JOINT-STOCK COMPANY
ELECTROVIPRYAMITEL

HIGH POWER SEMICONDUCTORS

Catalogue 2016 / 2017

www.elvpr.ru

CERTIFICATE

This is to certify that

JSC Electrovipryamitel

Proletarskaya Str., 126
430001 Saransk
Rep. Mordovia
Russian Federation

with the organizational units/sites as listed in the annex

has implemented and maintains a **Quality Management System**.

Scope:
The development, production and delivery of thyristors and diodes elements, power semiconductor devices, integrated power modules and assemblage builts around them

Through an audit, documented in a report, it was verified that the management system fulfills the requirements of the following standard:

ISO 9001 : 2008

Certificate registration no.	508340 QM08
Valid from	2015-09-23
Valid until	2018-09-14
Date of certification	2015-09-23

DAkkS
Deutsche
Akkreditierungsstelle
D-ZM-16074-01-00

DQS GmbH

G. Blechschmidt

Götz Blechschmidt
Managing Director

Accredited Body: DQS GmbH, August-Schanz-Straße 21, 60433 Frankfurt a
Administrative Office: OOO SSU DEKUES, Respublikanskaya str. 3, 150003

IQNet

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQNet and
DQS GmbH Deutsche Gesellschaft zur Zertifizierung von Managementsystemen
hereby certify that the company

JSC Electrovipryamitel

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Registration number: DE-508340 QM08

IQNet

Michael Drechsel
President of IQNet

G. Blechschmidt

Götz Blechschmidt
Managing Director of DQS GmbH

IQNet Partners*:
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* The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com

CONTENTS

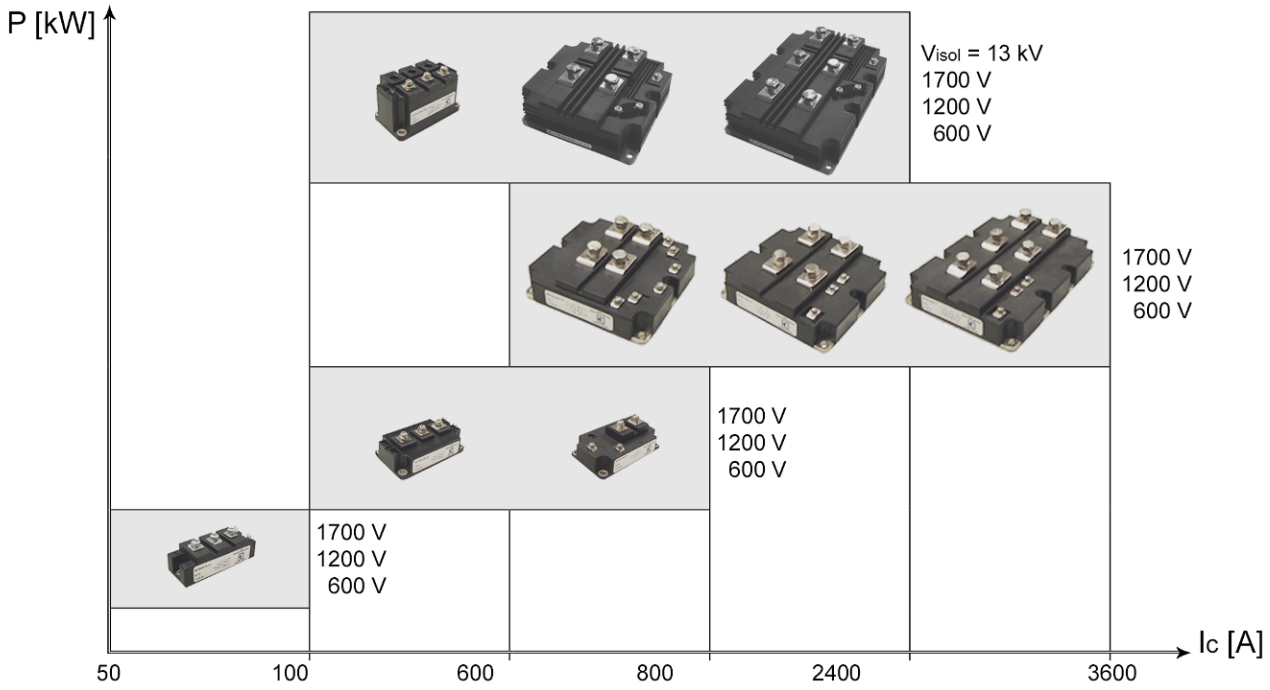
IGBT / SFRD MODULES

Features:

- NPT standard / NPT fast / Trench gate technology
- Low leakage current
- High short circuit current resistance
- Si / SiC hybrid IGBT modules
- SiC – SBD modules
- Low on-state losses
- Low switching losses
- High isolation voltage (up to 13 kV)
- Low internal inductance
- Copper or AlSiC baseplate

Applications:

- Frequency converters
- Wind turbines
- DC servomotor and robot control
- Welding
- Induction heating
- Uninterruptible power supplies
- Railway auxiliary converters
- High power drives with cycle operations
- AC motor control



IGBT Technologies		600 V	1200 V				1700 V	
		NPT Low Loss	Trench Gate	NPT Standard	NPT Ultra Fast	NPT Ultra Fast with Schottky diodes	NPT Low Loss	Trench Gate
$V_{ce(sat)}$, В	25 °C	1.95	1.70	2.50	3.00	3.00	2.70	2.00
	125 °C	2.00	2.00	3.10	3.60	3.60	3.10	2.40
V_F, В	25 °C	1.25	1.65	2.30	2.00	1.50	2.10	1.80
	125 °C	1.20	1.65	1.80	1.70	2.10	2.50	1.90
t_{on}, µs	25 °C	0.05	0.12	0.11	0.17	0.17	0.20	0.35
	125 °C	0.05	0.14	0.14	0.19	0.19	0.20	0.40
t_{off}, µs	25 °C	0.13	0.49	0.40	0.33	0.33	0.83	0.97
	125 °C	0.15	0.61	0.45	0.39	0.39	0.93	1.20
Optimal switching frequencies, kHz		2 – 20	1 – 5	4 – 12	15 – 25	25 – 50	1 – 5	1 – 5

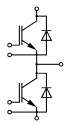
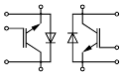
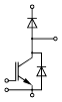
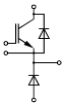
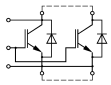
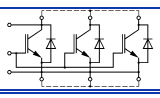
STANDARD IGBT MODULES

Features:

- NPT-technology
- Optimized for middle commutation frequencies

Applications:

- Frequency converters
- Uninterruptible power supplies
- Welding
- Railway auxiliary converters

Type	V_{CES}	I_C DC	I_{CM} t_p=1ms	V_{CEsat} typ	t_{on} typ	t_{off} typ	$R_{th(j-c)}$	T_{jmax}	V_{isol}	Case	Circuit
	V	A	A	V	µs	µs	°C/W	°C	V		
Half-bridges											
M2TKI2-50-12	1200	50	100	2.5	0.1	0.45	0.3	150	2500	MI3 *(page 45)*	
M2TKI2-75-12	1200	75	150	2.5	0.1	0.52	0.2	150	2500		
M2TKI3-100-12	1200	100	200	2.5	0.21	0.47	0.18	150	2500		
M2TKI2-100-12	1200	100	200	2.5	0.21	0.47	0.16	150	2500	MI4 *(page 45)*	
M2TKI2-150-12	1200	150	300	2.5	0.3	0.67	0.1	150	2500		
M2TKI2-200-12	1200	200	400	2.5	0.19	0.63	0.09	150	2500		
M2TKИ2-300-12	1200	300	600	2.5	0.3	0.67	0.06	150	2500		
M2TKI-300-12	1200	300	600	2.5	0.3	0.67	0.055	150	2500	MI6 *(page 46)*	
M2TKI-400-12	1200	400	800	2.7	0.8	1.15	0.046	150	2500		
M2TKI-600-12	1200	600	1200	2.7	0.8	1.15	0.032	150	2500		
M2TKI-800-12	1200	800	1600	2.7	0.8	1.15	0.025	150	2500		
Choppers											
MDTKI2-50-12	1200	50	100	2.5	0.1	0.45	0.3	150	2500	MI3 *(page 45)*	 MDTKI
MTKID2-50-12	1200	50	100	2.5	0.1	0.45	0.3	150	2500		
MDTKI2-75-12	1200	75	150	2.5	0.1	0.52	0.2	150	2500		
MTKID2-75-12	1200	75	150	2.5	0.1	0.52	0.2	150	2500		
MDTKI2-100-12	1200	100	200	2.5	0.21	0.47	0.16	150	2500	MI4 *(page 45)*	 MTKID
MTKID2-100-12	1200	100	200	2.5	0.21	0.47	0.16	150	2500		
MDTKI2-150-12	1200	150	300	2.5	0.3	0.67	0.1	150	2500		
MTKID2-150-12	1200	150	300	2.5	0.3	0.67	0.1	150	2500		
MDTKI2-200-12	1200	200	400	2.5	0.19	0.63	0.09	150	2500		
MTKID2-200-12	1200	200	400	2.5	0.19	0.63	0.09	150	2500		
MDTKI-400-12	1200	400	800	2.7	0.8	1.15	0.046	150	2500	MI6 *(page 46)*	
MDTKI-600-12	1200	600	1200	2.7	0.8	1.15	0.032	150	2500		
MDTKI-800-12	1200	800	1600	2.7	0.8	1.15	0.025	150	2500		
Single switches											
MTKI-50-12	1200	50	100	2.5	0.1	0.45	0.3	150	2500	MI1 *(page 45)*	
MTKI-50-12-1	1200	50	100	2.5	0.1	0.45	0.3	150	2500		
MTKI2-200-12	1200	200	400	2.5	0.19	0.63	0.08	150	2500	MI5 *(page 45)*	
MTKI2-300-12	1200	300	600	2.5	0.21	0.68	0.05	150	2500		
MTKI2-400-12	1200	400	800	2.5	0.21	0.63	0.045	150	2500		
MTKI-800-12	1200	800	1600	2.7	0.8	1.15	0.023	150	2500	MI7 *(page 46)*	
MTKI-1200-12	1200	1200	2400	2.7	0.8	1.15	0.016	150	2500		
MTKI-1600-12	1200	1600	3200	2.7	0.8	1.15	0.0125	150	2500		
MTKI-1800-12	1200	1800	3600	2.7	0.8	1.15	0.011	150	2500	MI8 *(page 46)*	
MTKI-2400-12	1200	2400	4800	2.7	0.8	1.15	0.01	150	2500		

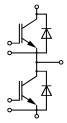
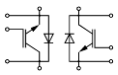
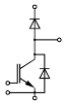
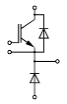
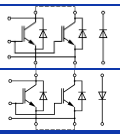
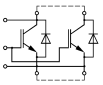
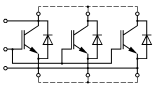
LOW LOSS IGBT MODULES WITH LOW ON-STATE LOSSES (H series)

Features:

- NPT - technology
- Low saturation V_{CEsat} and forward V_F voltages
- Optimized for low commutation frequencies

Applications:

- Frequency converters
- Uninterruptible power supplies
- Welding
- Railway auxiliary converters

Type	V_{CES}	I_C DC	I_{CM} t_p=1ms	V_{CEsat} typ	t_{on} typ	t_{off} typ	$R_{th(j-c)}$	T_{jmax}	V_{isol}	Case	Circuit
	V	A	A	V	µs	µs	°C/W	°C	V		
Half-bridges											
M2TKI-50-06	600	50	100	1.95	0.052	0.151	0.44	150	2500	MI3 *(page 45)*	
M2TKI-75-06	600	75	150	1.95	0.09	0.205	0.35	150	2500		
M2TKI-100-06	600	100	200	1.95	0.037	0.18	0.28	150	2500		
M2TKI-150-06	600	150	300	1.95	0.155	0.26	0.21	150	2500		
M2TKI-200-06	600	200	400	1.95	0.229	0.326	0.17	150	2500		
M2TKI2-50-17	1700	50	100	2.7	0.2	0.93	0.26	150	4000		
M2TKI2-75-17	1700	75	150	2.7	0.2	0.93	0.2	150	4000		
M2TKI-300-06	600	300	600	1.95	0.176	0.402	0.1	150	2500	MI4 *(page 45)*	
M2TKI-400-06	600	400	800	1.95	0.245	0.351	0.085	150	2500		
M2TKI2-100-17	1700	100	200	2.7	0.2	0.93	0.13	150	4000		
M2TKI2-150-17	1700	150	300	2.7	0.2	0.93	0.1	150	4000		
M2TKI2-200-17	1700	200	400	2.7	0.2	0.93	0.075	150	4000		
M2TKI-400-17	1700	400	800	2.7	0.44	1.11	0.034	150	4000	MI6 *(page 45)*	
M2TKI-600-17	1700	600	1200	2.7	0.47	1.22	0.026	150	4000		
M2TKI-800-17	1700	800	1600	2.7	0.5	1.24	0.02	150	4000		
Choppers											
MDTKI-200-06	600	200	400	1.95	0.229	0.326	0.17	150	2500	MI3 *(page 45)*	 MDTKI  MTKID
MTKID-200-06	600	200	400	1.95	0.229	0.326	0.17	150	2500		
MDTKI2-50-17	1700	50	100	2.7	0.2	0.93	0.26	150	4000		
MTKID2-50-17	1700	50	100	2.7	0.2	0.93	0.26	150	4000		
MDTKI2-75-17	1700	75	150	2.7	0.2	0.93	0.2	150	4000		
MTKID2-75-17	1700	75	150	2.7	0.2	0.93	0.2	150	4000		
MDTKI2-200-17	1700	200	400	2.7	0.2	0.93	0.075	150	4000		
MTKID2-200-17	1700	200	400	2.7	0.2	0.93	0.075	150	4000		
MDTKI2-100-17	1700	100	200	2.7	0.2	0.93	0.13	150	4000	MI4 *(page 45)*	
MTKID2-100-17	1700	100	200	2.7	0.2	0.93	0.13	150	4000		
MDTKI2-150-17	1700	150	300	2.7	0.2	0.93	0.1	150	4000		
MTKID2-150-17	1700	150	300	2.7	0.2	0.93	0.1	150	4000		
MDTKI-400-17	1700	400	800	2.7	0.44	1.21	0.034	150	4000	MI7 *(page 46)*	
MDTKI-600-17	1700	600	1200	2.7	0.47	1.22	0.026	150	4000		
MDTKI-800-17	1700	800	1600	2.7	0.5	1.24	0.02	150	4000		
MDTKI-1200-17	1700	1200	2400	2.7	0.46	1.24	0.013	150	4000	MI8 *(page 46)*	
MDTKI-1200-17-2	1700	1200	2400	2.7	0.46	1.24	0.013	150	4000		
Single switches											
MTKI-50-06	600	50	100	1.95	0.05	0.13	0.6	150	2500	MI1 *(page 45)*	
MTKI2-200-17	1700	200	400	2.7	0.2	0.93	0.065	150	4000	MI5 *(page 45)*	
MTKI2-300-17	1700	300	600	2.7	0.2	0.93	0.05	150	4000		
MTKI2-400-17	1700	400	800	2.7	0.2	0.93	0.04	150	4000		
MTKI-800-17	1700	800	1600	2.7	0.44	1.22	0.017	150	4000	MI7 *(page 46)*	
MTKI-1200-17	1700	1200	2400	2.7	0.46	1.24	0.013	150	4000		
MTKI-1600-17	1700	1600	3200	2.7	0.49	1.36	0.01	150	4000		
MTKI-3600-06	600	3600	7200	1.95	0.245	0.351	0.01	150	2500	MI8 *(page 46)*	
MTKI-4800-06	600	4800	9600	1.95	0.245	0.351	0.008	150	2500		
MTKI-1800-17	1700	1800	3600	2.7	0.5	1.46	0.009	150	4000		
MTKI-2400-17	1700	2400	4800	2.7	0.53	1.59	0.007	150	4000		

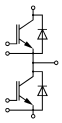
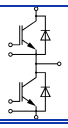
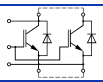
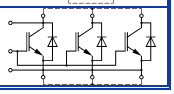
FAST IGBT MODULES WITH LOW SWITCHING LOSSES (F series)

Features:

- NPT - technology
- Low switching losses
- Optimal for switching frequencies 15-25 kHz

Applications:

- Frequency converters
- Uninterruptible power supplies
- Induction heating
- Railway auxiliary converters

Type	V_{CES}	I_C DC	I_{CM} t_p=1ms	V_{CEsat} typ	t_{on} typ	t_{off} typ	$R_{th(j-c)}$	T_{jmax}	V_{isol}	Case	Circuit
	V	A	A	V	µs	µs	°C/W	°C	V		
Half-bridges											
M2TKI-50-12F	1200	50	100	3.2	0.225	0.66	0.27	150	2500	MI3 *(page 45)*	
M2TKI-75-12F	1200	75	150	3.2	0.225	0.66	0.22	150	2500		
M2TKI-100-12-2F	1200	100	200	3.2	0.225	0.66	0.09	150	2500		
M2TKI-100-12F	1200	100	200	3.2	0.225	0.66	0.16	150	2500	MI4 *(page 45)*	
M2TKI-150-12F	1200	150	300	3.2	0.225	0.66	0.1	150	2500		
M2TKI-200-12F	1200	200	400	3.2	0.225	0.66	0.09	150	2500	MI4 *(page 45)*	
M2TKI-300-12F	1200	300	600	3.2	0.18	0.59	0.064	150	2500		
Single switches											
MTKI-50-12F	1200	50	100	3.2	0.225	0.66	0.3	150	2500	MI1 *(page 45)*	
MTKI-50-12-1F	1200	50	100	3.2	0.225	0.66	0.3	150	2500		
MTKI-200-12F	1200	200	400	3.2	0.18	0.59	0.16	150	2500	MI5 *(page 45)*	
MTKI-300-12F	1200	300	600	3.2	0.18	0.59	0.05	150	2500		
MTKI-400-12F	1200	400	800	3.2	0.18	0.59	0.045	150	2500		
MTKI-800-12F	1200	800	1600	3.2	0.225	0.64	0.023	150	2500	MI7 *(page 46)*	
MTKI-1200-12F	1200	1200	2400	3.2	0.225	0.64	0.016	150	2500		
MTKI-1800-12F	1200	1800	3600	3.2	0.225	0.64	0.011	150	2500	MI8 *(page 46)*	

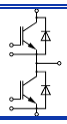
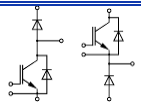
Si / SiC HYBRID IGBT MODULES FOR HIGH FREQUENCY APPLICATIONS (FS series)

Features:

- Silicon - GBT
- SiC - Schottky barrier diodes
- Low switching losses
- Zero reverse recovery charge
- Switching frequencies up to 50 kHz

Applications:

- Induction heating converters
- High frequency converters
- High frequency modulators

Type	V_{CES}	I_C DC	I_F/I_{FC}	V_{CEsat}	V_F	E_{on}	E_{off}	$R_{th(j-c)}$	T_{jmax}	V_{isol}	Case	Circuit
	V	A	A	V	V	mJ	mJ	°C/W	°C	V		
Half-bridges												
M2TKI-50-12FS *	1200	50	50	3.2	1.5	2.7	2.5	0.3	150	2500	MI3 *(page 45)*	
Choppers												
MDTKI-50-12FS *	1200	50	50	3.2	1.5	2.7	2.5	0.3	150	2500	MI3 *(page 45)*	 MDTKI MTKID
MTKID-50-12FS *	1200	50	50	3.2	1.5	2.7	2.5	0.3	150	2500		

* With current up to 200 A available

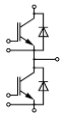
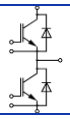
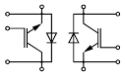
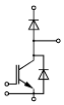
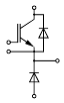
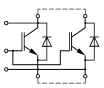
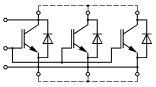
TRENCH GATE IGBT MODULES (K series)

Features:

- Trench Gate – technology
- Ultra low conduction losses

Applications:

- Frequency converters
- Uninterruptible power supply
- Railway auxiliary converters

Type	V_{CES}	I_C DC	I_{CM} t_p=1ms	V_{CEsat} typ	t_{on} typ	t_{off} typ	$R_{th(j-c)}$	T_{jmax}	V_{isol}	Case	Circuit
	V	A	A	V	µs	µs	°C/W	°C	V		
Half-bridges											
M2TKI-50-12K	1200	50	100	1.7	0.315	0.61	0.45	150	2500	MI3 *(page 45)*	
M2TKI-75-12K	1200	75	150	1.7	0.33	0.61	0.35	150	2500		
M2TKI-100-12K	1200	100	200	1.7	0.33	0.61	0.26	150	2500		
M2TKI-150-12K	1200	150	300	1.7	0.4	0.83	0.16	150	2500	MI4 *(page 45)*	
M2TKI-200-12K	1200	200	400	1.7	0.4	0.83	0.12	150	2500		
M2TKI-300-12K	1200	300	600	1.7	0.4	0.83	0.085	150	2500	MI4 *(page 45)*	
M2TKI-150-17K	1700	150	300	2.0	0.43	1.2	0.16	150	4000		
M2TKI-300-17K	1700	300	600	2.0	0.43	1.2	0.085	150	4000		
M2TKI-600-12K	1200	600	1200	1.7	0.88	1.14	0.044	150	2500	MI6 *(page 46)*	
M2TKI-800-12K	1200	800	1600	1.7	0.88	1.14	0.032	150	2500		
M2TKI-1200-12K	1200	1200	2400	1.7	0.88	1.14	0.025	150	2500		
M2TKI -600-17K	1700	600	1200	2.0	0.9	1.9	0.04	150	4000		
M2TKI-800-17K	1700	800	1600	2.0	0.9	1.9	0.028	150	4000		
M2TKI -1200-17K	1700	1200	2400	2.0	1.05	2.1	0.021	150	4000		
Choppers											
MDTKI-50-12K	1200	50	100	1.7	0.315	0.61	0.45	150	2500	MI3 *(page 45)*	MDTKI  MTKID 
MTKID-50-12K	1200	50	100	1.7	0.315	0.61	0.45	150	2500		
MDTKI-75-12K	1200	75	150	1.7	0.33	0.61	0.35	150	2500		
MTKID-75-12K	1200	75	150	1.7	0.33	0.61	0.35	150	2500		
MDTKI-100-12K	1200	100	200	1.7	0.33	0.61	0.26	150	2500		
MTKID-100-12K	1200	100	200	1.7	0.33	0.61	0.26	150	2500		
MDTKI-150-12K	1200	150	300	1.7	0.4	0.83	0.16	150	2500	MI4 *(page 45)*	
MTKID-150-12K	1200	150	300	1.7	0.4	0.83	0.16	150	2500		
MDTKI-200-12K	1200	200	400	1.7	0.4	0.83	0.12	150	2500		
MTKID-200-12K	1200	200	400	1.7	0.4	0.83	0.12	150	2500		
MDTKI-300-12K	1200	300	600	1.7	0.4	0.83	0.085	150	2500		
MTKID-300-12K	1200	300	600	1.7	0.4	0.83	0.085	150	2500		
MDTKI-150-17K	1700	150	300	2.0	0.43	1.2	0.16	150	4000		
MTKID-150-17K	1700	150	300	2.0	0.43	1.2	0.16	150	4000		
MDTKI-300-17K	1700	300	600	2.0	0.43	1.2	0.085	150	4000		
MTKID-300-17K	1700	300	600	2.0	0.43	1.2	0.085	150	4000		
MDTKI-600-12K	1200	600	1200	1.7	0.88	1.14	0.044	150	2500	MI6 *(page 46)*	
MDTKI-800-12K	1200	800	1600	1.7	0.88	1.14	0.032	150	2500		
MDTKI-1200-12K	1200	1200	2400	1.7	0.88	1.14	0.025	150	2500		
MDTKI -600-17K	1700	600	1200	2.0	0.9	1.9	0.04	150	4000		
MDTKI-800-17K	1700	800	1600	2.0	0.9	1.9	0.028	150	4000		
MDTKI -1200-17K	1700	1200	2400	2.0	1.05	2.1	0.021	150	4000		
Single switches											
MTKI-300-12K	1200	300	600	1.7	0.395	0.83	0.085	150	2500	MI5 *(page 45)*	
MTKI-400-12K	1200	400	800	1.7	0.395	0.83	0.055	150	2500		
MTKI-600-12K	1200	600	1200	1.7	0.395	0.83	0.045	150	2500		
MTKI-600-17K	1700	600	1200	2.0	0.43	1.23	0.04	150	4000		
MTKI-1200-12K	1200	1200	2400	1.7	0.87	1.14	0.022	150	2500	MI7 *(page 46)*	
MTKI-1600-12K	1200	1600	3200	1.7	0.88	1.14	0.016	150	2500		
MTKI-2400-12-2K	1200	2400	4800	1.7	0.88	1.14	0.0125	150	2500		
MTKI-1200-17K	1700	1200	2400	2.0	0.9	1.9	0.017	150	4000		
MTKI-1600-17K	1700	1600	3200	2.0	0.9	1.9	0.014	150	4000		
MTKI-3600-12K	1200	3600	9600	1.7	0.88	1.14	0.008	150	2500	MI8 *(page 46)*	
MTKI-2400-17K	1700	2400	4800	2.0	0.9	1.9	0.009	150	4000		
MTKI -3600-17K	1700	3600	7200	2.0	0.94	2.12	0.007	150	4000		

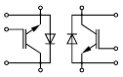
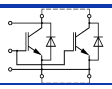
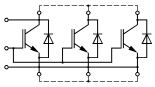
TRENCH GATE IGBT MODULES IV GENERATION (KH series)

Features:

- Trench Gate IV – technology
- Ultra low conduction
- Maximal junction temperature $T_{j\,max}$ = +175 °C

Applications:

- Converters for wind turbines
- AC motor drives
- Power inverters

Type	V_{CES}	I_C DC	I_{CM} t_p=1ms	V_{CEsat} typ	t_{on} typ	t_{off} typ	$R_{th(j-c)}$	T_{jmax}	V_{isol}	Case	Circuit
	V	A	A	V	µs	µs	°C/W	°C	V		
Half-bridges											
M2TKI-600-12KH	1200	600	1200	1.7	0.66	1.26	0.048	175	4000	MI6 *(page 46)*	
M2TKI-800-12KH	1200	800	1600	1.7	0.66	1.26	0.035	175	4000		
M2TKI-1200-12KH	1200	1200	2400	1.7	0.66	1.26	0.028	175	4000		
Choppers											
MDTKI-600-12KH	1200	600	1200	1.7	0.66	1.26	0.048	175	4000	MI6 *(page 46)*	
MDTKI-800-12KH	1200	800	1600	1.7	0.66	1.26	0.035	175	4000		
MDTKI-1200-12KH	1200	1200	2400	1.7	0.66	1.26	0.028	175	4000		
Single switches											
MTKI-1200-12KH	1200	1200	2400	1.7	0.66	1.26	0.024	175	4000	MI7 *(page 46)*	
MTKI-1600-12KH	1200	1600	3200	1.7	0.82	1.33	0.018	175	4000		
MTKI-1800-12KH	1200	1800	3600	1.7	0.72	1.33	0.016	175	4000	MI8 *(page 46)*	
MTKI-2400-12KH	1200	2400	4800	1.7	0.88	1.44	0.014	175	4000		
MTKI-3600-12KH	1200	3600	7200	1.7	0.89	1.55	0.009	175	4000		

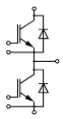
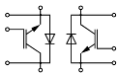
IGBT MODULES WITH HIGT THERMAL CYCLING CAPABILITY (T series)

Features:

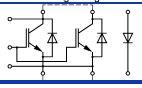
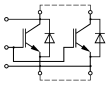
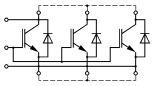
- NPT / Trench gate - technology
- High thermal cycling capability
- AlSiC base plate
- AlN DBC

Applications:

- Transport
- Power drives with cycle operations

Type	V_{CES}	I_C DC	I_{CM} t_p=1ms	V_{CEsat} typ	t_{on} typ	t_{off} typ	$R_{th(j-c)}$	T_{jmax}	V_{isol}	Case	Circuit
	V	A	A	V	µs	µs	°C/W	°C	V		
Half-bridges											
M2TKI-150-12KT	1200	150	300	1.7	0.4	0.83	0.14	150	2500	MI4 *(page 45)*	
M2TKI-200-12KT	1200	200	400	1.7	0.4	0.83	0.11	150	2500		
M2TKI-300-12KT	1200	300	600	1.7	0.4	0.83	0.075	150	2500		
M2TKI-150-17KT	1700	150	300	2.0	0.43	1.2	0.14	150	4000		
M2TKI-300-17KT	1700	300	600	2.0	0.43	1.2	0.075	150	4000		
M2TKI-600-12KT	1200	600	1200	1.7	0.88	1.14	0.036	150	2500	MI6 *(page 46)*	
M2TKI-600-12KHT	1200	600	1200	1.7	0.66	1.26	0.039	175	4000		
M2TKI-800-12KT	1200	800	1600	1.7	0.88	1.14	0.028	150	2500		
M2TKI-800-12KHT	1200	800	1600	1.7	0.66	1.26	0.03	175	4000		
M2TKI-1200-12KT	1200	1200	2400	1.7	0.88	1.14	0.022	150	2500		
M2TKI-1200-12KHT	1200	1200	2400	1.7	0.66	1.26	0.024	175	4000		
M2TKI-400-17T	1700	400	800	2.7	0.34	1.21	0.034	150	4000		
M2TKI-600-17T	1700	600	1200	2.7	0.47	1.22	0.026	150	4000		
M2TKI-800-17T	1700	800	1600	2.7	0.5	1.24	0.02	150	4000		
M2TKI-800-17KT	1700	800	1600	2.0	0.9	1.9	0.025	150	4000		
Choppers											
MDTKI-600-12KT	1200	600	1200	1.7	0.88	1.14	0.036	150	2500	MI6 *(page 46)*	
MDTKI-600-12KHT	1200	600	1200	1.7	0.66	1.26	0.039	175	4000		
MDTKI-800-12KT	1200	800	1600	1.7	0.88	1.14	0.028	150	2500		
MDTKI-800-12KHT	1200	800	1600	1.7	0.66	1.26	0.03	175	4000		
MDTKI-1200-12KT	1200	1200	2400	1.7	0.88	1.14	0.022	150	2500		
MDTKI-1200-12KHT	1200	1200	2400	1.7	0.66	1.26	0.024	175	4000		
MDTKI-400-17T	1700	400	800	2.7	0.34	1.21	0.034	150	4000		
MDTKI-600-17T	1700	600	1200	2.7	0.47	1.22	0.026	150	4000		

IGBT MODULES WITH HIGT THERMAL CYCLING CAPABILITY (T series)

Type	V_{CES}	I_C DC	I_{CM} t_p=1ms	V_{CEsat} typ	t_{on} typ	t_{off} typ	$R_{th(j-c)}$	T_{jmax}	V_{isol}	Case	Circuit
	V	A	A	V	µs	µs	°C/W	°C	V		
Choppers											
MDTKI-800-17T	1700	800	1600	2.7	0.5	1.24	0.02	150	4000	MI6 *(page 46)*	
MDTKI-800-17KT	1700	800	1600	2.0	0.9	1.9	0.025	150	4000		
MDTKI-1200-17T	1700	1200	2400	2.7	0.46	1.24	0.013	150	4000	MI8 *(page 46)*	
MDTKI-1200-17-2T	1700	1200	2400	2.7	0.46	1.24	0.013	150	4000		
Single switches											
MTKI-1200-12KT	1200	1200	2400	1.7	0.87	1.14	0.019	150	2500	MI7 *(page 46)*	
MTKI-1200-12KHT	1200	1200	2400	1.7	0.66	1.26	0.021	175	4000		
MTKI-1600-12KT	1200	1600	3200	1.7	0.88	1.14	0.013	150	2500		
MTKI-1600-12KHT	1200	1600	3200	1.7	0.82	1.33	0.014	175	4000		
MTKI-800-17T	1700	800	1600	2.7	0.44	1.21	0.017	150	4000		
MTKI-1200-17T	1700	1200	2400	2.7	0.46	1.23	0.013	150	4000		
MTKI-1600-17T	1700	1600	3200	2.7	0.49	1.36	0.01	150	4000		
MTKI-1200-17KT	1700	1200	2400	2.0	0.9	1.9	0.014	150	4000		
MTKI-1600-17KT	1700	1600	3200	2.0	0.9	1.9	0.012	150	4000		
MTKI-1800-12KHT	1200	1800	3600	1.7	0.72	1.33	0.012	175	4000	MI8 *(page 46)*	
MTKI-2400-12KT	1200	2400	4800	1.7	0.88	1.14	0.01	150	2500		
MTKI-2400-12KHT	1200	2400	4800	1.7	0.88	1.44	0.011	175	4000		
MTKI-3600-12KT	1200	3600	9600	1.7	0.88	1.14	0.007	150	2500		
MTKI-3600-12KHT	1200	3600	7200	1.7	0.89	1.55	0.008	175	4000		
MTKI-1800-17T	1700	1800	3600	2.7	0.5	1.45	0.009	150	4000		
MTKI-2400-17T	1700	2400	4800	2.7	0.53	1.69	0.007	150	4000		
MTKI-2400-17KT	1700	2400	4800	2.0	0.9	1.9	0.008	150	`4000		

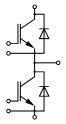
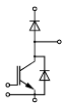
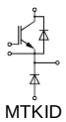
IGBT MODULES WITH HIGH ISOLATION VOLTAGE

Features:

- NPT - technology
- Low conduction and switching losses
- Patent design provided isolation voltage between therminals and base plate up to 15 kV

Applications:

- Special design inverters with series module connection
- Pulse power supplies with high isolation voltage
- Converters for auxiliary drives of DC locomotives

Type	V_{CES}	I_C DC	I_{CM} t_p=1ms	V_{CEsat} typ	t_{on} typ	t_{off} typ	$R_{th(j-c)}$	T_{jmax}	V_{isol}	Case	Circuit
	V	A	A	V	µs	µs	°C/W	°C	V		
Half-bridges											
M2TKI-50-12B	1200	50	100	2.5	0.1	0.45	0.35	150	13000	MI9 *(page 46)*	
M2TKI-75-12B	1200	75	150	2.5	0.1	0.52	0.24	150	13000		
M2TKI-100-12B	1200	100	200	2.5	0.21	0.47	0.2	150	13000		
M2TKI-50-17B	1700	50	100	2.7	0.2	0.93	0.3	150	13000		
M2TKI-75-17B	1700	75	150	2.7	0.2	0.93	0.24	150	13000		
M2TKI-100-17B	1700	100	200	2.7	0.2	0.93	0.16	150	13000		
Choppers											
MDTKI-50-12B	1200	50	100	2.5	0.1	0.45	0.35	150	13000	MI9 *(page 46)*	 MDTKI  MTKID
MTKID-50-12B	1200	50	100	2.5	0.1	0.45	0.35	150	13000		
MDTKI-75-12B	1200	75	150	2.5	0.1	0.52	0.24	150	13000		
MTKID-75-12B	1200	75	150	2.5	0.1	0.52	0.24	150	13000		
MDTKI-100-12B	1200	100	200	2.5	0.21	0.47	0.2	150	13000		
MTKID-100-12B	1200	100	200	2.5	0.21	0.47	0.2	150	13000		
MDTKI-50-17B	1700	50	100	2.7	0.2	0.93	0.3	150	13000		
MTKID-50-17B	1700	50	100	2.7	0.2	0.93	0.3	150	13000		
MTKID-75-17B	1700	75	150	2.7	0.2	0.93	0.24	150	13000		
MDTKI-75-17B	1700	75	150	2.7	0.2	0.93	0.24	150	13000		
MDTKI-100-17B	1700	100	200	2.7	0.2	0.93	0.16	150	13000		
MTKID-100-17B	1700	100	200	2.7	0.2	0.93	0.16	150	13000		

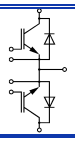
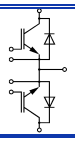
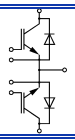
COMMON EMITTER CONNECTED IGBT MODULES

Features:

- NPT standard / NPT fast / Trench gate - technology
- Two IGBT with common emitter connection in one case

Applications:

- DC switches
- High speed safety systems

Type	V_{CES}	I_C DC	I_{CM} t_p=1ms	V_{CEsat} typ	t_{on} typ	t_{off} typ	$R_{th(j-c)}$	T_{jmax}	V_{isol}	Case	Circuit
	V	A	A	V	µs	µs	°C/W	°C	V		
Standard IGBT											
M2TKIE-100-12	1200	100	200	2.5	0.3	0.67	0.10	150	2500	MI4 *(page 45)*	
M2TKIE-150-12	1200	150	300	2.5	0.3	0.67	0.10	150	2500		
M2TKIE-200-12	1200	200	400	2.5	0.19	0.63	0.09	150	2500		
M2TKIE-300-12	1200	300	600	2.5	0.3	0.8	0.06	150	2500		
Fast IGBT											
M2TKIE-100-12F	1200	100	200	1.9	0.25	0.52	0.15	150	2500	MI4 *(page 45)*	
M2TKIE-150-12F	1200	150	300	1.9	0.17	0.67	0.1	150	2500		
M2TKIE-300-12F	1200	300	600	1.9	0.17	0.86	0.064	150	2500		
Trench gate IGBT											
M2TKIE-150-12K	1200	150	400	1.7	0.4	0.83	0.16	150	2500	MI4 *(page 45)*	
M2TKIE-200-12K	1200	200	400	1.7	0.4	0.83	0.12	150	2500		
M2TKIE-300-12K	1200	300	600	1.7	0.4	0.83	0.085	150	2500		

SFRD MODULES

Features:

- Optimum for operation with IGBT
- Soft reverse recovery
- Low reverse recovery time
- Low switching losses
- Isolated base plates

Applications:

- Freewheeling and snubber diodes for IGBT
- Demagnetize diodes for inductive loads
- AC motor drives
- Induction heating
- Uninterruptible power supply
- Welding

Type	V_{RRM}, V_{RSM}	I_F T_c=80°C	I_{FAV} T_c=80°C	I_{FSM} T_j=150°C	V_F max T_j=25°C	V_0	r_T	E_{rec} max (di/dt) T =125°C	$R_{th(j-c)}$	T_{jmax}	V_{isol}	Case	Circuit
	V	A	A	A	V	V	Ω	mJ (A/µs)	°C/W	°C	V		
Half-bridges													
M2DF-32-06	600	50	32	270	1.6	0.9	0.0013	1.5 (2900)	0.8	150	2500	MI3-3 *(page 47)*	
M2DF2-40-06	600	75	40	360	1.6	0.9	0.0086	2.3 (3000)	0.66	150	2500		
M2DF2-63-06	600	100	63	540	1.6	0.9	0.0065	3.2 (4400)	0.4	150	2500		
M2DF2-80-06	600	150	80	720	1.6	0.9	0.0043	4.7 (5600)	0.33	150	2500		
M2DF2-100-06	600	150	100	810	1.6	0.9	0.0043	4.5 (5600)	0.26	150	2500		
M2DF-125-06	600	225	125	1080	1.6	0.9	0.0029	4.1 (4000)	0.22	150	2500		
M2DF-160-06	600	300	160	1440	1.6	0.9	0.0022	7.0 (4200)	0.17	150	2500	MI4-1 *(page 47)*	
M2DF-200-06	600	300	200	1620	1.6	0.9	0.0022	7.0 (4200)	0.13	150	2500		
M2DF2-250-06	600	450	250	2160	1.6	0.9	0.0014	9.0 (4200)	0.1	150	2500		
M2DF2-320-06	600	600	320	2880	1.6	0.9	0.001	10.4 (3150)	0.083	150	2500		
M2DF-32-12	1200	50	32	450	2.8	1.2	0.022	1.8 (800)	0.6	150	2500	MI3-3 *(page 47)*	
M2DF2-40-12	1200	75	40	585	2.8	1.2	0.015	2.8 (900)	0.5	150	2500		
M2DF2-63-12	1200	100	63	900	2.8	1.2	0.011	3.2 (1000)	0.3	150	2500		
M2DF2-80-12	1200	150	80	1260	2.8	1.2	0.0073	4.1 (1500)	0.25	150	2500		
M2DF2-100-12	1200	150	100	1300	2.8	1.2	0.0073	4.1 (1500)	0.2	150	2500		
M2DF-125-12	1200	225	125	2025	2.8	1.2	0.0049	8.3 (2000)	0.16	150	2500		
M2DF-160-12	1200	300	160	2520	2.8	1.2	0.0037	9.2 (2500)	0.125	150	2500	MI4-1 *(page 47)*	
M2DF-200-12	1200	300	200	2700	2.8	1.2	0.0037	9.2 (2500)	0.1	150	2500		
M2DF2-250-12	1200	450	250	3600	2.8	1.2	0.0024	10.4 (3000)	0.08	150	2500		
M2DF-32-16	1600	50	32	380	2.6	1.5	0.018	4.0 (750)	0.56	150	2500	MI3-3 *(page 47)*	
M2DF2-40-16	1600	75	40	495	2.6	1.5	0.012	6.5 (1100)	0.47	150	4000		
M2DF2-63-16	1600	100	63	755	2.6	1.5	0.009	20 (1100)	0.28	150	4000		
M2DF2-80-16	1600	150	80	1080	2.6	1.5	0.006	30 (1600)	0.24	150	4000		
M2DF2-100-16	1600	150	100	1350	2.6	1.5	0.006	30 (1600)	0.186	150	4000		
M2DF-125-16	1600	225	125	1530	2.6	1.5	0.004	50 (2300)	0.16	150	4000		

SFRD MODULES

Type	V_{RRM}, V_{RSM}	I_F	I_{FAV}	I_{FSM}	V_F max	V_0	r_t	E_{rec} max (di/dt) T =125°C	$R_{th(j-c)}$	T_{jmax}	V_{isol}	Case	Circuit
		T_c=80°C		T_j=150°C	T_j=25°C								
	V	A	A	A	V	V	Ω	mJ (A/μs)	°C/W	°C	V		
Half-bridges													
M2DF-160-16	1600	300	160	1800	2.6	1.5	0.003	65 (3400)	0.12	150	4000	MI4-1 *(page 47)*	
M2DF-200-16	1600	300	200	1980	2.6	1.5	0.003	65 (3400)	0.09	150	4000		
M2DF2-250-16	1600	450	250	2700	2.6	1.5	0.002	55 (2800)	0.08	150	4000		
Single diodes													
MDF-32-06	600	50	32	270	1.6	0.9	0.013	1.5 (2900)	0.8	150	2500	MI1-1 *(page 47)*	
MDF-40-06	600	75	40	360	1.6	0.9	0.0086	2.3 (3000)	0.66	150	2500		
MDF-63-06	600	100	63	540	1.6	0.9	0.0065	3.2 (4400)	0.4	150	2500		
MDF-80-06	600	150	80	720	1.6	0.9	0.0043	4.7 (5600)	0.33	150	2500	MI3-1 *(page 47)*	
MDF-125-06	600	200	125	1080	1.6	0.9	0.00325	4.1 (4000)	0.2	150	2500		
MDF2-160-06	600	300	160	1440	1.6	0.9	0.0022	7 (4200)	0.17	150	2500		
MDF2-200-06	600	300	200	1620	1.6	0.9	0.0022	7 (4200)	0.13	150	2500		
MDF-250-06	600	450	250	2160	1.6	0.9	0.0014	9 (4200)	0.1	150	2500		
MDF-320-06	600	600	320	2880	1.6	0.9	0.001	10.4 (3150)	0.083	150	2500	MI5-1 *(page 47)*	
MDF-400-06	600	600	400	3240	1.6	0.9	0.001	10.4 (3150)	0.07	150	2500		
MDF-500-06	600	900	500	4300	1.6	0.9	0.007	16 (4400)	0.055	150	2500		
MDF-32-12	1200	50	32	450	2.8	1.2	0.022	1.8 (800)	0.6	150	2500	MI1-1 *(page 47)*	
MDF-40-12	1200	75	40	585	2.8	1.2	0.015	2.8 (900)	0.5	150	2500		
MDF-63-12	1200	100	63	900	2.8	1.2	0.011	3.2 (1000)	0.3	150	2500		
MDF-80-12	1200	150	80	1260	2.8	1.2	0.0073	4.1 (1500)	0.25	150	2500	MI3-1 *(page 47)*	
MDF-125-12	1200	200	125	1800	2.8	1.2	0.0055	8.3 (2000)	0.15	150	2500		
MDF2-160-12	1200	300	160	2520	2.8	1.2	0.0037	9.3 (2500)	0.125	150	2500		
MDF-160-12	1200	300	160	2520	2.8	1.2	0.0037	9.2 (2500)	0.125	150	2500	MI5-1 *(page 47)*	
MDF2-200-12	1200	300	200	2610	2.8	1.2	0.0037	9.2 (2500)	0.1	150	2500	MI3-1 *(page 47)*	
MDF-200-12	1200	200	200 (T_c=25°C)	1800	2.8	1.2	0.0055	8.3 (2000)	0.15	150	2500	MI5-1 *(page 47)*	
MDF-250-12	1200	450	250	2610	2.8	1.2	0.0024	15 (3000)	0.083	150	2500	MI3-1 *(page 47)*	
MDF-320-12	1200	600	320	4410	2.8	1.2	0.0018	17.3 (3000)	0.06	150	2500	MI5-1 *(page 47)*	
MDF-400-12	1200	600	400	4680	2.8	1.2	0.0018	17.3 (3000)	0.05	150	2500		
MDF-500-12	1200	900	500	5940	2.8	1.2	0.0012	28 (4000)	0.04	150	2500		
MDF-80-16	1600	150	80	1080	2.6	1.5	0.006	30 (1600)	0.24	150	4000	MI3-1 *(page 47)*	
MDF-125-16	1600	200	125	1440	2.6	1.5	0.045	50 (2300)	0.14	150	4000		
MDF2-160-16	1600	300	160	1800	2.6	1.5	0.003	65 (3400)	0.12	150	4000		
MDF2-200-16	1600	300	200	2700	2.6	1.5	0.003	65 (3400)	0.09	150	4000		
MDF-250-16	1600	450	250	3240	2.6	1.5	0.002	55 (2800)	0.08	150	4000		
MDF-320-16	1600	600	320	3420	2.6	1.5	0.0015	85 (4200)	0.063	150	4000	MI5-1 *(page 47)*	
MDF-500-16	1600	900	500	4590	2.6	1.5	0.001	110 (4800)	0.04	150	4000		
MDF-160-17	1700	300	160	1800	2.6	1.5	0.003	65 (3400)	0.12	150	4000		
MDF-200-17	1700	200	200 (T_c=25°C)	1440	2.6	1.5	0.005	50 (2300)	0.14	150	4000		
Common cathode circuit													
M2DFC-125-12	1200	225	125	2025	2.8	1.2	0.0049	8.3 (2000)	0.16	150	2500	MI3-3 *(page 47)*	
M2DFC-125-16	1600	225	125	1530	2.6	1.5	0.004	50 (2300)	0.16	150	4000		
Common anode circuit													
M2DFA-125-12	1600	225	125	2025	2.8	1.2	0.0049	8.3 (2000)	0.16	150	2500	MI3-3 *(page 47)*	
M2DFA-125-16	1200	225	125	1530	2.6	1.5	0.004	50 (2300)	0.16	150	4000		

SFRD MODULES WITH SCHOTTKY DIODES

Features:

- High-speed switching
- Low losses
- Zero reverse recovery current
- Temperature independent switching

Applications:

- High frequency power supplies
- Induction heating converters
- Welding
- High frequency converters

Type	V_{RRM}, V_{RSM}	I_F	I_{FAV}	I_{FSM}	V_F	V_0	r_T	t_{rr} max (di/dt=900) T =125°C	$R_{th(j-c)}$	T_{jmax}	V_{isol}	Case	Circuit
		T_c=110 °C		T_j=150°C	T_j=25°C								
	V	A	A	A	V	V	Ω	µs	°C/W	°C	V		
Half-bridges													
M2DF2-63-06S	600	80	63	580	1.8	0.75	0.013	0.04	0.30	175	2500	MI3-3 *(page 47)*	
M2DF2-80-06S	600	120	80	780	1,8	0,75	0,01	0.04	0,26	175	2500		
M2DF2-50-12S	1200	75 (T_c=25°C)	50	320	1,9	0,66	0,034	0.06	0,62	175	2500		
M2DF2-63-12S	1200	80	63	580	1,9	0,76	0,015	0.07	0,32	175	2500		
M2DF2-80-12S	1200	120	80	780	1,9	0,76	0,011	0.07	0,28	175	2500		
Single diodes													
MDF-32-06S	600	40	32	300	1,8	0,75	0,026	0.03	0,55	175	2500	MI1-1 *(page 47)*	
MDF-40-06S	600	60	40	400	1,9	0,75	0,022	0.03	0,47	175	2500		
MDF-63-06S	600	80	63	580	1,8	0,75	0,013	0.04	0,30	175	2500		
MDF-80-06S	600	120	80	780	1,8	0,75	0,01	0.04	0,26	175	2500		
MDF-32-12S	1200	40	32	300	1,9	0,76	0,03	0.06	0,62	175	2500		
MDF-40-12S	1200	60	40	400	1,9	0,76	0,023	0.06	0,50	175	2500		
MDF-63-12S	1200	80	63	580	1,9	0,76	0,015	0.07	0,32	175	2500		
MDF-80-12S	1200	120	80	780	1,9	0,76	0,011	0.07	0,28	175	2500		
Common cathode circuit													
M2DFC-63-06S	600	80	63	580	1,8	0,75	0,013	0.04	0,30	175	2500	MI3-3 *(page 47)*	
M2DFC-80-06S	600	120	80	300	1,8	0,15	0,01	0.04	0,55	175	2500		
M2DFC-63-12S	1200	80	63	780	1,9	0,76	0,015	0.07	0,26	175	2500		
M2DFC-80-12S	1200	120	80	780	1,9	0,76	0,011	0.07	0,28	175	2500		

SFRD MODULES WITH HIGH ISOLATION VOLTAGE

Features:

- Low conduction and switching losses
- Soft reverse recovery
- Patent design provided isolation voltage between interfaces and base plate up to 15 kV

Applications:

- High voltage frequency converters with module connection series
- Pulse power supply with high isolation voltage

Type	V_{RRM}	I_F	I_{FRM} t_p=1ms	V_F typ	I_{rm} typ	E_{rec} (di/dt) T =125°C	T_{jmax}	$R_{th(j-c)}$	V_{isol}	Case	Circuit
	V	A	A	V	A	mJ(Aµs)	°C	°C/W	V		
Single diodes											
M3DF-400-06B	600	400	800	1.25	315	18 (4200)	150	0.14	13000	MI10-1 *(page 47)*	

DIODE / THYRISTOR MODULES

Features:

- Voltage range of 100 to 6500 V
- Current range of 50 to 2000 A
- Pressure contact design
- Isolated copper baseplate
- Insulation test voltage of 2500 to 9500 Vrms
- High load cycle resistance
- Base plate width 20, 34, 50, 60, 70, 77, 90 mm
- Circuits:
  - single device;
  - two devices in parallel;
  - two devices in series;
  - two devices with common anode or cathode;
  - two parallel devices in opposite direction
- Product portfolio:
  - diode / thyristor module (phase control, rectifier, fast switching);
  - thyristor modules with integrated liquid cooling;
  - single-phase and three phase diode-thyristor bridges;
  - high voltage rectifier module (up to 50 kV)

Applications:

- Industrial AC and DC drives
- Oil-gas production and transport
- Power converters for traction
- Soft starters for AC motors
- Induction heating
- Welding
- Electroplating
- Power supplies

RECTIFIER DIODE MODULES

Type	V_{RRM}	$I_{F(AV)}$ (T_C,°C)	I_{FSM} t_p=10ms	V_{TO} $T_{j\,max}$	r_T $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	кA	V	mΩ	°C/W	°C	V	
MPD-63 MPD-63X	100-1600	63(90)	1.2	0.95	3.1	0.60	150	-	 MPD1 *(page 45)*
MPD-80 MPD-80X	100-1600	80(90)	1.4	0.95	2.5	0.50	150	-	
MPD-100 MPD-100X	100-1600	100(90)	1.6	0.90	2.3	0.40	150	-	
MPD-160 MPD-160X	100-1600	160(90)	2.2	0.90	1.6	0.24	150	-	
MDD-40 MDDA-40 MDDC-40	400-1800	40(100)	1.2	1.00	3.80	0.68	140	2500	 MTD1 *(page 48)*
MDD-63 MDDA-63 MDDC-63	400-1800	63(100)	1.6	0.95	2.70	0.46	140	2500	
MDD-80 MDDA-80 MDDC-80	400-1800	80(90)	2.0	0.95	1.60	0.45	140	2500	
M2D-160 M2DA-160 M2DC-160	2400-3200	180(85)	5.5	0.85	0.85	0.18	125	3000	 MTD2 *(page 48)*
M2D-200 M2DA-200 M2DC-200	1200-2200	211(85)	7.0	0.77	0.54	0.18	125	2500	
MDD-125 MDDA-125 MDDC-125	400-1600	125(92)	5.0	0.90	0.65	0.19	125	2500	
MDD-160 MDDA-160 MDDC-160	400-1600	160(89)	6.0	0.90	0.55	0.18	125	2500	
M2D-250 M2DA-250	2600-3200	286(85)	9.0	0.85	0.38	0.125	125	3000	 MTD3 *(page 48)*
MDD-320 MDDA-320	1200-2400	330(100)	8.3	0.84	0.45	0.125	150	3000	
MDD-200 MDDA-200	400-1600	200(89)	7.0	0.90	0.60	0.13	125	2500	
MDDA-250 MDD-250	400-1600	250(85)	11	0.90	0.56	0.12	125	2500	
M1D1-400	3400-4000	530(85)	12	0.90	0.46	0.068	140	3000	 MTD4 *(page 48)*
M1D1-500	2400-3200	705(85)	15	0.85	0.29	0.068	150	3000	
M1D1-630	1200-2200	830(85)	19	0.77	0.18	0.068	150	2500	
M1D-400	1900-2800	600(85)	18	0.90	0.30	0.068	140	3000	
M1D-500	1300-2600	730(85)	20	0.85	0.25	0.068	150	3000	
M1D-630	200-1200	850(85)	24	0.80	0.15	0.068	150	2500	
M1DA-400	2800-4000	400(85)	12	1.00	0.77	0.09	150	9500	 MTD4-1 *(page 48)*
M2D1-400 M2D1A-400 M2D1C-400	3400-4000	530(85)	12	0.90	0.46	0.068	140	3000	 MTD5 *(page 49)*
M2D1-500 M2D1A-500 M2D1C-500	2400-3200	705(85)	15	0.85	0.29	0.068	150	3000	
M2D1A-630 M2D1-630 M2D1C-630	1200-2200	830(85)	19	0.77	0.18	0.068	150	2500	

RECTIFIER DIODE MODULES

Type	V_{RRM}	$I_{F(AV)}$ (T_C,°C)	I_{FSM} t_p=10ms	V_{TO} $T_{j\,max}$	r_T $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	кA	V	mΩ	°C/W	°C	V	
M2DA-400 M2D-400 M2DC-400	1900-2800	600(85)	18	0.90	0.30	0.068	140	3000	 MTD5 *(page 49)*
M2DA-500 M2D-500 M2DC-500	1300-2600	730(85)	20	0.85	0.25	0.068	150	3000	
M2DA-630 M2D-630 M2DC-630	200-1200	850(85)	24	0.80	0.15	0.068	150	2500	
M1D2-630	2900-4400	920(85)	20	1.00	0.30	0.042	150	3000	 MTD6 *(page 49)*
M1D-800	1900-2800	1110(85)	28	0.90	0.18	0.042	150	3000	
M1D-1000	400-1800	1260(85)	32	0.85	0.12	0.042	150	3000	
M2D2-630 M2D2A-630 M2D2C-630	2900-4400	760(100)	20	1.00	0.30	0.042	150	3500	 MTD7 *(page 49)*
M2D2-800 M2D2A-800 M2D2C-800	1900-2800	910(100)	28	0.90	0.18	0.042	150	3000	
M2D2-1000 M2D2A-1000 M2D2C-1000	400-1800	1030(100)	32	0.85	0.12	0.042	150	3000	
M1D-1250	3400-4400	1250(96)	35	0.90	0.20	0.028	150	4000	 MTD8 *(page 49)*
M1D-1600	2400-3400	1600(96)	45	0.85	0.09	0.028	150	4000	
M1D-2000	1200-2400	2000(83)	55	0.82	0.075	0.028	150	4000	

HIGH VOLTAGE RECTIFIER MODULE CD-2-50

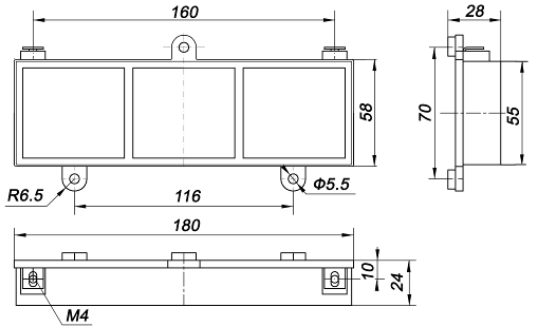
Features:

- Plastic case
- Heat dissipation through isolated metal-ceramic plates
- Mounting by means of screws
- Avalanche characteristics
- Double current value by air blowing of case

Applications:

- High voltage power supplies
- Electro-physics and measurement equipment
- Lasers
- X-ray equipment

Type	V_{RRM}	$I_{F(AV)}$ T_c=100°C	I_{FSM} $T_{j\,max}$ t_p=10ms	V_{FM} I_{FM}=6.3A T_j=25°C	I_{RRM} $T_{j\,max}$ V_R=V_{RRM}	I_R T_j=25°C V_R=V_{RRM}	$R_{th(j-c)}$	$T_{j\,max}$	Case
	V	A	A	V	mA	μA	°C/W	°C	
CD-2-50	50000	2	150	45	5	5	10	150	MVD1



MVD1 w = 180 g

PHASE CONTROL THYRISTOR MODULES

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ (T_C,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	кA	V	mΩ	A/µs	V/µs	µs	°C/W	°C	V	
MTT-40 MTTA-40 MTTC-40	400-1600	40(85)	0.8	1.00	3.80	200	500-1000	100	0.680	125	2500	 MTD1 *(page 48)*
MTT-63 MTTA-63 MTTC-63	400-1600	63(85)	1.2	0.94	2.80	200	500-1000	125	0.460	125	2500	
MTT-80 MTTA-80 MTTC-80	400-1200	80(75)	1.6	0.90	2.00	200	500-1000	160	0.450	125	2500	
M2T-100 M2TA-100 M2TC-100	2600-3200	116(85)	3.5	1.15	2.60	200	1000	320	0.180	125	2500	 MTD2 *(page 48)*
M2T-125 M2TA-125 M2TC-125	1800-2400	140(85)	4.0	1.05	1.50	200	1000	250	0.180	125	2500	
M2T-200 M2TA-200 M2TC-200	400-1200	218(85)	5.5	0.83	0.58	200	1000	125	0.180	130	2500	
MTT-100 MTTA-100 MTTC-100	400-1600	100(85)	2.5	1.15	2.40	200	1000	160	0.220	125	2500	
MTT-125 MTTA-125 MTTC-125	400-1600	125(85)	3.0	1.10	1.80	200	1000	200	0.190	125	2500	
MTT-160 MTTA-160 MTTC-160	400-1600	160(85)	4.5	1.00	1.05	200	1000	200	0.180	125	2500	
MTT1-200 MTT1A-200 MTT1C-200	600-1400	200(73)	5.0	0.95	1.25	500	1000	125	0.180	130	2500	
M2T1-160 M2T1A-160	2600-3200	175(85)	5.0	1.15	1.50	200	1000	320	0.125	125	3000	 MTD3 *(page 48)*
M2T1-200 M2T1A-200	1800-2400	210(85)	7.0	1.05	0.85	200	1000	250	0.125	125	3000	
M2T-250 M2TA-250	1200-1800	280(85)	8.0	0.95	0.50	200	1000	160	0.125	130	3000	
M2T1-320 M2T1A-320	600-1200	375(85)	10	0.85	0.35	200	1000	125	0.125	140	3000	
MTT2-160 MTT2A-160	400-1600	170(85)	5.4	1.15	1.00	200	1000	160	0.150	125	3000	
MTT-200 MTTA-200	400-1600	200(85)	6.0	1.05	0.95	200	1000	160	0.130	125	3000	
MTT-250 MTTA-250	400-1600	250(85)	7.0	1.05	0.53	200	1000	160	0.120	125	3000	
M1T-250	3400-4000	300(85)	6.0	1.20	1.00	200	1000	400	0.068	125	3000	 MTD4 *(page 48)*
M1T-320	2600-3200	357(85)	8.0	1.00	0.735	200	1000	320	0.068	125	3000	
M1T1-400	2000-2400	407(85)	9.0	1.02	0.42	200	1000	250	0.068	125	3000	
M1T1-500	800-1800	500(85)	13	0.95	0.30	200	1000	160	0.068	130	3000	
M1T-400	1300-1800	460(85)	13	0.92	0.32	200	1000	160	0.068	125	3000	
M1T-500	400-1200	545(85)	14	0.85	0.27	200	1000	125	0.068	130	3000	
M1T-630	400-1200	660(85)	17	0.81	0.25	200	1000	125	0.068	140	3000	

PHASE CONTROL THYRISTOR MODULES

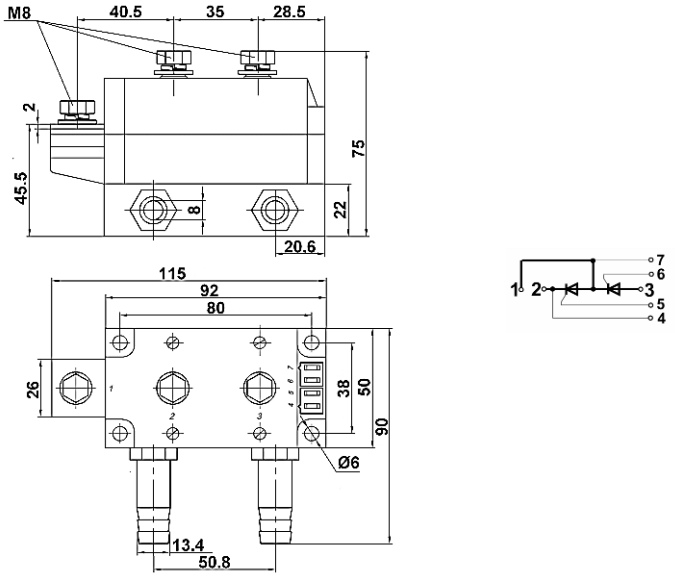
Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ (T_C,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	кA	V	mΩ	A/µs	V/µs	µs	°C/W	°C	V	
M2T1-250 M2T1A-250 M2T1C-250	3000-4000	300(85)	6.0	1.20	1.00	200	1000	400	0.068	125	3000	
M2T-320 M2TA-320 M2TC-320	2600-3200	357(85)	8.0	1.00	0.735	200	1000	320	0.068	125	3000	
M2T1-400 M2T1A-400 M2T1C-400	1800-2400	407(85)	9.0	1.02	0.42	200	1000	250	0.068	125	3000	
M2T-400 M2TA-400	1300-1800	460(85)	13	0.92	0.32	200	1000	200	0.068	125	3000	 MTD5 *(page 49)*
M2T1-500 M2T1A-500 M2T1C-500	800-1800	500(85)	13	0.95	0.30	200	1000	200	0.068	130	3000	
M2T-500 M2TA-500	200-1200	545(85)	14	0.85	0.27	200	1000	125	0.068	130	3000	
M2T-630 M2TA-630 M2TC-630	400-1200	660(85)	17	0.81	0.25	200	1000	125	0.068	140	3000	
M1T2-400	3600-4000	492(85)	15	1.18	0.62	200	1000	400	0.042	125	2500	
M1T2-500	2900-3400	570(85)	18	1.10	0.40	200	1000	320	0.042	125	2500	
M1T2-630	1900-2800	660(80)	20	1.05	0.35	200	1000	320	0.042	125	2500	
M1T-800	1300-1800	840(80)	23	1.00	0.20	200	1000	200	0.042	130	2500	 MTD6 *(page 49)*
M1T-1000	400-1200	1020(85)	28	0.90	0.15	200	1000	160	0.042	140	2500	
M1T1-1250	400-800	1250(85)	30	0.83	0.10	200	1000	100	0.042	150	2500	
M2T2-400 M2T2A-400 M2T2C-400	3600-4000	492(85)	15	1.18	0.62	200	1000	400	0.042	125	3500	
M2T2-500 M2T2A-500 M2T2C-500	2900-3400	570(85)	18	1.10	0.40	200	1000	320	0.042	125	3500	
M2T2-630 M2T2A-630 M2T2C-630	1900-2800	630(85)	20	1.02	0.32	200	1000	320	0.042	125	3000	
M2T2-800 M2T2A-800 M2T2C-800	1300-1800	820(85)	23	0.93	0.17	200	1000	200	0.042	130	3000	 MTD7 *(page 49)*
M2T2-1000 M2T2A-1000 M2T2C-1000	400-1200	1035(85)	28	0.90	0.15	200	1000	160	0.042	140	3000	
M2T2-1250 M2T2A-1250 M2T2C-1250	400-800	1250(85)	30	0.83	0.10	200	1000	125	0.042	150	3000	
M1T-1600	200-1200	1610(85)	60	0.85	0.064	200	1000	200	0.028	135	4000	
M1T-1250	1200-1800	1340(85)	49	0.90	0.07	200	1000	250	0.028	130	4000	
M1T2-1000	1800-2400	1110(85)	42	0.90	0.14	200	1000	320	0.028	125	4000	
M1T3-800	3600-4200	803(85)	32	1.20	0.26	200	1000	500	0.028	125	4000	 MTD8 *(page 49)*
M1T2-800	2400-3600	910(85)	36	1.10	0.21	200	1000	400	0.028	125	4000	

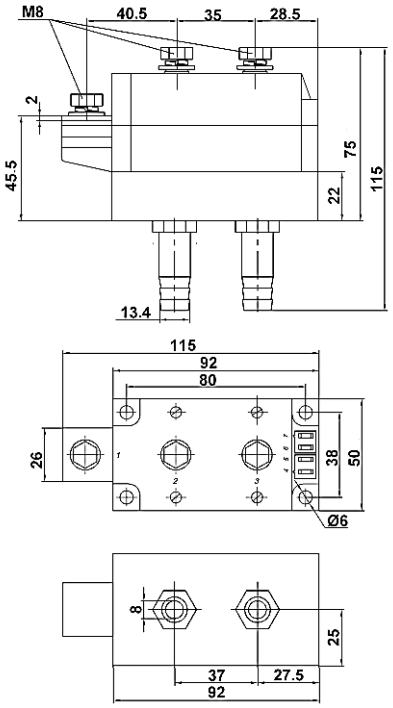
THYRISTOR MODULES WITH INTEGRATED LIQUID COOLING

Type	V_{DRM}, V_{RRM}	I_{TRMS} (T_W,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q typ	R_{thjW}	$T_{j\,max}$	V_{isol}	Case
	V	A	kA	V	mΩ	A/μs	V/μs	μs	°C/W	°C	V	
M2T-800-…-OB	1200-1800	825(25) 735(40)	8	0.95	0.50	200	1600	160	0.2	130	3000	MTD3-1
M2T-1550-…-OB	400-1200	1573(25) 1418(40)	17	0.81	0.25	200	1000	160	0.13	140	3000	MTD5-1

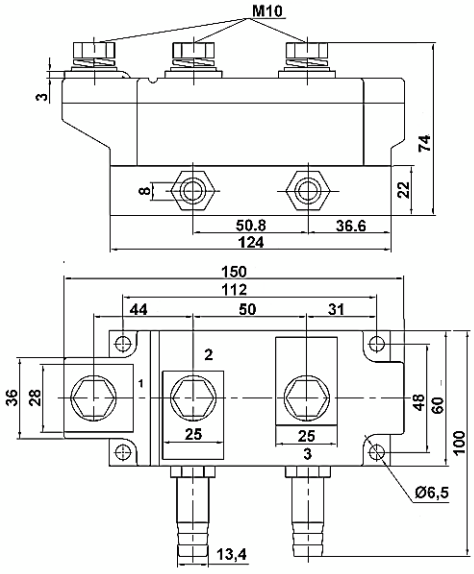
Module with side holes in base plate for cooling liquid

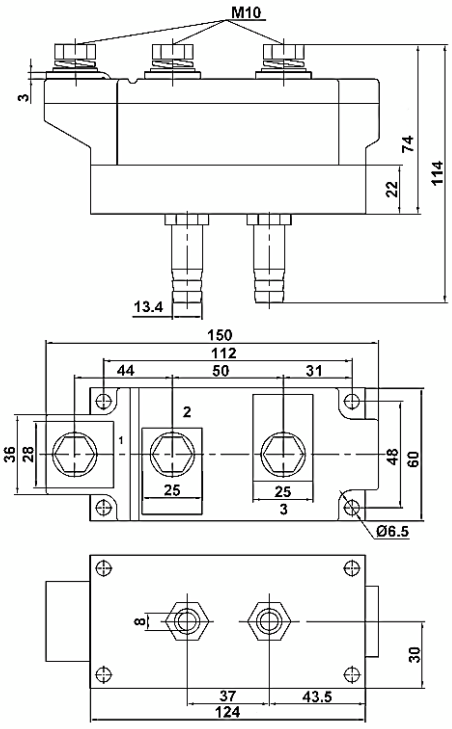
Module with bottom holes in base plate for cooling liquid





MTD3-1 w = 1400 g





MTD5-1 w = 2200 g

PHASE CONTROL THYRISTOR / DIODE AND DIODE / THYRISTOR MODULES

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ (T_C,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	кА	V	mΩ	A/μs	V/μs	μs	°C/W	°C	V	
MTD-40, MDT-40 MTDA-40, MDTA-40 MTDC-40, MDTC-40	400-1600	40 (85)	0.8	1.00	3.8	200	500-1000	100	0.680	125	2500	 MTD1 *(page 48)*
MTD-63, MDT-63 MTDA-63, MDTA-63 MTDC-63, MDTC-63	400-1600	63 (85)	1.2	0.15	3.0	200	500-1000	125	0.460	125	2500	
MTD-80, MDT-80 MTDA-80, MDTA-80 MTDC-80, MDTC-80	400-1600	80 (75)	1.6	0.90	2.0	200	500-1000	160	0.450	125	2500	
MTD1-100, MDT1-100 MTD1A-100, MDT1A-100 MTD1C-100, MDT1C-100	2600-3200	116 (85)	3.5	1.15	2.6	200	1000	320	0.180	125	2500	
MTD1-125, MDT1-125 MTD1A-125, MDT1A-125 MTD1C-125, MDT1C-125	1800-2400	140 (85)	4.0	1.05	1.5	200	1000	200	0.180	125	2500	
MTD1-160, MDT1-160 MTD1A-160, MDT1A-160 MTD1C-160, MDT1C-160	400-1600	180 (85)	5.0	0.90	0.75	200	1000	160	0.180	125	2500	
MTD1-200, MDT1-200 MTD1A-200, MDT1A-200 MTD1C-200, MDT1C-200	400-1200	218 (85)	5.5	0.83	0.58	200	1000	125	0.180	130	2500	 MTD2 *(page 48)*
MTD-100, MDT-100 MTDA-100, MDTA-100 MTDK-100, MDTK-100	400-1600	100 (85)	2.5	1.15	2.40	200	1000	160	0.220	125	2500	
MTD-125, MDT-125 MTDA-125, MDTA-125 MTDC-125, MDTC-125	400-1600	125 (85)	3.0	1.10	1.80	200	1000	200	0.190	125	2500	
MTD-160, MDT-160 MTDA-160, MDTA-160 MTDC-160, MDTC-160	400-1600	160 (85)	4.5	1.00	1.05	200	1000	200	0.180	125	2500	
MTD2-160, MDT2-160 MTD2A-160, MDT2A-160	2600-3200	172 (85)	5.0	1.15	1.50	200	1000	320	0.13	125	3000	
MTD2-200, MDT2-200 MTD2A-200, MDT2A-200	1800-2400	207 (85)	7.0	1.05	0.85	200	1000	250	0.13	125	3000	
MTD1-250, MDT1-250 MTD1A-250, MDT1A-250	1200-1800	269 (85)	8.0	0.95	0.5	200	1000	160	0.13	130	3000	 MTD3 *(page 48)*
MTD1-320, MDT1-320 MTD1A-320, MDT1A-320	600-1200	360 (85)	10	0.85	0.35	200	1000	125	0.13	140	3000	
MTD-200, MDT-200 MTDA-200, MDTA-200	400-1600	200 (85)	6.0	1.05	0.95	200	1000	160	0.13	125	3000	
MTD-250, MDT-250 MTDA-250, MDTA-250	400-1600	250 (85)	7.0	1.05	0.53	200	1000	160	0.12	125	3000	
MTD2-250, MDT2-250 MTD2A-250, MDT2A-250 MTD2T-250, MDT2T-250	3000-4000	300 (85)	6.0	1.20	1.00	200	1000	400	0.068	125	3000	
MTD1-400, MDT1-400 MTD1A-400, MDT1A-400 MTD1C-400, MDT1C-400	1800-2400	407 (85)	9.0	1.02	0.42	200	1000	250	0.068	125	3000	
MTD1-500, MDT1-500 MTD1A-500, MDT1A-500 MTD1C-500, MDT1C-500	800-1800	500 (85)	13	0.95	0.30	200	1000	200	0.068	130	3000	 MTD5 *(page 49)*
MTD-320, MDT-320 MTDA-320, MDTA-320 MTDC-320, MDTC-320	2600-3200	357 (85)	8.0	1.00	0.735	200	1000	320	0.068	125	3000	
MTD-400, MDT-400 MTDA-400, MDTA-400 MTDC-400, MDTC-400	1300-1800	460 (85)	13	0.92	0.32	200	1000	160	0.068	125	3000	

PHASE CONTROL THYRISTOR / DIODE AND DIODE / THYRISTOR MODULES

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ (T_C,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	кА	V	mΩ	A/μs	V/μs	μs	°C/W	°C	V	
MTD-500, MDT-500 MTDA-500, MDTA-500	200-1200	545 (85)	14	0.85	0.27	200	1000	125	0.068	130	3000	 MTD5 *(page 49)*
MTD-630, MDT-630 MTDA-630, MDTA-630	200-1200	660 (85)	15	0.81	0.25	200	1000	125	0.068	140	3000	
MTD2-400, MDT2-400 MTD2A-400, MDT2A-400 MTD2C-400, MDT2C-400	3600-4000	492 (85)	15	1.18	0.62	200	1000	400	0.042	125	3500	
MTD2-500, MDT2-500 MTD2A-500, MDT2A-500 MTD2C-500, MDT2C-500	2900-3400	570 (85)	18	1.10	0.40	200	1000	320	0.042	125	3500	
MTD2-630, MDT2-630 MTD2A-630, MDT2A-630 MTD2C-630, MDT2C-630	1900-2800	660 (80)	20	1.05	0.35	200	1000	320	0.042	125	3000	 MTD7 *(page 49)*
MTD2-800, MDT2-800 MTD2A-800, MDT2A-800 MTD2C-800, MDT2C-800	1300-1800	840 (80)	23	0.93	0.17	200	1000	200	0.043	130	3000	
MTD2-1000, MDT2-1000 MTD2A-1000, MDT2A-1000 MTD2C-1000, MDT2C-1000	400-1200	1020 (85)	28	0.90	0.13	200	1000	160	0.043	140	3000	
MTD2-1250, MDT2-1250 MTD2A-1250, MDT2A-1250 MTD2C-1250, MDT2C-1250	400-800	1060 (85)	30	0.85	0.11	200	1000	160	0.043	150	3000	

FAST DIODE MODULES

Type	V_{RRM}	$I_{F(AV)}$ (T_C,°C)	I_{FSM} t_p=10ms	V_{TO} $T_{j\,max}$	r_T $T_{j\,max}$	t_{rr} typ	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	кА	V	mΩ	μs	°C/W	°C	V	
MPDF-50 MPDF-50X	100-1400	50	1.5	1.2	6.0	0.5-1.0	0.60	150	-	
MPDF-63 MPDF-63X	100-1400	63	1.7	1.1	5.0	0.5-1.0	0.45	150	-	 MPD1 *(page 45)*
MPDF-80 MPDF-80X	100-1400	80	1.8	1.1	4.0	0.63-1	0.37	150	-	
MPDF-100 MPDF-100X	100-1400	100	2.0	1.1	3.5	0.63-1	0.24	150	-	
M2DF-40 M2DFA-40 M2DFC-40	400-1600	40(85)	1.6	1.2	6.0	0.50-1.0	0.68	140	2500	
M2DF-63 M2DFA-63 M2DFC-63	400-1600	63(85)	1.8	1.2	5.0	0.63-1.0	0.46	140	2500	 MTD1 *(page 48)*
M2DF-80 M2DFA-80 M2DFC-80	400-1400	80(75)	2.0	1.2	4.4	0.63-1.0	0.39	140	2500	
MDFDF-160 MDFDFA-160 MDFDFC-160	300-1400	160(85)	4.5	1.30	1.60	5	0.22	140	2500	 MTD2 *(page 48)*
M1DF-250	1900-2800	450(85)	12	1.20	0.50	5	0.068	140	3000	
M1DF-320	1300-1800	490(85)	14	1.15	0.40	3.2	0.068	140	3000	 MTD4 *(page 48)*
M1DF-400	200-1200	530(85)	16	1.10	0.30	2.5	0.068	140	3000	

FAST DIODE MODULES

Type	V_{RRM}	$I_{F(AV)}$ (T_C,°C)	I_{FSM} t_p=10ms	V_{TO} $T_{j\,max}$	r_T $T_{j\,max}$	t_{rr} typ	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	кA	V	mΩ	μs	°C/W	°C	V	
M2DF-250 M2DFA-250 M2DFC-250	1900-2800	450(85)	12	1.20	0.50	5	0.068	140	3000	 MTD5 *(page 49)*
M2DF-320 M2DFA-320 M2DFC-320	1300-1800	490(85)	14	1.15	0.40	3.2	0.068	140	3000	
M2DF-400 M2DFA-400	200-1200	530(85)	16	1.10	0.30	2.5	0.068	140	3000	
M1DF-800	1800-2600	800(90)	24	1.10	0.24	0,5	0.042	150	3000	 MTD6 *(page 49)*
M1DF-1000	2600	1155(90)	42	1.0	0.19	0,5	0.028	140	4000	 MTD8 *(page 49)*

FAST THYRISTOR MODULES

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ (T_C,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	кA	V	mΩ	A/μs	V/μs	μs	°C/W	°C	V	
M2TF-40 M2TFA-40 M2TFC-40	400-1600	40(85)	1.0	1.1	5.0	125	100-1000	25	0.46	125	2500	 MTD1 *(page 48)*
M2TF-63 M2TFA-63 M2TFC-63	400-1600	63(75)	1.1	1.4	4.0	125	100-1000	25	0.39	125	2500	
MTFTF-100 MTFTFA-100 MTFTFC-100	500-1000	100(85)	4	1.10	1.80	200	1000	40	0.220	125	2500	 MTD2 *(page 48)*
M1TF-400	600-1200	400(80)	10	1.30	0.35	200	500,1000	32	0.068	125	3000	 MTD4 *(page 48)*
M2TF-320 M2TFA-320	1300-1800	330(85)	9	1.35	0.50	200	500,1000	50	0.068	125	3000	 MTD5 *(page 49)*
M2TF-400 M2TFA-400	200-1200	400(80)	10	1.30	0.35	200	500,1000	32	0.068	125	3000	
M1TF-800	2200-2600	800(63)	16	1.25	0.41	300	500,1000	80	0.042	130	3000	 MTD6 *(page 49)*
M1TF-1000	2200-2600	1055(70)	38	1.25	0.30	300	1000	80	0.028	130	4000	 MTD8 *(page 49)*

FAST THYRISTOR / DIODE AND DIODE / THYRISTOR MODULES

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ (T_C,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q/t_{rr} typ	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	кA	V	mΩ	A/μs	V/μs	μs	°C/W	°C	V	
MTFDF-40, MDFTF-40 MTFDFA-40, MDFTFA-40 MTFDFC-40, MDFTFC-40	400-1600	40(85)	1.0	1.4	5.0	125	100-1000	25/0.63	0.46	125	2500	 MTD1 *(page 48)*
MTFDF-63, MDFTF-63 MTFDFA-63, MDFTFA-63 MTFDFC-63, MDFTFC-63	400-1600	63(80)	1.1	1.0	3.9	125	100-1000	25/0.63	0.45	125	2500	
MTFDF-100,MDFTF-100	500-1000	100(85)	4.0	1.10	1.80	200	1000	40/2.0	0.210	125	2500	 MTD2 *(page 48)*
MTFDF-200,MDFTF-200	600-1400	200(62)	4.0	1.15	1.50	200	500-1000	63/2.5	0.180	130	2500	
MTFDF-250, MDFTF-250	600-1400	250(81)	6.5	1.15	0.8	200	500-1000	63/2.5	0.180	130	3000	 MTD3 *(page 48)*
MTFDF-320, MDFTF-320	1300-1800	330(85)	9.0	1.35	0.50	200	500-1000	50/3.2	0.068	130	3000	 MTD5 *(page 49)*

FAST SWITCHING THYRISTOR / DIODE MODULES

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ (T_C,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q	t_{rr}	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	кA	V	mΩ	A/μs	V/μs	μs	μs	°C/W	°C	V	
MTFIDF-100 MDFTFI-100	600-1200	100(80)	2.5	1.38	2.70	800	1000	16-63	2.5-4	0.210	125	2500	 MTD2 *(page 48)*
MTFIDF-160 MDFTFI-160	600-1400	160(85)	6.0	1.35	1.10	1000	1000	16-63	2.5-4	0.130	125	3000	 MTD3 *(page 48)*
MTFIDF-160 MDFTFI-160	1500-2000	160(85)	4.0	1.25	1.30	1000	1000	32-63	3.2-4	0.130	125	3000	
MTFIDF-200 MDFTFI-200	300-900	200(80)	7.0	1.20	0.80	1000	1000	12-63	2.5-4	0.130	125	3000	 MTD3 *(page 48)*
MTFIDF-320 MDFTFI-320	600-1400	320(85)	9.0	1.20	0.64	1000	1000	25-63	2.5-5	0.073	125	3000	 MTD5 *(page 49)*
MTFIDF-320 MDFTFI-320	1500-2000	320(83)	7.5	1.25	0.70	1000	1000	40-63	3.2-5	0.073	125	3000	
MTFIDF-400 MDFTFI-400	300-900	400(80)	6.3	1.20	0.45	1000	1000	12-63	2.5-5	0.073	130	3000	

FAST SWITCHING THYRISTOR MODULES

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ (T_C,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	κA	V	mΩ	A/μs	V/μs	μs	°C/W	°C	V	
M2TFI-100 M2TFIA-100	600-1200	100(80)	2.5	1.38	2.70	800	1000	16-63	0.210	125	2500	 MTD2 *(page 48)*
M2TFI-125	600-1400	125(80)	4.0	-	-	1000	1000	25-63	0.230	125	3000	
M2TFI-160 M2TFIA-160	600-1400	160(85)	4.0	1.35	1.10	1000	1000	16-40	0.130	125	3000	 MTD3 *(page 48)*
M2TFI-160 M2TFIA-160	1500-2000	160(85)	6.0	1.25	1.30	1000	1000	32-63	0.130	125	3000	
M2TFI-200 M2TFIA-200	300-900	200(80)	7.0	1.20	0.80	1000	1000	12-63	0.130	125	3000	
M1TFI-320	600-1400	320(85)	9.0	1.20	0.64	1000	1000	25-50	0.073	125	3000	 MTD4 *(page 48)*
M1TFI-320	1500-2000	320(85)	7.5	1.25	0.70	1000	1000	40-63	0.073	125	3000	
M1TFI-400	300-900	400(80)	6.3	1.20	0.45	1000	1000	12-63	0.073	130	3000	
M2TFI-320 M2TFIA-320 M2TFIK-320	600-1400	320(85)	9.0	1.20	0.64	1000	1000	25-50	0.073	125	3000	 MTD5 *(page 49)*
M2TFI-320 M2TFIA-320 M2TFIC-320	1500-2000	320(83)	7.5	1.25	0.70	1000	1000	40-63	0.073	125	3000	
M2TFI-400 M2TFIA-400 M2TFIC-400	300-900	400(80)	6.3	1.20	0.45	1000	1000	12-63	0.073	125	3000	
M1TFI-500	600-1400	500(80)	17	1.30	0.24	1000	1000	25-50	0.042	125	4000	 MTD6 *(page 49)*
M1TFI2-500	1500-2000	500(80)	16	1.34	0.34	1000	1000	32-63	0.042	125	4000	
M1TFI-630	300-900	630(80)	18	1.20	0.34	1000	1000	12-40	0.042	125	4000	

SINGLE-PHASE AND THREE-PHASE DIODE-THYRISTOR BRIDGES

Features:

- Strength plastic case with screw interface connection
- Internal DBC isolation(Al2O3)
- Easy mounting

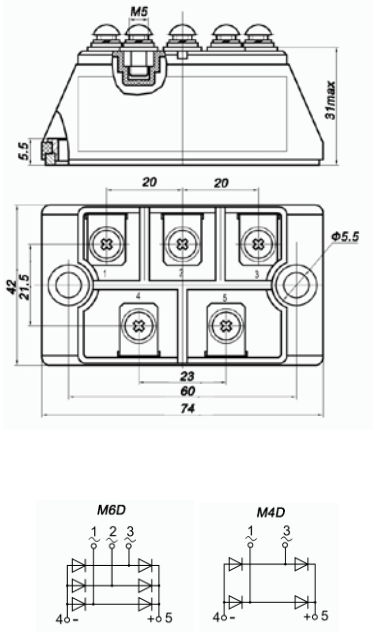
Applications:

- 1- and 3-phase bridges for power supplies
- Input rectifiers for frequency converters
- Rectifiers for excitation windings of DC motors
- Charging rectifiers

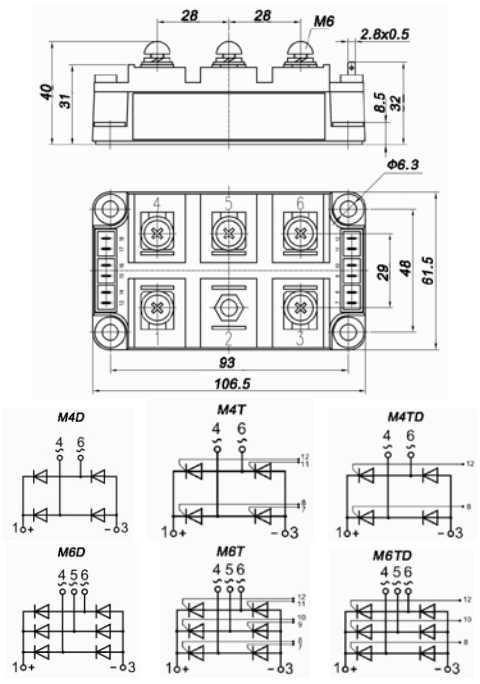
Type	V_{RRM}	I_D T_c=100°C	I_{FSM} t_p=10ms	V_{TO} $T_{j\,max}$	r_T $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	A	V	mΩ	°C/W	°C	V	
Single-phase diode bridges									
M4D-63	400-1600	63	1200	0.93	3.4	0.400	150	3000	MMD1
M4D-80	400-1600	80	1300	0.93	2.4	0.300	150	3000	
M4D-200	400-1600	200	2000	0.90	1.7	0.250	150	3000	MI4-2
Three-phase diode bridges									
M6D-63	400-1600	63	1000	0.93	4.5	0.500	150	3000	MMD1
M6D-80	400-1600	80	1200	0.93	3.4	0.400	150	3000	
M6D-100	400-1600	100	1300	0.93	2.4	0.300	150	3000	
M6D-250	400-1600	250	1800	0.90	1.7	0.250	150	3000	MI4-2

Type	V_{RRM}, V_{DRM}	I_D T_c=85°C	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	A	V	mΩ	V	°C/W	°C	V	
Single-phase diode-thyristor bridges										
M4DT-160	400-1600	160	1500	0.93	3.3	200-1000	0.3	125	3000	MI4-2
Three-phase diode-thyristor bridges										
M6DT-160	400-1600	170	1300	0.95	4.1	200-1000	0.4	125	3000	MI4-2
M6DT-200	400-1600	200	1500	0.93	3.3	200-1000	0.3	125	3000	

Type	V_{RRM}, V_{DRM}	I_D T_c=85°C	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	A	V	mΩ	V	°C/W	°C	V	
Single-phase thyristor bridges										
M4T-160	400-1600	160	1500	0.93	3.3	200-1000	0.3	125	3000	MI4-2
Three-phase thyristor bridges										
M6T-160	400-1600	170	1300	0.95	4.1	200-1000	0.4	125	3000	MI4-2
M6T-200	400-1600	200	1500	0.93	3.3	200-1000	0.3	125	3000	



MMD1 w = 180 g



MI4-2 w = 400 g

THYRISTORS

Features:

- Voltage range of 100 to 7800 V
- Current range of 10 to 6900 A
- High reability
- Optimized for low on-state voltage drop and switching losses
- Precision control Q_{RR}, V_{TM} for series and parallel connections
- Amplifying gates
- Broad range of housings:
  - press pack;
  - stud (ceramic-metal and metal-glass)
- Product portfolio:
  - phase control thyristors;
  - fast and fast switching thyristors;
  - asymmetric thyristors

Applications:

- HVDC transmission
- Static VAR compensation
- Industrial AC and DC drives
- Power converters for traction
- Oil-gas production and transport
- Power converters for traction
- Soft starters for AC motors
- Induction melting and heating
- Welding
- Electroplating
- Lighting equipment

PHASE CONTROL THYRISTORS (STUD DESIGN)

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ (T_C,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	M_d	Case
	V	A	кА	V	mΩ	A/µs	V/µs	µs	°C/W	°C	Nm	
T212-10	100-1300	10(95)	0.15	1.25	29.3	125	50-1000	80	1.50	125	0.9-1.1	ST1 *(page 50)*
T212-16	100-1300	16(85)	0.25	1.20	11.9	125	50-1000	80	1.50			
T222-20	100-1300	20(93)	0.30	1.15	17.2	125	50-1000	80	0.80	125	1.4-1.8	ST2 *(page 50)*
T222-25	100-1300	25(90)	0.35	1.10	10.9	125	50-1000	80	0.80			
T232-40	100-1600	40(93)	0.75	1.05	5.60	125	50-1000	80	0.50	125	5.3-5.7	ST3 *(page 50)*
T232-50	100-1600	50(85)	0.80	1.03	4.60	125	50-1000	80	0.50			
T242-63	100-1600	63(95)	1.30	0.95	4.10	125	50-1000	80	0.30	125	9.0-11	ST4 *(page 50)*
T242-80	100-1600	80(87)	1.50	0.93	3.30	125	50-1000	80	0.30			
T151-100	300-1600	100(80)	2.0	1.15	2.40	160	200-1000	160	0.30	130	10-20	ST5 *(page 50)*
T161-160	300-1800	160(87)	4.0	1.05	1.36	125	200-1000	160	0.15	125	20-30	ST6 *(page 50)*
T161-160	2400-2600	160(80)	3.5	1.41	1.29	125	500-1000	200	0.145			
T161-200	300-1600	200(87)	5.0	1.00	1.05	160	200-1000	250	0.13			
T371-250	2200-2600	302(85)	7.5	0.93	0.73	250	200-1000	250	0.09	125	25-35	ST7 *(page 50)*
T471-200	4000-4400	200(80)	4.0	1.85	1.24	200	500-1000	320	0.09			
T171-320	300-1800	320(87)	8.5	1.05	0.53	320	200-1000	160	0.085			
T371-320	2000-2200	320(82)	8.0	1.05	0.68	320	200-1000	200	0.085			
T271-400	100-800	400(95)	11.5	0.80	0.45	320	200-1000	160	0.09	140		

PHASE CONTROL THYRISTORS (PRESS PACK)

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ T_C=70°C	I_{TSM} t_p=10 ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	F_m	Case
	V	A	кА	V	mΩ	A/µs	V/µs	µs	°C/W	°C	кN	
up to 800V												
T123-500	400-800	710	6.0	0.84	0.430	200	1000,1600	100	0.070	150	6	PT21, PT21-1 *(page 51)*
T133-800	400-800	1270	12	0.90	0.287	200	1000,1600	100	0.035	150	10	PT31 *(page 51)*
T143-1250	400-800	1750	21	0.79	0.170	200	1000,1600	100	0.030	150	15	PT41 *(page 51)*
T153-2000	400-800	2883	36	0.85	0.120	200	1000,1600	160	0.018	150	24	PT51 *(page 52)*
T153-2500	200-400	3021	35	0.80	0.090	200	1000	160	0.018	150	26	
T163-2500	400-800	3191	50	0.82	0.070	200	1000,1600	100	0.016	140	33	PT63 *(page 52)*
T163-3200	200-400	3580	52	0.77	0.063	200	1000	125	0.014	145	33	
T173-5000	400-800	5595	66	0.85	0.042	200	1000,1600	100	0.010	150	45	PT73 *(page 52)*
T173-6300	200-400	6325	70	0.77	0.032	200	1000	125	0.0095	150	50	
up to 1800V												
T123-320	400-1600	408	5.0	0.90	0.640	200	1000,1600	160	0.070	125	6	PT21, PT21-1 *(page 51)*
T323-320	1200-1600	434	5	0.90	0.64	200	1600	320	0.080	125	7	
T123-400	800-1200	490	5.5	0.83	0.580	200	1000,1600	125	0.070	130	6	
T133-320	900-2400	524	7	1.20	1.100	200	1600	400	0.040	125	10	PT32 *(page 51)*
T233-500	1200-1800	730	9.0	1.08	0.440	200	1000,1600	160	0.040	125	10	
T333-500	1200-1800	804	9.0	1.08	0.440	200	1000,1600	160	0.035	125	10	PT31-1*(page 51)*
T133-630	200-1000	910	12	0.85	0.350	200	1000,1600	100	0.040	130	10	PT31 *(page 51)*
T233-630	800-1200	915	12	0.85	0.35	200	1000,1600	100	0.040	125	10	
T143-400	1800-2400	613	9	1.20	0.950	200	1600	400	0.034	125	15	PT42 *(page 51)*
T143-800	1200-1800	969	14	0.88	0.374	200	1000,1600	160	0.032	125	15	
T143-1000	800-1000	1240	19	0.85	0.250	200	1000,1600	160	0.030	140	15	PT41 *(page 51)*
T243-1250	800-1200	1239	19	0.85	0.200	200	1000,1600	100	0.030	130	15	
T253-1250	1200-1800	1587	28	0.95	0.200	200	1000,1600	160	0.020	125	24	PT53-1*(page 52)*
T153-1600	800-1200	2316	30	1.01	0.069	200	1000,1600	160	0.018	130	24	PT51 *(page 52)*
T163-1600	1200-1800	2023	35	0.95	0.150	200	1000,1600	160	0.016	125	33	PT63 *(page 52)*
T163-2000	800-1200	2694	40	0.96	0.065	200	1000,1600	120	0.016	130	33	
T173-2500	1200-1800	3224	52	0.95	0.095	200	1000,1600	160	0.010	125	45	PT73 *(page 53)*
T173-3200	1000-1200	4115	60	0.92	0.053	200	1000,1600	160	0.010	130	45	
T173-4000	800-1000	4778	62	0.84	0.053	200	1000,1600	100	0.010	140	45	
T183-4000	800-1600	4622	70	0.86	0.055	200	1000,1600	160	0.008	125	70	PT83 *(page 53)*
T293-5000	800-1800	6906	100	0.86	0.043	200	1000,1600	160	0.005	125	80	PT93 *(page 53)*
T193-4000	1000-2000	5568	90	0.86	0.048	200	1000,1600	160	0.0065	125	80	PT94 *(page 53)*

PHASE CONTROL THYRISTORS (PRESS PACK)

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ T_C=70°C	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	F_m	Case
	V	A	κA	V	mΩ	A/μs	V/μs	μs	°C/W	°C	κN	
up to 3400V												
T323-200	2600-3400	250	3.5	1.15	2.600	200	1000,1600	320	0.080	125	6	PT23 *(page 51)*
T223-250	1800-2600	312	4.0	1.05	1.500	200	1000,1600	160	0.080	125	6	
T233-320	2400-3400	474	5.0	1.15	1.500	200	1000,1600	320	0.040	125	10	PT32 *(page 51)*
T233-400	1800-2400	593	7.0	1.00	0.900	200	1000,1600	250	0.040	125	10	
T333-400	1800-2400	657	7.0	1.04	0.650	200	1000,1600	250	0.040	125	10	PT31-1*(page 51)*
T243-500	2800-3400	706	10	1.12	0.673	200	1000,1600	320	0.034	125	15	PT42 *(page 51)*
T243-630	1800-2800	796	9	1.05	0.500	200	1000,1600	250	0.034	125	15	
T153-630	2000-2800	1110	15	1.05	0.370	200	1000,1600	250	0.024	125	22	PT53 *(page 52)*
T153-800	1000-2000	1289	20	0.95	0.260	200	1000,1600	200	0.024	125	22	
T353-800	2800-3400	1151	17	1.12	0.447	200	1000,1600	320	0.020	125	24	PT53-1*(page 52)*
T253-1000	1800-2800	1423	22	1.02	0.260	200	1000,1600	250	0.020	125	24	PT53-1 *(page 52)*
T353-1000	2000-3200	1240	19	1.05	0.380	200	1000,1600	320	0.020	125	24	
T263-1000	2800-3400	1424	20	1.15	0.360	200	1000,1600	320	0.016	125	33	PT63 *(page 52)*
T163-1250	1800-2800	1616	25	1.05	0.270	200	1000,1600	250	0.016	125	33	
T173-1600	2400-3400	2112	34	1.22	0.250	200	1000,1600	320	0.011	125	45	PT73 *(page 52)*
T273-2000	2000-2800	2674	42	0.95	0.147	200	1000,1600	250	0.011	125	45	
T173-2000	1600-2000	2849	49	1.01	0.106	200	1000,1600	200	0.011	125	45	
T373-2000	1800-2800	2674	42	0.95	0.147	200	1000, 1600	250	0.011	125	45	PT73-1*(page 52)*
T283-2500	3000-3400	3380	55	0.95	0.130	200	1000,1600	320	0.008	125	70	PT83 *(page 52)*
T183-3200	1800-2800	3990	60	0.91	0.087	200	1000,1600	320	0.078	125	70	
T193-3200	1800-2800	4470	85	0.90	0.090	200	1000,1600	320	0.006	125	80	PT94 *(page 53)*
T293-4000	1800-2800	5130	85	0.90	0.070	200	1000,1600	320	0.006	125	80	PT93 *(page 53)*
T393-3200	2800-3400	4580	75	0.96	0.092	200	1000,1600	320	0.006	125	80	
up to 4800V												
T123-160	3400-4200	201	2.8	1.20	4.500	200	1600, 2000	400	0.080	125	6	PT23 *(page 51)*
T133-250	3400-4200	373	4.0	1.20	2.700	200	1600, 2000	400	0.040	125	10	PT32 *(page 51)*
T243-400	3400-4200	558	6.0	1.15	1.270	200	1600, 2000	400	0.034	125	15	PT42 *(page 51)*
T753-800	3400-4400	1009	15	1.18	0.620	200	1600, 2000	400	0.020	125	24	PT53-1 *(page 52)*
T353-630	3600-4800	995	15	1.20	0.63	200	1600, 2000	400	0.0185	125	24	
T163-1000	3400-4400	1343	18	1.14	0.428	200	1600, 2000	400	0.016	125	33	PT63 *(page 52)*
T273-1250	3600-4800	1937	32	1.10	0.310	200	1600, 2000	400	0.011	125	45	PT73 *(page 52)*
T373-1250	4000-4800	1937	32	1.10	0.310	200	1600, 2000	400	0.011	125	45	PT73-1 *(page 52)*
T183-2500	3600-4200	3094	50	1.00	0.160	200	1600, 2000	500	0.008	125	70	PT83 *(page 52)*
T193-2500	3400-4200	3866	68	1.12	0.112	200	1600, 2000	500	0.0065	125	80	PT94 *(page 53)*
T393-2500	3400-4200	4079	68	1.12	0.112	200	1600, 2000	500	0.006	125	80	PT93 *(page 53)*
up to 6500V												
T123-100	5000-6000	176	1.0	1.30	6.000	200	1600, 2000	630	0.080	125	6	PT23 *(page 51)*
T143-320	5000-6600	450	4.5	1.30	1.700	200	1600, 2000	630	0.038	125	15	PT43 *(page 51)*
T253-500	5000-6000	808	10	1.3	0.900	200	1600, 2000	630	0.022	125	24	PT53-1 *(page 52)*
T263-800	4400-5200	1127	15	1.20	0.600	200	1600, 2000	630	0.017	125	33	PT63 *(page 52)*
T183-2000	4400-5200	2620	40	1.07	0.240	200	1600, 2000	630	0.0080	125	70	PT83 *(page 52)*
T293-2000	5400-6000	3140	56	1.27	0.190	200	1600, 2000	630	0.0065	125	80	PT94 *(page 53)*
T293-2500	4400-5200	3258	60	1.07	0.190	200	1600, 2000	630	0.0065	125	80	
up to 8000V												
T353-500	6000-7200	808	10	1.35	0.900	200	1600, 2000	800	0.019	125	24	PT54 *(page 52)*
T163-800	6000-7000	1072	12	1.30	0.650	200	1600, 2000	800	0.017	125	33	PT63 *(page 52)*
T173-1000	6000-7000	1529	24	1.30	0.450	200	1600, 2000	800	0.012	125	45	PT73 *(page 52)*
T183-1600	6000-7000	2080	40	1.25	0.400	200	1600, 2000	800	0.008	125	70	PT83 *(page 52)*
T283-2000	6800-7400	2200	35	1.20	0.390	200	1600, 2000	800	0.0075	125	70	
T383-2000	6800-7400	2100	35	1.20	0.390	200	1600, 2000	800	0.008	125	70	PT84 *(page 53)*
T193-2000	6000-7000	3068	54	1.32	0.190	200	1600, 2000	800	0.0065	125	80	PT94 *(page 53)*

HIGH VOLTAGE INVERTER THYRISTORS

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ T_C=85°C	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	F_m	Case
	V	A	κA	V	mΩ	A/μs	V/μs	μs	°C/W	°C	κN	
T553-500	3600-4200	500	12	1.85	0.90	500	500,1000	320	0.022	125	24	PT53-1 *(page 52)*
T453-630	2400-3200	630	13	1.50	0.480	630	1000,1600	160	0.020	125		
T553-630	3600-4200	630	12.5	1.45	0.90	500	500, 1000	320	0.022	125		
T453-800	2400-2800	800	15	1.45	0.450	630	1000,1600	160	0.020	125		
T553-800	3600-4200	800	12	1.45	0.700	500	1000,1600	320	0.018	125		

LIGHT TRIGGERED THYRISTORS (LTT)

Type	V_{BO}	V_{DRM}	V_{RRM}	$I_{T(AV)}$ T_C=70°C	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	P_{LM}	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	F_m	Case
	V	V	V	A	A	V	mΩ	A/μs	V/μs	mW	μs	°C/W	°C	κN	
TL353-630	6200-6600	6000-6400	6600-7000	790	12	1.20	1.00	300	2000	40	630	0.0200	120	24	PTO54 *(page 55)*
TL273-1000	6200-6600	6000-6400	6600-7000	1360	24	1.20	0.55	300	2000	40	630	0.0120	120	45	PTO75 *(page 55)*
TL183-2000	6200-6600	6000-6400	6600-7000	2115	40	1.20	0.35	300	2000	40	630	0.0078	120	70	PTO84 *(page 55)*
TL193-2000	7000-7800	6800-7600	7200-8000	2295	55	1.27	0.35	300	2000	40	630	0.0067	120	80	PTO95 *(page 55)*
TL193-2500	6200-6600	6000-6400	6600-7000	2520	55	1.22	0.28	300	2000	40	630	0.0067	120	80	

AVALANCHE THYRISTORS

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ (T_C,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	P_{RSM} t_p=100 ms	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	M_d/F_m	Case
	V	A	KA	V	mΩ	A/μs	V/μs	kW	μs	°C/W	°C	Nm/ kN	
TA371-250	600-1200	250 (100)	6.0	1.00	0.95	125	20-1000	16	250	0.100	140	25-35	ST7 *(page 50)*
TA371-320		320 (100)	8.5	1.05	0.53	320	20-1000	16	250	0.085			
TA253-1250	1800	1270 (85)	28	0.95	0.20	200	1000	20	250	0.020	140	24	PT53 *(page 52)*

FAST THYRISTORS

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ (T_C, °C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_{gt} typ	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	Case
	V	A	κA	V	mΩ	A/μs	V/μs	μs	μs	°C/W	°C	
up to 1600V												
TF212-10	400-1400	10(85)	0.15	1.50	32.0	200	100-1000	4.0	20 (for class 4-8 12.5)	1.500	125	ST1 *(page 50)*
TF 222-16	400-1400	16(85)	0.30	1.50	18.0	200	100-1000			0.900	125	ST2 *(page 50)*
TF 222-20	400-1400	20(85)	0.35	1.40	14.0	200	100-1000			0.800		
TF 232-25	400-1400	25(85)	0.50	1.40	9.0	200	100-1000			0.800	125	ST3 *(page 50)*
TF 232-32	400-1400	32(85)	0.60	1.40	7.0	200	100-1000			0.620		
TF 232-40	400-1400	40(85)	0.75	1.40	6.0	200	100-1000			0.500		
TF242-50	400-1400	50(85)	1.00	1.60	3.0	200	100-1000			0.400	125	ST4 *(page 50)*
TF242-63	400-1400	63(85)	1.10	1.65	2.6	200	100-1000			0.300		
TF351-80	500-1100	85(80)	1.6	1.45	3.0	500	500-1000	3.2	20	0.250	125	ST5 *(page 50)*
TF351-100	500-1100	100(90)	2.0	1.30	1.5	500	500-1000		25	0.250	125	
TF361-125	500-1100	130(80)	3.5	1.45	2.5	500	500-1000		20	0.150	125	ST6 *(page 50)*
TF361-160	500-1100	160(88)	4.0	1.20	1.8	500	500-1000		25	0.150	125	
TF371-200	300-1400	210(80)	6.0	1.38	1.5	500	500-1000		20	0.100	125	ST7 *(page 50)*
TF371-250	300-1400	250(90)	7.0	1.20	0.97	500	500-1000		25	0.100	125	
TF333-250	1200-1600	395(85)	6.0	1.30	0.95	500	500-1000		25	0.045	125	PT31 *(page 51)*
TF333-400	300-1400	450(85)	6.5	1.50	0.92	500	500-1000		25	0.035	125	
TF333-500	300-1400	500(95)	7.5	1.00	0.50	500	500-1000		32	0.035	125	
TF343-500	500-1100	550(85)	9.0	1.25	1.00	500	500-1000		25	0.028	125	PT41 *(page 51)*
TF343-630	500-1400	630(90)	10.5	1.42	0.34	500	500-1000		32	0.028	125	
TF453-630	600-1400	765(85)	13.5	1.45	0.55	630	1000-1600	4.0	32	0.021	125	PT53-1 *(page 52)*
TF453-800	600-1400	785(85)	15.0	1.35	0.55	630	1000-1600		40	0.021	125	
TF453-1000	600-1400	1000(82)	16.0	1.20	0.34	630	1000-1600		40	0.021	125	
up to 2400V												
TF553-800	1400-2400	800(85)	15.0	1.50	0.50	630	1000	4.0	25-63	0.020	125	PT53-1 *(page 52)*

FAST SWITCHING THYRISTORS

Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ (T_C,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_{gt} typ	t_q	$R_{th(j-c)}$	$T_{j\,max}$	Case
	V	A	кА	V	mΩ	A/μs	V/μs	μs	μs	°C/W	°C	
up to 1200V												
TFI361-100	600-1200	119(85)	2.5	1.45	3.50	800	1000	2.5-3.2	12.5-20	0.160	125	ST6 *(page 50)*
TFI361-125	600-1200	129(80)	2.6	1.38	2.50	800	1000	2.5-3.2	20-25	0.160	125	
TFI371-160	600-1200	196(90)	4.0	1.40	1.20	1000	1000	2.5-3.2	10-16	0.090	125	ST7 *(page 50)*
TFI323-250	600-1200	300(85)	3.0	1.10	1.05	800	1000	2.5-3.2	20-25	0.070	125	PT21 *(page 51)*
TFI433-400	300-900	526(85)	7.0	1.20	0.80	1000	1000	2.5-3.2	12.5-20	0.035	125	PT31 *(page 51)*
TFI443-630	300-900	715(85)	6.3	1.20	0.45	1000	1000	2.5-3.2	12.5-20	0.028	125	PT41 *(page 51)*
TFI453-1000	300-900	1150(85)	16	1.20	0.34	1000	1000	2.5-3.2	12.5-20	0.016	125	PT51 *(page 52)*
TFI371-200	600-1800	222(85)	6.0	1.45	1.85	1000	1000	3.2	25-50	0.090	125	ST7 *(page 50)*
TFI333- 400	600-1400	404(85)	7.0	1.40	0.80	1000	1000	3.2	20-50	0.045	125	PT32 *(page 51)*
TFI343-500	1200-2000	539(85)	7.5	1.27	0.67	1000	1000	3.2	40-63	0.034	125	PT42 *(page 51)*
TFI343-630	600-1400	637(80)	9.0	1.23	0.52	1000	1000	3.2	25-50	0.034	125	
TFI353-1000	900-1400	1020(85)	20	1.28	0.27	1000	1000	3.2	16-63	0.020	125	PT53-1 *(page 52)*
TFI353-1000	1200-2000	1023(80)	16	1.42	0.33	1000	1000	3.2	40-63	0.020	125	
TFI353-1250	600-1500	1250(80)	21	1.15	0.21	1000	1000	3.2	20	0.020	125	
TFI163-1600	900-1400	1520(80)	35	1.26	0.19	1000	1000	3.2	25-63	0.015	125	PT63 *(page 52)*
TFI263-1600	1500-2000	1423(80)	35	1.30	0.23	1000	1000	3.2	40-63	0.015	125	
TFI173-1600	1500-2000	1890(85)	36	1.22	0.15	1000	1000	3.2	40-63	0.011	125	PT73 *(page 52)*
TFI173-2000	900-1400	2085(85)	45	1.23	0.10	1000	1000	3.2	20-63	0.011	125	
TFI183-3200	1000-1600	3214(70)	45	1.42	0.0906	1000	1000	3.2	25-63	0.008	125	PT83 *(page 52)*
up to 3000V												
TFI333-320	1200-2200	339(85)	6.0	1.70	1.10	1000	1000	3.2	25-63	0.045	125	PT32 *(page 51)*
TFI543-400	2000-2400	539(85)	6.0	1.30	0.85	1000	1000	4.0	40-63	0.035	125	PT42 *(page 51)*
TFI353-800	2000-2400	945(85)	18	1.40	0.56	1000	1000	4.0	32-63	0.020	125	PT53-1 *(page 52)*
TFI163-1250	2000-2400	1258(85)	24	1.25	0.28	1000	1000	4.0	50-63	0.015	125	PT63 *(page 52)*
TFI273-1600	2000-2400	1704(85)	32	1.25	0.21	1000	1000	4.0	50-63	0.011	125	PT73 *(page 52)*
TFI183-2500	2200-2400	2500(80)	40	1.35	0.146	1000	1000	3.2-4.0	40-63	0.008	125	PT83 *(page 52)*
TFI193-2500	2600-3000	2466(85)	50	1.43	0.175	1000	1000	3.2-4.0	63-100	0.0065	125	PT93 *(page 53)*

ASYMMETRIC THYRISTORS

Type	V_{DRM} / V_{RRM}	$I_{T(AV)}$ (T_C,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_{gt} typ	t_q typ	$R_{th(j-c)}$	T_{jmax}	Case
	V	A	кА	V	mΩ	A/μs	V/μs	μs	μs	°C/W	°C	
TAF123-250	600-1300/7	250(92)	2.70	1.20	0.95	1000	1000	3.2	8-16	0.070	125	PT21 (page 51)
TAF133-500	600-1300/7	500(93)	5.50	1.10	0.55	1000	1000	3.2	8-16	0.035	125	PT31 (page 51)
TAF143-800	600-1300/7	800(86)	10.5	1.1	0.25	1000	1000	3.2	16	0.028	125	PT41 (page 51)
TAF153-800	3000-3400/7	815(85)	16.0	1.65	0.40	1000	1000	3.2	50	0.020	125	PT53 *(page 52)*
TAF153-1000	2400-2800/7	1000(81)	16.0	1.35	0.35	1000	1000	3.2	50	0.020	125	
TAF253-1000	1000-1400/7	1000(80)	16.0	1.60	0.25	1000	1000	3.2	10	0.020	125	

OPTOTHYRISTORS

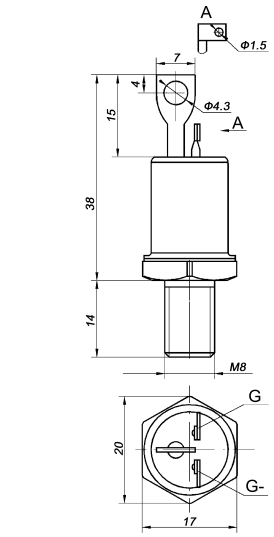
Features:

- Control through integrated GaAs LED
- Isolated base plate
- Direct control with logic elements available
- Interference immunity

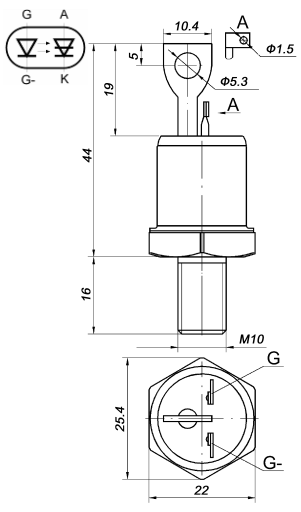
Applications:

- AC controllers (temperature control, DC motor speed control)
- Controlled switches
- Mashine-tool construction (asynchronous motor control in switch mode)
- High current relays

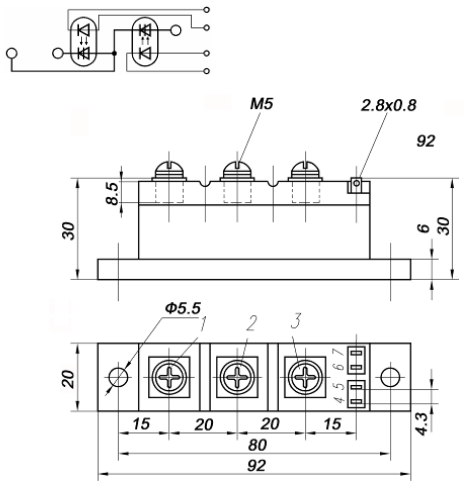
Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ (T_C,°C)	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	V_{MG}	Case
	V	A	кА	V	mΩ	A/μs	V/μs	μs	°C/W	°C	V	
Stud design												
TO232-25	100-1200	25(70)	0.60	1.15	8.0	160	50-1000	160	0.70	100	2800	ST3-1
TO232-40	100-1200	40(70)	0.75	1.05	5.5	160	50-1000	160	0.47			
TO242-50	100-1200	50(70)	0.80	1.00	5.4	160	50-1000	160	0.36	100	3000	ST4-1
TO242-63	100-1200	63(70)	1.20	1.00	3.8	160	50-1000	160	0.30			
TO242-80	100-1200	80(70)	1.35	0.95	3.0	160	50-1000	160	0.24			
Modules												
M2TOTO-40	400-1200	40(70)	1.25	0.85	8.0	160	20-1000	160	0.60	110	2500	MTD1
M2TOTO-63	400-1200	63(70)	1.45	0.85	3.4	160	20-1000	160	0.46			
M2TOTO-80	400-1200	80(60)	1.50	0.85	2.2	160	20-1000	160	0.45			



ST3-1
w = 26.5 g V_{MG} = 2800 V



ST4-1
w = 48.5 g V_{MG} = 3000 V



MTD1
w = 200 g V_{isol} = 2500 V

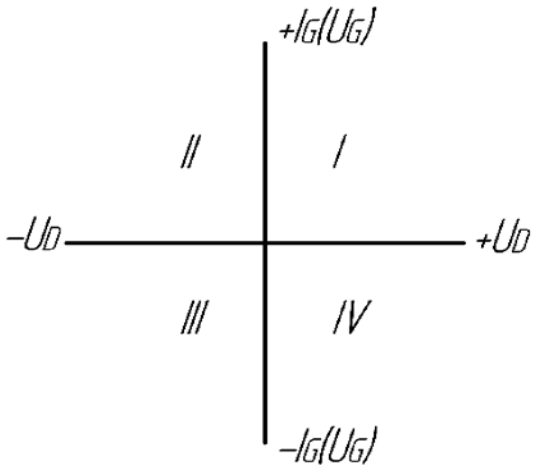
TRIACS

Features:

- Controlled AC switch integrated in one Si wafer. One gate interface
- One-pole and two-pole control
- Stud, press-pack and module design
- Low cost, high reliability (one triac substitutes two thyristors)

Applications:

- Industry and consume systems
- Lighting appliance control
- Thermal equipment (temperature control)
- Motor speed control
- Welding equipment
- Medical equipment



Triggering quadrants

SYMMETRIC THYRISTORS – TRIACS (UNIPOLAR TRIGGERING)

with positive gate current triggered by any anode voltage polarity (±V_D) – 1 and 2 quadrant

Type	V_{DRM}, V_{RRM}	I_{TRMS} T_C=85°C	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{com}$ $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	M_d/F_m	Case
	V	A	κA	V	mΩ	A/μs	V/μs	°C/W	°C	Nm/ kN	
Discrete devices											
TS151-100	300-1300	100	1.0	1.50	3.50	6.3	6.3-100	0.220	125	10-20	ST5 *(page 50)*
TS151-125		125	1.2	1.15	3.50	6.3	6.3-100	0.220			
TS151-160		160	1.4	1.10	2.00	6.3	6.3-100	0.190			
TS161-160	200-1300	160	1.8	1.20	2.60	6.3	6.3-100	0.140	125	20-30	ST6 *(page 50)*
TS161-200		200	2.0	1.00	2.25	6.3	6.3-100	0.140			
TS171-250	200-1300	250	3.0	1.00	2.00	6.3	6.3-100	0.100	125	25-35	ST7 *(page 50)*
TS171-320		320	3.3	0.86	1.50	6.3	6.3-100	0.100			
TS133-500	300-1300	500	3.0	1.20	1.80	6.3	6.3-100	0.037	125	10	PT31 *(page 51)*
TS133-630		630	3.3	1.10	1.30	6.3	6.3-100	0.040			

Type	V_{DRM}, V_{RRM}	I_{TRMS} T_C=85°C	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{com}$ $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	κA	V	mΩ	A/μs	V/μs	°C/W	°C	V	
Modules											
M2TS-125	200-1300	125	1.6	1.10	2.7	6.3	6.3-100	0.200	125	2500	MTD2 *(page 48)*
M2TS-160	200-1300	160	1.8	1.05	2.3	6.3	6.3-100	0.180			
M2TS-200	300-1400	200	2.7	1.05	2.0	6.3	6.3-100	0.150	125	3000	MTD3 *(page 48)*
M2TS-250	300-1400	250	3.0	1.00	1.5	6.3	6.3-100	0.120			

SYMMETRIC THYRISTORS – TRIACS (BIPOLAR TRIGGERING)

with negative gate current triggered by any anode voltage polarity (±V_D) – 3 and 4 quadrant
and with positive gate current triggered by positive anode voltage (+V_D) – 1 quadrant

Type	V_{DRM}, V_{RRM}	I_{TRMS} T_C=85°C	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{com}$ $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	M_d/F_m	Case
	V	A	κA	V	mΩ	A/μs	V/μs	°C/W	°C	Nm/ kN	
Discrete devices											
TS212-10	100-1300	10	0.07	1.20	46	50	2.5-50	2.50	125	0.9-1.1	ST1 *(page 50)*
TS212-16	100-1300	16	0.10	1.20	29	50	2.5-50	1.55			
TS222-20	100-1300	20	0.12	1.10	27	50	2.5-50	1.30	125	1.4-1.8	ST2 *(page 50)*
TS222-25	100-1300	25	0.20	1.10	21	50	2.5-50	0.90			
TS232-40	100-1300	40	0.25	1.00	15	63	2.5-100	0.65	125	5.3-5.7	ST3 *(page 50)*
TS232-50	100-1300	50	0.45	1.00	12	63	2.5-100	0.52			
TS242-63	100-1300	63	0.48	0.90	10	63	2.5-100	0.44	125	9-11	ST4 *(page 50)*
TS242-80	100-1300	80	0.58	0.90	8	63	2.5-100	0.34			
TS251-100	300-1400	100	1.0	1.50	3.5	25	6.3-100	0.22	125	10-20	ST5 *(page 50)*
TS251-125	300-1400	125	1.2	1.15	3.5	25	6.3-100	0.22			
TS251-160	300-1300	160	1.4	1.10	2.0	25	6.3-100	0.19			
TS261-160	300-1400	160	2.0	1.15	2.74	25	6.3-100	0.14	125	20-30	ST6 *(page 50)*
TS261-200	300-1400	200	2.0	1.00	2.25	25	6.3-100	0.14			
TS271-250	300-1400	250	3.0	1.00	1.98	25	6.3-100	0.10	125	25-35	ST7 *(page 50)*
TS271-320	300-1400	320	3.3	0.86	1.50	25	6.3-100	0.10			
TS233-500	300-1400	500	3.0	1.20	1.80	25	6.3-100	0.037	125	10	PT31 *(page 51)*
TS233-630	300-1400	630	3.3	1.10	1.30	25	6.3-100	0.037			
TS143-800	300-1400	800	4.5	0.92	0.90	25	6.3-100	0.030	125	15	PT41 *(page 51)*
TS143-1000	300-1200	1000	5.0	0.90	0.61	25	6.3-100	0.028			

Type	V_{DRM}, V_{RRM}	I_{TRMS} T_C=85°C	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{com}$ $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	V_{isol}	Case
	V	A	κA	V	mΩ	A/μs	V/μs	°C/W	°C	V	
Modules											
MTSTS-40	100-1200	40	0.25	0.90	15	63	2.5-50	0.600	125	2500	MTD1 *(page 48)*
MTSTS-63	100-1200	63	0.48	0.90	9.0	63	2.5-50	0.460			
MTSTS-80	100-1200	80	0.58	0.90	6.0	63	2.5-50	0.390			
M2TS2-125	300-1400	125	1.60	1.10	2.7	25	6.3-100	0.200	125	2500	MTD2 *(page 48)*
M2TS2-160	300-1400	160	1.80	1.05	2.3	25	6.3-100	0.180			
M2TS2-200	200-1300	200	2.70	1.05	2.0	25	6.3-100	0.150	125	3000	MTD3 *(page 48)*
M2TS2-250	200-1300	250	3.00	1.00	1.5	25	6.3-100	0.120			
M1TS-400	300-1400	400	5.0	1.0	1.0	25	6.3-100	0.076	125	3000	MTD4 *(page 48)*
M1TS-500	300-1200	500	5.5	1.0	0.67	25	6.3-100	0.064			

DIODES

Features:

- Voltage range of 100 to 10000 V
- Current range of 10 to 10200 A
- High reability
- Optimized for low on-state voltage drop and for low reverse recovery charge
- Precision control Q_{RR}, V_{FM} for series and parallel connection
- Broad range of housings:

- presspack;
- stud (ceramic-metal and metal-glass);
- flange

- Product portfolio:

- rectifier diodes;
- fast recovery diodes;
- welding diodes;
- avalanche diodes;
- silicon surge voltage suppressors

Applications:

- Industrial AC and DC drives
- Oil-gas production and transport
- Power converters for traction
- Induction melting and heating
- Welding
- Electroplating
- Lighting equipment
- Uncontrollable and half-controlled rectifier bridges
- Inverters, choppers
- Uninterruptible supplies

RECTIFIER DIODES (STUD DESIGN)

Type	V_{RRM}	$I_{F(AV)}$ (T_C,°C)	I_{FSM} t_p=10 ms	V_{TO} $T_{j\,max}$	r_T $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	M_d	Case
	V	A	κA	V	mΩ	°C/W	°C	Nm	
D212-10, D212-10X	100-1600	10(150)	0.25	0.94	19.600	2.70	190	0.9-1.1	SD1 *(page 56)*
D212-16, D212-16X	100-1600	16(150)	0.27	0.84	11.250	1.90			
D212-25, D212-25X	100-1600	25(150)	0.34	0.78	8.150	1.25			
D222-32, D222-32X	100-1600	32(150)	0.46	0.86	6.500	0.90	190	1.4-1.8	SD2 *(page 56)*
D222-40, D222-40X	100-1600	40(150)	0.55	0.80	4.623	0.80			
D232-50, D232-50X	100-1600	50(150)	1.20	0.92	2.740	0.60	190	5.3-5,7	SD3 *(page 56)*
D232-63, D232-63X	100-1600	63(150)	1.30	0.82	2.850	0.50			
D232-80, D232-80X	100-1600	80(150)	1.30	0.76	2.360	0.40			
D141-100	300-1600	100(135)	2.20	0.95	1.600	0.40	190	6-10	SD4 *(page 56)*
D141-100X	300-1600	100(135)	2.00	0.95	1.600	0.40			
D151-125	300-1600	125(140)	3.00	0.90	1.300	0.30	190	10-20	SD5 *(page 56)*
D151-160	300-1600	160(140)	4.50	0.90	1.000	0.24			
D161-200	300-1800	200(145)	5.50	0.90	0.850	0.15	190	20-30	SD6 *(page 56)*
D161-200X	300-1600	200(125)	5.50	0.90	0.850	0.15			
D161-250	300-1800	250(140)	6.40	0.90	0.640	0.15			
D161-250X	300-1600	250(140)	6.40	0.90	0.765	0.14			
D161-320	300-1600	320(130)	7.50	0.90	0.500	0.15			
D161-320X	300-1600	320(130)	7.50	0.90	0.650	0.13			
D161-400	300-1600	400(124)	8.25	0.90	0.350	0.13			
D261-250	2400-2600	250(113)	5.50	0.88	0.590	0.15	160	20-30	SD6 *(page 56)*
D271-250	2600-3000	250(130)	5.50	1.02	0.510	0.090	160	25-35	SD7 *(page 56)*
D371-250	4000-4400	250(116)	5.40	1.34	0.980	0.090			
D271-320	2000-2600	320(123)	6.50	0.92	0.450	0.090			
D171-400	300-1800	400(145)	14.0	0.90	0.560	0.085	190		

RECTIFIER DIODES (PRESS PACK DESIGN)

Type	V_{RRM}	$I_{F(AV)}$ T_C=85°C	I_{FSM} t_p=10ms	V_{TO} $T_{j\,max}$	r_T $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	F_m	Case
	V	A	κA	V	mΩ	°C/W	°C	kN	
up to 1200V									
D123-630	200-1000	880	9.0	0.72	0.350	0.080	190	6	PD21 *(page 56)*
D133-1600	200-1000	1810	18	0.72	0.147	0.036	175	10	PD31 *(page 56)*
D143-2000	200-1000	2400	24	0.73	0.110	0.027	175	15	PD41 *(page 57)*
D153-6300	200-400	6930	50	0.80	0.026	0.011	180	22	PD50 *(page 57)*
D253-4000	200-1000	4100	65	0.82	0.037	0.017	190	26	PD53 *(page 57)*
D163-4000	200-1000	4700	55	0.73	0.040	0.015	175	33	PD63 *(page 57)*
D173-6300	200-1000	7530	75	0.73	0.025	0.010	175	45	PD73 *(page 57)*
up to 2200V									
D123-500	1000-2200	690	7.5	0.77	0.540	0.080	180	6	PD21 *(page 56)*
D133-1250	1200-2200	1480	16	0.77	0.250	0.036	180	10	PD31 *(page 56)*
D243-1600	1200-2200	2000	22	0.77	0.180	0.027	175	15	PD41 *(page 56)*
D153-2500	1200-2200	3440	37	0.77	0.080	0.018	175	26	PD53 *(page 57)*
D163-3200	1200-2200	4080	48	0.77	0.060	0.016	175	33	PD63 *(page 57)*
D173-5000	1200-2200	6410	65	0.77	0.040	0.010	175	45	PD73 *(page 57)*
D183-6300	1200-2200	7460	90	0.77	0.040	0.008	175	70	PD83 *(page 57)*
D193-8000	1200-2200	9100	98	0.85	0.029	0.0065	175	80	PD93 *(page 57)*
up to 3400V									
D123-400	2400-3200	550	5.5	0.85	0.850	0.08	175	6	PD22 *(page 56)*
D233-1000	2400-3400	1240	11.0	0.85	0.380	0.036	175	10	PD32 *(page 56)*
D433-1000	2400-3400	1240	11.0	0.85	0.380	0.036	175	10	PD33 *(page 56)*
D243-1250	2400-3200	1640	18.5	0.85	0.290	0.027	175	15	PD42 *(page 57)*
D153-2000	2400-3200	2830	33.0	0.85	0.130	0.018	175	26	PD53 *(page 57)*
D163-2500	2400-3200	3380	42	0.85	0.097	0.016	175	33	PD63 *(page 57)*
D173-4000	2400-3200	5290	53	0.85	0.065	0.010	175	45	PD73 *(page 57)*
D183-5000	2400-3200	5690	80	0.85	0.080	0.008	175	70	PD83 *(page 57)*
D193-6300	2400-3200	8500	90	0.85	0.037	0.0065	175	80	PD93 *(page 57)*

RECTIFIER DIODES (PRESS PACK DESIGN)

Type	V_{RRM}	$I_{F(AV)}$ T_C=85°C	I_{FSM} t_p=10ms	V_{TO} $T_{j\,max}$	r_T $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	F_m	Case
	V	A	κA	V	mΩ	°C/W	°C	kN	
up to 4400V									
D123-320	3400-4200	410	4.2	0.87	1.370	0.080	150	6	PD22 *(page 56)*
D223-400	3400-4200	530	5.5	0.85	0.850	0,085	150	6	PD23 *(page 56)*
D233-800	3400-4400	920	7.5	0.90	0.599	0.036	160	10	PD32 *(page 56)*
D433-800	3400-4400	920	7.5	0.90	0.599	0.036	160	10	PD33 *(page 56)*
D343-1000	3400-4400	1210	13	0.90	0.460	0.027	160	15	PD42 *(page 56)*
D153-1600	3400-4200	2100	27	0.90	0.206	0.018	160	26	PD53 *(page 57)*
D163-2000	3400-4200	2520	31	0.90	0.154	0.016	160	33	PD63 *(page 57)*
D173-3200	3400-4400	3940	43	0.90	0.103	0.010	160	45	PD73 *(page 57)*
D183-4000	3400-4200	4680	60	0.90	0.095	0.008	160	70	PD83 *(page 57)*
D193-5000	3400-4200	7300	67	0.85	0.040	0.0065	160	80	PD93 *(page 57)*
up to 5200V									
D123-250	4400-5000	310	3.5	0.92	2.200	0.080	150	6	PD22 *(page 56)*
D223-320	4400-5000	364	4.2	0.87	1.370	0,085	160	6	PD23 *(page 56)*
D233-630	4400-5200	740	6.0	0.90	0.840	0.036	150	10	PD32 *(page 56)*
D433-630	4400-5200	740	6.0	0.90	0.840	0.036	150	10	PD33 *(page 56)*
D343-800	4400-5200	940	9.5	0.92	0.700	0.027	150	15	PD43 *(page 57)*
D153-1250	4400-5000	1650	25	0.92	0.310	0.018	150	26	PD53 *(page 57)*
D163-1600	4400-5000	1980	28	0.92	0.230	0.016	150	33	PD63 *(page 57)*
D173-2500	4400-5200	3060	37	0.95	0.155	0.010	150	45	PD73 *(page 57)*
D183-3200	4400-5000	4000	50	0.95	0.110	0.008	150	70	PD83 *(page 57)*
D193-4000	4400-5000	4950	58	0.94	0.088	0.0065	150	80	PD93 *(page 57)*
up to 6500V									
D123-200	5200-6000	240	3.0	1.0	3.100	0.080	140	6	PD22 *(page 56)*
D223-200	5200-6500	230	3.0	1.0	3.100	0.085	140	6	PD23 *(page 56)*
D223-250	5200-6000	300	3.5	0.92	2.200	0.085	150	6	PD23 *(page 56)*
D333-500	5200-6000	580	5.0	1.0	1.420	0.036	150	10	PD32 *(page 56)*
D433-500	5200-6000	580	5.0	1.0	1.420	0.036	150	10	PD33 *(page 56)*
D243-630	5200-6000	840	8.0	0.9	0.900	0.027	150	15	PD42 *(page 57)*
D443-630	5200-6000	840	8.0	0.9	0.90	0.027	150	15	PD43 *(page 57)*
D153-1000	5200-6000	1470	20	1.0	0.400	0.018	150	26	PD53 *(page 57)*
D163-1250	5200-6500	1490	21	1.0	0.350	0.016	140	33	PD63 *(page 57)*
D173-2000	5200-6500	2530	29	1.0	0.250	0.010	150	45	PD73 *(page 57)*
D183-2500	5200-6500	3170	40	1.0	0.200	0.008	150	70	PD83 *(page 57)*
D193-3200	5200-6500	4180	45	1.0	0.135	0.0065	150	80	PD93 *(page 57)*
up to 8000V									
D543-630	7000-8000	651	11	1.2	1.20	0.027	140	15	PD44 *(page 57)*
D453-800	7000-8000	933	23	1.2	0.90	0.018	140	26	PD54 *(page 57)*
D373-1600	7000-8000	1830	24	1.2	0.40	0.010	140	45	PD74 *(page 57)*
up to 10000V									
D543-500	9000-10000	560	10	1.5	1.50	0.027	140	15	PD44 *(page 57)*
D453-630	9000-10000	794	22	1.5	1.20	0.018	140	26	PD54 *(page 57)*
D373-1250	9000-10000	1403	23	1.5	0.70	0.010	140	45	PD74 *(page 57)*

FLANGE DESIGN HIGH VOLTAGE RECTIFIER DIODE D185-500

Type	V_{RRM}	$I_{F(AV)}$ T_C=100°C	I_{FSM} t_p=10ms	V_{TO} $T_{j\,max}$	r_T $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	F_m	w	Case
	V	A	κA	V	mΩ	°C/W	°C	Nm	g	
D185-500	3200-4000	614	15	0.95	0.43	0.061	160	16	620	FD3 *(page 56)*

AVALANCHE DIODES

Type	V_{RRM}	$I_{F(AV)}$ (T_C,°C)	I_{FSM} t_p=10 ms	V_{TO} $T_{j\,max}$	r_T $T_{j\,max}$	P_{RSM} t_p=100 µs	$R_{th(j-c)}$	$T_{j\,max}$	M_d/F_m	Case
	V	A	кА	V	mΩ	kW	°C/W	°C	Nm/ kN	
up to 1800V										
DA212-10, DA212-10X	400-1600	10(120)	0.25	1.03	16.20	2.5	2.700	160	0.9-1.1	SD1 *(page 56)*
DA212-16, DA212-16X	400-1600	16(120)	0.27	0.93	9.15	2.5	1.900			
DA212-25, DA212-25X	400-1600	25(120)	0.34	0.83	7.35	2.5	1.250			
DA222-32, DA222-32X	400-1600	32(120)	0.46	0.91	5.83	3.0	0.900	160	1.4-1.8	SD2 *(page 56)*
DA222-40, DA222-40X	400-1600	40(120)	0.55	0.82	4.38	3.0	0.800			
DA232-50, DA232-50X	400-1600	50(120)	1.2	0.97	2.86	5.0	0.600	160	5.0-6.2	SD3 *(page 56)*
DA232-63, DA232-63X	400-1600	63(120)	1.3	0.87	2.51	5.0	0.500			
DA232-80, DA232-80X	400-1600	80(120)	1.3	0.78	2.12	5.0	0.400			
DA161-200	400-1800	200(115)	7.5	0.92	0.680	16	0.130	150	20-30	SD6 *(page 56)*
DA171-320	400-1800	320(115)	10	1.00	0.500	16	0.085	150	25-35	SD7 *(page 56)*
DA123-320	400-1600	320(113)	5.5	0.90	0.830	16	0.075	150	6	PD21 *(page 56)*
DA133-500	400-1600	500(123)	12	0.85	0.410	16	0.040	150	10	PD32 *(page 56)*
DA153-2000	1600-2000	200(100)	30	0.90	0.185	16	0.020	175	22	PD53 *(page 57)*
up to 2800V										
DA243-1000	2000-2600	1100(110)	14	0.85	0.30	16	0.027	160	15	PD42 *(page 57)*
DA153-1600	2200-2600	1600(100)	26	1.00	0.30	16	0.020	175	22	PD53 *(page 57)*
DA253-2500	1600-2800	2500(90)	36	0.88	0.130	20	0.020	175	22	
DA173-4000	1600-2400	3860(100)	50	1.00	0.08	16	0.011	175	45	PD73 *(page 57)*
up to 3600V										
DA243-800	2800-3400	880(110)	11	1.00	0.50	16	0.027	160	15	PD42 *(page 57)*
DA153-1250	2200-3200	1250(115)	26	1.10	0.35	16	0.020	175	22	PD53 *(page 57)*
DA253-1600	2200-3600	1600(115)	32	0.90	0.189	20	0.020	175	22	
DA173-3200	2400-3200	3200(105)	45	1.10	0.124	16	0.011	175	45	PD73 *(page 57)*
up to 4500V										
DA243-630	3600-4400	760(110)	9	1.10	0.700	16	0.027	160	15	PD42 *(page 57)*
DA253-1250	3200-4500	1250(100)	28	1.32	0.440	20	0.020	175	22	PD53 *(page 57)*
up to 5200V										
DA153-1000	3800-5000	1000(122)	18	1.30	0.540	16	0.020	175	22	PD53 *(page 57)*
up to 6000V										
DA153-800	4400-6000	800(90)	12	1.31	0.740	16	0.020	150	22	PD53 *(page 57)*

FAST RECOVERY DIODES

Type	V_{RRM}	$I_{F(AV)}$ (T_C,°C)	I_{FSM} t_p=10ms	V_{TO} $T_{j\,max}$	r_T $T_{j\,max}$	t_{rr} di/dt=-50A/µs	$R_{th(j-c)}$	$T_{j\,max}$	M_d/F_m	Case
	V	A	кА	V	mΩ	µs	°C/W	°C	Nm/ kN	
up to 1800V										
DF212-10, DF212-10X	400-1400	10 (100)	0.18	1.20	32.0	0.50 - 1.00	2.50	150	0.9-1.1	SD1 *(page 56)*
DF212-16. DF212-16X	400-1400	16 (100)	0.25	1.20	20.0	0.50 - 1.00	1.60			
DF212-20, DF212-20X	400-1400	20 (100)	0.31	1.20	16.0	0.63 - 1.00	1.20			
DF222-25, DF222-25X	400-1400	25 (100)	0.40	1.20	13.0	0.50 - 1.00	1.00	150	1.4-1.8	SD2 *(page 56)*
DF222-32, DF222-32X	400-1400	32 (100)	0.50	1.20	10.0	0.63 - 1.00	0.80			
DF232-40, DF232-40X	400-1400	40 (100)	0.60	1.20	8.0	0.50 - 1.00	0.60	150	5-6.2	SD3 *(page 56)*
DF232-50, DF232-50X	400-1400	50 (100)	0.75	1.20	6.0	0.63 - 1.00	0,50			
DF232-63, DF232-63X	400-1400	63 (100)	0.95	1.20	5.0	0.63 - 1.00	0.40			
DF141-80	400-1600	80 (79)	2.5	1.10	4.4	1.6	0.45	150	6-10	SD4 *(page 56)*
DF141-80X	400-1600	80 (79)	2.2	1.10	4.4	1.6	0.45			
DF151-125	400-1600	125 (92)	4.0	1.15	2.2	2.0	0.25	150	10-20	SD5 *(page 56)*
DF151-125X	400-1600	125 (92)	3.5	1.15	2.2	2.0	0.25	150		
DF351-160, DF351-160X	600-1400	160 (59)	3.5	1.40	1.56	3.2;4.0	0.25	140		
DF351-200, DF351-200X	600-1400	200 (60)	4.3	1.05	1.1	3.2;4.0	0.25	140		
DF361-250, DF361-250X	600-1400	250 (58)	4.5	1.20	1.6	3.2;4.0;5.0	0.15	140	20-30	SD6 *(page 56)*
DF361-320, DF361-320X	600-1400	320 (56)	5.3	0.80	1.2	3.2,4.0,5.0	0.15			
DF343-800	600-1800	800(80)	12.5	1.30	0.60	4.0;5.0;6.3;8.0	0.035	150	16	PD42 *(page 57)*
DF343-1000	600-1800	1000(77)	14.5	1.20	0.35	5.0;6.3;8.0	0.035	150		

FAST RECOVERY DIODES

Type	V_{RRM}	$I_{F(AV)}$ (T_C=85°C)	I_{FSM} t_p=10ms	V_{TO} $T_{j\,max}$	r_T $T_{j\,max}$	t_{rr} di/dt=-100A/µs	$R_{th(j-c)}$	$T_{j\,max}$	M_d/F_m	Case
	V	A	κA	V	mΩ	µs	°C/W	°C	Nm/ kN	
up to 2600V										
DF141-63	1600-2600	70	2.0	1.20	5.0	1.0; 2.0	0.45	150	6-10	SD4 *(page 56)*
DF141-63X	1600-2500	70	2.2	1.20	5.0	2.0	0.45			
DF323-250	1600-2400	390	4.5	1.10	0.96	4.0	0.08	150	4.5	PD21 *(page 56)*
DF423-250	1600-2600	390	4.0	1.10	0.96	2.5	0.08	150		
DF333-400	1600-2400	630	6.5	1.20	0.88	4.0	0.04	150	4.5	PD32 *(page 56)*
DF433-400	1600-2600	630	6.5	1.20	0.88	4.0	0.04	150		
DF443-500	1600-2600	900	12	0.95	0.50	6.3	0.035	150	16	PD42 *(page 57)*
DF453-1000	1600-2600	1230	25	1.10	0.50	2.0	0.020	150	24	PD53 *(page 57)*
DF273-2000	1000-2400	2980	48	1.05	0.127	3.2;4.0;5.0;6.3;	0.011	150	45	PD73 *(page 56)*
up to 3400V										
DF343-500	3000-3600	630	10.5	1.55	0.90	5.0	0.035	150	16	PD42 *(page 57)*
up to 4600V										
DF323-200	3000-4600	230	3.0	1.40	2.70	5.0	0.08	140	4.5	PD22 *(page 56)*
DF423-200	3000-4600	230	2.7	1.40	2.70	3.2	0.08	140		
DF443-320	3000-4600	670	5.0	1.35	0.60	8.0	0.035	140	16	PD42 *(page 57)*
DF353-800	3000-4600	860	9.5	1.40	0.84	6.3	0.020	140	24	PD53 *(page 57)*
DF453-800	3000-4600	863	16	1.40	0.84	2.5	0.020	140		
DF173-1600	3000-4500	1700	32	1.4	0.305	8.0	0.012	140	45	PD73-1 *(page 57)*
up to 6000V										
DF443-250	4000-6000	620	4.0	1.60	0.60	8.0	0.035	140	16	PD42 *(page 57)*

SILICON SURGE VOLTAGE SUPPRESSORS

Features:

- Diffusion p-n-p structure
- Symmetric blocking characteristics with avalanche breakdown capability

Applications:

- Effective protection against repetitive and non-repetitive over-voltages
- Applicable for operation with thyristors

Type	V_N	I_{DRM}, I_{RRM}	V_{BR}	E_A	β	$R_{th(j-c)}$	$T_{j\,max}$	M_d	F	Case
	V	mA	V	J	%/˚C	ºC/W	ºC	Nm	kN	
SVS261-10	600-1800	5	V_N+100	10.0	0.15	0.120	125	20-30	-	SD6 *(page 56)*
SVS223-15	1800-2200	10	V_N+100	15.0	0.15	0.080	125	-	5	PD22 *(page 56)*
SVS423-15	2200-4600	10	V_N+200	15.0	0.15	0.080	125			
SVS333-15	400-2200	10	V_N+100	15.0	0.15	0.036	125	-	10	PD32 *(page 56)*
SVS433-15	2400-4400	10	V_N+200	15.0	0.15	0.036	125			
SVS343-15	800-2200	20	V_N+100	15.0	0.15	0.027	125	-	15	PD42 *(page 57)*
SVS443-15	2600-4400	20	V_N+200	15.0	0.15	0.027	125			
SVS353-15	1600-2200	20	V_N+100	15.0	0.15	0.018	125	-	26	PD53 *(page 57)*
SVS453-15	2800-4400	20	V_N+200	15.0	0.15	0.018	125			

ROTOR DEVICES

Features:

- Voltage range of 400 to 2800 V
- Current range of 160 to 630 A
- Flange design (terminals – round copper flange (base plate) and copper pipe)
- Diodes of direct and reverse polarity
- By means of special arrangement centrifugal forces are applied not to silicon chip but to case, providing safe operation in large mechanical force conditions
- Product portfolio: thyristor and diodes

Applications:

- Brushless excitation systems of power electric machines

THYRISTOR

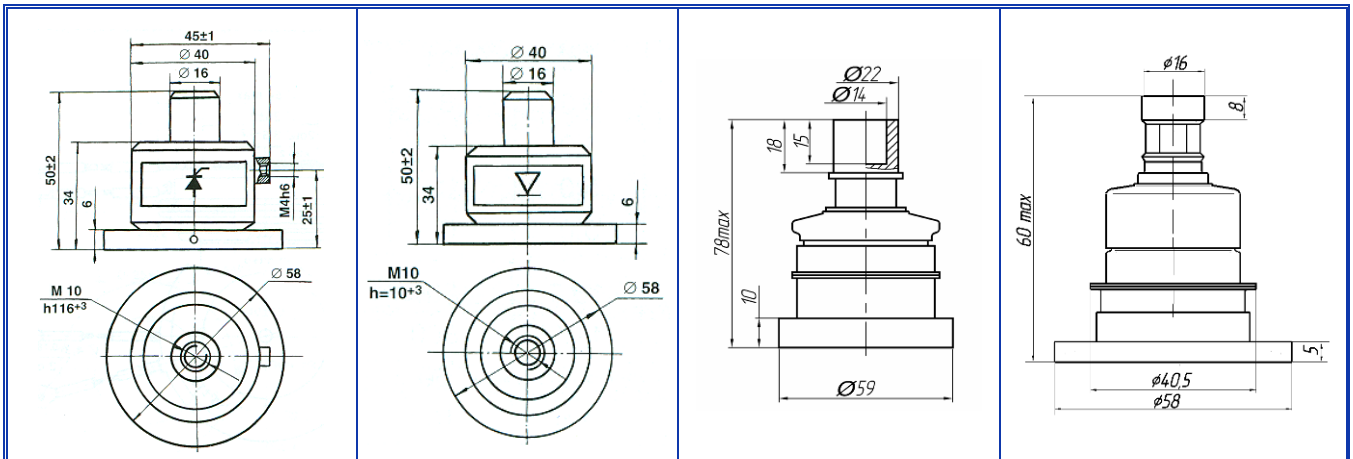
Type	V_{DRM}, V_{RRM}	$I_{T(AV)}$ T_C=85°C	I_{TSM} t_p=10ms	$V_{T(TO)}$ $T_{j\,max}$	r_T $T_{j\,max}$	$(di_T/dt)_{cr}$ $T_{j\,max}$	$(dv_D/dt)_{cr}$ $T_{j\,max}$	t_q typ	$R_{th(j-c)}$	$T_{j\,max}$	F_m	Case
	V	A	кА	V	mΩ	A/μs	V/μs	μs	°C/W	°C	Nm	
T2-160*	400-1000	160	3.5	1.13	0.94	100	20-1000	160	0.16	125	16	FT1

** - not for new design*

DIODES

Type	V_{RRM}	$I_{F(AV)}$ T_C=100ºC	I_{FSM} t_p=10ms	V_{TO} $T_{j\,max}$	r_T $T_{j\,max}$	$R_{th(j-c)}$	$T_{j\,max}$	F_m	Case
	V	A	кА	V	mΩ	°C/W	°C	Nm	
D105-630, D105-630X	2000-2800	630(100)	15	1.00	0.400	0.06	175	16	FD2
B6-200, B6-200X*	400-1600	200(100)	6	0.92	0.95	0.13	140	16	FD1
D275-200	2000-2600	200(139)	8	0.80	0.74	0.09	160	16	FD3
D275-200X	2000-2400	200(139)	8	0.80	0.74	0.09	160	16	FD3

** - not for new design*



FT1	FD1	FD2	FD3
w = 290 g	w = 290 g	w = 580 g	w = 330 g

PULSED POWER LIGHT TRIGGERED THYRISTORS (LTT)

Features:

- Optimized for low on-state voltage drop
- High pulse current values I_{TRM} and current rise rate di/dt
- High blocking voltage
- Low switching power loss

Applications:

- Pulse power switches for supply and protection systems of TOCAMACs, lasers, accelerators
- High power pulse generators of magnetic field
- Replacement for thyratrons and ignitrons

Type	V_{BO}	V_D, V_R	I_{TRM}, sin 180 el		$V_{T(TO)}$	r_T	$(di_T/dt)_{cr}$		t_q (typ)	$(dv_D/dt)_{cr}$	$R_{th(j-c)}$	F	Case
			t_p=700 μs	t_p=10 ms			f=1 Hz	f=50 Hz					
	V	V	кА	кА	V	mΩ	A/μs	A/μs	μs	V/μs	°C/W	kN	
TLI183-2000	6000-6500	4000-4500	65	20	1.20	0.39	5000	1000	630	1000-2000	0.0078	70	PTO84 *(page 55)*
TLI193-2000	7000-7200	5000	80	25	1.22	0.38	5000	1000	630	1000	0.0067	80	PTO95 *(page 55)*
TLI193-2500	4400-5000	3000	100	30	1.15	0.16	5000	1000	630	1600-2000	0.0065	80	

HIGH EFFICIENCY COOLING DEVICES FOR ALL SEMICONDUCTOR DEVICE TYPES:

- **AIR AND LIQUID COOLING**
- **ONE-SIDE AND TWO-SIDE COOLING**
- **MONOPLATES FOR MOUNTING AND COOLING OF POWER CIRCUIT BASED ON MODULES**

CLAMPING AND PRESSURE CONTROL SYSTEMS

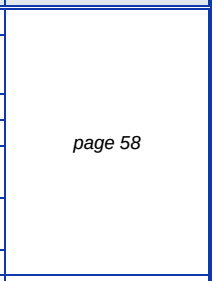
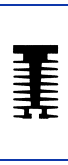
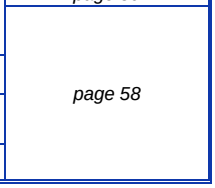
FASTENING PARTS

POWER BUSES

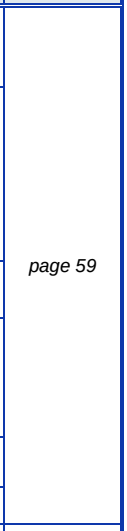
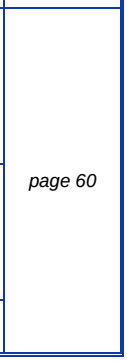
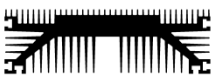
HEAT CONDUCTED ISOLATION PARTS

POTENTIALLESS TEMPERATURE SENSORS

AIR COOLING HEATSINKS FOR STUD DEVICES

Type	Cross section view	w	Thread	R_{thha} (P_F)		Δ_{ph}, (V_{cfh}=6 m/s)	For cases	Dimensions
				convection	V_{cfh}=6 m/s			
		g		°C/W(W)	°C/W	Pa		
O111		92	M5	5.60 (10)	-	-	SD1, ST1	 *page 58*
O121		92	M6	5.60 (10)	-	-	SD2, ST2	
O221		156	M6	2.80 (18)	-	-		
O131		157	M8	2.80 (18)	-	-	SD3. ST3,ST3-1	
O141		166	M10	2.80 (18)	-	-	SD4, ST4, ST4-1	
O231		369	M8	2.12 (30)	-		SD3, ST3, ST3-1	
O331		378	M8	2.12 (30)	0.670	15		
O241		375	M10	2.12 (30)	0.670	15	SD4, ST4, ST4-1	
O541		420	M10	1.90 (50)	0.670	15		
O151		420	M12	1.90 (50)	0.670	15	SD5, ST5	
O371		420	M20x1.5	1.90 (50)	0.670	15	SD6, ST6	*page 59*
O171		670	M20x1.5	1.12 (80)	0.355	18		 *page 58*
O181		700	M24x1.5	1.12 (80)	0.355	18	SD7, ST7	
O271		1750	M20x1.5	0.71 (130)	0.236	25	SD6, ST6	
O281		1750	M24x1.5	0.71 (130)	0.236	25	SD7, ST7	

AIR COOLING HEATSINKS FOR PRESS PACK DEVICES

Type	Cross section view	w	Contact surface diameter	R_{thha} (P_F)		Δ_{Ph}, V_{cfh}=6 m/s	For cases	Dimensions
				convection	V_{cfh}=6 m/s			
		g	mm	°C/W(W)	°C/W	Pa		
O232		1600	42	1.120 (80)	0.355	18	PD32, PD33 PT31,PT31-1,PT32	 *page 59*
O242		2400	55	0.670 (150)	0.236	25	PD42, PD43 PT41, PT42, PT43	
O342		3500	58	0.530 (150)	0.170	20		
O123		2000	22	0.710 (120)	0.212	20	PD22, PD23 PT21,PT21-1,PT23	
O143		3000	42	0.500 (120)	0.125	30	PD42, PD43 PT41, PT42, PT43	
O243		5800	42	0.280 (220)	0.080	30		
O153		6000	55	0.260 (220)	0.075	30	PD53 PT51,PT53,PT53-1	
O343		5300	42	0.355 (220)	0.100	30	PT41, PT42, PT43	
O253		5500	55	0.355 (220)	0.100	30	PD53 PT51,PT53,PT53-1	 *page 60*
O353		5700	55	0.355 (220)	0.100	30		
O453		6200	55	0.349 (230)	0.072	34		
O173		12000	76	0.195 (400)	0.060	35	PD63, PD73 PT63, PT73	
O273		13000	76	0.185 (400)	0.055	40		
O373		13000	76	0.185 (400)	0.055	40		
O473		25600	76	0.117 (400)	0.034	50		
O193		28000	100	0.110 (650)	0.030	50	PD94 PT83, PT93, PT94	

AIR COOLING HEATSINKS FOR POWER MODULES

- For power modules with currents of 40, 63, 80, 100, 125, 160, 200 A

Type	Cross section view	w	R_{thha} (P_F) convection	V_{cfh}=6 m/s	Δ_{Ph}, V_{cfh}=6 m/s	For cases	Dimensions
		g	°C/W (W)	°C/W	Pa		
O24		590	2.10(25)	0.48	25	MTD1, MTD2	*page 60*
O25		2170	0.75(80)	0.21	18	MI3, MI3-1	
O26		2180	0.74(85)	0.20	30	MTD3	*page 61*
O34		720	1.20(50)	0.31	25	MTD1, MTD2	
O35		1260	1.10(60)	0.23	30	MI3, MI3-1	
O36		990	1.15(55)	0.28	30	MTD3	
O45		1020	1,10(55)	0.23	30	MI3, MI3-1	
O46		2580	0.55(100)	0.18	30	MTD3	
O47		3250	0.40(150)	0.105	30	MTD5	

HIGH EFFICIENCY HEATSINKS FOR POWER MODULES

- For all power module types with insulated base plates (diode/thyristor/IGBT/SFRD modules and other)
- Optimum efficiency/volume ratio
- Heatsink length on request
- One heatsink can be mounted several modules

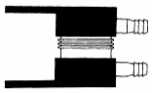
Type	Cross section view	Dimensions (width-length-height)	Module contact surface	Modules Number on heatsink	R_{thha} (P_F) convection	V_{cfh}= 6 m/s	Δ_{Ph}, V_{cfh}= 6 m/s	w	Dimensions
		mm	mm	n	°C/W (W)	°C/W	Pa	g	
O55/120		125x120x137	20x92	1	0.536 (140)	0.110	17	2300	*page 61*
				2	0.508 (140)	0.097			
				3	0.504 (140)	0.093			
O55/180		125x180x137	34x92	1	0.455 (160)	0.142	20	3500	
				2	0.423 (160)	0.106			
				3	0.407 (160)	0.093			
O55/265		125x265x137	50x92	1	0.338 (230)	0.091	25	5200	
				2	0.305 (230)	0.065			
				3	0.292 (260)	0.063			
O56		260x300x80	130x140	1	0.222 (340)	0.057	27	7500	
			140x190	1	0.210 (340)	0.051			
				2	0.207 (340)	0.043			
O57/300/300		300x300x88.5	130x140	1	0.208 (350)	0.060	43	9200	
				4	0.177 (400)	0.033			
O58/300/300		300x300x88.5	130x140	4	0.220 (400)	0.030	47	9500	

FLUID COOLING HEATSINKSFOR STUD DEVICES

- For stud devices series 161, 261, 361 (OM101)
- For stud devices series 171, 271, 371 (OM105)

Type	Cross section view	w	Thread	R_{thha} (water flow rate 3 l/min)	Δ_{Ph}, (water flaw rate 3 l/min)	For cases	Dimensions
		g		°C/W	Pa		
OM101		680	M20x1.5	0.110	7000	SD6, ST6	*page 62*
OM105		710	M24x1.5	0.085	11000	SD7, ST7	

FLUID COOLING HEATSINKS FOR PRESS PACK DEVICES

Type	Cross section view	w	Contact surface diamete	R_{thha} (water flow rate 3 l/min)	Δ_{Ph}, (water flow rate 3 l/min)	For cases	Dimensions
		g	mm	°C/W	Pa		
OM103		2000	50	0.0600	9000	PD32, PD33 PT31, PT31-1, PT32	*page 62*
OM104		2300	50	0.0300	18000	PD42, PD43, PD44 PT41, PT42, PT43	
OM106		3600	58	0.0200	18000	PD53, PD54 PT51, PT53, PT53-1	
OM107		10000	78	0.014	8000	PD73, PD73-1, PD74 PT73	
OM207		10000	78	0.0095	11000		
OM109		14000	102	0.011	9000	PD83, PD93 PT83, PT93, PT94	*page 63*
OM209		14000	102	0.0085	16000		

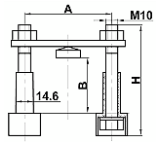
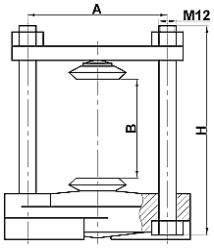
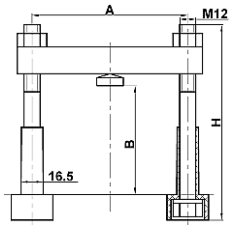
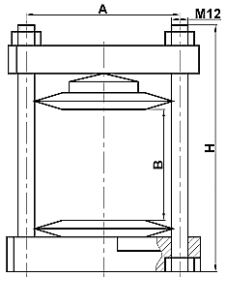
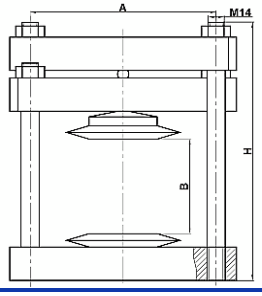
FLUID COOLING HEATSINKS FOR POWER MODULES

- Heatsinks OB15, OB16 are designed for waterfluid cooling of diode/thyristor modules with base plate width 20, 34, 50 mm
- HeatsinksOB17, OB18 are designed for water fluid cooling ofhigh power IGBT modules with base plates 130x140 mm and 140x190 mm

Type	Cross section view	w	R_{thha} (water flow rate 3 l/min)	Δ_{Ph}, (water flow rate 3 l/min)	Heatsink material	Dimensions
		g	°C/W	Pa		
OB15		250	0.065	10000	Copper	*page 63*
OB16		300	0.060	10000	Copper	
OB17		1300	0.022	7000	Aluminium	
OB18		1700	0.019	7000	Aluminium	
OB27		4700	0.010	18300	Copper	

CLAMPING SYSTEMS FOR PRESS PACK DIODES AND THYRISTORS

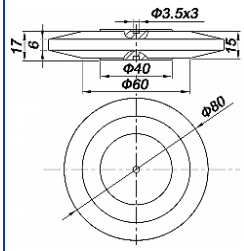
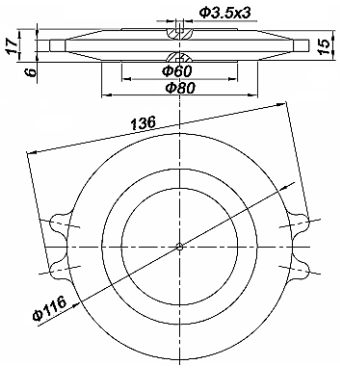
• For pressing of press-pack devices with contact surface diameters from 19 up to 100 mm with air and water heatsinks

Type	O123P	OM103P	OM104P	O243P	O153P	OM106P	OM107P	OM109P
A, mm	72	98	98	116	116	116	144	170
B, mm	44	50	70	70	76	80	76	85
H, mm	92	135	145	120	127	180	210	245
F, kN	4 ÷ 8	10 ÷ 17	10 ÷ 17	9 ÷ 17	20 ÷ 28	20 ÷ 28	48	80
V_{isol}, kV	5	5	5	5	5	5	5	5
w, g	230	330	340	420	660	2320	5500	8300
Outlines								

INSULATED CELLS

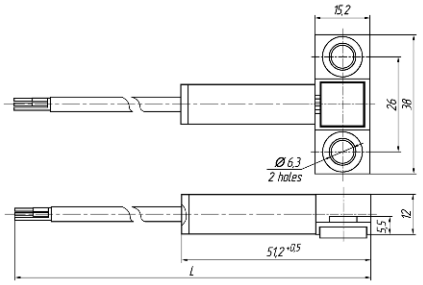
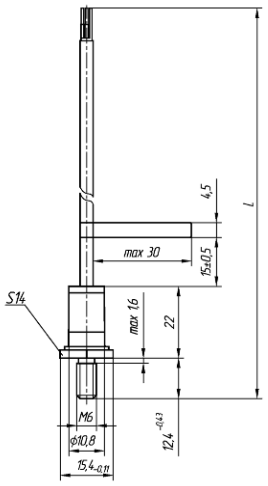
Features and applications:

- For insulation of press pack devices from cooling systems, allowing to place some devices on the same heatsink and to simplify converter design
- Optimum design for low thermal resistance
- Plastic housing, heat conductive insulation Al_2O_3 or AlN insulators

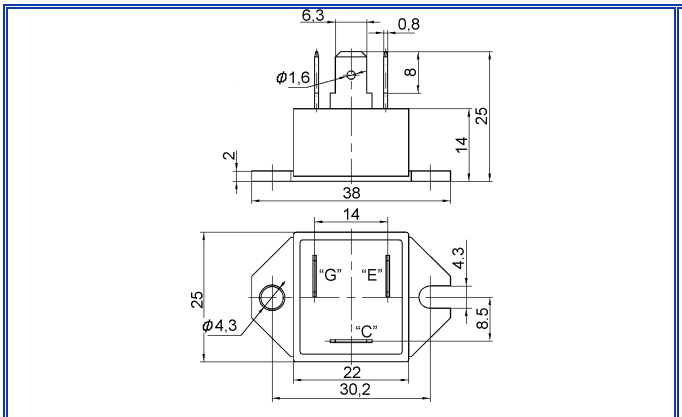
		IT40	IT60	IT60M▪
				
Weight	g	195	490	490
R_{th} (insulation material)	°C/W	0.172 (Al_2O_3)	0.151 (Al_2O_3)	0.075 (AlN)
F	kN	13.0÷16.0	24.0÷28.0	24.0÷28.0
V_{isol} (A.C.)	kV	10	10	10

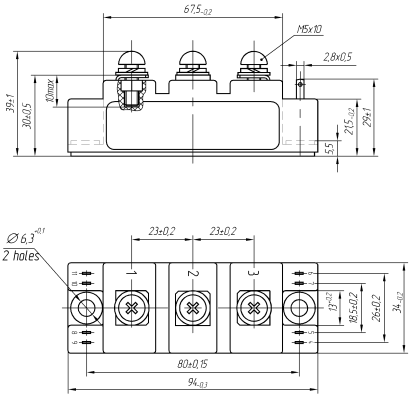
INSULATED TEMPERATURE SENSORS

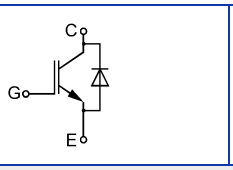
TMBA 1.6 (ANALOGUE), TMBC 4.6 (DIGITAL)

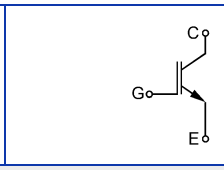
Type	TMBA 1.6		TMBC 4.6	
Features	• Base is insulated from signal terminals • Analogue output for temperature control • Internal amplification of analogue signal for interference damping • Screw clamping M5		• Base is insulated from signal terminals • Digital output signal for temperature control • 64-bit series code • 1-wire date exchange protocol • Stud design with threading M6	
Operation temperature, ºC	- 40…+ 125		- 55…+ 125	
Insulation voltage base - terminals, V (A.C.)	6000		6000	
Supply voltage, V	2,7÷5,5		3,0÷5,5	
Output signal stabilization maximum time by temperature sharp change from 25 ºC to 100 ºC, min	2		1,5	
Output signal	analogue		digital	
Signal transformation time in 12-bit digital code, uS ms	-		750	
Dimensions, mm				
	Length L, mm	Weight, g	Length L, mm	Weight, g
	370 +10	32	350 +10	23
	470 +10	35	450 +10	27
	670 +10	41	650 +10	33
	870 +10	47	850 +10	39
	1070 +10	53	1050 +10	45
	1270 +10	59	1250 +10	51

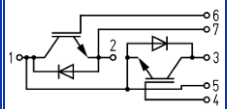
OUTLINES

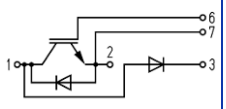


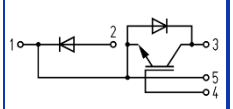






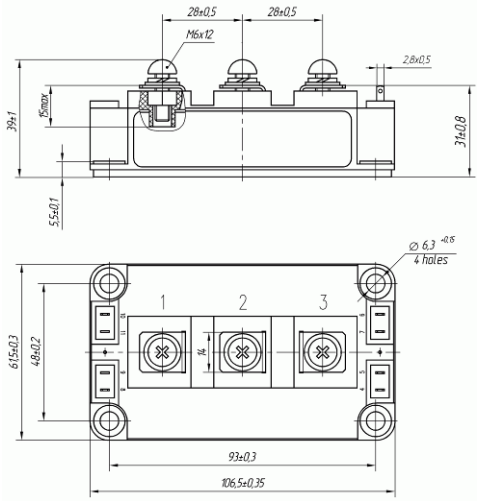


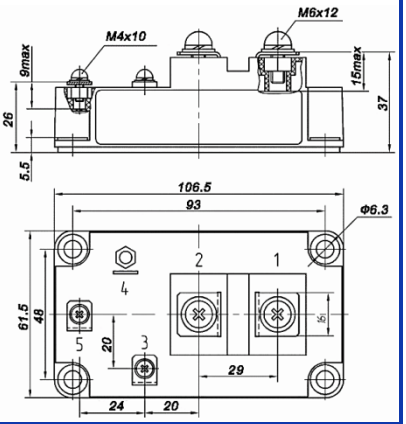


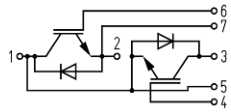


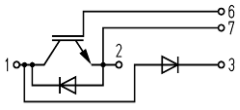
MI1 w = 25 g

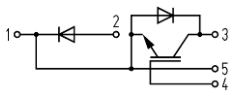
MI3 w = 165 g

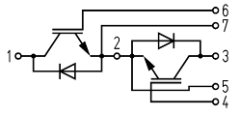


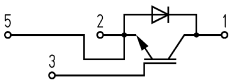






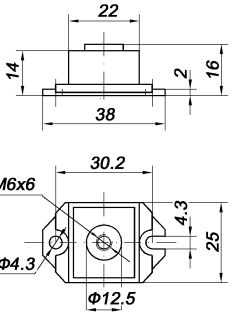






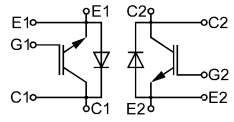
MI4 w = 350 g (290 g for T series)

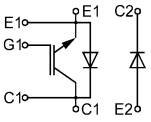
MI5 w = 350 g

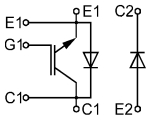


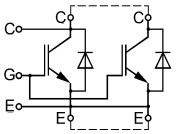
MPD1 w = 35 g

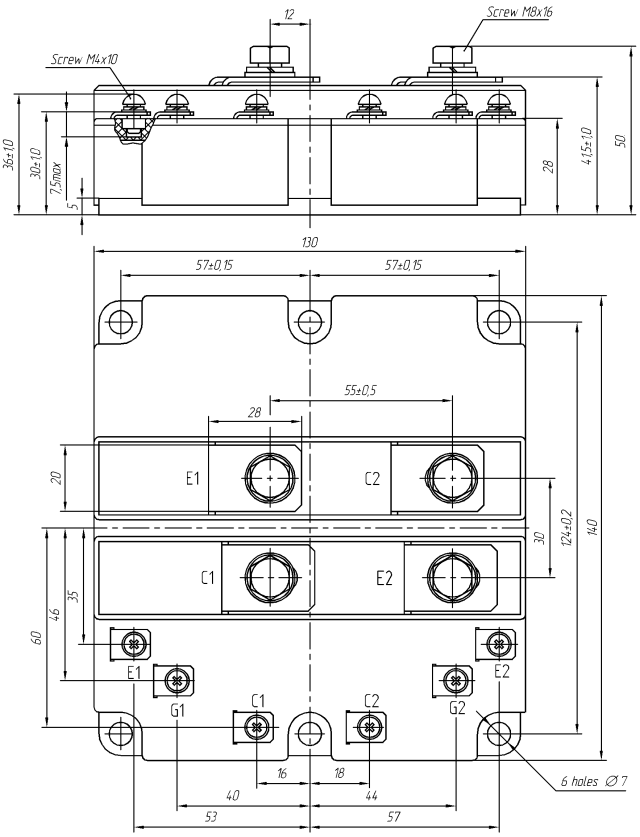
OUTLINES



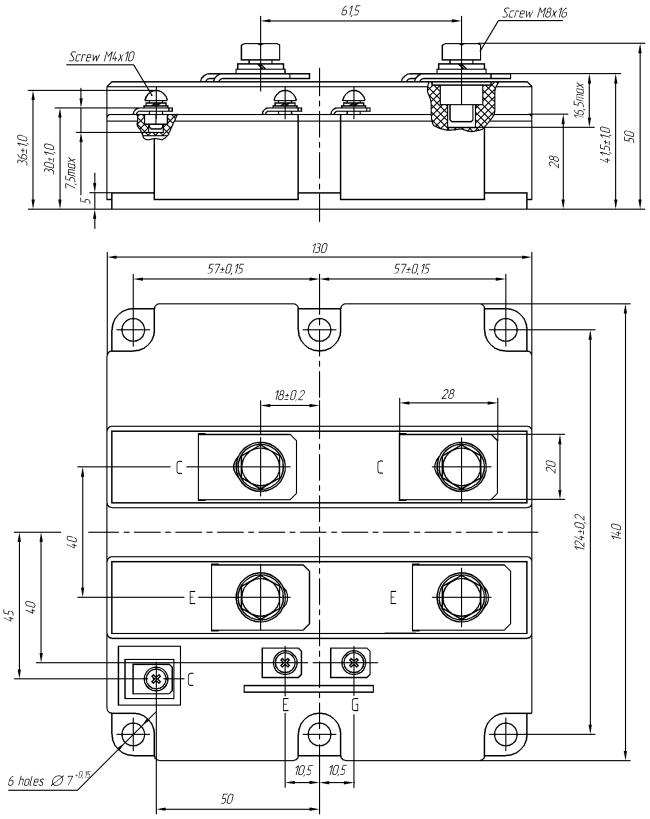




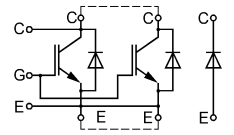


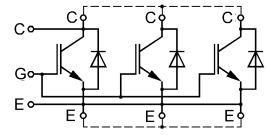


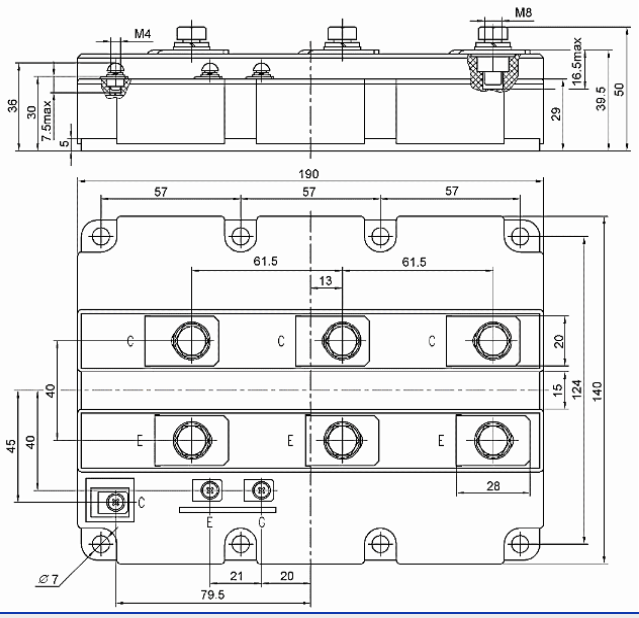
MI6 w = 1500 g (1100 g for T series)



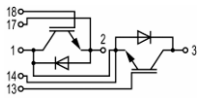
MI7 w = 1500 g (1100 g for T series)

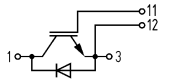


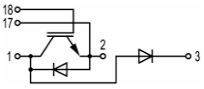


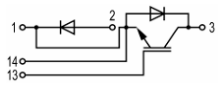


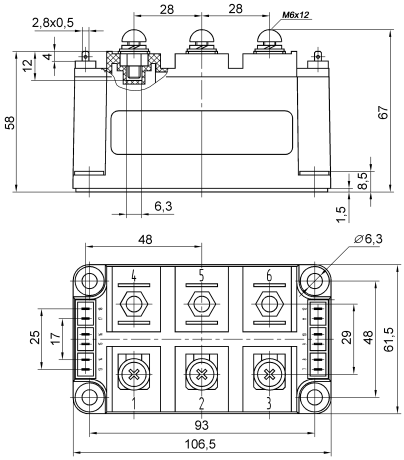
MI8 w = 2100 g (1600 g for T series)





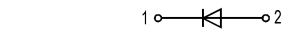


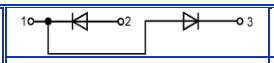




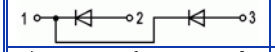
MI9 w = 370 g

OUTLINES

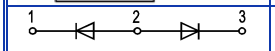




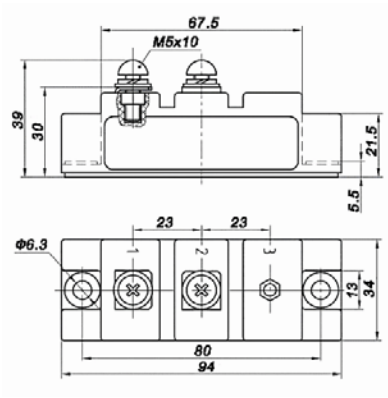
M2DF



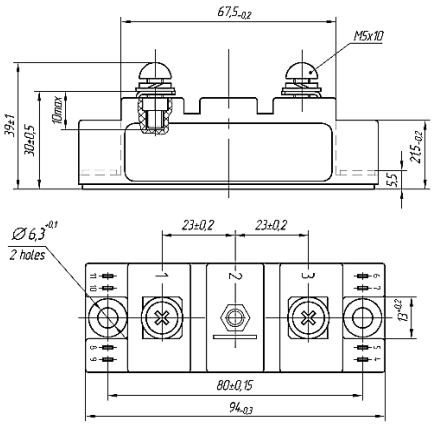
M2DFC



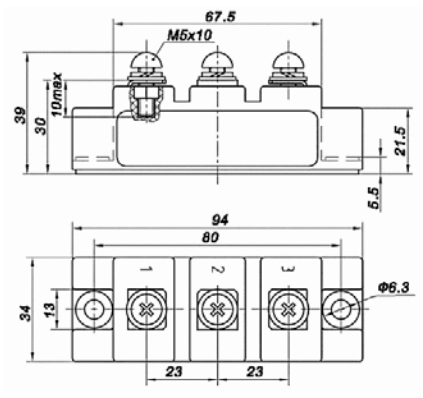
M2DFA



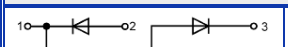
MI3-1 w = 165 g



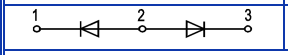
MI3-2 w = 165 g



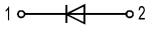
MI3-3 w = 165 g

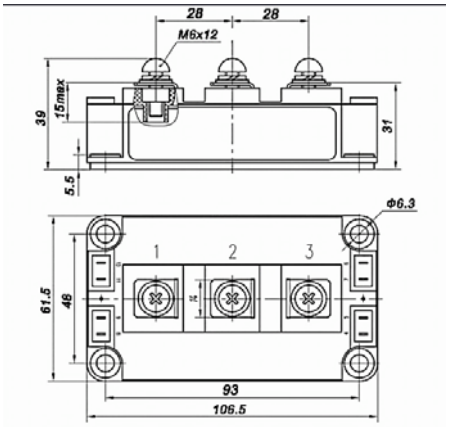


M2DF, M2DF2

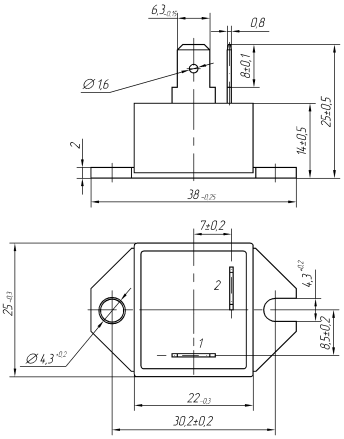


M2DFA

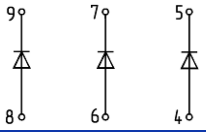


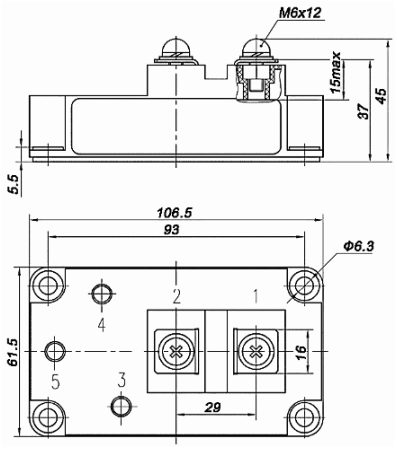


MI4-1 w = 350 g

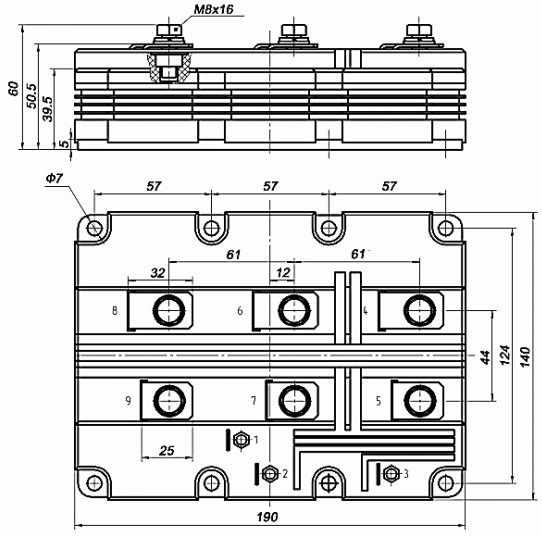


MI1-1 w = 25 g



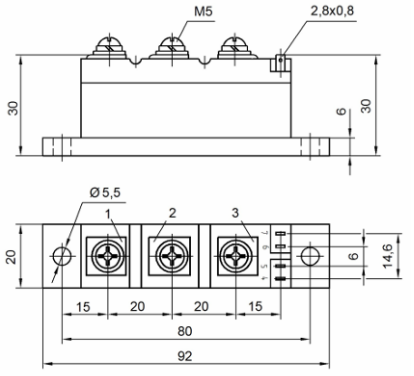


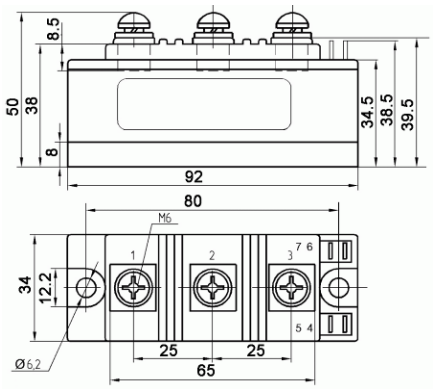
MI5-1 w = 350 g

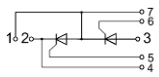
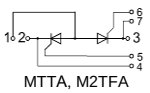
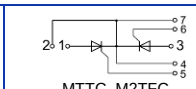
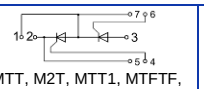
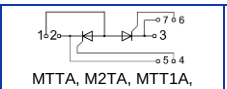
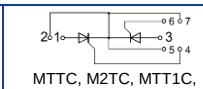
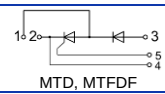
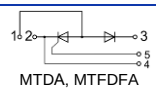
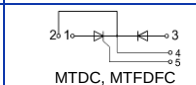
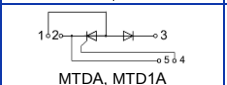
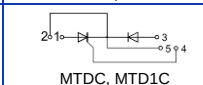
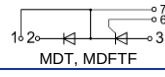
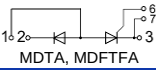
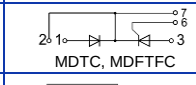
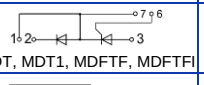
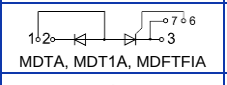
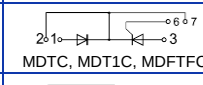
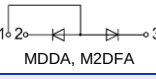
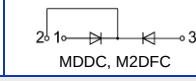
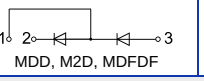
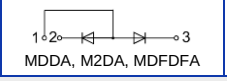
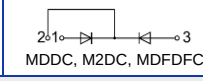


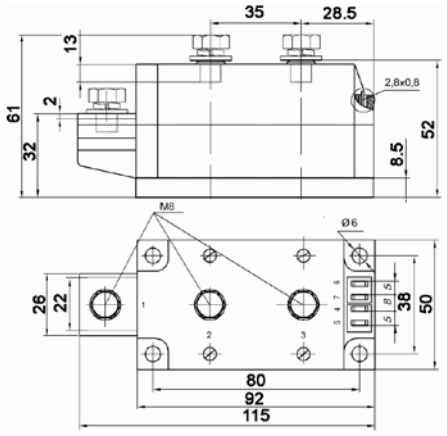
MI10-1 w = 2000 g

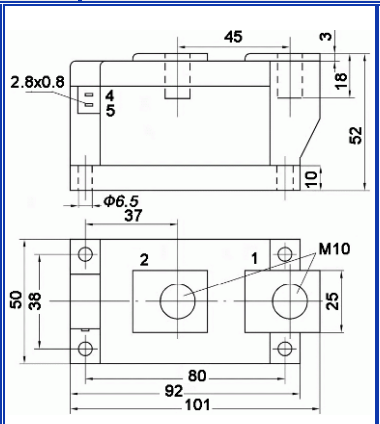
OUTLINES

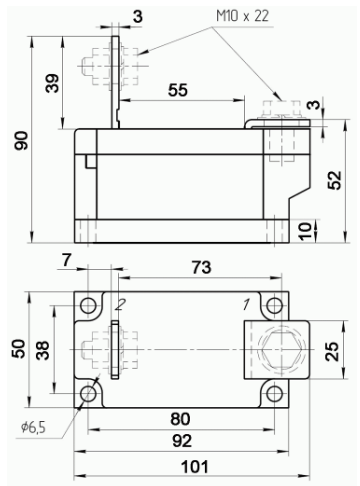


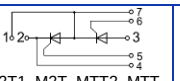
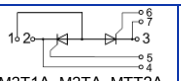
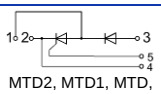
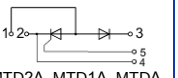
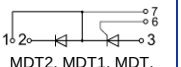
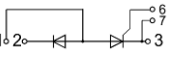
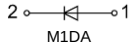


 MTT, M2TF	 MTTA, M2TFA	 MTTC, M2TFC	 MTT, M2T, MTT1, MTFTF, M2TFI	 MTTA, M2TA, MTT1A, MTFTFA, M2TFIA	 MTTC, M2TC, MTT1C, MTFTFC, M2TFIC
 MTD, MTFDF	 MTDA, MTFDFA	 MTDC, MTFDFC	 MTD, MTD1, MTFDF, MTFIDF	 MTDA, MTD1A	 MTDC, MTD1C
 MDT, MDFTF	 MDTA, MDFTFA	 MDTC, MDFTFC	 MDT, MDT1, MDFTF, MDFTFI	 MDTA, MDT1A, MDFTFIA	 MDTC, MDT1C, MDFTFC
 MDD, M2DF	 MDDA, M2DFA	 MDDC, M2DFC	 MDD, M2D, MDFDF	 MDDA, M2DA, MDFDFA	 MDDC, M2DC, MDFDFC
MTD1 w = 200 g			MTD2 w = 500 г.		

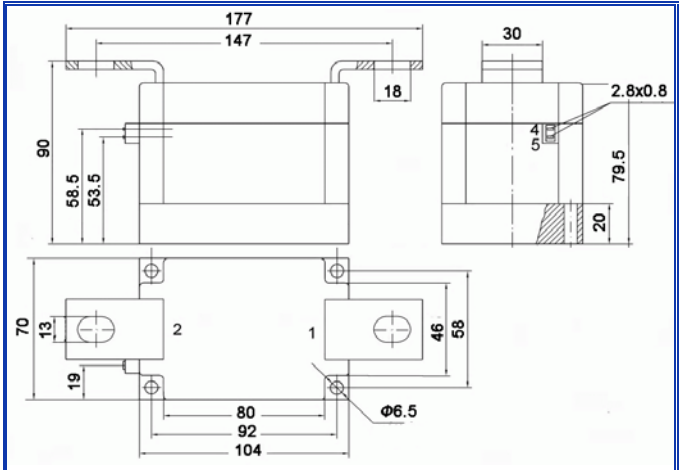


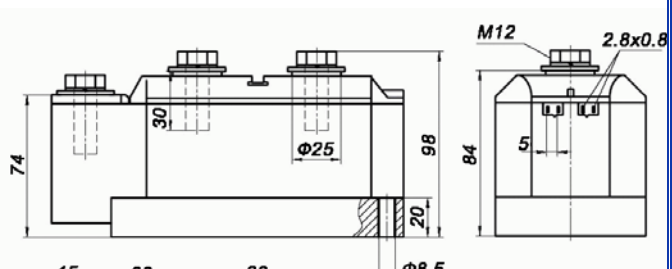




 M2T1, M2T, MTT2, MTT, M2TFI	 M2T1A, M2TA, MTT2A, MTTA, M2TFIA	 MTD2, MTD1, MTD, MTFDF, MTFIDF	 M1T, M1T1, МТФБ, M1TF, M1TFI	
 MTD2A, MTD1A, MTDA	 MDT2, MDT1, MDT, MDFTF, MDFTFI	 MDT2A, MDT1A, MDTA	 M1D1, M1D, M1ДД	 M1DA
 MDD, M2D	 MDA, M2DA			
MTD3 w = 800 g			MTD4 w = 900 g	MTD4-1 w = 900 g

OUTLINES





M1T2, M1T, M1T1, M1TF2, M1ТБ, M1TFI, M1TFI2

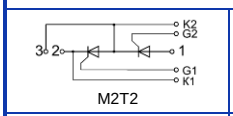
M1D2, M1Д, M1DF, MДЧ1

MTD6 w = 2300 g

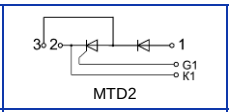
M1T, M1T2, M1TF, M1T3

M1D, M1DF

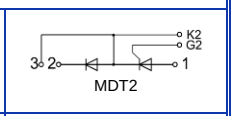
MTD8 w = 4300 g



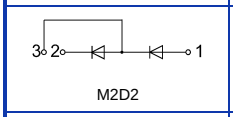
M2T2



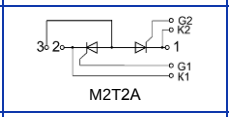
MTD2



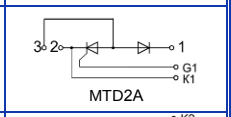
MDT2



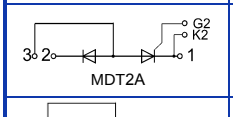
M2D2



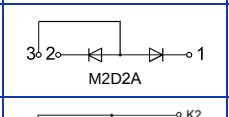
M2T2A



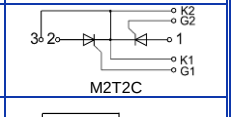
MTD2A



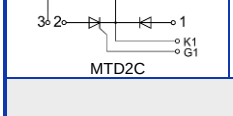
MDT2A



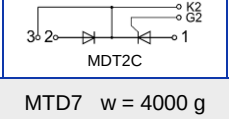
M2D2A



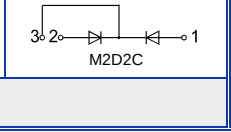
M2T2C



MTD2C

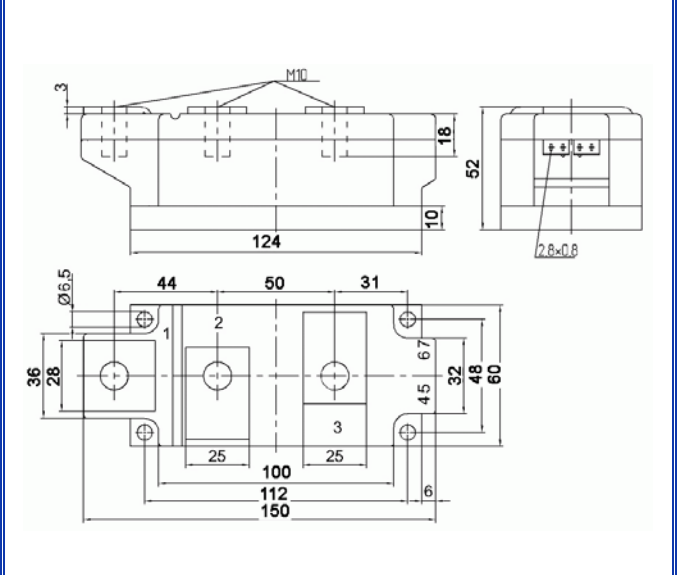


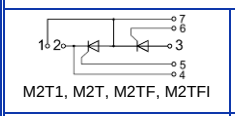
MDT2C



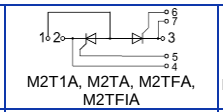
M2D2C

MTD7 w = 4000 g

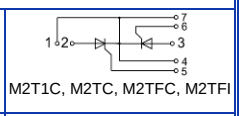




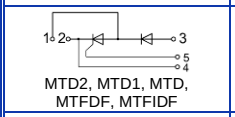
M2T1, M2T, M2TF, M2TFI



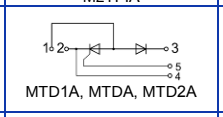
M2T1A, M2TA, M2TFA, M2TFIA



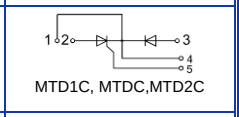
M2T1C, M2TC, M2TFC, M2TFI



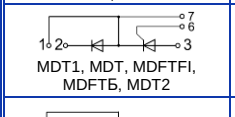
MTD2, MTD1, MTD, MTFDF, MTFIDF



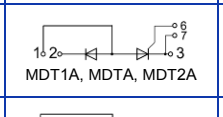
MTD1A, MTDA, MTD2A



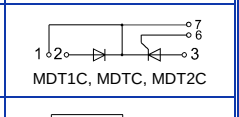
MTD1C, MTDC,MTD2C



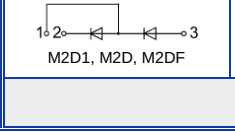
MDT1, MDT, MDFTFI, MDFTБ, MDT2



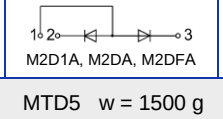
MDT1A, MDTA, MDT2A



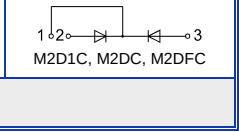
MDT1C, MDTC, MDT2C



M2D1, M2D, M2DF



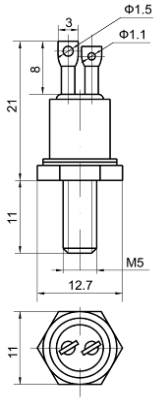
M2D1A, M2DA, M2DFA



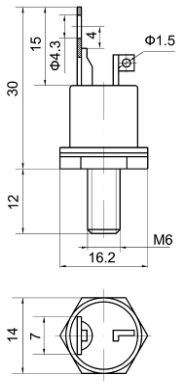
M2D1C, M2DC, M2DFC

MTD5 w = 1500 g

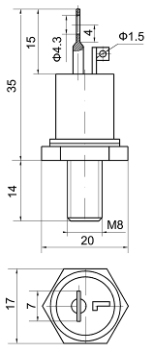
OUTLINES



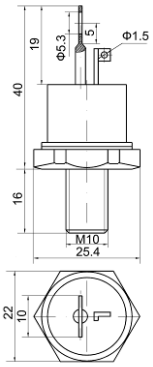
ST1 w = 6 g



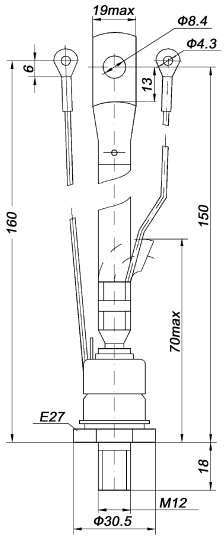
ST2 w = 11 g



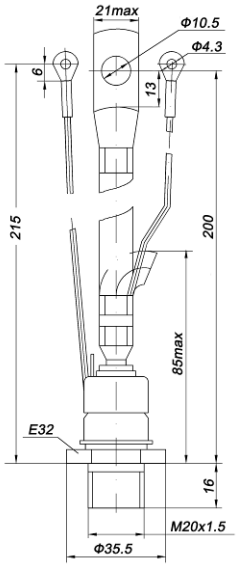
ST3 w = 23 g



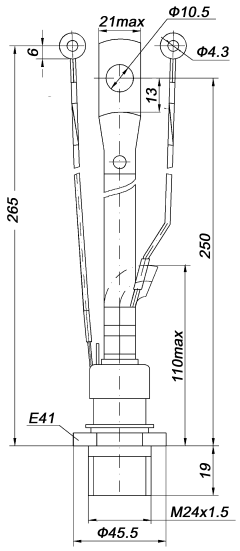
ST4 w = 50 g



ST5 w = 150 g

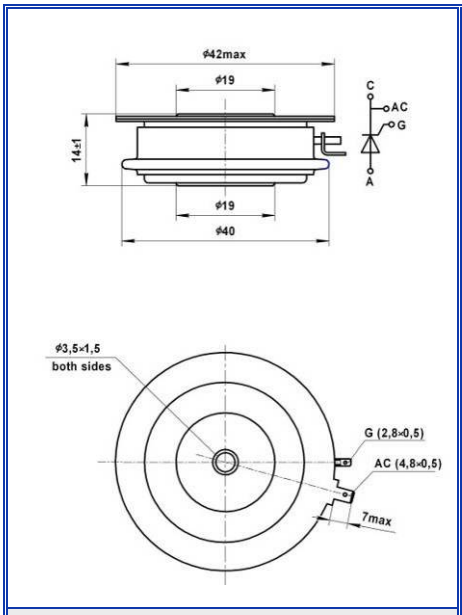


ST6 w = 240 g

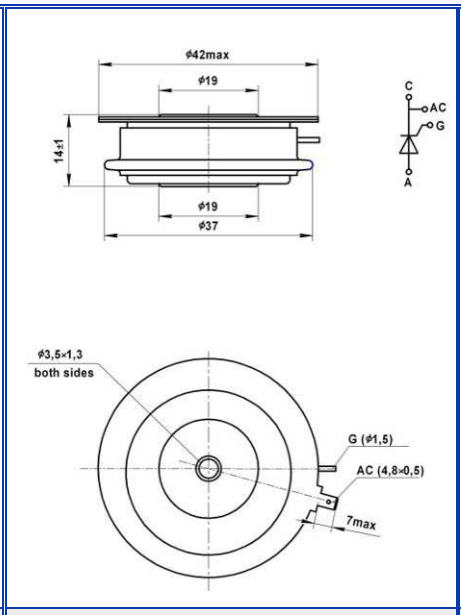


ST7 w = 440 g

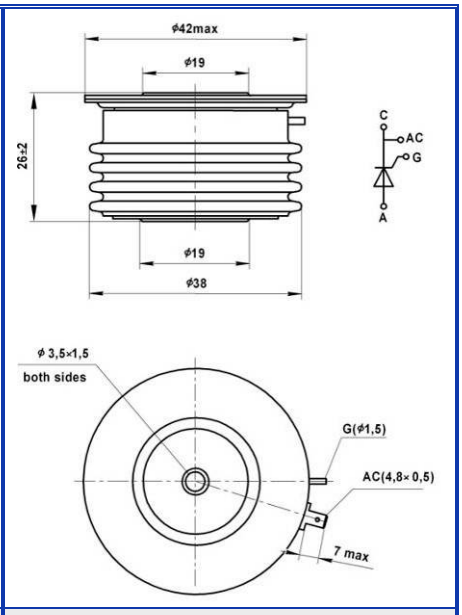
OUTLINES



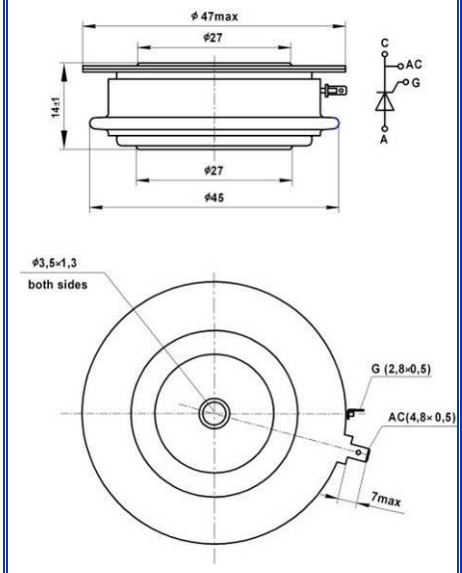
PT21 w = 70 g



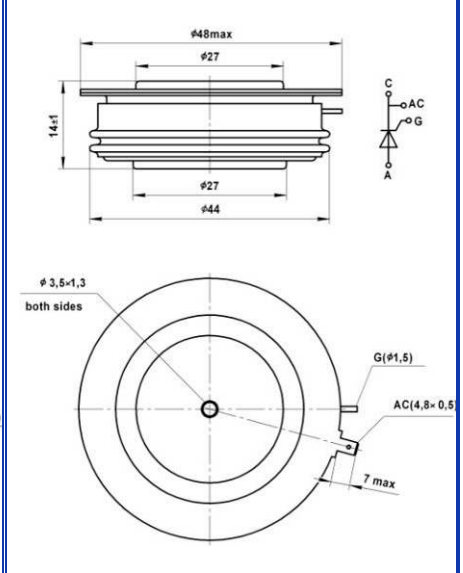
PT21-1 w = 70 g



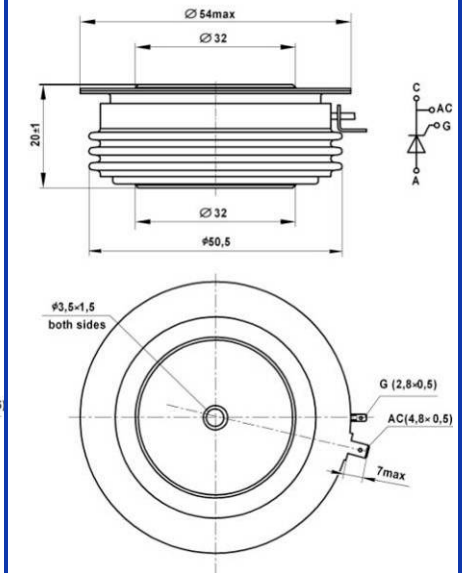
PT23 w = 100 g



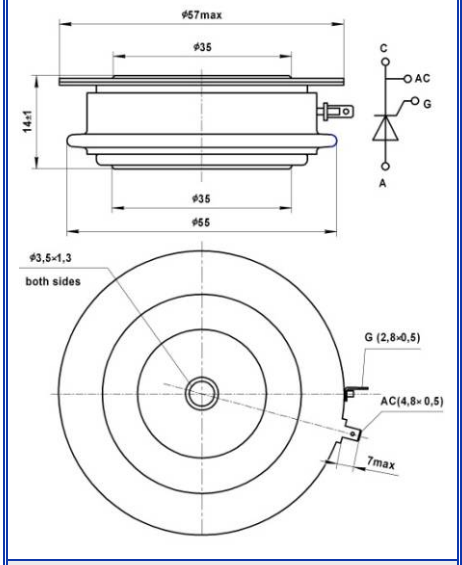
PT31 w = 100 g



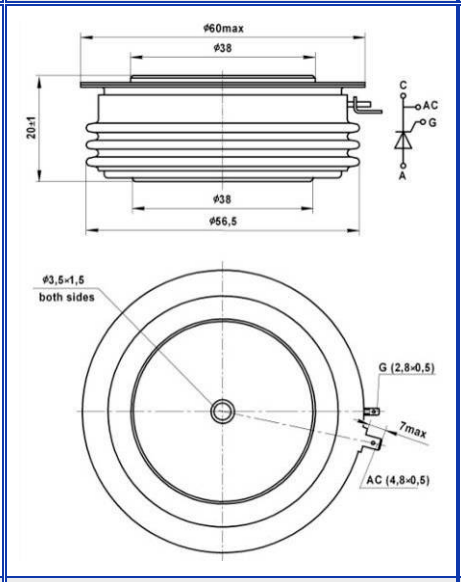
PT31-1 w = 100 g



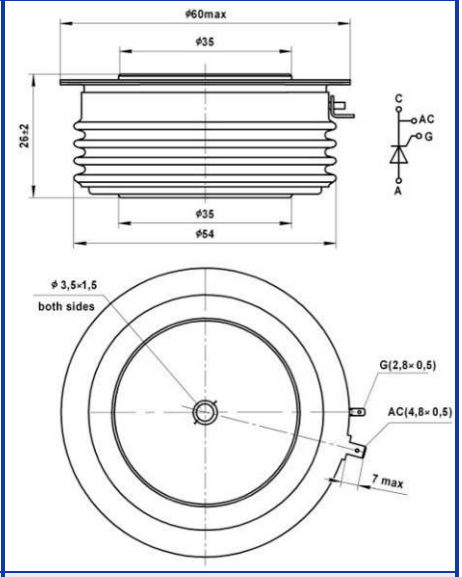
PT32 w = 180 g



PT41 w = 160 g

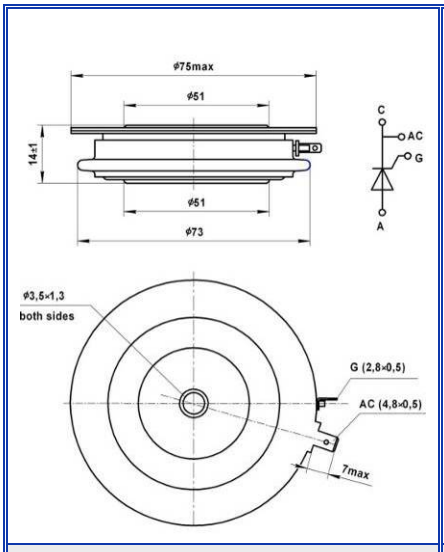


PT42 w = 240 g

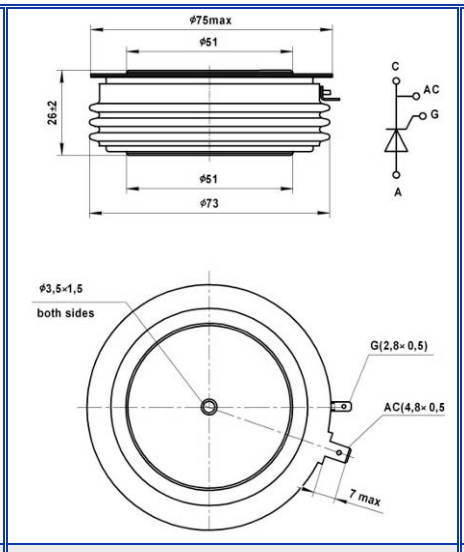


PT43 w = 270 g

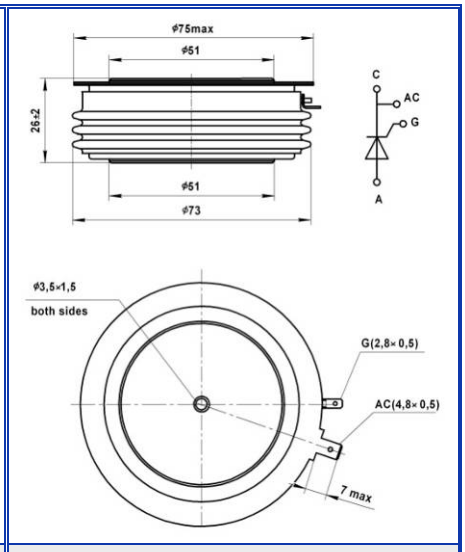
OUTLINES



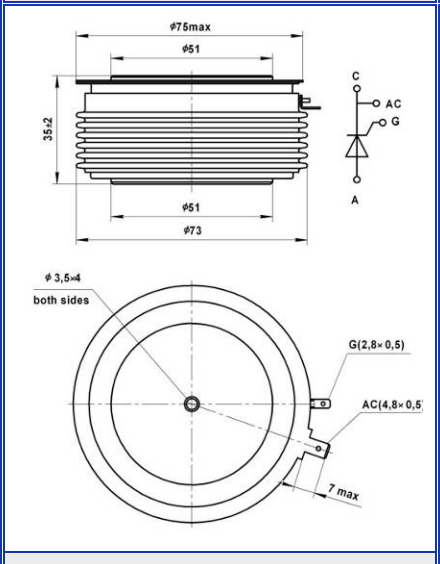
PT51 w = 330 g



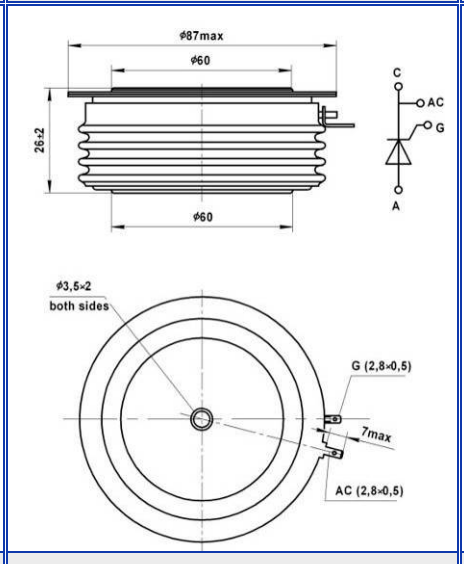
PT53 w = 500 g



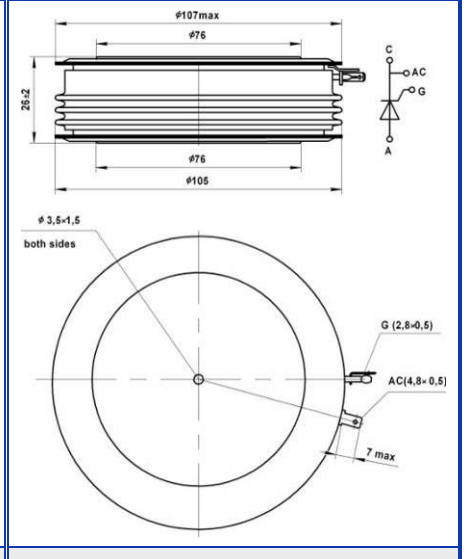
PT53-1 w = 550 g



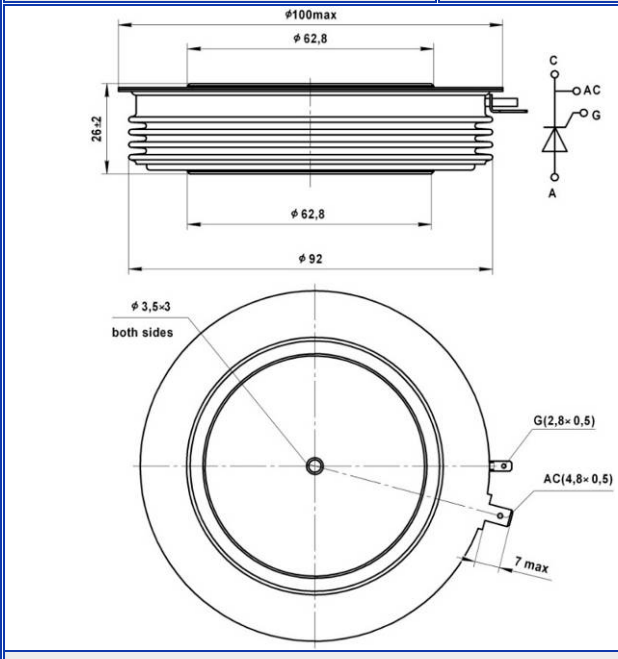
PT54 w = 720 g



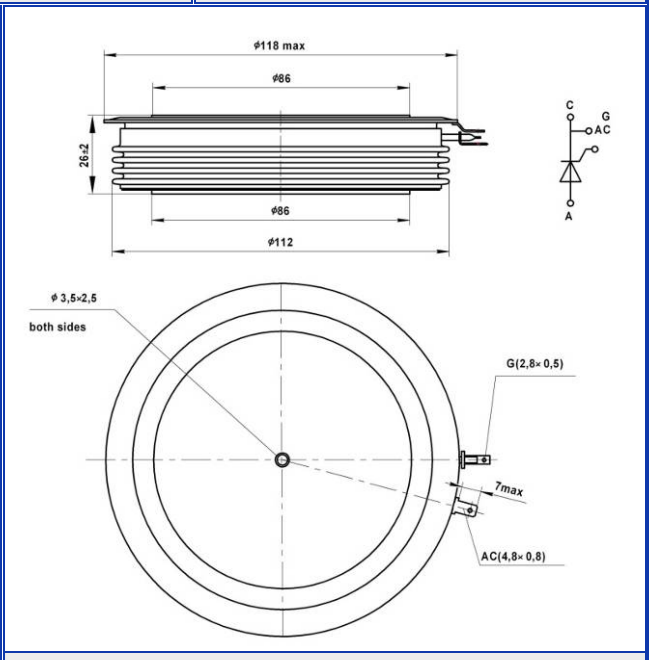
PT63 w = 700 g



PT73 w = 1200 g

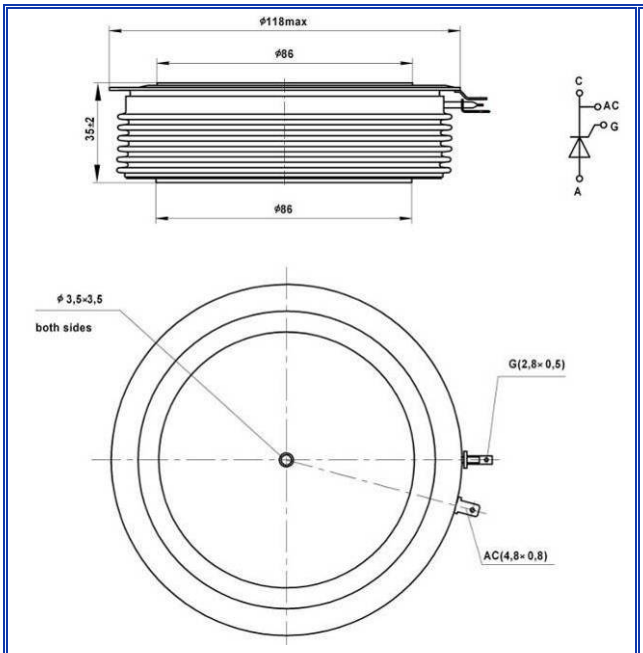


PT73-1 w = 1000 g

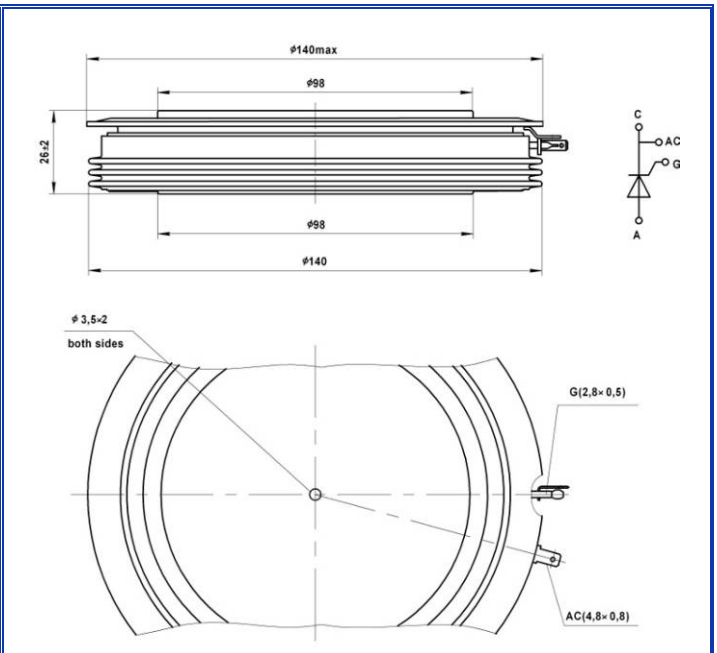


PT83 w = 1800 g

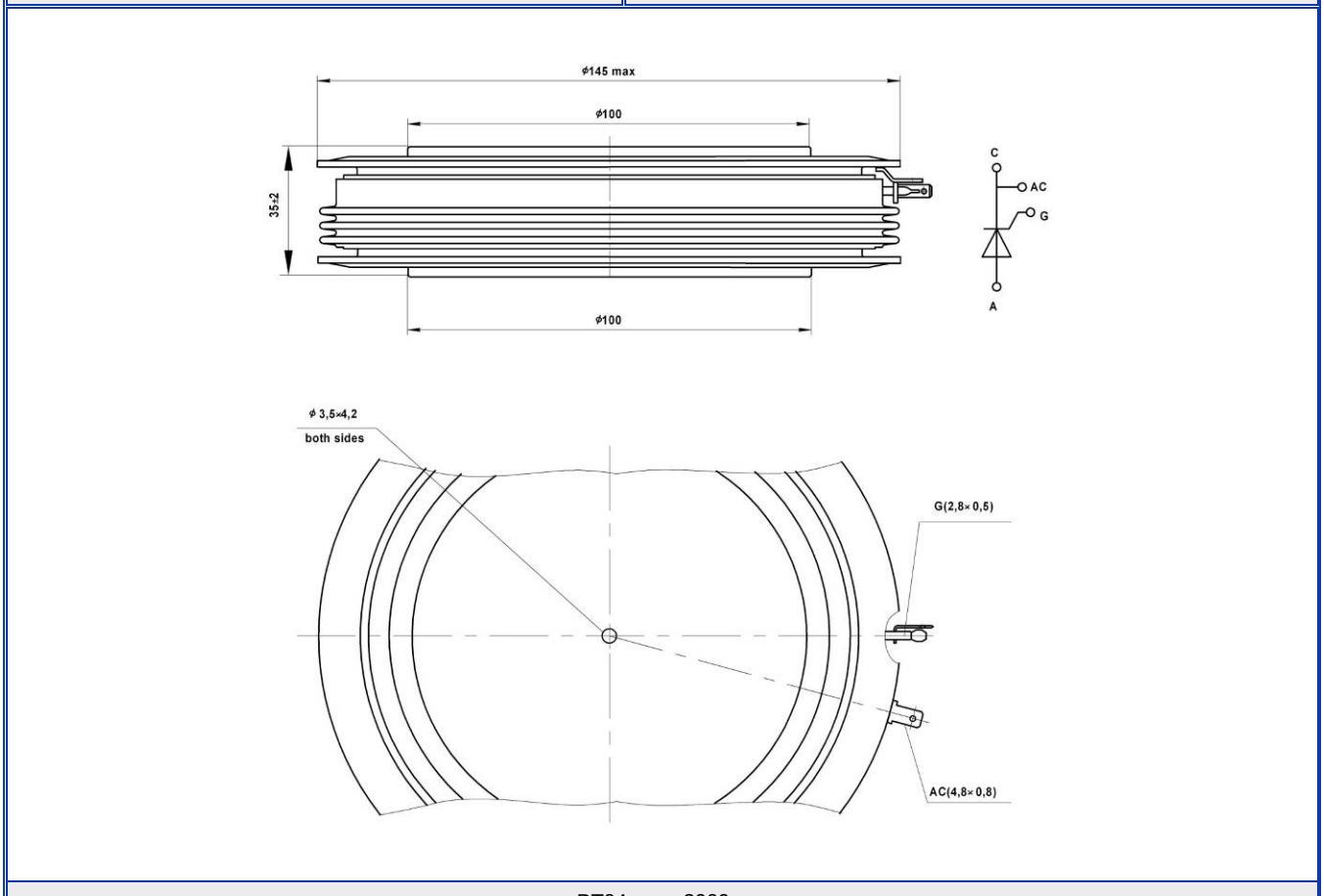
OUTLINES



PT84 w = 2000 g

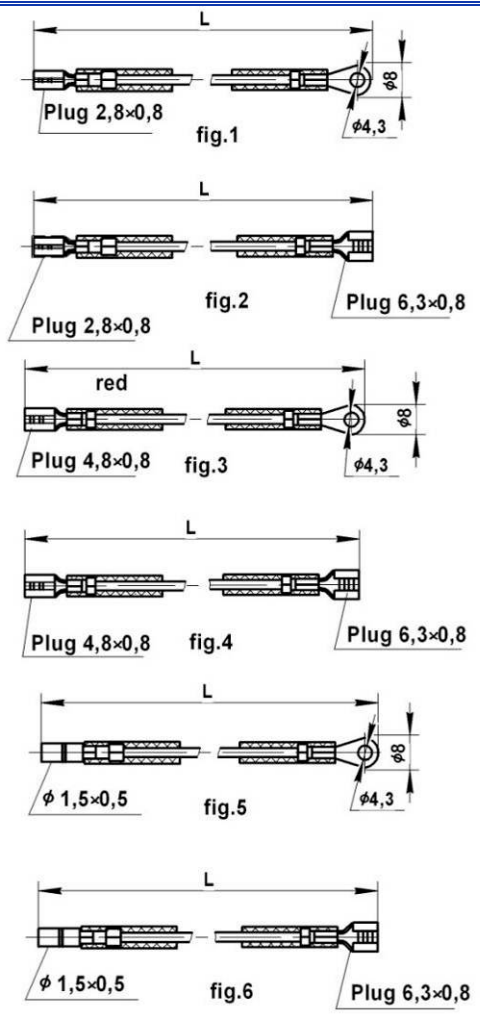


PT93 w = 1980 g



PT94 w = 3000 g

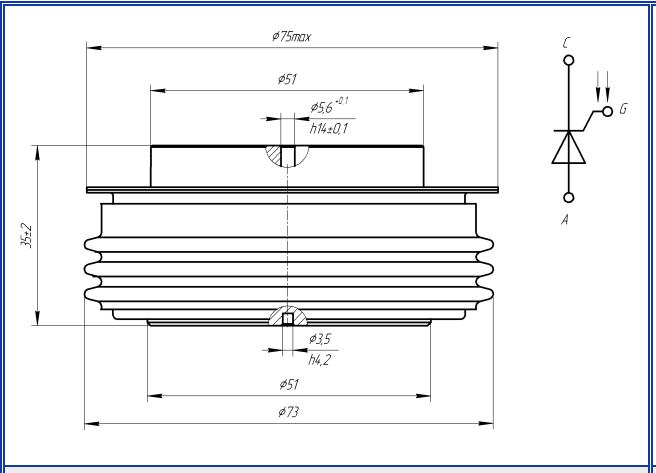
GATE INTERFACES



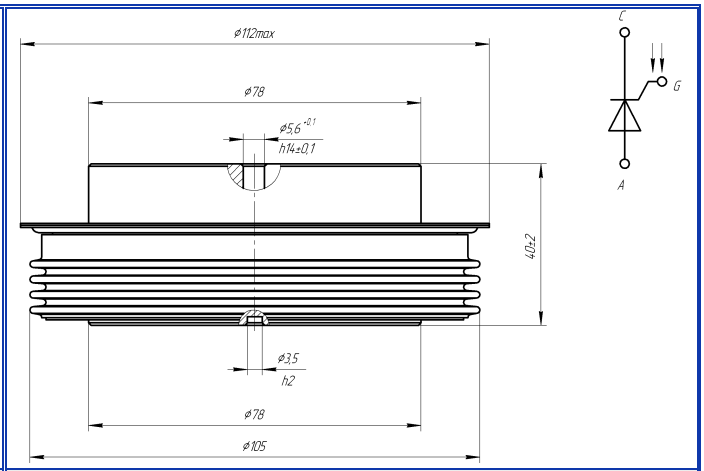
Case	fig.	Connector	L, mm	Color
PT21	1 or 2	G	114±3	white
	3 or 4	AC		red
PT21-1	5 or 6	G	132±3	white
	3 or 4	AC		red
PT23	1 or 2	G	192±3	white
	3 or 4	AC		red
PT31	1 or 2	G	114±3	white
	3 or 4	AC		red
PT31-1	5 or 6	G	180±3	white
	3 or 4	AC		red
PT32	1 or 2	G	114±3	white
	3 or 4	AC		red
PT41	1 or 2	G	114±3	white
	3 or 4	AC		red
PT42	1 or 2	G	132±3	white
	3 or 4	AC		red
PT43	1 or 2	G	132±3	white
	3 or 4	AC		red
PT51	1 or 2	G	180±3	white
	3 or 4	AC		red
PT53	1 or 2	G	180±3	white
	3 or 4	AC		red
PT54	1 or 2	G	180±3	white
	3 or 4	AC		red
PT63	1 or 2	G	260±3	white
	3 or 4	AC		red
PT73	1 or 2	G	160±3	white
	3 or 4	AC		red
PT73-1	1 or 2	G	160±3	white
	3 or 4	AC		red
PT83	1 or 2	G	260±3	white
	3 or 4	AC		red
PT84	1 or 2	G	260±3	white
	3 or 4	AC		red
PT93	1 or 2	G	260±3	white
	3 or 4	AC		red
PT94	1 or 2	G	260±3	white
	3 or 4	AC		red

Dimension “L” can be changed on request of the customer

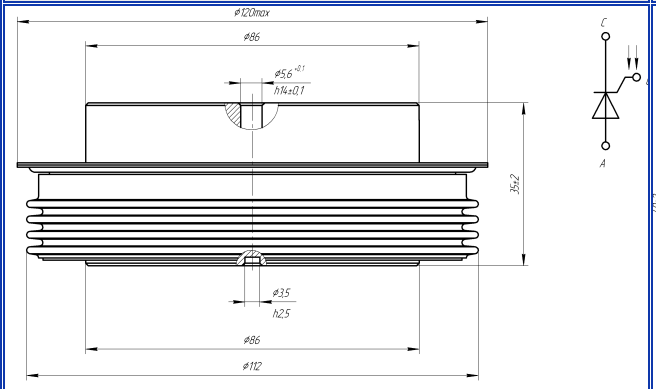
OUTLINES



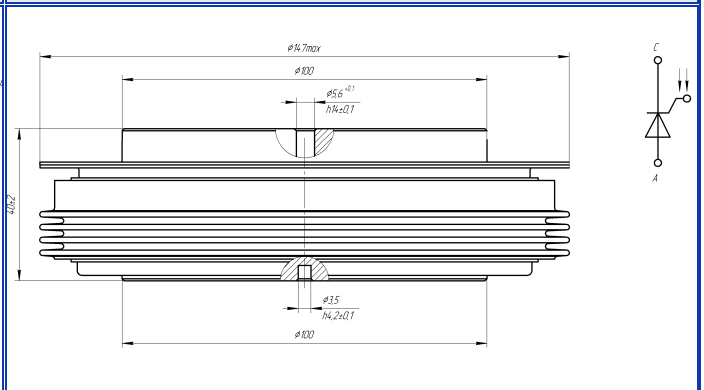
PTO54 w = 650 g



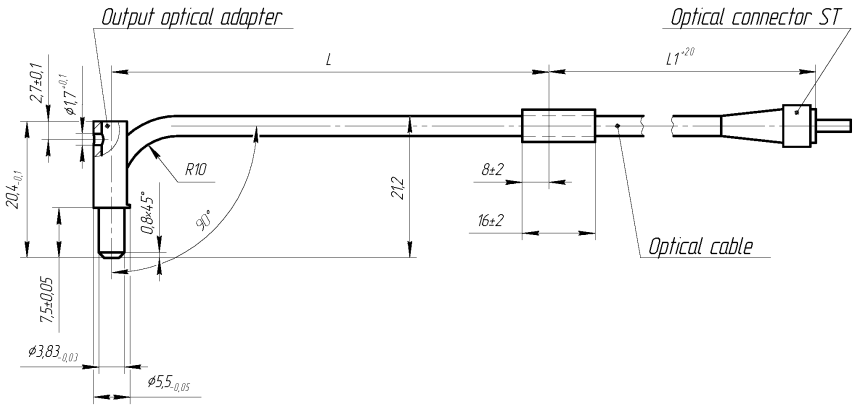
PTO75 w = 1650 g



PTO84 w = 2100 g



PTO95 w = 3200 g

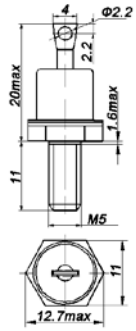


Designation	L, mm	Case
Optical adapter OA57	57	PTO54-1 PTO74-1
Optical adapter OF65	65	PTO-84 PTO-95

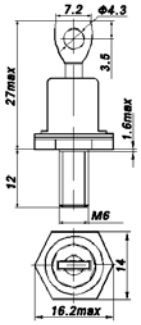
OA57	-530	-QQWF205/230	-ST	
				Type of optical connector output
				Length, mm
				Type of optical cable
				Type of optical connector on the inlet

Optical interface cable

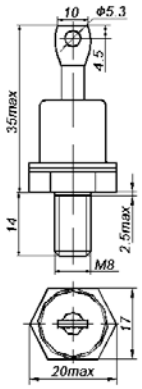
OUTLINES



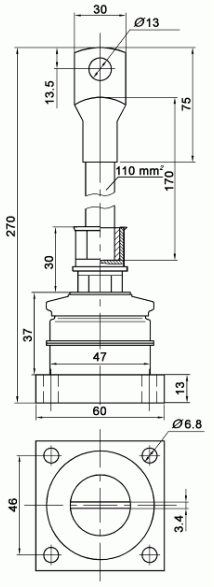
SD1 w = 6 g



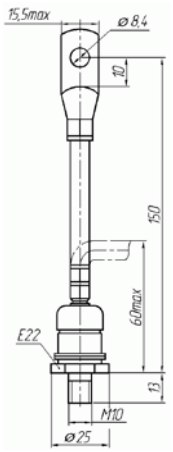
SD2 w = 12 g



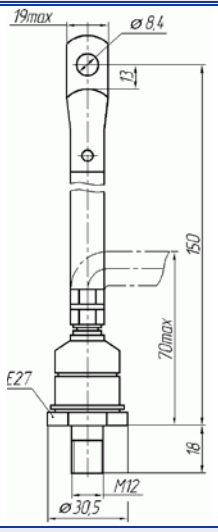
SD3 w = 27 g



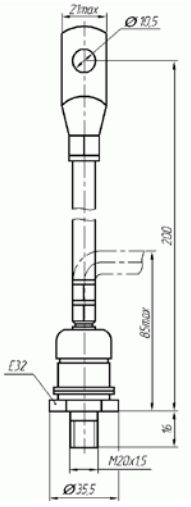
FD3 w = 620 g



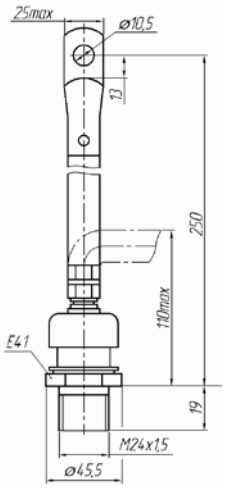
SD4 w = 90 g



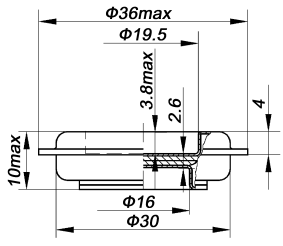
SD5 w = 165 g



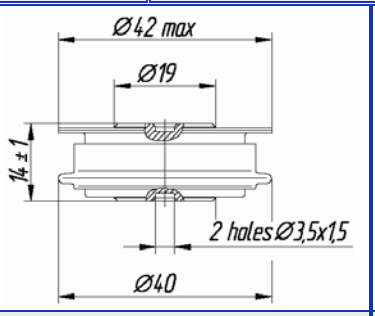
SD6 w = 265 g



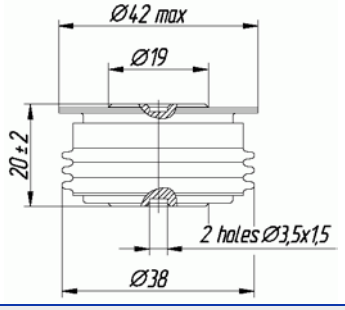
SD7 w = 465 g



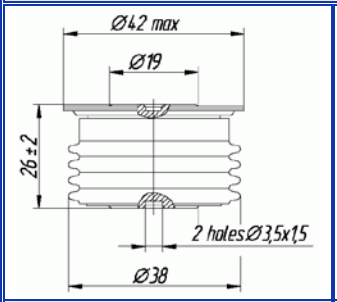
PD10 w = 34 g



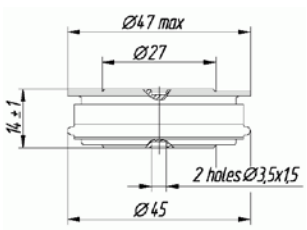
PD21 w = 70 g



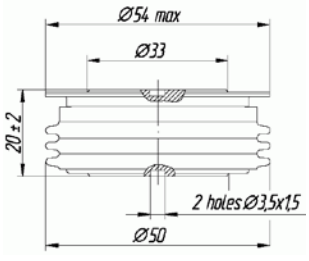
PD22 w = 91 g



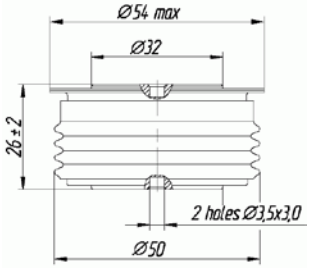
PD23 w = 100 g



PD31 w = 100 g

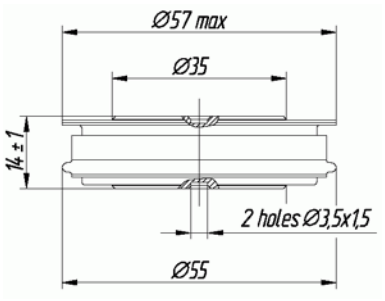


PD32 w = 180 g

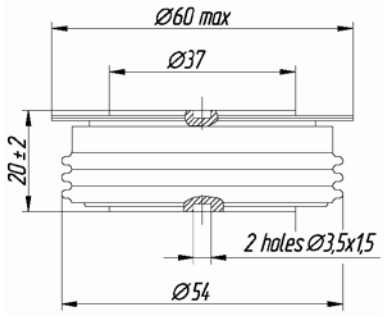


PD33 w = 200 g

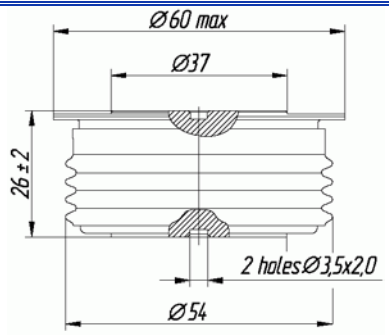
OUTLINES



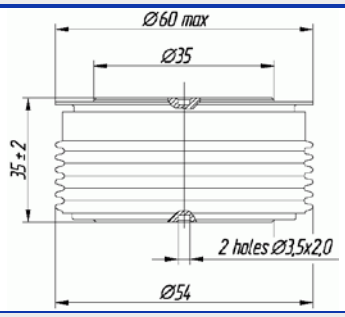
PD41 w = 160 g



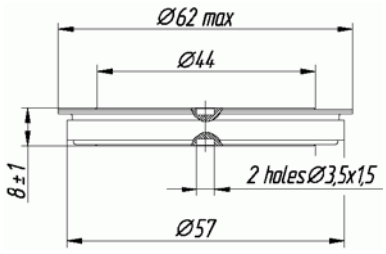
PD42 w = 240 g



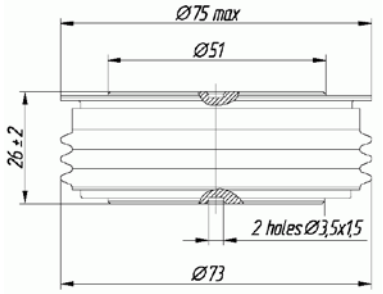
PD43 w = 300 g



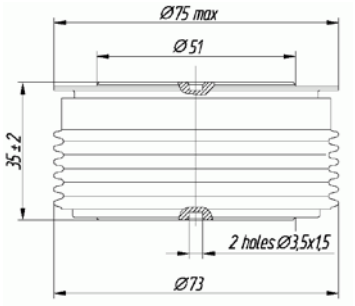
PD44 w = 320 g



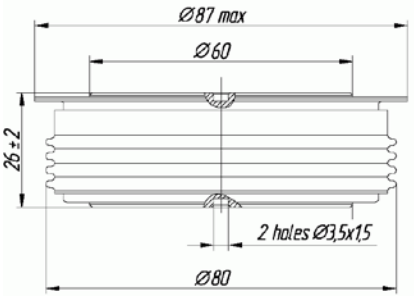
PD50 w = 150 g



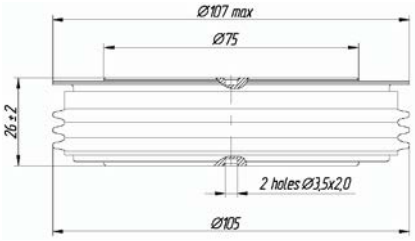
PD53 w = 550 g



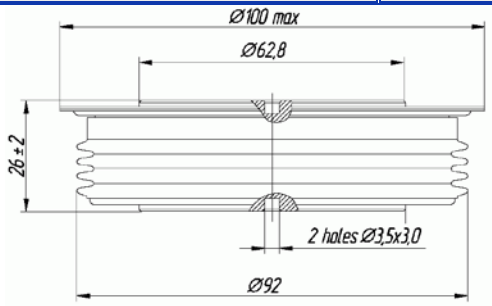
PD54 w = 580 g



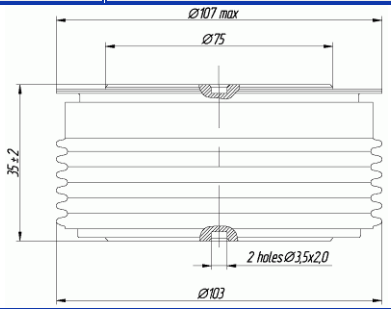
PD63 w = 710 g



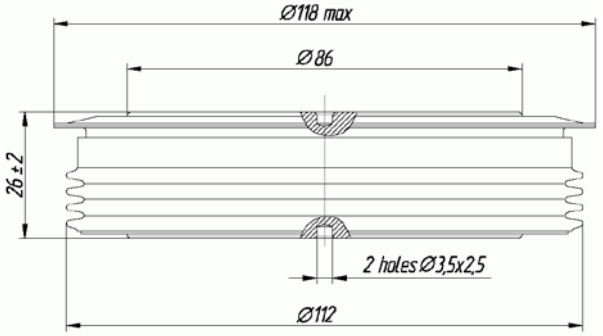
PD73 w = 1200 g



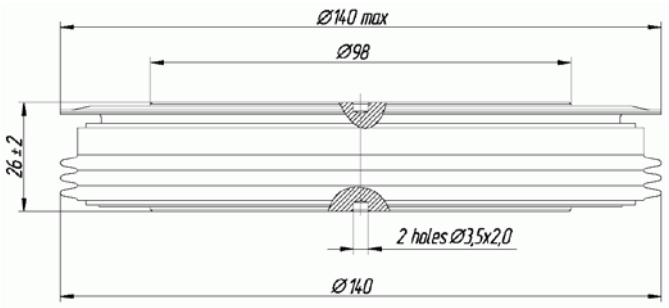
PD73-1 w = 1100 r.



PD74 w = 1300 r.

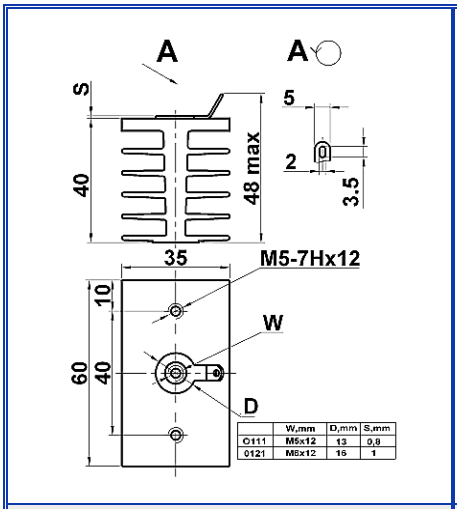


PD83 w = 1500 r.



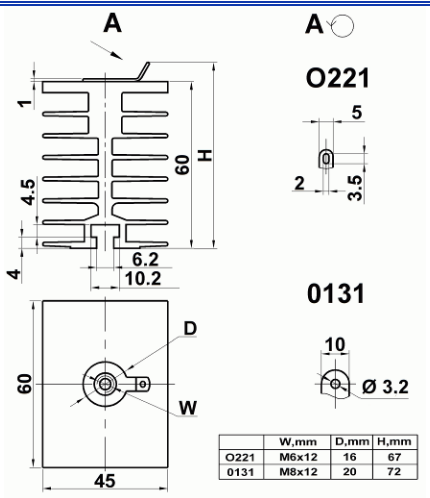
PD93 w = 3000 r.

OUTLINES



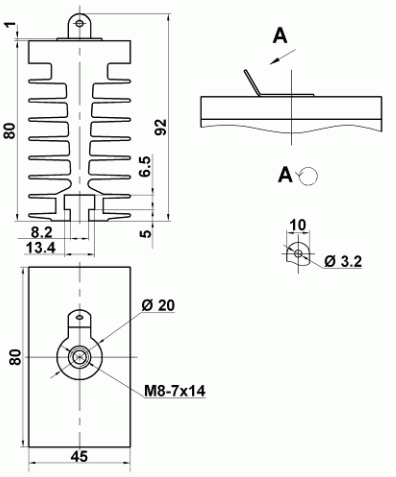
	W,mm	D,mm	S,mm
O111	M5x12	13	0,8
O121	M8x12	15	1

O111, O121

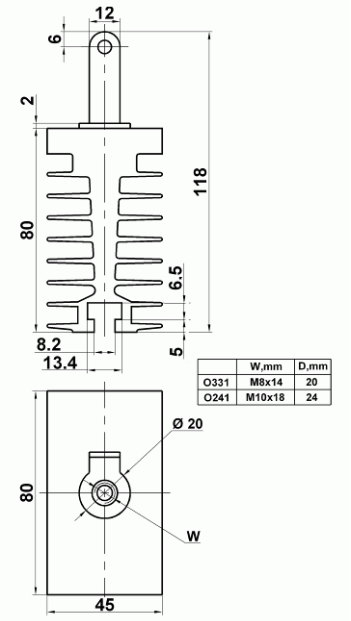


	W,mm	D,mm	H,mm
O221	M6x12	16	67
0131	M8x12	20	72

O221, O131

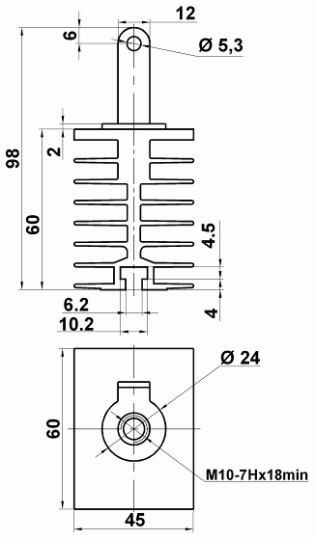


O231

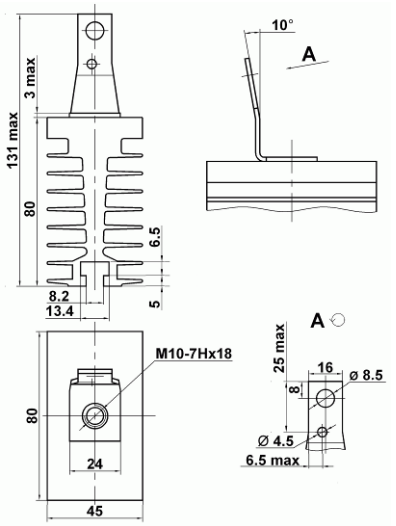


	W,mm	D,mm
O331	M8x14	20
O241	M10x18	24

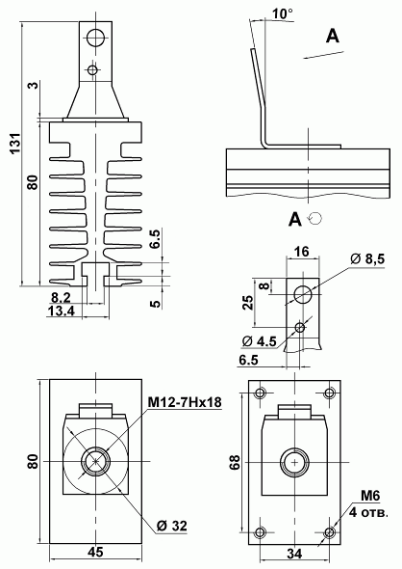
O331, O241



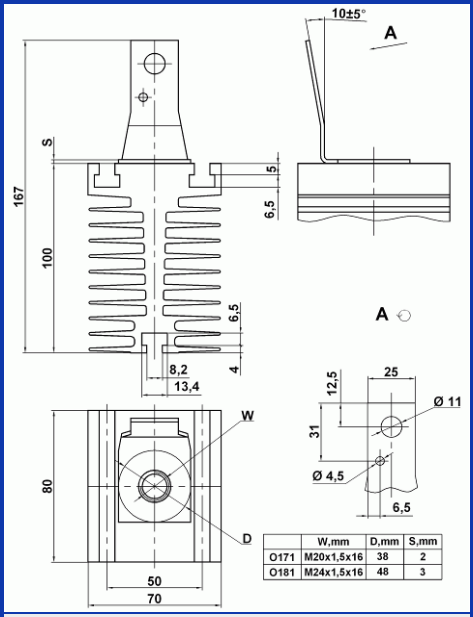
O141



O541

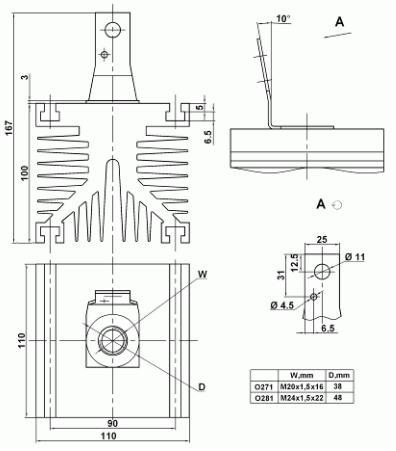


O151



	W,mm	D,mm	S,mm
O171	M20x1,5x16	38	2
O181	M24x1,5x16	48	3

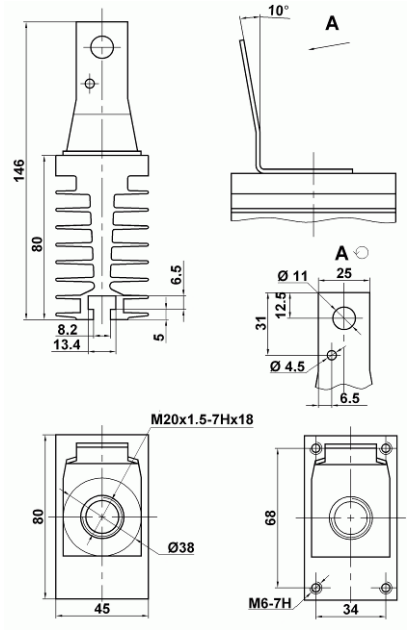
O171, O181



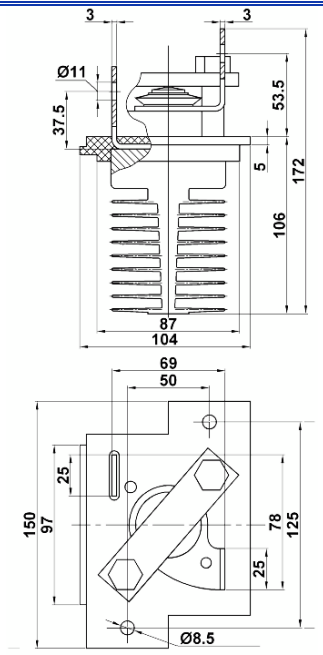
	W,mm	D,mm
O271	M20x1,5x16	38
O281	M24x1,5x22	48

O271, O281

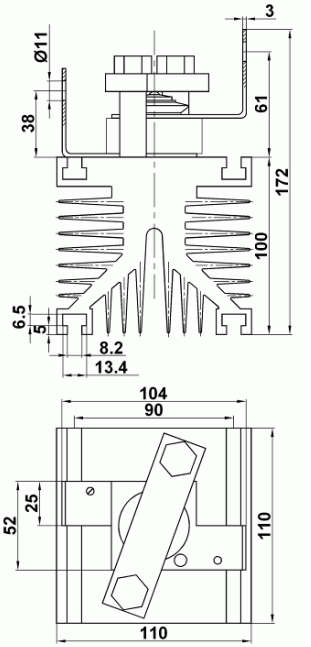
OUTLINES



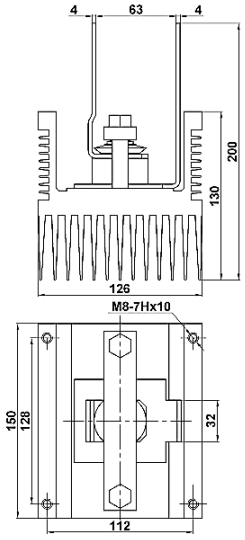
O371



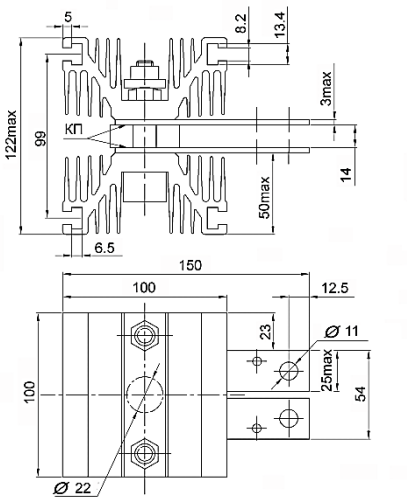
O232



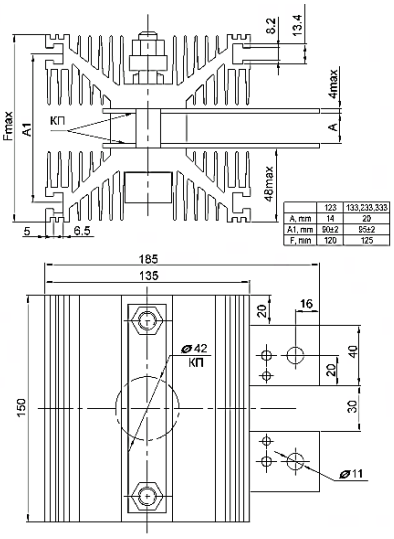
O242



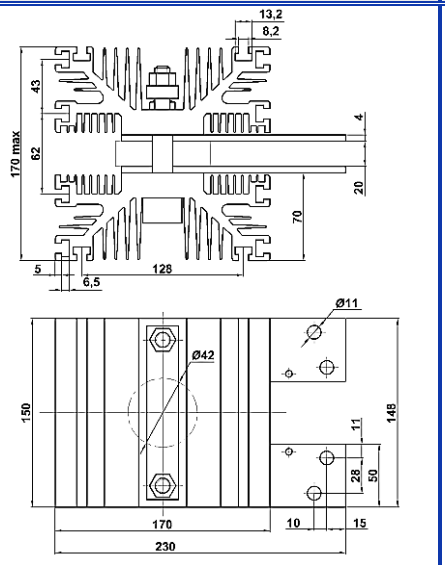
O342



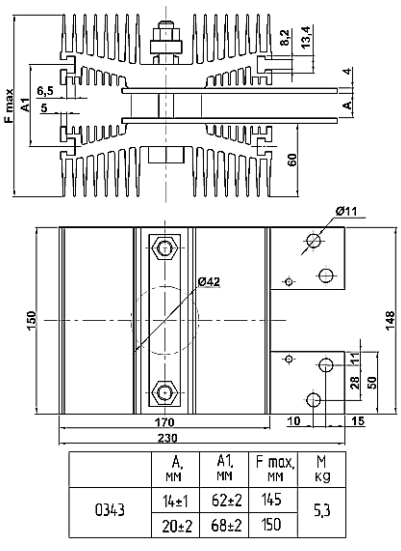
O123



O143

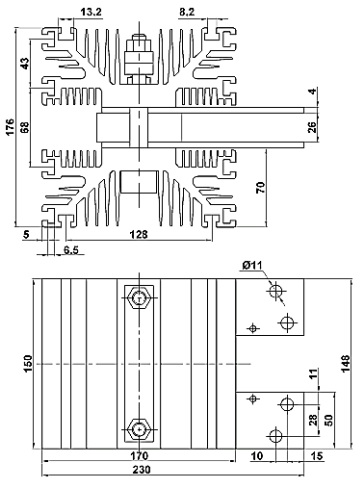


O243



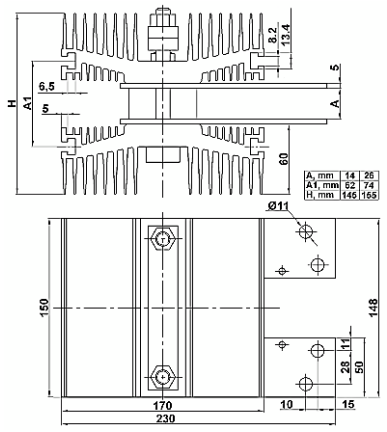
	A, MM	A1, MM	F max, MM	M kg
0343	14±1	62±2	145	5,3
	20±2	68±2	150	

O343

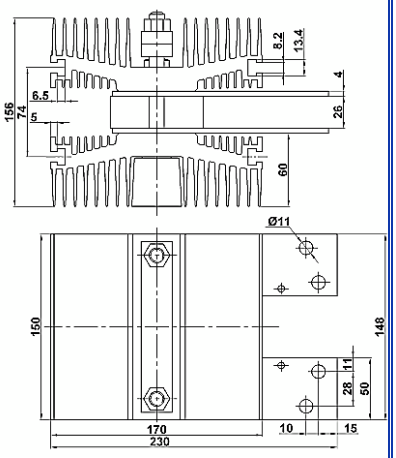


O153

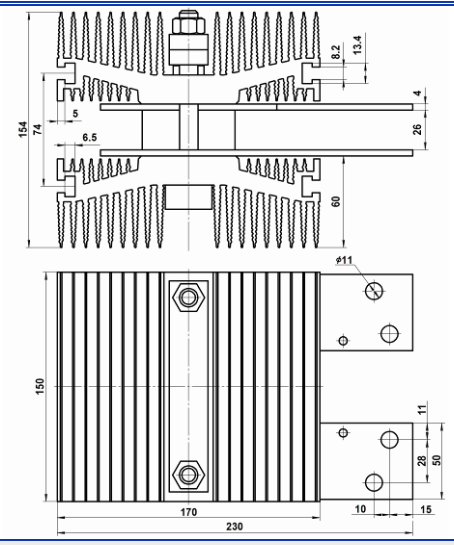
OUTLINES



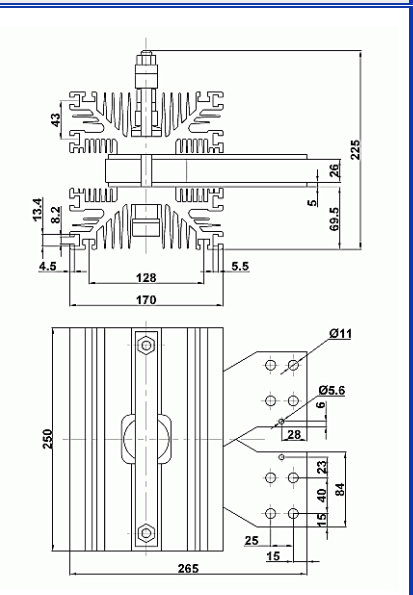
O253



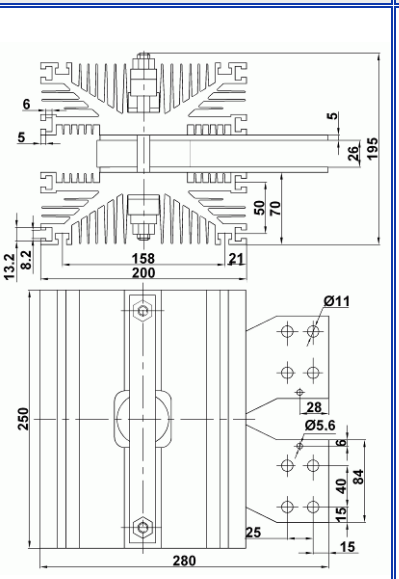
O353



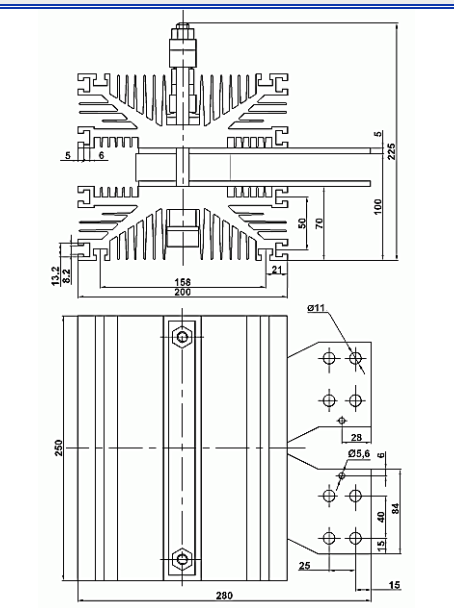
O453



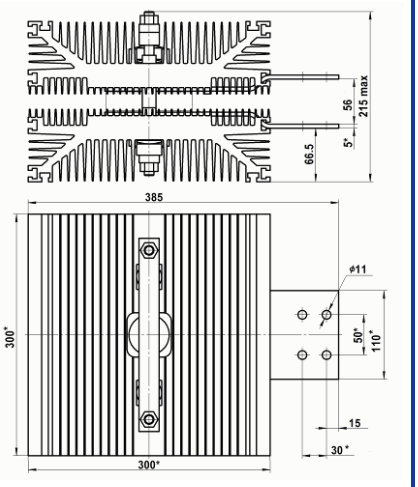
O173



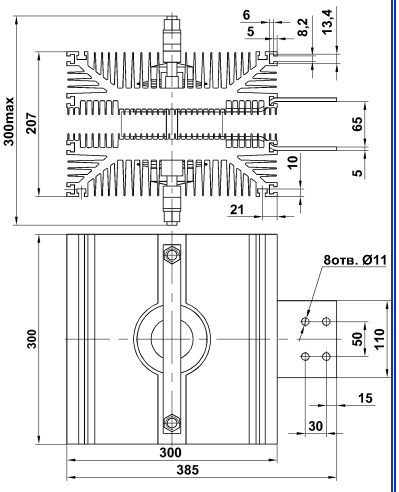
O273



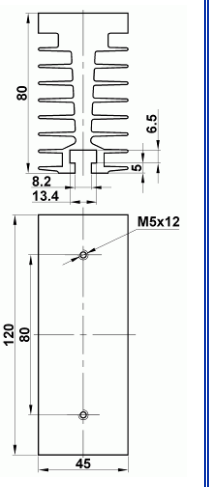
O373



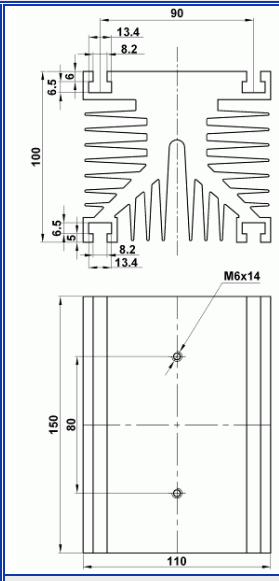
O473



O193

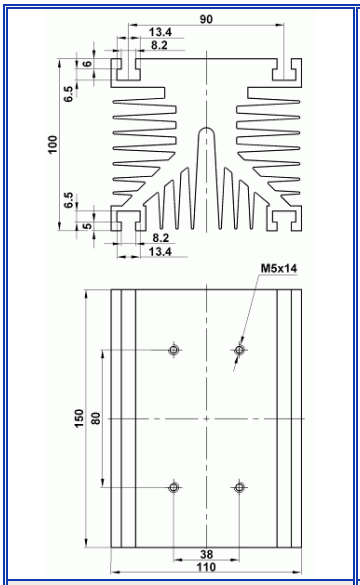


O24

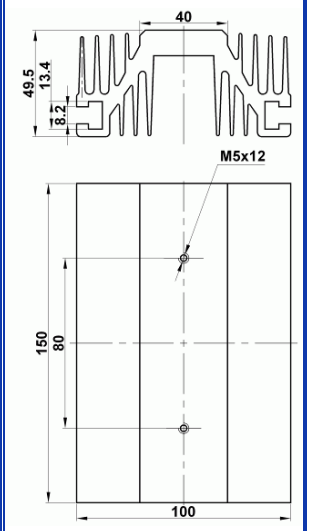


O25

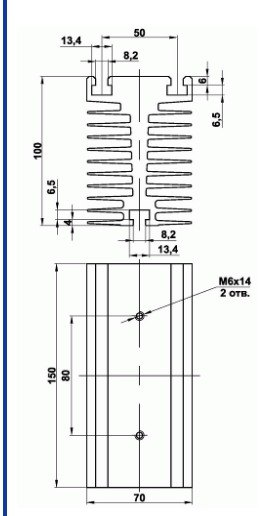
OUTLINES



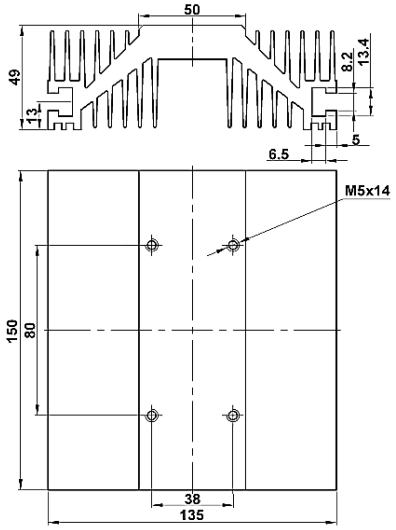
O26



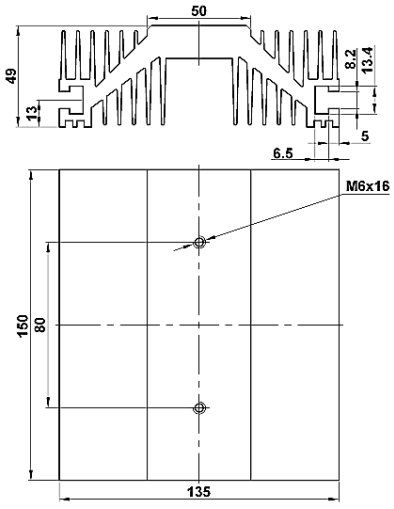
O34



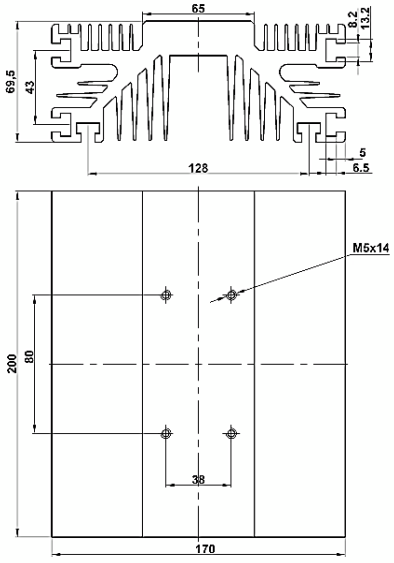
O35



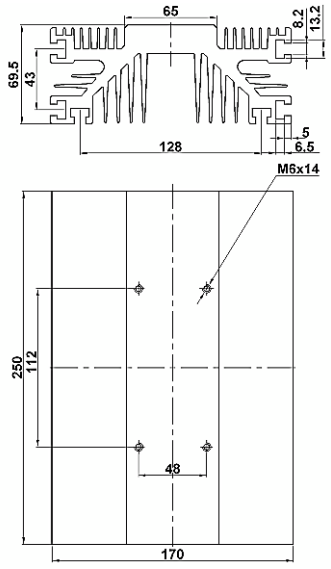
O36



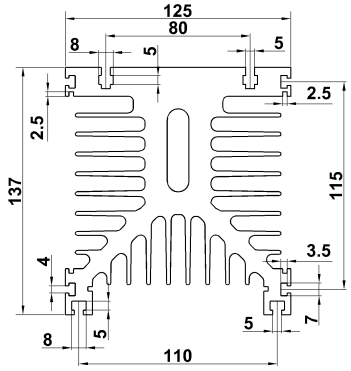
O45



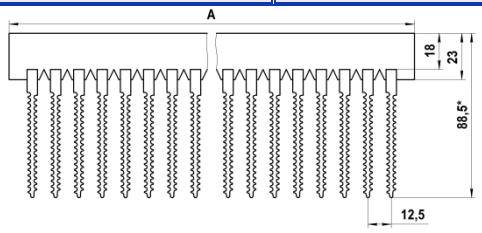
O46



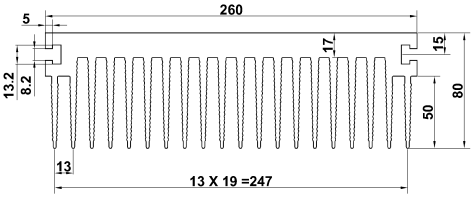
O47



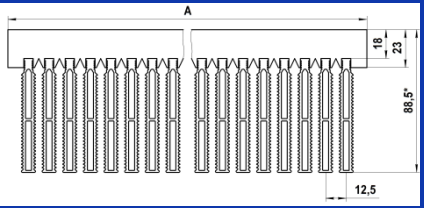
O55



O57

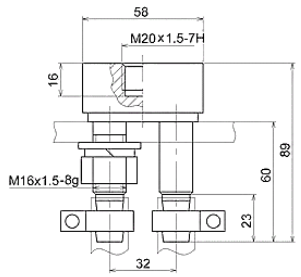


O56

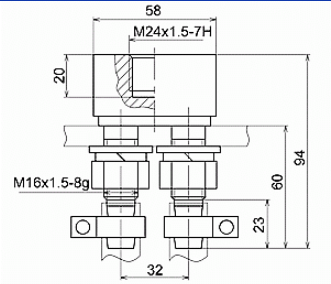


O58

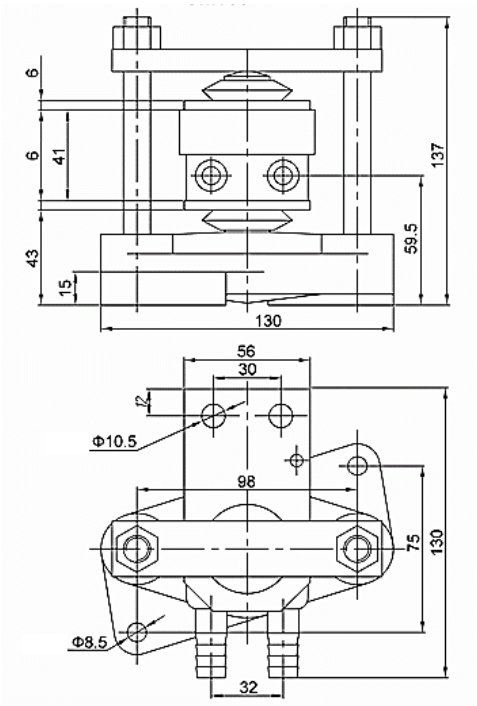
OUTLINES



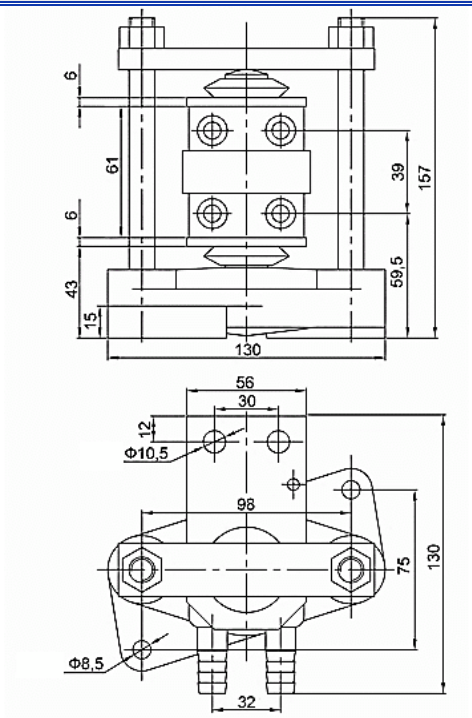
OM101



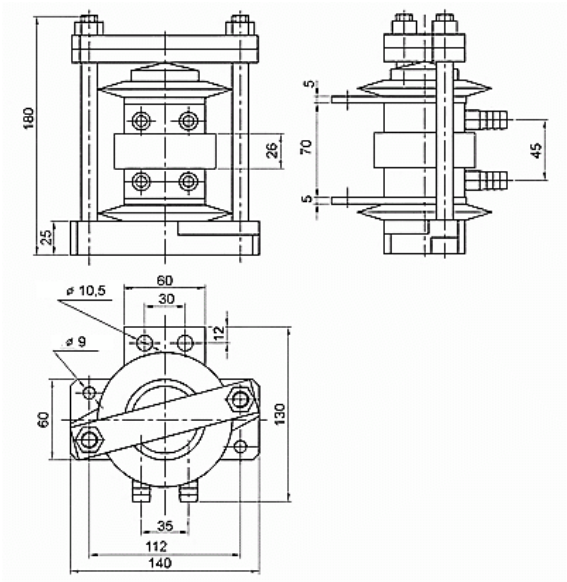
OM105



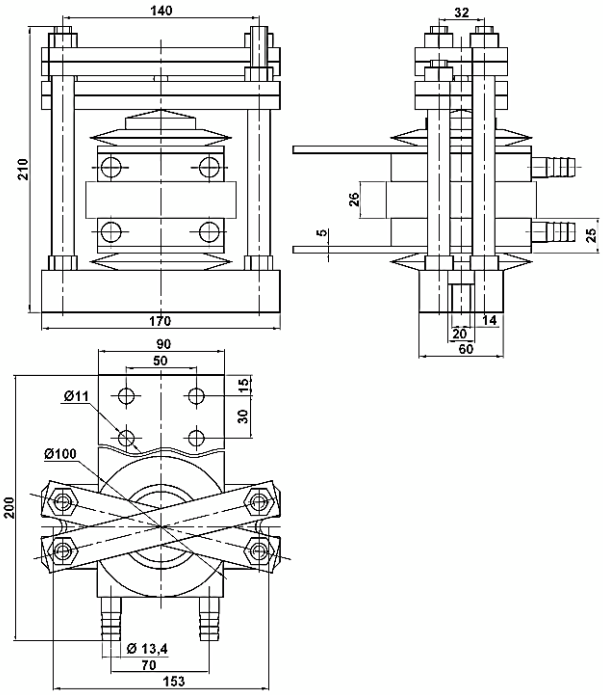
OM103



OM104

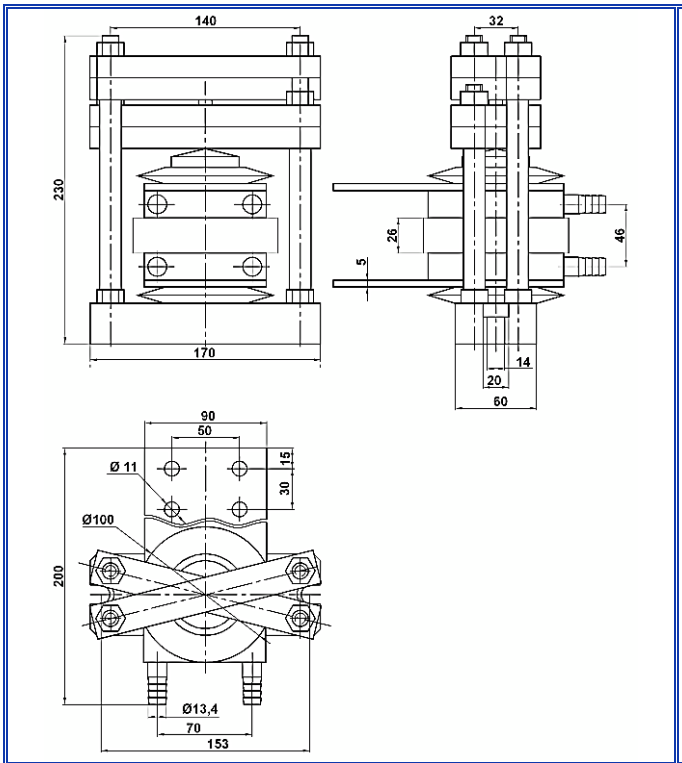


OM106

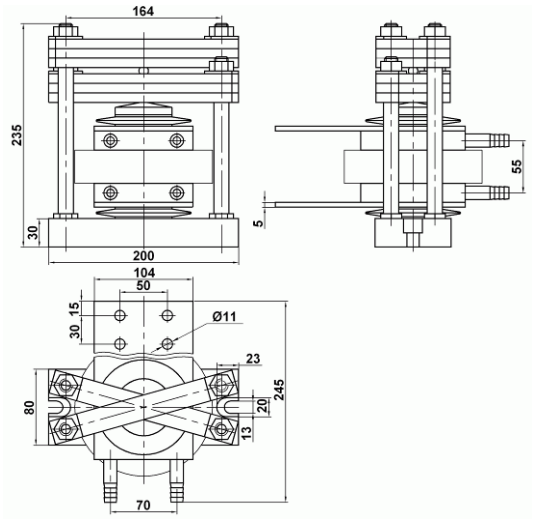


OM107, OM207

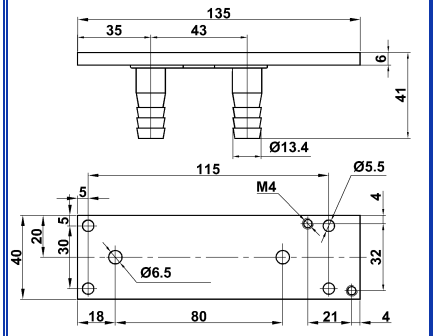
OUTLINES



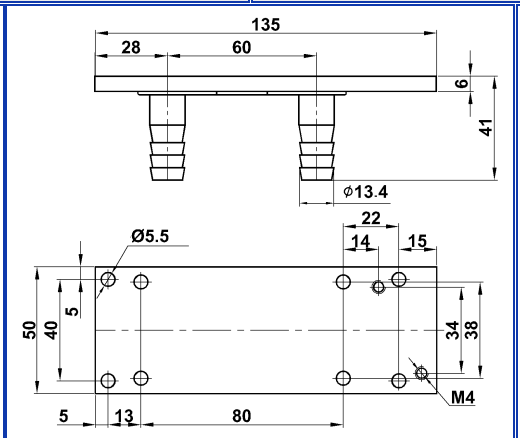
OM108



OM109, OM209



OB15



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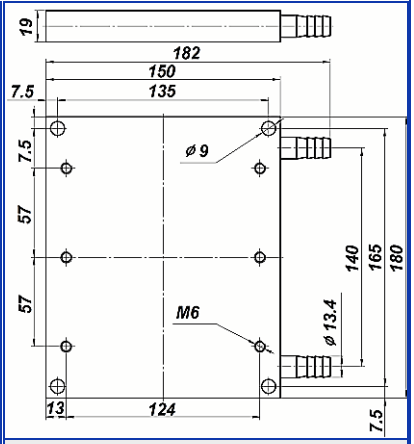

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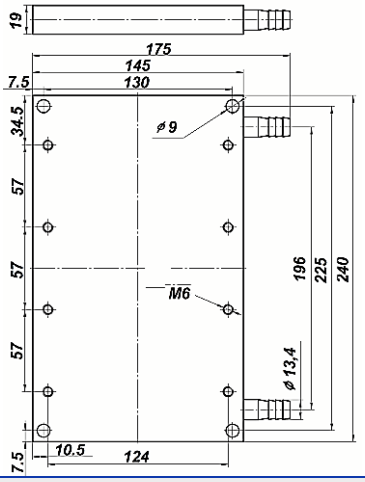

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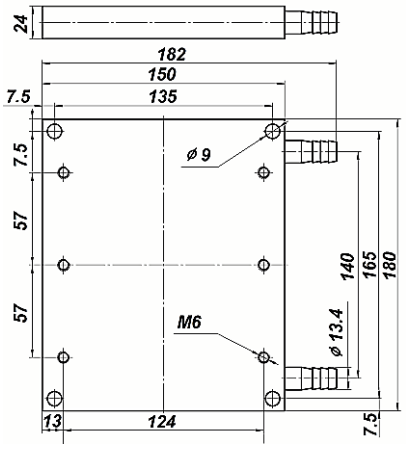


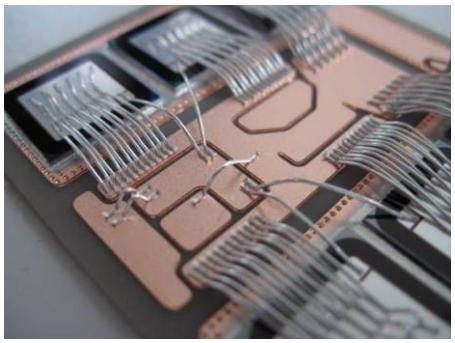
OB27

TYPE DESIGNATION

IGBT MODULES

M	2	TKI			2	- 50	- 12						M2TKI2-50-12
M	6	TKI				- 50	- 12	- 2	H				M6TKI-50-12-2H
M		TKI				- 1200	- 33			T			MTKI-1200-33T
M	2	TKI	E			- 100	- 12						M2TKIE-100-12
M		TKI	D	2		- 50	- 12		H			D	MTKID2-50-12HD
M	2	TKI				- 200	- 17			B			M2TKI-200-17B

M													module
	No sign												single switch
	2												2 switches (half-bridge)
	3												3 switches
	4												4 switches (single-phase bridge)
	6												6 switches (three-phase bridge)
	D												chopper with collector side diode
		TKI											IGBT
			E										common emitter circuit
				D									chopper with emitter side diode
					2,3								modification number
						50							collector direct current, A
							12						collector-emitter voltage, V/100
								2,3,...					design number
									No sign				standard IGBT module (NPT-technology), for middle commutation frequencies
									K				trenchgateIGBTmodule
									H				low on-state loss IGBT module (FSNPT-technology), for low commutation frequencies
									C				low on-state and switching loss IGBT module (SPT-technology)
									F				low switching loss IGBT module (NPT-technology), for high commutationfrequencies
										T			module with high thermal cycling capability, for traction applications
											B		module with high insulation voltage between base plate and terminals
												D	module with robust diode in chopper



THYRISTOR, DIODE / THYRISTOR, OPTOTHYRISTOR, TRIAC MODULES

M	1	T	1		- 630	- 28				M1T1-630-28
M		TT		A	- 160	- 32				MTTA-160-16-62
M	4	DT			- 160	- 14	- 7	4		M4DT-160-14-74
M	1	TFI	2		- 500	- 20	- 7	3	2	M1TFI2-500-20-732
M	2	TOTO			- 80	- 12	- 3	3		M2TOTO-80-12-33
M	1	TS			- 400	- 12	- 6			M1TC-400-12-6

M										Module
	No sign	TT								Two phase control thyristors
		TD								Phase control thyristor and rectifier diode
		DT								Rectifier diode and phase control thyristor
		TFTF								Two fast thyristors
		TFDF								Fast thyristor and fast recovery diode
		DFTF								Fast recovery diode and fast thyristor
		TFIDF								Fast switching thyristor and fast recovery diode
		DFTFI								Fast recovery diode and fast switching thyristor
	1	T								Single phase control thyristor
		TF								Single fast thyristor
		TFI								Single fast switching thyristor
		TS								Single triac
	2	T								Two phase control thyristors
		TF								Two fast thyristors
		TFI								Two fast switching thyristors
		TOTO								Two optothyristors
	4	T								Four phase control thyristors
		TD								Two phase control thyristors and two diodes
		DT								Two diodes and two phase control thyristors
	6	T								Six phase control thyristors
		TD								Three phase control thyristors and three diodes
		DT								Three diodes and three phase control thyristors
			1,2,...							Modification number
				No sign						Half-bridge
				A						Common anode circuit
				C						Common cathode circuit
					50					Maximum on-state current, A
						12				Repetitive pulse voltage class, V/100
							7			Critical rate of rise of off-state voltage, group
								3		Turn-off time, group
									2	Turn-on time, group (for fast modules)

DIODES MODULES

M		1	D	1		- 400		- 40		M1D1-400-40
M		2	D		A	- 160		- 32		M2DA-160-32
M			DD		K	- 160		- 16		MDDC-160-16
M		6	D			- 200		- 12		M6D-200-12
M		1	DF			- 250		- 28	- 4	M1DF-250-28-4
M			DFDF			- 160		- 14	- 1	MDFDF-160-14-1
M		2	DF			- 40		- 16	- 7	M2DF-40-16-7
M	P		D			- 63	X	- 16		MPD-63X-16

M										module
	no sign									potentialless
	P									potential (base plate has electric connection with one of terminals)
			D							single rectifier diode
			DD							two rectifier diodes
			DFDF							two fast recovery diodes
		1								single diode
		2								two diodes
		4								four diodes (single-phase bridge)
		6								six diodes (three-phase bridge)
			D							rectifier diode
			DF							fast recovery diode
				1,2,…						modification number
					A					common anode circuit
					C					common cathode circuit
						50				maximum on-state current, A
							X			reverse polarity sign
								12		repetitive pulse voltage class, V/100
									3	reverse recovery time, group (for fast diode modules)

THYRISTORS

T	■	■	■	■	■	■	■	■	■

	T – thyristor
	Letter designations for thyristor arts: L – light triggered thyristor, F – fast thyristor FI – fast switching thyristor S – triac A – asymmetric thyristor A – avalanche thyristor, I – thyristor for pulse applications O – optothyristor
	design modification number
	hexagon size designation for stud design thyristors or case diameter designation for press pack thyristors
	case design designation
	maximum on-state current, A maximum effective current (for triacs), A maximum pulse current (for pulse devices), A
	repetitive voltage class
	(dvD/dt)crit group
	tq group
	tgt (for TF and TFI)

DIODES

D	■	■	■	■	■	X	■	■	
									D– rectifier diode
									Letter designations for diode arts: A – avalanche diode F – fast recovery diode
									design modification number
									hexagon size designation for stud design diodes case diameter designation for press pack diodes
									case design designation
									maximum on-state current, A
									X – reverse polarity sign
									repetitive voltage class
									trr group (forDF)

AIR COOLING HEATSINKS FOR STUD AND PRESS PACK DEVICES

O	3	7	1	-80	
					air cooling heatsink
					modification index number
					designation of modification: – for stud design – thread diameter group – for press-pack design – contact surface diameter group
					heatsink design index number: 1 – for stud design 2 – for press-pack design, one side cooling 3 – for press-pack design, double side cooling
					heatsink length

FLUID COOLING HEATSINKSFOR STUD AND PRESS PACK DEVICES

OM	101	
		Water cooling heatsink
		Design designation

HEATSINKS FOR POWER MODULES

O	4	6	
			O – air cooling OB – water cooling
			design designation
			modification

VOLTAGE CLASS DESIGNATIONS

Class	Repetitive pulse voltage, V	Class	Repetitive pulse voltage, V	Class	Repetitive pulse voltage, V
1	100	16	1600	46	4600
2	200	18	1800	48	4800
3	300	20	2000	50	5000
4	400	22	2200	52	5200
5	500	24	2400	54	5400
6	600	26	2600	56	5600
7	700	28	2800	58	5800
8	800	30	3000	60	6000
9	900	32	3200	64	6400
10	1000	34	3400	68	6800
11	1100	36	3600	72	7200
12	1200	38	3800	76	7600
13	1300	40	4000	80	8000
14	1400	42	4200	-	-
15	1500	44	4400	-	-

DYNAMIC PARAMETER DESIGNATIONS

1. $(dv_D/dt)_{crit}$ - for phase control, avalanche, fast, frequency-pulse thyristors

Designation of group	0	P3	E3	A3	P2	K2	E2	A2	T1	P1	M1	K1	H1	E1	C1	B1
	0	1	2	3	4	5	6	7	8	-	9	-	-	-	-	-
V/µs	No norm	20	50	100	200	320	500	1000	1600	2000	2500	3200	4000	5000	6300	8000

2. $(dv_D/dt)_{com}$ - for triacs

Designation of group	0	M4	H4	E4	C4	A4	T3	M3	E3	A3	P2	K2	E2	C2	B2	A2
	0	1	2	-	3	4	5	6	7	8	9	-	-	-	-	-
V/µs	No norm	2,5	4	5	6,3	10	16	25	50	100	200	320	500	630	800	1000

3. t_q - for fast, fast switching thyristors

Designation of group	0	C3	E3	H3	K3	M3	P3	T3	X3	A4	B4	C4	E4	K4	P4	X4	B5	E5
	0	1	2	3	4	5	6	7	8	-	9	-	-	-	-	-	-	-
µs	No norm	63	50	40	32	25	20	16	12,5	10	8	6,3	5	3,2	2	1,25	0,8	0,5

4. t_q - for phase control, avalanche thyristors

Designation of group	0	B2	C2	E2	H2	K2	M2	P2	T2	X2	A3	B3	C3	E3	H3
	0	-	-	1	-	-	2	-	3	-	4	-	5	-	-
µs	No norm	800	630	500	400	320	250	200	160	125	100	80	63*	50*	40*

5. t_{gt} - for fast, fast switching thyristors

Designation of group	0	T3	A4	B4	C4	H4	K4	M4	P4	T4	X4	A5	C5	H5	M5	T5	A6	B6
	0	-	-	-	-	1	2	3	4	5	6	7	8	-	-	-	-	-
µs	No norm	16	10	8	6,3	4	3,2	2,5	2,0	1,6	1,25	1,0	0,63	0,4	0,25	0,16	0,1	0,08

6. t_{rr} – for fast recovery diodes

Designation of group	0	A4	B4	C4	E4	H4	K4	M4	P4	T4	X4	A5	B5	C5	E5	H5	K5	M5	P5	T5	X5	A6	B6	C6	E6	H6	K6	M6	P6	T6	X6	A7
	0	-	-	-	1	2	3	4	5	6	-	7	-	8	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
µs	No norm	10**	8**	6,3	5	4	3,2	2,5	2	1,6	1,25	1	0,8	0,63	0,5	0,4	0,32	0,25	0,2	0,16	0,125	0,1	0,08	0,063	0,05	0,04	0,032	0,025	0,02	0,016	0,0125	0,01

Note:

Designation of device groups with figures or letter-figures is allowable
* - for devices under 100 A only
** - for fast recovery diodes class 40 and higher only

LETTER SYMBOLS

Symbol	Terms
V_{RRM}	Repetitive peak reverse voltage
V_{DRM}	Repetitive peak off-state voltage
V_D	DC off-state voltage (maximum value)
V_R	DC reverse voltage (maximum value)
V_{BO}	Protective break overvoltage
V_{CES}	Collector-emitter voltage
V_{CEsat}	Collector-emitter saturation voltage
V_{BR}	Avalanche breakdown voltage
V_{FM}	Peak forward voltage
V_{TM}	Peak on-state voltage
V_{TO}	Threshold voltage diodes
$V_{T(TO)}$	On-state threshold voltage thyristor
V_{GT}	Gate trigger direct voltage
V_{RGM}	Peak reverse gate voltage
V_{MG}	Insulating strength between power and control circuits
V_D	Continuous (direct) off-state voltage
V_N	Rated voltage for silicon surge voltage suppressor
I_D	Direct output current of the rectifier
I_R	Reverse current
I_{RRM}	Repetitive peak reverse current
I_{DRM}	Repetitive peak off-state current
I_{TM}	Peak on-state current
$I_{T(AV)}$	Maximum average on-state current
I_{TRMS}	Maximum RMS on-state current
$I_{F(AV)}$	Maximum average forward current
I_{FM}	Peak forward current
I_{FRMS}	Maximum RMS forward current
I_C	DC collector current
I_{CM}	Peak collector current
I_{FGM}	Peak collector current
I_{TQRM}	Maximum repetitive turn-off current
I_{FSM}	Surge forward current
I_{TSM}	Surge on-state current
I_{GT}	Gate trigger current
$I_{G(ON)}$	Minimum on-state gate current
I_{GQM}	Peak gate turn-off current
I_{RM}	Peak reverse recovery current
I_{TRM}	Maximum permissible repetitive peak on-state current
I_{RCRM}	Gate trigger current for RCD
E_A	Avalanche breakdown energy
β	Temperature coefficient of avalanche breakdown voltage
T_C	Case temperature
$T_{j\ max}$	Maximum permissible junction temperature
T_W	temperature of water
r_T	On-state slope resistance
P_{RSM}	Maximum surge avalanche power dissipation
P_{LM}	Minimum gate trigger light power
t_{rr}	Reverse recovery time
t_{gt}	Turn-on time (for thyristors)
t_{on}	Turn-on time (for IGBT)
t_{off}	Turn-off time (for IGBT)
t_q	Turn-off time (for thyristors)
t_{gq}	Gate controlled turn-of time
t_s	Storage time
t_f	Fall time
$(dv_D/dt)_{cr}$	Critical rate of rise of off-state voltage
$(dv_D/dt)_{com}$	Critical rate of rise of commutating voltage
$(di_T/dt)_{cr}$	Critical rate of rise of on-state current
$R_{th(j-c)}$	Thermal resistance junction to case
M_d	Mounting torque
F_m	Mounting force
V_{isol}	Insulation voltage (r.m.s.)
w	Weight
V_{cf}	Flow rate of the cooling air
Q	cooling water flow

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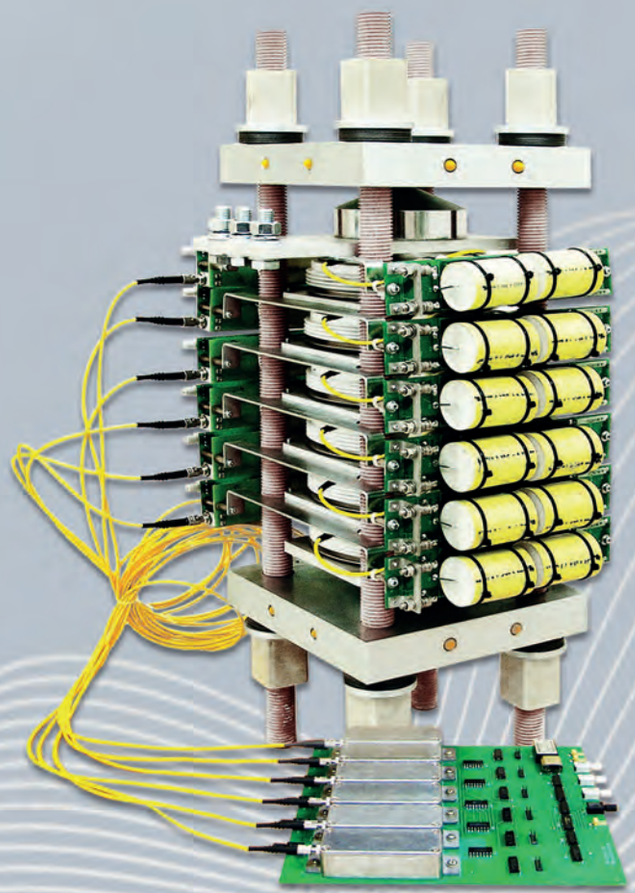
POWER ASSEMBLIES



- POWER RECTIFIERS
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