Thyristor \ Diode Module

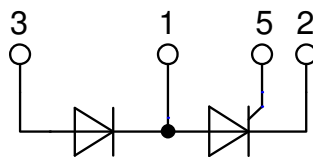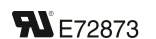|		
V_{RRM}	=	2x 1600 V
I_{TAV}	=	27 A
V_T	=	1.27 V

Phase leg

Part number

MCD26-16io8B
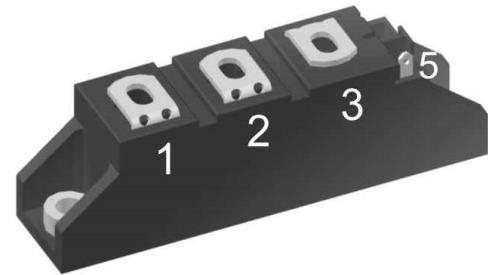
Backside: isolated

E72873

Features / Advantages:

● Thyristor for line frequency
● Planar passivated chip
● Long-term stability
● Direct Copper Bonded Al2O3-ceramic

Applications:

● Line rectifying 50/60 Hz
● Softstart AC motor control
● DC Motor control
● Power converter
● AC power control
● Lighting and temperature control

Package: TO-240AA

● Isolation Voltage: 3600 V~
● Industry standard outline
● RoHS compliant
● Soldering pins for PCB mounting
● Base plate: DCB ceramic
● Reduced weight
● Advanced power cycling

Rectifier						**Ratings**	
Symbol	**Definition**	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25°C$				1700	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25°C$				1600	V
$I_{R/D}$	reverse current, drain current	$V_{R/D} = 1600$ V	$T_{VJ} = 25°C$			100	µA
		$V_{R/D} = 1600$ V	$T_{VJ} = 125°C$			3	mA
V_T	forward voltage drop	$I_T = 40$ A	$T_{VJ} = 25°C$			1.27	V
		$I_T = 80$ A				1.64	V
		$I_T = 40$ A	$T_{VJ} = 125°C$			1.27	V
		$I_T = 80$ A				1.65	V
I_{TAV}	average forward current	$T_C = 85°C$	$T_{VJ} = 125°C$			27	A
$I_{T(RMS)}$	RMS forward current	180° sine				42	A
V_{T0}	threshold voltage		$T_{VJ} = 125°C$			0.85	V
r_T	slope resistance	for power loss calculation only				11	mΩ
R_{thJC}	thermal resistance junction to case					0.88	K/W
R_{thCH}	thermal resistance case to heatsink				0.20		K/W
P_{tot}	total power dissipation	$T_C = 25°C$				115	W
I_{TSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			520	A
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			560	A
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 125°C$			440	A
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			475	A
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			1.35	kA²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			1.31	kA²s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 125°C$			970	A²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			940	A²s
C_J	junction capacitance	$V_R = 400$ V f = 1 MHz	$T_{VJ} = 25°C$		22		pF
P_{GM}	max. gate power dissipation	$t_P = 30$ µs	$T_C = 125°C$			10	W
		$t_P = 300$ µs				5	W
P_{GAV}	average gate power dissipation					0.5	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 125°C$; f = 50 Hz repetitive, $I_T = 45$ A				150	A/µs
		$t_P = 200$ µs; $di_G/dt = 0.45$ A/µs;					
		$I_G = 0.45$ A; $V = ⅔ V_{DRM}$ non-repet., $I_T = 27$ A				500	A/µs
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = ⅔ V_{DRM}$	$T_{VJ} = 125°C$			1000	V/µs
		$R_{GK} = ∞$; method 1 (linear voltage rise)					
V_{GT}	gate trigger voltage	$V_D = 6$ V	$T_{VJ} = 25°C$			1.5	V
			$T_{VJ} = -40°C$			1.6	V
I_{GT}	gate trigger current	$V_D = 6$ V	$T_{VJ} = 25°C$			100	mA
			$T_{VJ} = -40°C$			200	mA
V_{GD}	gate non-trigger voltage	$V_D = ⅔ V_{DRM}$	$T_{VJ} = 125°C$			0.2	V
I_{GD}	gate non-trigger current					10	mA
I_L	latching current	$t_p = 10$ µs	$T_{VJ} = 25°C$			450	mA
		$I_G = 0.45$ A; $di_G/dt = 0.45$ A/µs					
I_H	holding current	$V_D = 6$ V $R_{GK} = ∞$	$T_{VJ} = 25°C$			200	mA
t_{gd}	gate controlled delay time	$V_D = ½ V_{DRM}$	$T_{VJ} = 25°C$			2	µs
		$I_G = 0.45$ A; $di_G/dt = 0.45$ A/µs					
t_q	turn-off time	$V_R = 100$ V; $I_T = 20$ A; $V = ⅔ V_{DRM}$ $T_{VJ} = 100$ °C			150		µs
		di/dt = 10 A/µs dv/dt = 20 V/µs $t_p = 200$ µs					

Package	**TO-240AA**						**Ratings**	
Symbol	**Definition**	**Conditions**			**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal					200	A
T_{VJ}	*virtual junction temperature*				-40		125	°C
T_{op}	*operation temperature*				-40		100	°C
T_{stg}	*storage temperature*				-40		125	°C
Weight						81		g
M_D	*mounting torque*				2.5		4	Nm
M_T	*terminal torque*				2.5		4	Nm
$d_{Spp/App}$	*creepage distance on surface | striking distance through air*	*terminal to terminal*	13.0	9.7				mm
$d_{Spb/Apb}$		*terminal to backside*	16.0	16.0				mm
V_{ISOL}	*isolation voltage*	t = 1 second	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA		3600			V
		t = 1 minute			3000			V

Ordering	**Ordering Number**	**Marking on Product**	**Delivery Mode**	**Quantity**	**Code No.**
Standard	MCD26-16io8B	MCD26-16io8B	Box	36	453277

Similar Part	**Package**	**Voltage class**
MCMA35PD1600TB	TO-240AA-1B	1600
MCMA50PD1600TB	TO-240AA-1B	1600

Equivalent Circuits for Simulation *on die level* $T_{VJ} = 125\,°C$

Thyristor

$V_{0\ max}$	*threshold voltage*	0.85	V
$R_{0\ max}$	*slope resistance* *	9.8	mΩ

Outlines   TO-240AA

M5x10   2.8 / 0.8   3

10

30

7.5

0.25

23.5

29.7

Ø5.5

65

20   20   25

15

6.9

20.8
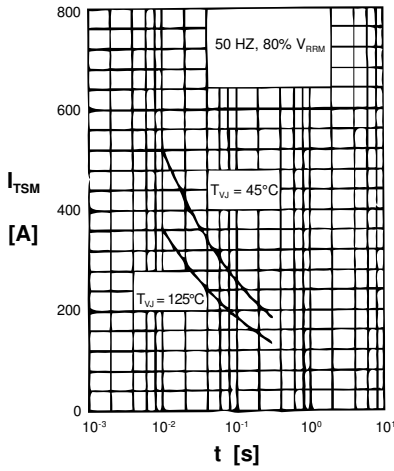
7 6

5 4

80

92

3   1   5   2
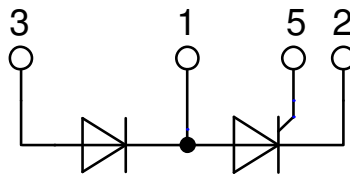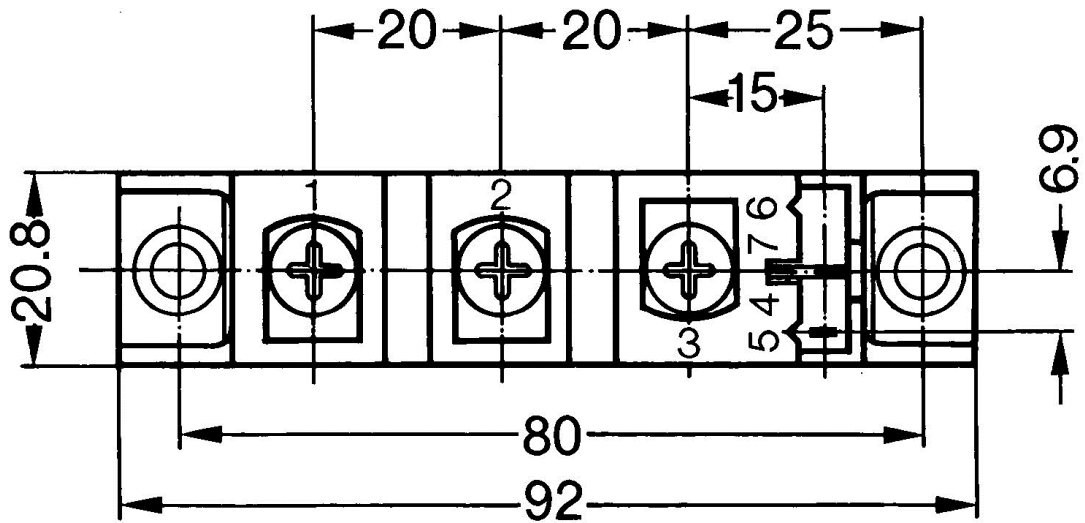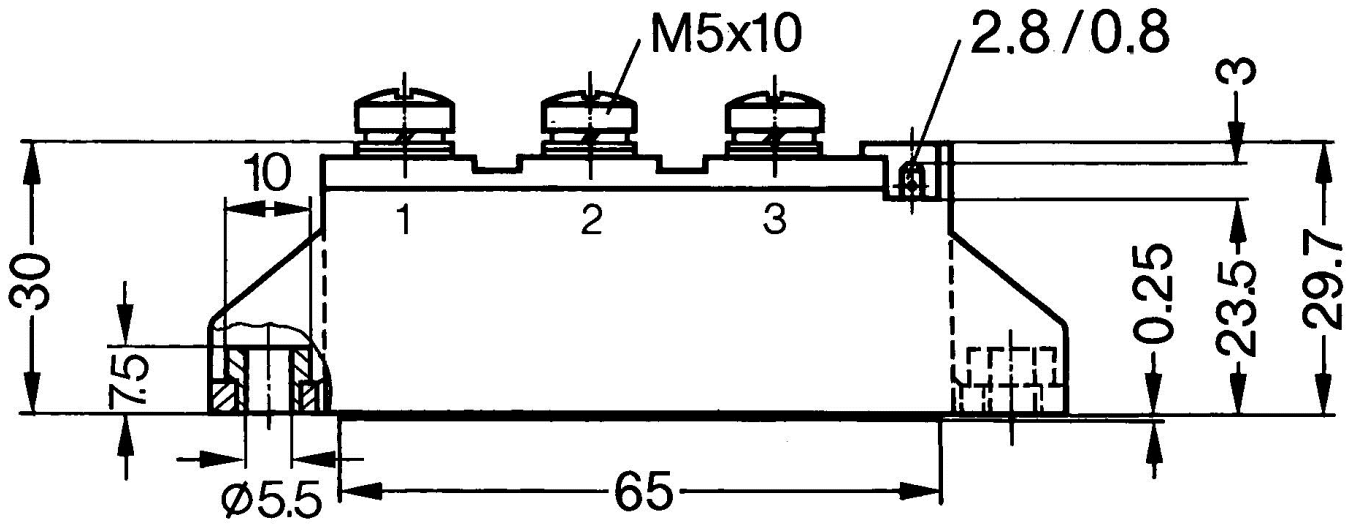
Thyristor

Fig. 1 Surge overload current
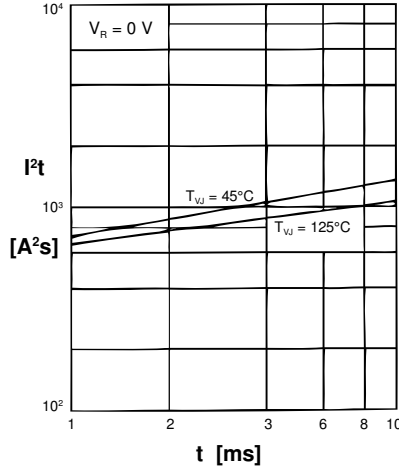I_{TSM}: Crest value, t: duration

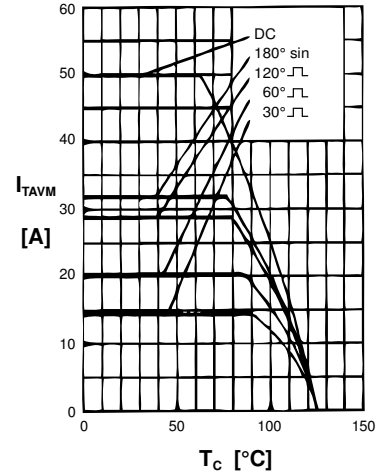Fig. 2 I²t versus time (1-10 ms)

Fig. 3 Max. forward current
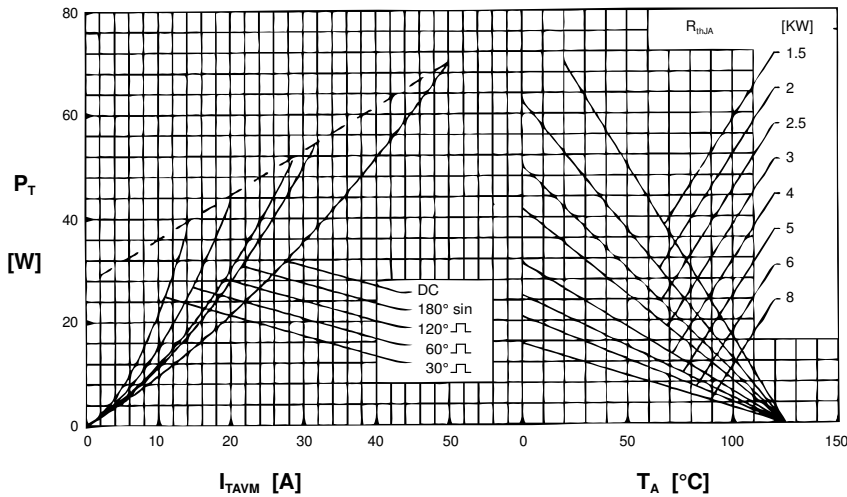at case temperature

Fig. 4 Power dissipation versus onstate current & ambient temp. (per thyristor)
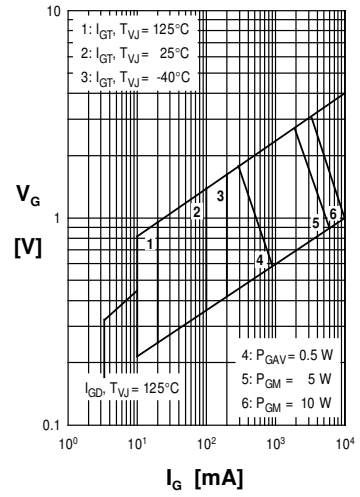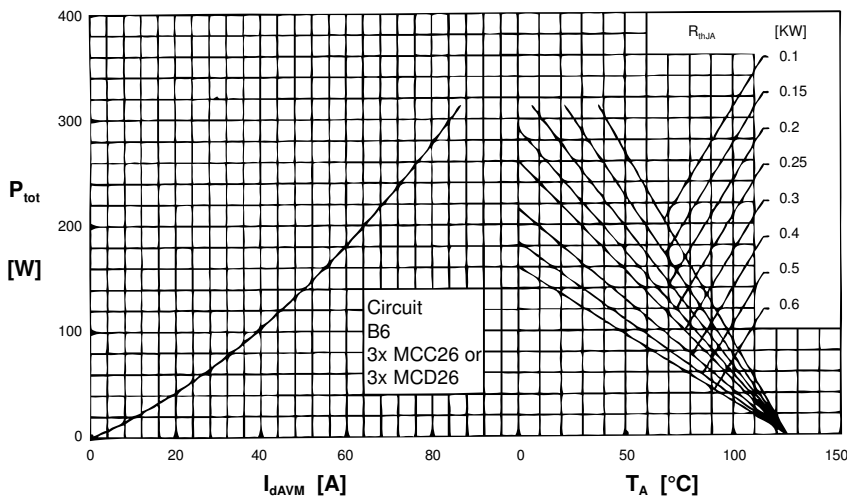

Fig. 5 Gate trigger charact.

Fig. 6 Three phase rectifier bridge: Power dissipation versus direct
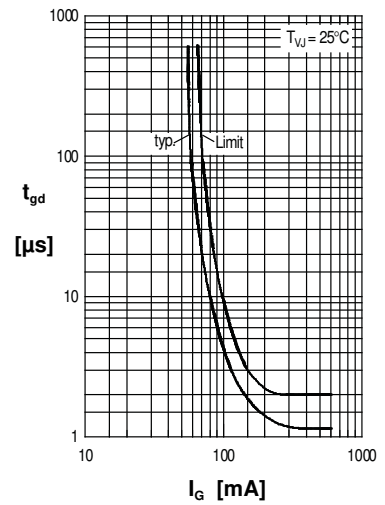output current and ambient temperature

Fig. 7 Gate trigger delay time

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20161222b
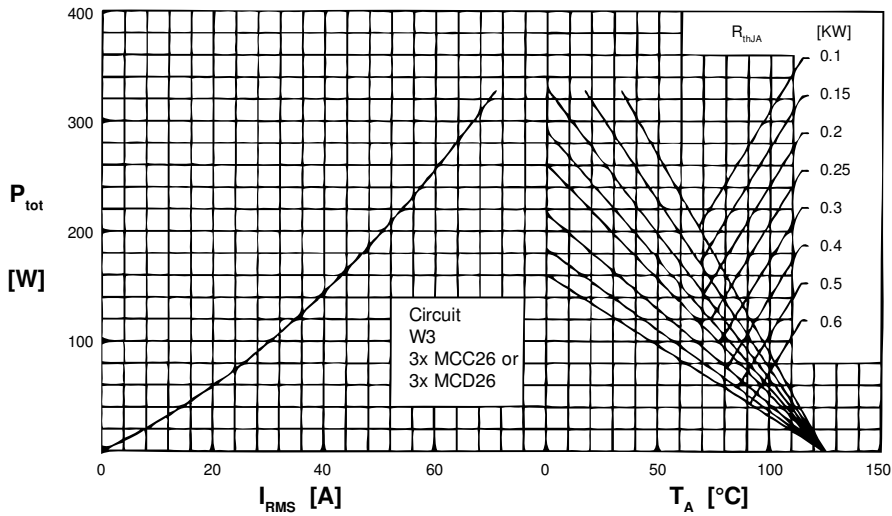
Rectifier

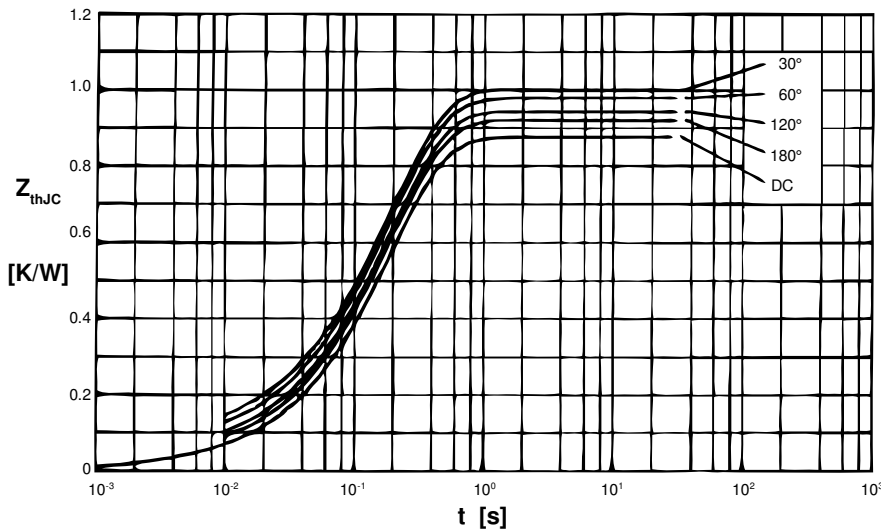Fig. 8 Three phase AC-controller: Power dissipation vs. RMS output current and ambient temperature

Fig. 9 Transient thermal impedance junction to case (per thyristor)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.88
180°	0.92
120°	0.95
60°	0.98
30°	1.01

Constants for Z_{thJC} calculation:

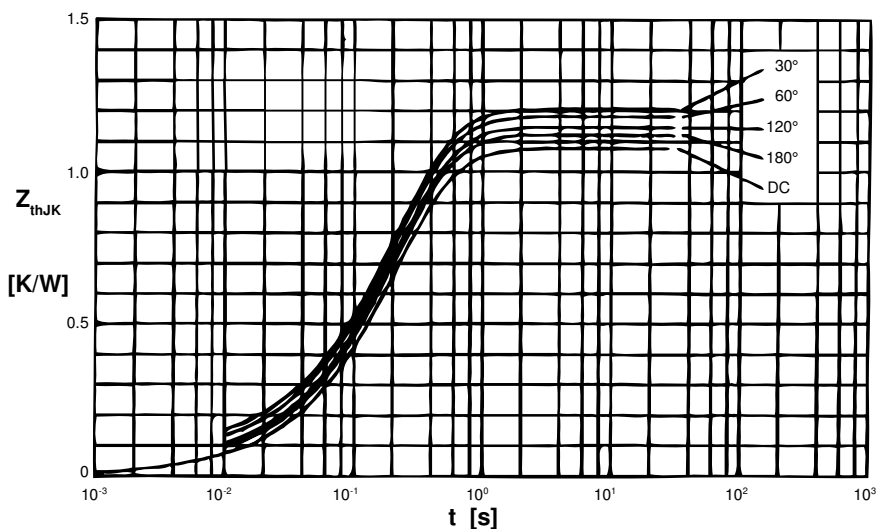| i	R_{thi} [K/W]	t_i [s]
1	0.019	0.0031
2	0.029	0.0216
3	0.832	0.1910

Fig. 10 Transient thermal impedance junction to heatsink (per thyristor)

R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	1.08
180°	1.12
120°	1.15
60°	1.18
30°	1.21

Constants for Z_{thJK} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.019	0.0031
2	0.029	0.0216
3	0.832	0.1910
4	0.200	0.4500