# IXYS

Thyristor Module

V_{RRM} = 2 x 1600 V

I_{TAV} = 260 A

V_T = 1.15 V

Phase leg

Part number

**MCMA265P1600KA**
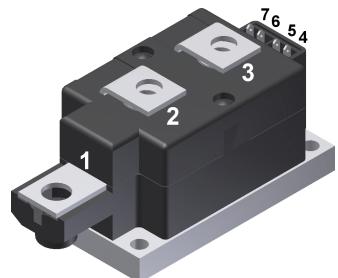
Backside: isolated

E72873
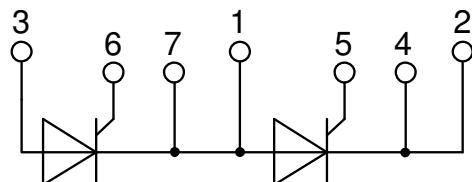
Features / Advantages:

- 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: Y1

- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: Copper internally DCB isolated
- Advanced power cycling

Terms ̲Conditions of usage:

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact your local sales office.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact your local sales office.

Should you intend to use the product in aviation, in health or life endangering or life support applications, please notify. For any such application we urgently recommend

- to perform joint risk and quality assessments;
- the conclusion of quality agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20170116c

preliminary

Thyristor

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			300	µA
		$V_{R/D}$ = 1600 V	T_{VJ} = 140°C			30	mA
V_T	forward voltage drop	I_T = 300 A	T_{VJ} = 25°C			1.19	V
		I_T = 600 A				1.46	V
		I_T = 300 A	T_{VJ} = 125°C			1.15	V
		I_T = 600 A				1.44	V
I_{TAV}	average forward current	T_C = 85°C	T_{VJ} = 140°C			260	A
$I_{T(RMS)}$	RMS forward current	180° sine				408	A
V_{T0}	threshold voltage	for power loss calculation only	T_{VJ} = 140°C			0.80	V
r_T	slope resistance					0.75	mΩ
R_{thJC}	thermal resistance junction to case					0.16	K/W
R_{thCH}	thermal resistance case to heatsink				0.04		K/W
P_{tot}	total power dissipation	T_C = 25°C				720	W
I_{TSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			8.50	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			9.18	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 140°C			7.23	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			7.81	kA
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			361.3	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			350.6	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 140°C			261.0	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			253.4	kA²s
C_J	junction capacitance	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		366		pF
P_{GM}	max. gate power dissipation	t_P = 30 µs	T_C = 140°C			120	W
		t_P = 500 µs				60	W
P_{GAV}	average gate power dissipation					20	W
$(di/dt)_{cr}$	critical rate of rise of current	T_{VJ} = 140°C; f = 50 Hz repetitive, I_T = 750 A				100	A/µs
		t_P = 200 µs; di_G/dt = 1 A/µs;					
		I_G = 1 A; V = ⅔ V_{DRM} non-repet., I_T = 268 A				500	A/µs
$(dv/dt)_{cr}$	critical rate of rise of voltage	V = ⅔ V_{DRM}	T_{VJ} = 140°C			1000	V/µs
		R_{GK} = ∞; method 1 (linear voltage rise)					
V_{GT}	gate trigger voltage	V_D = 6 V	T_{VJ} = 25°C			2	V
			T_{VJ} = -40°C			3	V
I_{GT}	gate trigger current	V_D = 6 V	T_{VJ} = 25°C			150	mA
			T_{VJ} = -40°C			220	mA
V_{GD}	gate non-trigger voltage	V_D = ⅔ V_{DRM}	T_{VJ} = 140°C			0.25	V
I_{GD}	gate non-trigger current					10	mA
I_L	latching current	t_p = 30 µs	T_{VJ} = 25°C			200	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			150	mA
t_{gd}	gate controlled delay time	V_D = ½ V_{DRM}	T_{VJ} = 25°C			2	µs
		I_G = 1 A; di_G/dt = 1 A/µs					
t_q	turn-off time	V_R = 100 V; I_T = 300 A; V = ⅔ V_{DRM} T_{VJ} = 125 °C			200		µs
		di/dt = 10 A/µs dv/dt = 50 V/µs t_p = 200 µs					

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MCMA265P1600KA

Package	Y1			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			600	A
T_{VJ}	virtual junction temperature		-40		140	°C
T_{op}	operation temperature		-40		125	°C
T_{stg}	storage temperature		-40		125	°C
Weight				680		g
M_D	mounting torque		4.5		7	Nm
M_T	terminal torque		11		13	Nm
$d_{Spp/App}$	creepage distance on surface | striking distance through air	terminal to terminal	16.0			mm
$d_{Spb/Apb}$		terminal to backside	16.0			mm
V_{ISOL}	isolation voltage	t = 1 second	4800			V
		50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA t = 1 minute	4000			V

Production Index (PI)
Date Code (DC)

Circuit

yywwAA
Part Number
Lot.No: xxxxxx
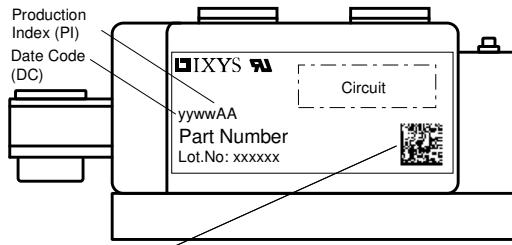
Data Matrix: *part no.* (1-19), *DC + PI* (20-25), *lot.no.#* (26-31),
blank (32), *serial no.#* (33-36)

Part description

M = Module
C = Thyristor (SCR)
M = Thyristor
A = (up to 1800V)
265 = Current Rating [A]
P = Phase leg
1600 = Reverse Voltage [V]
KA = Y1-CU

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCMA265P1600KA	MCMA265P1600KA	Box	3	509792

Equivalent Circuits for Simulation

on die level $T_{VJ} = 140 °C$

I → V₀ — R₀

Thyristor

$V_{0\,max}$	threshold voltage	0.8	V
$R_{0\,max}$	slope resistance *	0.51	mΩ

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Outlines   Y1

3x M8

2.8 x 0.8
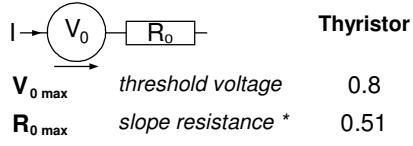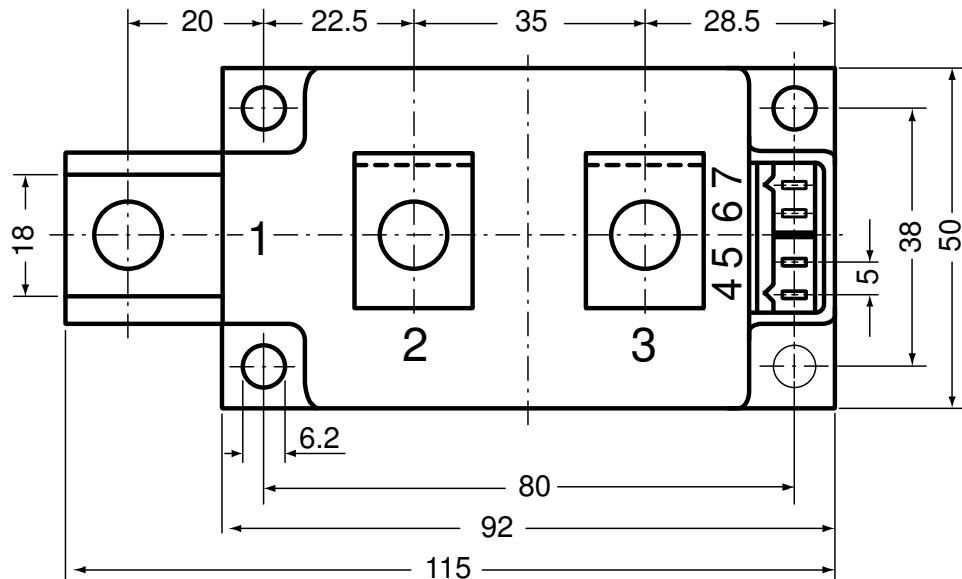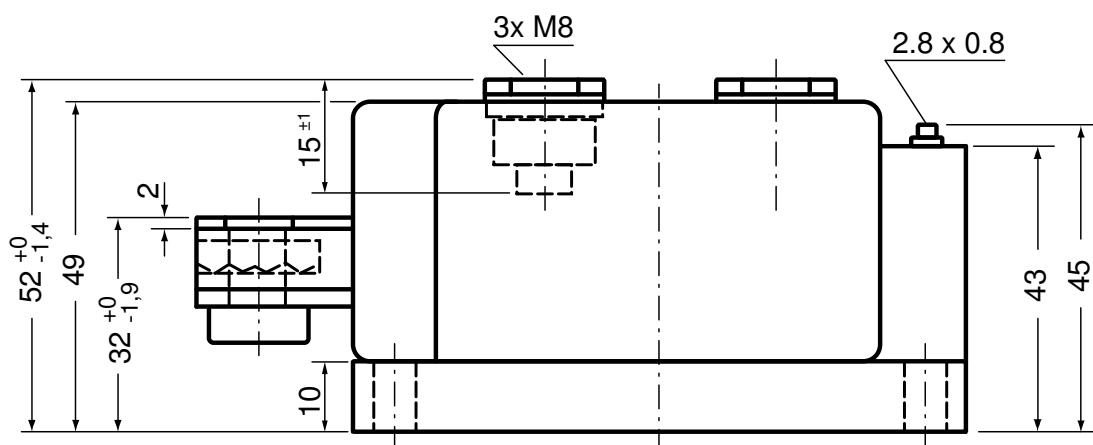
Optional accessories for modules
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = white, cathode = red
Type ZY 180L (L = Left for pin pair 4/5)
Type ZY 180R (R = Right for pin pair 6/7) } UL 758, style 3751

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Thyristor


Fig. 1 Forward voltage drop

Fig. 2 Gate trigger delay time

Fig. 3 Gate trigger characteristics
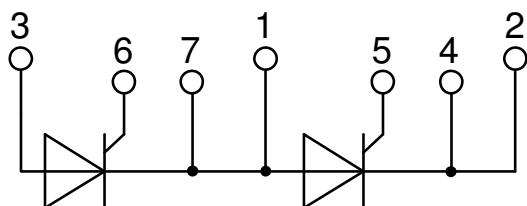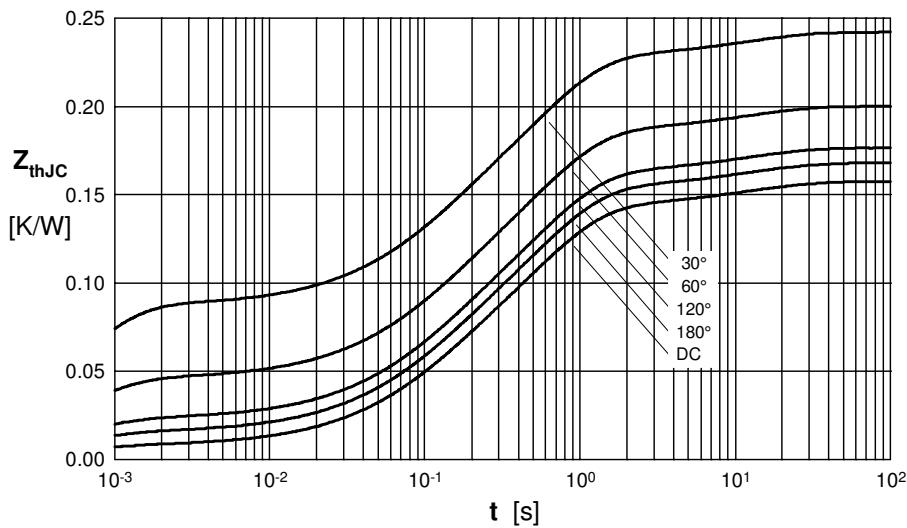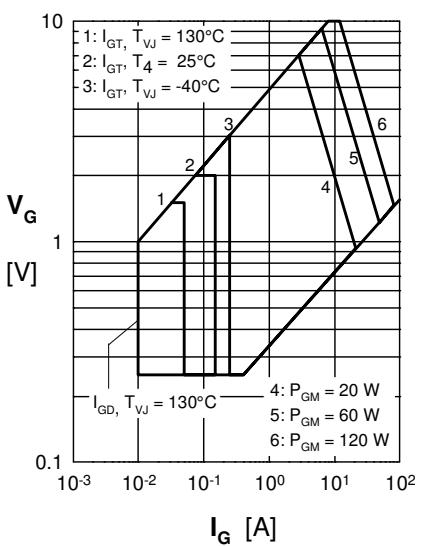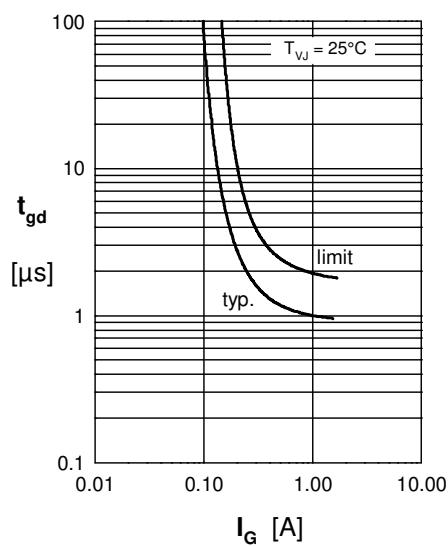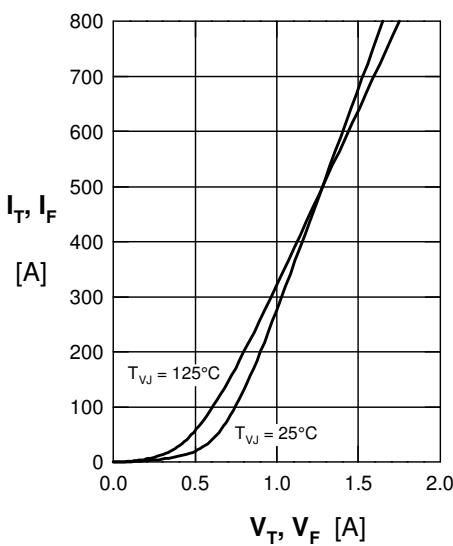
Fig. 4 Transient thermal impedance junction to case (per thyristor/diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} (K/W)
DC	0.157
180°	0.168
120°	0.177
60°	0.200
30°	0.243

Constants for Z_{th} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.0076	0.0054
2	0.0406	0.098
3	0.0944	0.54
4	0.0147	12