Thyristor Module

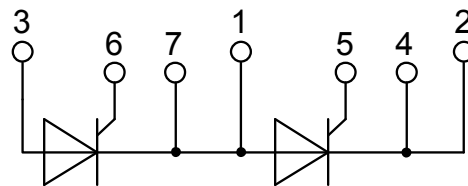|		
V_{RRM}	=	$2 \times 1600\,V$
I_{TAV}	=	$260\,A$
V_T	=	$1.06\,V$

Phase leg

Part number

MCMA260P1600YA
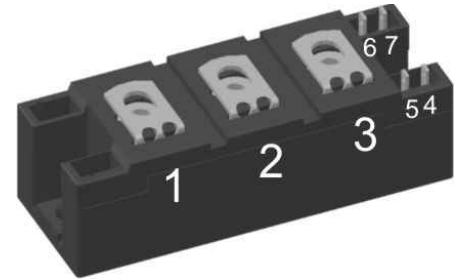
Backside: isolated

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: Y4
- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Data according to IEC 60747and per semiconductor unless otherwise specified

20131121a

Thyristor | | | | | 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			300	µA
		$V_{R/D}$ = 1600 V	T_{VJ} = 140°C			20	mA
V_T	forward voltage drop	I_T = 200 A	T_{VJ} = 25°C			1.12	V
		I_T = 400 A				1.33	V
		I_T = 200 A	T_{VJ} = 125°C			1.06	V
		I_T = 400 A				1.31	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			0.81	V
r_T	slope resistance					1.23	mΩ
R_{thJC}	thermal resistance junction to case					0.13	K/W
R_{thCH}	thermal resistance case to heatsink				0.08		K/W
P_{tot}	total power dissipation	T_C = 25°C				880	W
I_{TSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			8.30	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			8.97	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 140°C			7.06	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			7.62	kA
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			344.5	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			334.3	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 140°C			248.9	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			241.6	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 = 780 A				100	A/µs
		t_P = 200 µs; di_G/dt = 0.5 A/µs;					
		I_G = 0.5A; V_D = ⅔ V_{DRM} non-repet., I_T = 500 A				260	A/µs
$(dv/dt)_{cr}$	critical rate of rise of voltage	V_D = 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 = 0.5A; di_G/dt = 0.5 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 = 0.5A; di_G/dt = 0.5 A/µs					
t_q	turn-off time	V_R = 100 V; I_T = 260 A; V_D = ⅔ V_{DRM} T_{VJ} = 140°C			200		µs
		di/dt = 10 A/µs; dv/dt = 50 V/µs; t_p = 200 µs					

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20131121a

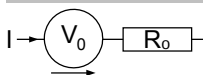| Package	Y4			Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal				300	A
T_{VJ}	virtual junction temperature			-40		140	°C
T_{op}	operation temperature			-40		125	°C
T_{stg}	storage temperature			-40		125	°C
Weight					150		g
M_D	mounting torque			2.25		2.75	Nm
M_T	terminal torque			4.5		5.5	Nm
$d_{Spp/App}$	creepage distance on surface | striking distance through air	terminal to terminal	14.0	10.0			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	4800			V
		t = 1 minute		4000			V
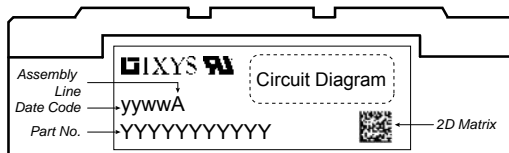
Part number

M = Module
C = Thyristor (SCR)
M = Thyristor
A = (up to 1800V)
260 = Current Rating [A]
P = Phase leg
1600 = Reverse Voltage [V]
YA = Y4-M6

Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCMA260P1600YA	MCMA260P1600YA	Box	6	509785

Equivalent Circuits for Simulation   *on die level* T_{VJ} = 140 °C

Thyristor

$V_{0\,max}$	threshold voltage	0.81	V
$R_{0\,max}$	slope resistance *	0.59	mΩ

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Outlines   Y4

M6 x 16   2.8 / 0.8   2.2

1   2   3

30   29   5

0.25   65   Ø 6.6

94

80   7

5   6
7

11 10   1   2   3

15
12.4   23.2   34

8 9   4
5

17

40

63
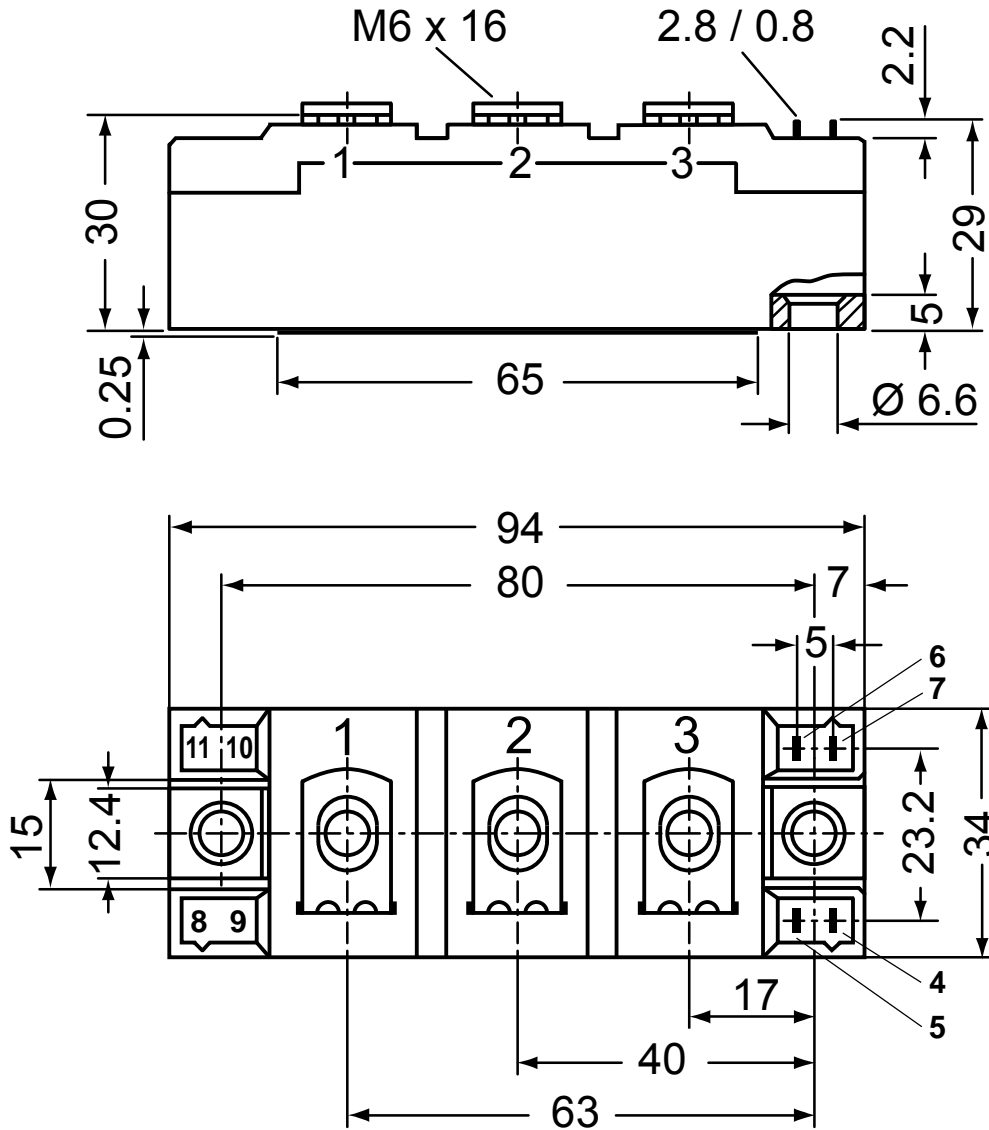
Optional accessories for modules
Keyed gate/cathode twin plugs with wire length = 350 mm, gate = white, cathode = red
Type ZY 180L (L = Left for pin pair 4/5)
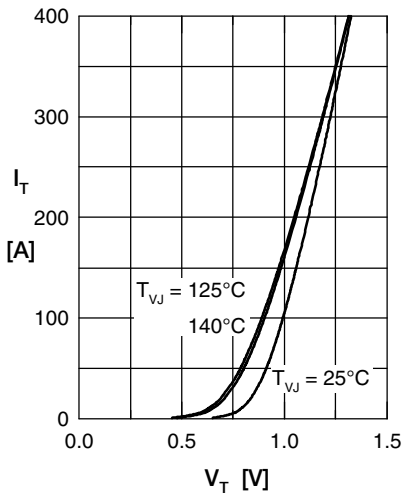Type ZY 180R (R = Right for pin pair 6/7) } UL 758, style 3751

3   6   7   1   5   4   2

Thyristor

Fig. 1 Forward current vs. voltage drop per thyristor
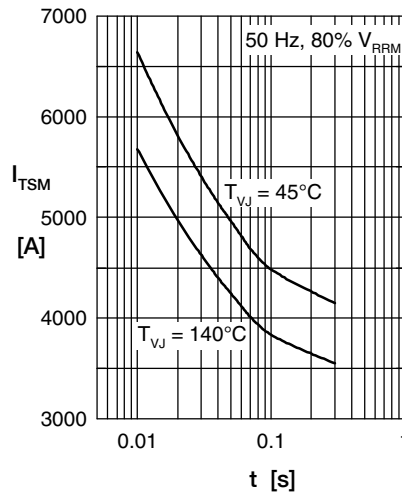
Fig. 2 Surge overload current vs. time per thyristor
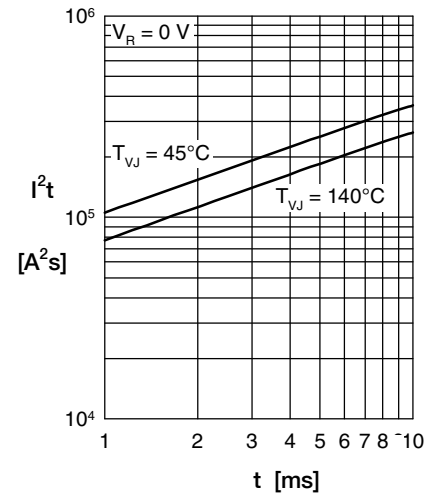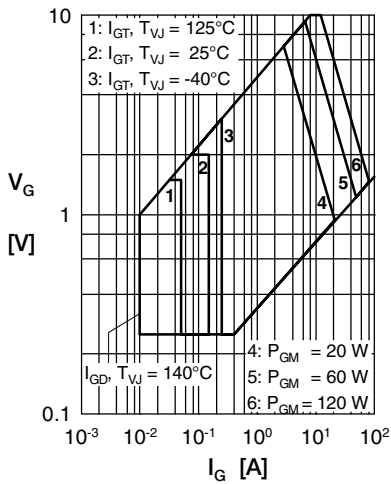

Fig. 3 I^2t vs. time per thyristor
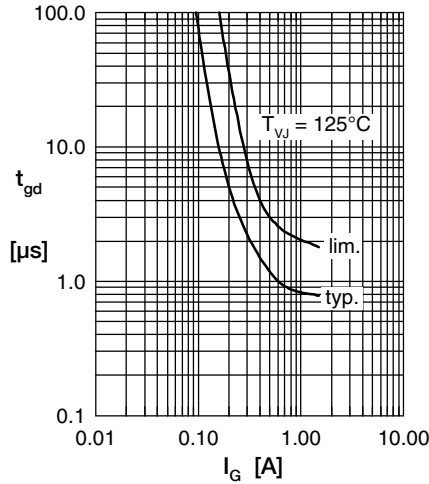

Fig. 4 Gate voltage & gate current
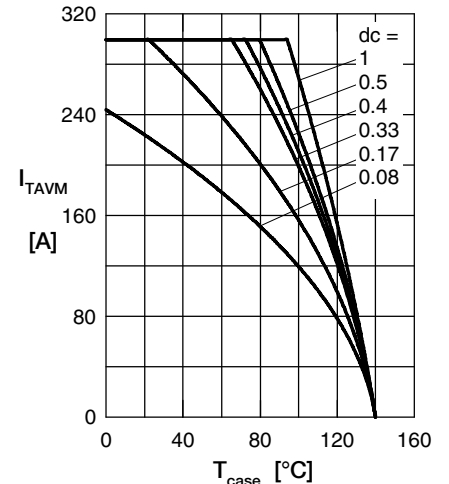

Fig. 5 Gate controlled delay time t_{gd}

Fig. 6 Max. forward current vs. case temperature per thyr.

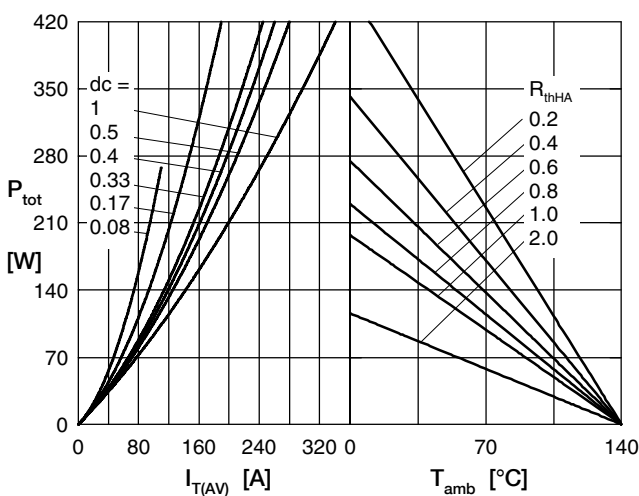Fig. 7 Power dissipation vs. forward current and ambient temperature per thyristor

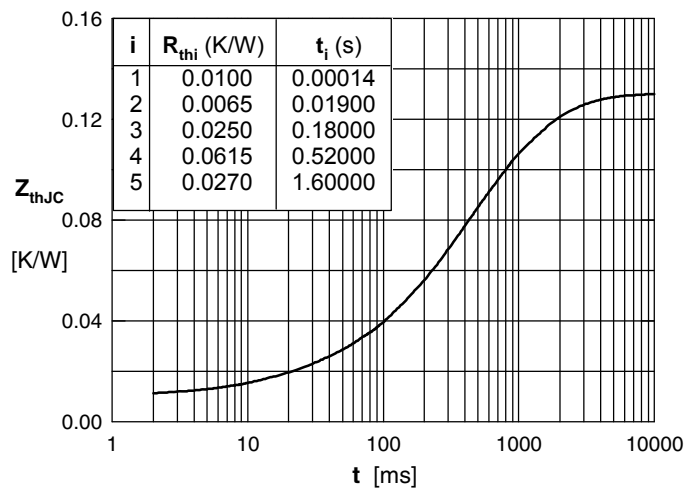| i	R_{thi} (K/W)	t_i (s)
1	0.0100	0.00014
2	0.0065	0.01900
3	0.0250	0.18000
4	0.0615	0.52000
5	0.0270	1.60000

Fig. 8 Transient thermal impedance junction to case vs. time per thyristor