Thyristor Module

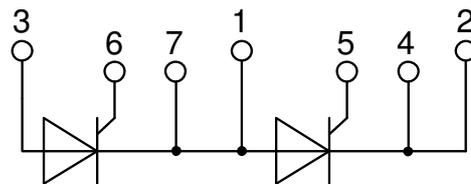|		
V_{RRM}	=	2 x 1600 V
I_{TAV}	=	260 A
V_T	=	1.06 V

Phase leg

Part number

MCMA260P1600YA
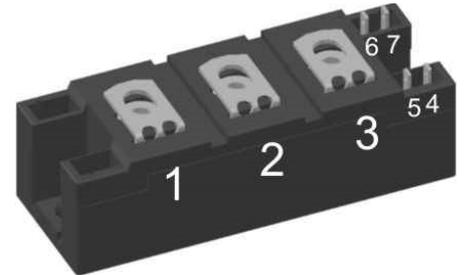
Backside: isolated

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

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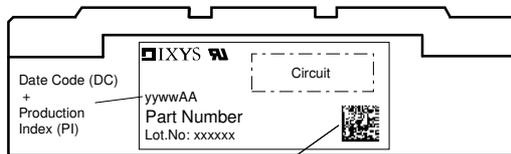- to perform joint risk and quality assessments;
- the conclusion of quality agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

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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			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		T_{VJ} = 140°C			0.81	V
r_T	slope resistance } for power loss calculation only					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 = 0.5 A; V = ⅔ V_{DRM} non-repet., I_T = 500 A				260	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 = 0.5 A; 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 = 0.5 A; di_G/dt = 0.5 A/μs					
t_q	turn-off time	V_R = 100 V; I_T = 260 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					

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 description

- 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

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Circuit

Date Code (DC)
+
Production
Index (PI)

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)

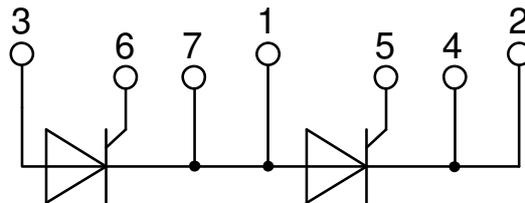| Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCMA260P1600YA	MCMA260P1600YA	Box	6	509785

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

I → (V₀) — [R₀]
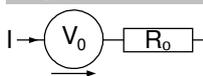
Thyristor

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

Outlines   Y4
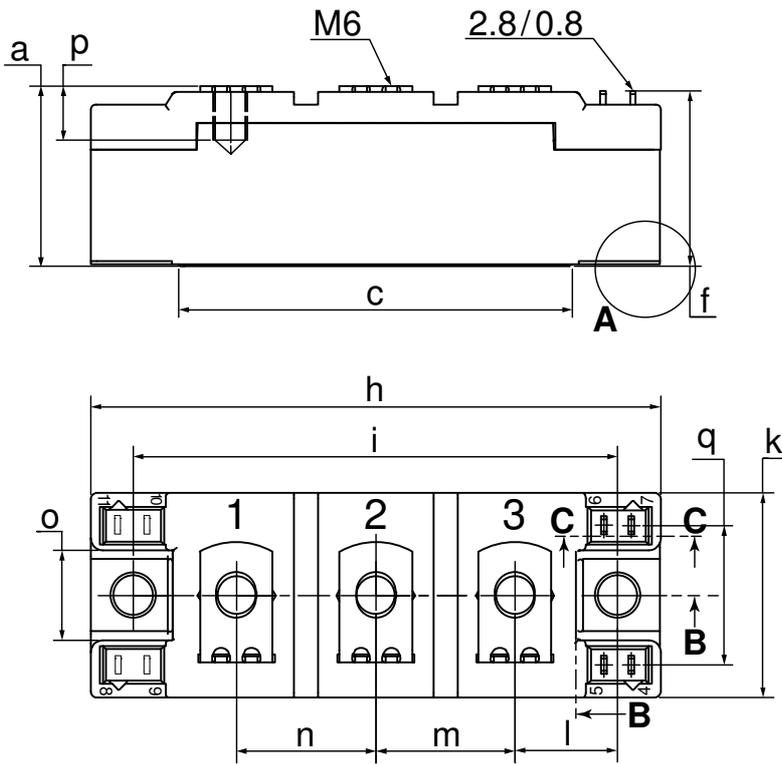
Dim.	MIN [mm]	MAX [mm]	MIN [inch]	MAX [inch]
a	30.0	30.6	1.181	1.205
b	typ. 0.25		typ. 0.010	
c	64.0	65.0	2.520	2.559
d	6.5	7.0	0.256	0.275
e	4.9	5.1	0.193	0.201
f	28.6	29.2	1.126	1.150
g	7.3	7.7	0.287	0.303
h	93.5	94.5	3.681	3.720
i	79.5	80.5	3.130	3.169
j	4.8	5.2	0.189	0.205
k	33.4	34.0	1.315	1.339
l	16.7	17.3	0.657	0.681
m	22.7	23.3	0.894	0.917
n	22.7	23.3	0.894	0.917
o	14.0	15.0	0.551	0.591
p	typ. 10.5		typ. 0.413	
q	22.8	23.3	0.898	0.917
r	1.8	2.4	0.071	0.041

A (3:1)

B-B (1:1)

C-C (1:1)

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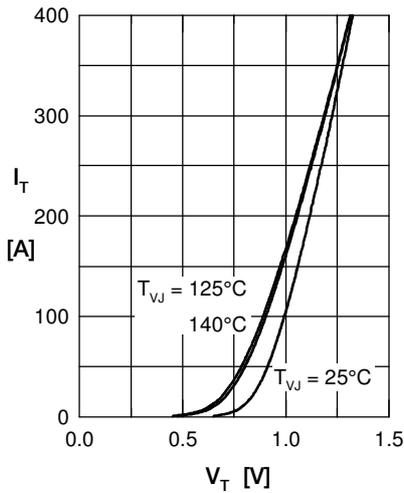© 2016 IXYS all rights reserved
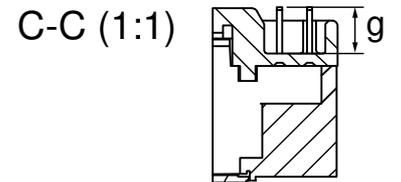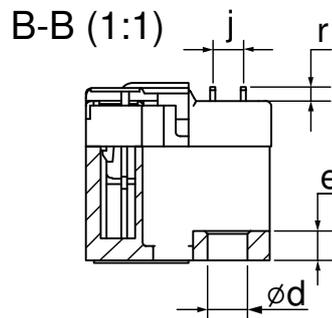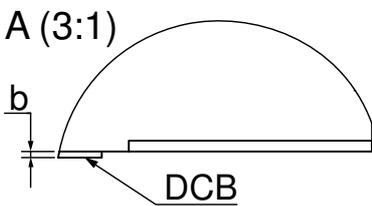
Thyristor

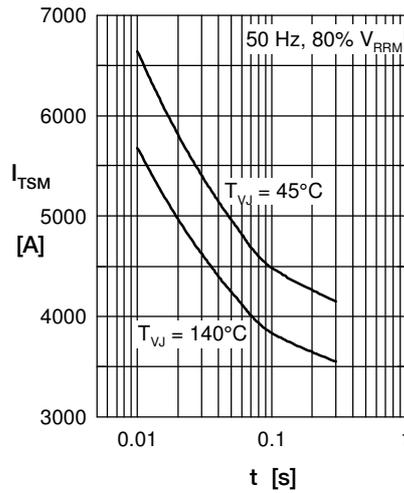Fig. 1 Forward current vs. voltage drop per thyristor

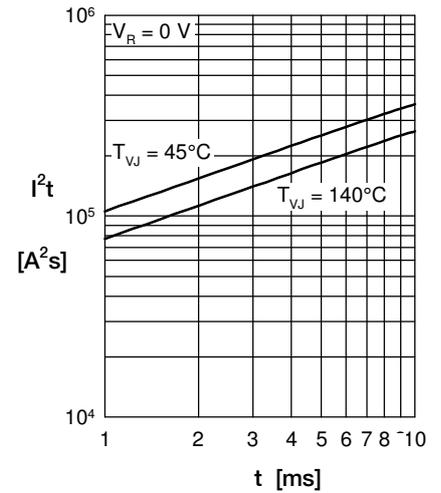Fig. 2 Surge overload current vs. time per thyristor
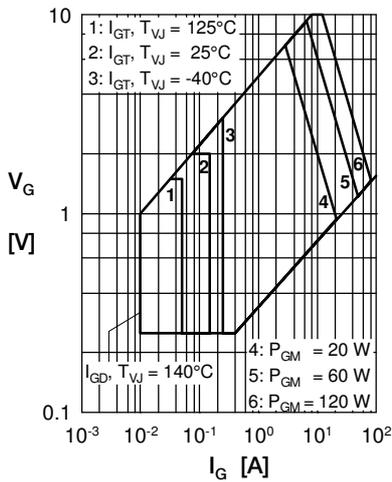

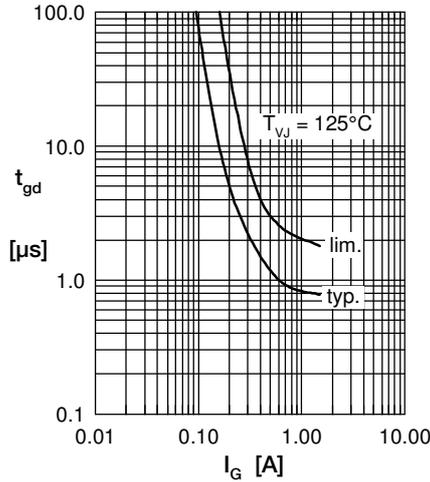Fig. 3 I^2t vs. time per thyristor

Fig. 4 Gate voltage & gate current
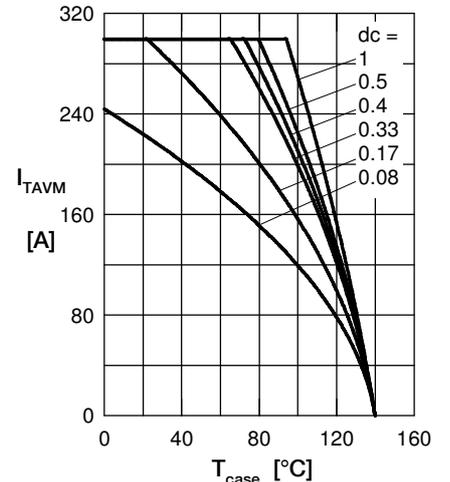

Fig. 5 Gate controlled delay time t_{gd}

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

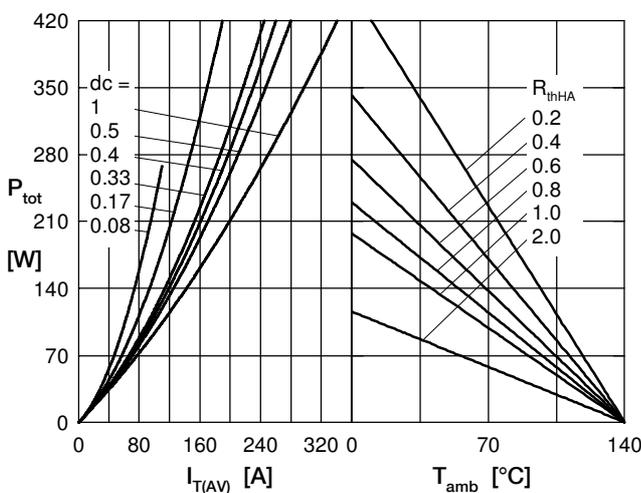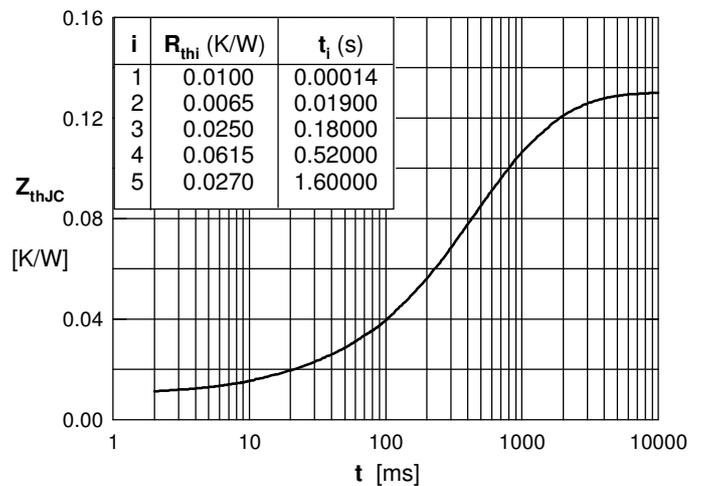Fig. 7 Power dissipation vs. forward current and ambient temperature per thyristor

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

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