Thyristor \ Diode Module

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

Phase leg

Part number

MCMA260PD1600YB

Backside: isolated

UL E72873
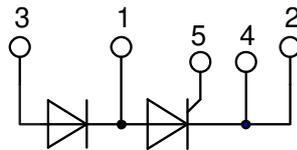
Features / Advantages:
● Thyristor for line frequency
● Planar passivated chip
● Long-term stability
● Direct Copper Bonded Al2O3-ceramic

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

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Rectifier

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				0.07		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., $I_T = 260$ 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
		$I_G = 0.5$ 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					

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Package   Y4

Symbol	Definition	Conditions			min.	typ.	max.	Unit
							Ratings	
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]
PD = Phase leg
1600 = Reverse Voltage [V]
YB = Y4-M6

Date Code (DC)
+
Production
Index (PI)

yywwAA
Part Number
Lot.No: xxxxxx

Circuit
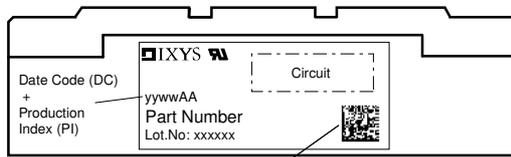
Data Matrix: *part no.* (1-19), DC + PI (20-25), *lot.no.#* (26-31),
blank (32), *serial no.#* (33-36)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCMA260PD1600YB	MCMA260PD1600YB	Box	6	509778

Equivalent Circuits for Simulation   ** on die level* T_{VJ} = 140 °C
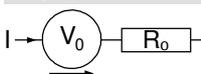
I → V_0 → R_0 →   **Thyristor**

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

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Outlines   Y4
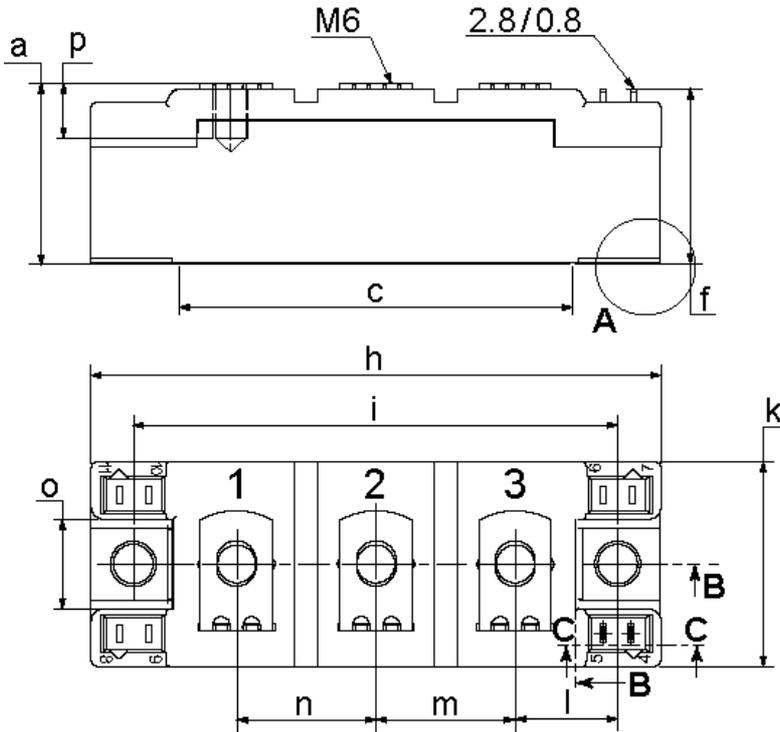
Dim.	MIN [mm]	MAX [mm]	MIN [inch]	MAX [inch]
a	30.0	30.6	1.181	1.205
b	typ. 0.25		typ. 0.010	
c	64.0	65.0	2.520	2.559
d	6.5	7.0	0.256	0.275
e	4.9	5.1	0.193	0.201
f	28.6	29.2	1.126	1.150
g	7.3	7.7	0.287	0.303
h	93.5	94.5	3.681	3.720
i	79.5	80.5	3.130	3.169
j	4.8	5.2	0.189	0.205
k	33.4	34.0	1.315	1.339
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	
r	1.8	2.4	0.071	0.041

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) UL 758, style 3751

A (3:1)

B-B (1:1)

C-C (1:1)
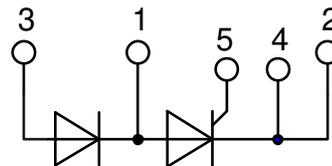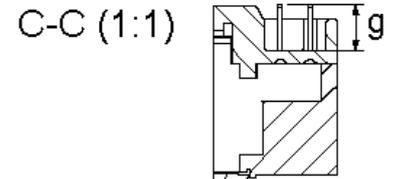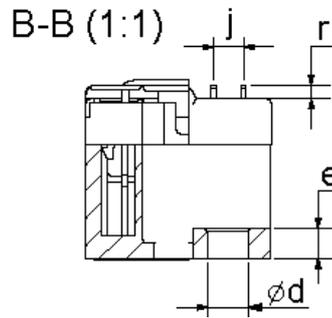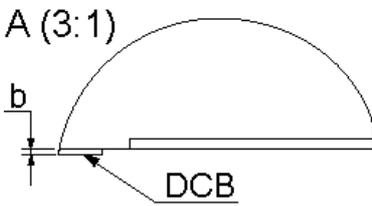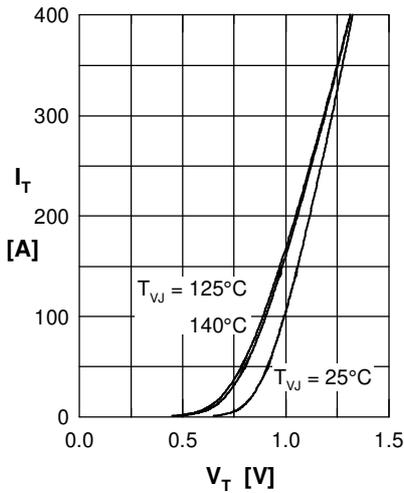
Thyristor

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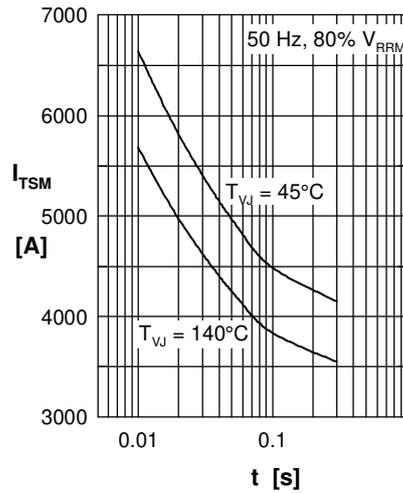
Fig. 2 Surge overload current vs. time per thyristor
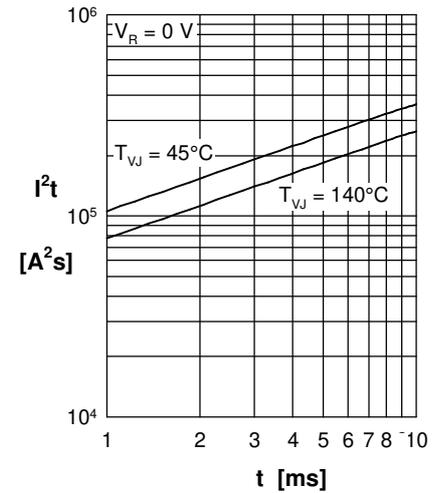

Fig. 3 I^2t vs. time per thyristor
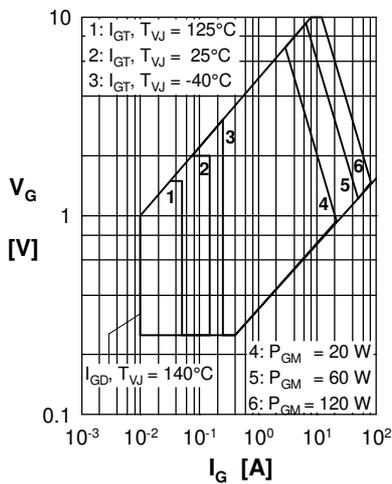

Fig. 4 Gate voltage & gate current
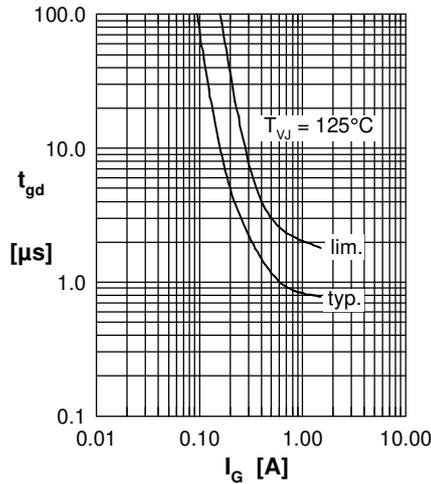

Fig. 5 Gate controlled delay time t_{gd}
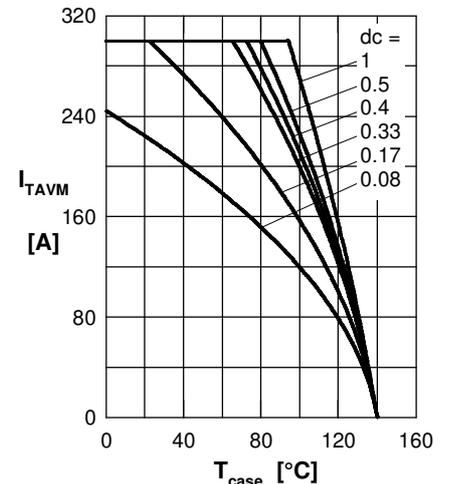
Fig. 6 Max. forward current vs. case temperature per thyr.
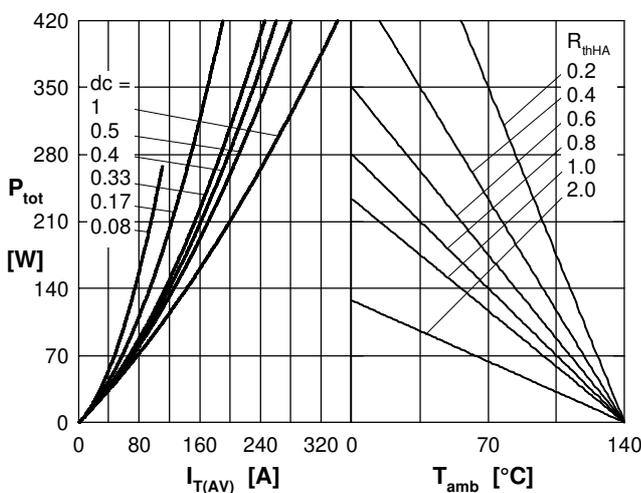
Fig. 7 Power dissipation vs. forward current and ambient temperature per thyristor

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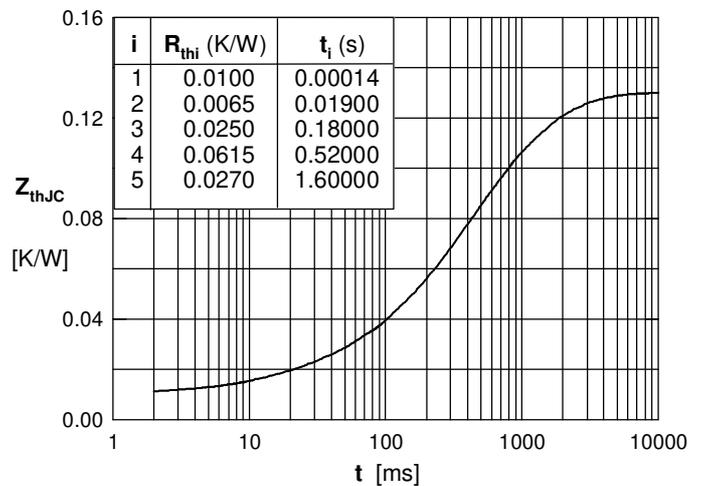
Fig. 8 Transient thermal impedance junction to case vs. time per thyristor

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DF01   DF10SA-E345   BU1508-E3/45   KBPC50-10S   RS405GL-BP   G5SBA60-E3/51   GBU10J-BP   GBU6M   GBU8D-BP   GBU8J-BP

2KBB10   36MB140A   TB102M   MB1510   MB258   MB6M-G   MB86   TL401G   MDA920A2   TU602   TU810   MP501W-BP   MP502-BP

BR101-BP   BR84DTP204   BU2008-E3/51   KBPC10/15/2501WP   KBPC25-02   VS-2KBB60   DF06SA-E345   DF1510S   VS-40MT160PAPBF

W02M   GBL02-E3/45   GBU4G-BP   GBJ2506-BP   GBU6B-E3/51   GSIB15A80-E3/45   DB104-BP