Thyristor \ Diode Module

preliminary

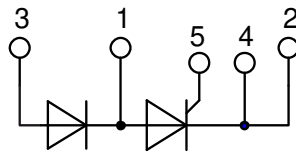|		
V_{RRM}	=	2 x 1600 V
I_{TAV}	=	260 A
V_T	=	1.15 V

Phase leg

Part number

MCMA265PD1600KB

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
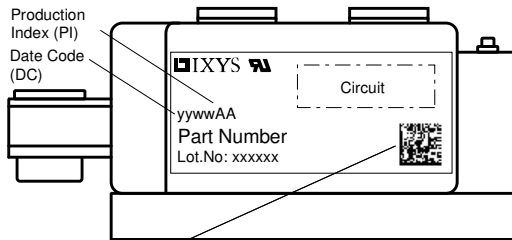- Advanced power cycling

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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	$T_{VJ} = 25°C$			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					

IXYS
A Littelfuse Technology

MCMA265PD1600KB

preliminary

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
		t = 1 minute — 50/60 Hz, RMS; I_ISOL ≤ 1 mA	4000			V

Production Index (PI)
Date Code (DC)

IXYS

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]
PD = Phase leg
1600 = Reverse Voltage [V]
KB = Y1-CU

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCMA265PD1600KB	MCMA265PD1600KB	Box	3	509202

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

I → V_0 — R_0 **Thyristor**
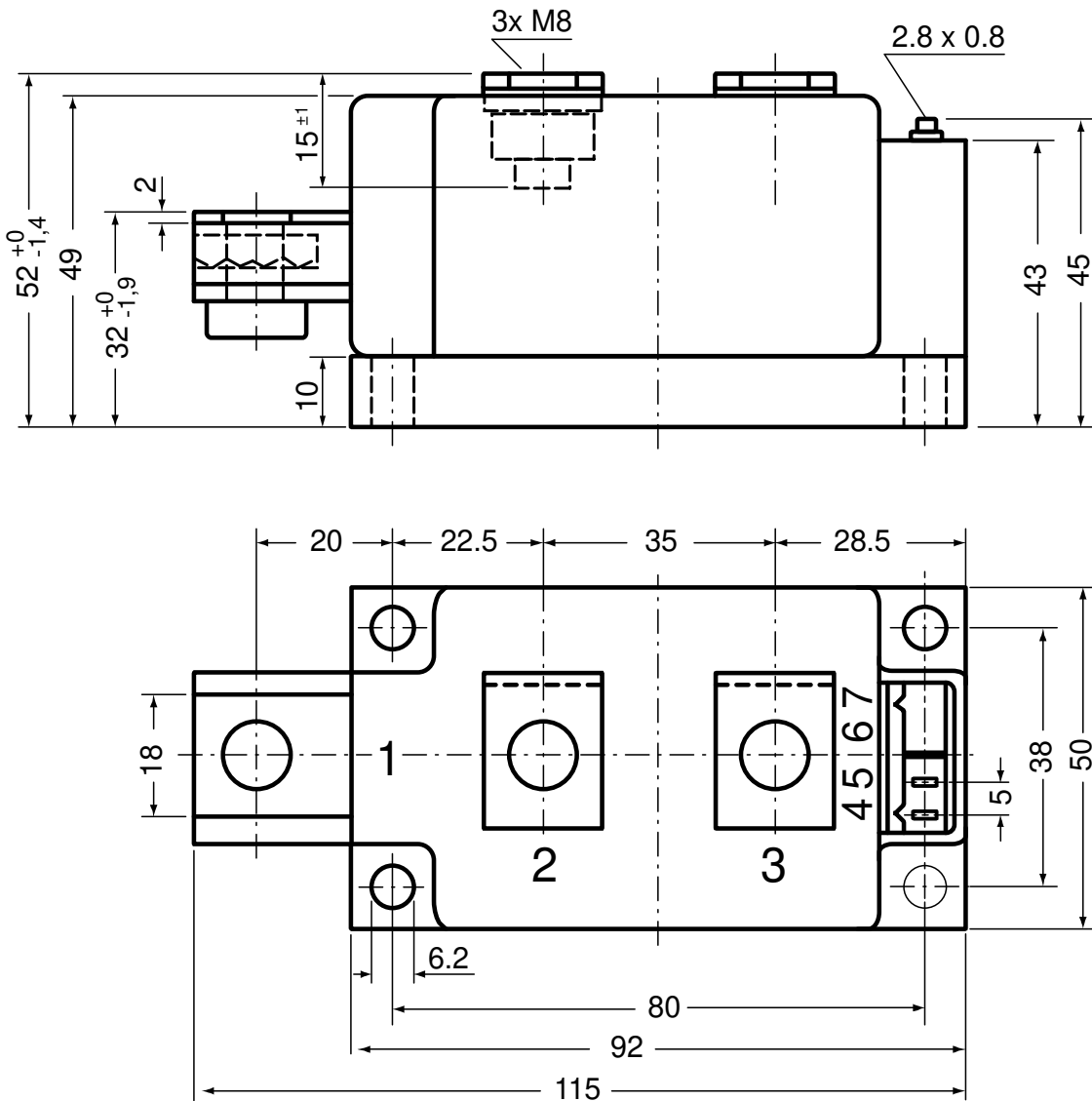
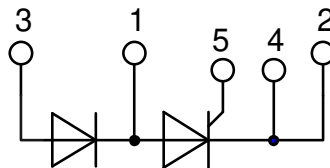|			
V_0 max	threshold voltage	0.8	V
R_0 max	slope resistance *	0.51	mΩ

Outlines   Y1

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) U L 758, style 3751
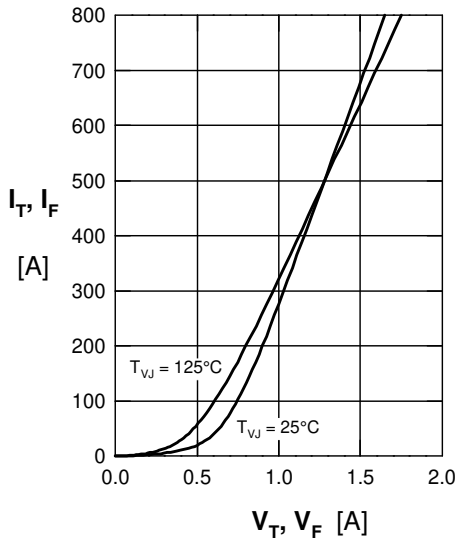
Thyristor
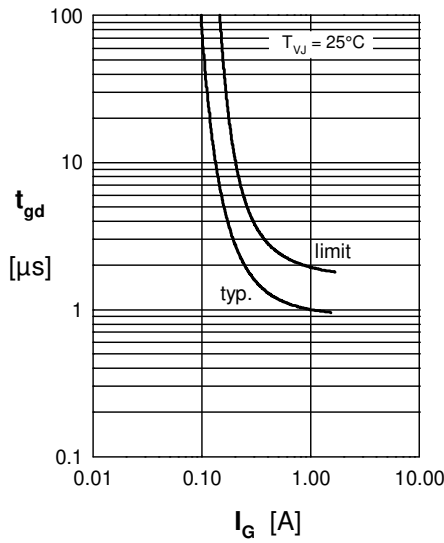

Fig. 1 Forward voltage drop
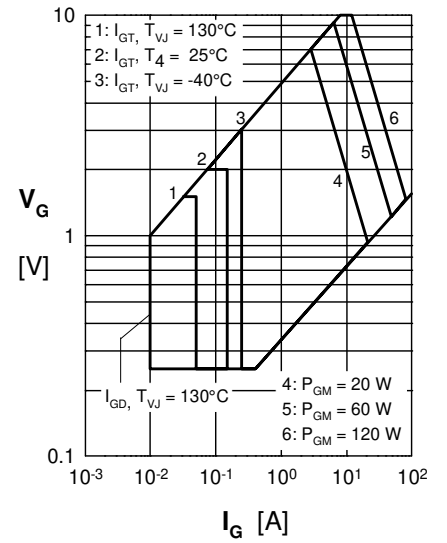

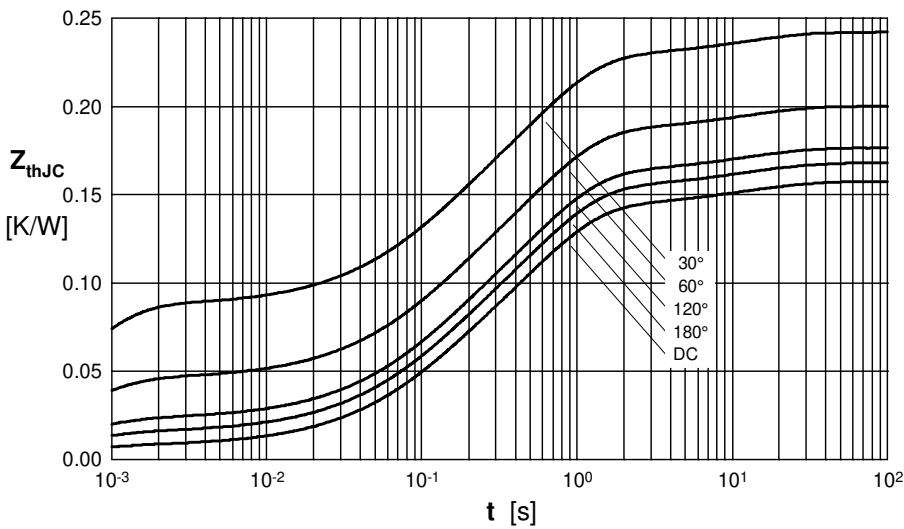Fig. 2 Gate trigger delay time

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

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