preliminary

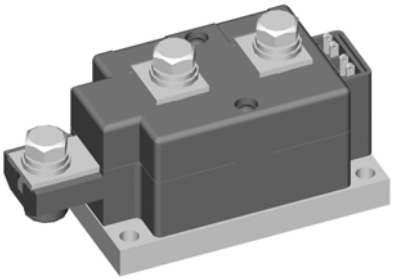
Thyristor Module

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

Phase leg

Part number

MCMA265P1600KA



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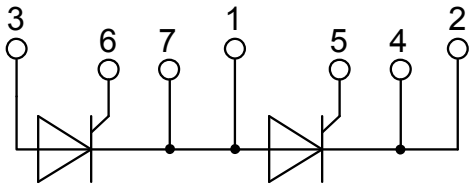


Features / Advantages:

- 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

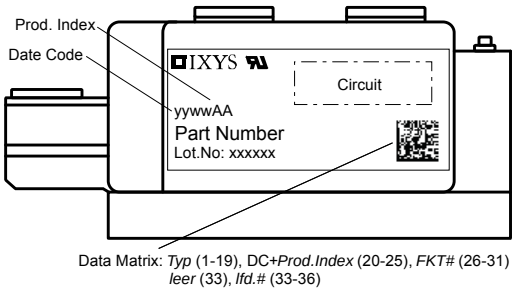
preliminary

Thyristor

Symbol	Definition	Conditions		Ratings 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 = 1A; V_D = ⅔ V_{DRM} non-repet.,	I_T = 268 A			500	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 = 0.45A; 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 = 1A; di_G/dt = 1 A/µs					
t_q	*turn-off time*	V_R = 100 V; I_T = 300 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					

preliminary

Package Y1				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I_{RMS}	*RMS current*	per terminal				600	A
T_{stg}	*storage temperature*			-40		125	°C
T_{VJ}	*virtual junction temperature*			-40		140	°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	50/60 Hz, RMS; I_{ISOL} ≤ 1 mA	4800			V
		t = 1 minute		4000			V

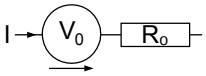


Part number

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

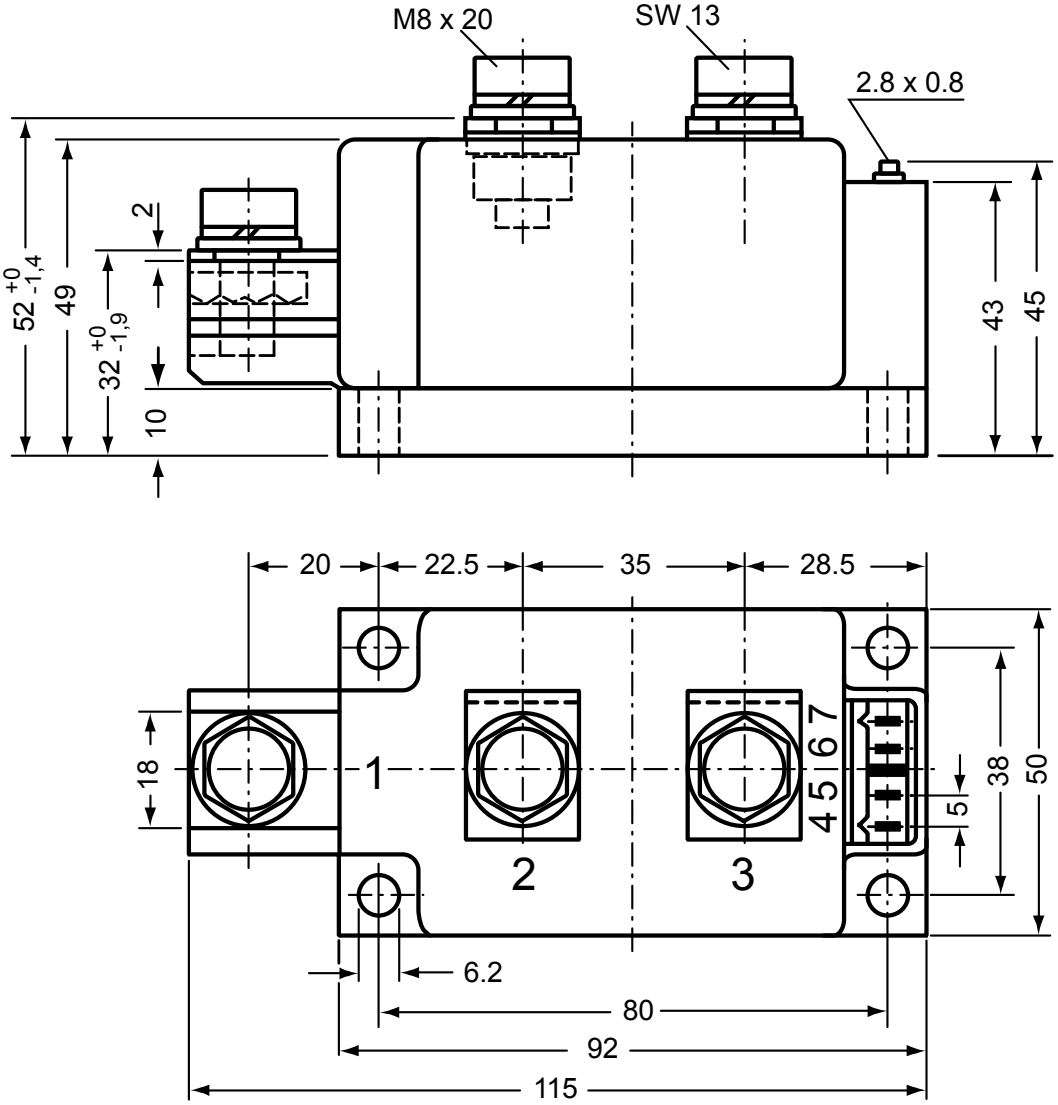
Equivalent Circuits for Simulation ** on die level* T_{VJ} = 140 °C



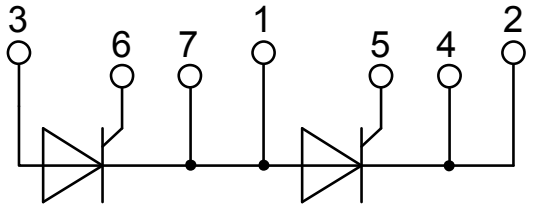
Thyristor

$V_{0\,max}$	*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)
Type ZY 180R (R = Right for pin pair 6/7)
} UL 758, style 3751



Thyristor

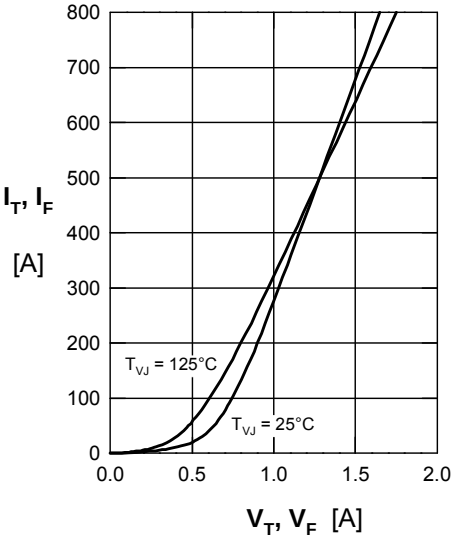


Fig. 1 Forward voltage drop

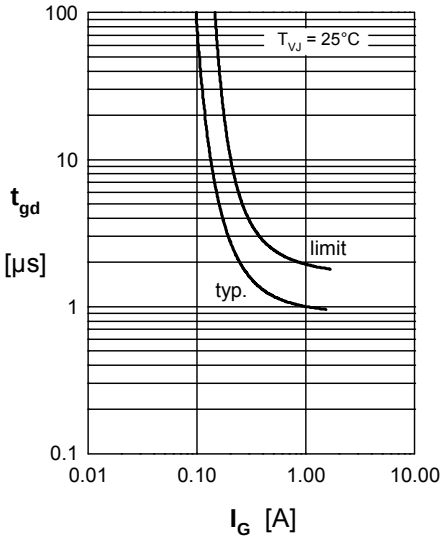


Fig. 2 Gate trigger delay time

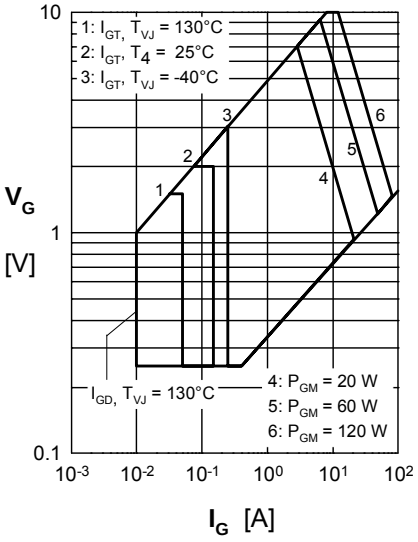
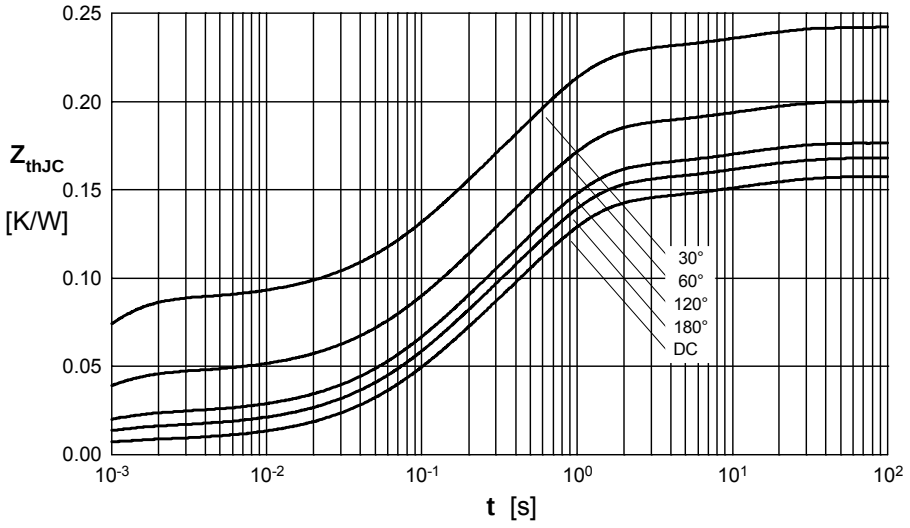


Fig. 3 Gate trigger characteristics



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

Fig. 4 Transient thermal impedance junction to case (per thyristor/diode)