

Thyristor Module

$$V_{RRM} = 2 \times 1600 \text{ V}$$

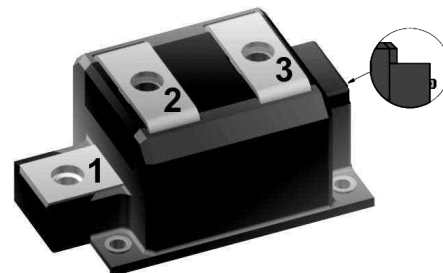
$$I_{TAV} = 700 \text{ A}$$

$$V_T = 1.11 \text{ V}$$

Phase leg
 optional usage as Dual Thyristor Triac

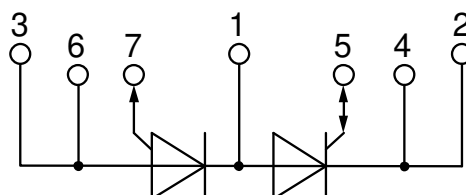
Part number

MCMA700P1600NCA



Backside: isolated

 E72873



Features / Advantages:

- Thyristor for line frequency
- Planar passivated chip
- Long-term stability
- Direct Copper Bonded Al₂O₃-ceramic
- Gate current polarities
 - upper SCR (2 -> 1) = positive/negative
 - lower SCR (1 -> 3) = negative

Applications:

- Line rectifying 50/60 Hz
- Softstart AC motor control
- DC Motor control
- Power converter
- AC power control
- Lighting and temperature control

Package: ComPack

- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: Copper internally DCB isolated
- Advanced power cycling
- Phase Change Material available

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Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1700	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1600	V
$I_{R/D}$	reverse current, drain current	$V_{R/D} = 1600\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			2	mA
		$V_{R/D} = 1600\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$			40	mA
V_T	forward voltage drop	$I_T = 700\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			1.16	V
		$I_T = 1400\text{ A}$				1.41	V
		$I_T = 700\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			1.11	V
		$I_T = 1400\text{ A}$				1.41	V
I_{TAV}	average forward current	$T_C = 85^{\circ}\text{C}$	$T_{VJ} = 140^{\circ}\text{C}$			700	A
$I_{T(RMS)}$	RMS forward current	180° sine				1100	A
V_{T0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 140^{\circ}\text{C}$			0.82	V
r_T	slope resistance					0.4	mΩ
R_{thJC}	thermal resistance junction to case					0.05	K/W
R_{thCH}	thermal resistance case to heatsink				0.02		K/W
P_{tot}	total power dissipation		$T_C = 25^{\circ}\text{C}$			2300	W
I_{TSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			19.0	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			20.5	kA
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 140^{\circ}\text{C}$			16.2	kA
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			17.4	kA
I^2t	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			1.81	MA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			1.75	MA ² s
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 140^{\circ}\text{C}$			1.30	MA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			1.27	MA ² s
C_J	junction capacitance	$V_R = 400\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		876		pF
P_{GM}	max. gate power dissipation	$t_p = 30\text{ }\mu\text{s}$	$T_C = 140^{\circ}\text{C}$			240	W
		$t_p = 300\text{ }\mu\text{s}$				120	W
P_{GAV}	average gate power dissipation					40	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 140^{\circ}\text{C}; f = 50\text{ Hz}$ repetitive, $I_T = 2100\text{ A}$				100	A/ μs
		$t_p = 200\text{ }\mu\text{s}; di_G/dt = 1\text{ A}/\mu\text{s};$ $I_G = 1\text{ A}; V = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 700\text{ A}$				500	A/ μs
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 140^{\circ}\text{C}$			1000	V/ μs
		$R_{GK} = \infty$; method 1 (linear voltage rise)					
V_{GT}	gate trigger voltage	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			2	V
			$T_{VJ} = -40^{\circ}\text{C}$			3	V
I_{GT}	gate trigger current	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			± 300	mA
			$T_{VJ} = -40^{\circ}\text{C}$			± 400	mA
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 140^{\circ}\text{C}$			0.25	V
I_{GD}	gate non-trigger current					± 10	mA
I_L	latching current	$t_p = 30\text{ }\mu\text{s}$	$T_{VJ} = 25^{\circ}\text{C}$			400	mA
		$I_G = 1\text{ A}; di_G/dt = 1\text{ A}/\mu\text{s}$					
I_H	holding current	$V_D = 6\text{ V}$ $R_{GK} = \infty$	$T_{VJ} = 25^{\circ}\text{C}$			300	mA
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}\text{C}$			2	μs
		$I_G = 1\text{ A}; di_G/dt = 1\text{ A}/\mu\text{s}$					
t_q	turn-off time	$V_R = 100\text{ V}; I_T = 700\text{ A}; V = \frac{2}{3} V_{DRM}$ $T_{VJ} = 125^{\circ}\text{C}$ $di/dt = 10\text{ A}/\mu\text{s}$ $dv/dt = 50\text{ V}/\mu\text{s}$ $t_p = 200\text{ }\mu\text{s}$			350		μs

Package ComPack			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			1200	A
T_{VJ}	virtual junction temperature		-40		140	°C
T_{op}	operation temperature		-40		125	°C
T_{stg}	storage temperature		-40		125	°C
Weight				500		g
M_D	mounting torque		3		5	Nm
M_T	terminal torque		12		14	Nm
$d_{Spp/App}$	creepage distance on surface striking distance through air	terminal to terminal	21.0			mm
$d_{Spb/Apb}$		terminal to backside	18.0			mm
V_{ISOL}	isolation voltage	t = 1 second	4800			V
		t = 1 minute	4000			V



Part description

M = Module
 C = Thyristor (SCR)
 M = Thyristor
 A = (up to 1800V)
 700 = Current Rating [A]
 P = Phase leg
 1600 = Reverse Voltage [V]
 N = Three Quadrants operation: QI - QIII
 CA = ComPack

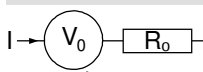
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCMA700P1600NCA	MCMA700P1600NCA	Box	3	515494

Similar Part	Package	Voltage class
MCMA700P1600CA	ComPack	1600

Equivalent Circuits for Simulation

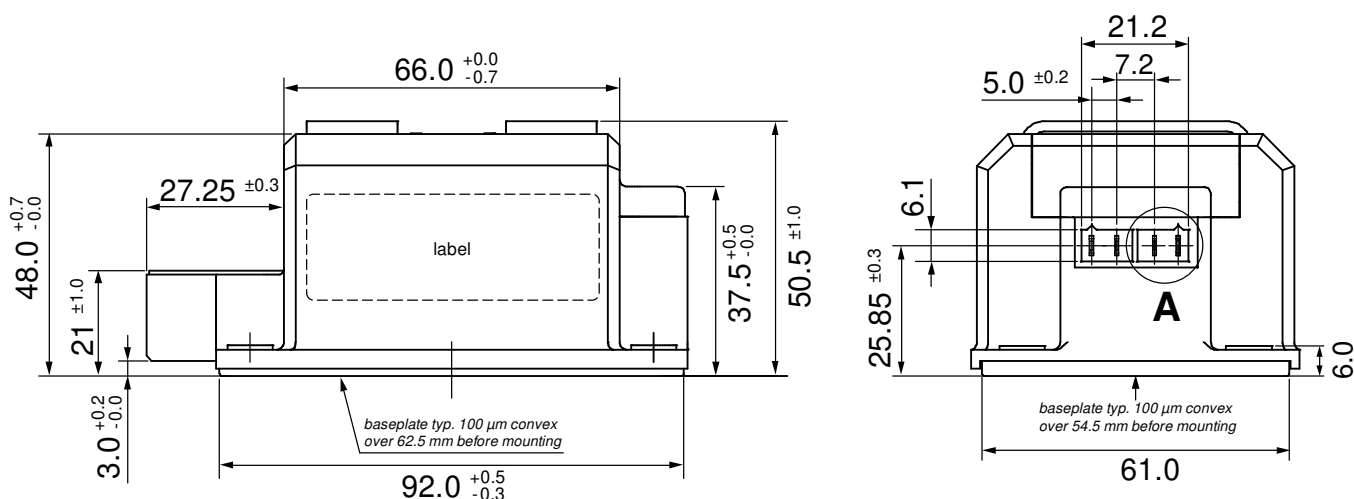
* on die level

$T_{VJ} = 140^{\circ}\text{C}$

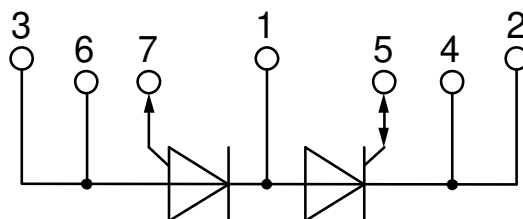
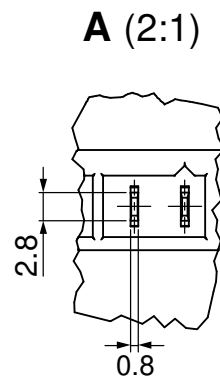
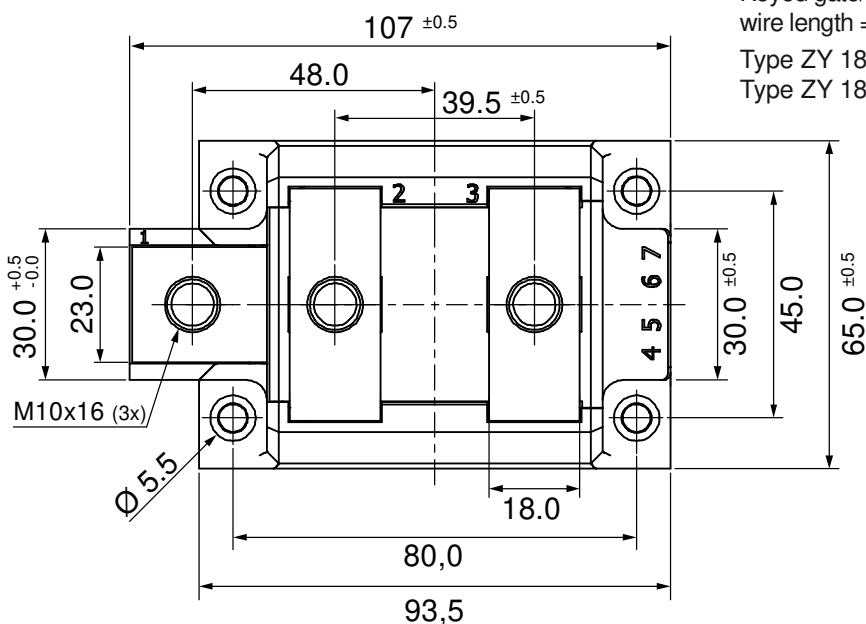


Thyristor

$V_{0\max}$	threshold voltage	0.82	V
$R_{0\max}$	slope resistance *	0.21	mΩ

Outlines ComPack


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,
 Type ZY 180R (R = Right for pin pair 6/7) } style 3751



Thyristor

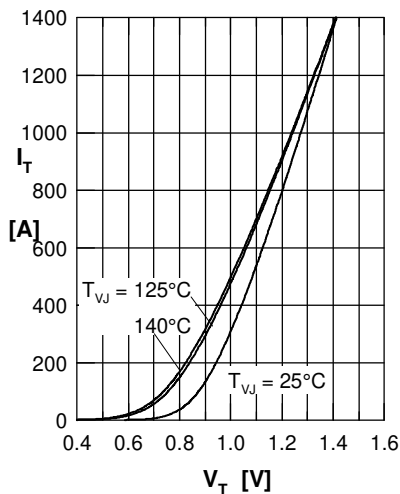


Fig. 1 Forward characteristics

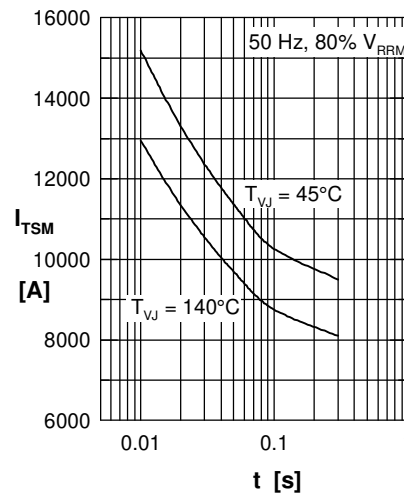


Fig. 2 Surge overload current
 I_{TSM} : crest value, t : duration

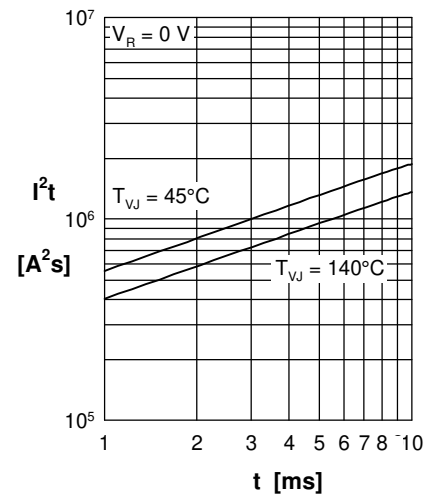


Fig. 3 I^2t versus time (1-10 s)

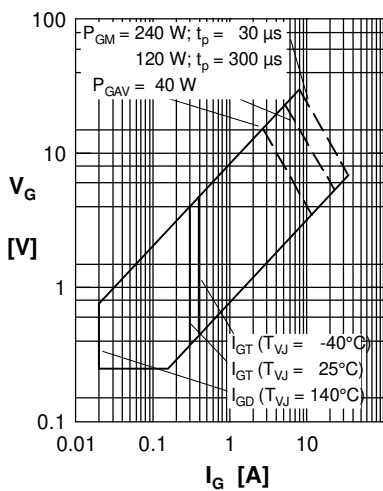


Fig. 4 Gate voltage & gate current

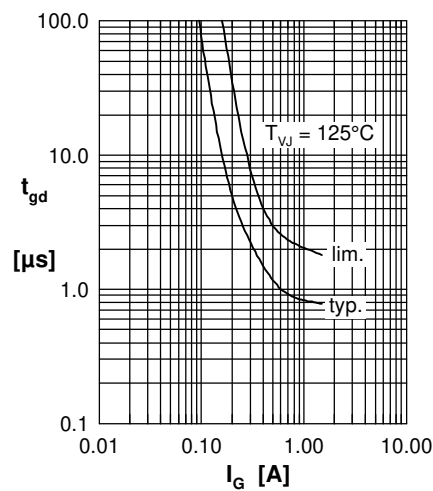


Fig. 5 Gate controlled delay time t_{gd}

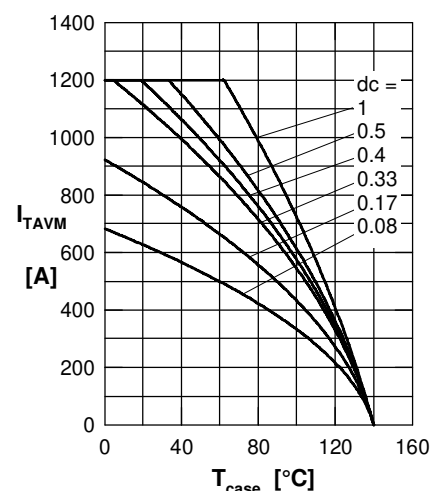


Fig. 6 Max. forward current at case temperature

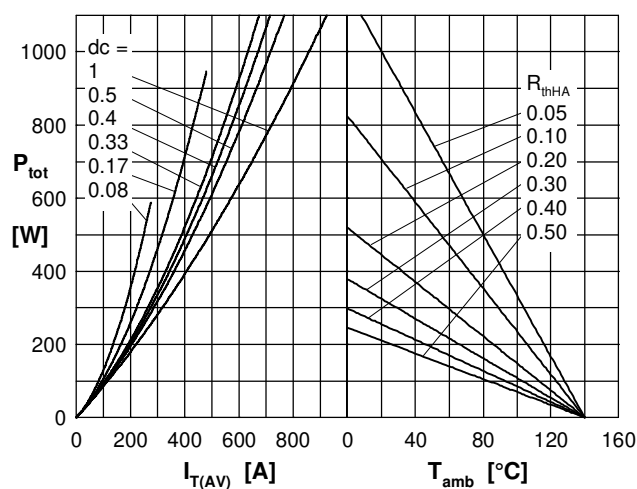


Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature

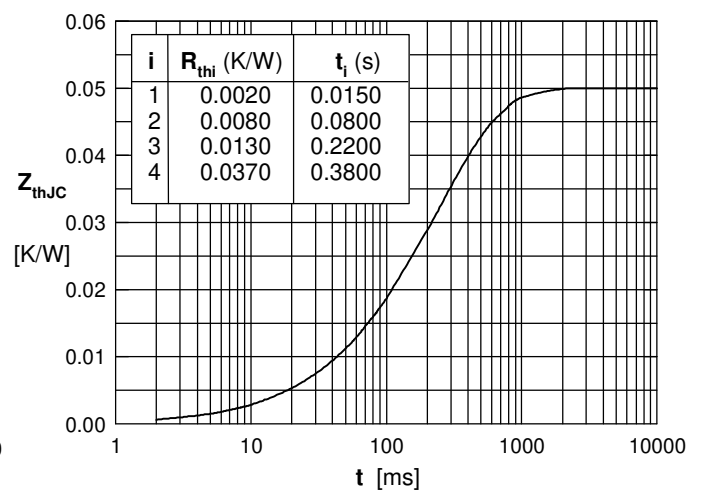


Fig. 8 Transient thermal impedance junction to case