

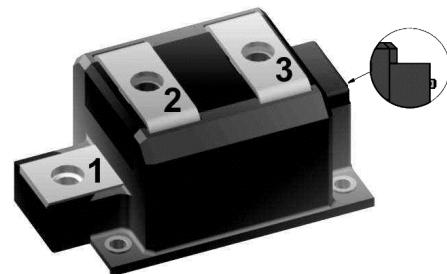
# Thyristor Module

 $V_{RRM} = 2 \times 1600 \text{ V}$ 
 $I_{TAV} = 700 \text{ A}$ 
 $V_T = 1.11 \text{ V}$ 

Phase leg  
optional usage as Dual Thyristor Triac

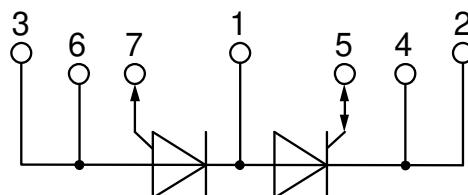
Part number

**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

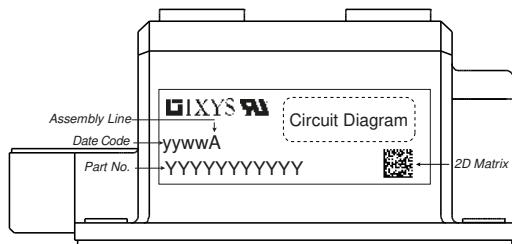
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**Rectifier**

Symbol	Definition	Conditions	Ratings			
			min.	typ.	max.	
$V_{RSM/DSM}$	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
$V_{T0}$ $r_T$	threshold voltage slope resistance } for power loss calculation only		$T_{VJ} = 140^\circ\text{C}$		0.82	V
					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	MA²s
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{sine}$	$V_R = 0 \text{ V}$		1.75	MA²s
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{sine}$	$T_{VJ} = 140^\circ\text{C}$		1.30	MA²s
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{sine}$	$V_R = 0 \text{ V}$		1.27	MA²s
$C_J$	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	$t_p = 30 \mu\text{s}$	$T_C = 140^\circ\text{C}$		240	W
		$t_p = 300 \mu\text{s}$			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
		$t_p = 200 \mu\text{s}; di_G/dt = 1 \text{ A/μs};$				
		$I_G = 1 \text{ A}; V = \frac{2}{3} V_{DRM}$	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	$t_p = 30 \mu\text{s}$	$T_{VJ} = 25^\circ\text{C}$		400	mA
		$I_G = 1 \text{ A}; di_G/dt = 1 \text{ A/μs}$				
$I_H$	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
		$I_G = 1 \text{ A}; di_G/dt = 1 \text{ A/μs}$				
$t_q$	turn-off time	$V_R = 100 \text{ V}; I_T = 700 \text{ A}; V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^\circ\text{C}$	350		μs
		$di/dt = 10 \text{ A/μs}$ $dv/dt = 50 \text{ V/μs}$ $t_p = 200 \mu\text{s}$				

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
<b>Weight</b>				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 $t = 1$ minute	50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA		4800 4000	V V


**Part description**

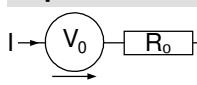
M = Module  
C = Thyristor (SCR)  
M = Thyristor  
A = (up to 1800V)  
700 = Current Rating [A]  
P = Phase leg  
1600 = Reverse Voltage [V]  
N = Three Quadrants operation: QI - QIII  
CA = ComPack

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

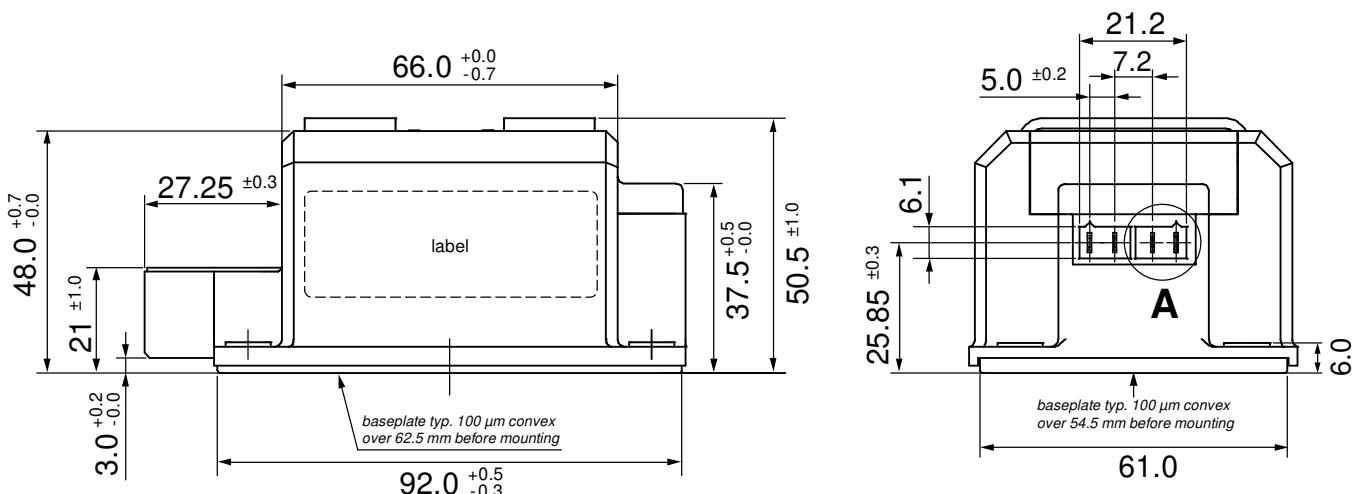
Similar Part	Package	Voltage class
MCMA700P1600CA	ComPack	1600

**Equivalent Circuits for Simulation**
<sup>\*</sup>on die level

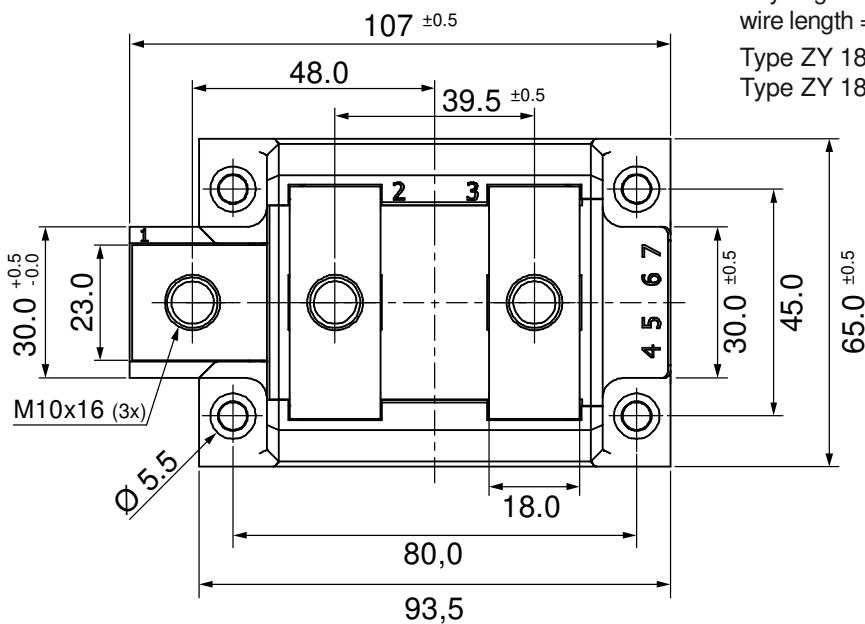
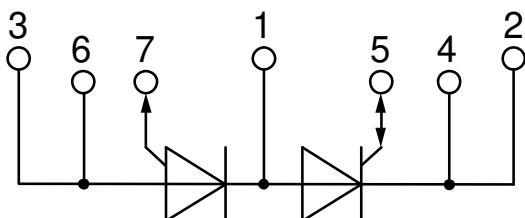
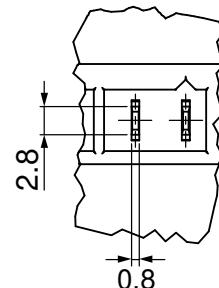
 $T_{VJ} = 140^\circ\text{C}$ 

	Thyristor
$V_{0\ max}$	threshold voltage
$R_{0\ max}$	slope resistance *

$V$   
 $\text{m}\Omega$

**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


**A (2:1)**


## Thyristor

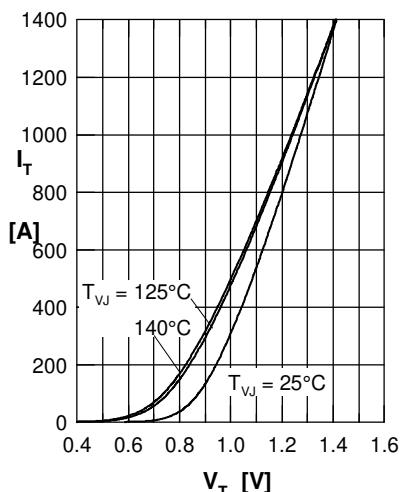


Fig. 1 Forward characteristics

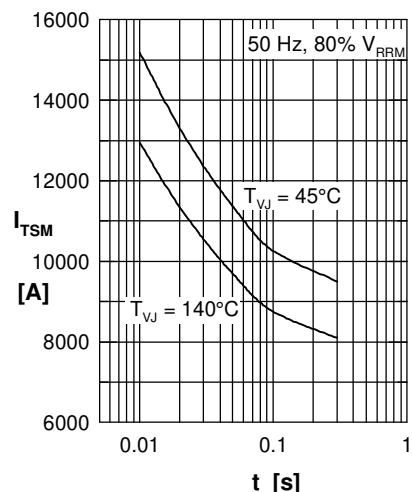


Fig. 2 Surge overload current  
 $I_{TSM}$ : crest value,  $t$ : duration

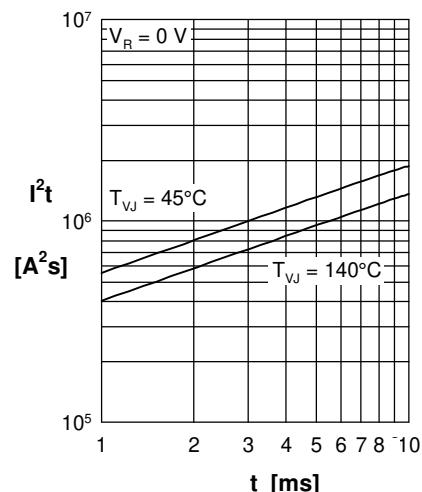


Fig. 3  $I^2t$  versus time (1-10 s)

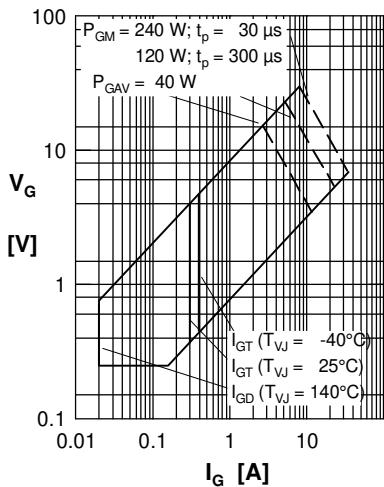


Fig. 4 Gate voltage & gate current

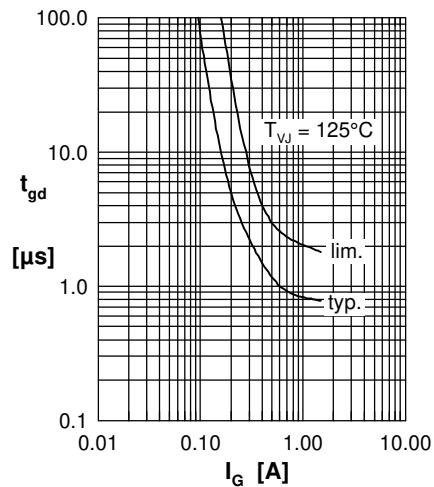


Fig. 5 Gate controlled delay time  $t_{gd}$

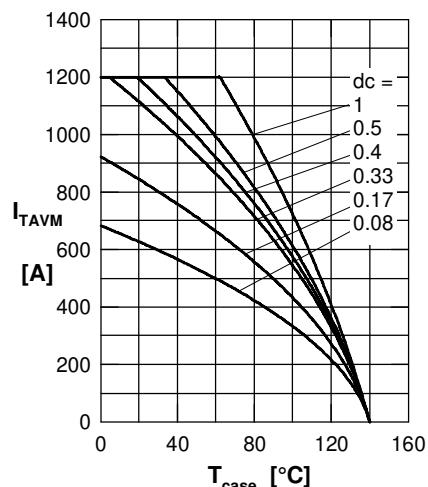


Fig. 6 Max. forward current at case temperature

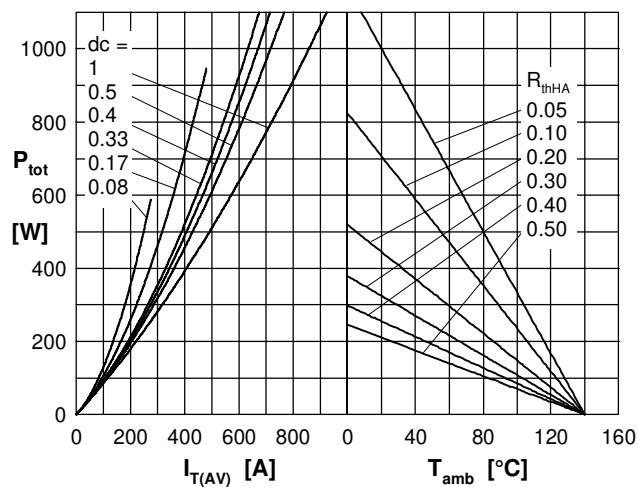


Fig. 7a Power dissipation versus direct output current  
Fig. 7b and ambient temperature

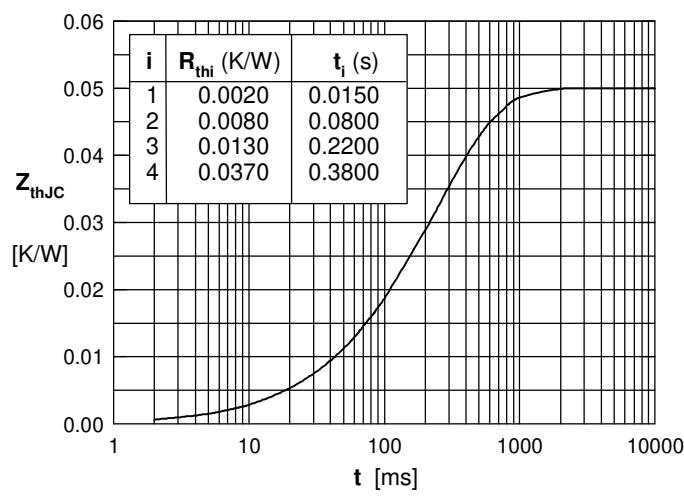


Fig. 8 Transient thermal impedance junction to case



**Стандарт  
Электрон  
Связь**

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**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литер Н,  
помещение 100-Н Офис 331