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With the principle of "Quality Parts, Customers Priority, Honest Operation, and Considerate Service", our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip, ALPS, ROHM, Xilinx, Pulse, ON, Everlight and Freescale. Main products comprise IC, Modules, Potentiometer, IC Socket, Relay, Connector. Our parts cover such applications as commercial, industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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# **Thyristor Module**

=2x 800 V

18 A

 $V_{\tau}$ 1.57 V

## Phase leg

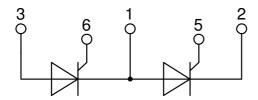
#### Part number

#### MCC19-08io8B



Backside: isolated

**F1** 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: TO-240AA

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- · Reduced weight
- Advanced power cycling

#### Terms \_Conditions of usage:

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact your local sales office.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact your local sales office.

Should you intend to use the product in aviation, in health or life endangering or life support applications, please notify. For any such application we urgently recommend

to perform joint risk and quality assessments;
the conclusion of quality agreements;

- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.

IXYS reserves the right to change limits, conditions and dimensions.

Data according to IEC 60747 and per semiconductor unless otherwise specified

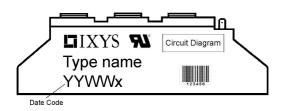
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Thyristo		Canditia		Ì	Ratings		
Symbol	Definition	Conditions	T 0500	min.	typ.	max.	Un
V <sub>RSM/DSM</sub>	max. non-repetitive reverse/forwa		$T_{VJ} = 25^{\circ}C$			900	! ! ! !
V <sub>RRM/DRM</sub>	max. repetitive reverse/forward bl		$T_{VJ} = 25^{\circ}C$			800	'
I <sub>R/D</sub>	reverse current, drain current	$V_{R/D} = 800 \text{ V}$	$T_{VJ} = 25^{\circ}C$			100	μ
		$V_{R/D} = 800 \text{ V}$	$T_{VJ} = 125^{\circ}C$			3	m
V <sub>T</sub>	forward voltage drop	$I_T = 40 \text{ A}$	$T_{VJ} = 25^{\circ}C$			1.56	,
		I <sub>T</sub> = 80 A				2.05	! !
		$I_T = 40 \text{ A}$	$T_{VJ} = 125$ °C			1.57	 
		I <sub>T</sub> = 80 A				2.29	! ! !
I <sub>TAV</sub>	average forward current	$T_{C} = 85^{\circ}C$	$T_{VJ} = 125$ °C			18	; ! !
I <sub>T(RMS)</sub>	RMS forward current	180° sine				28	
V <sub>T0</sub>	threshold voltage		$T_{VJ} = 125$ °C			0.85	,   
r <sub>T</sub>	slope resistance } for power lo	oss calculation only				18	m
R <sub>thJC</sub>	thermal resistance junction to cas	e				1.3	K/V
R <sub>thCH</sub>	thermal resistance case to heatsin				0.20		K/V
P <sub>tot</sub>	total power dissipation		T <sub>C</sub> = 25°C			77	٧
I <sub>TSM</sub>	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}C$			400	
TOW	-	t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$			430	
		t = 10 ms; (50 Hz), sine	T <sub>v.i</sub> = 125°C			340	
		t = 8.3  ms; (60 Hz), sine	$V_R = 0 V$			365	
l²t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}C$			800	A <sup>2</sup>
	value is: ideniig	t = 8.3  ms; (60 Hz), sine	$V_R = 0 V$			770	A <sup>2</sup>
		t = 0.5  ms, (00  Hz),  sine t = 10  ms; (50  Hz),  sine	$T_{VJ} = 125^{\circ}C$			580	A <sup>2</sup>
		t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$			555	A <sup>2</sup>
^	junction capacitance	<u> </u>	$V_R = 0 V$ $T_{VJ} = 25^{\circ}C$		22	555	-
C,		V <sub>R</sub> = 400 V f = 1 MHz			22	10	p V
$P_{GM}$	max. gate power dissipation	$t_P = 30 \mu s$	$T_{c} = 125^{\circ}C$			10	1
_		$t_{P} = 300  \mu s$				5	۷
P <sub>GAV</sub>	average gate power dissipation					0.5	۷
(di/dt) <sub>cr</sub>	critical rate of rise of current	$T_{VJ} = 125 ^{\circ}\text{C}; f = 50 \text{Hz}$ re	•			150	A/μ
		$t_P = 200 \mu s; di_G/dt = 0.45 A/\mu s; -$					
			on-repet., $I_T = 18 A$			500	
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125$ °C			1000	V/μ
		R <sub>GK</sub> = ∞; method 1 (linear volta	ge rise)				 
$V_{GT}$	gate trigger voltage	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$			1.5	١
			$T_{VJ} = -40$ °C			1.6	١
I <sub>GT</sub>	gate trigger current	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$			100	m
			$T_{VJ} = -40$ °C			200	m
V <sub>GD</sub>	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}C$			0.2	١
I <sub>GD</sub>	gate non-trigger current					5	m
IL	latching current	t <sub>p</sub> = 10 μs	$T_{VJ} = 25$ °C			450	m
		$I_{G} = 0.45 \text{ A}; \text{ di}_{G}/\text{dt} = 0.45 \text{ A}/\mu\text{s}$					[ [ [ [
I <sub>H</sub>	holding current	$V_D = 6 \text{ V } R_{GK} = \infty$	T <sub>vJ</sub> = 25°C			200	m
т <sub>gd</sub>	gate controlled delay time	$V_{D} = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25$ °C			2	μ
-ga	Jan	$I_{\rm G} = 0.45  \text{A};  \text{di}_{\rm G}/\text{dt} = 0.45  \text{A}/\mu \text{s}$				_	μ
		1/3 - 0.70/1, dig/di - 0.70/43	,	ı	r .		1
t <sub>q</sub>	turn-off time	$V_R = 100 \text{ V}; I_T = 20 \text{ A}; V = \frac{2}{3}$	√ V T _100 °C		150		μ



Package	TO-240AA				ı	Ratings	S	
Symbol	Definition	Conditions			min.	typ.	max.	Unit
RMS	RMS current	per terminal					200	Α
T <sub>VJ</sub>	virtual junction temperature				-40		125	°C
Top	operation temperature				-40		100	°C
T <sub>stg</sub>	storage temperature				-40		125	°C
Weight						81		g
M <sub>D</sub>	mounting torque				2.5		4	Nm
$\mathbf{M}_{_{T}}$	terminal torque				2.5		4	Nm
d <sub>Spp/App</sub>	creepage distance on surface	striking distance through air	terminal to terminal	13.0	9.7			mm
d <sub>Spb/Apb</sub>	creepage distance on surface	Striking distance through an	terminal to backside 1		16.0			mm
V <sub>ISOL</sub>	isolation voltage	t = 1 second			3600			٧
.002	t = 1  minute 50/60 Hz, RMS;		50/60 Hz, RMS; I <sub>ISOL</sub> ≤ 1 mA		3000			٧



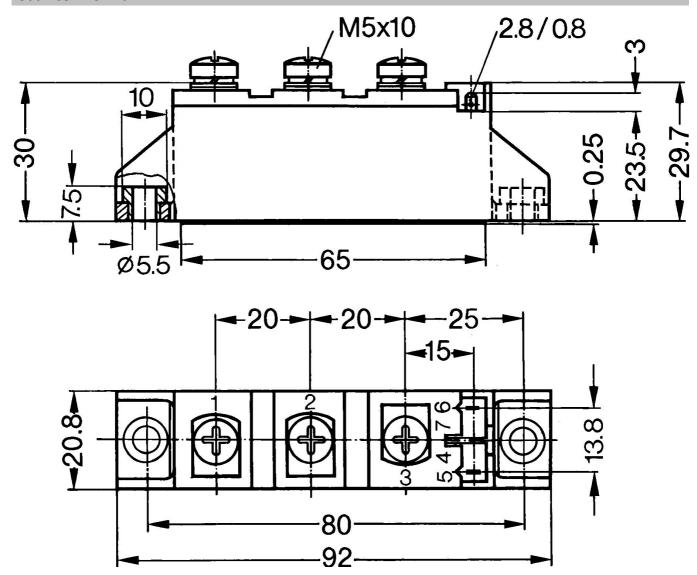
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCC19-08io8B	MCC19-08io8B	Box	36	457779

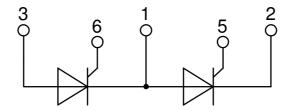
Similar Part	Package	Voltage class
MCMA25P1200TA	TO-240AA-1B	1200
MCMA35P1200TA	TO-240AA-1B	1200

Equiva	alent Circuits for	Simulation	* on die level	T <sub>vJ</sub> = 125 °C
$I \rightarrow V_0$	)— <u>R</u> o	Thyristor		
V <sub>0 max</sub>	threshold voltage	0.85		V
$R_{0 \text{ max}}$	slope resistance *	16.8		mΩ



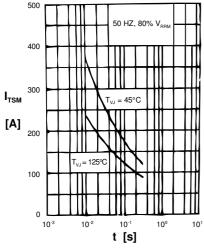
### Outlines TO-240AA

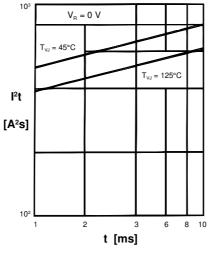






### **Thyristor**





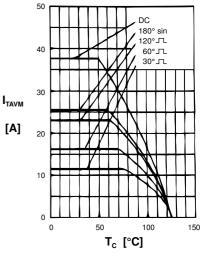
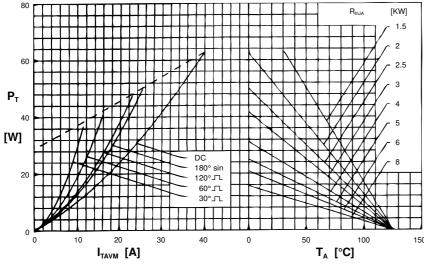


Fig. 1 Surge overload current  $I_{TSM}$ : Crest value, t: duration

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

Fig. 3 Max. forward current at case temperature



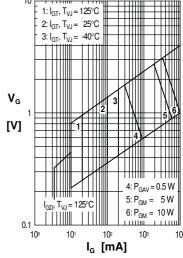
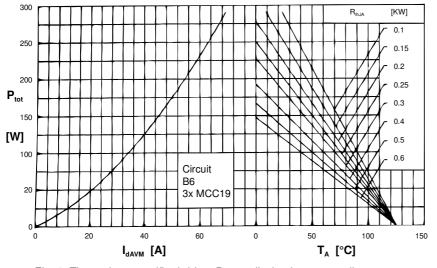


Fig. 4 Power dissipation versus onstate current & ambient temp. (per thyristor)

Fig. 5 Gate trigger charact.



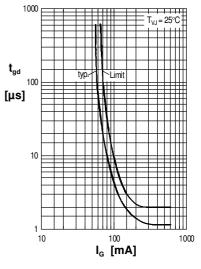


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

Fig. 7 Gate trigger delay time



#### **Thyristor**

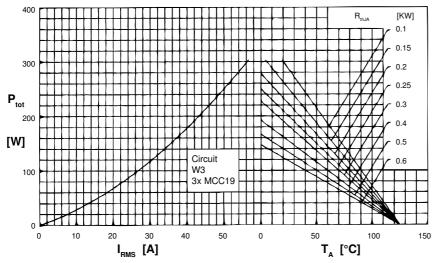


Fig. 8 Three phase AC-controller: Power dissipation vs. RMS output current and ambient temperature

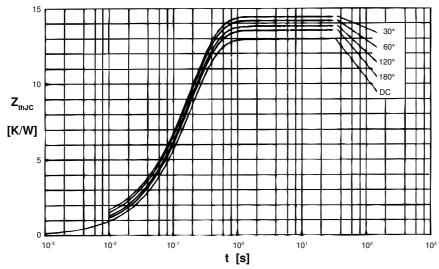


Fig. 9 Transient thermal impedance junction to case (per thyristor)

 $\boldsymbol{R}_{\text{thJC}}$  for various conduction angles d:

hJC	a
d	R <sub>thJC</sub> [K/\
DC	1.30
180°	1.35
120°	1.39
60°	1.42
30°	1.45

Constants for  $\mathbf{Z}_{\text{thJC}}$  calculation:

i I	R <sub>thi</sub> [K/W]	t <sub>,</sub> [s]
1	0.018	0.0033
2	0.041	0.0216
3	1.241	0.1910

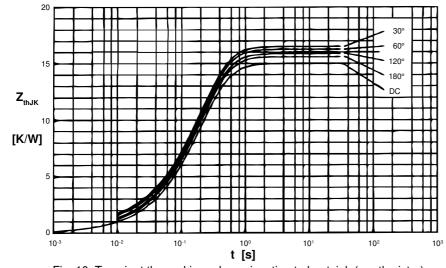


Fig. 10 Transient thermal impedance junction to heatsink (per thyristor)

 $\boldsymbol{R}_{thJK}$  for various conduction angles d:

d	R <sub>thJK</sub> [K/V
DC	1.50
180°	1.55
120°	1.59
60°	1.62
30°	1.65

Constants for  $\mathbf{Z}_{\text{thJK}}$  calculation:

i I	R <sub>thi</sub> [K/W]	t <sub>i</sub> [s]
1	0.018	0.0033
2	0.041	0.0216
3	1.241	0.1910
1	0.200	0.4600

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