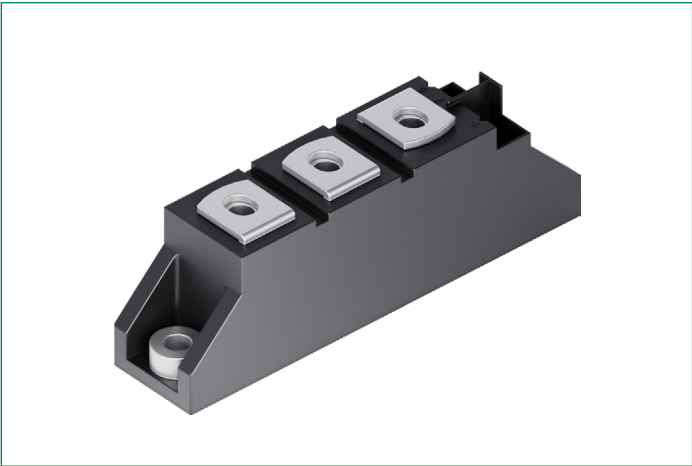
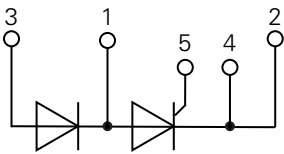
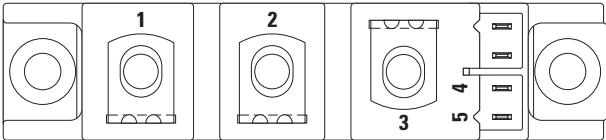


MCMA140PD1800TB

Thyristor-Diode Module



Pinout Diagram (TO-240AA)



1: AC (~); 2: DC+; 3: DC- ;4: Kelvin contact DC+ ; 5: Gate

Features

- Planar passivated chip
- Long-term stability
- Direct Copper Bonded Al_2O_3 -ceramic

Applications

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

Package

- RoHS compliant
- Industry standard outline
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Isolation voltage: 4800 V~
- Reduced weight
- Advanced power cycling
- UL recognized (file number E72873)

Product Summary

Characteristic	Value	Unit
V_{RRM}	2×1800	V
$I_{T(AV)}$	140	A
V_T	1.28	V

Maximum Ratings

Symbol	Characteristics	Conditions		Value	Units
$I_{T(RMS)}$	RMS On-state Current	180° Sine, $T_c = 85\text{ °C}$, $T_{vj} = 140\text{ °C}$		220	A
$I_{T(AV)}$	Average Forward Current			140	A
$I_{R/D}$	Reverse Current/ Drain Current	$T_{vj} = 25\text{ °C}$	$V_{R/D} = 1800\text{ V}$	100	μA
		$T_{vj} = 140\text{ °C}$		10	mA
I_{TSM}	Maximum Forward Surge Current	$T_{vj} = 45\text{ °C}$	t = 10 ms, (50 Hz), sine $V_R = 0\text{ V}$	2.40	kA
			t = 8.3 ms; (60 Hz), sine $V_R = 0\text{ V}$	2.59	
		$T_{vj} = 140\text{ °C}$	t = 10 ms, (50 Hz), sine $V_R = 0\text{ V}$	2.04	
			t = 8.3 ms; (60 Hz), sine $V_R = 0\text{ V}$	2.21	
I^2t	I^2t Value	$T_{vj} = 45\text{ °C}$	t = 10 ms; (50 Hz), sine $V_R = 0\text{ V}$	28.8	kA ² s
			t = 8.3 ms; (60 Hz), sine $V_R = 0\text{ V}$	27.9	
		$T_{vj} = 140\text{ °C}$	t = 10 ms; (50 Hz), sine $V_R = 0\text{ V}$	20.8	
			t = 8.3 ms; (60 Hz), sine $V_R = 0\text{ V}$	20.2	
V_{RSM}/V_{DSM}	Maximum Non-repetitive Reverse/Forward Blocking Voltage	$T_{vj} = 25\text{ °C}$		1900	V
V_{RRM}/V_{DRM}	Maximum Repetitive Reverse/Forward Blocking Voltage	$T_{vj} = 25\text{ °C}$		1800	V
di/dt_{cr}	Critical Rate of Rise of On-state Current	$t_p = 200\text{ }\mu\text{s}$; $di_G/dt = 0.45\text{ A}/\mu\text{s}$; $T_{vj} = 140\text{ °C}$, $f = 50\text{ Hz}$, $I_G = 0.45\text{ A}$; $V = 2/3 V_{DRM}$	Repetitive, $I_T = 450\text{ A}$	150	A/ μs
			Non-repetitive, $I_T = 150\text{ A}$	500	
dv/dt_{cr}	Critical Rate of Rise of Off-state Voltage	$T_{vj} = 140\text{ °C}$, $R_{GK} = \infty$, $V = 2/3 V_{DRM}$, method 1 (linear voltage rise)		1000	V/ μs
P_{GM}	Maximum Gate Power Dissipation	$T_c = 140\text{ °C}$	$t_p = 30\text{ }\mu\text{s}$	10	W
			$t_p = 300\text{ }\mu\text{s}$	5	
$P_{G(AV)}$	Average Gate Power Dissipation	$T_c = 140\text{ °C}$		0.5	W
P_{tot}	Total Power Dissipation	$T_c = 25\text{ °C}$		520	W
T_{stg}	Storage Temperature Range	–		–40 to 125	°C
T_{op}	Operating Temperature Range	–		–40 to 125	°C
T_{vj}	Virtual Junction Temperature Range	–		–40 to 140	°C

Thermal Characteristics

Symbol	Characteristics	Value			Units
		Min.	Typ.	Max.	
$R_{th(j-c)}$	Thermal Resistance Junction to Case	–	–	0.22	K/W
$R_{th(c-h)}$	Thermal Resistance Case to Heatsink	–	0.2	–	K/W

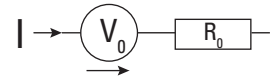
Electrical Characteristics

Symbol	Characteristics	Conditions		Value			Units
				Min.	Typ.	Max.	
I _{GT}	Gate Trigger Current	T _{vj} = 25 °C	V _D = 6 V	–	–	150	mA
		T _{vj} = –40 °C		–	–	200	
V _{GT}	Gate Trigger Voltage	T _{vj} = 25 °C	V _D = 6 V	–	–	1.5	V
		T _{vj} = –40 °C		–	–	1.6	
I _{GD}	Gate Non-trigger Current	V = 2/3 V _{DRM} , T _{vj} = 140 °C		–	–	10	mA
V _{GD}	Gate Non-trigger Voltage			–	–	0.2	V
V _T	Forward Voltage Drop	T _{vj} = 25 °C	I _T = 150 A	–	–	1.29	V
			I _T = 300 A	–	–	1.63	
		T _{vj} = 125 °C	I _T = 150 A	–	–	1.28	
			I _T = 300 A	–	–	1.70	
V _{TO}	Threshold Voltage	T _{vj} = 140 °C		–	–	0.85	V
r _T	Slope Resistance			–	–	2.8	mΩ
I _L	Latching Current	t _p = 10 μs; I _G = 0.45 A; di _G /dt = 0.45 A/μs, T _{vj} = 25 °C		–	–	200	mA
I _H	Holding Current	V _D = 6 V; R _{GK} = ∞; T _{vj} = 25 °C		–	–	200	mA
C _j	Junction Capacitance	V _R = 400 V, f = 1 MHz, T _{vj} = 25 °C		–	119	–	pF
t _{gd}	Gate Controlled Turn-on Delay Time	V _D = 1/2 V _{DRM} ; I _G = 0.45 A ; di _G /dt = 0.45 A/μs, T _{vj} = 25 °C		–	–	2	μs
t _q	Turn-off Time	V _R = 100 V, I _T = 150 A, V _D = 2/3 V _{DRM} , di/dt = 10 A/μs; dv/dt = 20 V/μs, t _p = 200 μs, T _{vj} = 125 °C		–	185	–	μs

Package

Symbol	Characteristics	Conditions		Value			Units
				Min.	Typ.	Max.	
I _{RMS}	RMS Current	–		–	–	200	A
M _D	Mounting Torque	–		2.5	–	4	Nm
M _T	Terminal Torque	–		2.5	–	4	Nm
G	Weight	–		–	81	–	g
d _{Spp/App}	Creepage Distance on Surface/ Striking Distance through Air	terminal to terminal	13.0	9.7	–	–	mm
d _{Spb/Apb}		terminal to backside	16.0	16.0	–	–	mm
V _{isol}	Isolation Voltage	t = 1 second	50/60 Hz, RMS, I _{isol} ≤ 1mA	4800	–	–	V
		t = 1 minute		4000	–	–	V

Equivalent Circuits for Simulation (T_{vj} = 140 °C)



Symbol	Characteristics	Value	Units
V _{0 max}	Threshold Voltage	0.85	V
R _{0 max}	Slope Resistance ¹	1.6	mΩ

Note 1: On die level

Characteristic Curves

Figure 1. Forward Characteristics

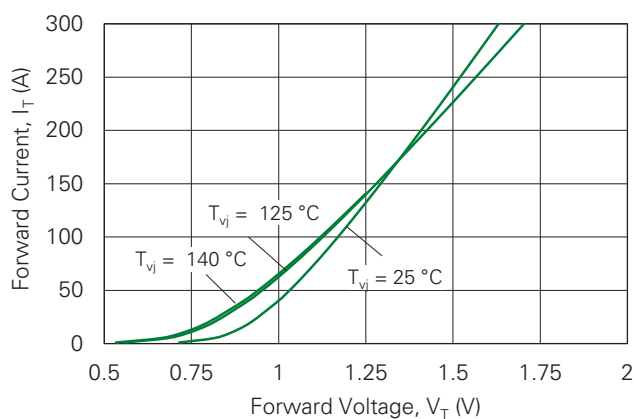
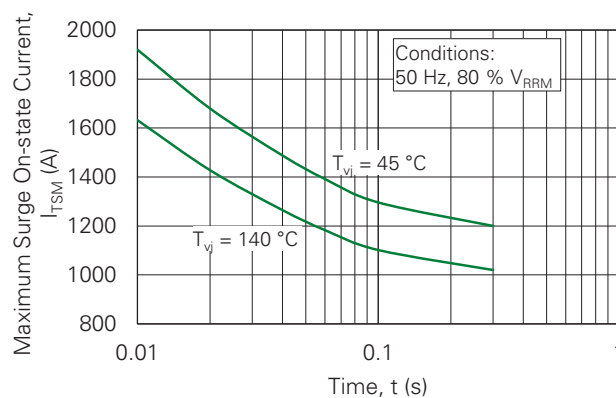
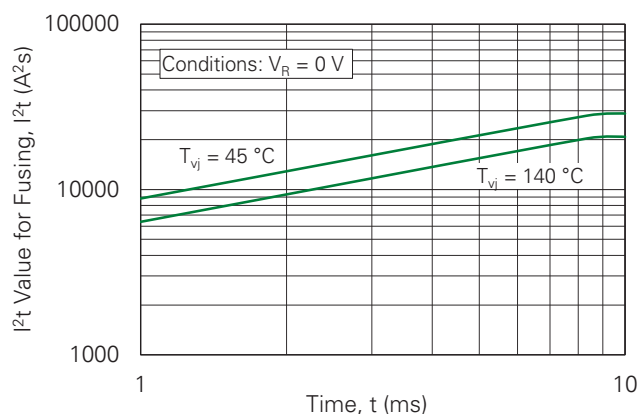
Figure 2. Surge Overload Current
 I_{TSM} : Crest Value, t: durationFigure 3. I^2t vs. Time (1-10 s)

Figure 4. Gate Voltage and Gate Current

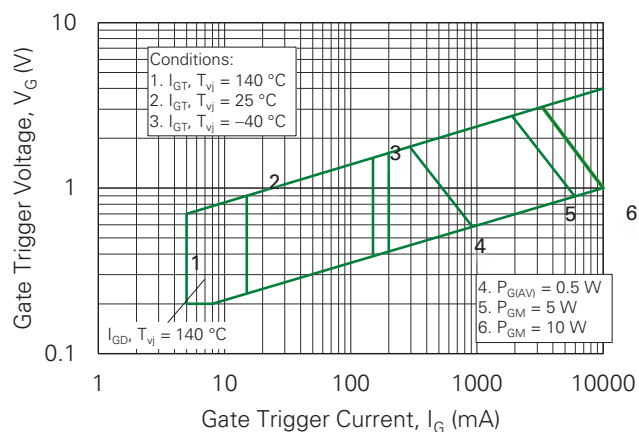


Figure 5. Gate Controlled Delay Time

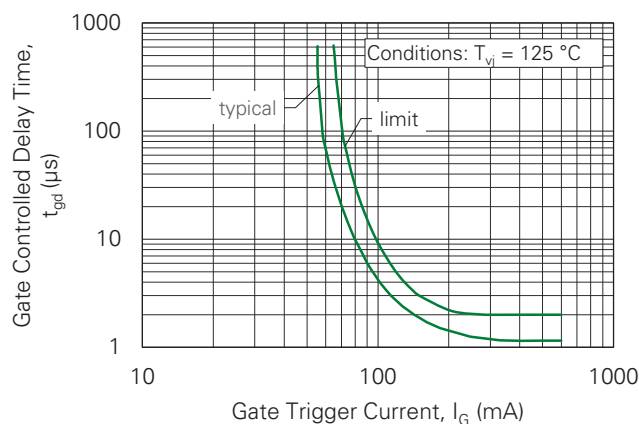


Figure 6. Max. Forward Current at Case Temperature

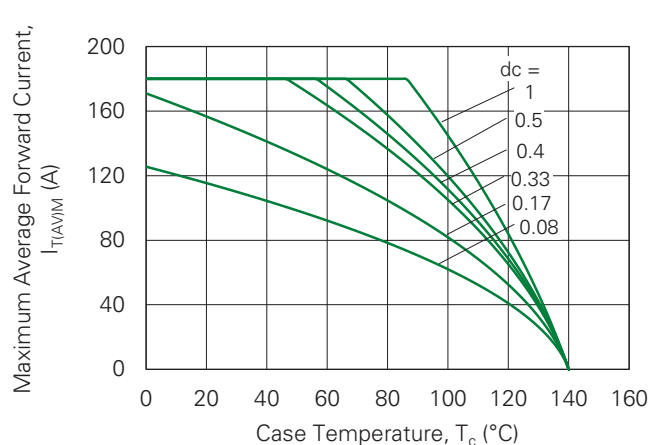


Figure 7a. Power Dissipation vs. Output Current Figure 7b. Power Output vs. Ambient Temperature

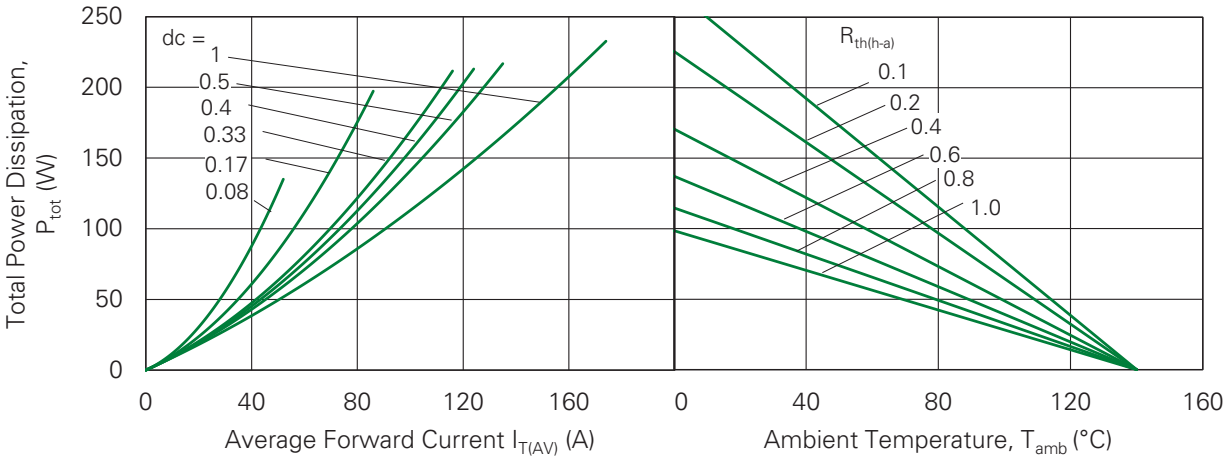
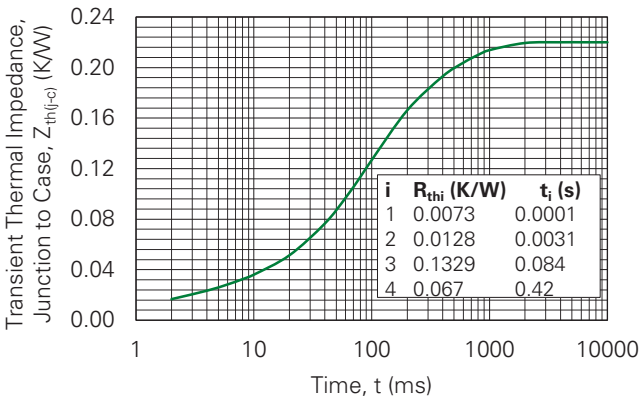
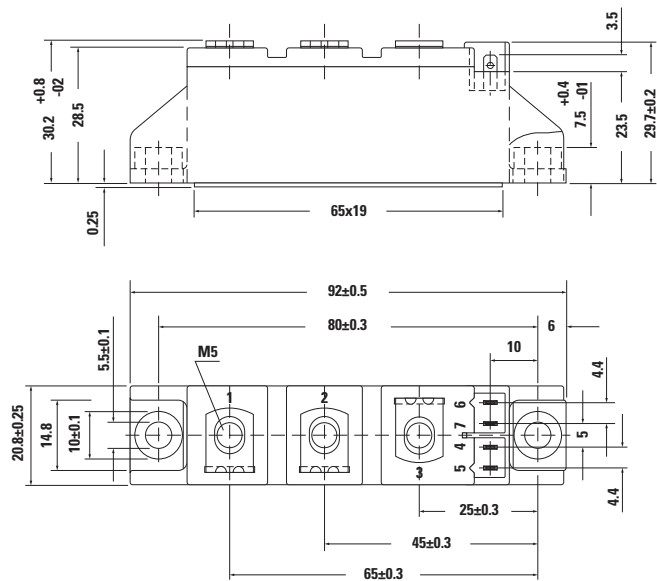


Figure 8. Transient Thermal Impedance, Junction to Case



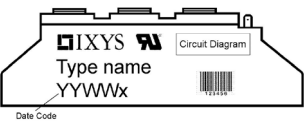
Package Dimensions (TO-240AA)



Packing Options

Part Number	Marking	Packing Mode	Quantity
MCMA140PD1800TB	MCMA140PD1800TB	Box	36

Part Numbering and Marking



- M = Module
- C = Thyristor (SCR)
- M = Thyristor
- A = Voltage Class (up to 1800 V)
- 140 = Current Rating (A)
- PD = Phase Leg
- 1800 = Reverse Voltage (V)
- TB = Package (TO-240AA-1B)

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