

Thyristor \ Diode Module

$$V_{RRM} = 2 \times 1400 \text{ V}$$

$$I_{TAV} = 27 \text{ A}$$

$$V_T = 1.27 \text{ V}$$

Phase leg

Part number

MCD26-14io8B



Backside: isolated

 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: 4800 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Disclaimer Notice

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.



Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1500	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				1400	V
$I_{R/D}$	reverse current, drain current	$V_{R/D} = 1400\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			100	μA
		$V_{R/D} = 1400\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$			3	mA
V_T	forward voltage drop	$I_T = 40\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			1.27	V
		$I_T = 80\text{ A}$				1.64	V
		$I_T = 40\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			1.27	V
		$I_T = 80\text{ A}$				1.65	V
I_{TAV}	average forward current	$T_C = 85^{\circ}\text{C}$	$T_{VJ} = 125^{\circ}\text{C}$			27	A
$I_{T(RMS)}$	RMS forward current	180° sine				42	A
V_{T0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 125^{\circ}\text{C}$			0.85	V
r_T	slope resistance					11	m Ω
R_{thJC}	thermal resistance junction to case					0.88	K/W
R_{thCH}	thermal resistance case to heatsink				0.2		K/W
P_{tot}	total power dissipation		$T_C = 25^{\circ}\text{C}$			115	W
I_{TSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			520	A
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			560	A
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 125^{\circ}\text{C}$			440	A
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			475	A
I^2t	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			1.35	kA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			1.31	kA ² s
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 125^{\circ}\text{C}$			970	A ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			940	A ² s
C_J	junction capacitance	$V_R = 400\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		22		pF
P_{GM}	max. gate power dissipation	$t_p = 30\text{ }\mu\text{s}$	$T_C = 125^{\circ}\text{C}$			10	W
		$t_p = 300\text{ }\mu\text{s}$				5	W
P_{GAV}	average gate power dissipation					0.5	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 125^{\circ}\text{C}; f = 50\text{ Hz}$ repetitive, $I_T = 45\text{ A}$				150	A/ μs
		$t_p = 200\text{ }\mu\text{s}; di_G/dt = 0.45\text{ A}/\mu\text{s};$ $I_G = 0.45\text{ A}; V = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 27\text{ A}$				500	A/ μs
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}\text{C}$			1000	V/ μs
		$R_{GK} = \infty$; method 1 (linear voltage rise)					
V_{GT}	gate trigger voltage	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			1.5	V
			$T_{VJ} = -40^{\circ}\text{C}$			1.6	V
I_{GT}	gate trigger current	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			100	mA
			$T_{VJ} = -40^{\circ}\text{C}$			200	mA
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}\text{C}$			0.2	V
I_{GD}	gate non-trigger current					10	mA
I_L	latching current	$t_p = 10\text{ }\mu\text{s}$	$T_{VJ} = 25^{\circ}\text{C}$			450	mA
		$I_G = 0.45\text{ A}; di_G/dt = 0.45\text{ A}/\mu\text{s}$					
I_H	holding current	$V_D = 6\text{ V}$ $R_{GK} = \infty$	$T_{VJ} = 25^{\circ}\text{C}$			200	mA
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}\text{C}$			2	μs
		$I_G = 0.45\text{ A}; di_G/dt = 0.45\text{ A}/\mu\text{s}$					
t_q	turn-off time	$V_R = 100\text{ V}; I_T = 20\text{ A}; V = \frac{2}{3} V_{DRM}$ $T_{VJ} = 100^{\circ}\text{C}$ $di/dt = 10\text{ A}/\mu\text{s}$ $dv/dt = 20\text{ V}/\mu\text{s}$ $t_p = 200\text{ }\mu\text{s}$			150		μs

Package TO-240AA				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I _{RMS}	RMS current	per terminal				200	A
T _{VJ}	virtual junction temperature			-40		125	°C
T _{op}	operation temperature			-40		100	°C
T _{stg}	storage temperature			-40		125	°C
Weight					81		g
M _D	mounting torque			2.5		4	Nm
M _T	terminal torque			2.5		4	Nm
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} ≤ 1 mA		4800		V
		t = 1 minute			4000		V



Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCD26-14io8B	MCD26-14io8B	Box	36	453269

Similar Part	Package	Voltage class
MCMA35PD1600TB	TO-240AA-1B	1600
MCMA50PD1600TB	TO-240AA-1B	1600

Equivalent Circuits for Simulation

* on die level

$T_{VJ} = 125^{\circ}\text{C}$

		Thyristor	
$V_{0\max}$	threshold voltage	0.85	V
$R_{0\max}$	slope resistance *	9.8	mΩ

Technical drawing of a mechanical part, likely a bracket or support, showing dimensions and material specifications.

Material: A 2.8 - 0.8 DIN 46244

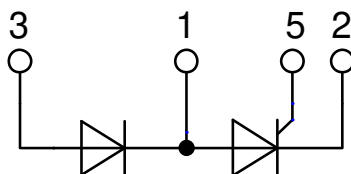
Dimensions (mm):

- Overall height: $30.2^{+0.8}_{-0.2}$
- Height of the main body: 28.5
- Height of the base: 0.25
- Height of the mounting flange: 3.5
- Height of the base flange: 7.5 $^{+0.4}_{-0.1}$
- Overall width: 29.7 ± 0.2
- Width of the main body: 65 x 19

Technical drawing of a 5-pin DIN connector. The drawing shows the front and side views with the following dimensions and labels:

- Overall length: 92 ± 0.5
- Distance from front face to center of pin 1: 80 ± 0.3
- Pin diameter: 6
- Pin spacing: 10
- Pin 1 label: *M5*
- Pin 2 label: *2*
- Pin 3 label: *3*
- Pin 4 label: *4*
- Pin 5 label: *5*
- Pin 6 label: *6*
- Pin 7 label: *7*
- Pin 8 label: *8*
- Pin 9 label: *9*
- Pin 10 label: *10*
- Pin 11 label: *11*
- Pin 12 label: *12*
- Pin 13 label: *13*
- Pin 14 label: *14*
- Pin 15 label: *15*
- Pin 16 label: *16*
- Pin 17 label: *17*
- Pin 18 label: *18*
- Pin 19 label: *19*
- Pin 20 label: *20*
- Pin 21 label: *21*
- Pin 22 label: *22*
- Pin 23 label: *23*
- Pin 24 label: *24*
- Pin 25 label: *25*
- Pin 26 label: *26*
- Pin 27 label: *27*
- Pin 28 label: *28*
- Pin 29 label: *29*
- Pin 30 label: *30*
- Pin 31 label: *31*
- Pin 32 label: *32*
- Pin 33 label: *33*
- Pin 34 label: *34*
- Pin 35 label: *35*
- Pin 36 label: *36*
- Pin 37 label: *37*
- Pin 38 label: *38*
- Pin 39 label: *39*
- Pin 40 label: *40*
- Pin 41 label: *41*
- Pin 42 label: *42*
- Pin 43 label: *43*
- Pin 44 label: *44*
- Pin 45 label: *45*
- Pin 46 label: *46*
- Pin 47 label: *47*
- Pin 48 label: *48*
- Pin 49 label: *49*
- Pin 50 label: *50*
- Pin 51 label: *51*
- Pin 52 label: *52*
- Pin 53 label: *53*
- Pin 54 label: *54*
- Pin 55 label: *55*
- Pin 56 label: *56*
- Pin 57 label: *57*
- Pin 58 label: *58*
- Pin 59 label: *59*
- Pin 60 label: *60*
- Pin 61 label: *61*
- Pin 62 label: *62*
- Pin 63 label: *63*
- Pin 64 label: *64*
- Pin 65 label: *65*
- Pin 66 label: *66*
- Pin 67 label: *67*
- Pin 68 label: *68*
- Pin 69 label: *69*
- Pin 70 label: *70*
- Pin 71 label: *71*
- Pin 72 label: *72*
- Pin 73 label: *73*
- Pin 74 label: *74*
- Pin 75 label: *75*
- Pin 76 label: *76*
- Pin 77 label: *77*
- Pin 78 label: *78*
- Pin 79 label: *79*
- Pin 80 label: *80*
- Pin 81 label: *81*
- Pin 82 label: *82*
- Pin 83 label: *83*
- Pin 84 label: *84*
- Pin 85 label: *85*
- Pin 86 label: *86*
- Pin 87 label: *87*
- Pin 88 label: *88*
- Pin 89 label: *89*
- Pin 90 label: *90*
- Pin 91 label: *91*
- Pin 92 label: *92*
- Pin 93 label: *93*
- Pin 94 label: *94*
- Pin 95 label: *95*
- Pin 96 label: *96*
- Pin 97 label: *97*
- Pin 98 label: *98*
- Pin 99 label: *99*
- Pin 100 label: *100*
- Pin 101 label: *101*
- Pin 102 label: *102*
- Pin 103 label: *103*
- Pin 104 label: *104*
- Pin 105 label: *105*
- Pin 106 label: *106*
- Pin 107 label: *107*
- Pin 108 label: *108*
- Pin 109 label: *109*
- Pin 110 label: *110*
- Pin 111 label: *111*
- Pin 112 label: *112*
- Pin 113 label: *113*
- Pin 114 label: *114*
- Pin 115 label: *115*
- Pin 116 label: *116*
- Pin 117 label: *117*
- Pin 118 label: *118*
- Pin 119 label: *119*
- Pin 120 label: *120*
- Pin 121 label: *121*
- Pin 122 label: *122*
- Pin 123 label: *123*
- Pin 124 label: *124*
- Pin 125 label: *125*
- Pin 126 label: *126*
- Pin 127 label: *127*
- Pin 128 label: *128*
- Pin 129 label: *129*
- Pin 130 label: *130*
- Pin 131 label: *131*
- Pin 132 label: *132*
- Pin 133 label: *133*
- Pin 134 label: *134*
- Pin 135 label: *135*
- Pin 136 label: *136*
- Pin 137 label: *137*
- Pin 138 label: *138*
- Pin 139 label: *139*
- Pin 140 label: *140*
- Pin 141 label: *141*
- Pin 142 label: *142*
- Pin 143 label: *143*
- Pin 144 label: *144*
- Pin 145 label: *145*
- Pin 146 label: *146*
- Pin 147 label: *147*
- Pin 148 label: *148*
- Pin 149 label: *149*
- Pin 150 label: *150*
- Pin 151 label: *151*
- Pin 152 label: *152*
- Pin 153 label: *153*
- Pin 154 label: *154*
- Pin 155 label: *155*
- Pin 156 label: *156*
- Pin 157 label: *157*
- Pin 158 label: *158*
- Pin 159 label: *159*
- Pin 160 label: *160*
- Pin 161 label: *161*
- Pin 162 label: *162*
- Pin 163 label: *163*
- Pin 164 label: *164*
- Pin 165 label: *165*
- Pin 166 label: *166*
- Pin 167 label: *167*
- Pin 168 label: *168*
- Pin 169 label: *169*
- Pin 170 label: *170*
- Pin 171 label: *171*
- Pin 172 label: *172*
- Pin 173 label: *173*
- Pin 174 label: *174*
- Pin 175 label: *175*
- Pin 176 label: *176*
- Pin 177 label: *177*
- Pin 178 label: *178*
- Pin 179 label: *179*
- Pin 180 label: *180*
- Pin 181 label: *181*
- Pin 182 label: *182*
- Pin 183 label: *183*
- Pin 184 label: *184*
- Pin 185 label: *185*
- Pin 186 label: *186*
- Pin 187 label: *187*
- Pin 188 label: *188*
- Pin 189 label: *189*
- Pin 190 label: *190*
- Pin 191 label: *191*
- Pin 192 label: *192*
- Pin 193 label: *193*
- Pin 194 label: *194*
- Pin 195 label: *195*
- Pin 196 label: *196*
- Pin 197 label: *197*
- Pin 198 label: *198*
- Pin 199 label: *199*

Keyed gate/cathode twin plugs with wire length = 350 mm, gate = white, cathode = red
Type ZY 200L (L = Left for pin pair 4/5) UL 758, style 3751



Thyristor

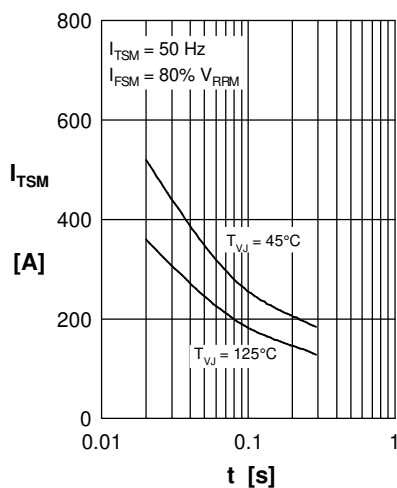


Fig. 1 Surge overload current I_{TSM} ,
 I_{FSM} : Crest value, t : duration

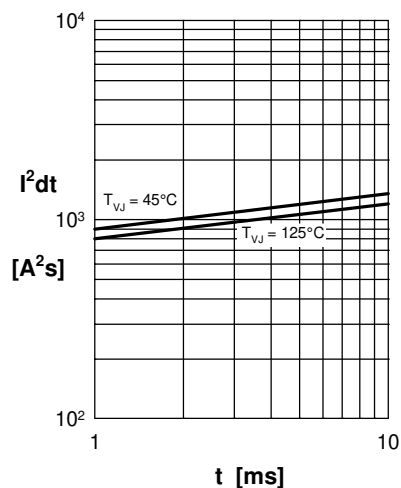


Fig. 2 I^2t versus time (1-10 ms)

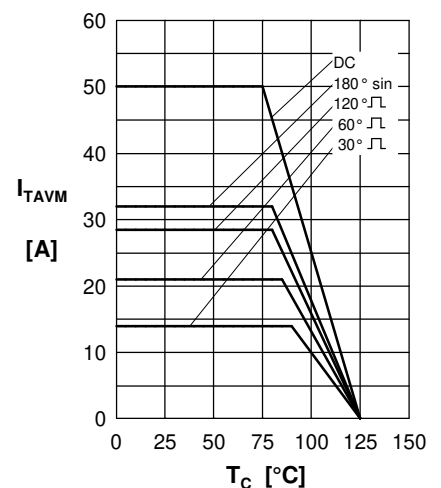


Fig. 3 Max. forward current
 at case temperature



Fig. 4 Power dissipation vs. on-state current & ambient temperature
 (per thyristor or diode)

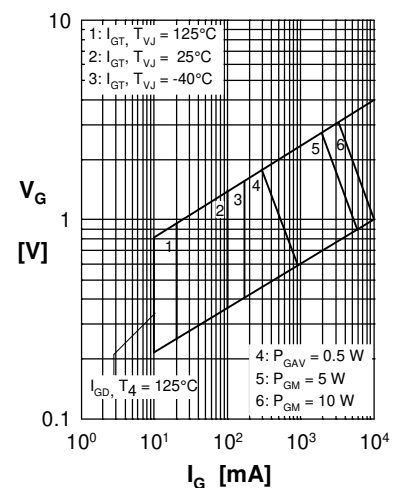


Fig. 5 Gate trigger characteristics



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



Fig. 7 Gate trigger delay time

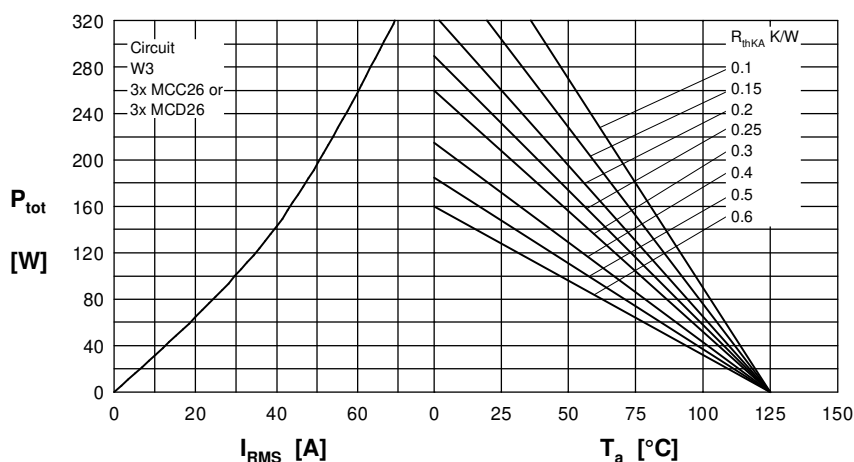
Rectifier


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

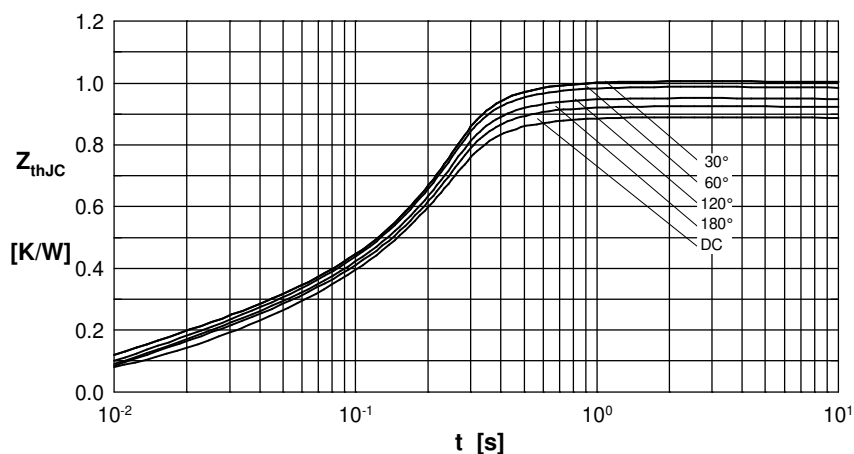


Fig. 9 Transient thermal impedance junction to case (per thyristor/diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.88
180°	0.92
120°	0.95
60°	0.98
30°	1.01

Constants for Z_{thJC} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.019	0.0031
2	0.029	0.0216
3	0.832	0.1910



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

R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	1.08
180°	1.12
120°	1.15
60°	1.18
30°	1.21

Constants for Z_{thJK} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.019	0.0031
2	0.029	0.0216
3	0.832	0.1910
4	0.200	0.4500