

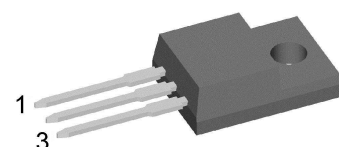
High Efficiency Thyristor

$$\begin{aligned} V_{RRM} &= 800 \text{ V} \\ I_{TAV} &= 16 \text{ A} \\ V_T &= 1.27 \text{ V} \end{aligned}$$

Single Thyristor

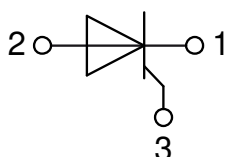
Part number

CS22-08io1M



Backside: isolated

 E72873



Features / Advantages:

- Thyristor for line frequency
- Planar passivated chip
- Long-term stability

Applications:

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

Package: TO-220FP

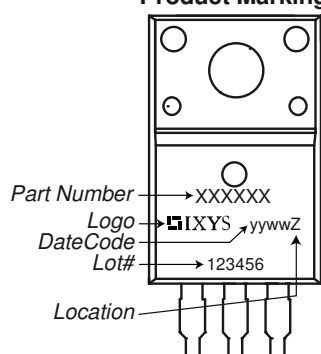
- Isolation Voltage: 2500 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Base plate: Plastic overmolded tab
- Reduced weight

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.

Thyristor				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				900	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$				800	V
$I_{R/D}$	reverse current, drain current	$V_{R/D} = 800\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			10	μA
		$V_{R/D} = 800\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$			2	mA
V_T	forward voltage drop	$I_T = 30\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$			1.30	V
		$I_T = 60\text{ A}$				1.59	V
		$I_T = 30\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$			1.27	V
		$I_T = 60\text{ A}$				1.65	V
I_{TAV}	average forward current	$T_C = 90^{\circ}\text{C}$	$T_{VJ} = 150^{\circ}\text{C}$			16	A
$I_{T(RMS)}$	RMS forward current	180° sine				25	A
V_{T0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}\text{C}$			0.86	V
r_T	slope resistance					13.2	m Ω
R_{thJC}	thermal resistance junction to case					2.5	K/W
R_{thCH}	thermal resistance case to heatsink				0.5		K/W
P_{tot}	total power dissipation		$T_C = 25^{\circ}\text{C}$			50	W
I_{TSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			300	A
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			325	A
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$			255	A
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			275	A
I^2t	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$			450	A ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			440	A ² s
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$			325	A ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$			315	A ² s
C_J	junction capacitance	$V_R = 400\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		13		pF
P_{GM}	max. gate power dissipation	$t_p = 30\text{ }\mu\text{s}$	$T_C = 150^{\circ}\text{C}$			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, $I_T = 90\text{ A}$				150	A/ μs
		$t_p = 200\text{ }\mu\text{s}; di_G/dt = 0.3\text{ A}/\mu\text{s};$ $I_G = 0.3\text{ A}; V = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 30\text{ A}$				500	A/ μs
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}\text{C}$			500	V/ μs
		$R_{GK} = \infty$; method 1 (linear voltage rise)					
V_{GT}	gate trigger voltage	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			1.3	V
			$T_{VJ} = -40^{\circ}\text{C}$			1.6	V
I_{GT}	gate trigger current	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$			30	mA
			$T_{VJ} = -40^{\circ}\text{C}$			50	mA
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^{\circ}\text{C}$			0.2	V
I_{GD}	gate non-trigger current					1	mA
I_L	latching current	$t_p = 10\text{ }\mu\text{s}$	$T_{VJ} = 25^{\circ}\text{C}$			90	mA
		$I_G = 0.3\text{ A}; di_G/dt = 0.3\text{ A}/\mu\text{s}$					
I_H	holding current	$V_D = 6\text{ V}$ $R_{GK} = \infty$	$T_{VJ} = 25^{\circ}\text{C}$			60	mA
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}\text{C}$			2	μs
		$I_G = 0.3\text{ A}; di_G/dt = 0.3\text{ A}/\mu\text{s}$					
t_q	turn-off time	$V_R = 100\text{ V}; I_T = 30\text{ A}; V = \frac{2}{3} V_{DRM}$ $T_{VJ} = 125^{\circ}\text{C}$ $di/dt = 10\text{ A}/\mu\text{s}$ $dv/dt = 20\text{ V}/\mu\text{s}$ $t_p = 200\text{ }\mu\text{s}$			150		μs

Package TO-220FP				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I _{RMS}	RMS current	per terminal				35	A
T _{VJ}	virtual junction temperature			-55		150	°C
T _{op}	operation temperature			-55		125	°C
T _{stg}	storage temperature			-55		150	°C
Weight					2		g
M _D	mounting torque			0.4		0.6	Nm
F _C	mounting force with clip			20		60	N
d _{Spp/App}	creepage distance on surface striking distance through air	terminal to terminal	1.6	1.0			mm
d _{Spb/Apb}		terminal to backside	2.5	2.5			mm
V _{ISOL}	isolation voltage	t = 1 second	50/60 Hz, RMS; I _{ISOL} ≤ 1 mA	2500			V
		t = 1 minute		2100			V

Product Marking


Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CS22-08io1M	CS22-08io1M	Tube	50	500475

Similar Part	Package	Voltage class
CS22-12io1M	TO-220ABFP (3)	1200
CLA16E800PN	TO-220ABFP (3)	1200
CMA30E1600PN	TO-220ABFP (3)	1600
CLA30E1200PB	TO-220AB (3)	1200

CLA30E1200PC	TO-263AB (D2Pak) (2)	1200
CLA30E1200HB	TO-247AD (3)	1200
CMA30E1600PB	TO-220AB (3)	1600
CMA30E1600PZ	TO-263AB (D2Pak) (2HV)	1600

Equivalent Circuits for Simulation
** on die level*
 $T_{VJ} = 150^{\circ}\text{C}$

Thyristor
 $V_{0\max}$ threshold voltage

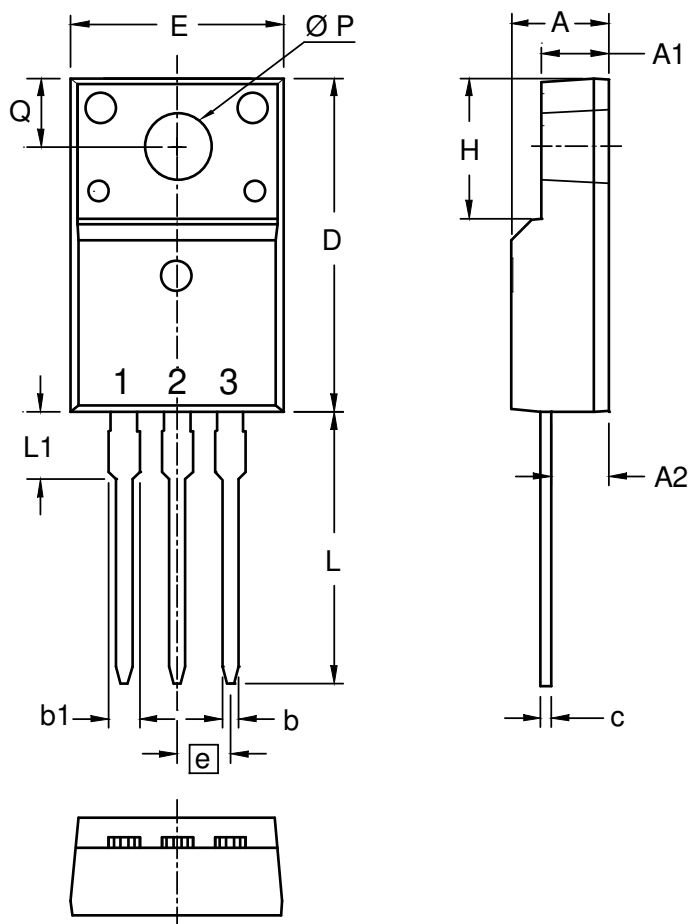
0.86

V

 $R_{0\max}$ slope resistance *

10.1

mΩ

Outlines TO-220FP


Dim.	Millimeters		Inches	
	min	max	min	max
A	4.50	4.90	0.177	0.193
A1	2.34	2.74	0.092	0.108
A2	2.56	2.96	0.101	0.117
b	0.70	0.90	0.028	0.035
c	0.45	0.60	0.018	0.024
D	15.67	16.07	0.617	0.633
E	9.96	10.36	0.392	0.408
e	2.54 BSC		0.100 BSC	
H	6.48	6.88	0.255	0.271
L	12.68	13.28	0.499	0.523
L1	3.03	3.43	0.119	0.135
Ø P	3.08	3.28	0.121	0.129
Q	3.20	3.40	0.126	0.134



Thyristor

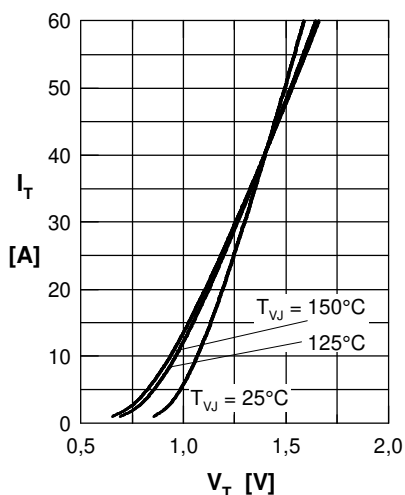


Fig. 1 Forward characteristics

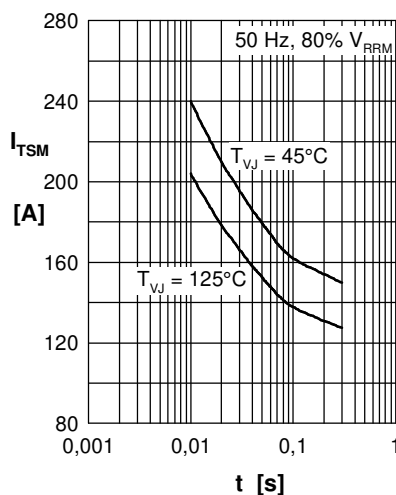


Fig. 2 Surge overload current
 I_{TSM} : crest value, t : duration

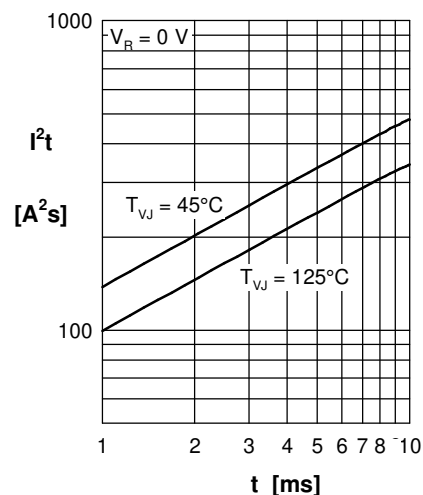


Fig. 3 I^2t versus time (1-10 s)

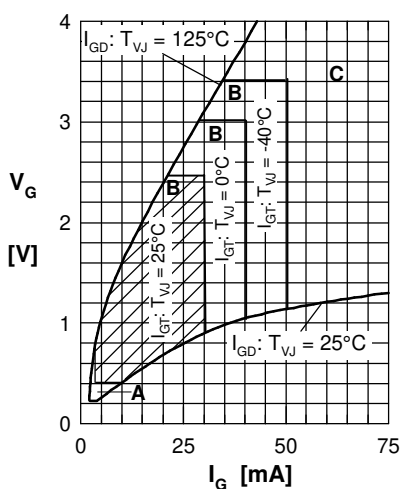


Fig. 4 Gate voltage & gate current
 Triggering: A = no; B = possible; C = safe

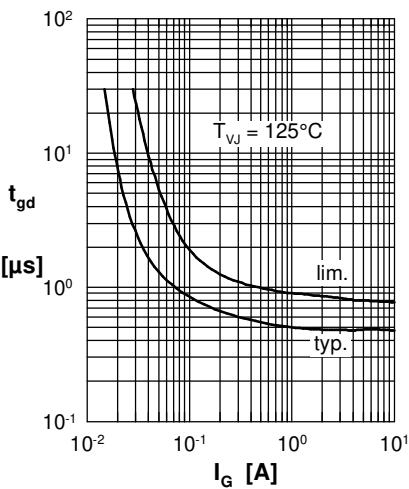


Fig. 5 Gate controlled delay time t_{gd}

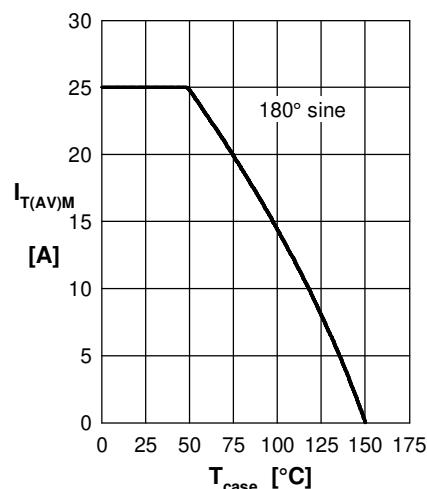


Fig. 6 Max. forward current at case temperature

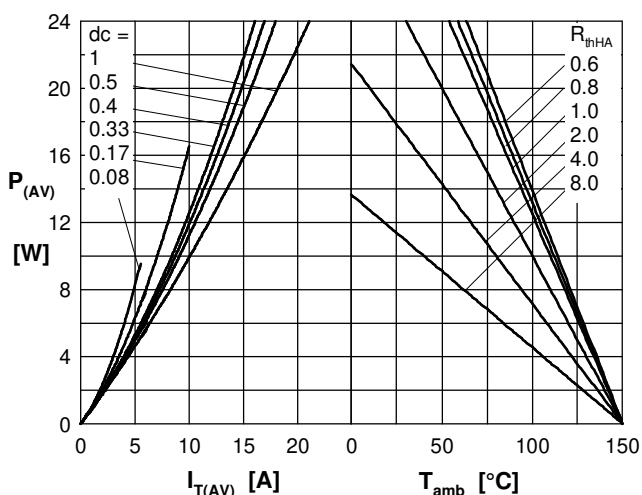


Fig. 7a Power dissipation versus direct output current
 Fig. 7b and ambient temperature

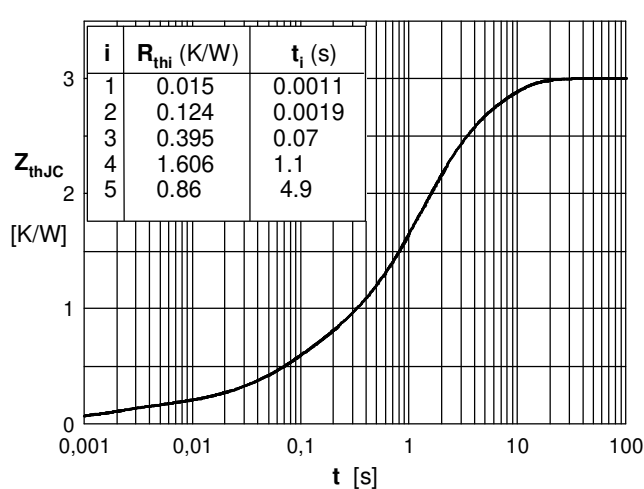


Fig. 8 Transient thermal impedance junction to case