

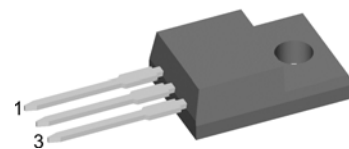
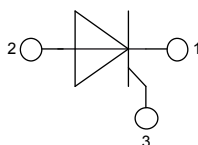
High Efficiency Thyristor

Single Thyristor

$$\begin{aligned} V_{RRM} &= 1200 \text{ V} \\ I_{T(AV)M} &= 16 \text{ A} \\ I_{T(RMS)} &= 25 \text{ A} \end{aligned}$$

Part number

CS22-12io1M



Backside: isolated

 E72873

Features / Advantages:

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

Applications:

- Softstart AC motor control
- DC Motor control
- Power converter
- AC power control
- Lighting and temperature control

Package:

- Housing: TO-220FP
- Industry standard outline
- Plastic overmolded tab for electrical isolation
- Isolation Voltage 2500 V
- Epoxy meets UL 94V-0
- RoHS compliant

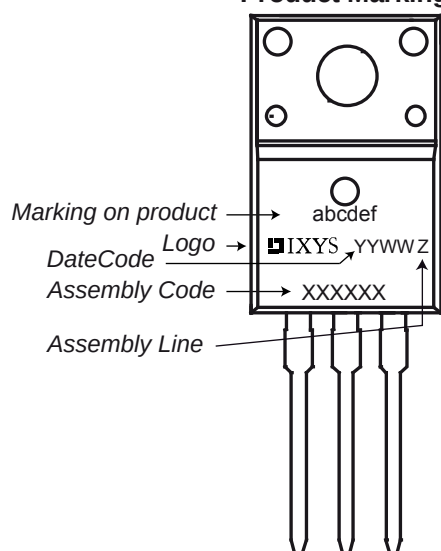
Ratings

Symbol	Definition	Conditions	min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$			1300	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V
I_{RD}	reverse current, drain current	$V_{RD} = 1200 \text{ V}$			10	μA
		$V_{RD} = 1200 \text{ V}$			2	mA
V_T	forward voltage drop	$I_T = 30 \text{ A}$			1.30	V
		$I_T = 60 \text{ A}$			1.59	V
		$I_T = 30 \text{ A}$			1.27	V
		$I_T = 60 \text{ A}$			1.65	V
$I_{T(AV)M}$	average forward current	$T_C = 90^{\circ}\text{C}$			16	A
$I_{T(RMS)}$	RMS forward current	180° sine			25	A
V_{T0}	threshold voltage	$T_{VJ} = 150^{\circ}\text{C}$			0.86	V
r_T	slope resistance				13.2	m Ω
R_{thJC}	thermal resistance junction to case				2.50	K/W
T_{VJ}	virtual junction temperature		-40		150	$^{\circ}\text{C}$
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$			50	W
P_{GM}	max. gate power dissipation	$t_p = 30 \mu\text{s}$			10	W
		$t_p = 300 \mu\text{s}$			5	W
P_{GAV}	average gate power dissipation				0.5	W
I_{TSM}	max. forward surge current	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$			300	A
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$			325	A
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$			255	A
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$			275	A
I^2t	value for fusing	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$			450	A ² s
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$			440	A ² s
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$			325	A ² s
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$			315	A ² s
C_J	junction capacitance	$V_R = 400 \text{ V}$ $f = 1 \text{ MHz}$		13		pF

Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 125^{\circ}\text{C}$ repetitive, $I_T = 40\text{ A}$ $f = 50\text{ Hz}$; $t_p = 200\text{ }\mu\text{s}$ $I_G = 0.3\text{ A}$; $di_G/dt = 0.3\text{ A}/\mu\text{s}$ $V_D = \frac{2}{3} V_{DRM}$ non-repetitive, $I_T = 20\text{ A}$			150	A/ μs
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V_D = \frac{2}{3} V_{DRM}$ $T_{VJ} = 125^{\circ}\text{C}$ $R_{GK} = \infty$; method 1 (linear voltage rise)			500	V/ μs
V_{GT}	gate trigger voltage	$V_D = 6\text{ V}$ $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = -40^{\circ}\text{C}$			1.3	V
I_{GT}	gate trigger current	$V_D = 6\text{ V}$ $T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = -40^{\circ}\text{C}$			1.6	V
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$ $T_{VJ} = 150^{\circ}\text{C}$			30	mA
I_{GD}	gate non-trigger current				50	mA
I_L	latching current	$t_p = 10\text{ }\mu\text{s}$ $T_{VJ} = 25^{\circ}\text{C}$ $I_G = 0.3\text{ A}$; $di_G/dt = 0.3\text{ A}/\mu\text{s}$			0.2	V
I_H	holding current	$V_D = 6\text{ V}$ $R_{GK} = \infty$ $T_{VJ} = 25^{\circ}\text{C}$			1	mA
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$ $T_{VJ} = 25^{\circ}\text{C}$ $I_G = 0.3\text{ A}$; $di_G/dt = 0.3\text{ A}/\mu\text{s}$			90	mA
t_q	turn-off time	$V_R = 100\text{ V}$; $I_T = 30\text{ A}$ $T_{VJ} = 150^{\circ}\text{C}$ $V_D = \frac{2}{3} V_{DRM}$; $t_p = 200\text{ }\mu\text{s}$ $di/dt = 10\text{ A}/\mu\text{s}$; $dv/dt = 20\text{ V}/\mu\text{s}$		150		μs

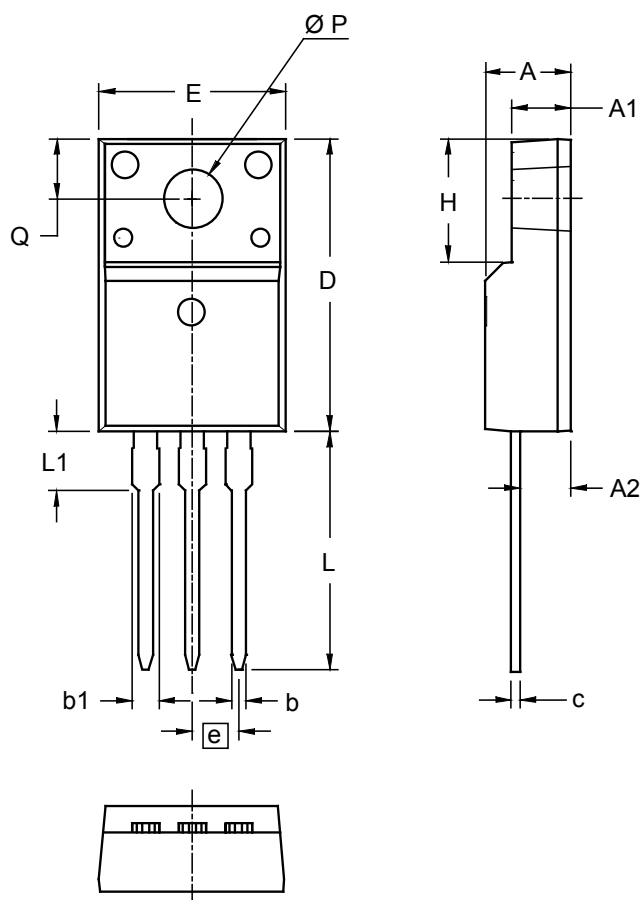
Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
I_{RMS}	RMS current	per terminal			35	A
R_{thCH}	thermal resistance case to heatsink			0.50		K/W
T_{stg}	storage temperature		-55		150	°C
Weight				2		g
M_D	mounting torque		0.4		0.6	Nm
F_C	mounting force with clip		20		60	N
V_{ISOL}	isolation voltage	t = 1 second	2500			V
		t = 1 minute	2000			V
$d_{Spp/App}$	creepage striking distance on surface through air	terminal to terminal	1.6	1.0		mm
$d_{Spb/Apb}$	creepage striking distance on surface through air	terminal to backside	2.5	2.5		mm

Product Marking



Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Code Key
Standard	CS22-12io1M	CS22-12io1M	Tube	50	500226

Similar Part	Package	Voltage class
CS22-08io1M	TO-220ABFP (3)	800
CMA30E1600PN	TO-220ABFP (3)	1600
CLA30E1200PB	TO-220AB (3)	1200
CLA30E1200PC	TO-263AB (D2Pak)	1200
CLA30E1200HB	TO-247AD (3)	1200
CMA30E1600PB	TO-220AB (3)	1600

Outlines TO-220FP


SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.177	.193	4.50	4.90
A1	.092	.108	2.34	2.74
A2	.101	.117	2.56	2.96
b	.028	.035	0.70	0.90
b1	.050	.058	1.27	1.47
c	.018	.024	0.45	0.60
D	.617	.633	15.67	16.07
E	.392	.408	9.96	10.36
e	.100 BSC		2.54 BSC	
H	.255	.271	6.48	6.88
L	.499	.523	12.68	13.28
L1	.119	.135	3.03	3.43
$\varnothing P$	.121	.129	3.08	3.28
Q	.126	.134	3.20	3.40

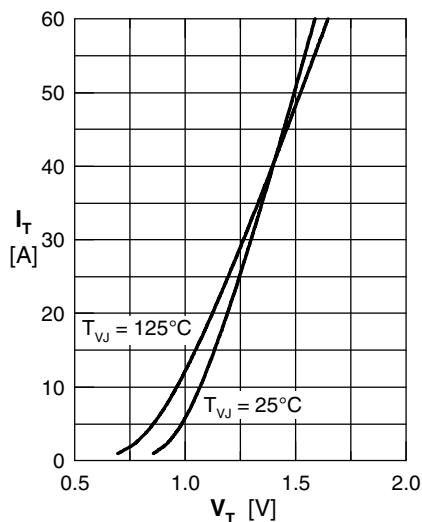


Fig. 1 Forward characteristics

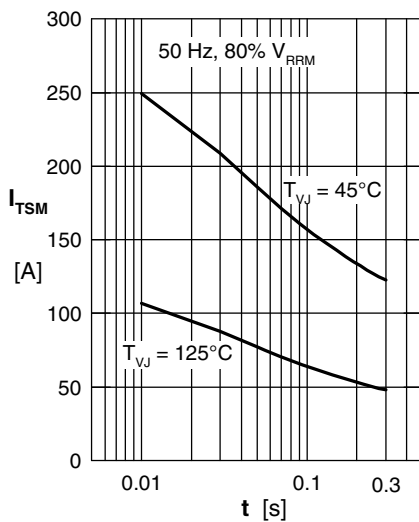


Fig. 2 Surge overload current
 I_{TSM} : crest value, t : duration

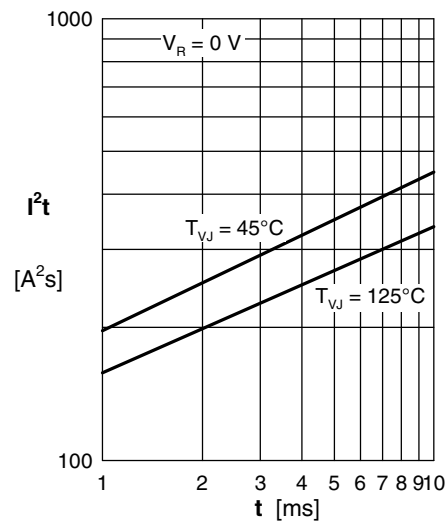


Fig. 3 I^2t versus time (1-10 s)

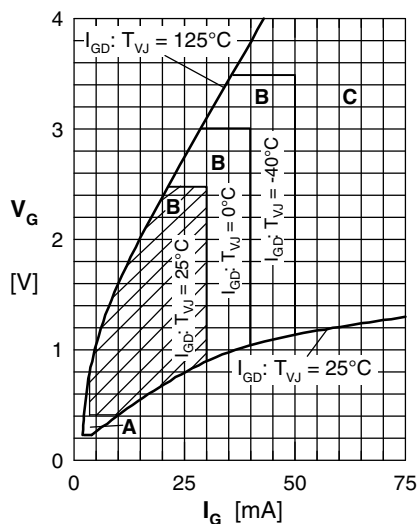


Fig. 4 Gate voltage & gate current
Triggering: A = no; B = possible; C = safe

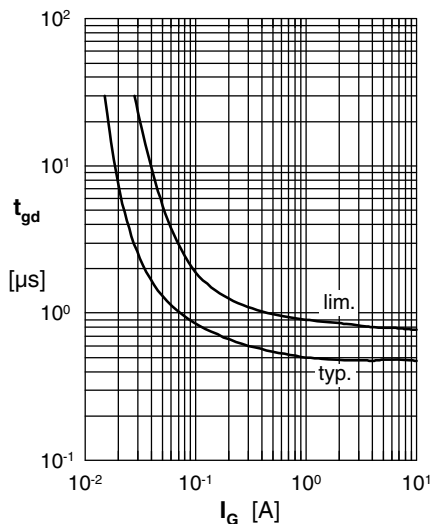


Fig. 5 Gate controlled delay time t_{gd}

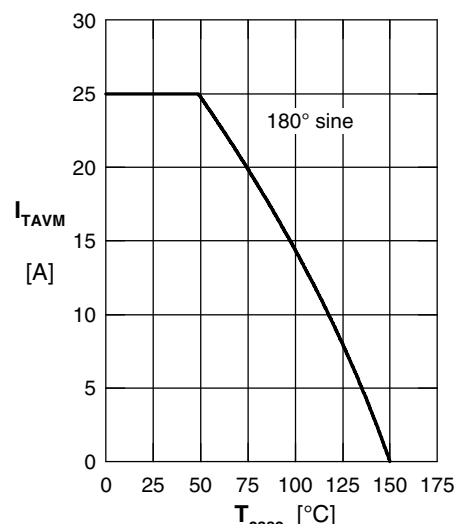


Fig. 6 Max. forward current at case temperature

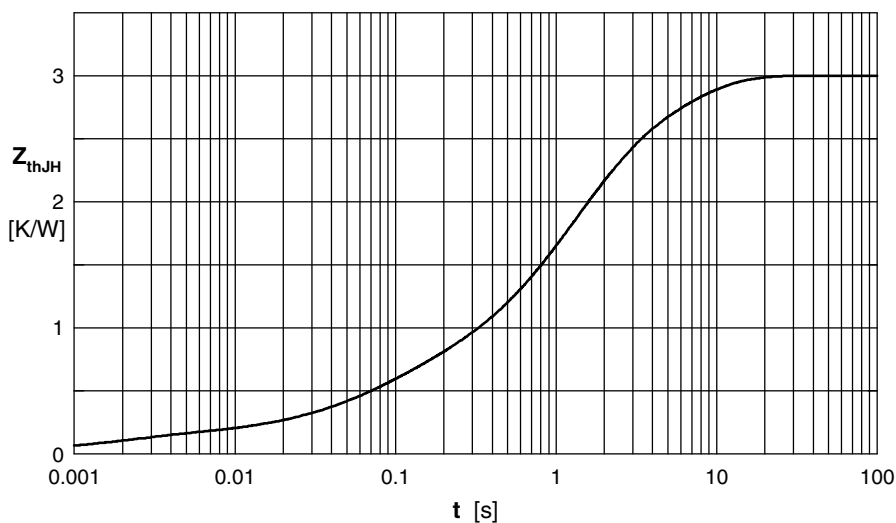


Fig. 7 Typ. transient thermal impedance junction to heatsink

Constants for Z_{thJH} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.015	0.0011
2	0.124	0.0019
3	0.395	0.07
4	1.606	1.1
5	0.86	4.9