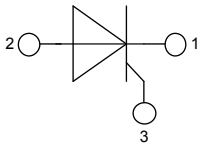
High Efficiency Thyristor

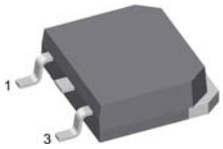
Single Thyristor

V_{RRM} = 1200 V
$I_{T(AV)M}$ = 50 A
$I_{T(RMS)}$ = 79 A

Part number

CLA 50 E 1200 TC





Backside: anode

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:

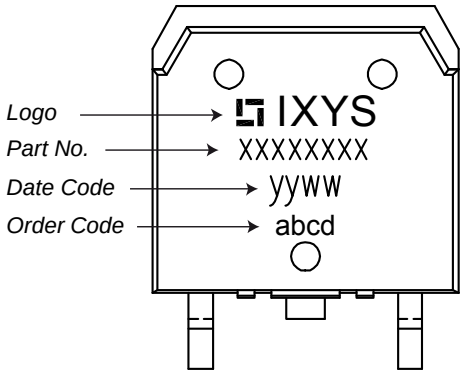
- Housing: TO-268AA (D3Pak)
- Industry standard outline
- Epoxy meets UL 94V-0
- RoHS compliant

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
$V_{RSM/DSM}$	*max. non-repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1300	V
$V_{RRM/DRM}$	*max. repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1200	V
$I_{R/D}$	*reverse current, drain current*	$V_{R/D}$ = 1200 V	T_{VJ} = 25°C			50	µA
		$V_{R/D}$ = 1200 V	T_{VJ} = 125°C			4	mA
V_T	*forward voltage drop*	I_T = 50 A	T_{VJ} = 25°C			1.32	V
		I_T = 100 A				1.60	V
		I_T = 50 A	T_{VJ} = 125°C			1.27	V
		I_T = 100 A				1.65	V
$I_{T(AV)M}$	*average forward current*	T_C = 125°C	T_{VJ} = 150°C			50	A
$I_{T(RMS)}$	*RMS forward current*	180° sine				79	A
V_{T0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 150°C			0.88	V
r_T	*slope resistance* }					7.7	mΩ
R_{thJC}	*thermal resistance junction to case*					0.25	K/W
T_{VJ}	*virtual junction temperature*			-40		150	°C
P_{tot}	*total power dissipation*		T_C = 25°C			500	W
P_{GM}	*max. gate power dissipation*	t_P = 30 µs	T_C = 150°C			10	W
		t_P = 300 µs				5	W
P_{GAV}	*average gate power dissipation*					0.5	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			550	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			595	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			470	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			505	A
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			1.52	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.48	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			1.11	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.06	kA²s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		25		pF

Symbol	Definition	Conditions	Ratings min.	typ.	max.	Unit
$(di/dt)_{cr}$	*critical rate of rise of current*	T_{VJ} = 150 °C repetitive, I_T = 40 A			150	A/µs
		f = 50 Hz; t_P = 200 µs				
		I = 0.3 A; di /dt = 0.3 A/µs				
		V_D = ⅔ V_{DRM} non-repetitive, I_T = 50 A			500	A/µs
$(dv/dt)_{cr}$	*critical rate of rise of voltage*	V_D = ⅔ V_{DRM} T_{VJ} = 150 °C			1000	V/µs
		R_{GK} = ∞; method 1 (linear voltage rise)				
V_{GT}	*gate trigger voltage*	V_D = 6 V T_{VJ} = 25 °C			1.5	V
		T_{VJ} = -40 °C			1.6	V
I_{GT}	*gate trigger current*	V_D = 6 V T_{VJ} = 25 °C			50	mA
		T_{VJ} = -40 °C			80	mA
V_{GD}	*gate non-trigger voltage*	V_D = ⅔ V_{DRM} T_{VJ} = 150 °C			0.2	V
I_{GD}	*gate non-trigger current*				3	mA
I_L	*latching current*	t_p = 10 µs T_{VJ} = 25 °C			125	mA
		I = 0.3 A; di /dt = 0.3 A/µs				
I_H	*holding current*	V_D = 6 V R_{GK} = ∞ T_{VJ} = 25 °C			100	mA
t_{gd}	*gate controlled delay time*	V_D = ½ V_{DRM} T_{VJ} = 25 °C			2	µs
		I = 0.3 A; di /dt = 0.3 A/µs				
t_q	*turn-off time*	V_R = 100 V; I_T = 33 A T_{VJ} = 150 °C		200		µs
		V_D = ⅔ V_{DRM}; t_p = 200 µs				
		di/dt = 10 A/µs; dv/dt = 20 V/µs				

Symbol	Definition	Conditions	Ratings min.	typ.	max.	Unit
I_{RMS}	*RMS current*	per terminal			70	A
R_{thCH}	*thermal resistance case to heatsink*			0.15		K/W
T_{stg}	*storage temperature*		-55		150	°C
Weight				5		g
F_C	*mounting force with clip*		20		120	N

Product Marking



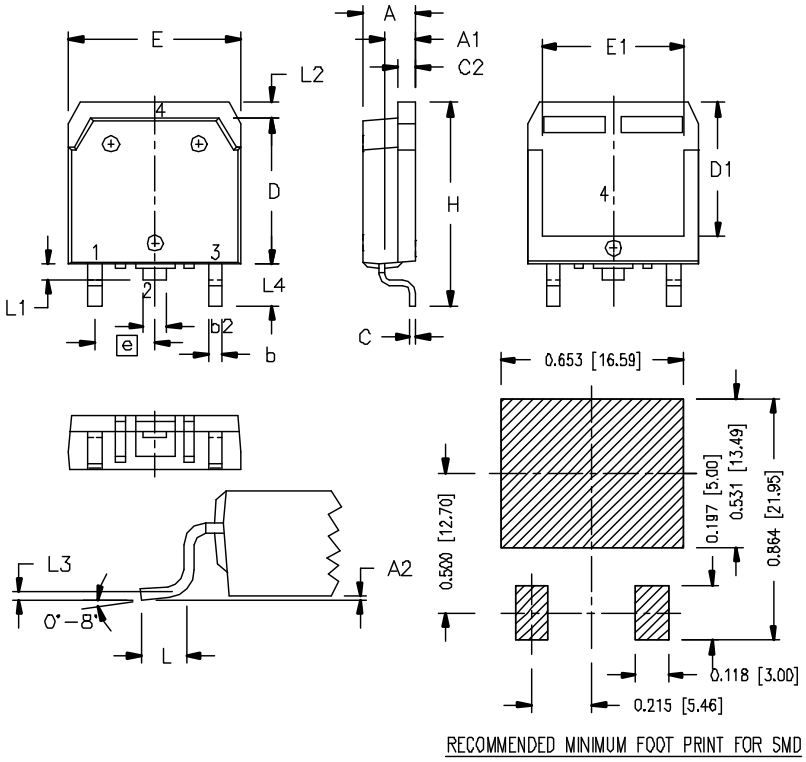
Part number

C = Thyristor (SCR)
L = High Efficiency Thyristor
A = (up to 1200 V)
50 = Current Rating [A]
E = Single Part
1200 = Reverse Voltage [V]
TC = TO-268AA (D3Pak) (2)

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Code Key
Standard	CLA 50 E 1200 TC	CLA50E1200TC	Tube	30	502708

Similar Part	Package	Voltage class
CLA50E1200HB	TO-247AD (3)	1200

Outlines TO-268AA (D3Pak)



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.193	.201	4.90	5.10
A1	.106	.114	2.70	2.90
A2	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
b2	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E1	.524	.535	13.30	13.60
e	.215 BSC		5.45 BSC	
H	.736	.752	18.70	19.10
L	.094	.106	2.40	2.70
L1	.047	.055	1.20	1.40
L2	.039	.045	1.00	1.15
L3	.010 BSC		0.25 BSC	
L4	.150	.161	3.80	4.10

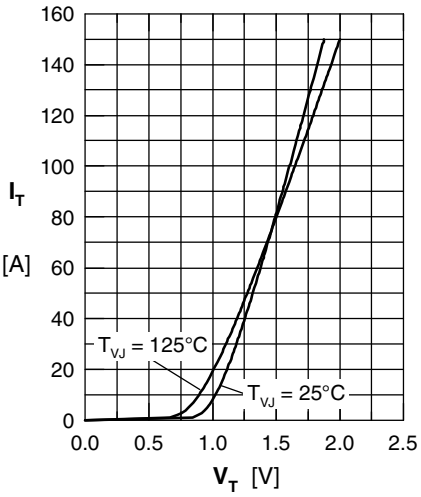


Fig. 1 Forward characteristics

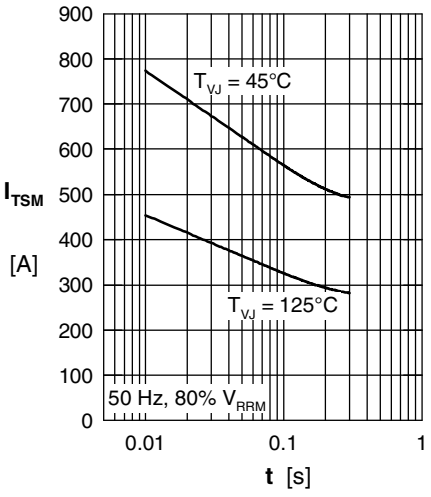


Fig. 2 Surge overload current

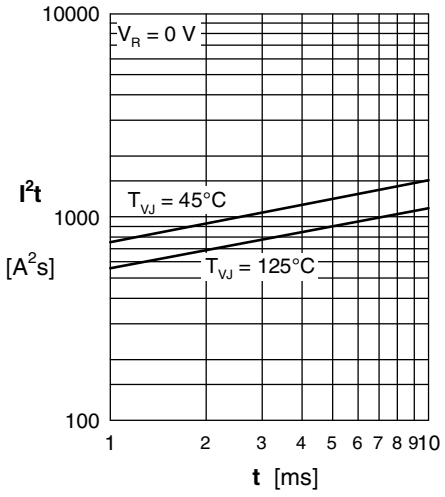


Fig. 3 I^2t versus time (1-10 ms)

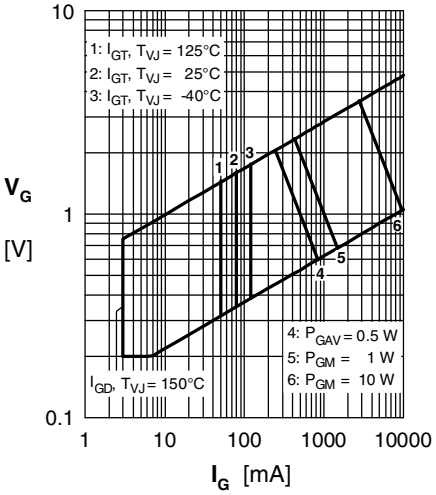


Fig. 4 Gate trigger characteristics

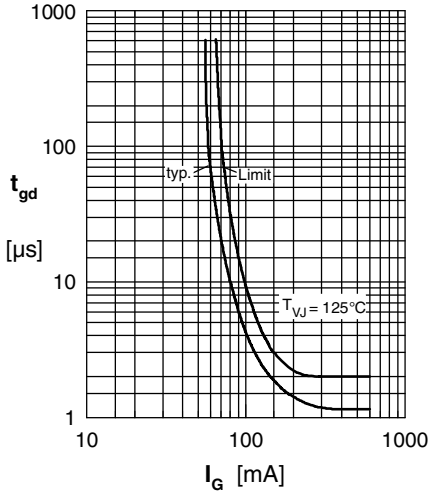


Fig. 5 Gate controlled delay time t_{gd}

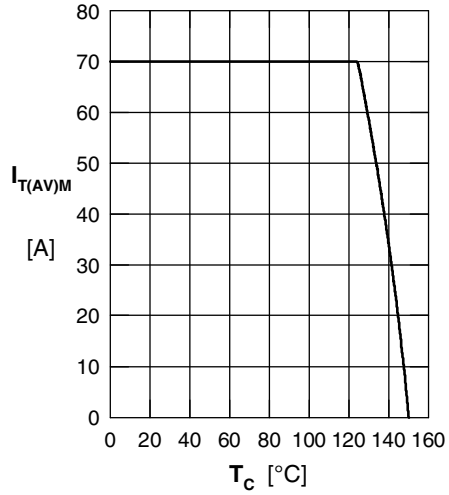
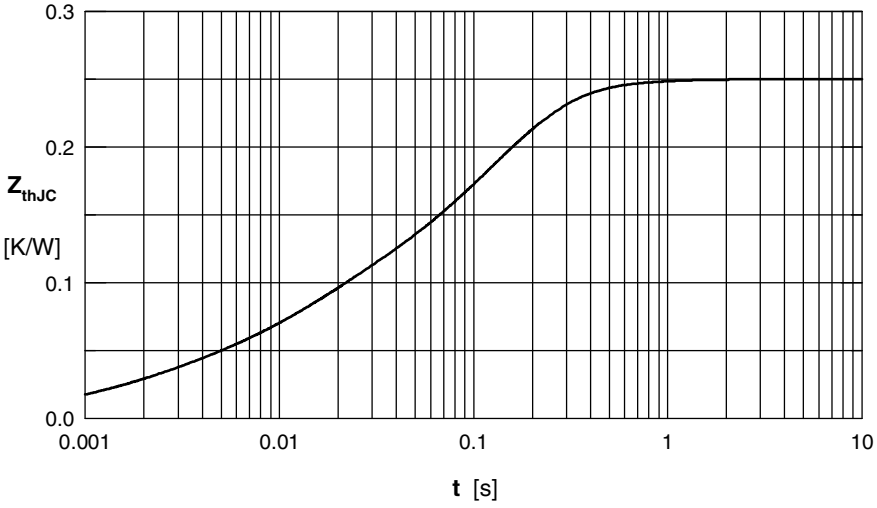


Fig. 6 Max. forward current at case temperature



Ri	τi
0.0075	0.0011
0.017	0.0019
0.057	0.0115
0.158	0.12
0.0105	0.5

Fig. 7 Transient thermal impedance junction to case