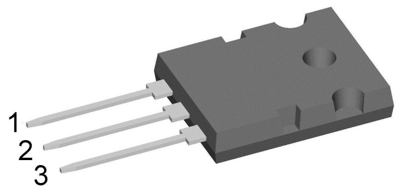
High Efficiency Thyristor

V_{RRM} = 1200 V
I_{TAV} = 100 A
V_T = 1.34 V

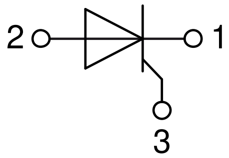
Single Thyristor

Part number

CLA100E1200KB



Backside: anode



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-264

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

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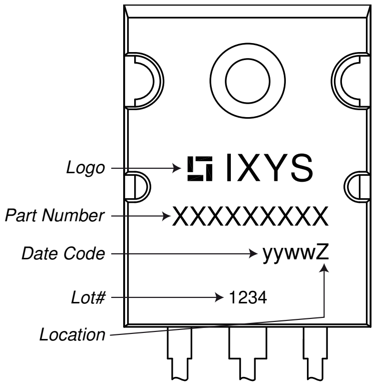
Thyristor

Symbol	Definition	Conditions		Ratings min.	Ratings typ.	Ratings 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			10	µA
		$V_{R/D}$ = 1200 V	T_{VJ} = 125°C			5	mA
V_T	*forward voltage drop*	I_T = 100 A	T_{VJ} = 25°C			1.37	V
		I_T = 200 A				1.78	V
		I_T = 100 A	T_{VJ} = 125°C			1.34	V
		I_T = 200 A				1.85	V
I_{TAV}	*average forward current*	T_C = 105°C	T_{VJ} = 150°C			100	A
$I_{T(RMS)}$	*RMS forward current*	180° sine				160	A
V_{T0}	*threshold voltage*	*for power loss calculation only*	T_{VJ} = 150°C			0.82	V
r_T	*slope resistance*					5.2	mΩ
R_{thJC}	*thermal resistance junction to case*					0.2	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.15		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			625	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			1.10	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.19	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			935	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.01	kA
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			6.05	kA^2s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			5.89	kA^2s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			4.37	kA^2s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			4.25	kA^2s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		43		pF
P_{GM}	*max. gate power dissipation*	t_P = 30 µs	T_C = 150°C			10	W
		t_P = 300 µs				1	W
P_{GAV}	*average gate power dissipation*					0.5	W
$(di/dt)_{cr}$	*critical rate of rise of current*	T_{VJ} = 150°C; f = 50 Hz	repetitive, I_T = 300 A			150	A/µs
		t_P = 200 µs; di_G/dt = 0.45 A/µs;					
		I_G = 0.45 A; V = ⅔ V_{DRM}	non-repet., I_T = 100 A			500	A/µs
$(dv/dt)_{cr}$	*critical rate of rise of voltage*	V = 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			40	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*					5	mA
I_L	*latching current*	t_p = 10 µs	T_{VJ} = 25°C			150	mA
		I_G = 0.45 A; di_G/dt = 0.45 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_G = 0.5 A; di_G/dt = 0.5 A/µs					
t_q	*turn-off time*	V_R = 100 V; I_T = 100A; V = ⅔ V_{DRM}	T_{VJ} = 125 °C		150		µs
		di/dt = 10 A/µs dv/dt = 20 V/µs	t_p = 200 µs				

Package TO-264			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	*RMS current*	per terminal			70	A
T_{VJ}	*virtual junction temperature*		-40		150	°C
T_{op}	*operation temperature*		-40		125	°C
T_{stg}	*storage temperature*		-40		150	°C
Weight				10		g
M_D	*mounting torque*		0.8		1.2	Nm
F_C	*mounting force with clip*		20		120	N



Part description

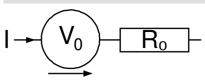
C = Thyristor (SCR)
L = High Efficiency Thyristor
A = (up to 1200V)
100 = Current Rating [A]
E = Single Thyristor
1200 = Reverse Voltage [V]
KB = TO-264 (3)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CLA100E1200KB	CLA100E1200KB	Tube	25	514750

Similar Part	Package	Voltage class
CLA100E1200HB	TO-247AD (3)	1200

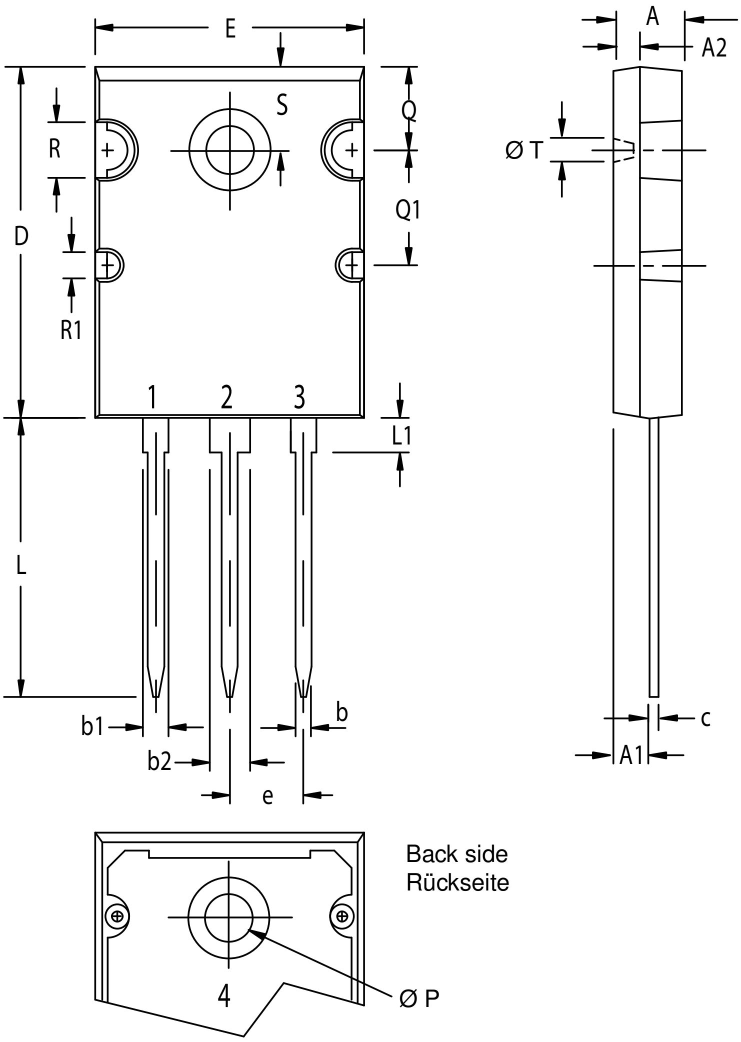
Equivalent Circuits for Simulation

** on die level* $T_{VJ} = 150°C$

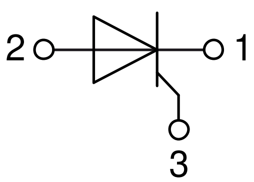


		Thyristor	
$V_{0\,max}$	*threshold voltage*	0.82	V
$R_{0\,max}$	*slope resistance **	2.7	mΩ

Outlines TO-264



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.190	0.202	4.82	5.13
A1	0.100	0.114	2.54	2.89
A2	0.079	0.083	2.00	2.10
b	0.044	0.056	1.12	1.42
b1	0.094	0.106	2.39	2.69
b2	0.114	0.122	2.90	3.09
c	0.021	0.033	0.53	0.83
D	1.020	1.030	25.91	26.16
E	0.780	0.786	19.81	19.96
e	5.46 BSC		.215 BSC	
J	0.000	0.010	0.00	0.25
K	0.000	0.010	0.00	0.25
L	0.800	0.820	20.32	20.83
L1	0.090	0.102	2.29	2.59
P	0.125	0.144	3.17	3.66
Q	0.239	0.247	6.07	6.27
Q1	0.330	0.342	8.38	8.69
R	0.150	0.170	3.81	4.32
R1	0.070	0.090	1.78	2.29
S	0.238	0.248	6.04	6.30
T	0.062	0.072	1.57	1.83



Thyristor

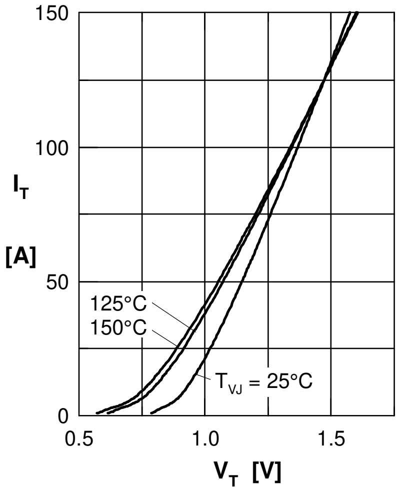


Fig. 1 Forward characteristics

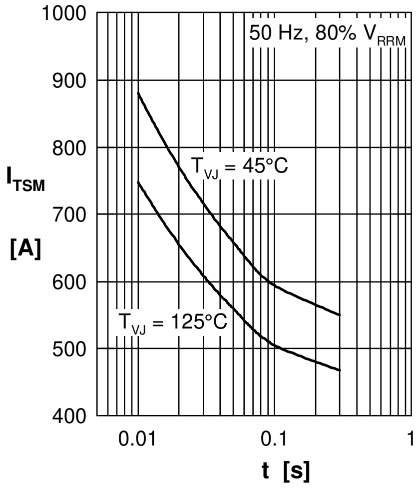


Fig. 2 Surge overload current

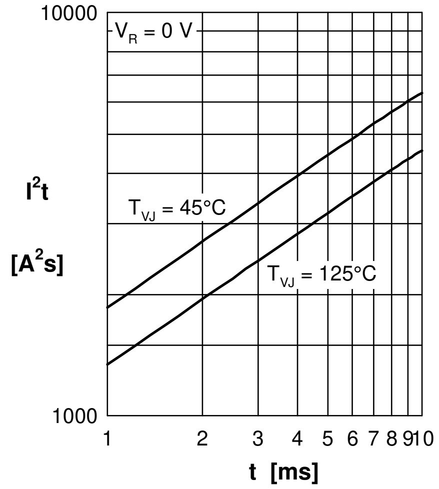


Fig. 3 I^2t versus time (1-10 ms)

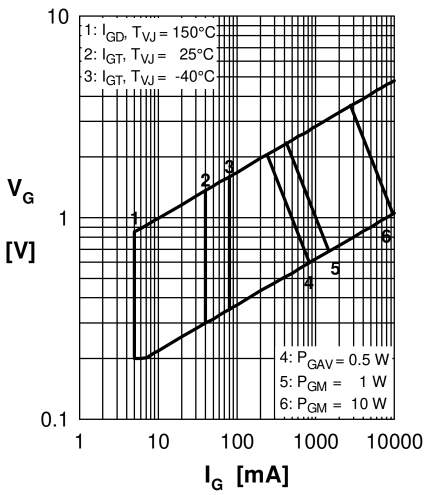


Fig. 4 Gate trigger characteristics

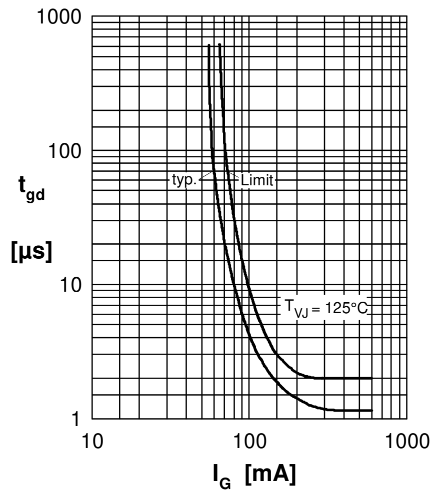


Fig. 5 Gate controlled delay time

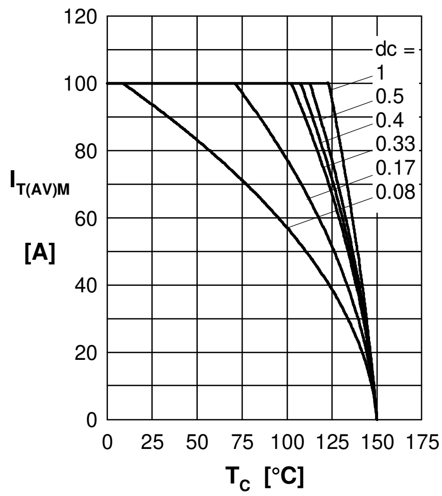


Fig. 6 Max. forward current at case temperature

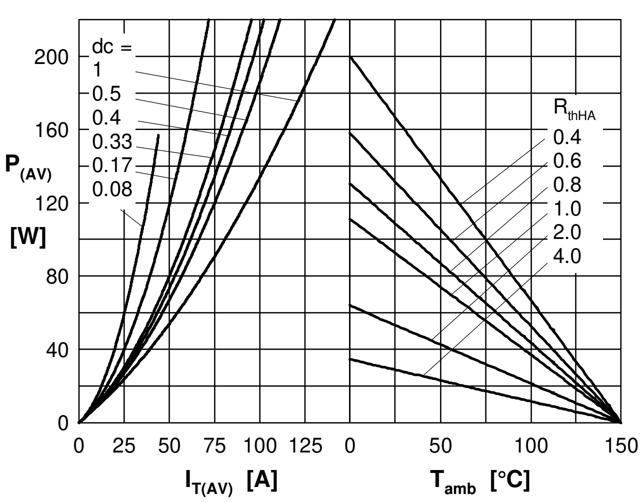
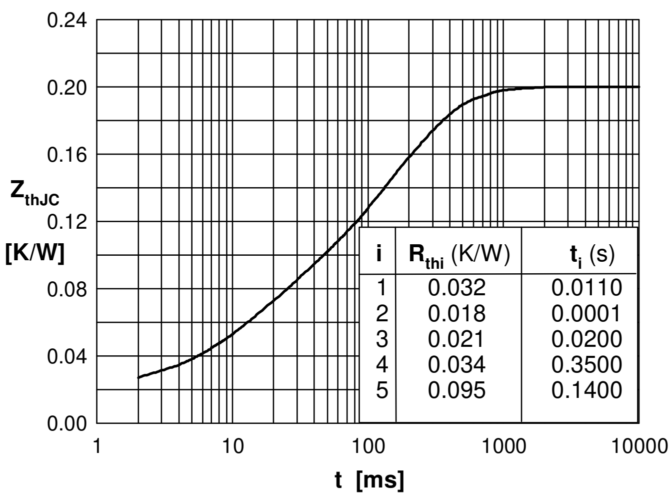


Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature



i	R_{thi} (K/W)	t_i (s)
1	0.032	0.0110
2	0.018	0.0001
3	0.021	0.0200
4	0.034	0.3500
5	0.095	0.1400

Fig. 8 Transient thermal impedance