

# High Efficiency Thyristor

$$V_{RRM} = 1200\text{ V}$$

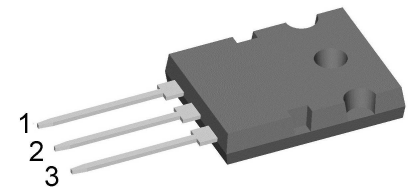
$$I_{TAV} = 100\text{ A}$$

$$V_T = 1.34\text{ V}$$

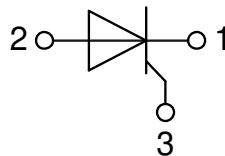
## Single Thyristor

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

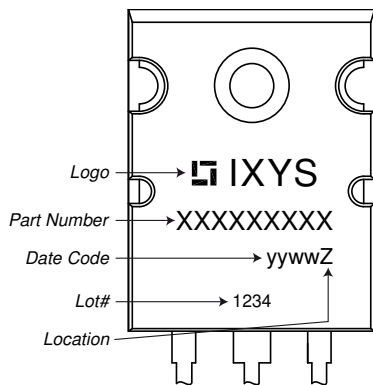
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Thyristor			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1300	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V
$I_{RD}$	reverse current, drain current	$V_{R/D} = 1200 V$	$T_{VJ} = 25^{\circ}C$		10	$\mu A$
		$V_{R/D} = 1200 V$	$T_{VJ} = 125^{\circ}C$		5	mA
$V_T$	forward voltage drop	$I_T = 100 A$	$T_{VJ} = 25^{\circ}C$		1.37	V
		$I_T = 200 A$			1.78	V
		$I_T = 100 A$	$T_{VJ} = 125^{\circ}C$		1.34	V
		$I_T = 200 A$			1.85	V
$I_{TAV}$	average forward current	$T_C = 105^{\circ}C$	$T_{VJ} = 150^{\circ}C$		100	A
$I_{T(RMS)}$	RMS forward current	180° sine			160	A
$V_{T0}$	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}C$		0.82	V
$r_T$	slope resistance				5.2	m $\Omega$
$R_{thJC}$	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		$T_C = 25^{\circ}C$		625	W
$I_{TSM}$	max. forward surge current	$t = 10 ms; (50 Hz), sine$	$T_{VJ} = 45^{\circ}C$		1.10	kA
		$t = 8,3 ms; (60 Hz), sine$	$V_R = 0 V$		1.19	kA
		$t = 10 ms; (50 Hz), sine$	$T_{VJ} = 150^{\circ}C$		935	A
		$t = 8,3 ms; (60 Hz), sine$	$V_R = 0 V$		1.01	kA
$I^2t$	value for fusing	$t = 10 ms; (50 Hz), sine$	$T_{VJ} = 45^{\circ}C$		6.05	kA <sup>2</sup> s
		$t = 8,3 ms; (60 Hz), sine$	$V_R = 0 V$		5.89	kA <sup>2</sup> s
		$t = 10 ms; (50 Hz), sine$	$T_{VJ} = 150^{\circ}C$		4.37	kA <sup>2</sup> s
		$t = 8,3 ms; (60 Hz), sine$	$V_R = 0 V$		4.25	kA <sup>2</sup> s
$C_J$	junction capacitance	$V_R = 400 V f = 1 MHz$	$T_{VJ} = 25^{\circ}C$		43	pF
$P_{GM}$	max. gate power dissipation	$t_p = 30 \mu s$	$T_C = 150^{\circ}C$		10	W
		$t_p = 300 \mu s$			1	W
$P_{GAV}$	average gate power dissipation				0.5	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 150^{\circ}C; f = 50 Hz$ repetitive, $I_T = 300 A$			150	A/ $\mu s$
		$t_p = 200 \mu s; di_G/dt = 0.45 A/\mu s;$ $I_G = 0.45 A; V = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 100 A$			500	A/ $\mu s$
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$ $R_{GK} = \infty; method 1 (linear voltage rise)$	$T_{VJ} = 150^{\circ}C$		1000	V/ $\mu s$
$V_{GT}$	gate trigger voltage	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$		1.5	V
			$T_{VJ} = -40^{\circ}C$		1.6	V
$I_{GT}$	gate trigger current	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$		40	mA
			$T_{VJ} = -40^{\circ}C$		80	mA
$V_{GD}$	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^{\circ}C$		0.2	V
$I_{GD}$	gate non-trigger current				5	mA
$I_L$	latching current	$t_p = 10 \mu s$	$T_{VJ} = 25^{\circ}C$		150	mA
		$I_G = 0.45 A; di_G/dt = 0.45 A/\mu s$				
$I_H$	holding current	$V_D = 6 V R_{GK} = \infty$	$T_{VJ} = 25^{\circ}C$		100	mA
$t_{gd}$	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}C$		2	$\mu s$
		$I_G = 0.5 A; di_G/dt = 0.5 A/\mu s$				
$t_q$	turn-off time	$V_R = 100 V; I_T = 100 A; V = \frac{2}{3} V_{DRM}$ $di/dt = 10 A/\mu s dv/dt = 20 V/\mu s t_p = 200 \mu s$	$T_{VJ} = 125^{\circ}C$		150	$\mu s$

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
<b>Weight</b>				10		g
$M_D$	mounting torque		0.8		1.2	Nm
$F_C$	mounting force with clip		20		120	N


**Part description**

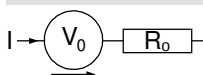
- C = Thyristor (SCR)
- L = High Efficiency Thyristor
- A = (up to 1200V)
- 100 = Current Rating [A]
- E = Single Thyristor
- 1200 = Reverse Voltage [V]
- KB = TO-264 (3)

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**

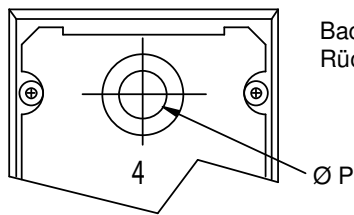
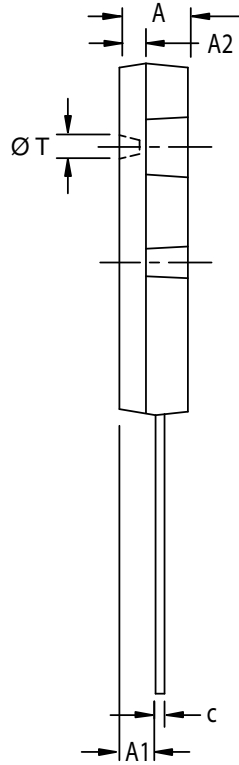
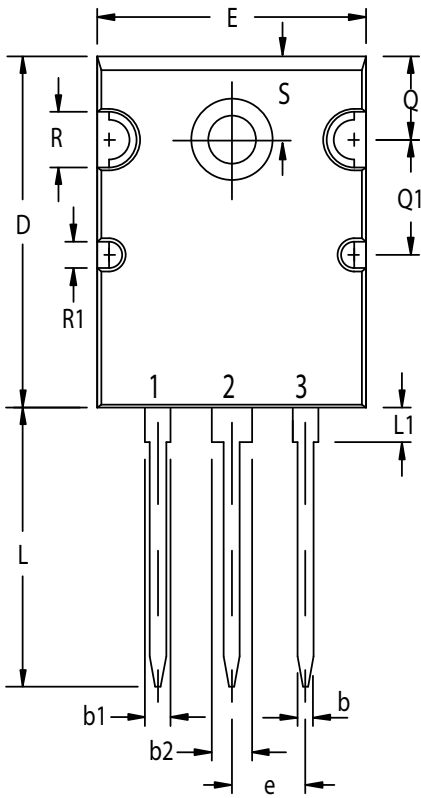
\* on die level

 $T_{VJ} = 150^{\circ}\text{C}$ 

**Thyristor**

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

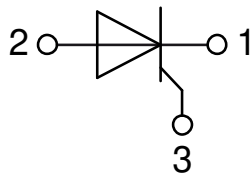


**Outlines TO-264**



Back side  
Rückseite

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



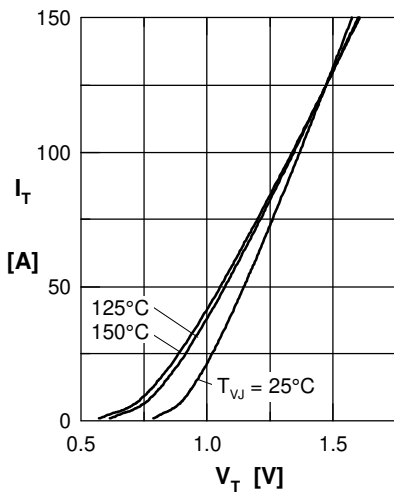
**Thyristor**


Fig. 1 Forward characteristics

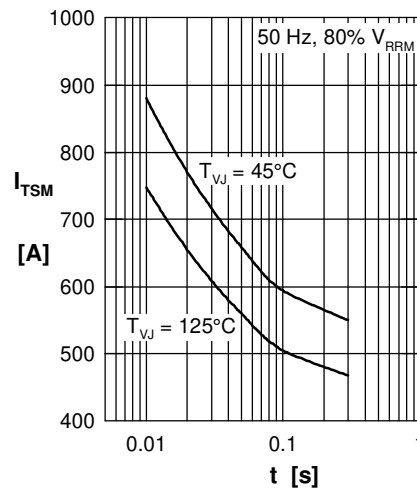


Fig. 2 Surge overload current

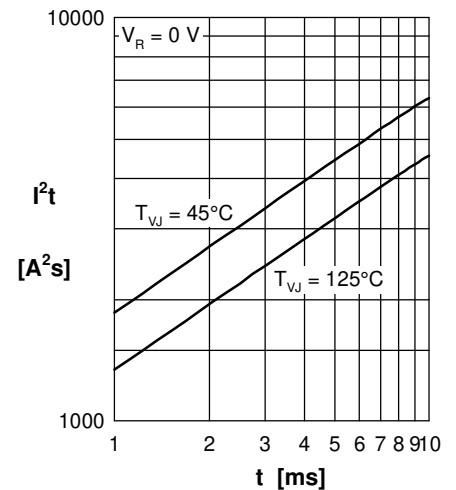
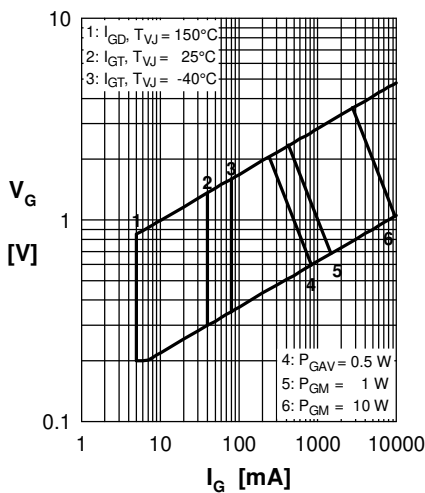

 Fig. 3  $I^2t$  versus time (1-10 ms)


Fig. 4 Gate trigger characteristics

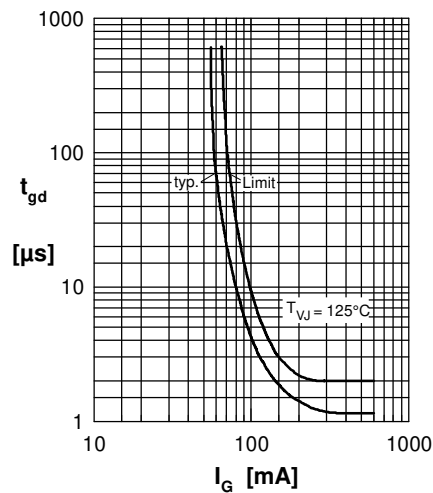


Fig. 5 Gate controlled delay time

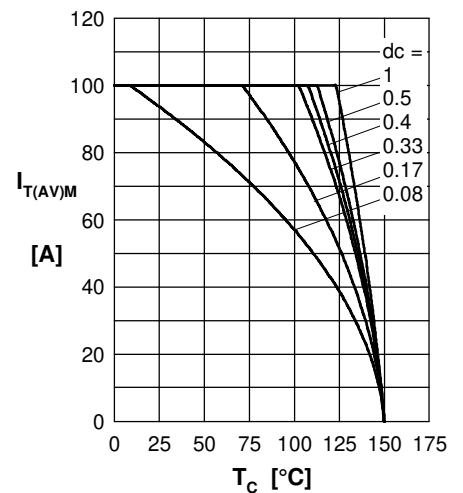


Fig. 6 Max. forward current at case temperature

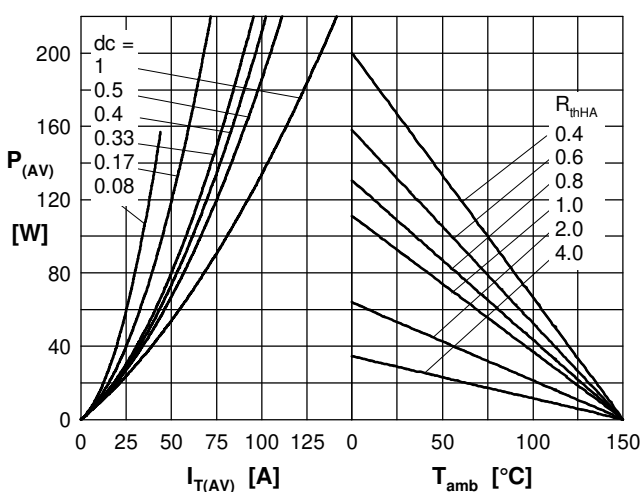
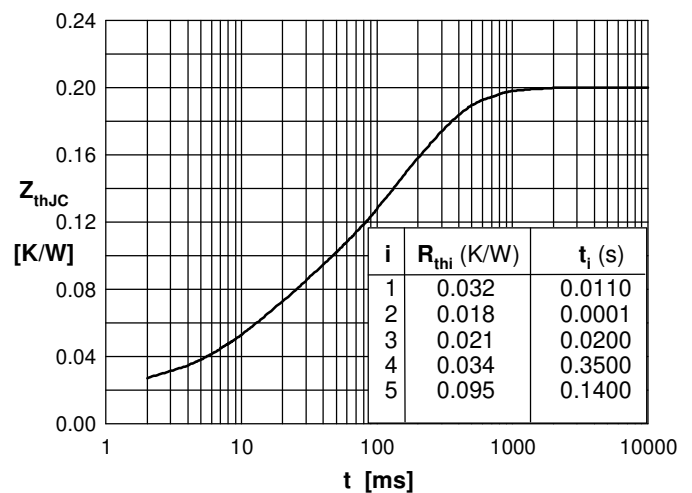

 Fig. 7a Power dissipation versus direct output current  
 Fig. 7b and ambient temperature


Fig. 8 Transient thermal impedance