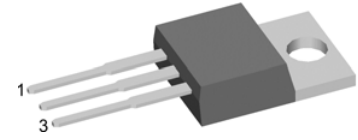
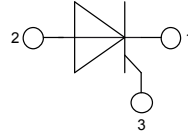


# High Efficiency Thyristor

Single Thyristor

$V_{RRM} = 1200\text{ V}$   
 $I_{T(AV)M} = 30\text{ A}$   
 $I_{T(RMS)} = 47\text{ A}$

Part number  
**CLA 30 E 1200 PB**



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-220
- Industry standard outline
- Epoxy meets UL 94V-0
- RoHS compliant

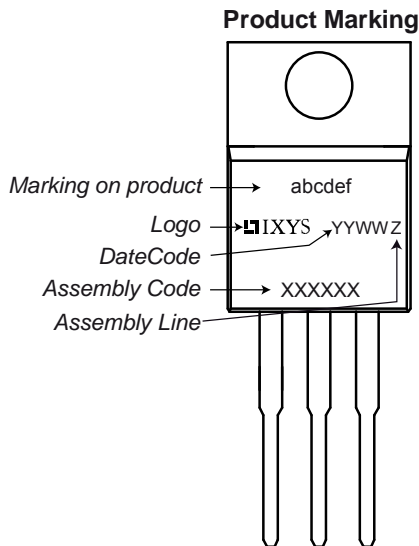
Symbol	Definition	Conditions	Ratings			Unit	
			min.	typ.	max.		
$V_{RSMDSM}$	max. non-repetitive reverse/forward blocking voltage				1300	V	
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage				1200	V	
$I_{R/D}$	reverse current, drain current	$V_{R/D} = 1200\text{ V}$			10	$\mu\text{A}$	
		$V_{R/D} = 1200\text{ V}$			2	mA	
$V_T$	forward voltage drop	$I_T = 30\text{ A}$			1.30	V	
		$I_T = 60\text{ A}$			1.59	V	
		$I_T = 30\text{ A}$	$T_{VJ} = 125^\circ\text{C}$			1.27	V
		$I_T = 60\text{ A}$	$T_{VJ} = 125^\circ\text{C}$			1.65	V
$I_{T(AV)M}$	average forward current	$T_C = 115^\circ\text{C}$			30	A	
$I_{T(RMS)}$	RMS forward current	180° sine			47	A	
$V_{TO}$	threshold voltage	} for power loss calculation only			0.86	V	
$r_T$	slope resistance				13.2	m $\Omega$	
$R_{thJC}$	thermal resistance junction to case				0.65	K/W	
$T_{VJ}$	virtual junction temperature		-40		150	$^\circ\text{C}$	
$P_{tot}$	total power dissipation		$T_C = 25^\circ\text{C}$		190	W	
$P_{GM}$	max. gate power dissipation	$t_p = 30\ \mu\text{s}$	$T_C = 150^\circ\text{C}$		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	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^\circ\text{C}$		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 <sup>2</sup> s	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		440	A <sup>2</sup> s	
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^\circ\text{C}$		325	A <sup>2</sup> s	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		315	A <sup>2</sup> s	
$C_J$	junction capacitance	$V_R = 400\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^\circ\text{C}$		13	pF	

Symbol	Definition	Conditions	Ratings			Unit
			min.	typ.	max.	
$(di/dt)_{cr}$	<i>critical rate of rise of current</i>	$T_{VJ} = 150\text{ °C}$ repetitive, $I_T = 40\text{ A}$ $f = 50\text{ Hz}$ ; $t_p = 200\text{ }\mu\text{s}$ $I = 0.3\text{ A}$ ; $di/dt = 0.3\text{ A}/\mu\text{s}$			150	$\text{A}/\mu\text{s}$
		$V_D = \frac{2}{3} V_{DRM}$ non-repetitive, $I_T = 30\text{ A}$			500	$\text{A}/\mu\text{s}$
$(dv/dt)_{cr}$	<i>critical rate of rise of voltage</i>	$V_D = \frac{2}{3} V_{DRM}$ $T_{VJ} = 150\text{ °C}$ $R_{GK} = \infty$ ; method 1 (linear voltage rise)			500	$\text{V}/\mu\text{s}$
$V_{GT}$	<i>gate trigger voltage</i>	$V_D = 6\text{ V}$ $T_{VJ} = 25\text{ °C}$ $T_{VJ} = -40\text{ °C}$			1.3	V
$I_{GT}$	<i>gate trigger current</i>	$V_D = 6\text{ V}$ $T_{VJ} = 25\text{ °C}$ $T_{VJ} = -40\text{ °C}$			1.6	V
					30	mA
					50	mA
$V_{GD}$	<i>gate non-trigger voltage</i>	$V_D = \frac{2}{3} V_{DRM}$ $T_{VJ} = 150\text{ °C}$			0.2	V
$I_{GD}$	<i>gate non-trigger current</i>				1	mA
$I_L$	<i>latching current</i>	$t_p = 10\text{ }\mu\text{s}$ $T_{VJ} = 25\text{ °C}$ $I = 0.3\text{ A}$ ; $di/dt = 0.3\text{ A}/\mu\text{s}$			90	mA
$I_H$	<i>holding current</i>	$V_D = 6\text{ V}$ $R_{GK} = \infty$ $T_{VJ} = 25\text{ °C}$			60	mA
$t_{gd}$	<i>gate controlled delay time</i>	$V_D = \frac{1}{2} V_{DRM}$ $T_{VJ} = 25\text{ °C}$ $I = 0.3\text{ A}$ ; $di/dt = 0.3\text{ A}/\mu\text{s}$			2	$\mu\text{s}$
$t_q$	<i>turn-off time</i>	$V_R = 100\text{ V}$ ; $I_T = 30\text{ A}$ $T_{VJ} = 150\text{ °C}$ $V_D = \frac{2}{3} V_{DRM}$ ; $t_p = 200\text{ }\mu\text{s}$ $di/dt = 10\text{ A}/\mu\text{s}$ ; $dv/dt = 20\text{ V}/\mu\text{s}$		150		$\mu\text{s}$

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
<b>Weight</b>				2		g
$M_D$	mounting torque		0.4		0.6	Nm
$F_c$	mounting force with clip		20		60	N

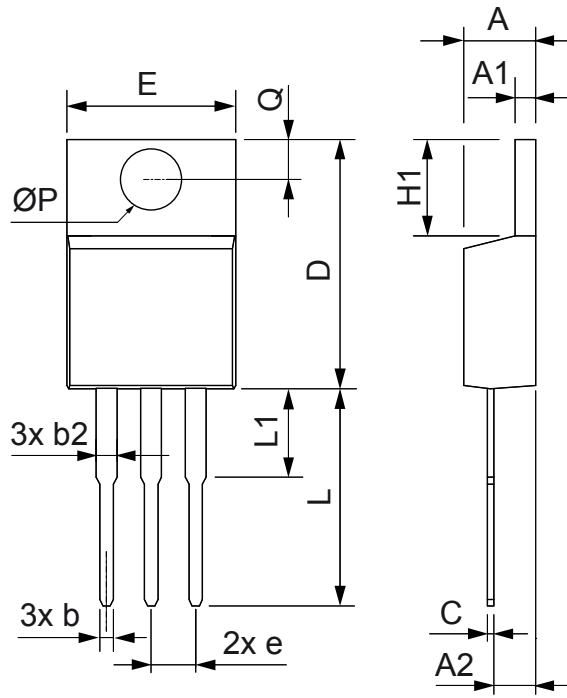
**Part number**

- C = Thyristor (SCR)
- L = High Efficiency Thyristor
- A = (up to 1200 V)
- 30 = Current Rating [A]
- E = Single Part
- 1200 = Reverse Voltage [V]
- PB = TO-220AB (3)



Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Code Key
Standard	CLA 30 E 1200 PB	CLA30E1200PB	Tube	50	508228

Similar Part	Package	Voltage class
CLA30E1200HB	TO-247AD (3)	1200
CLA30E1200PC	TO-263AB (D2Pak)	1200
CS22-12io1M	TO-220ABFP (3)	1200
CS22-08io1M	TO-220ABFP (3)	800
CMA30E1600PN	TO-220ABFP (3)	1600
CMA30E1600PB	TO-220AB (3)	1600

**Outlines TO-220**


Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.32	4.82	0.170	0.190
A1	1.14	1.39	0.045	0.055
A2	2.29	2.79	0.090	0.110
b	0.64	1.01	0.025	0.040
b2	1.15	1.65	0.045	0.065
C	0.35	0.56	0.014	0.022
D	14.73	16.00	0.580	0.630
E	9.91	10.66	0.390	0.420
e	2.54	BSC	0.100	BSC
H1	5.85	6.85	0.230	0.270
L	12.70	13.97	0.500	0.550
L1	2.79	5.84	0.110	0.230
$\varnothing P$	3.54	4.08	0.139	0.161
Q	2.54	3.18	0.100	0.125

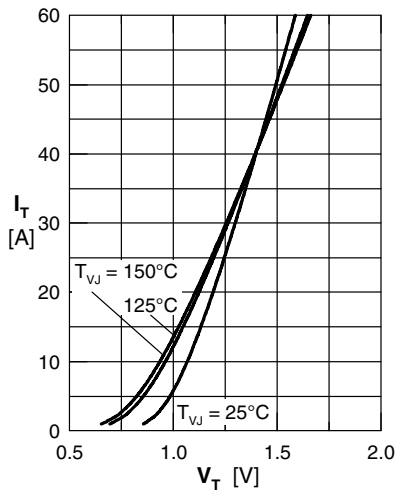


Fig. 1 Forward characteristics

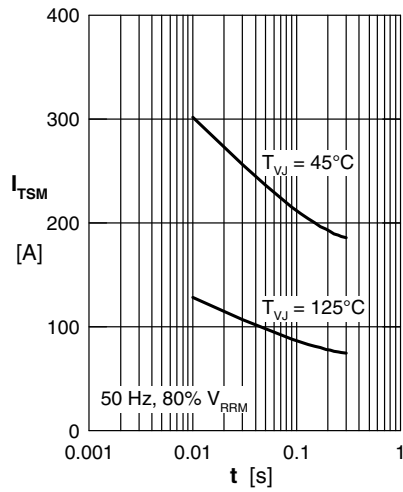


Fig. 2 Surge overload current  $I_{TSM}$ : crest value, t: duration

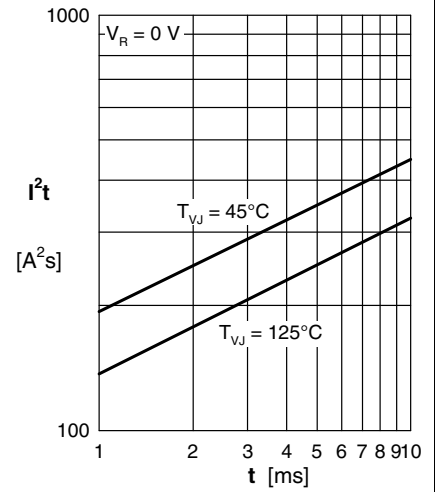


Fig. 3  $I^2t$  versus time (1-10 s)

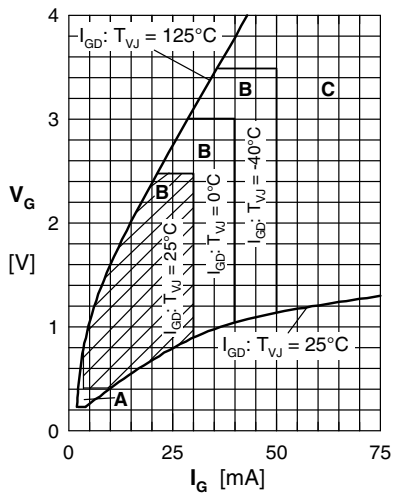


Fig. 4 Gate voltage & gate current  
Triggering: A = no; B = possible; C = safe

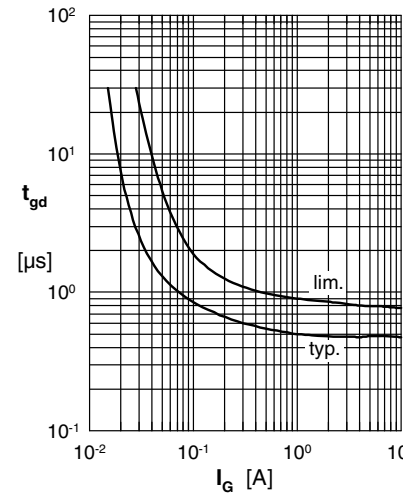


Fig. 5 Gate controlled delay time  $t_{gd}$

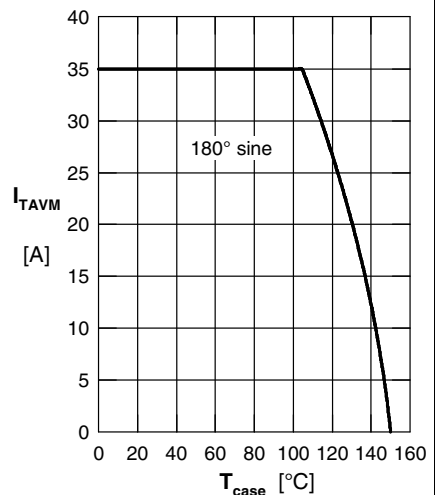


Fig. 6 Max. forward current at case temperature

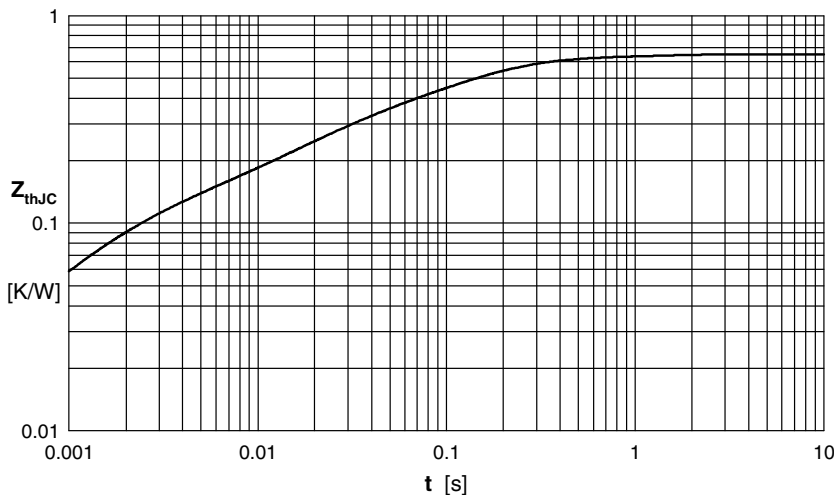


Fig. 7 Transient thermal impedance junction to case

Constants for  $Z_{thJC}$  calculation:

i	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.024	0.0007
2	0.069	0.0018
3	0.148	0.018
4	0.053	0.12
5	0.356	0.76