High Efficiency Thyristor

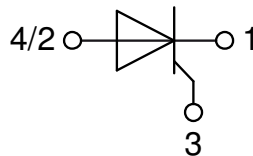|		
V_{RRM}	=	**1200** V
I_{TAV}	=	**30** A
V_T	=	**1.27** V

Single Thyristor

Part number

CLA30E1200PB
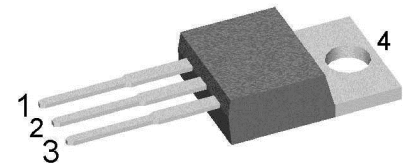
Backside: anode

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

Thyristor | Ratings

Symbol	Definition	Conditions		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	$T_{VJ} = 25°C$			10	µA
		$V_{R/D} = 1200$ V	$T_{VJ} = 125°C$			2	mA
V_T	forward voltage drop	$I_T = 30$ A	$T_{VJ} = 25°C$			1.30	V
		$I_T = 60$ A				1.59	V
		$I_T = 30$ A	$T_{VJ} = 125°C$			1.27	V
		$I_T = 60$ A				1.65	V
I_{TAV}	average forward current	$T_C = 115°C$	$T_{VJ} = 150°C$			30	A
$I_{T(RMS)}$	RMS forward current	180° sine				47	A
V_{T0}	threshold voltage	for power loss calculation only	$T_{VJ} = 150°C$			0.86	V
r_T	slope resistance					13.2	mΩ
R_{thJC}	thermal resistance junction to case					0.5	K/W
R_{thCH}	thermal resistance case to heatsink				0.50		K/W
P_{tot}	total power dissipation		$T_C = 25°C$			250	W
I_{TSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			300	A
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			325	A
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150°C$			255	A
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			275	A
I²t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			450	A²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			440	A²s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150°C$			325	A²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			315	A²s
C_J	junction capacitance	$V_R = 400$ V f = 1 MHz	$T_{VJ} = 25°C$		13		pF
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
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 150°C$; f = 50 Hz repetitive, $I_T = 90$ A				150	A/µs
		$t_P = 200$ µs; $di_G/dt = 0.3$ A/µs;					
		$I_G = 0.3$ A; V = ⅔ V_{DRM} non-repet., $I_T = 30$ A				500	A/µs
$(dv/dt)_{cr}$	critical rate of rise of voltage	V = ⅔ V_{DRM}	$T_{VJ} = 150°C$			500	V/µs
		$R_{GK} = ∞$; method 1 (linear voltage rise)					
V_{GT}	gate trigger voltage	$V_D = 6$ V	$T_{VJ} = 25°C$			1.3	V
			$T_{VJ} = -40°C$			1.6	V
I_{GT}	gate trigger current	$V_D = 6$ V	$T_{VJ} = 25°C$			30	mA
			$T_{VJ} = -40°C$			50	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					1	mA
I_L	latching current	$t_p = 10$ µs	$T_{VJ} = 25°C$			90	mA
		$I_G = 0.3$ A; $di_G/dt = 0.3$ A/µs					
I_H	holding current	$V_D = 6$ V $R_{GK} = ∞$	$T_{VJ} = 25°C$			60	mA
t_{gd}	gate controlled delay time	$V_D = ½ V_{DRM}$	$T_{VJ} = 25°C$			2	µs
		$I_G = 0.3$ A; $di_G/dt = 0.3$ A/µs					
t_q	turn-off time	$V_R = 100$ V; $I_T = 30$ A; V = ⅔ V_{DRM} $T_{VJ} = 125$ °C			150		µs
		di/dt = 10 A/µs dv/dt = 20 V/µs $t_p = 200$ µs					

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20150827e

Package   TO-220

			Ratings			
Symbol	**Definition**	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	RMS current	per terminal			35	A
T_{VJ}	virtual junction temperature		-40		150	°C
T_{op}	operation temperature		-40		125	°C
T_{stg}	storage temperature		-40		150	°C
Weight				2		g
M_D	mounting torque		0.4		0.6	Nm
F_C	mounting force with clip		20		60	N

Product Marking

Part Number → XXXXXX
Logo → IXYS   Zyyww
Assembly Line
Lot # → abcdef
Date Code
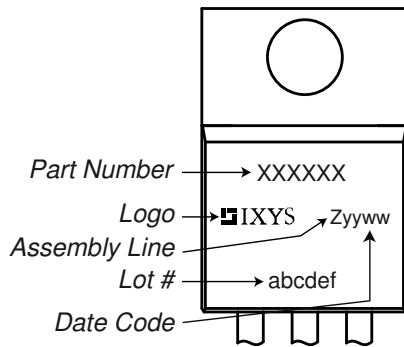
Part description

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

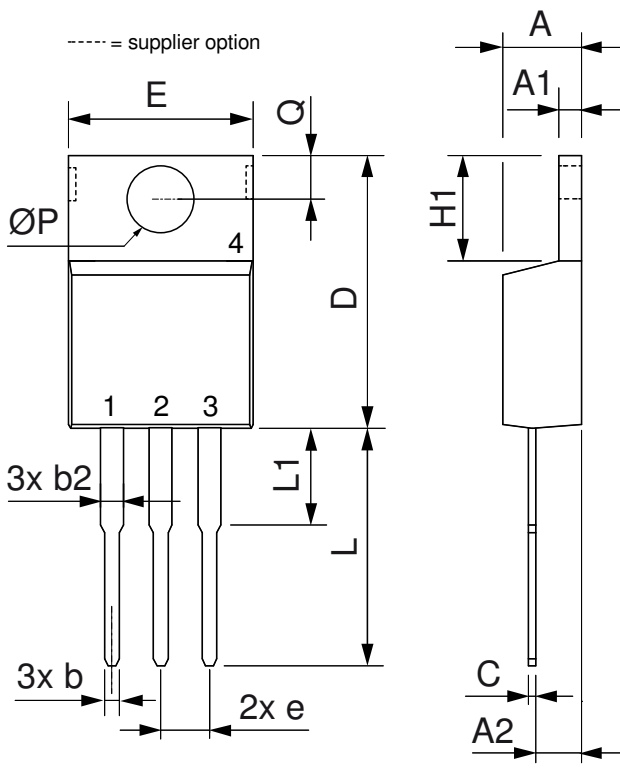| Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CLA30E1200PB	CLA30E1200PB	Tube	50	508228

Similar Part	Package	Voltage class
CLA30E1200HB	TO-247AD (3)	1200
CLA30E1200PC	TO-263AB (D2Pak) (2)	1200
CS22-12io1M	TO-220ABFP (3)	1200
CS22-08io1M	TO-220ABFP (3)	800
CMA30E1600PN	TO-220ABFP (3)	1600
CMA30E1600PB	TO-220AB (3)	1600
CMA30E1600PZ	TO-263AB (D2Pak) (2HV)	1600

Equivalent Circuits for Simulation   *on die level T_{VJ} = 150 °C
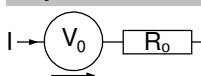
I → V_0 → R_0 **Thyristor**

$V_{0\,max}$	threshold voltage	0.86	V
$R_{0\,max}$	slope resistance *	10	mΩ

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Outlines   TO-220

----- = supplier option

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
ØP	3.54	4.08	0.139	0.161
Q	2.54	3.18	0.100	0.125

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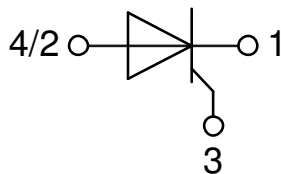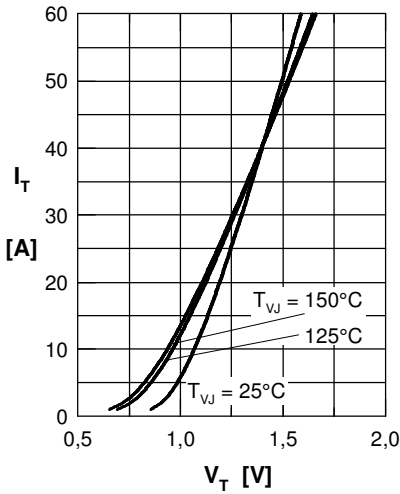
Thyristor

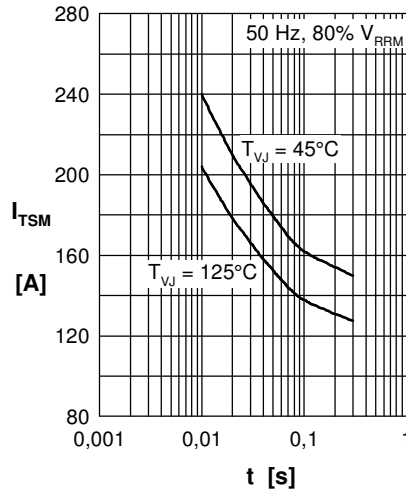Fig. 1 Forward characteristics

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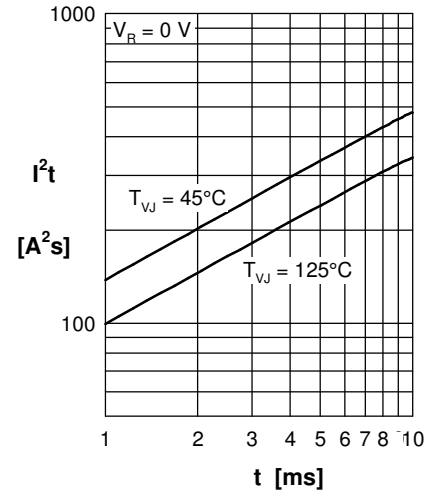I_{TSM}: crest value, t: duration

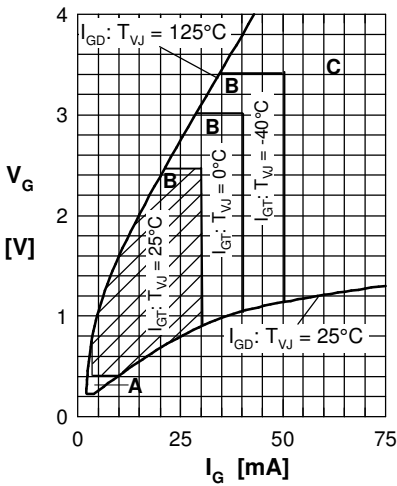Fig. 3 I^2t versus time (1-10 s)

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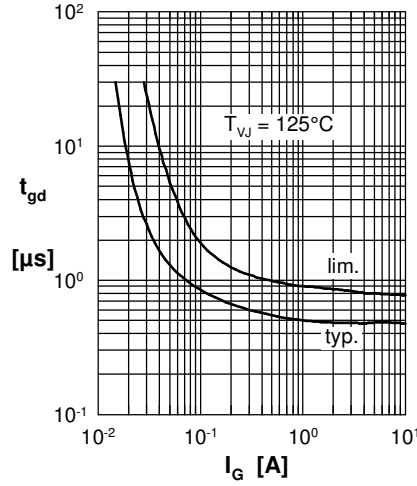Triggering: A = no; B = possible; C = safe
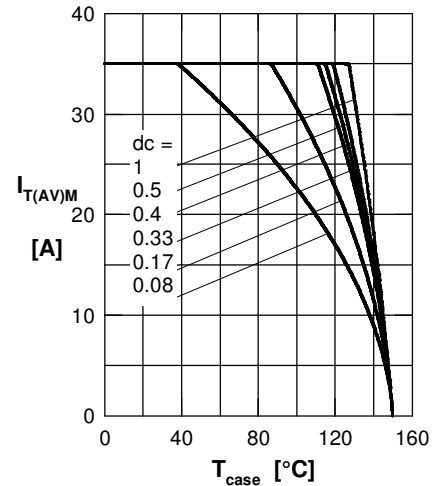

Fig. 5 Gate controlled delay time t_{gd}

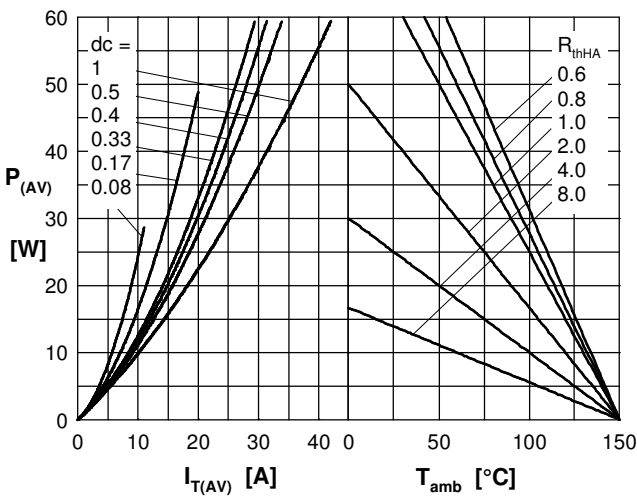Fig. 6 Max. forward current at
case temperature

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

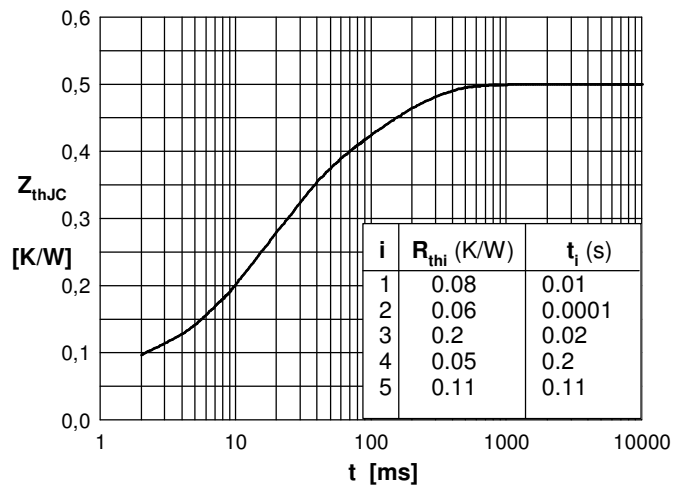| i	R_{thi} (K/W)	t_i (s)
1	0.08	0.01
2	0.06	0.0001
3	0.2	0.02
4	0.05	0.2
5	0.11	0.11

Fig. 7 Transient thermal impedance junction to case

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