



advanced

# High Efficiency Thyristor

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

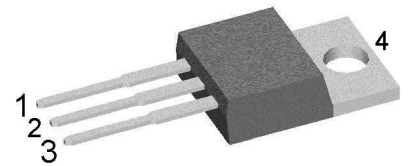
$$I_{TAV} = 20\text{ A}$$

$$V_T = 1.4\text{ V}$$

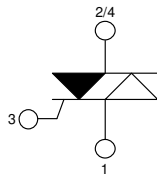
Triode  
Single Reverse Conducting Thyristor

Part number

**CLA20EF1200PB**



Backside: anode



**Features / Advantages:**

- Thyristor for fast turn-on switching
- Integrated free wheeling diode
- Planar passivated chip
- Long-term stability

**Applications:**

- Ignition for HD lamps
- Capacity discharge

**Package: TO-220**

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

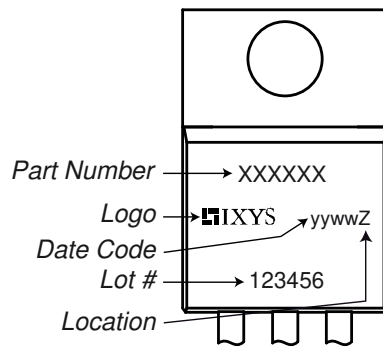
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Thyristor			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$V_{DSM}$	max. non-repetitive forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1300	V
$V_{DRM}$	max. repetitive forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V
$I_D$	drain current	$V_D = 1200 V$	$T_{VJ} = 25^{\circ}C$		10	$\mu A$
		$V_D = 1200 V$	$T_{VJ} = 125^{\circ}C$		1	mA
$V_T$	forward voltage drop Note: reverse voltage drop $\sim 1.2 \times VT$	$I_T = 20 A$	$T_{VJ} = 25^{\circ}C$		1.40	V
		$I_T = 40 A$			1.60	V
		$I_T = 20 A$	$T_{VJ} = 125^{\circ}C$		1.40	V
		$I_T = 40 A$			1.60	V
$I_{TAV}$	average forward current	$T_C = 115^{\circ}C$ DC	$T_{VJ} = 150^{\circ}C$		20	A
$V_{T0}$	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}C$		0.90	V
$r_T$	slope resistance				25	m $\Omega$
$R_{thJC}$	thermal resistance junction to case				0.65	K/W
$R_{thCH}$	thermal resistance case to heatsink			0.5		K/W
$P_{tot}$	total power dissipation		$T_C = 25^{\circ}C$		190	W
$I_{TSM}$	max. forward surge current	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		120	A
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		130	A
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$		100	A
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		110	A
$I^2t$	value for fusing	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		72	A <sup>2</sup> s
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		70	A <sup>2</sup> s
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$		50	A <sup>2</sup> s
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		50	A <sup>2</sup> s
$C_J$	junction capacitance	$V_R = 400 V \quad f = 1 \text{ MHz}$	$T_{VJ} = 25^{\circ}C$		6	pF
$P_{GM}$	max. gate power dissipation	$t_p = 30 \mu s$	$T_C = 150^{\circ}C$		10	W
		$t_p = 300 \mu s$			5	W
$P_{GAV}$	average gate power dissipation				0.5	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 150^{\circ}C; f = 50 \text{ Hz}$	repetitive, $I_T = 60 A$		500	A/ $\mu s$
		$t_p = 1 \mu s; di_G/dt = 0.5 \text{ A}/\mu s; I_{TSA} = 600 A$	non-repet., $I_T = 20 A$		1500	A/ $\mu s$
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^{\circ}C$		500	V/ $\mu s$
		$R_{GK} = \infty$ ; method 1 (linear voltage rise)				
$V_{GT}$	gate trigger voltage	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$		1.3	V
			$T_{VJ} = -40^{\circ}C$		1.6	V
$I_{GT}$	gate trigger current	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$		20	mA
			$T_{VJ} = -40^{\circ}C$		35	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				1	mA
$I_L$	latching current	$t_p = 10 \mu s$	$T_{VJ} = 25^{\circ}C$		30	mA
		$I_G = 0.07 A; di_G/dt = 0.5 \text{ A}/\mu s$				
$I_H$	holding current	$V_D = 6 V \quad R_{GK} = \infty$	$T_{VJ} = 25^{\circ}C$		25	mA
$t_{gd}$	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}C$		2	$\mu s$
		$I_G = 0.07 A; di_G/dt = 0.5 \text{ A}/\mu s$				
$t_q$	turn-off time	$V_R = 0 V; I_T = 20 A; V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}C$		150	$\mu s$
		$di/dt = 10 \text{ A}/\mu s \quad dv/dt = 20 \text{ V}/\mu s \quad t_p = 200 \mu s$				

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

**Product Marking**

**Part description**

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

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CLA20EF1200PB	CLA20EF1200PB	Tube	50	516273

Similar Part	Package	Voltage class
CLA20EF1200PZ	TO-263AB (D2Pak) (2HV)	1200

**Equivalent Circuits for Simulation**

\* on die level

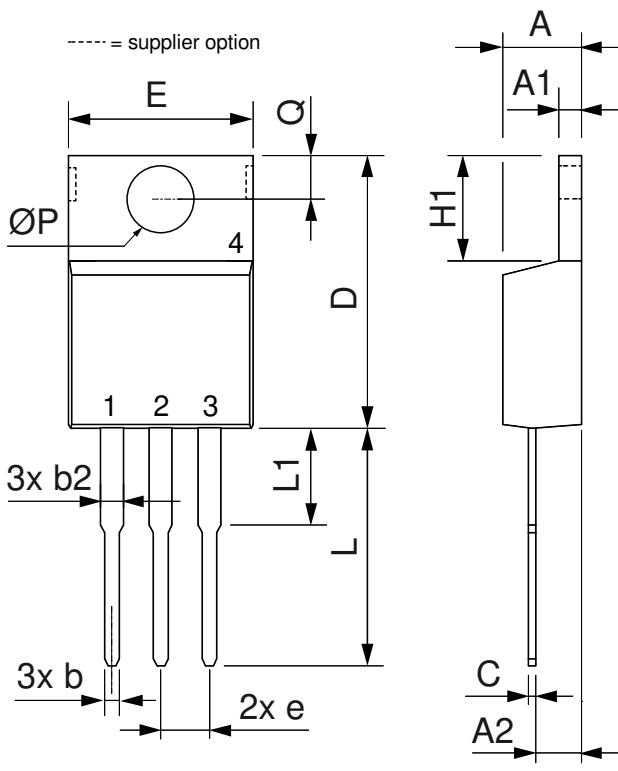
 $T_{VJ} = 150^{\circ}\text{C}$ 

**Thyristor**

$V_{0\ max}$	threshold voltage	0.9	V
$R_{0\ max}$	slope resistance *	22	mΩ



**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
ØP	3.54	4.08	0.139	0.161
Q	2.54	3.18	0.100	0.125

