



advanced

High Efficiency Thyristor

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

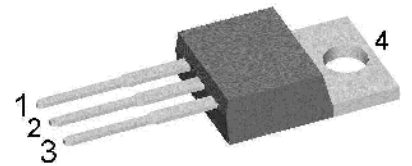
$$I_{TAV} = 20\text{ A}$$

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

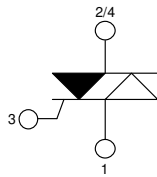
Triode
Single Reverse Conducting Thyristor

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

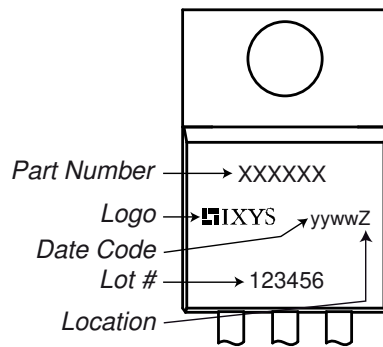
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Thyristor				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
V_{DSM}	max. non-repetitive forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1300	V	
V_{DRM}	max. repetitive forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V	
I_D	drain current	$V_D = 1200 V$	$T_{VJ} = 25^{\circ}C$		10	μA	
		$V_D = 1200 V$	$T_{VJ} = 125^{\circ}C$		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 slope resistance } for power loss calculation only		$T_{VJ} = 150^{\circ}C$		0.90	V	
r_T				25	m Ω		
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 ² s	
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		70	A ² s	
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$		50	A ² s	
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		50	A ² 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/ μs	
		$t_p = 1 \mu s; di_G/dt = 0.5 \text{ A}/\mu s; I_{TSA} = 600 A$ $I_G = 0.07 A; V = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 20 A$			1500	A/ μs	
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$ $R_{GK} = \infty$; method 1 (linear voltage rise)	$T_{VJ} = 150^{\circ}C$		500	V/ μs	
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	$V_D = \frac{1}{2} V_{DRM}$ $I_G = 0.07 A; di_G/dt = 0.5 \text{ A}/\mu s$	$T_{VJ} = 25^{\circ}C$		2	μs	
t_q	turn-off time	$V_R = 0 V; I_T = 20 A; V = \frac{2}{3} V_{DRM}$ $di/dt = 10 \text{ A}/\mu s \quad dv/dt = 20 \text{ V}/\mu s \quad t_p = 200 \mu s$	$T_{VJ} = 125^{\circ}C$		150	μs	

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 description

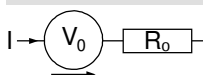
C = Thyristor (SCR)
 L = High Efficiency Thyristor
 A = (up to 1200V)
 20 = Current Rating [A]
 EF = Single Reverse Conducting Thyristor
 1200 = Reverse Voltage [V]
 PB = TO-220AB (3)

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

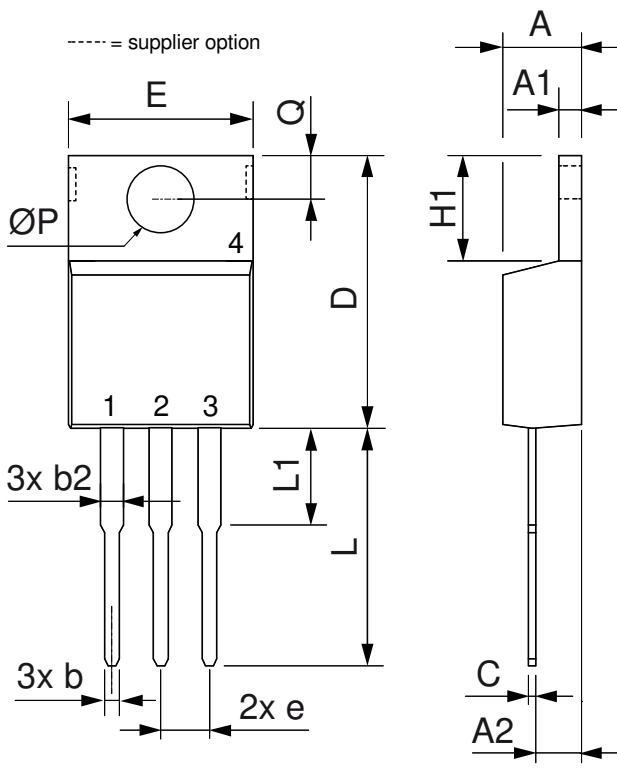
* on die level

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

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

