

# High Efficiency Thyristor

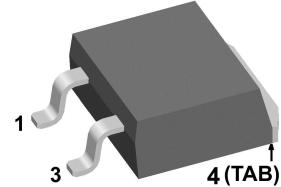
$V_{RRM}$  = 1200 V  
 $I_{TAV}$  = 15 A  
 $V_T$  = 1.35 V

Three Quadrants operation: QI - QIII  
1~ Triac

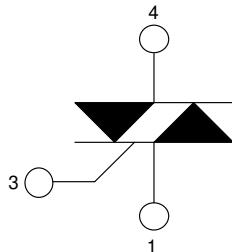
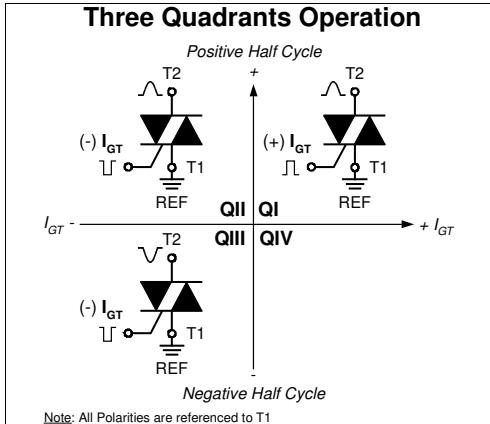
## Part number

**CLA30MT1200NPZ**

Marking on Product: *CLA30MT1200NPZ*



Backside: anode/cathode



## Features / Advantages:

- Triac for line frequency
- Three Quadrants Operation - QI - QIII
- Planar passivated chip
- Long-term stability of blocking currents and voltages

## Applications:

- Line rectifying 50/60 Hz
- Softstart AC motor control
- DC Motor control
- Power converter
- AC power control
- Lighting and temperature control

## Package: TO-263 (D2Pak-HV)

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- High creepage distance between terminals

## Disclaimer Notice

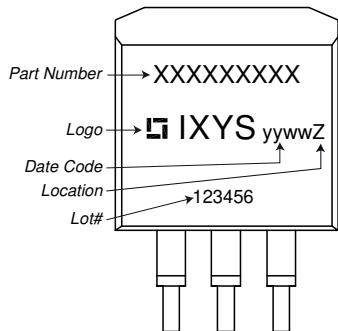
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**Rectifier**

Symbol	Definition	Conditions	Ratings			
			min.	typ.	max.	
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^\circ\text{C}$			1300	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^\circ\text{C}$			1200	V
$I_{R/D}$	reverse current, drain current	$V_{R/D} = 1200 \text{ V}$ $V_{R/D} = 1200 \text{ V}$	$T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$		10 1.5	$\mu\text{A}$ mA
$V_T$	forward voltage drop	$I_T = 15 \text{ A}$	$T_{VJ} = 25^\circ\text{C}$		1.35	V
		$I_T = 30 \text{ A}$			1.68	V
		$I_T = 15 \text{ A}$ $I_T = 30 \text{ A}$	$T_{VJ} = 125^\circ\text{C}$		1.35 1.79	V
$I_{TAV}$	average forward current	$T_C = 120^\circ\text{C}$	$T_{VJ} = 150^\circ\text{C}$		15	A
$I_{RMS}$	RMS forward current per phase	180° sine			33	A
$V_{T0}$	threshold voltage	$\left. \begin{array}{l} \text{slope resistance} \\ \end{array} \right\} \text{for power loss calculation only}$	$T_{VJ} = 150^\circ\text{C}$		0.89	V
$r_T$	slope resistance				30	$\text{m}\Omega$
$R_{thJC}$	thermal resistance junction to case				0.95	K/W
$R_{thCH}$	thermal resistance case to heatsink			0.3		K/W
$P_{tot}$	total power dissipation		$T_C = 25^\circ\text{C}$		130	W
$I_{TSM}$	max. forward surge current	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{sine}$	$T_{VJ} = 45^\circ\text{C}$		170	A
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{sine}$	$V_R = 0 \text{ V}$		185	A
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{sine}$	$T_{VJ} = 150^\circ\text{C}$		145	A
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{sine}$	$V_R = 0 \text{ V}$		155	A
$I^2t$	value for fusing	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{sine}$	$T_{VJ} = 45^\circ\text{C}$		145	$\text{A}^2\text{s}$
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{sine}$	$V_R = 0 \text{ V}$		140	$\text{A}^2\text{s}$
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{sine}$	$T_{VJ} = 150^\circ\text{C}$		105	$\text{A}^2\text{s}$
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{sine}$	$V_R = 0 \text{ V}$		100	$\text{A}^2\text{s}$
$C_J$	junction capacitance	$V_R = 400 \text{ V}$ $f = 1 \text{ MHz}$	$T_{VJ} = 25^\circ\text{C}$	9		pF
$P_{GM}$	max. gate power dissipation	$t_p = 30 \mu\text{s}$	$T_C = 150^\circ\text{C}$		5	W
		$t_p = 300 \mu\text{s}$			1	W
$P_{GAV}$	average gate power dissipation				0.2	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 150^\circ\text{C}; f = 50 \text{ Hz}$ repetitive, $I_T = 45 \text{ A}$			150	$\text{A}/\mu\text{s}$
		$t_p = 200 \mu\text{s}; di_G/dt = 0.3 \text{ A}/\mu\text{s};$				
		$I_G = 0.3 \text{ A}; V = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 15 \text{ A}$			500	$\text{A}/\mu\text{s}$
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^\circ\text{C}$		500	$\text{V}/\mu\text{s}$
		$R_{GK} = \infty$ ; method 1 (linear voltage rise)				
$V_{GT}$	gate trigger voltage	$V_D = 6 \text{ V}$	$T_{VJ} = 25^\circ\text{C}$		1.3	V
			$T_{VJ} = -40^\circ\text{C}$		1.6	V
$I_{GT}$	gate trigger current	$V_D = 6 \text{ V}$	$T_{VJ} = 25^\circ\text{C}$		$\pm 40$	mA
			$T_{VJ} = -40^\circ\text{C}$		$\pm 60$	mA
$V_{GD}$	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^\circ\text{C}$		0.2	V
$I_{GD}$	gate non-trigger current				$\pm 1$	mA
$I_L$	latching current	$t_p = 10 \mu\text{s}$	$T_{VJ} = 25^\circ\text{C}$		70	mA
		$I_G = 0.3 \text{ A}; di_G/dt = 0.3 \text{ A}/\mu\text{s}$				
$I_H$	holding current	$V_D = 6 \text{ V}$ $R_{GK} = \infty$	$T_{VJ} = 25^\circ\text{C}$		50	mA
$t_{gd}$	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^\circ\text{C}$		2	$\mu\text{s}$
		$I_G = 0.3 \text{ A}; di_G/dt = 0.3 \text{ A}/\mu\text{s}$				
$t_q$	turn-off time	$V_R = 100 \text{ V}; I_T = 15 \text{ A}; V = \frac{2}{3} V_{DRM}$ $T_{VJ} = 125^\circ\text{C}$	$di/dt = 10 \text{ A}/\mu\text{s}$ $dv/dt = 20 \text{ V}/\mu\text{s}$ $t_p = 200 \mu\text{s}$	150		$\mu\text{s}$

**Package TO-263 (D2Pak-HV)**

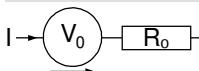
Symbol	Definition	Conditions	Ratings			
			min.	typ.	max.	
$I_{RMS}$	RMS current	per terminal			35	A
$T_{VJ}$	virtual junction temperature		-40		150	°C
$T_{op}$	operation temperature		-40		125	°C
$T_{stg}$	storage temperature		-40		150	°C
<b>Weight</b>				1.5		g
$F_c$	mounting force with clip		20		60	N
$d_{Spp/App}$	creepage distance on surface / striking distance through air	terminal to terminal	4.2			mm
$d_{Spb/Apb}$		terminal to backside	4.7			mm

**Product Marking**

**Part description**

C = Thyristor (SCR)  
 L = High Efficiency Thyristor  
 A = (up to 1200V)  
 30 = Current Rating [A]  
 MT = 1~ Triac  
 1200 = Reverse Voltage [V]  
 N = Three Quadrants operation: QI - QIII  
 PZ = TO-263AB (D2Pak) (2HV)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CLA30MT1200NPZ-TRL	CLA30MT1200NPZ	Tape & Reel	800	516960
Alternative	CLA30MT1200NPZ-TUB	CLA30MT1200NPZ	Tube	50	525255

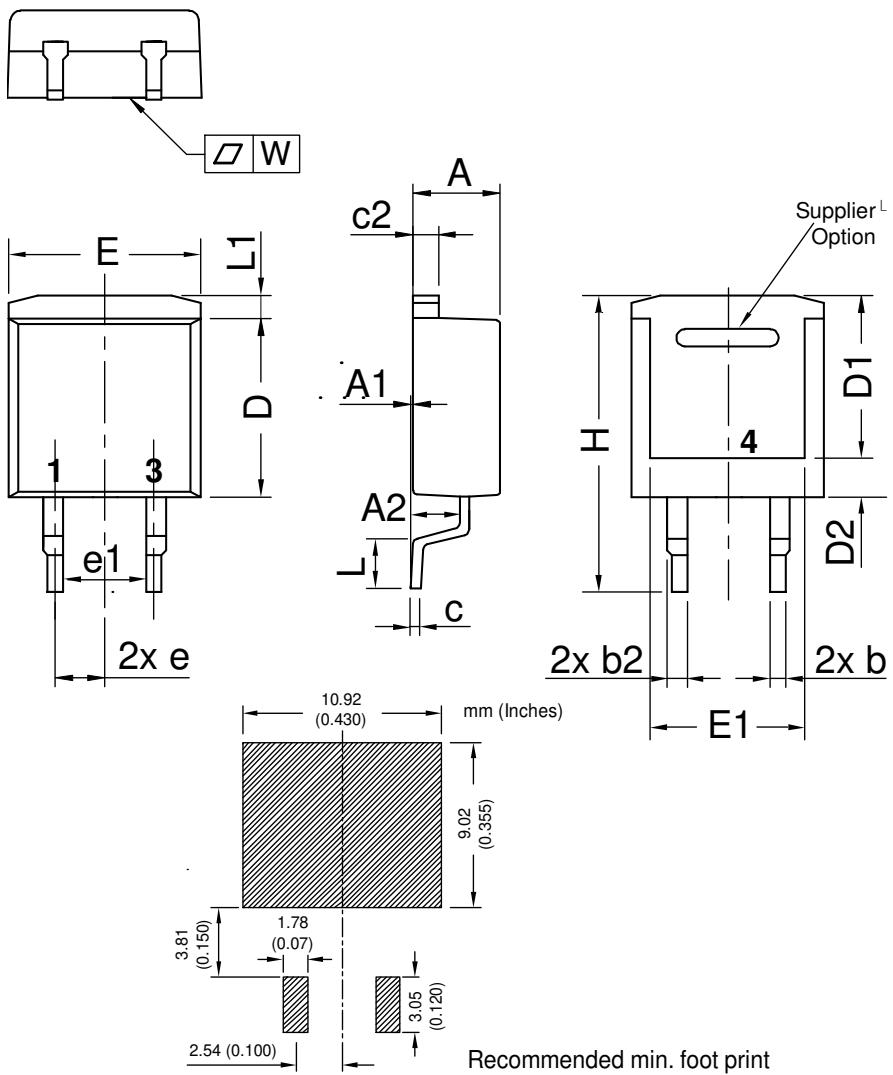
Similar Part	Package	Voltage class
CLA30MT1200NPB	TO-220AB (3)	1200

**Equivalent Circuits for Simulation**
*\* on die level*
 $T_{VJ} = 150^\circ\text{C}$ 

**Thyristor**

$V_{0\ max}$  threshold voltage 0.89  
 $R_{0\ max}$  slope resistance \* 27

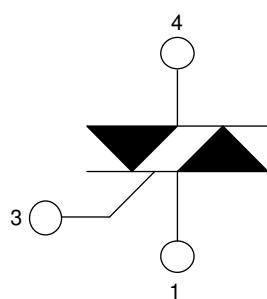
V  
 mΩ

## Outlines TO-263 (D2Pak-HV)



Dim.	Millimeter		Inches	
	min	max	min	max
A	4.06	4.83	0.160	0.190
A1	typ. 0.10		typ. 0.004	
A2	2.41		0.095	
b	0.51	0.99	0.020	0.039
b2	1.14	1.40	0.045	0.055
c	0.40	0.74	0.016	0.029
c2	1.14	1.40	0.045	0.055
D	8.38	9.40	0.330	0.370
D1	8.00	8.89	0.315	0.350
D2	2.3		0.091	
E	9.65	10.41	0.380	0.410
E1	6.22	8.50	0.245	0.335
e	2,54 BSC		0,100 BSC	
e1	4.28		0.169	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	1.02	1.68	0.040	0.066
W	typ. 0.02	0.040	typ. 0.0008	0.002

*All dimensions conform with  
and/or within JEDEC standard.*



## Thyristor

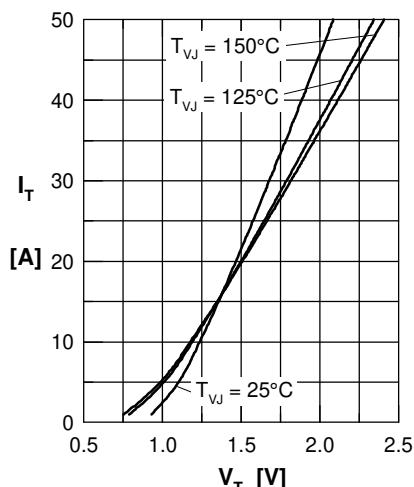


Fig. 1 Forward characteristics

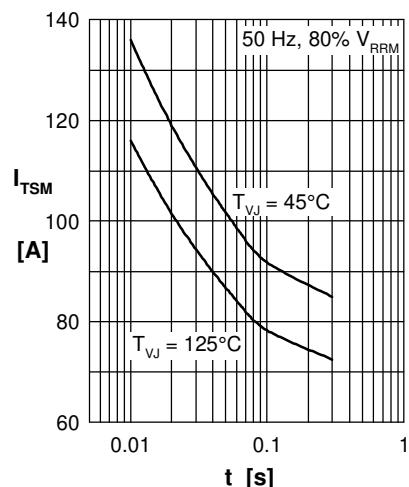


Fig. 2 Surge overload current

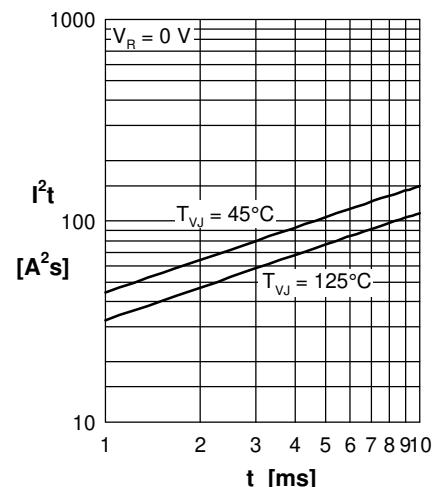


Fig. 3  $I^2t$  versus time (1-10 ms)

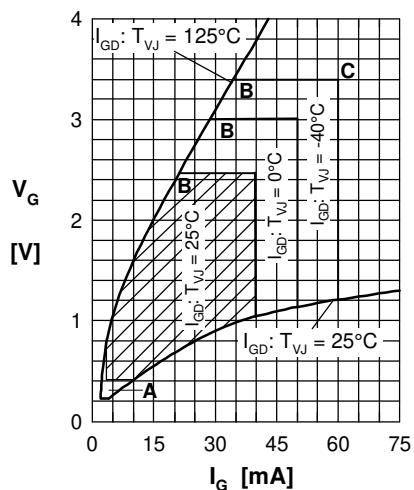


Fig. 4 Gate trigger characteristics

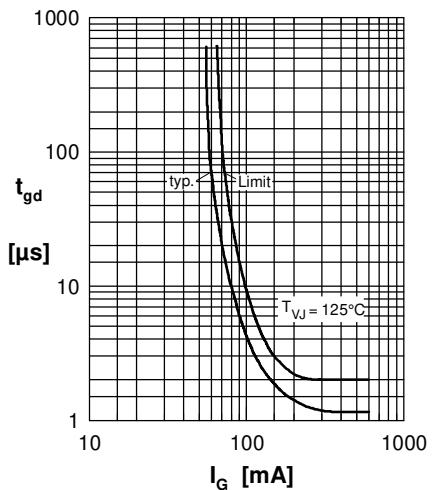


Fig. 5 Gate controlled delay time

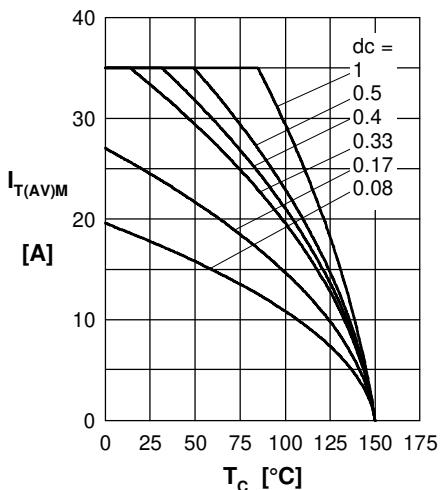


Fig. 6 Max. forward current at case temperature

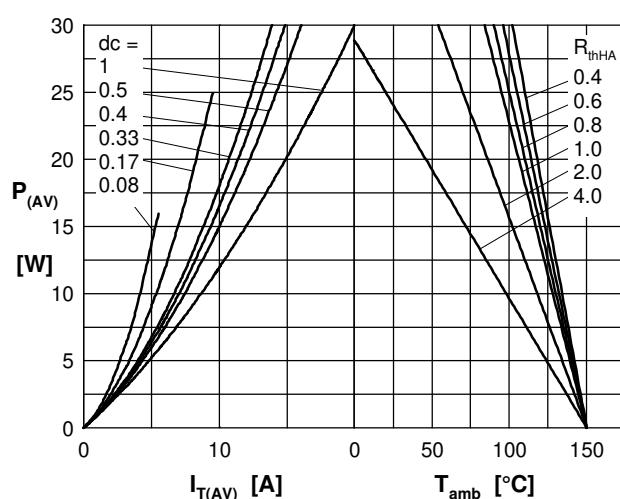


Fig. 7a Power dissipation versus direct output current  
Fig. 7b and ambient temperature

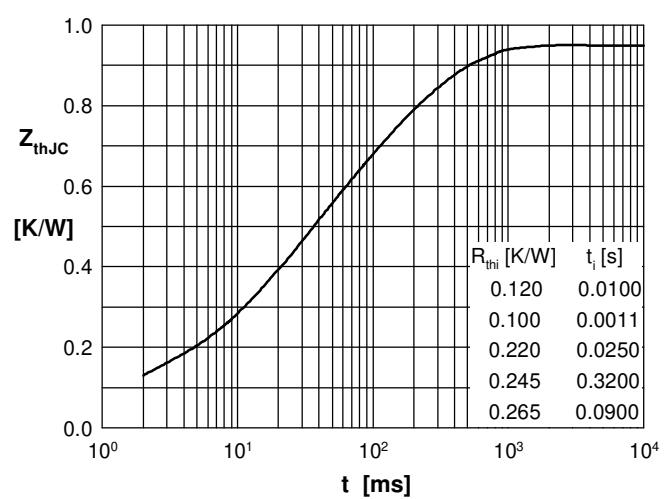


Fig. 8 Transient thermal impedance

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