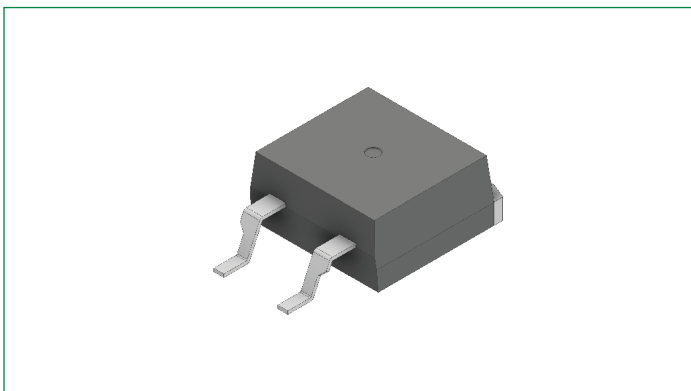


# CLA30MT1200NPZ

1200 V, 15 A High Efficiency Thyristor

Three Quadrants Operation: QI–QIII, 1 ~ TRIAC

RoHS



## Features:

- 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
- Soft start AC motor control
- Lighting and temperature control
- DC motor control
- Power converter
- AC power control

## Package:

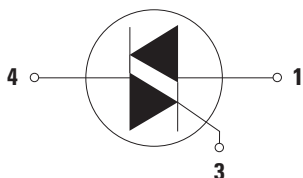
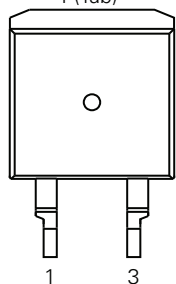
- Epoxy meets UL 94V-0
- Industry standard outline
- High creepage distance between terminals
- RoHS compliant

## Product Summary

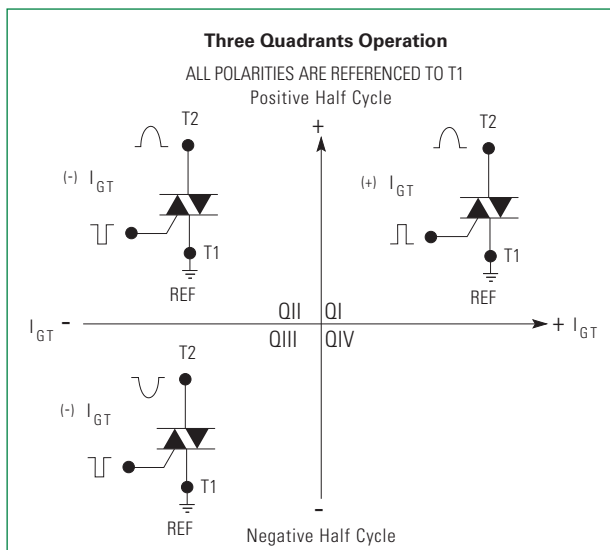
Characteristic	Value	Unit
$V_{RRM}$	1200	V
$I_{TAV}$	15	A
$V_T$	1.35	V

## Pinout Diagram TO-263 (D<sup>2</sup>PAK-HV)

Backside: anode/cathode  
4 (Tab)



1: T1; 3: Gate; 4: T2



## Maximum Ratings

Symbol	Characteristics	Conditions	Value	Units	
$I_{T(RMS)}$	RMS Forward Current per Phase	180° Sine; $T_C = 120\text{ °C}$ ; $T_{vj} = 150\text{ °C}$	33	A	
$I_{TAV}$	Average Forward Current		15		
$I_{R/D}$	Reverse Current, Drain Current	$T_{vj} = 25\text{ °C}$ ; $V_{R/D} = 1200\text{ V}$	10	$\mu\text{A}$	
		$T_{vj} = 125\text{ °C}$ ; $V_{R/D} = 1200\text{ V}$	1.5	mA	
$I_{TSM}$	Maximum Forward Surge Current	$T_{vj} = 45\text{ °C}$	t = 10 ms, 50 Hz sine, $V_R = 0\text{ V}$	170	A
			t = 8.3 ms, 60 Hz sine, $V_R = 0\text{ V}$	185	
		$T_{vj} = 150\text{ °C}$	t = 10 ms, 50 Hz sine, $V_R = 0\text{ V}$	145	
			t = 8.3 ms, 60 Hz sine, $V_R = 0\text{ V}$	155	
$I^2t$	$I^2t$ Value for Fusing	$T_{vj} = 45\text{ °C}$	t = 10 ms, 50 Hz sine, $V_R = 0\text{ V}$	145	$\text{A}^2\text{s}$
			t = 8.3 ms, 60 Hz sine, $V_R = 0\text{ V}$	140	
		$T_{vj} = 150\text{ °C}$	t = 10 ms, 50 Hz sine, $V_R = 0\text{ V}$	105	
			t = 8.3 ms, 60 Hz sine, $V_R = 0\text{ V}$	100	
$V_{RSM}/V_{DSM}$	Maximum Non-repetitive Reverse/Forward Blocking Voltage	$T_{vj} = 25\text{ °C}$	1300	V	
$V_{RRM}/V_{DRM}$	Maximum Repetitive Reverse/Forward Blocking Voltage	$T_{vj} = 25\text{ °C}$	1200	V	
$di/dt_{cr}$	Critical Rate of Rise of On-state Current	$t_p = 200\text{ }\mu\text{s}$ ; $f = 50\text{ Hz}$ ; $di_G/dt = 0.3\text{ A}/\mu\text{s}$ ; $I_G = 0.3\text{ A}$ ; $T_{vj} = 150\text{ °C}$ ; $V = 2/3 V_{DRM}$	Repetitive, $I_T = 45\text{ A}$	150	$\text{A}/\mu\text{s}$
			Non-repetitive, $I_T = 15\text{ A}$	500	
$dv/dt_{cr}$	Critical Rate of Rise of Voltage	$V = 2/3 V_{DRM}$ , $R_{GK} = \infty$ , method 1 (linear voltage rise), $T_{vj} = 150\text{ °C}$	500	$\text{V}/\mu\text{s}$	
$P_{GM}$	Maximum Gate Power Dissipation	$T_C = 150\text{ °C}$	$t_p = 30\text{ }\mu\text{s}$	5	W
			$t_p = 300\text{ }\mu\text{s}$	1	
$P_{GAV}$	Average Gate Power Dissipation	$T_C = 150\text{ °C}$	0.2	W	
$P_{tot}$	Total Power Dissipation	$T_C = 25\text{ °C}$	130	W	
$T_{stg}$	Storage Temperature Range	–	–40 to 150	$^{\circ}\text{C}$	
$T_{op}$	Operating Temperature Range	–	–40 to 125	$^{\circ}\text{C}$	
$T_{vj}$	Virtual Junction Temperature Range	–	–40 to 150	$^{\circ}\text{C}$	

## Thermal Characteristics

Symbol	Characteristics	Value			Units
		Min.	Typ.	Max.	
$R_{thJC}$	Thermal Resistance, Junction to Case	–	–	0.95	$\text{K}/\text{W}$
$R_{thCH}$	Thermal Resistance, Case to Heatsink	–	0.3	–	$\text{K}/\text{W}$

**Electrical Characteristics**

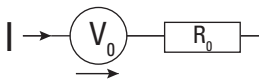
Symbol	Characteristics	Conditions	Value			Units		
			Min.	Typ.	Max.			
I <sub>GT</sub>	Gate Trigger Current	T <sub>vj</sub> = 25 °C	V <sub>D</sub> = 6 V	-	-	±48	mA	
		T <sub>vj</sub> = -40 °C		-	-	±60		
V <sub>GT</sub>	Gate Trigger Voltage	T <sub>vj</sub> = 25 °C	V <sub>D</sub> = 6 V	-	-	1.5	V	
		T <sub>vj</sub> = -40 °C		-	-	1.6		
I <sub>GD</sub>	Gate Non-trigger Current	V <sub>D</sub> = 2/3 V <sub>DRM</sub> ; T <sub>vj</sub> = 150 °C			-	-	±1	mA
V <sub>GD</sub>	Gate Non-trigger Voltage	V <sub>D</sub> = 2/3 V <sub>DRM</sub> ; T <sub>vj</sub> = 150 °C			-	-	0.2	V
V <sub>T</sub>	Forward Voltage Drop	T <sub>vj</sub> = 25 °C		I <sub>T</sub> = 15 A	-	-	1.35	V
				I <sub>T</sub> = 30 A	-	-	1.68	
		T <sub>vj</sub> = 125 °C		I <sub>T</sub> = 15 A	-	-	1.35	
				I <sub>T</sub> = 30 A	-	-	1.79	
I <sub>L</sub>	Latching Current	t <sub>p</sub> = 10 μs; I <sub>G</sub> = 0.3 A; di <sub>G</sub> /dt = 0.3 A/μs; T <sub>vj</sub> = 25 °C			-	-	70	mA
I <sub>H</sub>	Holding Current	V <sub>D</sub> = 6 V; R <sub>GK</sub> = ∞; T <sub>vj</sub> = 25 °C			-	-	50	mA
V <sub>T0</sub>	Threshold Voltage <sup>1</sup>	T <sub>vj</sub> = 150 °C			-	-	0.89	V
r <sub>T</sub>	Slope Resistance <sup>1</sup>	T <sub>vj</sub> = 150 °C			-	-	30	mΩ
C <sub>J</sub>	Junction Capacitance	V <sub>R</sub> = 400 V, f = 1 MHz, T <sub>vj</sub> = 25 °C			-	9	-	pF
t <sub>gd</sub>	Gate Controlled Delay Time	V <sub>D</sub> = 1/2 V <sub>DRM</sub> ; I <sub>G</sub> = 0.3 A; di <sub>G</sub> /dt = 0.3 A/μs; T <sub>vj</sub> = 25 °C			-	-	2	μs
t <sub>q</sub>	Turn-off Time	V <sub>R</sub> = 100 V; I <sub>T</sub> = 15 A; V = 2/3 V <sub>DRM</sub> ; di/dt = 10 A/μs; dv/dt = 20 V/μs; t <sub>p</sub> = 200 μs; T <sub>vj</sub> = 125 °C			-	150	-	μs

Note 1: For power loss calculation only

**Package**

Symbol	Characteristics	Conditions	Value			Units
			Min.	Typ.	Max.	
I <sub>RMS</sub>	RMS Current	per terminal	-	-	35	A
F <sub>C</sub>	Mounting force with clip	-	20	-	60	N
G	Weight	-	-	1.5	-	g
d <sub>Spp/App</sub>	creepage distance on surface / striking distance through air	terminal to terminal	4.2	-	-	mm
d <sub>Spb/Abp</sub>		terminal to backside	4.7	-	-	

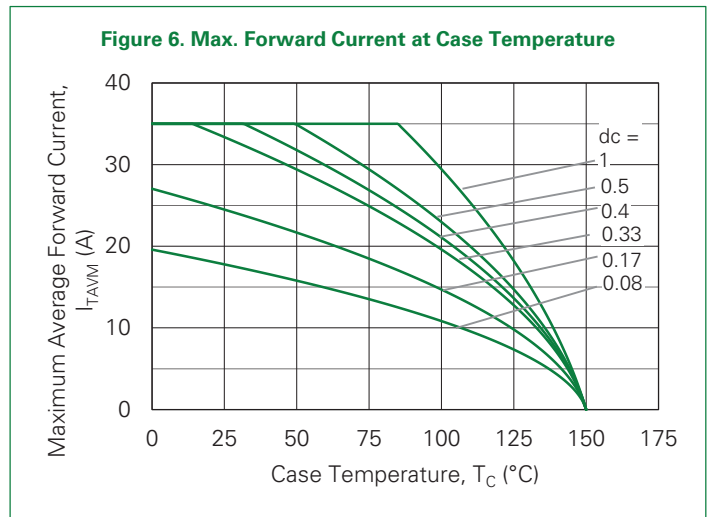
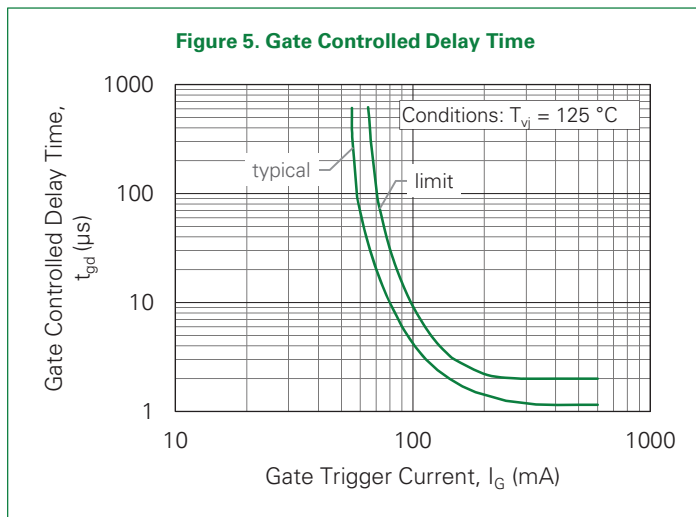
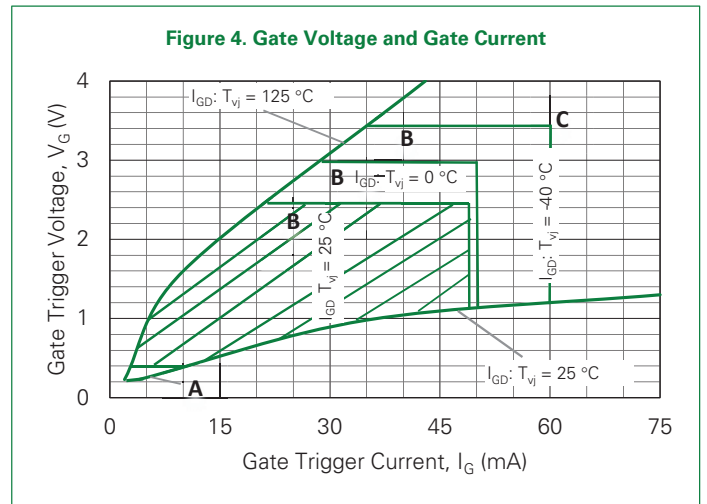
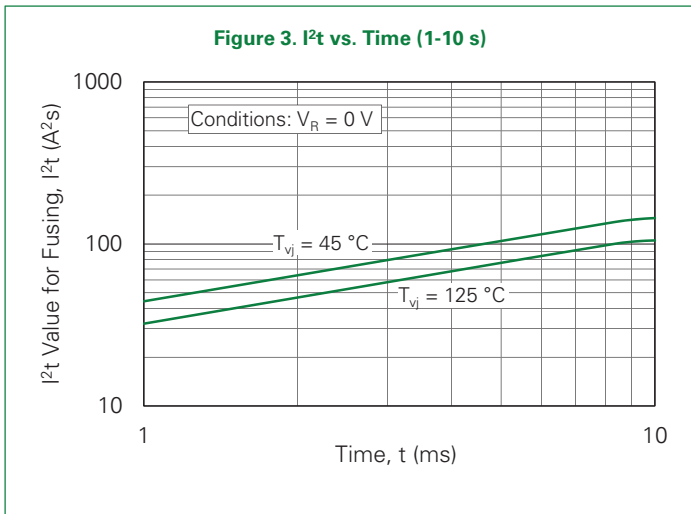
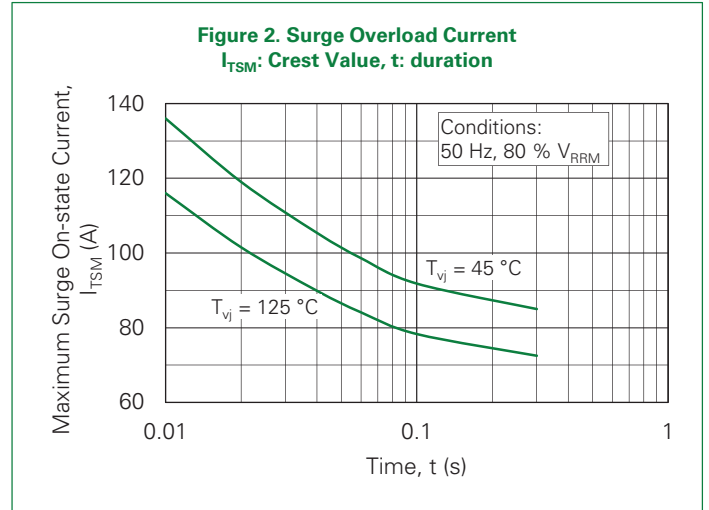
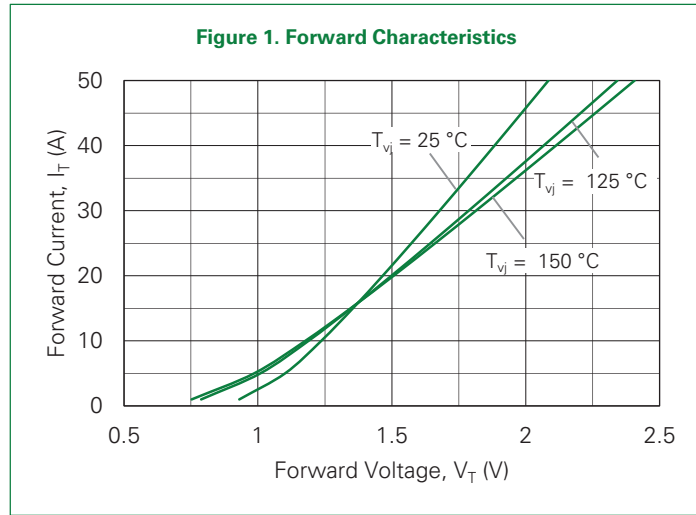
**Equivalent Circuits for Simulation** (T<sub>vj</sub> = 150 °C)



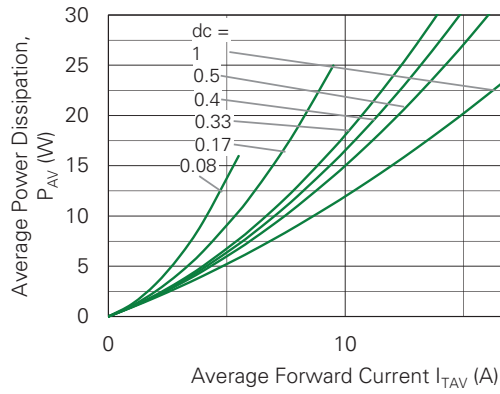
Symbol	Characteristics	Value	Units
V <sub>0 max</sub>	Threshold Voltage	0.89	V
R <sub>0 max</sub>	Slope Resistance <sup>1</sup>	27	mΩ

Note 1: On die level

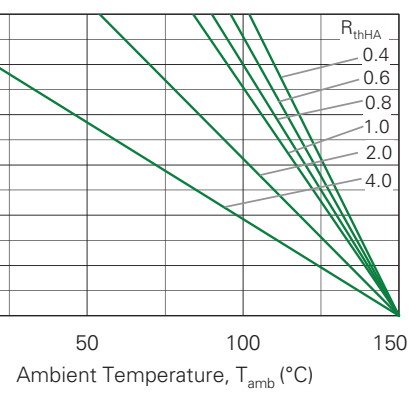
**Characteristic Curves**



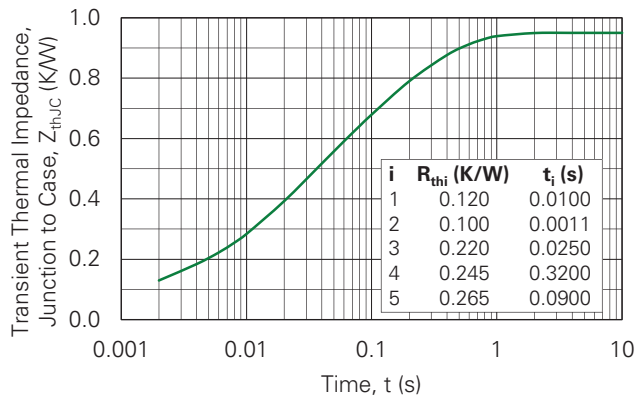
**Figure 7a. Power Dissipation vs. Direct Output Current**



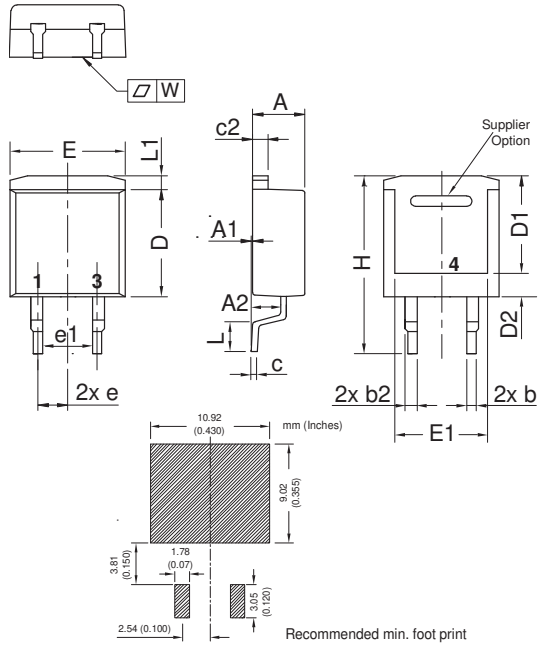
**Figure 7b. Power Dissipation vs. Ambient Temperature**



**Figure 8. Transient Thermal Impedance, Junction to Case**



**Part Outline Drawing** (TO-263-2L) (D<sup>2</sup>PAK-HV)



Symbol	Millimeters		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

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

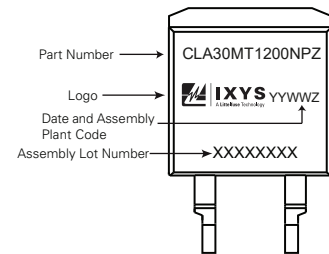
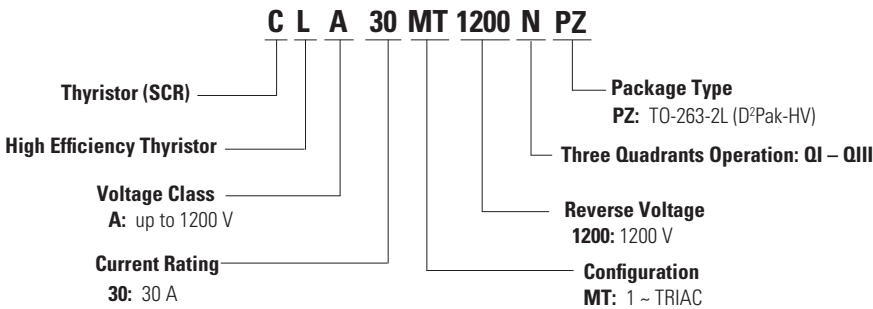
**Product Selector**

Part Number	Voltage Class	Package
CLA30MT1200NPZ	1200 V	TO-263-2L (D <sup>2</sup> PAK-HV)
CLA30MT1200NPB	1200 V	TO-220AB-3L

**Packing Options**

Part Number	Marking	Packing Mode	Quantity
CLA30MT1200NPZ-TRL	CLA30MT1200NPZ	Tape & Reel	800
CLA30MT1200NPZ-TUB	CLA30MT1200NPZ	Tube	50

**Part Numbering and Marking**



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Part of:

