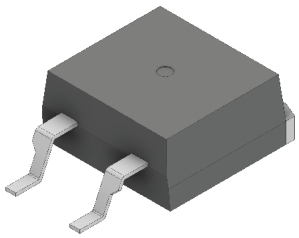
CLA30MT1200NPZ

1200 V, 15 A High Efficiency Thyristor

Three Quandrants 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

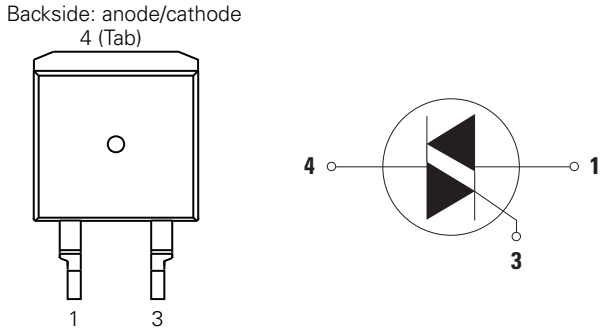
Applications:

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

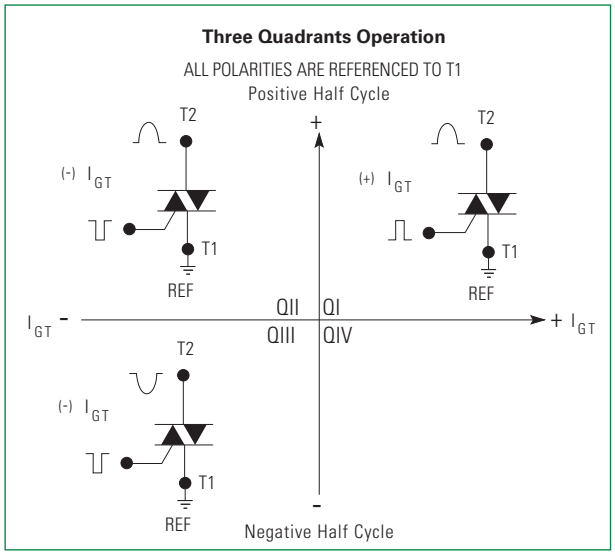
Package:

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

Pinout Diagram TO-263 (D^2PAK-HV)



1: T1; **3:** Gate; **4:** T2



Product Summary

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

Revised: TK.06/03/24

Maximum Ratings

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

Thermal Characteristics

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

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Electrical Characteristics

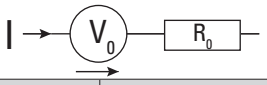
Symbol	Characteristics	Conditions		Value			Units
				Min.	Typ.	Max.	
I_{GT}	Gate Trigger Current	T_{vj} = 25 °C	V_D = 6 V	–	–	±48	mA
		T_{vj} = –40 °C		–	–	±60	
V_{GT}	Gate Trigger Voltage	T_{vj} = 25 °C	V_D = 6 V	–	–	1.5	V
		T_{vj} = –40 °C		–	–	1.6	
I_{GD}	Gate Non-trigger Current	V_D = 2/3 V_{DRM}, T_{vj} = 150 °C		–	–	±1	mA
V_{GD}	Gate Non-trigger Voltage	V_D = 2/3 V_{DRM}, T_{vj} = 150 °C		–	–	0.2	V
V_T	Forward Voltage Drop	T_{vj} = 25 °C	I_T = 15 A	–	–	1.35	V
			I_T = 30 A	–	–	1.68	
		T_{vj} = 125 °C	I_T = 15 A	–	–	1.35	
			I_T = 30 A	–	–	1.79	
I_L	Latching Current	t_p = 10 µs; I_G = 0.3 A; di_G/dt = 0.3 A/µs; T_{vj} = 25 °C		–	–	70	mA
I_H	Holding Current	V_D = 6 V; R_{GK} = ∞; T_{vj} = 25 °C		–	–	50	mA
V_{T0}	Threshold Voltage [1]	T_{vj} = 150 °C		–	–	0.89	V
r_T	Slope Resistance [1]	T_{vj} = 150 °C		–	–	30	mΩ
C_J	Junction Capacitance	V_R = 400 V, f = 1 MHz, T_{vj} = 25 °C		–	9	–	pF
t_{gd}	Gate Controlled Delay Time	V_D = 1/2 V_{DRM}; I_G = 0.3 A ; di_G/dt = 0.3 A/µs; T_{vj} = 25 °C		–	–	2	µs
t_q	Turn-off Time	V_R = 100 V; I_T = 15 A; V = 2/3 V_{DRM} ; di/dt = 10 A/µs; dv/dt = 20 V/µs; t_p = 200 µs; T_{vj} = 125 °C		–	150	–	µs

Note 1: For power loss calculation only

Package

Symbol	Characteristics	Conditions	Value			Units
			Min.	Typ.	Max.	
I_{RMS}	RMS Current	per terminal	–	–	35	A
F_C	Mounting force with clip	–	20	–	60	N
G	Weight	–	–	1.5	–	g
$d_{Spp/App}$	creepage distance on surface / striking distance through air	terminal to terminal	4.2	–	–	mm
$d_{Spb/Apb}$		terminal to backside	4.7	–	–	

Equivalent Circuits for Simulation (T_{vj} = 150 °C)



Symbol	Characteristics	Value	Units
$V_{0\ max}$	Threshold Voltage	0.89	V
$R_{0\ max}$	Slope Resistance[1]	27	mΩ

Note 1: On die level

Characteristic Curves

Figure 1. Forward Characteristics

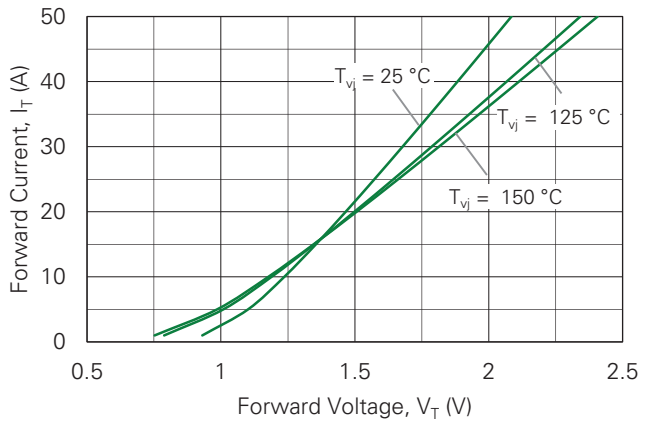


Figure 2. Surge Overload Current
I_{TSM}: Crest Value, t: duration

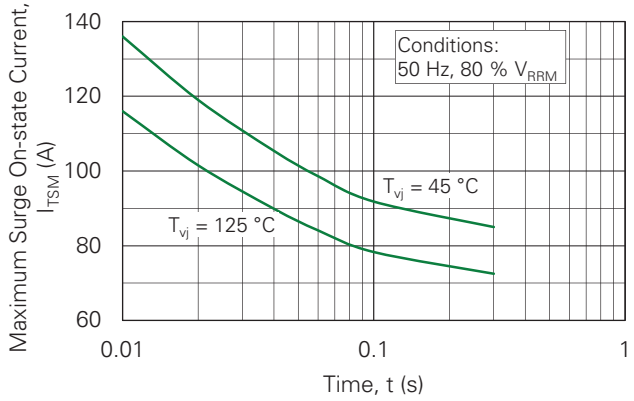


Figure 3. I^2t vs. Time (1-10 s)

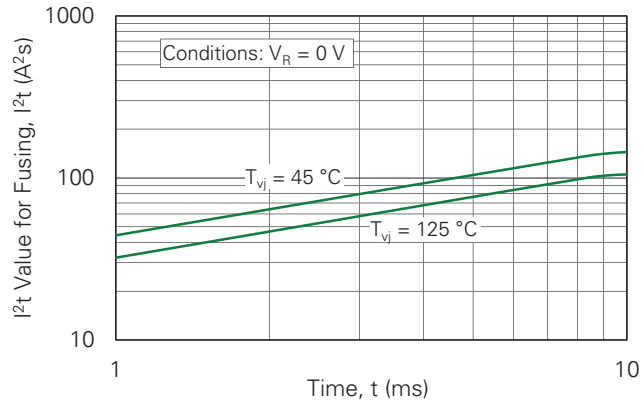


Figure 4. Gate Voltage and Gate Current

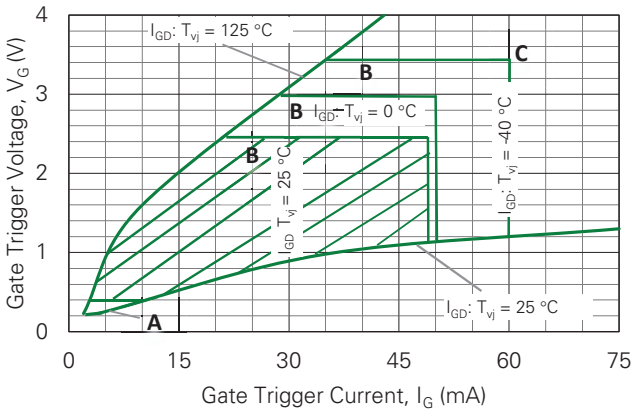


Figure 5. Gate Controlled Delay Time

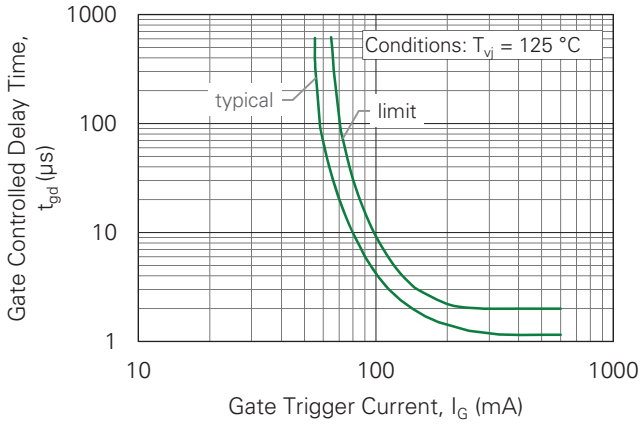


Figure 6. Max. Forward Current at Case Temperature

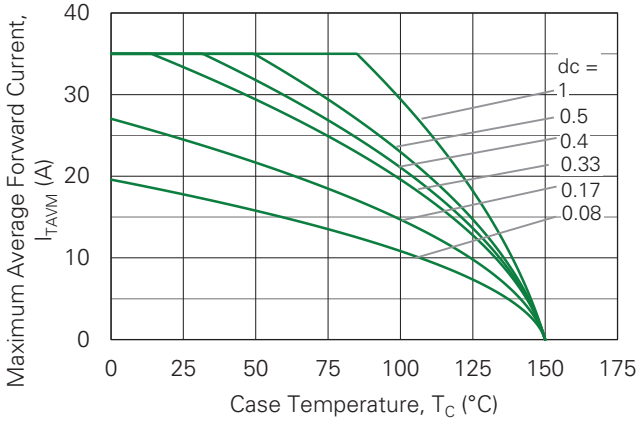


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Figure 7a. Power Dissipation vs. Direct Output Current

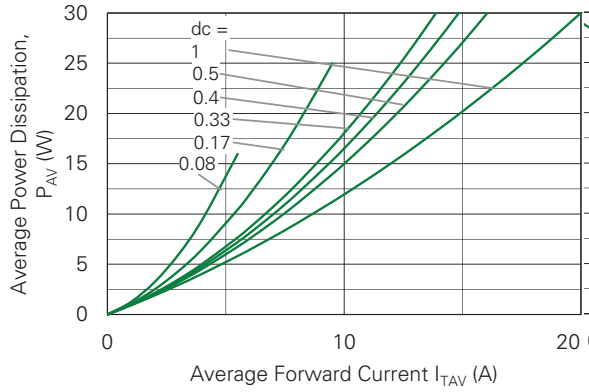


Figure 7b. Power Dissipation vs. Ambient Temperature

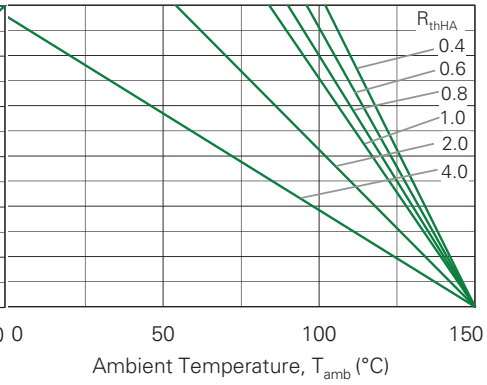
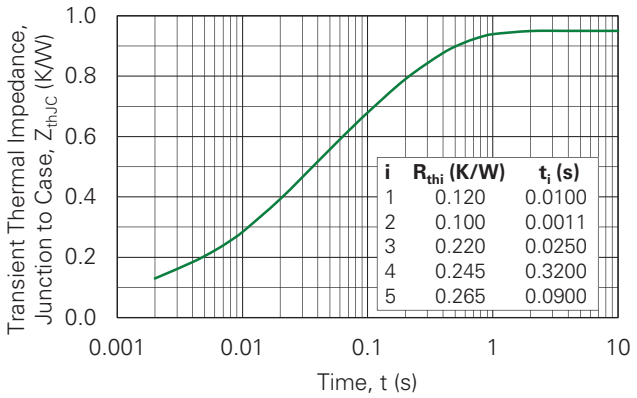
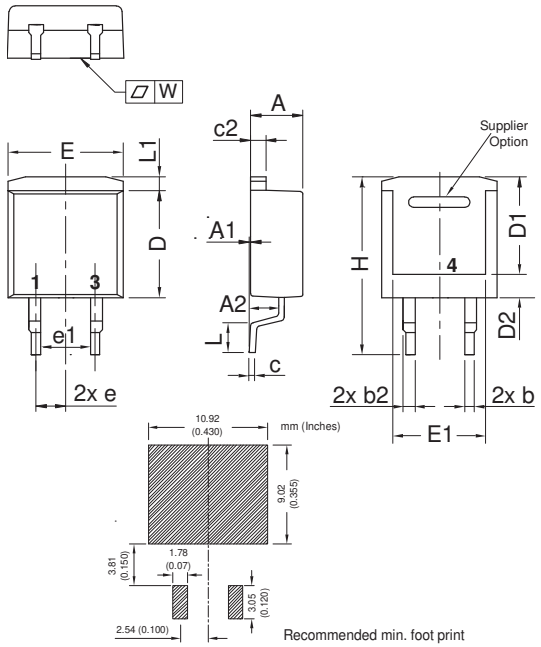


Figure 8. Transient Thermal Impedance, Junction to Case



i	R_{thi} (K/W)	t_i (s)
1	0.120	0.0100
2	0.100	0.0011
3	0.220	0.0250
4	0.245	0.3200
5	0.265	0.0900

Part Outline Drawing (TO-263-2L) (D²PAK-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 (D²PAK-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

C L A 30 MT 1200 N PZ

- **Thyristor (SCR)**
- **High Efficiency Thyristor**
- **Voltage Class**
  A: up to 1200 V
- **Current Rating**
  30: 30 A
- **Configuration**
  MT: 1 ~ TRIAC
- **Reverse Voltage**
  1200: 1200 V
- **Three Quadrants Operation: QI – QIII**
- **Package Type**
  PZ: TO-263-2L (D²Pak-HV)