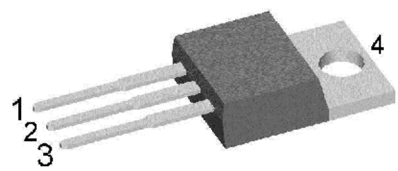
High Efficiency Thyristor

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

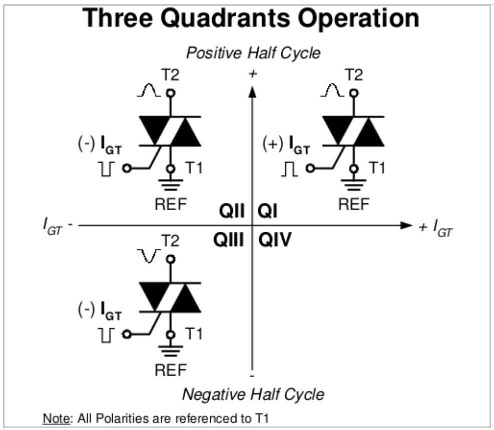
Three Quadrants operation: QI - QIII
1~ Triac

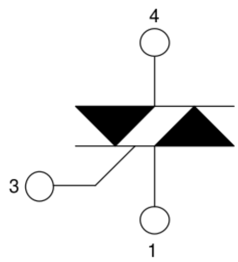
Part number

CLA30MT1200NPB



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-220

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

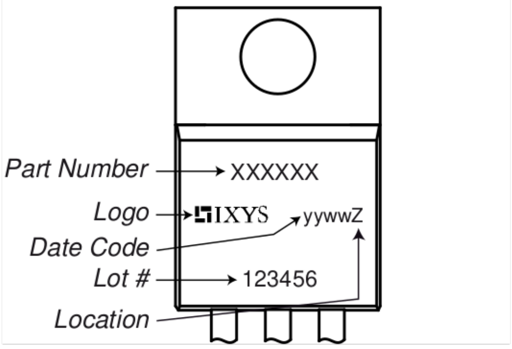
Disclaimer Notice

Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.

Rectifier				Ratings			
Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	*max. non-repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1300	V
$V_{RRM/DRM}$	*max. repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1200	V
$I_{R/D}$	*reverse current, drain current*	$V_{R/D}$ = 1200 V	T_{VJ} = 25°C			10	µA
		$V_{R/D}$ = 1200 V	T_{VJ} = 125°C			1.5	mA
V_T	*forward voltage drop*	I_T = 15 A	T_{VJ} = 25°C			1.35	V
		I_T = 30 A				1.68	V
		I_T = 15 A	T_{VJ} = 125°C			1.35	V
		I_T = 30 A				1.79	V
I_{TAV}	*average forward current*	T_C = 120°C	T_{VJ} = 150°C			15	A
I_{RMS}	*RMS forward current per phase*	180° sine				33	A
V_{T0}	*threshold voltage*	*for power loss calculation only*	T_{VJ} = 150°C			0.89	V
r_T	*slope resistance*					30	mΩ
R_{thJC}	*thermal resistance junction to case*					0.95	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.5		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			130	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			170	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			185	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			145	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			155	A
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			145	A²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			140	A²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			105	A²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			100	A²s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		9		pF
P_{GM}	*max. gate power dissipation*	t_P = 30 µs	T_C = 150°C			5	W
		t_P = 300 µs				1	W
P_{GAV}	*average gate power dissipation*					0.2	W
$(di/dt)_{cr}$	*critical rate of rise of current*	T_{VJ} = 150 °C; f = 50 Hz	repetitive, I_T = 45 A			150	A/µs
		t_P = 200 µs; di_G/dt = 0.3 A/µs;					
		I_G = 0.3 A; V = ⅔ V_{DRM}	non-repet., I_T = 15 A			500	A/µs
$(dv/dt)_{cr}$	*critical rate of rise of voltage*	V = ⅔ V_{DRM}	T_{VJ} = 150°C			500	V/µs
		R_{GK} = ∞; method 1 (linear voltage rise)					
V_{GT}	*gate trigger voltage*	V_D = 6 V	T_{VJ} = 25°C			1.3	V
			T_{VJ} = -40°C			1.6	V
I_{GT}	*gate trigger current*	V_D = 6 V	T_{VJ} = 25°C			± 40	mA
			T_{VJ} = -40°C			± 60	mA
V_{GD}	*gate non-trigger voltage*	V_D = ⅔ V_{DRM}	T_{VJ} = 150°C			0.2	V
I_{GD}	*gate non-trigger current*					± 1	mA
I_L	*latching current*	t_p = 10 µs	T_{VJ} = 25°C			70	mA
		I_G = 0.3 A; di_G/dt = 0.3 A/µs					
I_H	*holding current*	V_D = 6 V R_{GK} = ∞	T_{VJ} = 25°C			50	mA
t_{gd}	*gate controlled delay time*	V_D = ½ V_{DRM}	T_{VJ} = 25°C			2	µs
		I_G = 0.3 A; di_G/dt = 0.3 A/µs					
t_q	*turn-off time*	V_R = 100 V; I_T = 15A; V = ⅔ V_{DRM}	T_{VJ} = 125 °C		150		µs
		di/dt = 10 A/µs dv/dt = 20 V/µs t_p = 200 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

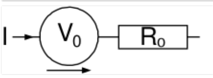
C = Thyristor (SCR)
L = High Efficiency Thyristor
A = (up to 1200V)
30 = Current Rating [A]
MT = 1~ Triac
1200 = Reverse Voltage [V]
N = Three Quadrants operation: QI - QIII
PB = TO-220AB (3)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CLA30MT1200NPB	CLA30MT1200NPB	Tube	50	517031

Similar Part	Package	Voltage class
CLA30MT1200NPZ	TO-263AB (D2Pak) (2HV)	1200

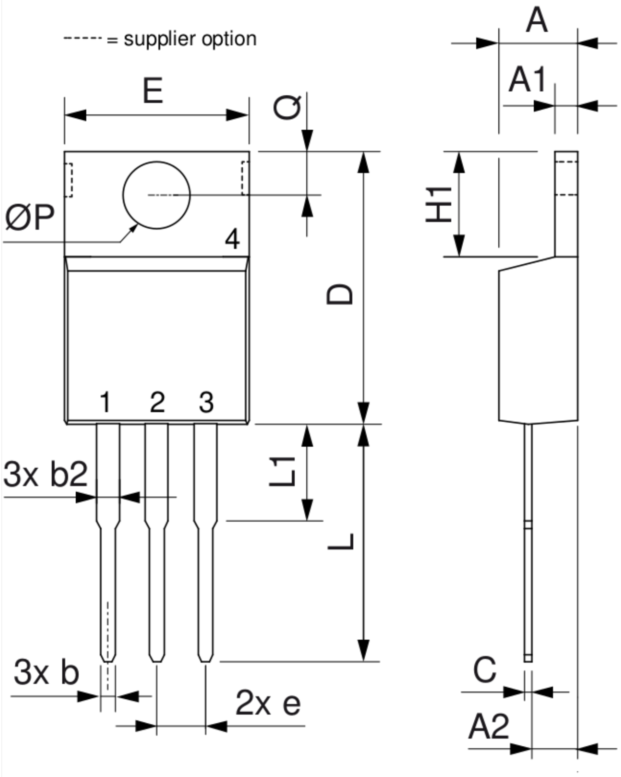
Equivalent Circuits for Simulation

* on die level $T_{VJ} = 150°C$

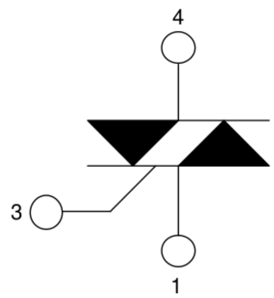


		Thyristor	
$V_{0\,max}$	*threshold voltage*	0.89	V
$R_{0\,max}$	*slope resistance **	27	mΩ

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



Thyristor

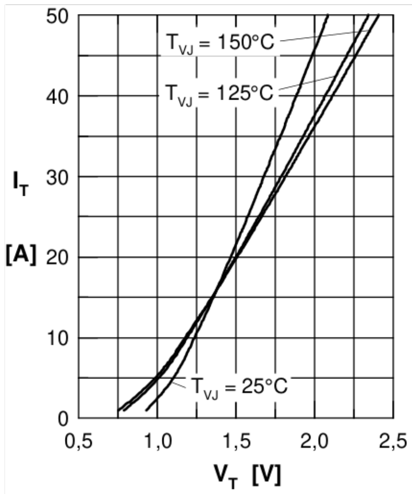


Fig. 1 Forward characteristics

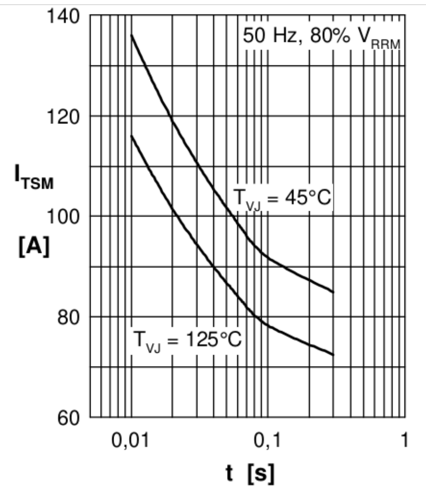


Fig. 2 Surge overload current

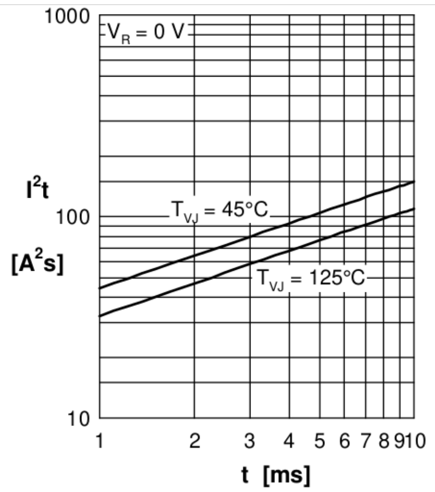


Fig. 3 I^2t versus time (1-10 ms)

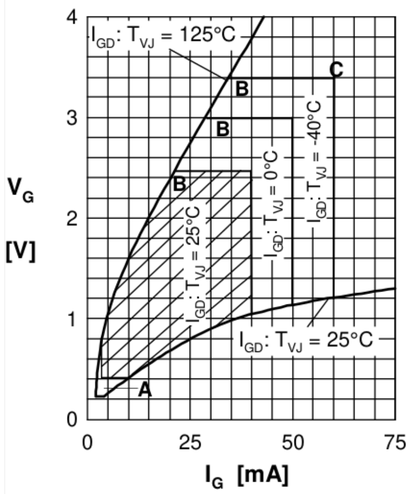


Fig. 4 Gate trigger characteristics

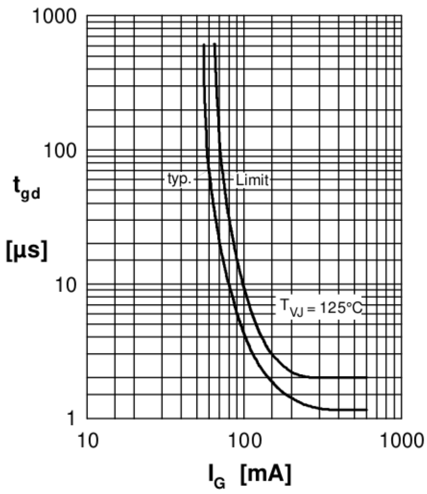


Fig. 5 Gate controlled delay time

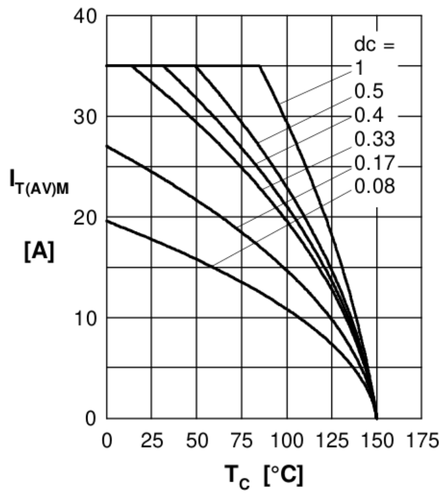


Fig. 6 Max. forward current at case temperature

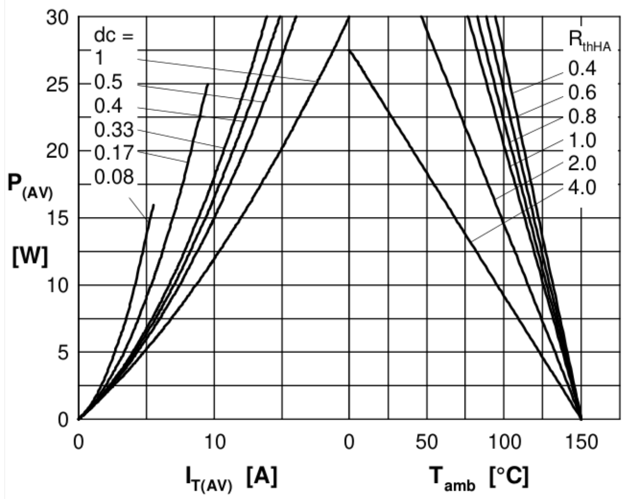
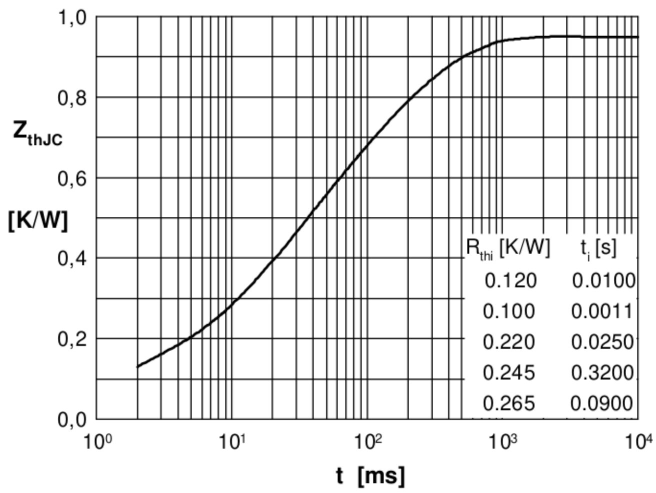


Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature



R_{thi} [K/W]	t_i [s]
0.120	0.0100
0.100	0.0011
0.220	0.0250
0.245	0.3200
0.265	0.0900

Fig. 8 Transient thermal impedance