High Efficiency Thyristor

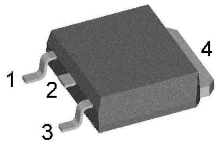
V_{RRM}	=	1200 V
I_{TAV}	=	5 A
V_T	=	1.31 V

Single Thyristor

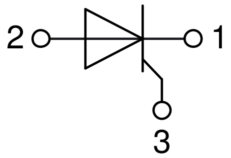
Part number

CLA5E1200UC

Marking on Product: C5TLUE



Backside: anode



Features / Advantages:

- Thyristor for line frequency
- Planar passivated chip
- Long-term stability

Applications:

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

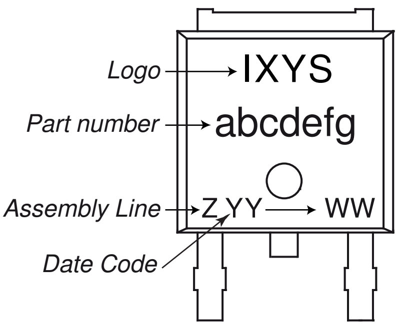
Package: TO-252 (DPak)

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

Thyristor				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	mA
V_T	*forward voltage drop*	I_T = 5 A	T_{VJ} = 25°C			1.33	V
		I_T = 10 A				1.62	V
		I_T = 5 A	T_{VJ} = 125°C			1.31	V
		I_T = 10 A				1.72	V
I_{TAV}	*average forward current*	T_C = 135°C	T_{VJ} = 150°C			5	A
$I_{T(RMS)}$	*RMS forward current*	180° sine				7.8	A
V_{T0}	*threshold voltage*	*for power loss calculation only*	T_{VJ} = 150°C			0.89	V
r_T	*slope resistance*					85	mΩ
R_{thJC}	*thermal resistance junction to case*					1.5	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.50		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			85	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			70	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			76	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			60	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			64	A
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			25	A^2s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			24	A^2s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			18	A^2s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			17	A^2s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		2		pF
P_{GM}	*max. gate power dissipation*	t_P = 30 µs	T_C = 150°C			5	W
		t_P = µs				2.5	W
P_{GAV}	*average gate power dissipation*					0.25	W
$(di/dt)_{cr}$	*critical rate of rise of current*	T_{VJ} = 150°C; f = 50 Hz	repetitive, I_T = 10 A			150	A/µs
		t_P = 200 µs; di_G/dt = 0.1 A/µs;					
		I_G = 0.1 A; V = ⅔ V_{DRM}	non-repet., I_T = 5 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			1.8	V
			T_{VJ} = -40°C			1.9	V
I_{GT}	*gate trigger current*	V_D = 6 V	T_{VJ} = 25°C			30	mA
			T_{VJ} = -40°C			50	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			45	mA
		I_G = 0.1 A; di_G/dt = 0.1 A/µs					
I_H	*holding current*	V_D = 6 V R_{GK} = ∞	T_{VJ} = 25°C			30	mA
t_{gd}	*gate controlled delay time*	V_D = ½ V_{DRM}	T_{VJ} = 25°C			2	µs
		I_G = 0.1 A; di_G/dt = 0.1 A/µs					
t_q	*turn-off time*	V_R = 100 V; I_T = 5 A; 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-252 (DPak)			Ratings			
Symbol	**Definition**	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal			20	A
T_{VJ}	*virtual junction temperature*		-40		150	°C
T_{op}	*operation temperature*		-40		125	°C
T_{stg}	*storage temperature*		-40		150	°C
Weight				0.3		g
F_C	*mounting force with clip*		20		60	N

Product Marking



Part description

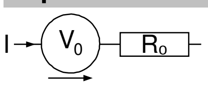
C = Thyristor (SCR)
L = High Efficiency Thyristor
A = (up to 1200V)
5 = Current Rating [A]
E = Single Thyristor
1200 = Reverse Voltage [V]
UC = TO-252AA (DPak)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CLA5E1200UC	C5TLUE	Tape & Reel	2500	509799

Similar Part	Package	Voltage class
CLA5E1200PZ	TO-263AB (D2Pak) (2HV)	1200

Equivalent Circuits for Simulation

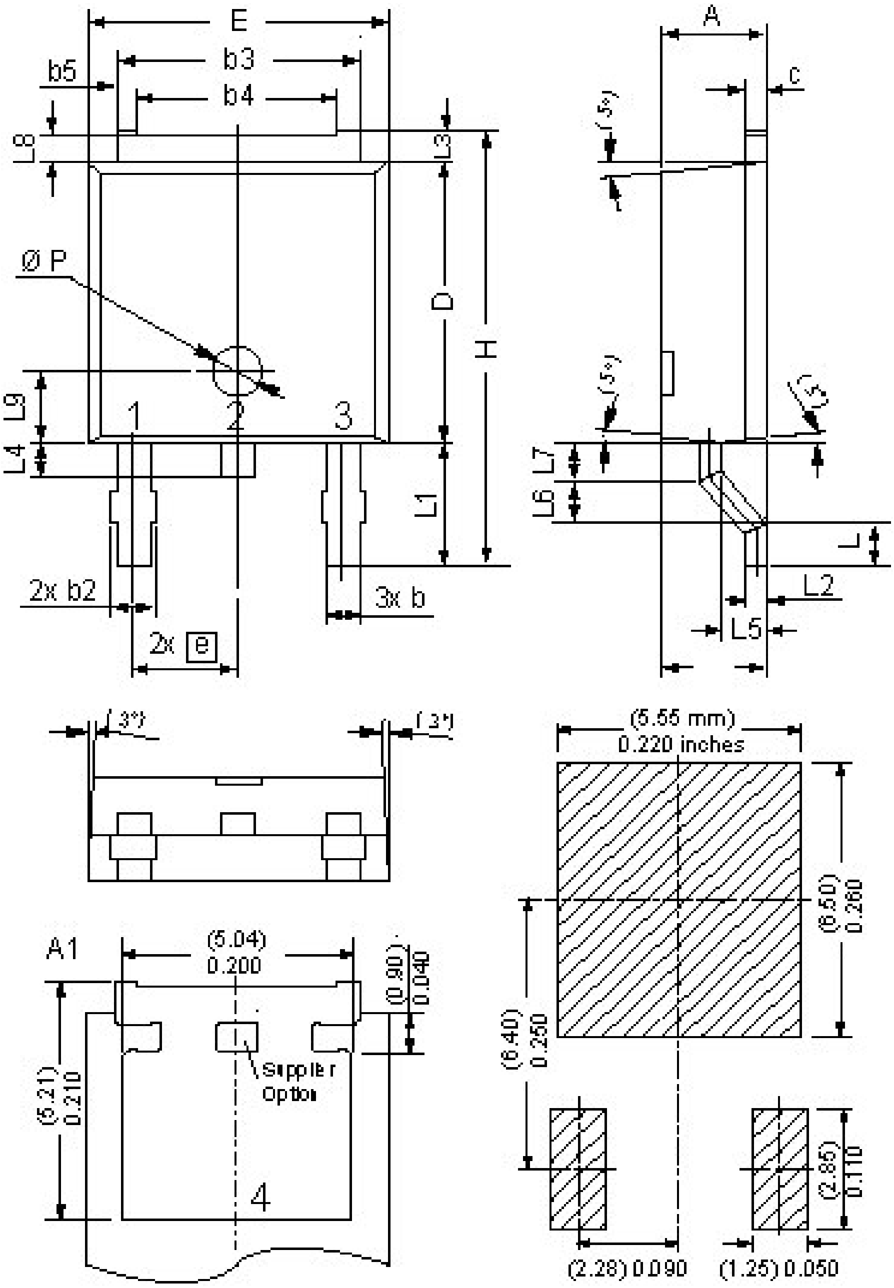
** on die level* $T_{VJ} = 150\,°C$



		Thyristor	
$V_{0\,max}$	*threshold voltage*	0.89	V
$R_{0\,max}$	*slope resistance **	82	mΩ

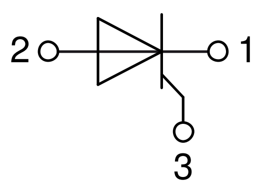
 Data according to IEC 60747and per semiconductor unless otherwise specified 20160803c

Outlines TO-252 (DPak)



Dim.	Millimeters		Inches	
	min	max	min	max
A	2.20	2.40	0.087	0.094
A1	2.10	2.50	0.083	0.098
b	0.66	0.86	0.026	0.034
b2	-	0.96	-	0.038
b3	5.04	5.64	0.198	0.222
b4	4.34 BSC		0.171 BSC	
b5	0.50 BSC		0.020 BSC	
c	0.40	0.86	0.016	0.034
D	5.90	6.30	0.232	0.248
E	6.40	6.80	0.252	0.268
e	2.10	2.50	0.083	0.098
H	9.20	10.10	0.362	0.398
L	0.55	1.28	0.022	0.050
L1	2.50	2.90	0.098	0.114
L2	0.40	0.60	0.016	0.024
L3	0.50	0.90	0.020	0.035
L4	0.60	1.00	0.024	0.039
L5	0.82	1.22	0.032	0.048
L6	0.79	0.99	0.031	0.039
L7	0.81	1.01	0.032	0.040
L8	0.40	0.80	0.016	0.031
L9	1.50 BSC		0.059 BSC	
Ø P	1.00 BSC		0.039 BSC	

Recommended
min. foot print



Thyristor

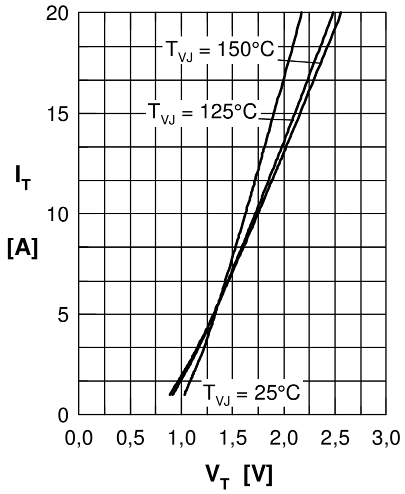


Fig. 1 Forward characteristics

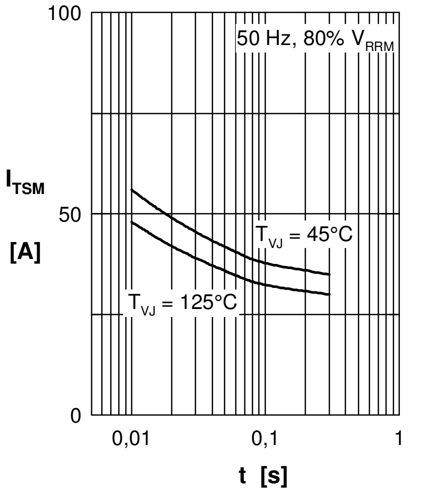


Fig. 2 Surge overload current
I_{TSM}: crest value, t: duration

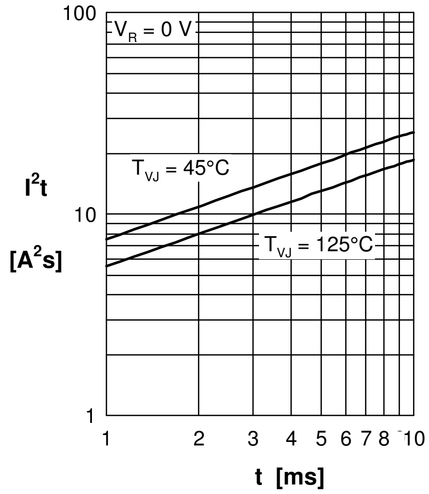


Fig. 3 I^2t versus time (1-10 s)

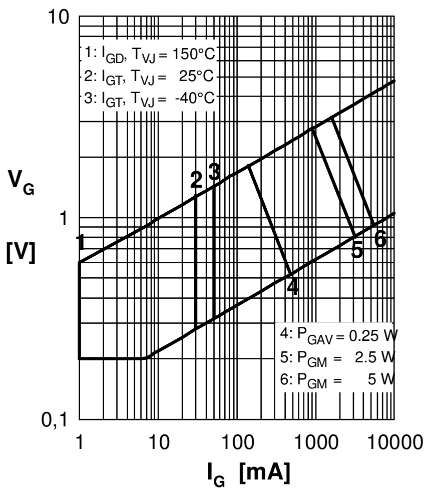


Fig. 4 Gate voltage & gate current

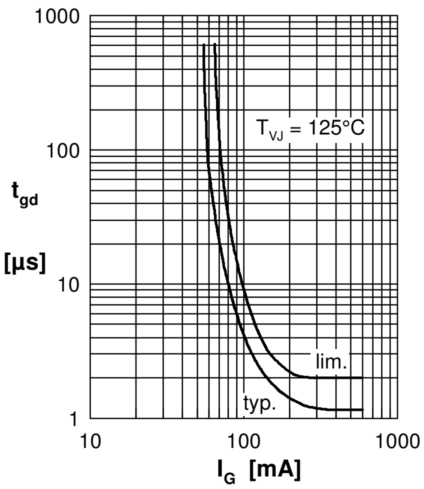


Fig. 5 Gate controlled delay time t_{gd}

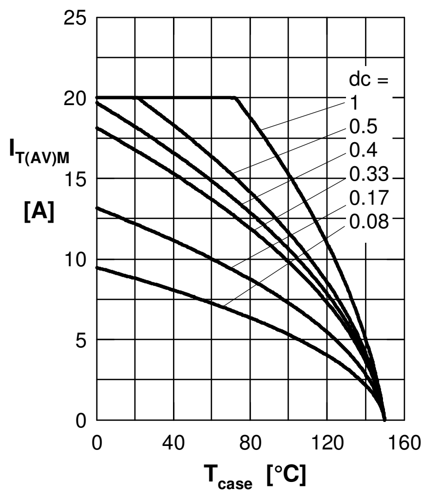


Fig. 6 Max. forward current at case temperature

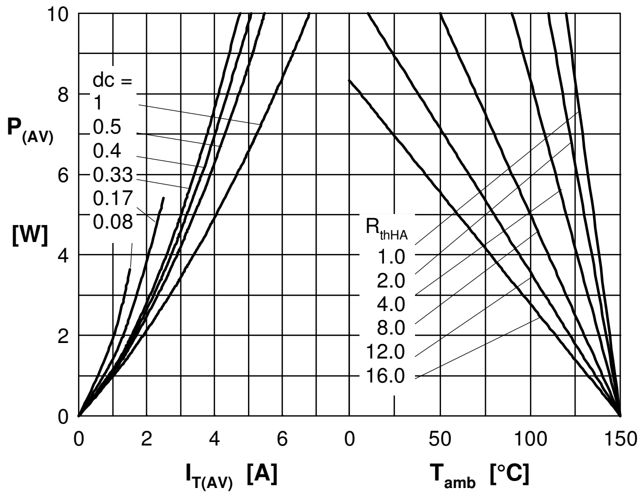
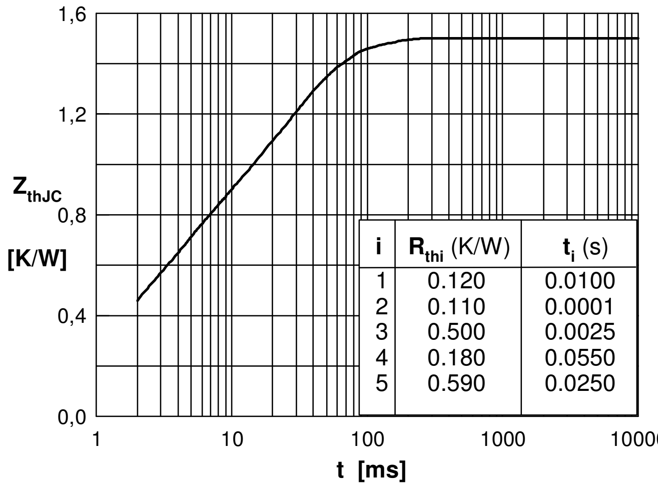


Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature



i	R_{thi} (K/W)	t_i (s)
1	0.120	0.0100
2	0.110	0.0001
3	0.500	0.0025
4	0.180	0.0550
5	0.590	0.0250

Fig. 7 Transient thermal impedance junction to case