High Efficiency Thyristor

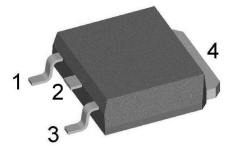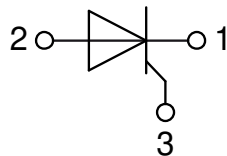|		
V_{RRM}	=	1200 V
I_{TAV}	=	5 A
V_T	=	1.31 V

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

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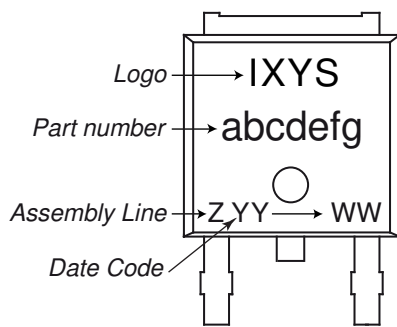
Thyristor

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	A²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			24	A²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			18	A²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			17	A²s
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					

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20190212d

![IXYS - A Littelfuse Technology]

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

Logo → IXYS
Part number → abcdefg
Assembly Line → Z YY → WW
Date Code

Part description

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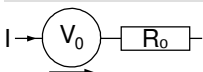E = Single Thyristor
1200 = Reverse Voltage [V]
UC = TO-252AA (DPak)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CLA5E1200UC-TRL	C5TLUE	Tape & Reel	2500	509799
Alternative	CLA5E1200UC-TUB	C5TLUE	Tube	70	523428

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

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Outlines   TO-252 (DPak)
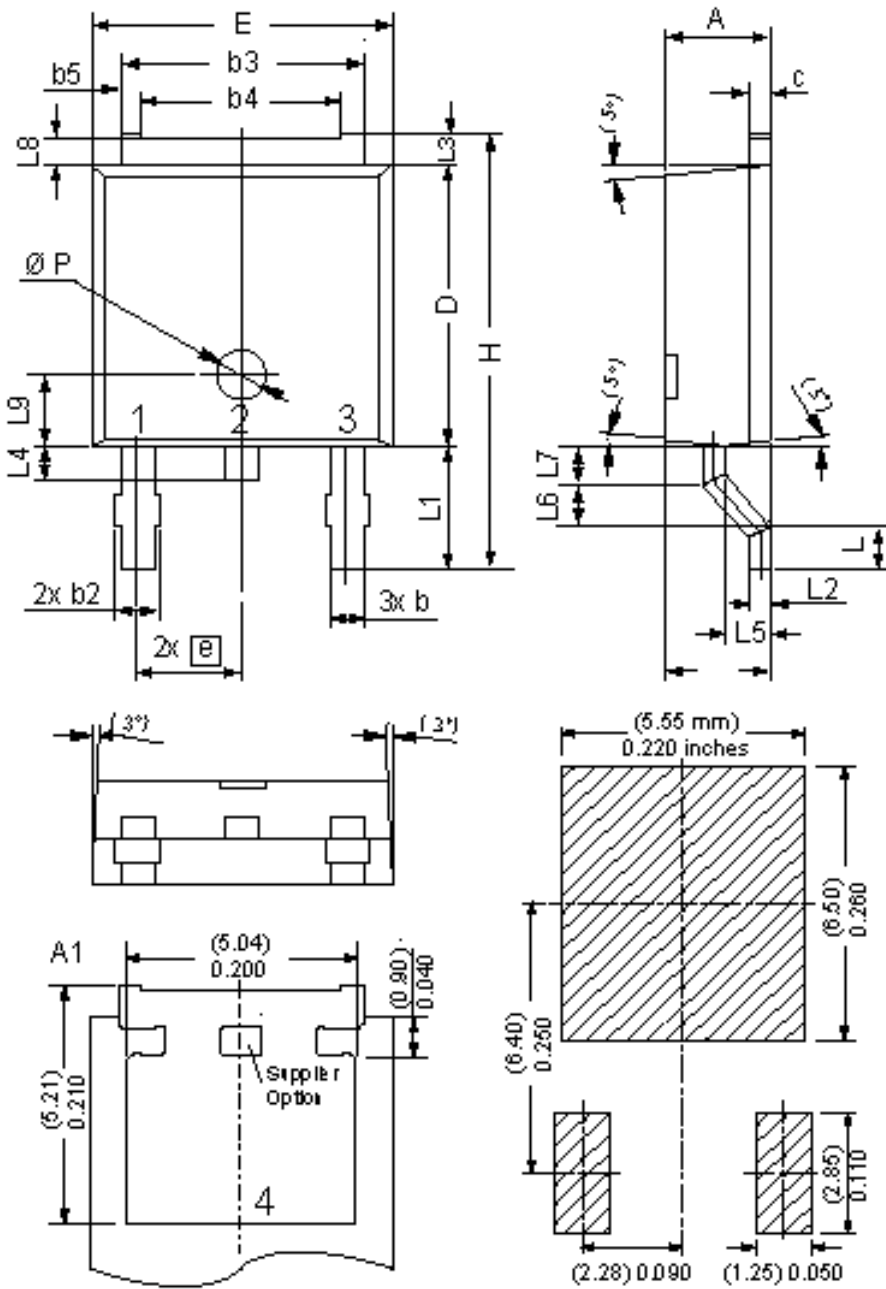
| Dim.	Millimeters		Inches	
	min	max	min	max
A	2.20	2.40	0.087	0.094
A1	2.10	2.50	0.083	0.098
b	0.66	0.86	0.026	0.034
b2	-	0.96	-	0.038
b3	5.04	5.64	0.198	0.222
b4	4.34 BSC		0.171 BSC	
b5	0.50 BSC		0.020 BSC	
c	0.40	0.86	0.016	0.034
D	5.90	6.30	0.232	0.248
E	6.40	6.80	0.252	0.268
e	2.10	2.50	0.083	0.098
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
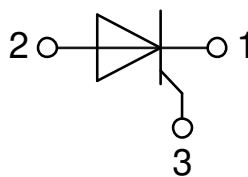
Thyristor
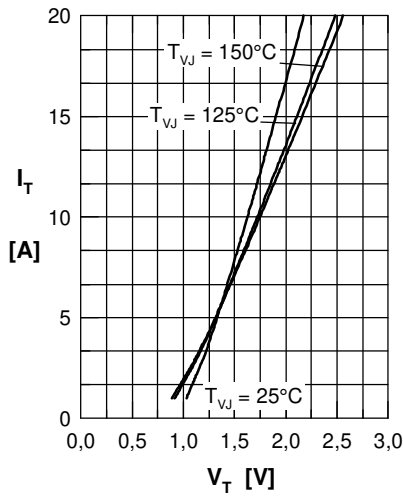
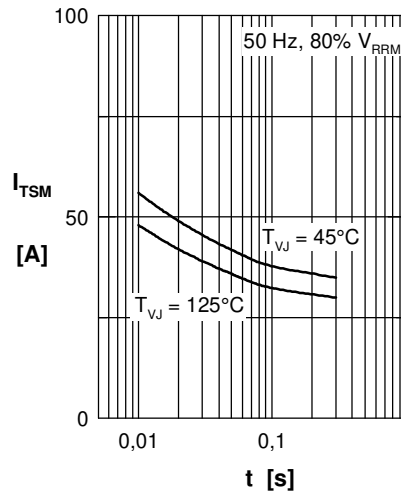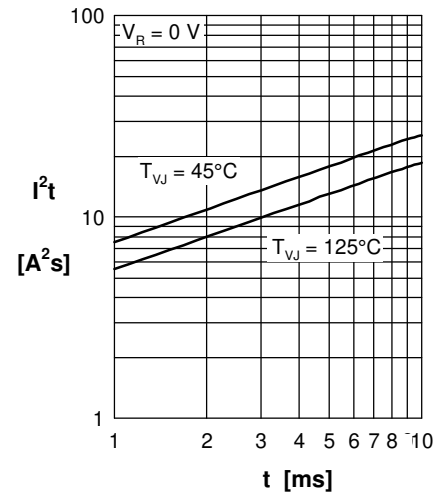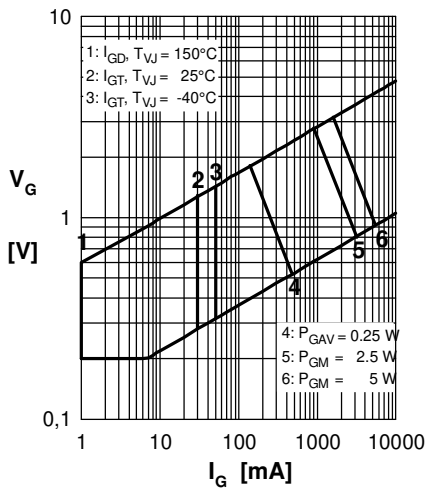Fig. 1 Forward characteristics

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

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

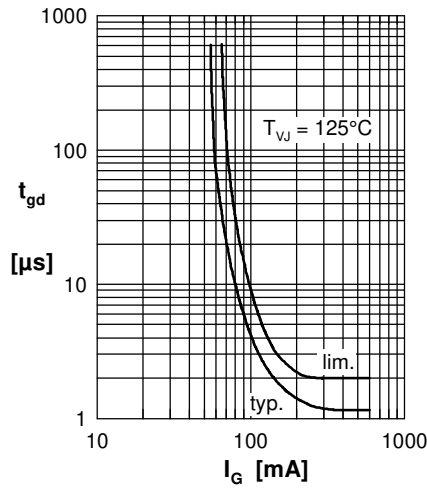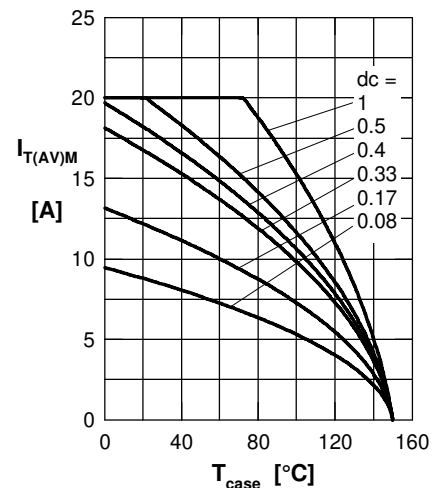Fig. 4 Gate voltage & gate current

Fig. 5 Gate controlled delay time t_{gd}

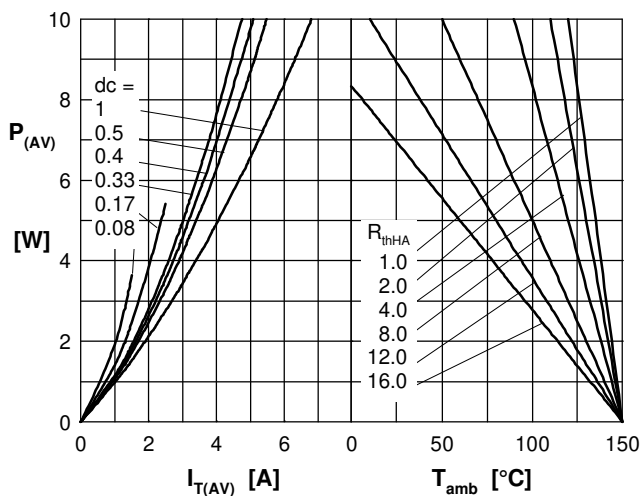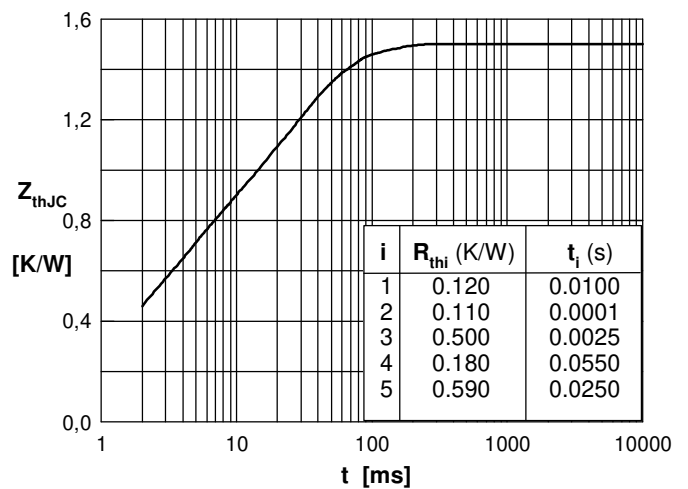Fig. 6 Max. forward current at
case temperature

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

Fig. 7 Transient thermal impedance junction to case

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

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