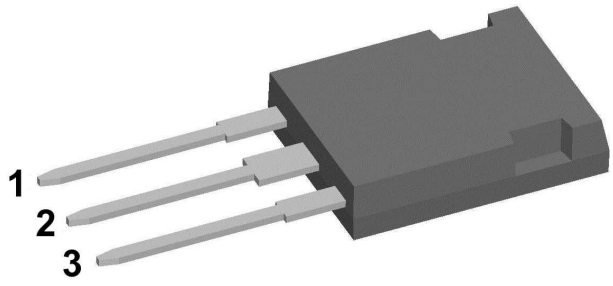
Thyristor

V_{RRM}	=	1600 V
I_{TAV}	=	60 A
V_T	=	1.14 V

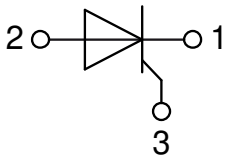
Single Thyristor

Part number

CS60-16io1



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: PLUS247

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

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.

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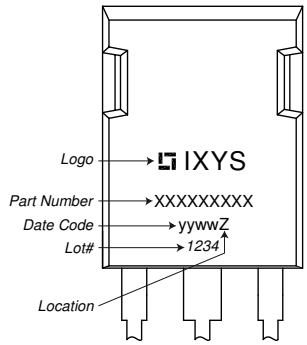
Thyristor

Symbol	Definition	Conditions		Ratings min.	typ.	max.	Unit
$V_{RSM/DSM}$	*max. non-repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1700	V
$V_{RRM/DRM}$	*max. repetitive reverse/forward blocking voltage*		T_{VJ} = 25°C			1600	V
$I_{R/D}$	*reverse current, drain current*	$V_{R/D}$ = 1600 V	T_{VJ} = 25°C			200	µA
		$V_{R/D}$ = 1600 V	T_{VJ} = 140°C			10	mA
V_T	*forward voltage drop*	I_T = 60 A	T_{VJ} = 25°C			1.18	V
		I_T = 120 A				1.44	V
		I_T = 60 A	T_{VJ} = 125°C			1.14	V
		I_T = 120 A				1.46	V
I_{TAV}	*average forward current*	T_C = 110°C	T_{VJ} = 140°C			60	A
$I_{T(RMS)}$	*RMS forward current*	180° sine				75	A
V_{T0}	*threshold voltage* } *for power loss calculation only*		T_{VJ} = 140°C			0.82	V
r_T	*slope resistance* }					5.3	mΩ
R_{thJC}	*thermal resistance junction to case*					0.32	K/W
R_{thCH}	*thermal resistance case to heatsink*				0.15		K/W
P_{tot}	*total power dissipation*		T_C = 25°C			360	W
I_{TSM}	*max. forward surge current*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			1.40	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.51	kA
		t = 10 ms; (50 Hz), sine	T_{VJ} = 140°C			1.19	kA
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			1.29	kA
I^2t	*value for fusing*	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			9.80	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			9.49	kA²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 140°C			7.08	kA²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			6.87	kA²s
C_J	*junction capacitance*	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		74		pF
P_{GM}	*max. gate power dissipation*	t_P = 30 µs	T_C = 140°C			10	W
		t_P = 300 µs				5	W
P_{GAV}	*average gate power dissipation*					0.5	W
$(di/dt)_{cr}$	*critical rate of rise of current*	T_{VJ} = 140°C; f = 50 Hz repetitive, I_T = 180 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 = 60 A				500	A/µs
$(dv/dt)_{cr}$	*critical rate of rise of voltage*	V = ⅔ V_{DRM}	T_{VJ} = 140°C			1000	V/µs
		R_{GK} = ∞; method 1 (linear voltage rise)					
V_{GT}	*gate trigger voltage*	V_D = 6 V	T_{VJ} = 25°C			1.5	V
			T_{VJ} = -40°C			1.6	V
I_{GT}	*gate trigger current*	V_D = 6 V	T_{VJ} = 25°C			100	mA
			T_{VJ} = -40°C			200	mA
V_{GD}	*gate non-trigger voltage*	V_D = ⅔ V_{DRM}	T_{VJ} = 140°C			0.2	V
I_{GD}	*gate non-trigger current*					10	mA
I_L	*latching current*	t_p = 10 µs	T_{VJ} = 25°C			450	mA
		I_G = 0.45 A; di_G/dt = 0.45 A/µs					
I_H	*holding current*	V_D = 6 V R_{GK} = ∞	T_{VJ} = 25°C			200	mA
t_{gd}	*gate controlled delay time*	V_D = ½ V_{DRM}	T_{VJ} = 25°C			2	µs
		I_G = 0.45 A; di_G/dt = 0.45 A/µs					
t_q	*turn-off time*	V_R = 100 V; I_T = 60A; V = ⅔ V_{DRM}	T_{VJ} = 125 °C		150		µs
		di/dt = 10 A/µs dv/dt = 20 V/µs t_p = 200 µs					

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Package PLUS247			Ratings			
Symbol	**Definition**	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	*RMS current*	per terminal			70	A
T_{VJ}	*virtual junction temperature*		-40		140	°C
T_{op}	*operation temperature*		-40		125	°C
T_{stg}	*storage temperature*		-40		140	°C
Weight				6		g
F_C	*mounting force with clip*		20		120	N
$d_{Spp/App}$	*creepage distance on surface | striking distance through air*	*terminal to terminal*	5.5			mm
$d_{Spb/Apb}$		*terminal to backside*	5.5			mm

Product Marking

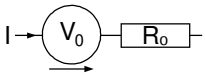


Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CS60-16io1	CS60-16io1	Tube	30	503360

Similar Part	Package	Voltage class
CS60-12io1	PLUS247 (3)	1200
CS60-14io1	PLUS247 (3)	1400
CS60-16io1R	ISOPLUS247 (3)	1600

Equivalent Circuits for Simulation

** on die level* $T_{VJ} = 140°C$

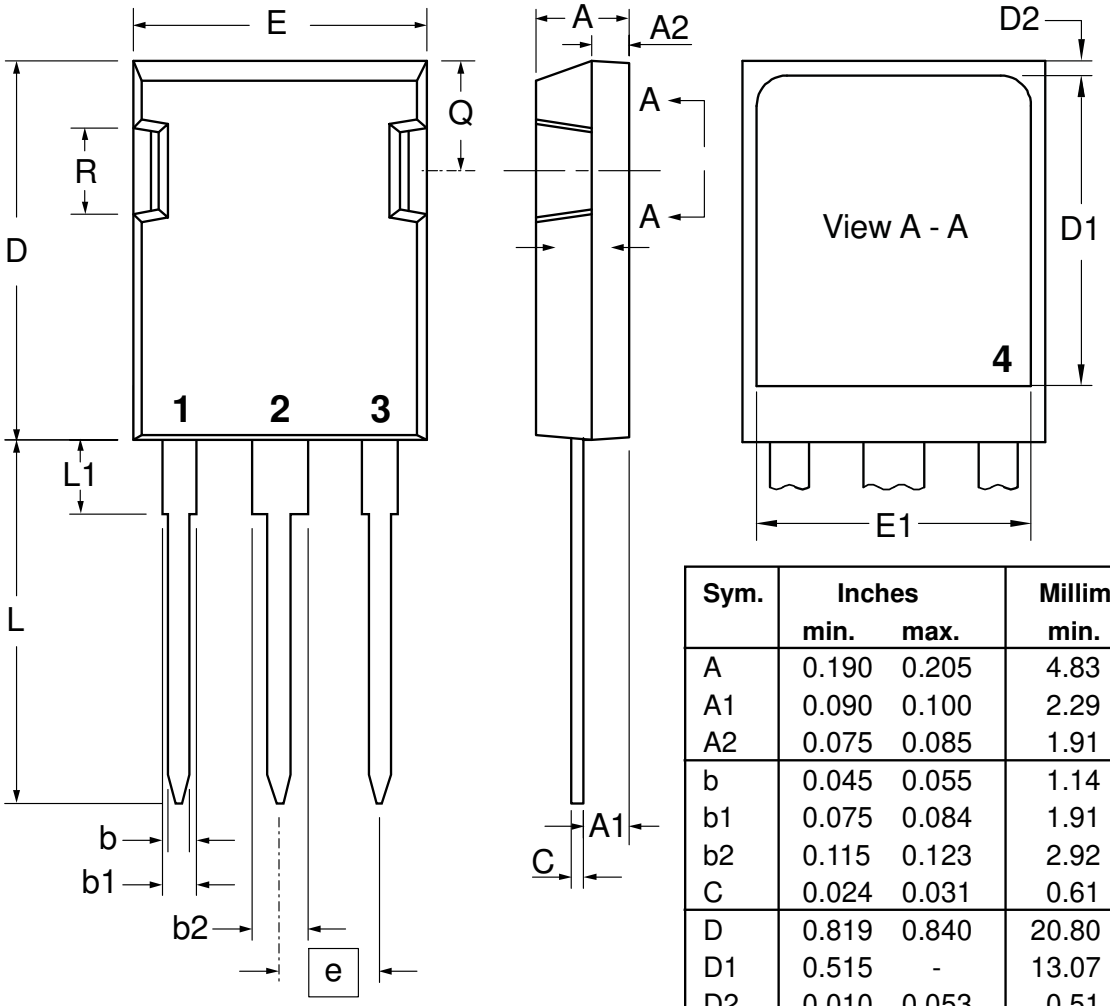


Thyristor

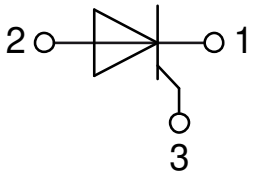
$V_{0\,max}$	*threshold voltage*	0.82	V
$R_{0\,max}$	*slope resistance **	3	mΩ

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Outlines PLUS247



Sym.	Inches		Millimeter	
	min.	max.	min.	max.
A	0.190	0.205	4.83	5.21
A1	0.090	0.100	2.29	2.54
A2	0.075	0.085	1.91	2.16
b	0.045	0.055	1.14	1.40
b1	0.075	0.084	1.91	2.13
b2	0.115	0.123	2.92	3.12
C	0.024	0.031	0.61	0.80
D	0.819	0.840	20.80	21.34
D1	0.515	-	13.07	-
D2	0.010	0.053	0.51	1.35
E	0.620	0.635	15.75	16.13
E1	0.530	-	13.45	-
e	0.215 BSC		5.45 BSC	
L	0.780	0.800	19.81	20.32
L1	0.150	0.170	3.81	4.32
Q	0.220	0.244	5.59	6.20
R	0.170	0.190	4.32	4.83



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Thyristor

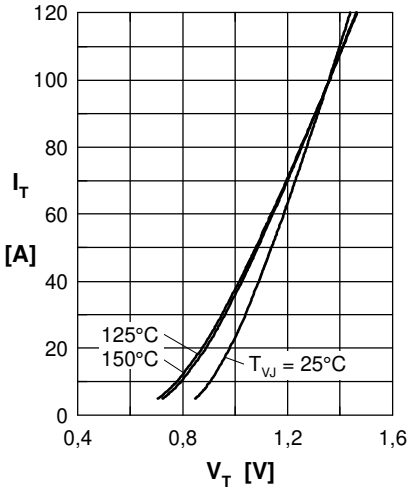


Fig. 1 Forward characteristics

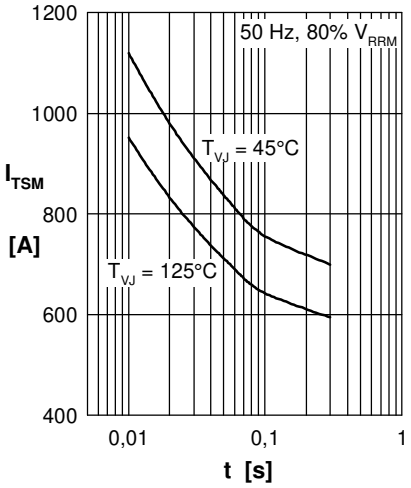


Fig. 2 Surge overload current

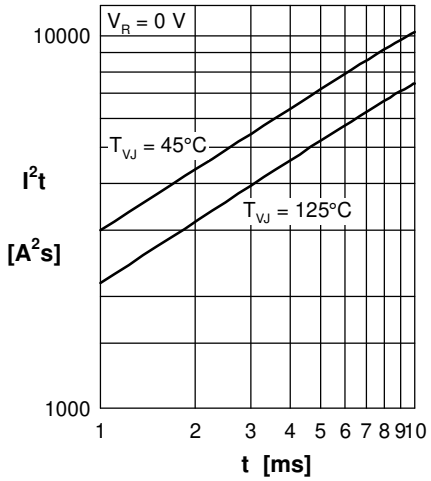


Fig. 3 I^2t versus time (1-10 ms)

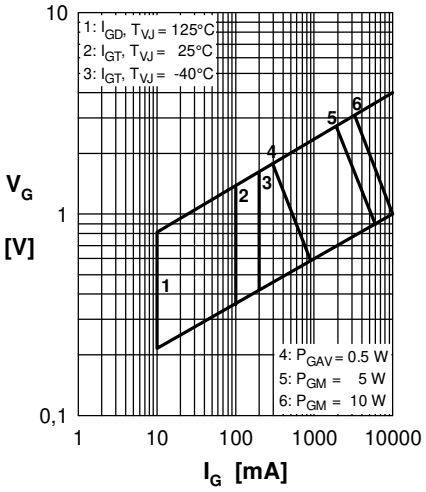


Fig. 4 Gate trigger characteristics

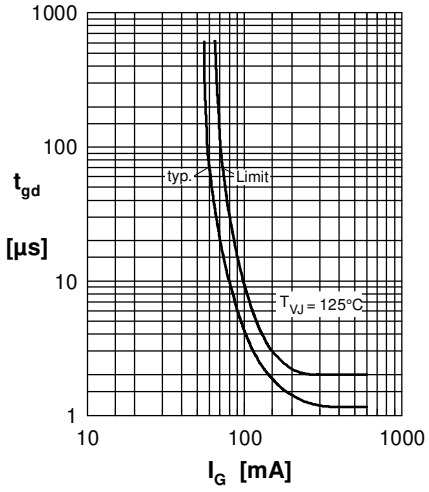


Fig. 5 Gate controlled delay time

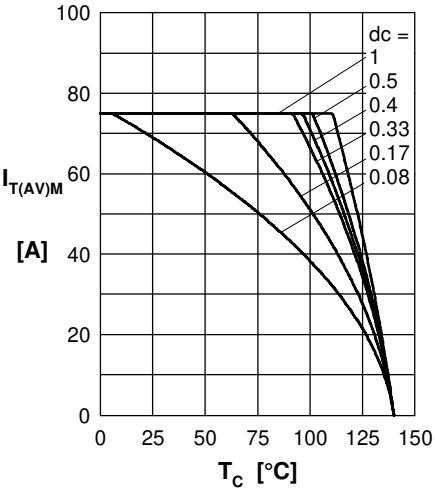


Fig. 6 Max. forward current at case temperature

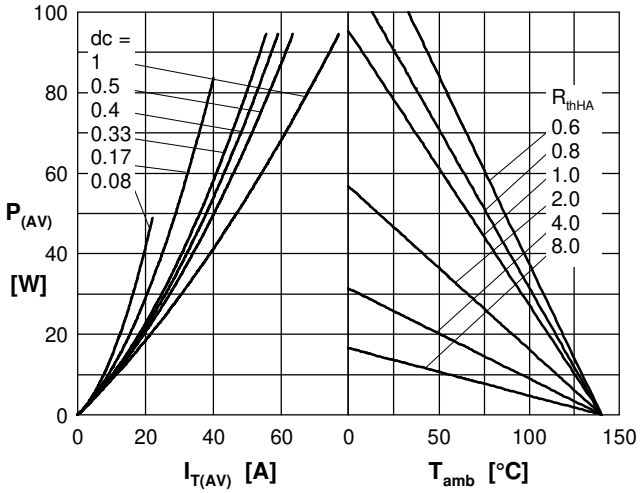


Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature

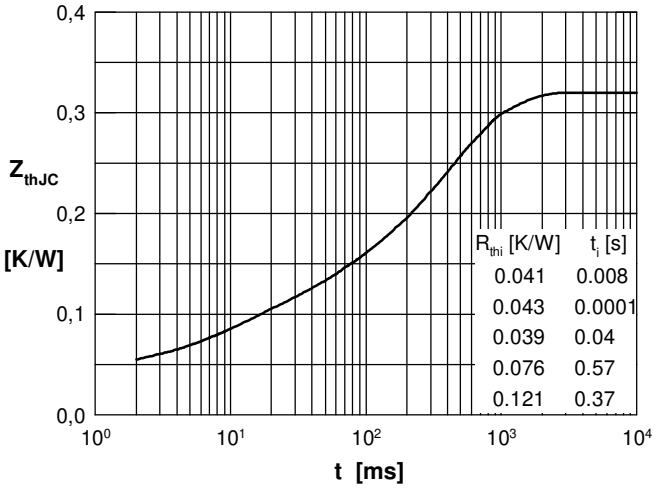


Fig. 8 Transient thermal impedance junction to case

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