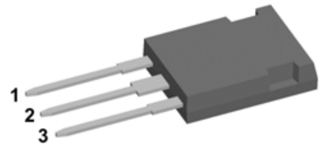
Thyristor

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

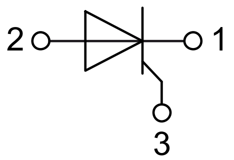
Single Thyristor

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

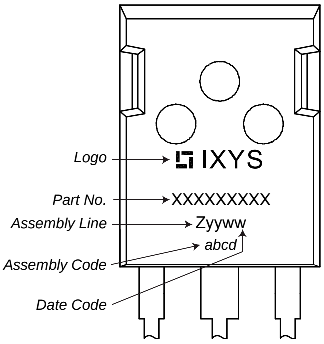
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

Thyristor					Ratings		
Symbol	Definition	Conditions		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_D = ⅔ V_{DRM}	non-repet., I_T = 60 A			500	A/µs
$(dv/dt)_{cr}$	*critical rate of rise of voltage*	V_D = 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 = 60 A; V_D = ⅔ V_{DRM}	T_{VJ} = 140°C		150		µs
		di/dt = 10 A/µs; dv/dt = 20 V/µs; t_p = 200 µs					

Data according to IEC 60747and per semiconductor unless otherwise specified

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

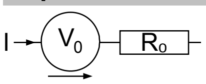


Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CS60-16io1	CS60-16io1	Tube	30	503360

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

Equivalent Circuits for Simulation

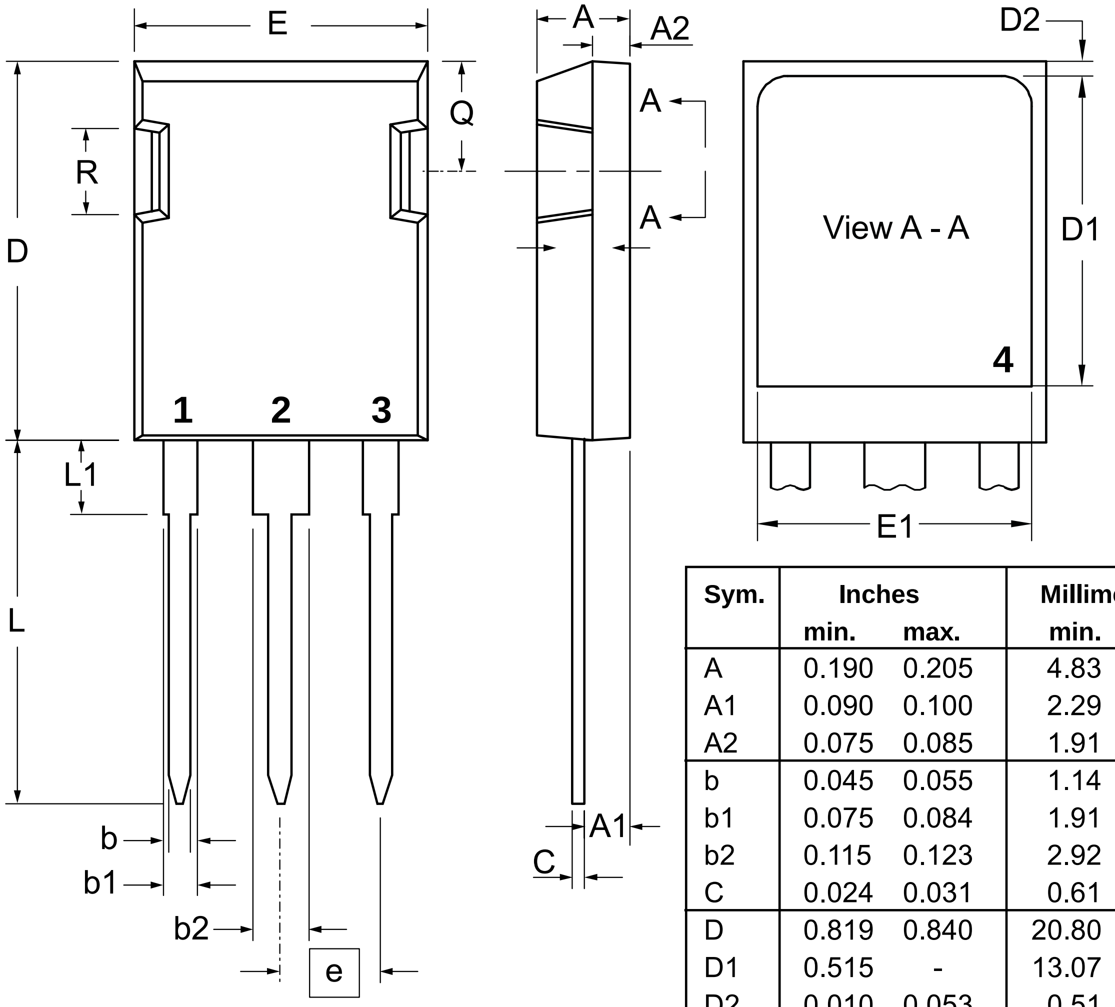
** on die level* T_{VJ} = 140 °C



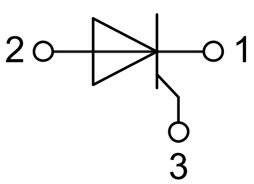
Thyristor

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

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



Thyristor

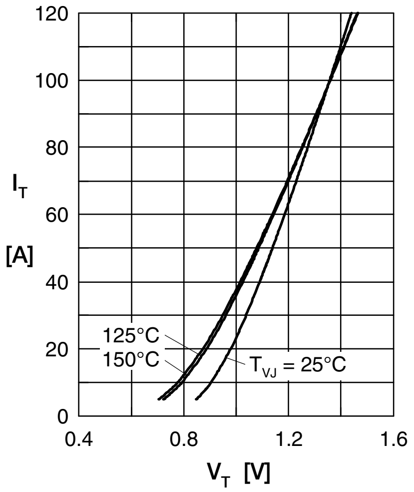


Fig. 1 Forward characteristics

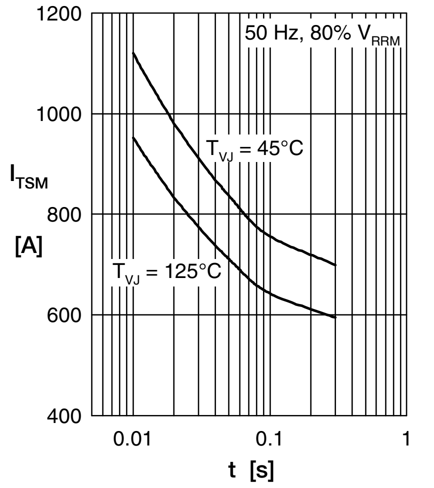


Fig. 2 Surge overload current

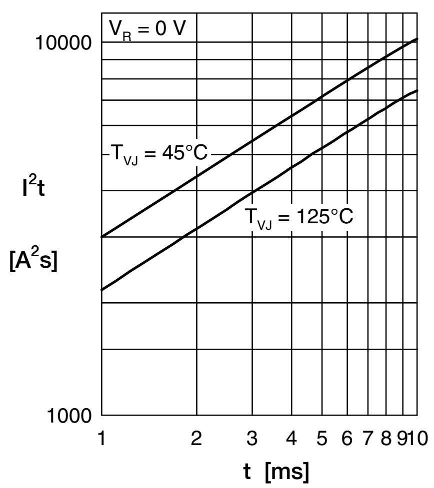


Fig. 3 I^2t versus time (1-10 ms)

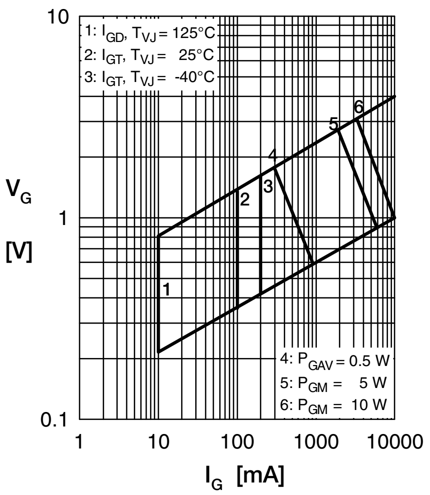


Fig. 4 Gate trigger characteristics

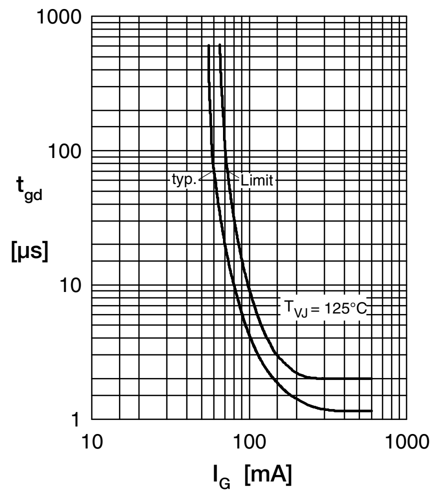


Fig. 5 Gate controlled delay time

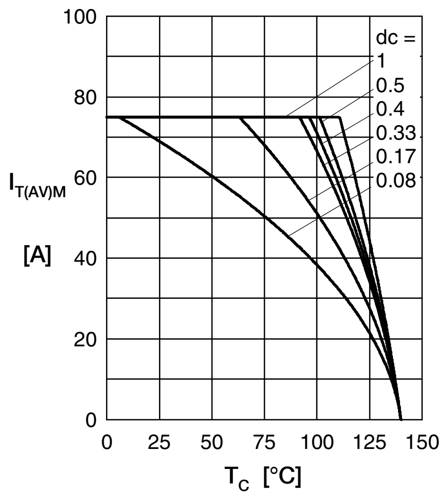


Fig. 6 Max. forward current at case temperature

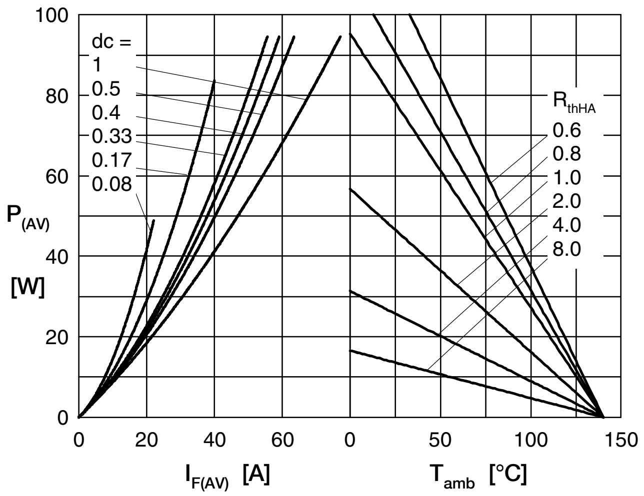


Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature

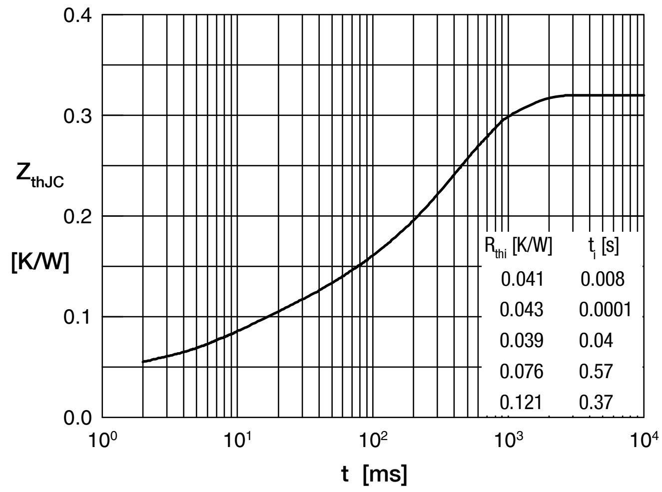


Fig. 8 Transient thermal impedance