

Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from, Europe, America and south Asia, supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts, Customers Priority, Honest Operation, and Considerate Service", our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip, ALPS, ROHM, Xilinx, Pulse, ON, Everlight and Freescale. Main products comprise IC, Modules, Potentiometer, IC Socket, Relay, Connector. Our parts cover such applications as commercial, industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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 $V_{RRM}$ 1600 V **Thyristor** 

60 A

1,14 V

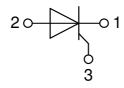
Single Thyristor

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

### Terms \_Conditions of usage:

The data contained in this product data sheet is exclusively intended for technically trained staff. The user will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to his application. The specifications of our components may not be considered as an assurance of component characteristics. The information in the valid application- and assembly notes must be considered. Should you require product information in excess of the data given in this product data sheet or which concerns the specific application of your product, please contact the sales office, which is responsible for you.

Due to technical requirements our product may contain dangerous substances. For information on the types in question please contact the sales office, which is responsible for you.

Should you intend to use the product in aviation, in health or live endangering or life support applications, please notify. For any such application we urgently recommend

- to perform joint risk and quality assessments;
  the conclusion of quality agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.



Thyristo				<b>"</b>	Ratings	•	1
Symbol	Definition	Conditions		min.	typ.	max.	Ur
V <sub>RSM/DSM</sub>	max. non-repetitive reverse/forwa	rd blocking voltage	$T_{VJ} = 25^{\circ}C$			1700	
V <sub>RRM/DRM</sub>	max. repetitive reverse/forward bi	ocking voltage	$T_{VJ} = 25^{\circ}C$			1600	
R/D	reverse current, drain current	$V_{R/D} = 1600 \text{ V}$	$T_{VJ} = 25^{\circ}C$			200	μ
		$V_{R/D} = 1600 \text{ V}$	$T_{VJ} = 140$ °C			10	m
V <sub>T</sub>	forward voltage drop	I <sub>T</sub> = 60 A	$T_{VJ} = 25^{\circ}C$			1,18	
		$I_{T} = 120 \text{ A}$				1,44	
		$I_T = 60 \text{ A}$	T <sub>VJ</sub> = 125°C			1,14	
		$I_{T} = 120 \text{ A}$				1,46	
I <sub>TAV</sub>	average forward current	T <sub>C</sub> = 110°C	T <sub>VJ</sub> = 140°C			60	
I <sub>T(RMS)</sub>	RMS forward current	180° sine				75	
V <sub>T0</sub>	threshold voltage		T <sub>v.i</sub> = 140°C			0,82	
r <sub>T</sub>	slope resistance	oss calculation only	***			5,3	m!
R <sub>thJC</sub>	thermal resistance junction to cas	re				0,32	K/V
R <sub>thCH</sub>	thermal resistance case to heatsi				0,15		K/V
P <sub>tot</sub>	total power dissipation		$T_{\rm C} = 25^{\circ}{\rm C}$		-, -	360	٧
I <sub>TSM</sub>	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{V.I} = 45^{\circ}C$			1,40	!
•ISM		t = 8,3  ms; (60  Hz),  sine	$V_R = 0 V$			1,51	1
		t = 0.0  ms; (50 Hz), sine	$T_{VJ} = 140^{\circ}C$			1,19	<u> </u>
		t = 8,3  ms; (60  Hz),  sine	$V_R = 0 V$			1,13	k
124	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}C$				kA <sup>2</sup>
l²t	value for fusing		$V_{R} = 0 V$			9,80 9,49	1
		t = 8,3 ms; (60 Hz), sine					<u>.                                    </u>
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 140$ °C			7,08	į
	i un ation a sur a litera a	t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$		7.4	6,87	
C,	junction capacitance	V <sub>R</sub> = 400 V f = 1 MHz	$T_{VJ} = 25^{\circ}C$		74	- 40	р
$P_{GM}$	max. gate power dissipation	$t_P = 30 \mu s$	$T_{C} = 140 ^{\circ}C$			10	į
		t <sub>P</sub> = 300 μs				5	۷
P <sub>GAV</sub>	average gate power dissipation					0,5	٧
(di/dt) <sub>cr</sub>	critical rate of rise of current		epetitive, $I_T = 180 A$			150	A/μ
		$t_P = 200 \mu s; di_G/dt = 0.3 A/\mu s; -$					
			on-repet., $I_T = 60 \text{ A}$			500	A/μ
(dv/dt) <sub>cr</sub>	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 140$ °C			1000	V/µ
		R <sub>GK</sub> = ∞; method 1 (linear volta	ge rise)				 
<b>V</b> <sub>GT</sub>	gate trigger voltage	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$			1,5	,
			$T_{VJ} = -40$ °C			1,6	,
I <sub>GT</sub>	gate trigger current	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$			100	m
			$T_{VJ} = -40$ °C			200	m
V <sub>GD</sub>	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 140^{\circ}C$			0,2	,
I <sub>GD</sub>	gate non-trigger current					10	m
   <sub>L</sub>	latching current	t <sub>p</sub> = 10 μs	$T_{VJ} = 25$ °C			450	m
	-	$I_G = 0.45 \text{A};  di_G/dt = 0.45 \text{A/}\mu \text{s}$					
I <sub>H</sub>	holding current	$V_D = 6 \text{ V } R_{GK} = \infty$	T <sub>vJ</sub> = 25°C			200	m
·н t <sub>gd</sub>	gate controlled delay time	$V_{D} = \frac{1}{2} V_{DBM}$	$T_{VJ} = 25 ^{\circ}\text{C}$			2	μ
•ga	gano some sinos doray anno	$I_{G} = 0.45 \text{ A}; \text{ di}_{G}/\text{dt} = 0.45 \text{ A}/\mu\text{s}$				_	μ
	turn-off time				150		
t <sub>q</sub>	tanron ame	$V_R = 100 \text{ V}; I_T = 60 \text{ A}; V = \frac{2}{3}$			150		μ
		$di/dt = 10 A/\mu s dv/dt = 20 V$	/μs τ <sub>p</sub> = 200 μs				!



Package PLUS247			Ratings			
Symbol	Definition Conditions	s	min.	typ.	max.	Unit
I <sub>RMS</sub>	RMS current per terminal				70	Α
T <sub>vJ</sub>	virtual junction temperature				140	°C
T <sub>op</sub>	operation temperature		-40		125	°C
T <sub>stg</sub>	storage temperature				140	°C
Weight				6		g
<b>F</b> <sub>c</sub>	mounting force with clip		20		120	N
d <sub>Spp/App</sub>	creepage distance on surface   striking distance through	terminal to terminal	5,5			mm
$d_{\text{Spb/Apb}}$	creepage distance on surface   striking distance timough	terminal to backside	5,5			mm

# Product Marking Logo IIXYS Part No. XXXXXXXXX Assembly Line Assembly Code Date Code

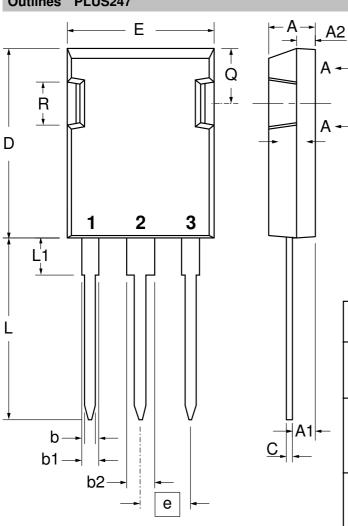
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CS60-16io1	CS60-16io1	Tube	30	503360

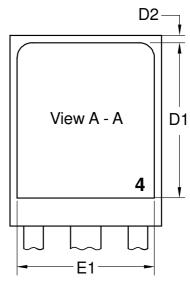
Similar Part	Package	Voltage class
CS60-12io1	PLUS247 (3)	1200
CS60-14io1	PLUS247 (3)	1400

Equiva	alent Circuits for	Simulation	* on die level	T <sub>VJ</sub> = 140 °C
$I \rightarrow V_0$	)— <u>R</u> o	Thyristor		
V <sub>0 max</sub>	threshold voltage	0,82		V
$R_{0 \text{ max}}$	slope resistance *	3		mΩ

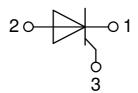


# **Outlines PLUS247**





Sym.	Inches		Millimeter		
	min. max.		min.	max.	
Α	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	
С	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	
Е	0.620	0.635	15.75	16.13	
E1	0.530	-	13.45	-	
е	0.215	0.215 BSC 5.45 BS		5 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**

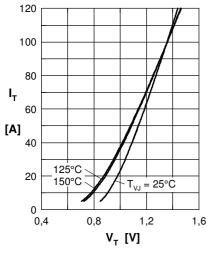


Fig. 1 Forward characteristics

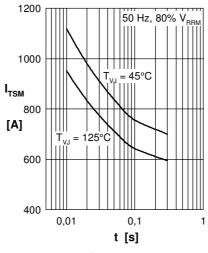


Fig. 2 Surge overload current

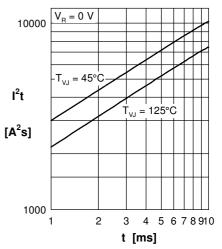


Fig. 3 I<sup>2</sup>t versus time (1-10 ms)

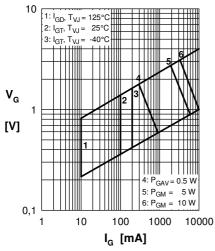


Fig. 4 Gate trigger characteristics

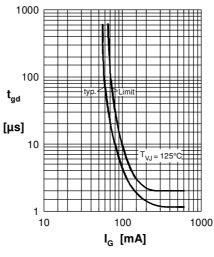


Fig. 5 Gate controlled delay time

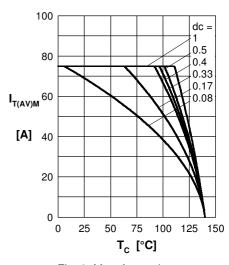


Fig. 6 Max. forward current at case temperature

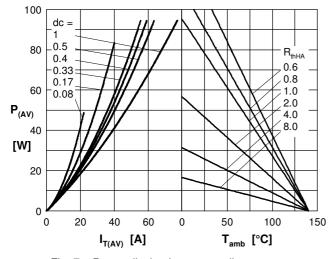


Fig. 7a Power dissipation versus direct output current Fig. 7b and ambient temperature

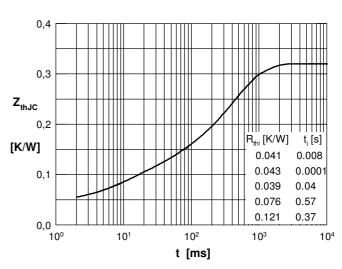


Fig. 8 Transient thermal impedance junction to case