

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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 $V_{RRM}$ 1200 V **Thyristor** 

20 A

1,23 V

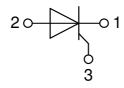
Single Thyristor

Part number

CS20-12io1



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-247

- 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

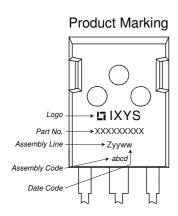
- to perform joint risk and quality assessments;
  the conclusion of quality agreements;
- to establish joint measures of an ongoing product survey, and that we may make delivery dependent on the realization of any such measures.



Thyristo		Canditions		Ì	Ratings		
Symbol	Definition	Conditions	T 0500	min.	typ.	max.	Un
V <sub>RSM/DSM</sub>	max. non-repetitive reverse/forwa		$T_{VJ} = 25^{\circ}C$			1300	í I
V <sub>RRM/DRM</sub>	max. repetitive reverse/forward bl		$T_{VJ} = 25^{\circ}C$			1200	,
I <sub>R/D</sub>	reverse current, drain current	$V_{R/D} = 1200 \text{ V}$	$T_{VJ} = 25^{\circ}C$			20	μ
		$V_{R/D} = 1200 \text{ V}$	$T_{VJ} = 125^{\circ}C$			2	m
V <sub>T</sub>	forward voltage drop	$I_T = 20 A$	$T_{VJ} = 25^{\circ}C$			1,27	,
		$I_T = 40 \text{ A}$				1,53	'
		$I_T = 20 A$	$T_{VJ} = 125$ °C			1,23	,
		$I_T = 40 \text{ A}$				1,57	,
I <sub>TAV</sub>	average forward current	T <sub>C</sub> = 130°C	$T_{VJ} = 150$ °C			20	
I <sub>T(RMS)</sub>	RMS forward current	180° sine				31	
V <sub>T0</sub>	threshold voltage		T <sub>vJ</sub> = 150°C			0,87	,
r <sub>T</sub>	slope resistance } for power lo	oss calculation only				17,3	m
R <sub>thJC</sub>	thermal resistance junction to cas	e				0,6	K/V
R <sub>thCH</sub>	thermal resistance case to heatsing	nk			0,25		K/V
P <sub>tot</sub>	total power dissipation		T <sub>C</sub> = 25°C		,	200	٧
I <sub>TSM</sub>	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{v,l} = 45^{\circ}C$			260	
TOM	-	t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$			280	
		t = 10 ms; (50 Hz), sine	T <sub>v.i</sub> = 150°C			220	,
		t = 8.3  ms; (60 Hz), sine	$V_R = 0 V$			240	
l²t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}C$			340	A <sup>2</sup>
	- Land 10 100 ing	t = 8.3  ms; (60 Hz), sine	$V_R = 0 V$			325	A <sup>2</sup>
		t = 0.5  ms; (50 Hz), sine	$T_{VJ} = 150^{\circ}C$			240	A <sup>2</sup>
		t = 8.3  ms; (60 Hz), sine	$V_R = 0 V$			240	A <sup>2</sup>
<b>C</b> <sub>J</sub>	junction capacitance	$V_{R} = 400 \text{ V} \text{ f} = 1 \text{ MHz}$	$T_{VJ} = 25^{\circ}C$		16	270	pl
		$t_{P} = 30 \mu s$	$T_{\rm C} = 150^{\circ}{\rm C}$		10	10	V
P <sub>GM</sub>	max. gate power dissipation	·	1 <sub>C</sub> = 150 C			5	۷
<b>D</b>		t <sub>P</sub> = 300 μs				_	!
P <sub>GAV</sub>	average gate power dissipation	T 40500 ( 5044				0,5	V
(di/dt) <sub>cr</sub>	critical rate of rise of current	$T_{VJ} = 125 ^{\circ}\text{C}; f = 50 \text{Hz}$ re	•			150	Α/μ
		$t_P = 200 \mu s; di_G/dt = 0.3 A/\mu s; -$					
			on-repet., $I_T = 20 A$			500	<u> </u>
(dv/dt) <sub>cr</sub>	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125$ °C			1000	V/μ
		R <sub>GK</sub> = ∞; method 1 (linear volta					
$V_{GT}$	gate trigger voltage	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$			1,3	'
			$T_{VJ} = -40$ °C			1,6	١
I <sub>GT</sub>	gate trigger current	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$			50	m
			$T_{VJ} = -40$ °C			80	m
$V_{GD}$	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}C$			0,2	١
I <sub>GD</sub>	gate non-trigger current					5	m
I <sub>L</sub>	latching current	t <sub>p</sub> = 10 μs	T <sub>VJ</sub> = 25°C			150	m
		$I_{G} = 0.3 \text{ A}; \text{ di}_{G}/\text{dt} = 0.3 \text{ A}/\mu\text{s}$	5				-
I <sub>H</sub>	holding current	$V_D = 6 \text{ V}  R_{GK} = \infty$	T <sub>vJ</sub> = 25°C			100	m
t <sub>gd</sub>	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25$ °C			2	μ
- gu	5 <del>,</del>	$I_{G} = 0.3 \text{ A}; \text{ di}_{G}/\text{dt} = 0.3 \text{ A}/\mu\text{s}$				_	۲
		$\mu_{G} = 0,0.7$ , $\mu_{G}$	•		l		į
t <sub>q</sub>	turn-off time	$V_{R} = 100 \text{ V}; I_{T} = 20 \text{ A}; V = \frac{3}{2}$	4 V T 125 °C		150		μ



Package	Package TO-247			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
RMS	RMS current	per terminal			70	Α	
T <sub>vJ</sub>	virtual junction temperature		-40		150	°C	
T <sub>op</sub>	operation temperature		-40		125	°C	
T <sub>stg</sub>	storage temperature		-40		150	°C	
Weight				6		g	
M <sub>D</sub>	mounting torque		0,8		1,2	Nm	
<b>F</b> <sub>c</sub>	mounting force with clip		20		120	Ν	



0	rdering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
S	tandard	CS20-12io1	CS20-12io1	Tube	30	466514

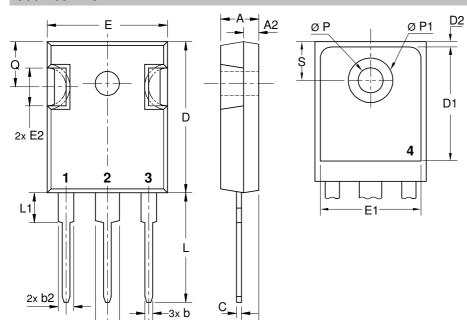
Similar Part	Package	Voltage class
CS20-14io1	TO-247AD (3)	1400
CS20-16io1	TO-247AD (3)	1600

Equiva	alent Circuits for	Simulation	* on die level	T <sub>vJ</sub> = 150 °C
$I \rightarrow V_0$	)— <u>R</u> o	Thyristor		
V <sub>0 max</sub>	threshold voltage	0,87		V
$R_{0 \text{ max}}$	slope resistance *	14,8		mΩ

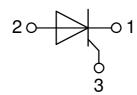


# Outlines TO-247

2xe

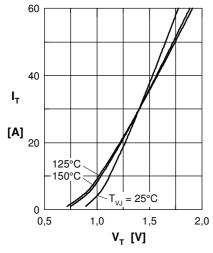


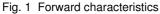
Sym.	Inch	Inches Millimeter		eter
	min.	max.	min.	max.
Α	0.185	0.209	4.70	5.30
A1	0.087	0.102	2.21	2.59
A2	0.059	0.098	1.50	2.49
D	0.819	0.845	20.79	21.45
E	0.610	0.640	15.48	16.24
E2	0.170	0.216	4.31	5.48
е	0.215	BSC	5.46	BSC
L	0.780	0.800	19.80	20.30
L1	-	0.177	-	4.49
ØΡ	0.140	0.144	3.55	3.65
Q	0.212	0.244	5.38	6.19
S	0.242	BSC	6.14	BSC
b	0.039	0.055	0.99	1.40
b2	0.065	0.094	1.65	2.39
b4	0.102	0.135	2.59	3.43
С	0.015	0.035	0.38	0.89
D1	0.515	-	13.07	-
D2	0.020	0.053	0.51	1.35
E1	0.530	-	13.45	-
Ø P1	-	0.29	-	7.39





# **Thyristor**





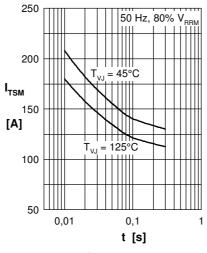


Fig. 2 Surge overload current

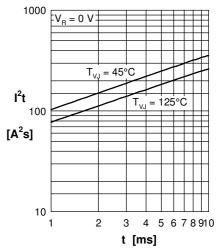


Fig. 3 I<sup>2</sup>t versus time (1-10 ms)

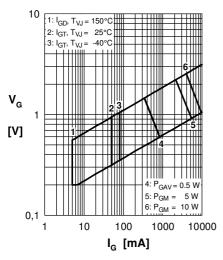


Fig. 4 Gate trigger characteristics

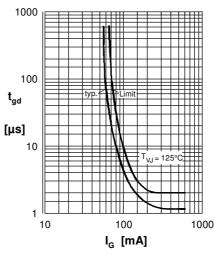


Fig. 5 Gate controlled delay time

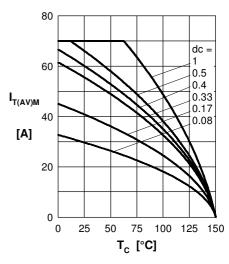


Fig. 6 Max. forward current at case temperature

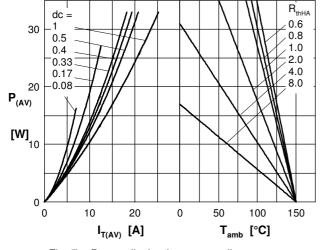


Fig. 7a Power dissipation versus direct output current Fig. 7b and ambient temperature

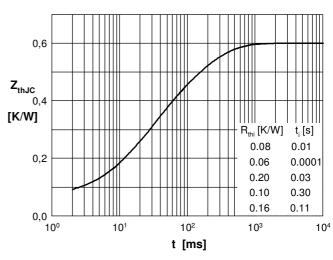


Fig. 8 Transient thermal impedance junction to case