

High Efficiency Thyristor

1200 V

40 A

1,19 V

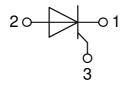
Single Thyristor

Part number

CLA40E1200HR



Backside: isolated



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: ISO247

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- · Reduced weight
- Advanced power cycling

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.

IXYS reserves the right to change limits, conditions and dimensions.

Data according to IEC 60747 and per semiconductor unless otherwise specified

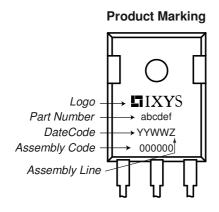
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Thyristo	T				Ratings	•	
Symbol	Definition	Conditions		min.	typ.	max.	Un
V _{RSM/DSM}	max. non-repetitive reverse/forwa	rd blocking voltage	$T_{VJ} = 25^{\circ}C$			1300	١
V _{RRM/DRM}	max. repetitive reverse/forward bl		$T_{VJ} = 25^{\circ}C$			1200	١
R/D	reverse current, drain current	$V_{R/D} = 1200 \text{ V}$	$T_{VJ} = 25^{\circ}C$			50	μ/
		$V_{R/D} = 1200 \text{ V}$	$T_{VJ} = 125^{\circ}C$			4	m/
V _T	forward voltage drop	$I_T = 40 \text{ A}$	$T_{VJ} = 25^{\circ}C$			1,25	١
		I _T = 80 A				1,49	١
		$I_T = 40 \text{ A}$	$T_{VJ} = 125$ °C			1,19	١
		I _T = 80 A				1,50	١
I _{TAV}	average forward current	$T_c = 95^{\circ}C$	$T_{VJ} = 150$ °C			40	1
T(RMS)	RMS forward current	180° sine				63	ļ
V _{T0}	threshold voltage	and adoutation only	$T_{VJ} = 150$ °C			0,86	١
r _T	slope resistance	oss calculation only				7,9	mΩ
R _{thJC}	thermal resistance junction to cas	e				0,8	K/W
R _{thCH}	thermal resistance case to heatsi	nk			0,25		K/W
P _{tot}	total power dissipation		$T_{C} = 25^{\circ}C$			155	W
I _{TSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}C$			650	F
		t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$			700	1
		t = 10 ms; (50 Hz), sine	T _{vJ} = 150°C			555	ļ
		t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$			595	/
l²t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45^{\circ}C$			2,12	kA2
		t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$			2,04	kA2
		t = 10 ms; (50 Hz), sine	T _{VJ} = 150°C			1,54	kA2
		t = 8,3 ms; (60 Hz), sine	$V_R = 0 V$			1,48	kA2
C _J	junction capacitance	$V_R = 400 V$ f = 1 MHz	$T_{VJ} = 25^{\circ}C$		25		рF
P _{GM}	max. gate power dissipation	t _P = 30 μs	T _C = 150°C			10	V
		t _P = 300 μs				5	W
P_{GAV}	average gate power dissipation					0,5	W
(di/dt) _{cr}	critical rate of rise of current	$T_{vJ} = 150 ^{\circ}\text{C}; f = 50 \text{Hz}$ re	epetitive, $I_T = 120 \text{ A}$			150	A/µs
		$t_P = 200 \mu s; di_G/dt = 0.3 A/\mu s;$	•				
		$I_{G} = 0.3 \text{ A}; V = \frac{2}{3} V_{DRM}$ no	on-repet., $I_{T} = 40 \text{ A}$			500	A/μs
(dv/dt) _{cr}	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	T _{vJ} = 150°C			1000	<u>i </u>
, ,,,		R _{GK} = ∞; method 1 (linear volta	ge rise)				
V _{GT}	gate trigger voltage	V _D = 6 V	$T_{VJ} = 25^{\circ}C$			1,5	١
.		_	$T_{VJ} = -40$ °C			1,6	١
I _{GT}	gate trigger current	$V_D = 6 \text{ V}$	$T_{VJ} = 25^{\circ}C$			50	m/
ui		5 -	$T_{VJ} = -40$ °C			80	m/
V _{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DBM}$	T _{vJ} = 150°C			0,2	\
I _{GD}	gate non-trigger current	U UNIVI	VO			3	m/
- _{GD}	latching current	t _n = 10 μs	$T_{VJ} = 25$ °C			125	m/
•L	ratering current	$I_{\rm G} = 0.3 \text{A}; \text{di}_{\rm G}/\text{dt} = 0.3 \text{A}/\mu \text{s}$				120	''''
	holding current	$V_{D} = 6 \text{ V } R_{GK} = \infty$	$T_{VJ} = 25$ °C			100	m/
l _н +	gate controlled delay time	$V_D = 0 V N_{GK} = \infty$ $V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25 \text{C}$ $T_{VJ} = 25 \text{C}$			2	į
t _{gd}	gate controlled delay tillle					2	μ
	turn off time	$I_G = 0.3 \text{ A}; \text{ di}_G/\text{dt} = 0.3 \text{ A}/\mu\text{s}$			000		! .
t _q	turn-off time	$V_R = 100 \text{ V}; I_T = 40 \text{ A}; V = \frac{2}{3}$			200		μ
		$di/dt = 10 A/\mu s dv/dt = 20 V$	/μs t _p = 200 μs				1



Package	e ISO247				Ratings	S	
Symbol	Definition	Conditions		min.	typ.	max.	Unit
I _{RMS}	RMS current	per terminal				70	Α
T _{VJ}	virtual junction temperature			-55		150	°C
T _{op}	operation temperature			-55		125	°C
T _{stg}	storage temperature			-55		150	°C
Weight					6		g
M _D	mounting torque			0,8		1,2	Nm
F _c	mounting force with clip			20		120	N
d _{Spp/App}	creepage distance on surface striking d	a diatanaa thraugh a	terminal to terminal	2,7			mm
$d_{Spb/Apb}$	creepage distance on surface striking d	iistarice trirougii aii	terminal to backside	4,1			mm
V _{ISOL}	isolation voltage	t = 1 second		3600			٧
.002	t = 1 minu		50/60 Hz, RMS; lisoL ≤ 1 mA	3000			٧



Part description

C = Thyristor (SCR) L = High Efficiency Thyristor

A = (up to 1200V)

40 = Current Rating [A]

E = Single Thyristor

1200 = Reverse Voltage [V]

HR = ISO247(3)

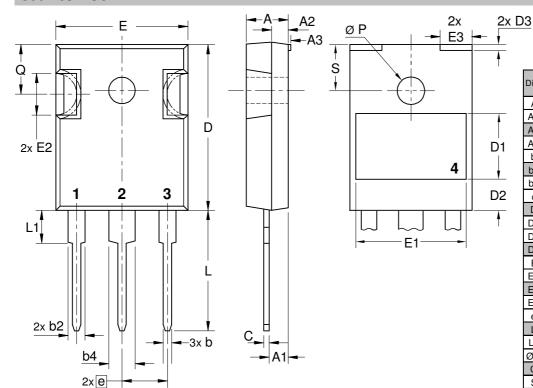
Ord	lering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Star	ndard	CLA40E1200HR	CLA40E1200HR	Tube	30	515428

Similar Part	Package	Voltage class
CMA40E1600HR	ISO247 (3)	1600

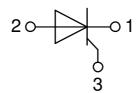
Equiva	alent Circuits for	Simulation	* on die level	$T_{VJ} = 150 ^{\circ}\text{C}$
$I \rightarrow V_0$)— <u>R</u> o	Thyristor		
V _{0 max}	threshold voltage	0,86		V
$R_{0\;max}$	slope resistance *	5,4		$m\Omega$



Outlines ISO247



Dim.	Millimeter		Inches		
ווווט.	min	max	min	max	
Α	4.70	5.30	0.185	0.209	
Α1	2.21	2.59	0.087	0.102	
A2	1.50	2.49	0.059	0.098	
А3	typ.	0.05	typ.	0.002	
b	0.99	1.40	0.039	0.055	
b2	1.65	2.39	0.065	0.094	
b4	2.59	3.43	0.102	0.135	
С	0.38	0.89	0.015	0.035	
О	20.79	21.45	0.819	0.844	
D1	typ.	8.90	typ. 0.350		
D2	typ.	2.90	typ. 0.114		
D3	typ.	1.00	typ. 0.039		
Е	15.49	16.24	0.610	0.639	
E1	typ.	13.45	typ.	0.530	
E2	4.31	5.48	0.170	0.216	
E3	typ.	4.00	typ. 0.157		
е	5.46 BSC		0.215 BSC		
L	19.80	20.30	0.780	0.799	
L1	-	4.49	-	0.177	
ØΡ	3.55	3.65	0.140	0.144	
Q	5.38	6.19	0.212	0.244	
S	6.14	BSC	0.242	BSC	





Thyristor

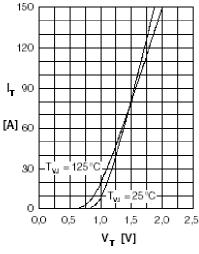


Fig. 1 Forward characteristics

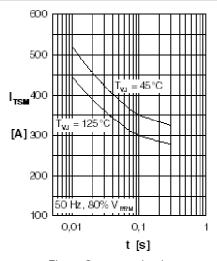


Fig. 2 Surge overload current I_{TSM}: crest value, t: duration

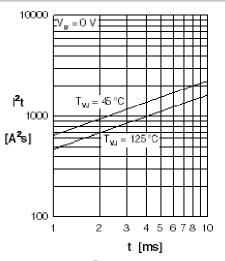


Fig. 3 I²t versus time (1-10 s)

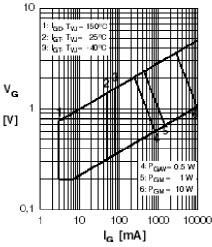


Fig. 4 Gate voltage & gate current

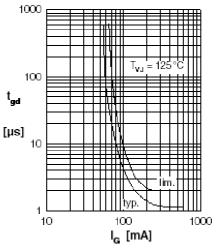


Fig. 5 Gate controlled delay time t_{od}

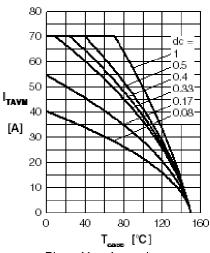


Fig. 6 Max. forward current at case temperature

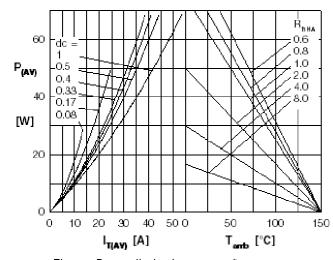


Fig. 7a Power dissipation versus direct output current

Fig. 7b and ambient temperature

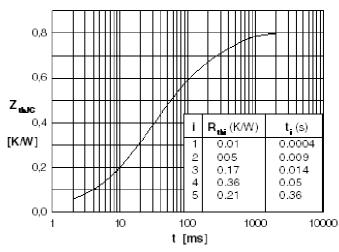


Fig. 7 Transient thermal impedance junction to case