

# High Efficiency Thyristor

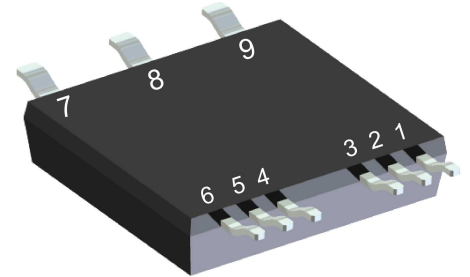
<b>3~ Rectifier</b>	
$V_{RRM}$	= 1200 V
$I_{DAV}$	= 90 A
$I_{FSM}$	= 350 A

SemiFast  
 3~ Rectifier Bridge, half-controlled (high-side)


Part number

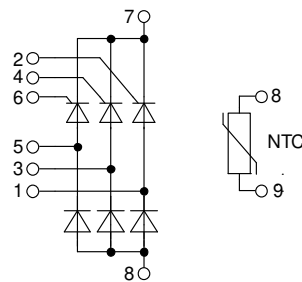
**CLE90UH1200TLB**

Marking on Product: CLE90UH1200TLB



Backside: isolated

 E72873



## Features / Advantages:

- Thyristor for line and moderate frequencies
- Short turn-off time
- Planar passivated chip
- Long-term stability

## Applications:

- Line rectifying 50/60 Hz
- Drives
- SMPS
- UPS

## Package: SMPD

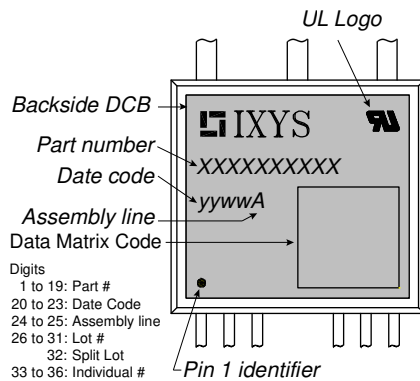
- Isolation Voltage: 3000 V~
- Industry convenient outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

## Disclaimer Notice

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Rectifier				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V	
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V	
$I_{RD}$	reverse current, drain current	$V_{R/D} = 1200\text{ V}$	$T_{VJ} = 25^{\circ}C$		10	$\mu A$	
		$V_{R/D} = 1200\text{ V}$	$T_{VJ} = 125^{\circ}C$		2	mA	
$V_T$	forward voltage drop	$I_T = 30\text{ A}$	$T_{VJ} = 25^{\circ}C$		1.30	V	
		$I_T = 90\text{ A}$			1.80	V	
		$I_T = 30\text{ A}$	$T_{VJ} = 125^{\circ}C$		1.28	V	
		$I_T = 90\text{ A}$			1.95	V	
$I_{DAV}$	bridge output current	$T_C = 90^{\circ}C$ 120° sine	$T_{VJ} = 150^{\circ}C$		90	A	
$V_{T0}$	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}C$		0.92	V	
$r_T$	slope resistance				13	m $\Omega$	
$R_{thJC}$	thermal resistance junction to case				0.9	K/W	
$R_{thCH}$	thermal resistance case to heatsink			0.40		K/W	
$P_{tot}$	total power dissipation		$T_C = 25^{\circ}C$		140	W	
$I_{TSM}$	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		350	A	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		380	A	
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$		300	A	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		320	A	
$I^2t$	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		615	A <sup>2</sup> s	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		600	A <sup>2</sup> s	
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$		450	A <sup>2</sup> s	
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		425	A <sup>2</sup> s	
$C_J$	junction capacitance	$V_R = 400\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}C$		13	pF	
$P_{GM}$	max. gate power dissipation	$t_p = 30\text{ }\mu s$	$T_C = 150^{\circ}C$		10	W	
		$t_p = 300\text{ }\mu s$			5	W	
$P_{GAV}$	average gate power dissipation				0.5	W	
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 150^{\circ}C; f = 50\text{ Hz}$ repetitive, $I_T = 90\text{ A}$			150	A/ $\mu s$	
		$t_p = 200\text{ }\mu s; di_G/dt = 0.3\text{ A}/\mu s;$ $I_G = 0.3\text{ A}; V = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 30\text{ A}$			500	A/ $\mu s$	
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^{\circ}C$		500	V/ $\mu s$	
		$R_{GK} = \infty$ ; method 1 (linear voltage rise)					
$V_{GT}$	gate trigger voltage	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}C$		1.4	V	
			$T_{VJ} = -40^{\circ}C$		1.7	V	
$I_{GT}$	gate trigger current	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}C$		30	mA	
			$T_{VJ} = -40^{\circ}C$		50	mA	
$V_{GD}$	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^{\circ}C$		0.2	V	
$I_{GD}$	gate non-trigger current				1	mA	
$I_L$	latching current	$t_p = 10\text{ }\mu s$	$T_{VJ} = 25^{\circ}C$		90	mA	
		$I_G = 0.3\text{ A}; di_G/dt = 0.3\text{ A}/\mu s$					
$I_H$	holding current	$V_D = 6\text{ V}$ $R_{GK} = \infty$	$T_{VJ} = 25^{\circ}C$		60	mA	
$t_{gd}$	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}C$		2	$\mu s$	
		$I_G = 0.3\text{ A}; di_G/dt = 0.3\text{ A}/\mu s$					
$t_q$	turn-off time	$V_R = 100\text{ V}; I_T = 30\text{ A}; V = \frac{2}{3} V_{DRM}$ $di/dt = 10\text{ A}/\mu s$ $dv/dt = 20\text{ V}/\mu s$ $t_p = 200\text{ }\mu s$	$T_{VJ} = 125^{\circ}C$		50	$\mu s$	

Package SMPD		Ratings				
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$I_{RMS}$	RMS current	per terminal			100	A
$T_{VJ}$	virtual junction temperature		-55		150	°C
$T_{op}$	operation temperature		-55		125	°C
$T_{stg}$	storage temperature		-55		150	°C
<b>Weight</b>				8.5		g
$F_C$	mounting force with clip		40		130	N
$d_{Spp/App}$	creepage distance on surface / striking distance through air	terminal to terminal	1.6			mm
$d_{Spb/Apb}$		terminal to backside	4.0			mm
$V_{ISOL}$	isolation voltage	t = 1 second t = 1 minute	3000 2500			V V
		50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA				


**Part description**

C = Thyristor (SCR)  
 L = High Efficiency Thyristor  
 E = Semifast (up to 1200V)  
 90 = Current Rating [A]  
 UH = 3- Rectifier Bridge, half-controlled (high-side)  
 1200 = Reverse Voltage [V]  
 T = Thermistor \ Temperature sensor  
 LB = SMPD-B

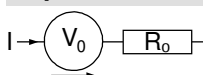
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CLE90UH1200TLB-TUB	CLE90UH1200TLB	Tube	20	517456
Alternative	CLE90UH1200TLB-TRR	CLE90UH1200TLB	Tape & Reel	200	517463

**Temperature Sensor NTC**

Symbol	Definition	Conditions	min.	typ.	max.	Unit
$R_{25}$	resistance	$T_{VJ} = 25^\circ$	4.75	5	5.25	k $\Omega$
$B_{25/50}$	temperature coefficient			3375		K

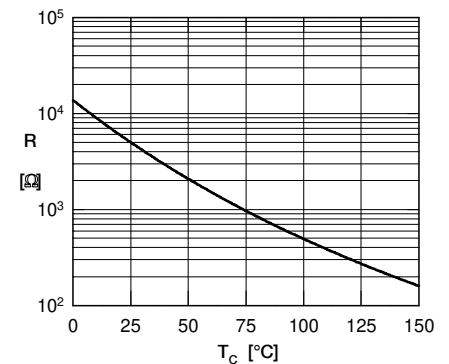
**Equivalent Circuits for Simulation**

\* on die level

 $T_{VJ} = 150^\circ\text{C}$ 


Thyristor

$V_{0\max}$	threshold voltage	0.92				V
$R_{0\max}$	slope resistance *	10.5				m $\Omega$

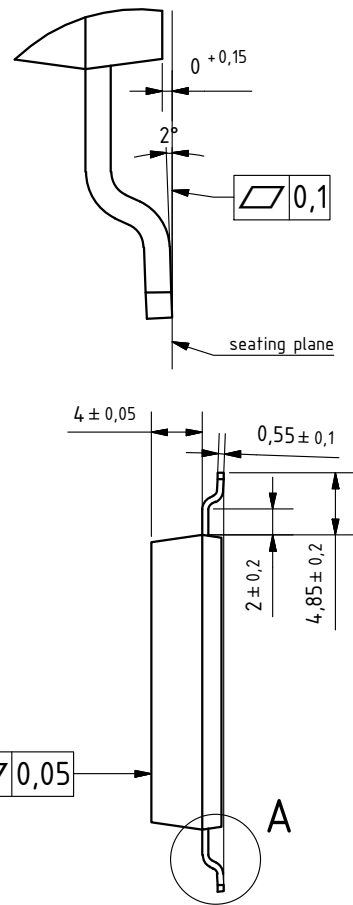
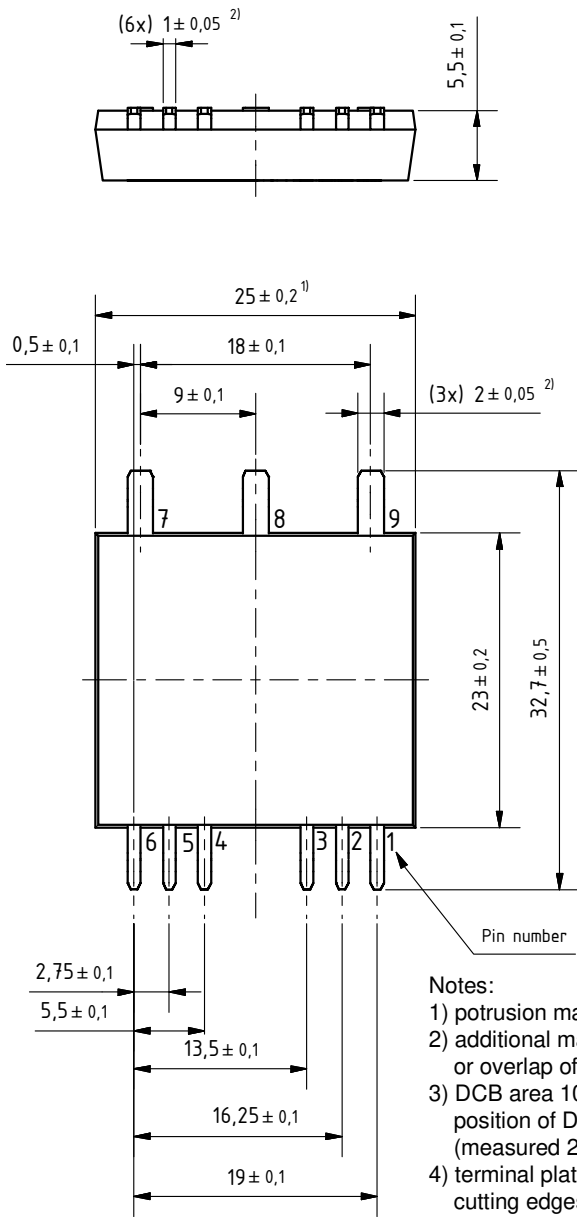


Typ. NTC resistance vs. temperature



Outlines SMPD

A ( 8 : 1 )



Notes:

- 1) protusion may add 0.2 mm max. on each side
- 2) additional max. 0.05 mm per side by punching misalignment or overlap of dam bar or bending compression
- 3) DCB area 10 to 50  $\mu\text{m}$  convex; position of DCB area in relation to plastic rim:  $\pm 25 \mu\text{m}$  (measured 2 mm from Cu rim)
- 4) terminal plating: 0.2 - 1  $\mu\text{m}$  Ni + 10 - 25  $\mu\text{m}$  Sn (gal v.) cutting edges may be partially free of plating

