

High Efficiency Thyristor

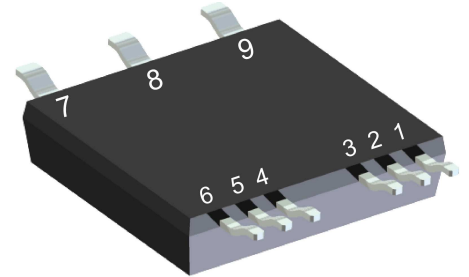
3~ Rectifier	
V_{RRM}	= 1200 V
I_{DAV}	= 90 A
I_{FSM}	= 350 A

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


Part number

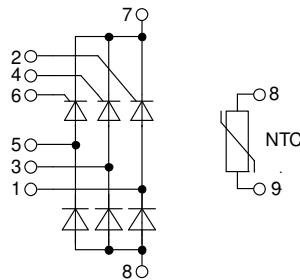
CLE90UH1200TLB

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

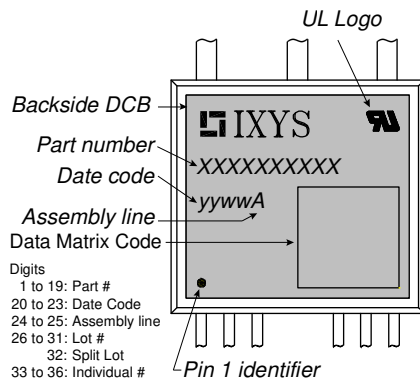
- Isolation Voltage: 3000 V~
- Industry convenient outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

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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	μA
		$V_{R/D} = 1200\text{ V}$	$T_{VJ} = 125^{\circ}C$		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 Ω
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 ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		600	A ² s
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$		450	A ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		425	A ² 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/ μs
		$t_p = 200\text{ }\mu s; di_G/dt = 0.3\text{ A}/\mu s;$ $I_G = 0.3\text{ A}; V = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 30\text{ A}$			500	A/ μs
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$ $R_{GK} = \infty$; method 1 (linear voltage rise)	$T_{VJ} = 150^{\circ}C$		500	V/ μs
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	μs
		$I_G = 0.3\text{ A}; di_G/dt = 0.3\text{ A}/\mu s$				
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	μs

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
Weight				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	3000			V
		t = 1 minute	2500			V


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

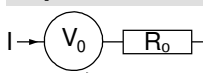
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CLE90UH1200TLB-TUB	CLE90UH1200TLB	Tube	20	517456
Alternative	CLE90UH1200TLB-TRR	CLE90UH1200TLB	Tape & Reel	200	517463

Temperature Sensor NTC

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

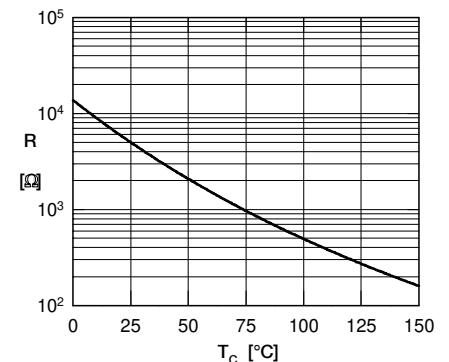
Equivalent Circuits for Simulation

* 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 Ω

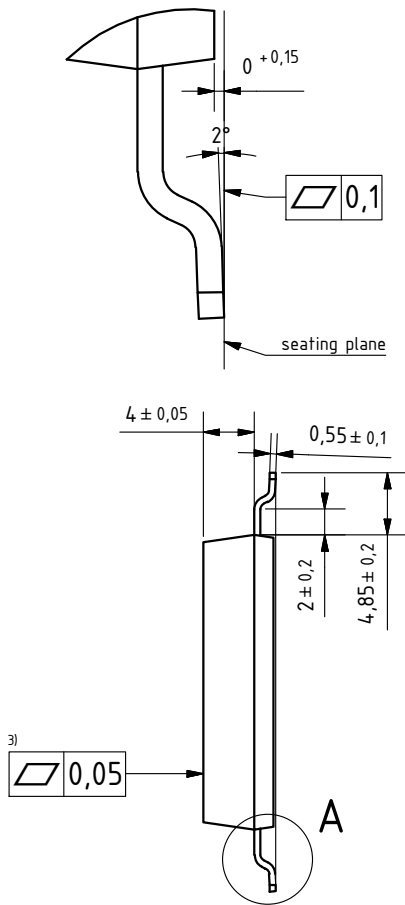
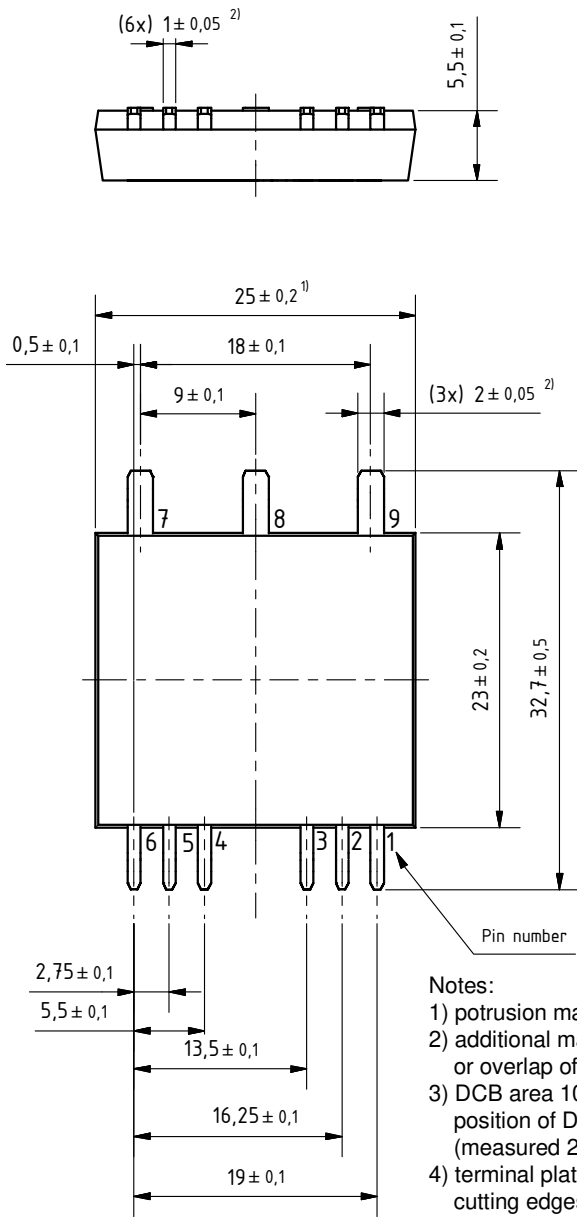


Typ. NTC resistance vs. temperature



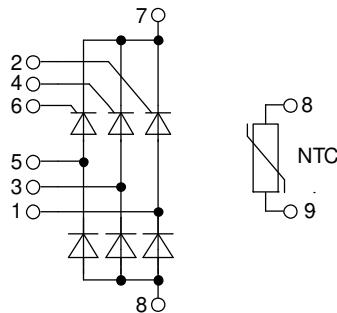
Outlines SMPD

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 μ m convex; position of DCB area in relation to plastic rim: $\pm 25 \mu$ m (measured 2 mm from Cu rim)
- 4) terminal plating: 0.2 - 1 μ m Ni + 10 - 25 μ m Sn (gal v.) cutting edges may be partially free of plating



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[25.326.3553.1](#) [25.330.1653.1](#) [25.330.4753.1](#) [25.330.5253.1](#) [25.334.3253.1](#) [25.334.3353.1](#) [25.350.2053.0](#) [25.352.4753.1](#) [25.522.3253.0](#)
[T483C](#) [T484C](#) [T485F](#) [T485H](#) [T512F-YEB](#) [T513F](#) [T514F](#) [T554](#) [T612FSE](#) [25.161.3453.0](#) [25.179.2253.0](#) [25.194.3253.0](#) [25.325.1253.1](#)
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