

XPT IGBT

tentative

$$V_{CES} = 2 \times 1200V$$

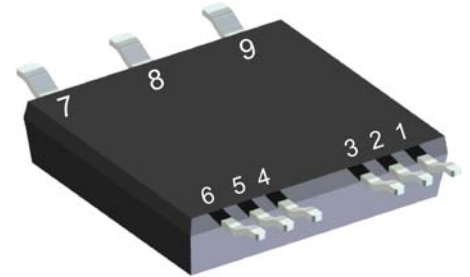
$$I_{C25} = 28A$$

$$V_{CE(sat)} = 1.8V$$

ISOPLUS™
Surface Mount Power Device
Phase leg SCR / IGBT

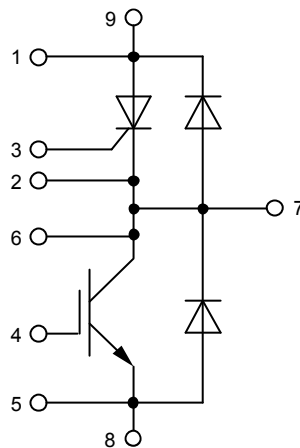
Part number

IXA20PT1200LB



Backside: isolated

E326641



Features / Advantages:

- XPT IGBT
 - low saturation voltage
 - positive temperature coefficient for easy paralleling
 - fast switching
 - short tail current for optimized performance in resonant circuits
- Sonic™ diode
 - fast reverse recovery
 - low operating forward voltage
 - low leakage current
 - low temperature dependency of reverse recovery
- Thyristor

Applications:

- Phaseleg
 - buck-boost chopper
- Full bridge
 - power supplies
 - induction heating
 - four quadrant DC drives
 - controlled rectifier
- Three phase bridge
 - AC drives
 - controlled rectifier

Package: SMPD

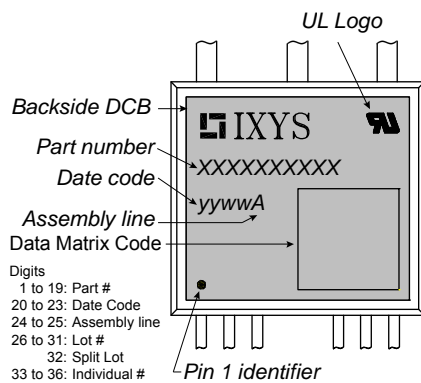
- Isolation Voltage: 3000V~
- Industry convenient outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

IGBT				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit	
V_{CES}	collector emitter voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V	
V_{GES}	max. DC gate voltage				± 20	V	
V_{GEM}	max. transient gate emitter voltage				tbd	V	
I_{C25}	collector current	$T_C = 25^{\circ}\text{C}$			28	A	
I_{C80}		$T_C = 80^{\circ}\text{C}$			20	A	
P_{tot}	total power dissipation	$T_C = 25^{\circ}\text{C}$			100	W	
$V_{CE(sat)}$	collector emitter saturation voltage	$I_C = 15\text{A}; V_{GE} = 15\text{V}$		1.8	2.1	V	
				2		V	
$V_{GE(th)}$	gate emitter threshold voltage	$I_C = 0.6\text{mA}; V_{GE} = V_{CE}$	5.4	5.9	6.5	V	
I_{CES}	collector emitter leakage current	$V_{CE} = V_{CES}; V_{GE} = 0\text{V}$			0.1	mA	
				0.1		mA	
I_{GES}	gate emitter leakage current	$V_{GE} = \pm 20\text{V}$			500	nA	
$Q_{G(on)}$	total gate charge	$V_{CE} = 600\text{V}; V_{GE} = 15\text{V}; I_C = 15\text{A}$		48		nC	
$t_{d(on)}$	turn-on delay time	inductive load $V_{CE} = 600\text{V}; I_C = 15\text{A}$ $V_{GE} = \pm 15\text{V}; R_G = 56\Omega$		70		ns	
t_r	current rise time		$T_{VJ} = 125^{\circ}\text{C}$	40		ns	
$t_{d(off)}$	turn-off delay time		250			ns	
t_f	current fall time		100			ns	
E_{on}	turn-on energy per pulse		1.55			mJ	
E_{off}	turn-off energy per pulse		1.7			mJ	
RBSOA	reverse bias safe operating area	$V_{GE} = \pm 15\text{V}; R_G = 56\Omega$					
I_{CM}		$V_{CEmax} = 1200\text{V}$			45	A	
SCSOA	short circuit safe operating area	$V_{CEmax} = 1200\text{V}$					
t_{sc}	short circuit duration	$V_{CE} = 900\text{V}; V_{GE} = \pm 15\text{V}$			10	μs	
I_{sc}	short circuit current	$R_G = 56\Omega; \text{non-repetitive}$		60		A	
R_{thJC}	thermal resistance junction to case				1.25	K/W	
R_{thCH}	thermal resistance case to heatsink			0.40		K/W	
Diode							
V_{RRM}	max. repetitive reverse voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V	
I_{F25}	forward current	$T_C = 25^{\circ}\text{C}$			32	A	
I_{F80}		$T_C = 80^{\circ}\text{C}$			22	A	
V_F	forward voltage	$I_F = 20\text{A}$			2.24	V	
				1.90		V	
I_R	reverse current	$V_R = V_{RRM}$			0.03	mA	
				0.12		mA	
Q_{rr}	reverse recovery charge	$V_R = 600\text{V}$ $-di_F/dt = 400\text{A}/\mu\text{s}$ $I_F = 20\text{A}; V_{GE} = 0\text{V}$		3		μC	
I_{RM}	max. reverse recovery current		$T_{VJ} = 125^{\circ}\text{C}$	20		A	
t_{rr}	reverse recovery time		350			ns	
E_{rec}	reverse recovery energy		0.7			mJ	
R_{thJC}	thermal resistance junction to case				1.5	K/W	
R_{thCH}	thermal resistance case to heatsink			0.5		K/W	

Thyristor			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1300	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1200	V
I_{RD}	reverse current, drain current	$V_{RD} = 1200 V$	$T_{VJ} = 25^{\circ}C$		50	μA
		$V_{RD} = 1200 V$	$T_{VJ} = 125^{\circ}C$		5	mA
V_T	forward voltage drop	$I_T = 15 A$	$T_{VJ} = 25^{\circ}C$		1.42	V
					1.77	V
		$I_T = 30 A$	$T_{VJ} = 125^{\circ}C$		1.37	V
					1.86	V
I_{TAV}	average forward current	$T_C = 80^{\circ}C$	$T_{VJ} = 150^{\circ}C$		18	A
$I_{T(RMS)}$	RMS forward current	180 sine			28	A
V_{T0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}C$		0.87	V
r_T	slope resistance				32.9	m Ω
R_{thJC}	thermal resistance junction to case				1.7	K/W
R_{thCH}	thermal resistance case to heatsink			0.57		K/W
P_{tot}	total power dissipation		$T_C = 25^{\circ}C$		74	W
I_{TSM}	max. forward surge current	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$	$V_R = 0 V$	200	A
					215	A
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$	$V_R = 0 V$	170	A
					185	A
I^2t	value for fusing	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$	$V_R = 0 V$	200	A ² s
					190	A ² s
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$	$V_R = 0 V$	145	A ² s
					140	A ² s
C_j	junction capacitance	$V_R = 0 V \quad f = 1 \text{ MHz}$	$T_{VJ} = 25^{\circ}C$		0	pF
P_{GM}	max. gate power dissipation	$t_p = 30 \mu s$ $t_p = 300 \mu s$	$T_C = 150^{\circ}C$		10	W
					5	W
P_{GAV}	average gate power dissipation				0.5	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 125^{\circ}C; f = 50 \text{ Hz}$	repetitive, $I_T = 20 A$		100	A/ μs
				$t_p = 200 \mu s; di_G/dt = 0.3 A/\mu s;$ $I_G = 0.3 A; V_D = \frac{2}{3} V_{DRM}$	non-repet., $I_T = 20 A$	500
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V_D = \frac{2}{3} V_{DRM}$ $R_{GK} = \infty; \text{ method 1 (linear voltage rise)}$	$T_{VJ} = 125^{\circ}C$		500	V/ μs
V_{GT}	gate trigger voltage	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$		1.5	V
			$T_{VJ} = -40^{\circ}C$		2.5	V
I_{GT}	gate trigger current	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$		25	mA
			$T_{VJ} = -40^{\circ}C$		50	mA
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}C$		0.2	V
I_{GD}	gate non-trigger current				4	mA
I_L	latching current	$t_p = 10 \mu s$ $I_G = 0.3 A; di_G/dt = 0.3 A/\mu s$	$T_{VJ} = 25^{\circ}C$		75	mA
I_H	holding current	$V_D = 6 V \quad R_{GK} = \infty$	$T_{VJ} = 25^{\circ}C$		50	mA
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$ $I_G = 0.3 A; di_G/dt = 0.3 A/\mu s$	$T_{VJ} = 25^{\circ}C$		2	μs
t_q	turn-off time	$V_R = 100 V; I_T = 20 A; V_D = \frac{2}{3} V_{DRM}$ $di/dt = 10 A/\mu s; dv/dt = 20 V/\mu s; t_p = 200 \mu s$	$T_{VJ} = 150^{\circ}C$		40	μs

tentative

Package SMPD		Ratings				
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			100	A
T_{stg}	storage temperature		-55		150	°C
T_{VJ}	virtual junction 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 number

- I = IGBT
- X = XPT IGBT
- A = Gen 1 / std
- 20 = Current Rating [A]
- PT = Phase leg SCR / IGBT
- 1200 = Reverse Voltage [V]
- LB = SMPD-B

Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	IXA20PT1200LB	IXA20PT1200LB	Blister	45	
			Tape & Reel	200	

Equivalent Circuits for Simulation

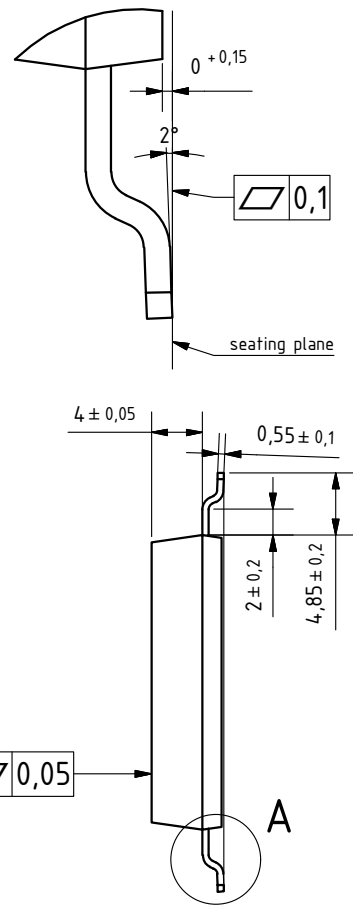
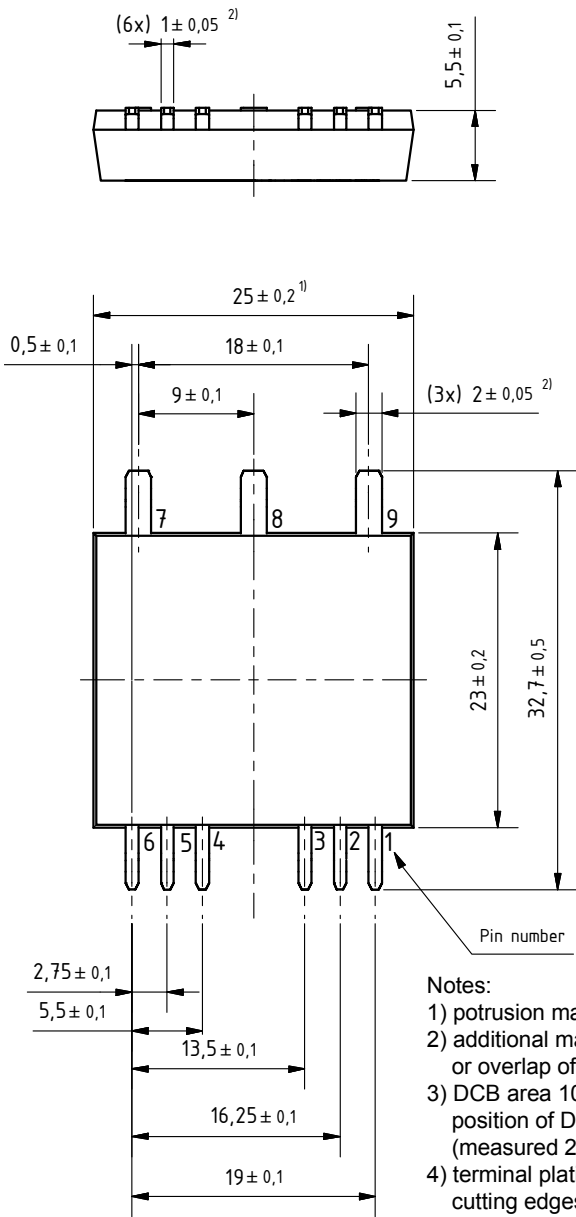
* on die level

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

Circuit		Thyristor	IGBT	Diode
I	V_0 — R_0			
$V_{0\ max}$	threshold voltage	0.87	1.1	1.2 V
$R_{0\ max}$	slope resistance *	32.9	90	45 mΩ

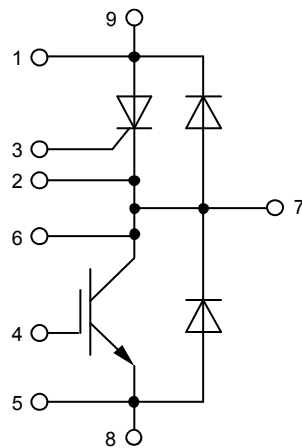
Outlines SMPD

A (8 : 1)



Notes:

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





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