

# XPT IGBT

tentative

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

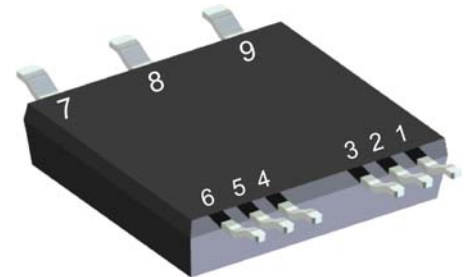
$$I_{C25} = 28A$$

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

ISOPLUS™  
Surface Mount Power Device  
Phase leg SCR / IGBT

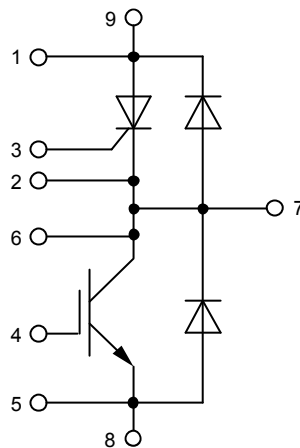
Part number

**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

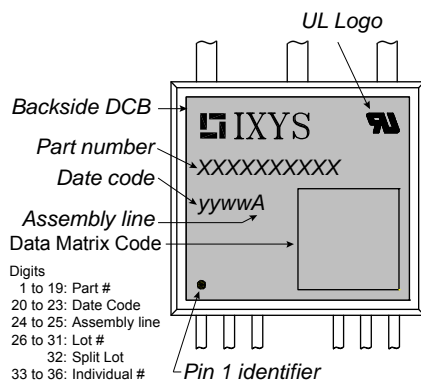
- Isolation Voltage: 3000V~
- Industry convenient outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

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				$\pm 20$	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	
<b>RBSOA</b>	reverse bias safe operating area	$V_{GE} = \pm 15\text{V}; R_G = 56\Omega$					
$I_{CM}$		$V_{CEmax} = 1200\text{V}$			45	A	
<b>SCSOA</b>	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	$\mu\text{s}$	
$I_{sc}$	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	
<b>Diode</b>							
$V_{RRM}$	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		$\mu\text{C}$	
$I_{RM}$	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	$T_{VJ} = 25^{\circ}\text{C}$			1300	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$			1200	V
$I_{RD}$	reverse current, drain current	$V_{RD} = 1200\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$		50	$\mu\text{A}$
		$V_{RD} = 1200\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$		5	mA
$V_T$	forward voltage drop	$I_T = 15\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$		1.42	V
		$I_T = 30\text{ A}$			1.77	V
		$I_T = 15\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$		1.37	V
		$I_T = 30\text{ A}$			1.86	V
$I_{TAV}$	average forward current	$T_C = 80^{\circ}\text{C}$	$T_{VJ} = 150^{\circ}\text{C}$		18	A
$I_{T(RMS)}$	RMS forward current	180 sine			28	A
$V_{T0}$	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}\text{C}$		0.87	V
$r_T$	slope resistance				32.9	m $\Omega$
$R_{thJC}$	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		$T_C = 25^{\circ}\text{C}$		74	W
$I_{TSM}$	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$		200	A
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		215	A
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$		170	A
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		185	A
$I^2t$	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$		200	A <sup>2</sup> s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		190	A <sup>2</sup> s
		$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$		145	A <sup>2</sup> s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$V_R = 0\text{ V}$		140	A <sup>2</sup> s
$C_j$	junction capacitance	$V_R = 0\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		0	pF
$P_{GM}$	max. gate power dissipation	$t_p = 30\text{ }\mu\text{s}$	$T_C = 150^{\circ}\text{C}$		10	W
		$t_p = 300\text{ }\mu\text{s}$			5	W
$P_{GAV}$	average gate power dissipation				0.5	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 125^{\circ}\text{C}; f = 50\text{ Hz}$ repetitive, $I_T = 20\text{ A}$			100	A/ $\mu\text{s}$
		$t_p = 200\text{ }\mu\text{s}; di_G/dt = 0.3\text{ A}/\mu\text{s};$ $I_G = 0.3\text{ A}; V_D = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 20\text{ A}$			500	A/ $\mu\text{s}$
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V_D = \frac{2}{3} V_{DRM}$ $R_{GK} = \infty$ ; method 1 (linear voltage rise)	$T_{VJ} = 125^{\circ}\text{C}$		500	V/ $\mu\text{s}$
$V_{GT}$	gate trigger voltage	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$		1.5	V
			$T_{VJ} = -40^{\circ}\text{C}$		2.5	V
$I_{GT}$	gate trigger current	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$		25	mA
			$T_{VJ} = -40^{\circ}\text{C}$		50	mA
$V_{GD}$	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}\text{C}$		0.2	V
$I_{GD}$	gate non-trigger current				4	mA
$I_L$	latching current	$t_p = 10\text{ }\mu\text{s}$	$T_{VJ} = 25^{\circ}\text{C}$		75	mA
		$I_G = 0.3\text{ A}; di_G/dt = 0.3\text{ A}/\mu\text{s}$				
$I_H$	holding current	$V_D = 6\text{ V}$ $R_{GK} = \infty$	$T_{VJ} = 25^{\circ}\text{C}$		50	mA
$t_{gd}$	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}\text{C}$		2	$\mu\text{s}$
		$I_G = 0.3\text{ A}; di_G/dt = 0.3\text{ A}/\mu\text{s}$				
$t_q$	turn-off time	$V_R = 100\text{ V}; I_T = 20\text{ A}; V_D = \frac{2}{3} V_{DRM}$ $di/dt = 10\text{ A}/\mu\text{s}; dv/dt = 20\text{ V}/\mu\text{s}; t_p = 200\text{ }\mu\text{s}$	$T_{VJ} = 150^{\circ}\text{C}$		40	$\mu\text{s}$

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
<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	3000			V
		t = 1 minute	2500			V



### Part number

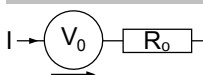
I = IGBT  
 X = XPT IGBT  
 A = Gen 1 / std  
 20 = Current Rating [A]  
 PT = Phase leg SCR / IGBT  
 1200 = Reverse Voltage [V]  
 LB = SMPD-B

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

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



	Thyristor	IGBT	Diode	
$V_{0\ max}$	0.87	1.1	1.2	V
$R_{0\ max}$	32.9	90	45	mΩ

**Outlines SMPD**

**A ( 8 : 1 )**

