

# XPT IGBT

preliminary

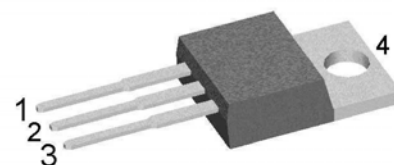
$$V_{CES} = 1200V$$

$$I_{C25} = 38A$$

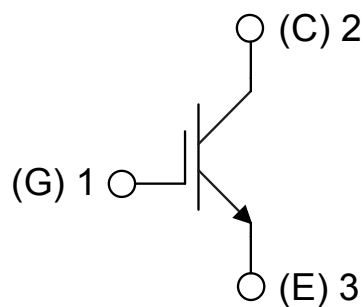
$$V_{CE(sat)} = 1.8V$$

## Single IGBT

Part number

**IXA20I1200PB**


Backside: collector



### Features / Advantages:

- Easy paralleling due to the positive temperature coefficient of the on-state voltage
- Rugged XPT design (Xtreme light Punch Through) results in:
  - short circuit rated for 10  $\mu$ sec.
  - very low gate charge
  - low EMI
  - square RBSOA @ 3x  $I_C$
- Thin wafer technology combined with the XPT design results in a competitive low  $V_{CE(sat)}$

### Applications:

- AC motor drives
- Solar inverter
- Medical equipment
- Uninterruptible power supply
- Air-conditioning systems
- Welding equipment
- Switched-mode and resonant-mode power supplies
- Inductive heating, cookers
- Pumps, Fans

### Package: TO-220

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

| IGBT                 |                                      |                                                                                                                    |                         | Ratings |      |      |      |
|----------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------|-------------------------|---------|------|------|------|
| Symbol               | Definition                           | Conditions                                                                                                         |                         | min.    | typ. | max. | Unit |
| V <sub>CES</sub>     | collector emitter voltage            | T <sub>VJ</sub> = 25°C                                                                                             |                         |         |      | 1200 | V    |
| V <sub>GES</sub>     | max. DC gate voltage                 |                                                                                                                    |                         |         |      | ±20  | V    |
| V <sub>GEM</sub>     | max. transient gate emitter voltage  |                                                                                                                    |                         |         |      | ±30  | V    |
| I <sub>C25</sub>     | collector current                    | T <sub>C</sub> = 25°C                                                                                              |                         |         |      | 38   | A    |
| I <sub>C80</sub>     |                                      | T <sub>C</sub> = 80°C                                                                                              |                         |         |      | 22   | A    |
| P <sub>tot</sub>     | total power dissipation              | T <sub>C</sub> = 25°C                                                                                              |                         |         |      | 165  | W    |
| V <sub>CE(sat)</sub> | collector emitter saturation voltage | I <sub>C</sub> = 15A; V <sub>GE</sub> = 15 V                                                                       | T <sub>VJ</sub> = 25°C  |         | 1.8  | 2.1  | V    |
|                      |                                      |                                                                                                                    | T <sub>VJ</sub> = 125°C |         | 2.1  |      | V    |
| V <sub>GE(th)</sub>  | gate emitter threshold voltage       | I <sub>C</sub> = 0.6mA; V <sub>GE</sub> = V <sub>CE</sub>                                                          | T <sub>VJ</sub> = 25°C  | 5.4     | 5.9  | 6.5  | V    |
| I <sub>CES</sub>     | collector emitter leakage current    | V <sub>CE</sub> = V <sub>CES</sub> ; V <sub>GE</sub> = 0 V                                                         | T <sub>VJ</sub> = 25°C  |         |      | 0.1  | mA   |
|                      |                                      |                                                                                                                    | T <sub>VJ</sub> = 125°C |         | 0.1  |      | mA   |
| I <sub>GES</sub>     | gate emitter leakage current         | V <sub>GE</sub> = ±20 V                                                                                            |                         |         |      | 500  | nA   |
| Q <sub>G(on)</sub>   | total gate charge                    | V <sub>CE</sub> = 600 V; V <sub>GE</sub> = 15 V; I <sub>C</sub> = 15 A                                             |                         |         | 47   |      | nC   |
| t <sub>d(on)</sub>   | turn-on delay time                   | } inductive load<br>V <sub>CE</sub> = 600V; I <sub>C</sub> = 15A<br>V <sub>GE</sub> = ±15 V; R <sub>G</sub> = 56 Ω | T <sub>VJ</sub> = 125°C |         | 70   |      | ns   |
| t <sub>r</sub>       | current rise time                    |                                                                                                                    |                         |         | 40   |      | ns   |
| t <sub>d(off)</sub>  | turn-off delay time                  |                                                                                                                    |                         |         | 250  |      | ns   |
| t <sub>f</sub>       | current fall time                    |                                                                                                                    |                         |         | 100  |      | ns   |
| E <sub>on</sub>      | turn-on energy per pulse             |                                                                                                                    |                         |         | 1.65 |      | mJ   |
| E <sub>off</sub>     | turn-off energy per pulse            |                                                                                                                    |                         |         | 1.7  |      | mJ   |
| RBSOA                | reverse bias safe operating area     | V <sub>GE</sub> = ±15 V; R <sub>G</sub> = 56 Ω                                                                     | T <sub>VJ</sub> = 125°C |         |      |      |      |
| I <sub>CM</sub>      |                                      | V <sub>CEmax</sub> = 1200V                                                                                         |                         |         |      | 45   | A    |
| SCSOA                | short circuit safe operating area    | V <sub>CEmax</sub> = 900 V                                                                                         |                         |         |      |      |      |
| t <sub>sc</sub>      | short circuit duration               | V <sub>CE</sub> = 900 V; V <sub>GE</sub> = ±15 V                                                                   | T <sub>VJ</sub> = 125°C |         |      | 10   | μs   |
| I <sub>sc</sub>      | short circuit current                | R <sub>G</sub> = 56 Ω; non-repetitive                                                                              |                         |         | 60   |      | A    |
| R <sub>thJC</sub>    | thermal resistance junction to case  |                                                                                                                    |                         |         |      | 0.76 | K/W  |
| R <sub>thCH</sub>    | thermal resistance case to heatsink  |                                                                                                                    |                         |         | 0.50 |      | K/W  |

preliminary

| Package TO-220 |                              |              | Ratings |      |      |      |
|----------------|------------------------------|--------------|---------|------|------|------|
| Symbol         | Definition                   | Conditions   | min.    | typ. | max. | Unit |
| $I_{RMS}$      | RMS current                  | per terminal |         |      | 35   | A    |
| $T_{VJ}$       | virtual junction temperature |              | -40     |      | 150  | °C   |
| $T_{op}$       | operation temperature        |              | -40     |      | 125  | °C   |
| $T_{stg}$      | storage temperature          |              | -40     |      | 150  | °C   |
| Weight         |                              |              |         | 2    |      | g    |
| $M_D$          | mounting torque              |              | 0.4     |      | 0.6  | Nm   |
| $F_C$          | mounting force with clip     |              | 20      |      | 60   | N    |

### Product Marking



### Part number

I = IGBT  
 X = XPT IGBT  
 A = Gen 1 / std  
 20 = Current Rating [A]  
 I = Single IGBT  
 1200 = Reverse Voltage [V]  
 PB = TO-220AB (3)

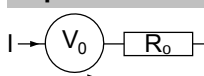
| Ordering | Part Number  | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|--------------|--------------------|---------------|----------|----------|
| Standard | IXA20I1200PB | IXA20I1200PB       | Tube          | 50       | 507929   |

| Similar Part  | Package      | Voltage class |
|---------------|--------------|---------------|
| IXA20IF1200HB | TO-247AD (3) | 1200          |

### Equivalent Circuits for Simulation

\* on die level

$T_{VJ} = 150\text{ °C}$



IGBT

$V_{0\max}$  threshold voltage

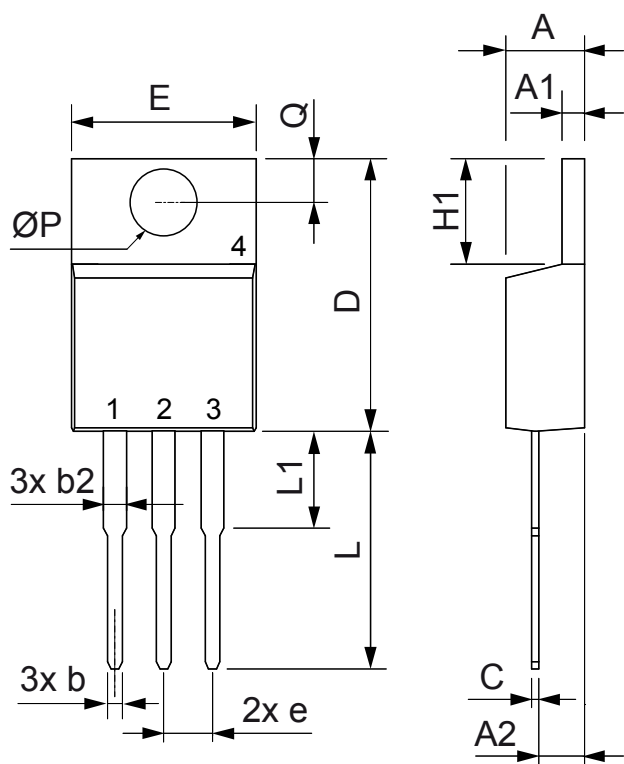
1.1

V

$R_{0\max}$  slope resistance \*

86

mΩ

**Outlines TO-220**


| Dim.            | Millimeter |       | Inches |       |
|-----------------|------------|-------|--------|-------|
|                 | Min.       | Max.  | Min.   | Max.  |
| A               | 4.32       | 4.82  | 0.170  | 0.190 |
| A1              | 1.14       | 1.39  | 0.045  | 0.055 |
| A2              | 2.29       | 2.79  | 0.090  | 0.110 |
| b               | 0.64       | 1.01  | 0.025  | 0.040 |
| b2              | 1.15       | 1.65  | 0.045  | 0.065 |
| C               | 0.35       | 0.56  | 0.014  | 0.022 |
| D               | 14.73      | 16.00 | 0.580  | 0.630 |
| E               | 9.91       | 10.66 | 0.390  | 0.420 |
| e               | 2.54       | BSC   | 0.100  | BSC   |
| H1              | 5.85       | 6.85  | 0.230  | 0.270 |
| L               | 12.70      | 13.97 | 0.500  | 0.550 |
| L1              | 2.79       | 5.84  | 0.110  | 0.230 |
| $\varnothing P$ | 3.54       | 4.08  | 0.139  | 0.161 |
| Q               | 2.54       | 3.18  | 0.100  | 0.125 |

