

# XPT IGBT

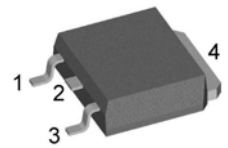
|               |   |             |
|---------------|---|-------------|
|               |   | preliminary |
| $V_{CES}$     | = | 1200V       |
| $I_{C25}$     | = | 9A          |
| $V_{CE(sat)}$ | = | 1.8V        |

Copack

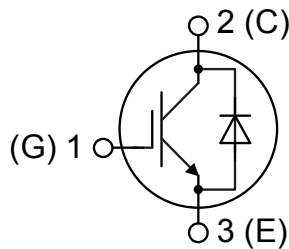
**Part number**

**IXA4IF1200UC**

Marking on Product: X4TAUF



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 Ic
- Thin wafer technology combined with the XPT design results in a competitive low VCE(sat)
- SONIC™ diode
  - fast and soft reverse recovery
  - low operating forward voltage

**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-252 (DPak)

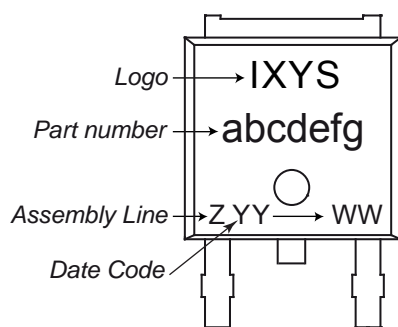
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

| 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    |   |                                |         | $\pm 30$ | V             |  |
| $I_{C25}$     | collector current                      | $T_C = 25^{\circ}\text{C}$  |                                |         | 9        | A             |  |
| $I_{C100}$    |  | $T_C = 100^{\circ}\text{C}$   |                                |         | 5        | A             |  |
| $P_{tot}$     | total power dissipation                | $T_C = 25^{\circ}\text{C}$  |                                |         | 45       | W             |  |
| $V_{CE(sat)}$ | collector emitter saturation voltage   | $I_C = 3\text{A}; V_{GE} = 15\text{V}$  |                                | 1.8     | 2.1      | V             |  |
|               |  |   |                                | 2.1     |          | V             |  |
| $V_{GE(th)}$  | gate emitter threshold voltage         | $I_C = 0.1\text{mA}; V_{GE} = V_{CE}$   | 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                      | $V_{CE} = 600\text{V}; V_{GE} = 15\text{V}; I_C = 3\text{A}$  |                                | 12      |          | nC            |  |
| $t_{d(on)}$   | turn-on delay time                     | inductive load<br>$V_{CE} = 600\text{V}; I_C = 3\text{A}$<br>$V_{GE} = \pm 15\text{V}; R_G = 330\Omega$ |                                | 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               |   | 0.4                            |         |          | mJ            |  |
| $E_{off}$     | turn-off energy per pulse              |   | 0.3                            |         |          | mJ            |  |
| <b>RBSOA</b>  | reverse bias safe operating area       | $V_{GE} = \pm 15\text{V}; R_G = 330\Omega$  |                                |         |          |               |  |
| $I_{CM}$      |  | $V_{CEmax} = 1200\text{V}$  |                                |         | 9        | A             |  |
| <b>SCSOA</b>  | short circuit safe operating area      | $V_{CEmax} = 900\text{V}$   |                                |         |          |               |  |
| $t_{sc}$      | short circuit duration                 | $V_{CE} = 900\text{V}; V_{GE} = \pm 15\text{V}$   |                                |         | 10       | $\mu\text{s}$ |  |
| $I_{sc}$      | short circuit current                  | $R_G = 330\Omega; \text{non-repetitive}$  |                                | 12      |          | A             |  |
| $R_{thJC}$    | thermal resistance junction to case    |   |                                |         | 2.7      | K/W           |  |
| $R_{thCH}$    | thermal resistance case to heatsink    |   |                                | 0.50    |          | K/W           |  |
| <b>Diode</b>  |  |   |                                |         |          |               |  |
| $V_{RRM}$     | max. repetitive reverse voltage        | $T_{VJ} = 25^{\circ}\text{C}$   |                                |         | 1200     | V             |  |
| $I_{F25}$     | forward current                        | $T_C = 25^{\circ}\text{C}$  |                                |         | 10       | A             |  |
| $I_{F100}$    |  | $T_C = 100^{\circ}\text{C}$   |                                |         | 6        | A             |  |
| $V_F$         | forward voltage                        | $I_F = 3\text{A}$   |                                |         | 2.20     | V             |  |
|               |  |   |                                | 1.90    |          | V             |  |
| $I_R$         | reverse current                        | $V_R = V_{RRM}$   |                                |         | *        | mA            |  |
|               | * not applicable, see Ices value above |   |                                |         | *        | mA            |  |
| $Q_{rr}$      | reverse recovery charge                | $V_R = 600\text{V}$<br>$-di_F/dt = -150\text{A}/\mu\text{s}$<br>$I_F = 3\text{A}; V_{GE} = 0\text{V}$   |                                | 0.5     |          | $\mu\text{C}$ |  |
| $I_{RM}$      | max. reverse recovery current          |   | $T_{VJ} = 125^{\circ}\text{C}$ | 5       |          | A             |  |
| $t_{rr}$      | reverse recovery time                  |   | 350                            |         |          | ns            |  |
| $E_{rec}$     | reverse recovery energy                |   | 0.1                            |         |          | mJ            |  |
| $R_{thJC}$    | thermal resistance junction to case    |   |                                |         | 3        | K/W           |  |
| $R_{thCH}$    | thermal resistance case to heatsink    |   |                                | 0.50    |          | K/W           |  |

preliminary

| Package TO-252 (DPak) |                              |              | Ratings |      |      |      |
|-----------------------|------------------------------|--------------|---------|------|------|------|
| Symbol                | Definition                   | Conditions   | min.    | typ. | max. | Unit |
| $I_{RMS}$             | RMS current                  | per terminal |         |      | 20   | A    |
| $T_{VJ}$              | virtual junction temperature |              | -40     |      | 150  | °C   |
| $T_{op}$              | operation temperature        |              | -40     |      | 125  | °C   |
| $T_{stg}$             | storage temperature          |              | -40     |      | 150  | °C   |
| <b>Weight</b>         |                              |              |         | 0.3  |      | g    |
| $F_C$                 | mounting force with clip     |              | 20      |      | 60   | N    |

### Product Marking



### Part number

- I = IGBT
- X = XPT IGBT
- A = Gen 1 / std
- 4 = Current Rating [A]
- IF = Copack
- 1200 = Reverse Voltage [V]
- UC = TO-252AA (DPak)

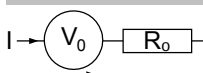
| Ordering | Part Number  | Marking on Product | Delivery Mode | Quantity | Code No. |
|----------|--------------|--------------------|---------------|----------|----------|
| Standard | IXA4IF1200UC | X4TAUF             | Tape & Reel   | 2500     | 510217   |

| Similar Part | Package              | Voltage class |
|--------------|----------------------|---------------|
| IXA4IF1200TC | TO-268AA (D3Pak) (2) | 1200          |

### Equivalent Circuits for Simulation

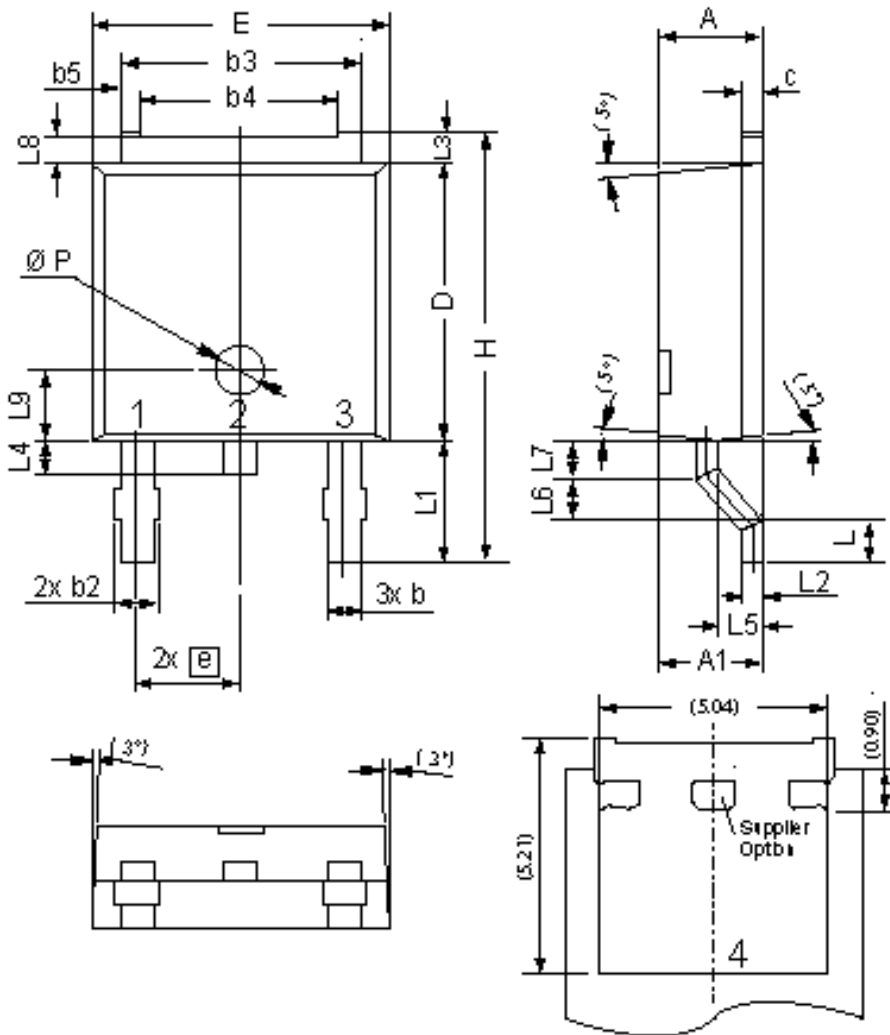
\* on die level

$T_{VJ} = 150\text{ °C}$

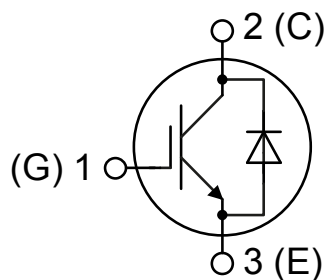


|              | IGBT | Diode |    |
|--------------|------|-------|----|
| $V_{0\ max}$ | 1.1  | 1.25  | V  |
| $R_{0\ max}$ | 460  | 280   | mΩ |

## Outlines TO-252 (DPak)



| Dim | Millimeters |       | Inches    |       |
|-----|-------------|-------|-----------|-------|
|     | min         | max   | min       | max   |
| A   | 2.20        | 2.40  | 0.087     | 0.094 |
| A1  | 2.10        | 2.50  | 0.083     | 0.098 |
| b   | 0.66        | 0.86  | 0.026     | 0.034 |
| b2  | -           | 0.96  | -         | 0.038 |
| b3  | 5.04        | 5.64  | 0.198     | 0.222 |
| b4  | 4.34 BSC    |       | 0.171 BSC |       |
| b5  | 0.50 BSC    |       | 0.020 BSC |       |
| c   | 0.40        | 0.86  | 0.016     | 0.034 |
| D   | 5.90        | 6.30  | 0.232     | 0.248 |
| E   | 6.40        | 6.80  | 0.252     | 0.268 |
| e   | 2.10        | 2.50  | 0.083     | 0.098 |
| H   | 9.20        | 10.10 | 0.362     | 0.398 |
| L   | 0.55        | 1.28  | 0.022     | 0.050 |
| L1  | 2.50        | 2.90  | 0.098     | 0.114 |
| L2  | 0.40        | 0.60  | 0.016     | 0.024 |
| L3  | 0.50        | 0.90  | 0.020     | 0.035 |
| L4  | 0.60        | 1.00  | 0.024     | 0.039 |
| L5  | 0.82        | 1.22  | 0.032     | 0.048 |
| L6  | 0.79        | 0.99  | 0.031     | 0.039 |
| L7  | 0.81        | 1.01  | 0.032     | 0.040 |
| L8  | 0.40        | 0.80  | 0.016     | 0.031 |
| L9  | 1.50 BSC    |       | 0.059 BSC |       |
| Ø P | 1.00 BSC    |       | 0.039 BSC |       |





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