

XPT IGBT

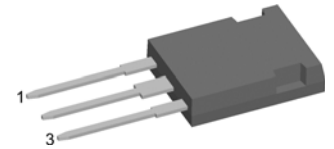
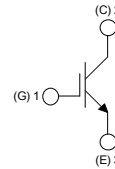
Single IGBT

$$I_{C25} = 84 \text{ A}$$

$$V_{CES} = 1200 \text{ V}$$

$$V_{CE(sat)typ} = 1.8 \text{ V}$$

Part number

IXA55I1200HJ

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 μ 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

Package:

- Housing: ISOPLUS247
- Industry standard outline
- DCB isolated backside
- Isolation Voltage 3000 V
- Epoxy meets UL 94V-0
- RoHS compliant

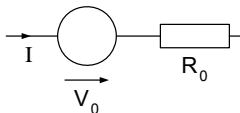
IGBT
Ratings

| Symbol | Definition | Conditions | Ratings | | | Unit |
|---------------|--------------------------------------|--|---------|------|----------|---------|
| | | | min. | typ. | max. | |
| V_{CES} | Collector emitter voltage | $V_{GE} = 0 \text{ V}$ | | | 1200 | V |
| V_{GES} | Maximum DC gate voltage | | | | ± 20 | V |
| I_{C25} | Collector current | | | | 84 | A |
| I_{C90} | | | | | 54 | A |
| P_{tot} | Total power dissipation | | | | 290 | W |
| 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 | $V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$ | | | 500 | nA |
| $V_{CE(sat)}$ | Collector emitter saturation voltage | $I_C = 55 \text{ A}; V_{GE} = 15 \text{ V}$ | | 1.8 | 2.1 | V |
| | | | | 2.1 | | V |
| $V_{GE(th)}$ | Gate emitter threshold voltage | $I_C = 2 \text{ mA}; V_{GE} = V_{CE}$ | 5.5 | 6 | 6.5 | V |
| Q_{Gon} | Total gate charge | $V_{CE} = 600 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 50 \text{ A}$ | | 190 | | nC |
| $t_{d(on)}$ | Turn-on delay time | | | 70 | | ns |
| t_r | Current rise time | | | 40 | | ns |
| $t_{d(off)}$ | Turn-off delay time | Inductive load | | 250 | | ns |
| t_f | Current fall time | $V_{CE} = 600 \text{ V}; I_C = 50 \text{ A}$ | | 100 | | ns |
| E_{on} | Turn-on energy per pulse | $V_{GE} = \pm 15 \text{ V}; R_G = 15 \Omega$ | | 4.5 | | mJ |
| E_{off} | Turn-off energy per pulse | | | 5.5 | | mJ |
| RBSOA | Reverse bias safe operation area | $V_{GE} = 15 \text{ V}; R_G = 15 \Omega$ $V_{CEK} = 1200 \text{ V}$ | | | 150 | A |
| SCSOA | Short circuit safe operation area | | | | | |
| t_{sc} | Short circuit duration | $V_{CE} = 900 \text{ V}; V_{GE} = \pm 15 \text{ V}$ | | | 10 | μ s |
| I_{sc} | Short circuit current | $R_G = 15 \Omega$; non-repetitive | | | 200 | A |
| R_{thJC} | Thermal resistance junction to case | | | | 0.43 | K/W |

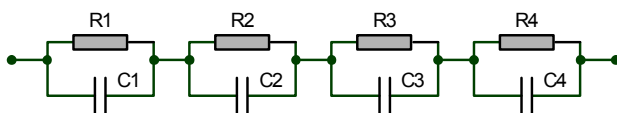
Diode

| Symbol | Definition | Conditions | Ratings | | | Unit |
|----------------|-------------------------------------|---|---------|------|------|---------------|
| | | | min. | typ. | max. | |
| I_{F25} | Forward current | $T_C = 25^\circ\text{C}$ | | | n/a | A |
| I_{F90} | | $T_C = 90^\circ\text{C}$ | | | n/a | A |
| V_F | Forward voltage | $I_F = \quad \text{A}$ | | | n/a | V |
| | | | | | n/a | V |
| Q_{rr} | Reverse recovery charge | $V_R = 600\text{V};$ | | | n/a | μC |
| I_{RM} | Maximum reverse recovery current | $di_F/dt = - \quad \text{A}/\mu\text{s};$ | | | n/a | A |
| t_{rr} | Reverse recovery time | $I_F = \quad \text{A}$ | | | n/a | ns |
| $E_{rec(off)}$ | Reverse recovery losses at turn-off | | | | n/a | mJ |
| R_{thJC} | Thermal resistance junction to case | | | | n/a | K/W |

Equivalent Circuits for Simulation



| Symbol | Definition | | Ratings | | | Unit |
|--------|------------|------------------------------|---------|------|------|------------|
| | | | min. | typ. | max. | |
| V_0 | IGBT | $T_{VJ} = 150^\circ\text{C}$ | | | 1.1 | V |
| R_0 | | | | | 28 | m Ω |
| V_0 | Diode | $T_{VJ} = 150^\circ\text{C}$ | | | n/a | V |
| R_0 | | | | | n/a | m Ω |



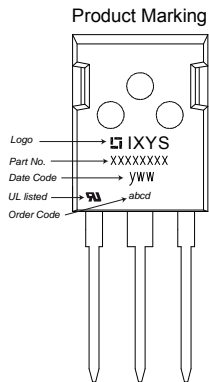
$$Z_{th}(t) = \sum_{i=1}^n \left[R_i \cdot \left(1 - \exp\left(-\frac{t}{\tau_i}\right) \right) \right]$$

$$\tau_i = R_i \cdot C_i$$

| | IGBT | Diode |
|----------|--------|-------|
| R_1 | 0.1 | n/a |
| R_2 | 0.05 | n/a |
| R_3 | 0.21 | n/a |
| R_4 | 0.07 | n/a |
| τ_1 | 0.0025 | n/a |
| τ_2 | 0.03 | n/a |
| τ_3 | 0.03 | n/a |
| τ_4 | 0.08 | n/a |

Package ISOPLUS247

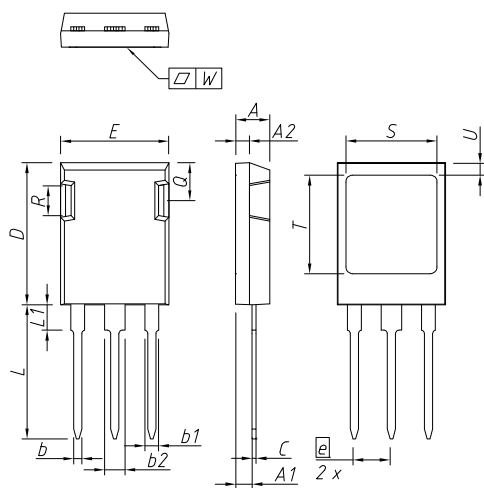
| Symbol | Definition | Conditions | Ratings | | | Unit |
|---------------|-------------------------------------|--------------|---------|------|------|------|
| | | | min. | typ. | max. | |
| T_{vj} | Virtual junction temperature | | -55 | | 150 | °C |
| T_{stg} | Storage temperature | | -55 | | 150 | °C |
| R_{thCH} | Thermal resistance case to heatsink | | | 0.25 | | K/W |
| Weight | | | | 6 | | g |
| F_C | Mounting force with clip | | 20 | | 120 | N |
| V_{ISOL} | Isolation voltage | t = 1 second | 3600 | | | V |
| | | t = 1 minute | 3000 | | | V |
| d_s | Creepage distance on surface | | | | | mm |
| d_A | Striking distance through air | | | | | mm |



Part number

I = IGBT
 X = XPT IGBT
 A = Gen 1 / std
 55 = Current Rating [A]
 I = Single IGBT
 1200 = Reverse Voltage [V]
 HJ = ISOPLUS247 (3)

| Ordering | Part Name | Marking on Product | Delivering Mode | Base Qty | Code Key |
|----------|------------------|--------------------|-----------------|----------|----------|
| Standard | IXA 55 I 1200 HJ | IXA55I1200HJ | | | |



| DIM. | MILLIMETER | | INCHES | |
|------|------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4,83 | 5,21 | 0,190 | 0,205 |
| A1 | 2,29 | 2,54 | 0,090 | 0,100 |
| A2 | 1,91 | 2,16 | 0,075 | 0,085 |
| b | 1,14 | 1,40 | 0,045 | 0,055 |
| b1 | 1,91 | 2,15 | 0,075 | 0,085 |
| b2 | 2,92 | 3,20 | 0,115 | 0,126 |
| C | 0,61 | 0,83 | 0,024 | 0,033 |
| D | 20,80 | 21,34 | 0,819 | 0,840 |
| E | 15,75 | 16,13 | 0,620 | 0,635 |
| e | 5,45 BSC | | 0,215 BSC | |
| L | 19,81 | 20,60 | 0,780 | 0,811 |
| L1 | 3,81 | 4,38 | 0,150 | 0,172 |
| Q | 5,59 | 6,20 | 0,220 | 0,244 |
| R | 4,32 | 4,85 | 0,170 | 0,191 |
| S | 13,21 | 13,72 | 0,520 | 0,540 |
| T | 15,75 | 16,26 | 0,620 | 0,640 |
| U | 1,65 | 2,03 | 0,065 | 0,080 |
| W | - | 0,10 | - | 0,004 |

Die konvexe Form des Substrates ist typ. < 0.04 mm über der Kunststoffoberfläche der Bauteilunterseite
 The convex bow of substrate is typ. < 0.04 mm over plastic surface level of device bottom side

Die Gehäuseabmessungen entsprechen dem Typ TO-247 AD gemäß JEDEC außer Schraubloch und L_{max} .
 This drawing will meet all dimensions requirement of JEDEC outline TO-247 AD except screw hole and except L_{max} .

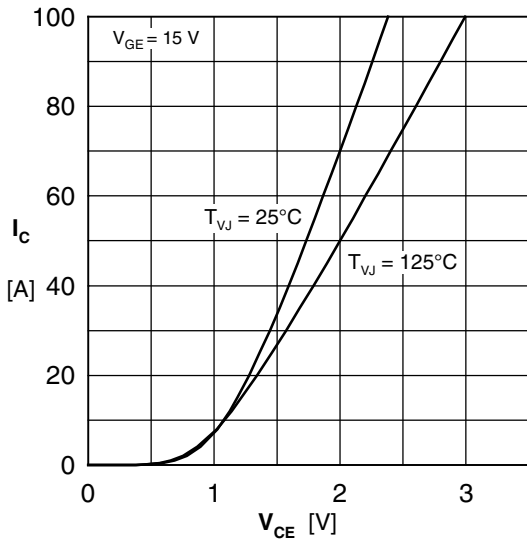


Fig. 1 Typ. output characteristics

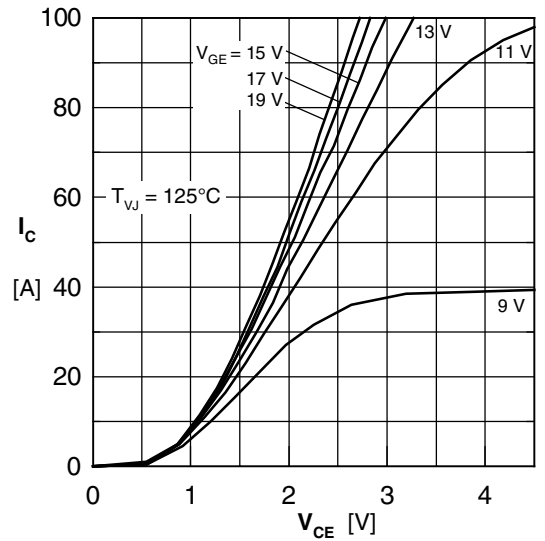


Fig. 2 Typ. output characteristics

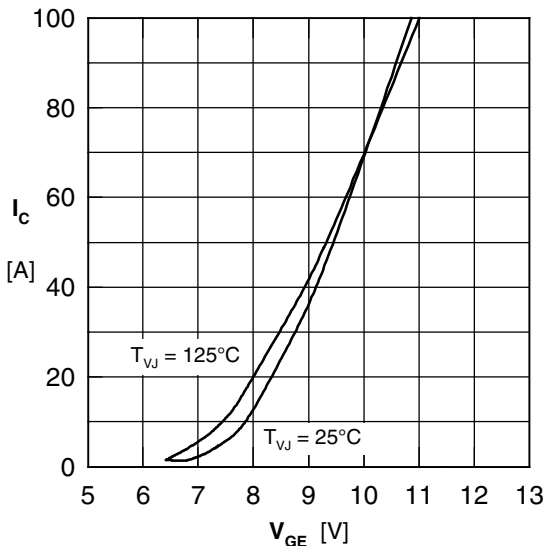


Fig. 3 Typ. transfer characteristics

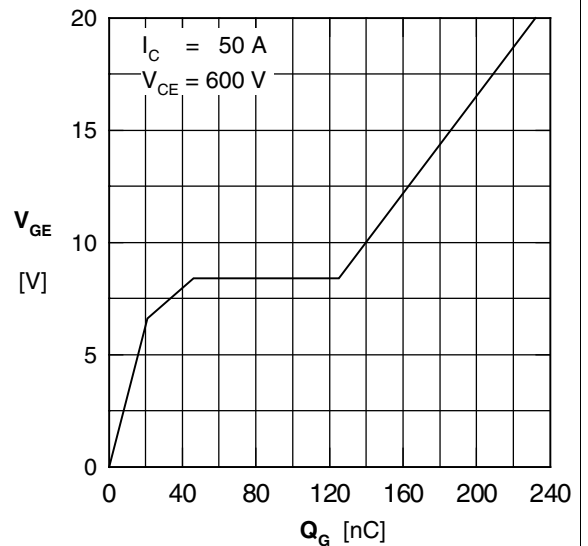


Fig. 4 Typ. turn-on gate charge

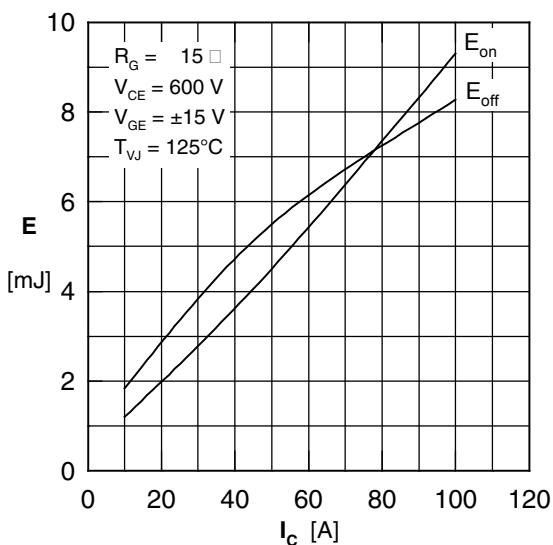


Fig. 5 Typ. switching energy vs. collector current

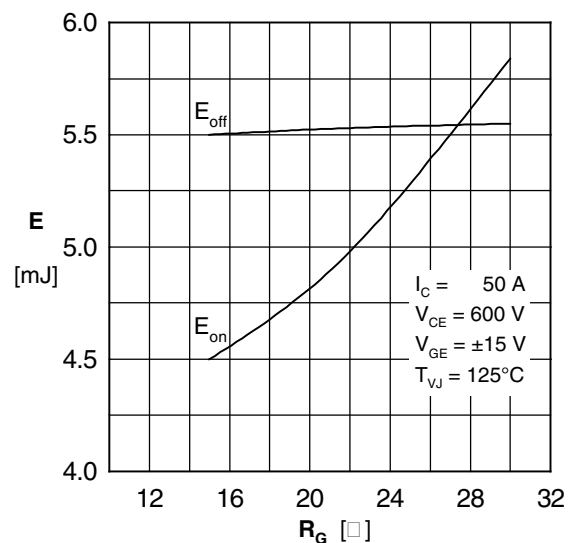


Fig. 6 Typ. switching energy vs. gate resistance

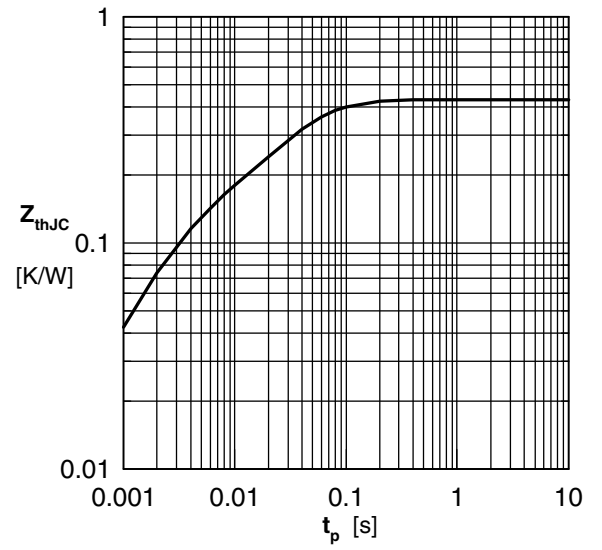


Fig. 8 Typ. transient thermal impedance