

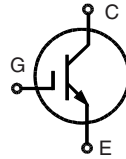
NPT³ IGBT

in ISOPLUS 247™

$$I_{C25} = 95 \text{ A}$$

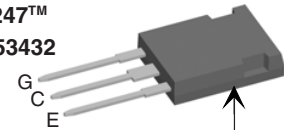
$$V_{CES} = 1200 \text{ V}$$

$$V_{CE(sat) \text{ typ.}} = 2.1 \text{ V}$$



ISOPLUS 247™

E153432



Isolated Backside

G = Gate C = Collector E = Emitter

| IGBT | | |
|-----------------------|--|------------------|
| Symbol | Conditions | Maximum Ratings |
| V_{CES} | $T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$ | 1200 V |
| V_{GES} | | ± 20 V |
| I_{C25} | $T_C = 25^{\circ}\text{C}$ | 95 A |
| I_{C90} | $T_C = 90^{\circ}\text{C}$ | 60 A |
| I_{CM} V_{CEK} | $V_{GE} = \pm 15 \text{ V}; R_G = 22 \Omega; T_{VJ} = 125^{\circ}\text{C}$ RBSOA, Clamped inductive load; $L = 100 \mu\text{H}$ | 100 A |
| | | V_{CES} |
| t_{SC} (SCSOA) | $V_{CE} = 900 \text{ V}; V_{GE} = \pm 15 \text{ V}; R_G = 22 \Omega; T_{VJ} = 125^{\circ}\text{C}$ non-repetitive | 10 μs |
| P_{tot} | $T_C = 25^{\circ}\text{C}$ | 375 W |

Features

- NPT³ IGBT
 - low saturation voltage
 - positive temperature coefficient for easy paralleling
 - fast switching
 - short tail current for optimized performance in resonant circuits
- ISOPLUS 247™ package
 - isolated back surface
 - low coupling capacity between pins and heatsink
 - high reliability
 - industry standard outline

Applications

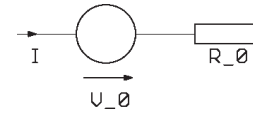
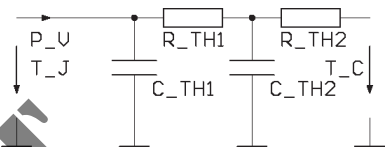
- single switches and with complementary free wheeling diodes
- choppers
- phaselegs, H bridges, three phase bridges e.g. for
 - power supplies, UPS
 - AC, DC and SR drives
 - induction heating

| Symbol | Conditions | Characteristic Values ($T_{VJ} = 25^{\circ}\text{C}$, unless otherwise specified) | | | |
|--|--|--|------|--------|----|
| | | min. | typ. | max. | |
| $V_{CE(sat)}$ | $I_C = 60 \text{ A}; V_{GE} = 15 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$ | 2.1 | 2.7 | V | |
| $V_{GE(th)}$ | $I_C = 2 \text{ mA}; V_{GE} = V_{CE}$ | 4.5 | | 6.5 V | |
| I_{CES} | $V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$ $T_{VJ} = 125^{\circ}\text{C}$ | 0.1 | | 0.1 mA | |
| I_{GES} | $V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$ | | | 200 nA | |
| $t_{d(on)}$ t_r $t_{d(off)}$ t_f E_{on} E_{off} | Inductive load, $T_{VJ} = 125^{\circ}\text{C}$ $V_{CE} = 600 \text{ V}; I_C = 60 \text{ A}$ $V_{GE} = \pm 15 \text{ V}; R_G = 22 \Omega$ | | 80 | ns | |
| | | | | 50 | ns |
| | | | | 680 | ns |
| | | | | 30 | ns |
| | | | | 7.2 | mJ |
| | | | | 4.8 | mJ |
| C_{ies} | $V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}; f = 1 \text{ MHz}$ | | 3.8 | nF | |
| Q_{Gon} | $V_{CE} = 600 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 50 \text{ A}$ | | 350 | nC | |
| R_{thJC} R_{thJH} | | | 0.33 | K/W | |
| | | 0.66 | | K/W | |

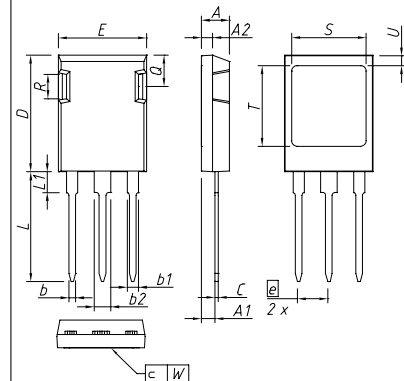
Component

| Symbol | Conditions | Maximum Ratings | |
|------------|--|-----------------|----|
| T_{VJ} | | -55...+150 | °C |
| T_{stg} | | -55...+125 | °C |
| V_{ISOL} | $I_{ISOL} \leq 1 \text{ mA}; 50/60 \text{ Hz}$ | 2500 | V~ |
| F_c | mounting force with clip | 20...120 | N |

| Symbol | Conditions | Characteristic Values | | |
|---------------|---|-----------------------|------|------|
| | | min. | typ. | max. |
| C_p | coupling capacity between shorted pins and mounting tab in the case | | 30 | pF |
| Weight | | | 6 | g |

Equivalent Circuits for Simulation
Conduction

 IGBT (typ. at $V_{GE} = 15 \text{ V}; T_j = 125^\circ\text{C}$)
 $V_o = 0.99 \text{ V}; R_o = 25 \text{ m}\Omega$
Thermal Response


IGBT (typ.)

 $C_{th1} = 0.13 \text{ J/K}; R_{th1} = 0.06 \text{ K/W}$
 $C_{th2} = 0.32 \text{ J/K}; R_{th2} = 0.27 \text{ K/W}$
ISOPLUS247™ OUTLINE


| 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 |

The convex bow of substrate is typ. < 0.04 mm over plastic surface level of device bottom side
 This drawing will meet all dimensions requirement of JEDEC outline TO-247 AD except screw hole and except Lmax.

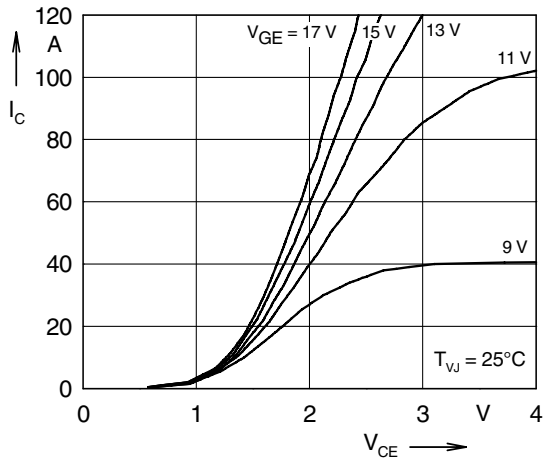


Fig. 1 Typ. output characteristics

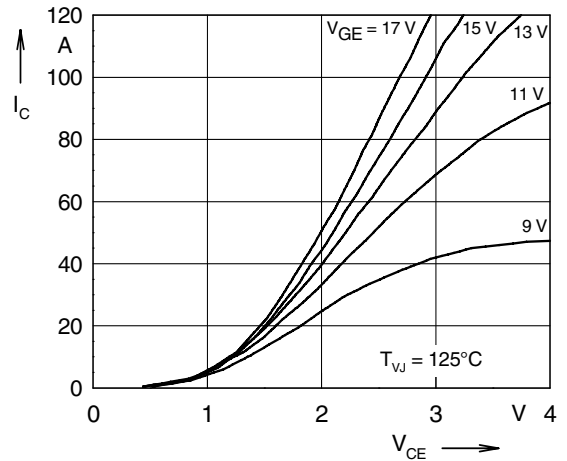


Fig. 2 Typ. output characteristics

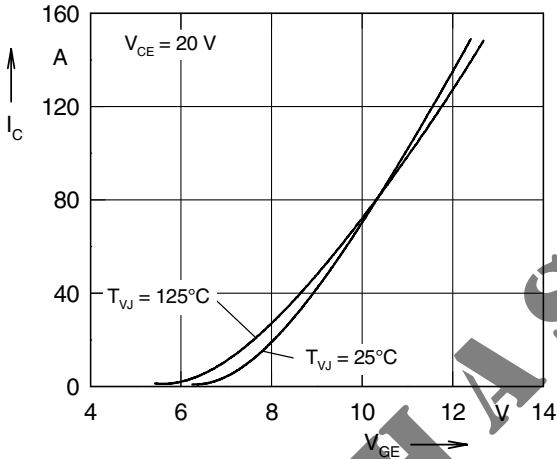


Fig. 3 Typ. transfer characteristics

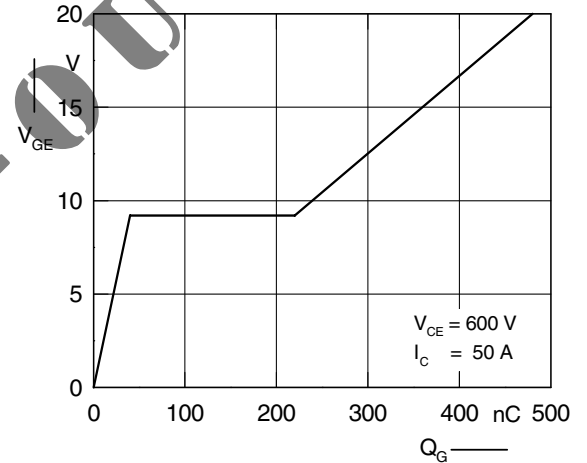


Fig. 4 Typ. turn on gate charge

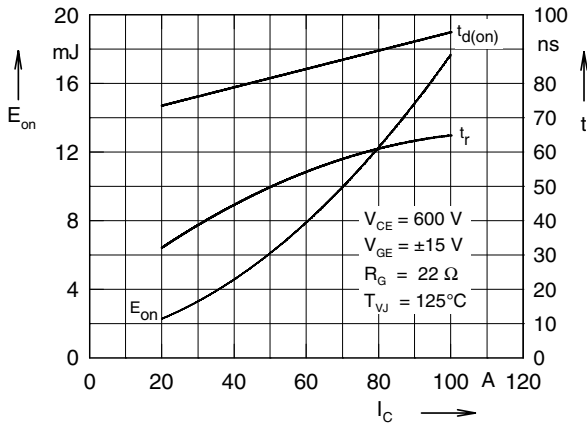


Fig. 5 Typ. turn on energy and switching times versus collector current

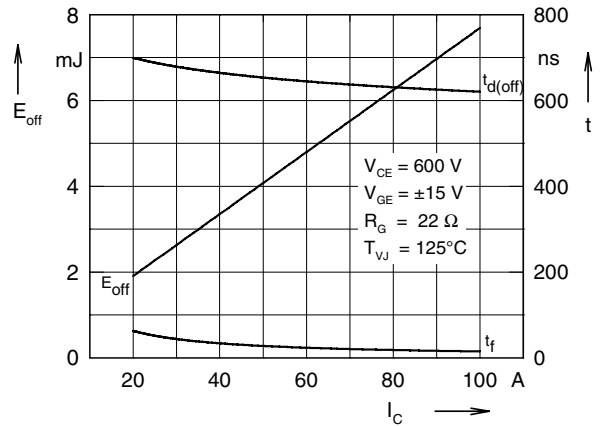


Fig. 6 Typ. turn off energy and switching times versus collector current

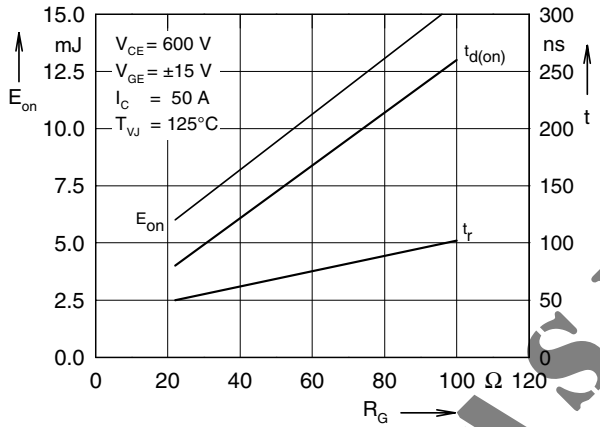


Fig. 7 Typ. turn on energy and switching times versus gate resistor

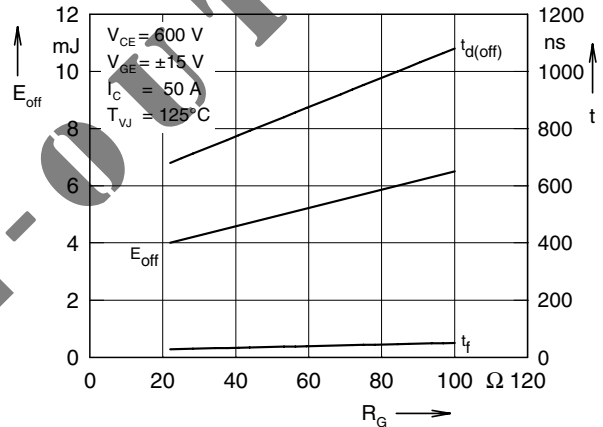


Fig. 8 Typ. turn off energy and switching times versus gate resistor

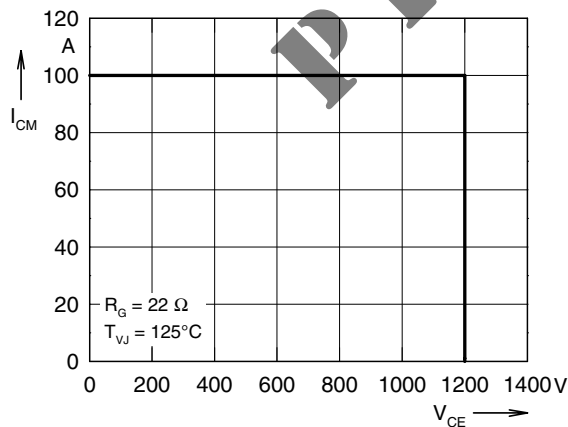


Fig. 9 Reverse biased safe operating area RBSOA

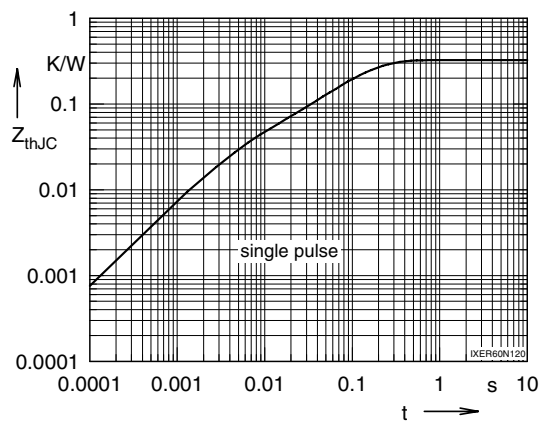


Fig. 10 Typ. transient thermal impedance