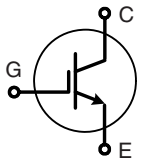
# High Voltage IGBT with optional Diode ISOPLUS™ package

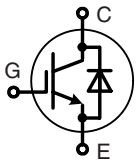
(Electrically Isolated Back Side)

$V_{CES}$ = 1200 V
$I_{C25}$ = 50 A
$V_{CE(sat)\ typ}$ = 2.4 V

Short Circuit SOA Capability
Square RBSOA

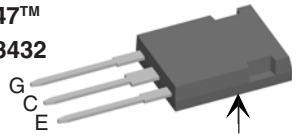



IXDR 30N120




IXDR 30N120 D1

ISOPLUS 247™
E153432




Isolated Backside*

G = Gate C = Collector E = Emitter

| Symbol | Conditions | | Maximum Ratings | |
|---|---|---|---|---|
| $V_{CES}$ | $T_J$ = 25°C to 150°C | | 1200 | V |
| $V_{CGR}$ | $T_J$ = 25°C to 150°C; $R_{GE}$ = 20 kΩ | | 1200 | V |
| $V_{GES}$ | Continuous | | ±20 | V |
| $V_{GEM}$ | Transient | | ±30 | V |
| $I_{C25}$ | $T_C$ = 25°C | | 50 | A |
| $I_{C90}$ | $T_C$ = 90°C | | 30 | A |
| $I_{CM}$ | $T_C$ = 90°C, $t_p$ = 1 ms | | 60 | A |
| RBSOA | $V_{GE}$ = ±15 V, $T_J$ = 125°C, $R_G$ = 47 Ω<br>Clamped inductive load, L = 30 mH | | $I_{CM}$ = 50<br>$V_{CEK} < V_{CES}$ | A |
| $t_{SC}$ (SCSOA) | $V_{GE}$ = ±15 V, $V_{CE}$ = $V_{CES}$, $T_J$ = 125°C<br>$R_G$ = 47 Ω, non repetitive | | 10 | µs |
| $P_C$ | $T_C$ = 25°C | IGBT<br>Diode | 200<br>95 | W<br>W |
| $T_J$ | | | -55 ... +150 | °C |
| $T_{stg}$ | | | -55 ... +150 | °C |
| $V_{ISOL}$ | 50/60 Hz, RMS $I_{ISOL} \leq$ 1 mA | | 2500 | V~ |
| Weight | | | 6 | g |

| Symbol | Conditions | Characteristic Values ($T_J$ = 25°C, unless otherwise specified) min. | typ. | max. | |
|---|---|---|---|---|---|
| $V_{(BR)CES}$ | $V_{GE}$ = 0 V | 1200 | | | V |
| $V_{GE(th)}$ | $I_C$ = 1 mA, $V_{CE}$ = $V_{GE}$ | 4.5 | | 6.5 | V |
| $I_{CES}$ | $V_{CE}$ = $V_{CES}$, $T_J$ = 25°C<br>$T_J$ = 125°C | | <br>2.5 | 1.5 | mA<br>mA |
| $I_{GES}$ | $V_{CE}$ = 0 V, $V_{GE}$ = ±20 V | | | ± 500 | nA |
| $V_{CE(sat)}$ | $I_C$ = 30 A, $V_{GE}$ = 15 V | | 2.4 | 2.9 | V |

### Features

- NPT IGBT technology
  - high switching speed
  - low switching losses
  - square RBSOA, no latch up
  - high short circuit capability
  - positive temperature coefficient for easy paralleling
  - MOS input, voltage controlled
  - fast recovery epitaxial diode
- Epoxy meets UL 94V-0
- Isolated and UL registered E153432

### Advantages

- DCB Isolated mounting tab
- Meets TO-247AD package Outline
- Package for clip or spring mounting
- Space savings
- High power density

### Typical Applications

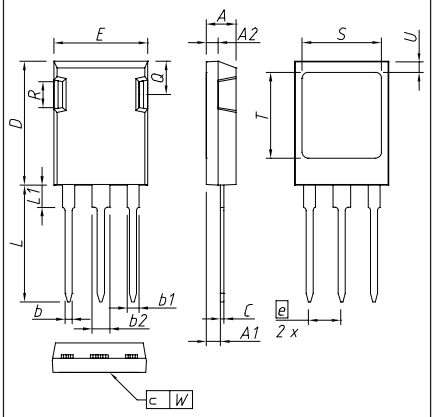
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninteruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies

| Symbol | Conditions | Characteristic Values ($T_J$ = 25°C, unless otherwise specified) min. | typ. | max. | |
|---|---|---|---|---|---|
| $C_{ies}$ | $V_{CE}$ = 25 V, $V_{GE}$ = 0 V, f = 1 MHz | | 1650 | | pF |
| $C_{oes}$ | | | 250 | | pF |
| $C_{res}$ | | | 110 | | pF |
| $Q_g$ | $I_C$ = 30 A, $V_{GE}$ = 15 V, $V_{CE}$ = 0.5 $V_{CES}$ | | 120 | | nC |
| $t_{d(on)}$ | **Inductive load, $T_J$ = 125°C** $I_C$ = 30 A, $V_{GE}$ = ±15 V, $V_{CE}$ = 600 V, $R_G$ = 47 Ω | | 100 | | ns |
| $t_r$ | | | 70 | | ns |
| $t_{d(off)}$ | | | 500 | | ns |
| $t_f$ | | | 70 | | ns |
| $E_{on}$ | | | 4.6 | | mJ |
| $E_{off}$ | | | 3.4 | | mJ |
| $R_{thJC}$ | | | | 0.6 | K/W |
| $R_{thCH}$ | Package with heatsink compound | | 0.25 | | K/W |

**Reverse Diode (FRED)**

| Symbol | Conditions | Characteristic Values ($T_J$ = 25°C, unless otherwise specified) min. | typ. | max. | |
|---|---|---|---|---|---|
| $V_F$ | $I_F$ = 30 A, $V_{GE}$ = 0 V | | 2.5 | 2.75 | V |
| | $I_F$ = 30 A, $V_{GE}$ = 0 V, $T_J$ = 125°C | | 2.0 | | V |
| $I_F$ | $T_C$ = 25°C | | | 50 | A |
| | $T_C$ = 90°C | | | 27 | A |
| $I_{RM}$ | $I_F$ = 30 A, -$di_F/dt$ = 400 A/µs, $V_R$ = 600 V | | 20 | | A |
| $t_{rr}$ | $V_{GE}$ = 0 V, $T_J$ = 125°C | | 200 | | ns |
| $t_{rr}$ | $I_F$ = 1 A, -$di_F/dt$ = 100 A/µs, $V_R$ = 30 V, $V_{GE}$ = 0 V | | 40 | | ns |
| $R_{thJC}$ | | | | 1.3 | K/W |

**ISOPLUS247™ OUTLINE**




| DIM. | MILLIMETER MIN | MILLIMETER MAX | INCHES MIN | INCHES 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.

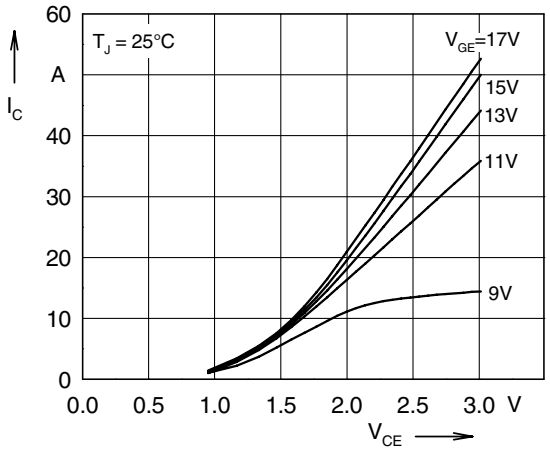



Fig. 1 Typ. output characteristics

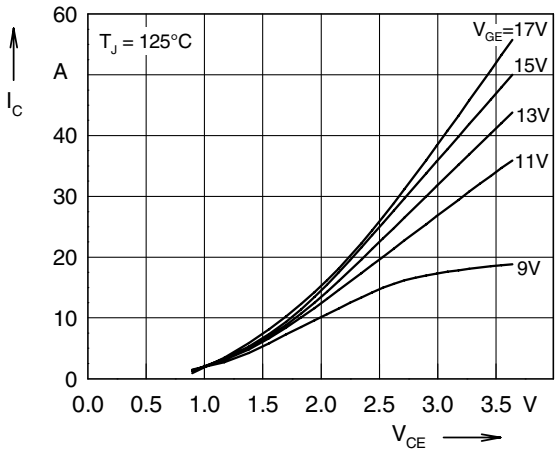



Fig. 2 Typ. output characteristics

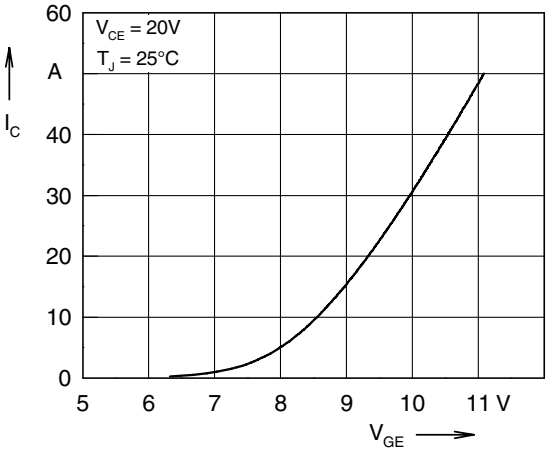



Fig. 3 Typ. transfer characteristics

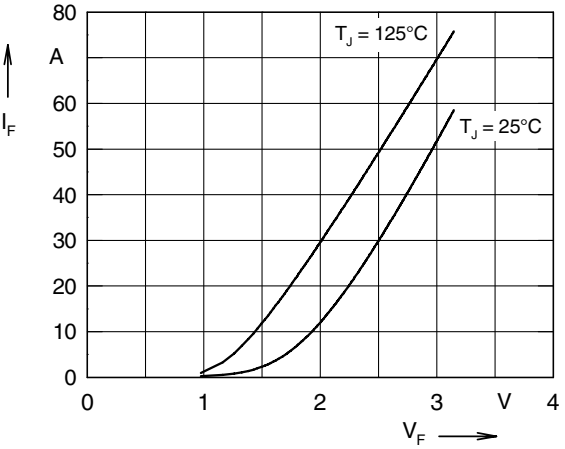



Fig. 4 Typ. forward characteristics of free wheeling diode

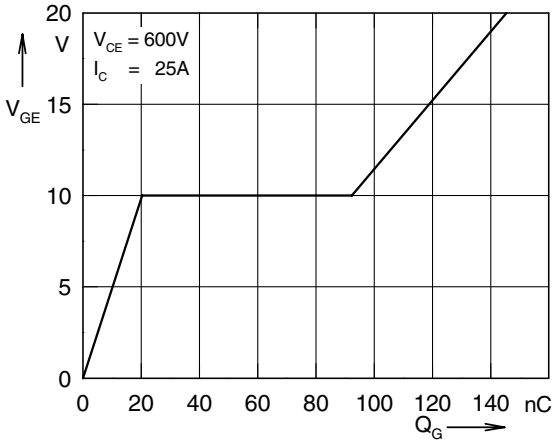



Fig. 5 Typ. turn on gate charge

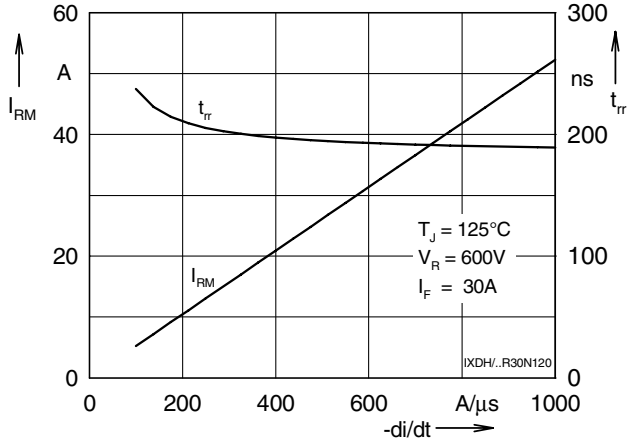



Fig. 6 Typ. turn off characteristics of free wheeling diode

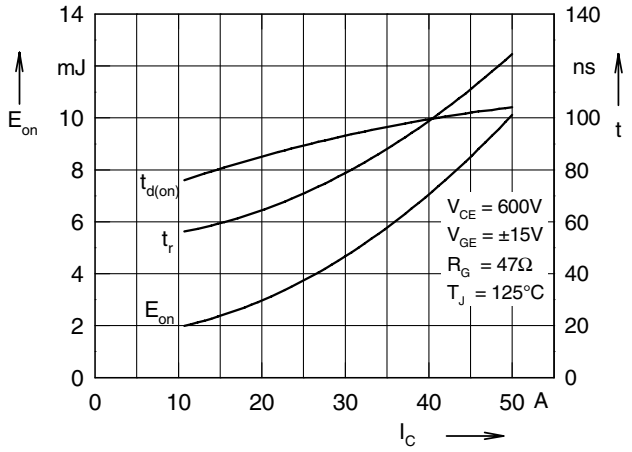



Fig. 7 Typ. turn on energy and switching times versus collector current

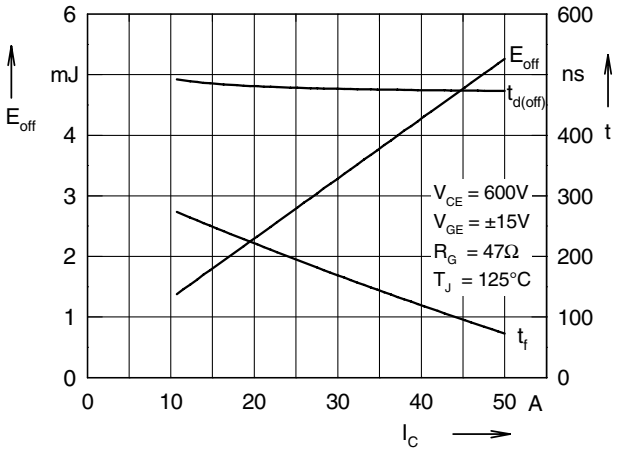



Fig. 8 Typ. turn off energy and switching times versus collector current

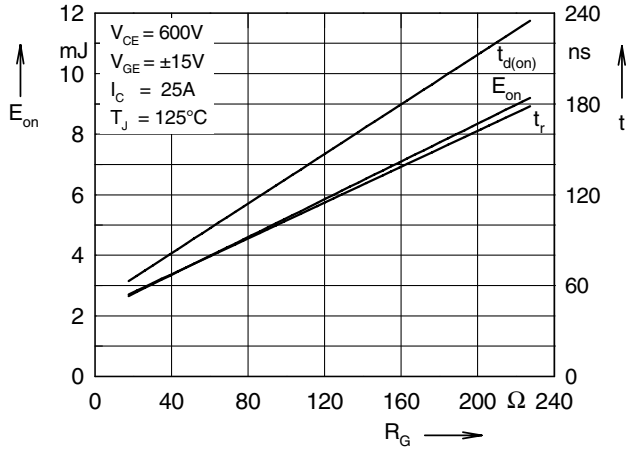



Fig. 9 Typ. turn on energy and switching times versus gate resistor

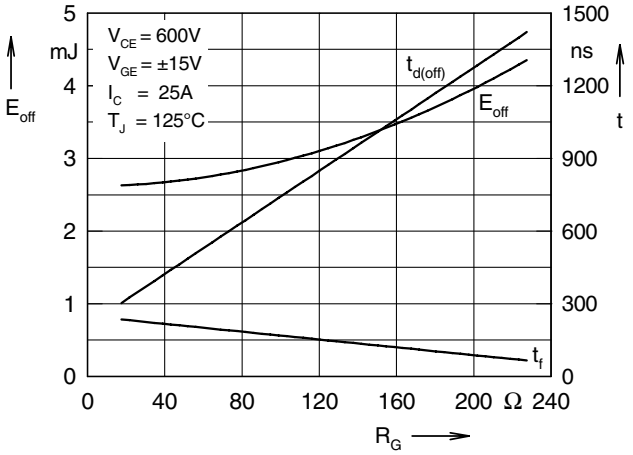



Fig.10 Typ. turn off energy and switching times versus gate resistor

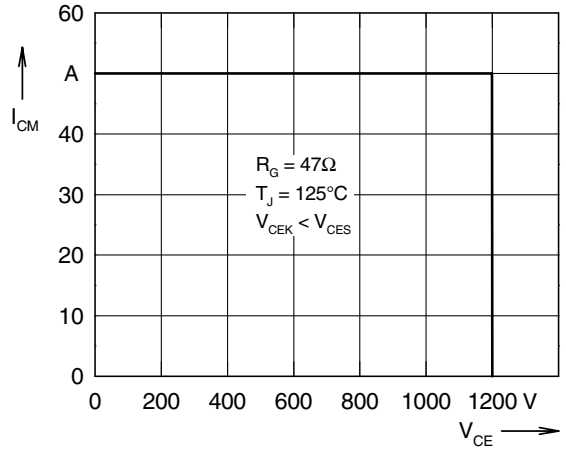



Fig. 11 Reverse biased safe operating area RBSOA

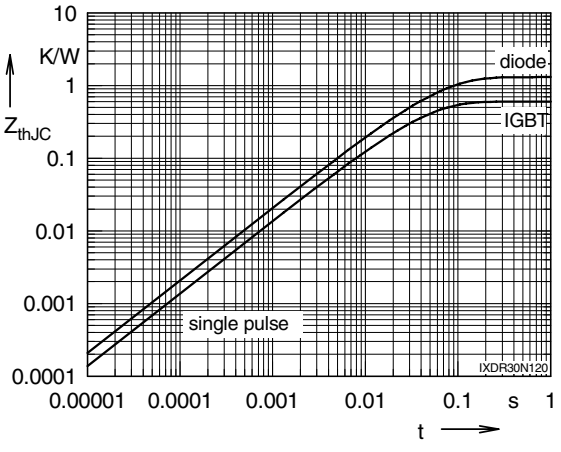



Fig. 12 Typ. transient thermal impedance