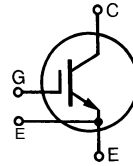


# HiPerFAST™ IGBT

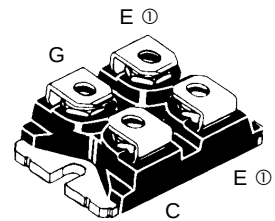
**IXGN 200N60**  
**IXGN 200N60A**



| $V_{CES}$    | $I_{C25}$    | $V_{CE(sat)}$ |
|--------------|--------------|---------------|
| <b>600 V</b> | <b>200 A</b> | <b>2.5 V</b>  |
| <b>600 V</b> | <b>200 A</b> | <b>2.7 V</b>  |

| Symbol              | Test Conditions                                                                                                             | Maximum Ratings                    |                  |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------|------------------|
| $V_{CES}$           | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                                             | 600                                | V                |
| $V_{CGR}$           | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GE} = 1\text{ M}\Omega$                                               | 600                                | V                |
| $V_{GES}$           | Continuous                                                                                                                  | $\pm 20$                           | V                |
| $V_{GEM}$           | Transient                                                                                                                   | $\pm 30$                           | V                |
| $I_{C25}$           | $T_C = 25^\circ\text{C}$                                                                                                    | 200                                | A                |
| $I_{C90}$           | $T_C = 90^\circ\text{C}$                                                                                                    | 100                                | A                |
| $I_{CM}$            | $T_C = 25^\circ\text{C}$ , 1 ms                                                                                             | 300                                | A                |
| <b>SSOA (RBSOA)</b> | $V_{GE} = 15\text{ V}$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 22\ \Omega$<br>Clamped inductive load, $L = 30\ \mu\text{H}$ | $I_{CM} = 100$<br>@ $0.8\ V_{CES}$ | A                |
| $P_c$               | $T_C = 25^\circ\text{C}$                                                                                                    | 600                                | W                |
| $T_J$               |                                                                                                                             | -55 ... +150                       | $^\circ\text{C}$ |
| $T_{JM}$            |                                                                                                                             | 150                                | $^\circ\text{C}$ |
| $T_{stg}$           |                                                                                                                             | -55 ... +150                       | $^\circ\text{C}$ |
| $V_{ISOL}$          | 50/60 Hz<br>$I_{ISOL} \leq 1\text{ mA}$                                                                                     | t = 1 min                          | 2500 V~          |
|                     |                                                                                                                             | t = 1 s                            | 3000 V~          |
| $M_d$               | Mounting torque                                                                                                             | 1.5/13                             | Nm/lb.in.        |
|                     | Terminal connection torque (M4)                                                                                             | 1.5/13                             | Nm/lb.in.        |
| <b>Weight</b>       |                                                                                                                             | 30                                 | g                |

**SOT-227B, miniBLOC**



G = Gate, C = Collector, E = Emitter

① either emitter terminal can be used as Main or Kelvin Emitter

## Features

- International standard package miniBLOC (ISOTOP compatible)
- Aluminium nitride isolation
  - high power dissipation
- Isolation voltage 3000 V~
- Very high current, fast switching IGBT
- Low  $V_{CE(sat)}$ 
  - for minimum on-state conduction losses
- MOS Gate turn-on
  - drive simplicity
- Low collector-to-case capacitance (< 50 pF)
- Low package inductance (< 5 nH)
  - easy to drive and to protect

## Applications

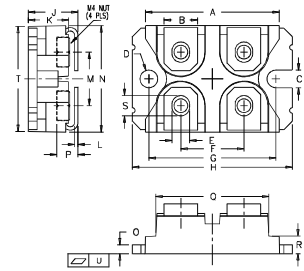
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies

## Advantages

- Easy to mount with 2 screws
- Space savings
- High power density

| Symbol        | Test Conditions                                       | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                     |
|---------------|-------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------------|
|               |                                                       | min.                                                                              | typ. | max.                |
| $BV_{CES}$    | $I_C = 250\ \mu\text{A}$ , $V_{GE} = 0\text{ V}$      | 600                                                                               |      | V                   |
| $V_{GE(th)}$  | $I_C = 10\text{ mA}$ , $V_{CE} = V_{GE}$              | 2.5                                                                               |      | 6 V                 |
| $I_{CES}$     | $V_{CE} = 0.8 \cdot V_{CES}$<br>$V_{GE} = 0\text{ V}$ | $T_J = 25^\circ\text{C}$                                                          |      | 200 $\mu\text{A}$   |
|               |                                                       | $T_J = 125^\circ\text{C}$                                                         |      | 2 mA                |
| $I_{GES}$     | $V_{CE} = 0\text{ V}$ , $V_{GE} = \pm 20\text{ V}$    |                                                                                   |      | $\pm 400\text{ nA}$ |
| $V_{CE(sat)}$ | $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$              | 200N60<br>200N60A                                                                 |      | 2.5 V<br>2.7 V      |

| Symbol                                                                       | Test Conditions                                                                                                                                                                                                                                                                                                                                                                                 | Characteristic Values<br>( $T_J = 25^{\circ}\text{C}$ , unless otherwise specified) |      |      |    |
|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|------|----|
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 | min.                                                                                | typ. | max. |    |
| $g_{fs}$                                                                     | $I_C = 60\text{ A}$ ; $V_{CE} = 10\text{ V}$ ,<br>Pulse test, $t \leq 300\text{ }\mu\text{s}$ , duty cycle $\leq 2\%$                                                                                                                                                                                                                                                                           | 40                                                                                  | 57   | S    |    |
| $C_{ies}$<br>$C_{oes}$<br>$C_{res}$                                          | $V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$                                                                                                                                                                                                                                                                                                                             |                                                                                     | 9000 | pF   |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 600  | pF   |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 305  | pF   |    |
| $Q_g$<br>$Q_{ge}$<br>$Q_{gc}$                                                | $I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$                                                                                                                                                                                                                                                                                                                               |                                                                                     | 465  | nC   |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 52   | nC   |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 228  | nC   |    |
| $t_{d(on)}$<br>$t_{ri}$<br>$E_{on}$<br>$t_{d(off)}$<br>$t_{fi}$<br>$E_{off}$ | <b>Inductive load, <math>T_J = 25^{\circ}\text{C}</math></b><br>$I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $L = 30\text{ }\mu\text{H}$ ,<br>$V_{CE} = 0.8 V_{CES}$ , $R_G = R_{off} = 2.4\text{ }\Omega$<br>200N60<br>Remarks: Switching times<br>may increase for<br>200N60<br>$V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$ ,<br>200N60A<br>higher $T_J$ or increased $R_G$<br>200N60<br>200N60A |                                                                                     | 100  | ns   |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 100  | ns   |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 2.4  | mJ   |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 800  | 1100 | ns |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 700  | 950  | ns |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 350  | 500  | ns |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 200  | 280  | ns |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 14.4 | mJ   |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 | 9.6                                                                                 | mJ   |      |    |
| $t_{d(on)}$<br>$t_{ri}$<br>$E_{on}$<br>$t_{d(off)}$<br>$t_{fi}$<br>$E_{off}$ | <b>Inductive load, <math>T_J = 125^{\circ}\text{C}</math> (IXGN 200N60A)</b><br>$I_C = I_{C90}$ , $V_{GE} = 15\text{ V}$ , $L = 30\text{ }\mu\text{H}$<br>$V_{CE} = 0.8 V_{CES}$ , $R_G = R_{off} = 2.4\text{ }\Omega$<br>Remarks: Switching times<br>may increase for $V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$ ,<br>higher $T_J$ or increased $R_G$                                          |                                                                                     | 100  | ns   |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 200  | ns   |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 4.8  | mJ   |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 780  | ns   |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 250  | ns   |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 14.4 | mJ   |    |
| $R_{thJC}$<br>$R_{thCK}$                                                     |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     | 0.21 | K/W  |    |
|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                 | 0.05                                                                                |      | K/W  |    |

**miniBLOC, SOT-227 B**


M4 screws (4x) supplied

| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 31.50      | 31.88 | 1.240  | 1.255 |
| B    | 7.80       | 8.20  | 0.307  | 0.323 |
| C    | 4.09       | 4.29  | 0.161  | 0.169 |
| D    | 4.09       | 4.29  | 0.161  | 0.169 |
| E    | 4.09       | 4.29  | 0.161  | 0.169 |
| F    | 14.91      | 15.11 | 0.587  | 0.595 |
| G    | 30.12      | 30.30 | 1.186  | 1.193 |
| H    | 38.00      | 38.23 | 1.496  | 1.505 |
| J    | 11.68      | 12.22 | 0.460  | 0.481 |
| K    | 8.92       | 9.60  | 0.351  | 0.378 |
| L    | 0.76       | 0.84  | 0.030  | 0.033 |
| M    | 12.60      | 12.85 | 0.496  | 0.506 |
| N    | 25.15      | 25.42 | 0.990  | 1.001 |
| O    | 1.98       | 2.13  | 0.078  | 0.084 |
| P    | 4.95       | 5.97  | 0.195  | 0.235 |
| Q    | 26.54      | 26.90 | 1.045  | 1.059 |
| R    | 3.94       | 4.42  | 0.155  | 0.174 |
| S    | 4.72       | 4.85  | 0.186  | 0.191 |
| T    | 24.59      | 25.07 | 0.968  | 0.987 |
| U    | -0.05      | 0.1   | -0.002 | 0.004 |

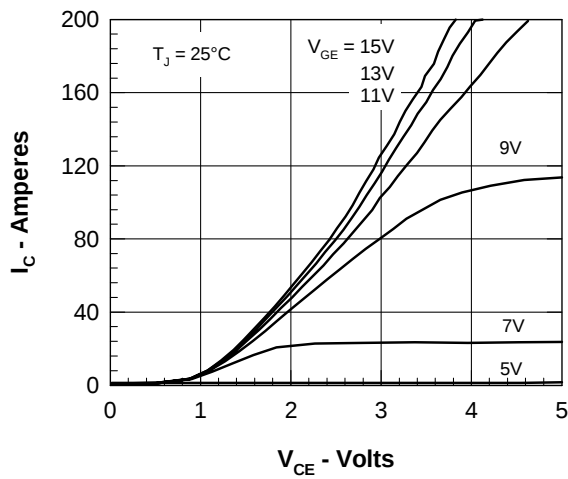


Fig. 1. Saturation Voltage Characteristics

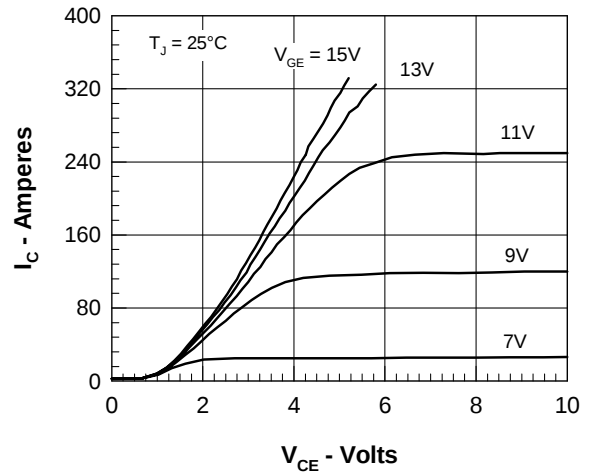


Fig. 2. Extended Output Characteristics

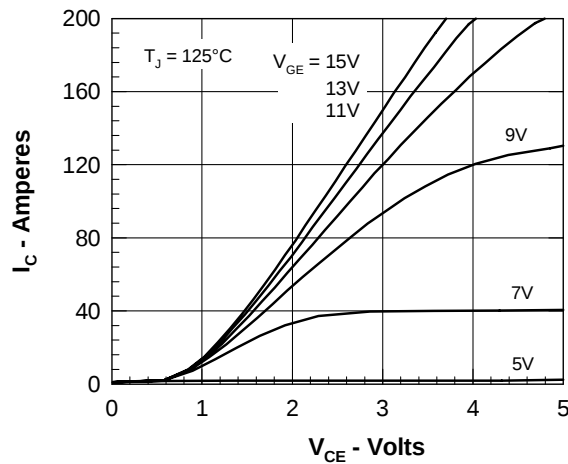


Fig. 3. Saturation Voltage Characteristics

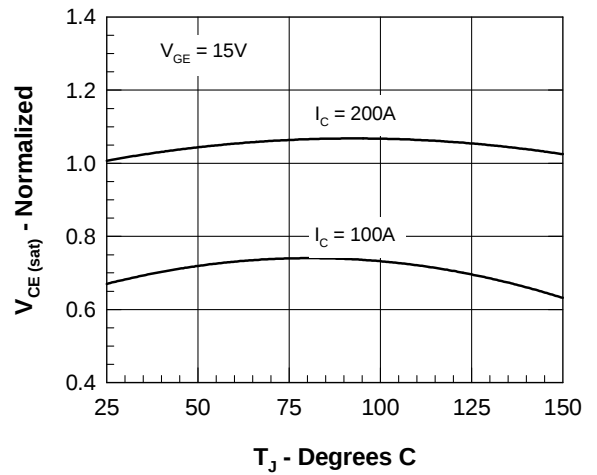
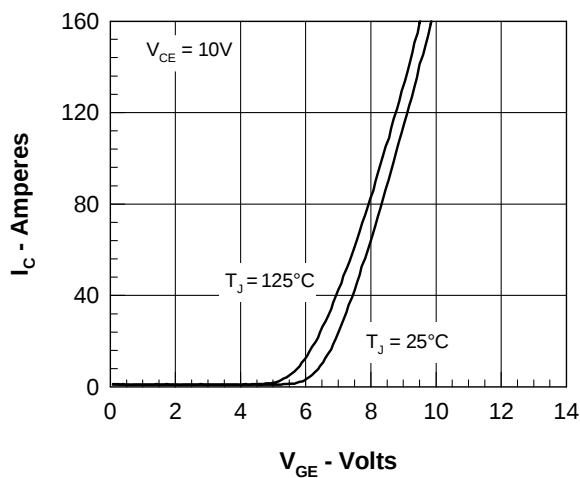
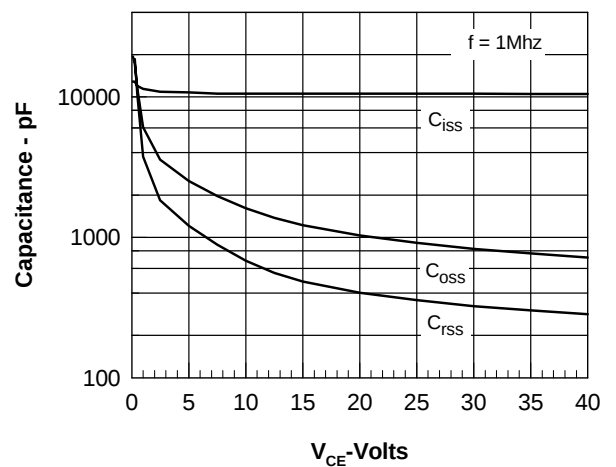

Fig. 4. Temperature Dependence of  $V_{CE(sat)}$ 


Fig. 5. Turn-off Safe Operating Area


Fig. 6. Temperature Dependence of  $BV_{CES}$  &  $V_{GE(th)}$

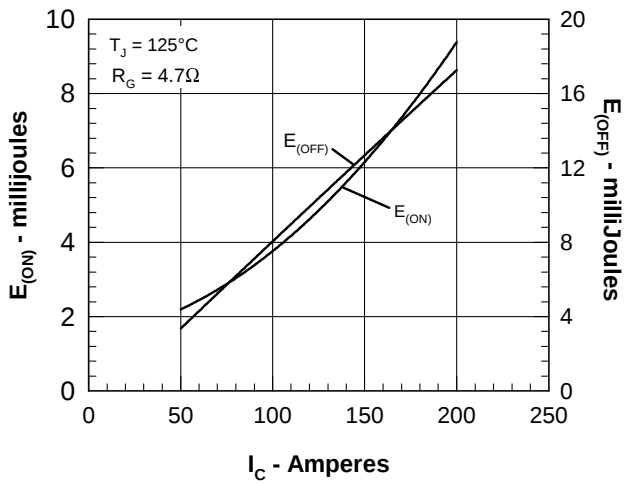
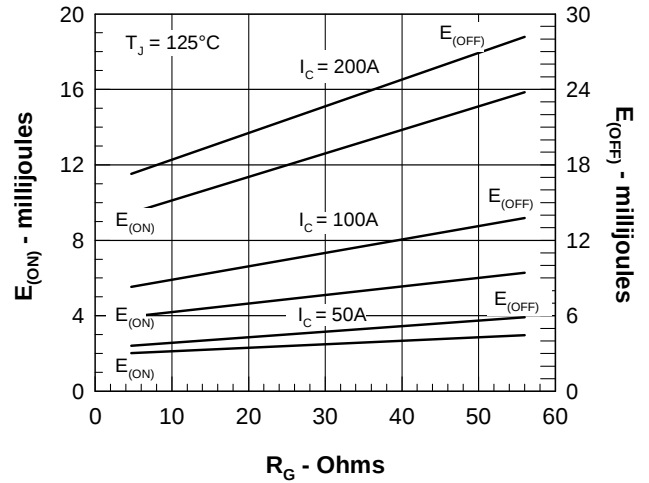
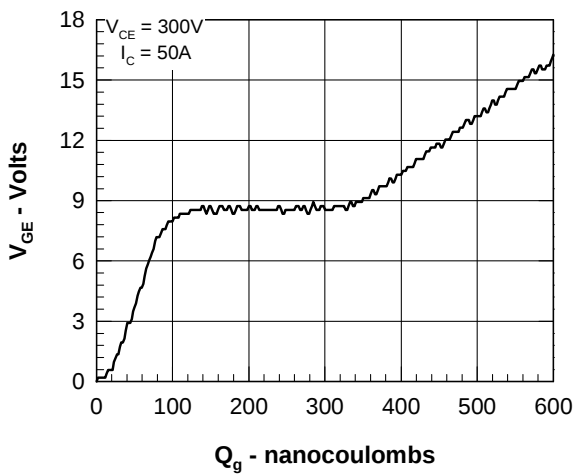

Fig. 7. Dependence of  $t_{fi}$  and  $E_{OFF}$  on  $I_C$ .

Fig. 8. Dependence of  $t_{fi}$  and  $E_{OFF}$  on  $R_G$ .


Fig. 9. Gate Charge

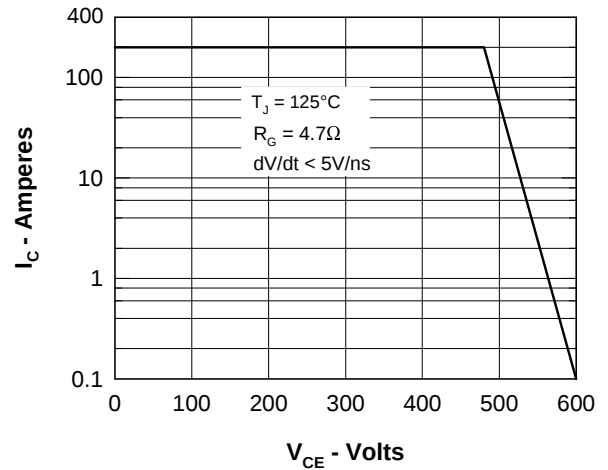


Fig. 10. Junction Capacitance Curves

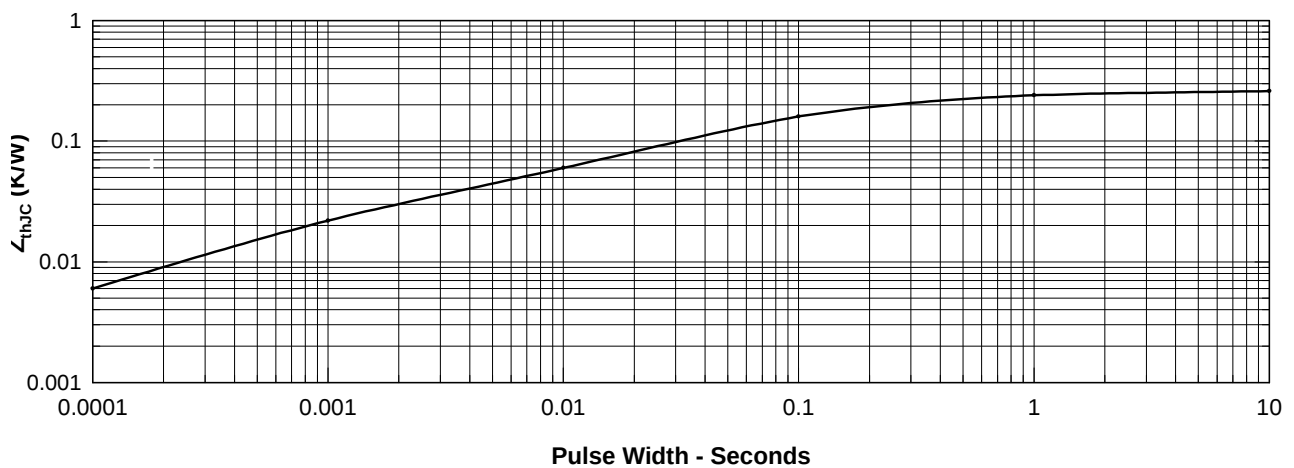


Fig. 11. Transient Thermal Resistance