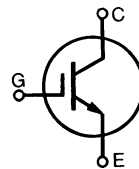


# IGBT

Improved SCSOA Capability

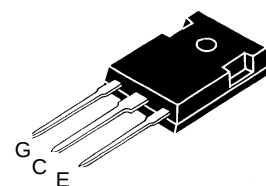
## IXSH25N120A

$$\begin{aligned} I_{C25} &= 50 \text{ A} \\ V_{CES} &= 1200 \text{ V} \\ V_{CE(sat)} &= 4.0 \text{ V} \end{aligned}$$



| Symbol                                                               | Test Conditions                                                                                                    | Maximum Ratings                  |                  |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------|
| $V_{CES}$                                                            | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                                                                     | 1200                             | V                |
| $V_{CGR}$                                                            | $T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1 \text{ M}\Omega$                                         | 1200                             | V                |
| $V_{GES}$                                                            | Continuous                                                                                                         | $\pm 20$                         | V                |
| $V_{GEM}$                                                            | Transient                                                                                                          | $\pm 30$                         | V                |
| $I_{C25}$                                                            | $T_C = 25^\circ\text{C}$                                                                                           | 50                               | A                |
| $I_{C90}$                                                            | $T_C = 90^\circ\text{C}$                                                                                           | 25                               | A                |
| $I_{CM}$                                                             | $T_C = 25^\circ\text{C}, 1 \text{ ms}$                                                                             | 80                               | A                |
| <b>SSOA</b><br><b>(RBSOA)</b>                                        | $V_{GE} = 15 \text{ V}, T_J = 125^\circ\text{C}, R_G = 33 \Omega$<br>Clamped inductive load, $L = 100 \mu\text{H}$ | $I_{CM} = 50$<br>@ $0.8 V_{CES}$ | A                |
| $t_{sc}$                                                             | $T_J = 125^\circ\text{C}, V_{CE} = 720 \text{ V}; V_{GE} = 15 \text{ V}, R_G = 33 \Omega$                          | 10                               | $\mu\text{s}$    |
| $P_C$                                                                | $T_C = 25^\circ\text{C}$                                                                                           | 200                              | W                |
| $T_J$                                                                |                                                                                                                    | -55 ... +150                     | $^\circ\text{C}$ |
| $T_{JM}$                                                             |                                                                                                                    | 150                              | $^\circ\text{C}$ |
| $T_{STG}$                                                            |                                                                                                                    | -55 ... +150                     | $^\circ\text{C}$ |
| $M_d$                                                                | Mounting torque                                                                                                    | 1.15/10                          | Nm/lb-in.        |
| <b>Weight</b>                                                        |                                                                                                                    | 6                                | g                |
| <b>Max. Lead Temperature for Soldering</b> (1.6mm from case for 10s) |                                                                                                                    | 300                              | $^\circ\text{C}$ |

TO-247AD



### Features

- Second generation HDMOS™ process  
Low  $V_{CE(sat)}$   
- for minimum on-state conduction losses
- MOS Gate turn-on  
- drive simplicity

### Applications

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

### Advantages

- Easy to mount (isolated mounting hole)
- Reduces assembly time and cost

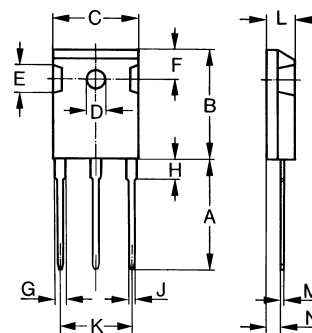
| Symbol        | Test Conditions                                        | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified) |      |                           |
|---------------|--------------------------------------------------------|---------------------------------------------------------------------------------|------|---------------------------|
|               |                                                        | Min.                                                                            | Typ. | Max.                      |
| $BV_{CES}$    | $I_C = 3 \text{ mA}, V_{GE} = 0 \text{ V}$             | 1200                                                                            |      | V                         |
| $V_{GE(th)}$  | $I_C = 2.5 \text{ mA}, V_{CE} = V_{GE}$                | 4                                                                               |      | 8 V                       |
| $I_{CES}$     | $V_{CE} = 0.8 V_{CES}, V_{GE} = 0 \text{ V}$<br>Note 2 |                                                                                 |      | 200 $\mu\text{A}$<br>1 mA |
| $I_{GES}$     | $V_{CE} = 0 \text{ V}, V_{GE} = \pm 20 \text{ V}$      |                                                                                 |      | $\pm 100 \text{ nA}$      |
| $V_{CE(sat)}$ | $I_C = I_{C90}, V_{GE} = 15 \text{ V}$                 |                                                                                 |      | 4.0 V                     |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ unless otherwise specified)                                               | Characteristic Values |      |          |
|--------------|-------------------------------------------------------------------------------------------------------------------------|-----------------------|------|----------|
|              |                                                                                                                         | Min.                  | Typ. | Max.     |
| $g_{fs}$     | $I_C = I_{C90^\circ}$ , $V_{CE} = 10\text{ V}$ ,<br>Pulse test, $t \leq 300\text{ }\mu\text{s}$ , duty cycle $\leq 2\%$ | 10                    | 17   | S        |
| $I_{C(on)}$  | $V_{GE} = 15\text{ V}$ , $V_{CE} = 10\text{ V}$                                                                         |                       | 140  | A        |
| $C_{ies}$    | $V_{CE} = 25\text{ V}$ , $V_{GE} = 0\text{ V}$ , $f = 1\text{ MHz}$                                                     |                       | 2850 | pF       |
| $C_{oes}$    |                                                                                                                         |                       | 210  | pF       |
| $C_{res}$    |                                                                                                                         |                       | 50   | pF       |
| $Q_g$        | $I_C = I_{C90^\circ}$ , $V_{GE} = 15\text{ V}$ , $V_{CE} = 0.5 V_{CES}$                                                 |                       | 120  | nC       |
| $Q_{ge}$     |                                                                                                                         |                       | 30   | nC       |
| $Q_{gc}$     |                                                                                                                         |                       | 50   | nC       |
| $t_{d(on)}$  | Inductive load, $T_J = 25^\circ\text{C}$                                                                                |                       | 100  | ns       |
| $t_{ri}$     | $I_C = I_{C90^\circ}$ , $V_{GE} = 15\text{ V}$ , $L = 100\text{ }\mu\text{H}$                                           |                       | 200  | ns       |
| $t_{d(off)}$ | $R_G = 18\text{ }\Omega$ , $V_{CLAMP} = 0.8 V_{CES}$                                                                    |                       | 450  | ns       |
| $t_{fi}$     | Note 1                                                                                                                  |                       | 650  | ns       |
| $E_{off}$    |                                                                                                                         |                       | 9.6  | mJ       |
| $t_{d(on)}$  | Inductive load, $T_J = 125^\circ\text{C}$                                                                               |                       | 100  | ns       |
| $t_{ri}$     | $I_C = I_{C90^\circ}$ , $V_{GE} = 15\text{ V}$ , $L = 100\text{ }\mu\text{H}$                                           |                       | 200  | ns       |
| $E_{(on)}$   | $R_G = 18\text{ }\Omega$                                                                                                |                       | 1.8  | mJ       |
| $t_{d(off)}$ | $V_{CLAMP} = 0.8 V_{CES}$                                                                                               |                       | 450  | ns       |
| $t_{fi}$     | Note 1                                                                                                                  |                       | 900  | ns       |
| $E_{off}$    |                                                                                                                         |                       | 17   | mJ       |
| $R_{thJC}$   |                                                                                                                         |                       |      | 0.63 K/W |
| $R_{thCK}$   |                                                                                                                         | 0.25                  |      | K/W      |

Notes:

- 1) Switching times may increase for  $V_{CE}$  (Clamp)  $> 0.8 V_{CES}$ , higher  $T_J$  or  $R_G$  values.
- 2) Device must be heatsunk for high temperature measurements to avoid thermal runaway.

TO-247 AD (IXSH) Outline



| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 19.81      | 20.32 | 0.780  | 0.800 |
| B    | 20.80      | 21.46 | 0.819  | 0.845 |
| C    | 15.75      | 16.26 | 0.610  | 0.640 |
| D    | 3.55       | 3.65  | 0.140  | 0.144 |
| E    | 4.32       | 5.49  | 0.170  | 0.216 |
| F    | 5.4        | 6.2   | 0.212  | 0.244 |
| G    | 1.65       | 2.13  | 0.065  | 0.084 |
| H    | -          | 4.5   | -      | 0.177 |
| J    | 1.0        | 1.4   | 0.040  | 0.055 |
| K    | 10.8       | 11.0  | 0.426  | 0.433 |
| L    | 4.7        | 5.3   | 0.185  | 0.209 |
| M    | 0.4        | 0.8   | 0.016  | 0.031 |
| N    | 1.5        | 2.49  | 0.087  | 0.102 |