

# HiPerFET™

## Power MOSFETs

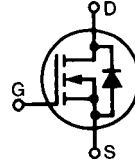
### Q-Class

N-Channel Enhancement Mode  
Avalanche Rated, High dv/dt, Low  $t_{rr}$   
Low Gate Charge and Capacitances

Preliminary data

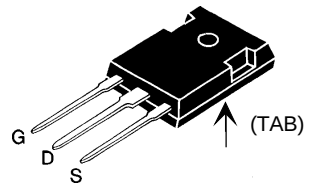
**IXFH 52N30Q**  
**IXFK 52N30Q**  
**IXFT 52N30Q**

$$\begin{aligned} V_{DSS} &= 300 \text{ V} \\ I_{D25} &= 52 \text{ A} \\ R_{DS(on)} &= 60 \text{ m}\Omega \\ t_{rr} &\leq 250 \text{ ns} \end{aligned}$$

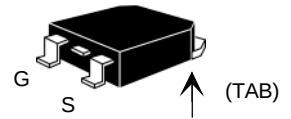


| Symbol    | Test Conditions                                                                                                                         | Maximum Ratings            |                                      |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------|
| $V_{DSS}$ | $T_J = 25^\circ\text{C to } 150^\circ\text{C}$                                                                                          | 300                        | V                                    |
| $V_{DGR}$ | $T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GS} = 1 \text{ M}\Omega$                                                              | 300                        | V                                    |
| $V_{GS}$  | Continuous                                                                                                                              | $\pm 20$                   | V                                    |
| $V_{GSM}$ | Transient                                                                                                                               | $\pm 30$                   | V                                    |
| $I_{D25}$ | $T_C = 25^\circ\text{C}$ , Chip capability                                                                                              | 52                         | A                                    |
| $I_{DM}$  | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                              | 208                        | A                                    |
| $I_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 52                         | A                                    |
| $E_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 30                         | mJ                                   |
| $E_{AS}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 1.5                        | J                                    |
| dv/dt     | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2 \Omega$ | 5                          | V/ns                                 |
| $P_D$     | $T_C = 25^\circ\text{C}$                                                                                                                | 360                        | W                                    |
| $T_J$     |                                                                                                                                         | -55 ... +150               | $^\circ\text{C}$                     |
| $T_{JM}$  |                                                                                                                                         | 150                        | $^\circ\text{C}$                     |
| $T_{stg}$ |                                                                                                                                         | -55 ... +150               | $^\circ\text{C}$                     |
| $T_L$     | 1.6 mm (0.063 in) from case for 10 s                                                                                                    | 300                        | $^\circ\text{C}$                     |
| $M_d$     | Mounting torque                                                                                                                         | TO-247<br>TO-264           | 1.13/10 Nm/lb.in.<br>0.9/6 Nm/lb.in. |
| Weight    |                                                                                                                                         | TO-247<br>TO-264<br>TO-268 | 6<br>10<br>4 g                       |

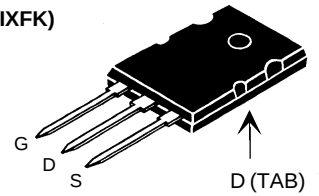
TO-247 AD (IXFH)



TO-268 (D3) (IXFT)



TO-264 AA (IXFK)



G = Gate  
S = Source

TAB = Drain

| Symbol       | Test Conditions                                                                                                        | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                          |
|--------------|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|--------------------------|
|              |                                                                                                                        | min.                                                                              | typ. | max.                     |
| $V_{DSS}$    | $V_{GS} = 0 \text{ V}$ , $I_D = 1 \text{ mA}$                                                                          | 300                                                                               |      | V                        |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 4 \text{ mA}$                                                                               | 2                                                                                 |      | 4 V                      |
| $I_{GSS}$    | $V_{GS} = \pm 20 \text{ V}_{DC}$ , $V_{DS} = 0$                                                                        |                                                                                   |      | $\pm 200 \text{ nA}$     |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0 \text{ V}$                                                                            |                                                                                   |      | 50 $\mu\text{A}$<br>1 mA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 0.5 \cdot I_{D25}$<br>Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2 \%$ |                                                                                   |      | 60 m $\Omega$            |

#### Features

- Low gate charge
- International standard packages
- Epoxy meet UL 94V-0, flammability classification
- Low  $R_{DS(on)}$  HDMOS™ process
- Rugged polysilicon gate cell structure
- Avalanche energy and current rated
- Fast intrinsic Rectifier

#### Advantages

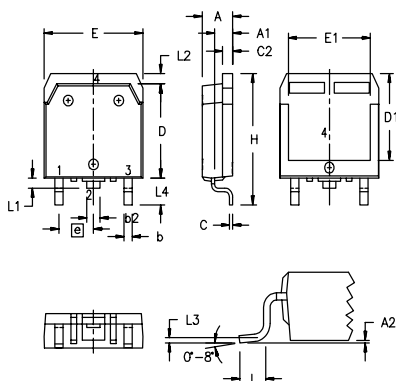
- Easy to mount
- Space savings
- High power density

| Symbol                    | Test Conditions                                                                                                                                                                 | Characteristic Values<br>(T <sub>J</sub> = 25°C, unless otherwise specified) |      |      |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------|------|
|                           |                                                                                                                                                                                 | min.                                                                         | typ. | max. |
| <b>g<sub>fs</sub></b>     | V <sub>DS</sub> = 10 V; I <sub>D</sub> = 0.5 • I <sub>D25</sub> , pulse test                                                                                                    | 22                                                                           | 35   | S    |
| <b>C<sub>iss</sub></b>    | $\left. \begin{array}{l} \\ \\ \end{array} \right\} V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$                                                             |                                                                              | 5300 | pF   |
| <b>C<sub>oss</sub></b>    |                                                                                                                                                                                 |                                                                              | 1010 | pF   |
| <b>C<sub>rss</sub></b>    |                                                                                                                                                                                 |                                                                              | 200  | pF   |
| <b>t<sub>d(on)</sub></b>  | $\left. \begin{array}{l} \\ \\ \\ \end{array} \right\} V_{GS} = 10 \text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$<br>$R_G = 1.5 \, \Omega \text{ (External),}$ |                                                                              | 27   | ns   |
| <b>t<sub>r</sub></b>      |                                                                                                                                                                                 |                                                                              | 60   | ns   |
| <b>t<sub>d(off)</sub></b> |                                                                                                                                                                                 |                                                                              | 80   | ns   |
| <b>t<sub>f</sub></b>      |                                                                                                                                                                                 |                                                                              | 25   | ns   |
| <b>Q<sub>g(on)</sub></b>  | $\left. \begin{array}{l} \\ \\ \end{array} \right\} V_{GS} = 10 \text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                                 |                                                                              | 150  | nC   |
| <b>Q<sub>gs</sub></b>     |                                                                                                                                                                                 |                                                                              | 34   | nC   |
| <b>Q<sub>gd</sub></b>     |                                                                                                                                                                                 |                                                                              | 75   | nC   |
| <b>R<sub>thJC</sub></b>   |                                                                                                                                                                                 |                                                                              | 0.35 | K/W  |
| <b>R<sub>thCK</sub></b>   | TO-247                                                                                                                                                                          |                                                                              | 0.25 | K/W  |
|                           | TO-264                                                                                                                                                                          |                                                                              | 0.15 | K/W  |

### Source-Drain Diode

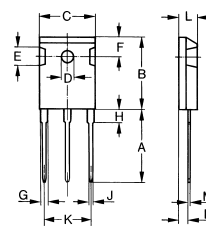
**Characteristic Values**  
( $T_1 = 25^{\circ}\text{C}$ , unless otherwise specified)

| Symbol                           | Test Conditions                                                                                           | min.   | typ. | max.                         |
|----------------------------------|-----------------------------------------------------------------------------------------------------------|--------|------|------------------------------|
| $I_S$                            | $V_{GS} = 0 \text{ V}$                                                                                    |        |      | 52 A                         |
| $I_{SM}$                         | Repetitive; pulse width limited by $T_{JM}$                                                               |        |      | 208 A                        |
| $V_{SD}$                         | $I_F = I_S$ , $V_{GS} = 0 \text{ V}$ ,<br>Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2 \%$ |        |      | 1.5 V                        |
| $t_{rr}$<br>$Q_{RM}$<br>$I_{RM}$ | $I_F = I_S$ -di/dt = 100 A/ $\mu\text{s}$ , $V_R = 100 \text{ V}$                                         | 1<br>8 |      | 250 ns<br>$\mu\text{C}$<br>A |

**TO-268AA (D<sup>3</sup> PAK)**

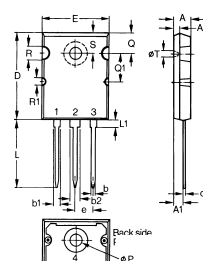
| Dim.           | Millimeter |       | Inches   |      |
|----------------|------------|-------|----------|------|
|                | Min.       | Max.  | Min.     | Max. |
| A              | 4.9        | 5.1   | .193     | .201 |
| A <sub>1</sub> | 2.7        | 2.9   | .106     | .114 |
| A <sub>2</sub> | .02        | .25   | .001     | .010 |
| b              | 1.15       | 1.45  | .045     | .057 |
| b <sub>2</sub> | 1.9        | 2.1   | .75      | .83  |
| C              | .4         | .65   | .016     | .026 |
| D              | 13.80      | 14.00 | .543     | .551 |
| E              | 15.85      | 16.05 | .624     | .632 |
| E <sub>1</sub> | 13.3       | 13.6  | .524     | .535 |
| e              | 5.45 BSC   |       | .215 BSC |      |
| H              | 18.70      | 19.10 | .736     | .752 |
| L              | 2.40       | 2.70  | .094     | .106 |
| L1             | 1.20       | 1.40  | .047     | .055 |
| L2             | 1.00       | 1.15  | .039     | .045 |
| L3             | .025 BSC   |       | .010 BSC |      |
| L4             | 3.80       | 4.10  | .150     | .161 |

## TO-247 AD (IXFH) Outline

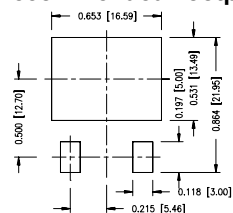


| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 19.81      | 20.32 | 0.780  | 0.800 |
| B    | 20.80      | 21.46 | 0.819  | 0.845 |
| C    | 15.75      | 16.26 | 0.610  | 0.640 |
| D    | 3.55       | 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 |

## TO-264 AA Outline



| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 4.82       | 5.13  | .190   | .202  |
| A1   | 2.54       | 2.89  | .100   | .114  |
| A2   | 2.00       | 2.10  | .079   | .083  |
| b    | 1.12       | 1.42  | .044   | .056  |
| b1   | 2.39       | 2.69  | .094   | .106  |
| b2   | 2.90       | 3.09  | .114   | .122  |
| c    | 0.53       | 0.83  | .021   | .033  |
| D    | 25.91      | 26.16 | 1.020  | 1.030 |
| E    | 19.81      | 19.96 | .780   | .786  |
| e    | 5.46       | BSC   | .215   | BSC   |
| J    | 0.00       | 0.25  | .000   | .010  |
| K    | 0.00       | 0.25  | .000   | .010  |
| L    | 20.32      | 20.83 | .800   | .820  |
| L1   | 2.29       | 2.59  | .090   | .102  |
| P    | 3.17       | 3.66  | .125   | .144  |
| Q    | 6.07       | 6.27  | .239   | .247  |
| Q1   | 8.38       | 8.69  | .330   | .342  |
| R    | 3.81       | 4.32  | .150   | .170  |
| R1   | 1.78       | 2.29  | .070   | .090  |
| S    | 6.04       | 6.30  | .238   | .248  |
| T    | 1.57       | 1.83  | .062   | .072  |

**Min. Recommended Footprint**



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