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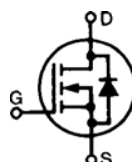
# HiPerFET™ Power MOSFETs IXFR 58N20Q

## ISOPLUS247™ Q-Class

(Electrically Isolated Back Surface)

N-Channel Enhancement Mode  
 Avalanche Rated, High dV/dt  
 Low Gate Charge and Capacitances

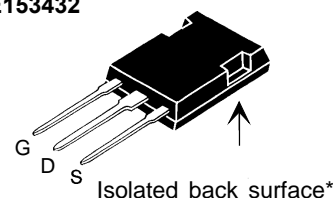
Preliminary Data Sheet



$V_{DSS} = 200 \text{ V}$   
 $I_{D25} = 50 \text{ A}$   
 $R_{DS(on)} = 40 \text{ m}\Omega$   
 $t_{rr} \leq 200 \text{ ns}$

| Symbol        | Test Conditions                                                                                                                       | Maximum Ratings |                  |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                                                       | 200             | V                |
| $V_{DGR}$     | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1 \text{ M}\Omega$                                                        | 200             | V                |
| $V_{GS}$      | Continuous                                                                                                                            | $\pm 20$        | V                |
| $V_{GSM}$     | Transient                                                                                                                             | $\pm 30$        | V                |
| $I_{D25}$     | $T_C = 25^\circ\text{C}$                                                                                                              | 50              | A                |
| $I_{DM}$      | $T_C = 25^\circ\text{C}$ , Note 1                                                                                                     | 232             | A                |
| $I_{AR}$      | $T_C = 25^\circ\text{C}$                                                                                                              | 58              | A                |
| $E_{AR}$      | $T_C = 25^\circ\text{C}$                                                                                                              | 30              | mJ               |
| $E_{AS}$      | $T_C = 25^\circ\text{C}$                                                                                                              | 1.0             | J                |
| <b>dv/dt</b>  | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2 \Omega$ | 5               | V/ns             |
| $P_D$         | $T_C = 25^\circ\text{C}$                                                                                                              | 300             | 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 (0.062 in.) from case for 10 s                                                                                                 | 250             | $^\circ\text{C}$ |
| $V_{ISOL}$    | 50/60 Hz, RMS $t = 1 \text{ min}$                                                                                                     | 2500            | V~               |
| <b>Weight</b> |                                                                                                                                       | 5               | g                |

ISOPLUS247™  
 E153432



G = Gate      D = Drain  
 S = Source

\* Patent pending

### Features

- Silicon chip on Direct-Copper-Bond substrate
  - High power dissipation
  - Isolated mounting surface
  - 2500V electrical isolation
- Low drain to tab capacitance (<50pF)
- IXYS advanced low  $Q_g$  process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Fast intrinsic diode

### Applications

- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC motor control

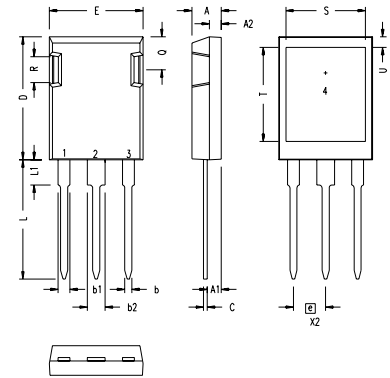
### Advantages

- Easy assembly
- Space savings
- High power density

| Symbol       | Test Conditions                                                                                     | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                          |
|--------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|--------------------------|
|              |                                                                                                     | min.                                                                              | typ. | max.                     |
| $V_{DSS}$    | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$                                                    | 200                                                                               |      | V                        |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 4 \text{ mA}$                                                            | 2.0                                                                               |      | 4.0 V                    |
| $I_{GSS}$    | $V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0$                                                          |                                                                                   |      | $\pm 100 \text{ nA}$     |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $T_J = 25^\circ\text{C}$<br>$V_{GS} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$ |                                                                                   |      | 25 $\mu\text{A}$<br>1 mA |
| $R_{DS(on)}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 29 \text{ A}$<br>Note 2                                            |                                                                                   |      | 40 m $\Omega$            |

| Symbol       | Test Conditions                                                                                    |        | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |    |
|--------------|----------------------------------------------------------------------------------------------------|--------|-----------------------------------------------------------------------------------|------|------|----|
|              |                                                                                                    |        | min.                                                                              | typ. | max. |    |
| $g_{fs}$     | $V_{DS} = 10\text{ V}; I_D = 29\text{ A}$                                                          | Note 2 | 24                                                                                | 34   | S    |    |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                      |        |                                                                                   | 3600 | pF   |    |
| $C_{oss}$    |                                                                                                    |        |                                                                                   | 870  | pF   |    |
| $C_{rss}$    |                                                                                                    |        |                                                                                   | 280  | pF   |    |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 29\text{ A}$<br>$R_G = 1.5\ \Omega$ (External), |        |                                                                                   | 20   | ns   |    |
| $t_r$        |                                                                                                    |        |                                                                                   | 40   | ns   |    |
| $t_{d(off)}$ |                                                                                                    |        |                                                                                   | 40   | ns   |    |
| $t_f$        |                                                                                                    |        |                                                                                   | 13   | ns   |    |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 V_{DSS}, I_D = 29\text{ A}$                                    |        |                                                                                   | 98   | 140  | nC |
| $Q_{gs}$     |                                                                                                    |        |                                                                                   | 25   | 35   | nC |
| $Q_{gd}$     |                                                                                                    |        |                                                                                   | 45   | 70   | nC |
| $R_{thJC}$   |                                                                                                    |        |                                                                                   | 0.5  | K/W  |    |
| $R_{thCK}$   | (TO-247)                                                                                           |        |                                                                                   | 0.15 | K/W  |    |

| Symbol   | Test Conditions                                                    | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |      |               |
|----------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------|---------------|
|          |                                                                    | min.                                                                              | typ. | max. |               |
| $I_s$    | $V_{GS} = 0\text{ V}$                                              |                                                                                   |      | 58   | A             |
| $I_{SM}$ | Repetitive, Note 1                                                 |                                                                                   |      | 232  | A             |
| $V_{SD}$ | $I_F = I_s, V_{GS} = 0\text{ V}$ , Note 2                          |                                                                                   |      | 1.5  | V             |
| $t_{rr}$ | $I_F = I_s, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$ |                                                                                   |      | 200  | ns            |
| $Q_{RM}$ |                                                                    |                                                                                   |      | 0.7  | $\mu\text{C}$ |
| $I_{RM}$ |                                                                    |                                                                                   |      | 7    | A             |

**ISOPLUS247 OUTLINE**


| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .190     | .205 | 4.83        | 5.21  |
| A1  | .090     | .100 | 2.29        | 2.54  |
| A2  | .075     | .085 | 1.91        | 2.16  |
| b   | .045     | .055 | 1.14        | 1.40  |
| b1  | .075     | .084 | 1.91        | 2.13  |
| b2  | .115     | .123 | 2.92        | 3.12  |
| C   | .024     | .031 | 0.61        | 0.80  |
| D   | .819     | .840 | 20.80       | 21.34 |
| E   | .620     | .635 | 15.75       | 16.13 |
| e   | .215 BSC |      | 5.45 BSC    |       |
| L   | .780     | .800 | 19.81       | 20.32 |
| L1  | .150     | .170 | 3.81        | 4.32  |
| Q   | .220     | .244 | 5.59        | 6.20  |
| R   | .170     | .190 | 4.32        | 4.83  |
| S   | .520     | .540 | 13.21       | 13.72 |
| T   | .620     | .640 | 15.75       | 16.26 |
| U   | .065     | .080 | 1.65        | 2.03  |

- 1 - GATE
- 2 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)
- 4 - NO CONNECTION

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

- Note: 1. Pulse width limited by  $T_{JM}$   
2. Pulse test,  $t \leq 300\ \mu\text{s}$ , duty cycle  $d \leq 2\%$

IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETS and IGBTs are covered by one or more of the following U.S. patents:

|           |           |           |           |           |           |             |
|-----------|-----------|-----------|-----------|-----------|-----------|-------------|
| 4,835,592 | 4,881,106 | 5,017,508 | 5,049,961 | 5,187,117 | 5,486,715 | 6,306,728B1 |
| 4,850,072 | 4,931,844 | 5,034,796 | 5,063,307 | 5,237,481 | 5,381,025 |             |