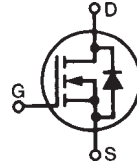


# Polar™ Power MOSFET

## HiPerFET™

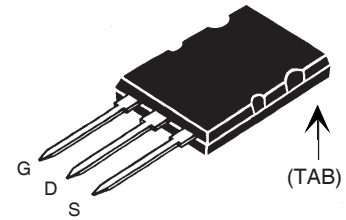
# IXFB40N110P

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



$V_{DSS} = 1100V$   
 $I_{D25} = 40A$   
 $R_{DS(on)} \leq 260m\Omega$   
 $t_{rr} \leq 300ns$

PLUS264™ (IXFB)



G = Gate      D = Drain  
S = Source      TAB = Drain

| Symbol        | Test Conditions  | Maximum Ratings |            |
|---------------|--|-----------------|------------|
| $V_{DSS}$     | $T_J = 25^\circ C$ to $150^\circ C$                                | 1100            | V          |
| $V_{DGR}$     | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$          | 1100            | V          |
| $V_{GSS}$     | Continuous   | $\pm 30$        | V          |
| $V_{GSM}$     | Transient  | $\pm 40$        | V          |
| $I_{D25}$     | $T_C = 25^\circ C$   | 40              | A          |
| $I_{DM}$      | $T_C = 25^\circ C$ , pulse width limited by $T_{JM}$               | 100             | A          |
| $I_{AR}$      | $T_C = 25^\circ C$   | 20              | A          |
| $E_{AS}$      | $T_C = 25^\circ C$   | 2               | J          |
| $dV/dt$       | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$ | 15              | V/ns       |
| $P_D$         | $T_C = 25^\circ C$   | 1250            | W          |
| $T_J$         |  | -55 ... +150    | $^\circ C$ |
| $T_{JM}$      |  | 150             | $^\circ C$ |
| $T_{stg}$     |  | -55 ... +150    | $^\circ C$ |
| $T_L$         | 1.6mm (0.062 in.) from case for 10s                                | 300             | $^\circ C$ |
| $T_{SOLD}$    | Plastic body for 10s   | 260             | $^\circ C$ |
| $F_C$         | Mounting force   | 30..120/6.7..27 | N/lb.      |
| <b>Weight</b> |  | 10              | g          |

### Features

- Fast recovery diode
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
  - easy to drive and to protect

### Advantages

- Plus 264™ package for clip or spring mounting
- Space savings
- High power density

### Applications:

- High Voltage Switched-mode and resonant-mode power supplies
- High Voltage Pulse Power Applications
- High Voltage Discharge circuits in Lasers Pulsers, Spark Igniters, RF Generators
- High Voltage DC-DC converters
- High Voltage DC-AC inverters

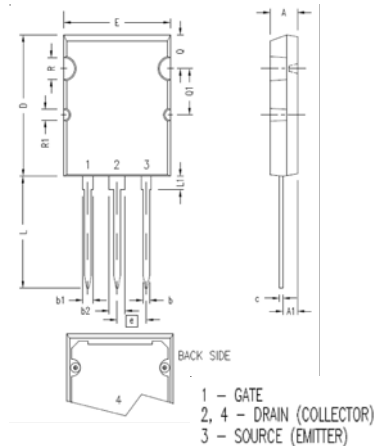
| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , unless otherwise specified) | Characteristic Values |      |   |
|--------------|---|-----------------------|------|---|
|              |   | Min.                  | Typ. | Max.                                      |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 3mA$   | 1100                  |      | V   |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 1mA$                                       | 3.5                   |      | 6.5 V                                     |
| $I_{GSS}$    | $V_{GS} = \pm 30V$ , $V_{DS} = 0V$                                    |                       |      | $\pm 200$ nA                              |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$<br>$V_{GS} = 0V$                                   |                       |      | 50 $\mu A$<br>3 mA<br>$T_J = 125^\circ C$ |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1                   |                       |      | 260 m $\Omega$                            |

| Symbol       | Test Conditions   | Characteristic Values |      |               |
|--------------|---|-----------------------|------|---------------|
|              |   | Min.                  | Typ. | Max.          |
| $g_{fs}$     | $V_{DS} = 20V, I_D = 0.5 \cdot I_{D25}$ , Note 1  | 20                    | 32   | S             |
| $C_{iss}$    | $V_{GS} = 0V, V_{DS} = 25V, f = 1MHz$   |                       | 19   | nF            |
| $C_{oss}$    |   |                       | 1070 | pF            |
| $C_{rss}$    |   |                       | 46   | pF            |
| $R_{GI}$     | Gate Input Resistance   |                       | 1.65 | $\Omega$      |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10V, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$<br>$R_G = 1\Omega$ (External) |                       | 53   | ns            |
| $t_r$        |   |                       | 55   | ns            |
| $t_{d(off)}$ |   |                       | 110  | ns            |
| $t_f$        |   |                       | 54   | ns            |
| $Q_{g(on)}$  | $V_{GS} = 10V, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$   |                       | 310  | nC            |
| $Q_{gs}$     |   |                       | 95   | nC            |
| $Q_{gd}$     |   |                       | 142  | nC            |
| $R_{thJC}$   |   |                       | 0.10 | $^{\circ}C/W$ |
| $R_{thCS}$   |   | 0.13                  |      | $^{\circ}C/W$ |

**Source-Drain Diode**

| Symbol   | Test Conditions   | Characteristic Values |      |         |
|----------|---|-----------------------|------|---------|
|          |   | Min.                  | Typ. | Max.    |
| $I_S$    | $V_{GS} = 0V$   |                       |      | 40 A    |
| $I_{SM}$ | Repetitive, pulse width limited by $T_{JM}$                   |                       |      | 160 A   |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0V$ , Note 1                             |                       |      | 1.5 V   |
| $t_{rr}$ | $I_F = 20A, -di/dt = 100A/\mu s$<br>$V_R = 100V, V_{GS} = 0V$ |                       |      | 300 ns  |
| $Q_{RM}$ |   |                       | 2.2  | $\mu C$ |
| $I_{RM}$ |   |                       | 16   | A       |

Note 1: Pulse test,  $t \leq 300\mu s$ ; duty cycle,  $d \leq 2\%$ .

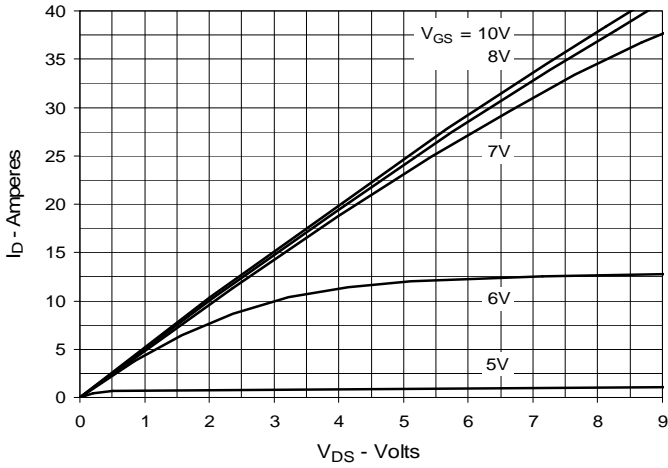
**PLUS264™ (IXFB) Outline**


| SYM              | INCHES   |       | MILLIMETERS |       |
|------------------|----------|-------|-------------|-------|
|                  | MIN      | MAX   | MIN         | MAX   |
| A                | .185     | .209  | 4.70        | 5.31  |
| A1               | .102     | .118  | 2.59        | 3.00  |
| b                | .037     | .055  | 0.94        | 1.40  |
| b1               | .087     | .102  | 2.21        | 2.59  |
| b2               | .110     | .126  | 2.79        | 3.20  |
| c                | .017     | .029  | 0.43        | 0.74  |
| D                | 1.007    | 1.047 | 25.58       | 26.59 |
| E                | .760     | .799  | 19.30       | 20.29 |
| e                | .215 BSC |       | 5.46 BSC    |       |
| L                | .779     | .842  | 19.79       | 21.39 |
| L1               | .087     | .102  | 2.21        | 2.59  |
| Q                | .240     | .256  | 6.10        | 6.50  |
| Q1               | .330     | .346  | 8.38        | 8.79  |
| $\varnothing R$  | .155     | .187  | 3.94        | 4.75  |
| $\varnothing R1$ | .085     | .093  | 2.16        | 2.36  |

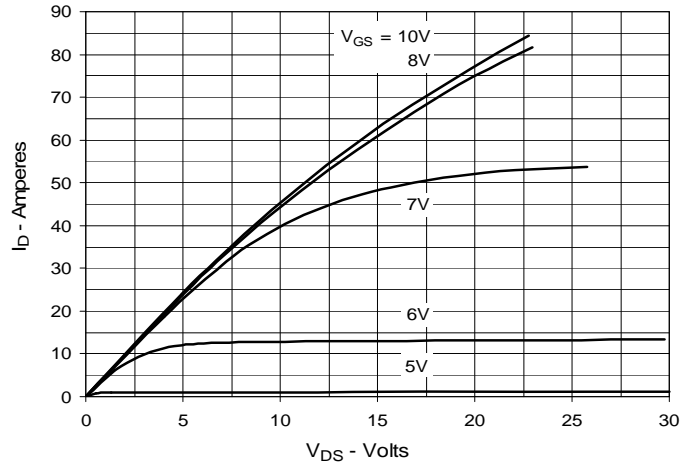
IXYS reserves the right to change limits, test conditions, and dimensions.

|  |           |           |           |           |              |              |              |              |              |             |
|--|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: | 4,835,592 | 4,931,844 | 5,049,961 | 5,237,481 | 6,162,665    | 6,404,065 B1 | 6,683,344    | 6,727,585    | 7,005,734 B2 | 7,157,338B2 |
|  | 4,850,072 | 5,017,508 | 5,063,307 | 5,381,025 | 6,259,123 B1 | 6,534,343    | 6,710,405 B2 | 6,759,692    | 7,063,975 B2 |             |
|  | 4,881,106 | 5,034,796 | 5,187,117 | 5,486,715 | 6,306,728 B1 | 6,583,505    | 6,710,463    | 6,771,478 B2 | 7,071,537    |             |

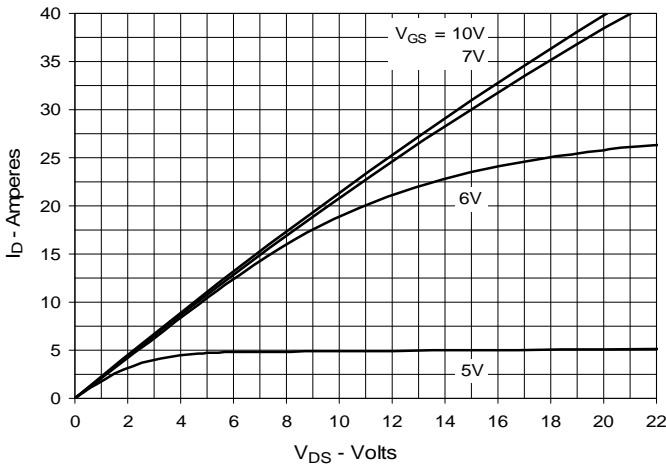
**Fig. 1. Output Characteristics @ 25°C**



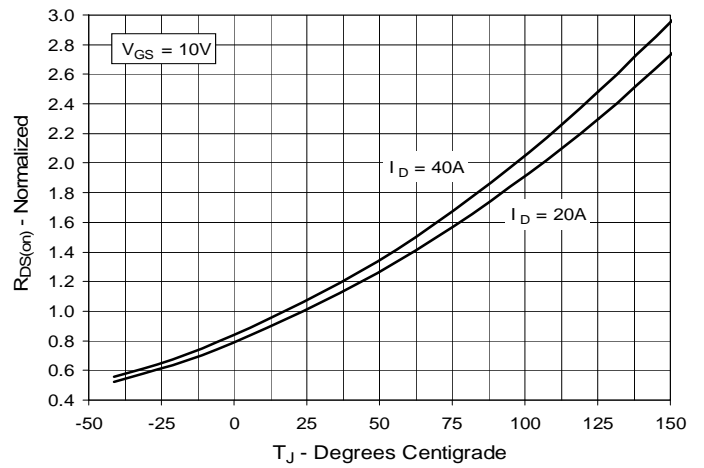
**Fig. 2. Extended Output Characteristics @ 25°C**



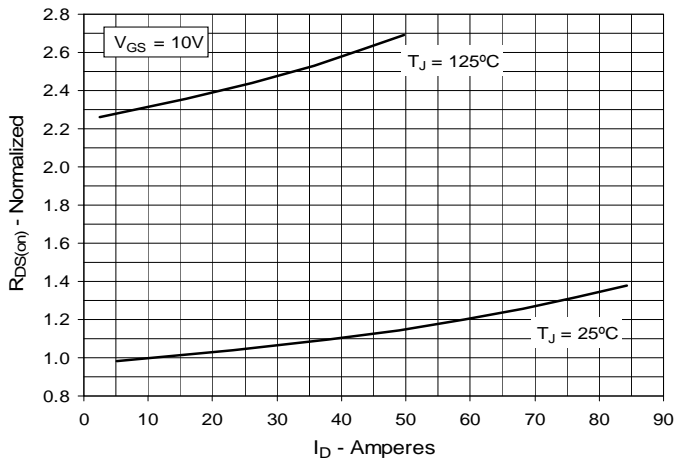
**Fig. 3. Output Characteristics @ 125°C**



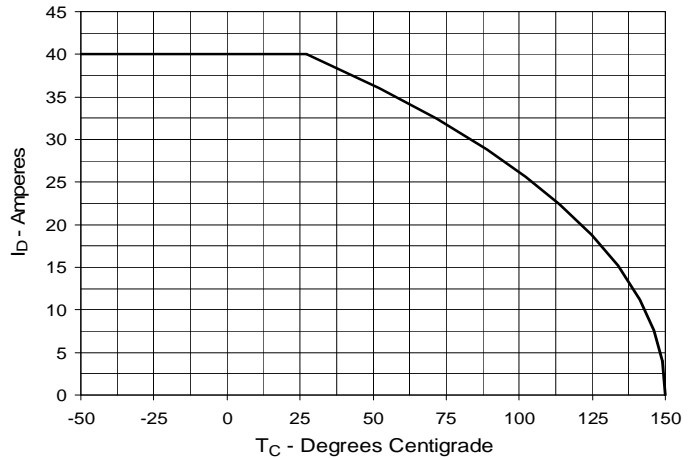
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 20A$  Value vs. Junction Temperature**

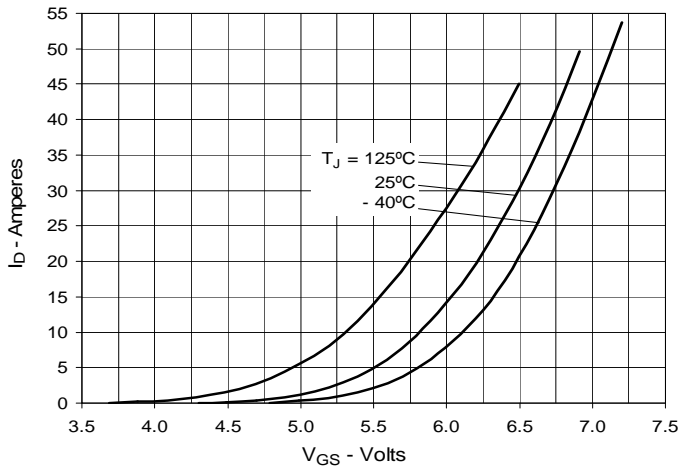
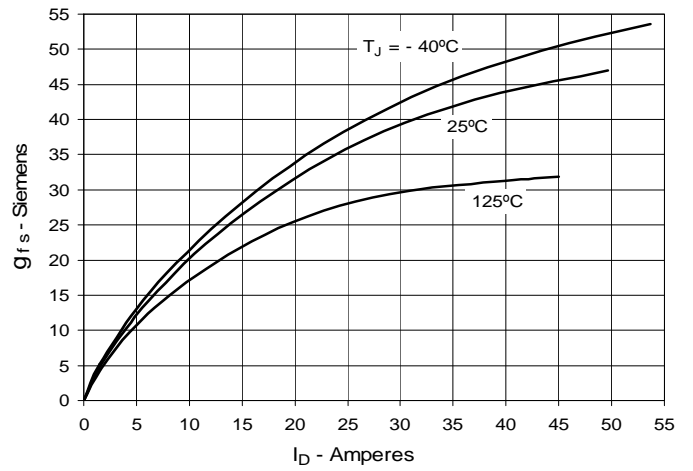
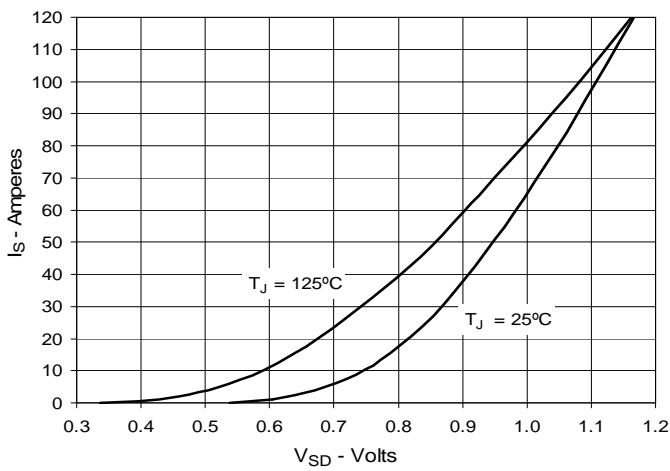
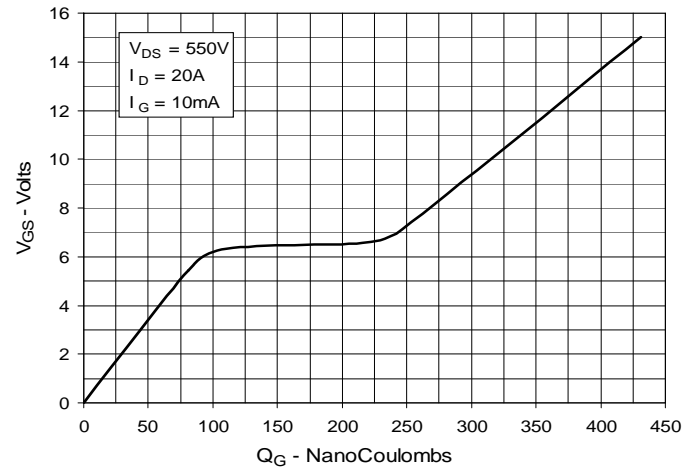
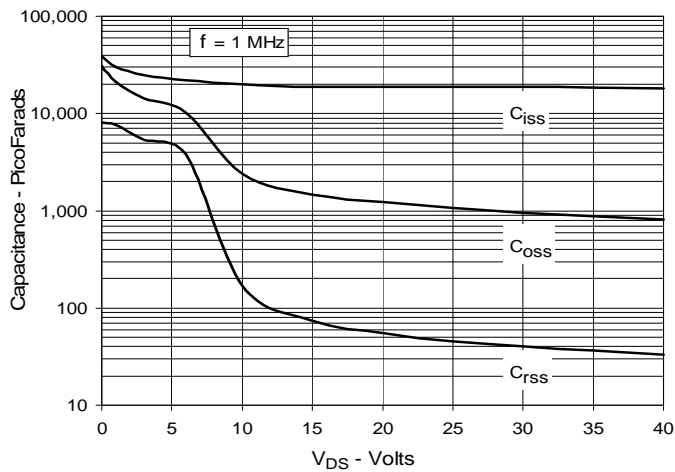
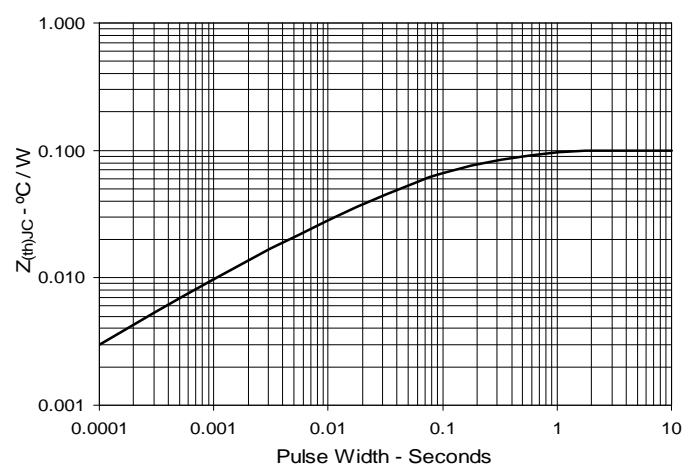


**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 20A$  Value vs. Drain Current**



**Fig. 6. Maximum Drain Current vs. Case Temperature**



**Fig. 7. Input Admittance**

**Fig. 8. Transconductance**

**Fig. 9. Forward Voltage Drop of Intrinsic Diode**

**Fig. 10. Gate Charge**

**Fig. 11. Capacitance**

**Fig. 12. Maximum Transient Thermal Impedance**


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