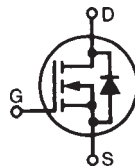


# Polar™ HiPerFET™ Power MOSFET

## IXFL30N120P

( Electrically Isolated Tab )

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode

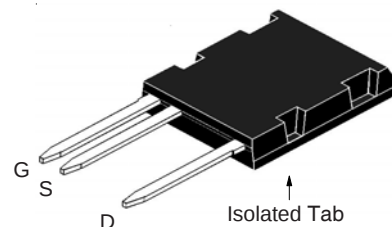


$$\begin{aligned} V_{DSS} &= 1200V \\ I_{D25} &= 18A \\ R_{DS(on)} &\leq 380m\Omega \\ t_{rr} &\leq 300ns \end{aligned}$$

| Symbol     | Test Conditions                                                    | Maximum Ratings |            |
|------------|--------------------------------------------------------------------|-----------------|------------|
| $V_{DSS}$  | $T_J = 25^\circ C$ to $150^\circ C$                                | 1200            | V          |
| $V_{DGR}$  | $T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$          | 1200            | V          |
| $V_{GSS}$  | Continuous                                                         | $\pm 30$        | V          |
| $V_{GSM}$  | Transient                                                          | $\pm 40$        | V          |
| $I_{D25}$  | $T_C = 25^\circ C$                                                 | 18              | A          |
| $I_{DM}$   | $T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$               | 80              | A          |
| $I_A$      | $T_C = 25^\circ C$                                                 | 15              | A          |
| $E_{AS}$   | $T_C = 25^\circ C$                                                 | 1.5             | J          |
| $dv/dt$    | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$ | 15              | V/ns       |
| $P_D$      | $T_C = 25^\circ C$                                                 | 357             | W          |
| $T_J$      |                                                                    | -55 ... +150    | $^\circ C$ |
| $T_{JM}$   |                                                                    | 150             | $^\circ C$ |
| $T_{stg}$  |                                                                    | -55 ... +150    | $^\circ C$ |
| $T_L$      | Maximum Lead Temperature for Soldering                             | 300             | $^\circ C$ |
| $T_{SOLD}$ | Plastic Body for 10s                                               | 260             | $^\circ C$ |
| $V_{ISOL}$ | 50/60 Hz, RMS, 1 minute                                            | 2500            | V~         |
|            | $I_{ISOL} \leq 1mA$ $t = 1s$                                       | 3000            | V~         |
| $F_C$      | Mounting Force                                                     | 40..120/4.5..27 | N/lb.      |
| Weight     |                                                                    | 8               | g          |

| Symbol       | Test Conditions<br>( $T_J = 25^\circ C$ , Unless Otherwise Specified) | Characteristic Values |      |                    |
|--------------|-----------------------------------------------------------------------|-----------------------|------|--------------------|
|              |                                                                       | Min.                  | Typ. | Max.               |
| $BV_{DSS}$   | $V_{GS} = 0V$ , $I_D = 3mA$                                           | 1200                  |      | 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       |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $V_{GS} = 0V$<br>Note 2, $T_J = 125^\circ C$     |                       |      | 50 $\mu A$<br>5 mA |
| $R_{DS(on)}$ | $V_{GS} = 10V$ , $I_D = 15A$ , Note 1                                 |                       |      | 380 m $\Omega$     |

ISOPLUS i5-Pak™



G = Gate      D = Drain  
S = Source

### Features

- Silicon Chip on Direct-Copper-Bond Substrate
  - High Power Dissipation
  - Isolated Mounting Surface
  - 2500V~ Electrical Isolation
- Avalanche Rated
- Fast Intrinsic Diode

### Advantages

- Easy Assembly
- Space Savings
- High Power Density

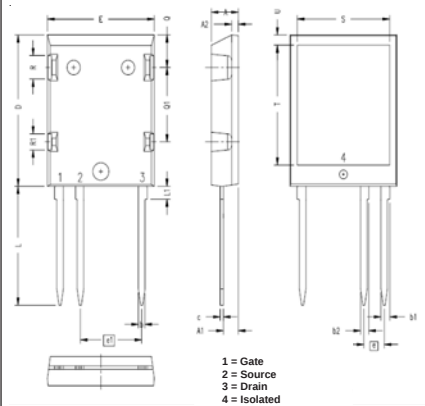
### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- Laser Drivers
- AC and DC Motor Drives
- Robotics and Servo Controls

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)                                                             | Characteristic Values |      |                         |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------------------------|
|              |                                                                                                                                       | Min.                  | Typ. | Max.                    |
| $g_{fs}$     | $V_{DS} = 20\text{V}, I_D = 15\text{A}$ , Note 1                                                                                      | 13                    | 22   | S                       |
| $C_{iss}$    | $V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1\text{MHz}$                                                                            |                       | 19   | nF                      |
| $C_{oss}$    |                                                                                                                                       |                       | 960  | pF                      |
| $C_{rss}$    |                                                                                                                                       |                       | 25   | pF                      |
| $R_{Gi}$     | Gate input resistance                                                                                                                 |                       | 1.70 | $\Omega$                |
| $t_{d(on)}$  | <b>Resistive Switching Times</b><br>$V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 15\text{A}$<br>$R_G = 1\Omega$ (External) |                       | 57   | ns                      |
| $t_r$        |                                                                                                                                       |                       | 60   | ns                      |
| $t_{d(off)}$ |                                                                                                                                       |                       | 95   | ns                      |
| $t_f$        |                                                                                                                                       |                       | 56   | ns                      |
| $Q_{g(on)}$  | $V_{GS} = 10\text{V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 15\text{A}$                                                                   |                       | 310  | nC                      |
| $Q_{gs}$     |                                                                                                                                       |                       | 104  | nC                      |
| $Q_{gd}$     |                                                                                                                                       |                       | 137  | nC                      |
| $R_{thJC}$   |                                                                                                                                       |                       |      | 0.35 $^\circ\text{C/W}$ |
| $R_{thCS}$   |                                                                                                                                       |                       | 0.15 | $^\circ\text{C/W}$      |

| Source-Drain Diode                                   |                                                                                                 | Characteristic Values |      |               |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------|------|---------------|
| $T_J = 25^\circ\text{C}$ Unless Otherwise Specified) |                                                                                                 | Min.                  | Typ. | Max.          |
| $I_S$                                                | $V_{GS} = 0\text{V}$                                                                            |                       |      | 30 A          |
| $I_{SM}$                                             | Repetitive, Pulse Width Limited by $T_{JM}$                                                     |                       |      | 120 A         |
| $V_{SD}$                                             | $I_F = I_S, V_{GS} = 0\text{V}$ , Note 1                                                        |                       |      | 1.5 V         |
| $t_{rr}$                                             | $I_F = 15\text{A}, -di/dt = 100\text{A}/\mu\text{s}$<br>$V_R = 100\text{V}, V_{GS} = 0\text{V}$ |                       |      | 300 ns        |
| $Q_{RM}$                                             |                                                                                                 |                       | 1.6  | $\mu\text{C}$ |
| $I_{RM}$                                             |                                                                                                 |                       | 14   | A             |

## ISOPLUS i5-Pak™ (IXFL) Outline



| SYM | INCHES    |       | MILLIMETER |       |
|-----|-----------|-------|------------|-------|
|     | MIN       | MAX   | MIN        | MAX   |
| A   | 0.190     | 0.205 | 4.83       | 5.21  |
| A1  | 0.102     | 0.118 | 2.59       | 3.00  |
| A2  | 0.046     | 0.055 | 1.17       | 1.40  |
| b   | 0.045     | 0.055 | 1.14       | 1.40  |
| b1  | 0.063     | 0.072 | 1.60       | 1.83  |
| b2  | 0.058     | 0.068 | 1.47       | 1.73  |
| c   | 0.020     | 0.029 | 0.51       | 0.74  |
| D   | 1.020     | 1.040 | 25.91      | 26.42 |
| E   | 0.770     | 0.799 | 19.56      | 20.29 |
| e   | 0.150 BSC |       | 3.81 BSC   |       |
| e1  | 0.450 BSC |       | 11.43 BSC  |       |
| L   | 0.780     | 0.820 | 19.81      | 20.83 |
| L1  | 0.080     | 0.102 | 2.03       | 2.59  |
| Q   | 0.210     | 0.235 | 5.33       | 5.97  |
| Q1  | 0.490     | 0.513 | 12.45      | 13.03 |
| R   | 0.150     | 0.180 | 3.81       | 4.57  |
| R1  | 0.100     | 0.130 | 2.54       | 3.30  |
| S   | 0.668     | 0.690 | 16.97      | 17.53 |
| T   | 0.801     | 0.821 | 20.34      | 20.85 |
| U   | 0.065     | 0.080 | 1.65       | 2.03  |

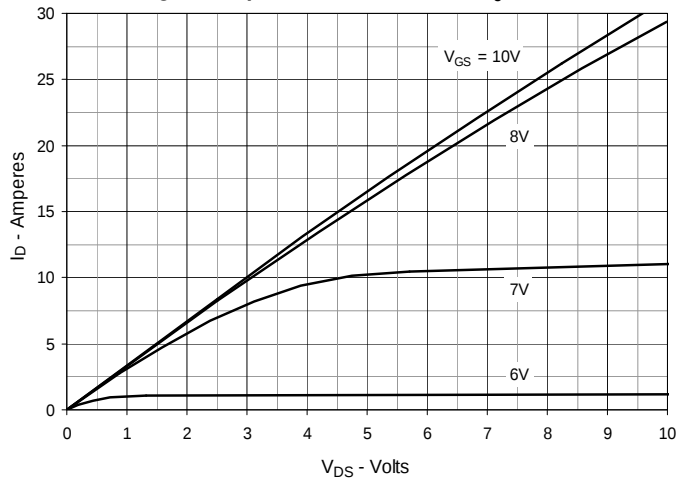
### Notes:

1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .
2. Part must be heatsunk for high-temp  $I_{CS}$  measurement.

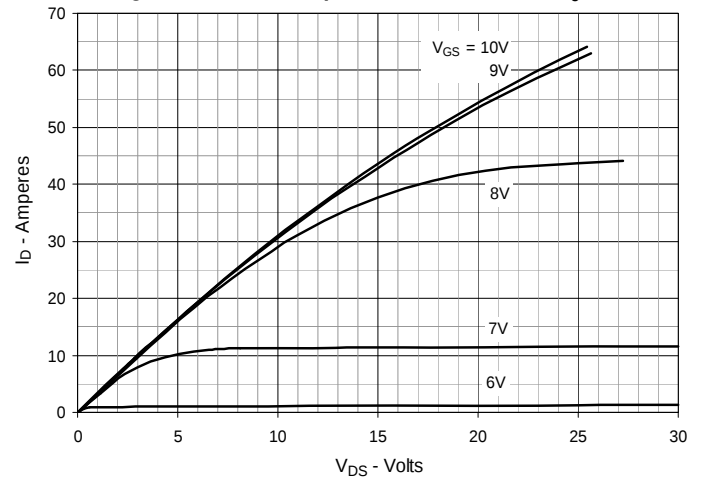
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

|                                                                                  |           |           |           |           |              |              |              |              |              |             |
|----------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|-------------|
| 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    |             |

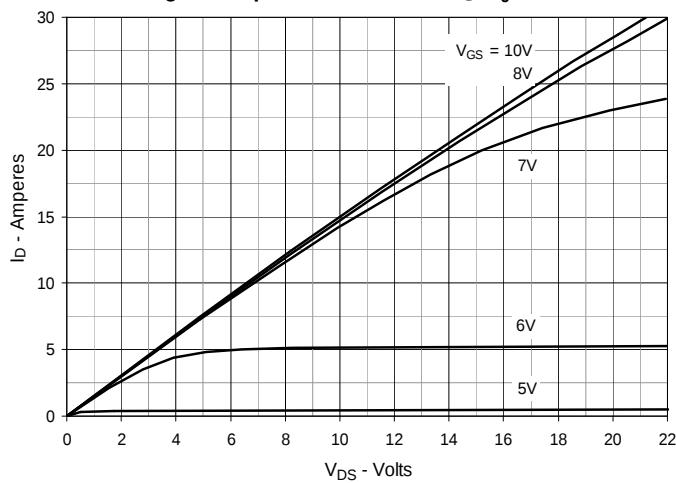
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



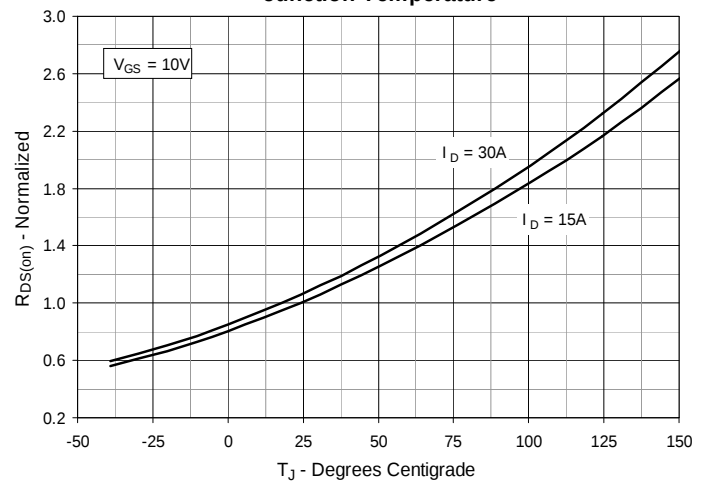
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



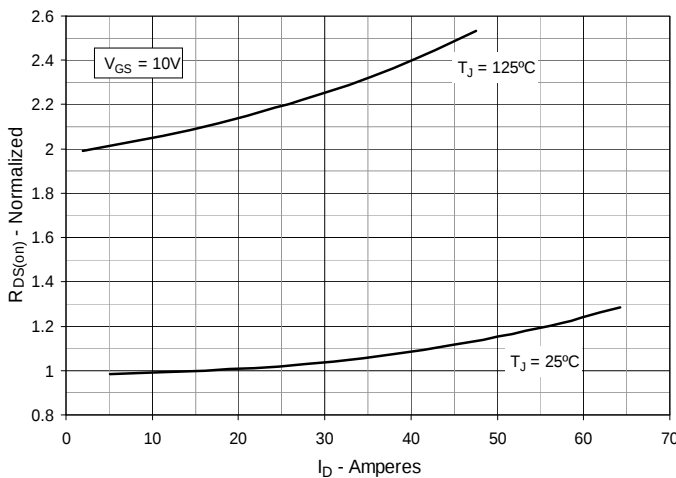
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



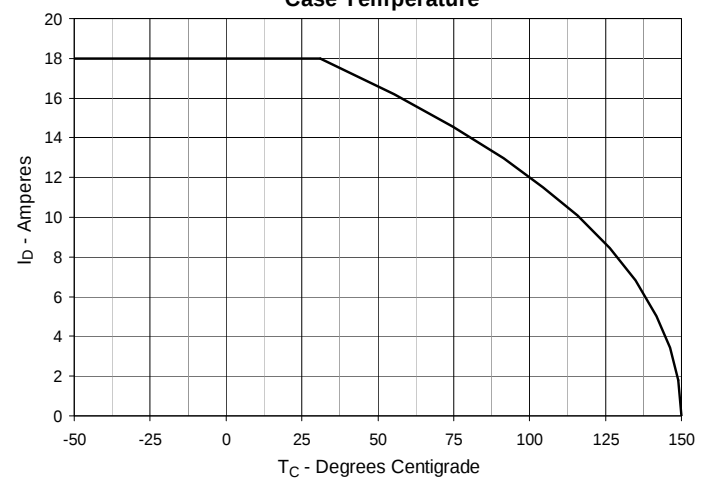
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 15A$  Value vs. Junction Temperature**

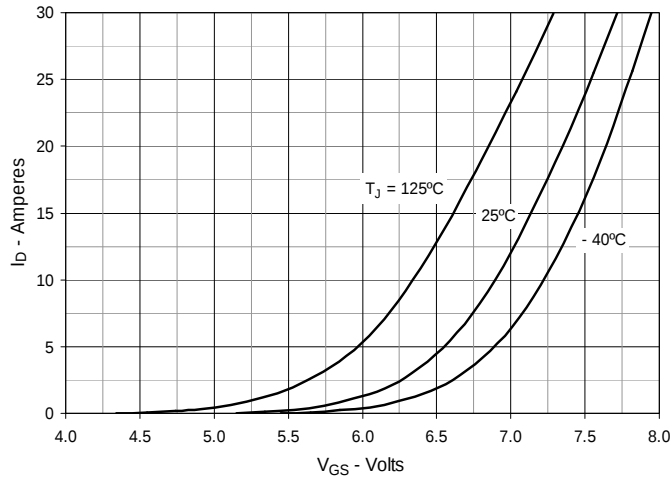
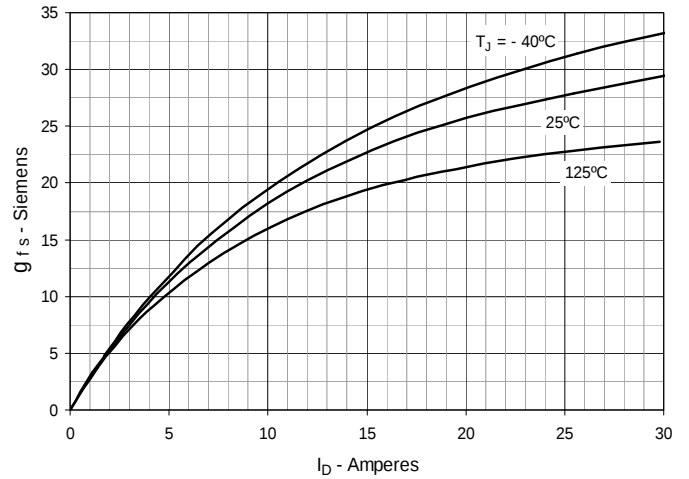
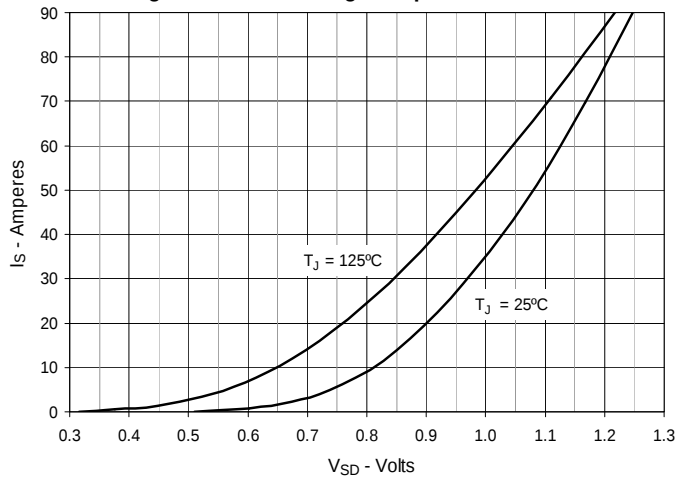
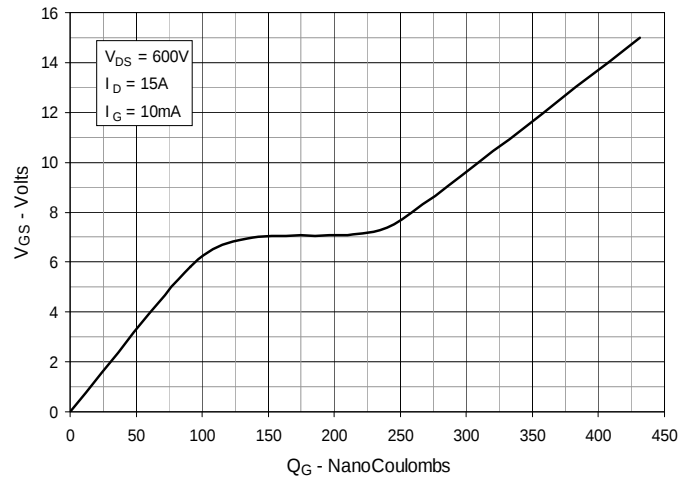
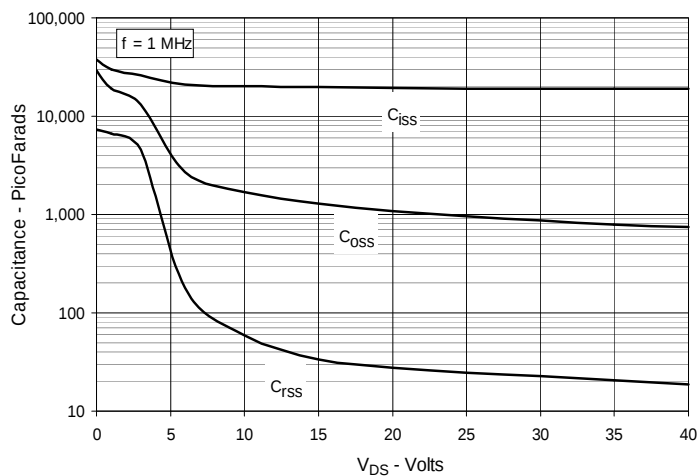


**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 15A$  Value vs. Drain Current**



**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**
