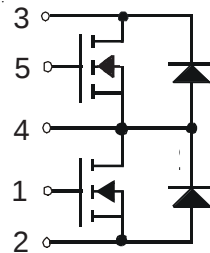


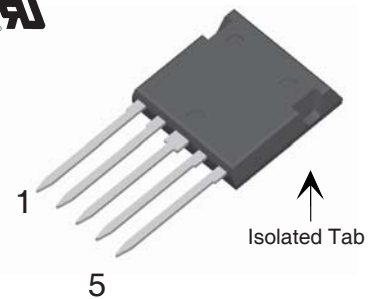
# PolarHV™ HiPerFET N-Channel Power MOSFET Phase leg Topology

## FMM22-06PF



$$\begin{aligned} V_{DSS} &= 600V \\ I_{D25} &= 12A \\ R_{DS(on)} &\leq 350m\Omega \\ t_{rr(max)} &\leq 200ns \end{aligned}$$

ISOPLUS i4-Pak™



| Symbol      | Test Conditions                      | Maximum Ratings   |       |
|-------------|--------------------------------------|-------------------|-------|
| $T_J$       |                                      | -55 ... +150      | °C    |
| $T_{JM}$    |                                      | 150               | °C    |
| $T_{stg}$   |                                      | -55 ... +150      | °C    |
| $V_{ISOLD}$ | 50/60Hz, RMS, t = 1min, leads-to-tab | 2500              | ~V    |
| $T_L$       | 1.6mm (0.062 in.) from case for 10s  | 300               | °C    |
| $T_{SOLD}$  | Plastic body for 10s                 | 260               | °C    |
| $F_C$       | Mounting force                       | 20..120 / 4.5..27 | N/lb. |

| Symbol    | Test Conditions                                                          | Maximum Ratings |      |
|-----------|--------------------------------------------------------------------------|-----------------|------|
| $V_{DSS}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                          | 600             | V    |
| $V_{DGR}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GS} = 1M\Omega$    | 600             | V    |
| $V_{GSS}$ | Continuous                                                               | $\pm 30$        | V    |
| $V_{GSM}$ | Transient                                                                | $\pm 40$        | V    |
| $I_{D25}$ | $T_C = 25^\circ\text{C}$                                                 | 12              | A    |
| $I_{DM}$  | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$               | 66              | A    |
| $I_A$     | $T_C = 25^\circ\text{C}$                                                 | 22              | A    |
| $E_{AS}$  | $T_C = 25^\circ\text{C}$                                                 | 1.0             | J    |
| $dV/dt$   | $I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ | 10              | V/ns |
| $P_D$     | $T_C = 25^\circ\text{C}$                                                 | 130             | W    |

### Features

- Silicon chip on Direct-Copper Bond (DCB) substrate
  - UL recognized package
  - Isolated mounting surface
  - 2500V electrical isolation
- Avalanche rated
- Low  $Q_g$
- Low Drain-to-Tab capacitance
- Low package inductance

### Advantages

- Low gate drive requirement
- High power density
- Fast intrinsic rectifier
- Low drain to ground capacitance
- Fast switching

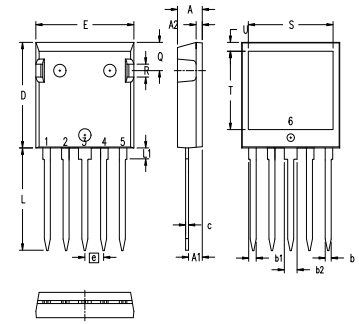
### Applications

- DC and AC motor drives
- UPS, solar and wind power inverters
- Synchronous rectifiers
- Multi-phase DC to DC converters
- Industrial battery chargers
- Switching power supplies

| Symbol     | Test Conditions                                                        | Characteristic Values |      |      |
|------------|------------------------------------------------------------------------|-----------------------|------|------|
|            |                                                                        | Min.                  | Typ. | Max. |
| $C_p$      | Coupling capacitance between shorted pins and mounting tab in the case |                       | 40   | pF   |
| $d_S, d_A$ | pin - pin                                                              | 1.7                   |      | mm   |
| $d_S, d_A$ | pin - backside metal                                                   | 5.5                   |      | mm   |
| Weight     |                                                                        |                       | 9    | g    |

| Symbol                    | Test Conditions <sup>2</sup><br>(T <sub>J</sub> = 25°C unless otherwise specified)                                                                           | Characteristic Values |      |                 |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-----------------|
|                           |                                                                                                                                                              | Min.                  | Typ. | Max.            |
| <b>BV<sub>DSS</sub></b>   | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                                                                                                 | 600                   |      | V               |
| <b>V<sub>GS(th)</sub></b> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1mA                                                                                                     | 3.0                   |      | 5.0 V           |
| <b>I<sub>GSS</sub></b>    | V <sub>GS</sub> = ±30 V, V <sub>DS</sub> = 0V                                                                                                                |                       |      | ± 100 nA        |
| <b>I<sub>DSS</sub></b>    | V <sub>DS</sub> = V <sub>DSS</sub><br>V <sub>GS</sub> = 0V<br>T <sub>J</sub> = 125°C                                                                         |                       |      | 25 μA<br>250 μA |
| <b>R<sub>DS(on)</sub></b> | V <sub>GS</sub> = 10V, I <sub>D</sub> = 11A, Note 1                                                                                                          |                       |      | 350 mΩ          |
| <b>g<sub>fs</sub></b>     | V <sub>DS</sub> = 20V, I <sub>D</sub> = 11A, Note 1                                                                                                          | 15                    | 20   | S               |
| <b>C<sub>iss</sub></b>    | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 25V, f = 1MHz                                                                                                        |                       | 3600 | pF              |
| <b>C<sub>oss</sub></b>    |                                                                                                                                                              |                       | 305  | pF              |
| <b>C<sub>rss</sub></b>    |                                                                                                                                                              |                       | 38   | pF              |
| <b>t<sub>d(on)</sub></b>  | <b>Resistive Switching Times</b><br>V <sub>GS</sub> = 10V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 11A<br>R <sub>G</sub> = 4Ω (External) |                       | 20   | ns              |
| <b>t<sub>r</sub></b>      |                                                                                                                                                              |                       | 20   | ns              |
| <b>t<sub>d(off)</sub></b> |                                                                                                                                                              |                       | 60   | ns              |
| <b>t<sub>f</sub></b>      |                                                                                                                                                              |                       | 23   | ns              |
| <b>Q<sub>g(on)</sub></b>  | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 0.5 • V <sub>DSS</sub> , I <sub>D</sub> = 11A                                                                       |                       | 58   | nC              |
| <b>Q<sub>gs</sub></b>     |                                                                                                                                                              |                       | 20   | nC              |
| <b>Q<sub>gd</sub></b>     |                                                                                                                                                              |                       | 22   | nC              |
| <b>R<sub>thJC</sub></b>   |                                                                                                                                                              |                       |      | 0.95 °C/W       |
| <b>R<sub>thCS</sub></b>   |                                                                                                                                                              | 0.15                  |      | °C/W            |

## ISOPLUS i4-Pak™ Outline



NOTE: Bottom heatsink meets 3000 Volts AC 1 sec isolation to the other pins.

| SYM | INCHES   |      | MILLIMETERS |       |
|-----|----------|------|-------------|-------|
|     | MIN      | MAX  | MIN         | MAX   |
| A   | .190     | .205 | 4.83        | 5.21  |
| A1  | .102     | .118 | 2.59        | 3.00  |
| A2  | .046     | .085 | 1.17        | 2.16  |
| b   | .045     | .055 | 1.14        | 1.40  |
| b1  | .058     | .068 | 1.47        | 1.73  |
| b2  | .100     | .110 | 2.54        | 2.79  |
| C   | .020     | .029 | 0.51        | 0.74  |
| D   | .819     | .840 | 20.80       | 21.34 |
| E   | .770     | .799 | 19.56       | 20.29 |
| e   | .150 BSC |      | 3.81 BSC    |       |
| L   | .780     | .840 | 19.81       | 21.34 |
| L1  | .083     | .102 | 2.11        | 2.59  |
| Q   | .210     | .244 | 5.33        | 6.20  |
| R   | .100     | .180 | 2.54        | 4.57  |
| S   | .660     | .690 | 16.76       | 17.53 |
| T   | .590     | .620 | 14.99       | 15.75 |
| U   | .065     | .080 | 1.65        | 2.03  |

Ref: IXYS CO 0077 R0

## Source-Drain Diode

| Symbol                | Test Conditions <sup>3</sup>                                                          | Characteristic Values |      |        |
|-----------------------|---------------------------------------------------------------------------------------|-----------------------|------|--------|
|                       |                                                                                       | Min.                  | Typ. | Max.   |
| <b>I<sub>S</sub></b>  | V <sub>GS</sub> = 0V                                                                  |                       |      | 12 A   |
| <b>I<sub>SM</sub></b> | Repetitive, pulse width limited by T <sub>JM</sub>                                    |                       |      | 66 A   |
| <b>V<sub>SD</sub></b> | I <sub>F</sub> = 22A, V <sub>GS</sub> = 0V, Note 1                                    |                       |      | 1.5 V  |
| <b>t<sub>rr</sub></b> | I <sub>F</sub> = 22A, -di/dt = 100A/μs<br>V <sub>R</sub> = 100V, V <sub>GS</sub> = 0V | 1.0                   |      | 200 ns |
| <b>Q<sub>RM</sub></b> |                                                                                       |                       |      | μC     |

Note 1: Pulse test, t ≤ 300μs, duty cycle, d ≤ 2 %.

## ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated objective result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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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    |             |

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