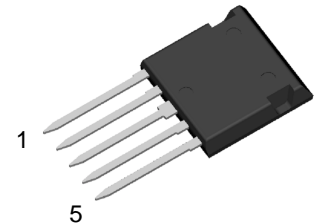
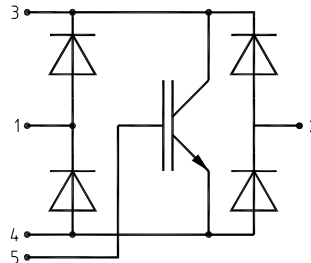


# Bidirectional Switch with IGBT and fast Diode Bridge in ISOPLUS i4-PAC™

## FIO 50-12BD

$I_{C25} = 50 \text{ A}$   
 $V_{CES} = 1200 \text{ V}$   
 $V_{CE(sat) \text{ typ.}} = 2.0 \text{ V}$



### IGBT

| Symbol                | Conditions   | Maximum Ratings |               |
|-----------------------|--|-----------------|---------------|
| $V_{CES}$             | $T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$  | 1200            | V             |
| $V_{GES}$             |  | $\pm 20$        | V             |
| $I_{C25}$             | $T_C = 25^{\circ}\text{C}$   | 50              | A             |
| $I_{C90}$             | $T_C = 90^{\circ}\text{C}$   | 32              | A             |
| $I_{CM}$<br>$V_{CEK}$ | $V_{GE} = \pm 15 \text{ V}; R_G = 39 \Omega; T_{VJ} = 125^{\circ}\text{C}$<br>RBSOA, Clamped inductive load; $L = 100 \mu\text{H}$ | 50              | A             |
|                       |  | $V_{CES}$       |               |
| $t_{SC}$<br>(SCSOA)   | $V_{CE} = 900\text{V}; V_{GE} = \pm 15 \text{ V}; R_G = 39 \Omega; T_{VJ} = 125^{\circ}\text{C}$<br>non-repetitive                 | 10              | $\mu\text{s}$ |
| $P_{tot}$             | $T_C = 25^{\circ}\text{C}$   | 200             | W             |

### Features

- IGBT
  - low saturation voltage
  - positive temperature coefficient for easy paralleling
  - fast switching
  - short tail current for optimized performance in resonant circuits
- HiPerFRED™ diodes
  - fast reverse recovery
  - low operating forward voltage
  - low leakage current
- ISOPLUS i4-PAC™ package
  - isolated back surface
  - low coupling capacity between pins and heatsink
  - enlarged creepage towards heatsink
  - application friendly pinout
  - low inductive current path
  - high reliability
  - industry standard outline

### Applications

switches to control bidirectional current flow by a single control signal:

- matrix converters
- spare matrix converters
- AC controllers

| Symbol  | Conditions   | Characteristic Values<br>( $T_{VJ} = 25^{\circ}\text{C}$ , unless otherwise specified) |      |              |
|---|--|--|------|--------------|
|   |  | min.   | typ. | max.         |
| $V_{CE(sat)}$                                 | $I_C = 30 \text{ A}; V_{GE} = 15 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$<br>$T_{VJ} = 125^{\circ}\text{C}$                                     | 2.0<br>2.3   |      | V<br>V       |
| $V_{GE(th)}$                                  | $I_C = 1 \text{ mA}; V_{GE} = V_{CE}$  | 4.5  |      | 6.5 V        |
| $I_{CES}$                                     | $V_{CE} = V_{CES}; V_{GE} = 0 \text{ V}; T_{VJ} = 25^{\circ}\text{C}$<br>$T_{VJ} = 125^{\circ}\text{C}$  | 0.4  |      | 0.4 mA<br>mA |
| $I_{GES}$                                     | $V_{CE} = 0 \text{ V}; V_{GE} = \pm 20 \text{ V}$  |  |      | 200 nA       |
| $t_{d(on)}$<br>$t_r$<br>$t_{d(off)}$<br>$t_f$ | Inductive load, $T_{VJ} = 125^{\circ}\text{C}$<br>$V_{CE} = 600 \text{ V}; I_C = 30 \text{ A}$<br>$V_{GE} = \pm 15 \text{ V}; R_G = 39 \Omega$ | 150  |      | ns           |
| $E_{on}$                                      |  | 60   |      | ns           |
| $E_{off}$                                     |  | 700  |      | ns           |
|   |  | 50   |      | ns           |
|   |  | 3.6  |      | mJ           |
|   |  | 3.0  |      | mJ           |
| $C_{ies}$                                     | $V_{CE} = 25 \text{ V}; V_{GE} = 0 \text{ V}; f = 1 \text{ MHz}$   | 2  |      | nF           |
| $Q_{Gon}$                                     | $V_{CE} = 600 \text{ V}; V_{GE} = 15 \text{ V}; I_C = 30 \text{ A}$  | 250  |      | nC           |
| $R_{thJC}$<br>$R_{thJS}$                      |  | 1.2  |      | 0.6 KW<br>KW |

**Diodes**

| Symbol    | Conditions               | Maximum Ratings |   |
|-----------|--------------------------|-----------------|---|
| $I_{F25}$ | $T_C = 25^\circ\text{C}$ | 48              | A |
| $I_{F90}$ | $T_C = 90^\circ\text{C}$ | 25              | A |

| Symbol     | Conditions  | Characteristic Values |      |         |
|------------|---|-----------------------|------|---------|
|            |   | min.                  | typ. | max.    |
| $V_F$      | $I_F = 30\text{ A}; T_{VJ} = 25^\circ\text{C}$<br>$T_{VJ} = 125^\circ\text{C}$  | 2.4                   | 2.8  | V       |
| $I_{RM}$   | $I_F = 30\text{ A}; di_F/dt = -500\text{ A}/\mu\text{s}; T_{VJ} = 125^\circ\text{C}$<br>$V_R = 600\text{ V}; V_{GE} = 0\text{ V}$ | 27                    |      | A       |
| $t_{rr}$   |   | 150                   |      | ns      |
| $R_{thJC}$ | (per diode)   |                       |      | 1.3 K/W |
| $R_{thJS}$ |   | 2.6                   |      | K/W     |

**Component**

| Symbol     | Conditions                                   | Maximum Ratings |                  |
|------------|--|-----------------|------------------|
| $T_{VJ}$   |  | -55...+150      | $^\circ\text{C}$ |
| $T_{stg}$  |  | -55...+125      | $^\circ\text{C}$ |
| $V_{ISOL}$ | $I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz}$ | 2500            | V~               |
| $F_c$      | mounting force with clip                     | 20...120        | N                |

| Symbol        | Conditions  | Characteristic Values |      |      |
|---------------|---|-----------------------|------|------|
|               |   | min.                  | typ. | max. |
| $C_p$         | coupling capacity 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   |
| <b>Weight</b> |   |                       | 9    | g    |

**Dimensions in mm (1 mm = 0.0394")**
