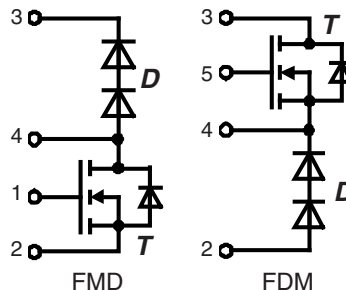


# CoolMOS™ 1) Power MOSFET

## with HiPerDyn™ FRED

### Buck and Boost Topologies

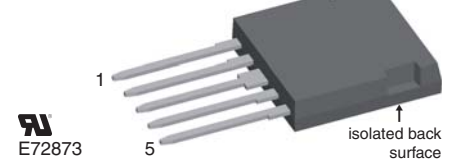
Electrically isolated back surface  
 2500 V electrical isolation  
 N-Channel Enhancement Mode  
 Low  $R_{DS(on)}$ , high  $V_{DSS}$  MOSFET  
 Ultra low gate charge



$$I_{D25} = 15 \text{ A}$$

$$V_{DSS} = 600 \text{ V}$$

$$R_{DS(on) \text{ max}} = 0.165 \Omega$$

**ISOPLUS i4™**

**Features**

- Silicon chip on Direct-Copper-Bond substrate
  - high power dissipation
  - isolated mounting surface
  - 2500 V electrical isolation
  - low drain to tab capacitance (< 40 pF)
- Fast CoolMOS™ 1) power MOSFET 4<sup>th</sup> generation
  - high blocking capability
  - lowest resistance
  - avalanche rated for unclamped inductive switching (UIS)
  - low thermal resistance due to reduced chip thickness
- Enhanced total power density
- HiPerDyn™ FRED
  - consisting of series connected diodes
  - enhanced dynamic behaviour for high frequency operation

**Applications**

- Switched mode power supplies (SMPS)
- Uninterruptible power supplies (UPS)
- Power factor correction (PFC)

**Advantages**

- Easy assembly: no screws or isolation foils required
- Space savings
- High power density
- High reliability

<sup>1)</sup> CoolMOS™ is a trademark of Infineon Technologies AG.

| MOSFET T  |  |                 |      |
|-----------|--|-----------------|------|
| Symbol    | Conditions   | Maximum Ratings |      |
| $V_{DSS}$ | $T_{VJ} = 25^{\circ}\text{C}$  | 600             | V    |
| $V_{GS}$  |  | $\pm 20$        | V    |
| $I_{D25}$ | $T_C = 25^{\circ}\text{C}$   | 15              | A    |
| $I_{D90}$ | $T_C = 90^{\circ}\text{C}$   | 11              | A    |
| $E_{AS}$  | single pulse } $I_D = 7.9 \text{ A}; T_C = 25^{\circ}\text{C}$<br>repetitive | 522             | mJ   |
| $E_{AR}$  |  | 0.79            | mJ   |
| $dV/dt$   | MOSFET $dV/dt$ ruggedness $V_{DS} = 0 \dots 480 \text{ V}$                   | 50              | V/ns |

| Symbol        | Conditions  | Characteristic Values   |      |      |               |
|---------------|---|---|------|------|---------------|
|               |   | $(T_{VJ} = 25^{\circ}\text{C}, \text{ unless otherwise specified})$ |      |      |               |
|               |   | min.  | typ. | max. |               |
| $R_{DS(on)}$  | $V_{GS} = 10 \text{ V}; I_D = 12 \text{ A}$   |   | 150  | 165  | m $\Omega$    |
| $V_{GS(th)}$  | $V_{DS} = V_{GS}; I_D = 0.79 \text{ mA}$  | 2.5   | 3    | 3.5  | V             |
| $I_{DSS}$     | $V_{DS} = 600 \text{ V}; V_{GS} = 0 \text{ V}$  |   |      | 1    | $\mu\text{A}$ |
|               |   |   |      | 10   | $\mu\text{A}$ |
| $I_{GSS}$     | $V_{GS} = \pm 20 \text{ V}; V_{DS} = 0 \text{ V}$   |   |      | 100  | nA            |
| $C_{iss}$     | } $V_{GS} = 0 \text{ V}; V_{DS} = 100 \text{ V}$<br>$f = 1 \text{ MHz}$                     |   | 2000 |      | pF            |
| $C_{oss}$     |   |   |      | 100  |               |
| $Q_g$         | } $V_{GS} = 0 \text{ to } 10 \text{ V}; V_{DS} = 400 \text{ V}; I_D = 12 \text{ A}$         |   | 40   | 52   | nC            |
| $Q_{gs}$      |   |   | 9    |      | nC            |
| $Q_{gd}$      |   |   | 13   |      | nC            |
| $t_{d(on)}$   | } $V_{GS} = 10 \text{ V}; V_{DS} = 400 \text{ V}$<br>$I_D = 12 \text{ A}; R_G = 3.3 \Omega$ |   | 12   |      | ns            |
| $t_r$         |   |   | 5    |      | ns            |
| $t_{d(off)}$  |   |   | 50   |      | ns            |
| $t_f$         |   |   | 5    |      | ns            |
| $E_{on}$      |   |   | tbd  |      | mJ            |
| $E_{off}$     |   |   | tbd  |      | mJ            |
| $E_{rec off}$ |   |   | tbd  |      | mJ            |
| $R_{thJC}$    |   |   | 1.1  |      | K/W           |
| $R_{thCH}$    | with heat transfer paste  | 0.35  |      |      | K/W           |

**MOSFET T Source-Drain Diode**

| Symbol  | Conditions   | Characteristic Values |      |      |               |
|---|--|-----------------------|------|------|---------------|
|   |  | min.                  | typ. | max. |               |
| ( $T_{VJ} = 25^{\circ}\text{C}$ , unless otherwise specified) |  |                       |      |      |               |
| $I_S$   | $V_{GS} = 0\text{ V}$  |                       |      | 12   | A             |
| $V_{SD}$  | $I_F = 12\text{ A}; V_{GS} = 0\text{ V}$                                     |                       | 0.9  | 1.2  | V             |
| $t_{rr}$  | $I_F = 12\text{ A}; -di_F/dt = 100\text{ A}/\mu\text{s}; V_R = 400\text{ V}$ |                       | 390  |      | ns            |
| $Q_{RM}$  |  |                       | 7.5  |      | $\mu\text{C}$ |
| $I_{RM}$  |  |                       | 38   |      | A             |

**Diode D (data for series connection)**

| Symbol    | Conditions  | Maximum Ratings |   |
|-----------|---|-----------------|---|
| $V_{RRM}$ | $T_{VJ} = 25^{\circ}\text{C to } 150^{\circ}\text{C}$ | 600             | V |
| $I_{F25}$ | $T_C = 25^{\circ}\text{C}$                            | 15              | A |
| $I_{F90}$ | $T_C = 90^{\circ}\text{C}$                            | 8               | A |

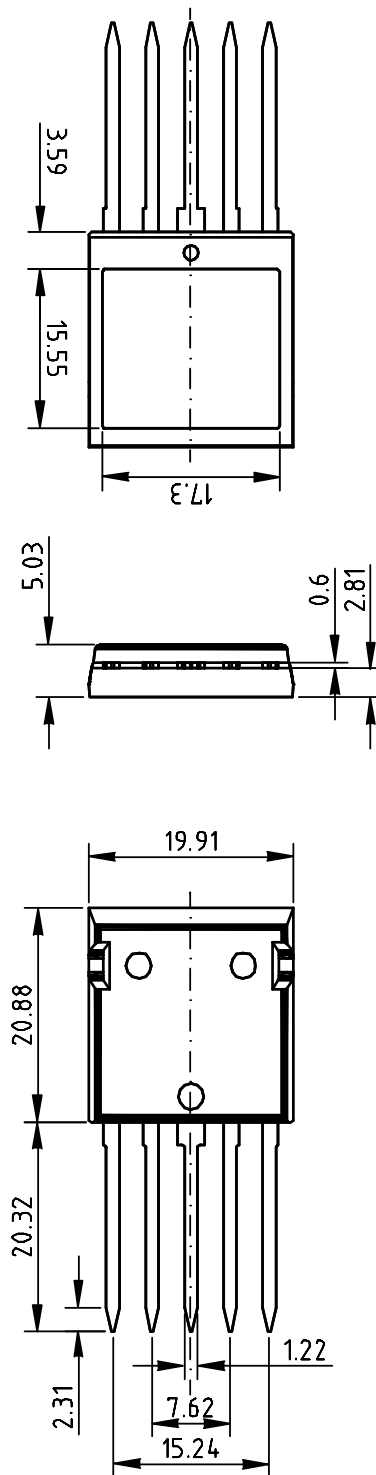
| Symbol     | Conditions  | Characteristic Values          |      |      |               |
|------------|---|--------------------------------|------|------|---------------|
|            |   | min.                           | typ. | max. |               |
| $V_F$      | $I_F = 15\text{ A}$   | $T_{VJ} = 25^{\circ}\text{C}$  |      | 2.50 | V             |
|            |   |                                |      | 3.00 | V             |
|            | $I_F = 30\text{ A}$   | $T_{VJ} = 150^{\circ}\text{C}$ |      | 2.00 | A             |
|            |   |                                |      | 2.55 | A             |
| $I_R$      | $V_R = V_{RRM}$   | $T_{VJ} = 25^{\circ}\text{C}$  |      | 1    | $\mu\text{A}$ |
|            |   | $T_{VJ} = 150^{\circ}\text{C}$ |      | 0.08 | mA            |
| $I_{FSM}$  | $t = 10\text{ ms (50 Hz), sine};$   | $T_{VJ} = 45^{\circ}\text{C}$  |      | 150  | A             |
| $I_{RM}$   | $I_F = 20\text{ A}; V_R = 100\text{ V};$<br>$-di_F/dt = 200\text{ A}/\mu\text{s}$ | $T_{VJ} = 25^{\circ}\text{C}$  |      | 3    | A             |
| $t_{rr}$   |   |                                |      | 35   | ns            |
| $R_{thJC}$ | with heat transfer paste  |                                |      | 2.4  | K/W           |
| $R_{thJH}$ |   | 0.8                            |      |      | K/W           |

**Component**

| Symbol     | Conditions                                | Maximum Ratings |                    |
|------------|---|-----------------|--------------------|
| $T_{VJ}$   | operating                                 | -55...+150      | $^{\circ}\text{C}$ |
| $T_{stg}$  | storage                                   | -55...+125      | $^{\circ}\text{C}$ |
| $V_{ISOL}$ | $I_{ISOL} < 1\text{ mA}; 50/60\text{ Hz}$ | 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 |
| Weight     |   |                       | 9    |      | g  |

ISOPLUS i4™ Outline





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