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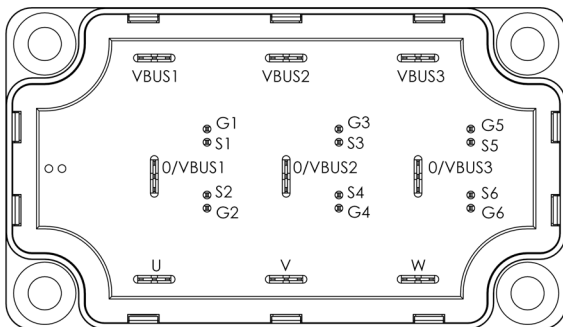
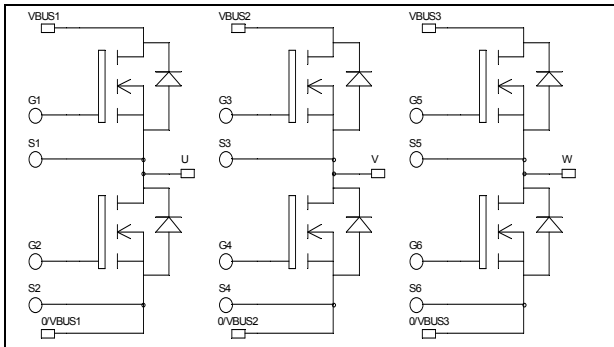
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Triple phase leg Super Junction MOSFET Power Module

$V_{DSS} = 800V$
 $R_{DSon} = 150m\Omega \text{ max @ } T_j = 25^\circ C$
 $I_D = 28A \text{ @ } T_c = 25^\circ C$



Application

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- **COOLMOS**
Power Semiconductors
 - Ultra low R_{DSon}
 - Low Miller capacitance
 - Ultra low gate charge
 - Avalanche energy rated
 - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - Lead frames for power connections
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Very low (12mm) profile
- Each leg can be easily paralleled to achieve a phase leg of three times the current capability
- Module can be configured as a three phase bridge
- Module can be configured as a boost followed by a full bridge
- RoHS Compliant

Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|------------|---|--------------------|-----------|
| V_{DSS} | Drain - Source Breakdown Voltage | 800 | V |
| I_D | Continuous Drain Current | $T_c = 25^\circ C$ | 28 |
| | | $T_c = 80^\circ C$ | 21 |
| I_{DM} | Pulsed Drain current | 110 | A |
| V_{GS} | Gate - Source Voltage | ± 30 | V |
| R_{DSon} | Drain - Source ON Resistance | 150 | $m\Omega$ |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 277 |
| I_{AR} | Avalanche current (repetitive and non repetitive) | 17 | A |
| E_{AR} | Repetitive Avalanche Energy | 0.5 | mJ |
| E_{AS} | Single Pulse Avalanche Energy | 670 | |

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Electrical Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|---------------------------------|-------------------------------------|-----|-----|-----------|------------------|
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{GS} = 0V, V_{DS} = 800V$ | | | 50 | μA |
| | | $T_j = 25^\circ\text{C}$ | | | | |
| | | $V_{GS} = 0V, V_{DS} = 800V$ | | | 375 | |
| $R_{DS(on)}$ | Drain – Source on Resistance | $V_{GS} = 10V, I_D = 14A$ | | | 150 | $\text{m}\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 2\text{mA}$ | 2.1 | 3 | 3.9 | V |
| I_{GSS} | Gate – Source Leakage Current | $V_{GS} = \pm 20V, V_{DS} = 0V$ | | | ± 150 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|---|-----|------|-----|---------------|
| C_{iss} | Input Capacitance | $V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{MHz}$ | | 4507 | | pF |
| C_{oss} | Output Capacitance | | | 2092 | | |
| C_{rss} | Reverse Transfer Capacitance | | | 108 | | |
| Q_g | Total gate Charge | $V_{GS} = 10V$ $V_{Bus} = 400V$ $I_D = 28A$ | | 180 | | nC |
| Q_{gs} | Gate – Source Charge | | | 22 | | |
| Q_{gd} | Gate – Drain Charge | | | 90 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 533V$ $I_D = 28A$ $R_G = 2.5\Omega$ | | 10 | | ns |
| T_r | Rise Time | | | 13 | | |
| $T_{d(off)}$ | Turn-off Delay Time | | | 83 | | |
| T_f | Fall Time | | | 35 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 533V$ $I_D = 28A, R_G = 2.5\Omega$ | | 486 | | μJ |
| E_{off} | Turn-off Switching Energy | | | 278 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 533V$ $I_D = 28A, R_G = 2.5\Omega$ | | 850 | | μJ |
| E_{off} | Turn-off Switching Energy | | | 342 | | |

Source - Drain diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|----------|---|--|--------------------------|-----|-----|---------------|
| I_S | Continuous Source current (Body diode) | $T_c = 25^\circ\text{C}$ | | 28 | | A |
| | | $T_c = 80^\circ\text{C}$ | | 21 | | |
| V_{SD} | Diode Forward Voltage | $V_{GS} = 0V, I_S = -28A$ | | | 1.2 | V |
| dv/dt | Peak Diode Recovery ① | | | | 6 | V/ns |
| t_{rr} | Reverse Recovery Time | $I_S = -28A$ $V_R = 400V$ $di_S/dt = 200A/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | 550 | ns |
| Q_{rr} | Reverse Recovery Charge | | $T_j = 25^\circ\text{C}$ | | 30 | μC |

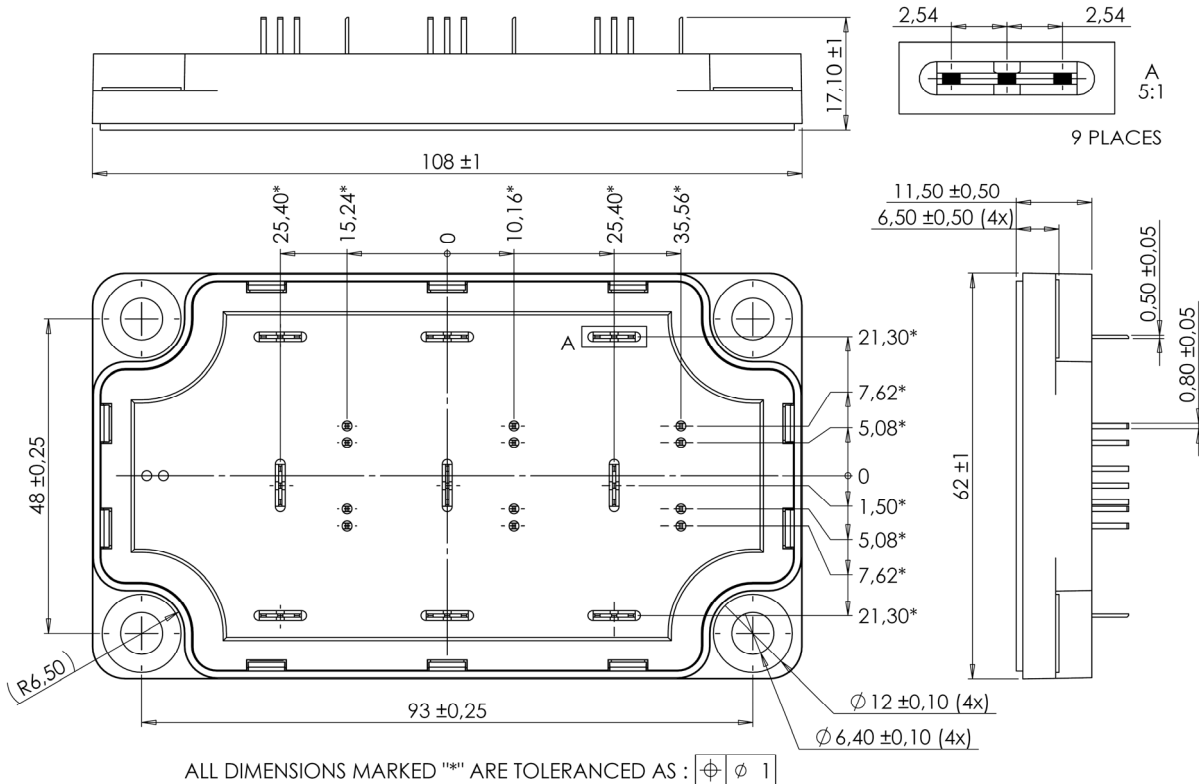
① dv/dt numbers reflect the limitations of the circuit rather than the device itself.

$$I_S \leq -28A \quad di/dt \leq 200A/\mu\text{s} \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ\text{C}$$

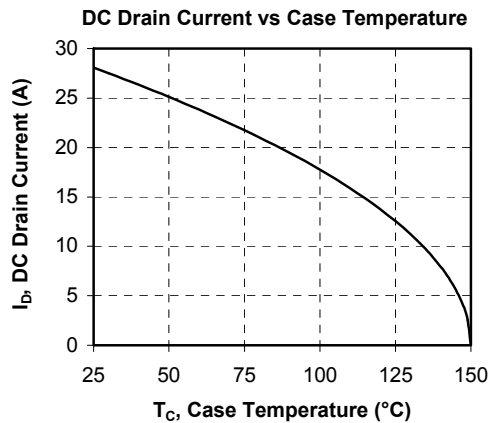
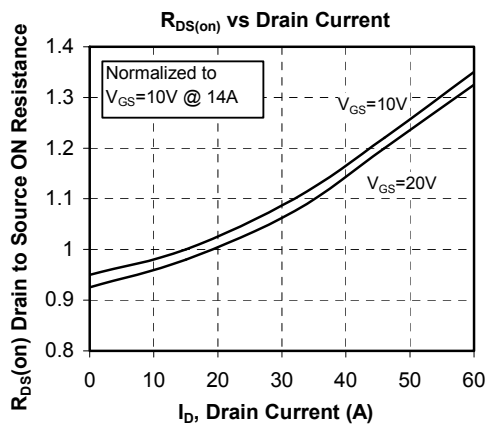
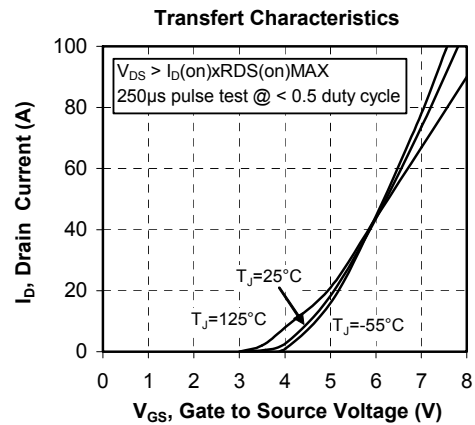
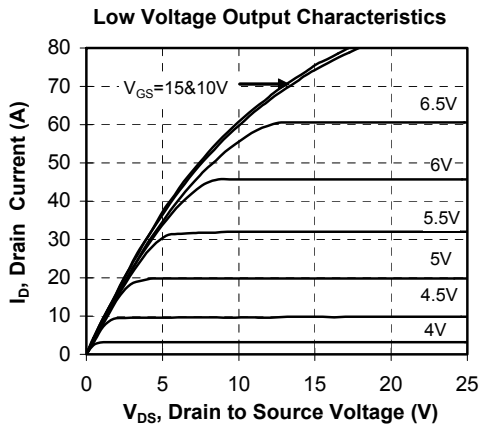
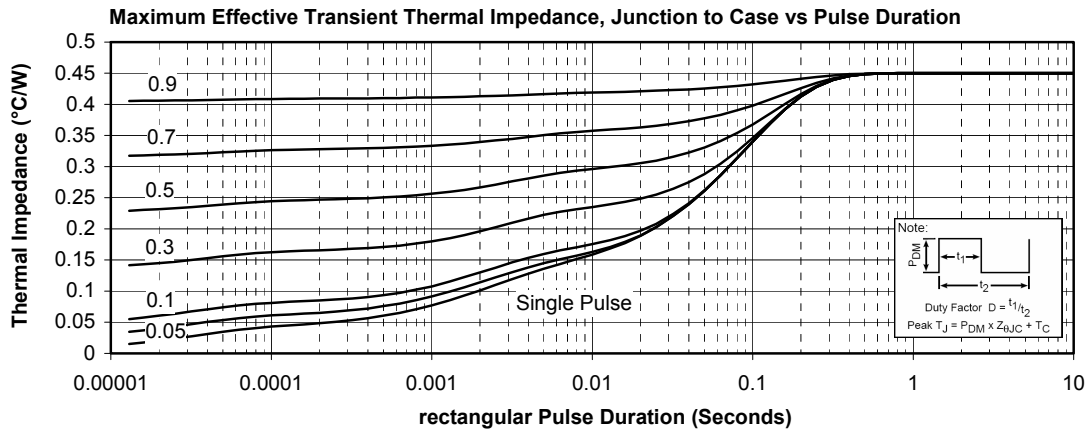
Thermal and package characteristics

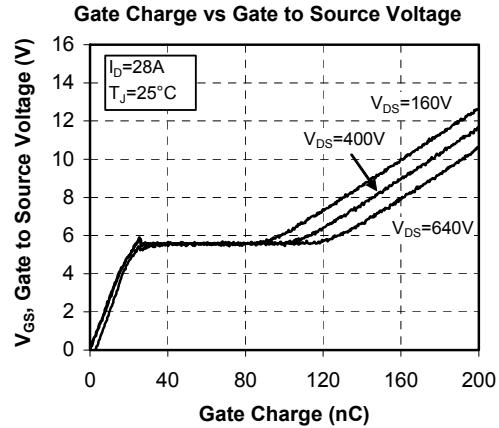
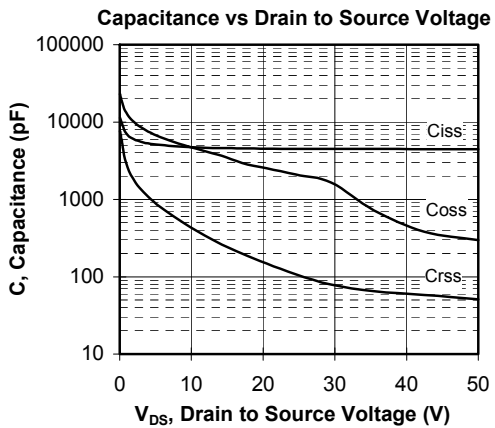
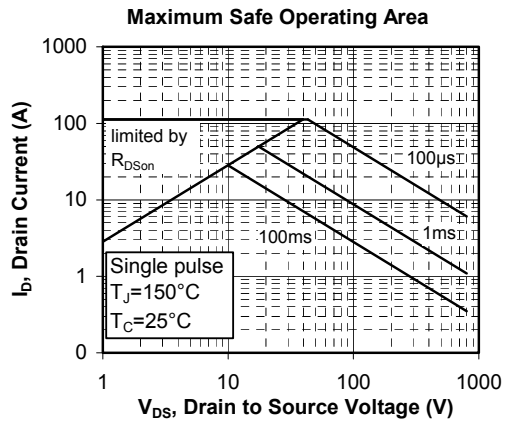
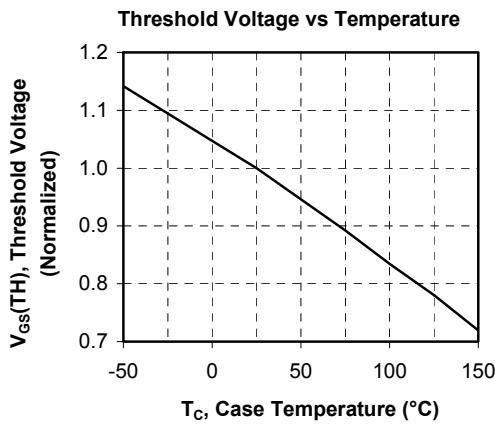
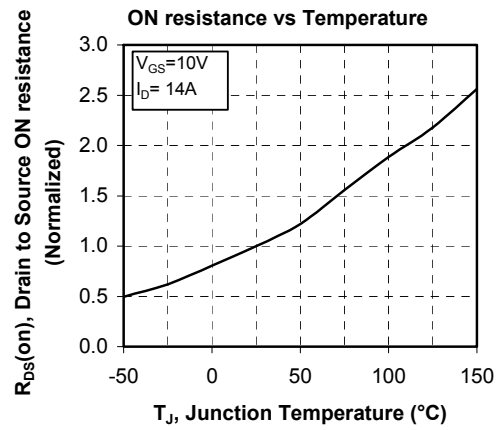
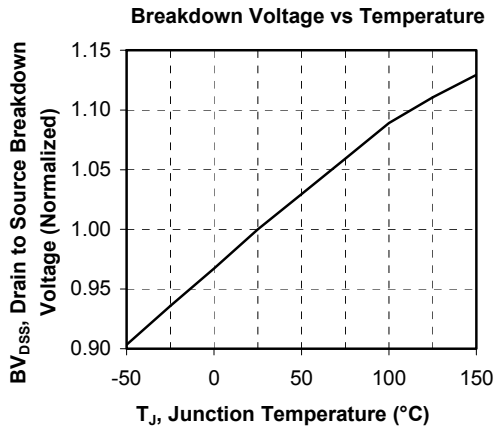
| Symbol | Characteristic | Min | Typ | Max | Unit | |
|-------------------|--|-------------|-----|------|------|-----|
| R _{thJC} | Junction to Case Thermal Resistance | | | 0.45 | °C/W | |
| V _{ISOL} | RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz | 4000 | | | V | |
| T _J | Operating junction temperature range | -40 | | 150 | °C | |
| T _{STG} | Storage Temperature Range | -40 | | 125 | | |
| T _C | Operating Case Temperature | -40 | | 100 | | |
| Torque | Mounting torque | To heatsink | M6 | 3 | 5 | N.m |
| Wt | Package Weight | | | | 250 | g |

SP6-P Package outline (dimensions in mm)

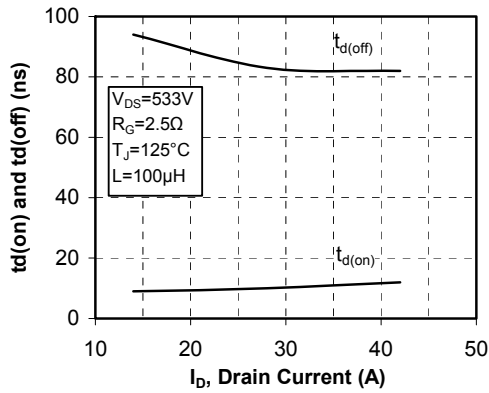


See application note 1902 - Mounting Instructions for SP6-P (12mm) Power Modules on www.microsemi.com

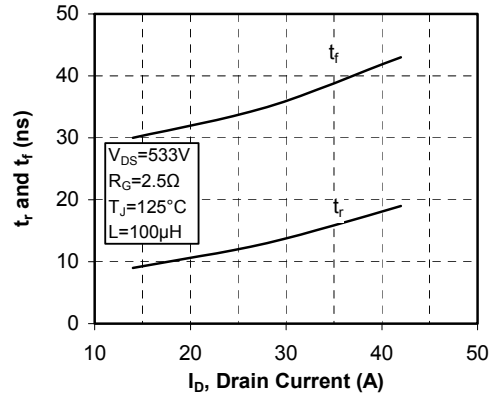
Typical Performance Curve




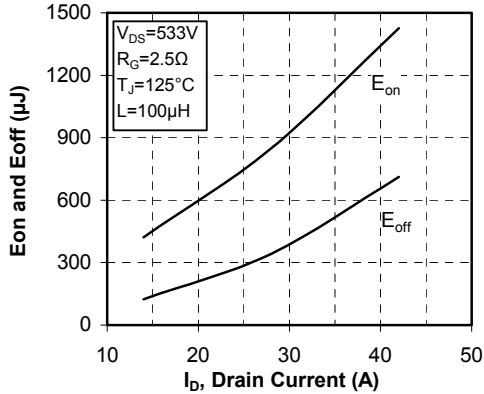
Delay Times vs Current



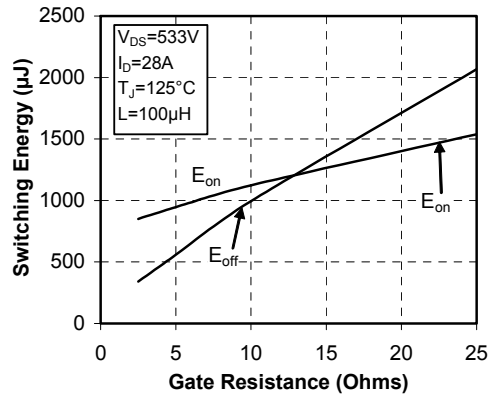
Rise and Fall times vs Current



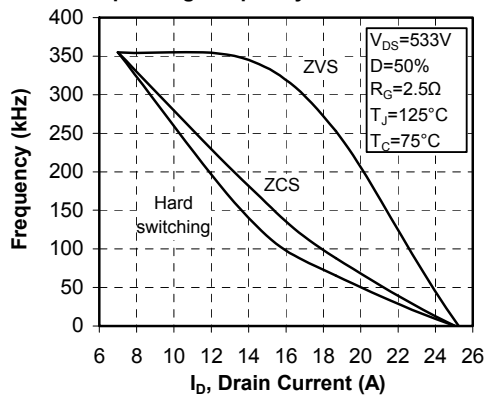
Switching Energy vs Current



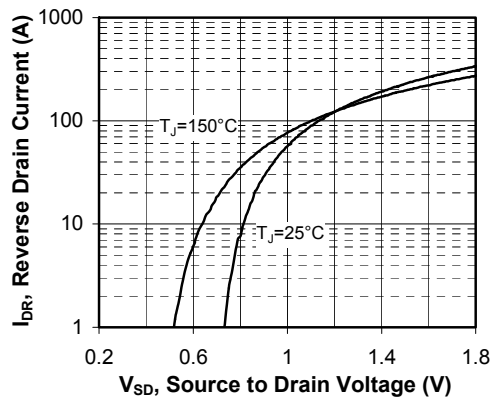
Switching Energy vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage



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