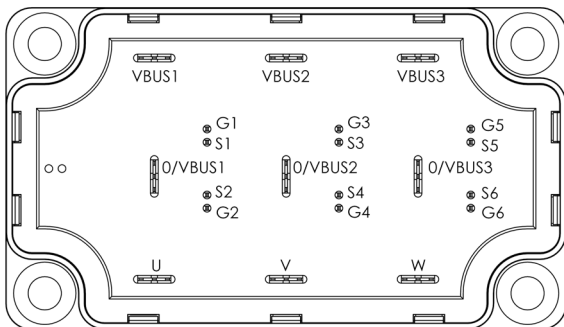
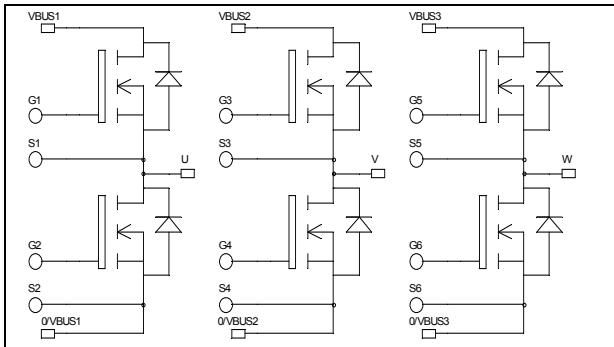


Triple phase leg Super Junction MOSFET Power Module



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

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

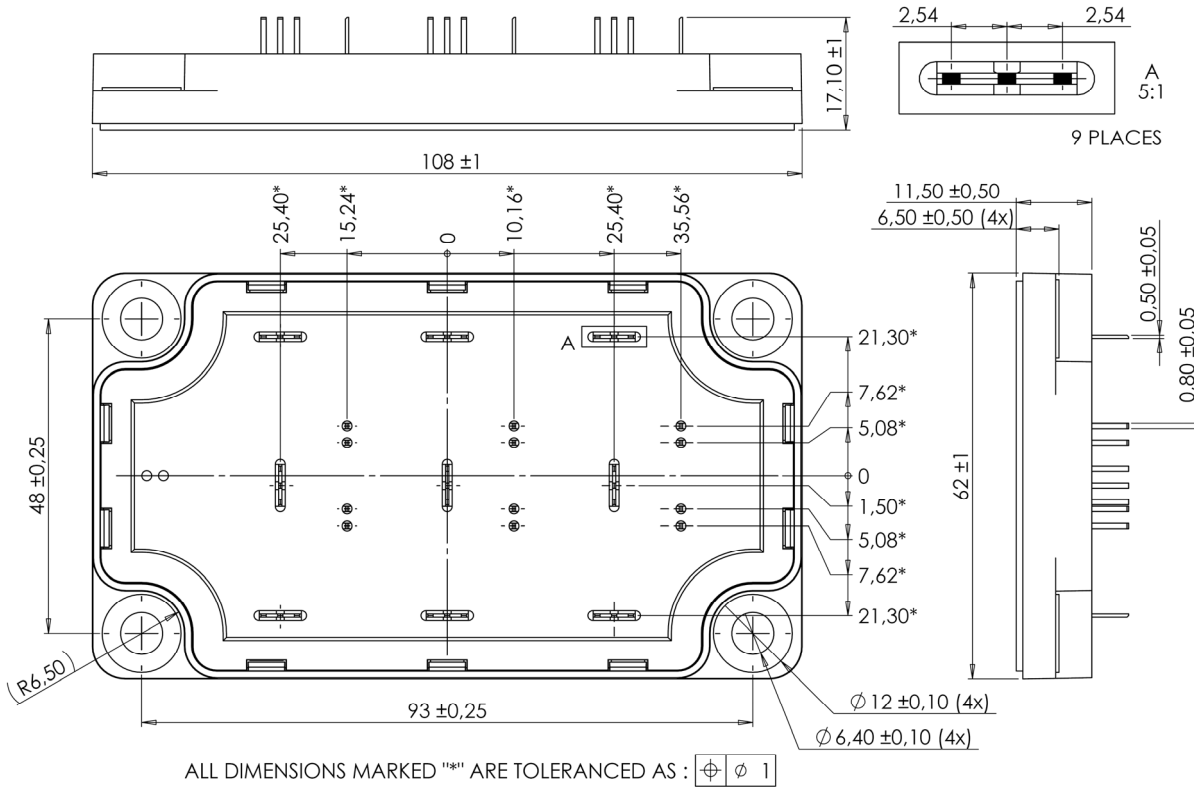
Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_S	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$		28		A
		$T_c = 80^\circ\text{C}$		21		
V_{SD}	Diode Forward Voltage	$V_{GS} = 0V, I_S = -28A$			1.2	V
dv/dt	Peak Diode Recovery ❶				6	V/ns
t_{rr}	Reverse Recovery Time	$I_S = -28A$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

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

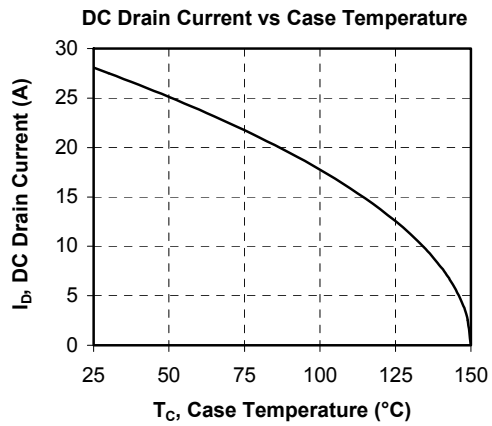
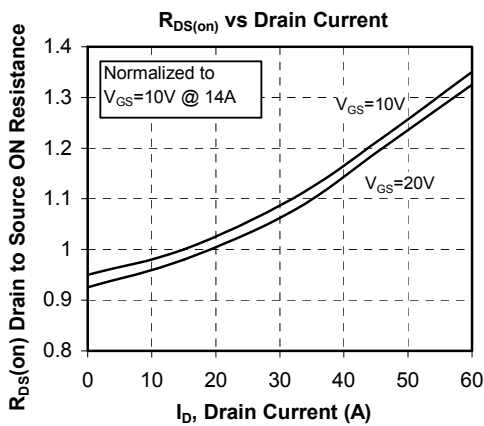
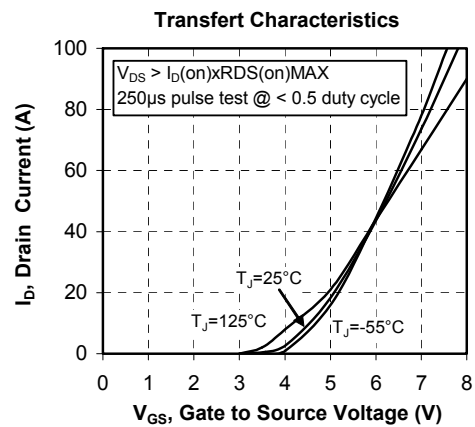
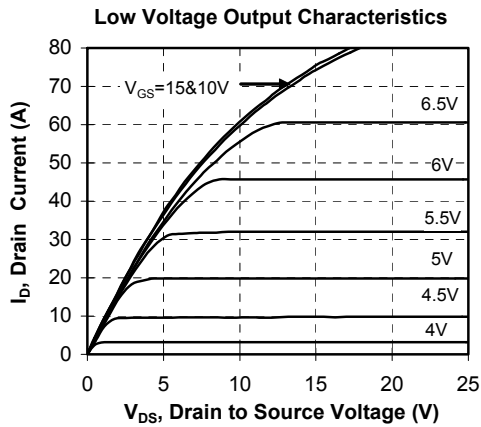
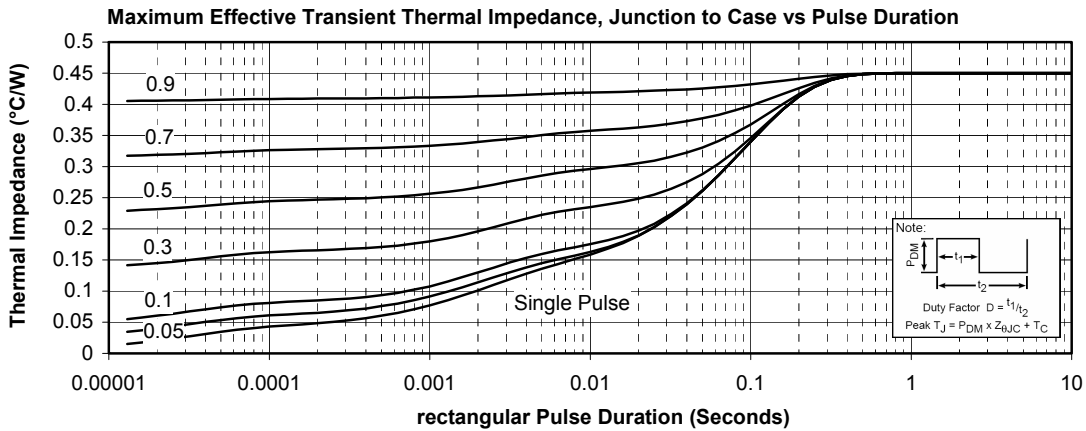
$$I_S \leq -28A \quad di/dt \leq 200A/\mu\text{s} \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ\text{C}$$

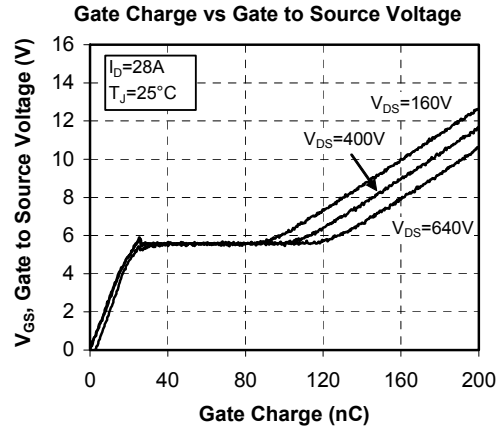
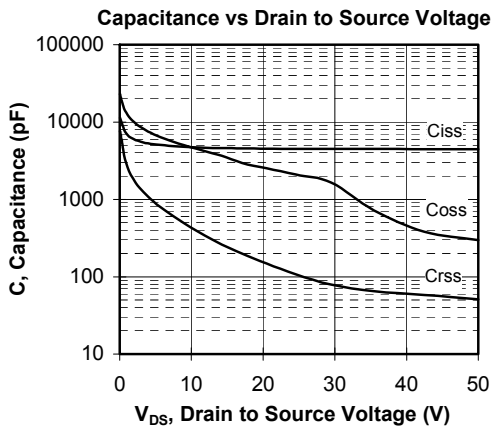
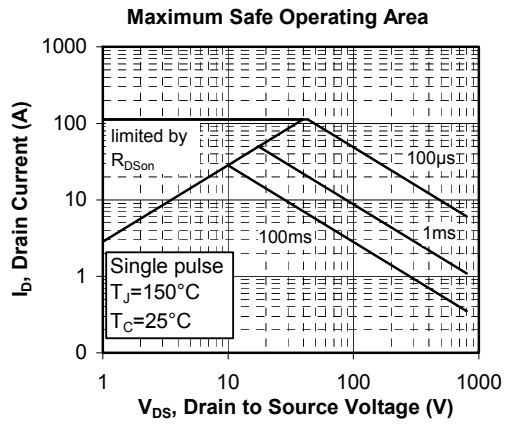
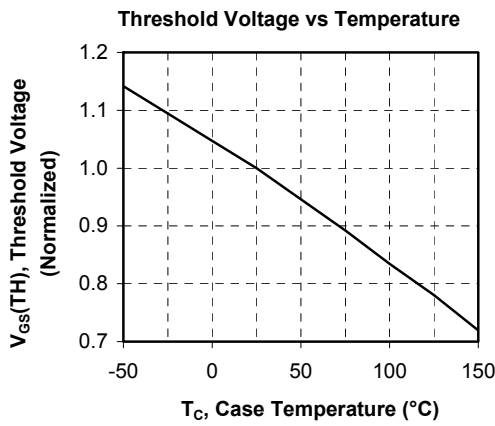
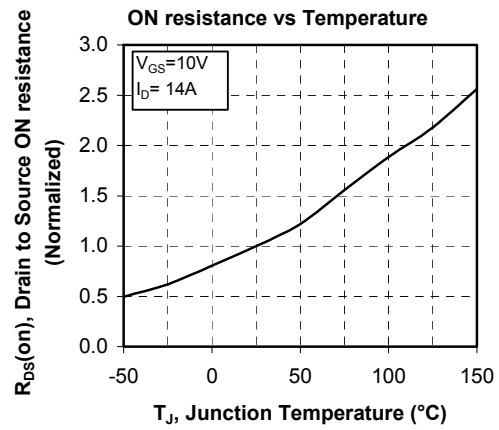
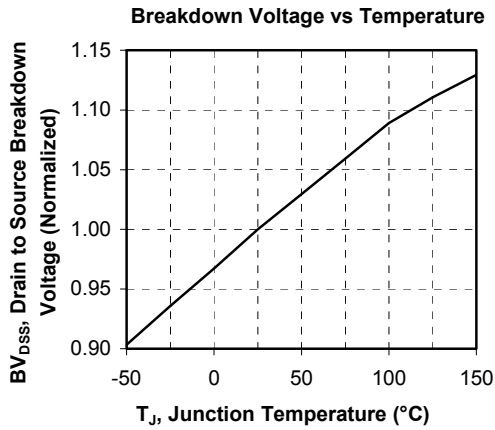
Thermal and package characteristics

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

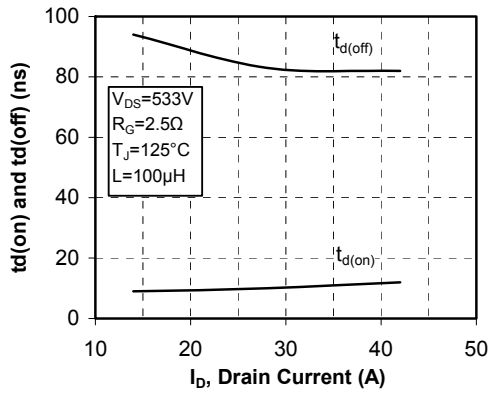
SP6-P Package outline (dimensions in mm)


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

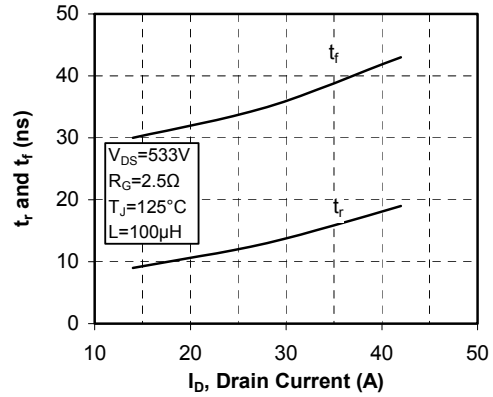
Typical Performance Curve




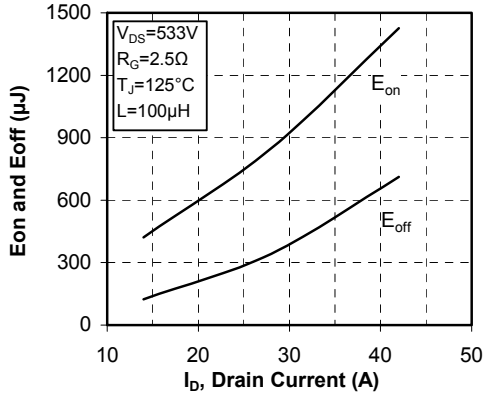
Delay Times vs Current



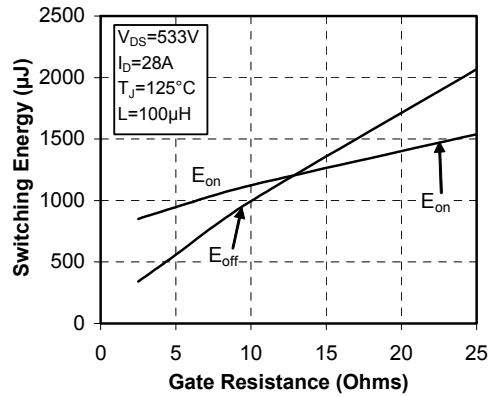
Rise and Fall times vs Current



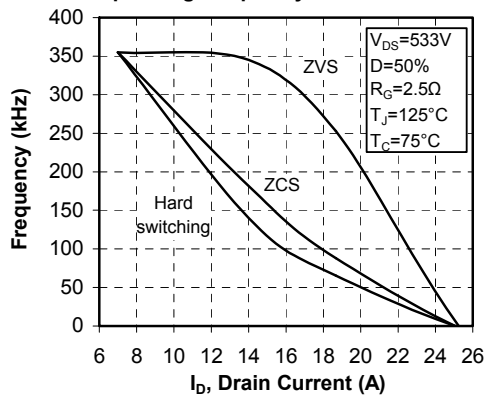
Switching Energy vs Current



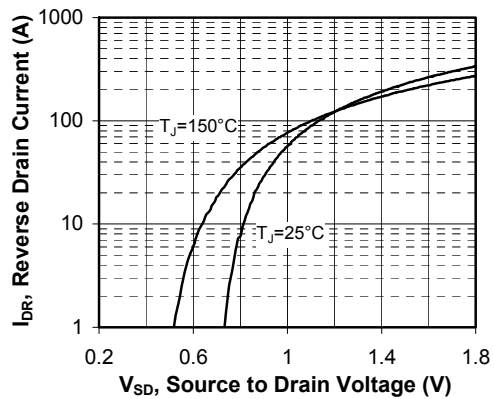
Switching Energy vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage



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