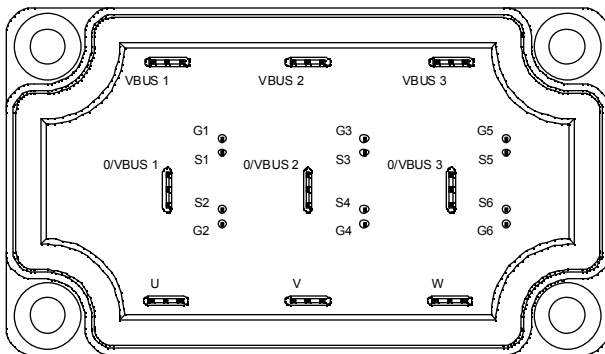
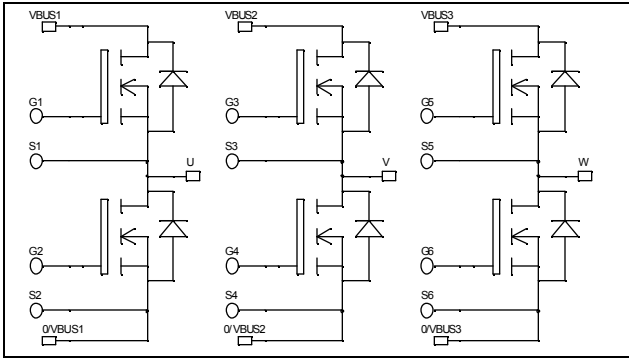


## Triple phase leg Super Junction MOSFET Power Module



$$V_{DSS} = 600V$$

$$R_{DSon} = 35m\Omega \text{ max @ } T_j = 25^\circ C$$

$$I_D = 72A \text{ @ } T_c = 25^\circ C$$

### 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	600	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	72
		$T_c = 80^\circ C$	54
$I_{DM}$	Pulsed Drain current	200	A
$V_{GS}$	Gate - Source Voltage	$\pm 20$	V
$R_{DSon}$	Drain - Source ON Resistance	35	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	416
$I_{AR}$	Avalanche current (repetitive and non repetitive)	20	A
$E_{AR}$	Repetitive Avalanche Energy	1	mJ
$E_{AS}$	Single Pulse Avalanche Energy	1800	

 **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	$V_{GS} = 0V, V_{DS} = 600V$   $T_j = 25^\circ\text{C}$			40	$\mu\text{A}$
		$V_{GS} = 0V, V_{DS} = 600V$   $T_j = 125^\circ\text{C}$			375	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 72A$			35	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 5.4\text{mA}$	2.1	3	3.9	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$			$\pm 150$	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{MHz}$		14		nF
$C_{oss}$	Output Capacitance			5.13		
$C_{rss}$	Reverse Transfer Capacitance			0.42		
$Q_g$	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 300V$ $I_D = 72A$		518		nC
$Q_{gs}$	Gate – Source Charge			58		
$Q_{gd}$	Gate – Drain Charge			222		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive Switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15V$ $V_{Bus} = 400V$ $I_D = 72A$ $R_G = 2.5\Omega$		21		ns
$T_r$	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			283		
$T_f$	Fall Time			84		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 72A, R_G = 2.5\Omega$		1340		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			1960		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ <math>125^\circ\text{C}</math></b> $V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 72A, R_G = 2.5\Omega$		2192		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			2412		

**Source - Drain diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_S$	Continuous Source current (Body diode)		$T_c = 25^\circ\text{C}$		72	A
			$T_c = 80^\circ\text{C}$		54	
$V_{SD}$	Diode Forward Voltage	$V_{GS} = 0V, I_S = -72A$			1.2	V
dv/dt	Peak Diode Recovery ①				6	V/ns
$t_{rr}$	Reverse Recovery Time	$I_S = -72A$ $V_R = 350V$ $di/dt = 200A/\mu\text{s}$	$T_j = 25^\circ\text{C}$		580	ns
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$		46	$\mu\text{C}$

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

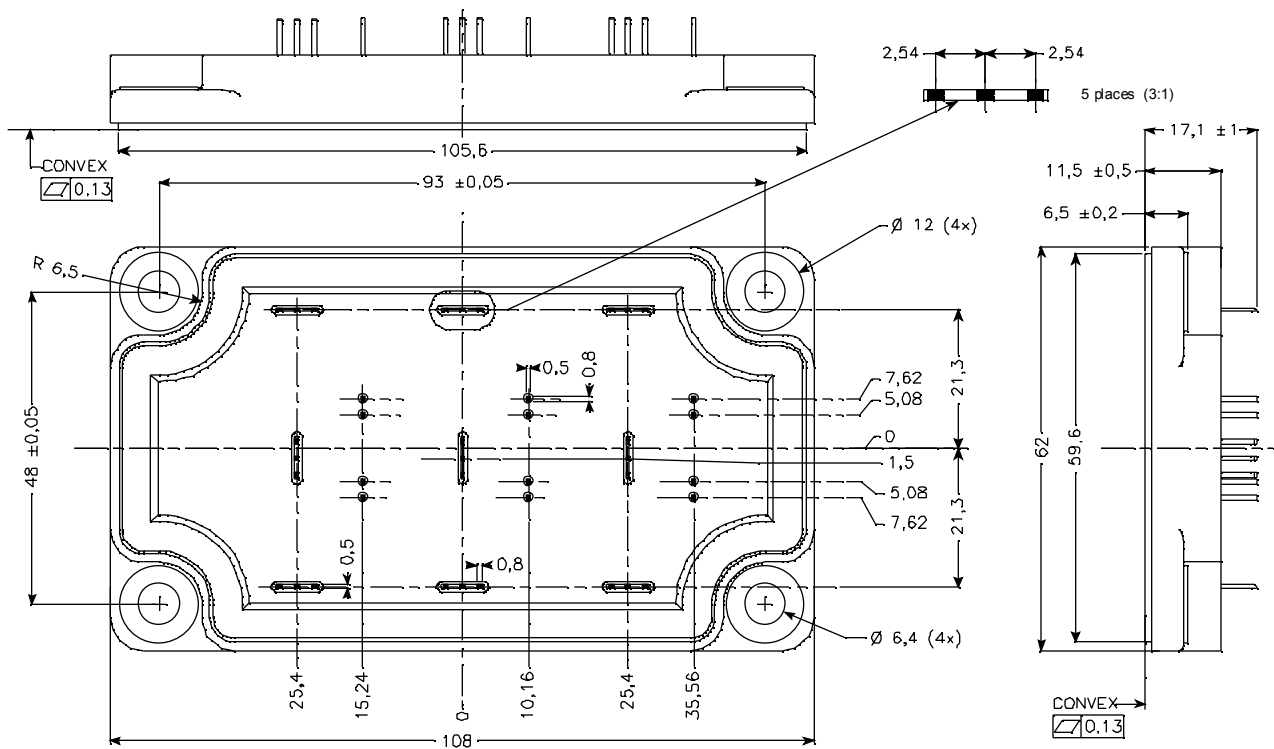
$$I_S \leq -72A \quad di/dt \leq 200A/\mu\text{s} \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ\text{C}$$

## Thermal and package characteristics

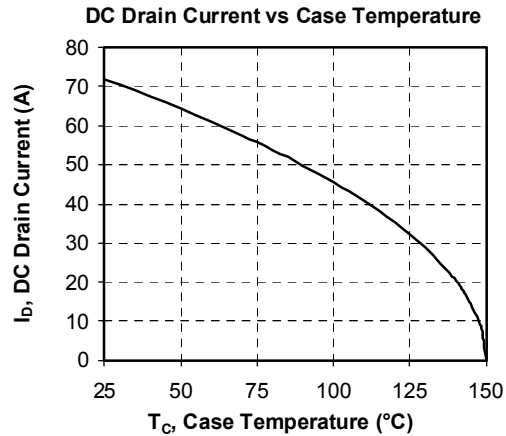
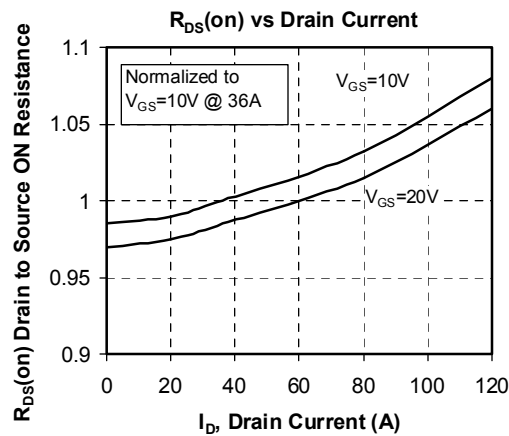
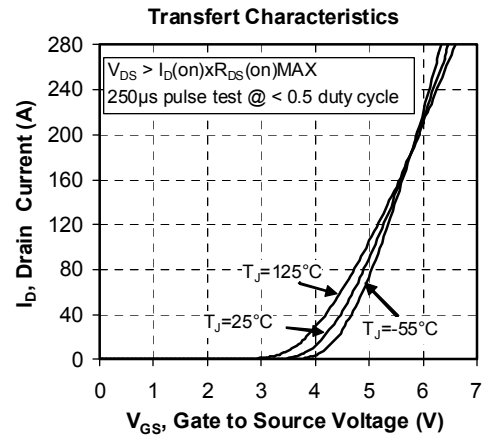
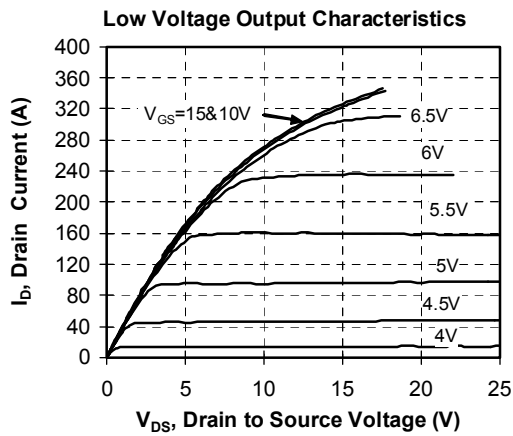
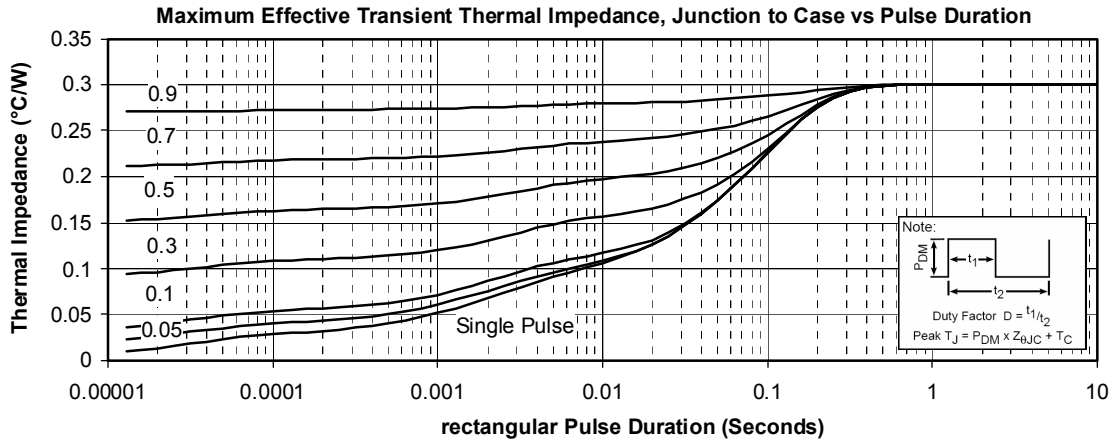
*Symbol Characteristic*

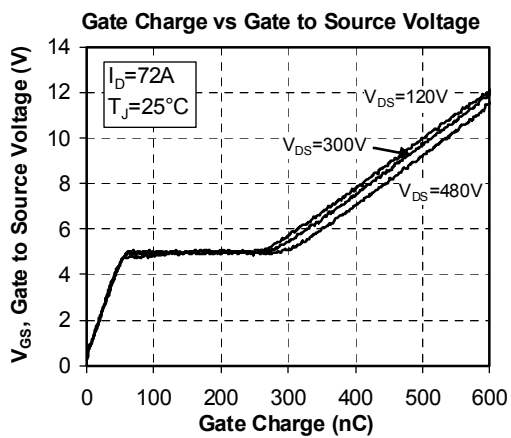
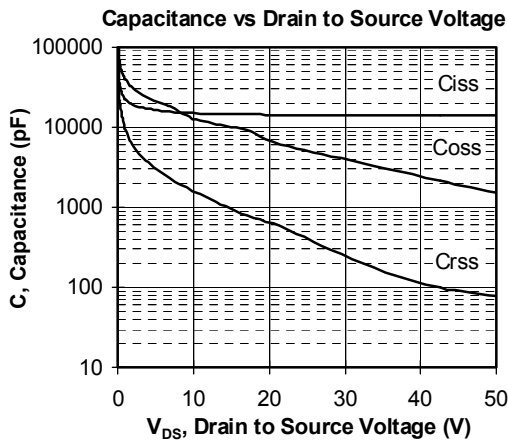
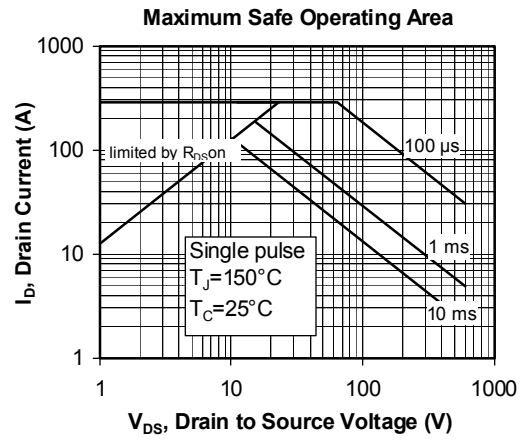
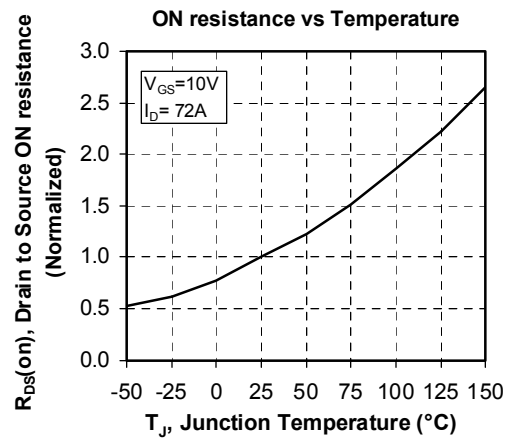
		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>	
$R_{thJC}$	Junction to Case Thermal Resistance			0.3	°C/W	
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case t=1 min, I isol<1mA, 50/60Hz	2500			V	
$T_J$	Operating junction temperature range	-40		150	°C	
$T_{STG}$	Storage Temperature Range	-40		125		
$T_C$	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M6	3	5	N.m
Wt	Package Weight				250	g

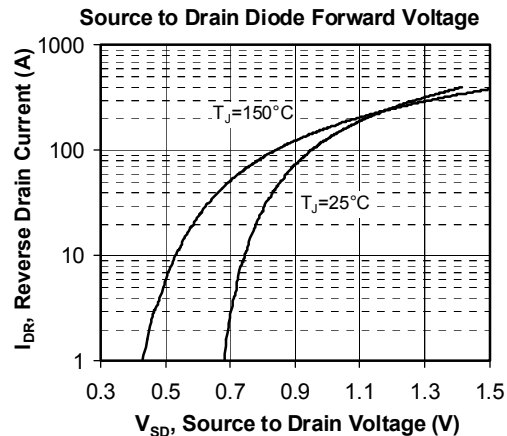
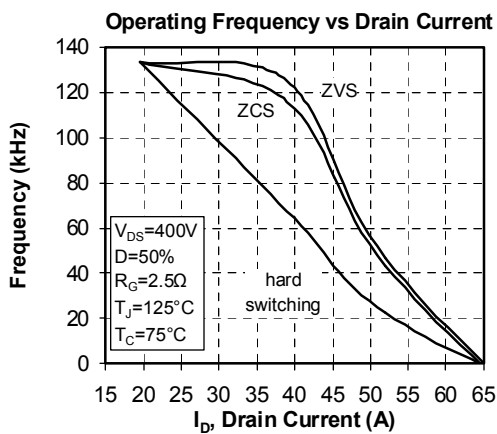
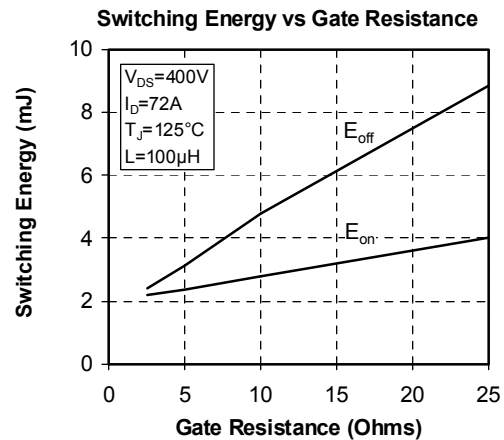
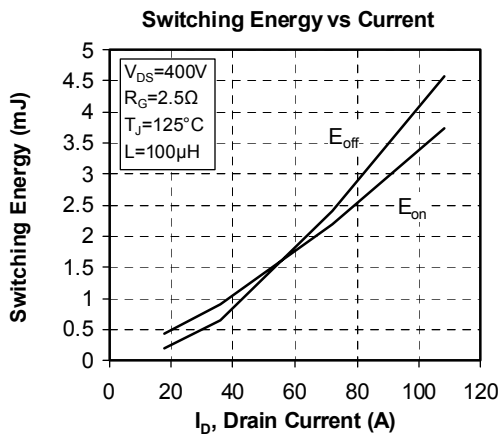
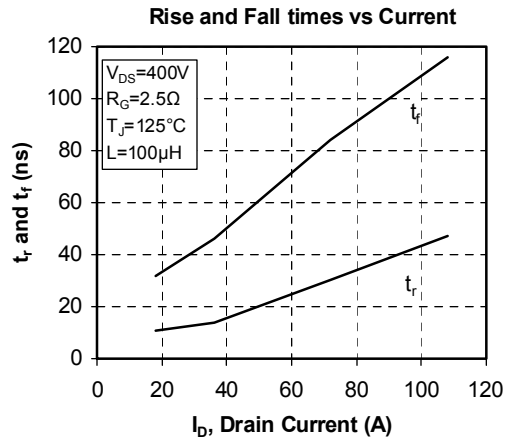
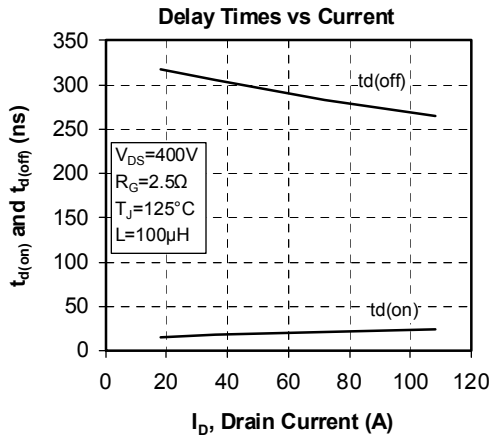
## SP6-P Package outline (dimensions in mm)



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

**Typical Performance Curve**






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