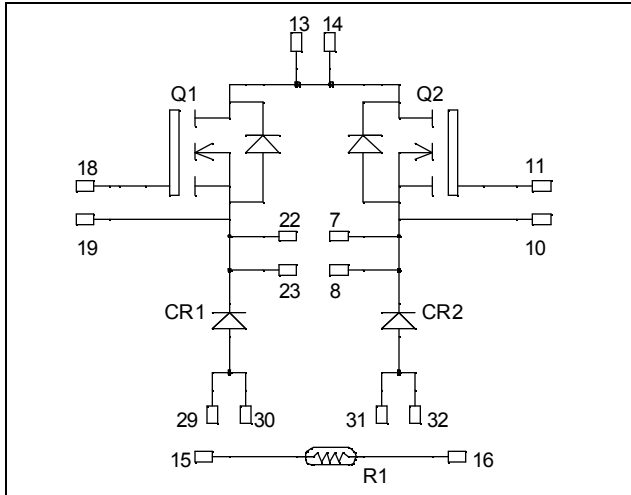


## Dual buck chopper Super Junction MOSFET Power Module

$$V_{DSS} = 600V$$

$$R_{DSon} = 70m\Omega \text{ max @ } T_j = 25^\circ C$$

$$I_D = 39A \text{ @ } T_c = 25^\circ C$$

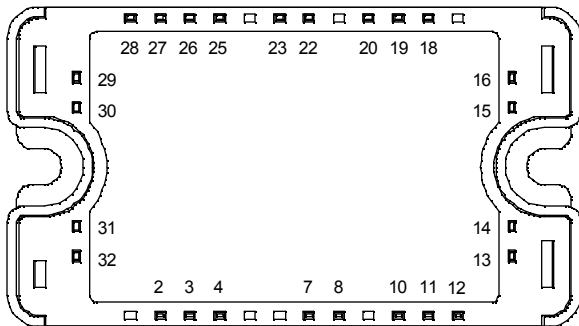


### Application

- AC and DC motor control
- Switched Mode Power Supplies

### 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
- Internal thermistor for temperature monitoring
- 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
- Low profile
- Each leg can be easily paralleled to achieve a single buck of twice the current capability
- RoHS Compliant

All multiple inputs and outputs must be shorted together  
 Example: 13/14 ; 29/30 ; 22/23 ...

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	600	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	39
		$T_c = 80^\circ C$	29
$I_{DM}$	Pulsed Drain current	160	
$V_{GS}$	Gate - Source Voltage	$\pm 20$	V
$R_{DSon}$	Drain - Source ON Resistance	70	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	250
$I_{AR}$	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. See application note APT0502 on [www.microsemi.com](http://www.microsemi.com)

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	$V_{GS} = 0\text{V}, V_{DS} = 600\text{V}$			25	$\mu\text{A}$
		$V_{GS} = 0\text{V}, V_{DS} = 600\text{V}$			250	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 39\text{A}$			70	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.7\text{mA}$	2.1	3	3.9	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$			$\pm 100$	nA

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}$		7		nF
$C_{oss}$	Output Capacitance	$V_{DS} = 25\text{V}$		2.56		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.21		
$Q_g$	Total gate Charge	$V_{GS} = 10\text{V}$		259		nC
$Q_{gs}$	Gate – Source Charge	$V_{Bus} = 300\text{V}$		29		
$Q_{gd}$	Gate – Drain Charge	$I_D = 39\text{A}$		111		
$T_{d(on)}$	Turn-on Delay Time	<b>Inductive Switching @ 125°C</b> $V_{GS} = 15\text{V}$ $V_{Bus} = 400\text{V}$ $I_D = 39\text{A}$ $R_G = 5\Omega$		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 @ 25°C</b> $V_{GS} = 15\text{V}, V_{Bus} = 400\text{V}$ $I_D = 39\text{A}, R_G = 5\Omega$		670		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			980		
$E_{on}$	Turn-on Switching Energy	<b>Inductive switching @ 125°C</b> $V_{GS} = 15\text{V}, V_{Bus} = 400\text{V}$ $I_D = 39\text{A}, R_G = 5\Omega$		1096		$\mu\text{J}$
$E_{off}$	Turn-off Switching Energy			1206		

**Chopper diode ratings and characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		600			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 600\text{V}$	$T_j = 25^\circ\text{C}$		250	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		500	
$I_F$	DC Forward Current			40		A
$V_F$	Diode Forward Voltage	$I_F = 40\text{A}$ $V_{GE} = 0\text{V}$	$T_j = 25^\circ\text{C}$	1.45		V
			$T_j = 125^\circ\text{C}$	1.35		
$t_{rr}$	Reverse Recovery Time	$I_F = 40\text{A}$ $V_R = 300\text{V}$	$T_j = 25^\circ\text{C}$	95		ns
			$T_j = 125^\circ\text{C}$	115		
$Q_{rr}$	Reverse Recovery Charge	$di/dt = 2600\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$	2.6		$\mu\text{C}$
			$T_j = 125^\circ\text{C}$	4		

## Thermal and package characteristics

Symbol Characteristic

			Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case Thermal Resistance	Transistor			0.5	°C/W
		Diode			1.5	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, I <sub>isol</sub> <1mA, 50/60Hz		2500			V
T <sub>J</sub>	Operating junction temperature range		-40		150	°C
T <sub>STG</sub>	Storage Temperature Range		-40		125	
T <sub>C</sub>	Operating Case Temperature		-40		100	
Torque	Mounting torque	To heatsink	M4	2.5	4.7	N.m
Wt	Package Weight				110	g

## Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

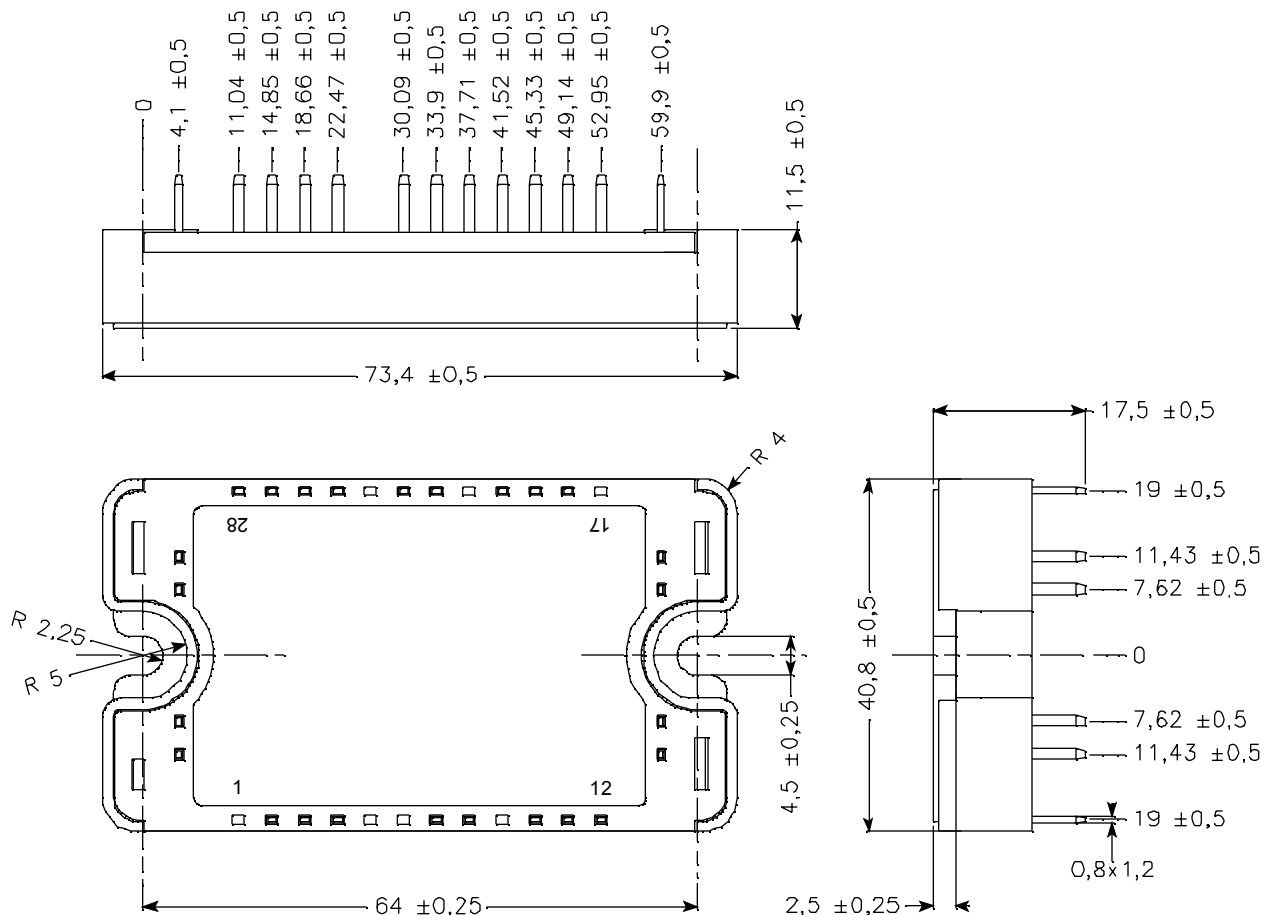
Symbol Characteristic

		Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		50		kΩ
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K		3952		K

$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

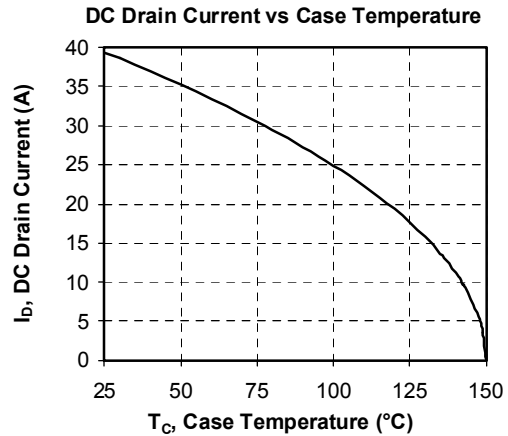
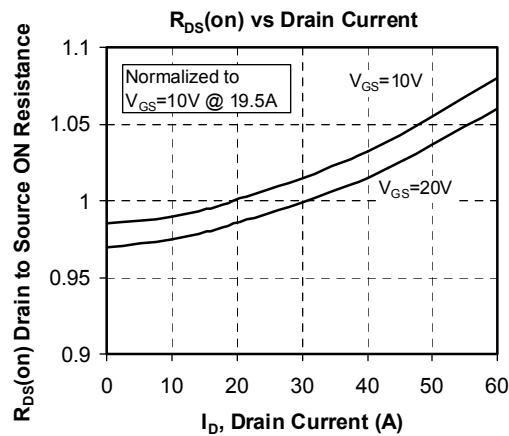
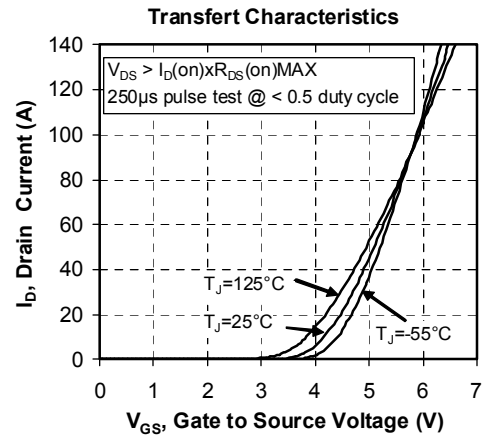
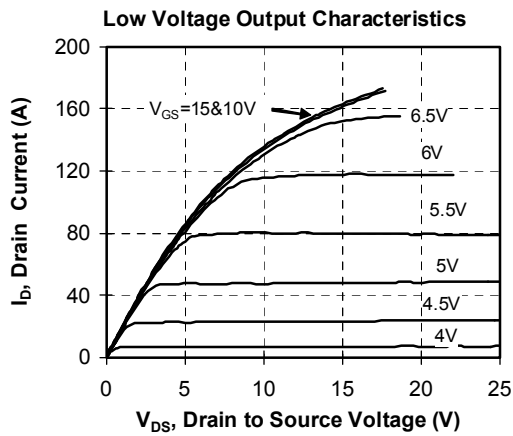
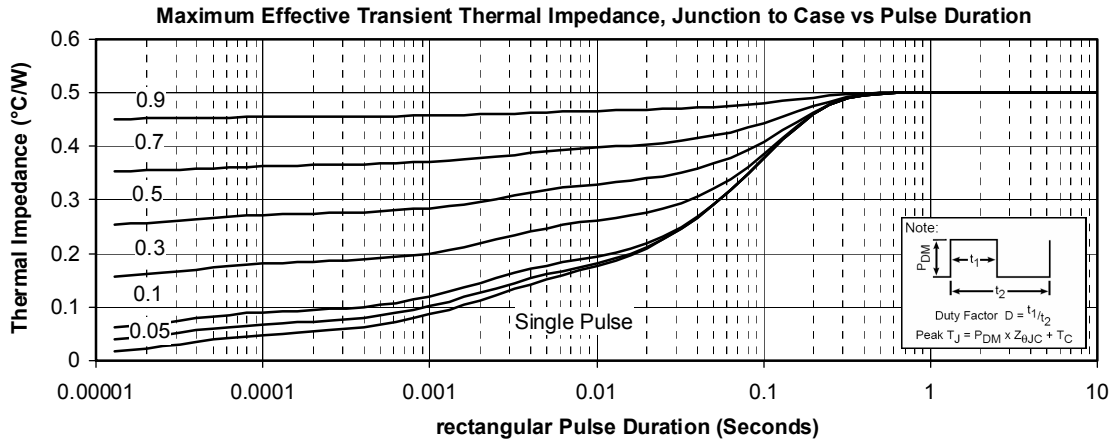
T: Thermistor temperature  
 R<sub>T</sub>: Thermistor value at T

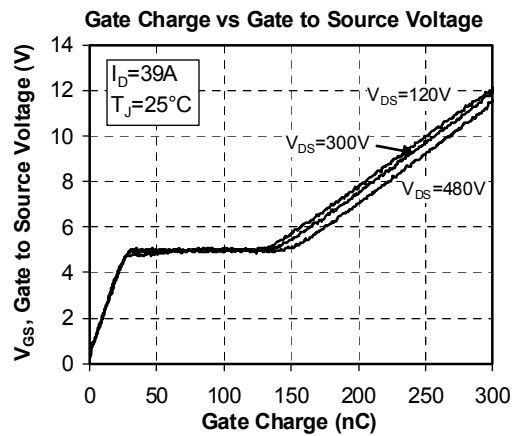
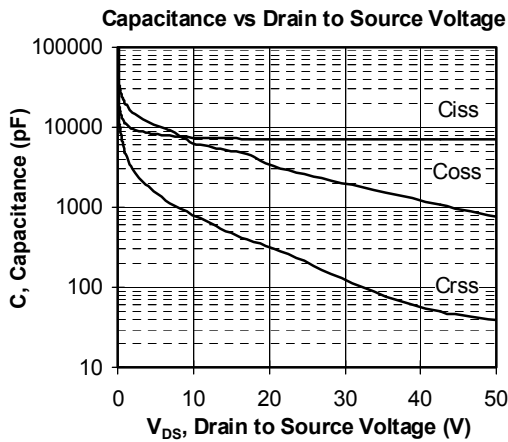
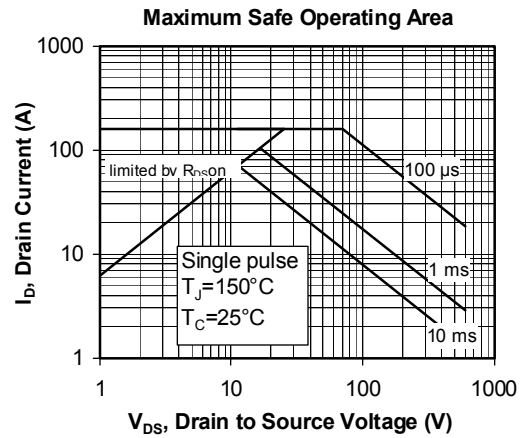
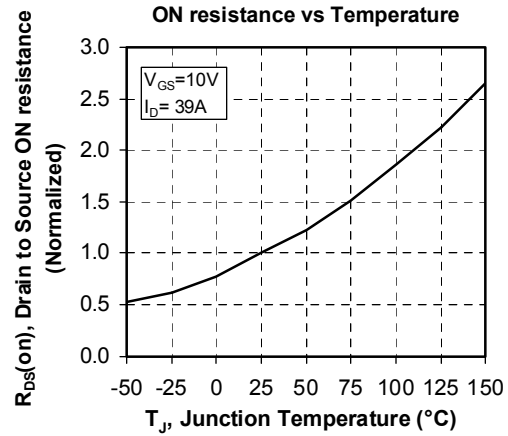
## SP3 Package outline (dimensions in mm)

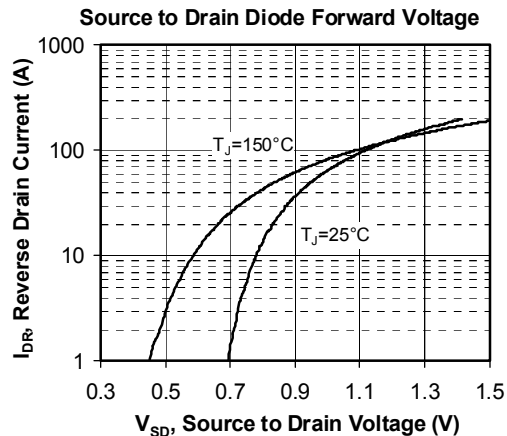
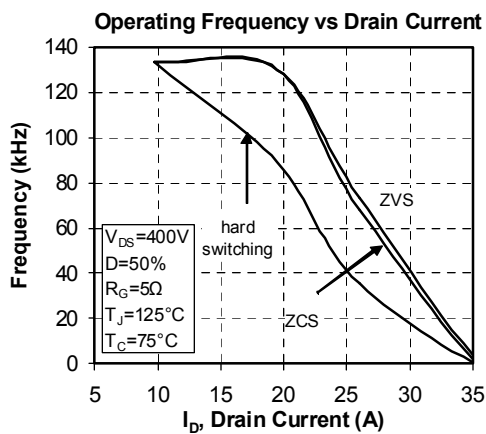
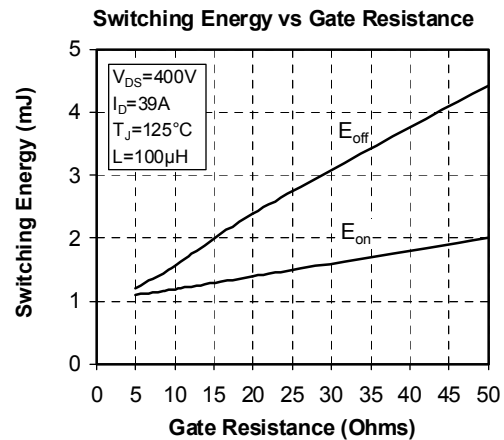
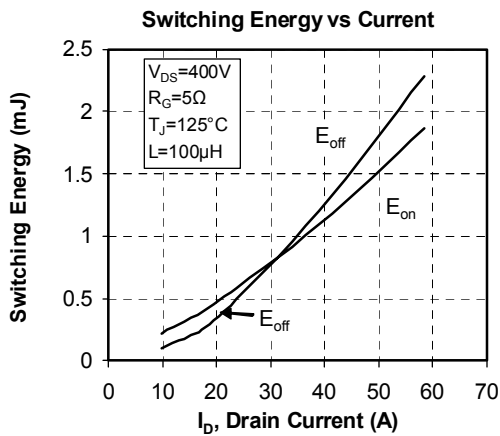
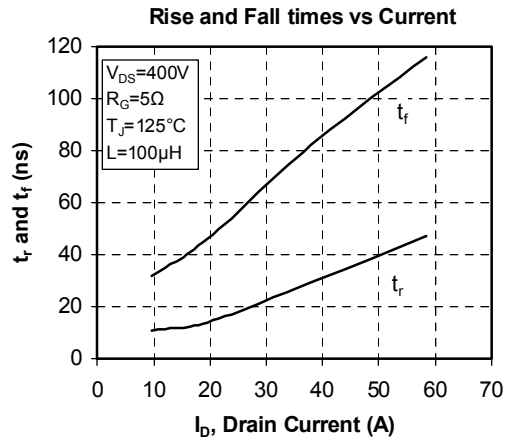
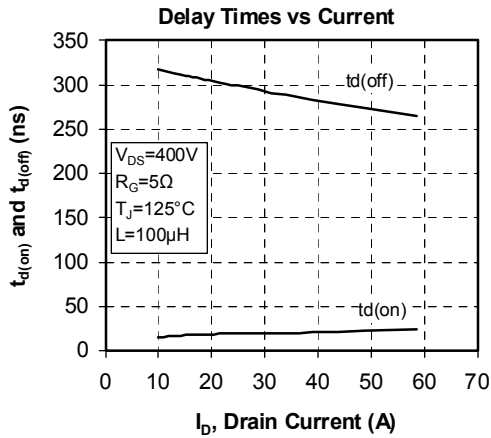


See application note 1901 - Mounting Instructions for SP3 Power Modules on www.microsemi.com

## Typical Performance Curve







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