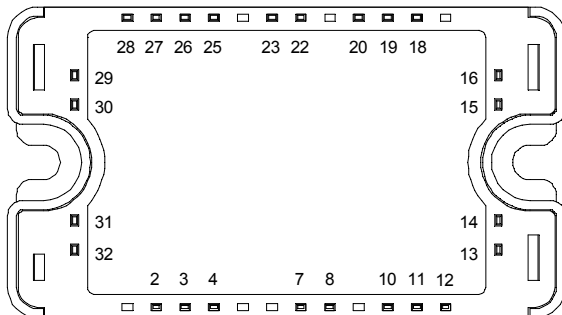
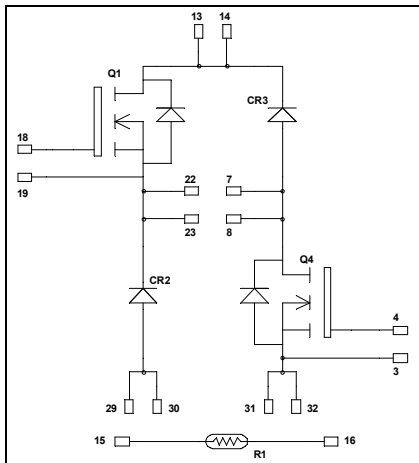


## Asymmetrical - Bridge MOSFET Power Module

$V_{DSS} = 500V$   
 $R_{DSon} = 65m\Omega \text{ typ @ } T_j = 25^\circ C$   
 $I_D = 51A \text{ @ } T_c = 25^\circ C$



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

### Application

- Welding converters
- Switched Mode Power Supplies
- Switched Reluctance Motor Drives

### Features

- Power MOS 8<sup>TM</sup> MOSFETs
  - Low  $R_{DSon}$
  - Low input and Miller capacitance
  - 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
- RoHS Compliant

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	500	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	51
		$T_c = 80^\circ C$	38
$I_{DM}$	Pulsed Drain current	270	
$V_{GS}$	Gate - Source Voltage	$\pm 30$	V
$R_{DSon}$	Drain - Source ON Resistance	78	m $\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	390
$I_{AR}$	Avalanche current (repetitive and non repetitive)	42	A

**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	$V_{DS} = 500\text{V}$ $V_{GS} = 0\text{V}$	$T_j = 25^\circ\text{C}$		250	$\mu\text{A}$
			$T_j = 125^\circ\text{C}$		1000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 42\text{A}$		65	78	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 2.5\text{mA}$	3	4	5	V
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}$			$\pm 100$	$\text{nA}$

**Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}$ $V_{DS} = 25\text{V}$ $f = 1\text{MHz}$		10800		$\text{pF}$
$C_{oss}$	Output Capacitance			1164		
$C_{riss}$	Reverse Transfer Capacitance			148		
$Q_g$	Total gate Charge	$V_{GS} = 10\text{V}$ $V_{Bus} = 250\text{V}$ $I_D = 42\text{A}$		340		$\text{nC}$
$Q_{gs}$	Gate – Source Charge			75		
$Q_{gd}$	Gate – Drain Charge			155		
$T_{d(on)}$	Turn-on Delay Time	<b>Resistive switching @ <math>25^\circ\text{C}</math></b> $V_{GS} = 15\text{V}$ $V_{Bus} = 333\text{V}$ $I_D = 42\text{A}$ $R_G = 2.2\Omega$		60		$\text{ns}$
$T_r$	Rise Time			70		
$T_{d(off)}$	Turn-off Delay Time			155		
$T_f$	Fall Time			50		

**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	$T_c = 80^\circ\text{C}$		60		A
$V_F$	Diode Forward Voltage	$I_F = 60\text{A}$		1.7	2.3	V
		$I_F = 120\text{A}$		2		
		$I_F = 60\text{A}$	$T_j = 125^\circ\text{C}$		1.4	
$t_{rr}$	Reverse Recovery Time	$I_F = 60\text{A}$ $V_R = 400\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		70	$\text{ns}$
			$T_j = 125^\circ\text{C}$		140	
$Q_{rr}$	Reverse Recovery Charge	$I_F = 60\text{A}$ $V_R = 400\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		100	$\text{nC}$
			$T_j = 125^\circ\text{C}$		690	

**Thermal and package characteristics**

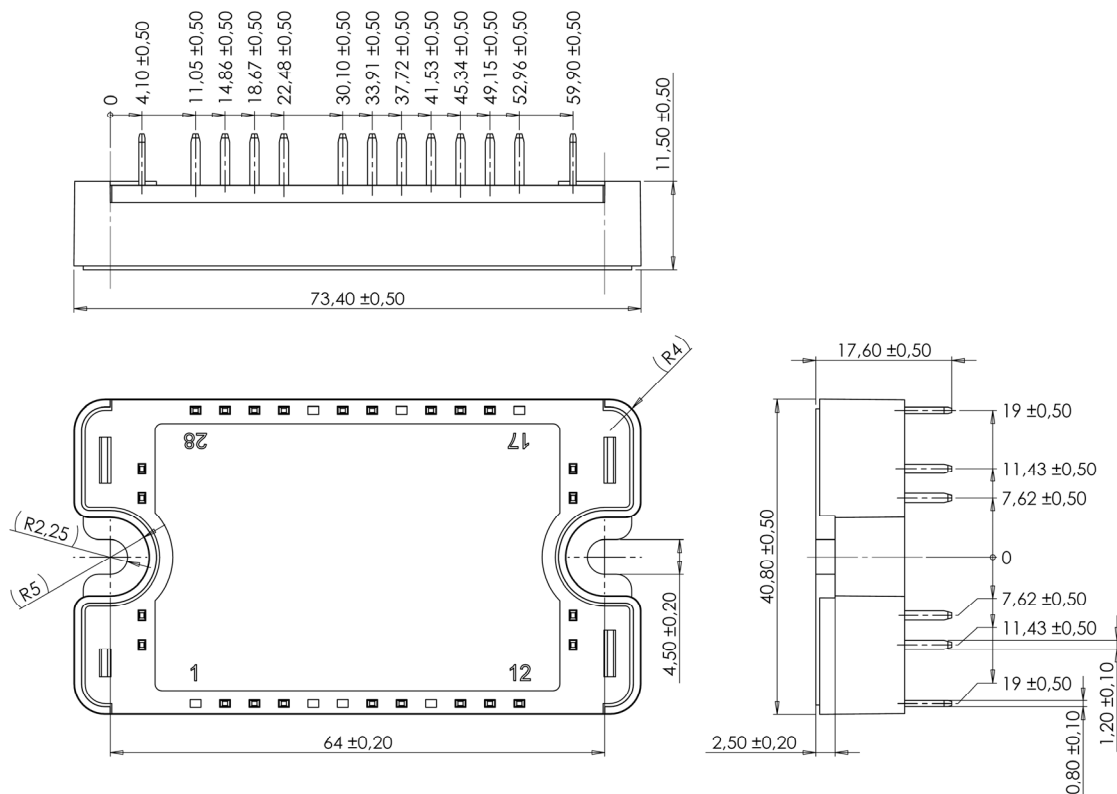
Symbol	Characteristic	Min	Typ	Max	Unit	
R <sub>thJC</sub>	Junction to Case Thermal Resistance	MOSFET		0.32	°C/W	
		Diode		0.85		
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min,50/60Hz	4000			V	
T <sub>J</sub>	Operating junction temperature range	-40		150	°C	
T <sub>STG</sub>	Storage Temperature Range	-40		125		
T <sub>C</sub>	Operating Case Temperature	-40		100		
Torque	Mounting torque	To Heatsink	M4	2	3	N.m
Wt	Package Weight				110	g

**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com) for more information).

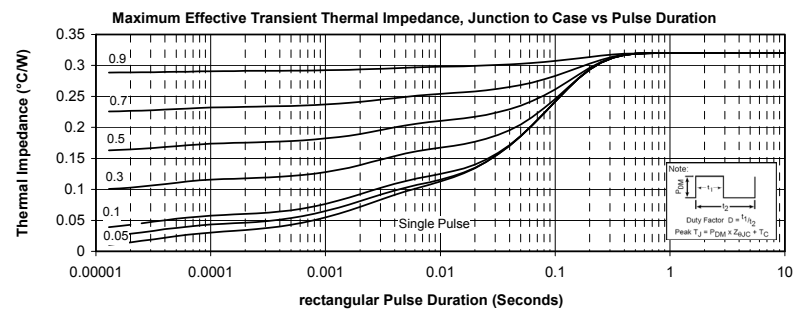
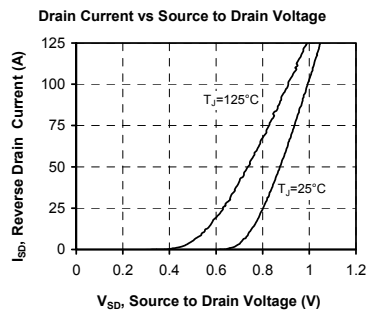
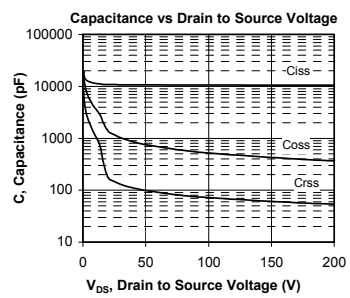
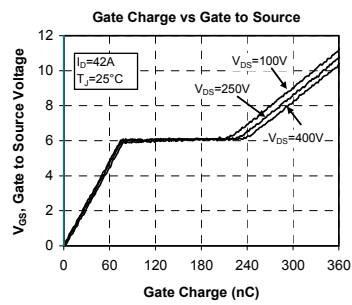
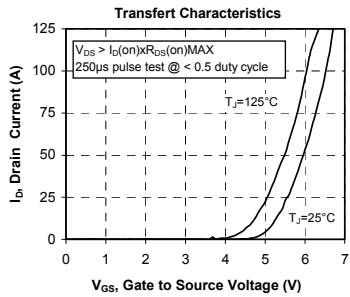
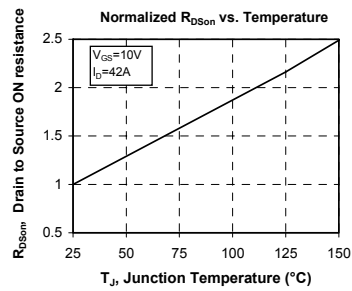
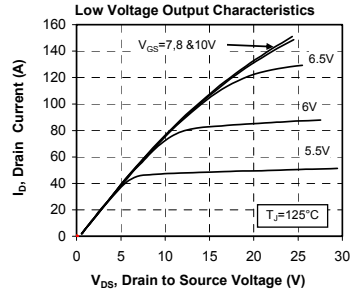
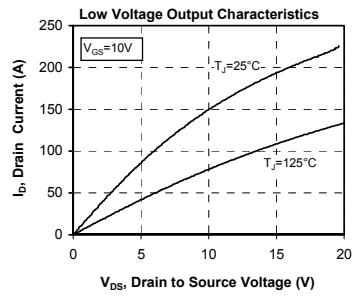
Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		50		kΩ
ΔR <sub>25</sub> /R <sub>25</sub>			5		%
B <sub>25/85</sub>	T <sub>25</sub> = 298.15 K		3952		K
ΔB/B		T <sub>C</sub> =100°C	4		%

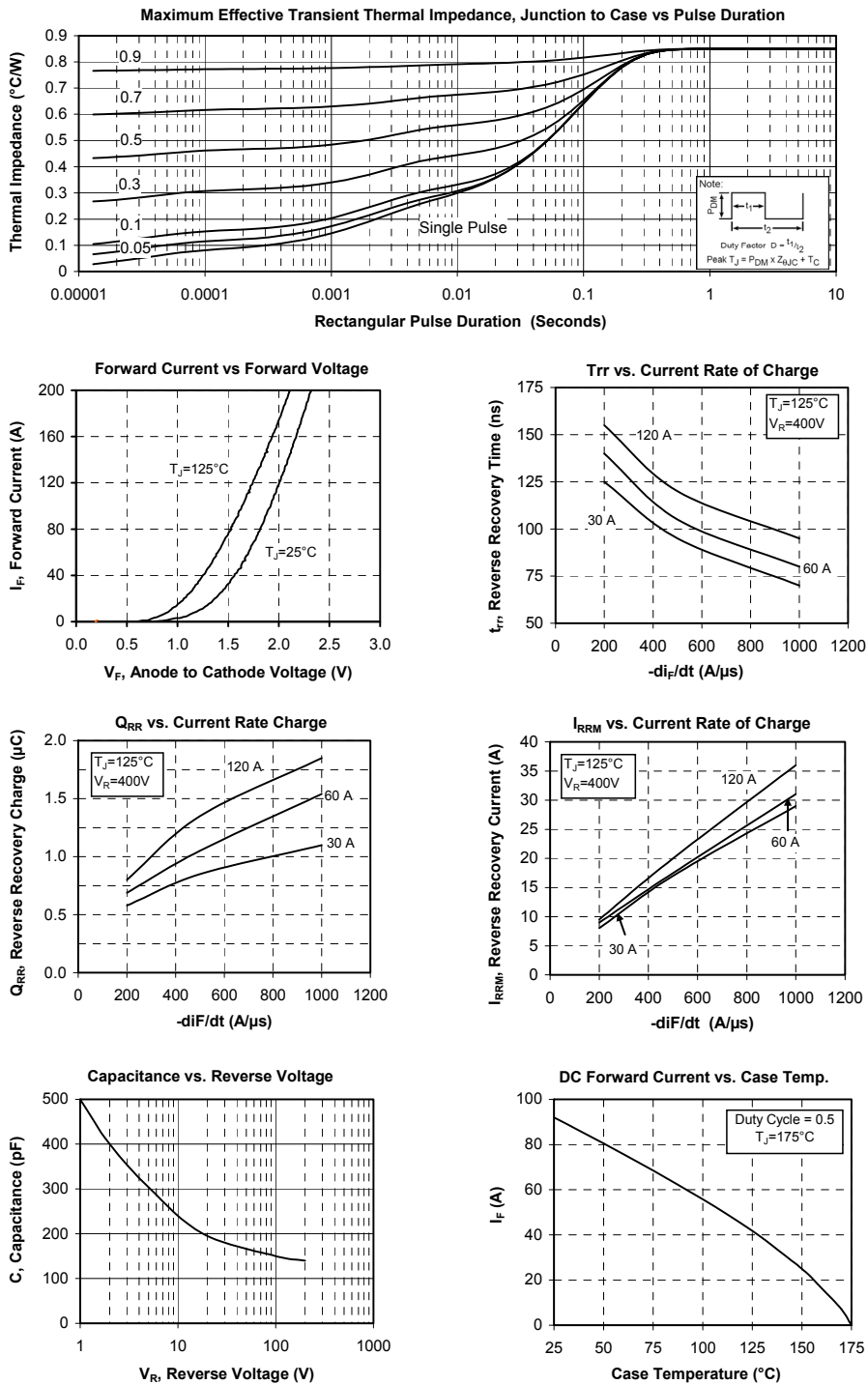
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

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

**SP3 Package outline** (dimensions in mm)

 See application note APT0501 - Mounting Instructions for SP4 Power Modules on [www.microsemi.com](http://www.microsemi.com)

## Typical MOSFET Performance Curve



**Typical diode Performance Curve**


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