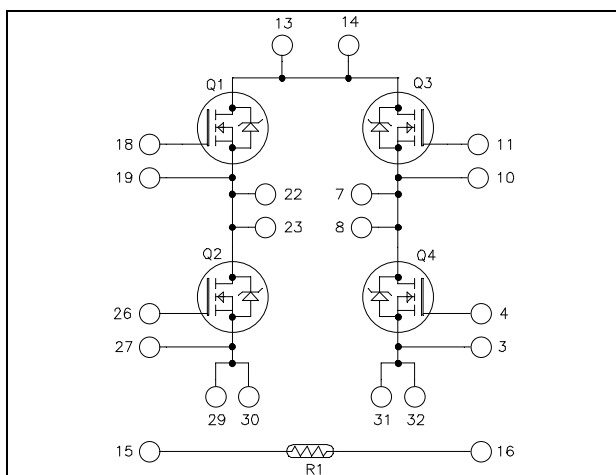


Full - Bridge Super Junction MOSFET Power Module

$V_{DSS} = 800V$

$R_{DSon} = 150m\Omega \text{ max @ } T_j = 25^\circ C$

$I_D = 28A \text{ @ } T_c = 25^\circ C$



Application

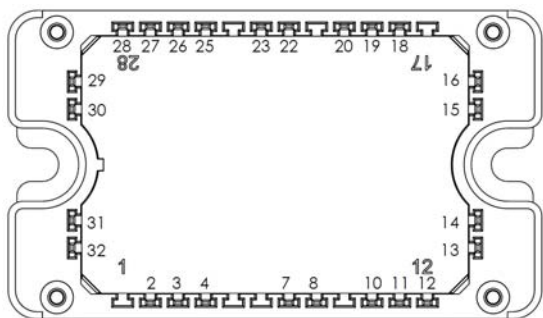
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

Features

- **Super junction MOSFET**
 - 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
- Internal thermistor for temperature monitoring

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 phase leg of twice the current capability
- RoHS Compliant



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

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

Absolute maximum ratings (per super junction MOSFET)

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Voltage	800	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	A
		$T_c = 80^\circ C$	
I_{DM}	Pulsed Drain current	110	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	150	m Ω
P_D	Power Dissipation	$T_c = 25^\circ C$	W
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.

Electrical Characteristics (per super junction MOSFET)

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

Dynamic Characteristics (per super junction MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		4507		pF
C_{oss}	Output Capacitance	$V_{DS} = 25V$		2092		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		108		
Q_g	Total gate Charge	$V_{GS} = 10V$		180		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 400V$		22		
Q_{gd}	Gate – Drain Charge	$I_D = 28A$		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		
R_{thJC}	Junction to Case Thermal Resistance				0.45	°C/W

Source - Drain diode ratings and characteristics (per super junction MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_S	Continuous Source current (Body diode)	$T_c = 25^\circ C$		28		A
		$T_c = 80^\circ C$		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	$I_S = -28A; V_R = 400V$		550		ns
Q_{rr}	Reverse Recovery Charge	$di/dt = 200A/\mu s$		30		μC

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

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

Thermal and package characteristics

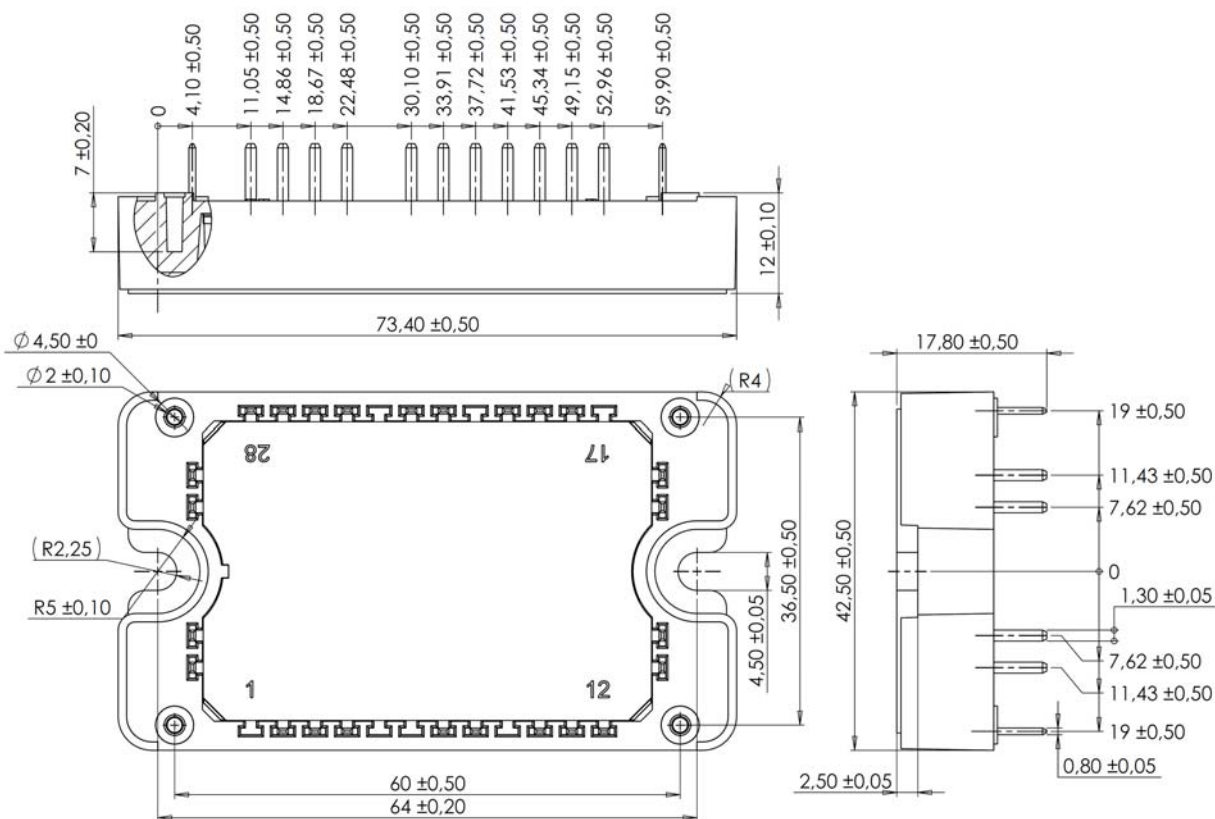
Symbol	Characteristic	Min	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance		0.45	°C/W
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz	4000		V
T _J	Operating junction temperature range	-40	150	°C
T _{JOP}	Recommended junction temperature under switching conditions	-40	T _{Jmax} -25	
T _{STG}	Storage Temperature Range	-40	125	
T _C	Operating Case Temperature	-40	125	
Torque	Mounting torque	To heatsink	M4	
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 ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B	T _C = 100°C		4		%

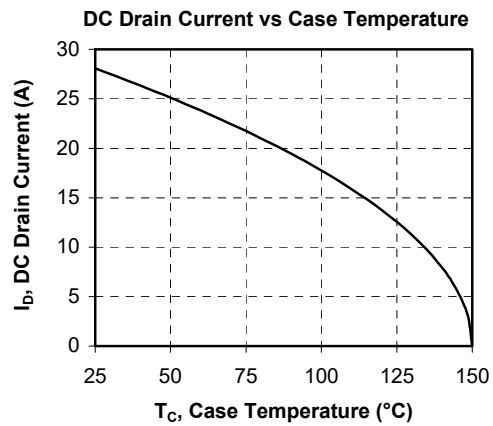
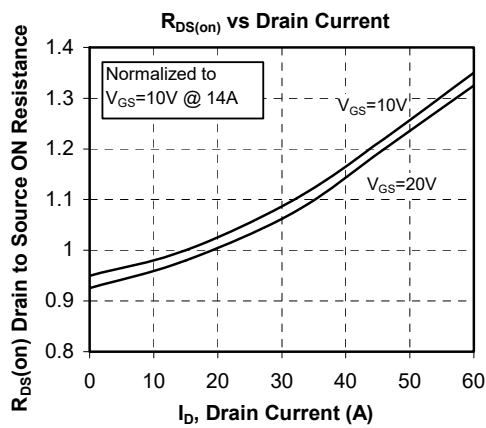
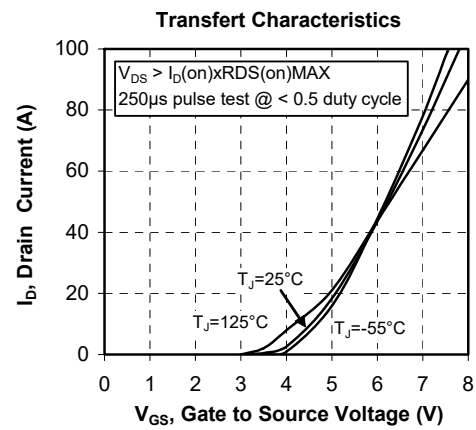
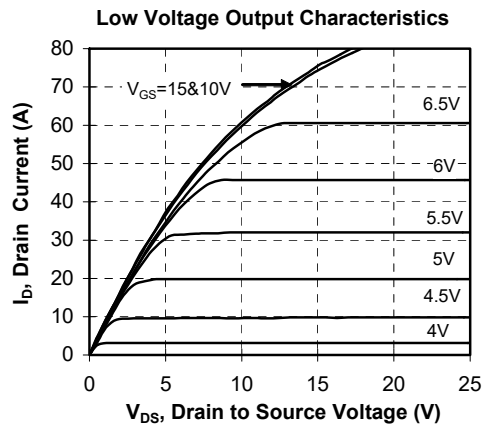
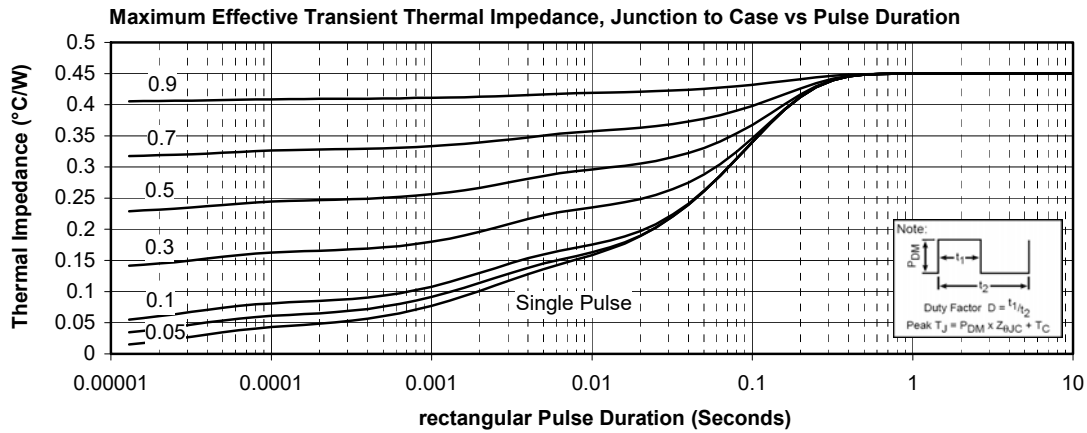
$$R_T = \frac{R_{25}}{\exp \left[B_{25/85} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

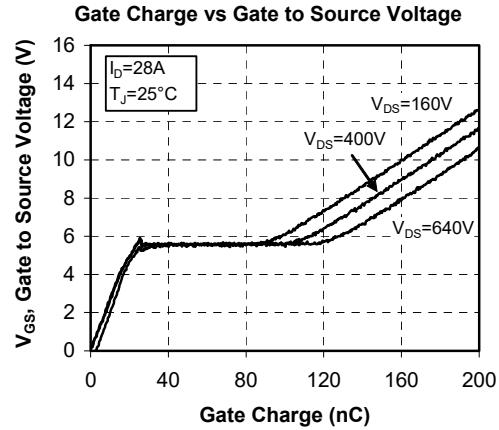
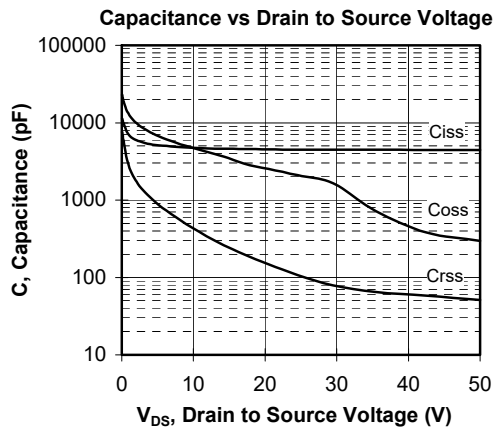
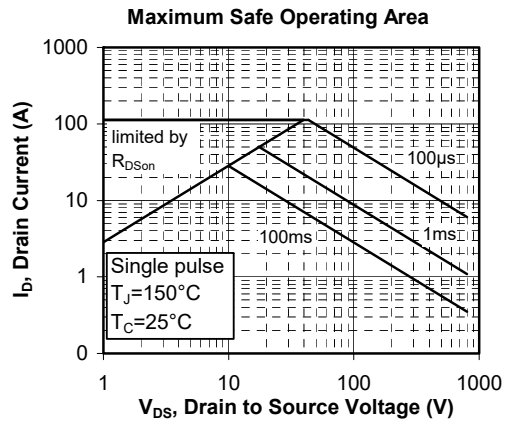
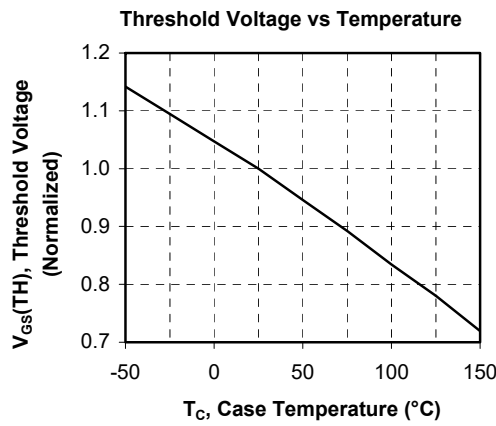
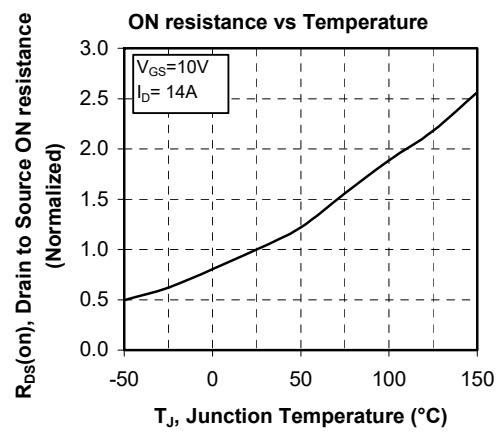
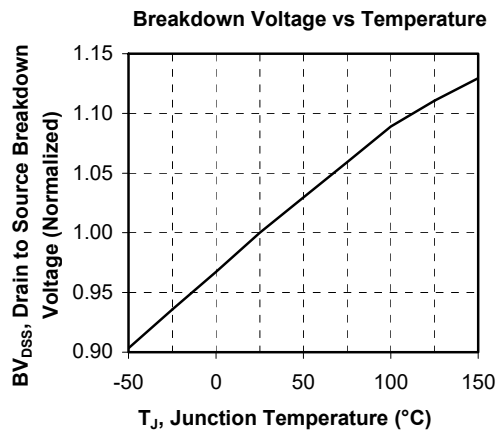
T: Thermistor temperature
 R_T: Thermistor value at T

Package outline (dimensions in mm)


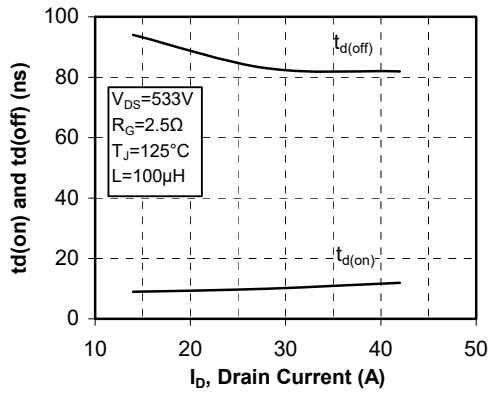
See application note 1906 - Mounting Instructions for SP3F Power Modules on www.microsemi.com

Typical Performance Curve

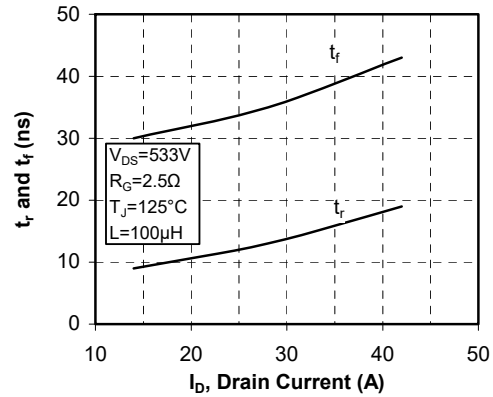




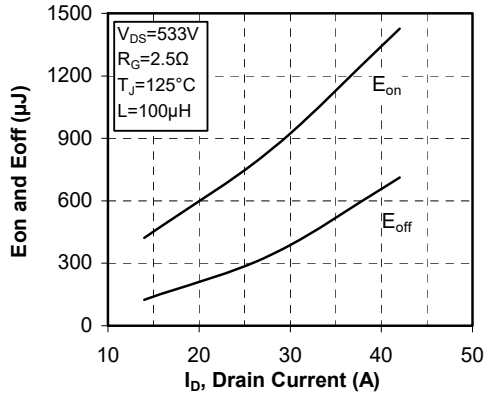
Delay Times vs Current



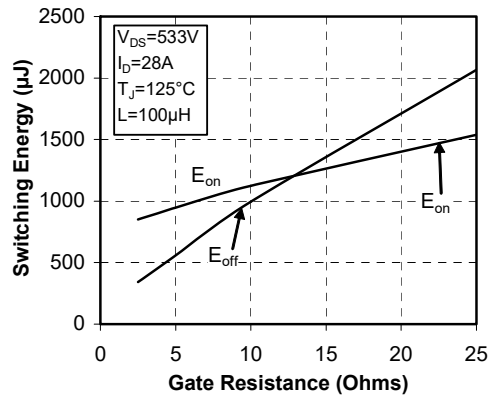
Rise and Fall times vs Current



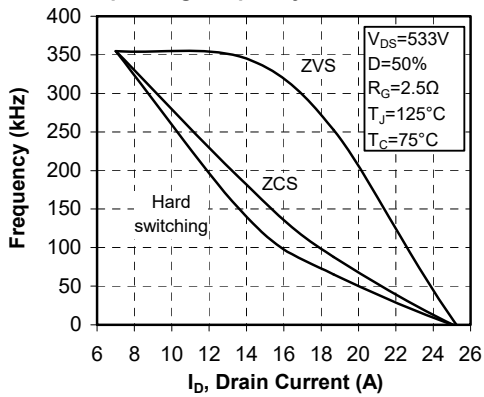
Switching Energy vs Current



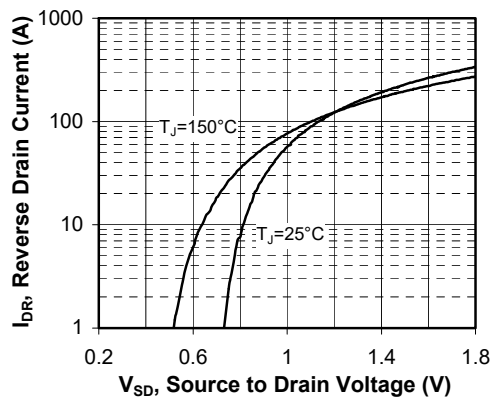
Switching Energy vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage



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