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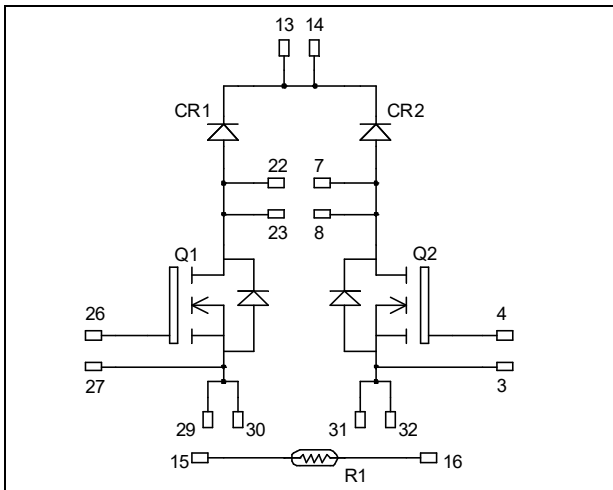
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**Dual Boost chopper
Super Junction MOSFET
Power Module**

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



Application

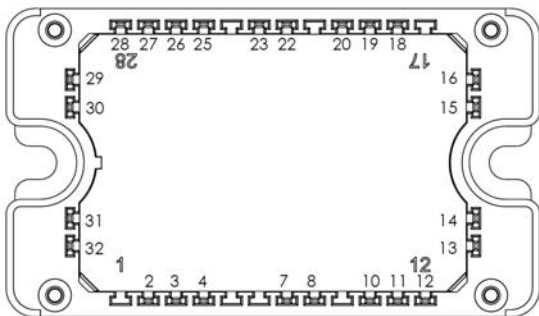
- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

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 single boost 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	$T_c = 25^\circ C$	28
		$T_c = 80^\circ C$	21
I_{DM}	Pulsed Drain current	110	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	150	$m\Omega$
P_D	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.

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	mΩ
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} = ±20 V, 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 = 2.5Ω		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 = 2.5Ω		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 = 2.5Ω		850		μJ
E _{off}	Turn-off Switching Energy			342		
R _{thJC}	Junction to Case Thermal Resistance				0.45	°C/W

Chopper diode ratings and characteristics (per diode)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V _{RRM}	Peak Repetitive Reverse Voltage				1000	V
I _{RM}	Reverse Leakage Current	V _R = 1000V			250	μA
I _F	DC Forward Current	T _c = 100°C		60		A
V _F	Diode Forward Voltage	I _F = 60A		1.9	2.5	V
		I _F = 120A		2.2		
		I _F = 60A T _j = 125°C		1.7		
t _{rr}	Reverse Recovery Time	I _F = 60A V _R = 667V di/dt = 200A/μs	T _j = 25°C	280		ns
			T _j = 125°C	350		
Q _{rr}	Reverse Recovery Charge	I _F = 60A V _R = 667V di/dt = 200A/μs	T _j = 25°C	760		nC
			T _j = 125°C	3600		
R _{thJC}	Junction to Case Thermal Resistance				0.9	°C/W

Thermal and package characteristics

Symbol	Characteristic	Min	Max	Unit		
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	2	3	N.m
Wt	Package Weight				110	g

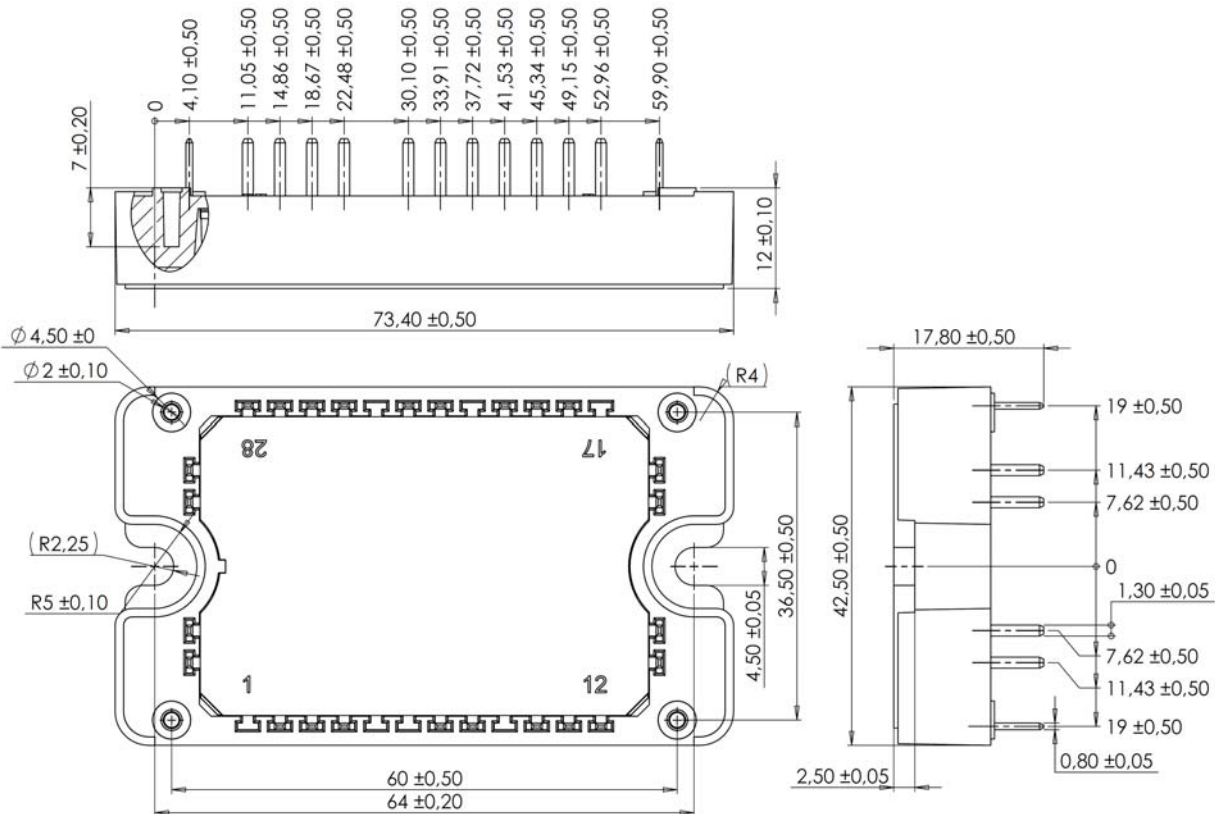
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
ΔR ₂₅ /R ₂₅			5		%
B _{25/85}	T ₂₅ = 298.15 K		3952		K
ΔB/B			4		%

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

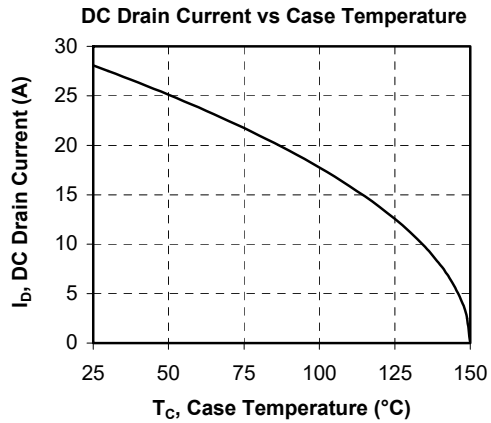
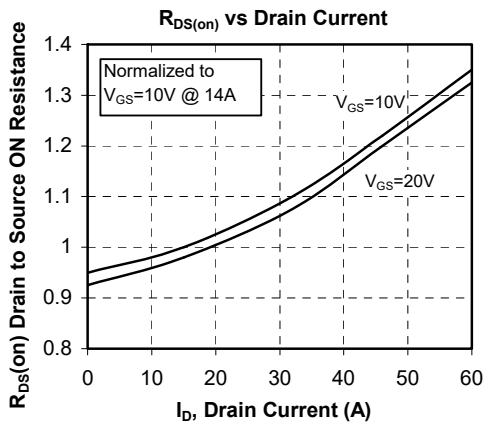
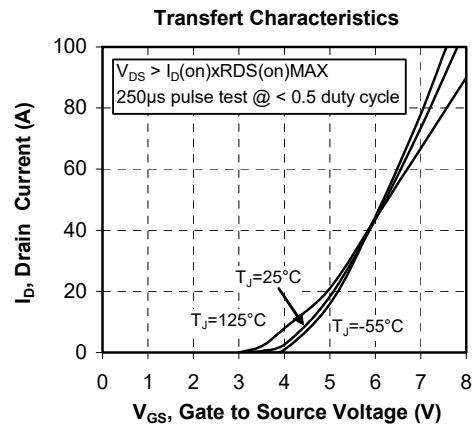
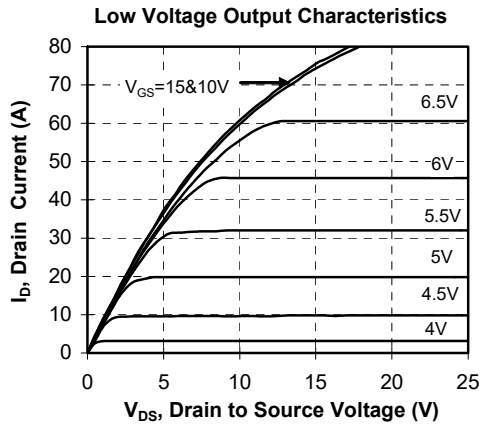
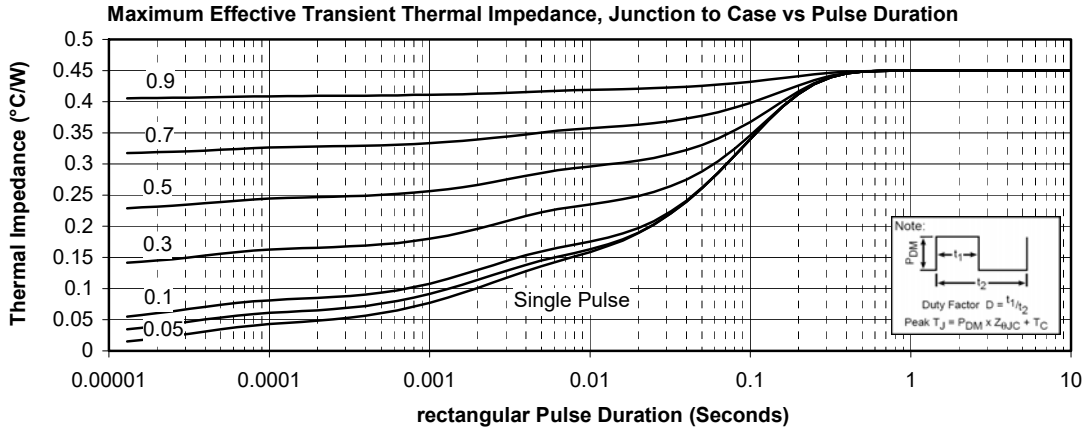
T: Thermistor temperature
 R_T: Thermistor value at T

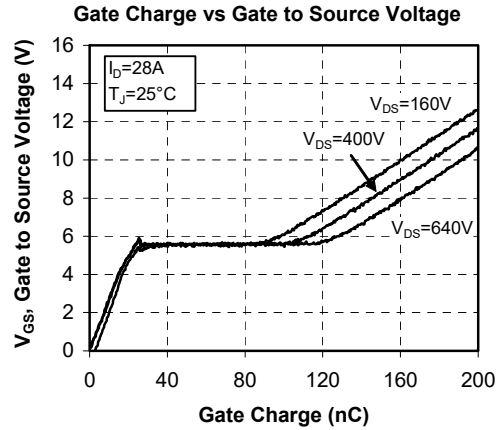
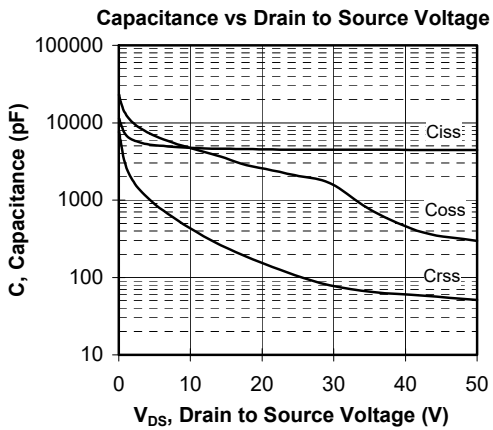
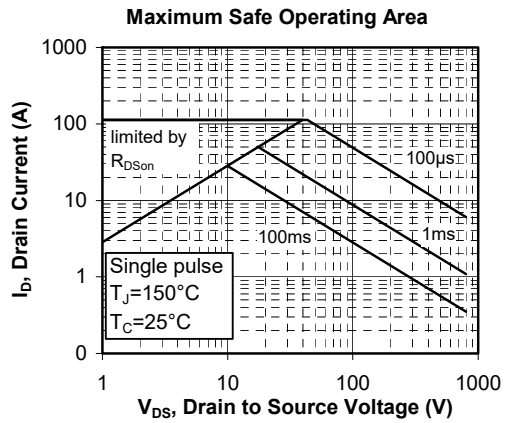
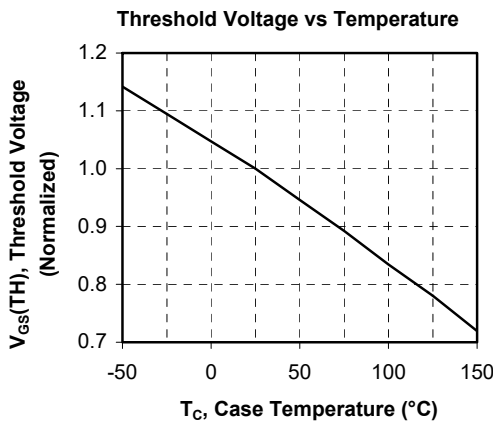
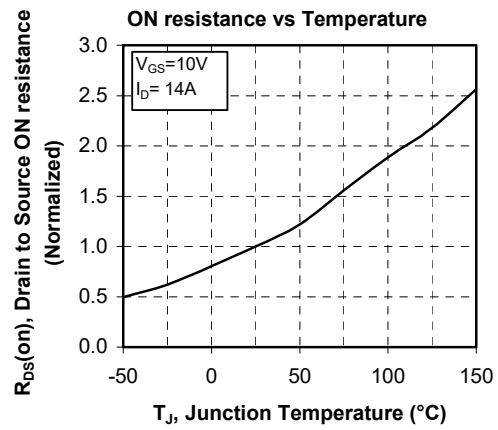
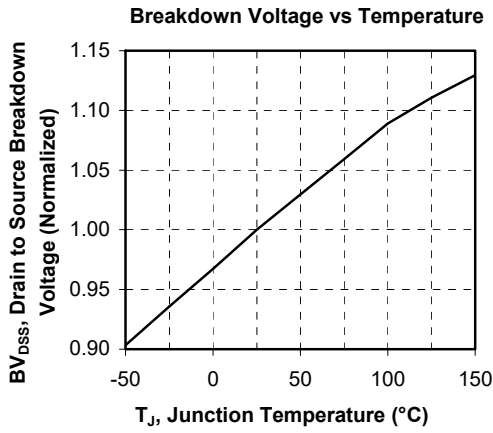
Package outline (dimensions in mm)

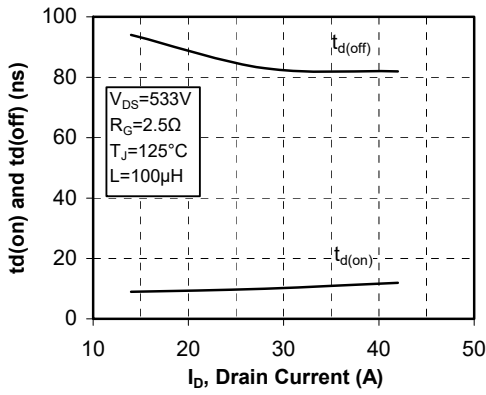
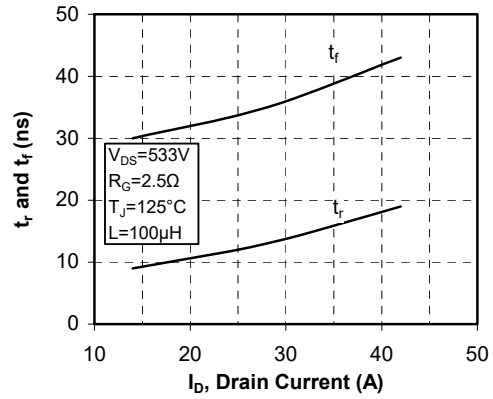
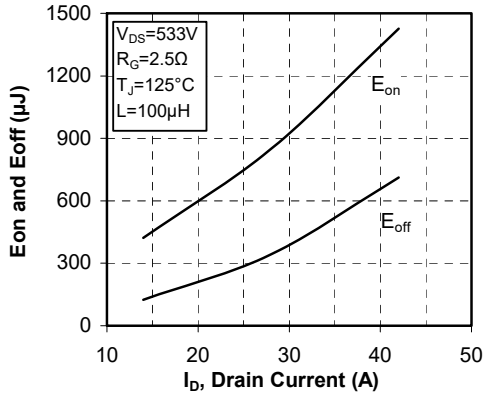
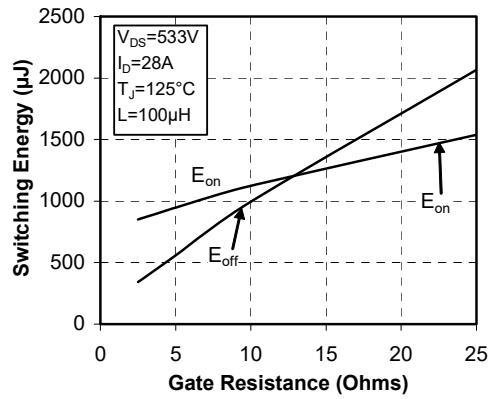
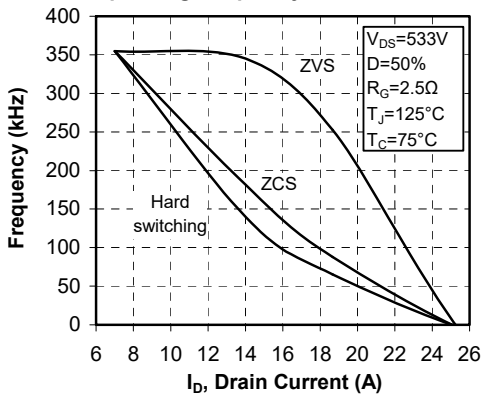
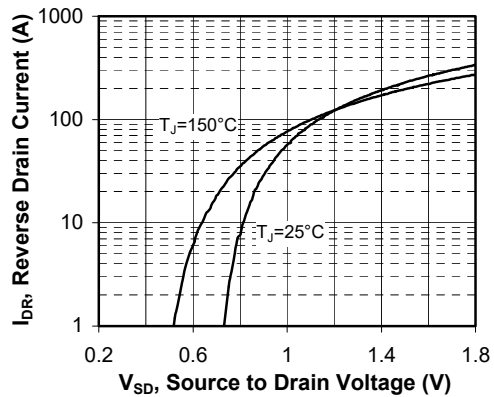


See application note 1906 - Mounting Instructions for SP3F Power Modules on www.microsemi.com

Typical Super junction MOSFET 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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