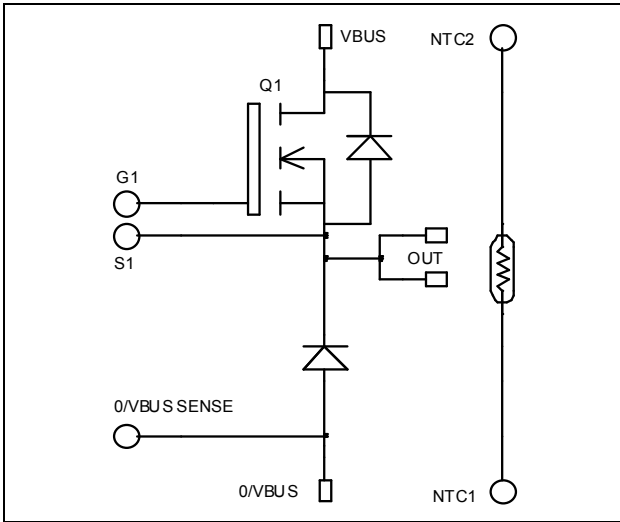


Buck chopper MOSFET Power Module

$V_{DSS} = 100V$
 $R_{DSon} = 4.5m\Omega \text{ typ @ } T_j = 25^\circ C$
 $I_D = 278A \text{ @ } T_c = 25^\circ C$

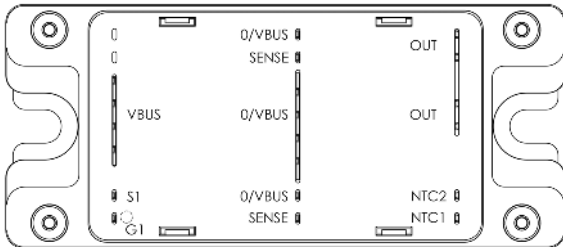


Application

- AC and DC motor control
- Switched Mode Power Supplies

Features

- Power MOS V[®] 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
 - Lead frames for power connections
- 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	100	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	278
		$T_c = 80^\circ C$	207
I_{DM}	Pulsed Drain current	1100	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	5	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	780
I_{AR}	Avalanche current (repetitive and non repetitive)	100	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	3000	

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on 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} = 0V, V _{DS} = 100V			200	μA
		T _j = 25°C				
R _{DS(on)}	Drain – Source on Resistance	V _{GS} = 0V, V _{DS} = 80V			1000	mΩ
		T _j = 125°C				
R _{DS(on)}	Drain – Source on Resistance	V _{GS} = 10V, I _D = 125A		4.5	5	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 5mA	2		4	V
I _{GSS}	Gate – Source Leakage Current	V _{GS} = ±30 V, V _{DS} = 0V			±200	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = 25V f = 1MHz		20		nF
C _{oss}	Output Capacitance			8		
C _{rss}	Reverse Transfer Capacitance			2.9		
Q _g	Total gate Charge	V _{GS} = 10V V _{Bus} = 50V I _D = 250A		700		nC
Q _{gs}	Gate – Source Charge			120		
Q _{gd}	Gate – Drain Charge			360		
T _{d(on)}	Turn-on Delay Time	Inductive switching @ 125°C V _{GS} = 15V V _{Bus} = 66V I _D = 250A R _G = 2.5 Ω		80		ns
T _r	Rise Time			165		
T _{d(off)}	Turn-off Delay Time			280		
T _f	Fall Time			135		
E _{on}	Turn-on Switching Energy	Inductive switching @ 25°C V _{GS} = 15V, V _{Bus} = 66V I _D = 250A, R _G = 2.5Ω		1.1		mJ
E _{off}	Turn-off Switching Energy			1.2		
E _{on}	Turn-on Switching Energy	Inductive switching @ 125°C V _{GS} = 15V, V _{Bus} = 66V I _D = 250A, R _G = 2.5Ω		1.22		mJ
E _{off}	Turn-off Switching Energy			1.28		

Chopper diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V _{RRM}	Maximum Peak Repetitive Reverse Voltage		200			V
I _{RM}	Maximum Reverse Leakage Current	V _R = 200V	T _j = 25°C		350	μA
			T _j = 125°C		600	
I _F	DC Forward Current	T _c = 80°C		200		A
V _F	Diode Forward Voltage	I _F = 200A		1		V
		I _F = 400A		1.4		
		I _F = 200A	T _j = 125°C		0.9	
t _{rr}	Reverse Recovery Time	I _F = 200A V _R = 133V di/dt = 400A/μs	T _j = 25°C		60	ns
			T _j = 125°C		110	
Q _{rr}	Reverse Recovery Charge	I _F = 200A V _R = 133V di/dt = 400A/μs	T _j = 25°C		400	nC
			T _j = 125°C		1680	

Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit	
R _{thJC}	Junction to Case Thermal Resistance	Transistor		0.16	°C/W	
		Diode		0.29		
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 _{STG}	Storage Temperature Range	-40		125		
T _C	Operating Case Temperature	-40		100		
Torque	Mounting torque	To Heatsink	M5	2.5	4.7	N.m
Wt	Package Weight				160	g

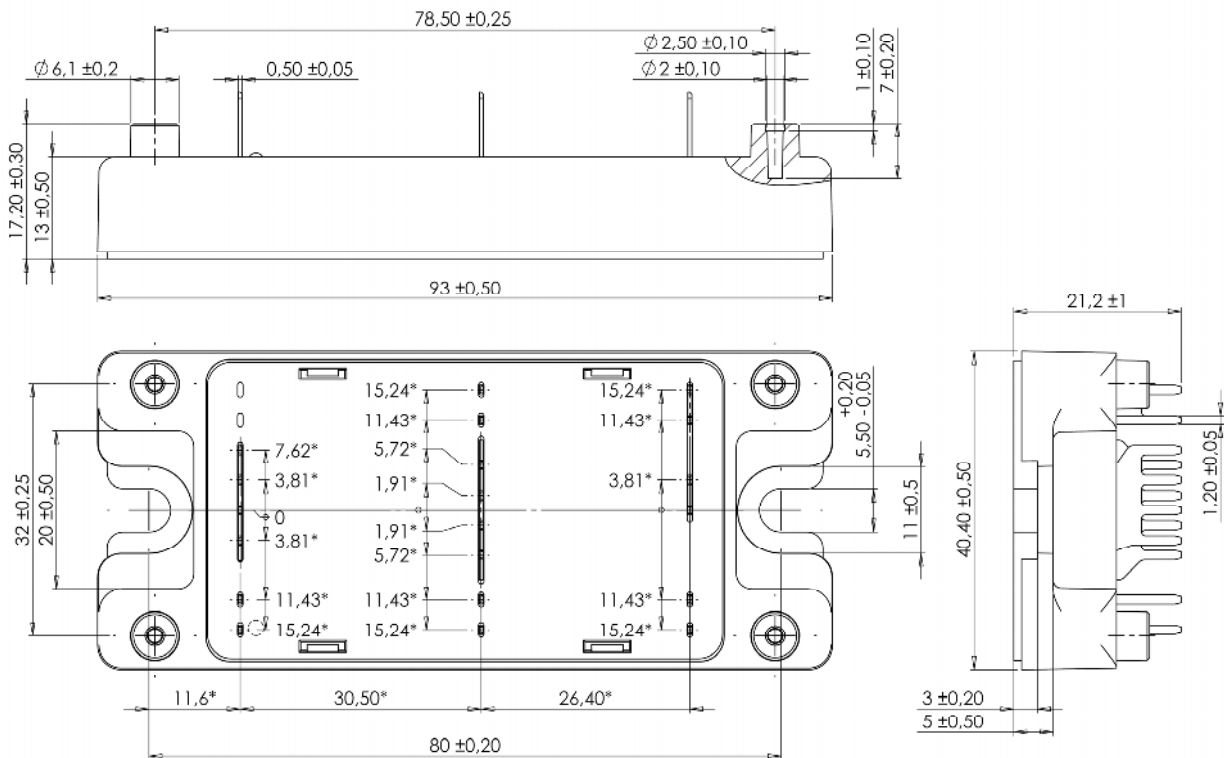
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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

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

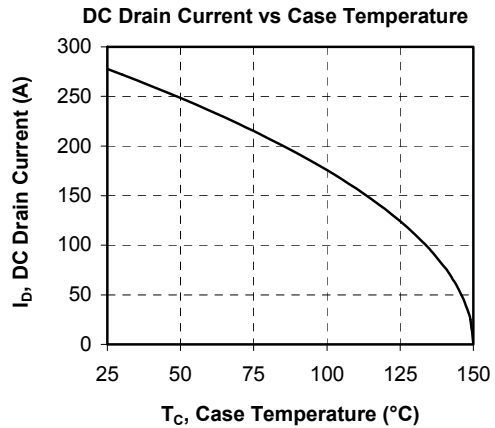
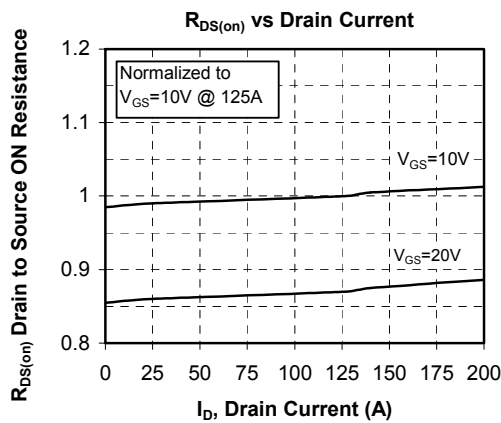
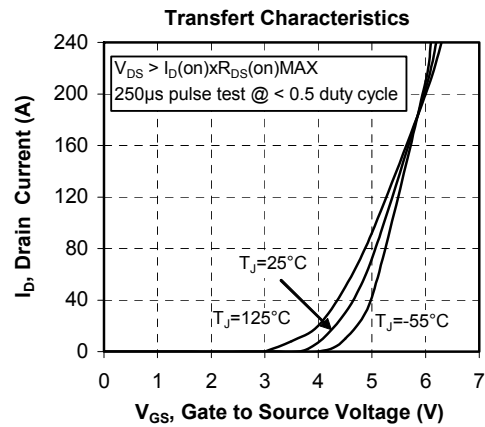
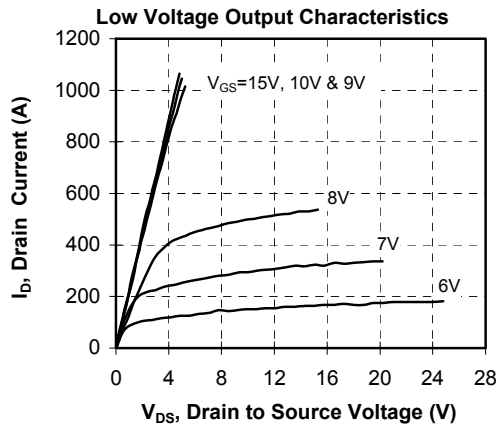
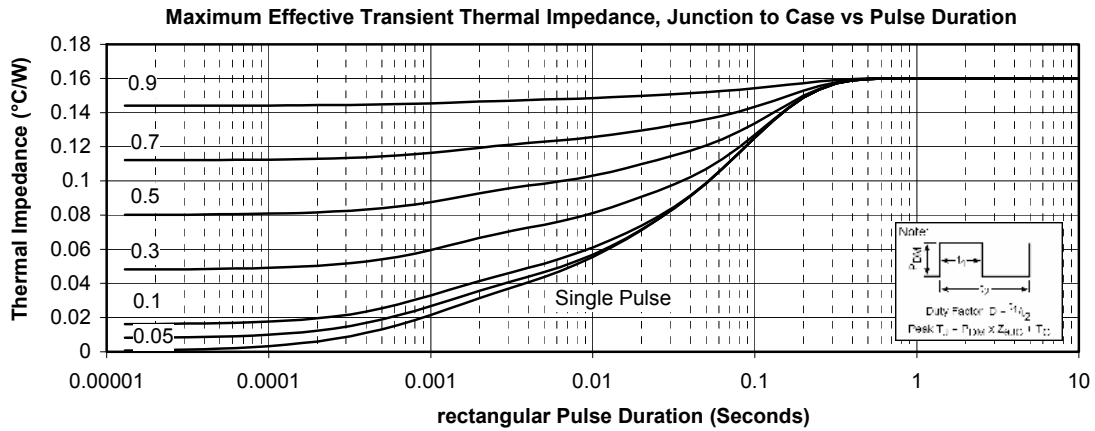
T: Thermistor temperature
 R_T: Thermistor value at T

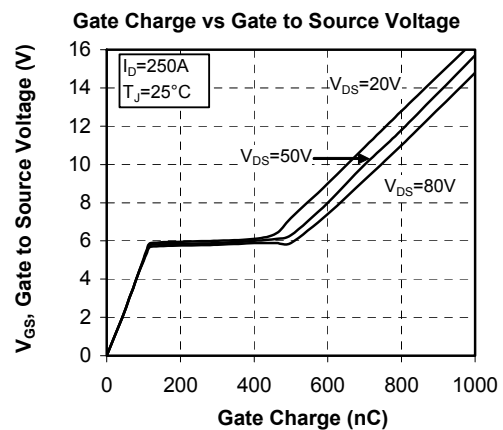
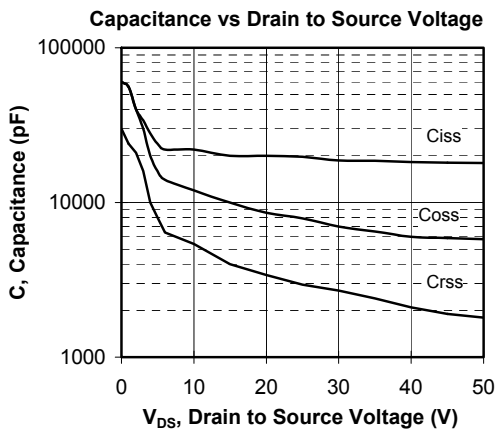
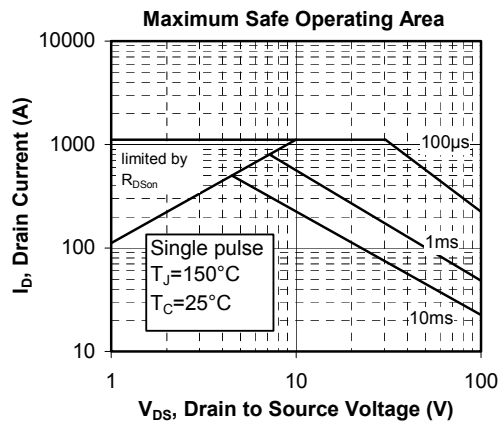
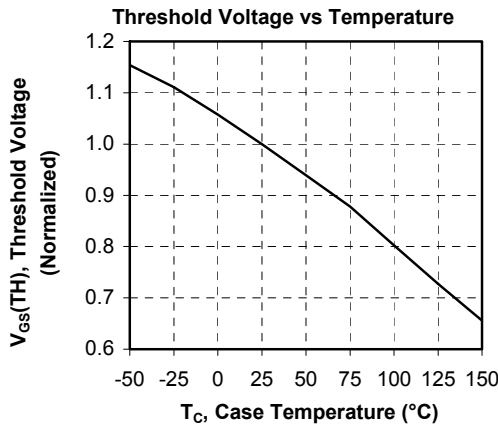
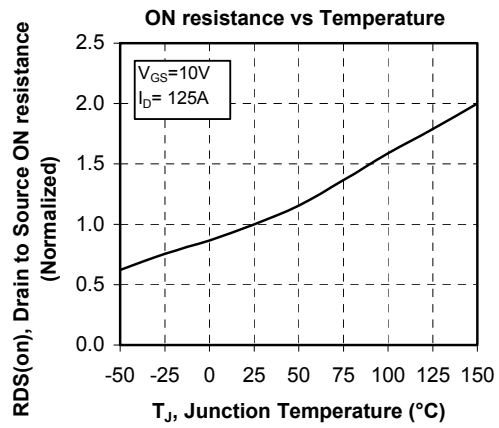
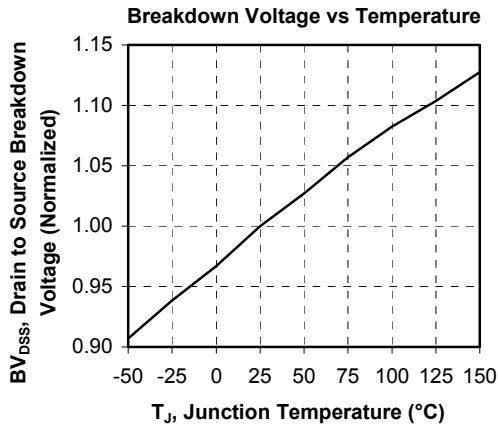
SP4 Package outline (dimensions in mm)



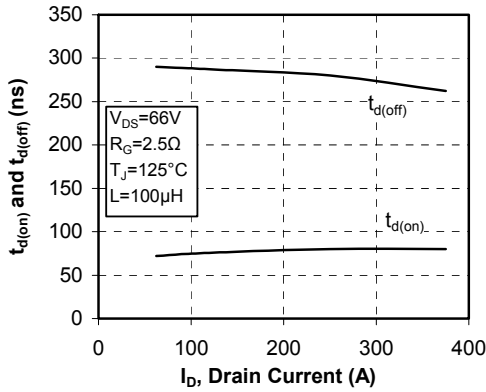
ALL DIMENSIONS MARKED "*" ARE TOLERANCED AS: ± 0.1

See application note APT0501 - Mounting Instructions for SP4 Power Modules on www.microsemi.com

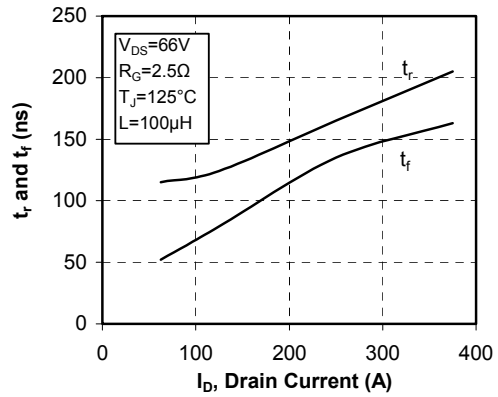
Typical Performance Curve




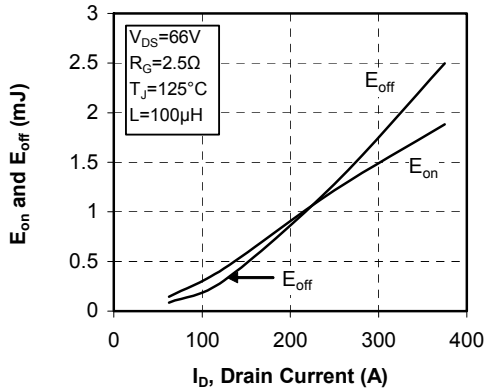
Delay Times vs Current



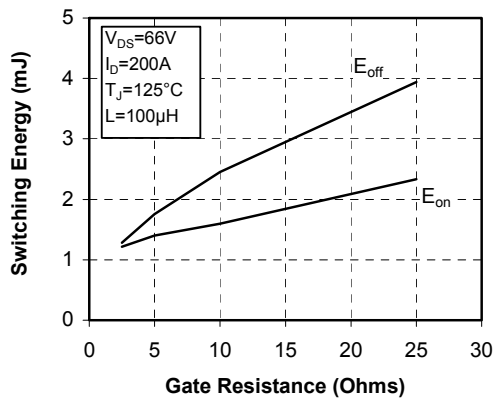
Rise and Fall times vs Current



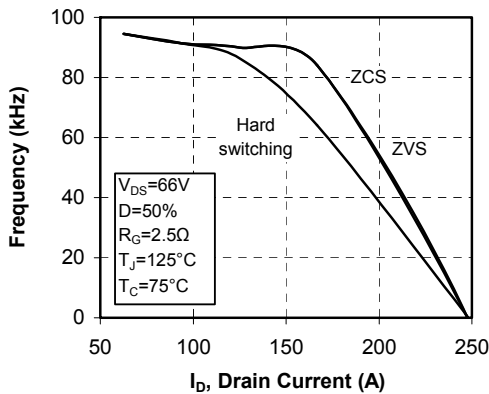
Switching Energy vs Current



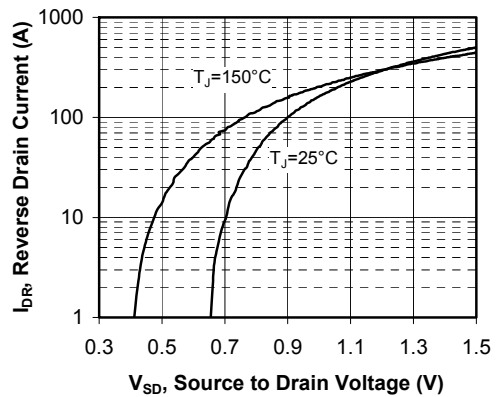
Switching Energy vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage



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