



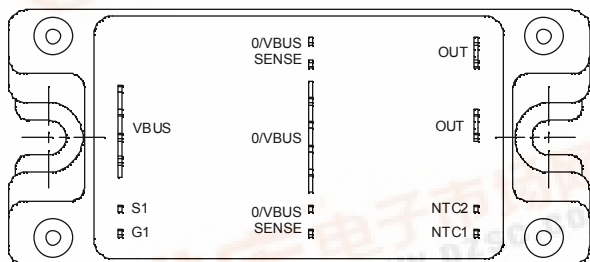
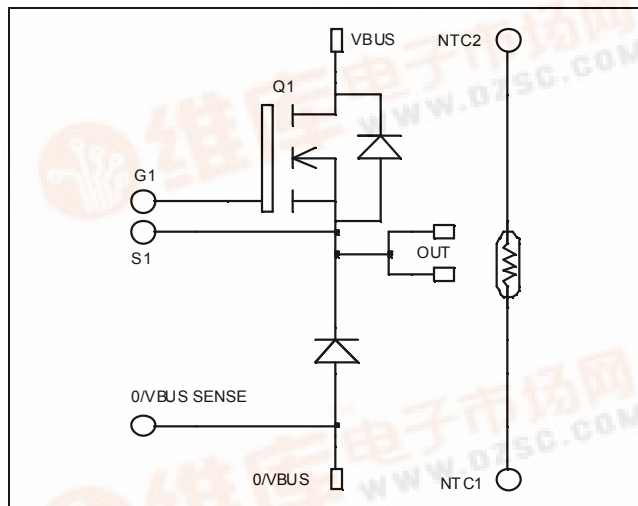
APT0502SKM10TG

Buck chopper MOSFET Power Module

$$V_{DSS} = 200V$$

$$R_{DSon} = 10m\Omega \text{ typ @ } T_j = 25^\circ C$$

$$I_D = 175A \text{ @ } T_c = 25^\circ C$$



Application

- AC and DC motor control
- Switched Mode Power Supplies

Features

- Power MOS 7[®] 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	200	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$ 175	A
		$T_c = 80^\circ C$ 131	
I_{DM}	Pulsed Drain current	700	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	12	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$ 694	W
I_{AR}	Avalanche current (repetitive and non repetitive)	89	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	2500	

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	$V_{GS} = 0V, V_{DS} = 200V$			200	μA
		$V_{GS} = 0V, V_{DS} = 160V$			1000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 87.5A$		10	12	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 5mA$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 150	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		13.7		nF
C_{oss}	Output Capacitance	$V_{DS} = 25V$		4.36		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		0.19		
Q_g	Total gate Charge	$V_{GS} = 10V$		224		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 100V$		86		
Q_{gd}	Gate – Drain Charge	$I_D = 150A$		94		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 133V$ $I_D = 150A$ $R_G = 2.5\Omega$		28		ns
T_r	Rise Time			56		
$T_{d(off)}$	Turn-off Delay Time			81		
T_f	Fall Time			99		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 133V$ $I_D = 150A, R_G = 2.5\Omega$		926		μJ
E_{off}	Turn-off Switching Energy			910		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 133V$ $I_D = 150A, R_G = 2.5\Omega$		1216		μJ
E_{off}	Turn-off Switching Energy			1062		

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	$V_R = 200V$	$T_j = 25^\circ\text{C}$		250	μA
			$T_j = 125^\circ\text{C}$		600	
I_F	DC Forward Current	$T_c = 85^\circ\text{C}$		120		A
V_F	Diode Forward Voltage	$I_F = 120A$		1.1	1.15	V
		$I_F = 240A$		1.4		
		$I_F = 120A$	$T_j = 125^\circ\text{C}$	0.9		
t_{rr}	Reverse Recovery Time	$I_F = 120A$ $V_R = 133V$ $di/dt = 400A/\mu s$	$T_j = 25^\circ\text{C}$	31		ns
			$T_j = 125^\circ\text{C}$	60		
Q_{rr}	Reverse Recovery Charge	$I_F = 120A$ $V_R = 133V$ $di/dt = 400A/\mu s$	$T_j = 25^\circ\text{C}$	120		nC
			$T_j = 125^\circ\text{C}$	500		

Thermal and package characteristics

Symbol	Characteristic			Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance			Transistor		0.18	°C/W
				Diode		0.46	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz			2500			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

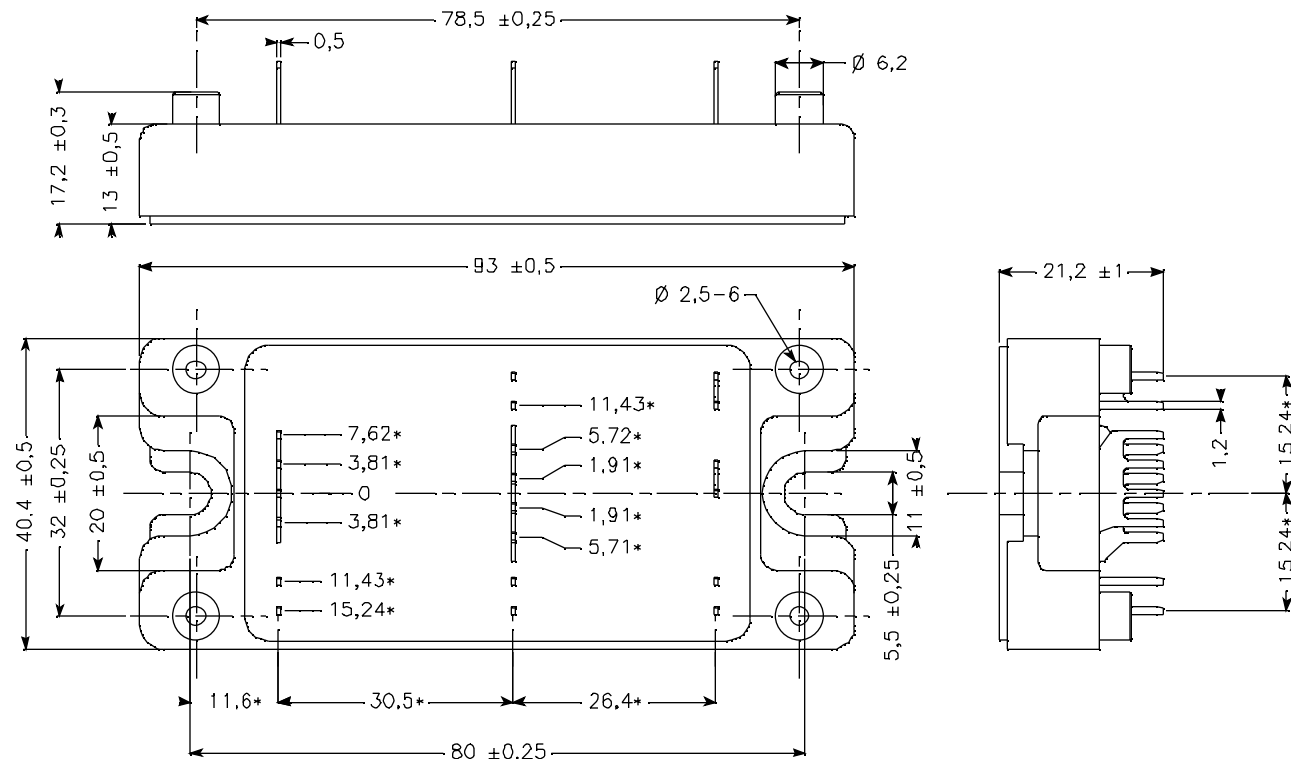
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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

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

T: Thermistor temperature
R_T: Thermistor value at T

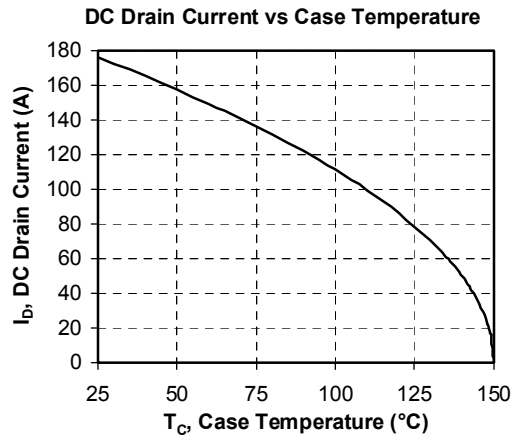
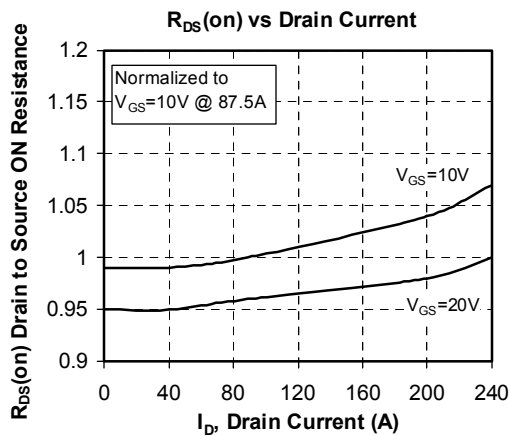
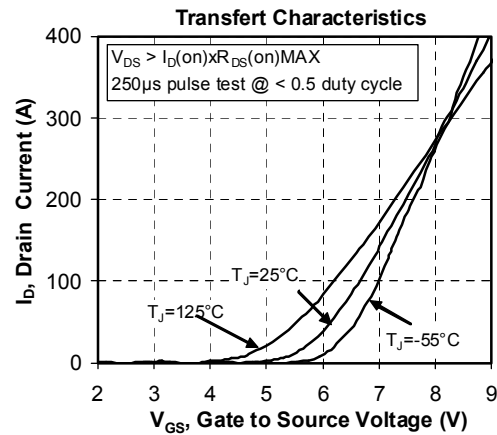
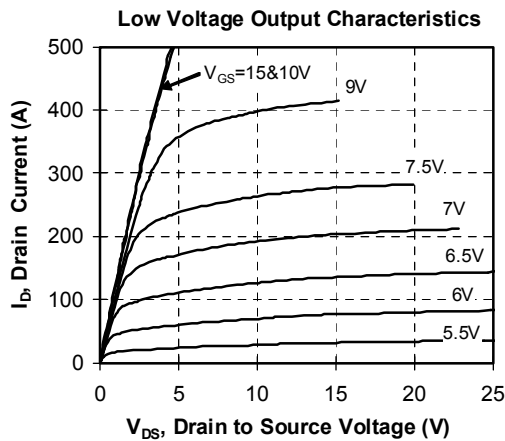
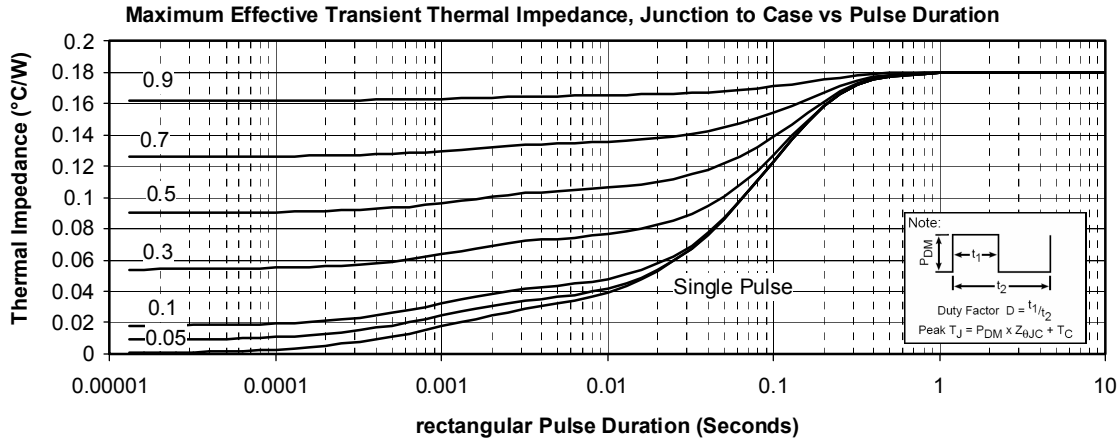
SP4 Package outline (dimensions in mm)

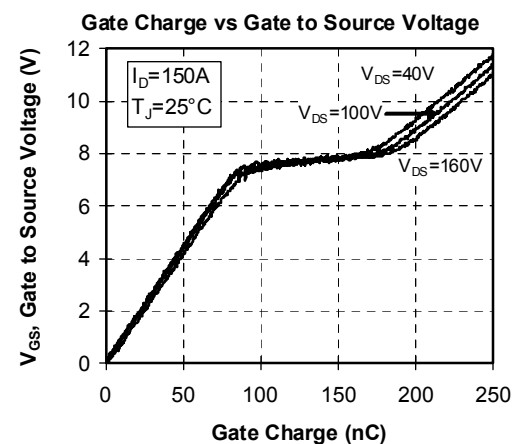
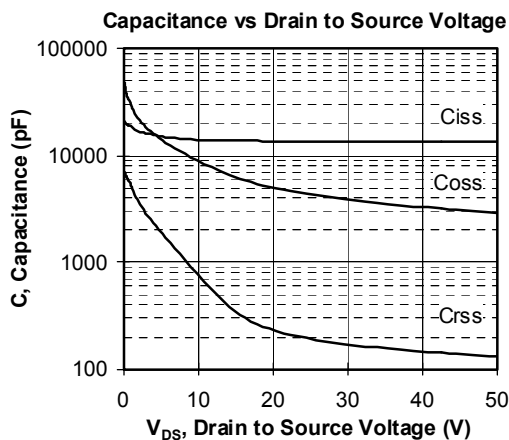
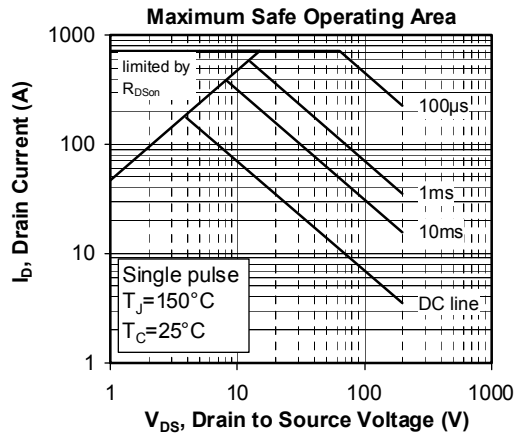
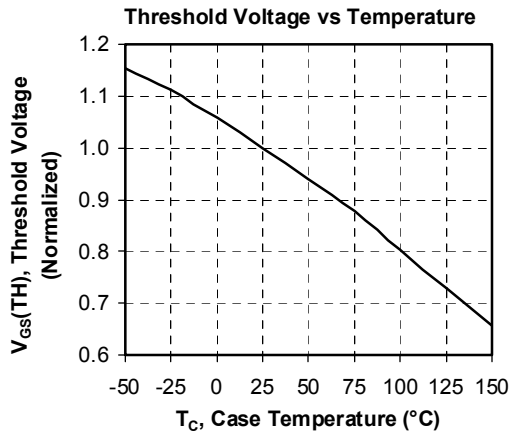
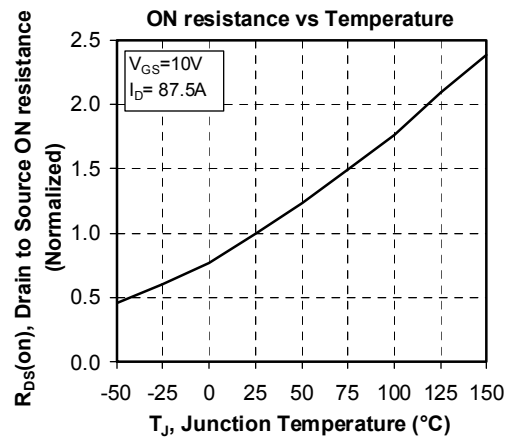
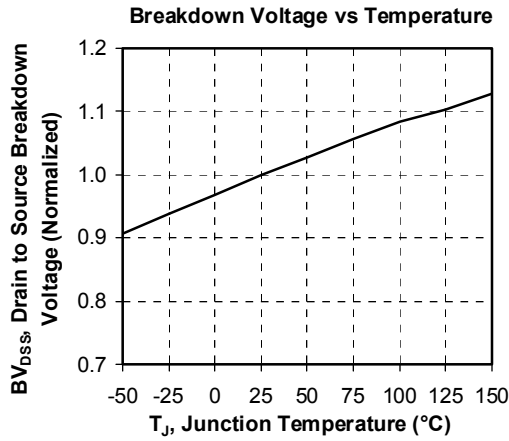


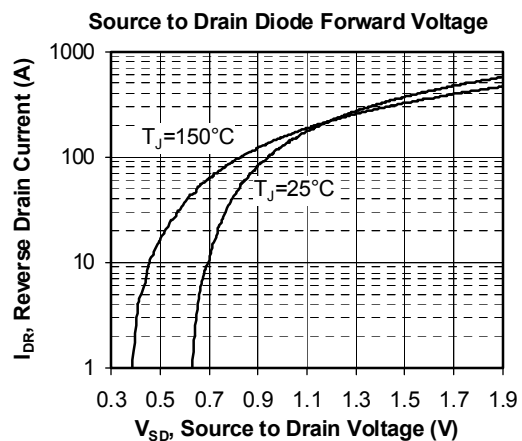
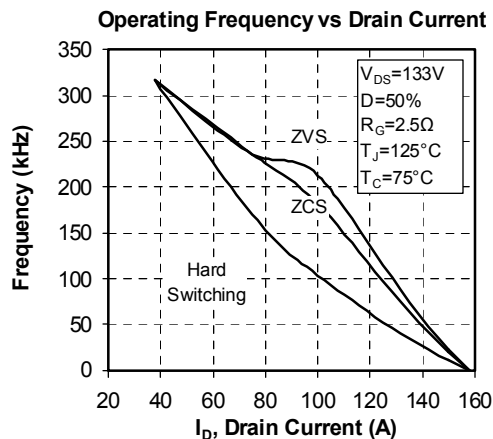
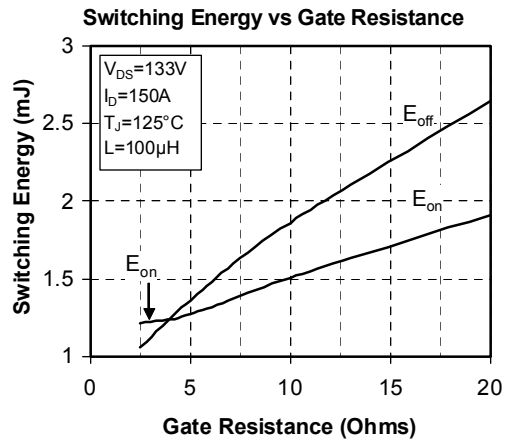
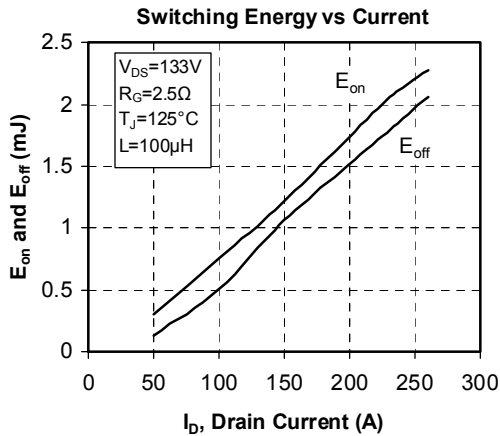
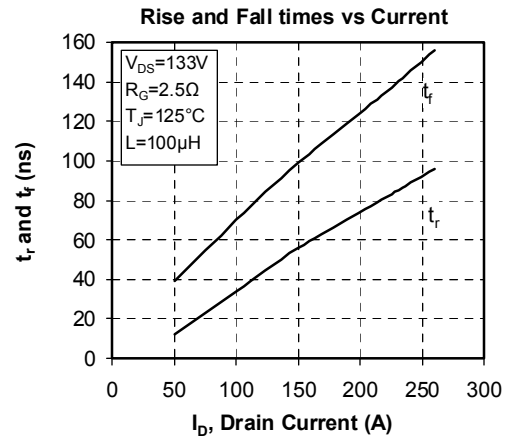
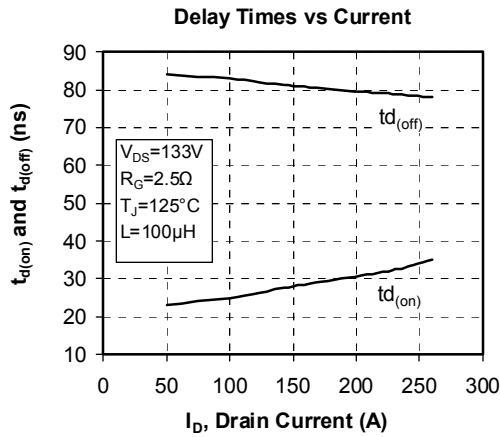
ALL DIMENSIONS MARKED "*" ARE TOLERENCED AS: $\pm 0,1$

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

Typical Performance Curve







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