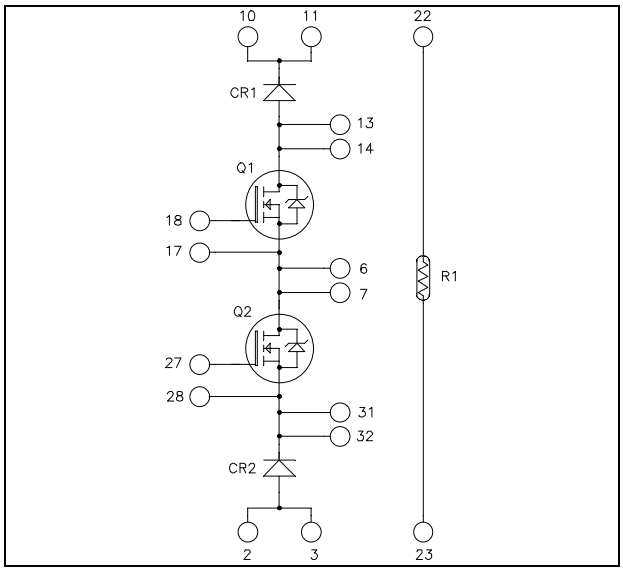
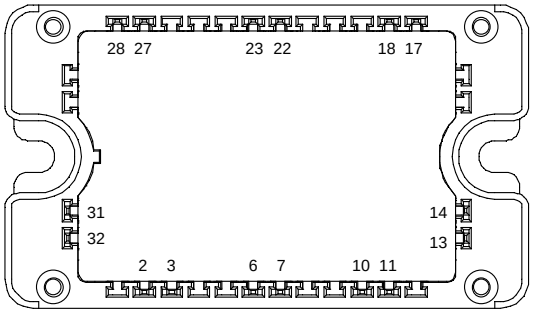
APT5M65BBM19T3G

Boost buck chopper MOSFET Power Module

V_{DSS} = 650V
R_{DSon} = 19mΩ max @ Tj = 25°C
I_D = 104A @ Tc = 25°C





All multiple inputs and outputs must be shorted together
Example: 10/11 ; 13/14 ; 6/7 …

Application

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

Features

- MDmesh™ V power MOSFETs
  - High V_{DSS} rating
  - Higher dv/dt capability
  - Excellent switching performance
  - Avalanche energy rated
- Kelvin source for easy drive
- Very low stray inductance
- 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 (per MOSFET)

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{DSS}	Drain - Source Breakdown Voltage		650	V
I_D	Continuous Drain Current	T_c = 25°C	104	A
		T_c = 80°C	78	
I_{DM}	Pulsed Drain current		400	
V_{GS}	Gate - Source Voltage		±25	V
R_{DSon}	Drain - Source ON Resistance		19	mΩ
P_D	Maximum Power Dissipation	T_c = 25°C	460	W
I_{AR}	Avalanche current (repetitive and non repetitive)		15	A
E_{AS}	Single Pulse Avalanche Energy		2000	mJ

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°C unless otherwise specified

Electrical Characteristics (per MOSFET)

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS} = 0V, V_{DS} = 650V	T_j = 25°C			100	µA
			T_j = 125°C			500	
$R_{DS(on)}$	Drain – Source on Resistance	V_{GS} = 10V, I_D = 40A			15	19	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 500µA		3	4	5	V
I_{GSS}	Gate – Source Leakage Current	V_{GS} = ±25 V, V_{DS} = 0V				200	nA

Dynamic Characteristics (per MOSFET)

Symbol	*Characteristic*	*Test Conditions*	*Min*	*Typ*	*Max*	*Unit*
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1MHz		19600		pF
C_{oss}	Output Capacitance			400		
C_{rss}	Reverse Transfer Capacitance			12		
Q_g	Total gate Charge	V_{GS} = 10V V_{Bus} = 520V I_D = 80A		400		nC
Q_{gs}	Gate – Source Charge			120		
Q_{gd}	Gate – Drain Charge			140		
$T_{d(on)}$	Turn-on Delay Time	**Inductive switching @ 25°C** V_{GS} = 10V V_{Bus} = 400V I_D = 80A R_G = 2.5Ω		35		ns
T_r	Rise Time			90		
$T_{d(off)}$	Turn-off Delay Time			130		
T_f	Fall Time			40		
E_{on}	Turn on Energy			1.3		mJ
E_{off}	Turn off Energy			0.6		

Chopper diode ratings and characteristics (per diode)

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=600V	T_j = 25°C			500	µA
			T_j = 125°C			1000	
I_F	DC Forward Current		Tc = 80°C		120		A
V_F	Diode Forward Voltage	I_F = 120A	T_j = 25°C		1.6	1.8	V
		I_F = 240A			1.9		
		I_F = 120A	T_j = 125°C		1.4		
t_{rr}	Reverse Recovery Time	I_F = 120A V_R = 400V di/dt =400A/µs	T_j = 25°C		130		ns
			T_j = 125°C		170		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		440		nC
			T_j = 125°C		1840		

Thermal and package characteristics

Symbol	Characteristic			Min	Typ	Max	Unit
R_{thJC}	Junction to Case Thermal Resistance	Per MOSFET				0.27	°C/W
		Per Diode				0.46	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 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	M4	2.5		4.7	N.m
Wt	Package Weight					110	g

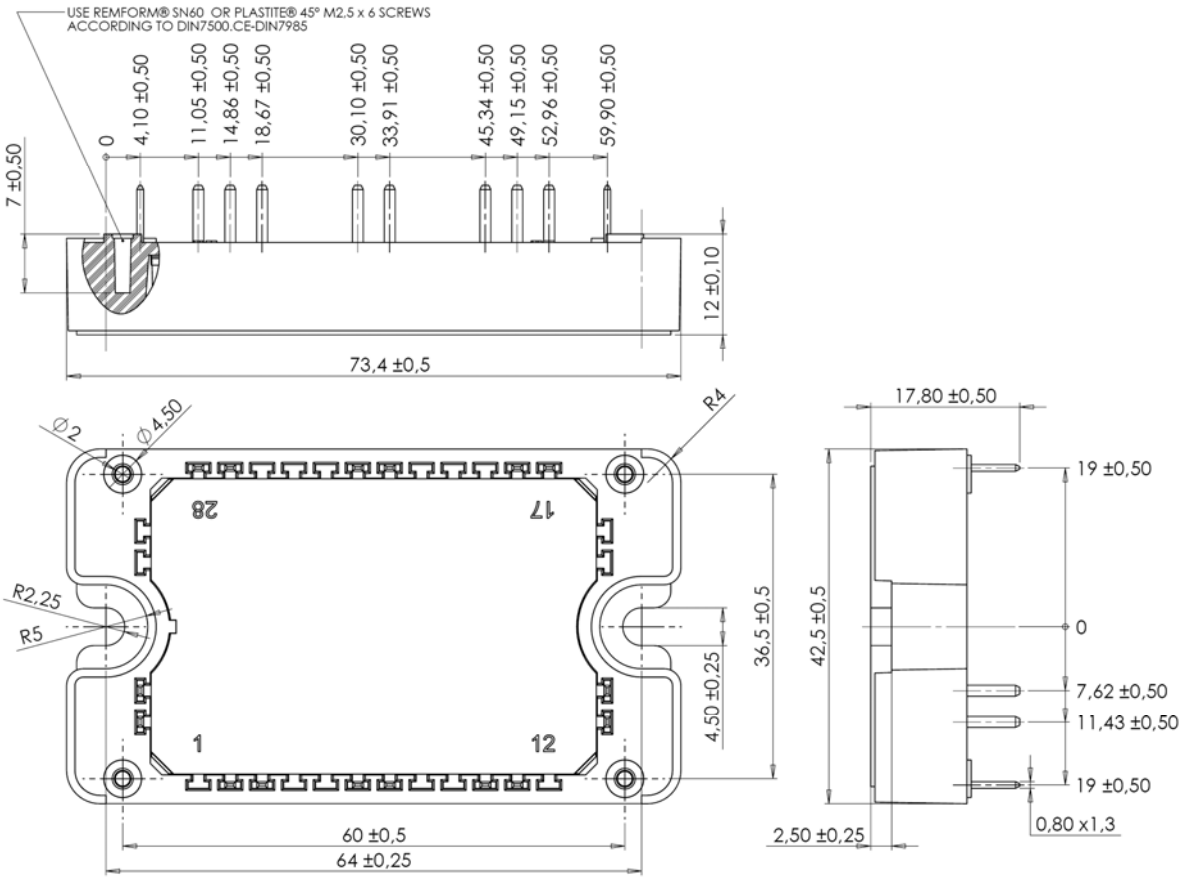
Temperature sensor NTC

Symbol	Characteristic	Min	Typ	Max	Unit
R_{25}	Resistance @ 25°C		22		kΩ
$\Delta R_{25}/R_{25}$	Resistance tolerance			5	%
$\Delta B/B$	Beta tolerance			3	
$B_{25/100}$	T_{25} = 298.16 K		3980		K

$$R_T = \frac{R_{25}}{\exp\left[B_{25/100}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

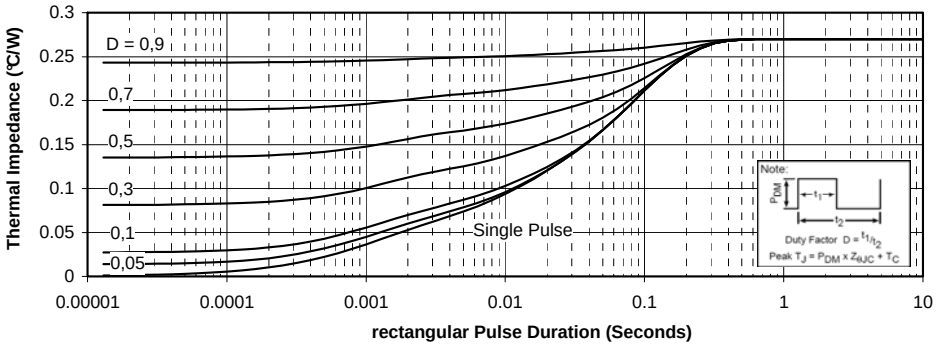
T: Thermistor temperature
R_T: Thermistor value at T

SP3F Package outline (dimensions in mm)

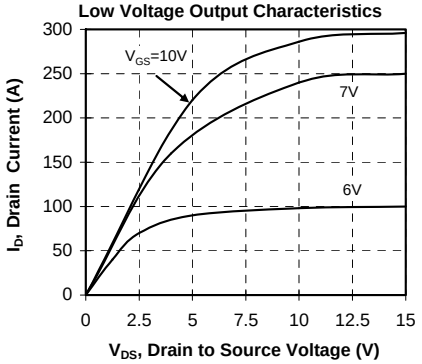


Typical MOSFET performance curves

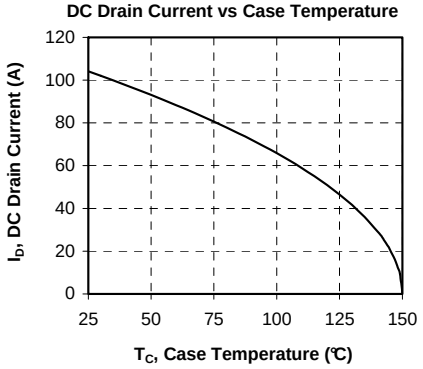
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



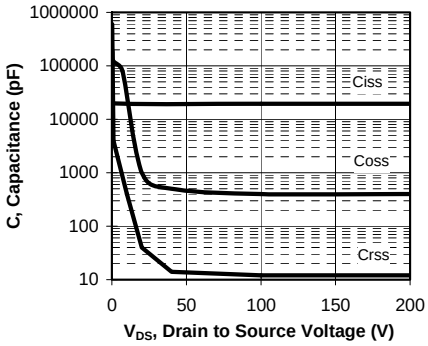
Low Voltage Output Characteristics



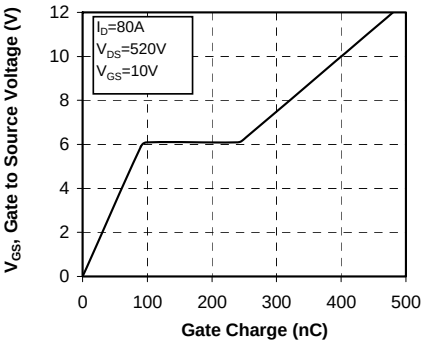
DC Drain Current vs Case Temperature



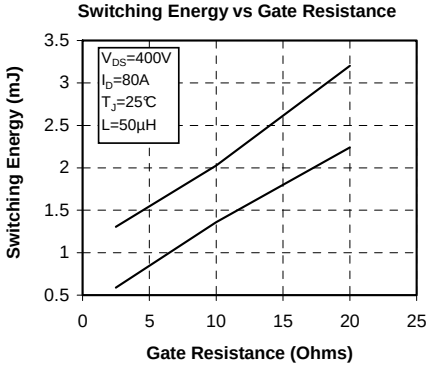
Capacitance vs Drain to Source Voltage



Gate Charge vs Gate to Source Voltage



Switching Energy vs Gate Resistance



Typical diode performance curves