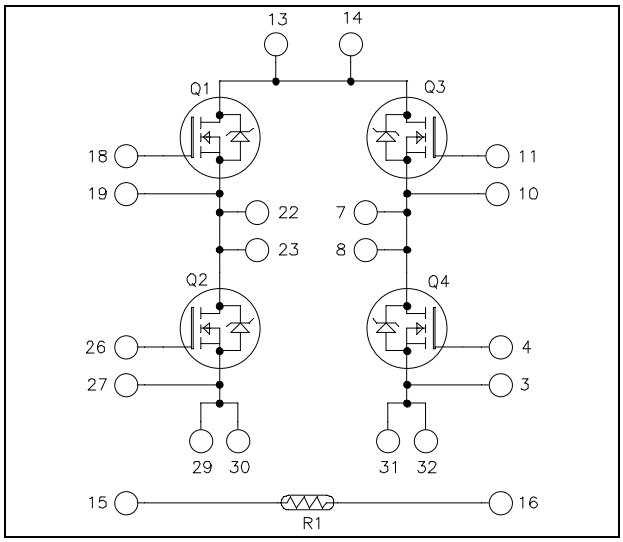
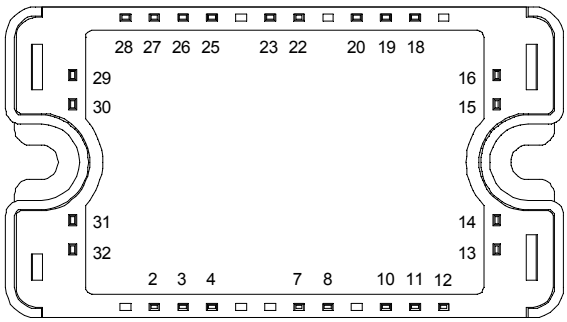
APTM100H46FT3G

Full bridge MOSFET Power Module

V_{DSS} = 1000V
R_{DSon} = 460mΩ typ @ Tj = 25°C
I_D = 19A @ Tc = 25°C





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

Application

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

Features

- Power MOS 8™ Fast FREDFETs
  - Low R_{DSon}
  - Low input and Miller capacitance
  - Low gate charge
  - Fast intrinsic reverse diode
  - Avalanche energy rated
  - Very rugged
- Very low stray inductance
  - Symmetrical design
- Kelvin source for easy drive
- 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
- Each leg can be easily paralleled to achieve a phase leg of twice the current capability
- RoHS Compliant

Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{DSS}	Drain - Source Breakdown Voltage		1000	V
I_D	Continuous Drain Current	T_c = 25°C	19	A
		T_c = 80°C	14	
I_{DM}	Pulsed Drain current		120	
V_{GS}	Gate - Source Voltage		±30	V
R_{DSon}	Drain - Source ON Resistance		552	mΩ
P_D	Maximum Power Dissipation	T_c = 25°C	357	W
I_{AR}	Avalanche current (repetitive and non repetitive)		16	A

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

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 1000V V_{GS} = 0V	T_j = 25°C			250	µA
			T_j = 125°C			1000	
$R_{DS(on)}$	Drain – Source on Resistance	V_{GS} = 10V, I_D = 16A			460	552	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 2.5mA		3	4	5	V
I_{GSS}	Gate – Source Leakage Current	V_{GS} = ±30 V				±100	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1MHz		6800		pF
C_{oss}	Output Capacitance			715		
C_{rss}	Reverse Transfer Capacitance			92		
Q_g	Total gate Charge	V_{GS} = 10V V_{Bus} = 500V I_D = 16A		260		nC
Q_{gs}	Gate – Source Charge			46		
Q_{gd}	Gate – Drain Charge			125		
$T_{d(on)}$	Turn-on Delay Time	**Resistive switching @ 25°C** V_{GS} = 15V V_{Bus} = 667V I_D = 16A R_G = 2.2Ω		36		ns
T_r	Rise Time			37		
$T_{d(off)}$	Turn-off Delay Time			140		
T_f	Fall Time			35		

Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_S	Continuous Source current (Body diode)		Tc = 25°C			19	A
			Tc = 80°C			14	
V_{SD}	Diode Forward Voltage	V_{GS} = 0V, I_S = - 16A				1	V
dv/dt	Peak Diode Recovery ❶					25	V/ns
t_{rr}	Reverse Recovery Time	I_S = - 16A V_R = 100V di_S/dt = 100A/µs	T_j = 25°C			290	ns
			T_j = 125°C			600	
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		1.3		µC
			T_j = 125°C		3.5		

❶ dv/dt numbers reflect the limitations of the circuit rather than the device itself.
I_S ≤ - 16A di/dt ≤ 1000A/µs V_{DD} ≤ 667V T_j ≤ 125°C

Thermal and package characteristics

Symbol	Characteristic			Min	Typ	Max	Unit
R_{thJC}	Junction to Case Thermal Resistance					0.35	°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_{STG}	Storage Temperature Range			-40		125	
T_C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M4	2		3	N.m
Wt	Package Weight					110	g

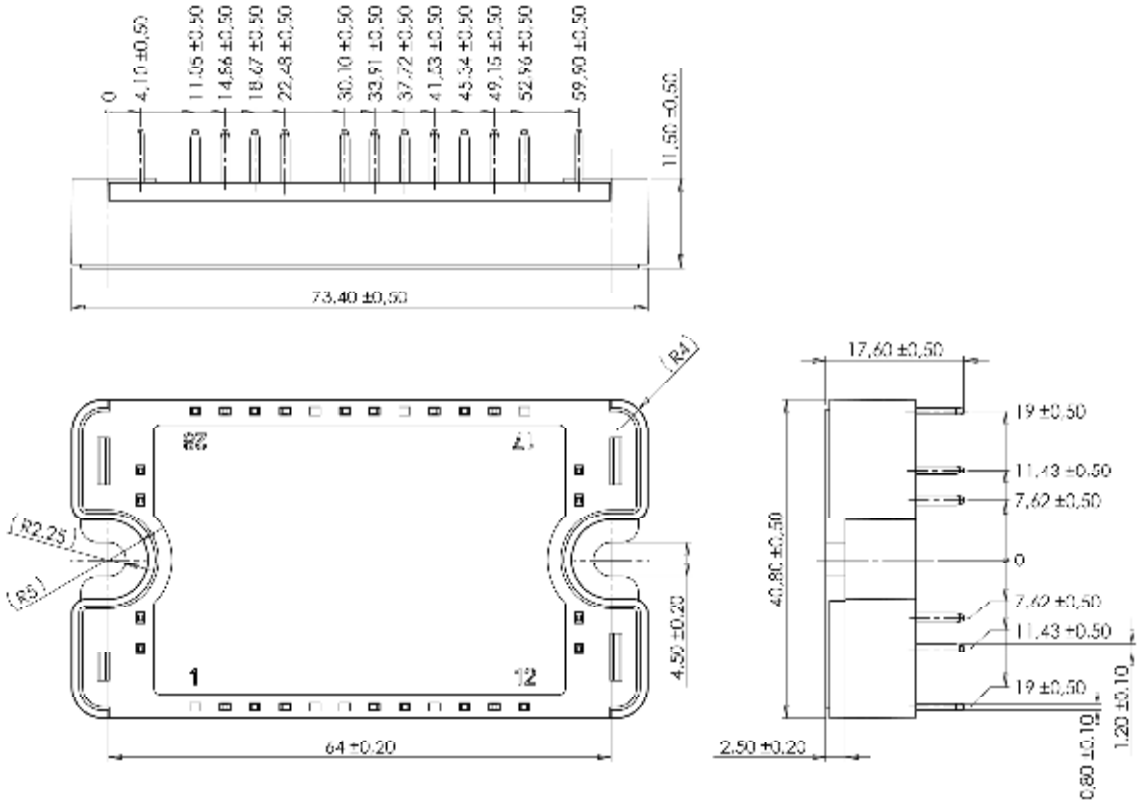
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic		Min	Typ	Max	Unit
R_{25}	Resistance @ 25°C			50		kΩ
$\Delta R_{25}/R_{25}$				5		%
$B_{25/85}$	T_{25} = 298.15 K			3952		K
$\Delta B/B$		T_C=100°C		4		%

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

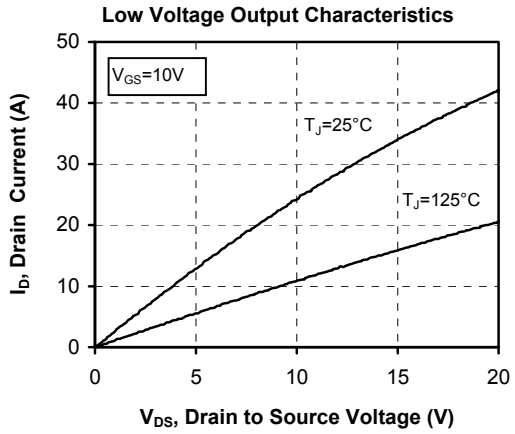
T: Thermistor temperature
R_T: Thermistor value at T

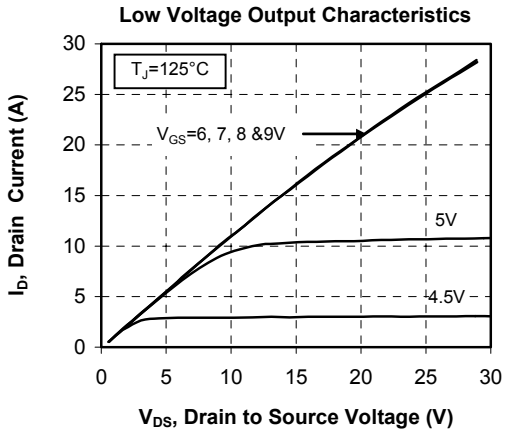
SP3 Package outline (dimensions in mm)

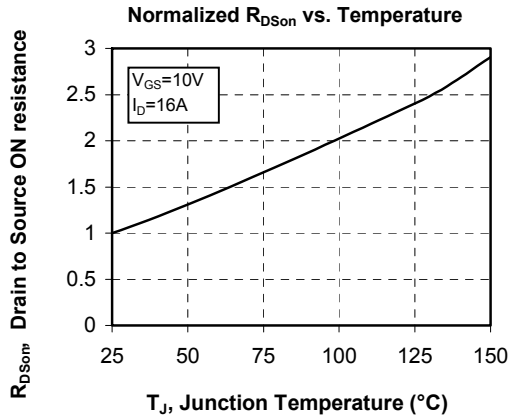


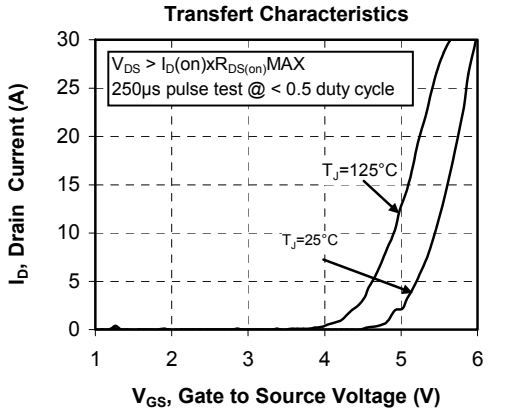
See application note 1901 - Mounting Instructions for SP3 Power Modules on www.microsemi.com

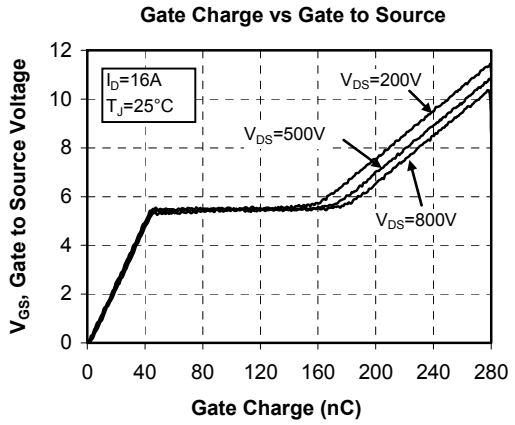
Typical Performance Curve

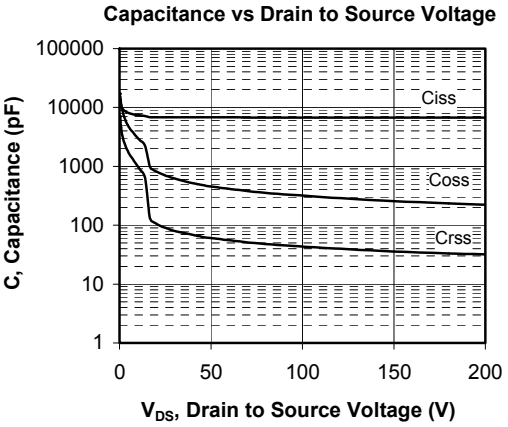


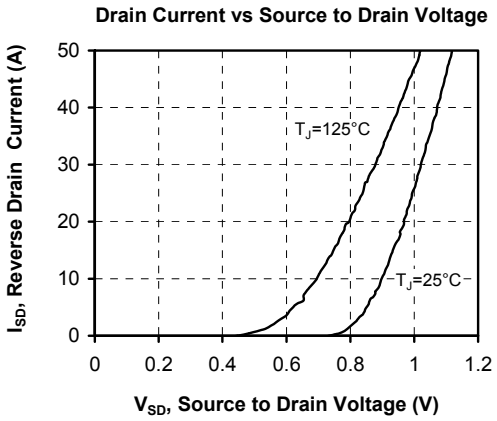


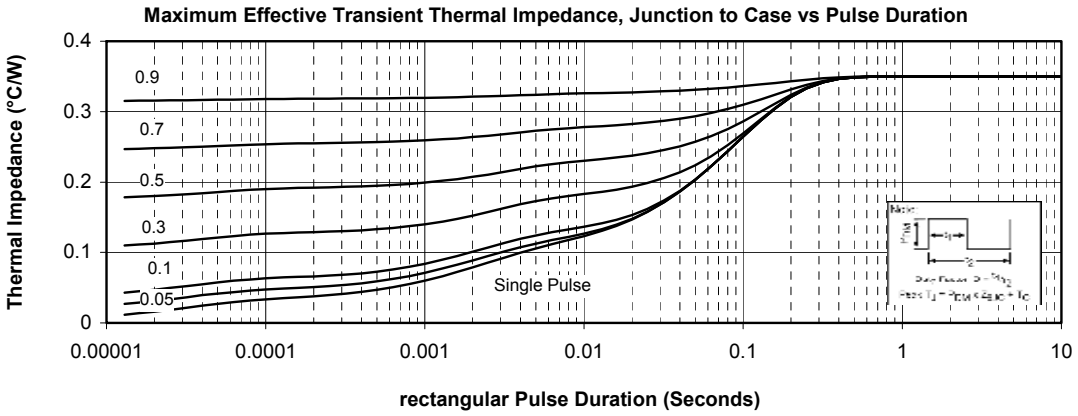









Drain Current vs Source to Drain Voltage
I_{SD}, Reverse Drain Current (A)
50
40
30
20
10
0
T_J=125°C
T_J=25°C
0
0.2
0.4
0.6
0.8
1
1.2
V_{SD}, Source to Drain Voltage (V)


Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration
Thermal Impedance (°C/W)
0.4
0.3
0.2
0.1
0
0.9
0.7
0.5
0.3
0.1
0.05
Single Pulse
0.00001
0.0001
0.001
0.01
0.1
1
10
rectangular Pulse Duration (Seconds)

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