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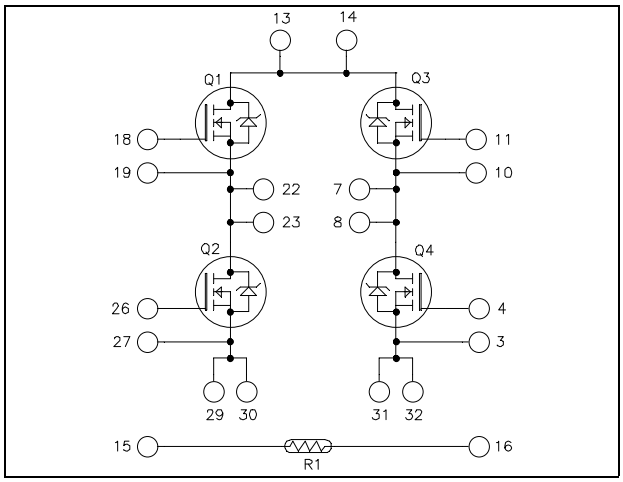
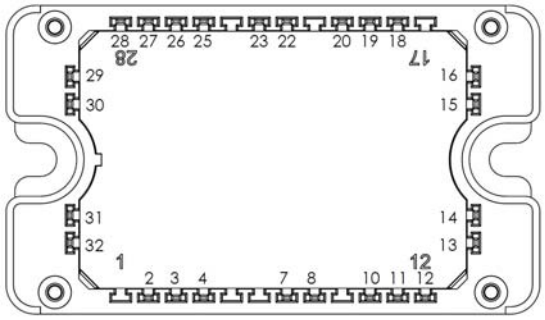
APTC90HM60T3G

Full - Bridge
Super Junction MOSFET
Power Module

V_{DSS} = 900V
R_{DSon} = 60mΩ max @ Tj = 25°C
I_D = 59A @ 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

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 phase leg of twice the current capability
- RoHS Compliant

All ratings @ T_j = 25°C unless otherwise specified

Absolute maximum ratings (per super junction MOSFET)

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{DSS}	Drain - Source Voltage		900	V
I_D	Continuous Drain Current	T_c = 25°C	59	A
		T_c = 80°C	44	
I_{DM}	Pulsed Drain current		150	
V_{GS}	Gate - Source Voltage		±20	V
R_{DSon}	Drain - Source ON Resistance		60	mΩ
P_D	Power Dissipation	T_c = 25°C	462	W
I_{AR}	Avalanche current (repetitive and non repetitive)		8.8	A
E_{AR}	Repetitive Avalanche Energy		2.9	mJ
E_{AS}	Single Pulse Avalanche Energy		1940	

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} = 900V			200	µA
$R_{DS(on)}$	Drain – Source on Resistance	V_{GS} = 10V, I_D = 52A		50	60	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 6mA	2.5	3	3.5	V
I_{GSS}	Gate – Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0V			200	nA

Dynamic Characteristics (per super junction MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{GS} = 0V ; V_{DS} = 100V f = 1MHz		13.6		nF
C_{oss}	Output Capacitance			0.66		
Q_g	Total gate Charge	V_{GS} = 10V V_{Bus} = 400V I_D = 52A		540		nC
Q_{gs}	Gate – Source Charge			64		
Q_{gd}	Gate – Drain Charge			230		
$T_{d(on)}$	Turn-on Delay Time	**Inductive Switching (125°C)** V_{GS} = 10V V_{Bus} = 600V I_D = 52A R_G = 3.8Ω		70		ns
T_r	Rise Time			20		
$T_{d(off)}$	Turn-off Delay Time			400		
T_f	Fall Time			25		
E_{on}	Turn-on Switching Energy	**Inductive switching @ 25°C** V_{GS} = 10V ; V_{Bus} = 600V I_D = 52A ; R_G = 3.8Ω		3		mJ
E_{off}	Turn-off Switching Energy			1.5		
E_{on}	Turn-on Switching Energy	**Inductive switching @ 125°C** V_{GS} = 10V ; V_{Bus} = 600V I_D = 52A ; R_G = 3.8Ω		4.2		mJ
E_{off}	Turn-off Switching Energy			1.7		
R_{thJC}	Junction to Case Thermal Resistance				0.27	°C/W

Source - Drain diode ratings and characteristics (per super junction MOSFET)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_S	Continuous Source current (Body diode)		Tc = 25°C			59	A
			Tc = 80°C			44	
V_{SD}	Diode Forward Voltage	V_{GS} = 0V, I_S = - 52A			0.8	1.2	V
t_{rr}	Reverse Recovery Time	I_S = - 52A V_R = 400V di_S/dt = 200A/µs	T_j = 25°C		920		ns
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		60		µC

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	$T_J$max -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

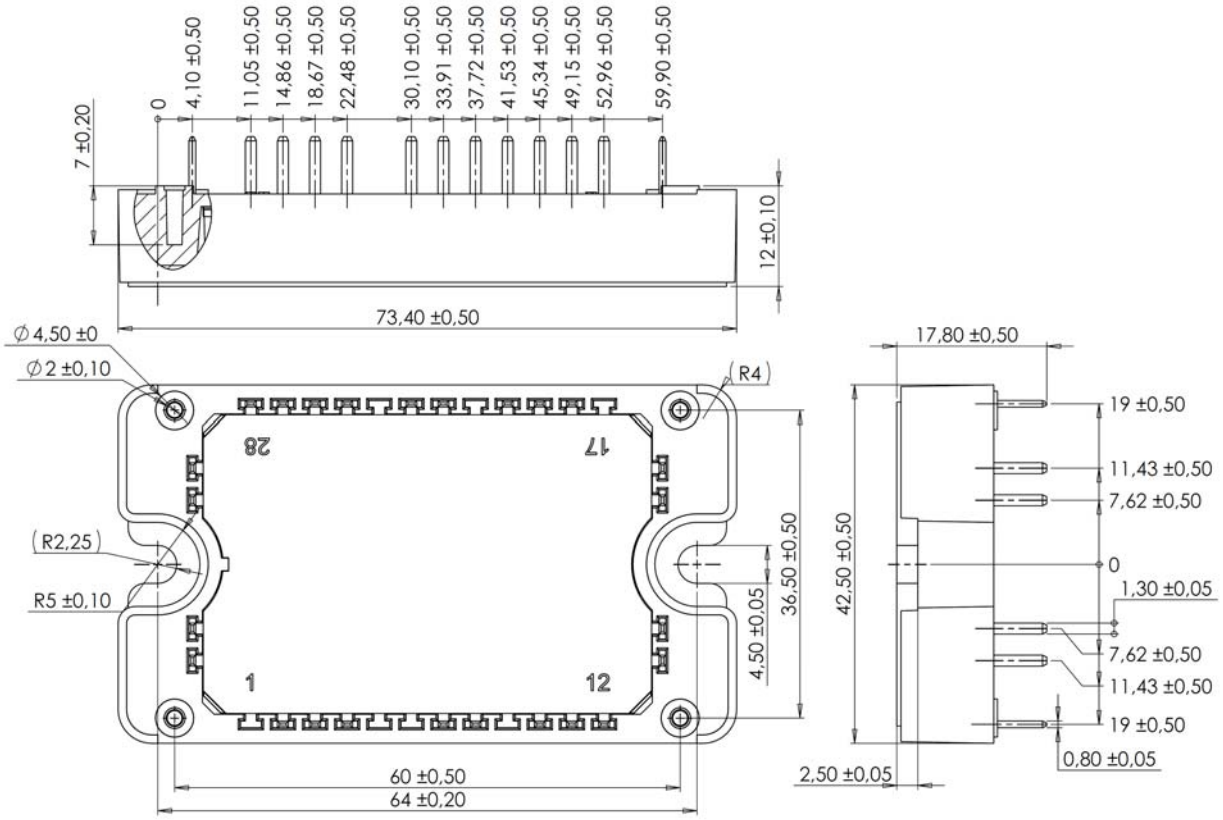
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

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

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

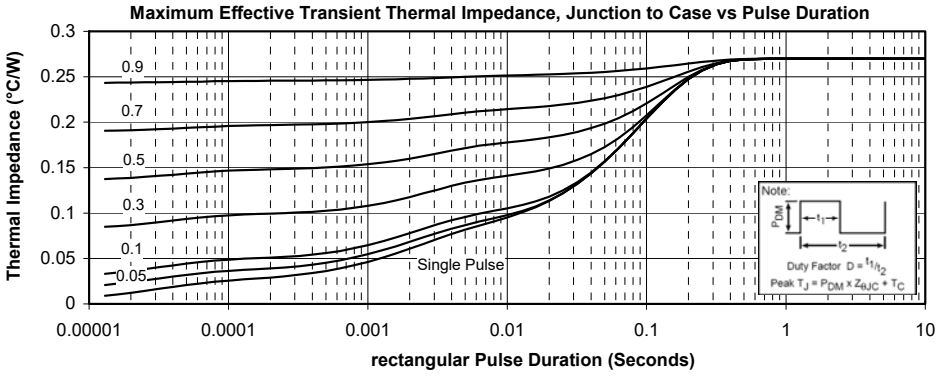
T: Thermistor temperature
R_T: Thermistor value at T

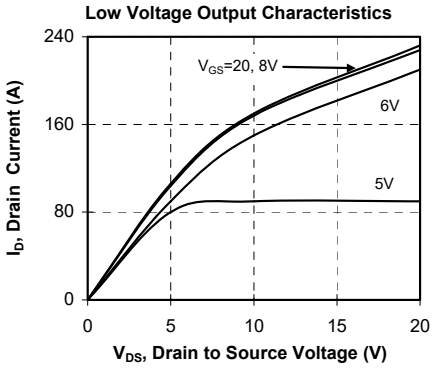
Package outline (dimensions in mm)

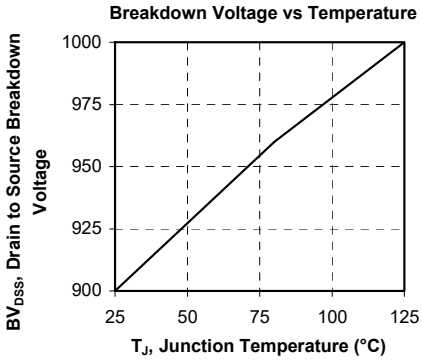


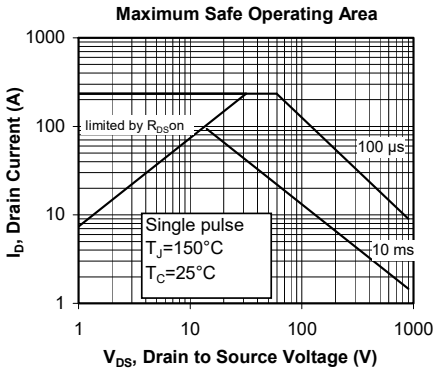
See application note 1906 - Mounting Instructions for SP3F Power Modules on www.microsemi.com

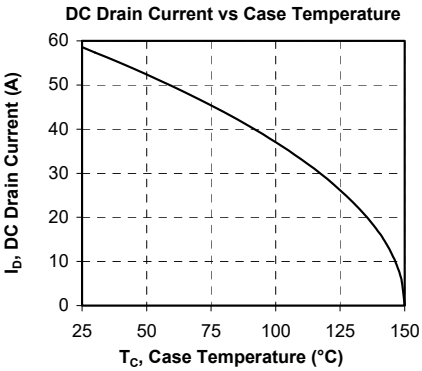
Typical Performance Curve

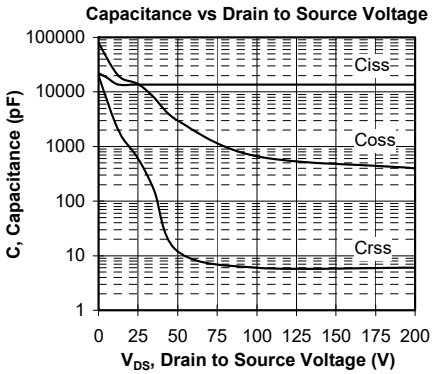


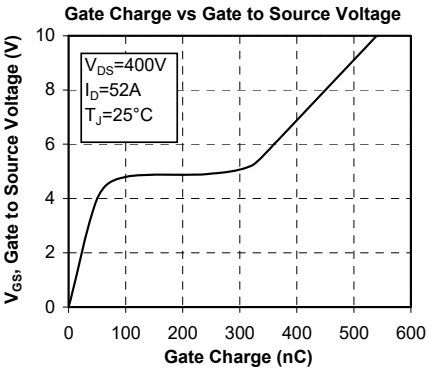




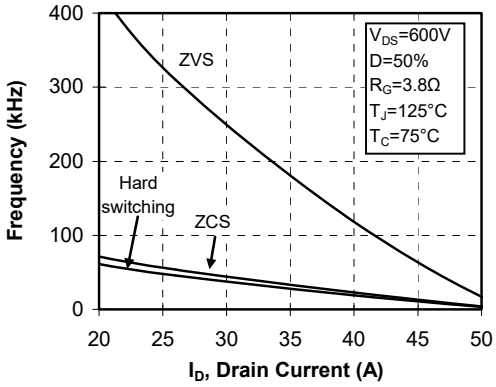




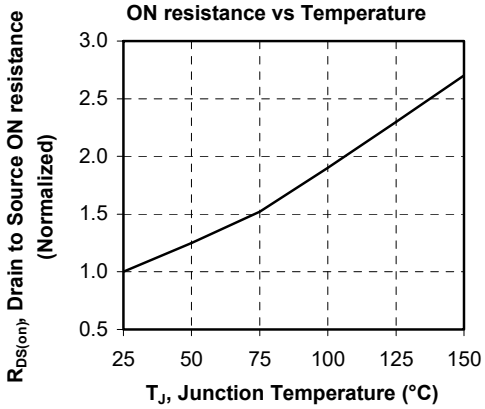




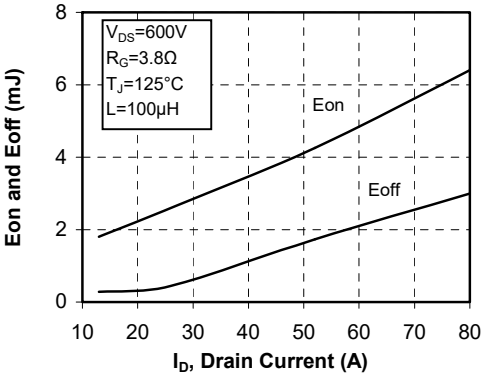
Operating Frequency vs Drain Current



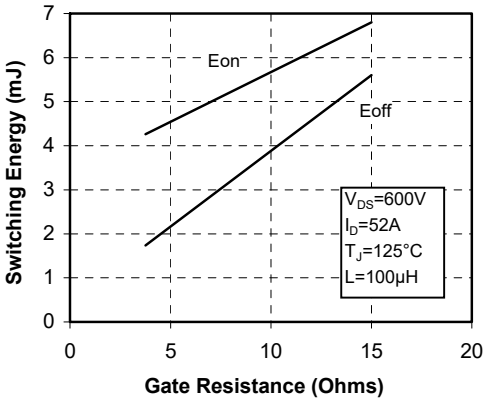
ON resistance vs Temperature



Switching Energy vs Current



Switching Energy vs Gate Resistance



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