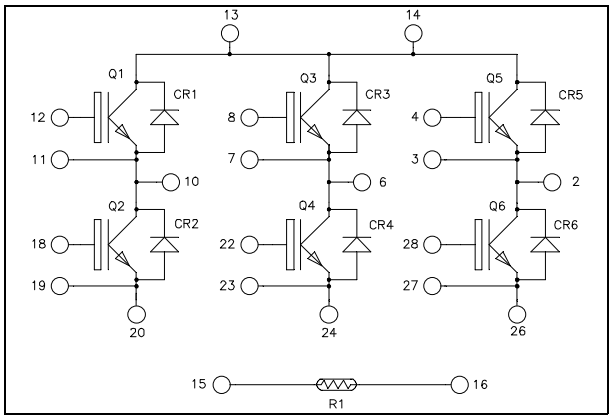
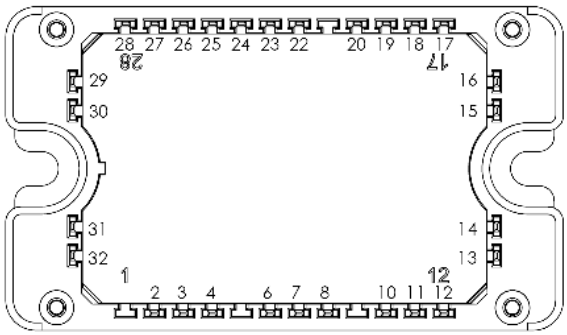
APTGTQ50TA65T3G

Triple phase leg
High speed IGBT 5 Power Module

V_{CES} = 650V ; I_C = 50A @ Tc = 25°C





Pins 20, 24 & 26 must be shorted together to perform a 3 phase bridge.

Application

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

Features

- High speed IGBT 5
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 100 kHz
  - Low leakage current
- Very low stray inductance
- Kelvin source for easy drive
- 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
- RoHS Compliant

All ratings @ T_j = 25°C unless otherwise specified

Absolute maximum ratings (Per IGBT)

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{CES}	Collector - Emitter Voltage		650	V
I_C	Continuous Collector Current	T_C = 25°C	50	A
		T_C = 80°C	30	
I_{CM}	Pulsed Collector Current	T_C = 25°C	100	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Power Dissipation		125	W

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handing Procedures Should Be Followed.

Electrical Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	V_{GE} = 0V, V_{CE} = 650V				50	µA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	V_{GE} =15V I_C = 50A	T_j = 25°C		1.65	2.2	V
			T_j = 150°C		1.9		
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE} , I_C = 0.5mA		3.3	4.0	4.7	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = 20V, V_{CE} = 0V				120	nA

Dynamic Characteristics (per IGBT)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
C_{ies}	Input Capacitance	V_{GE} = 0V V_{CE} = 25V f = 1MHz			3000		pF
C_{oes}	Output Capacitance				50		
C_{res}	Reverse Transfer Capacitance				11		
Q_G	Gate charge	V_{GE} = 15V, I_C = 50A V_{CE} = 520V			120		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) V_{GE} = 15V V_{Bus} = 400V I_C = 25A R_G = 12Ω			21		ns
T_r	Rise Time				15		
$T_{d(off)}$	Turn-off Delay Time				180		
T_f	Fall Time				18		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) V_{GE} = 15V V_{Bus} = 400V I_C = 25A R_G = 12Ω			20		ns
T_r	Rise Time				15		
$T_{d(off)}$	Turn-off Delay Time				205		
T_f	Fall Time				26		
E_{on}	Turn on Energy	V_{GE} = 15V V_{Bus} = 400V I_C = 25A R_G = 12Ω	T_j = 150°C		0.75		mJ
E_{off}	Turn off Energy		T_j = 150°C		0.3		
R_{thJC}	Junction to Case Thermal Resistance					1.2	°C/W

Diode ratings and characteristics (per diode)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage					650	V
I_{RM}	Reverse Leakage Current	V_R=650V				50	µA
I_F	DC Forward Current		Tc = 25°C		50		A
V_F	Diode Forward Voltage	I_F = 50A V_{GE} = 0V	T_j = 25°C		1.6	2.2	V
			T_j = 150°C		1.65		
t_{rr}	Reverse Recovery Time	I_F = 25A V_R = 400V di/dt =1500A/µs	T_j = 25°C		46		ns
			T_j = 150°C		62		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		0.5		µC
			T_j = 150°C		1		
R_{thJC}	Junction to Case Thermal Resistance					1.4	°C/W

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

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
ΔB/B		T_C=100°C		4		%

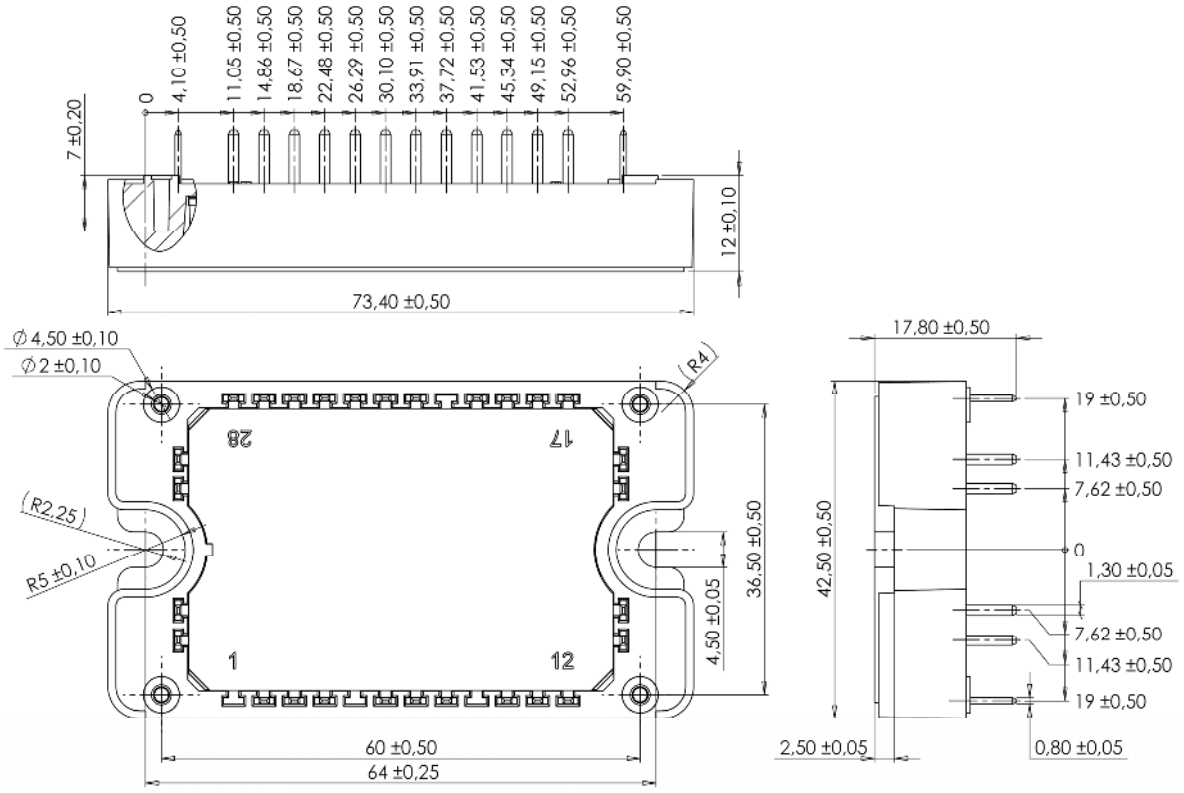
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
R_T: Thermistor value at T

Package 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	175	°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

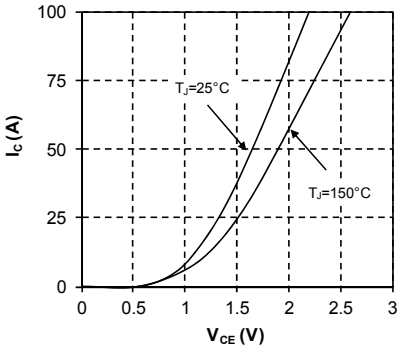
Package outline (dimensions in mm)



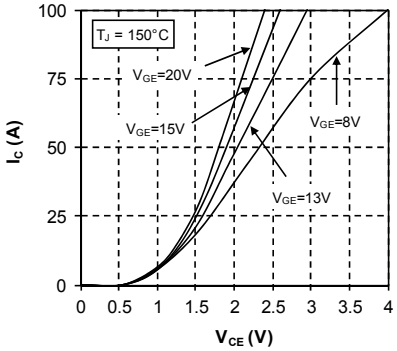
See application note 1906 - Mounting Instructions for SP3F Power Modules on www.microsemi.com

Typical Performance Curve

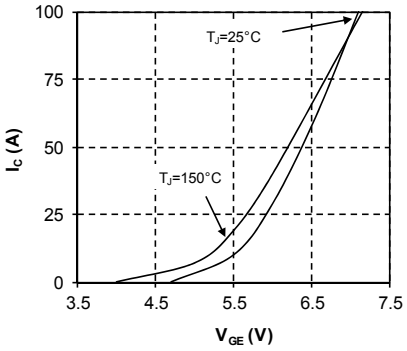
Output Characteristics (V_{GE}=15V)



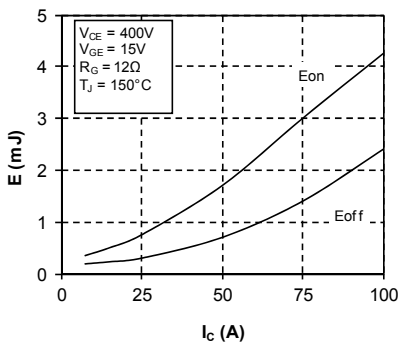
Output Characteristics



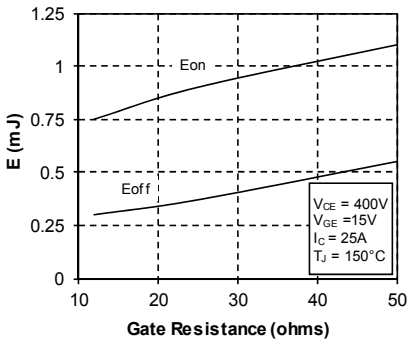
Transfert Characteristics



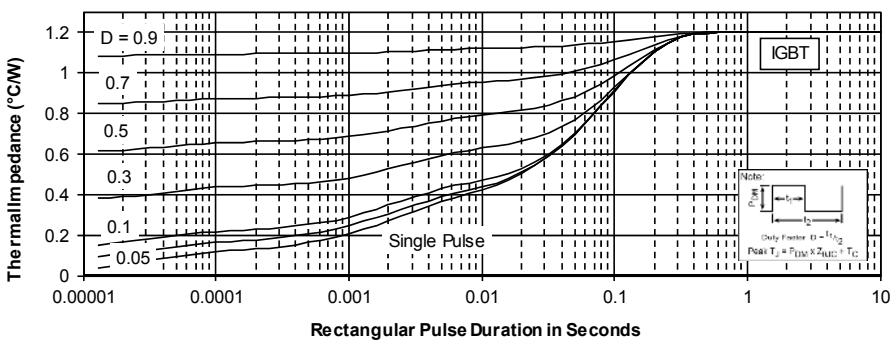
Energy losses vs Collector Current



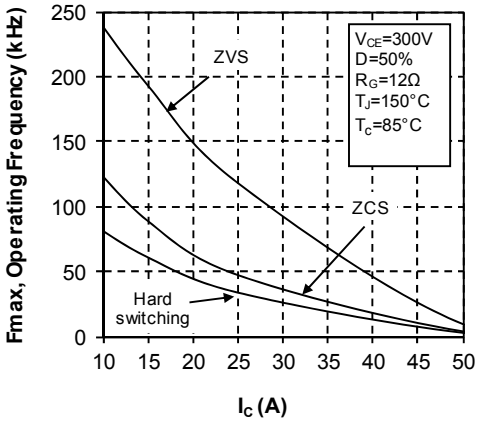
Switching Energy Losses vs Gate Resistance



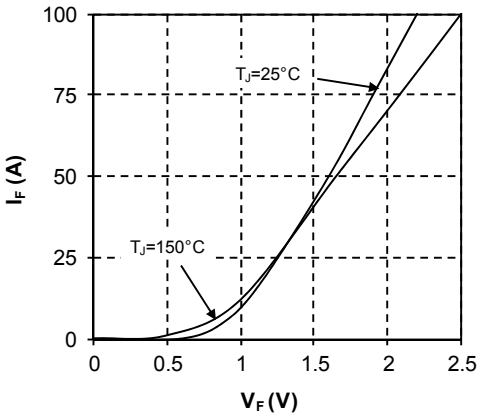
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



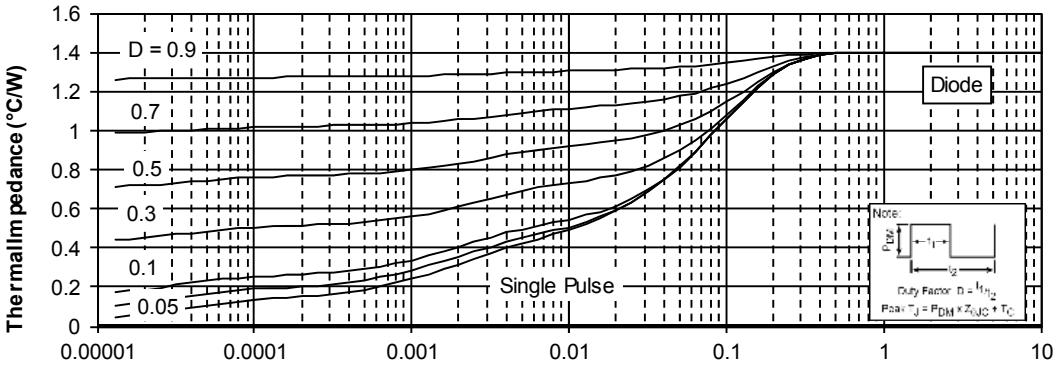
Operating Frequency vs Collector Current



Diode forward characteristic



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



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