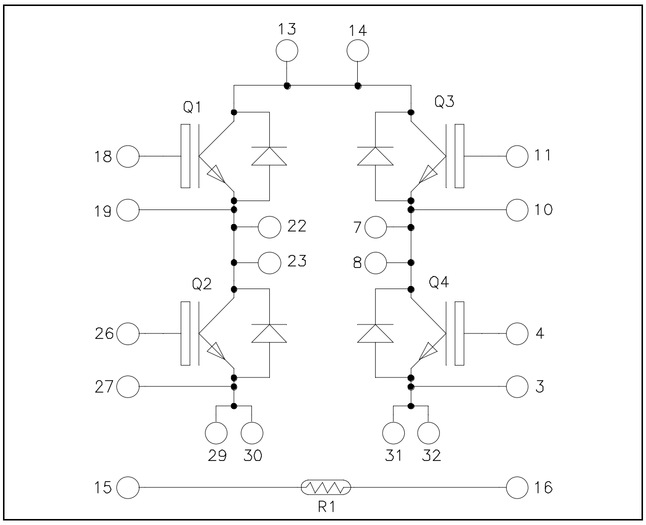
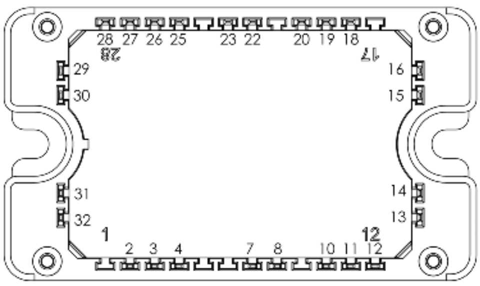
APTGLQ100H65T3G

Full bridge
High speed Trench + Field Stop
IGBT4 Power Module

V_{CES} = 650V
I_C = 100A @ Tc = 60°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
- ***High speed Trench + Field Stop IGBT 4***
  - Low voltage drop
  - Low leakage current
  - Low switching losses
- 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
- Easy paralleling due to positive TC of VCEsat
- 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 IGBT)

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{CES}	Collector - Emitter Voltage		650	V
I_C	Continuous Collector Current	T_C = 25°C	135	A
		T_C = 60°C	100	
I_{CM}	Pulsed Collector Current	T_C = 25°C	270	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Power Dissipation		350	W

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling 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	$V_{GE} = 15V$ $I_C = 100A$	$T_j = 25°C$	1.4	1.85	2.3	V
			$T_j = 150°C$		2.2		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$, $I_C = 1.6$ mA		4.2	5.1	5.6	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V$, $V_{CE} = 0V$				150	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			6100		pF
C_{oes}	Output Capacitance				232		
C_{res}	Reverse Transfer Capacitance				180		
Q_G	Gate charge	$V_{GE} = 15V$, $I_C = 100A$ $V_{CE} = 480V$			630		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm15V$ $V_{Bus} = 400V$ $I_C = 100A$ $R_G = 3.6\Omega$			19		ns
T_r	Rise Time				33		
$T_{d(off)}$	Turn-off Delay Time				197		
T_f	Fall Time				21		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) $V_{GE} = \pm15V$ $V_{Bus} = 400V$ $I_C = 100A$ $R_G = 3.6\Omega$			19		ns
T_r	Rise Time				29		
$T_{d(off)}$	Turn-off Delay Time				227		
T_f	Fall Time				22		
E_{on}	Turn on Energy	$V_{GE} = \pm15V$ $V_{Bus} = 400V$ $I_C = 100A$ $R_G = 3.6\Omega$	$T_j = 150°C$		2.4		mJ
E_{off}	Turn off Energy		$T_j = 150°C$		2		
R_G	Integrated gate resistor				2		Ω
I_{sc}	Short Circuit data	$V_{GE} \leq 15V$; $V_{Bus} = 400V$ $t_p \leq 5\mu s$; $T_j = 150°C$			700		A
R_{thJC}	Junction to Case Thermal Resistance					0.44	°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		100		A
V_F	Diode Forward Voltage	$I_F = 100A$ $V_{GE} = 0V$	$T_j = 25°C$		1.6	2	V
			$T_j = 150°C$		1.5		
t_{rr}	Reverse Recovery Time	$I_F = 100A$ $V_R = 300V$ di/dt =2000A/µs	$T_j = 25°C$		125		ns
			$T_j = 150°C$		220		
Q_{rr}	Reverse Recovery Charge		$T_j = 25°C$		4.7		µC
			$T_j = 150°C$		9.9		
E_{rr}	Reverse Recovery Energy		$T_j = 25°C$		1.1		mJ
			$T_j = 150°C$		2.4		
R_{thJC}	Junction to Case Thermal Resistance					0.77	°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
$\Delta B/B$		T_C=100°C		4		%

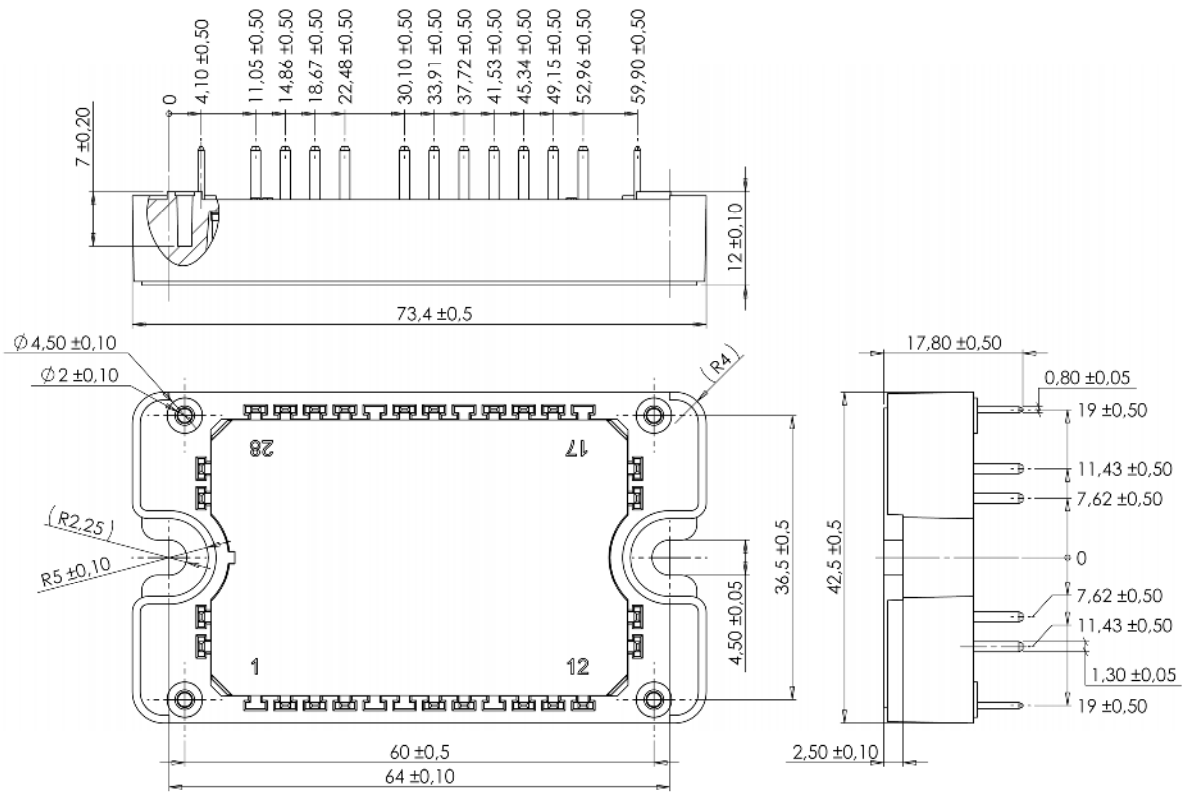
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
R_T: Thermistor value at T

Thermal and package characteristics

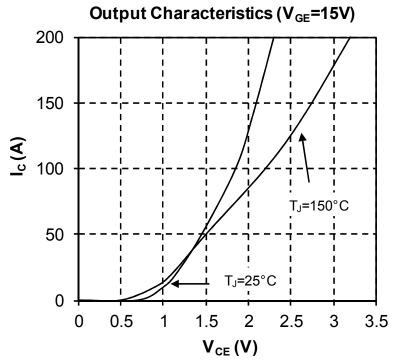
Symbol	Characteristic			Min	Max	Unit
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000		V
T_J	Operating junction temperature range			-40	175	°C
T_{JOP}	Recommended junction temperature under switching conditions			-40	$T_J$max -25	°C
T_{STG}	Storage Temperature Range			-40	125	°C
T_C	Operating Case Temperature			-40	125	°C
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				110	g

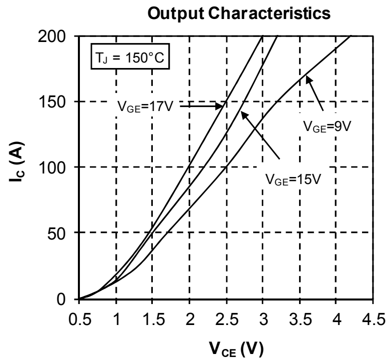
Package outline (dimensions in mm)

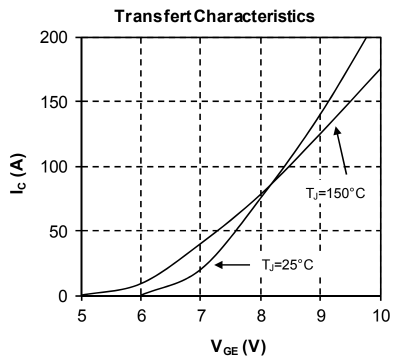


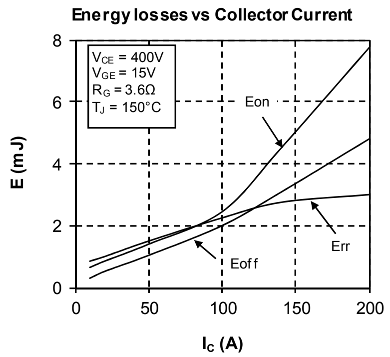
See application note 1906 - Mounting Instructions for SP3F Power Modules on www.microsemi.com

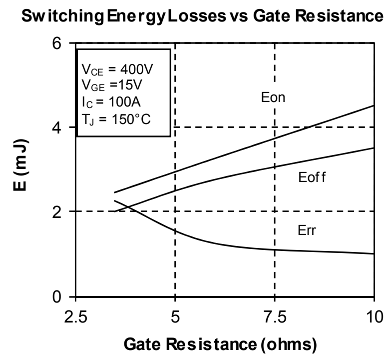
Typical performance curve

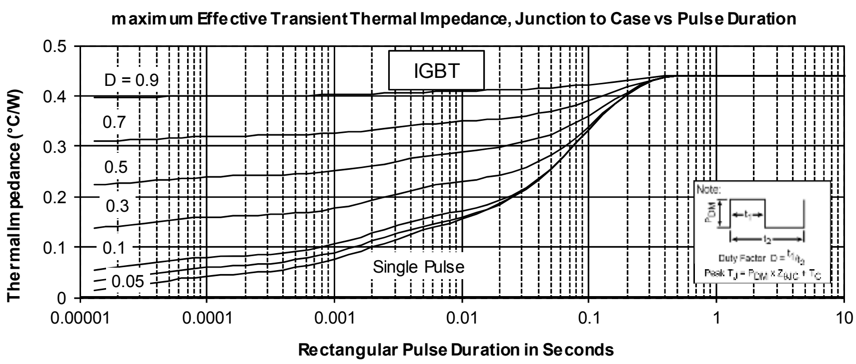


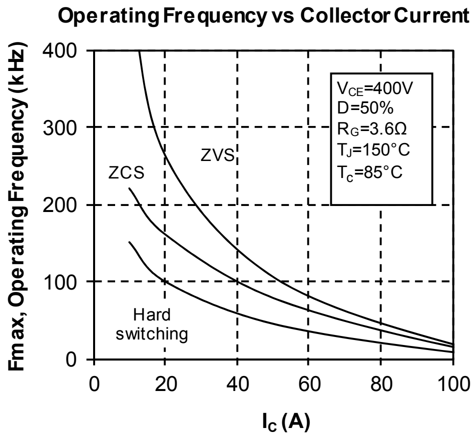


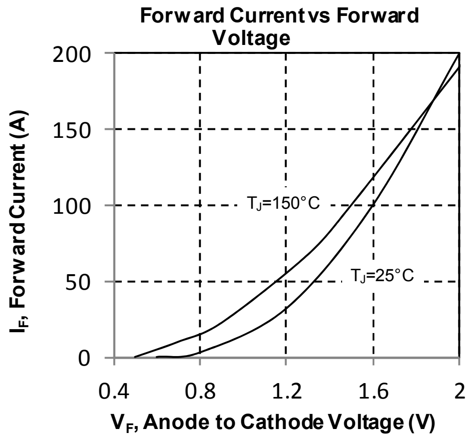


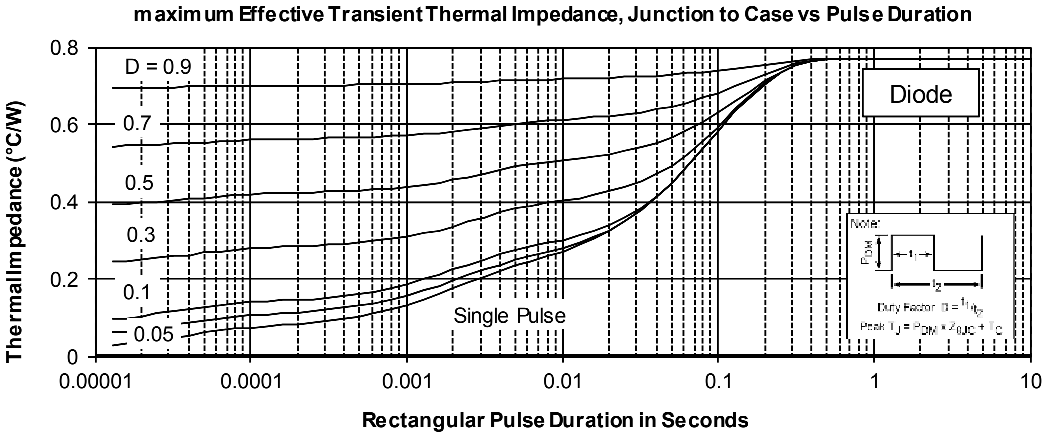







Operating Frequency vs Collector Current
Fmax, Operating Frequency (kHz)
VCE=400V
D=50%
RG=3.6Ω
TJ=150°C
TC=85°C
ZCS
ZVS
Hard switching
IC (A)


Forward Current vs Forward Voltage
IF, Forward Current (A)
TJ=150°C
TJ=25°C
VF, Anode to Cathode Voltage (V)


maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration
Thermal Impedance (°C/W)
D = 0.9
0.7
0.5
0.3
0.1
0.05
Single Pulse
Diode
Rectangular Pulse Duration in Seconds

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