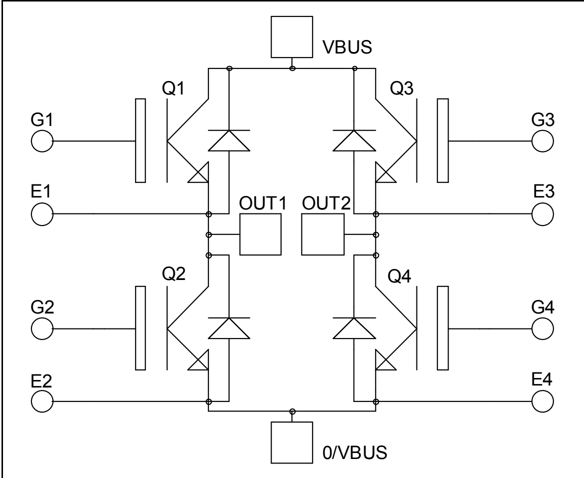
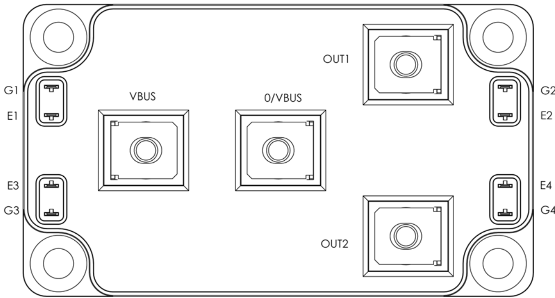
Microsemi
Power Matters.™

APTGLQ200H65G

Full bridge
High speed Trench + Field Stop IGBT4
Power Module

V_{CES} = 650V
I_C = 200A @ Tc = 60°C





Application

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

Features

- ***High speed Trench + Field Stop IGBT 4 Technology***
  - Low voltage drop
  - Low leakage current
  - Low switching losses
- Very low stray inductance
- Kelvin emitter for easy drive

Benefits

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of VCEsat
- 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	270	A
		T_C = 60°C	200	
I_{CM}	Pulsed Collector Current	T_C = 25°C	540	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Power Dissipation		680	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				75	µA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	V_{GE} =15V, I_C = 200A	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 = 3.2 mA		4.2	5.1	5.6	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = 20V, V_{CE} = 0V				300	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			12.2		nF
C_{oes}	Output Capacitance				0.43		
C_{res}	Reverse Transfer Capacitance				0.36		
Q_G	Gate charge	V_{GE} = 15V, I_C = 200A, V_{CE} = 480V			1260		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C), V_{GE} = ±15V, V_{Bus} = 400V, I_C = 200A, R_G = 1.8Ω			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} = ±15V, V_{Bus} = 400V, I_C = 200A, R_G = 1.8Ω			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} = ±15V, V_{Bus} = 400V, I_C = 200A, R_G = 1.8Ω	T_j = 150°C		4.8		mJ
E_{off}	Turn off Energy		T_j = 150°C		4		
R_G	Integrated gate resistor				1		Ω
I_{sc}	Short Circuit data	V_{GE} ≤15V ; V_{Bus} = 400V, t_p ≤5µs ; T_j = 150°C			1400		A
R_{thJC}	Junction to Case Thermal Resistance					0.22	°C/W

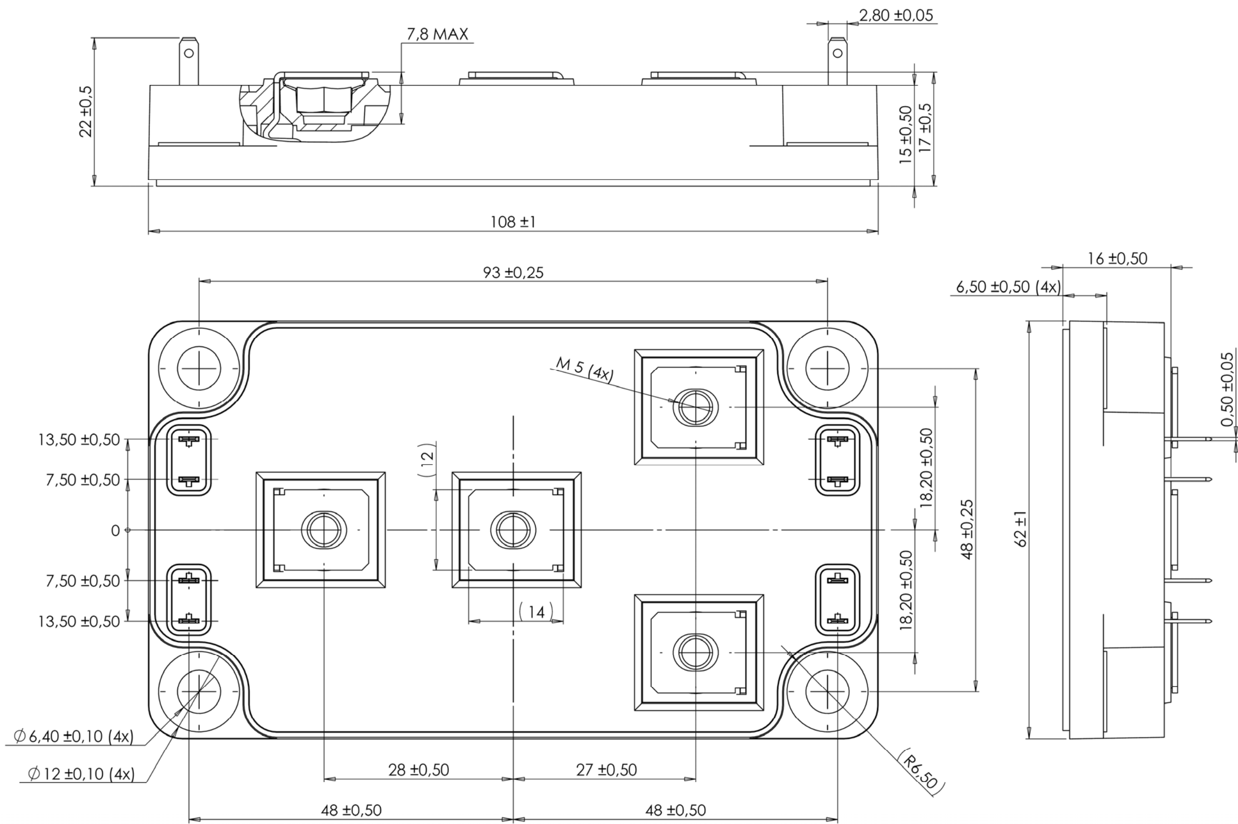
Diode ratings and characteristics (per diode)

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		200		A
V_F	Diode Forward Voltage	I_F = 200A, V_{GE} = 0V	T_j = 25°C		1.6	2	V
			T_j = 150°C		1.5		
t_{rr}	Reverse Recovery Time	I_F = 200A, V_R = 300V, di/dt =2800A/µs	T_j = 25°C		125		ns
			T_j = 150°C		220		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		9.4		µC
			T_j = 150°C		20		
E_{rr}	Reverse Recovery Energy		T_j = 25°C		2.2		mJ
			T_j = 150°C		4.8		
R_{thJC}	Junction to Case Thermal Resistance					0.39	°C/W

Thermal and package characteristics

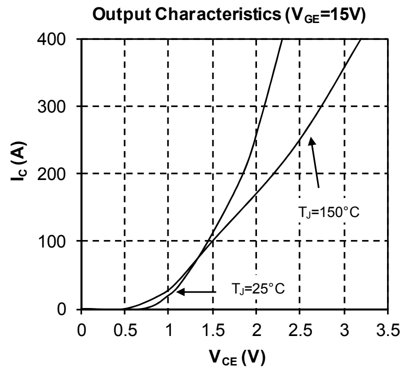
Symbol	*Characteristic*			*Min*	*Max*	*Unit*
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000		V
T_J	Operating junction temperature range			-40	175	°C
T_{JOP}	Recommended junction temperature under switching conditions			-40	$T_J$max -25	°C
T_{STG}	Storage Temperature Range			-40	125	°C
T_C	Operating Case Temperature			-40	125	°C
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	N.m
Wt	Package Weight				300	g

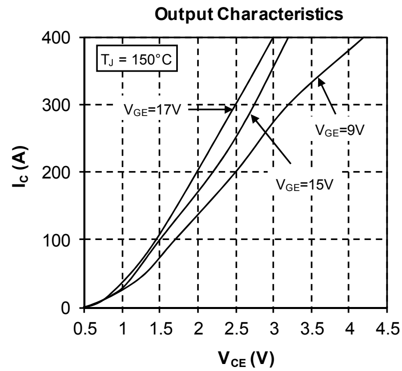
Package outline (dimensions in mm)

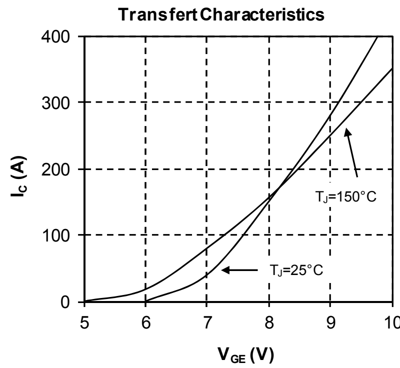


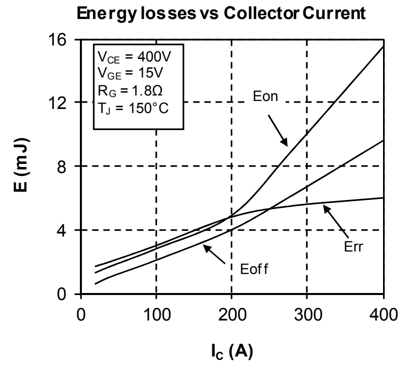
See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

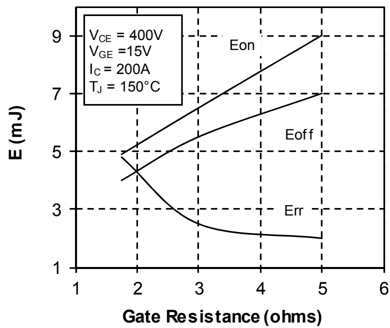
Typical Performance Curve

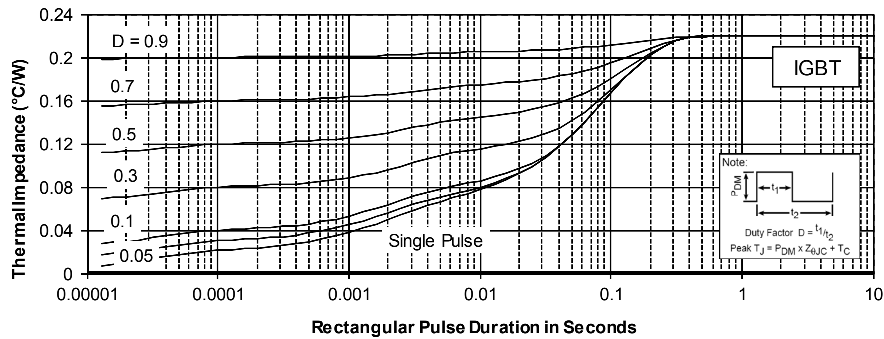


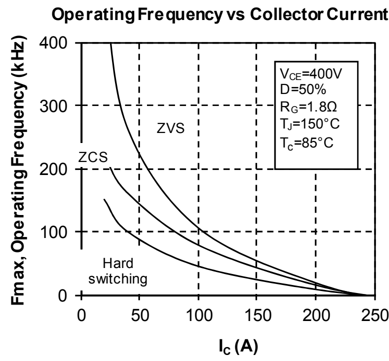


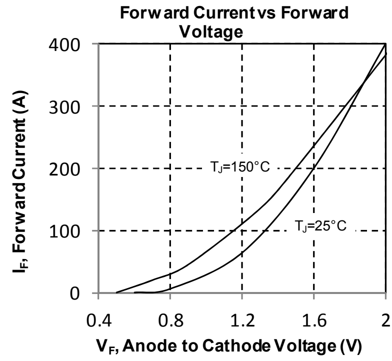


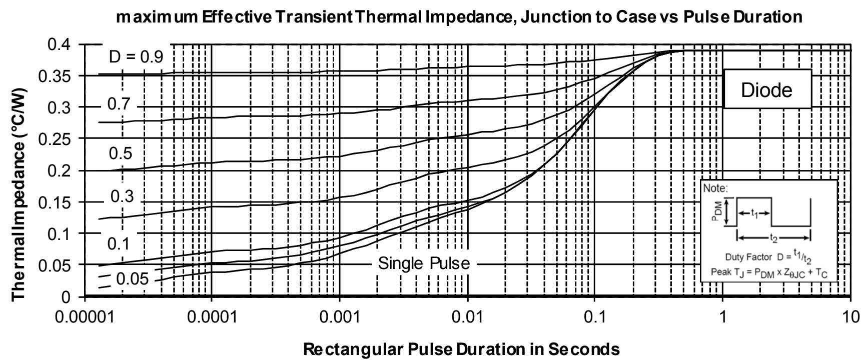







Operating Frequency vs Collector Current
Fmax, Operating Frequency (kHz)
I_C (A)
V_{CE}=400V
D=50%
R_G=1.8Ω
T_J=150°C
T_C=85°C
ZVS
ZCS
Hard switching
400
300
200
100
0
0
50
100
150
200
250


Forward Current vs Forward Voltage
I_F, Forward Current (A)
V_F, Anode to Cathode Voltage (V)
T_J=150°C
T_J=25°C
400
300
200
100
0
0.4
0.8
1.2
1.6
2


maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration
Thermal Impedance (°C/W)
Rectangular Pulse Duration in Seconds
D = 0.9
0.7
0.5
0.3
0.1
0.05
Single Pulse
Diode
Note:
Duty Factor D = t_1/t_2
Peak $T_J = P_{DM} \times Z_{\theta JC} + T_C$
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0.00001
0.0001
0.001
0.01
0.1
1
10

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