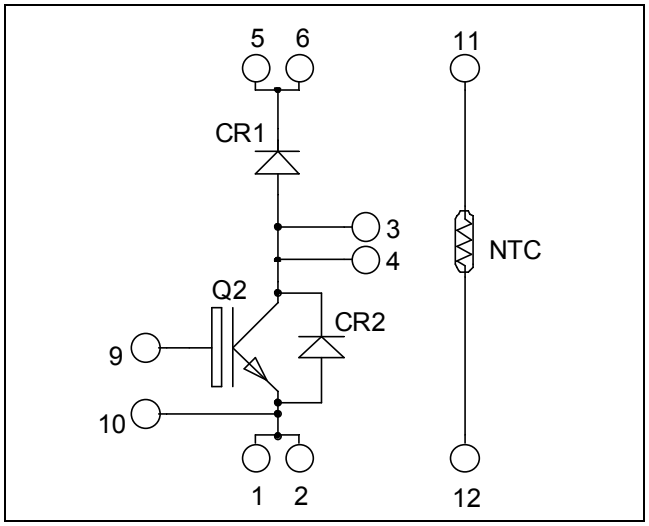
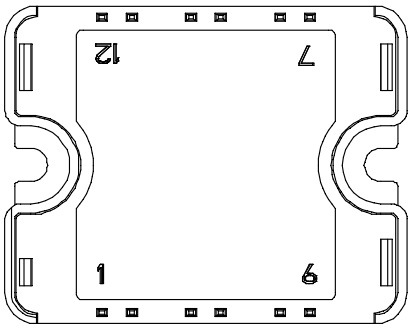
APTGLQ100DA120T1G

Boost chopper
High speed Trench + Field Stop IGBT4
Power Module

V_{CES} = 1200V
I_C = 100A @ Tc = 80°C





Pins 1/2 ; 3/4 ; 5/6 must be shorted together

Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

Features

- ***High speed Trench + Field Stop IGBT 4 Technology***
  - 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
- RoHS Compliant

All ratings @ T_j = 25°C unless otherwise specified

Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{CES}	Collector - Emitter Voltage		1200	V
I_C	Continuous Collector Current	T_C = 25°C	170	A
		T_C = 80°C	100	
I_{CM}	Pulsed Collector Current	T_C = 25°C	340	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Power Dissipation		520	W

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

Electrical Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	V_{GE} = 0V, V_{CE} = 1200V				50	µA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	V_{GE} =15V I_C = 100A	T_j = 25°C	1.78	2.05	2.42	V
			T_j = 150°C		2.6		
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE} , I_C = 3.8 mA		5.1	5.8	6.4	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = 20V, V_{CE} = 0V				150	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
C_{ies}	Input Capacitance	V_{GE} = 0V V_{CE} = 25V f = 1MHz			6150		pF
C_{oes}	Output Capacitance				460		
C_{res}	Reverse Transfer Capacitance				345		
Q_G	Gate charge	V_{GE} = 15V, I_C = 100A V_{CE} = 960V			460		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) V_{GE} = ±15V V_{Bus} = 600V I_C = 100A R_G = 5Ω			30		ns
T_r	Rise Time				57		
$T_{d(off)}$	Turn-off Delay Time				290		
T_f	Fall Time				16		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) V_{GE} = ±15V V_{Bus} = 600V I_C = 100A R_G = 5Ω			30		ns
T_r	Rise Time				49		
$T_{d(off)}$	Turn-off Delay Time				366		
T_f	Fall Time				48		
E_{on}	Turn on Energy	V_{GE} = ±15V V_{Bus} = 600V I_C = 100A R_G = 5Ω	T_j = 150°C		9.5		mJ
E_{off}	Turn off Energy		T_j = 150°C		5.6		
R_G	Integrated gate resistor				7.5		Ω
I_{sc}	Short Circuit data	V_{GE} ≤15V ; V_{Bus} = 600V t_p≤10µs ; T_j = 150°C			350		A
R_{thJC}	Junction to Case Thermal Resistance					0.29	°C/W

Chopper diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage					1200	V
I_{RM}	Reverse Leakage Current	V_R=1200V				100	µA
I_F	DC Forward Current		Tc = 60°C		100		A
V_F	Diode Forward Voltage	I_F = 100A			2.4	3.5	V
		I_F = 150A			2.7		
		I_F = 100A	T_j = 125°C		1.8		
t_{rr}	Reverse Recovery Time	I_F = 100A V_R = 800V di/dt = 200A/µs	T_j = 25°C		385		ns
			T_j = 125°C		480		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		1.05		µC
			T_j = 125°C		5.24		
R_{thJC}	Junction to Case Thermal Resistance					0.35	°C/W

IGBT parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage					1200	V
I_{RM}	Reverse Leakage Current	V_R=1200V				100	µA
I_F	DC Forward Current		Tc = 70°C		30		A
V_F	Diode Forward Voltage	I_F = 30A			2.6	3.5	V
		I_F = 60A			3.2		
		I_F = 30A	T_j = 125°C		1.8		
t_{rr}	Reverse Recovery Time	I_F = 30A V_R = 800V di/dt =200A/µs	T_j = 25°C		300		ns
			T_j = 125°C		360		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		360		nC
			T_j = 125°C		1700		
R_{thJC}	Junction to Case Thermal Resistance					1.2	°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		%

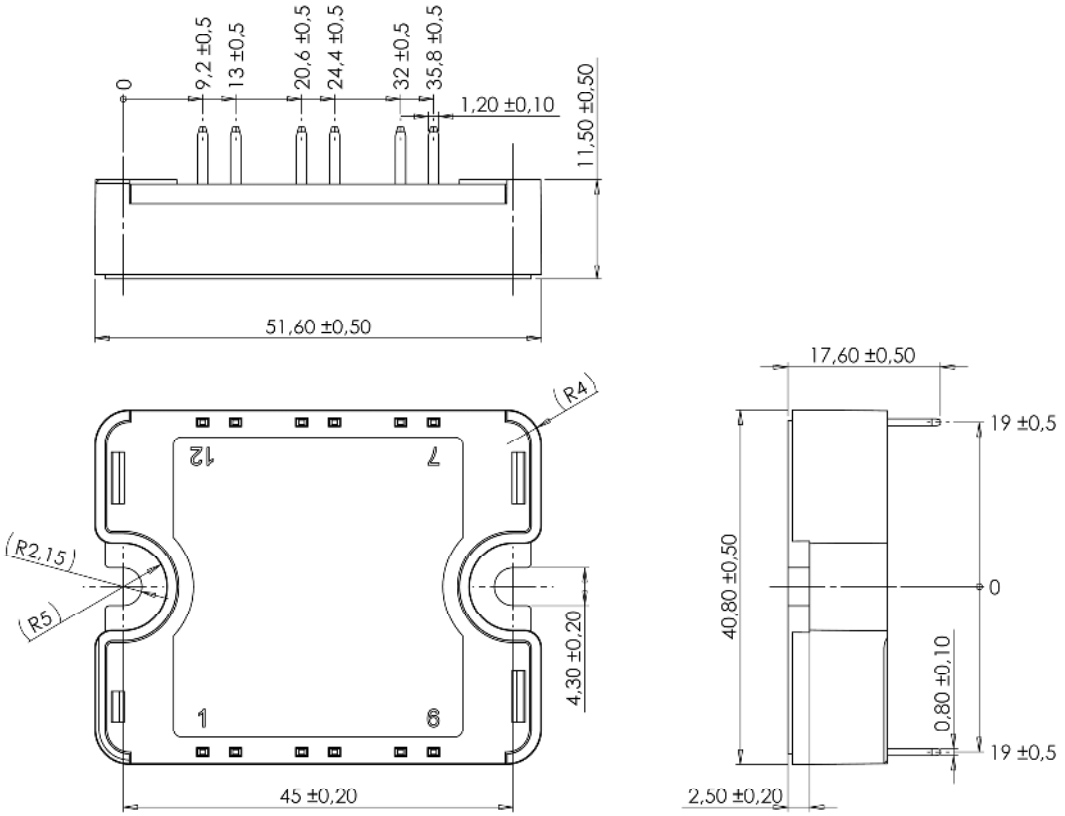
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
R_T: Thermistor value at T

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	
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				80	g

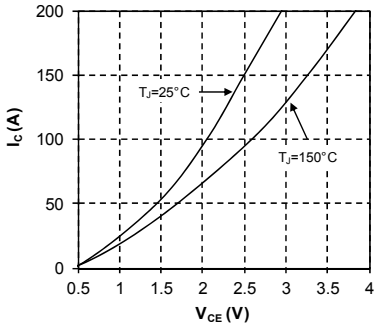
Package outline (dimensions in mm)



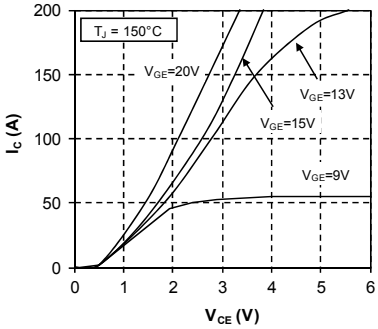
See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

Typical IGBT & chopper diode performance curves

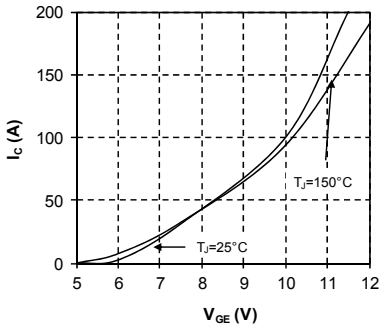
Output Characteristics (V_{GE}=15V)



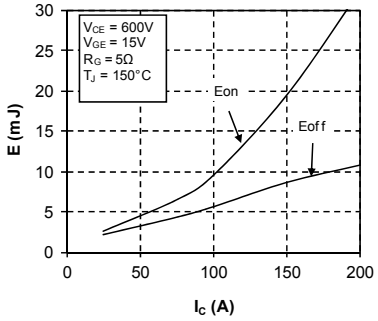
Output Characteristics



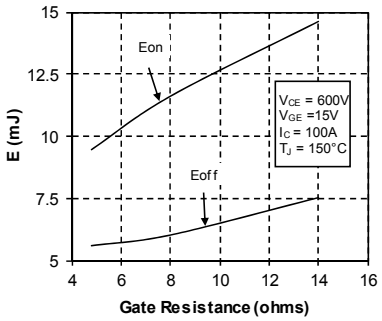
Transfert Characteristics



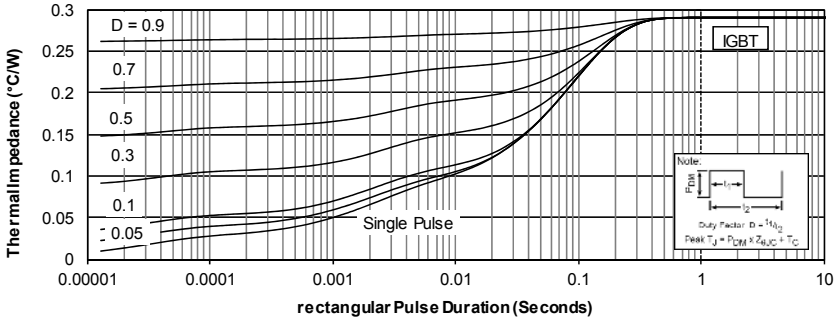
Energy losses vs Collector Current

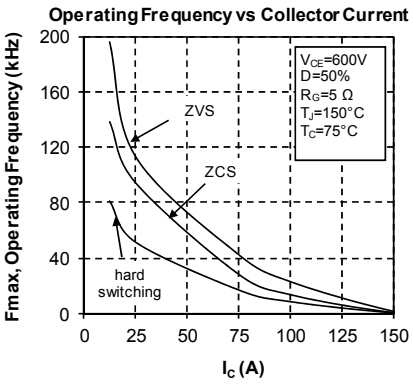


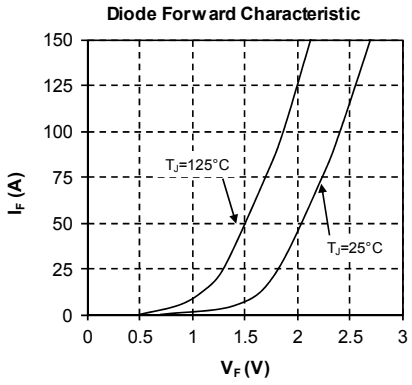
Switching Energy Losses vs Gate Resistance

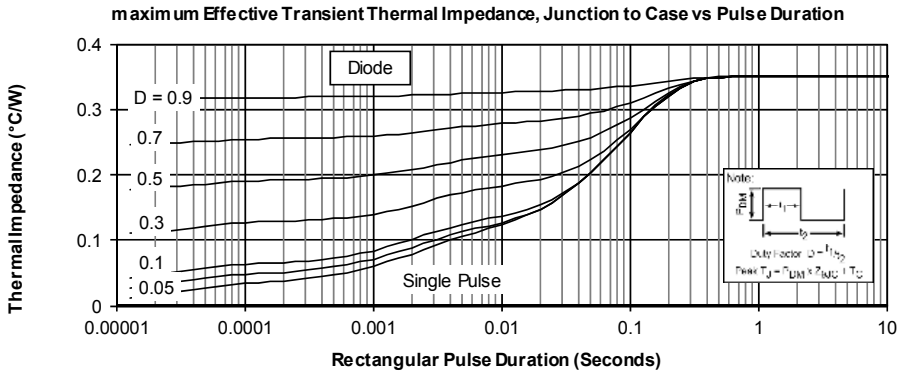


maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration

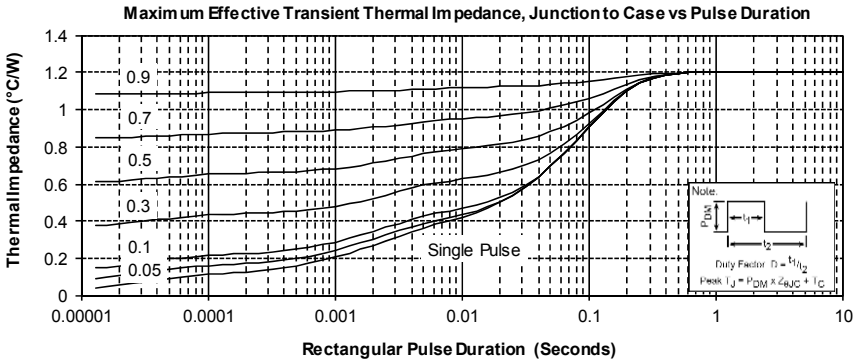


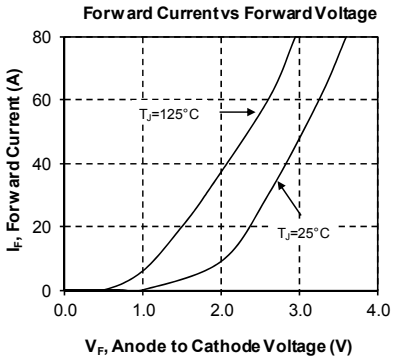






IGBT parallel diode Typical Performance Curves





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