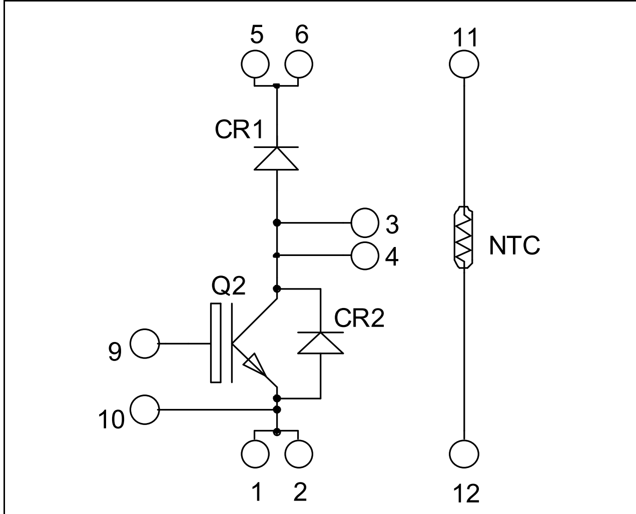
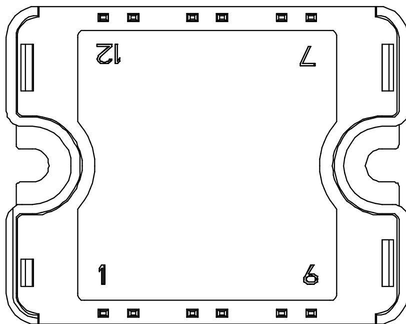
Microsemi
Power Matters.™

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) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 100A$ $R_G = 5\Omega$			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) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 100A$ $R_G = 5\Omega$			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	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 100A$ $R_G = 5\Omega$	$T_j = 150°C$		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	$V_{GE} \leq 15V$; $V_{Bus} = 600V$ $t_p \leq 10\mu s$; $T_j = 150°C$			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		%

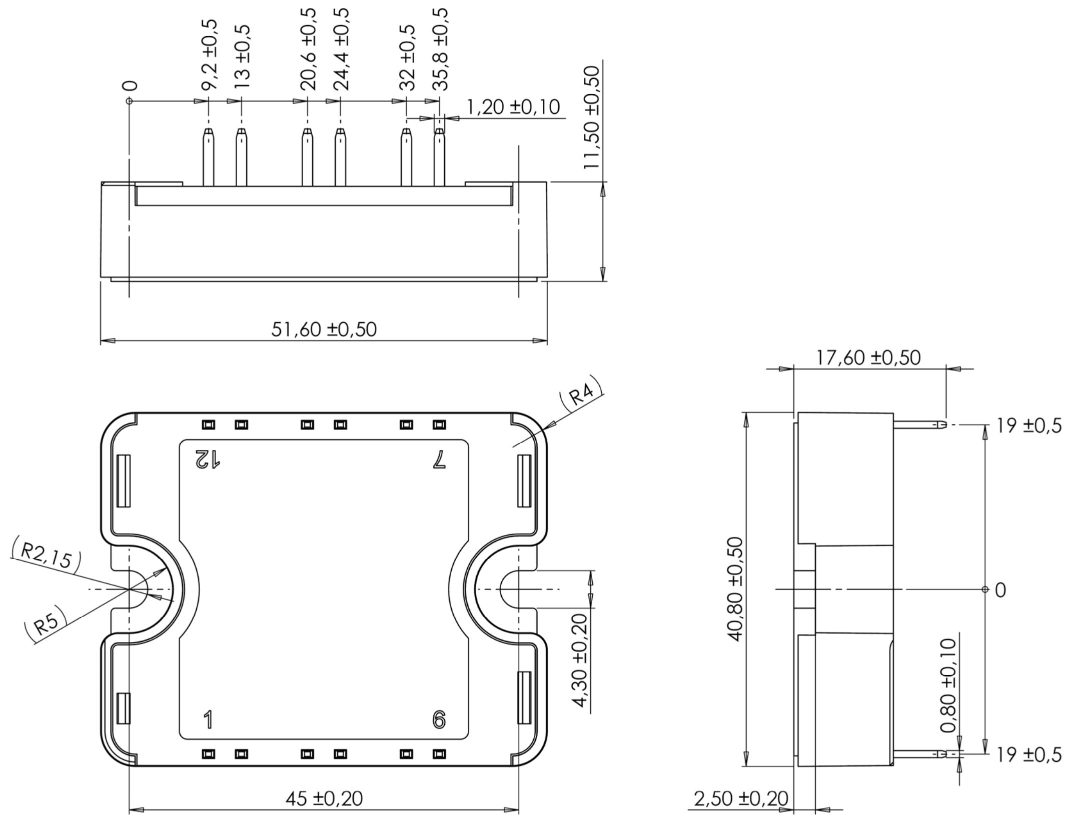
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
R_T: Thermistor value at T

Thermal and package characteristics

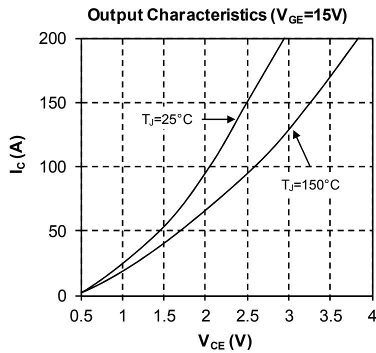
Symbol	Characteristic			Min	Max	Unit
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000		V
T_J	Operating junction temperature range			-40	175	°C
T_{JOP}	Recommended junction temperature under switching conditions			-40	$T_J$max -25	
T_{STG}	Storage Temperature Range			-40	125	
T_C	Operating Case Temperature			-40	125	
Torque	Mounting torque	To heatsink	M4	2	3	N.m
Wt	Package Weight				80	g

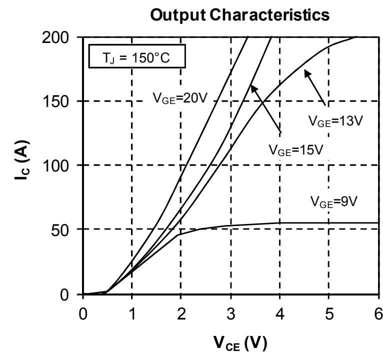
Package outline (dimensions in mm)

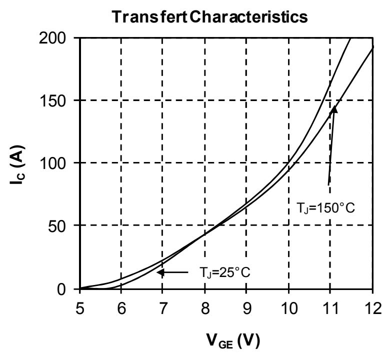


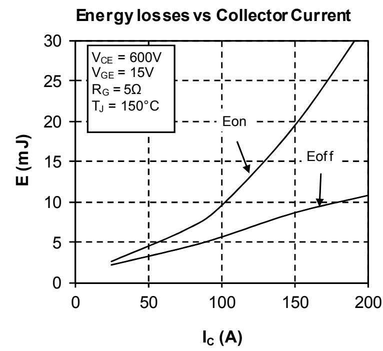
See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

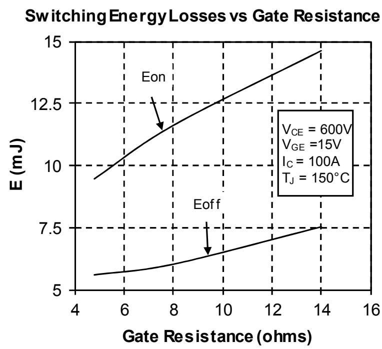
Typical IGBT & chopper diode performance curves

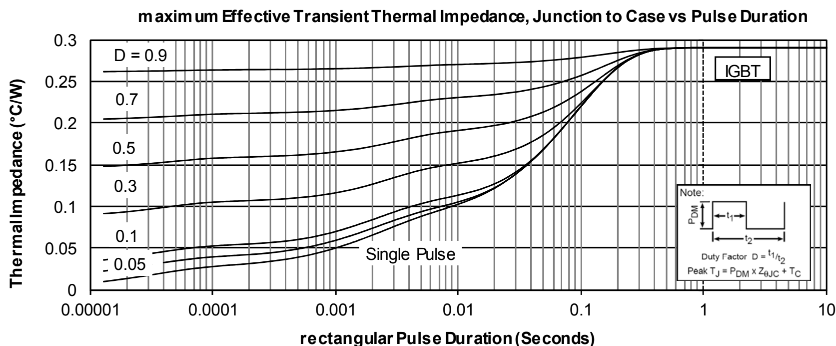


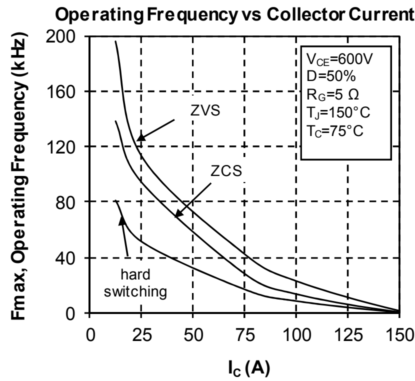


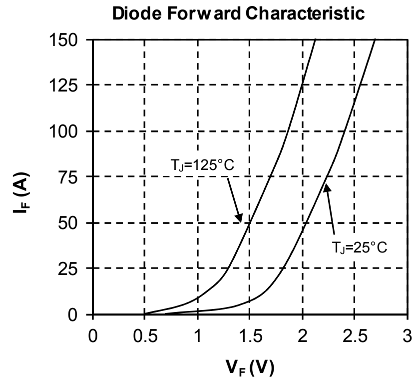


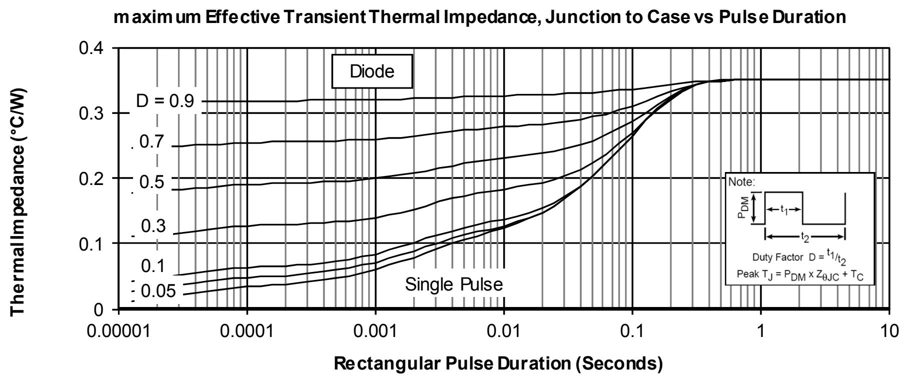




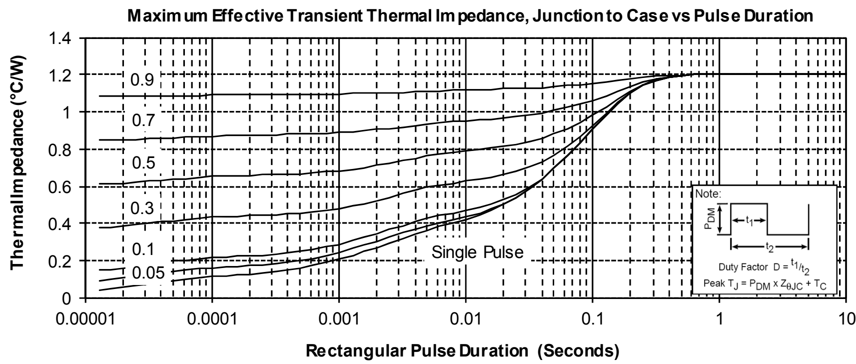


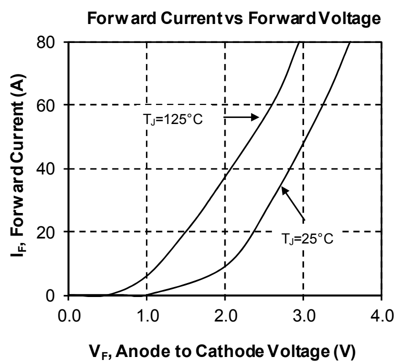






IGBT parallel diode Typical Performance Curves





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