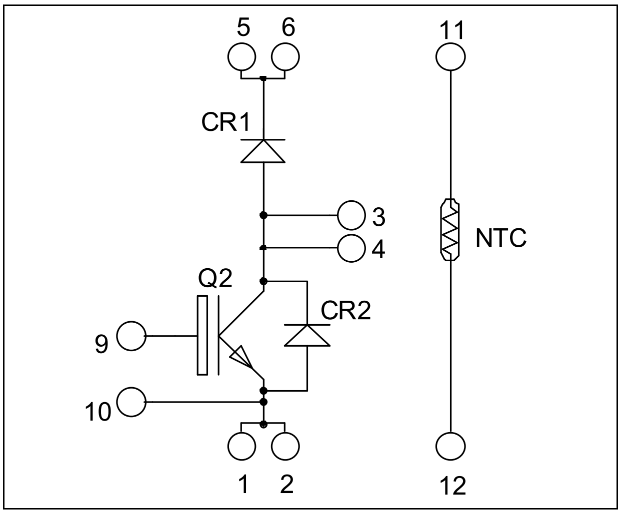
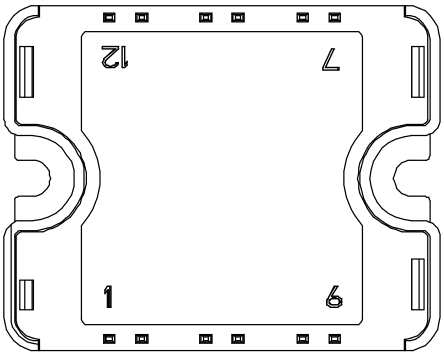
APTGT100DA120T1G

Boost chopper
Fast Trench + Field Stop IGBT3
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

- Fast Trench + Field Stop IGBT3 Technology
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 20 kHz
  - Soft recovery parallel diodes
  - Low diode VF
  - Low leakage current
  - RBSOA and SCSOA rated
- Very low stray inductance
- Internal thermistor for temperature monitoring
- High level of integration

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

Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{CES}	Collector - Emitter Breakdown Voltage		1200	V
I_C	Continuous Collector Current	T_C = 25°C	140 *	A
		T_C = 80°C	100 *	
I_{CM}	Pulsed Collector Current	T_C = 25°C	200	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Maximum Power Dissipation	T_C = 25°C	480	W
RBSOA	Reverse Bias Safe Operating Area	T_j = 125°C	200A @ 1100V	

Specification of IGBT device but output current must be limited to 75A to not exceed a delta of temperature greater than 30°C for the connectors.

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

All ratings @ T_j = 25°C unless otherwise specified

Electrical Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	V_{GE} = 0V, V_{CE} = 1200V				250	µA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	V_{GE} =15V, I_C = 100A	T_j = 25°C	1.4	1.7	2.1	V
			T_j = 125°C		2.0		
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE} , I_C = 2 mA		5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = 20V, V_{CE} = 0V				400	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
C_{ies}	Input Capacitance	V_{GE} = 0V, V_{CE} = 25V, f = 1MHz			7200		pF
C_{oes}	Output Capacitance				400		
C_{res}	Reverse Transfer Capacitance				300		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C), V_{GE} = ±15V, V_{Bus} = 600V, I_C = 100A, R_G = 3.9Ω			260		ns
T_r	Rise Time				30		
$T_{d(off)}$	Turn-off Delay Time				420		
T_f	Fall Time				70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C), V_{GE} = ±15V, V_{Bus} = 600V, I_C = 100A, R_G = 3.9Ω			290		ns
T_r	Rise Time				50		
$T_{d(off)}$	Turn-off Delay Time				520		
T_f	Fall Time				90		
E_{on}	Turn on Energy	V_{GE} = ±15V, V_{Bus} = 600V, I_C = 100A, R_G = 3.9Ω	T_j = 125°C		10		mJ
E_{off}	Turn off Energy		T_j = 125°C		10		

Chopper diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			1200			V
I_{RM}	Maximum Reverse Leakage Current	V_R=1200V	T_j = 25°C			250	µA
			T_j = 125°C			500	
I_F	DC Forward Current		Tc = 80°C		100		A
V_F	Diode Forward Voltage	I_F = 100A, V_{GE} = 0V	T_j = 25°C		1.6	2.1	V
			T_j = 125°C		1.6		
t_{rr}	Reverse Recovery Time	I_F = 100A, V_R = 600V, di/dt =2000A/µs	T_j = 25°C		170		ns
			T_j = 125°C		280		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		9		µC
			T_j = 125°C		18		
E_r	Reverse Recovery Energy		T_j = 25°C		5		mJ
			T_j = 125°C		9		

Thermal and package characteristics

Symbol	Characteristic		Min	Typ	Max	Unit
R_{thJC}	Junction to Case Thermal Resistance	IGBT			0.26	°C/W
		Diode			0.48	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz		4000			V
T_J	Operating junction temperature range		-40		150	°C
T_{STG}	Storage Temperature Range		-40		125	
T_C	Operating Case Temperature		-40		100	
Torque	Mounting torque	To heatsink M4	2		3	N.m
Wt	Package Weight				80	g

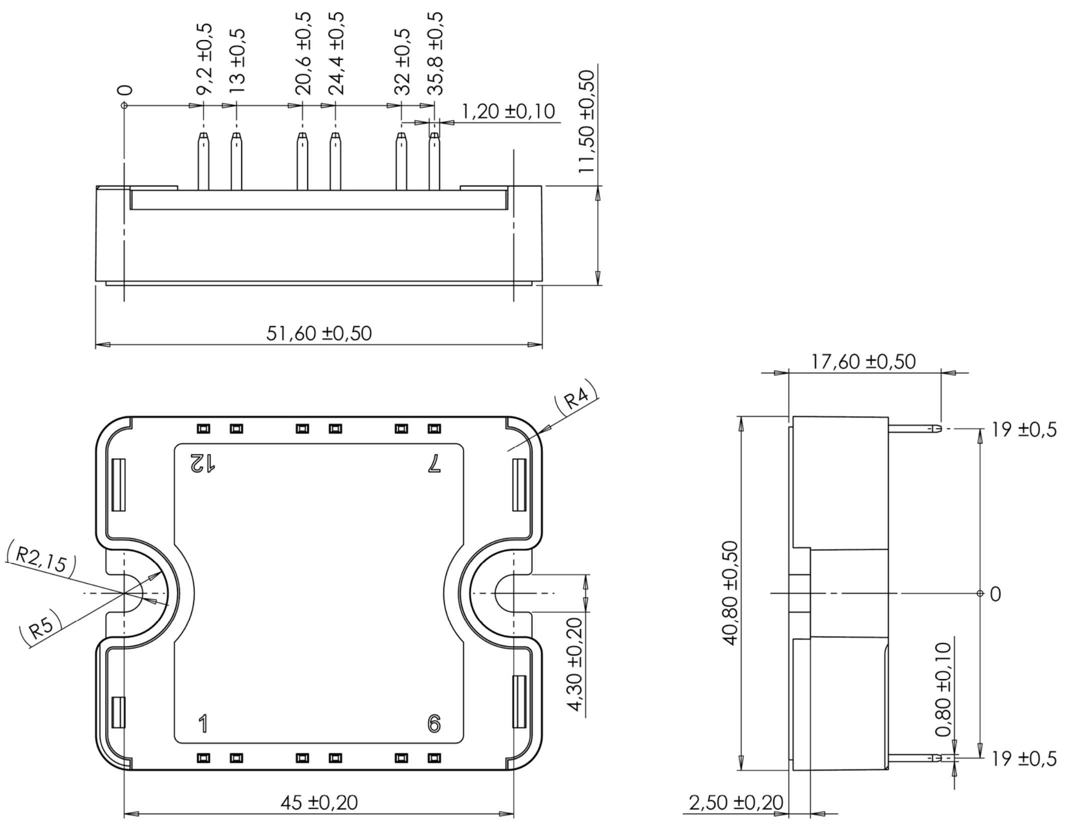
Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
R_{25}	Resistance @ 25°C		50		kΩ
$B_{25/85}$	T_{25} = 298.15 K		3952		K

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

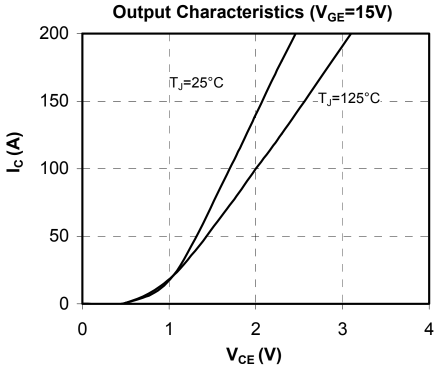
T: Thermistor temperature
R_T: Thermistor value at T

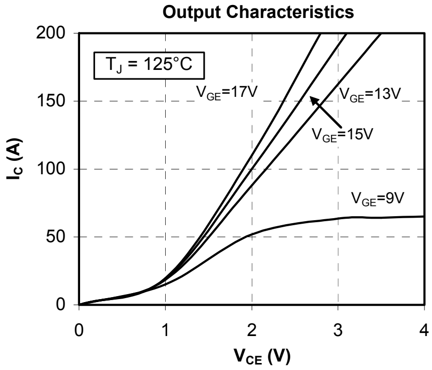
SP1 Package outline (dimensions in mm)

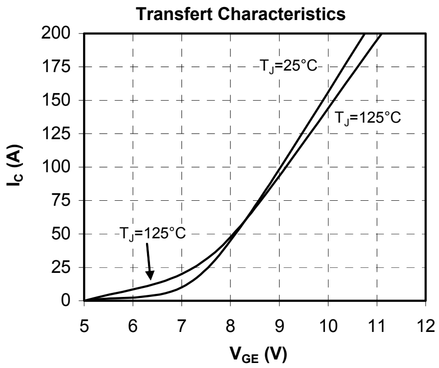


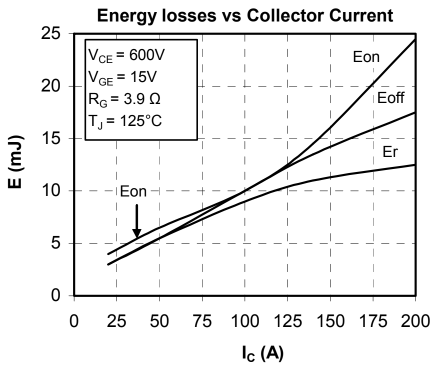
See application note 1904 - Mounting Instructions for SP1 Power Modules on www.microsemi.com

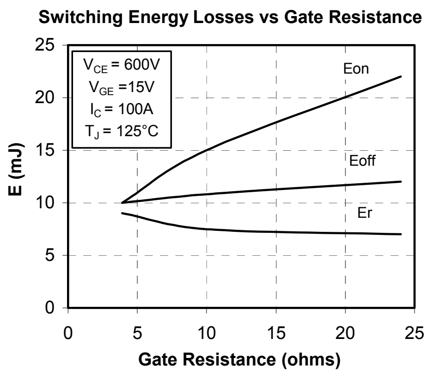
Typical Performance Curve

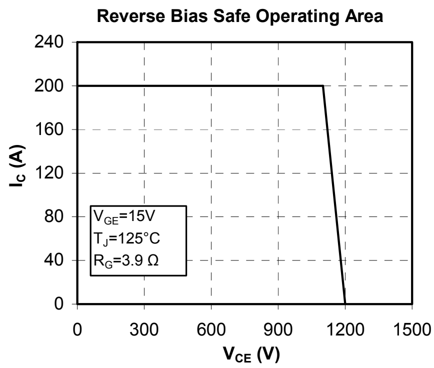


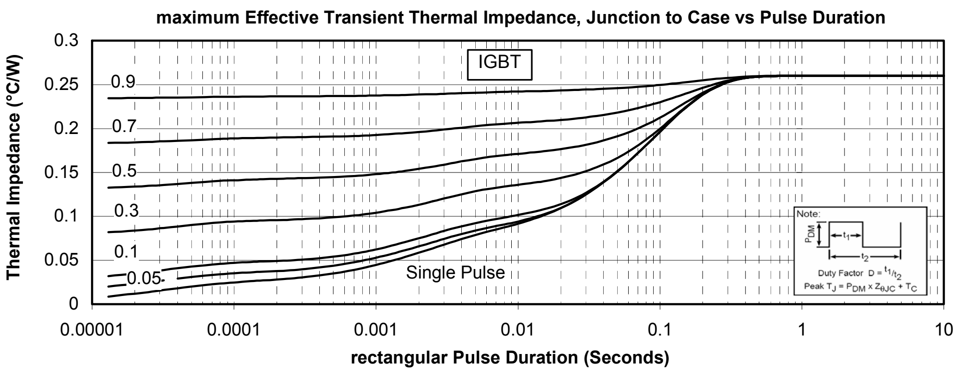


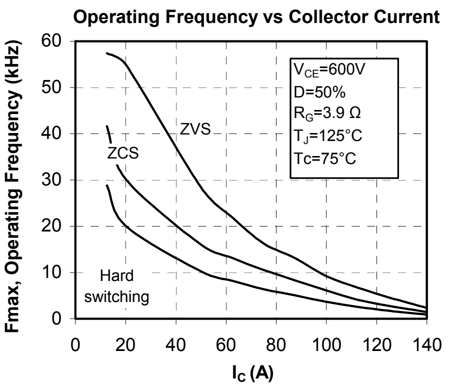


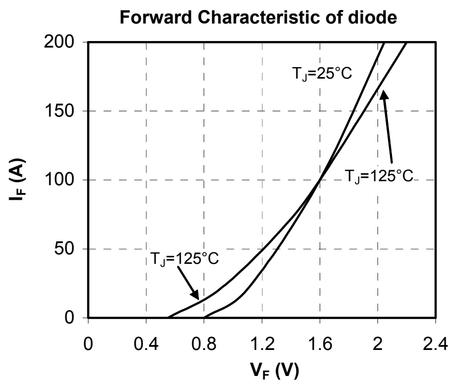


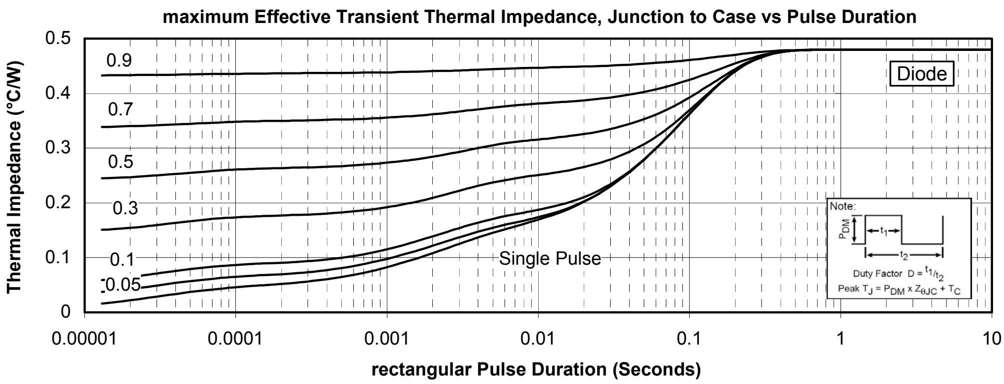







Operating Frequency vs Collector Current
V_{CE}=600V
D=50%
R_G=3.9 Ω
T_J=125°C
Tc=75°C
ZVS
ZCS
Hard switching
Fmax, Operating Frequency (kHz)
I_C (A)
0
10
20
30
40
50
60
0
20
40
60
80
100
120
140


Forward Characteristic of diode
T_J=25°C
T_J=125°C
T_J=125°C
I_F (A)
V_F (V)
0
50
100
150
200
0
0.4
0.8
1.2
1.6
2
2.4


maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration
Thermal Impedance (°C/W)
rectangular Pulse Duration (Seconds)
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} x $Z_{θJC}$ + T_C
0
0.1
0.2
0.3
0.4
0.5
0.00001
0.0001
0.001
0.01
0.1
1
10

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