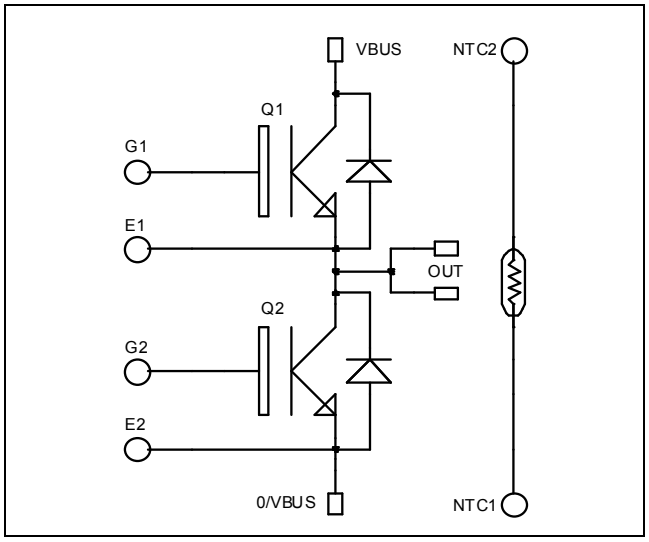
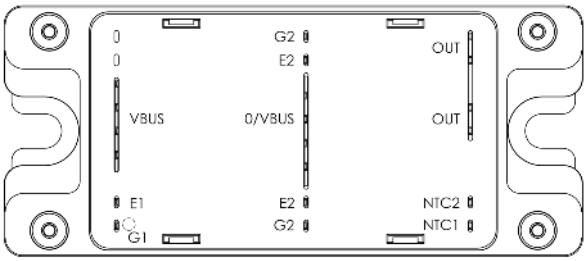
APTGLQ150A120TG

Phase leg
High speed Trench + Field Stop IGBT4
Power Module

V_{CES} = 1200V
I_C = 150A @ Tc = 80°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
- Kelvin emitter for easy drive
- Very low stray inductance
- Lead frames for power connections
- Internal thermistor for temperature monitoring

Benefits

- Stable temperature behavior
- Very rugged
- Solderable terminals for easy PCB mounting
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of V_{CEsat}
- 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		1200	V
I_C	Continuous Collector Current	T_C = 25°C	250	A
		T_C = 80°C	150	
I_{CM}	Pulsed Collector Current	T_C = 25°C	480	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Power Dissipation		750	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} = 1200V				100	µA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	V_{GE} =15V I_C = 150A	T_j = 25°C	1.78	2.05	2.4	V
			T_j = 150°C		2.6		
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE} , I_C = 5.2 mA		5.3	5.8	6.3	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = 20V, V_{CE} = 0V				240	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			8.8		nF
C_{oes}	Output Capacitance				0.5		
C_{res}	Reverse Transfer Capacitance				0.45		
Q_G	Gate charge	V_{GE} = 15V, I_C = 150A V_{CE} = 960V			645		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) V_{GE} = ±15V V_{Bus} = 600V I_C = 150A R_G = 3.5Ω			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 = 150A R_G = 3.5Ω			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 = 150A R_G = 3.5Ω	T_j = 150°C		13		mJ
E_{off}	Turn off Energy		T_j = 150°C		8		
R_G	Integrated gate resistor				5		Ω
I_{sc}	Short Circuit data	V_{GE} ≤15V ; V_{Bus} = 600V t_p≤10µs ; T_j = 150°C			525		A
R_{thJC}	Junction to Case Thermal Resistance					0.20	°C/W

Diode ratings and characteristics (per diode)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage					1200	V
I_{RM}	Reverse Leakage Current	V_R=1200V				400	µA
I_F	DC Forward Current		Tc = 60°C		120		A
V_F	Diode Forward Voltage	I_F = 120A			2.6	3.5	V
		I_F = 240A			3.2		
		I_F = 120A	T_j = 125°C		1.8		
t_{rr}	Reverse Recovery Time	I_F = 120A V_R = 800V di/dt = 800A/µs	T_j = 25°C		300		ns
			T_j = 125°C		380		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		1.44		µC
			T_j = 125°C		6.8		
R_{thJC}	Junction to Case Thermal Resistance					0.33	°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		%

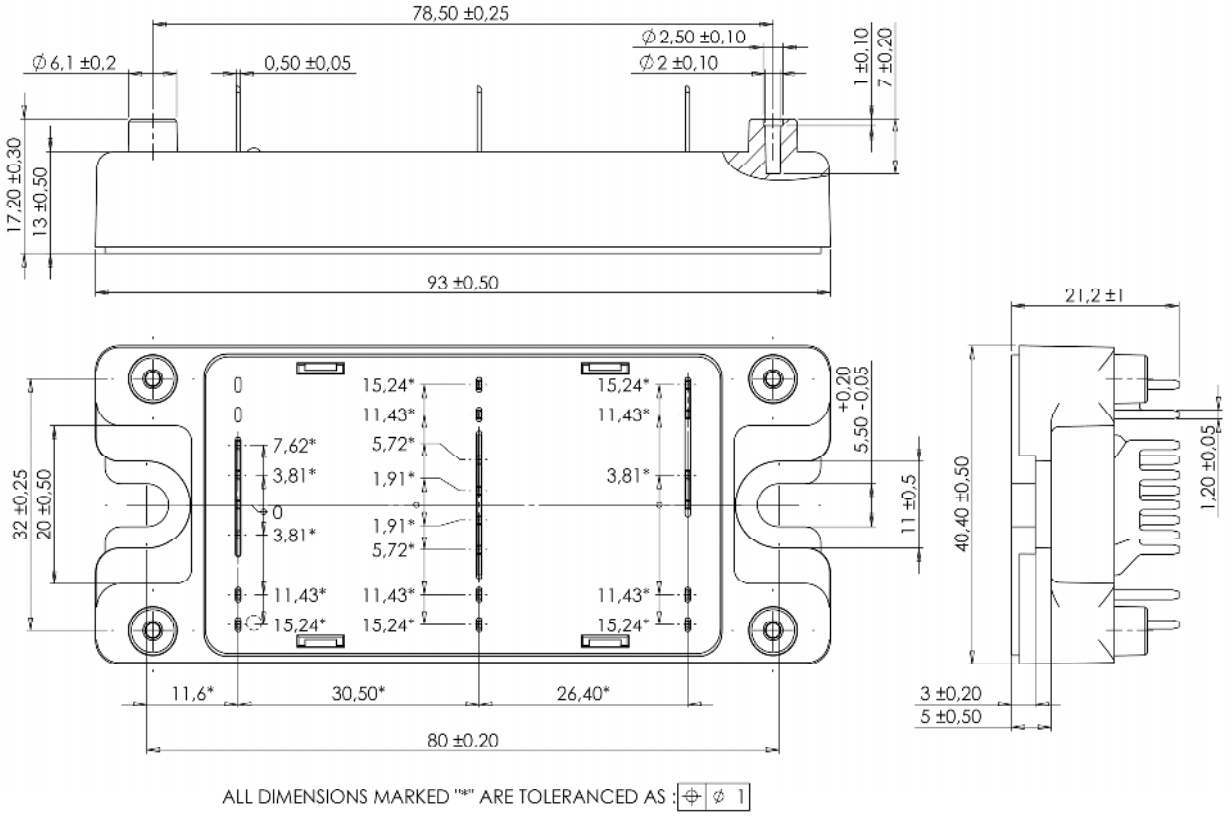
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

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	
T_{STG}	Storage Temperature Range			-40	125	
T_C	Operating Case Temperature			-40	125	
Torque	Mounting torque	To heatsink	M5	2.5	4.7	N.m
Wt	Package Weight				160	g

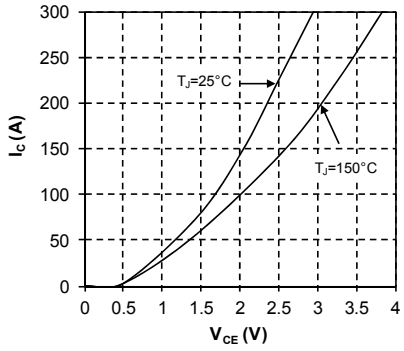
Package outline (dimensions in mm)



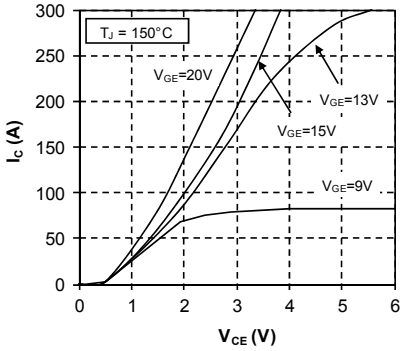
See application note APT0501 - Mounting Instructions for SP4 Power Modules on www.microsemi.com

Typical performance curve

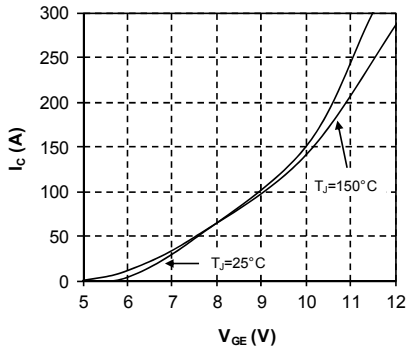
Output Characteristics (V_{GE}=15V)



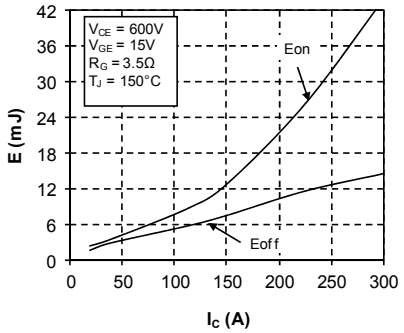
Output Characteristics



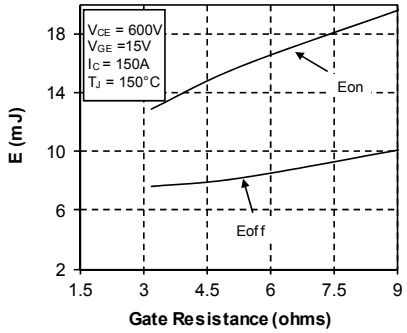
Transfert Characteristics



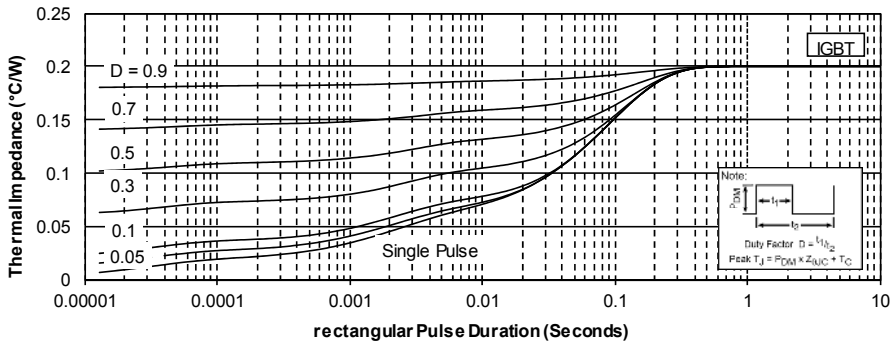
Energy losses vs Collector Current



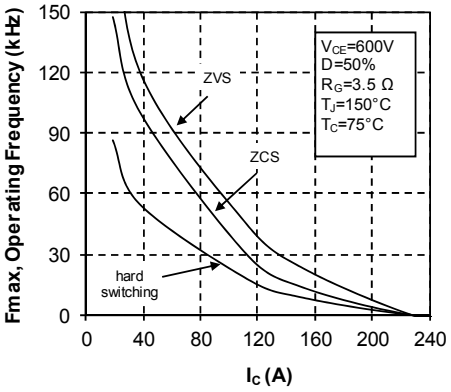
Switching Energy Losses vs Gate Resistance



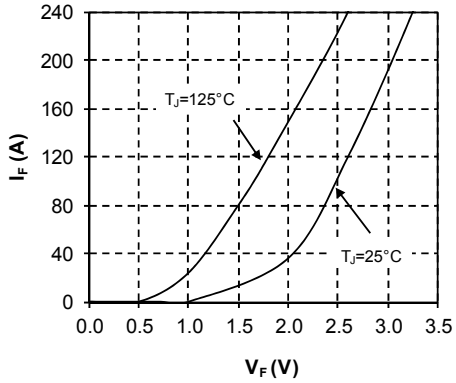
maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



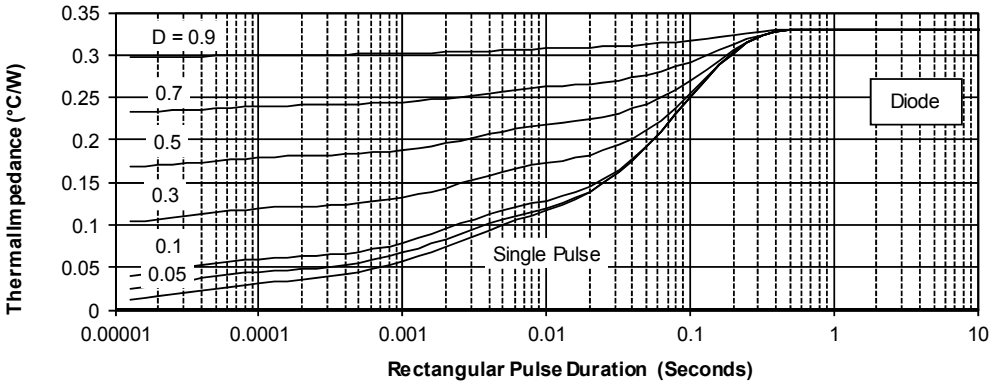
Operating Frequency vs Collector Current



Diode Forward Characteristic



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



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