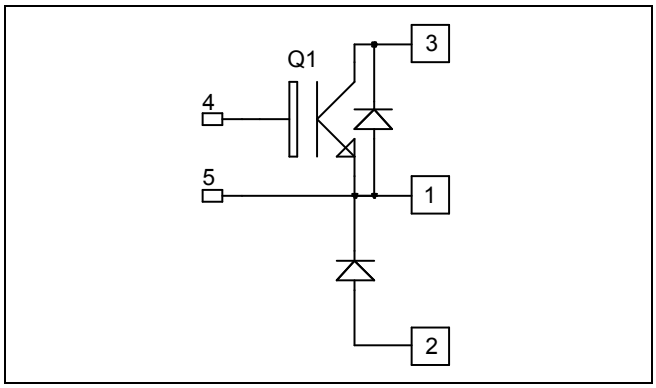
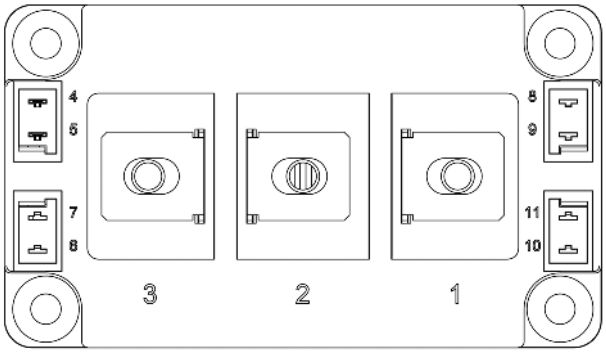
APTGL700SK120D3G

Buck chopper
Trench + Field Stop IGBT4
Power Module

V_{CES} = 1200V
I_C = 700A @ Tc = 80°C





Application

- AC and DC motor control
- Switched Mode Power Supplies

Features

- Trench + Field Stop IGBT 4 Technology
  - Low voltage drop
  - Low leakage current
  - Low switching losses
  - Soft recovery parallel diodes
  - Low diode VF
  - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- High level of integration
- M6 power connectors

Benefits

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of V_{CEsat}
- 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	840	A
		T_C = 80°C	700	
I_{CM}	Pulsed Collector Current	T_C = 25°C	1800	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Maximum Power Dissipation	T_C = 25°C	3000	W
RBSOA	Reverse Bias Safe Operating Area	T_j = 125°C	1200A @ 1100V	

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				5	mA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	V_{GE} = 15V I_C = 600A	T_j = 25°C		1.8	2.2	V
			T_j = 125°C		2.2		
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE} , I_C = 11mA		5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = 20V, V_{CE} = 0V				800	nA

Dynamic Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
C_{ies}	Input Capacitance	V_{GE} = 0V V_{CE} = 25V f = 1MHz			37.2		nF
C_{oes}	Output Capacitance				2.3		
C_{res}	Reverse Transfer Capacitance				2		
Q_G	Gate charge	V_{GE}= -8V / 15V ; V_{CE}=600V I_C=600A			3.4		µC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) V_{GE} = ±15V V_{CE} = 600V I_C = 600A R_G = 0.8Ω			200		ns
T_r	Rise Time				40		
$T_{d(off)}$	Turn-off Delay Time				380		
T_f	Fall Time				70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) V_{GE} = ±15V V_{CE} = 600V I_C = 600A R_G = 0.8Ω			220		ns
T_r	Rise Time				50		
$T_{d(off)}$	Turn-off Delay Time				450		
T_f	Fall Time				80		
E_{on}	Turn-on Switching Energy	V_{GE} = ±15V V_{CE} = 600V I_C = 600A R_G = 0.8Ω	T_J = 150°C		54		mJ
E_{off}	Turn-off Switching Energy		T_J = 150°C		58		mJ
I_{sc}	Short Circuit data	V_{GE} ≤15V ; V_{Bus} = 900V t_p ≤10µs ; T_j = 150°C			2400		A

Chopper ratings and characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
V_{RRM}	Maximum Repetitive Reverse Voltage			1200			V
I_{RRM}	Maximum Reverse Leakage Current	V_R=1200V	T_j = 25°C			250	µA
			T_j = 150°C			2000	
I_F	DC Forward Current		T_C = 80°C		600		A
V_F	Diode Forward Voltage	I_F = 600A V_{GE} = 0V	T_j = 25°C		1.7	2.2	V
			T_j = 150°C		1.65		
t_{rr}	Reverse Recovery Time	I_F = 600A V_R = 600V di/dt = 7000A/µs	T_j = 25°C		155		ns
			T_j = 150°C		300		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		53		µC
			T_j = 150°C		110		
E_{rr}	Reverse Recovery Energy		T_j = 25°C		23		mJ
			T_j = 150°C		46		

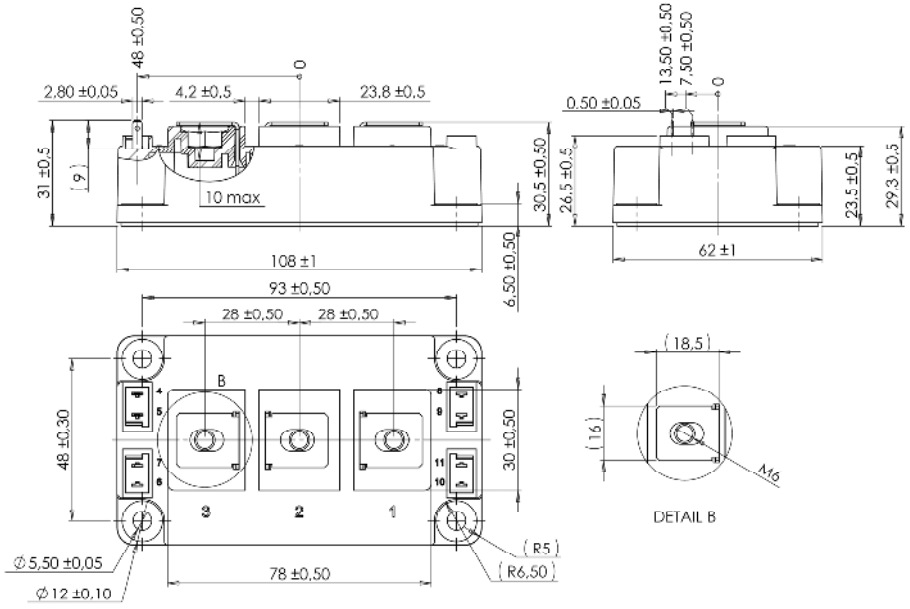
IGBT Parallel protection diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Maximum Repetitive Reverse Voltage			1200			V
I_{RRM}	Maximum Reverse Leakage Current	V_R=1200V	T_j = 25°C			100	µA
			T_j = 150°C			500	
I_F	DC Forward Current		T_C = 80°C		75		A
V_F	Diode Forward Voltage	I_F = 75A V_{GE} = 0V	T_j = 25°C		1.7	2.2	V
			T_j = 150°C		1.65		
t_{rr}	Reverse Recovery Time	I_F = 75A V_R = 600V di/dt = 1900A/µs	T_j = 25°C		155		ns
			T_j = 150°C		300		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		7.3		µC
			T_j = 150°C		15.2		
E_{rr}	Reverse Recovery Energy		T_j = 25°C		2.6		mJ
			T_j = 150°C		5.5		

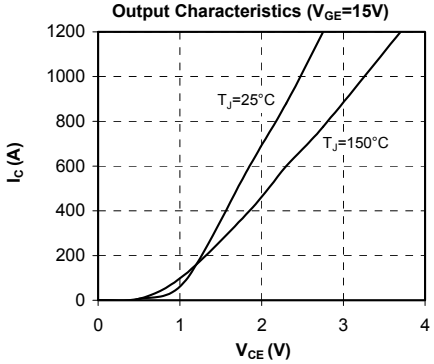
Thermal and package characteristics

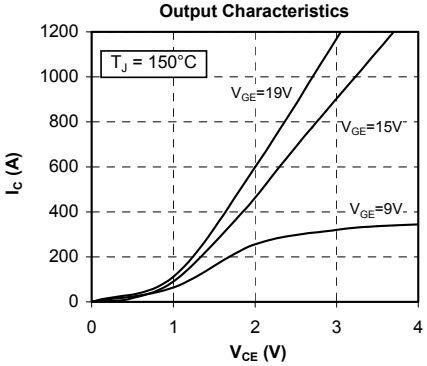
Symbol	Characteristic			Min	Typ	Max	Unit
R_{thJC}	Junction to Case Thermal Resistance	IGBT				0.05	°C/W
		Chopper diode				0.10	
		IGBT parallel diode				0.62	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000			V
T_J	Operating junction temperature range			-40		175	°C
T_{STG}	Storage Temperature Range			-40		125	
T_C	Operating Case Temperature			-40		125	
Torque	Mounting torque	For terminals	M6	3		5	N.m
		To Heatsink	M6	3		5	
Wt	Package Weight					350	g

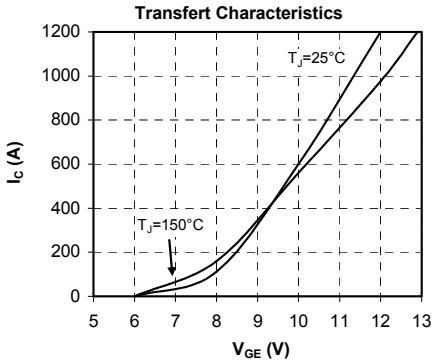
D3 Package outline (dimensions in mm)

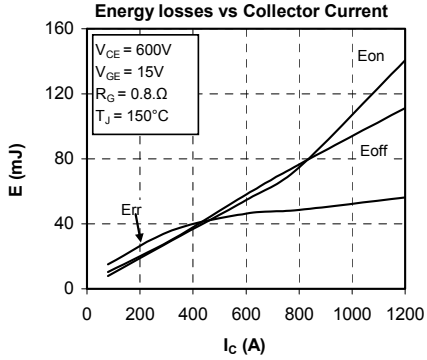


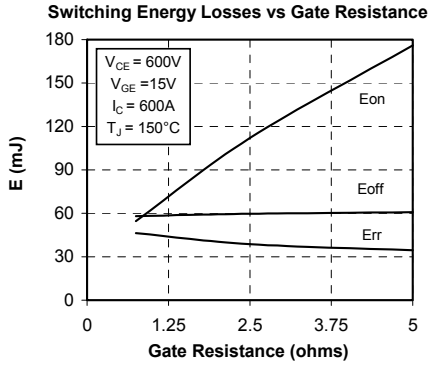
Typical Performance Curve

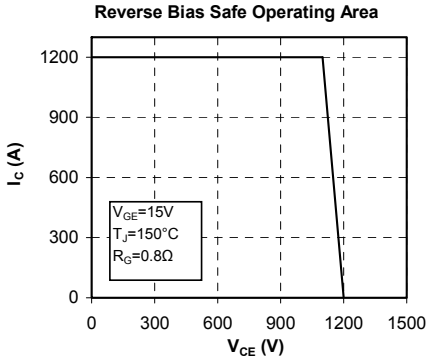


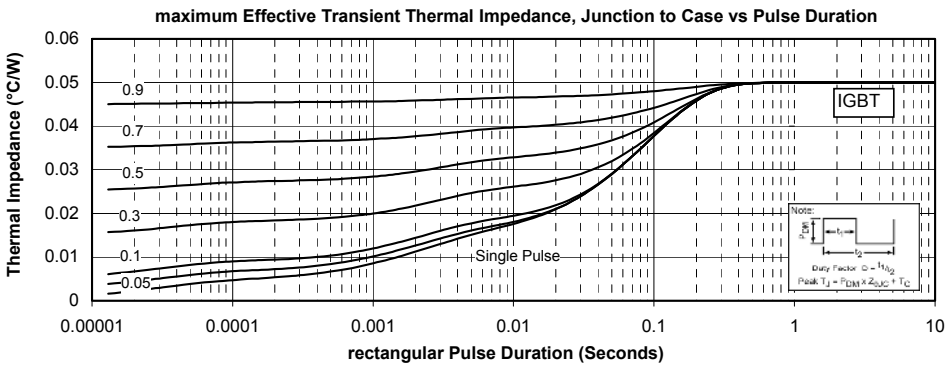




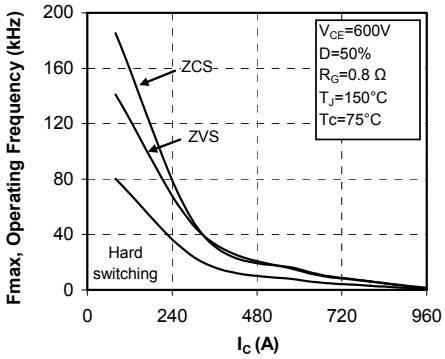




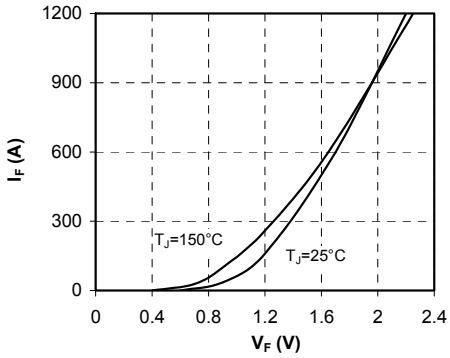




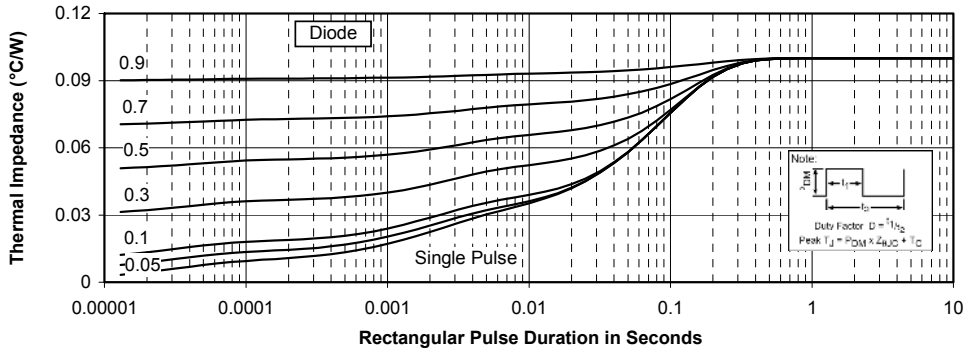
Operating Frequency vs Collector Current



Forward Characteristic of diode



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



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