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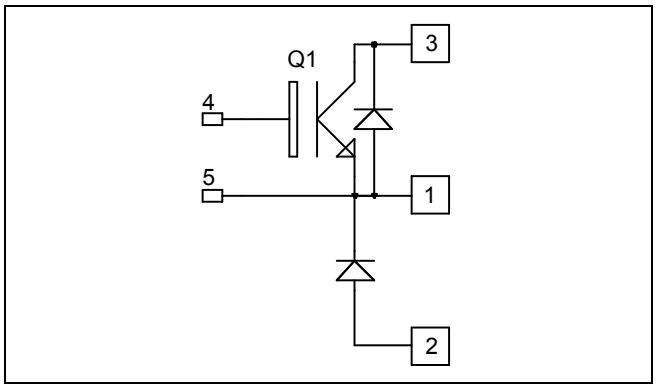
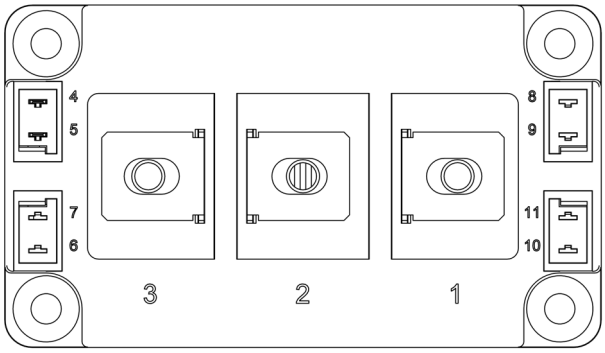
APTGL700SK120D3G

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			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		

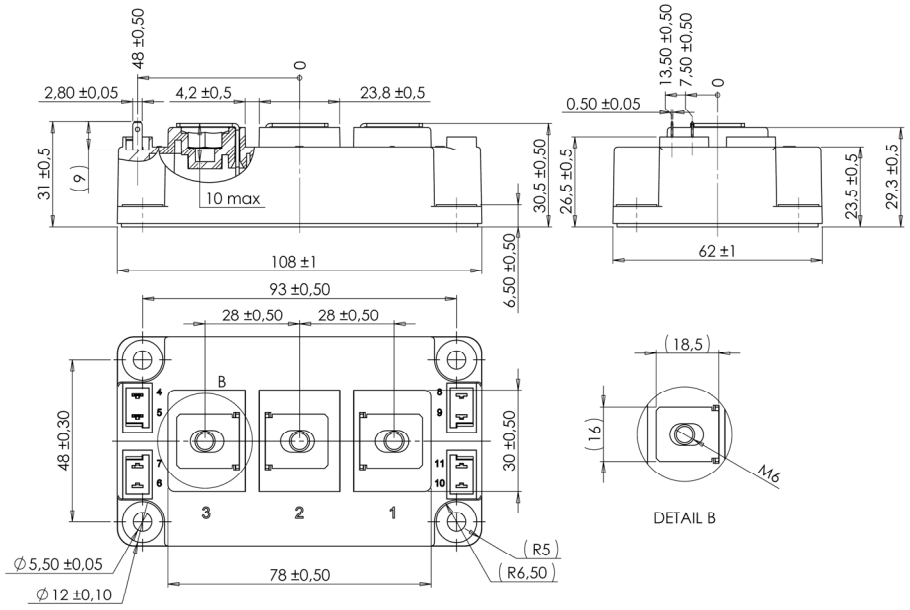
IGBT Parallel protection diode ratings and characteristics

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

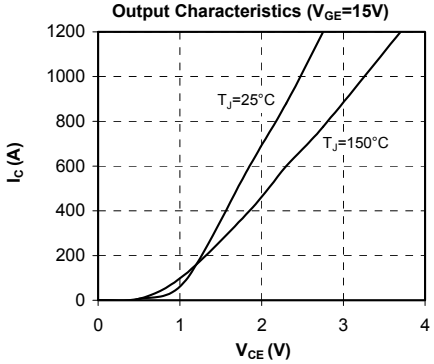
Symbol	Characteristic			Min	Typ	Max	Unit
R_{thJC}	Junction to Case Thermal Resistance	IGBT				0.05	°C/W
		Chopper diode				0.10	
		IGBT parallel diode				0.62	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000			V
T_J	Operating junction temperature range			-40		175	°C
T_{STG}	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)

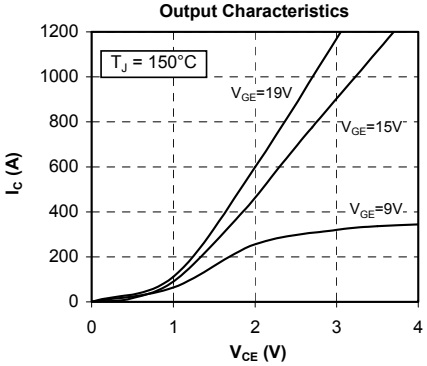


Typical Performance Curve

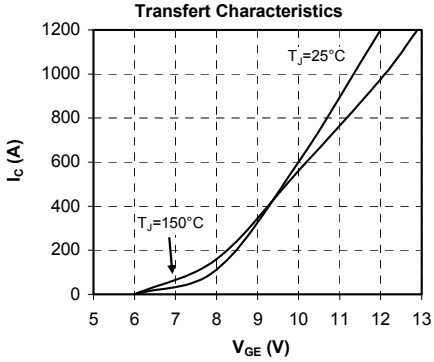
Output Characteristics (V_{GE}=15V)



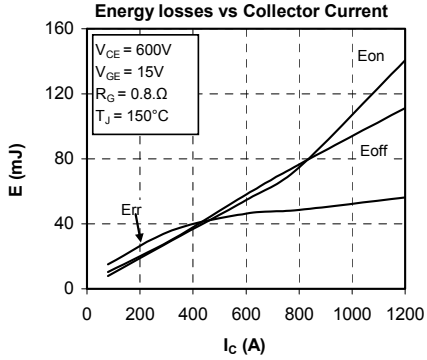
Output Characteristics



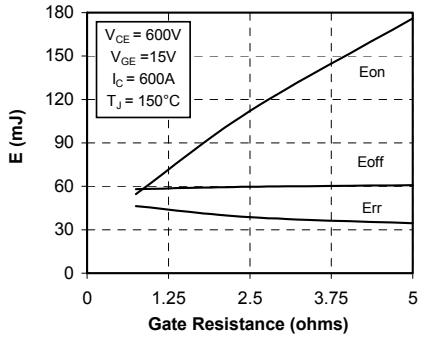
Transfert Characteristics



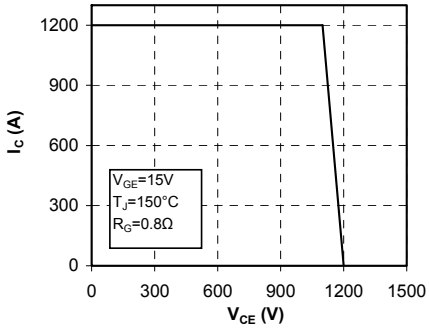
Energy losses vs Collector Current



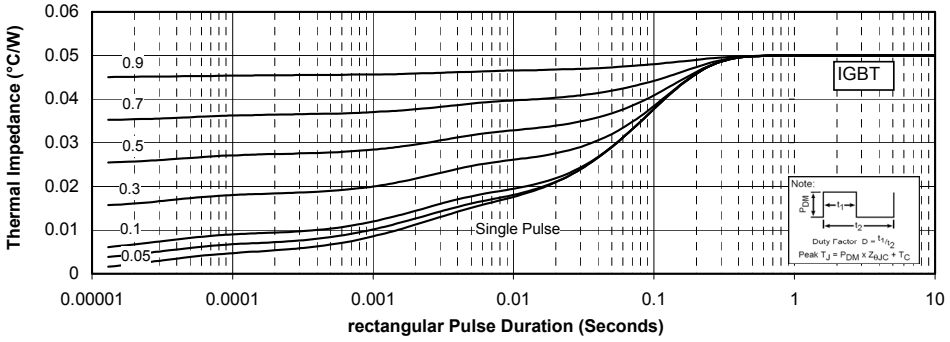
Switching Energy Losses vs Gate Resistance



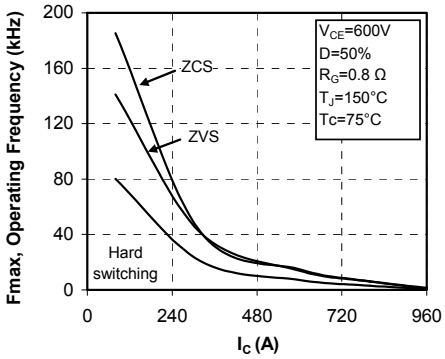
Reverse Bias Safe Operating Area



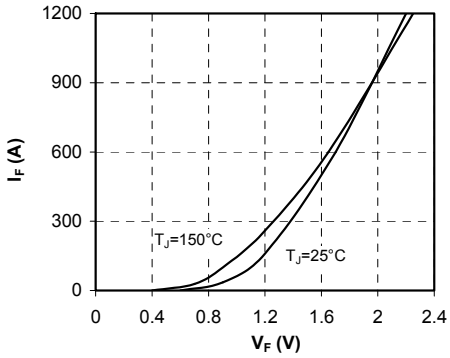
maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



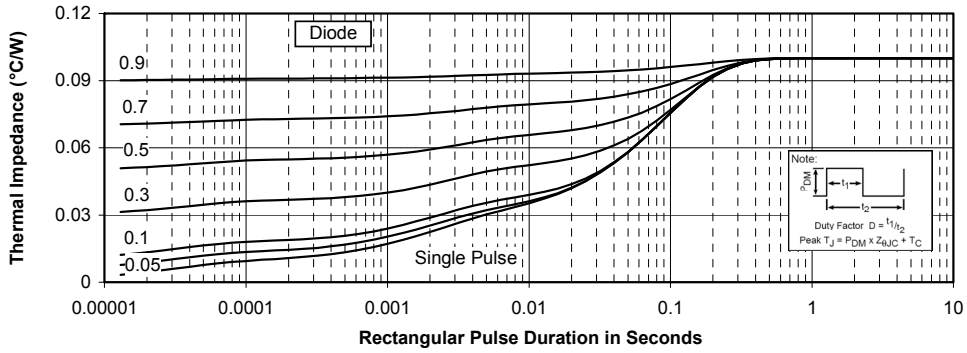
Operating Frequency vs Collector Current



Forward Characteristic of diode



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



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