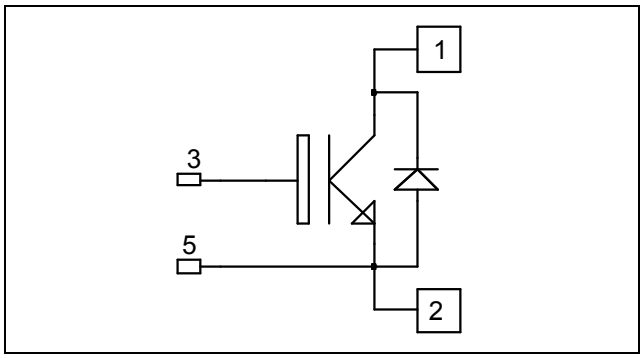
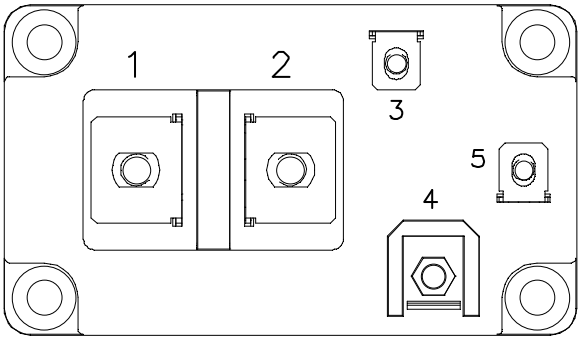
APTGF660U60D4G

Single switch NPT IGBT Power Module

V_{CES} = 600V
I_C = 660A @ Tc = 80°C





Application

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- Non Punch Through (NPT) IGBT
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 50 kHz
  - Soft recovery parallel diodes
  - Low diode VF
  - Low leakage current
  - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- M6 connectors for power
- M4 connectors for signal
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- 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		600	V
I_C	Continuous Collector Current	T_C = 25°C	860	A
		T_C = 80°C	660	
I_{CM}	Pulsed Collector Current	T_C = 25°C	1320	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Maximum Power Dissipation	T_C = 25°C	2800	W
RBSOA	Reverse Bias Safe Operating Area	T_j = 125°C	1600A@520V	

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} = 600V	T_j = 25°C			500	µA
			T_j = 125°C			1	mA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	V_{GE} = 15V I_C = 800A	T_j = 25°C		1.95	2.45	V
			T_j = 125°C		2.2		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$, I_C = 16mA		4.5	5.5	6.5	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = 20V, V_{CE} = 0V				2400	nA

Dynamic Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
C_{ies}	Input Capacitance	V_{GE} = 0V, V_{CE} = 25V f = 1MHz			36		nF
C_{res}	Reverse Transfer Capacitance				3.2		
Q_G	Gate charge	V_{GE}=15V, I_C=800A V_{CE}=300V			2		µC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) V_{GE} = ±15V V_{Bus} = 300V I_C = 800A R_G = 16Ω			150		ns
T_r	Rise Time				72		
$T_{d(off)}$	Turn-off Delay Time				530		
T_f	Fall Time				40		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) V_{GE} = ±15V V_{Bus} = 300V I_C = 800A R_G = 16Ω			160		ns
T_r	Rise Time				75		
$T_{d(off)}$	Turn-off Delay Time				550		
T_f	Fall Time				50		
E_{on}	Turn on Energy	V_{GE} = ±15V V_{Bus} = 300V I_C = 800A R_G = 16Ω	T_j = 125°C		36		mJ
E_{off}	Turn off Energy		T_j = 125°C		33		mJ
I_{sc}	Short Circuit data	V_{GE} ≤15V ; V_{Bus} = 360V t_p ≤ 10µs ; T_j = 125°C			3600		A

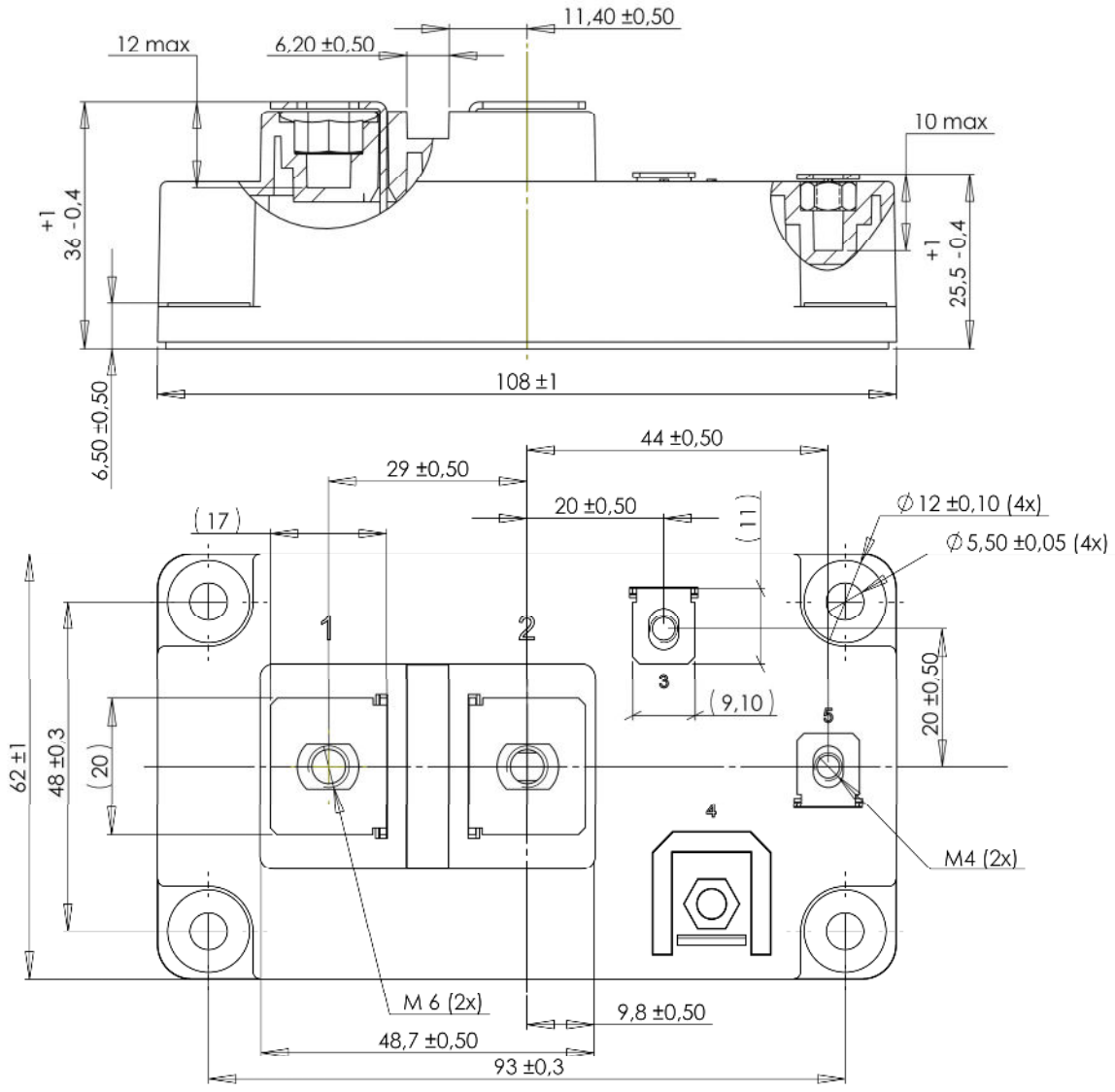
Reverse diode ratings and characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			600			V
I_{RRM}	Maximum Reverse Leakage Current	V_R = 600V	T_j = 25°C			750	µA
			T_j = 125°C			1000	
I_F	DC Forward Current		Tc = 80°C		800		A
V_F	Diode Forward Voltage	I_F = 800A V_{GE} = 0V	T_j = 25°C		1.25	1.6	V
			T_j = 125°C		1.2		
t_{rr}	Reverse Recovery Time	I_F = 800A V_R = 300V di/dt =7000A/µs	T_j = 25°C		150		ns
			T_j = 125°C		250		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		57		µC
			T_j = 125°C		80		
E_{rr}	Reverse Recovery Energy		T_j = 25°C		11.6		mJ
			T_j = 125°C		22.8		

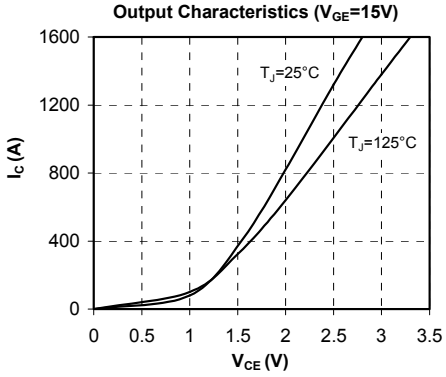
Thermal and package characteristics

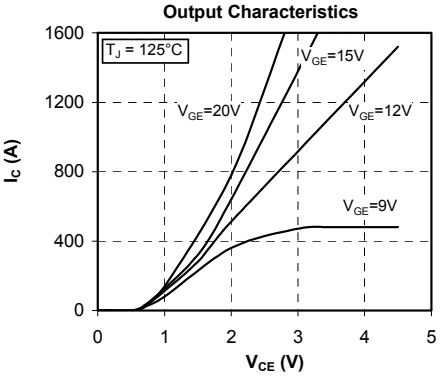
Symbol	*Characteristic*		*Min*	*Typ*	*Max*	*Unit*
R_{thJC}	Junction to Case Thermal Resistance	IGBT			0.044	°C/W
		Diode			0.085	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz		2500			V
T_J	Operating junction temperature range		-40		150	°C
T_{STG}	Storage Temperature Range		-40		125	
T_C	Operating Case Temperature		-40		125	
Torque	Mounting torque	M6	3		5	N.m
		M4	1		2	
Wt	Package Weight				350	g

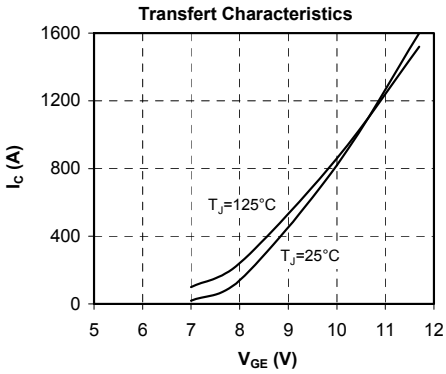
D4 Package outline (dimensions in mm)

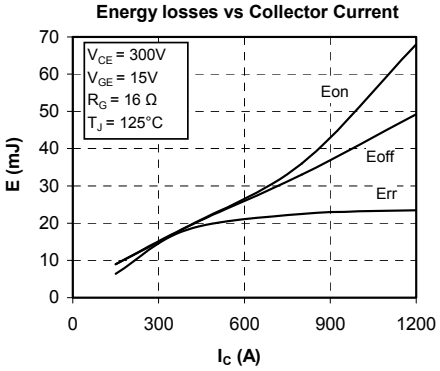


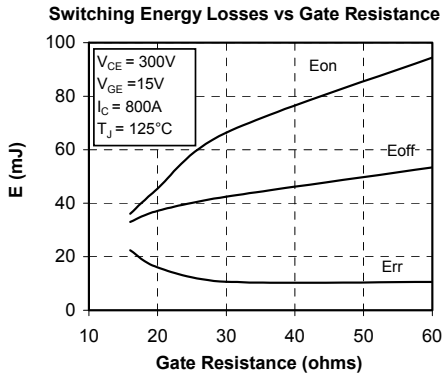
Typical Performance Curve

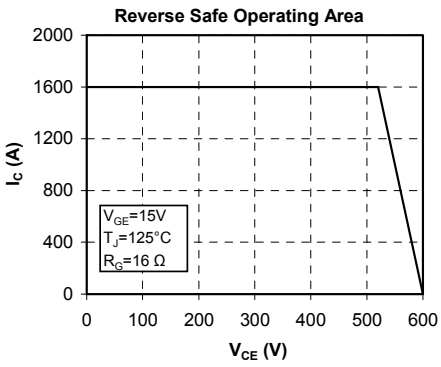


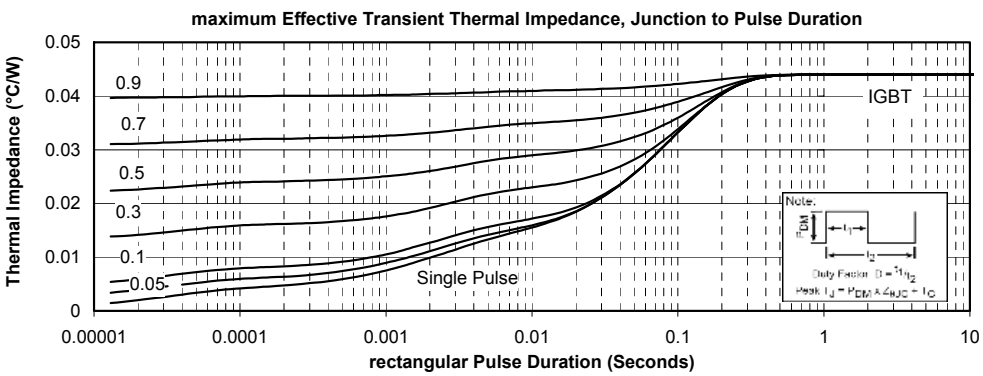




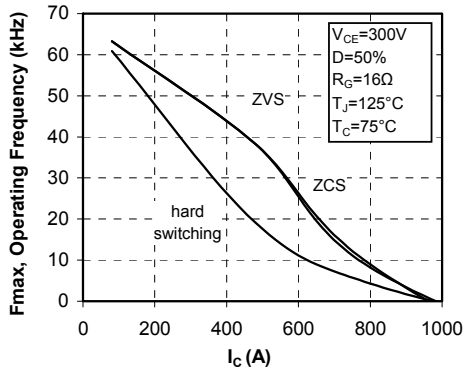




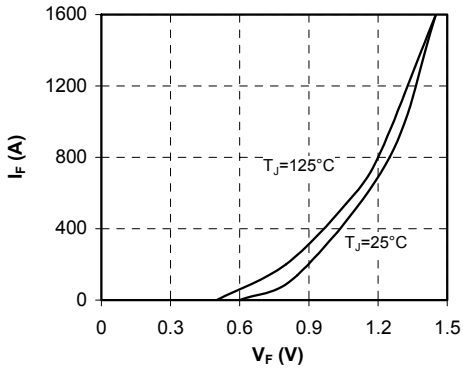




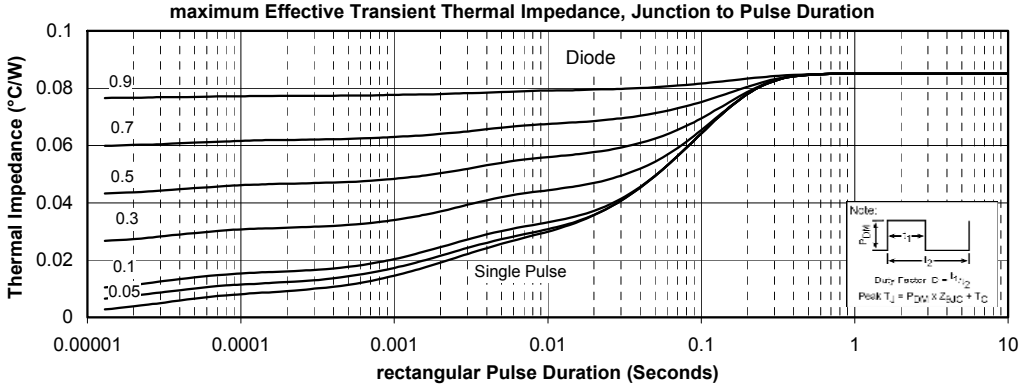
Operating Frequency vs Collector Current



Forward Characteristic of diode



maximum Effective Transient Thermal Impedance, Junction to Pulse Duration



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