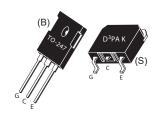


APT75GN60B(G) APT75GN60S(G)

600V

Utilizing the latest Field Stop and Trench Gate technologies, these IGBT's have ultra low $V_{\text{CE}(ON)}$ and are ideal for low frequency applications that require absolute minimum conduction loss. Easy paralleling is a result of very tight parameter distribution and a slightly positive $V_{\text{CE}(ON)}$ temperature coefficient. A built-in gate resistor ensures extremely reliable operation, even in the event of a short circuit fault. Low gate charge simplifies gate drive design and minimizes losses.



- 600V Field Stop
- Trench Gate: Low V_{CE(on)}
- Easy Paralleling
- · 6µs Short Circuit Capability
- Intergrated Gate Resistor: Low EMI, High Reliability
 Applications: Welding, Inductive Heating, Solar Inverters, SMPS, Motor drives, UPS



MAXIMUM RATINGS

All Ratings: $T_C = 25^{\circ}C$ unless otherwise specified.

Symbol	Parameter	APT75GN60B_S(G)	UNIT	
V _{CES}	Collector-Emitter Voltage	600	Volts	
V _{GE}	Gate-Emitter Voltage	±30		
I _{C1}	Continuous Collector Current [®] @ T _C = 25°C	155		
I _{C2}	Continuous Collector Current @ T _C = 110°C	93	Amps	
I _{CM}	Pulsed Collector Current (1)	225		
SSOA	Switching Safe Operating Area @ T _J = 175°C	225A @ 600V		
P _D	Total Power Dissipation	536	Watts	
T_J , T_{STG}	Operating and Storage Junction Temperature Range	-55 to 175		
T _L	Max. Lead Temp. for Soldering: 0.063" from Case for 10 Sec.	300	°C	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	Units
V _{(BR)CES}	Collector-Emitter Breakdown Voltage $(V_{GE} = 0V, I_{C} = 4mA)$	600			Volts
V _{GE(TH)}	Gate Threshold Voltage (V _{CE} = V _{GE} , I _C = 1mA, T _j = 25°C)	5.0	5.8	6.5	
V _{CE(ON)}	Collector-Emitter On Voltage (V _{GE} = 15V, I _C = 75A, T _j = 25°C)	1.05	1.45	1.85	
	Collector-Emitter On Voltage (V _{GE} = 15V, I _C = 75A, T _j = 125°C)		1.87		
I _{CES}	Collector Cut-off Current (V _{CE} = 600V, V _{GE} = 0V, T _j = 25°C) ^②			25	μА
	Collector Cut-off Current (V _{CE} = 600V, V _{GE} = 0V, T _j = 125°C) ⁽²⁾				
I _{GES}	Gate-Emitter Leakage Current (V _{GE} = ±20V)			600	nA
R _{G(int)}	Intergrated Gate Resistor		4		Ω

These Devices are Sensitive to Electrostatic Discharge Proper Handling Procedures Should Be Followed.

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DYNAMIC CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C _{ies}	Input Capacitance	Capacitance		4500		
C _{oes}	Output Capacitance	V _{GE} = 0V, V _{CE} = 25V		370		pF
C _{res}	Reverse Transfer Capacitance	f = 1 MHz		150		1
V _{GEP}	Gate-to-Emitter Plateau Voltage	Gate Charge		9.5		V
Q_{a}	Total Gate Charge ^③	V _{GF} = 15V		485		
Q _{ge}	Gate-Emitter Charge	V _{CE} = 300V		30		nC
Q _{gc}	Gate-Collector ("Miller") Charge	I _C = 75A		270		-
SSOA	Switching Safe Operating Area	$T_J = 175^{\circ}C$, $R_G = 4.3\Omega^{\text{T}}$, $V_{GE} = 15V$, $L = 100\mu\text{H}$, $V_{CE} = 600V$	225			А
SCSOA	Short Circuit Safe Operating Area	$V_{CC} = 600V, V_{GE} = 15V,$ $T_J = 125^{\circ}C, R_G = 4.3\Omega^{\textcircled{7}}$	6			μs
t _{d(on)}	Turn-on Delay Time	Inductive Switching (25°C)		47		
t _r	Current Rise Time	V _{CC} = 400V		48		ns
t _{d(off)}	Turn-off Delay Time	V _{GE} = 15V		385		113
t _f	Current Fall Time	I _C = 75A		38		
E _{on1}	Turn-on Switching Energy ⁴	$R_G = 1.0\Omega^{\bigcirc}$		2500		
E _{on2}	Turn-on Switching Energy (Diode) ^⑤	T _J = +25°C		3725		μJ
E _{off}	Turn-off Switching Energy ⁶			2140		1
t _{d(on)}	Turn-on Delay Time	Inductive Switching (125°C)		47		
t _r	Current Rise Time	V _{CC} = 400V		48] ,,
t _{d(off)}	Turn-off Delay Time	V _{GE} = 15V		430		ns
t _f	Current Fall Time	I _C = 75A		55		
E _{on1}	Turn-on Switching Energy ⁴	$R_G = 1.0\Omega^{\bigcirc}$		2600		
E _{on2}	Turn-on Switching Energy (Diode) ^⑤	T _J = +125°C		4525		μJ
E _{off}	Turn-off Switching Energy ⁶			2585]

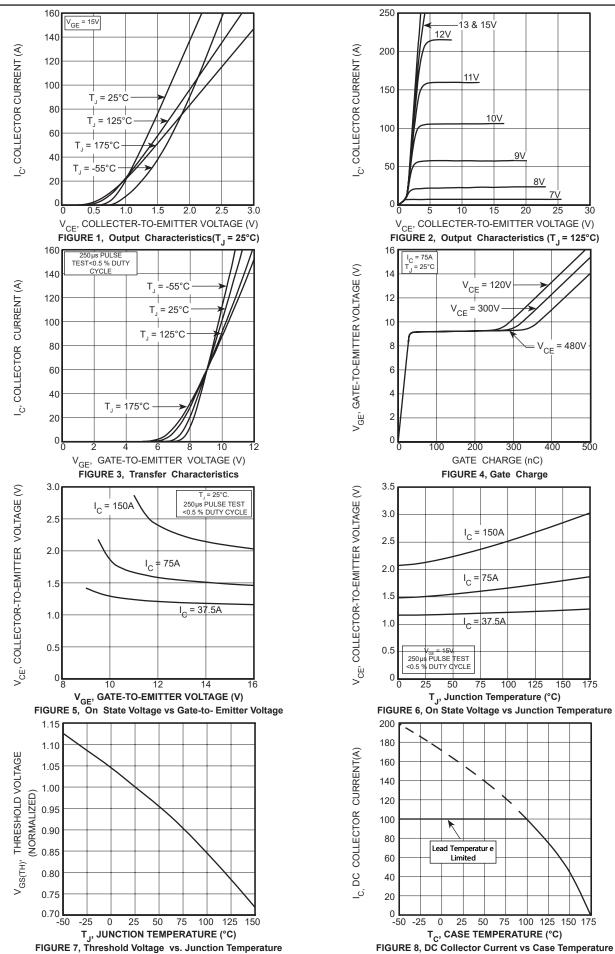
THERMAL AND MECHANICAL CHARACTERISTICS

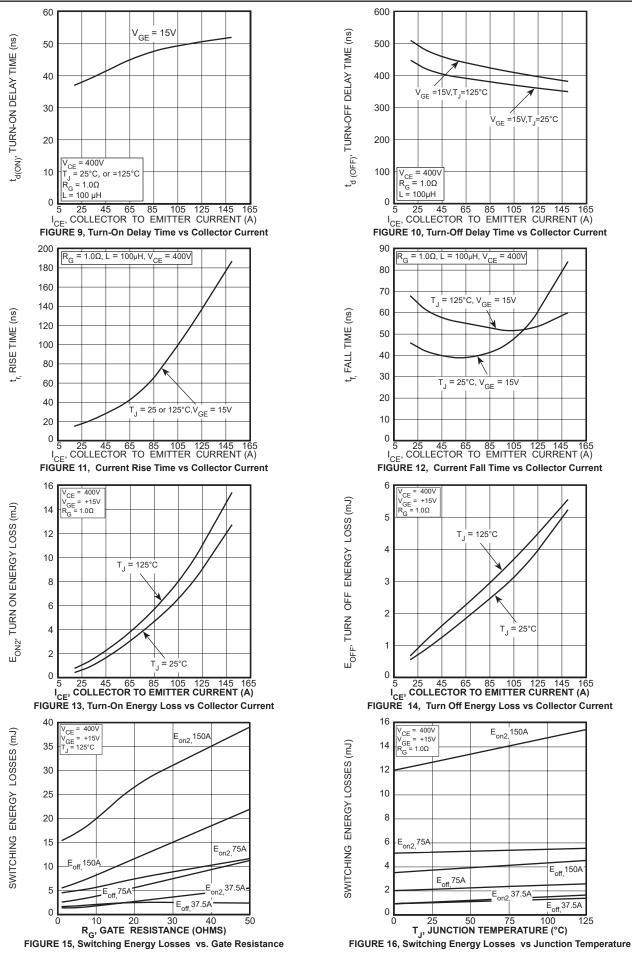
Symbol	Characteristic	MIN	TYP	MAX	UNIT
R _{θJC}	Junction to Case (IGBT)			.28	°C/W
$R_{\theta JC}$	Junction to Case (DIODE)			N/A	- C/VV
W _T	Package Weight		5.9		gm

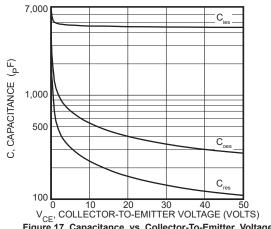
- 1 Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2 For Combi devices, \mathbf{I}_{ces} includes both IGBT and FRED leakages
- ③ See MIL-STD-750 Method 3471.
- (4) E_{on1} is the clamped inductive turn-on energy of the IGBT only, without the effect of a commutating diode reverse recovery current adding to the IGBT turn-on loss. Tested in inductive switching test circuit shown in figure 21, but with a Silicon Carbide diode.
- (5) E_{on2} is the clamped inductive turn-on energy that includes a commutating diode reverse recovery current in the IGBT turn-on switching loss. (See Figures 21, 22.)
- (6) E_{off} is the clamped inductive turn-off energy measured in accordance with JEDEC standard JESD24-1. (See Figures 21, 23.)
- \bigcirc R $_{\rm G}$ is external gate resistance, not including R $_{\rm G(int)}$ nor gate driver impedance. (MIC4452)
- (8) Continuous current limited by package pin temperature to 100A.
 Microsemi reserves the right to change, without notice, the specifications and information contained herein.

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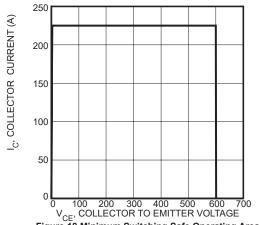
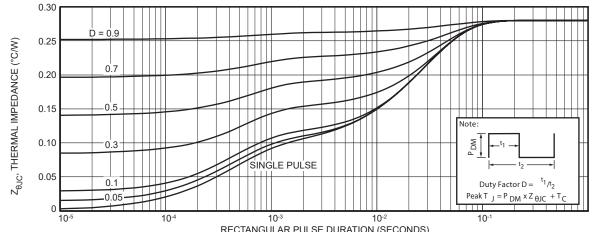


Figure 17, Capacitance vs Collector-To-Emitter Voltage Figure 18, Minimum Switching Safe Operating Area



RECTANGULAR PULSE DURATION (SECONDS)
Figure 19a, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

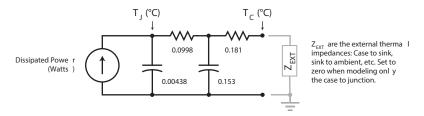
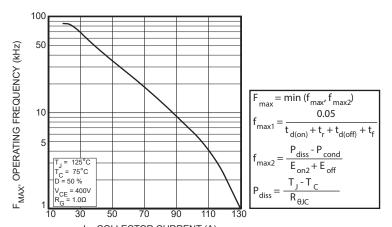


FIGURE 19b, TRANSIENT THERMAL IMPEDANCE MODEL



I_C, COLLECTOR CURRENT (A)
Figure 20, Operating Frequency vs Collector Current

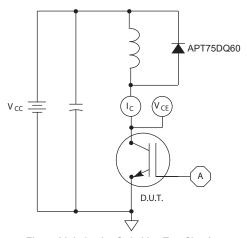


Figure 21, Inductive Switching Test Circuit

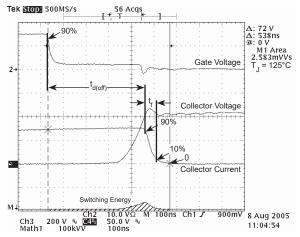


Figure 23, Turn-off Switching Waveforms and Definitions

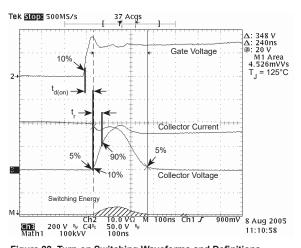
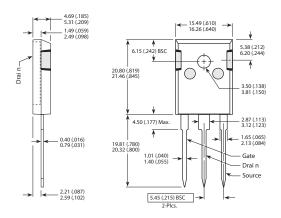
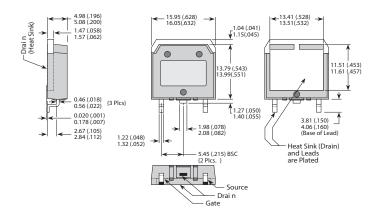


Figure 22, Turn-on Switching Waveforms and Definitions

TO-247 (B) Package Outline



D³PAK (S) Package Outline



Dimensions in Millimeters (Inches)

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