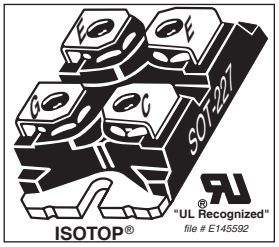
600V

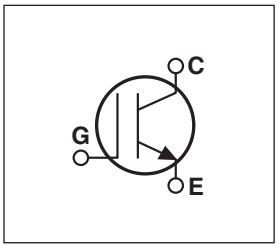
APT100GT60JR

Thunderbolt IGBT®



The Thunderblot IGBT® is a new generation of high voltage power IGBTs. Using Non- Punch Through Technology, the Thunderblot IGBT® offers superior ruggedness and ultrafast switching speed.

- **Low Forward Voltage Drop**
- **High Freq. Switching to 80KHz**
- **Low Tail Current**
- **Ultra Low Leakage Current**
- **RBSOA and SCSOA Rated**



MAXIMUM RATINGS

All Ratings: T_C = 25°C unless otherwise specified.

Symbol	Parameter	APT100GT60JR	UNIT
V_{CES}	Collector-Emitter Voltage	600	Volts
V_{GE}	Gate-Emitter Voltage	±30	
I_{C1}	Continuous Collector Current @ T_C = 25°C	148	Amps
I_{C2}	Continuous Collector Current @ T_C = 100°C	80	
I_{CM}	Pulsed Collector Current ①	300	
SSOA	Switching Safe Operating Area @ T_J = 150°C	300A @ 600V	
P_D	Total Power Dissipation	500	Watts
T_J,T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	°C
T_L	Max. Lead Temp. for Soldering: 0.063" from Case for 10 Sec.	300	

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 = 1.5mA, T_j = 25°C)	3	4	5	
$V_{CE(ON)}$	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 100A, T_j = 25°C)	1.7	2.1	2.5	
	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 100A, T_j = 125°C)		2.5		
I_{CES}	Collector Cut-off Current (V_{CE} = 600V, V_{GE} = 0V, T_j = 25°C) ②			25	µA
	Collector Cut-off Current (V_{CE} = 600V, V_{GE} = 0V, T_j = 125°C) ②			TBD	
I_{GES}	Gate-Emitter Leakage Current (V_{GE} = ±30V)			300	nA

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

DYNAMIC CHARACTERISTICS

APT100GT60JR

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{ies}	Input Capacitance	**Capacitance**		5150		pF
C_{oes}	Output Capacitance	V_{GE} = 0V, V_{CE} = 25V		475		
C_{res}	Reverse Transfer Capacitance	f = 1 MHz		295		
V_{GEP}	Gate-to-Emitter Plateau Voltage	Gate Charge		8.0		V
Q_g	Total Gate Charge ③	V_{GE} = 15V		460		nC
Q_{ge}	Gate-Emitter Charge	V_{CE} = 300V		40		
Q_{gc}	Gate-Collector ("Miller") Charge	I_C = 100A		210		
SSOA	Switching Safe Operating Area	T_J = 150°C, R_G = 4.3Ω, V_{GE} = 15V, L = 100µH, V_{CE} = 600V	300			A
$t_{d(on)}$	Turn-on Delay Time	**Inductive Switching (25°C)**		40		ns
t_r	Current Rise Time	V_{CC} = 400V		75		
$t_{d(off)}$	Turn-off Delay Time	V_{GE} = 15V		320		
t_f	Current Fall Time	I_C = 100A		100		
E_{on1}	Turn-on Switching Energy ④	R_G = 4.3Ω		3250		µJ
E_{on2}	Turn-on Switching Energy (Diode) ⑤	T_J = +25°C		3525		
E_{off}	Turn-off Switching Energy ⑥			3125		
$t_{d(on)}$	Turn-on Delay Time	**Inductive Switching (125°C)**		40		ns
t_r	Current Rise Time	V_{CC} = 400V		75		
$t_{d(off)}$	Turn-off Delay Time	V_{GE} = 15V		350		
t_f	Current Fall Time	I_C = 100A		100		
E_{on1}	Turn-on Switching Energy ④	R_G = 4.3Ω		3275		µJ
E_{on2}	Turn-on Switching Energy (Diode) ⑤	T_J = +125°C		4650		
E_{off}	Turn-off Switching Energy ⑥			3750		

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case **(IGBT)**			.25	°C/W
$R_{\theta JC}$	Junction to Case **(DIODE)**			N/A	
W_T	Package Weight		29.2		gm
$V_{Isolation}$	RMS Voltage (50-60hHz Sinusoidal Wavefomr Ffrom Terminals to Mounting Base for 1 Min.)	2500			Volts

① Repetitive Rating: Pulse width limited by maximum junction temperature.

② For Combi devices, 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.)

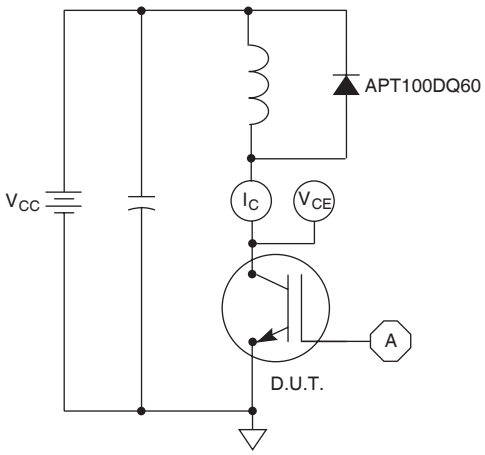


Figure 21, Inductive Switching Test Circuit

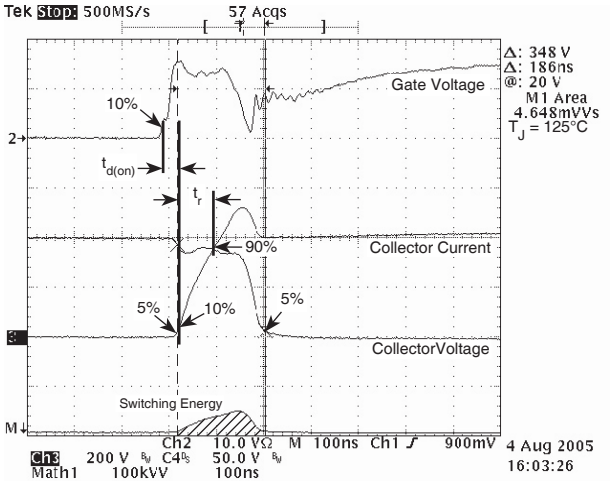


Figure 22, Turn-on Switching Waveforms and Definitions

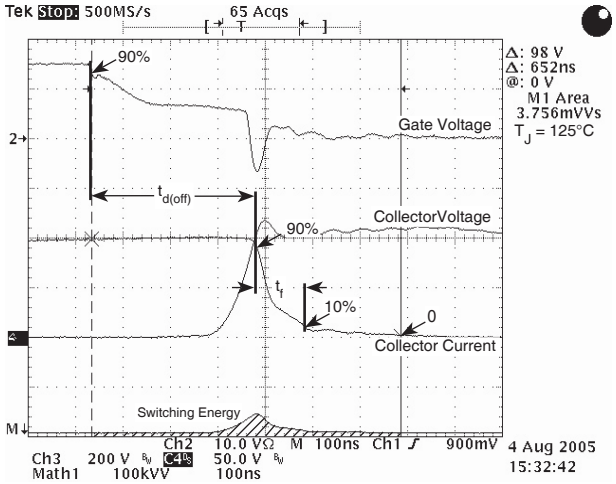
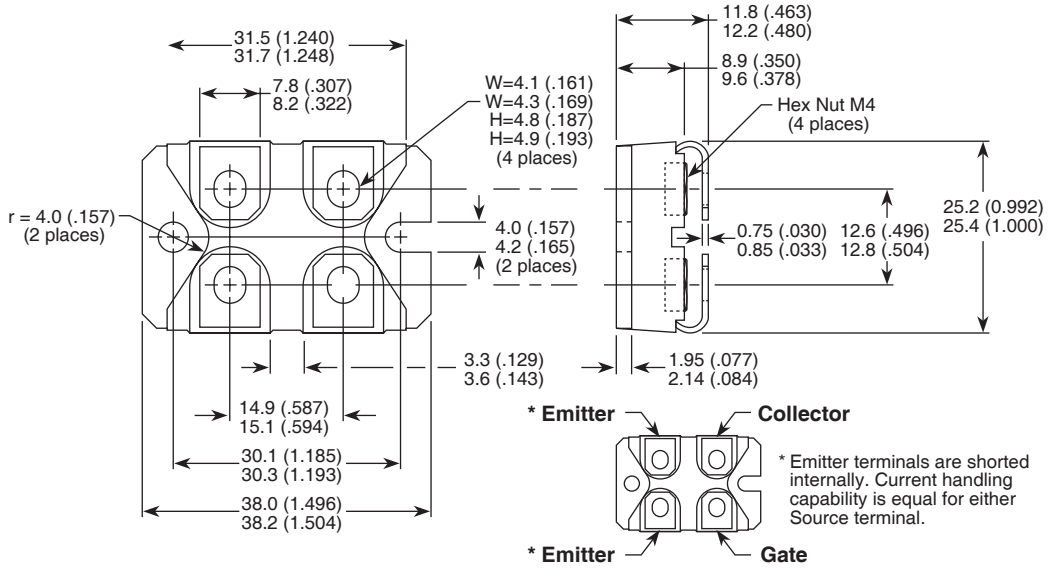


Figure 23, Turn-off Switching Waveforms and Definitions

SOT-227 (ISOTOP®) Package Outline



Dimensions in Millimeters and (Inches)