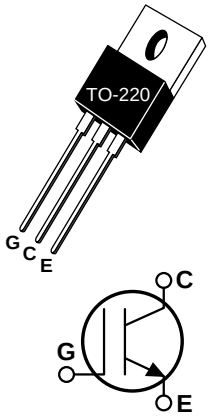
APT8GT60KR

600V 17A

Thunderbolt IGBT™



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

- **Low Forward Voltage Drop**
- **Low Tail Current**
- **Avalanche Rated**
- **High Freq. Switching to 150KHz**
- **Ultra Low Leakage Current**
- **RBSOA and SCSOA Rated**

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

Symbol	Parameter	APT8GT60KR	UNIT
V_{CES}	Collector-Emitter Voltage	600	Volts
V_{CGR}	Collector-Gate Voltage (R_{GE} = 20KΩ)	600	
V_{EC}	Emitter-Collector Voltage	15	
V_{GE}	Gate-Emitter Voltage	±20	
I_{C1}	Continuous Collector Current @ T_C = 25°C	17	Amps
I_{C2}	Continuous Collector Current @ T_C = 110°C	8	
I_{CM1}	Pulsed Collector Current ① @ T_C = 25°C	34	
I_{CM2}	Pulsed Collector Current ① @ T_C = 110°C	16	
E_{AS}	Single Pulse Avalanche Energy ②	9	mJ
P_D	Total Power Dissipation	70	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	UNIT
BV_{CES}	Collector-Emitter Breakdown Voltage (V_{GE} = 0V, I_C = 0.5mA, T_j = -55°C)	600			Volts
RBV_{CES}	Collector-Emitter Reverse Breakdown Voltage (V_{GE} = 0V, I_C = 50mA)	-15			
$V_{GE}(TH)$	Gate Threshold Voltage (V_{CE} = V_{GE}, I_C = 200µA, T_j = 25°C)	3	4	5	
$V_{CE}(ON)$	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = I_{C2}, T_j = 25°C)	1.6	2.0	2.5	
	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = I_{C2}, T_j = 150°C)		2.3	2.8	
I_{CES}	Collector Cut-off Current (V_{CE} = V_{CES}, V_{GE} = 0V, T_j = 25°C)			20	µA
	Collector Cut-off Current (V_{CE} = V_{CES}, V_{GE} = 0V, T_j = 150°C)			700	
I_{GES}	Gate-Emitter Leakage Current (V_{GE} = ±20V, V_{CE} = 0V)			±100	nA

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

APT Website - http://www.advancedpower.com

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052-6200 Rev C

DYNAMIC CHARACTERISTICS

APT8GT60KR

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{ies}	Input Capacitance	**Capacitance** V_{GE} = 0V, V_{CE} = 25V, f = 1 MHz		355		pF
C_{oes}	Output Capacitance			44		
C_{res}	Reverse Transfer Capacitance			23		
Q_g	Total Gate Charge ③	**Gate Charge** V_{GE} = 15V, V_{CC} = 0.66V_{CES}, I_C = I_{C2}		32		nC
Q_{ge}	Gate-Emitter Charge			15		
Q_{gc}	Gate-Collector ("Miller") Charge			3		
$t_d(on)$	Turn-on Delay Time	**Resistive Switching (25°C)** V_{GE} = 15V, V_{CC} = 0.66V_{CES}, I_C = I_{C2}, R_G = 50Ω		7		ns
t_r	Rise Time			11		
$t_d(off)$	Turn-off Delay Time			40		
t_f	Fall Time			90		
$t_d(on)$	Turn-on Delay Time	**Inductive Switching (150°C)** V_{CLAMP}(Peak) = 0.66V_{CES}, V_{GE} = 15V, I_C = I_{C2}, R_G = 50Ω, T_J = +150°C		11		ns
t_r	Rise Time			5		
$t_d(off)$	Turn-off Delay Time			100		
t_f	Fall Time			70		
E_{on}	Turn-on Switching Energy			0.05		mJ
E_{off}	Turn-off Switching Energy			0.22		
E_{ts}	Total Switching Losses			0.27		
$t_d(on)$	Turn-on Delay Time	**Inductive Switching (25°C)** V_{CLAMP}(Peak) = 0.66V_{CES}, V_{GE} = 15V, I_C = I_{C2}, R_G = 50Ω, T_J = +25°C		11		ns
t_r	Rise Time			5		
$t_d(off)$	Turn-off Delay Time			80		
t_f	Fall Time			45		
E_{ts}	Total Switching Losses			0.20		mJ
gfe	Forward Transconductance	V_{CE} = 20V, I_C = I_{C2}	1.2	4.3		S

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\Theta JC}$	Junction to Case			1.8	°C/W
$R_{\Theta JA}$	Junction to Ambient			80	
Torque	Mounting Torque using a 6-32 or 3mm Binding Head Machine Screw		10		lb•in

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

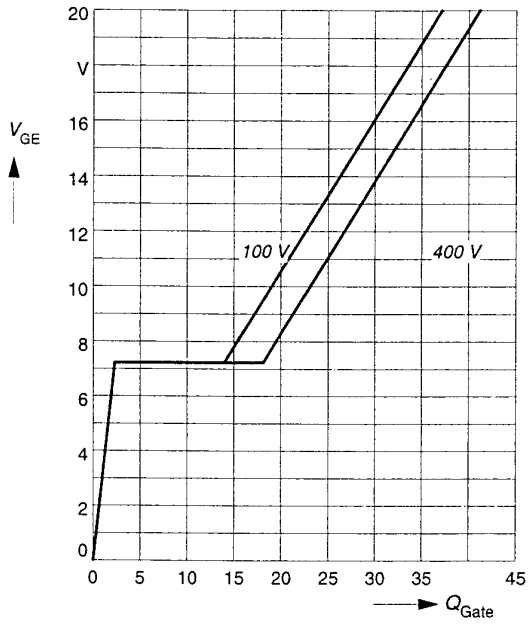
② I_C = I_{C2}, V_{CC} = 50V, R_{GE} = 25Ω, L = 500µH, T_j = 25°C

③ See MIL-STD-750 Method 3471

Typ. gate charge

$V_{GE} = f(Q_{Gate})$

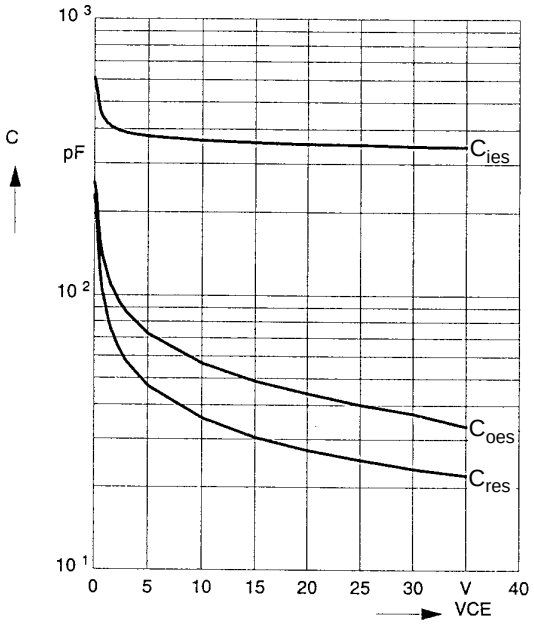
parameter: $I_{C\ puls} = 8\,A$



Typ. capacitances

$C = f(V_{CE})$

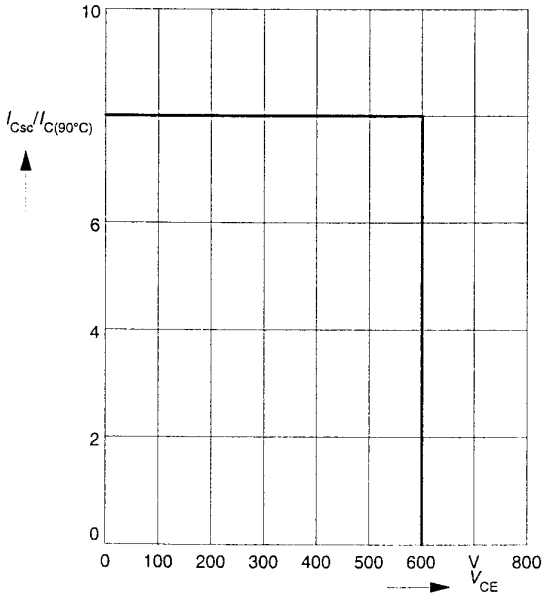
parameter: V_{GE} = 0V, f = 1 MHz



Short circuit safe operating area

$I_{Csc} = f(V_{CE})$, $T_j = 150°C$

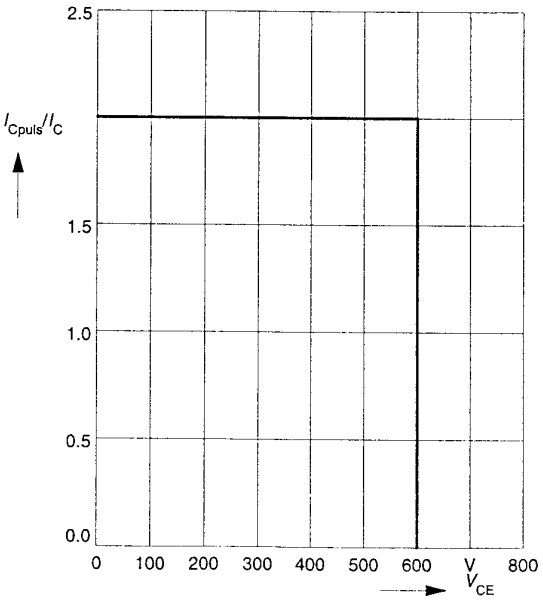
parameter: $V_{GE} = \pm 15$ V, $t_{sc} \leq 10$ µs, L < 50 nH



Reverse biased safe operating area

$I_{Cpuls} = f(V_{CE})$, $T_j = 150°C$

parameter: $V_{GE} = 15$ V



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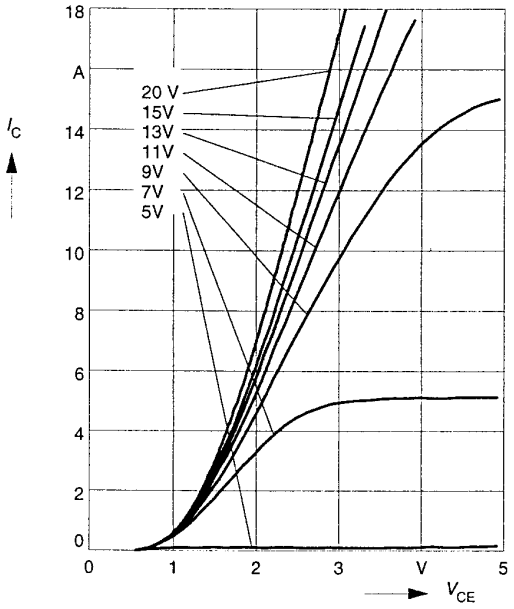
Typ. output characteristics

$I_C = f(V_{CE})$

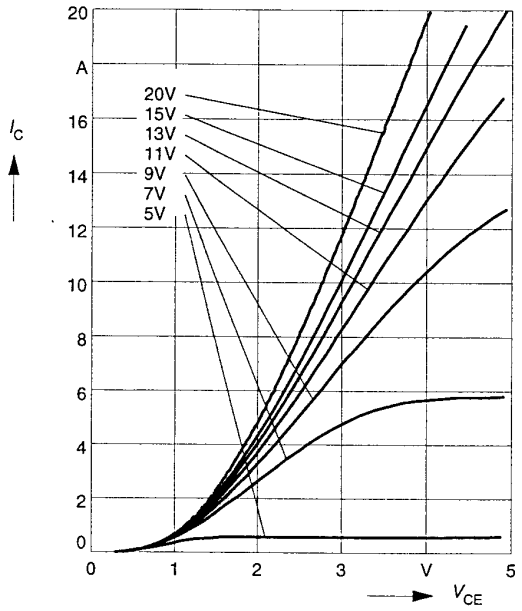
parameter: t_p = 80 µs, T_j = 25 °C



Typ. output characteristics

$I_C = f(V_{CE})$

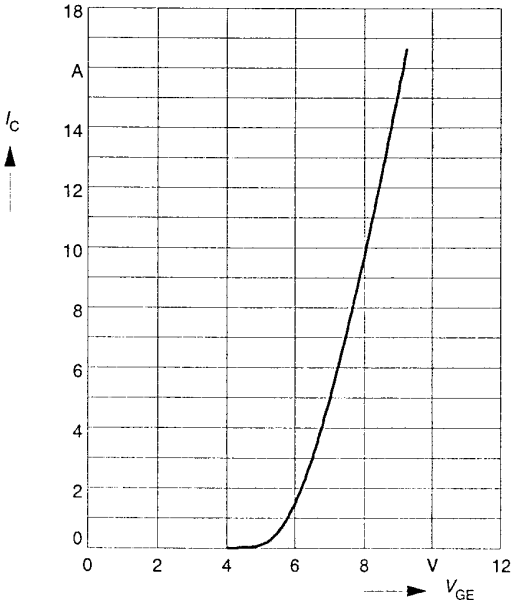
parameter: t_p = 80 µs, T_j = 150 °C



Typ. transfer characteristics

$I_C = f(V_{GE})$

parameter: t_p = 80 µs, V_{CE} = 20 V



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