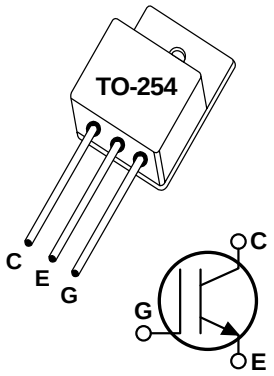
APT20GT60CR

600V 25A

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**
- **Hermetic Package**
- **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	APT20GT60CR	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 ④ @ T_C = 25°C	25	Amps
I_{C2}	Continuous Collector Current @ T_C = 85°C	20	
I_{CM}	Pulsed Collector Current ① @ T_C = 25°C	50	
I_{LM}	RBSOA Clamped Inductive Load Current @ R_g = 11Ω T_C = 125°C	40	
E_{AS}	Single Pulse Avalanche Energy ②	40	mJ
P_D	Total Power Dissipation	100	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	

PRELIMINARY

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 = 500µA, 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)			2.8	
I_{CES}	Collector Cut-off Current (V_{CE} = V_{CES}, V_{GE} = 0V, T_j = 25°C)			40	µA
	Collector Cut-off Current (V_{CE} = V_{CES}, V_{GE} = 0V, T_j = 150°C)			1000	
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

USA 405 S.W. Columbia Street Bend, Oregon 97702-1035 Phone: (541) 382-8028 FAX: (541) 388-0364

EUROPE Chemin de Magret F-33700 Merignac - France Phone: (33) 5 57 92 15 15 FAX: (33) 5 56 47 97 61

050-5970 Rev - 6-2000

DYNAMIC CHARACTERISTICS

APT20GT60CR

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{ies}	Input Capacitance	**Capacitance** V_{GE} = 0V, V_{CE} = 25V, f = 1 MHz		1100		pF
C_{oes}	Output Capacitance			110		
C_{res}	Reverse Transfer Capacitance			65		
Q_g	Total Gate Charge ③	**Gate Charge** V_{GE} = 15V, V_{CC} = 0.5V_{CES}, I_C = I_{C2}		95		nC
Q_{ge}	Gate-Emitter Charge			40		
Q_{gc}	Gate-Collector ("Miller") Charge			8		
t_d(on)	Turn-on Delay Time	**Resistive Switching (25°C)** V_{GE} = 15V, V_{CC} = 0.8V_{CES}, I_C = I_{C2}, R_G = 10Ω		10		ns
t_r	Rise Time			34		
t_d(off)	Turn-off Delay Time			115		
t_f	Fall Time			125		
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 = 10Ω, T_J = +150°C		15		ns
t_r	Rise Time			15		
t_d(off)	Turn-off Delay Time			190		
t_f	Fall Time			30		
E_{on}	Turn-on Switching Energy			0.55		mJ
E_{off}	Turn-off Switching Energy			0.45		
E_{ts}	Total Switching Losses			1.0		
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 = 10Ω, T_J = +25°C		15		ns
t_r	Rise Time			18		
t_d(off)	Turn-off Delay Time			160		
t_f	Fall Time			25		
E_{ts}	Total Switching Losses			0.60		mJ
gfe	Forward Transconductance	V_{CE} = 20V, I_C = I_{C2}	4			S

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\Theta JC}$	Junction to Case			1.25	°C/W
$R_{\Theta JA}$	Junction to Ambient			80	

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

② I_C = I_{C2}, R_{GE} = 25Ω, L = 200µH, T_j = 25°C

③ See MIL-STD-750 Method 3471

④ The maximum current is limited by lead temperature.

APT Reserves the right to change, without notice, the specifications and information contained herein.

PRELIMINARY