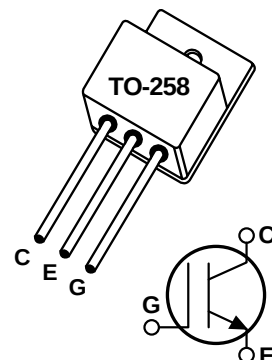


Fast IGBT

The Fast IGBT is a new generation of high voltage power IGBTs. Using Non-Punch Through Technology the Fast IGBT offers superior ruggedness, fast switching speed and low Collector-Emitter On voltage.

- Low Forward Voltage Drop
- Low Tail Current
- Avalanche Rated
- Hermetic Package
- High Freq. Switching to 20KHz
- Ultra Low Leakage Current
- RBSOA and SCSOA Rated



MAXIMUM RATINGS

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

Symbol	Parameter	APT50GF60HR	UNIT
V_{CES}	Collector-Emitter Voltage	600	Volts
V_{CGR}	Collector-Gate Voltage ($R_{GE} = 20K\Omega$)	600	
V_{GE}	Gate-Emitter Voltage	± 20	
I_{C1}	Continuous Collector Current @ $T_C = 25^\circ\text{C}$	55	Amps
I_{C2}	Continuous Collector Current @ $T_C = 90^\circ\text{C}$	50	
I_{CM}	Pulsed Collector Current ^① @ $T_C = 25^\circ\text{C}$	110	
I_{LM}	RBSOA Clamped Inductive Load Current @ $R_g = 11\Omega$ $T_C = 125^\circ\text{C}$	100	
E_{AS}	Single Pulse Avalanche Energy ^②	75	mJ
P_D	Total Power Dissipation	180	Watts
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	$^\circ\text{C}$
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 ($V_{GE} = 0V, I_C = 0.5mA$)	600			Volts
$V_{GE(TH)}$	Gate Threshold Voltage ($V_{CE} = V_{GE}, I_C = 700\mu A, T_J = 25^\circ\text{C}$)	4.5	5.5	6.5	
$V_{CE(ON)}$	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = I_{C2}, T_J = 25^\circ\text{C}$)		2.1	2.7	
	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = I_{C2}, T_J = 125^\circ\text{C}$)		2.2	2.8	
I_{CES}	Collector Cut-off Current ($V_{CE} = V_{CES}, V_{GE} = 0V, T_J = 25^\circ\text{C}$)			0.5	mA
	Collector Cut-off Current ($V_{CE} = V_{CES}, V_{GE} = 0V, T_J = 125^\circ\text{C}$)			5.0	
I_{GES}	Gate-Emitter Leakage Current ($V_{GE} = \pm 20V, V_{CE} = 0V$)			± 100	nA

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

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

DYNAMIC CHARACTERISTICS

APT50GF60HR

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{ies}	Input Capacitance	Capacitance $V_{GE} = 0V$ $V_{CE} = 25V$ $f = 1\text{ MHz}$		2600		pF
C_{oes}	Output Capacitance			280		
C_{res}	Reverse Transfer Capacitance			165		
Q_g	Total Gate Charge ③	Gate Charge $V_{GE} = 15V$ $V_{CC} = 0.5V_{CES}$ $I_C = I_{C2}$		170		nC
Q_{ge}	Gate-Emitter Charge			25		
Q_{gc}	Gate-Collector ("Miller") Charge			100		
$t_d(on)$	Turn-on Delay Time	Resistive Switching (25°C) $V_{GE} = 15V$ $V_{CC} = 0.8V_{CES}$ $I_C = I_{C2}$ $R_G = 10\Omega$		20		ns
t_r	Rise Time			100		
$t_d(off)$	Turn-off Delay Time			100		
t_f	Fall Time			110		
$t_d(on)$	Turn-on Delay Time	Inductive Switching (150°C) $V_{CLAMP(Peak)} = 0.66V_{CES}$ $V_{GE} = 15V$ $I_C = I_{C2}$ $R_G = 10\Omega$ $T_J = +150^\circ C$		30		ns
t_r	Rise Time			90		
$t_d(off)$	Turn-off Delay Time			280		
t_f	Fall Time			170		
E_{on}	Turn-on Switching Energy			2.2		mJ
E_{off}	Turn-off Switching Energy			2.4		
E_{ts}	Total Switching Losses			4.6		
$t_d(on)$	Turn-on Delay Time	Inductive Switching (25°C) $V_{CLAMP(Peak)} = 0.66V_{CES}$ $V_{GE} = 15V$ $I_C = I_{C2}$ $R_G = 10\Omega$ $T_J = +25^\circ C$		30		ns
t_r	Rise Time			90		
$t_d(off)$	Turn-off Delay Time			250		
t_f	Fall Time			100		
E_{ts}	Total Switching Losses			4.1		mJ
g_{fe}	Forward Transconductance	$V_{CE} = 20V, I_C = I_{C2}$	6			S

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.70	$^\circ C/W$
$R_{\theta JA}$	Junction to Ambient			40	

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

② $I_C = I_{C2}$, $R_{GE} = 25\Omega$, $L = 60\mu H$, $T_J = 25^\circ C$

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.