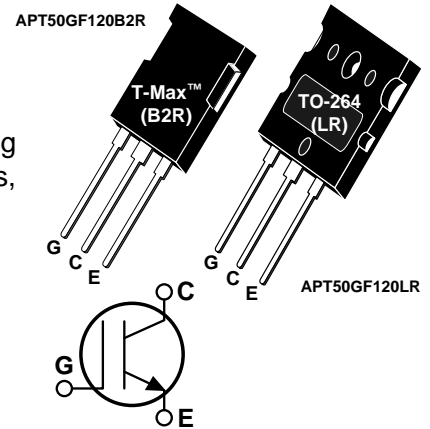


## Fast IGBT

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
- 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	APT50GF120B2R/LR	UNIT
$V_{CES}$	Collector-Emitter Voltage	1200	Volts
$V_{CGR}$	Collector-Gate Voltage ( $R_{GE} = 20K\Omega$ )	1200	
$V_{EC}$	Emitter-Collector Voltage	15	
$V_{GE}$	Gate-Emitter Voltage	$\pm 20$	
$I_{C1}$	Continuous Collector Current @ $T_C = 25^\circ\text{C}$	80	Amps
$I_{C2}$	Continuous Collector Current @ $T_C = 90^\circ\text{C}$	50	
$I_{CM1}$	Pulsed Collector Current <sup>①</sup> @ $T_C = 25^\circ\text{C}$	160	
$I_{CM2}$	Pulsed Collector Current <sup>①</sup> @ $T_C = 90^\circ\text{C}$	100	
$E_{AS}$	Single Pulse Avalanche Energy <sup>②</sup>	85	mJ
$P_D$	Total Power Dissipation	390	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 ( $V_{GE} = 0V, I_C = 0.5mA$ )	1200			Volts
$RBV_{CES}$	Collector-Emitter Reverse Breakdown Voltage ( $V_{GE} = 0V, I_C = 50mA$ )	-15			
$V_{GE(TH)}$	Gate Threshold Voltage ( $V_{CE} = V_{GE}, I_C = 700\mu A, T_J = 25^\circ\text{C}$ )	4.5	5.5	6.5	
$V_{CE(ON)}$	Collector-Emitter On Voltage ( $V_{GE} = 15V, I_C = 50A, T_J = 25^\circ\text{C}$ )		2.9	3.4	
	Collector-Emitter On Voltage ( $V_{GE} = 15V, I_C = 50A, T_J = 125^\circ\text{C}$ )		3.5	4.1	
$I_{CES}$	Collector Cut-off Current ( $V_{CE} = V_{CES}, V_{GE} = 0V, T_J = 25^\circ\text{C}$ )			0.5	mA
	Collector Cut-off Current ( $V_{CE} = V_{CES}, V_{GE} = 0V, T_J = 125^\circ\text{C}$ )			TBD	
$I_{GES}$	Gate-Emitter Leakage Current ( $V_{GE} = \pm 20V, V_{CE} = 0V$ )			$\pm 100$	nA

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

**USA**  
405 S.W. Columbia Street

**EUROPE**  
Avenue J.F. Kennedy Bât B4 Parc Cadéra Nord

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

Bend, Oregon 97702-1035

Phone: (541) 382-8028

FAX: (541) 388-0364

F-33700 Merignac - France

Phone: (33) 5 57 92 15 15

FAX: (33) 5 56 47 97 61

**DYNAMIC CHARACTERISTICS**
**APT50GF120B2R/LR**

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$C_{ies}$	Input Capacitance	<b>Capacitance</b> $V_{GE} = 0V$ $V_{CE} = 25V$ $f = 1\text{ MHz}$		3450	4850	pF
$C_{oes}$	Output Capacitance			330	500	
$C_{res}$	Reverse Transfer Capacitance			230	350	
$Q_g$	Total Gate Charge <sup>③</sup>	<b>Gate Charge</b> $V_{GE} = 15V$ $V_{CC} = 0.50V_{CES}$ $I_C = I_{C2}$		330	450	nC
$Q_{ge}$	Gate-Emitter Charge			30	50	
$Q_{gc}$	Gate-Collector ("Miller") Charge			205	290	
$t_{d(on)}$	Turn-on Delay Time	<b>Resistive Switching (25°C)</b> $V_{GE} = 15V$ $V_{CC} = 0.80V_{CES}$ $I_C = I_{C2}$ $R_G = 10\Omega$		55		ns
$t_r$	Rise Time			245		
$t_{d(off)}$	Turn-off Delay Time			155		
$t_f$	Fall Time			275		
$t_{d(on)}$	Turn-on Delay Time	<b>Inductive Switching (150°C)</b> $V_{CLAMP(Peak)} = 0.66V_{CES}$ $V_{GE} = 15V$ $I_C = I_{C2}$ $R_G = 10\Omega$ $T_J = +150^\circ C$		45	75	ns
$t_r$	Rise Time			100	150	
$t_{d(off)}$	Turn-off Delay Time			540	810	
$t_f$	Fall Time			40	80	
$E_{on}$	Turn-on Switching Energy			7.0		
$E_{off}$	Turn-off Switching Energy		7.0		mJ	
$E_{ts}$	Total Switching Losses		14.0			
$t_{d(on)}$	Turn-on Delay Time	<b>Inductive Switching (25°C)</b> $V_{CLAMP(Peak)} = 0.66V_{CES}$ $V_{GE} = 15V$ $I_C = I_{C2}$ $R_G = 10\Omega$ $T_J = +25^\circ C$		50		ns
$t_r$	Rise Time			115		
$t_{d(off)}$	Turn-off Delay Time			480		
$t_f$	Fall Time			40		
$E_{ts}$	Total Switching Losses			12.0		
$g_{fe}$	Forward Transconductance	$V_{CE} = 20V, I_C = I_{C2}$	8			S

**THERMAL CHARACTERISTICS**

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.32	°C/W
$R_{\theta JA}$	Junction to Ambient			40	
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  $I_C = I_{C2}, V_{CC} = 50V, R_{GE} = 25\Omega, L = 68\mu H, T_J = 25^\circ C$

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.**

PRELIMINARY

