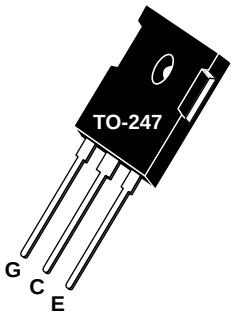
APT15GP90B

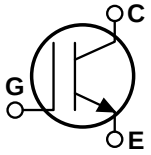
900V

POWER MOS 7® IGBT



The POWER MOS 7® IGBT is a new generation of high voltage power IGBTs. Using Punch Through Technology this IGBT is ideal for many high frequency, high voltage switching applications and has been optimized for high frequency switchmode power supplies.

- **Low Conduction Loss**
- **Low Gate Charge**
- **Ultrafast Tail Current shutoff**
- **RBSOA rated**



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

Symbol	Parameter	APT15GP90B	UNIT
V_{CES}	Collector-Emitter Voltage	900	Volts
V_{GE}	Gate-Emitter Voltage	±20	
V_{GEM}	Gate-Emitter Voltage Transient	±30	
I_{C1}	Continuous Collector Current @ T_C = 25°C	46	Amps
I_{C2}	Continuous Collector Current @ T_C = 110°C	23	
I_{CM}	Pulsed Collector Current ① @ T_C = 25°C	60	
RBSOA	Reverse Bias Safe Operating Area @ T_J = 150°C	60A @ 720V	
P_D	Total Power Dissipation	291	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 = 250µA)	900			Volts
$V_{GE(TH)}$	Gate Threshold Voltage (V_{CE} = V_{GE}, I_C = 1mA, T_j = 25°C)	3	4.5	6	
$V_{CE(ON)}$	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 15A, T_j = 25°C)		3.2	3.9	
	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 15A, T_j = 125°C)		2.7		
I_{CES}	Collector Cut-off Current (V_{CE} = V_{CES}, V_{GE} = 0V, T_j = 25°C) ②			250	µA
	Collector Cut-off Current (V_{CE} = V_{CES}, V_{GE} = 0V, T_j = 125°C) ②			2500	
I_{GES}	Gate-Emitter Leakage Current (V_{GE} = ±20V)			±100	nA

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

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

050-7470 Rev - 11-2002

DYNAMIC CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{ies}	Input Capacitance	**Capacitance**		1100		pF
C_{oes}	Output Capacitance	V_{GE} = 0V, V_{CE} = 25V		120		
C_{res}	Reverse Transfer Capacitance	f = 1 MHz		32		
V_{GEP}	Gate-to-Emitter Plateau Voltage	**Gate Charge**		7.5		V
Q_g	Total Gate Charge ③	V_{GE} = 15V		60		nC
Q_{ge}	Gate-Emitter Charge	V_{CE} = 450V		10		
Q_{gc}	Gate-Collector ("Miller") Charge	I_C = 15A		27		
RBSOA	Reverse Bias Safe Operating Area	T_J = 150°C, R_G = 5Ω, V_{GE} = 15V, L = 100µH, V_{CE} = 720V	60			A
$t_{d(on)}$	Turn-on Delay Time	**Inductive Switching (25°C)**		9		ns
t_r	Current Rise Time	V_{CC} = 600V		20		
$t_{d(off)}$	Turn-off Delay Time	V_{GE} = 15V		30		
t_f	Current Fall Time	I_C = 15A		42		
E_{on1}	Turn-on Switching Energy ④	R_G = 5Ω		TBD		µJ
E_{on2}	Turn-on Switching Energy (Diode) ⑤	T_J = +25°C		500		
E_{off}	Turn-off Switching Energy ⑥			220		
$t_{d(on)}$	Turn-on Delay Time	**Inductive Switching (125°C)**		9		ns
t_r	Current Rise Time	V_{CC} = 600V		20		
$t_{d(off)}$	Turn-off Delay Time	V_{GE} = 15V		72		
t_f	Current Fall Time	I_C = 15A		99		
E_{on1}	Turn-on Switching Energy ④	R_G = 5Ω		TBD		µJ
E_{on2}	Turn-on Switching Energy (Diode) ⑤	T_J = +125°C		750		
E_{off}	Turn-off Switching Energy ⑥			550		

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\Theta JC}$	Junction to Case (IGBT)			.43	°C/W
$R_{\Theta JC}$	Junction to Case (DIODE)			N/A	
W_T	Package Weight			5.90	gm

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. (See Figure 13.)

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. A Combi device is used for the clamping diode as shown in the E_{on2} test circuit. (See Figures 12)

⑥ E_{off} is the clamped inductive turn-off energy. (See Figures 12, 13.)

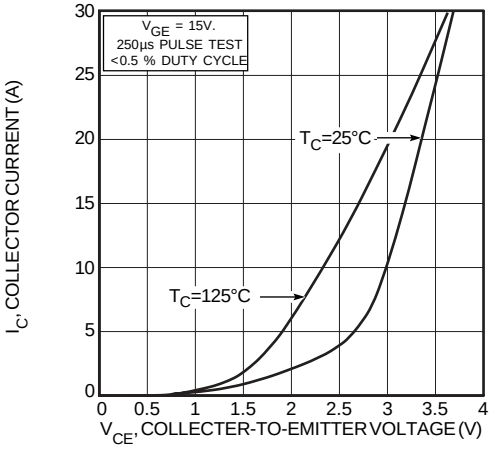


FIGURE 1, Output Characteristics(V_{GE} = 15V)

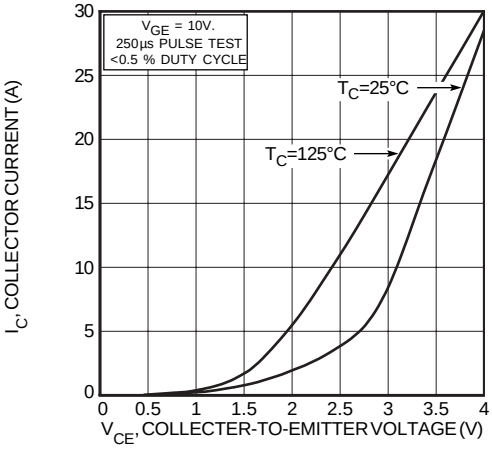


FIGURE 2, Output Characteristics (V_{GE} = 10V)

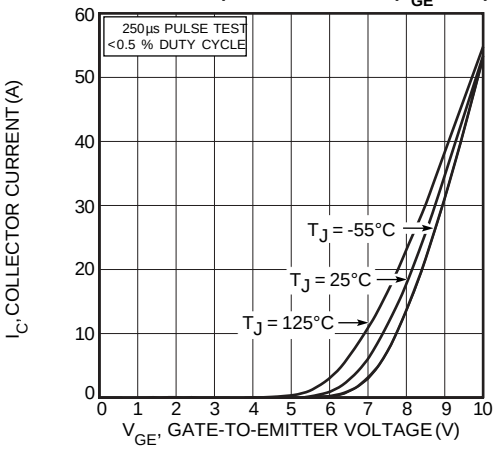


FIGURE 3, Transfer Characteristics

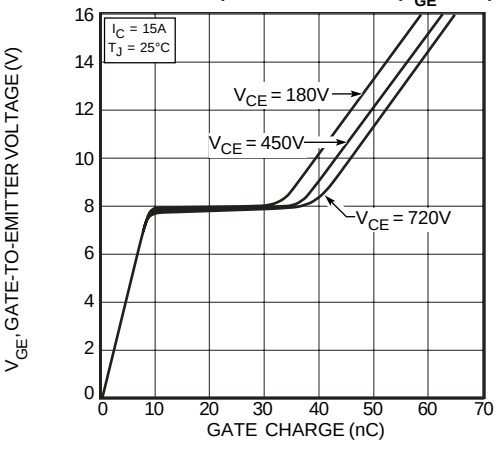


FIGURE 4, Gate Charge

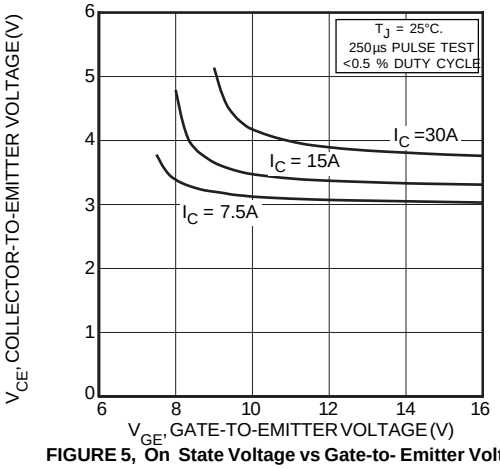


FIGURE 5, On State Voltage vs Gate-to- Emitter Voltage

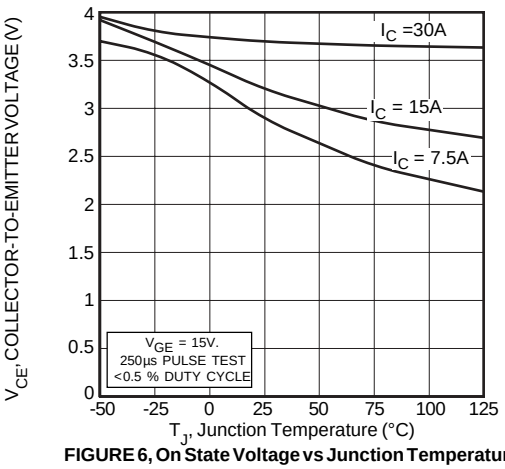


FIGURE 6, On State Voltage vs Junction Temperature

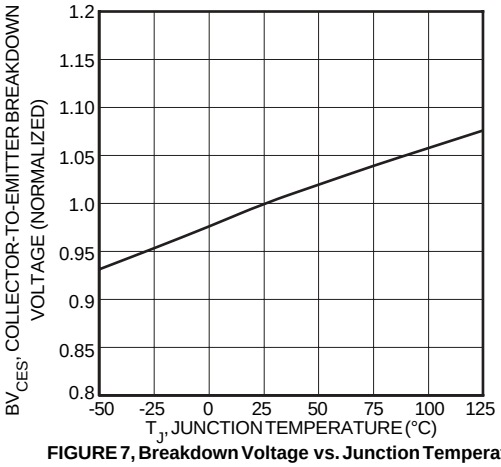


FIGURE 7, Breakdown Voltage vs. Junction Temperature

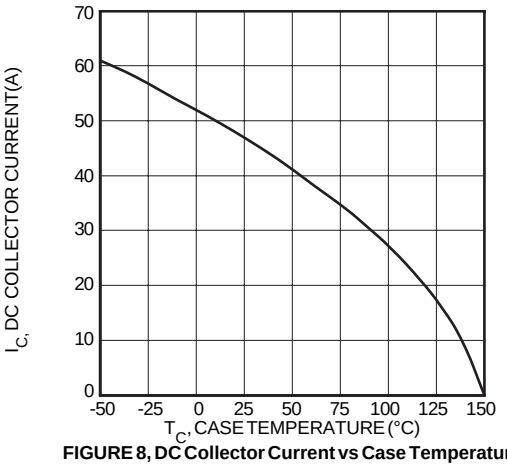


FIGURE 8, DC Collector Current vs Case Temperature

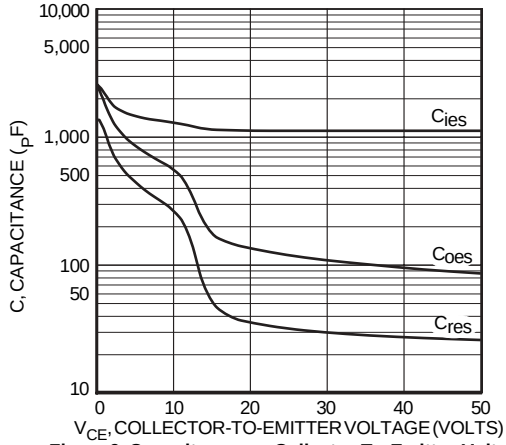


Figure 9, Capacitance vs Collector-To-Emitter Voltage

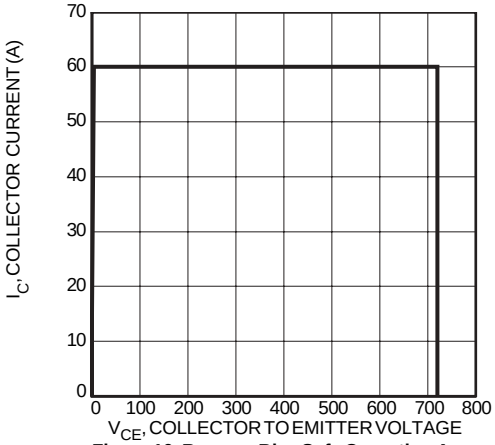


Figure 10, Reverse Bias Safe Operating Area

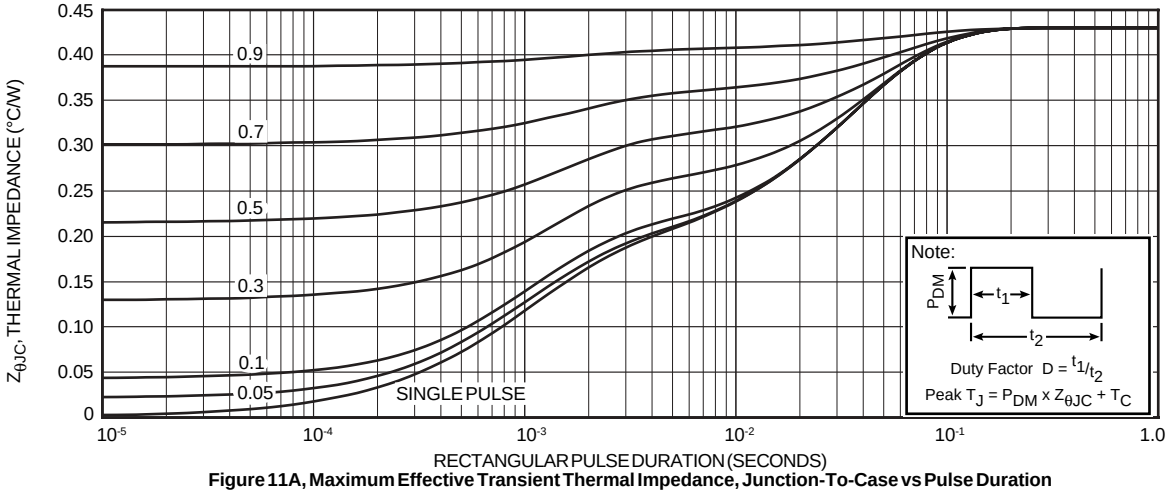


Figure 11A, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

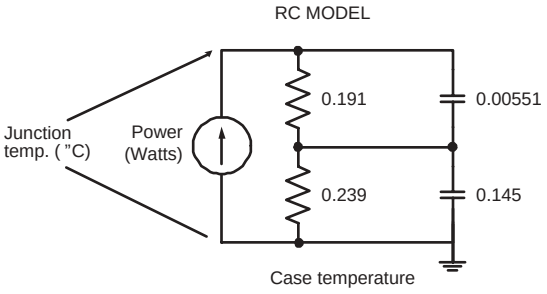


FIGURE 11B, TRANSIENT THERMAL IMPEDANCE MODEL

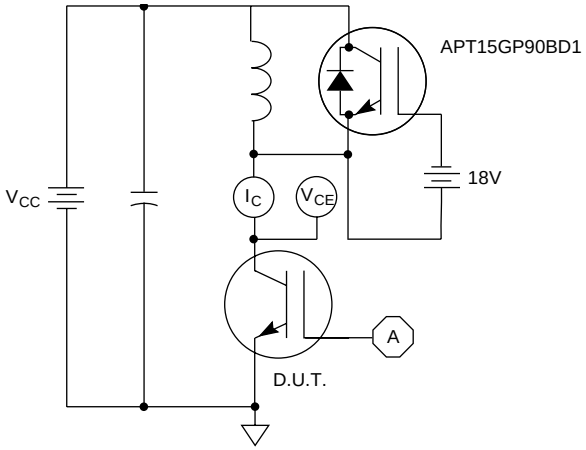


Figure 12, Inductive Switching Test Circuit

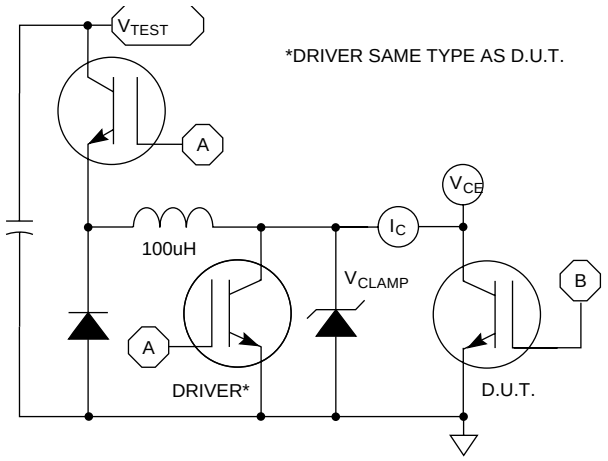
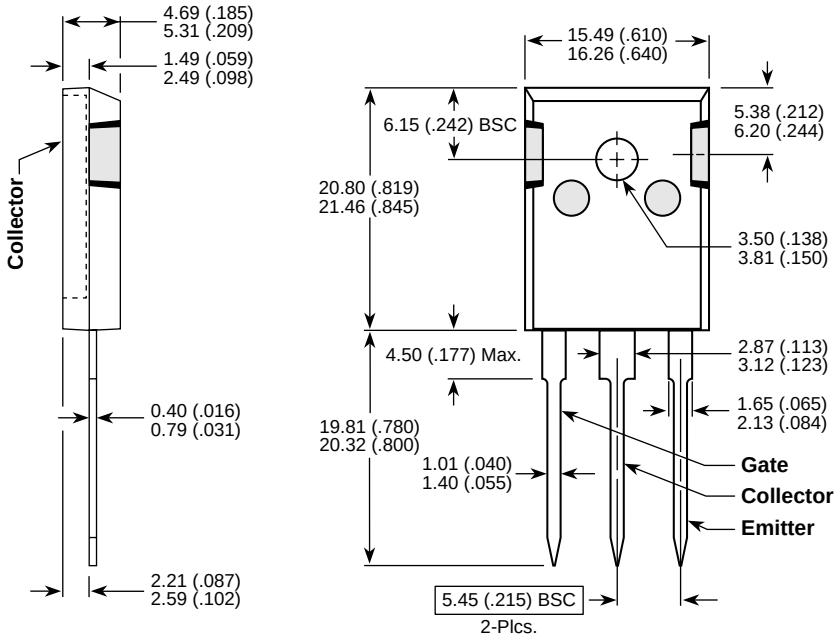


Figure 13, E_{ON1} Test Circuit

T0-247 Package Outline



Dimensions in Millimeters and (Inches)