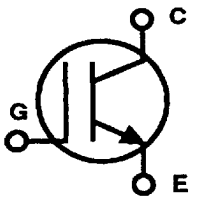

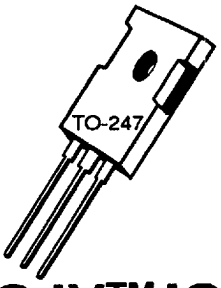

ADVANCED POWER TECHNOLOGY®

APT30G100BN 1000V 30A

POWER MOS IV™ IGBT

N-CHANNEL ENHANCEMENT MODE HIGH VOLTAGE POWER INSULATED GATE BIPOLAR TRANSISTOR

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

Symbol	Parameter		APT30G100BN	UNIT
V_{CES}	Collector-Emitter Voltage		1000	Volts
V_{GE}	Gate-Emitter Voltage	±20		
I_{C1}	Continuous Collector Current	30		Amps
I_{C2}	Continuous Collector Current @ T_C = 100°C	17		
I_{CM}	Pulsed Collector Current ①	60		
I_{LM}	Clamped Inductive Load Current @ T_J = +125°C ②	34		
E_{ARV}	Reverse Voltage Avalanche Energy	100		mJ
P_D	Total Power Dissipation	160		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 / Part Number		MIN	TYP	MAX	UNIT
BV_{CES}	Collector-Emitter Breakdown Voltage (V_{GE} = 0V, I_C = 1.0mA)	APT30G100BN	1000			Volts
RBV_{CES}	Collector-Emitter Reverse Breakdown Voltage (V_{GE} = 0V, I_C = 1.0A)		-15	-25		
$V_{GE}(TH)$	Gate Threshold Voltage (V_{CE} = V_{GE}, I_C = 1.0mA)		2.5		5	
$V_{CE}(ON)$	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = I_{C2})			3.5	4.0	
I_{CES}	Collector Cut-off Current (V_{CE} = 0.8 V_{CES}, V_{GE} = 0V)				500	µA
	Collector Cut-off Current (V_{CE} = 0.8 V_{CES}, V_{GE} = 0V, T_C = 125°C)				1.0	mA
I_{GES}	Gate-Emitter Leakage Current (V_{GE} = ±20V, V_{CE} = 0V)				±100	nA
$V_{GE}/\Delta T_J$	Gate-Emitter Threshold Voltage Temperature Coefficient			-5.9		mV/°C
gfe	Forward Transconductance (V_{CE} = 10V, I_C = I_{C2})			11		S

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

405 S.W. COLUMBIA STREET
BEND, OREGON 97702-1035
U.S.A.

PHONE . . . (503) 382-8028
FAX . . . . . (503) 388-0364

DYNAMIC CHARACTERISTICS

APT30G100BN

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{ies}	Input Capacitance	**Capacitance** V_{GE} = 0V, V_{CE} = 10V, f = 1 MHz		1140	1400	pF
C_{oes}	Output Capacitance			180	250	
C_{res}	Reverse Transfer Capacitance			50	90	
Q_g	Total Gate Charge ③	**Gate Charge** V_{GE} = 10V, V_{CC} = 0.5 V_{CES}, I_C = I_{C1}		50	75	nC
Q_{ge}	Gate-Emitter Charge			6	10	
Q_{gc}	Gate-Collector ("Miller") Charge			30	45	
$t_d(on)$	Turn-on Delay Time	**Resistive Switching (25°C)** V_{GE} = 15V, V_{CC} = 0.5 V_{CES}, I_C = I_{C2}, R_G = 2Ω		20		ns
t_r	Rise Time			70		
$t_d(off)$	Turn-off Delay Time			40		
t_f	Fall Time			400		
$t_d(on)$	Turn-on Delay Time	**Inductive Switching (125°C)** V_{CLAMP}(Peak) = 0.8V_{CES}, V_{GE} = 15V, I_C = I_{C2}, R_G = 2Ω, T_J = +125°C		10		ns
t_r	Rise Time			20		
$t_d(off)$	Turn-off Delay Time			260		
t_f	Fall Time			800		
E_{on}	Turn-on Switching Energy			0.35		mJ
E_{off}	Turn-off Switching Energy			4.0		
E_{ts}	Total Switching Losses			4.35		
$t_d(on)$	Turn-on Delay Time	**Inductive Switching (25°C)** V_{CLAMP}(Peak) = 0.8V_{CES}, V_{GE} = 15V, I_C = I_{C2}, R_G = 2Ω, T_J = +25°C		10		ns
t_r	Rise Time			20		
$t_d(off)$	Turn-off Delay Time			150		
t_f	Fall Time			370		
E_{ts}	Total Switching Losses			2.2		mJ
L_E	Internal Emitter Inductance Measured 5mm/0.197in. From Package			5		nH

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.77	°C/W
$R_{\theta JA}$	Junction to Ambient			40	
Torque	Mounting Torque using a 6-32 or 3mm Binding Head Machine Screw		10		in-Lbs.

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

② V_{CLAMP} = 0.8V_{CES} Volts, R_G = 2Ω.

③ See MIL-STD-750 Method 3471

APT30G100BN

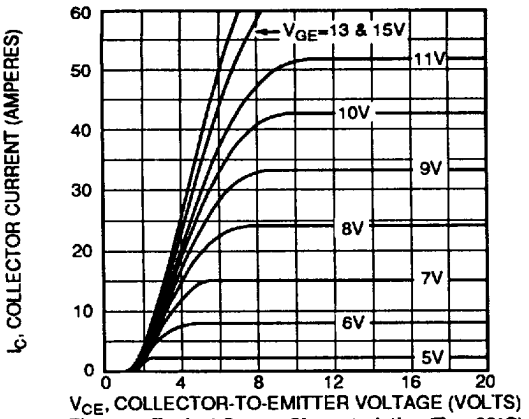

Figure 1, Typical Output Characteristics (T_J = 25°C)

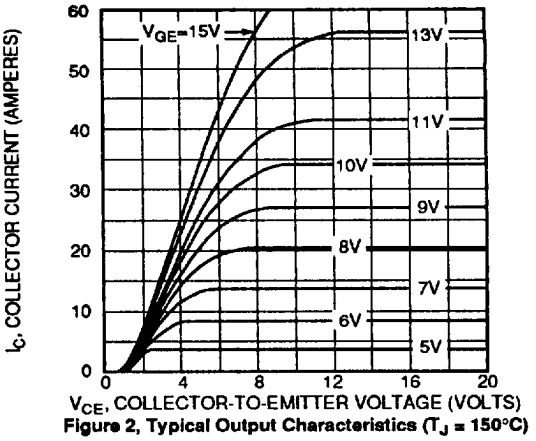

Figure 2, Typical Output Characteristics (T_J = 150°C)

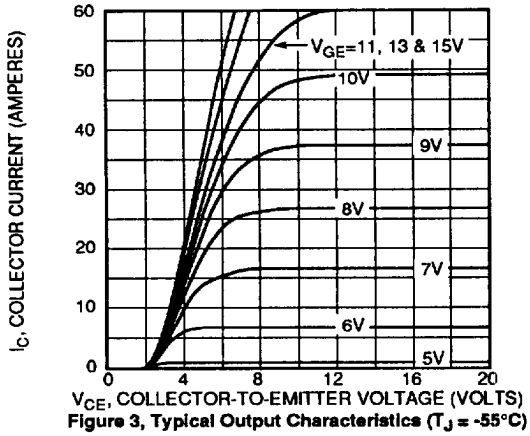

Figure 3, Typical Output Characteristics (T_J = -55°C)

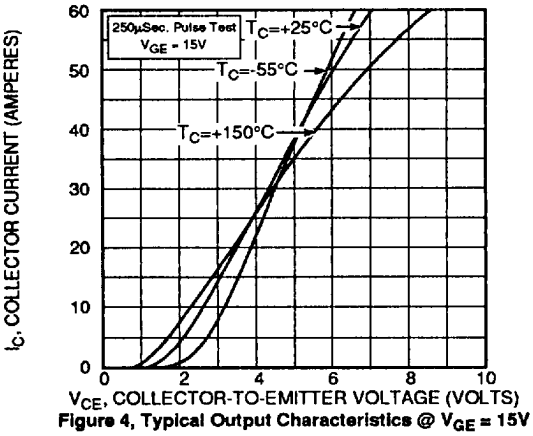

Figure 4, Typical Output Characteristics @ V_{GE} = 15V

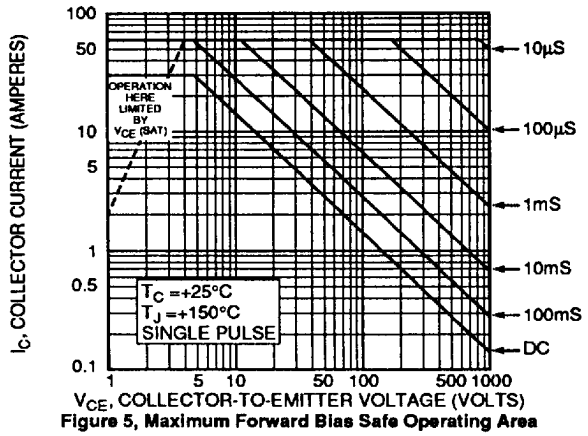

Figure 5, Maximum Forward Bias Safe Operating Area

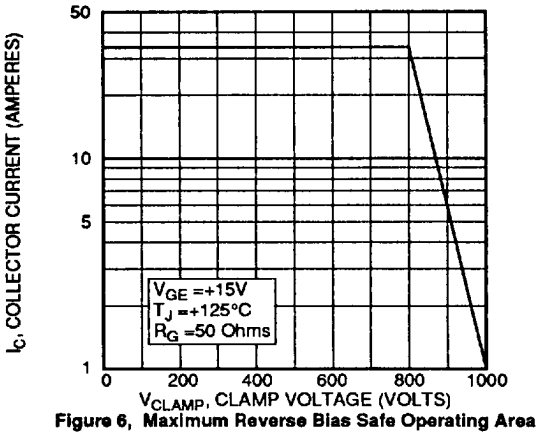

Figure 6, Maximum Reverse Bias Safe Operating Area

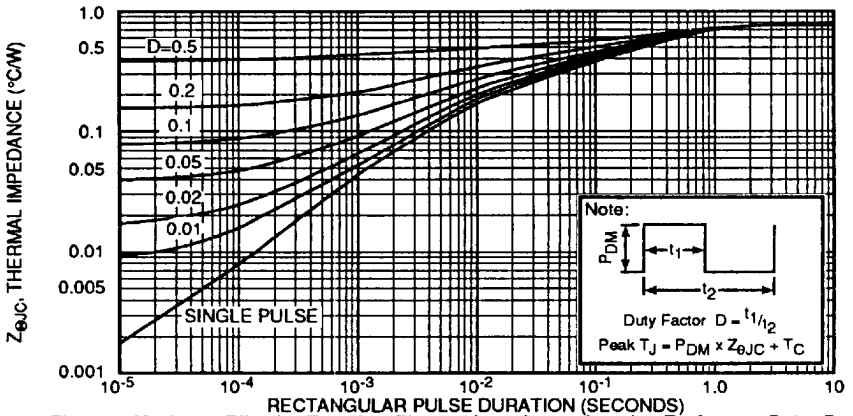

Figure 7, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

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Rev A

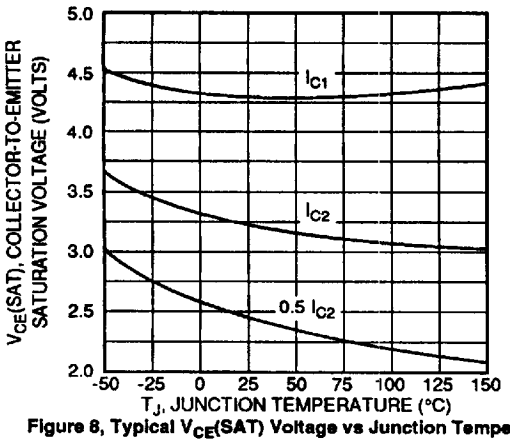


Figure 8, Typical V_{CE}(SAT) Voltage vs Junction Temperature

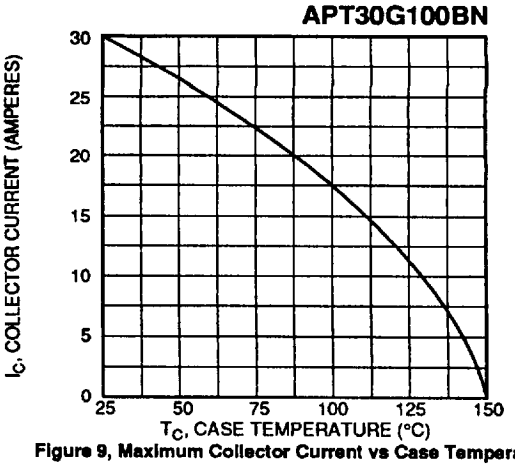


Figure 9, Maximum Collector Current vs Case Temperature

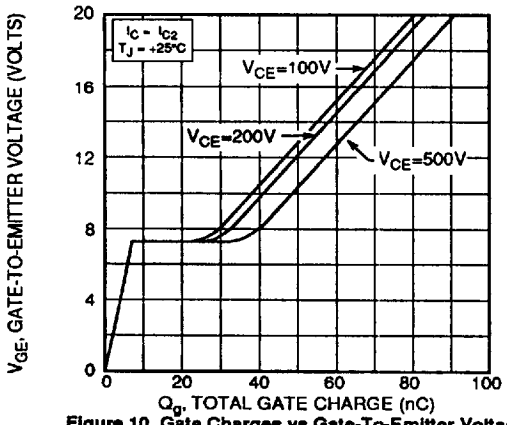


Figure 10, Gate Charges vs Gate-To-Emitter Voltage

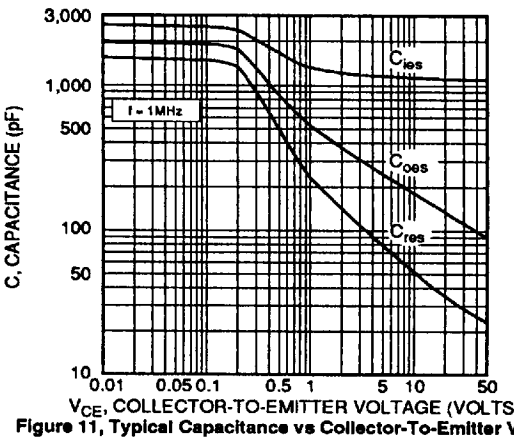


Figure 11, Typical Capacitance vs Collector-To-Emitter Voltage

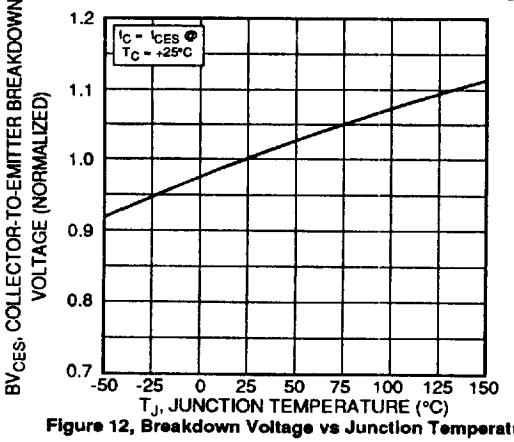


Figure 12, Breakdown Voltage vs Junction Temperature

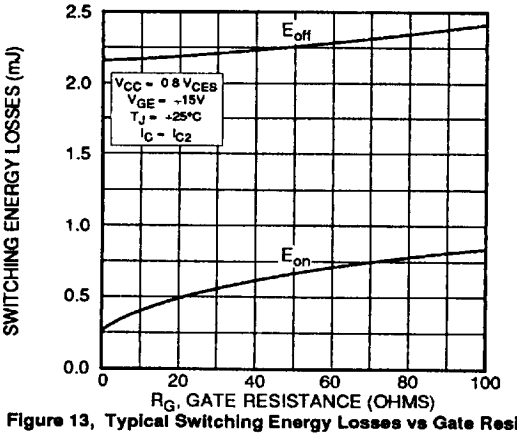


Figure 13, Typical Switching Energy Losses vs Gate Resistance

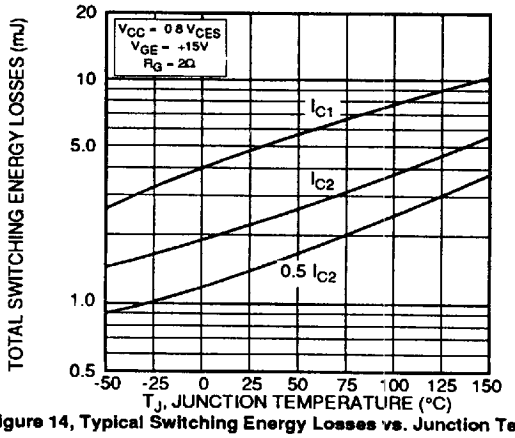


Figure 14, Typical Switching Energy Losses vs. Junction Temperature

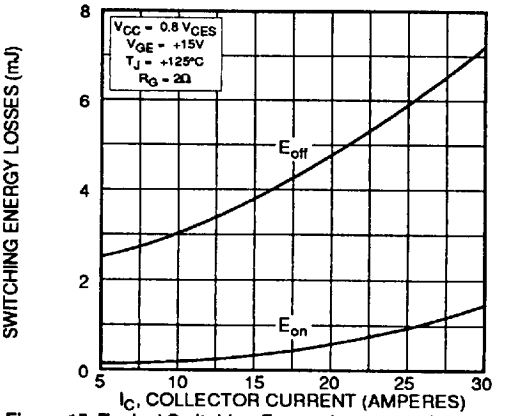


Figure 15, Typical Switching Energy Losses vs Collector Current

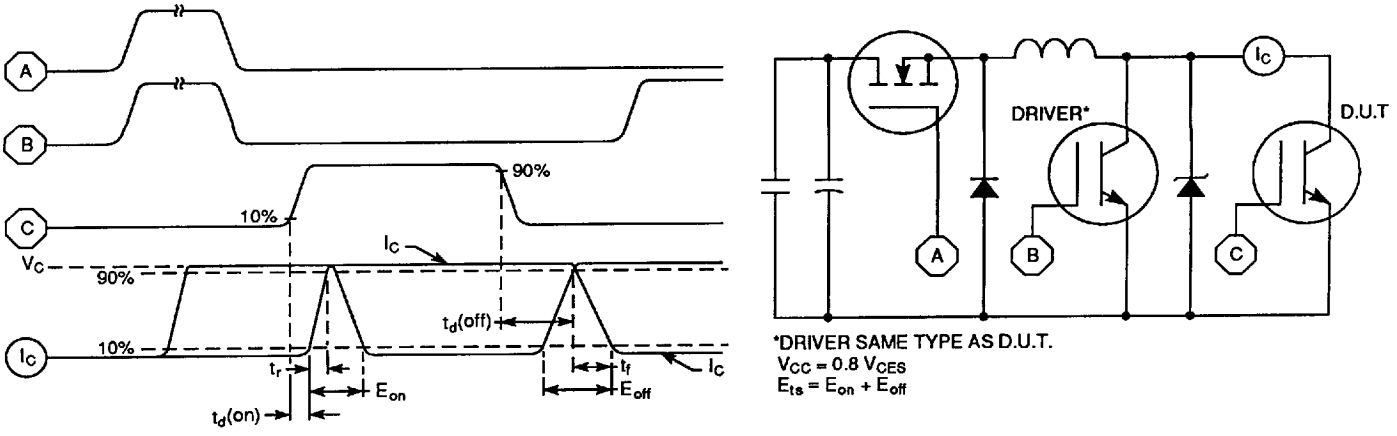


Figure 16, Switching Loss Test Circuit and Waveforms

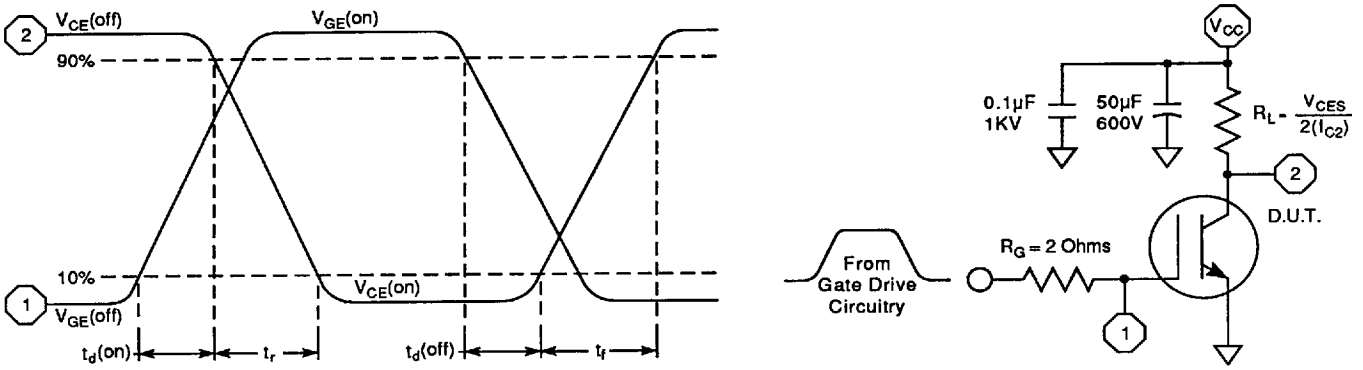
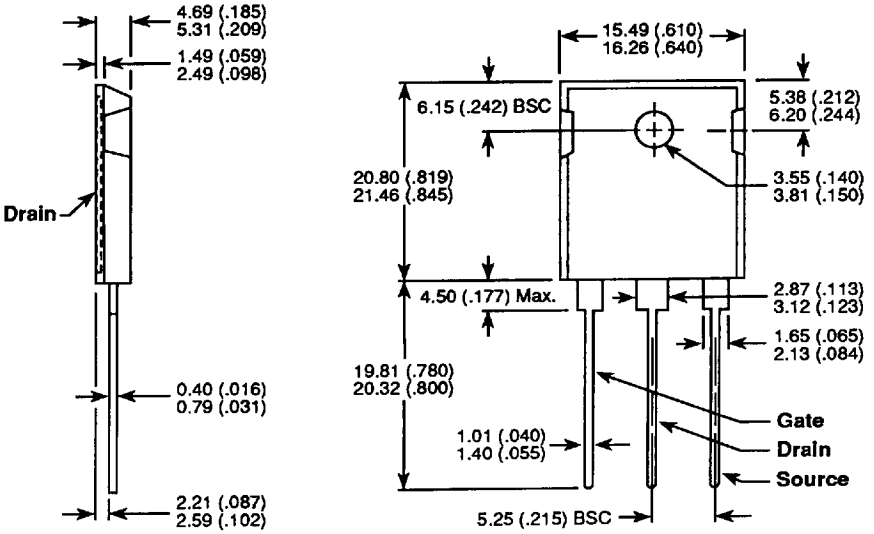


Figure 17, Resistive Switching Time Test Circuit and Waveforms

TO-247AD Package Outline



Dimensions in Millimeters and (Inches)

5