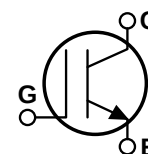
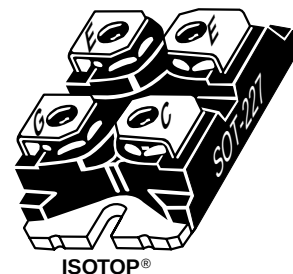


POWER MOS 7® IGBT

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
- 50 kHz operation @ 800V, 14A
- 20 kHz operation @ 800V, 25A
- RBSOA rated


MAXIMUM RATINGS

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

Symbol	Parameter	APT35GP120J	UNIT
V_{CES}	Collector-Emitter Voltage	1200	Volts
V_{GE}	Gate-Emitter Voltage	± 20	
V_{GEM}	Gate-Emitter Voltage Transient	± 30	
I_{C1}	Continuous Collector Current @ $T_C = 25^\circ\text{C}$	64	Amps
I_{C2}	Continuous Collector Current @ $T_C = 110^\circ\text{C}$	29	
I_{CM}	Pulsed Collector Current ^① @ $T_C = 25^\circ\text{C}$	140	
RBSOA	Reverse Bias Safe Operating Area @ $T_J = 150^\circ\text{C}$	140A @ 960V	
P_D	Total Power Dissipation	284	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 ($V_{GE} = 0V, I_C = 250\mu A$)	1200			Volts
$V_{GE(TH)}$	Gate Threshold Voltage ($V_{CE} = V_{GE}, I_C = 1mA, T_J = 25^\circ\text{C}$)	3	4.5	6	
$V_{CE(ON)}$	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = 35A, T_J = 25^\circ\text{C}$)		3.3	3.9	
	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = 35A, T_J = 125^\circ\text{C}$)		3		
I_{CES}	Collector Cut-off Current ($V_{CE} = 1200V, V_{GE} = 0V, T_J = 25^\circ\text{C}$) ^②			250	μA
	Collector Cut-off Current ($V_{CE} = 1200V, V_{GE} = 0V, T_J = 125^\circ\text{C}$) ^②			2500	
I_{GES}	Gate-Emitter Leakage Current ($V_{GE} = \pm 20V$)			± 100	nA

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

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

DYNAMIC CHARACTERISTICS

APT35GP120J

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{ies}	Input Capacitance	Capacitance $V_{GE} = 0V, V_{CE} = 25V$ $f = 1 \text{ MHz}$		3240		pF
C_{oes}	Output Capacitance			248		
C_{res}	Reverse Transfer Capacitance			31		
V_{GEP}	Gate-to-Emitter Plateau Voltage	Gate Charge $V_{GE} = 15V$ $V_{CE} = 600V$ $I_C = 35A$		7.5		V
Q_g	Total Gate Charge ^③			150		nC
Q_{ge}	Gate-Emitter Charge			21		
Q_{gc}	Gate-Collector ("Miller") Charge			62		
RBSOA	Reverse Bias Safe Operating Area	$T_J = 150^\circ C, R_G = 5\Omega, V_{GE} = 15V, L = 100\mu H, V_{CE} = 960V$	140			A
$t_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{CC} = 600V$ $V_{GE} = 15V$ $I_C = 35A$ $R_G = 5\Omega$ $T_J = +25^\circ C$		16		ns
t_r	Current Rise Time			20		
$t_{d(off)}$	Turn-off Delay Time			94		
t_f	Current Fall Time			40		
E_{on1}	Turn-on Switching Energy ^④			750		μJ
E_{on2}	Turn-on Switching Energy (Diode) ^⑤			1305		
E_{off}	Turn-off Switching Energy ^⑥			680		
$t_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) $V_{CC} = 600V$ $V_{GE} = 15V$ $I_C = 35A$ $R_G = 5\Omega$ $T_J = +125^\circ C$		16		ns
t_r	Current Rise Time			20		
$t_{d(off)}$	Turn-off Delay Time			147		
t_f	Current Fall Time			75		
E_{on1}	Turn-on Switching Energy ^④			750		μJ
E_{on2}	Turn-on Switching Energy (Diode) ^⑤			2132		
E_{off}	Turn-off Switching Energy ^⑥			1744		

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case (IGBT)			.44	$^\circ C/W$
$R_{\theta JC}$	Junction to Case (DIODE)			N/A	
W_T	Package Weight			29.2	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 24.)

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. (See Figures 21, 22.)

⑥ E_{off} is the clamped inductive turn-off energy measured in accordance with JEDEC standard JESD24-1. (See Figures 21, 23.)

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

TYPICAL PERFORMANCE CURVES

APT35GP120J

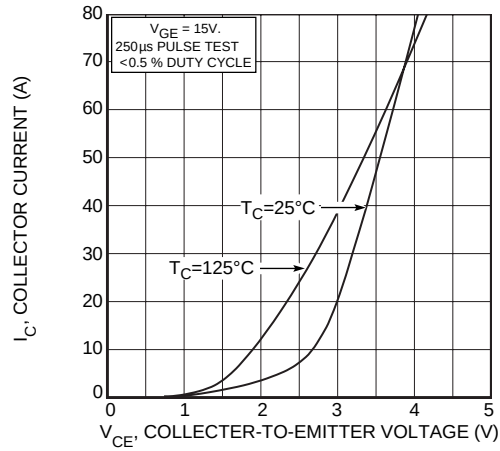


FIGURE 1, Output Characteristics ($V_{GE} = 15V$)

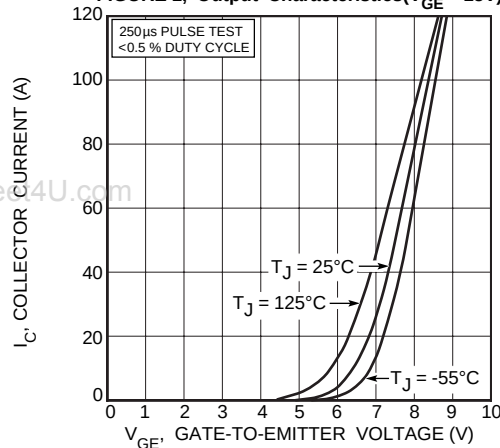


FIGURE 3, Transfer Characteristics

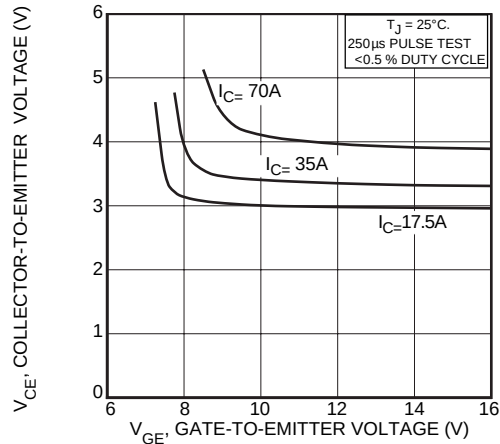


FIGURE 5, On State Voltage vs Gate-to-Emitter Voltage

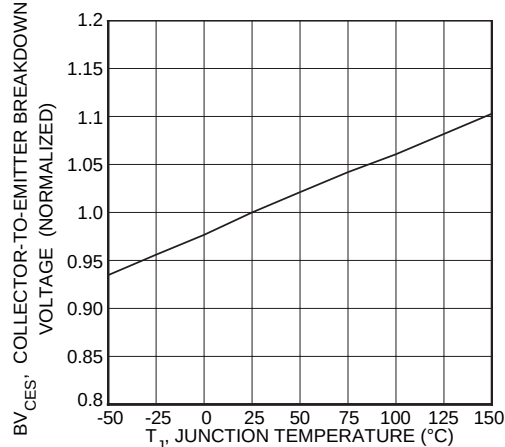


FIGURE 7, Breakdown Voltage vs. Junction Temperature

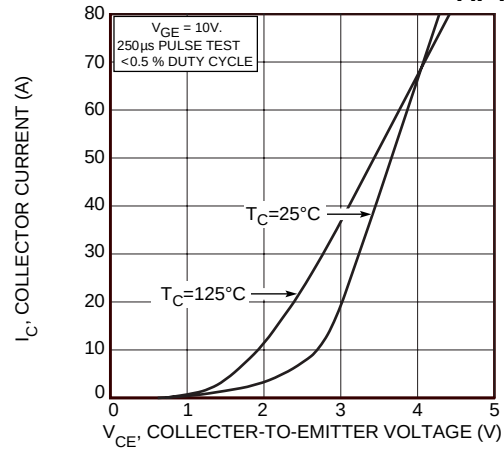


FIGURE 2, Output Characteristics ($V_{GE} = 10V$)

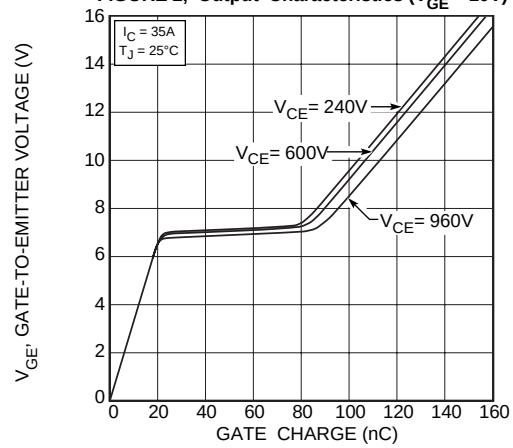


FIGURE 4, Gate Charge

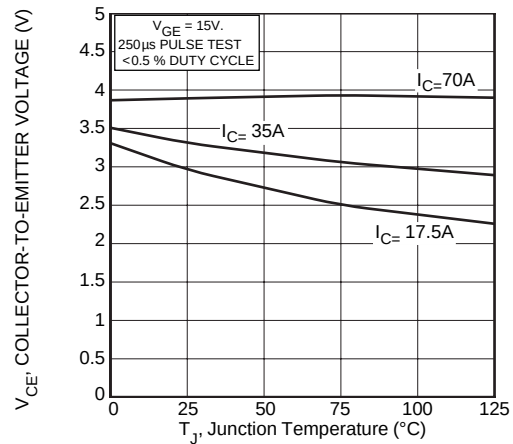


FIGURE 6, On State Voltage vs Junction Temperature

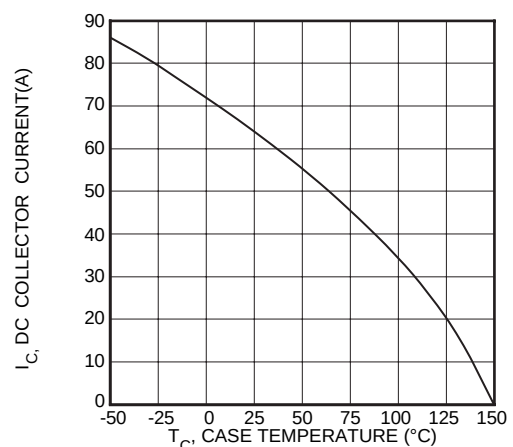


FIGURE 8, DC Collector Current vs Case Temperature

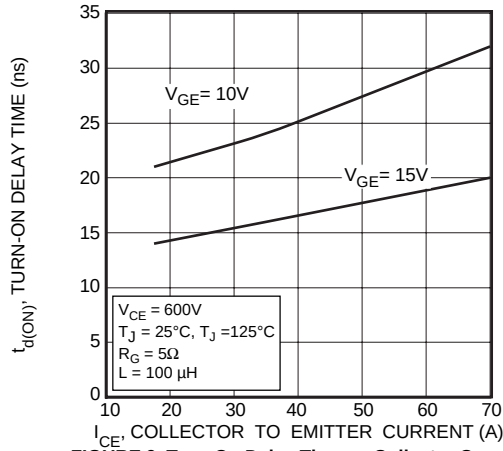


FIGURE 9, Turn-On Delay Time vs Collector Current

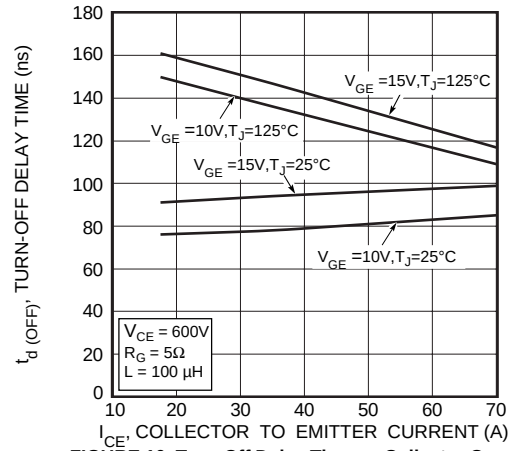


FIGURE 10, Turn-Off Delay Time vs Collector Current

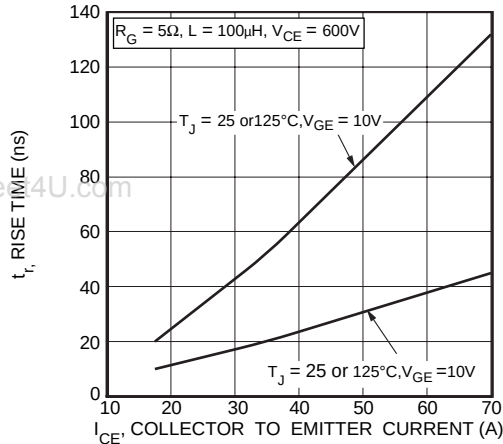


FIGURE 11, Current Rise Time vs Collector Current

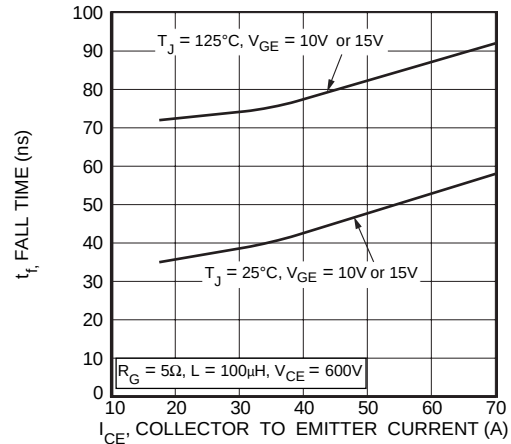


FIGURE 12, Current Fall Time vs Collector Current

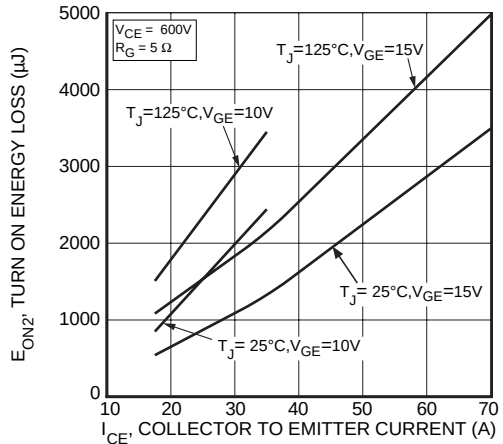


FIGURE 13, Turn-On Energy Loss vs Collector Current

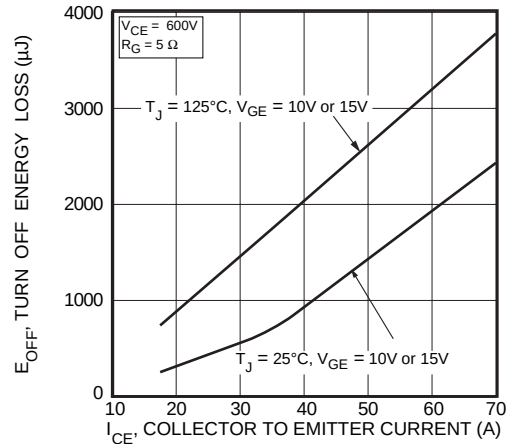


FIGURE 14, Turn Off Energy Loss vs Collector Current

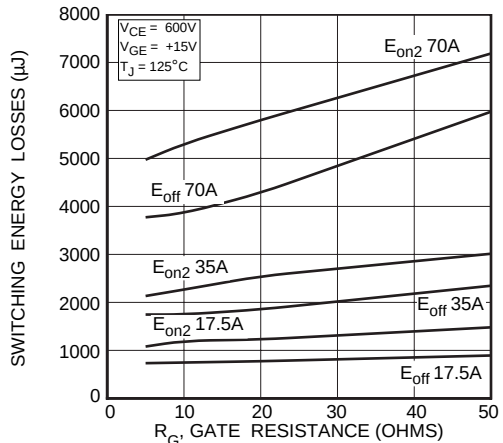


FIGURE 15, Switching Energy Losses vs. Gate Resistance

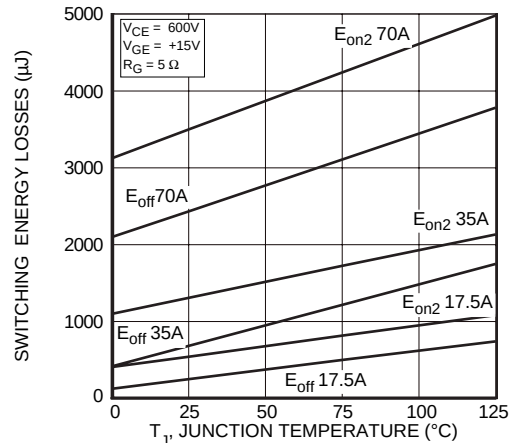
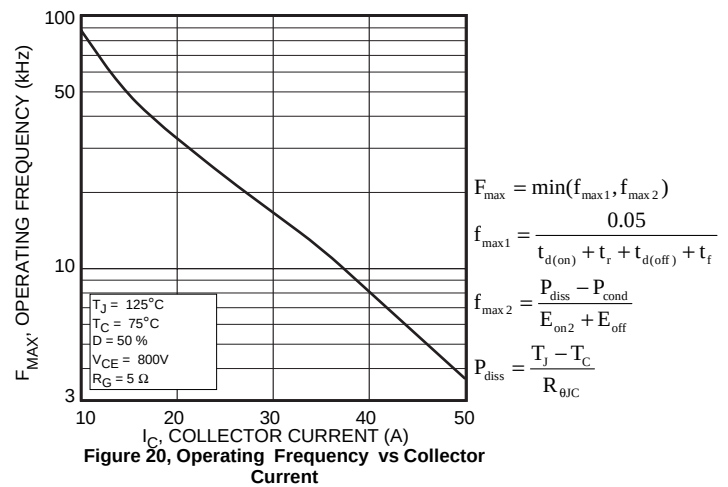
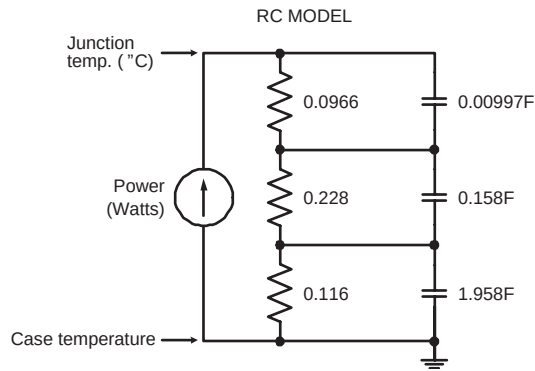
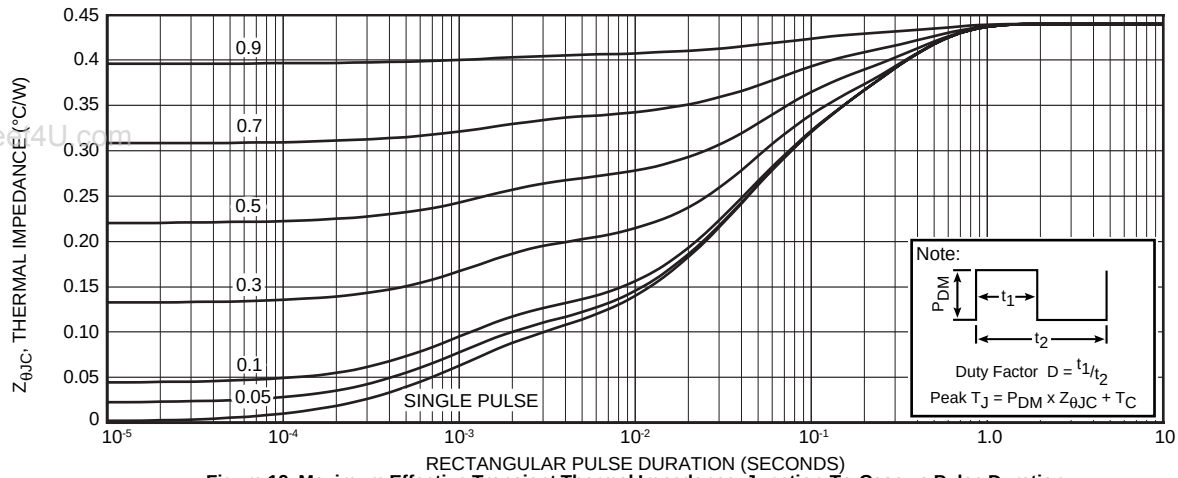
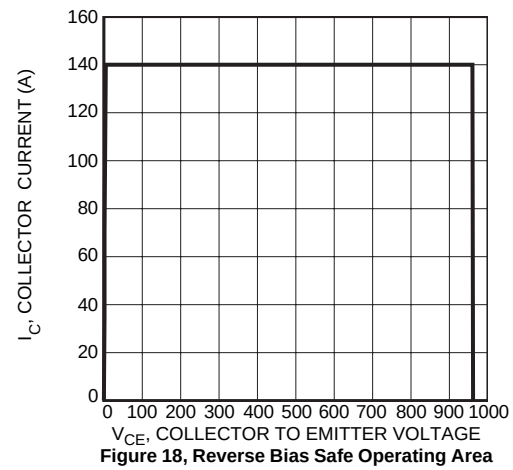
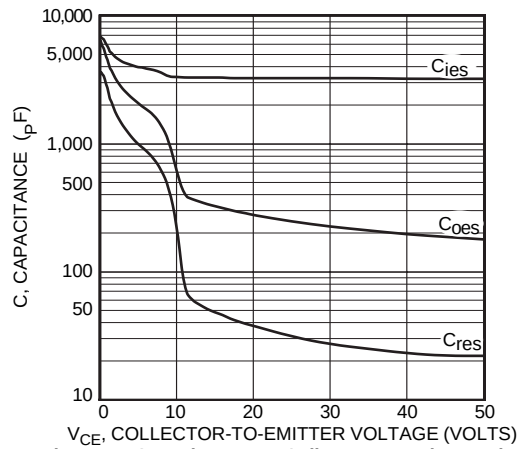
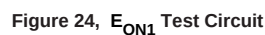
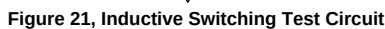


FIGURE 16, Switching Energy Losses vs Junction Temperature

TYPICAL PERFORMANCE CURVES

APT35GP120J





Technical drawing of the 2N4350 MOSFET package, showing dimensions in inches and millimeters.

Top View Dimensions:

- Overall width: 31.5 (1.240) / 31.7 (1.248)
- Distance between mounting holes: 7.8 (.307) / 8.2 (.322)
- Radius: $r = 4.0 (.157)$ (2 places)
- Distance from mounting hole to gate terminal: 4.0 (.157) / 4.2 (.165) (2 places)
- Distance from mounting hole to collector terminal: 3.3 (.129) / 3.6 (.143)
- Distance between gate terminals: 14.9 (.587) / 15.1 (.594)
- Distance between collector terminals: 30.1 (1.185) / 30.3 (1.193)
- Overall length: 38.0 (1.496) / 38.2 (1.504)

Side View Dimensions:

- Distance from mounting hole to gate terminal: 11.8 (.463) / 12.2 (.480)
- Distance from mounting hole to collector terminal: 8.9 (.350) / 9.6 (.378)
- Hex Nut M4 (4 places)
- Distance from mounting hole to gate terminal: 0.75 (.030) / 0.85 (.033)
- Distance from mounting hole to collector terminal: 12.6 (.496) / 12.8 (.504)
- Overall height: 25.2 (0.992) / 25.4 (1.000)

Gate View Dimensions:

- Distance from mounting hole to gate terminal: 1.95 (.077) / 2.14 (.084)

Terminal Labels:

- * Emitter
- Collector
- * Emitter
- Gate

Notes:

- W=4.1 (.161)
- W=4.3 (.169)
- H=4.8 (.187)
- H=4.9 (.193) (4 places)
- * Emitter terminals are shorted internally. Current handling capability is equal for either Source terminal.

Dimensions in Millimeters and (Inches)

APT's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. US and Foreign patents pending. All Rights Reserved.