

Dynamic Characteristics

$T_J = 25^{\circ}\text{C}$ unless otherwise specified

APT28GA60K

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	Capacitance $V_{GE} = 0\text{V}, V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		2109		pF
C_{oes}	Output Capacitance			214		
C_{res}	Reverse Transfer Capacitance			26		
Q_g^3	Total Gate Charge	Gate Charge $V_{GE} = 15\text{V}$ $V_{CE} = 300\text{V}$ $I_C = 16\text{A}$		90		nC
Q_{ge}	Gate-Emitter Charge			14		
Q_{gc}	Gate- Collector Charge			28		
SSOA	Switching Safe Operating Area	$T_J = 150^{\circ}\text{C}, R_G = 10\Omega^4, V_{GE} = 15\text{V},$ $L = 100\mu\text{H}, V_{CE} = 600\text{V}$	84			A
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (25°C) $V_{CC} = 400\text{V}$ $V_{GE} = 15\text{V}$ $I_C = 16\text{A}$ $R_G = 10\Omega^4$ $T_J = +25^{\circ}\text{C}$		11		ns
t_r	Current Rise Time			8		
$t_{d(off)}$	Turn-Off Delay Time			101		
t_f	Current Fall Time			27		
E_{on2}	Turn-On Switching Energy			239		μJ
E_{off}^6	Turn-Off Switching Energy			170		
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (125°C) $V_{CC} = 400\text{V}$ $V_{GE} = 15\text{V}$ $I_C = 16\text{A}$ $R_G = 10\Omega^4$ $T_J = +125^{\circ}\text{C}$		11		ns
t_r	Current Rise Time			10		
$t_{d(off)}$	Turn-Off Delay Time			132		
t_f	Current Fall Time			114		
E_{on2}	Turn-On Switching Energy			412		μJ
E_{off}^6	Turn-Off Switching Energy			335		

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

2 Pulse test: Pulse Width $< 380\mu\text{s}$, duty cycle $< 2\%$.

3 See Mil-Std-750 Method 3471.

4 R_G is external gate resistance, not including internal gate resistance or gate driver impedance. (MIC4452)

5 E_{on2} is the clamped inductive turn on energy that includes a commutating diode reverse recovery current in the IGBT turn on energy loss. A combi device is used for the clamping diode.

6 E_{off} is the clamped inductive turn-off energy measured in accordance with JEDEC standard JESD24-1.

Microsemi reserves the right to change, without notice, the specifications and information contained herein.

Typical Performance Curves

APT28GA60K

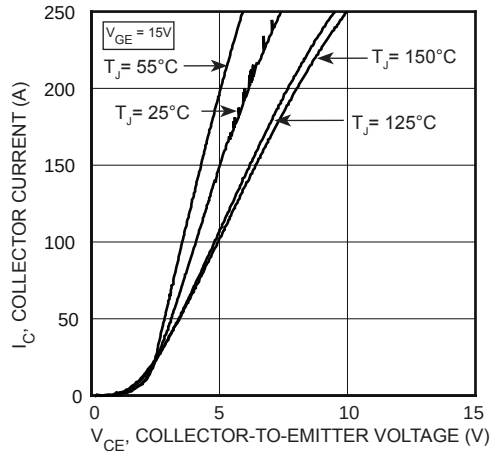


FIGURE 1, Output Characteristics ($T_J = 25^\circ\text{C}$)

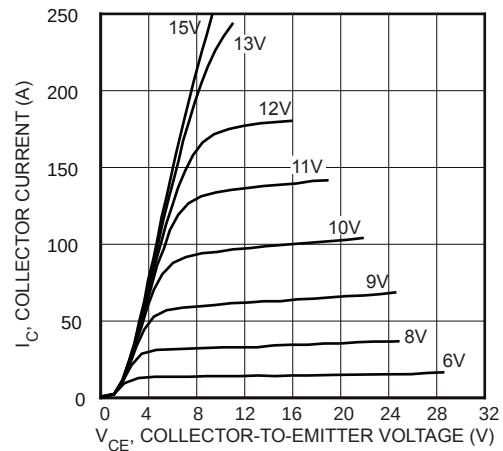


FIGURE 2, Output Characteristics ($T_J = 25^\circ\text{C}$)

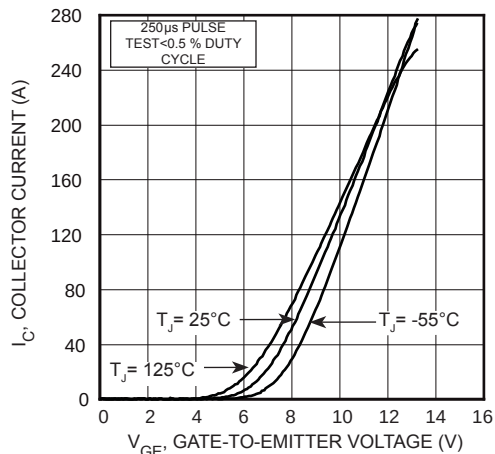


FIGURE 3, Transfer Characteristics

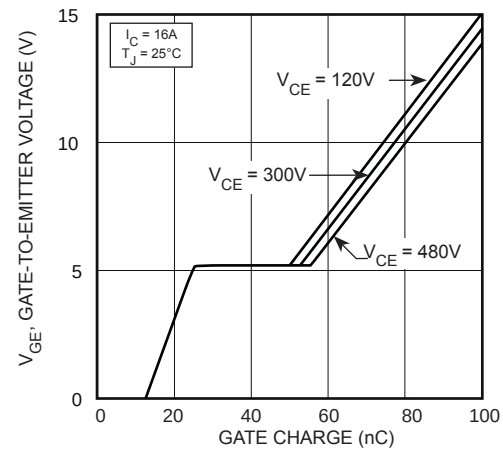


FIGURE 4, Gate charge

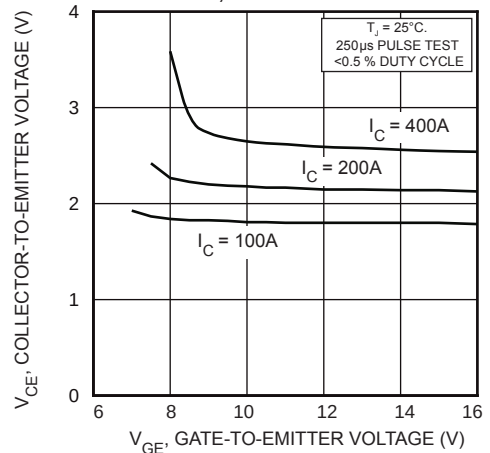


FIGURE 5, On State Voltage vs Gate-to-Emitter Voltage

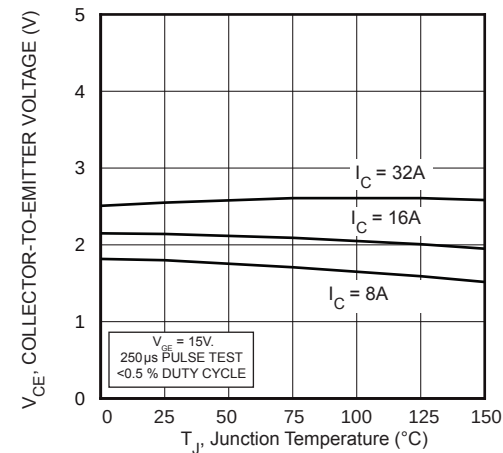


FIGURE 6, On State Voltage vs Junction Temperature

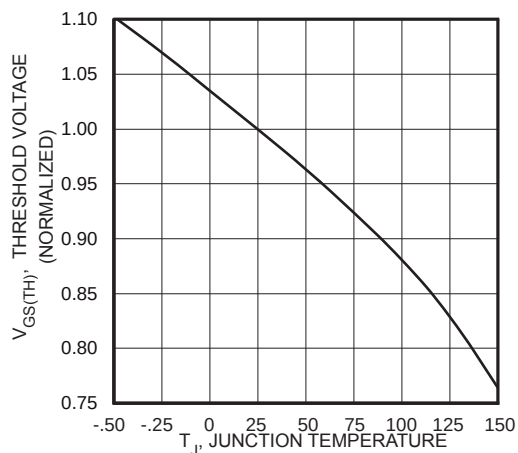


FIGURE 7, Threshold Voltage vs Junction Temperature

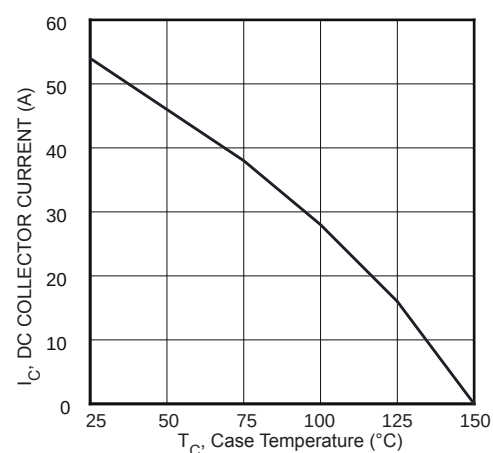


FIGURE 8, DC Collector Current vs Case Temperature

Typical Performance Curves

APT28GA60K

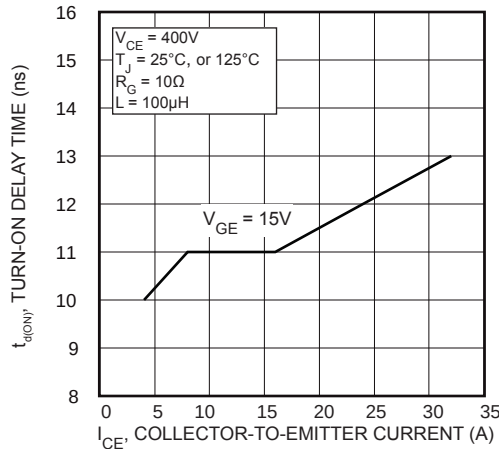


FIGURE 9, Turn-On Delay Time vs Collector Current

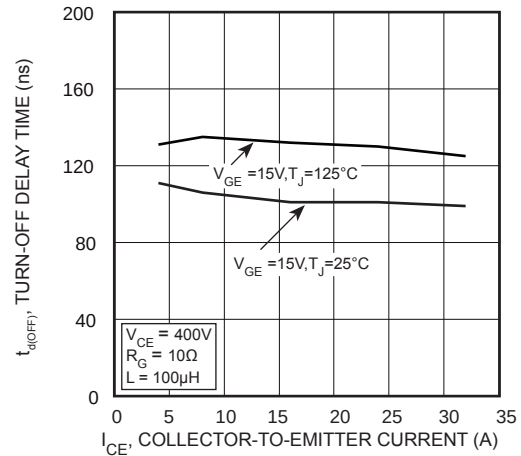


FIGURE 10, Turn-Off Delay Time vs Collector Current

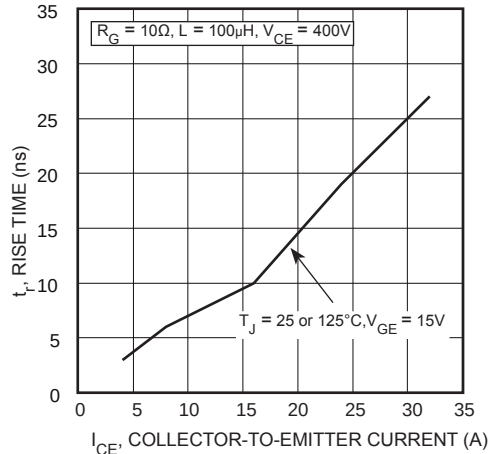


FIGURE 11, Current Rise Time vs Collector Current

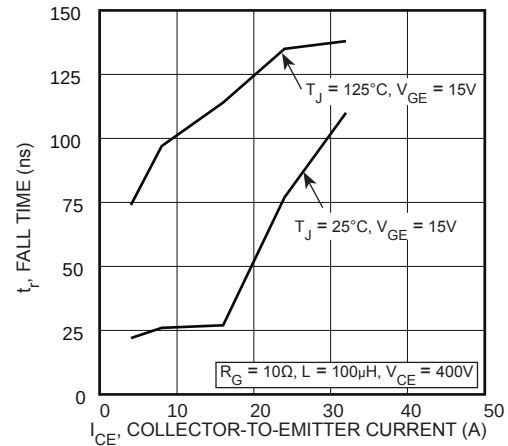


FIGURE 12, Current Fall Time vs Collector Current

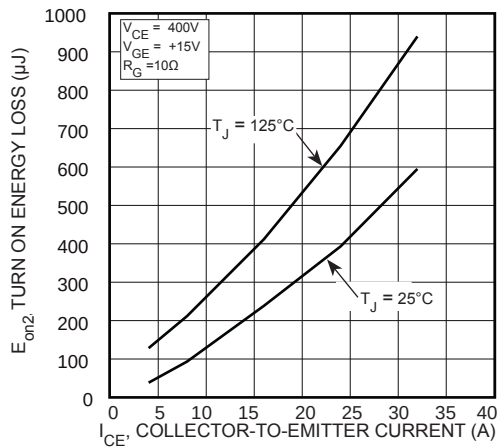


FIGURE 13, Turn-On Energy Loss vs Collector Current

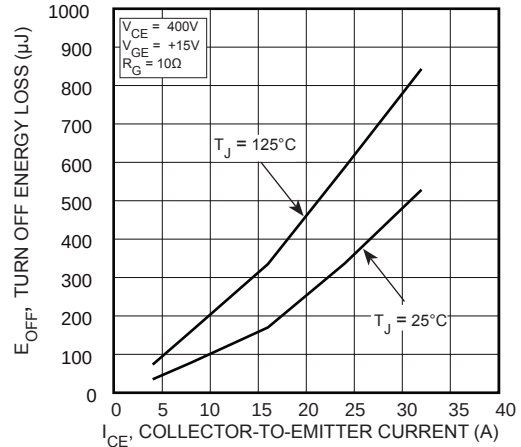


FIGURE 14, Turn-Off Energy Loss vs Collector Current

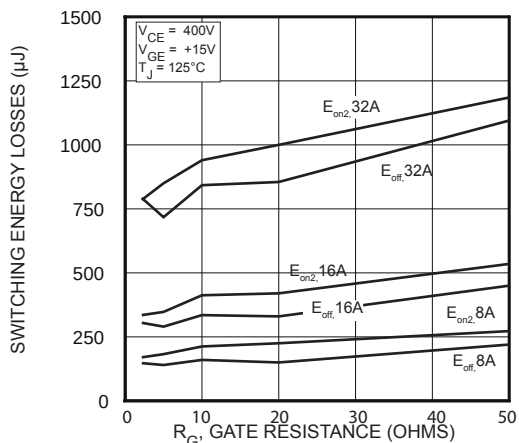


FIGURE 15, Switching Energy Losses vs Gate Resistance

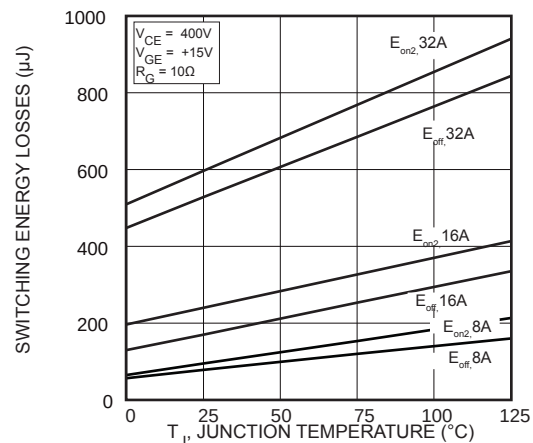


FIGURE 16, Switching Energy Losses vs Junction Temperature

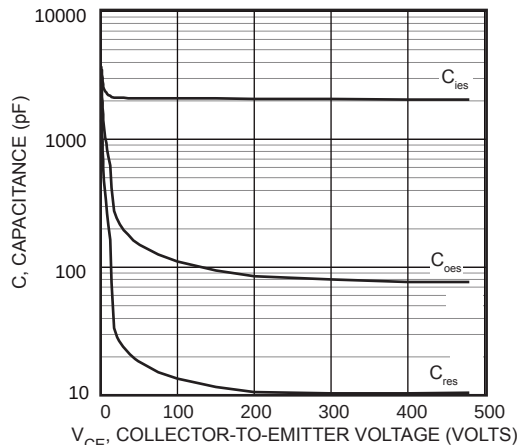


FIGURE 17, Capacitance vs Collector-To-Emitter Voltage

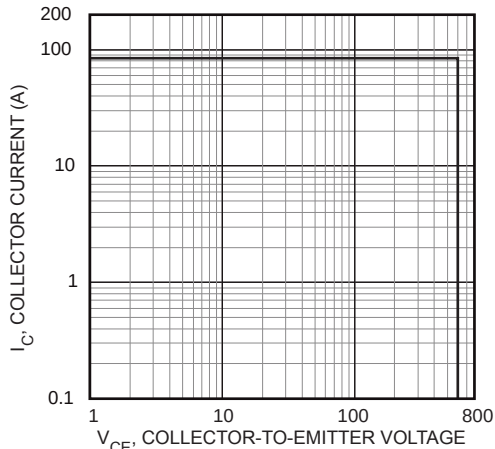


FIGURE 18, Minimum Switching Safe Operating Area

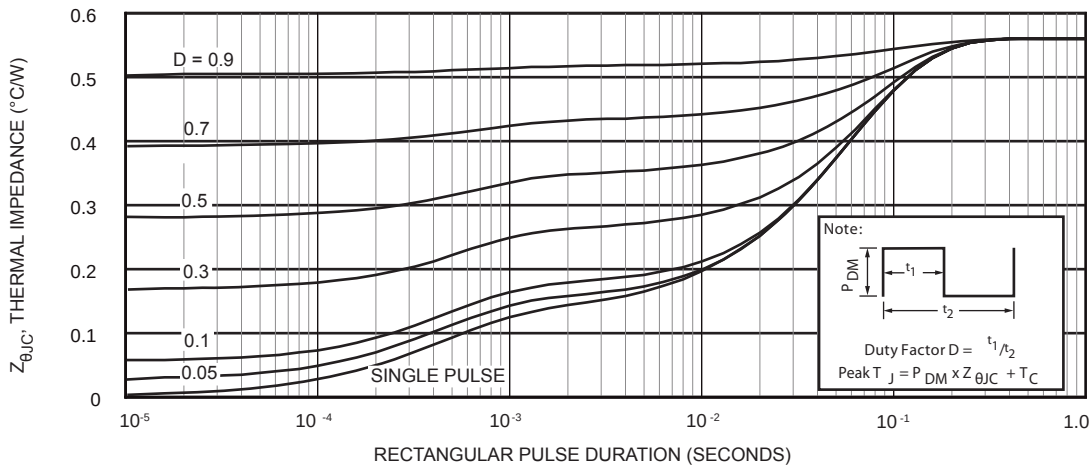
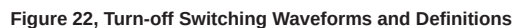
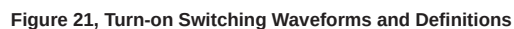


Figure 19, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration



Technical drawing of a 3-pin TO-18 package, showing front and side views with dimensions in inches and millimeters.

Front View Dimensions:

- Overall width: 10.66 (.420) / 9.66 (.380)
- Pin pitch (center-to-center): 5.33 (.210) / 4.83 (.190)
- Pin diameter: 3.40 (.133) Dia. / 3.10 (.123)
- Pin height (from base): 7.10 (.280) / 6.70 (.263)
- Base width: 2.80 (.110) / 2.60 (.102)
- Base thickness: 12.192 (.480) / 9.912 (.390)
- Base to pin center distance: 3.70 (.145) / 2.20 (.126)
- Pin diameter (bottom): 0.48 (.019) / 0.44 (.017)
- Pin length: 2.85 (.112) / 2.65 (.104)
- Pin to base distance: 4.80 (.189) / 4.60 (.181)

Side View Dimensions:

- Pin height (from base): 14.73 (.580) / 12.70 (.500)
- Pin diameter (top): 3.683 (.145) MAX.
- Pin diameter (bottom): 1.01 (.040) 3-Plcs. / .83 (.033)
- Pin to base distance: 2.79 (.110) / 2.29 (.090)
- Pin to base distance: 5.33 (.210) / 4.83 (.190)
- Pin to base distance: 1.77 (.070) 3-Plcs. / 1.15 (.045)

Labels:

- Collector
- Emitter
- Source

Dimensions in Millimeters and (Inches)