

DYNAMIC CHARACTERISTICS

APT12040L2FLL

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		7247		pF
C_{oss}	Output Capacitance			1102		
C_{rss}	Reverse Transfer Capacitance			200		
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 600V$ $I_D = 30A @ 25^\circ C$		275		nC
Q_{gs}	Gate-Source Charge			32		
Q_{gd}	Gate-Drain ("Miller") Charge			179		
$t_{d(on)}$	Turn-on Delay Time	RESISTIVE SWITCHING $V_{GS} = 15V$ $V_{DD} = 600V$ $I_D = 30A @ 25^\circ C$ $R_G = 0.6\Omega$		21		ns
t_r	Rise Time			14		
$t_{d(off)}$	Turn-off Delay Time			67		
t_f	Fall Time			24		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 25°C $V_{DD} = 800V, V_{GS} = 15V$ $I_D = 30A, R_G = 5\Omega$		1265		μJ
E_{off}	Turn-off Switching Energy			1147		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 125°C $V_{DD} = 800V, V_{GS} = 15V$ $I_D = 30A, R_G = 5\Omega$		2293		
E_{off}	Turn-off Switching Energy			1411		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			30	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)			120	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V, I_S = -30A$)			1.3	Volts
dv/dt	Peak Diode Recovery dv/dt ⑤			18	V/ns
t_{rr}	Reverse Recovery Time ($I_S = -30A, di/dt = 100A/\mu s$)	$T_j = 25^\circ C$		375	ns
		$T_j = 125^\circ C$		860	
Q_{rr}	Reverse Recovery Charge ($I_S = -30A, di/dt = 100A/\mu s$)	$T_j = 25^\circ C$	2.0		μC
		$T_j = 125^\circ C$	9.0		
I_{RRM}	Peak Recovery Current ($I_S = -30A, di/dt = 100A/\mu s$)	$T_j = 25^\circ C$	15		Amps
		$T_j = 125^\circ C$	28		

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.14	$^\circ C/W$
$R_{\theta JA}$	Junction to Ambient			40	

① Repetitive Rating: Pulse width limited by maximum junction temperature

② Pulse Test: Pulse width < 380 μs , Duty Cycle < 2%

③ See MIL-STD-750 Method 3471

④ Starting $T_j = +25^\circ C$, $L = 7.11mH$, $R_G = 25\Omega$, Peak $I_L = 30A$

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. $I_S \leq -30A$ $di/dt \leq 700A/\mu s$ $V_R \leq 1200$ $T_j \leq 150^\circ C$

⑥ E_{on} includes diode reverse recovery. See figures 18, 20.

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

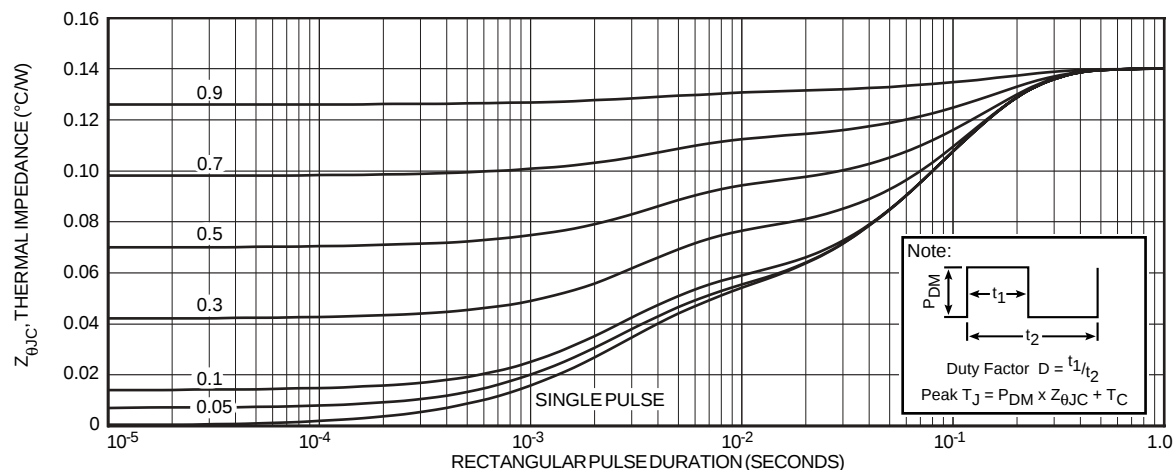


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

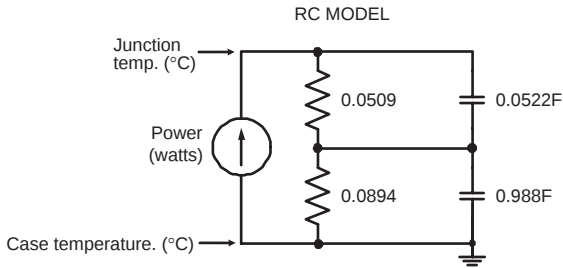


FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL

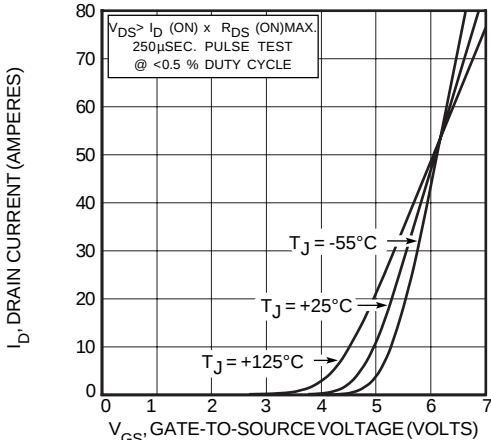


FIGURE 4, TRANSFER CHARACTERISTICS

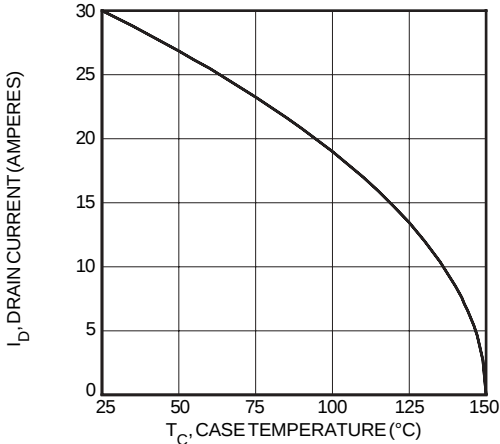


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

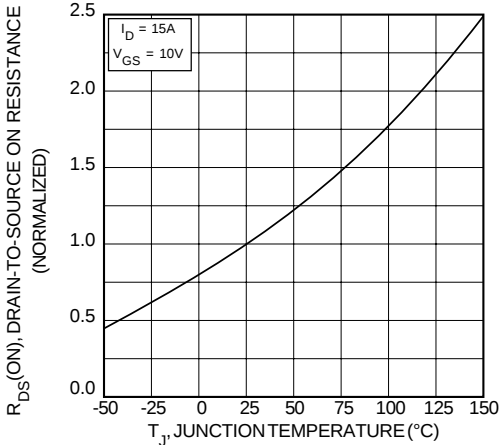


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

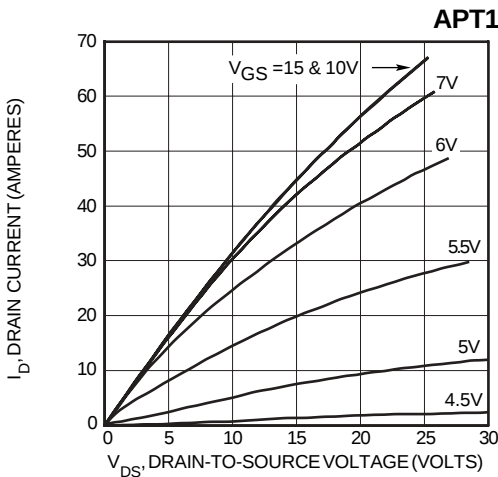


FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

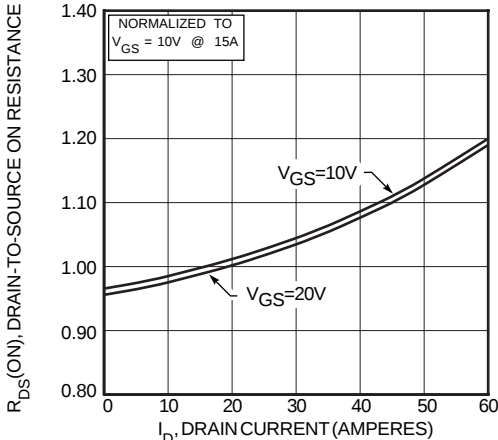


FIGURE 5, $R_{DS}(\text{ON})$ vs DRAIN CURRENT

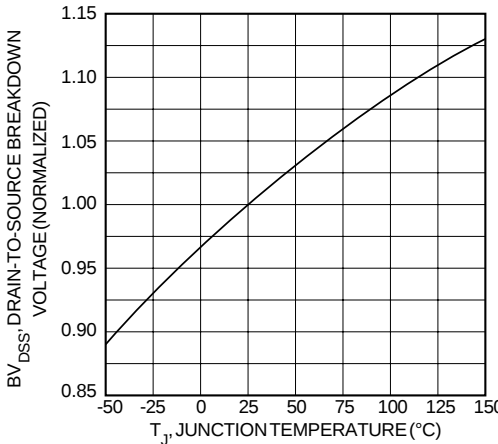


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

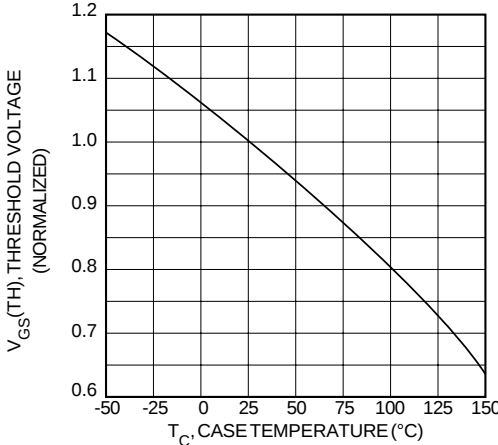


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

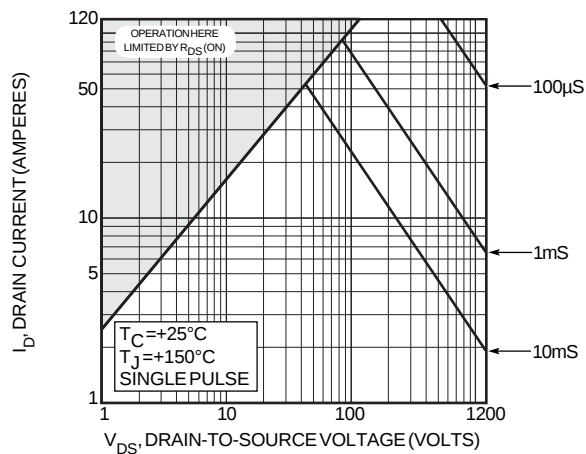


FIGURE 10, MAXIMUM SAFE OPERATING AREA

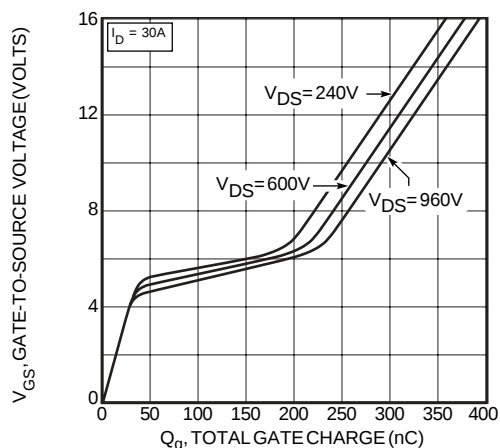


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

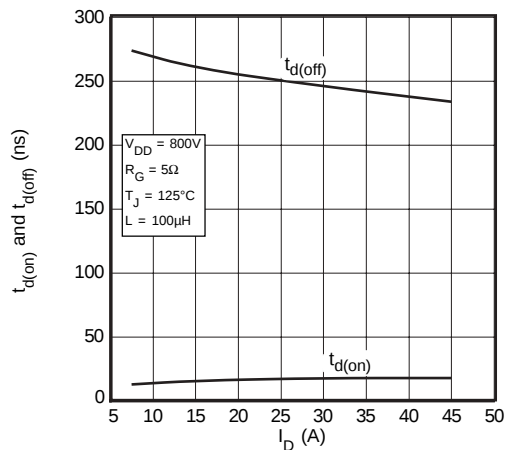


FIGURE 14, DELAY TIMES vs CURRENT

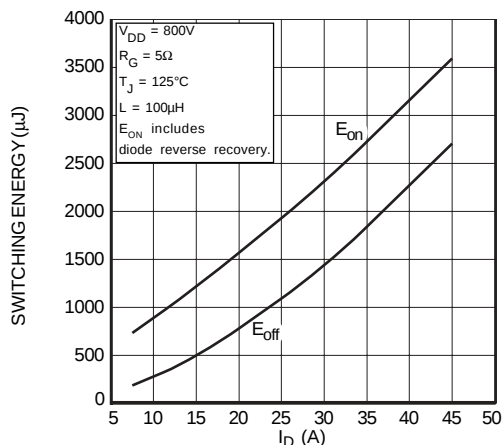


FIGURE 16, SWITCHING ENERGY vs CURRENT

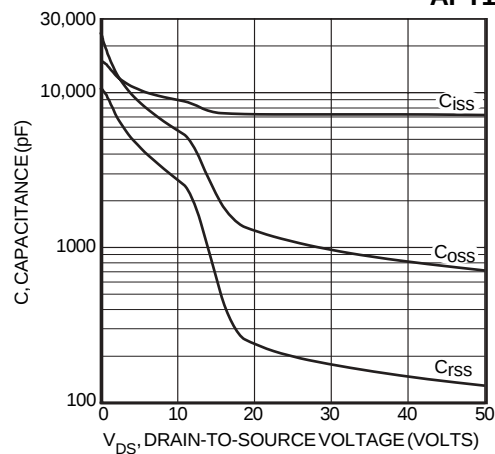


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

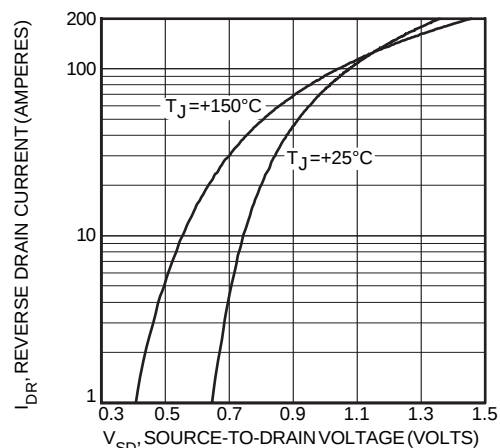


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

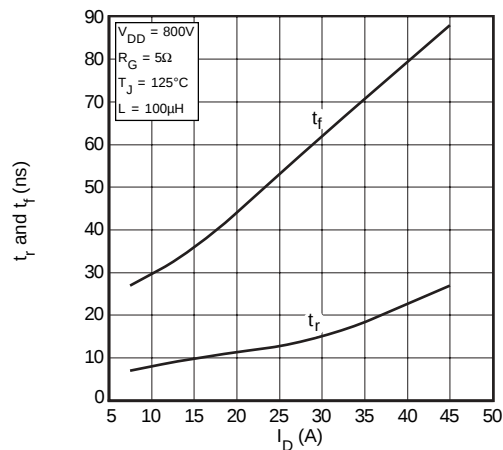


FIGURE 15, RISE AND FALL TIMES vs CURRENT

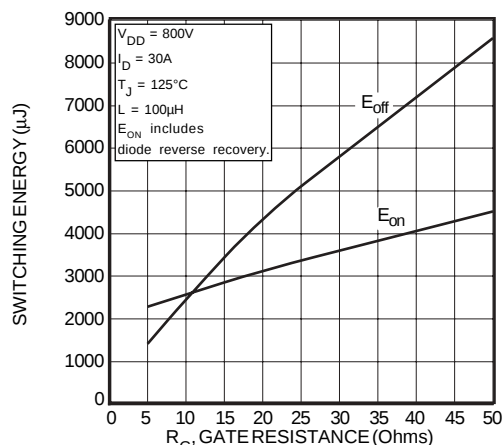


FIGURE 17, SWITCHING ENERGY vs. GATE RESISTANCE

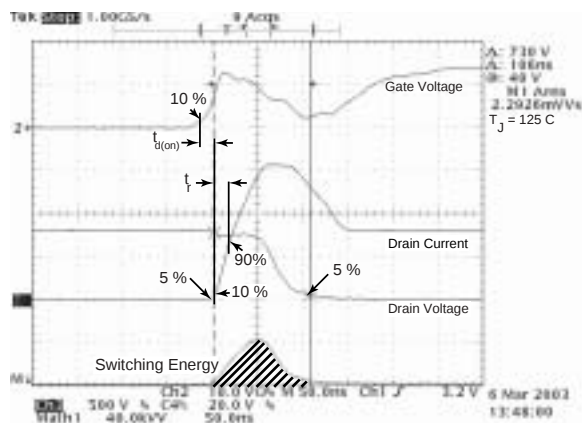


Figure 18, Turn-on Switching Waveforms and Definitions

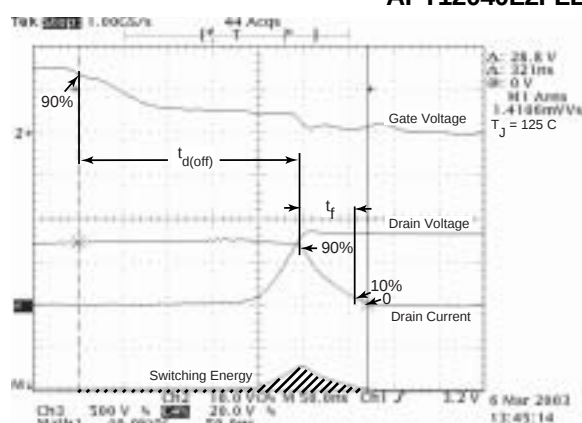


Figure 19, Turn-off Switching Waveforms and Definitions

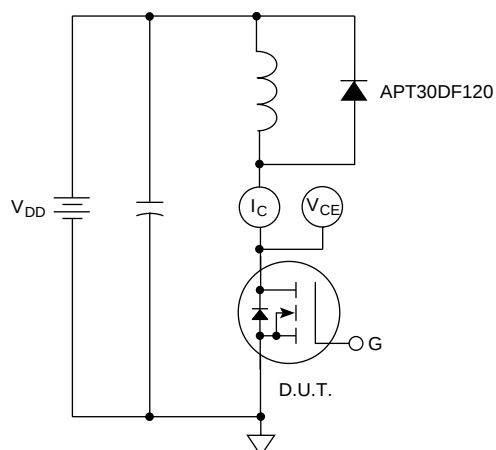
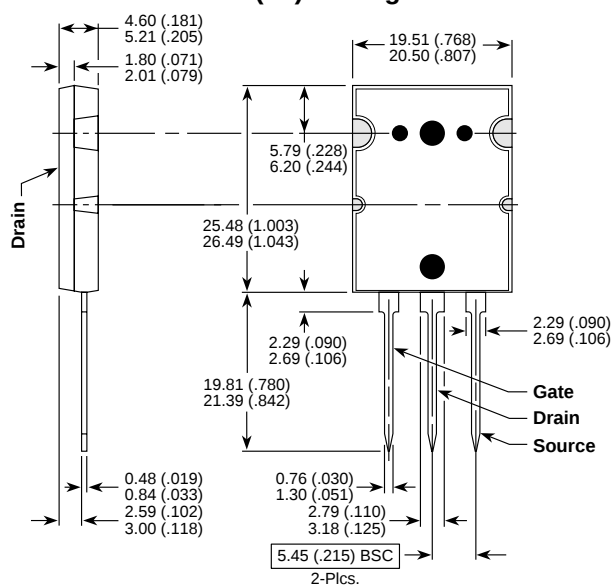


Figure 20, Inductive Switching Test Circuit

TO-264 MAXTM(L2) Package Outline

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.