

DYNAMIC CHARACTERISTICS

APT50M50L2FLL

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		10550		pF
C_{oss}	Output Capacitance			2060		
C_{rss}	Reverse Transfer Capacitance			105		
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 250V$ $I_D = 89A @ 25^\circ C$		200		nC
Q_{gs}	Gate-Source Charge			50		
Q_{gd}	Gate-Drain ("Miller") Charge			105		
$t_{d(on)}$	Turn-on Delay Time	RESISTIVE SWITCHING $V_{GS} = 15V$ $V_{DD} = 250V$ $I_D = 89A @ 25^\circ C$ $R_G = 0.6\Omega$		24		ns
t_r	Rise Time			22		
$t_{d(off)}$	Turn-off Delay Time			56		
t_f	Fall Time			8		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 25°C $V_{DD} = 333V, V_{GS} = 15V$ $I_D = 89A, R_G = 3\Omega$		1490		μJ
E_{off}	Turn-off Switching Energy			1650		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 125°C $V_{DD} = 333V, V_{GS} = 15V$ $I_D = 89A, R_G = 3\Omega$		2105		
E_{off}	Turn-off Switching Energy			1835		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			89	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)			356	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V, I_S = -89A$)			1.3	Volts
dv/dt	Peak Diode Recovery dv/dt ⑤			15	V/ns
t_{rr}	Reverse Recovery Time ($I_S = -89A, di/dt = 100A/\mu s$)	$T_j = 25^\circ C$		300	ns
		$T_j = 125^\circ C$		600	
Q_{rr}	Reverse Recovery Charge ($I_S = -89A, di/dt = 100A/\mu s$)	$T_j = 25^\circ C$	2.6		μC
		$T_j = 125^\circ C$	10		
I_{RRM}	Peak Recovery Current ($I_S = -89A, di/dt = 100A/\mu s$)	$T_j = 25^\circ C$	17		Amps
		$T_j = 125^\circ C$	34		

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 $T_j = +25^\circ C$, $L = 0.81mH$, $R_G = 25\Omega$, Peak $I_L = 89A$

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. $I_S \leq -89A$ $di/dt \leq 700A/\mu s$ $V_R \leq 500V$ $T_j \leq 150^\circ C$

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.

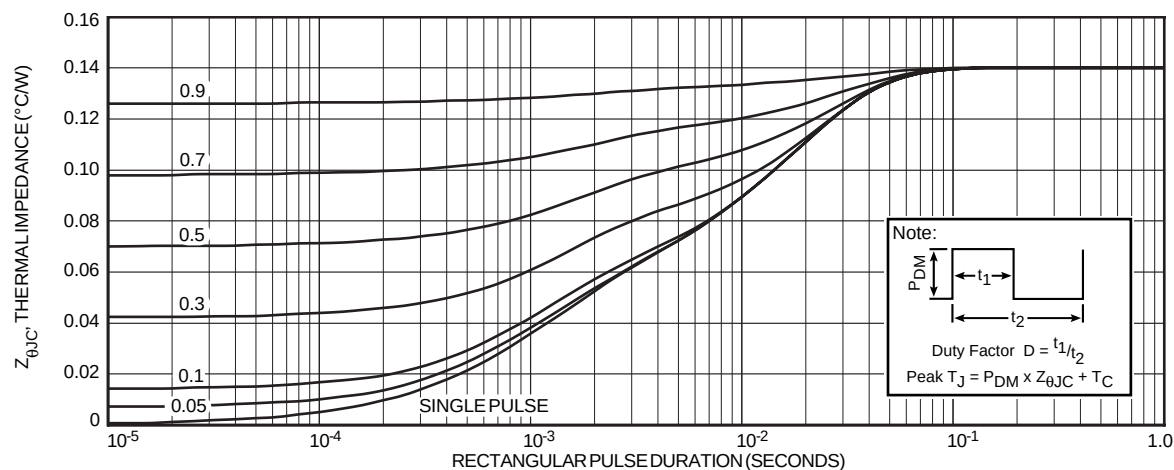


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

APT50M50L2FLL

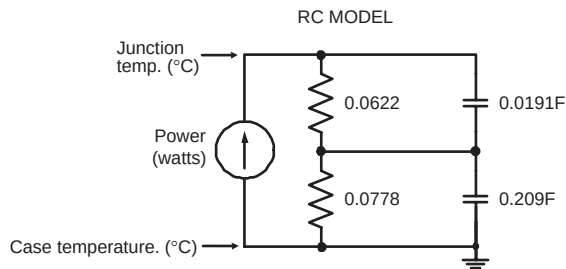


FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL

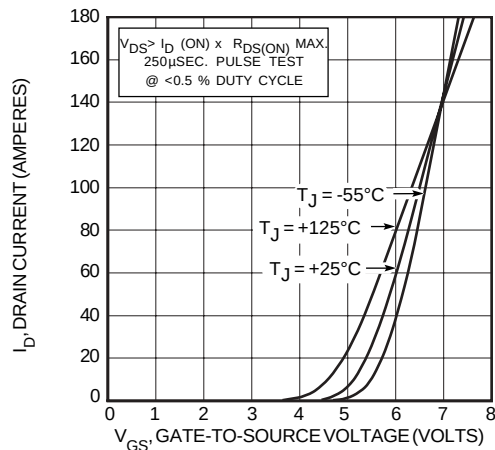


FIGURE 4, TRANSFER CHARACTERISTICS

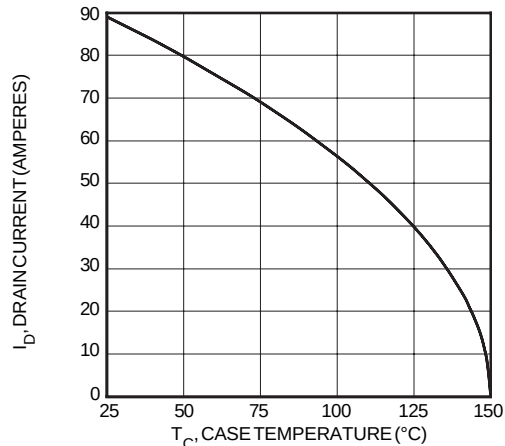


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

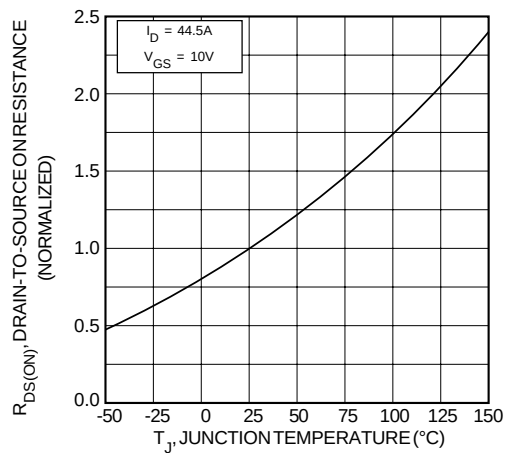


FIGURE 8, $R_{DS(\text{ON})}$ vs. TEMPERATURE

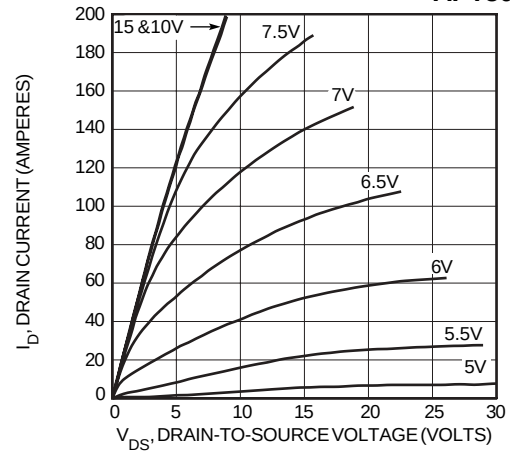


FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

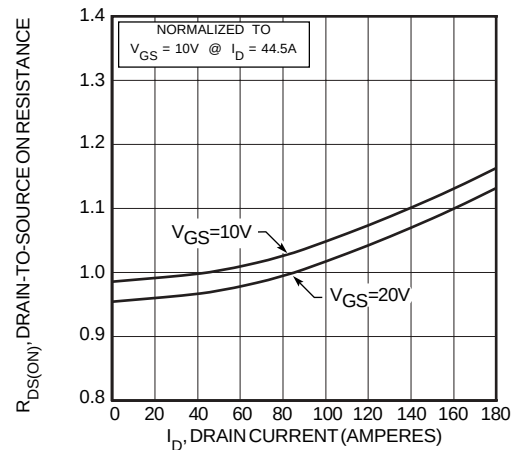


FIGURE 5, $R_{DS(\text{ON})}$ vs DRAIN CURRENT

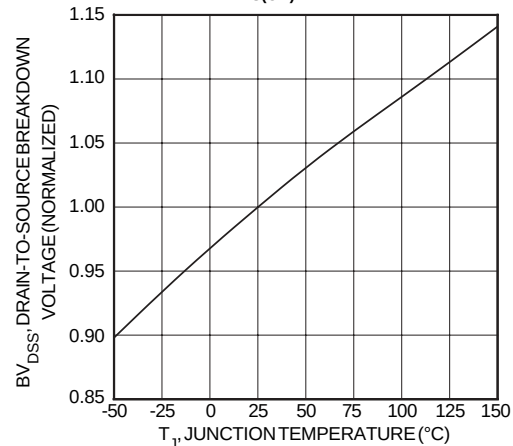


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

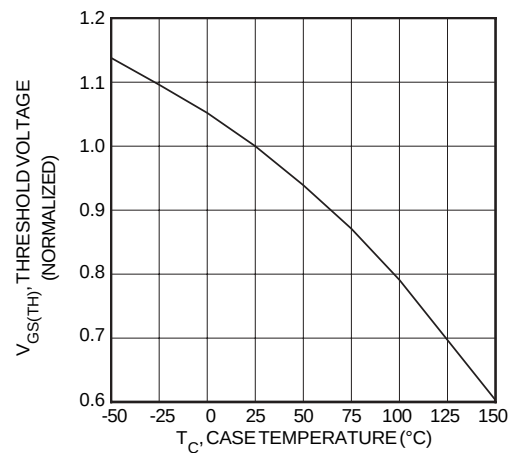


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

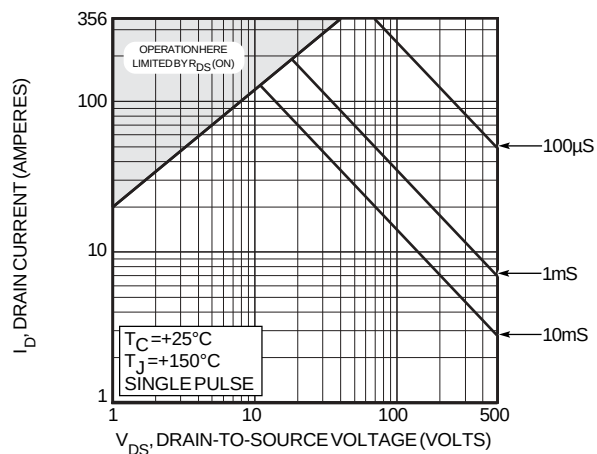


FIGURE 10, MAXIMUM SAFE OPERATING AREA

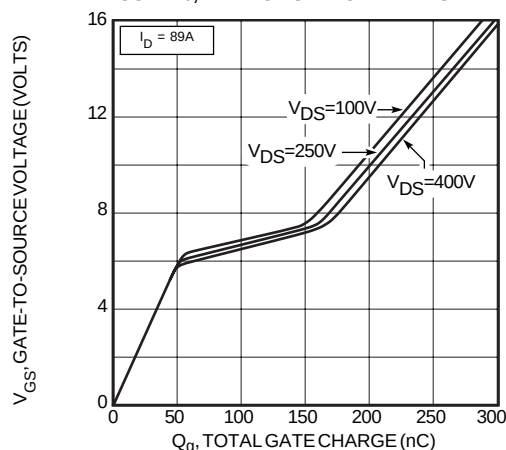


FIGURE 12, GATE CHARGE vs GATE-TO-SOURCE VOLTAGE

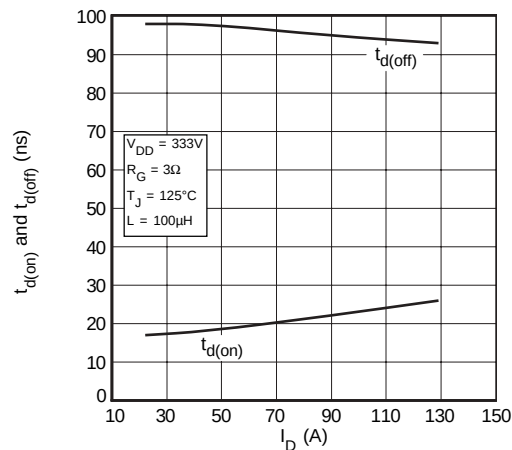


FIGURE 14, DELAY TIMES vs CURRENT

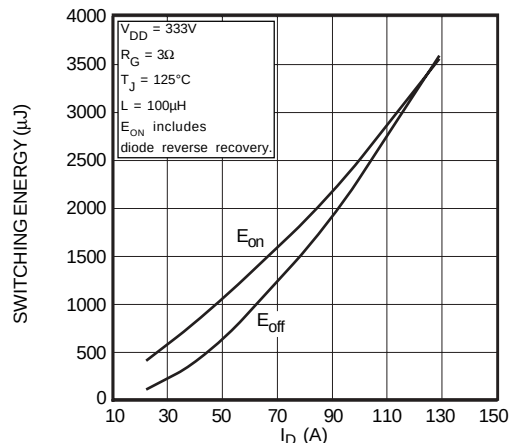


FIGURE 16, SWITCHING ENERGY vs CURRENT

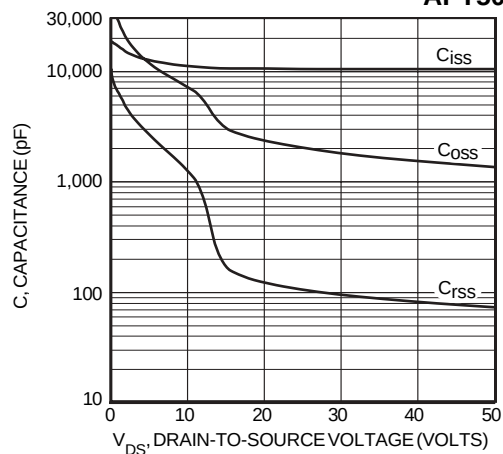


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

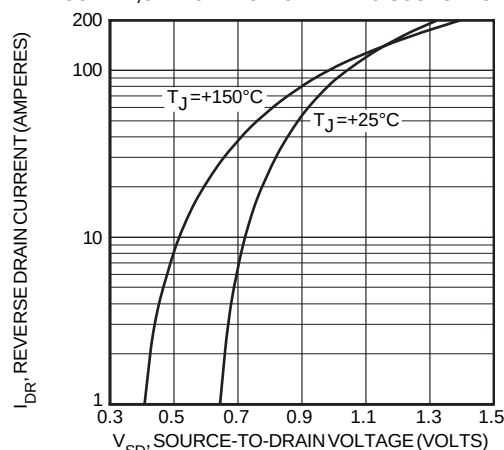


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

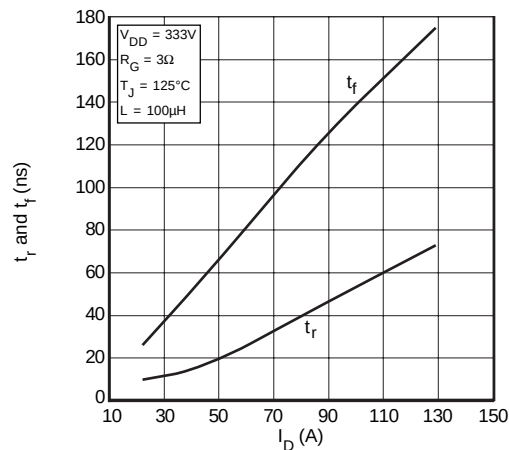


FIGURE 15, RISE AND FALL TIMES vs CURRENT

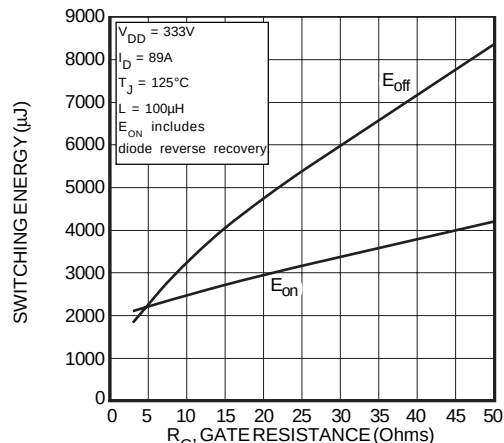


FIGURE 17, SWITCHING ENERGY vs. GATE RESISTANCE

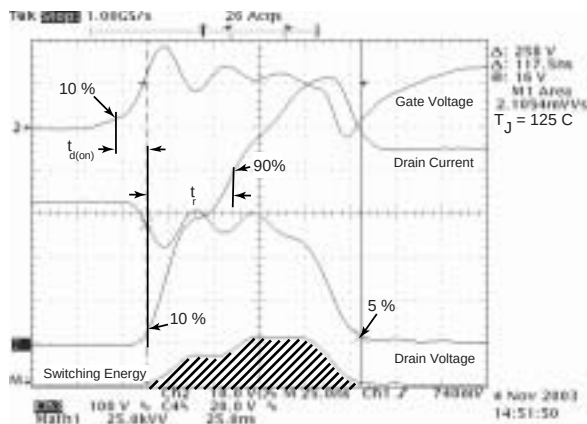


Figure 18, Turn-on Switching Waveforms and Definitions

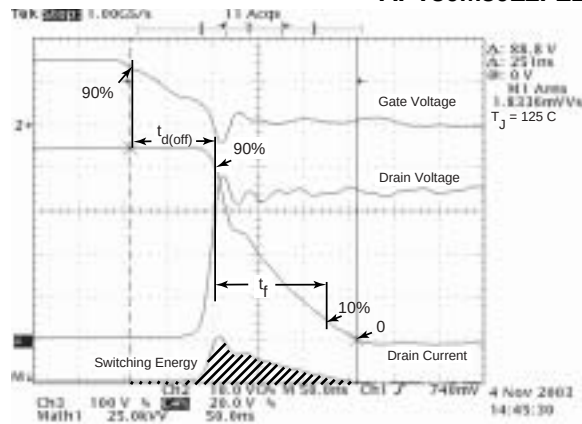


Figure 19, Turn-off Switching Waveforms and Definitions

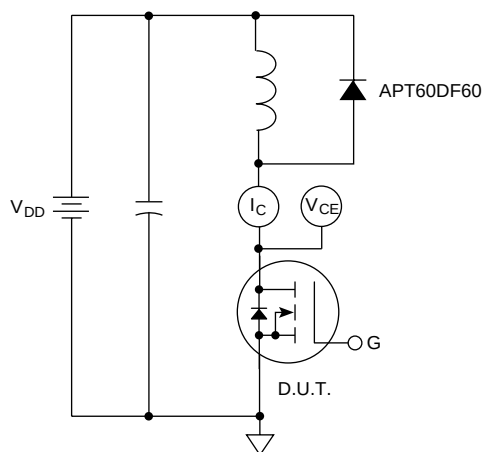
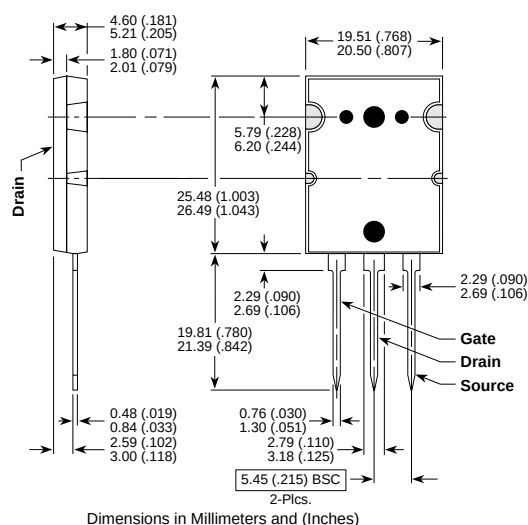


Figure 20, Inductive Switching Test Circuit

TO-264 MAX™(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.