DYNAMIC CHARACTERISTICS

APT47N65BC3

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1 MHz		6965	8355	pF
C_{oss}	Output Capacitance			2100	2940	
C_{rss}	Reverse Transfer Capacitance			85	127	
Q_g	Total Gate Charge [3]	V_{GS} = 10V V_{DD} = 300V I_D = 47A @ 25°C		250	375	nC
Q_{gs}	Gate-Source Charge			30	45	
Q_{gd}	Gate-Drain ("Miller") Charge			105	157	
$t_{d(on)}$	Turn-on Delay Time	**INDUCTIVE SWITCHING** V_{GS} = 13V V_{DD} = 380V I_D = 47A @ 125°C R_G = 5Ω		18	36	ns
t_r	Rise Time			28	56	
$t_{d(off)}$	Turn-off Delay Time			295	442	
t_f	Fall Time			84	168	
E_{on}	Turn-on Switching Energy [6]	**INDUCTIVE SWITCHING @ 25°C** V_{DD} = 400V, V_{GS} = 15V I_D = 47A, R_G = 5Ω		810	1620	µJ
E_{off}	Turn-off Switching Energy			840	1680	
E_{on}	Turn-on Switching Energy [6]	**INDUCTIVE SWITCHING @ 125°C** V_{DD} = 400V V_{GS} = 15V I_D = 47A, R_G = 5Ω		1172	1758	
E_{off}	Turn-off Switching Energy			985	1970	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			47	Amps
I_{SM}	Pulsed Source Current [1] (Body Diode)			141	
V_{SD}	Diode Forward Voltage [2] (V_{GS} = 0V, I_S = -47A)			1.2	Volts
t_{rr}	Reverse Recovery Time (I_S = -47A, dI_S/dt = 100A/µs, V_R = 350V)		580	650	ns
Q_{rr}	Reverse Recovery Charge (I_S = -47A, dI_S/dt = 100A/µs, V_R = 350V)		23	16.5	µC
$^{dv}/_{dt}$	Peak Diode Recovery $^{dv}/_{dt}$ [5]			6	V/ns

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.30	°C/W
$R_{\theta JA}$	Junction to Ambient			62	

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°C, L = 36.0mH, R_G = 25Ω, Peak I_L = 10A

⑤ $^{dv}/_{dt}$ numbers reflect the limitations of the test circuit rather than the device itself. I_S = $-I_D$47A , $^{di}/_{dt}$ = 700A/µs $V_R = V_{DSS}$, T_J = 150°C

⑥ Eon includes diode reverse recovery. See figures 18, 20.

⑦ Repetitve avalanche causes additional power losses that can be calculated as $P_{AV}=E_{AR}*f$

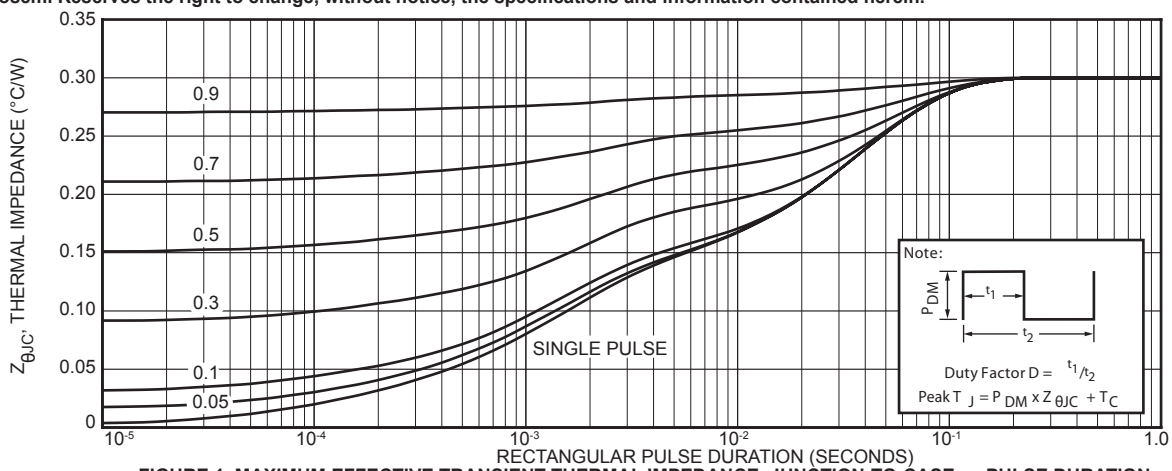


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

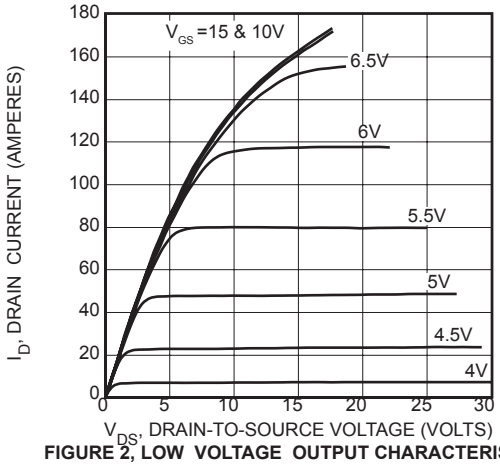


FIGURE 2, LOW VOLTAGE OUTPUT CHARACTERISTICS

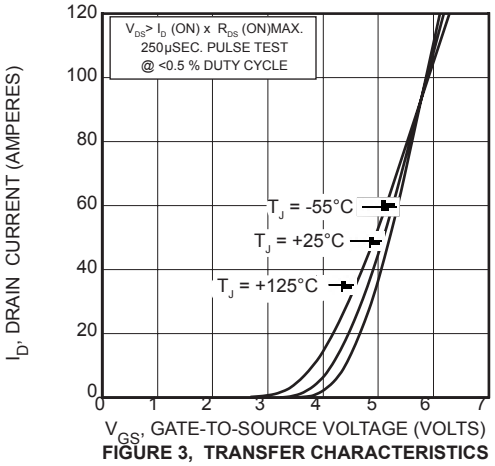


FIGURE 3, TRANSFER CHARACTERISTICS

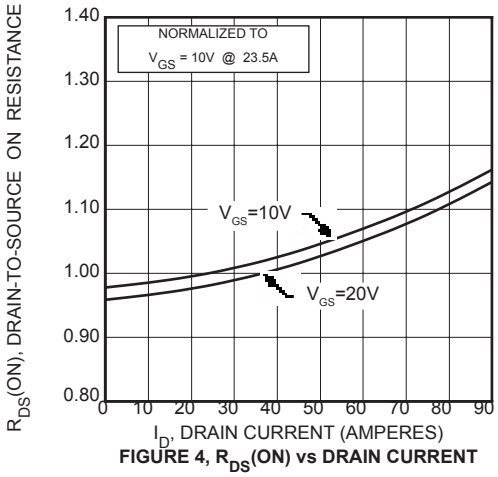


FIGURE 4, R_{DS}(ON) vs DRAIN CURRENT

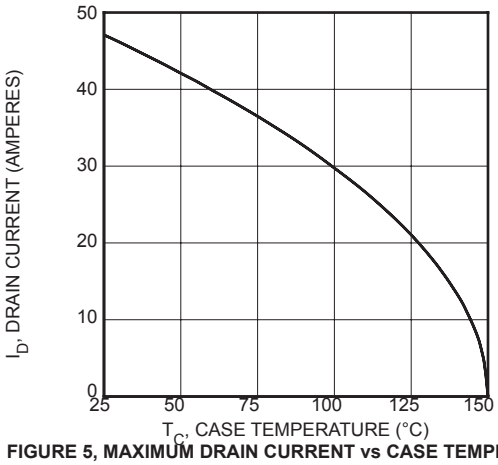


FIGURE 5, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

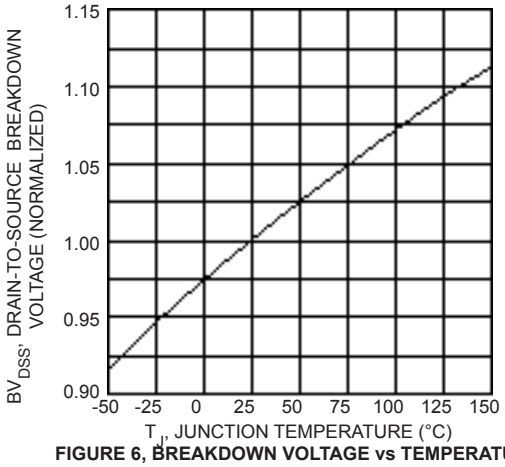


FIGURE 6, BREAKDOWN VOLTAGE vs TEMPERATURE

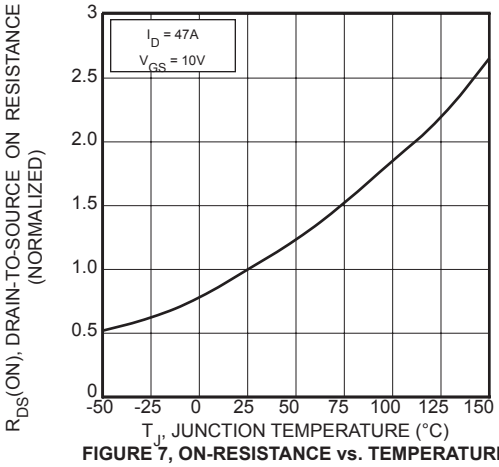


FIGURE 7, ON-RESISTANCE vs. TEMPERATURE

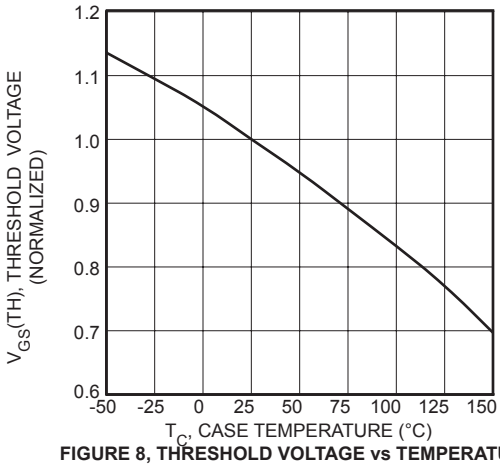


FIGURE 8, THRESHOLD VOLTAGE vs TEMPERATURE

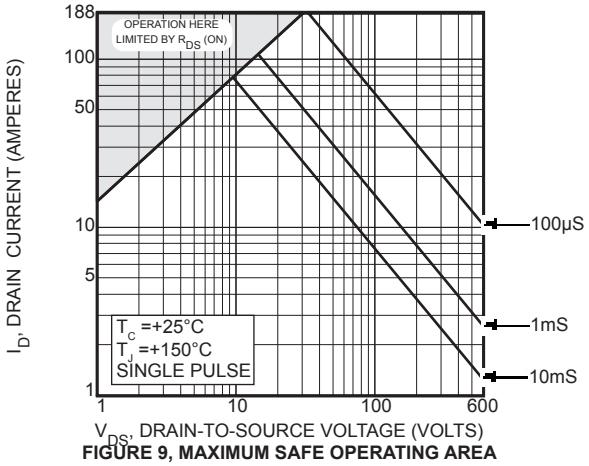


FIGURE 9, MAXIMUM SAFE OPERATING AREA

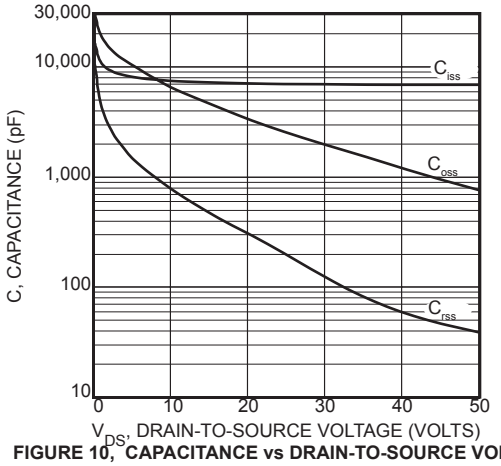


FIGURE 10, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

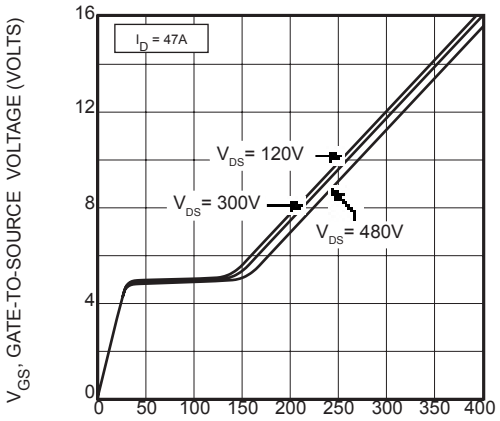


FIGURE 11, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

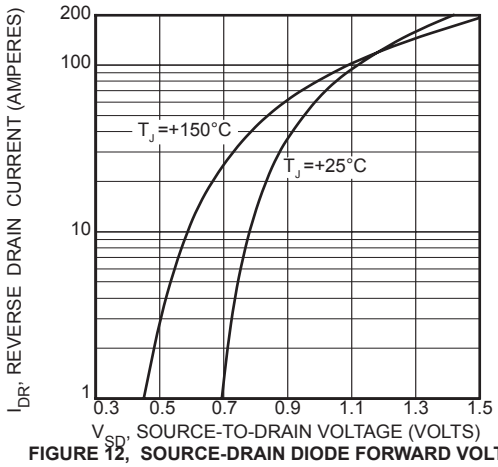


FIGURE 12, SOURCE-DRAIN DIODE FORWARD VOLTAGE

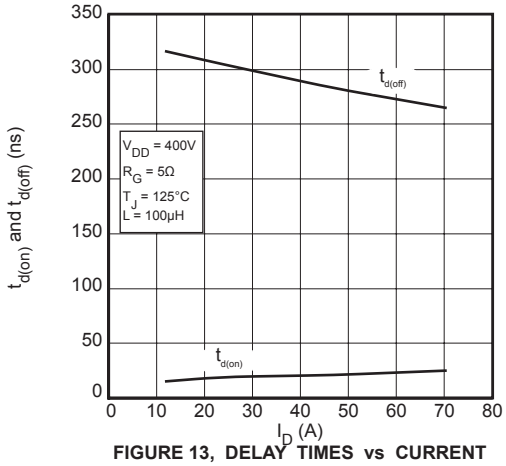


FIGURE 13, DELAY TIMES vs CURRENT

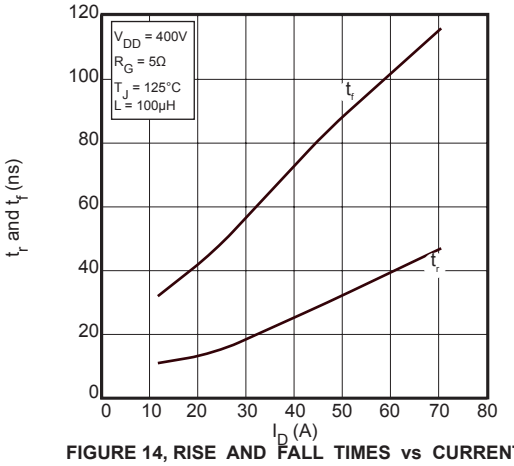


FIGURE 14, RISE AND FALL TIMES vs CURRENT

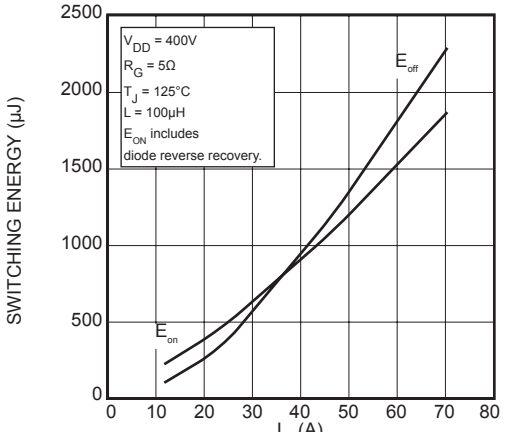


FIGURE 15, SWITCHING ENERGY vs CURRENT

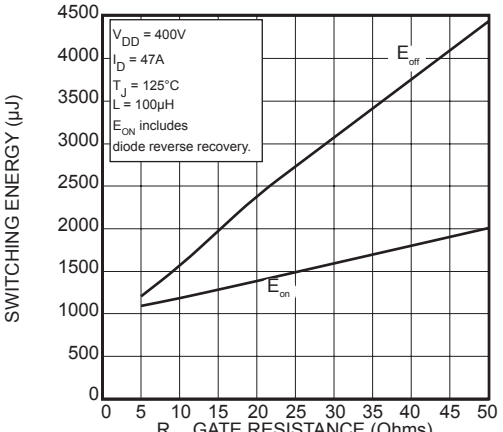


FIGURE 16, SWITCHING ENERGY VS. GATE RESISTANCE

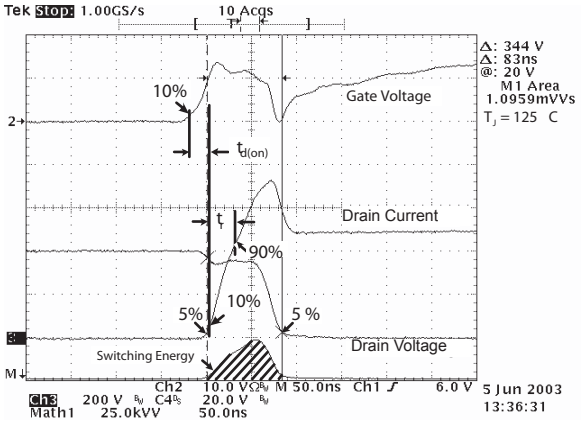


Figure 18, Turn-on Switching Waveforms and Definitions

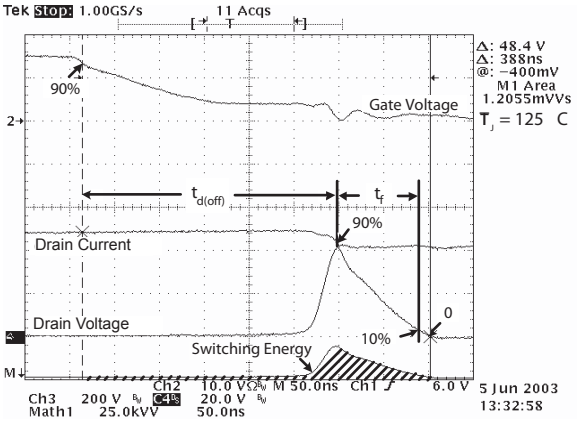


Figure 19, Turn-off Switching Waveforms and Definitions

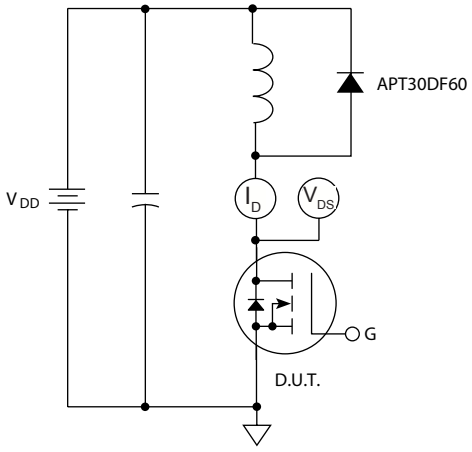
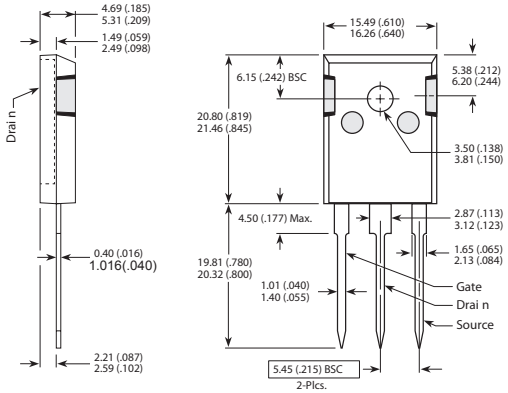


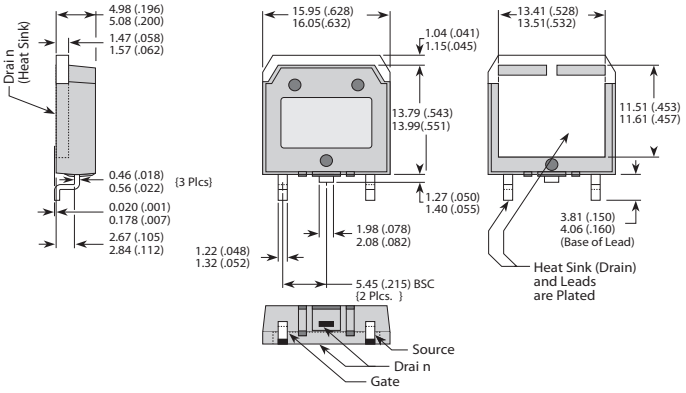
Figure 20, Inductive Switching Test Circuit

TO-247 Package Outline



D³PAK (S) Package Outline

e3 100% SN Plated



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