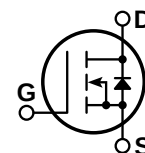
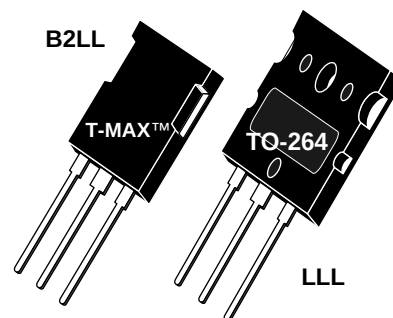


POWER MOS 7® MOSFET

Power MOS 7® is a new generation of low loss, high voltage, N-Channel enhancement mode power MOSFETS. Both conduction and switching losses are addressed with Power MOS 7® by significantly lowering $R_{DS(ON)}$ and Q_g . Power MOS 7® combines lower conduction and switching losses along with exceptionally fast switching speeds inherent with APT's patented metal gate structure.

- Lower Input Capacitance
- Lower Miller Capacitance
- Lower Gate Charge, Q_g
- Increased Power Dissipation
- Easier To Drive
- Popular T-MAX™ or TO-264 Package



MAXIMUM RATINGS

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

Symbol	Parameter	APT10035	UNIT
V_{DSS}	Drain-Source Voltage	1000	Volts
I_D	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	28	Amps
I_{DM}	Pulsed Drain Current ^①	112	
V_{GS}	Gate-Source Voltage Continuous	± 30	Volts
V_{GSM}	Gate-Source Voltage Transient	± 40	
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	690	Watts
	Linear Derating Factor	5.52	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	$^\circ\text{C}$
T_L	Lead Temperature: 0.063" from Case for 10 Sec.	300	
I_{AR}	Avalanche Current ^① (Repetitive and Non-Repetitive)	28	Amps
E_{AR}	Repetitive Avalanche Energy ^①	50	mJ
E_{AS}	Single Pulse Avalanche Energy ^④	3000	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 250\mu\text{A}$)	1000			Volts
$I_{D(on)}$	On State Drain Current ^② ($V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$)	28			Amps
$R_{DS(on)}$	Drain-Source On-State Resistance ^② ($V_{GS} = 10V, 14A$)			0.350	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = 1000V, V_{GS} = 0V$)			100	μA
	Zero Gate Voltage Drain Current ($V_{DS} = 800V, V_{GS} = 0V, T_C = 125^\circ\text{C}$)			500	
I_{GSS}	Gate-Source Leakage Current ($V_{GS} = \pm 30V, V_{DS} = 0V$)			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 2.5mA$)	3		5	Volts



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

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

DYNAMIC CHARACTERISTICS

APT10035 B2LL - LLL

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		5185		pF
C_{oss}	Output Capacitance			881		
C_{rss}	Reverse Transfer Capacitance			160		
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 500V$ $I_D = 28A @ 25^\circ C$		186		nC
Q_{gs}	Gate-Source Charge			24		
Q_{gd}	Gate-Drain ("Miller") Charge			122		
$t_{d(on)}$	Turn-on Delay Time	RESISTIVE SWITCHING $V_{GS} = 15V$ $V_{DD} = 500V$ $I_D = 28A @ 25^\circ C$ $R_G = 1.6\Omega$		12		ns
t_r	Rise Time			10		
$t_{d(off)}$	Turn-off Delay Time			36		
t_f	Fall Time			9		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 25°C $V_{DD} = 670V, V_{GS} = 15V$ $I_D = 28A, R_G = 5\Omega$		900		μJ
E_{off}	Turn-off Switching Energy			623		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 125°C $V_{DD} = 670V, V_{GS} = 15V$ $I_D = 28A, R_G = 5\Omega$		1423		
E_{off}	Turn-off Switching Energy			779		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			25	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)			100	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V, I_S = -I_D 28A$)			1.3	Volts
t_{rr}	Reverse Recovery Time ($I_S = -I_D 28A, di_S/dt = 100A/\mu s$)		1170		ns
Q_{rr}	Reverse Recovery Charge ($I_S = -I_D 28A, di_S/dt = 100A/\mu s$)		16.28		μC
dv/dt	Peak Diode Recovery dv/dt ⑤			10	V/ns

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.18	$^\circ C/W$
$R_{\theta JA}$	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

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

④ Starting $T_J = +25^\circ C$, $L = 7.50mH$, $R_G = 25\Omega$, Peak $I_L = 28A$

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. $I_S = -I_D 28A$ $di/dt \leq 700A/\mu s$ $V_R \leq V_{DSS}$ $T_J \leq 150^\circ C$

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

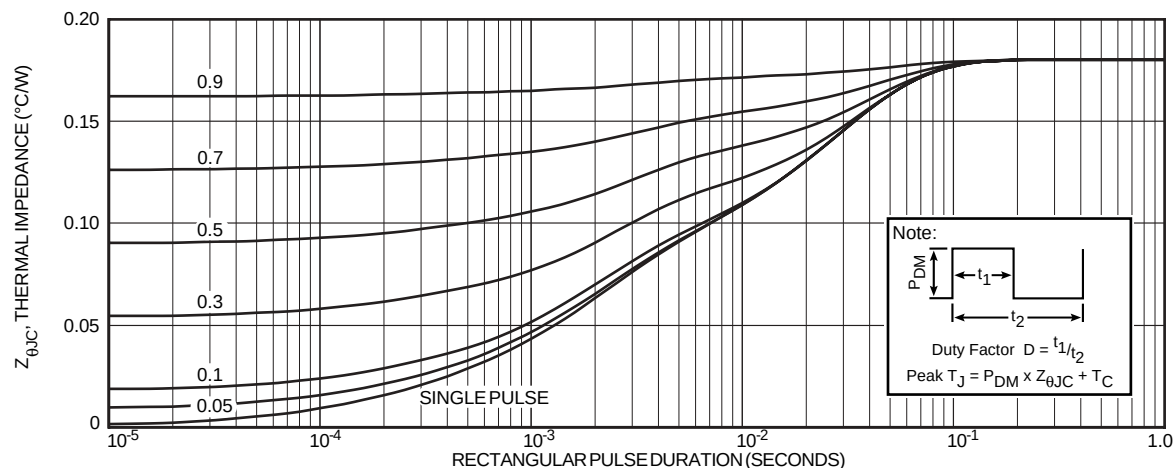


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

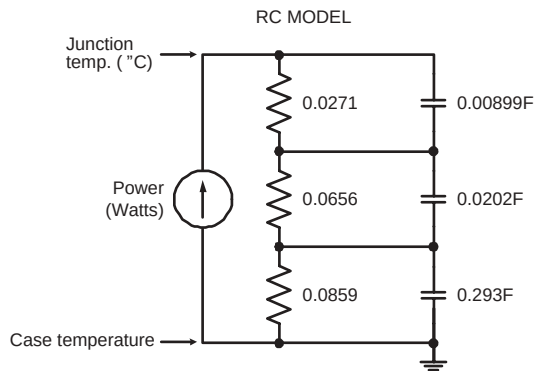


FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL

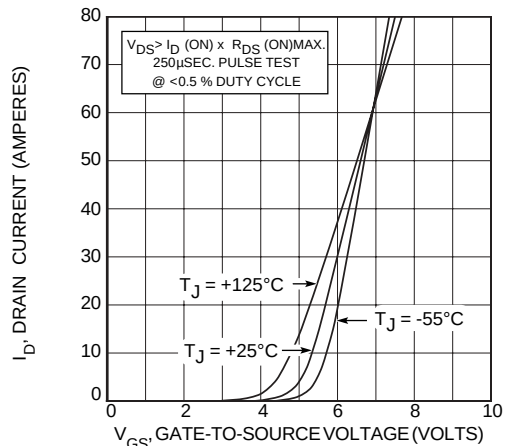


FIGURE 4, TRANSFER CHARACTERISTICS

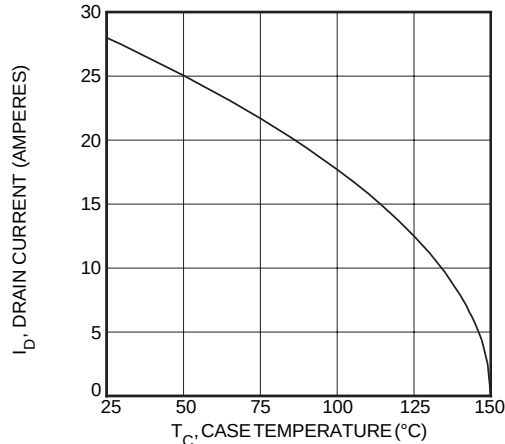


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

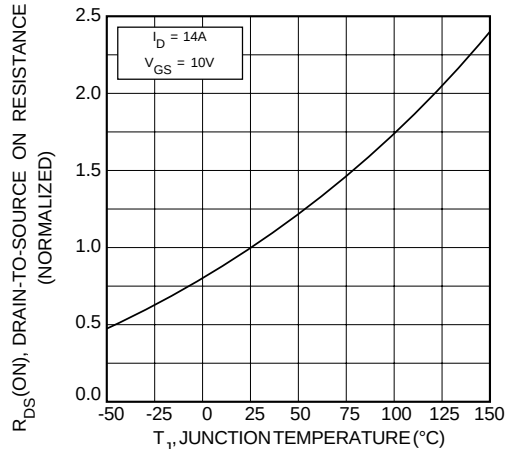


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

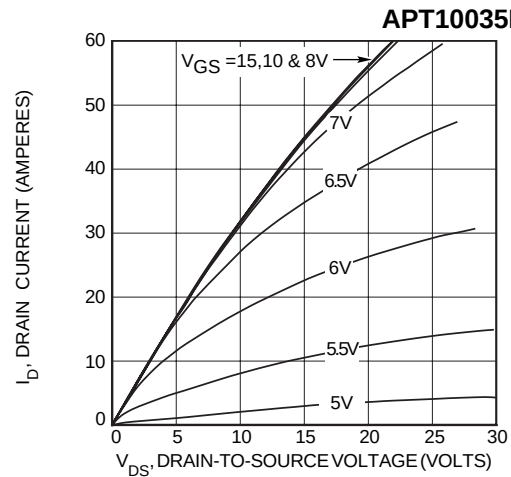


FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

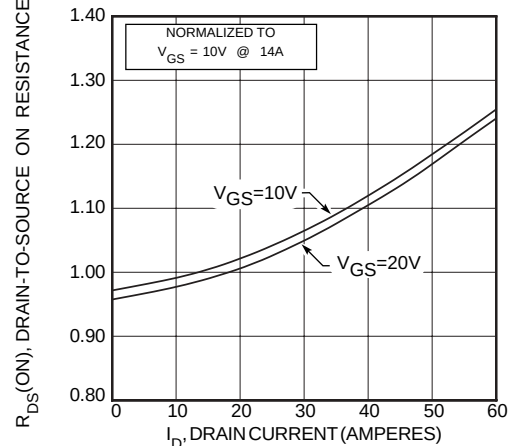


FIGURE 5, $R_{DS}(\text{ON})$ vs DRAIN CURRENT

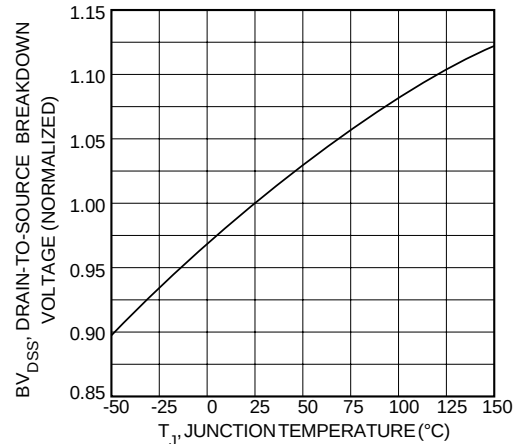


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

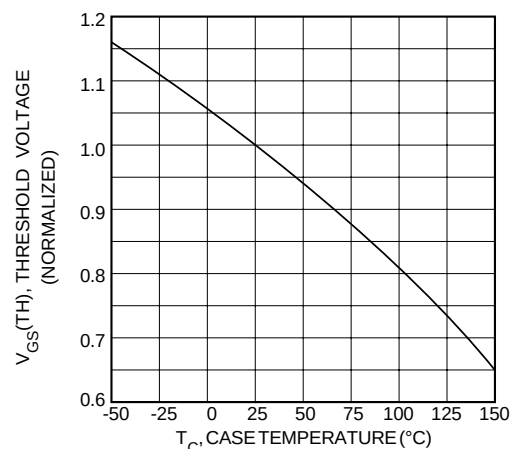


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

Typical Performance Curves

APT10035B2LL - LLL

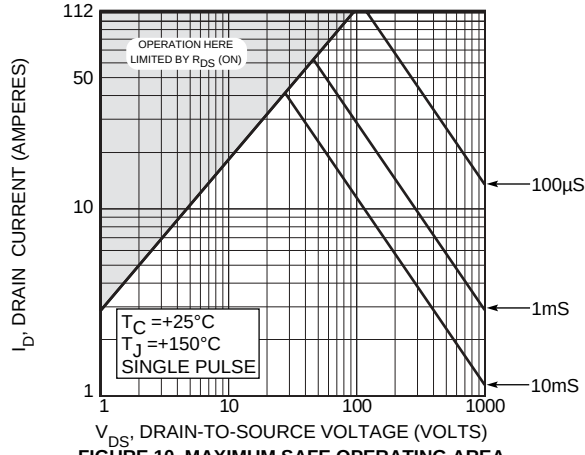


FIGURE 10, MAXIMUM SAFE OPERATING AREA

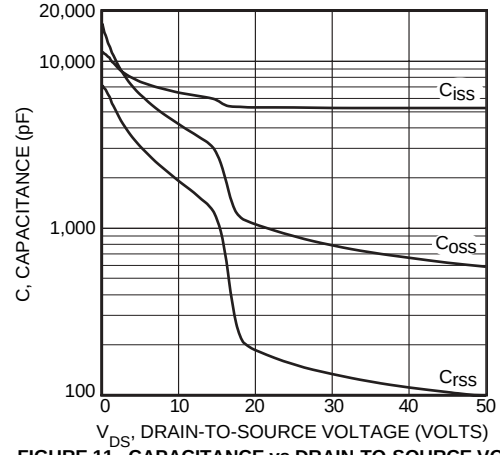


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

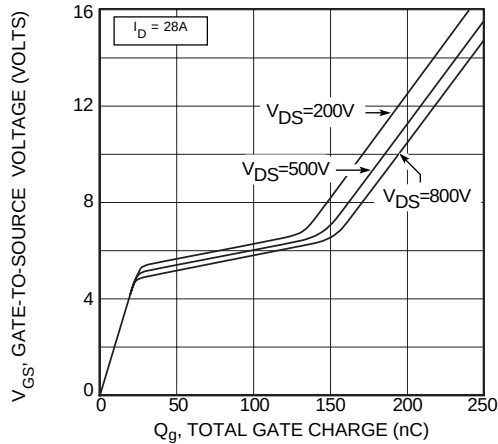


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

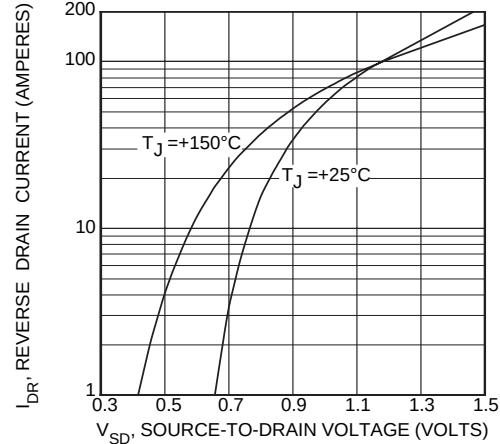


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

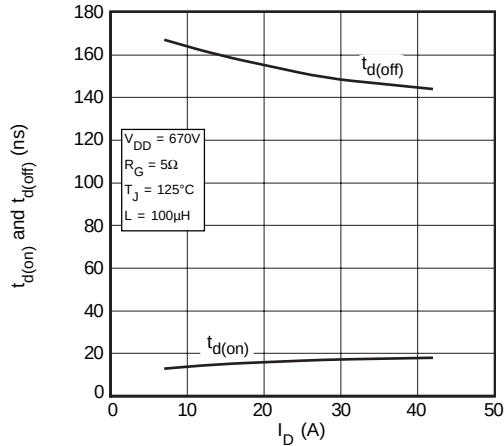


FIGURE 14, DELAY TIMES vs CURRENT

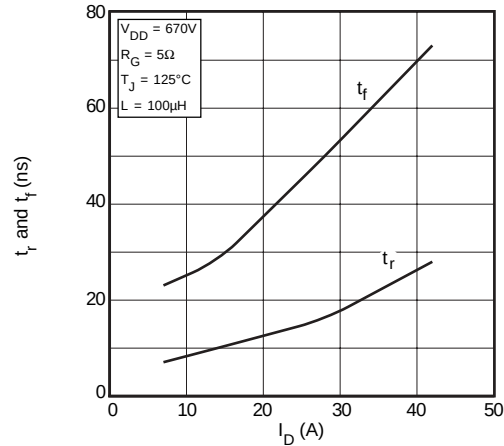


FIGURE 15, RISE AND FALL TIMES vs CURRENT

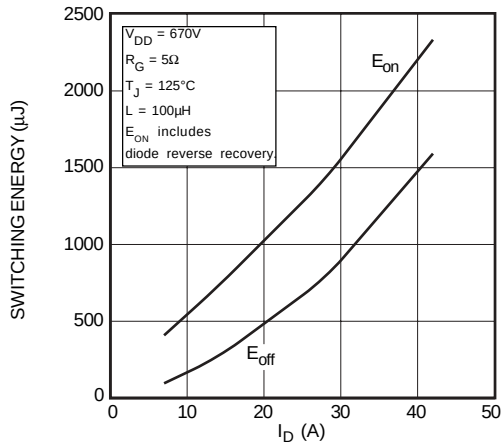


FIGURE 16, SWITCHING ENERGY vs CURRENT

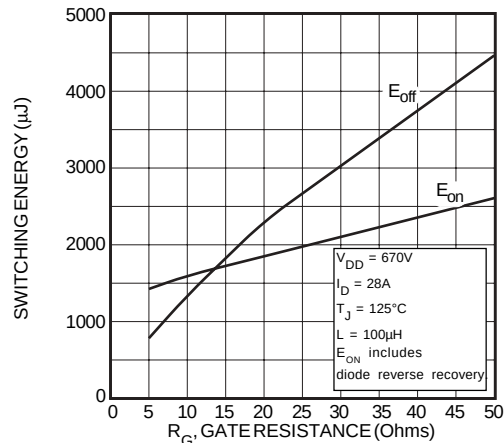


FIGURE 17, SWITCHING ENERGY vs. GATE RESISTANCE

AP110035D2LL-LLT

Top: 1.09G/s

10 Arms

Δ: 27.2 V
Δ: 20.8 V
W: 0 V
M1 Arms
778mV/div

90%

Gate Voltage

$T_J = 125\text{ }^{\circ}\text{C}$

$t_{d(off)}$

90%

Drain Voltage

10%

Drain Current

0

t_f

Switching Energy

24 Feb 2003 13:16:53

The drawing shows the 2-PLRS probe assembly with the following dimensions:

- Top View Dimensions:**
 - Overall width: 15.49 (.610) inches, 16.26 (.640) inches
 - Internal width: 5.38 (.212) inches, 6.20 (.244) inches
 - Probe pin diameter: 0.40 (.016) inches, 0.79 (.031) inches
 - Probe pin length: 2.21 (.087) inches, 2.59 (.102) inches
 - Probe pin spacing: 5.45 (.215) BSC (Between Spacing Center) inches
- Side View Dimensions:**
 - Overall height: 20.80 (.819) inches, 21.46 (.845) inches
 - Probe pin height: 19.81 (.780) inches, 20.32 (.800) inches
 - Probe pin diameter: 1.01 (.040) inches, 1.40 (.055) inches
 - Probe pin length: 4.50 (.177) Max. inches
- Labels:**
 - Drain**: Points to the top of the probe pin.
 - Gate**: Points to the top of the probe pin.
 - Drain**: Points to the top of the probe pin.
 - Source**: Points to the bottom of the probe pin.

Figure 1: Mechanical drawing of the gate assembly. The drawing shows a side view of the gate on the left and a top view of the gate assembly on the right. The side view shows a vertical gate with a drain at the top. Dimensions include 4.60 (.181), 5.21 (.205), 1.80 (.071), 2.01 (.079), 25.48 (1.003), 26.49 (1.043), 19.81 (.780), 21.39 (.842), 0.48 (.019), 0.84 (.033), 2.59 (.102), and 3.00 (.118). The top view shows a rectangular gate assembly with a central circular feature. Dimensions include 19.51 (.768), 20.50 (.807), 3.10 (.122), 3.48 (.137), 5.79 (.228), 6.20 (.244), 2.29 (.090), 2.69 (.106), 0.76 (.030), 1.30 (.051), 2.79 (.110), 3.18 (.125), and 5.45 (.215) BSC. Labels include 'Drain', 'Gate', 'Drain', 'Source', and '2.Pls'.

050-7010 Rev C 3-2003