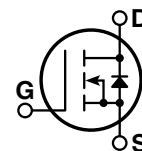
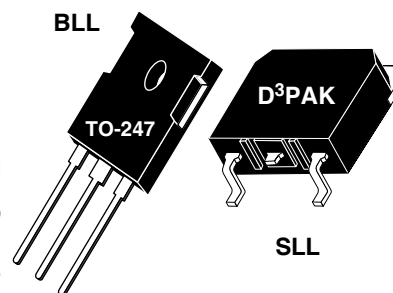


POWER MOS 7® MOSFET

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
- TO-247 or Surface Mount D³PAK Package



MAXIMUM RATINGS

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

Symbol	Parameter	APT6038BLL_SLL	UNIT
V_{DSS}	Drain-Source Voltage	600	Volts
I_D	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	17	Amps
I_{DM}	Pulsed Drain Current ^①	68	
V_{GS}	Gate-Source Voltage Continuous	± 30	Volts
V_{GSM}	Gate-Source Voltage Transient	± 40	
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	265	Watts
	Linear Derating Factor	2.12	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)	17	Amps
E_{AR}	Repetitive Avalanche Energy ^①	30	mJ
E_{AS}	Single Pulse Avalanche Energy ^④	960	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 250\mu A$)	600			Volts
$R_{DS(on)}$	Drain-Source On-State Resistance ^② ($V_{GS} = 10V, I_D = 8.5A$)			0.380	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = 600V, V_{GS} = 0V$)			100	μA
	Zero Gate Voltage Drain Current ($V_{DS} = 480V, V_{GS} = 0V, T_C = 125^\circ\text{C}$)			500	
I_{GSS}	Gate-Source Leakage Current ($V_{GS} = \pm 30V, V_{DS} = 0V$)			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 1mA$)	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

APT6038BLL_SLL

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		1850		pF
C_{oss}	Output Capacitance			365		
C_{rss}	Reverse Transfer Capacitance			30		
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 300V$ $I_D = 17A @ 25^\circ C$		43		nC
Q_{gs}	Gate-Source Charge			11		
Q_{gd}	Gate-Drain ("Miller") Charge			23		
$t_{d(on)}$	Turn-on Delay Time	RESISTIVE SWITCHING $V_{GS} = 15V$ $V_{DD} = 300V$ $I_D = 17A @ 25^\circ C$ $R_G = 1.6\Omega$		9		ns
t_r	Rise Time			3		
$t_{d(off)}$	Turn-off Delay Time			17		
t_f	Fall Time			4		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 25°C $V_{DD} = 400V, V_{GS} = 15V$ $I_D = 17A, R_G = 5\Omega$		190		μJ
E_{off}	Turn-off Switching Energy			46		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 125°C $V_{DD} = 400V, V_{GS} = 15V$ $I_D = 17A, R_G = 5\Omega$		310		
E_{off}	Turn-off Switching Energy			50		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			17	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)			68	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V, I_S = -17A$)			1.3	Volts
t_{rr}	Reverse Recovery Time ($I_S = -17A, dI_S/dt = 100A/\mu s$)		400		ns
Q_{rr}	Reverse Recovery Charge ($I_S = -17A, dI_S/dt = 100A/\mu s$)		6.0		μC
dv/dt	Peak Diode Recovery dv/dt ⑤			8	V/ns

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.47	$^\circ C/W$
$R_{\theta JA}$	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 $T_J = +25^\circ C$, $L = 6.64mH$, $R_G = 25\Omega$, Peak $I_L = 17A$

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. $I_S \leq -I_D 17A$ $dI_S/dt \leq 700A/\mu s$ $V_R \leq V_{DSS}$ $T_J \leq 150^\circ C$

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

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

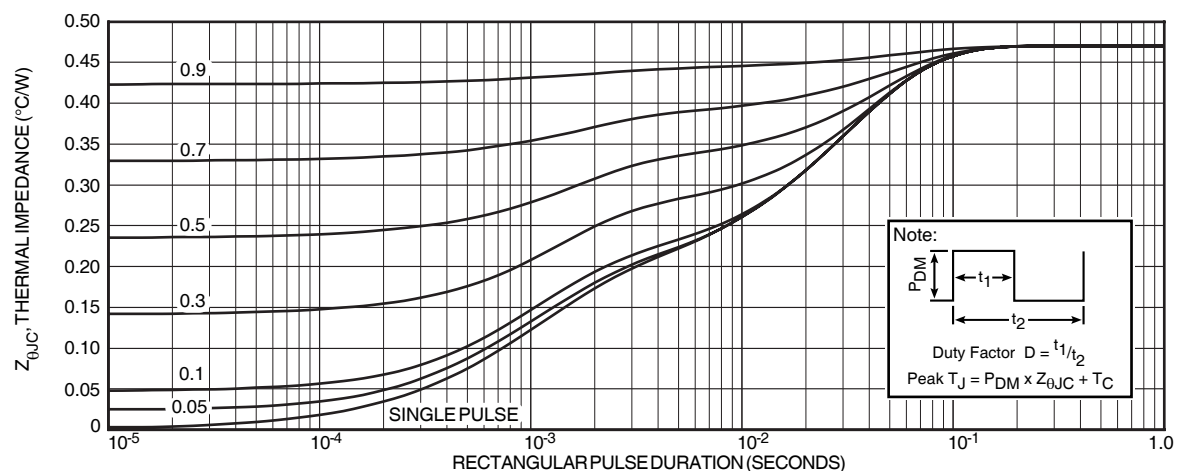


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

APT6038BLL_SLL

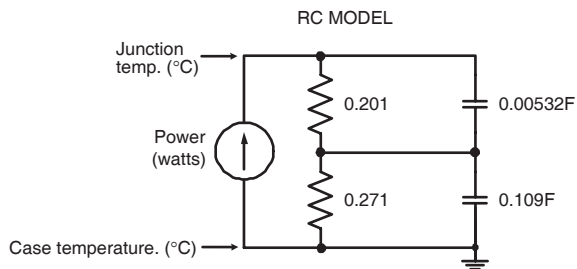


FIGURE2, TRANSIENT THERMAL IMPEDANCE MODEL

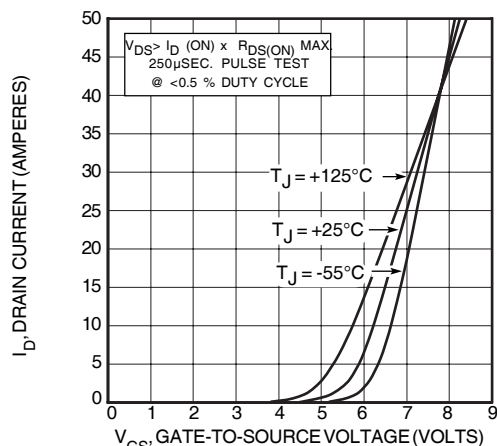


FIGURE4, TRANSFER CHARACTERISTICS

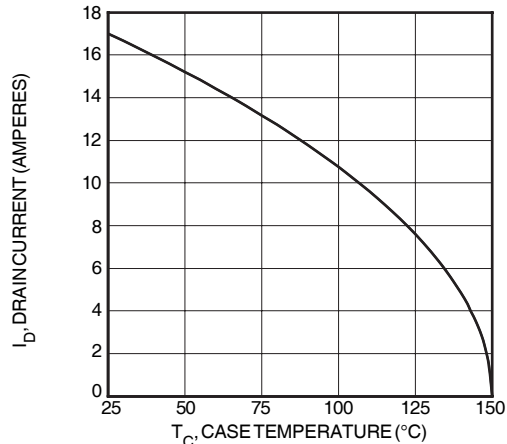


FIGURE6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

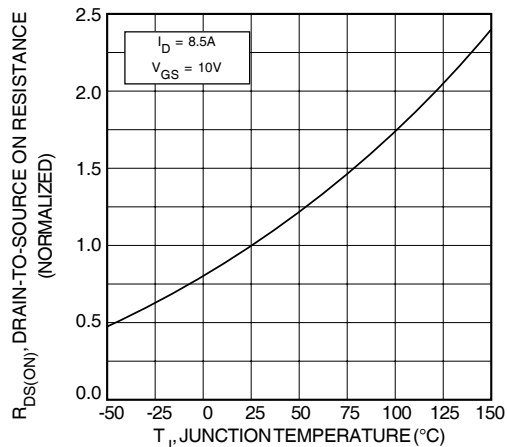


FIGURE8, $R_{DS(ON)}$ vs. TEMPERATURE

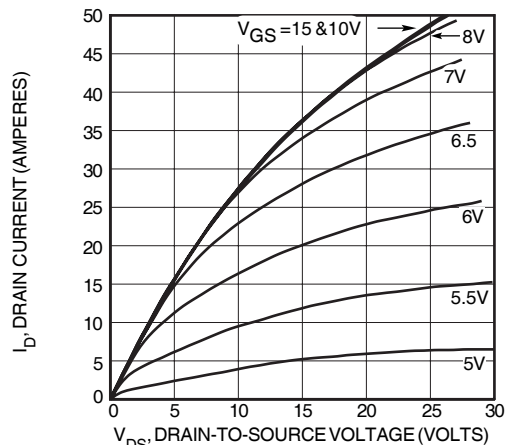


FIGURE3, LOW VOLTAGE OUTPUT CHARACTERISTICS

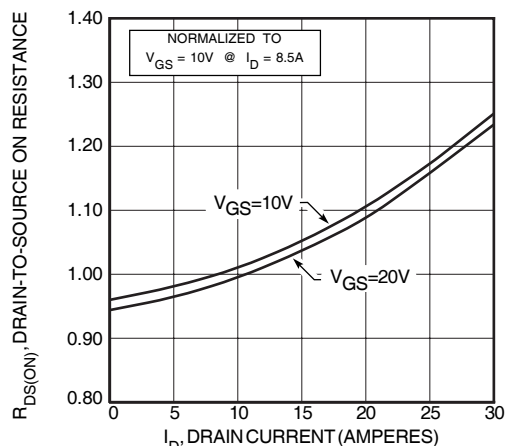


FIGURE5, $R_{DS(ON)}$ vs DRAIN CURRENT

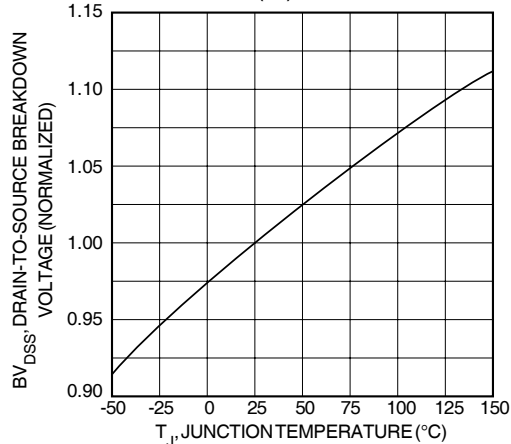


FIGURE7, BREAKDOWN VOLTAGE vs TEMPERATURE

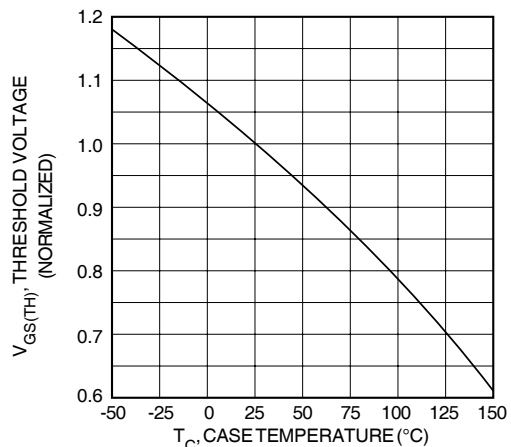


FIGURE9, THRESHOLD VOLTAGE vs TEMPERATURE

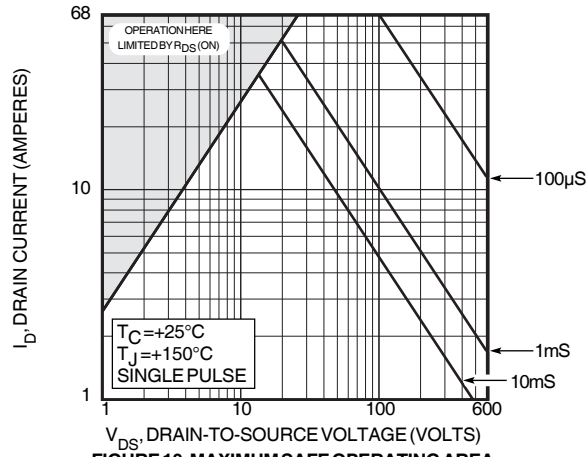


FIGURE 10, MAXIMUM SAFE OPERATING AREA

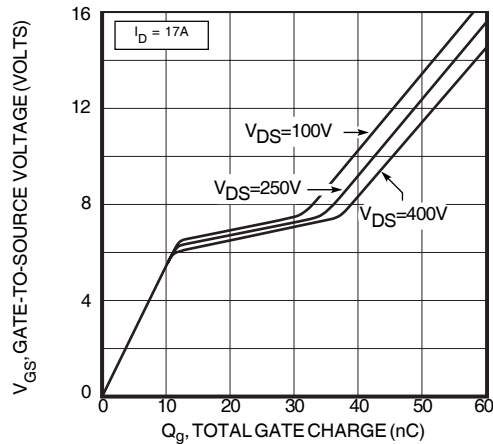


FIGURE 12, GATE CHARGE vs GATE-TO-SOURCE VOLTAGE

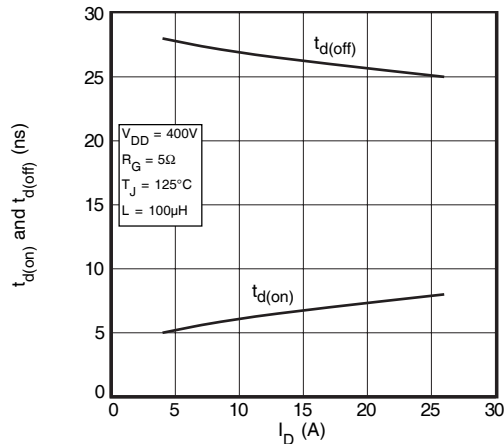


FIGURE 14, DELAY TIMES vs CURRENT

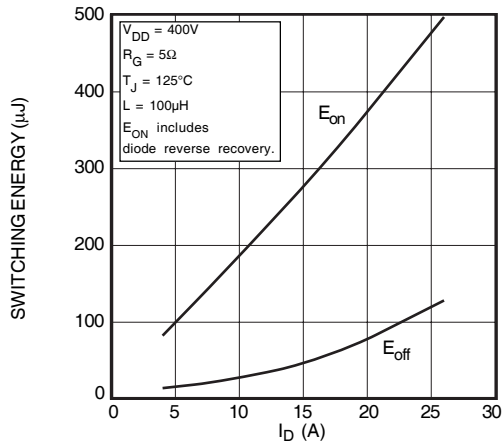


FIGURE 16, SWITCHING ENERGY vs CURRENT

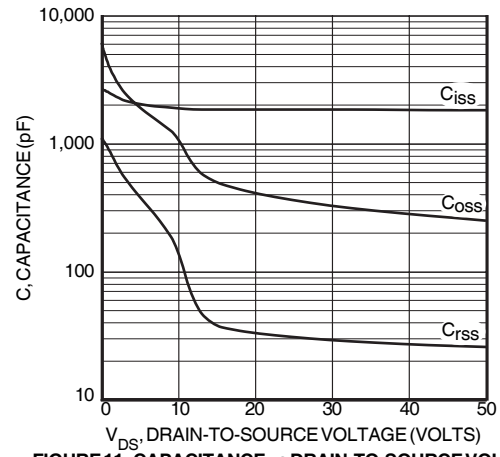


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

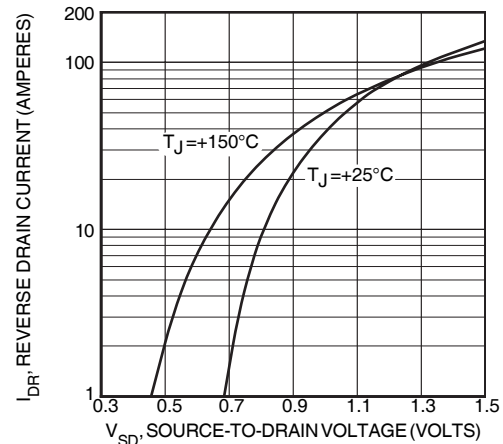


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

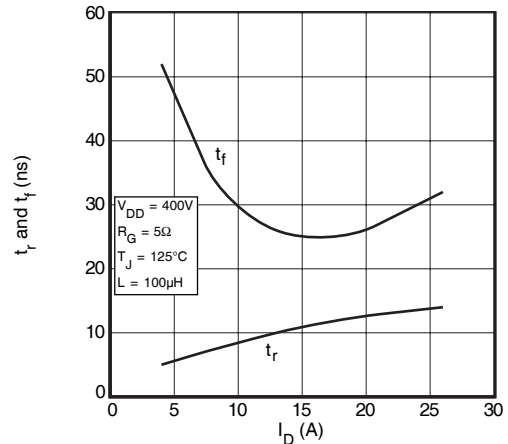


FIGURE 15, RISE AND FALL TIMES vs CURRENT

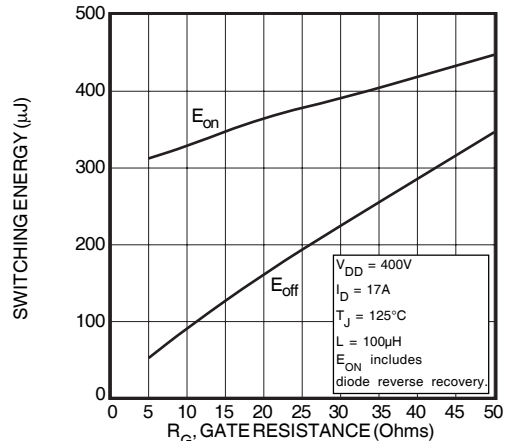


FIGURE 17, SWITCHING ENERGY VS. GATE RESISTANCE

Tek **STOP** 1.00GS/s 42 Acqs
 Δ: 17.2 V
 Δ: 59ns
 @: 0 V
 M1 Area
 52.3μVVs
 T_J = 125 C
 90%
 t_{d(off)}
 Gate Voltage
 2+
 Drain Voltage
 90%
 t_r
 10%
 Drain Current
 M4
 Switching Energy
 Ch2 10.0 V V_{ds} M 50.0ns
 Ch1 6.0 V
 Ch3 200 V V_{gs} 50.0ns
 Math1 25.0kV 50.0ns
 25 Sep 2002
 09:53:24

The drawing shows a side view on the left and a front view on the right of a gate valve assembly. The side view shows the gate, stem, and handle with dimensions for height and width. The front view shows the valve body with two gate openings, a central stem, and a handle. Dimensions for body width, height, and gate opening are provided. The drawing is labeled with dimensions in millimeters and inches.

Side View Dimensions:

- Gate height: 4.69 (.185) [mm], 5.31 (.209) [mm]
- Gate width: 1.49 (.059) [mm], 2.49 (.098) [mm]
- Stem diameter: 0.40 (.016) [mm], 0.79 (.031) [mm]
- Handle height: 2.21 (.087) [mm], 2.59 (.102) [mm]

Front View Dimensions:

- Body width: 15.49 (.610) [mm], 16.26 (.640) [mm]
- Gate opening width: 6.15 (.242) BSC [mm]
- Body height: 20.80 (.819) [mm], 21.46 (.845) [mm]
- Gate height: 2.87 (.113) [mm], 3.12 (.123) [mm]
- Gate width: 1.65 (.065) [mm], 2.13 (.084) [mm]
- Stem diameter: 1.01 (.040) [mm], 1.40 (.055) [mm]
- Handle height: 5.45 (.215) BSC [mm]

Labels:

- Drain
- Gate
- Drain
- Source

Dimensions in Millimeters and (Inches)

Figure 1: Dimensions of the 100-pin BSC package. The figure consists of three views: a side view (left), a top view (middle), and a front view (right). The side view shows the package height and lead dimensions. The top view shows the package width and lead spacing. The front view shows the package length and lead dimensions. Dimensions are given in millimeters and inches.

Dimensions in Millimeters (Inches)

Side View Dimensions:

- 4.98 (.196)
- 5.08 (.200)
- 1.47 (.058)
- 1.57 (.062)
- 0.46 (.018)
- 0.56 (.022)
- 0.020 (.001)
- 0.178 (.007)
- 2.67 (.105)
- 2.84 (.112)
- 1.22 (.048)
- 1.32 (.052)

Top View Dimensions:

- 15.95 (.628)
- 16.05 (.632)
- 1.04 (.041)
- 1.15 (.045)
- 13.79 (.543)
- 13.99 (.551)
- 1.27 (.050)
- 1.40 (.055)
- 1.98 (.078)
- 2.08 (.082)
- 5.45 (.215) BSC
- 2 Pcs.

Front View Dimensions:

- 13.41 (.528)
- 13.51 (.532)
- 11.51 (.453)
- 11.61 (.457)
- 3.81 (.150)
- 4.06 (.160)
- (Base of Lead)

Labels:

- Drain (Heat Sink)
- Heat Sink (Drain) and Leads are Plated
- Source
- Drain
- Gate