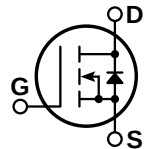


POWER MOS 7® FREDFET

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 SOT-227 Package
- **FAST RECOVERY BODY DIODE**

MAXIMUM RATINGS

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

Symbol	Parameter	APT5510JFLL	UNIT
V_{DSS}	Drain-Source Voltage	550	Volts
I_D	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	44	Amps
I_{DM}	Pulsed Drain Current ^①	176	
V_{GS}	Gate-Source Voltage Continuous	± 30	Volts
V_{GSM}	Gate-Source Voltage Transient	± 40	
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	463	Watts
	Linear Derating Factor	3.70	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)	44	Amps
E_{AR}	Repetitive Avalanche Energy ^①	35	mJ
E_{AS}	Single Pulse Avalanche Energy ^④	2500	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_D = 250\mu A$)	550			Volts
$I_{D(on)}$	On State Drain Current ^② ($V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$)	44			Amps
$R_{DS(on)}$	Drain-Source On-State Resistance ^② ($V_{GS} = 10V, 22A$)			0.100	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = 550V, V_{GS} = 0V$)			250	μA
	Zero Gate Voltage Drain Current ($V_{DS} = 440V, V_{GS} = 0V, T_C = 125^\circ\text{C}$)			1000	
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

APT5510JFLL

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		5823		pF
C_{oss}	Output Capacitance			1124		
C_{rss}	Reverse Transfer Capacitance			81		
Q_g	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 275V$ $I_D = 49A @ 25^\circ C$		124		nC
Q_{gs}	Gate-Source Charge			34		
Q_{gd}	Gate-Drain ("Miller") Charge			64		
$t_{d(on)}$	Turn-on Delay Time	RESISTIVE SWITCHING $V_{GS} = 15V$ $V_{DD} = 275V$ $I_D = 49A @ 25^\circ C$ $R_G = 0.6\Omega$		16		ns
t_r	Rise Time			12		
$t_{d(off)}$	Turn-off Delay Time			33		
t_f	Fall Time			5		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 25°C $V_{DD} = 367V, V_{GS} = 15V$ $I_D = 49A, R_G = 5\Omega$		697		μJ
E_{off}	Turn-off Switching Energy			577		
E_{on}	Turn-on Switching Energy ⑥	INDUCTIVE SWITCHING @ 125°C $V_{DD} = 367V, V_{GS} = 15V$ $I_D = 49A, R_G = 5\Omega$		1025		
E_{off}	Turn-off Switching Energy			664		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)			44	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)			176	
V_{SD}	Diode Forward Voltage ② ($V_{GS} = 0V, I_S = -44A$)			1.3	Volts
dv/dt	Peak Diode Recovery dv/dt ⑤			15	V/ns
t_{rr}	Reverse Recovery Time ($I_S = -44A, di/dt = 100A/\mu s$)	$T_j = 25^\circ C$		280	ns
		$T_j = 125^\circ C$		600	
Q_{rr}	Reverse Recovery Charge ($I_S = -44A, di/dt = 100A/\mu s$)	$T_j = 25^\circ C$	1.9		μC
		$T_j = 125^\circ C$	5.7		
I_{RRM}	Peak Recovery Current ($I_S = -44A, di/dt = 100A/\mu s$)	$T_j = 25^\circ C$	15		Amps
		$T_j = 125^\circ C$	23		

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.27	$^\circ C/W$
$R_{\theta JA}$	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 $T_j = +25^\circ C$, $L = 2.58mH$, $R_G = 25\Omega$, Peak $I_L = 44A$

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. $I_S \leq -I_D 44A$ $di/dt \leq 700A/\mu s$ $V_R \leq V_{DSS}$ $T_j \leq 150^\circ C$

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

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

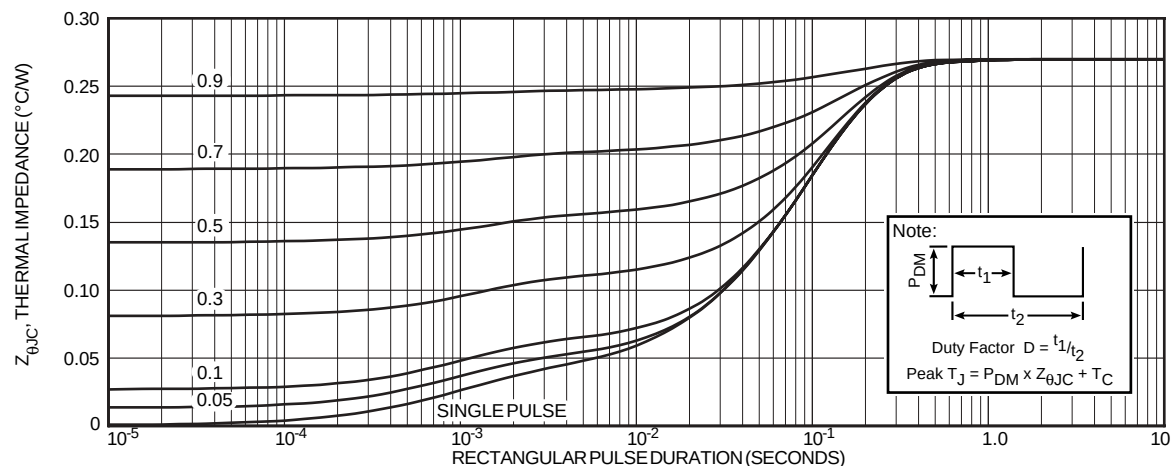


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

APT5510JFLL

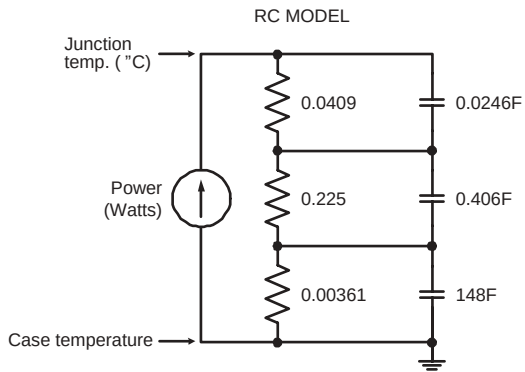


FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL

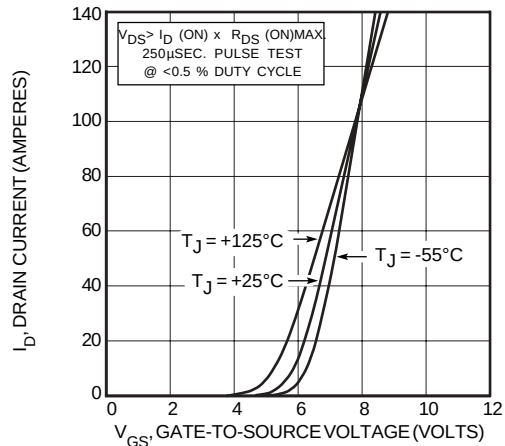


FIGURE 4, TRANSFER CHARACTERISTICS

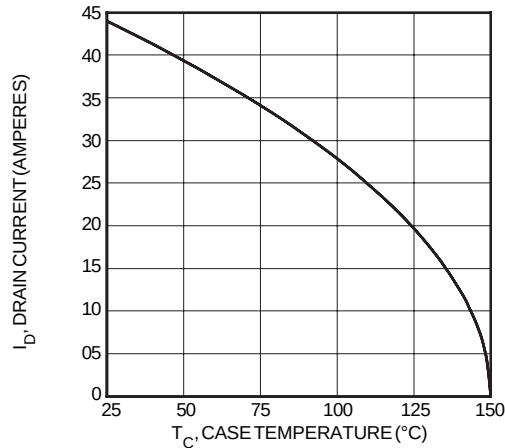


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

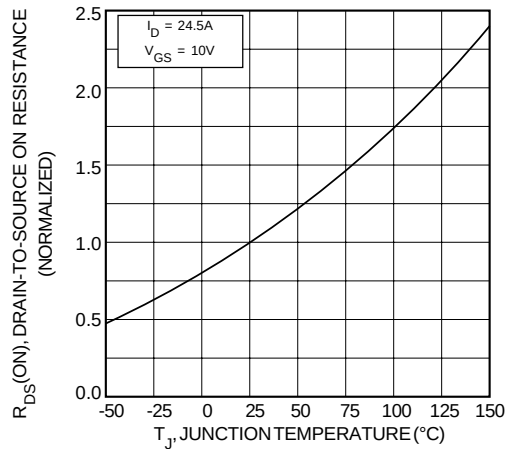


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

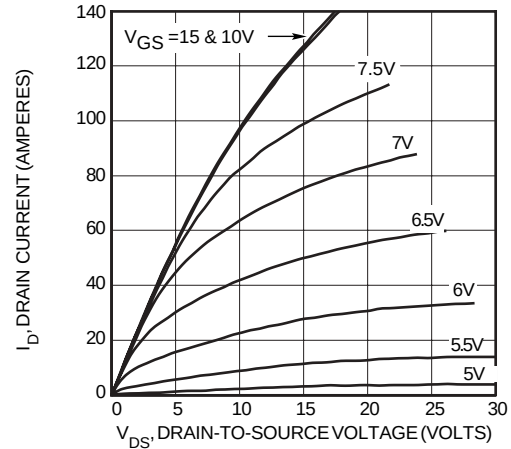


FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

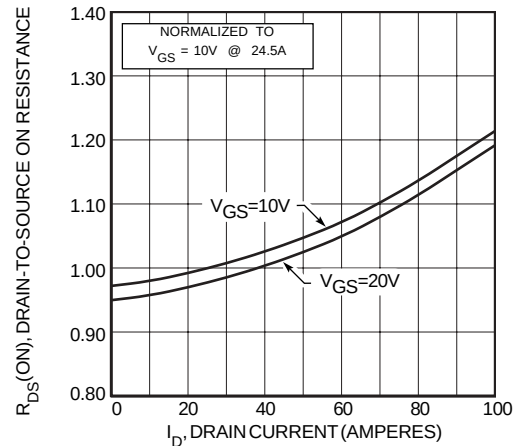


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

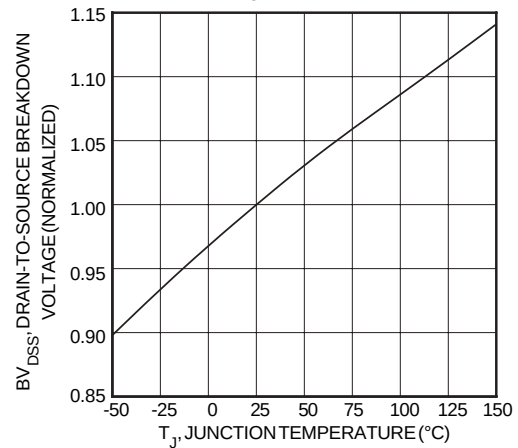


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

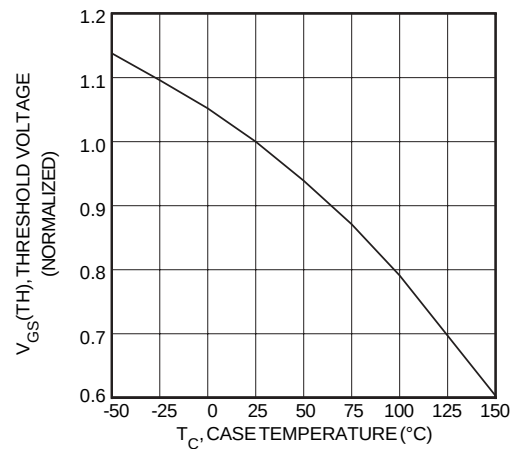


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

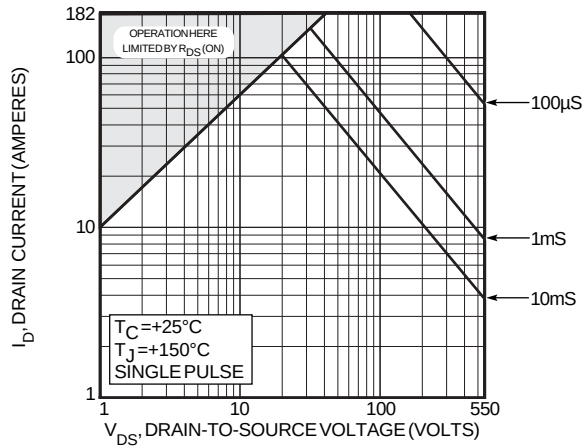


FIGURE 10, MAXIMUM SAFE OPERATING AREA

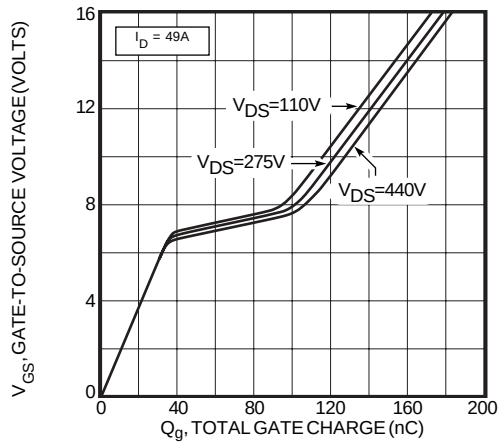


FIGURE 12, GATE CHARGE vs GATE-TO-SOURCE VOLTAGE

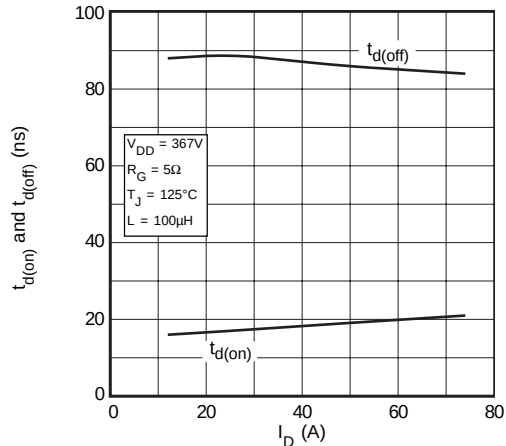


FIGURE 14, DELAY TIMES vs CURRENT

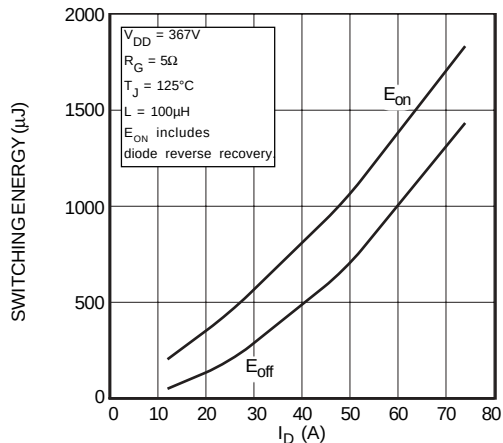


FIGURE 16, SWITCHING ENERGY vs CURRENT

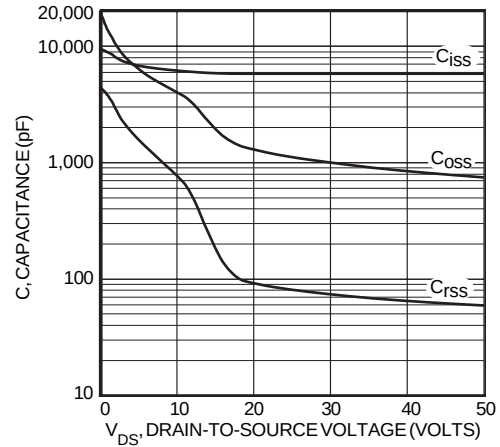


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

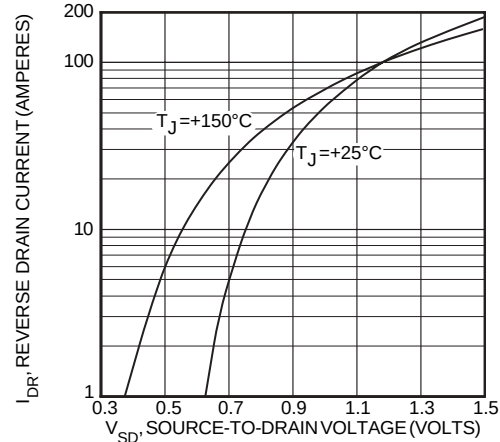


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

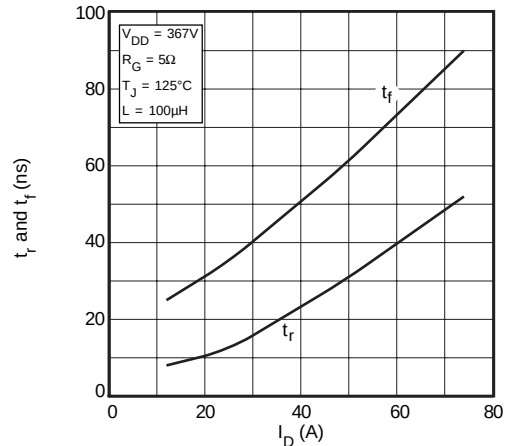


FIGURE 15, RISE AND FALL TIMES vs CURRENT

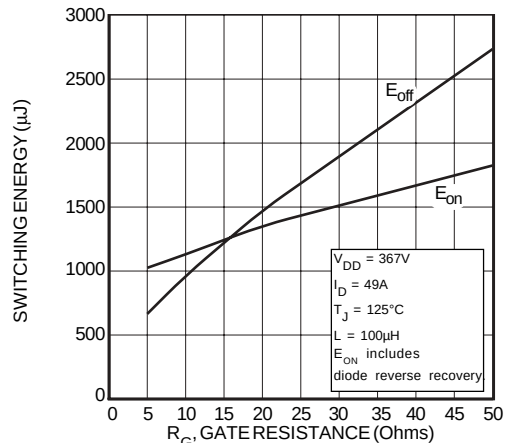


FIGURE 17, SWITCHING ENERGY vs. GATE RESISTANCE

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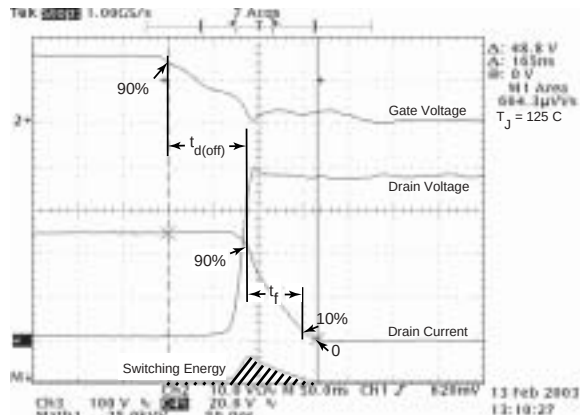
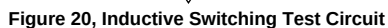


Figure 19, Turn-off Switching Waveforms and Definitions



Top View Dimensions:

- Overall width: 31.5 (1.240) / 31.7 (1.248)
- Distance between mounting holes: 7.8 (.307) / 8.2 (.322)
- Radius: $r = 4.0 (.157)$ (2 places)
- Distance from mounting hole to center: 14.9 (.587) / 15.1 (.594)
- Distance between gate terminals: 30.1 (1.185) / 30.3 (1.193)
- Overall length: 38.0 (1.496) / 38.2 (1.504)

Side View Dimensions:

- Lead height: 11.8 (.463) / 12.2 (.480)
- Lead thickness: 8.9 (.350) / 9.6 (.378)
- Distance from lead to mounting hole: 4.0 (.157) / 4.2 (.165) (2 places)
- Distance from mounting hole to center: 3.3 (.129) / 3.6 (.143)
- Distance from mounting hole to center: 1.95 (.077) / 2.14 (.084)
- Distance from mounting hole to center: 0.75 (.030) / 0.85 (.033)
- Distance from mounting hole to center: 12.6 (.496) / 12.8 (.504)
- Overall height: 25.2 (0.992) / 25.4 (1.000)

Detail View Dimensions:

- Lead height: 4.1 (.161) / 4.3 (.169)
- Lead thickness: 4.8 (.187) / 4.9 (.193) (4 places)

Other Features:

- Hex Nut M4 (4 places)
- * Source
- Drain
- * Source
- Gate

* Source terminals are shorted internally. Current handling capability is equal for either Source terminal.

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