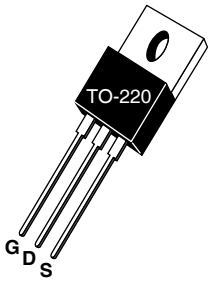
APT1204R7KFLL

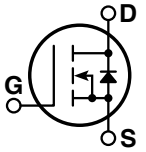
1200V 3.5A 4.700Ω

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, Qg**
- **Increased Power Dissipation**
- **Easier To Drive**
- **TO-220 Package**



MAXIMUM RATINGS All Ratings: T_C = 25°C unless otherwise specified.

Symbol	Parameter	APT1204R7KFLL	UNIT
V_{DSS}	Drain-Source Voltage	1200	Volts
I_D	Continuous Drain Current @ T_C = 25°C	3.5	Amps
I_{DM}	Pulsed Drain Current ①	14	
V_{GS}	Gate-Source Voltage Continuous	±30	Volts
V_{GSM}	Gate-Source Voltage Transient	±40	
P_D	Total Power Dissipation @ T_C = 25°C	135	Watts
	Linear Derating Factor	1.08	W/°C
T_J,T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	°C
T_L	Lead Temperature: 0.063" from Case for 10 Sec.	300	
I_{AR}	Avalanche Current ① (Repetitive and Non-Repetitive)	3.5	Amps
E_{AR}	Repetitive Avalanche Energy ①	10	mJ
E_{AS}	Single Pulse Avalanche Energy ④	425	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage (V_{GS} = 0V, I_D = 250μA)	1200			Volts
$R_{DS(on)}$	Drain-Source On-State Resistance ② (V_{GS} = 10V, I_D = 1.75A)			4.70	Ohms
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = 1200V, V_{GS} = 0V)			250	μA
	Zero Gate Voltage Drain Current (V_{DS} = 960V, V_{GS} = 0V, T_C = 125°C)			1000	
I_{GSS}	Gate-Source Leakage Current (V_{GS} = ±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.

DYNAMIC CHARACTERISTICS

APT1204R7 KFLL

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1 MHz		716	900	pF
C_{oss}	Output Capacitance			132	200	
C_{rss}	Reverse Transfer Capacitance			36	60	
Q_g	Total Gate Charge ③	V_{GS} = 10V V_{DD} = 600V I_D = 3.5A @ 25°C		31	50	nC
Q_{gs}	Gate-Source Charge			4	5	
Q_{gd}	Gate-Drain ("Miller") Charge			21	40	
$t_{d(on)}$	Turn-on Delay Time	V_{GS} = 15V V_{DD} = 600V I_D = 3.5A @ 25°C R_G = 1.6Ω		7	14	ns
t_r	Rise Time			2	4	
$t_{d(off)}$	Turn-off Delay Time			20	30	
t_f	Fall Time			24	50	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions		MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)				3.5	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)				14	
V_{SD}	Diode Forward Voltage ② (V_{GS} = 0V, I_S = -I_D 3.5A)				1.3	Volts
$^{dv}/_{dt}$	Peak Diode Recovery $^{dv}/_{dt}$ ⑤				18	V/ns
t_{rr}	Reverse Recovery Time (I_S = -I_D 3.5A, $^{di}/_{dt}$ = 100A/µs)	T_j = 25°C			250	ns
		T_j = 125°C			515	
Q_{rr}	Reverse Recovery Charge (I_S = -I_D 3.5A, $^{di}/_{dt}$ = 100A/µs)	T_j = 25°C		.5		µC
		T_j = 125°C		1.1		
I_{RRM}	Peak Recovery Current (I_S = -I_D 3.5A, $^{di}/_{dt}$ = 100A/µs)	T_j = 25°C		8.3		Amps
		T_j = 125°C		11.5		

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.90	°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°C, L = 69.39mH, R_G = 25Ω, Peak I_L = 3.5A

⑤ $^{dv}/_{dt}$ numbers reflect the limitations of the test circuit rather than the device itself. $I_S \le -I_D 3.5A$ $^{di}/_{dt} \le 700A/\mu s$ $V_R \le 1200$ $T_J \le 150°C$

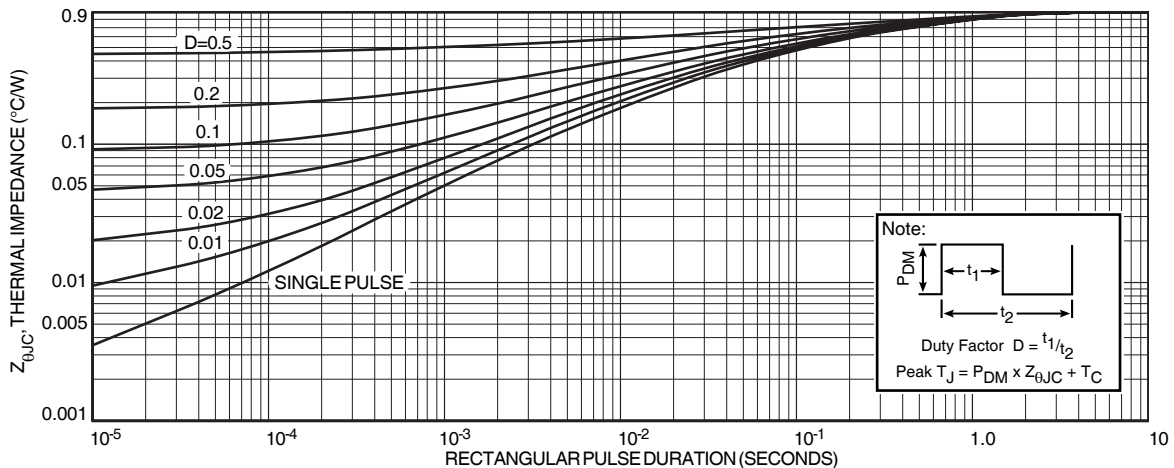


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Graph Deleted

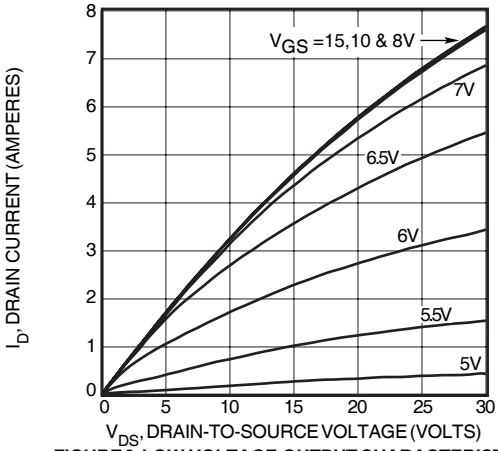


FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

FIGURE 2, HIGH VOLTAGE OUTPUT CHARACTERISTICS

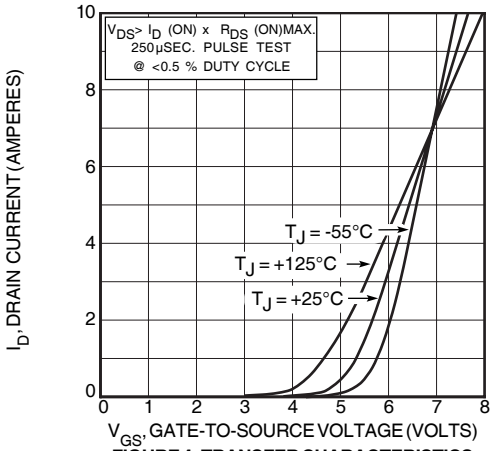


FIGURE 4, TRANSFER CHARACTERISTICS

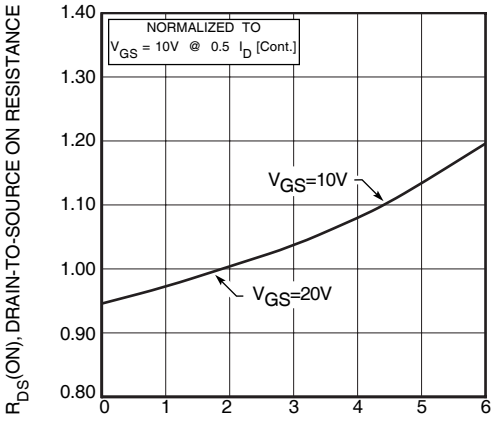


FIGURE 5, R_{DS}(ON) vs DRAIN CURRENT

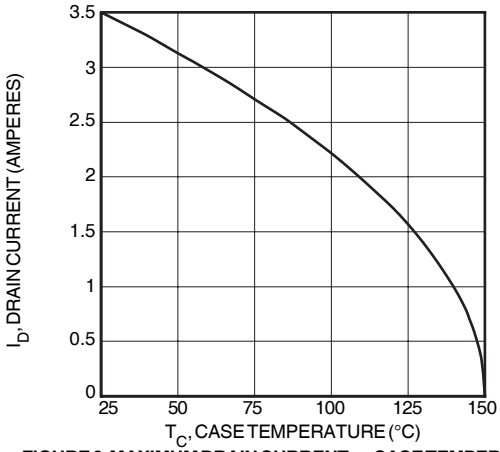


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

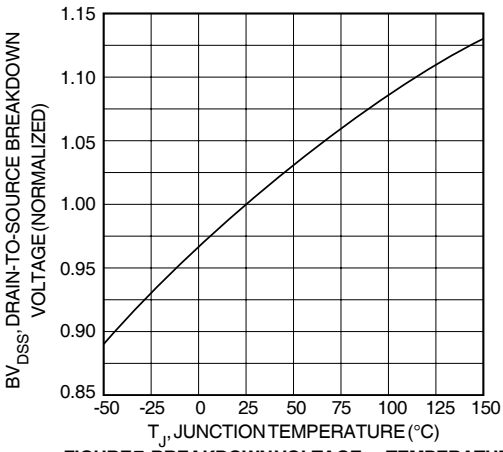


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

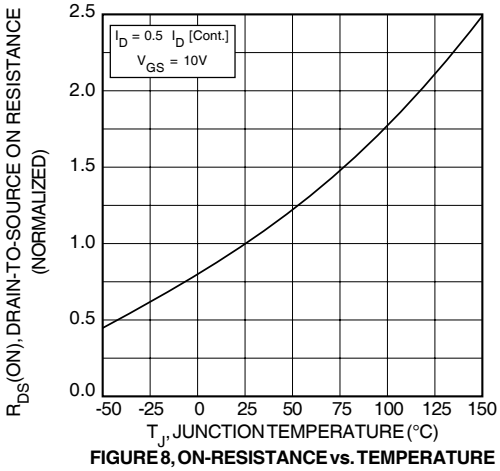


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

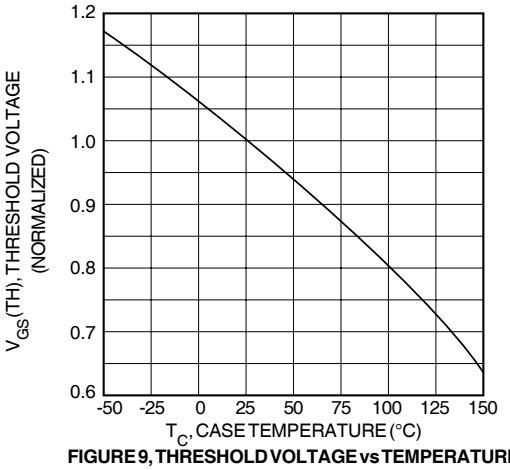


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

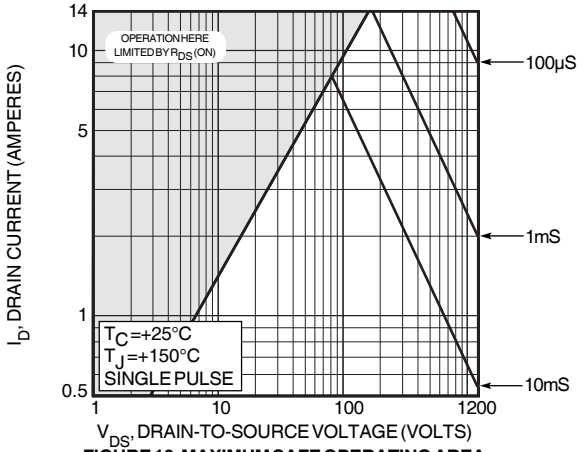


FIGURE 10, MAXIMUM SAFE OPERATING AREA

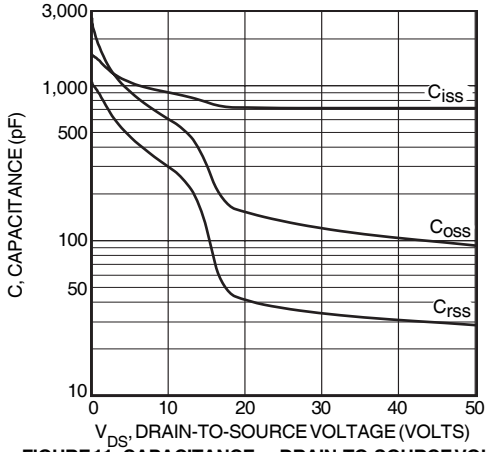


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

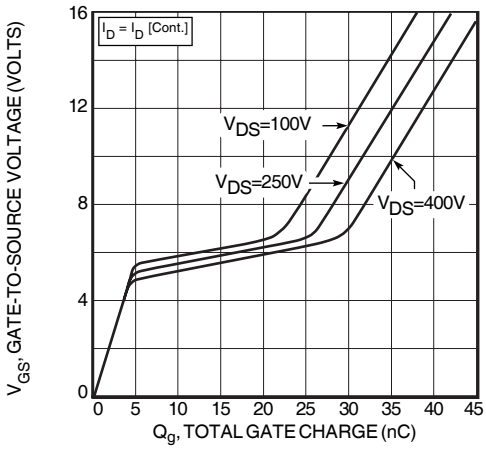


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

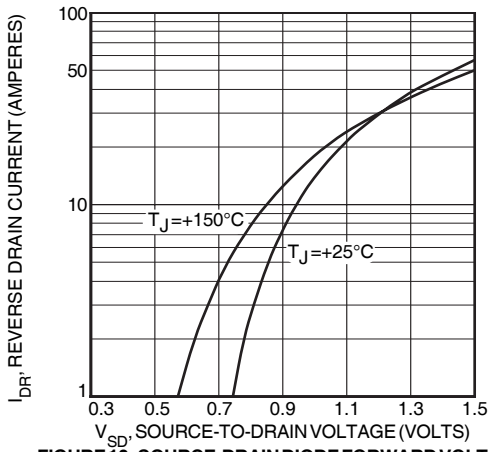
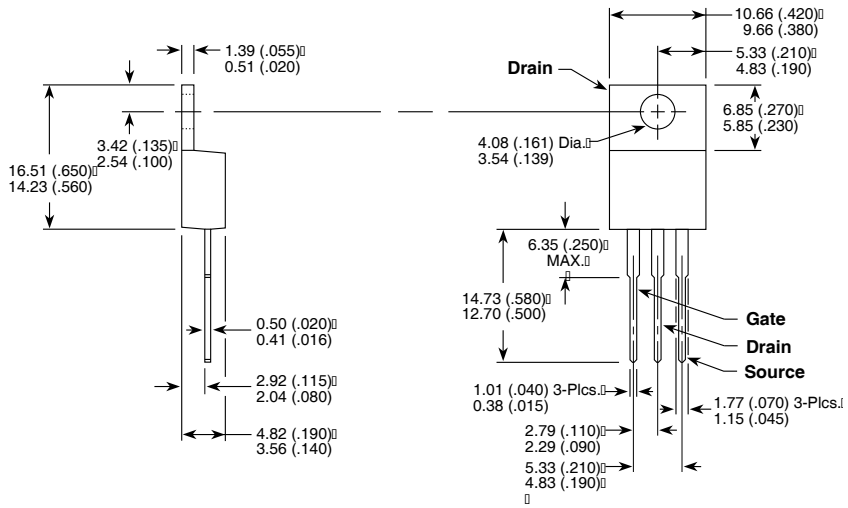


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-220AC Package Outline



Dimensions in Millimeters and (Inches)