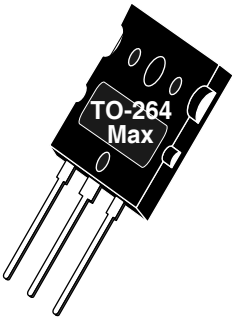
APT12045L2VFR

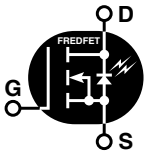
1200V 28A 0.450Ω

POWER MOS V®



Power MOS V® is a new generation of high voltage N-Channel enhancement mode power MOSFETs. This new technology minimizes the JFET effect, increases packing density and reduces the on-resistance. Power MOS V® also achieves faster switching speeds through optimized gate layout.

- **Faster Switching**
- **Lower Leakage**
- **Avalanche Energy Rated**
- **TO-264 MAX**



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

Symbol	Parameter	APT12045L2VFR	UNIT
V_{DSS}	Drain-Source Voltage	1200	Volts
I_D	Continuous Drain Current @ T_C = 25°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°C	833	Watts
	Linear Derating Factor	6.67	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 ③ (Repetitive and Non-Repetitive)	28	Amps
E_{AR}	Repetitive Avalanche Energy ③	50	mJ
E_{AS}	Single Pulse Avalanche Energy ④	3200	

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= 14A)			0.450	Ohms
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = 1200, 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 = 5mA)	2		4	Volts

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

DYNAMIC CHARACTERISTICS

APT12045L2VFR

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	V_{GS} = 0V		11370		pF
C_{oss}	Output Capacitance	V_{DS} = 25V		950		
C_{rss}	Reverse Transfer Capacitance	f = 1 MHz		495		
Q_g	Total Gate Charge ③	V_{GS} = 10V		605		nC
Q_{gs}	Gate-Source Charge	V_{DD} = 600V		42		
Q_{gd}	Gate-Drain ("Miller") Charge	I_D = 28A @ 25°C		310		
$t_d(on)$	Turn-on Delay Time	V_{GS} = 15V		16		ns
t_r	Rise Time	V_{DD} = 600V		15		
$t_d(off)$	Turn-off Delay Time	I_D = 28A @ 25°C		85		
t_f	Fall Time	R_G = 0.6Ω		14		

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions		MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)				28	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)				112	
V_{SD}	Diode Forward Voltage ② (V_{GS} = 0V, I_S = -I_D 28A)				1.3	Volts
$^{dv}/_{dt}$	Peak Diode Recovery $^{dv}/_{dt}$ ⑤				18	V/ns
t_{rr}	Reverse Recovery Time	T_j = 25°C			310	ns
	(I_S = -I_D 28A, $^{di}/_{dt}$ = 100A/µs)	T_j = 125°C			625	
Q_{rr}	Reverse Recovery Charge	T_j = 25°C		2		µC
	(I_S = -I_D 28A, $^{di}/_{dt}$ = 100A/µs)	T_j = 125°C		6		
I_{RRM}	Peak Recovery Current	T_j = 25°C		14		Amps
	(I_S = -I_D 28A, $^{di}/_{dt}$ = 100A/µs)	T_j = 125°C		24		

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.15	°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 = 8.16mH, R_G = 25Ω, Peak I_L = 28A

⑤ $I_S \leq I_D$ [Cont.], $^{di}/_{dt}$ = 100A/µs, $T_j \leq 150°C$, R_G = 2.0Ω V_R = 200V.

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

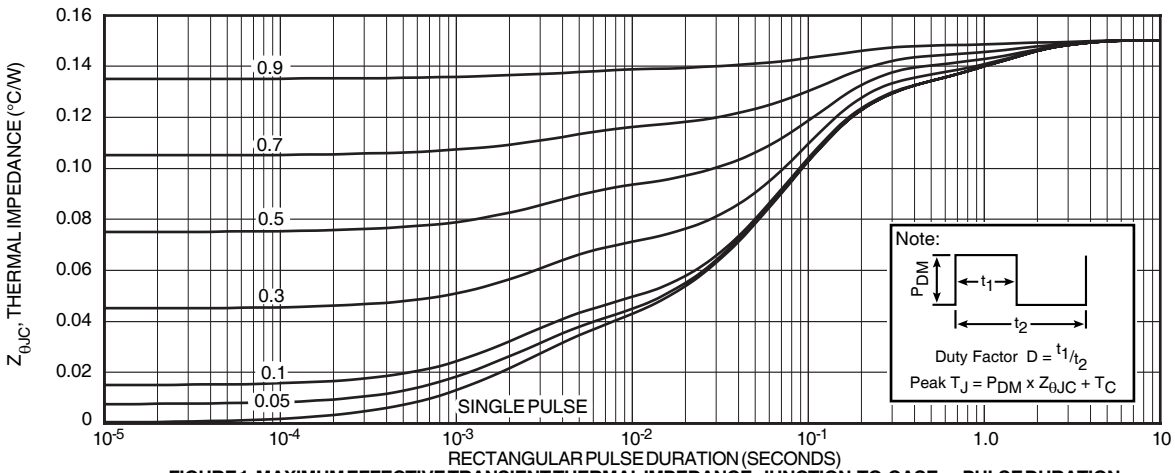


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

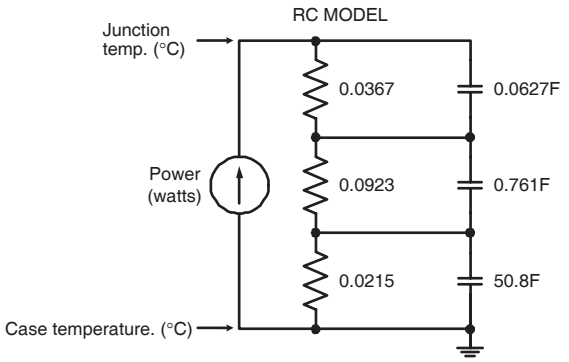


FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL

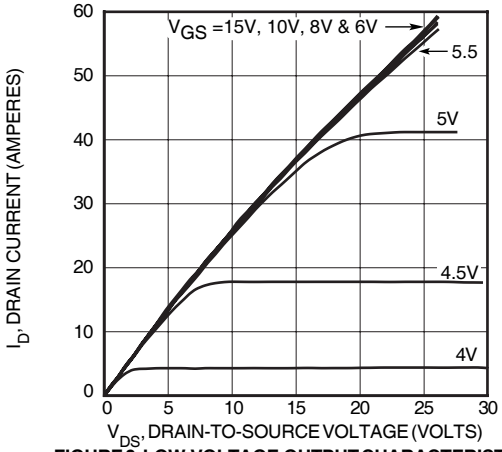


FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

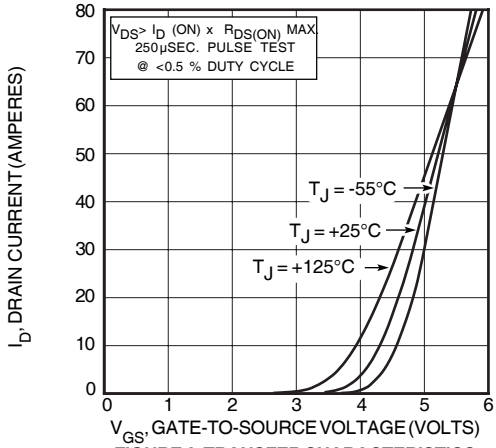


FIGURE 4, TRANSFER CHARACTERISTICS

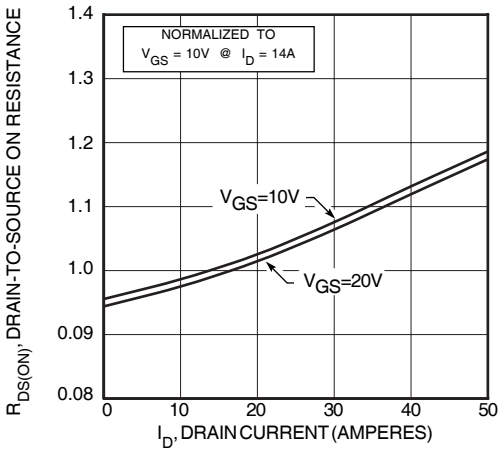


FIGURE 5, $R_{DS(ON)}$ vs DRAIN CURRENT

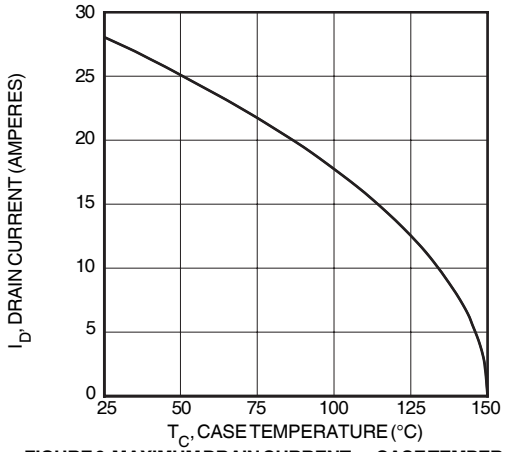


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

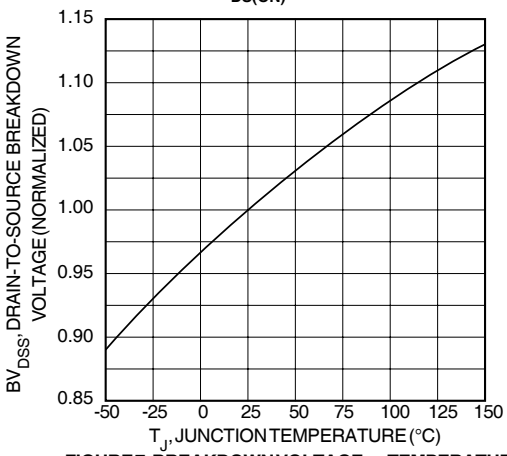


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

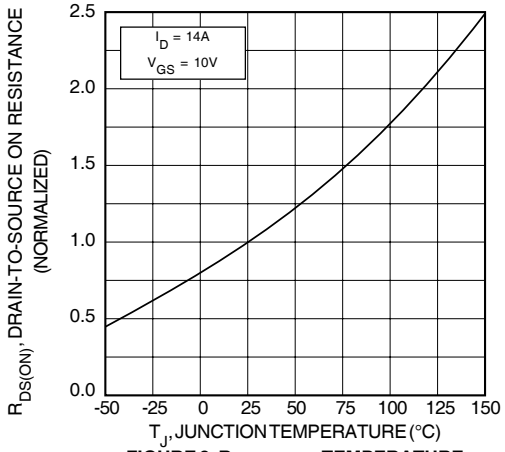


FIGURE 8, $R_{DS(ON)}$ vs. TEMPERATURE

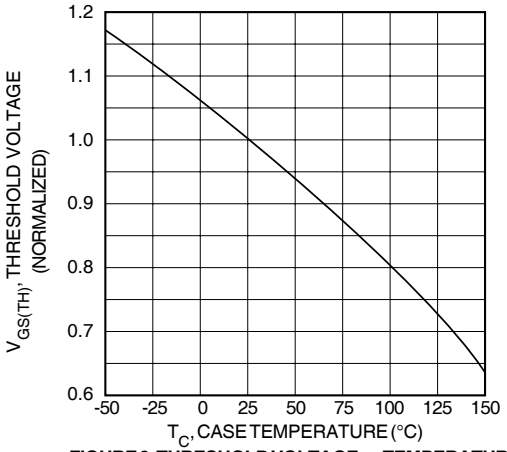


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

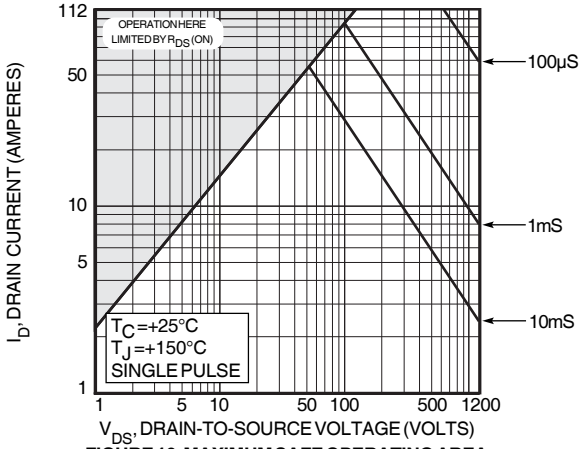


FIGURE 10, MAXIMUM SAFE OPERATING AREA

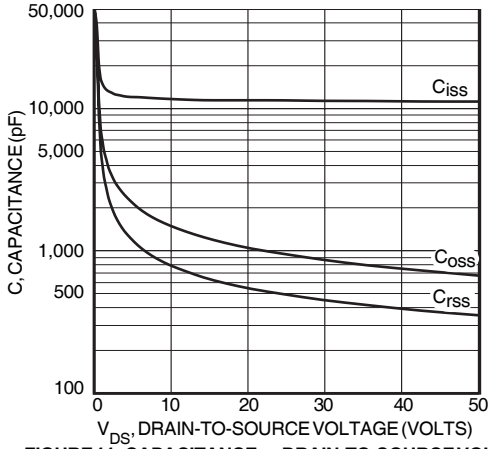


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

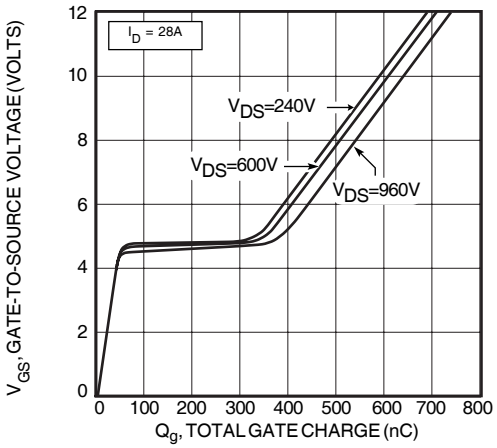


FIGURE 12, GATE CHARGE vs GATE-TO-SOURCE VOLTAGE

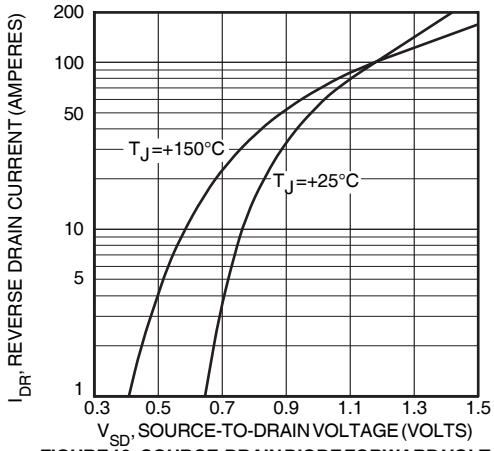
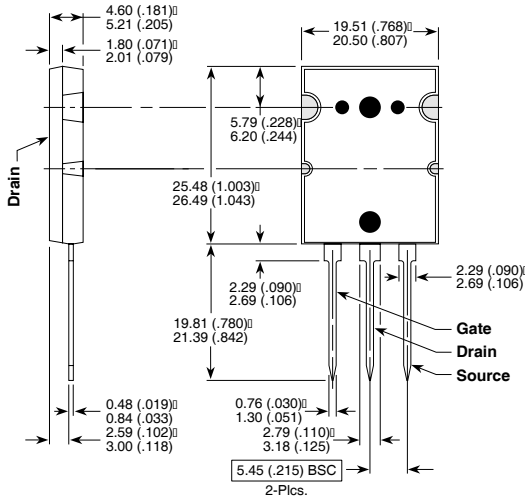


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-264 MAX™(L2) Package Outline



Dimensions in Millimeters and (Inches)

APT's products are covered by one or more of U.S.patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. US and Foreign patents pending. All Rights Reserved.