ADVANCED POWER TECHNOLOGY®

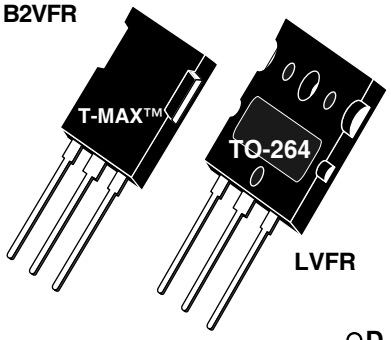
400V 57A 0.070Ω

APT40M70B2VFR APT40M70LVFR

APT40M70B2VFRG* APT40M70LVFRG*

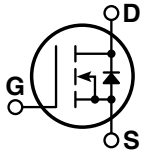
*G Denotes RoHS Compliant, Pb Free Terminal Finish.

POWER MOS V® FREDFET



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.

- **T-MAX™ or TO-264 Package**
- **Faster Switching**
- **Lower Leakage**
- **Avalanche Energy Rated**
- **FAST RECOVERY BODY DIODE**



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

Symbol	Parameter	APT40M70B2_LVFR(G)	UNIT
V_{DSS}	Drain-Source Voltage	400	Volts
I_D	Continuous Drain Current @ T_C = 25°C	57	Amps
I_{DM}	Pulsed Drain Current ①	228	
V_{GS}	Gate-Source Voltage Continuous	±30	Volts
V_{GSM}	Gate-Source Voltage Transient	±40	
P_D	Total Power Dissipation @ T_C = 25°C	520	Watts
	Linear Derating Factor	4.16	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)	57	Amps
E_{AR}	Repetitive Avalanche Energy ①	50	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 = 250µA)	400			Volts
$I_{D(on)}$	On State Drain Current ② ($V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, V_{GS} = 10V)	57			Amps
$R_{DS(on)}$	Drain-Source On-State Resistance ② (V_{GS} = 10V, 0.5 $I_{D[Cont.]}$)			0.070	Ohms
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = V_{DSS}$, V_{GS} = 0V)			250	µA
	Zero Gate Voltage Drain Current (V_{DS} = 0.8 V_{DSS}, 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 = 2.5mA)	2		4	Volts

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

DYNAMIC CHARACTERISTICS

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1 MHz		7410	8890	pF
C_{oss}	Output Capacitance			1140	1600	
C_{rss}	Reverse Transfer Capacitance			450	675	
Q_g	Total Gate Charge ③	V_{GS} = 10V V_{DD} = 200V I_D = 57A @ 25°C		330	495	nC
Q_{gs}	Gate-Source Charge			40	40	
Q_{gd}	Gate-Drain ("Miller") Charge			125	190	
$t_{d(on)}$	Turn-on Delay Time	V_{GS} = 15V V_{DD} = 200V I_D = 57A @ 25°C R_G = 0.6Ω		16	32	ns
t_r	Rise Time			16	32	
$t_{d(off)}$	Turn-off Delay Time			55	80	
t_f	Fall Time			5	10	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions		MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)				57	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)				228	
V_{SD}	Diode Forward Voltage ② (V_{GS} = 0V, I_S = -57A)				1.3	Volts
dv/dt	Peak Diode Recovery dv/dt ⑤				15	V/ns
t_{rr}	Reverse Recovery Time (I_S = -57A, di/dt = 100A/µs)	T_j = 25°C			250	ns
		T_j = 125°C			500	
Q_{rr}	Reverse Recovery Charge (I_S = -57A, di/dt = 100A/µs)	T_j = 25°C		1.6		µC
		T_j = 125°C		5.5		
I_{RRM}	Peak Recovery Current (I_S = -57A, di/dt = 100A/µs)	T_j = 25°C		15		Amps
		T_j = 125°C		27		

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.24	°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 = 1.54mH, R_G = 25Ω, Peak I_L = 57A

⑤ dv/dt numbers reflect the limitations of the test circuit rather than the device itself. $I_S \leq -I_D$57A $di/dt \leq$ 700A/µs $V_R \leq$400V $T_J \leq$ 150°C

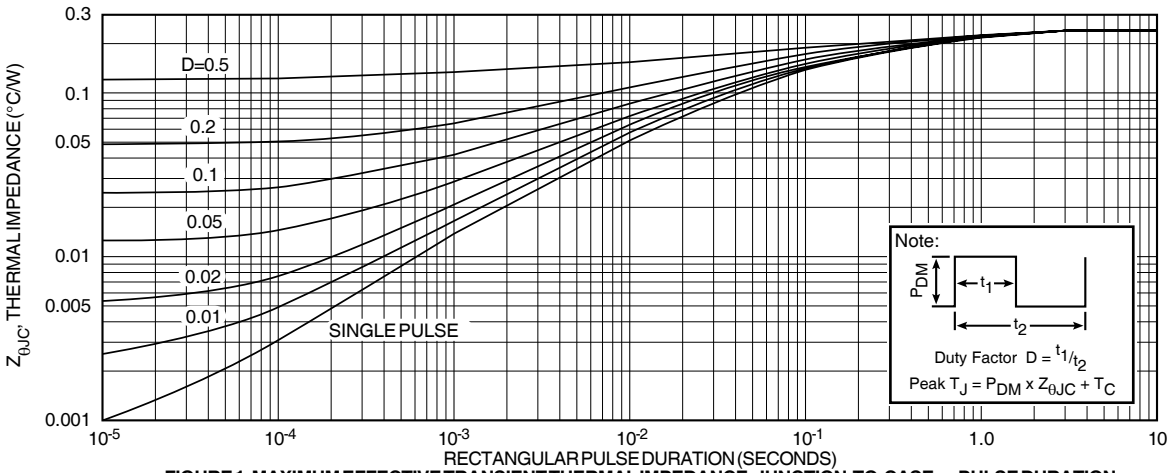


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

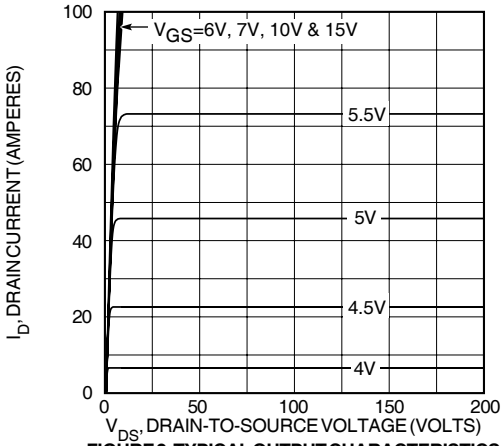


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

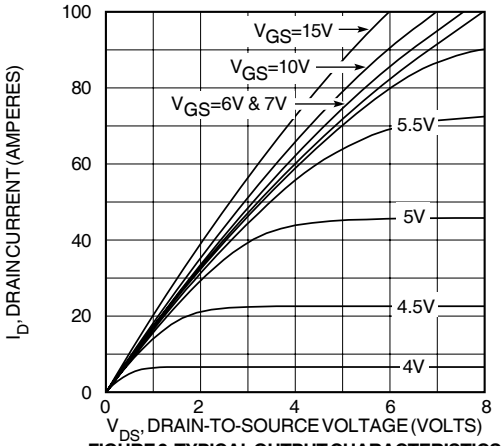


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

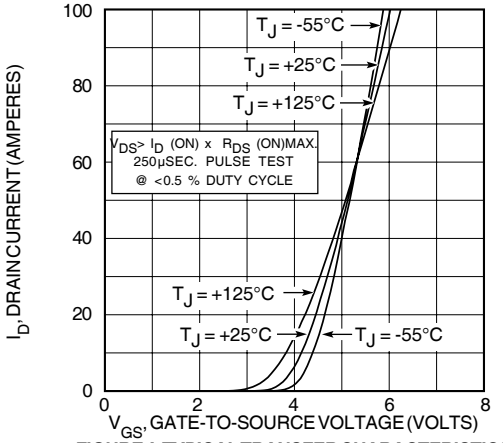


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

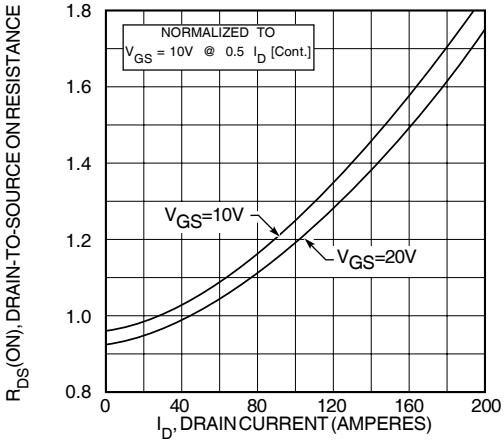


FIGURE 5, R_{DS}(ON) vs DRAIN CURRENT

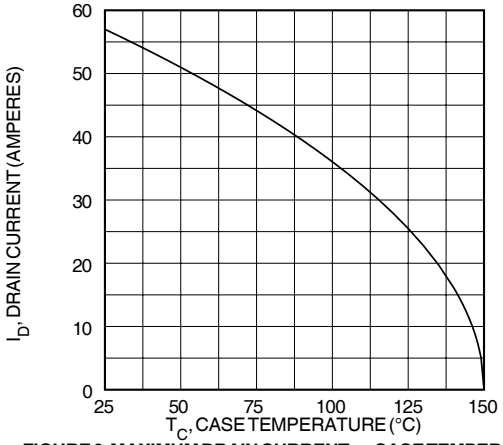


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

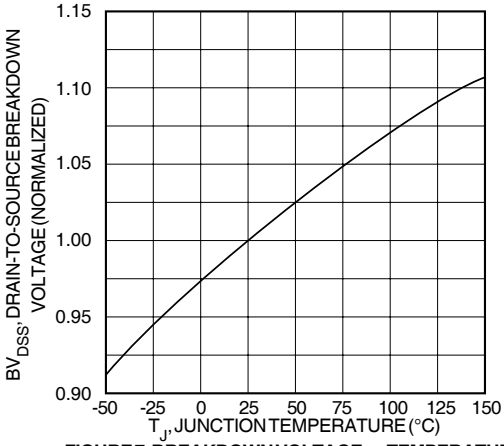


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

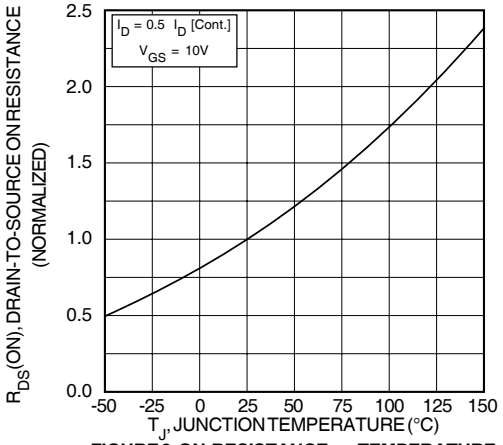


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

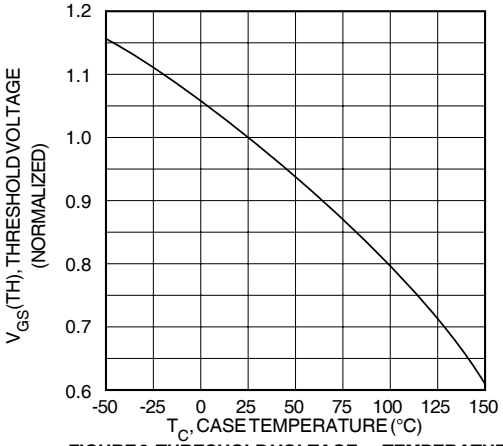


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

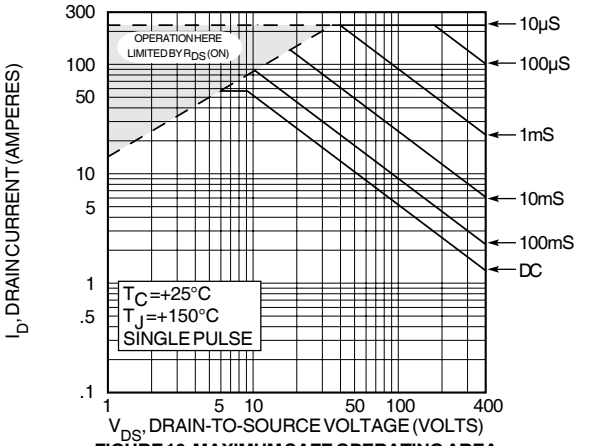


FIGURE 10, MAXIMUM SAFE OPERATING AREA

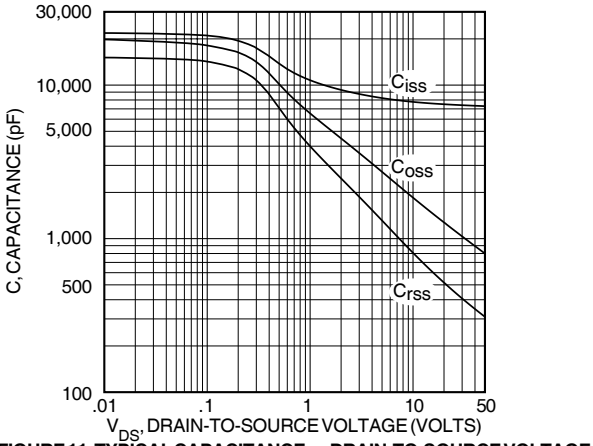


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

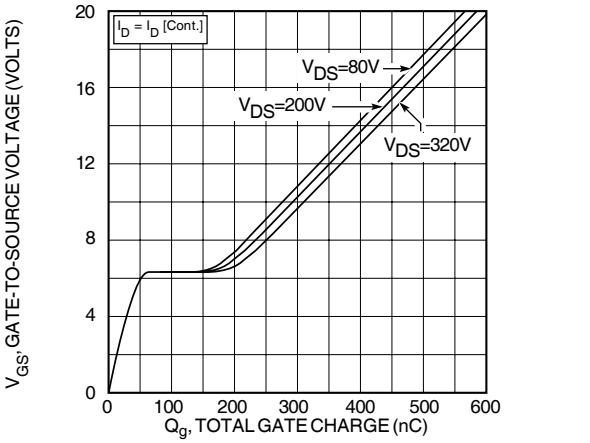


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

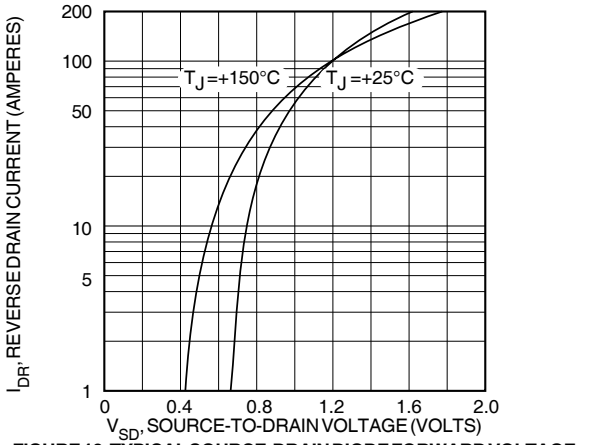
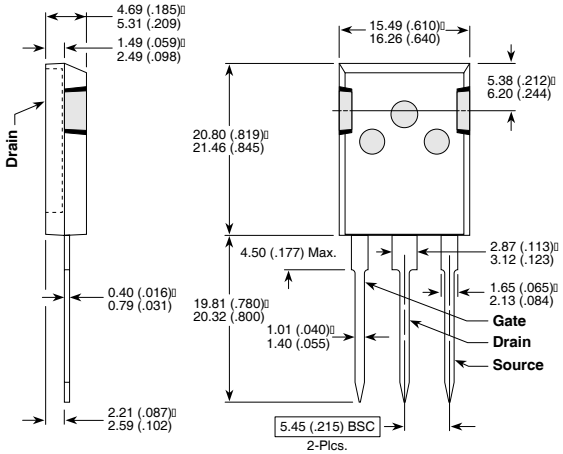


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

T-MAX™ (B2) Package Outline (B2VFR)

e1 SAC: Tin, Silver, Copper

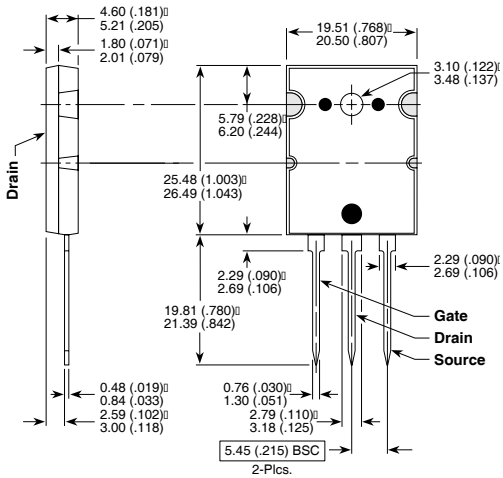


These dimensions are equal to the TO-247 without the mounting hole.

Dimensions in Millimeters and (Inches)

TO-264 (L) Package Outline (LVFR)

e1 SAC: Tin, Silver, Copper



Dimensions in Millimeters and (Inches)