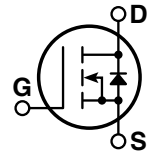
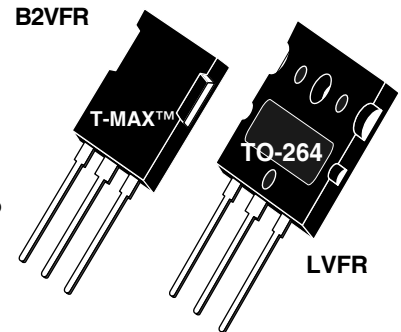


# POWER MOS V® FREDFET



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
- Avalanche Energy Rated
- Faster Switching
- **FAST RECOVERY BODY DIODE**
- Lower Leakage

## MAXIMUM RATINGS

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

Symbol	Parameter	APT40M70B2_LVFR(G)	UNIT
$V_{DSS}$	Drain-Source Voltage	400	Volts
$I_D$	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	57	Amps
$I_{DM}$	Pulsed Drain Current <sup>①</sup>	228	
$V_{GS}$	Gate-Source Voltage Continuous	$\pm 30$	Volts
$V_{GSM}$	Gate-Source Voltage Transient	$\pm 40$	
$P_D$	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	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 <sup>①</sup> (Repetitive and Non-Repetitive)	57	Amps
$E_{AR}$	Repetitive Avalanche Energy <sup>①</sup>	50	mJ
$E_{AS}$	Single Pulse Avalanche Energy <sup>④</sup>	2500	

## STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$BV_{DSS}$	Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250\mu A$ )	400			Volts
$I_{D(on)}$	On State Drain Current <sup>②</sup> ( $V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$ )	57			Amps
$R_{DS(on)}$	Drain-Source On-State Resistance <sup>②</sup> ( $V_{GS} = 10V, 0.5 I_{D[Cont.]}$ )			0.070	Ohms
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}, V_{GS} = 0V$ )			250	$\mu A$
	Zero Gate Voltage Drain Current ( $V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$ )			1000	
$I_{GSS}$	Gate-Source Leakage Current ( $V_{GS} = \pm 30V, V_{DS} = 0V$ )			$\pm 100$	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.

APT Website - <http://www.advancedpower.com>

**DYNAMIC CHARACTERISTICS**

**APT40M70B2\_LVFR(G)**

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		7410	8890	pF
$C_{oss}$	Output Capacitance			1140	1600	
$C_{rss}$	Reverse Transfer Capacitance			450	675	
$Q_g$	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 200V$ $I_D = 57A @ 25^\circ C$		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	$V_{GS} = 15V$ $V_{DD} = 200V$ $I_D = 57A @ 25^\circ C$ $R_G = 0.6\Omega$		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 ( $I_S = -57A, di/dt = 100A/\mu s$ )	$T_j = 25^\circ C$		250	ns
		$T_j = 125^\circ C$		500	
$Q_{rr}$	Reverse Recovery Charge ( $I_S = -57A, di/dt = 100A/\mu s$ )	$T_j = 25^\circ C$		1.6	$\mu C$
		$T_j = 125^\circ C$		5.5	
$I_{RRM}$	Peak Recovery Current ( $I_S = -57A, di/dt = 100A/\mu s$ )	$T_j = 25^\circ C$		15	Amps
		$T_j = 125^\circ C$		27	

**THERMAL CHARACTERISTICS**

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.24	$^\circ C/W$
$R_{\theta JA}$	Junction to Ambient			40	

① Repetitive Rating: Pulse width limited by maximum junction temperature

② Pulse Test: Pulse width < 380  $\mu s$ , Duty Cycle < 2%

③ See MIL-STD-750 Method 3471

④ Starting  $T_j = +25^\circ C$ ,  $L = 1.54mH$ ,  $R_G = 25\Omega$ , Peak  $I_L = 57A$

⑤  $dv/dt$  numbers reflect the limitations of the test circuit rather than the device itself.  $I_S \leq -I_D 57A$   $di/dt \leq 700A/\mu s$   $V_R \leq 400V$   $T_j \leq 150^\circ C$

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

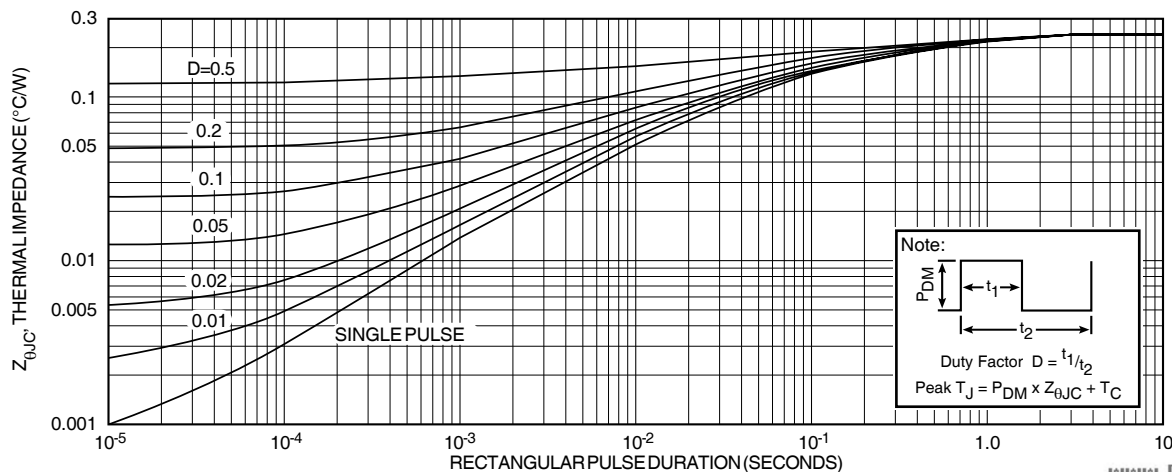


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

APT40M70B2\_LVFR(G)

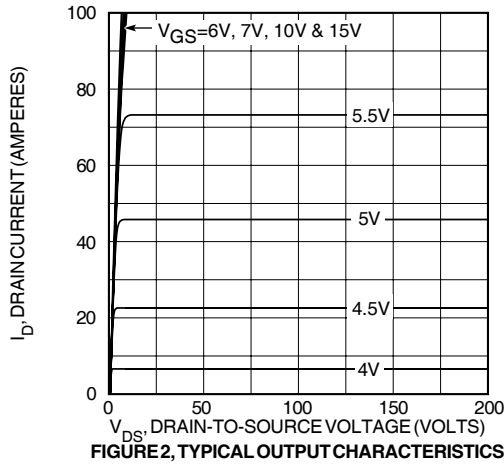


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

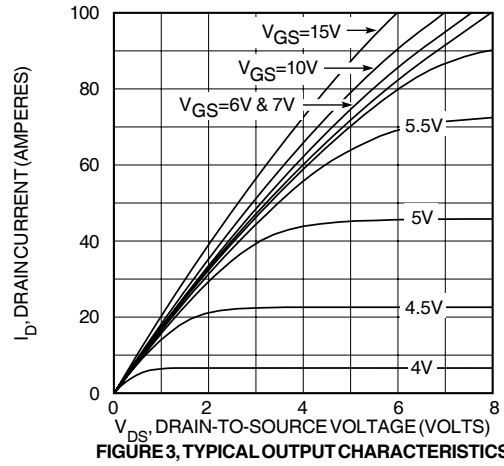


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

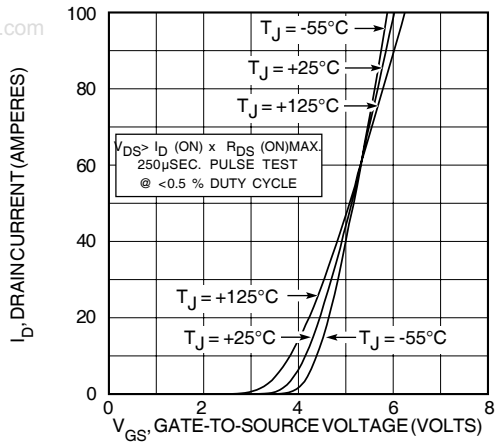


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

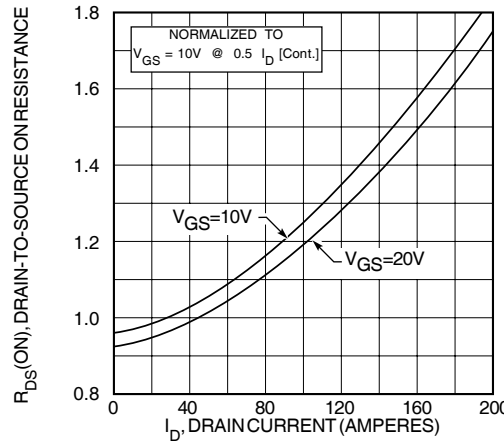


FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT

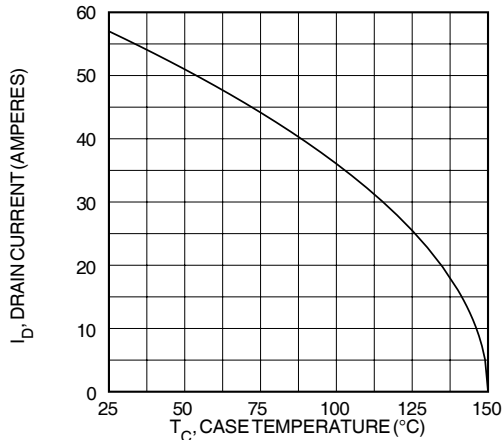


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

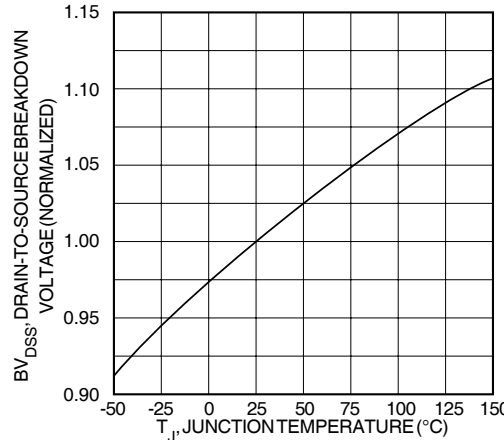


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

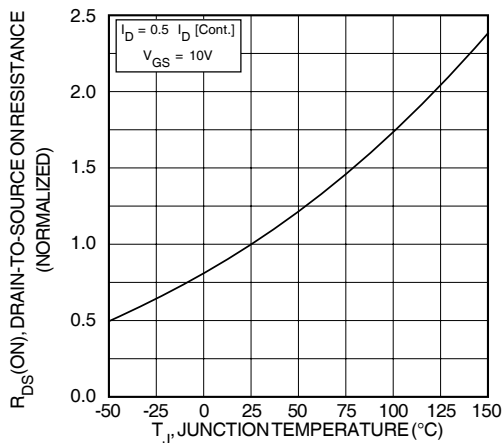


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

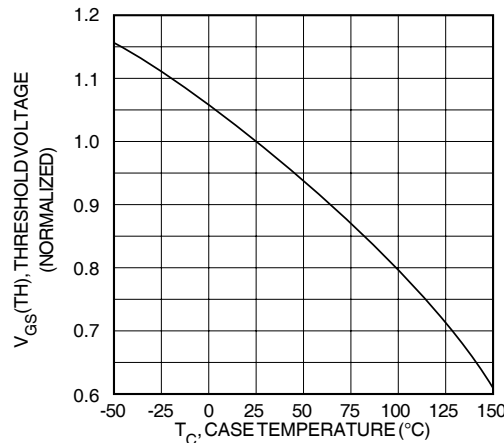


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

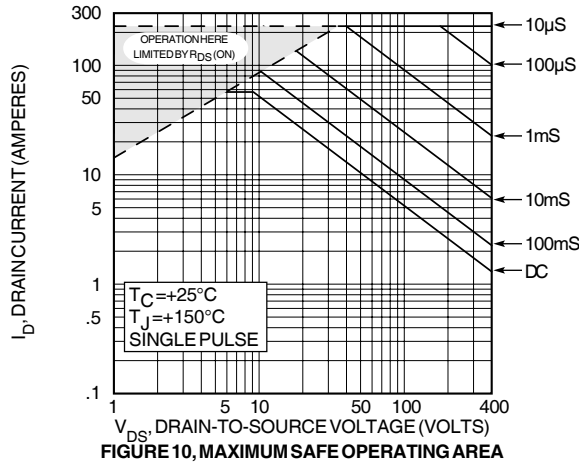


FIGURE 10, MAXIMUM SAFE OPERATING AREA

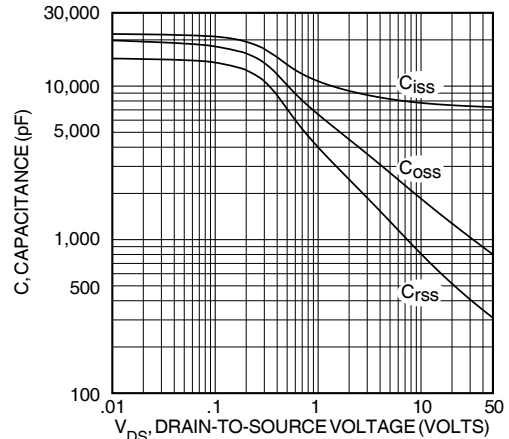


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

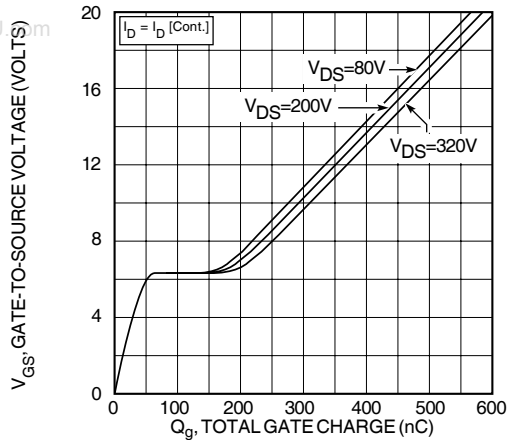


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

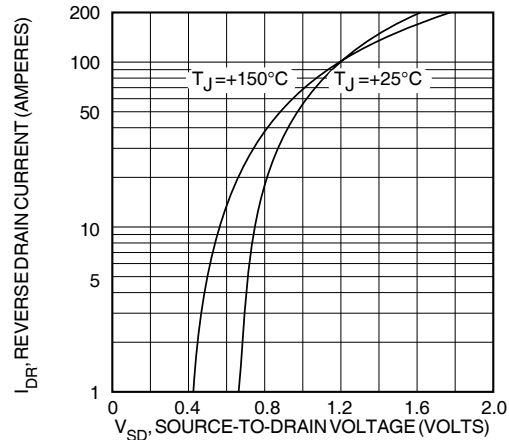
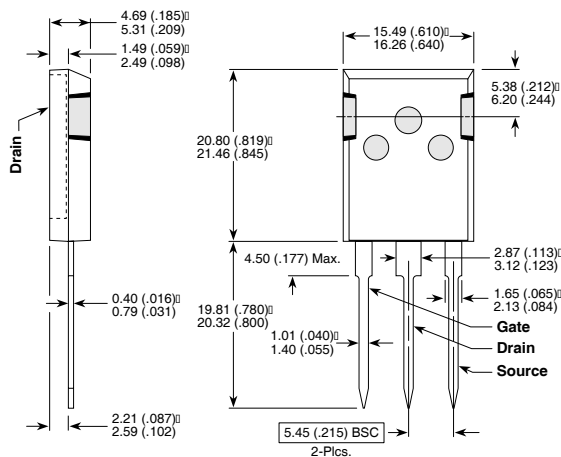


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

T-MAX™ (B2) Package Outline (B2VFR)

(e1) SAC: Tin, Silver, Copper

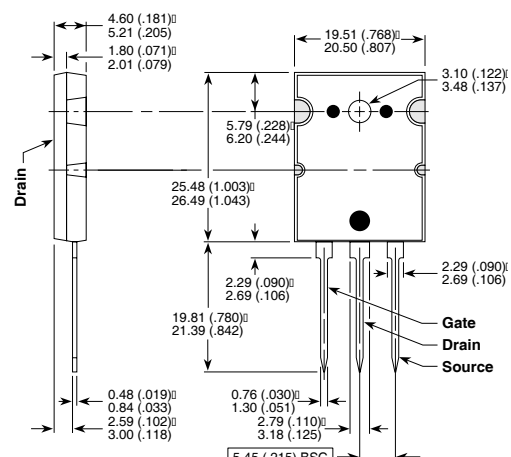


These dimensions are equal to the TO-247 without the mounting hole.

Dimensions in Millimeters and (Inches)

TO-264 (L) Package Outline (LVFR)

(e1) SAC: Tin, Silver, Copper



Dimensions in Millimeters and (Inches)