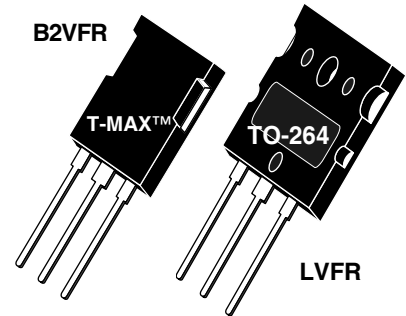
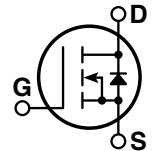


## POWER MOS V® FREDFET

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	APT50M85B2VFR_LVFR	UNIT
$V_{DSS}$	Drain-Source Voltage	500	Volts
$I_D$	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	56	Amps
$I_{DM}$	Pulsed Drain Current <sup>①</sup>	224	
$V_{GS}$	Gate-Source Voltage Continuous	$\pm 30$	Volts
$V_{GSM}$	Gate-Source Voltage Transient	$\pm 40$	
$P_D$	Total Power Dissipation @ $T_C = 25^\circ\text{C}$	625	Watts
	Linear Derating Factor	5.00	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)	56	Amps
$E_{AR}$	Repetitive Avalanche Energy <sup>①</sup>	50	mJ
$E_{AS}$	Single Pulse Avalanche Energy <sup>④</sup>	3000	

### STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$BV_{DSS}$	Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250\mu\text{A}$ )	500			Volts
$R_{DS(on)}$	Drain-Source On-State Resistance <sup>②</sup> ( $V_{GS} = 10V, I_D = 28A$ )			0.085	Ohms
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = 500V, V_{GS} = 0V$ )			250	$\mu\text{A}$
	Zero Gate Voltage Drain Current ( $V_{DS} = 400V, V_{GS} = 0V, T_C = 125^\circ\text{C}$ )			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.

**DYNAMIC CHARACTERISTICS**

**APT50M85B2VFR\_LVFR**

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		10500		pF
$C_{oss}$	Output Capacitance			1290		
$C_{rss}$	Reverse Transfer Capacitance			600		
$Q_g$	Total Gate Charge ③	$V_{GS} = 10V$ $V_{DD} = 250V$ $I_D = 56A @ 25^\circ C$		420		nC
$Q_{gs}$	Gate-Source Charge			50		
$Q_{gd}$	Gate-Drain ("Miller") Charge			200		
$t_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 250V$ $I_D = 56A @ 25^\circ C$ $R_G = 0.6\Omega$		16		ns
$t_r$	Rise Time			18		
$t_{d(off)}$	Turn-off Delay Time			60		
$t_f$	Fall Time			6		

**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

Symbol	Characteristic / Test Conditions	MIN	TYP	MAX	UNIT
$I_S$	Continuous Source Current (Body Diode)			56	Amps
$I_{SM}$	Pulsed Source Current ① (Body Diode)			224	
$V_{SD}$	Diode Forward Voltage ② ( $V_{GS} = 0V, I_S = -56A$ )			1.3	Volts
$dv/dt$	Peak Diode Recovery $dv/dt$ ⑤			15	V/ns
$t_{rr}$	Reverse Recovery Time ( $I_S = -56A, di/dt = 100A/\mu s$ )	$T_j = 25^\circ C$		270	ns
		$T_j = 125^\circ C$		540	
$Q_{rr}$	Reverse Recovery Charge ( $I_S = -56A, di/dt = 100A/\mu s$ )	$T_j = 25^\circ C$		1.8	$\mu C$
		$T_j = 125^\circ C$		6.2	
$I_{RFM}$	Peak Recovery Current ( $I_S = -56A, di/dt = 100A/\mu s$ )	$T_j = 25^\circ C$		16	Amps
		$T_j = 125^\circ C$		29	

**THERMAL CHARACTERISTICS**

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.20	$^\circ C/W$
$R_{\theta JA}$	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  $T_j = +25^\circ C$ ,  $L = 1.91mH$ ,  $R_G = 25\Omega$ , Peak  $I_L = 56A$

⑤  $dv/dt$  numbers reflect the limitations of the test circuit rather than the device itself.  $I_S \leq -I_D 56A$   $di/dt \leq 700A/\mu s$   $V_R \leq 500V$   $T_j \leq 150^\circ C$

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

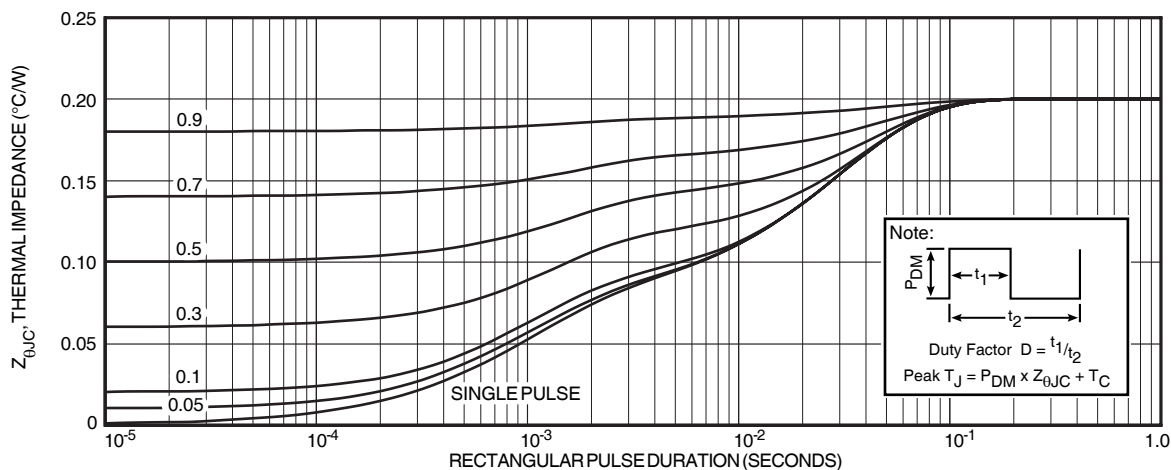


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Typical Performance Curves

APT50M85B2VFR\_LVFR

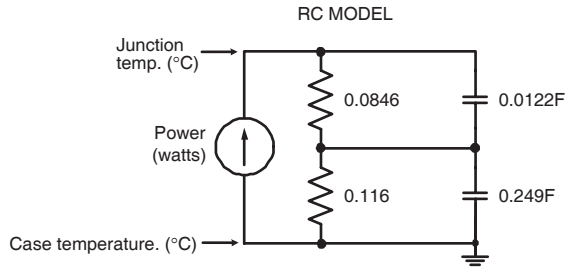


FIGURE 2, TRANSIENT THERMAL IMPEDANCE MODEL

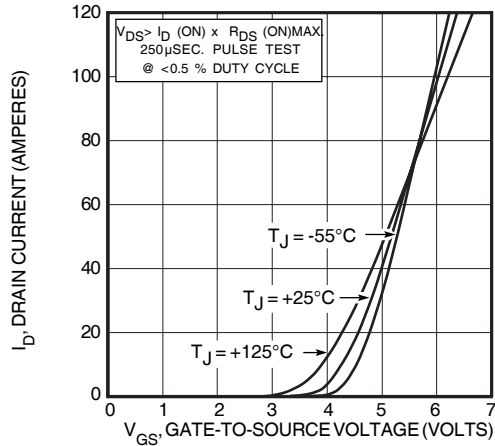


FIGURE 4, TRANSFER CHARACTERISTICS

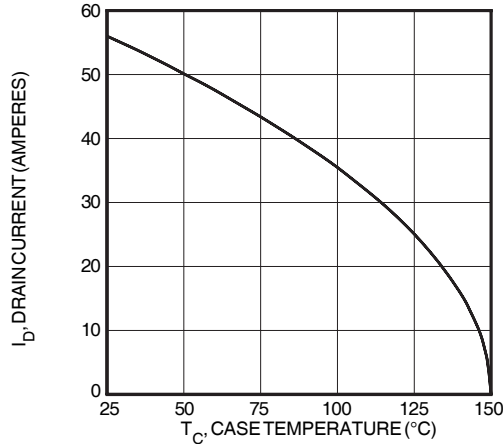


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

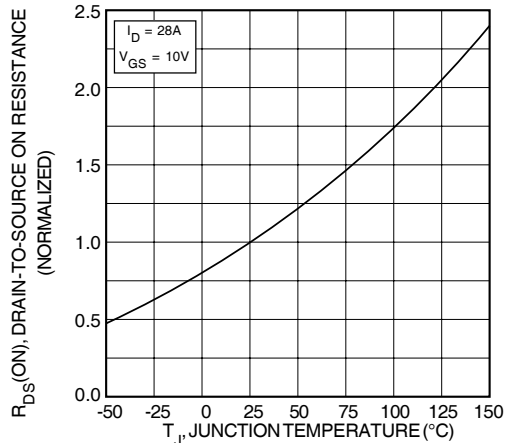


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

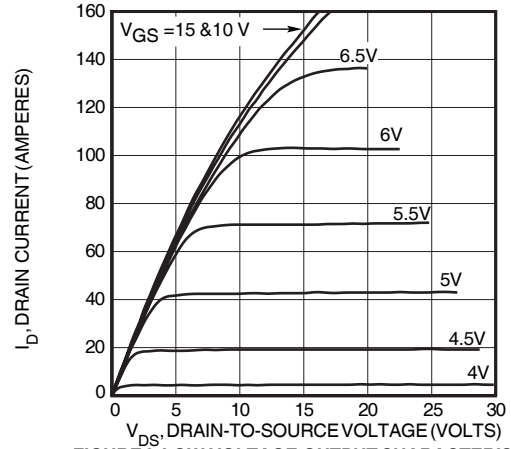


FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

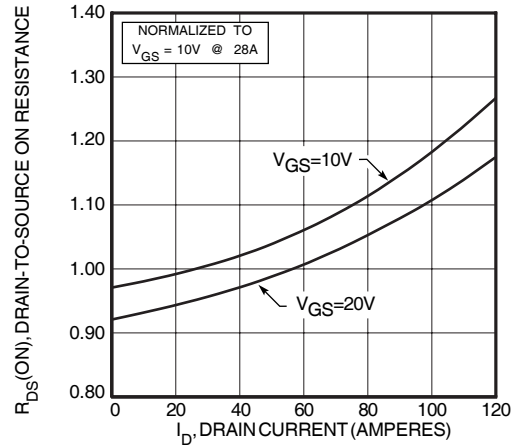


FIGURE 5,  $R_{DS}(\text{ON})$  vs DRAIN CURRENT

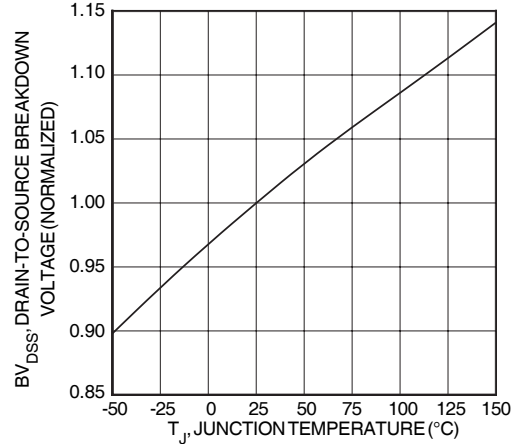


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

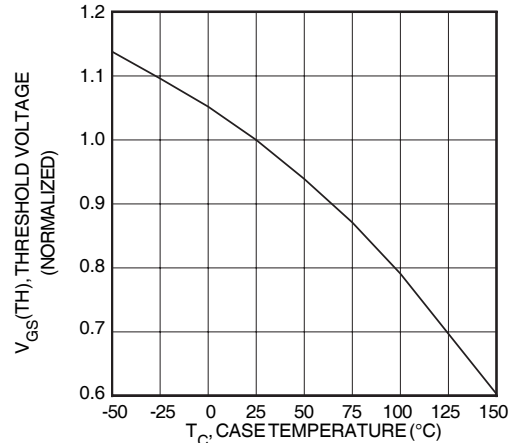


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

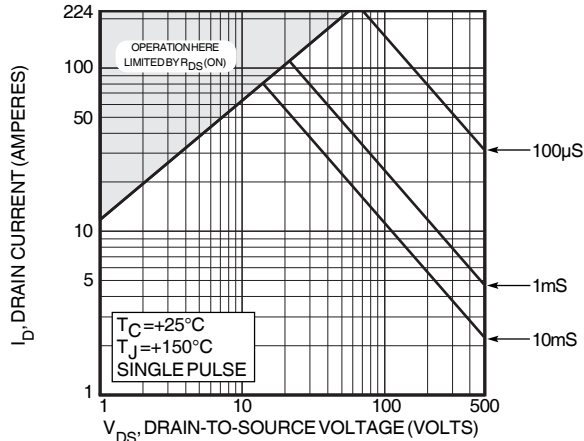


FIGURE 10, MAXIMUM SAFE OPERATING AREA

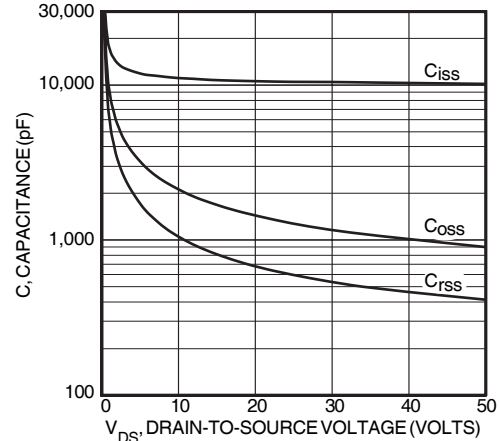


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

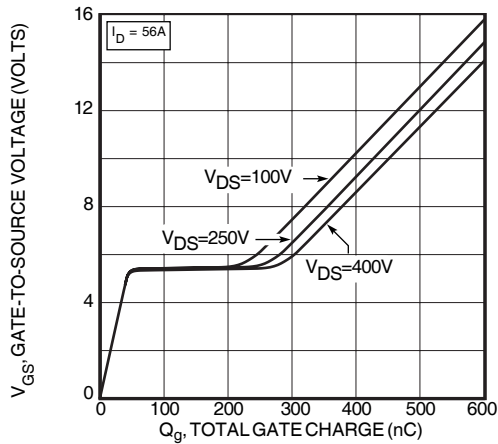


FIGURE 12, GATE CHARGE vs GATE-TO-SOURCE VOLTAGE

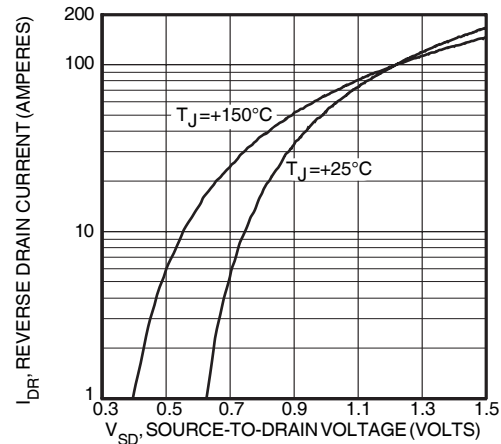
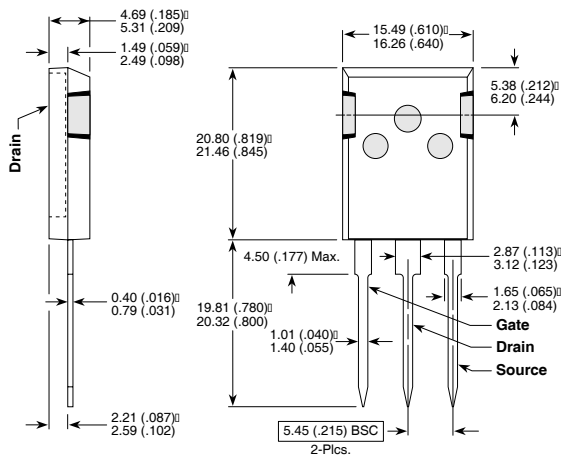


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

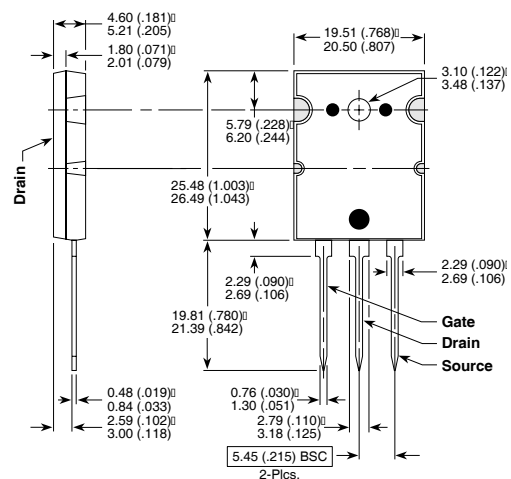
T-MAX™ (B2) Package Outline (B2VFR)



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

Dimensions in Millimeters and (Inches)

TO-264 (L) Package Outline (LVFR)



Dimensions in Millimeters and (Inches)