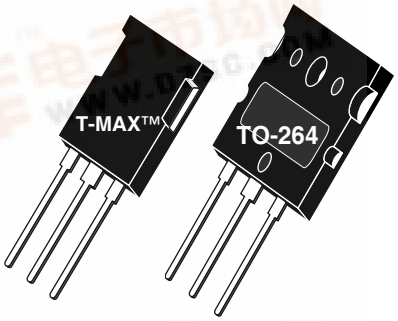
ADVANCED POWER TECHNOLOGY®

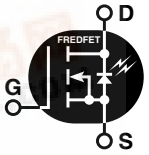
APT12060B2VFR
APT12060LVFR
1200V 20A 0.600Ω

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**
- **Popular T-MAX™ or TO-264 Package**



MAXIMUM RATINGS

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

Symbol	Parameter	APT12060B2VFR_LVFR	UNIT
V_{DSS}	Drain-Source Voltage	1200	Volts
I_D	Continuous Drain Current @ T_C = 25°C	20	Amps
I_{DM}	Pulsed Drain Current ①	80	
V_{GS}	Gate-Source Voltage Continuous	±30	Volts
V_{GSM}	Gate-Source Voltage Transient	±40	
P_D	Total Power Dissipation @ T_C = 25°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 ① (Repetitive and Non-Repetitive)	20	Amps
E_{AR}	Repetitive Avalanche Energy ①	50	mJ
E_{AS}	Single Pulse Avalanche Energy ④	3000	

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= 10A)			0.600	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 = 1mA)	2		4	Volts

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

052-5845 Rev A 4-2004

DYNAMIC CHARACTERISTICS

APT12060B2VFR_LVFR

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	V_{GS} = 0V		7545	9500	pF
C_{oss}	Output Capacitance	V_{DS} = 25V		650	980	
C_{rss}	Reverse Transfer Capacitance	f = 1 MHz		350	490	
Q_g	Total Gate Charge ③	V_{GS} = 10V		431	650	nC
Q_{gs}	Gate-Source Charge	V_{DD} = 0.5 V_{DSS}		34	41	
Q_{gd}	Gate-Drain ("Miller") Charge	I_D = I_D [Cont.] @ 25°C		210	320	
$t_{d}(on)$	Turn-on Delay Time	V_{GS} = 15V		13	26	ns
t_r	Rise Time	V_{DD} = 0.5 V_{DSS}		12	24	
$t_{d}(off)$	Turn-off Delay Time	I_D = I_D [Cont.] @ 25°C		63	95	
t_f	Fall Time	R_G = 0.6Ω		12	25	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions		MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)				20	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)				80	
V_{SD}	Diode Forward Voltage ② (V_{GS} = 0V, I_S = -I_D [Cont.])				1.3	Volts
$^{dv}/_{dt}$	Peak Diode Recovery $^{dv}/_{dt}$ ⑤				18	V/ns
t_{rr}	Reverse Recovery Time	T_j = 25°C			320	ns
	(I_S = -I_D [Cont.], $^{di}/_{dt}$ = 100A/µs)	T_j = 125°C			650	
Q_{rr}	Reverse Recovery Charge	T_j = 25°C		3		µC
	(I_S = -I_D [Cont.], $^{di}/_{dt}$ = 100A/µs)	T_j = 125°C		9		
I_{RRM}	Peak Recovery Current	T_j = 25°C		15		Amps
	(I_S = -I_D [Cont.], $^{di}/_{dt}$ = 100A/µs)	T_j = 125°C		25		

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			0.20	°C/W
$R_{\theta JA}$	Junction to Ambient			40	

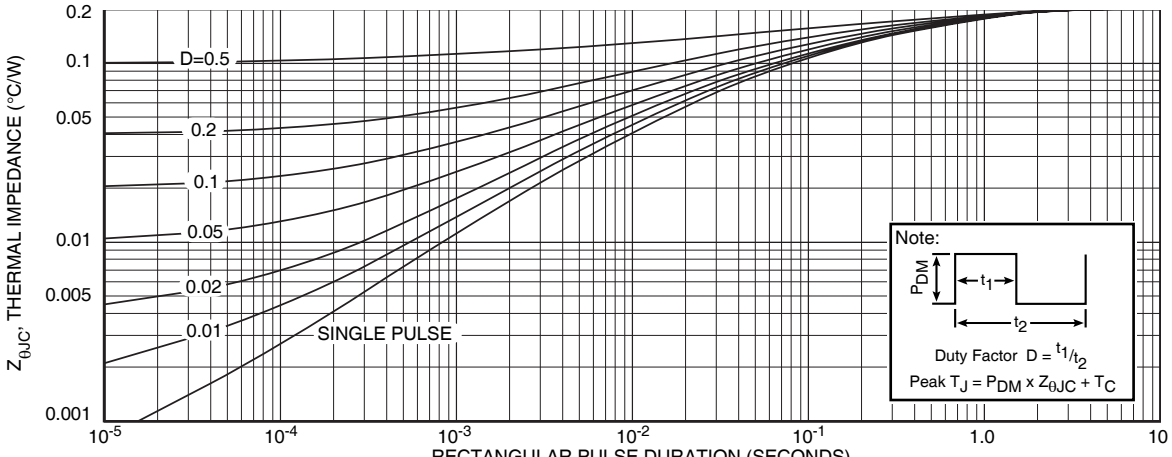
① Repetitive Rating: Pulse width limited by maximum junction temperature.

② Pulse Test: Pulse width < 380 µS, Duty Cycle < 2%

③ See MIL-STD-750 Method 3471

④ Starting T_j = +25°C, L = 15mH, R_G = 25Ω, Peak I_L = 20A

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



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V_{DS}, DRAIN-TO-SOURCE VOLTAGE (VOLTS)

FIGURE 2, HIGH VOLTAGE OUTPUT CHARACTERISTICS

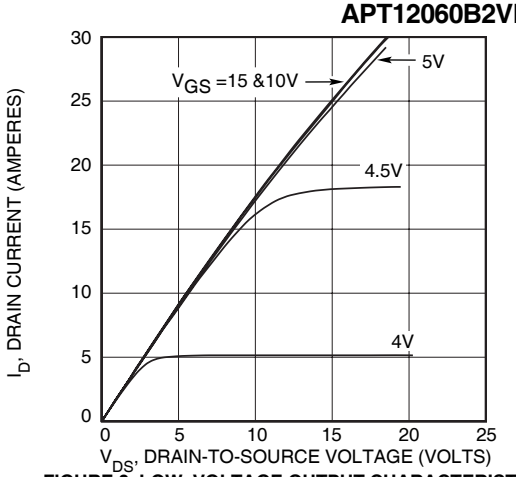


FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS

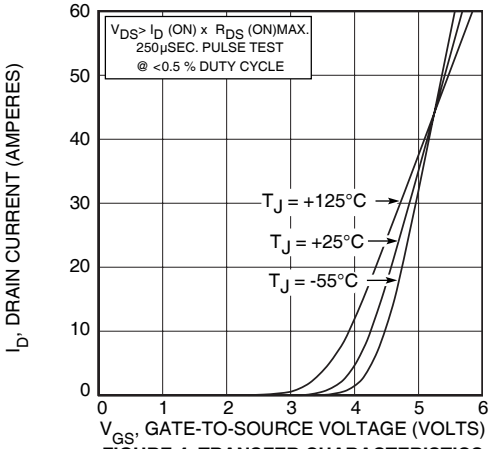


FIGURE 4, TRANSFER CHARACTERISTICS

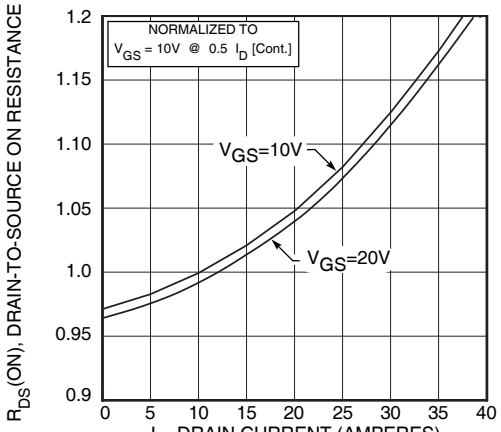


FIGURE 5, R_{DS}(ON) vs DRAIN CURRENT

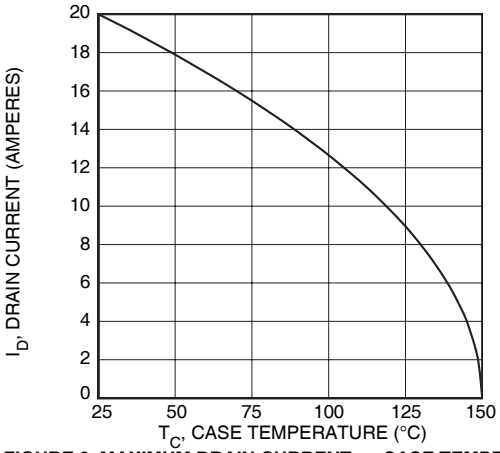


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

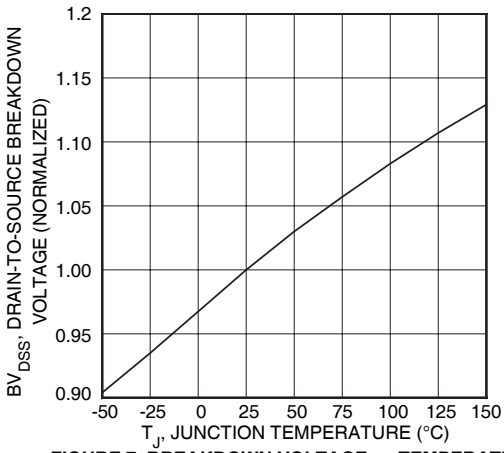


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

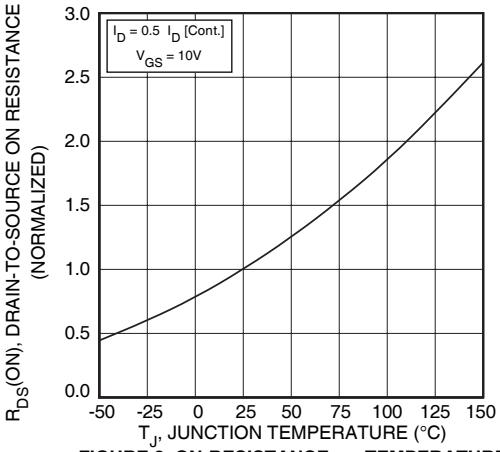


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

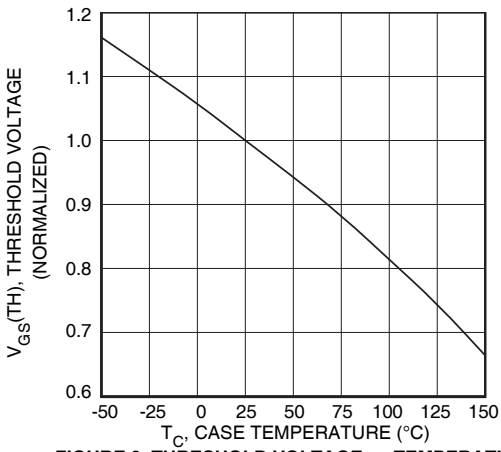


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

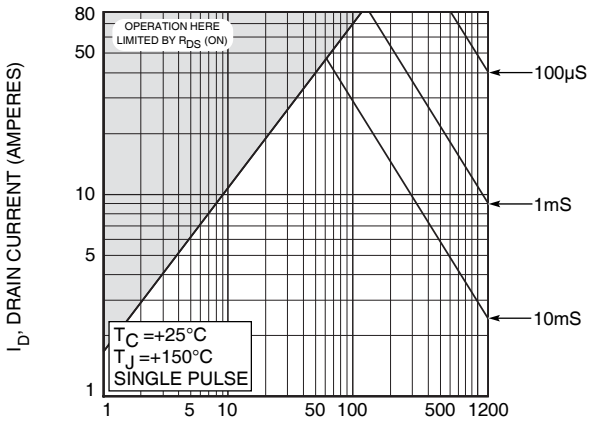


FIGURE 10, MAXIMUM SAFE OPERATING AREA

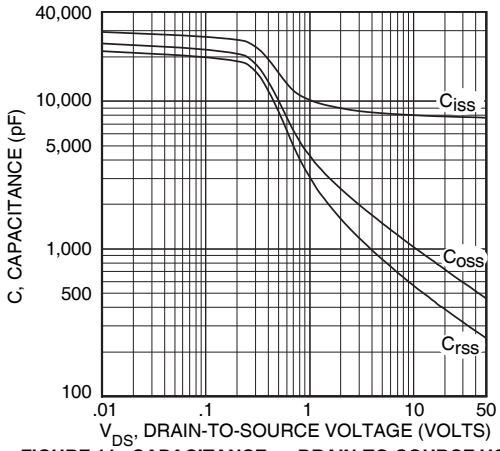


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

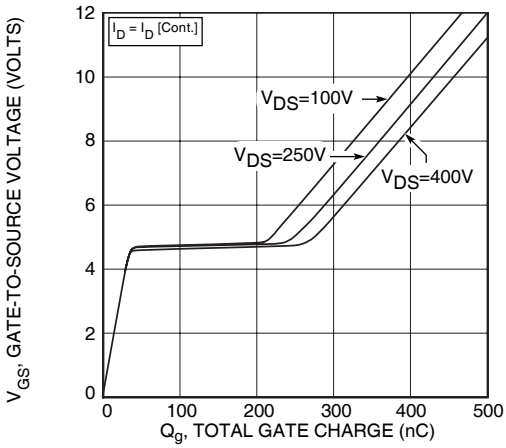


FIGURE 12, GATE CHARGE vs GATE-TO-SOURCE VOLTAGE

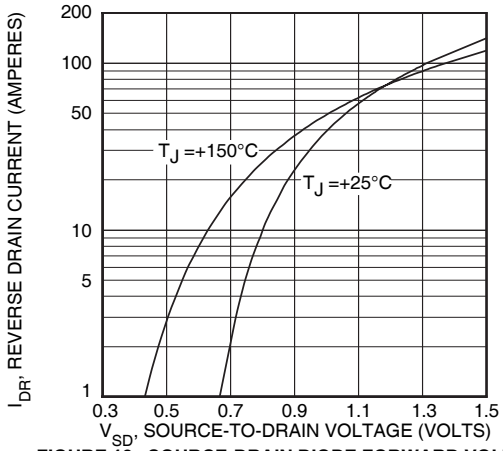
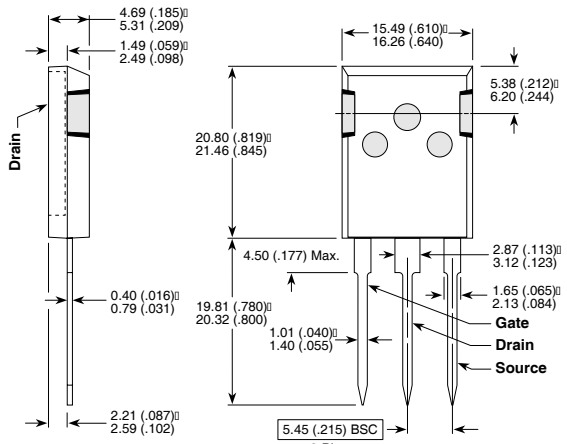


FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

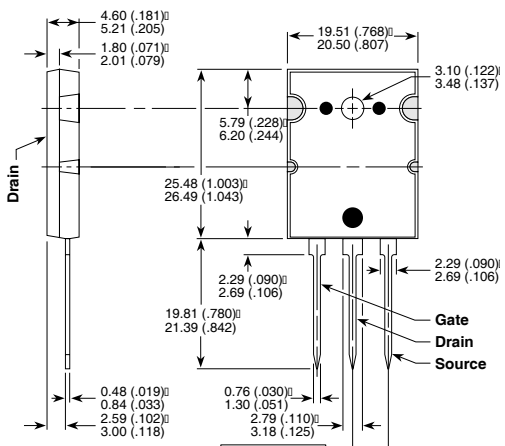
T-MAX™ (B2) Package Outline



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

Dimensions in Millimeters and (Inches)

TO-264 (L) Package Outline



Dimensions in Millimeters and (Inches)