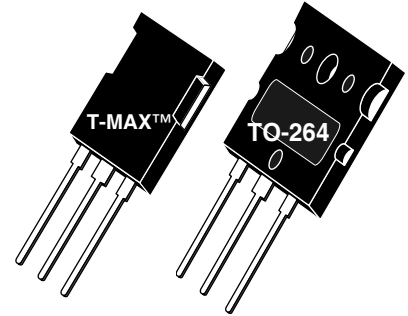
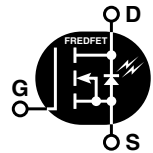


**POWER MOS V®**

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

Symbol	Parameter	APT12060B2VFR_LVFR	UNIT
$V_{DSS}$	Drain-Source Voltage	1200	Volts
$I_D$	Continuous Drain Current @ $T_C = 25^\circ\text{C}$	20	Amps
$I_{DM}$	Pulsed Drain Current <sup>①</sup>	80	
$V_{GS}$	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)	20	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 ( $V_{GS} = 0V, I_D = 250\mu A$ )	1200			Volts
$R_{DS(on)}$	Drain-Source On-State Resistance <sup>②</sup> ( $V_{GS} = 10V, I_D = 10A$ )			0.600	Ohms
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = 1200, V_{GS} = 0V$ )			250	$\mu A$
	Zero Gate Voltage Drain Current ( $V_{DS} = 960V, V_{GS} = 0V, T_C = 125^\circ\text{C}$ )			1000	
$I_{GSS}$	Gate-Source Leakage Current ( $V_{GS} = \pm 30V, V_{DS} = 0V$ )			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 1mA$ )	2		4	Volts

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

## DYNAMIC CHARACTERISTICS

APT12060B2VFR\_LVFR

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		7545	9500	pF
$C_{oss}$	Output Capacitance			650	980	
$C_{rss}$	Reverse Transfer Capacitance			350	490	
$Q_g$	Total Gate Charge <sup>③</sup>	$V_{GS} = 10V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_D [\text{Cont.}] @ 25^\circ\text{C}$		431	650	nC
$Q_{gs}$	Gate-Source Charge			34	41	
$Q_{gd}$	Gate-Drain ("Miller") Charge			210	320	
$t_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$ $V_{DD} = 0.5 V_{DSS}$ $I_D = I_D [\text{Cont.}] @ 25^\circ\text{C}$ $R_G = 0.6\Omega$		13	26	ns
$t_r$	Rise Time			12	24	
$t_{d(off)}$	Turn-off Delay Time			63	95	
$t_f$	Fall Time			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 <sup>①</sup> (Body Diode)			80	
$V_{SD}$	Diode Forward Voltage <sup>②</sup> ( $V_{GS} = 0V, I_S = -I_D [\text{Cont.}]$ )			1.3	Volts
$dv/dt$	Peak Diode Recovery $dv/dt$ <sup>③</sup>			18	V/ns
$t_{rr}$	Reverse Recovery Time ( $I_S = -I_D [\text{Cont.}], di/dt = 100A/\mu s$ )	$T_j = 25^\circ\text{C}$		320	ns
		$T_j = 125^\circ\text{C}$		650	
$Q_{rr}$	Reverse Recovery Charge ( $I_S = -I_D [\text{Cont.}], di/dt = 100A/\mu s$ )	$T_j = 25^\circ\text{C}$		3	$\mu\text{C}$
		$T_j = 125^\circ\text{C}$		9	
$I_{RFM}$	Peak Recovery Current ( $I_S = -I_D [\text{Cont.}], di/dt = 100A/\mu s$ )	$T_j = 25^\circ\text{C}$		15	Amps
		$T_j = 125^\circ\text{C}$		25	

## THERMAL CHARACTERISTICS

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

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

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

③ See MIL-STD-750 Method 3471

④ Starting  $T_j = +25^\circ\text{C}$ ,  $L = 15\text{mH}$ ,  $R_G = 25\Omega$ , Peak  $I_L = 20\text{A}$

⑤  $I_S \leq I_D [\text{Cont.}]$ ,  $di/dt = 100\text{A}/\mu\text{s}$ ,  $T_j \leq 150^\circ\text{C}$ ,  $R_G = 2.0\Omega$ ,  $V_R = 200\text{V}$ .

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

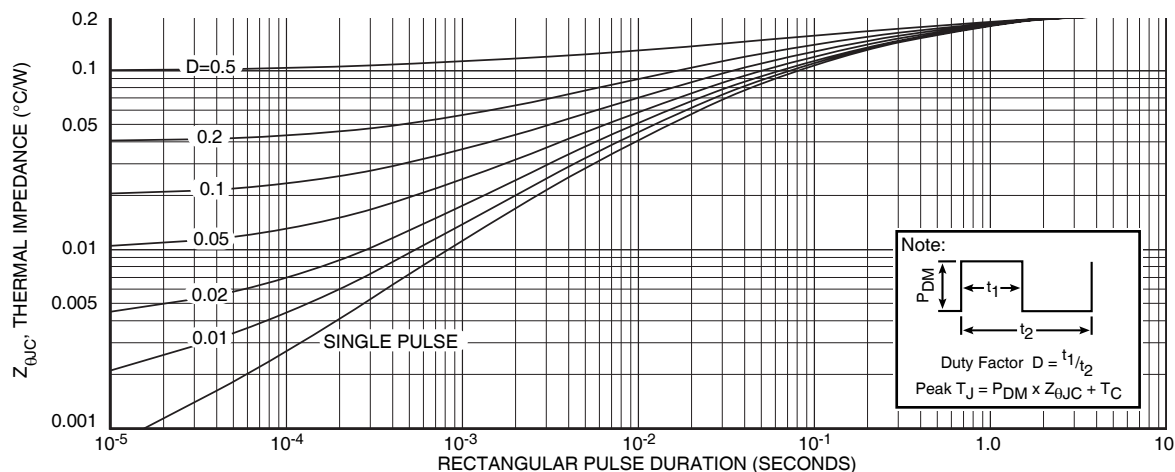
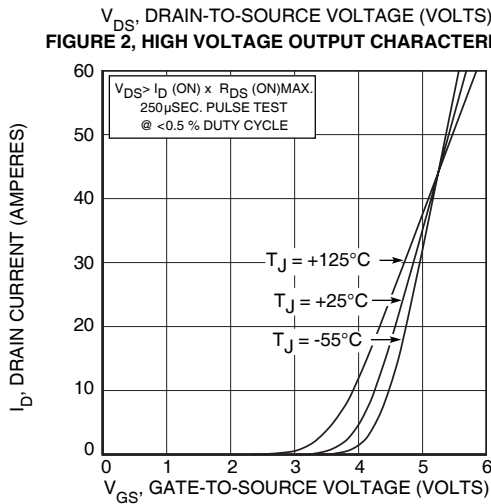


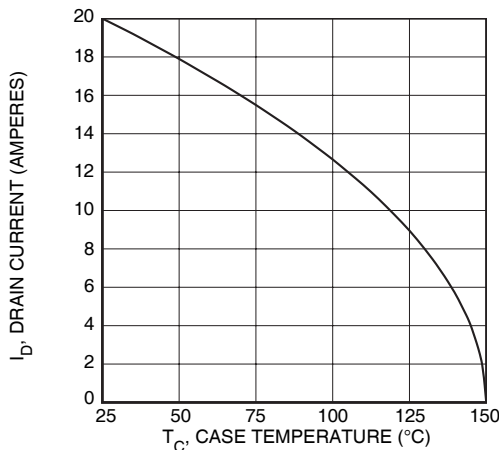
FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

Graph Deleted

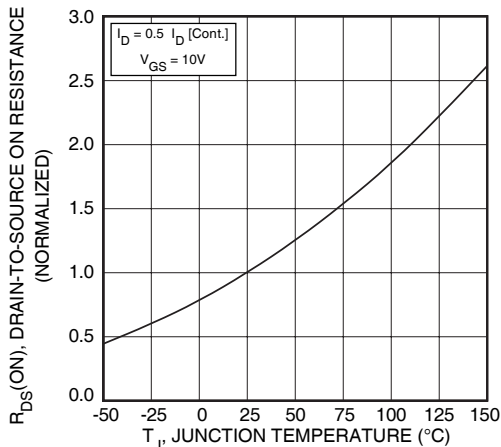
**FIGURE 2, HIGH VOLTAGE OUTPUT CHARACTERISTICS**



**FIGURE 4, TRANSFER CHARACTERISTICS**



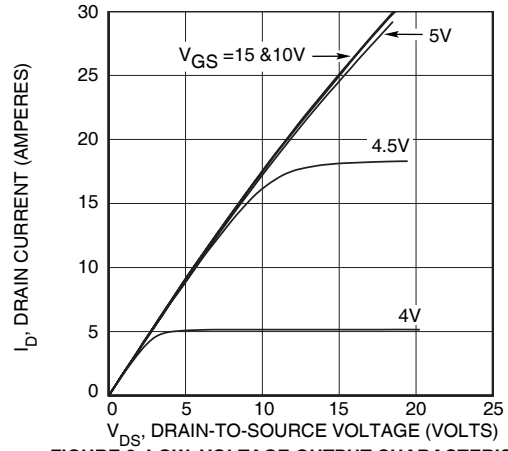
**FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE**



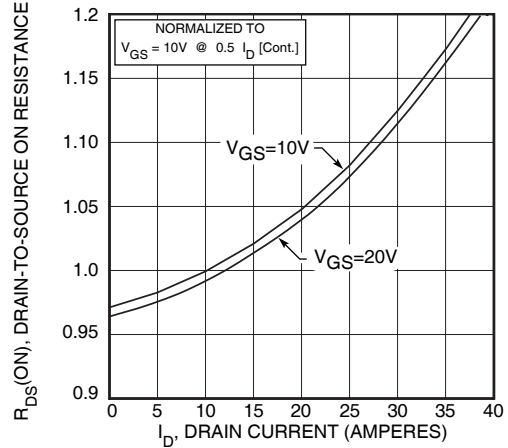
**FIGURE 8, ON-RESISTANCE vs. TEMPERATURE**



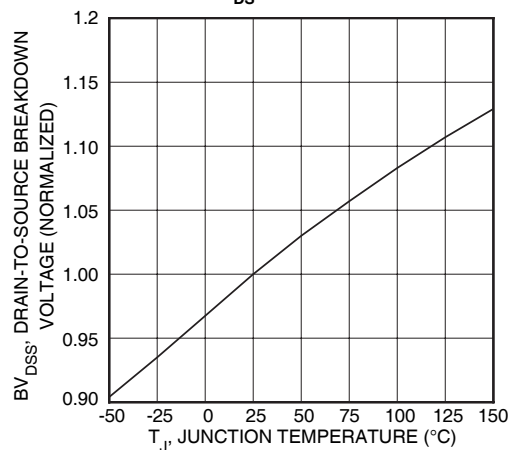
**FIGURE 8, ON-RESISTANCE vs. TEMPERATURE**



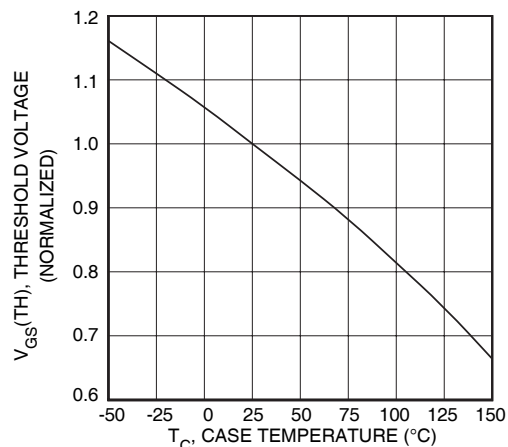
**FIGURE 3, LOW VOLTAGE OUTPUT CHARACTERISTICS**



**FIGURE 5, R<sub>DS(ON)</sub> vs DRAIN CURRENT**



**FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE**



**FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE**

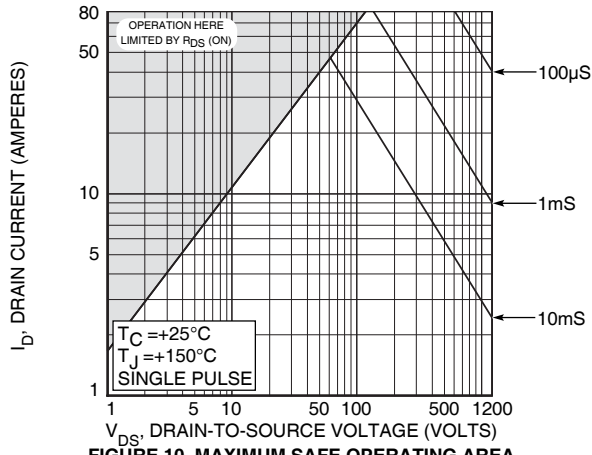


FIGURE 10, MAXIMUM SAFE OPERATING AREA

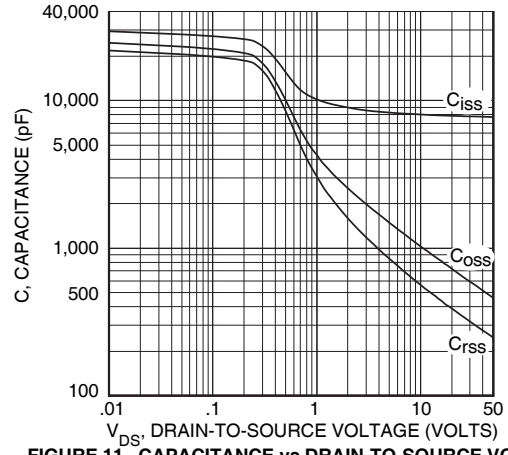


FIGURE 11, CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

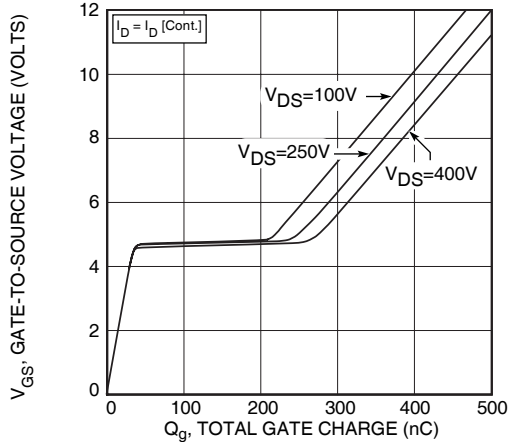


FIGURE 12, GATE CHARGE vs GATE-TO-SOURCE VOLTAGE

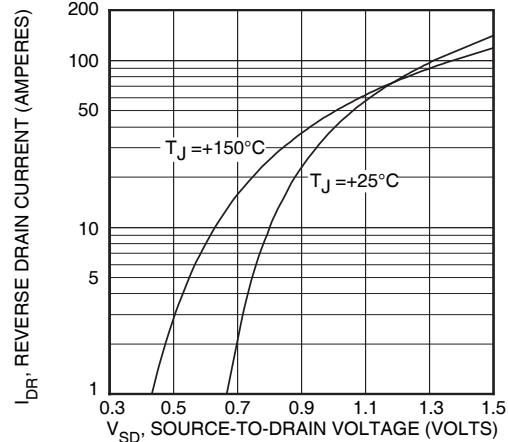
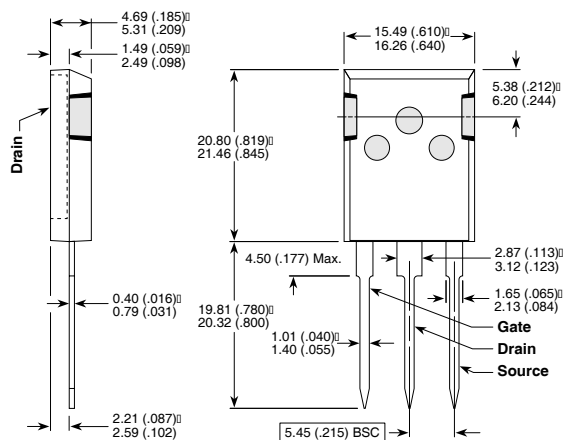


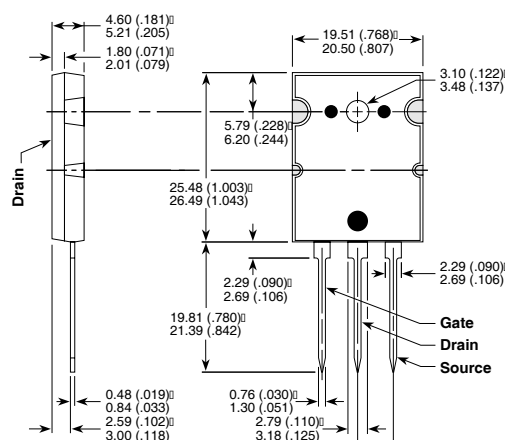
FIGURE 13, SOURCE-DRAIN DIODE FORWARD VOLTAGE

T-MAX™ (B2) Package Outline



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)