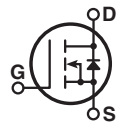
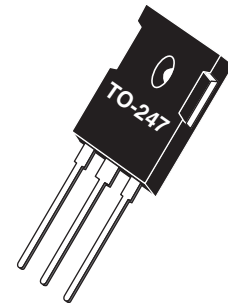



**POWER MOS V®**

APT20M45BVR(G)

POWER MOS V® is a new generation of high voltage N-Channel enhancement mode power MOSFETs. This new technology minimizes the JFET effect, increase packing density and reduces the on-resistance. Power MOS V® also achieves faster switching speeds through optimized gate layout.


**FEATURES**

- Faster switching
- Lower Leakage
- 100% Avalanche tested
- Popular TO-247 Package
- RoHS compliant 

**Absolute Maximum Ratings**

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

Symbol	Parameter	Ratings	Unit
$V_{DSS}$	Drain Source Voltage	200	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 @ $T_C = 25^\circ\text{C}$	300	Watts
	Linear Derating Factor	2.4	W/C°
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to 150	°C
$T_L$	Lead Temperature for Soldering: 0.063" from Case for 10 Seconds	300	
$I_{AR}$	Avalanche Current <sup>1</sup> (Repetitive and Non-Repetitive)	56	Amps
$E_{AR}$	Repetitive Avalanche Energy <sup>1</sup>	30	mJ
$E_{AS}$	Single Pulse Avalanche Energy <sup>4</sup>	1300	

**Static Characteristics**
 $T_J = 25^\circ\text{C}$  unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage ( $V_{GS} = 0V, I_D = 250\mu\text{A}$ )	200			Volts
$I_{D(on)}$	On State Drain Current <sup>2</sup> ( $V_{DS} > I_{D(on)} \times R_{DS(on)}$ Max, $V_{GS} = 10V$ )	56			Amps
$R_{DS(on)}$	Drain-Source On-State Resistance <sup>2</sup> ( $V_{GS} = 10V, 0.5 I_{D(Cont.)}$ )			0.045	Ohms
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{DS} = V_{DSS}, V_{GS} = 0V$ )			25	$\mu\text{A}$
	Zero Gate Voltage Collector Current ( $V_{GS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125^\circ\text{C}$ )			250	
$I_{GSS}$	Gate-Source Leakage Current ( $V_{GS} = \pm 30V, V_{DS} = 0V$ )			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = 1.0\text{mA}$ )	2		4	Volts

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

## Dynamic Characteristics

APT20M45BVR(G)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$		4050	4860	pF
$C_{oss}$	Output Capacitance	$V_{DS} = 25V$		980	1375	
$C_{rss}$	Reverse Transfer Capacitance	$f = 1MHz$		300	450	
$Q_g$	Total Gate Charge <sup>1</sup>	$V_{GS} = 10V$		130	195	nC
$Q_{ge}$	Gate-Source Charge	$V_{DD} = 0.5V_{DSS}$		30	45	
$Q_{gd}$	Gate- Drain ("Miller") Charge	$I_D = I_{D(cont.)} @ 25^\circ C$		55	80	
$t_{d(on)}$	Turn-on Delay Time	$V_{GS} = 10V$		12	24	ns
$t_r$	Rise Time	$V_{DD} = 0.5V_{DSS}$		14	28	
$t_{d(off)}$	Turn-off Delay Time	$I_D = I_{D(cont.)} @ 25^\circ C$		43	70	
$t_f$	Fall Time	$R_G = 1.6\Omega$		7	14	

## Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic / Test Conditions	Min	Typ	Max	Unit
$I_S$	Continuous Source Current (Body Diode)			56	Amps
$I_{SM}$	Pulse Source Current <sup>1</sup> (Body Diode)			224	
$V_{SD}$	Diode Forward Voltage <sup>2</sup> ( $V_{GS} = 0V, I_S = -I_{D(cont.)}$ )			1.3	Volts
$t_{rr}$	Reverse Recovery Time ( $I_S = -I_{D(cont.)}^1, di_S/dt = 100A/\mu s$ )		280		nS
$Q_{rr}$	Reverse Recovery Time ( $I_S = -I_{D(cont.)}^1, di_S/dt = 100A/\mu s$ )		3.5		$\mu C$

## Thermal Characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction to Case			0.42	C °/W
$R_{\theta JA}$	Junction to Ambient			40	

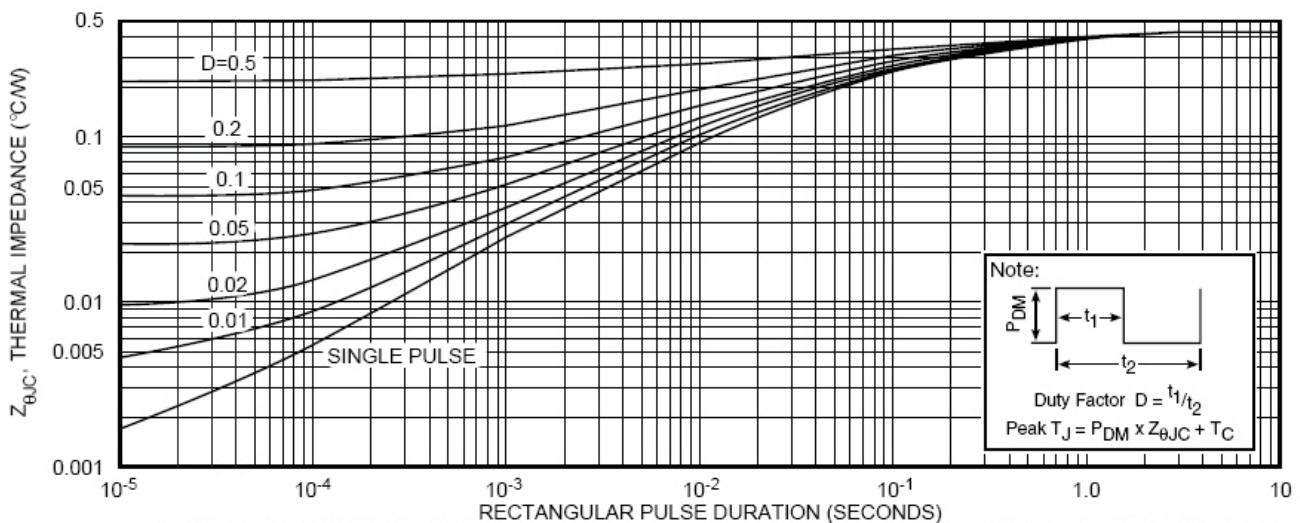
① Repetitive Rating: Pulse width limited by maximum junction temperature.

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

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

③ See MIL-STD-750 Method 3471

④ Starting  $T_J = +25^\circ C$ ,  $L = 830\mu H$ ,  $R_G = 25\Omega$ , Peak  $I_L = 56A$



Typical Performance Curves

APT20M45BVR(G)

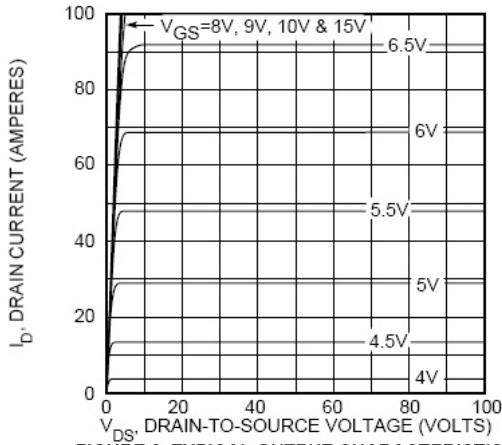


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

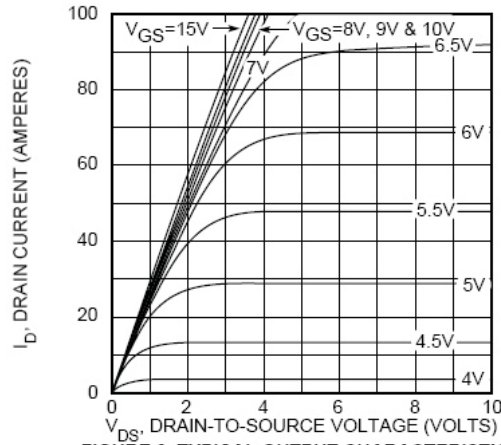


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

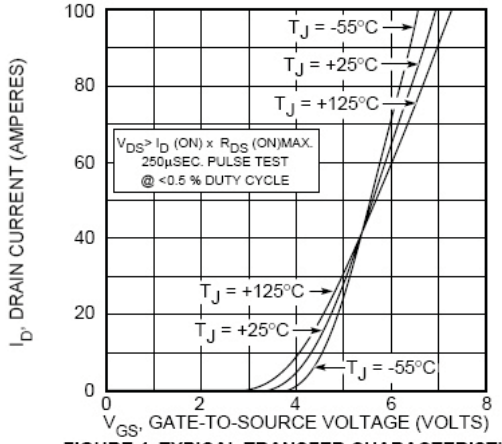


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

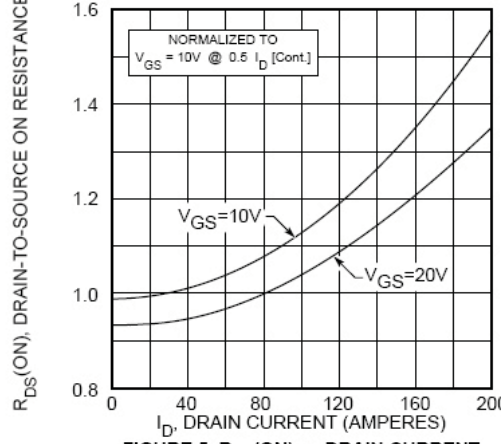


FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT

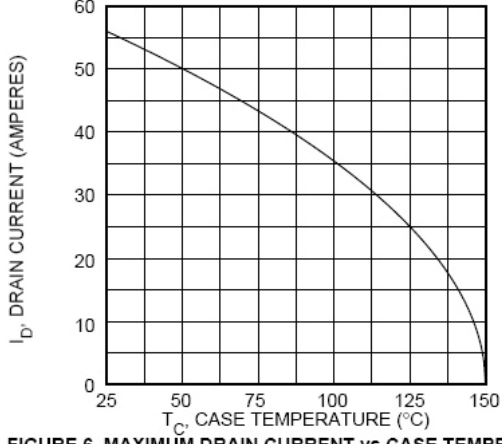


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

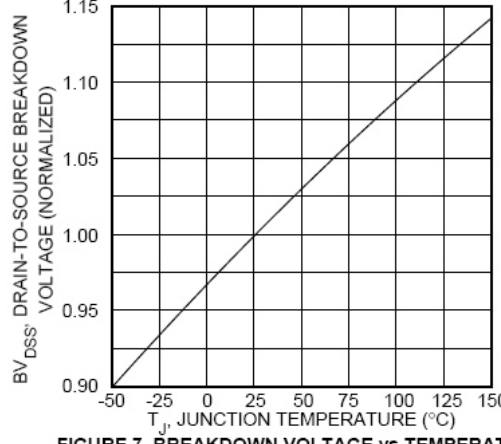


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

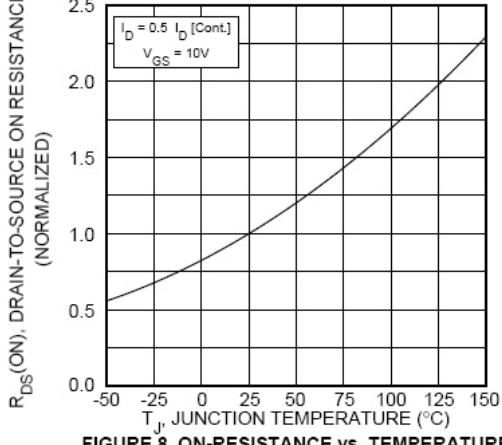


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

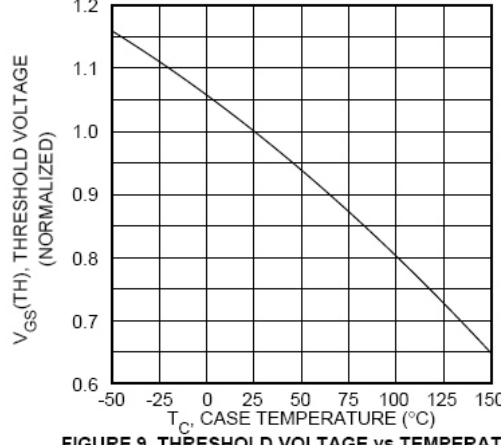


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

# Typical Performance Curves

APT20M45BVR(G)

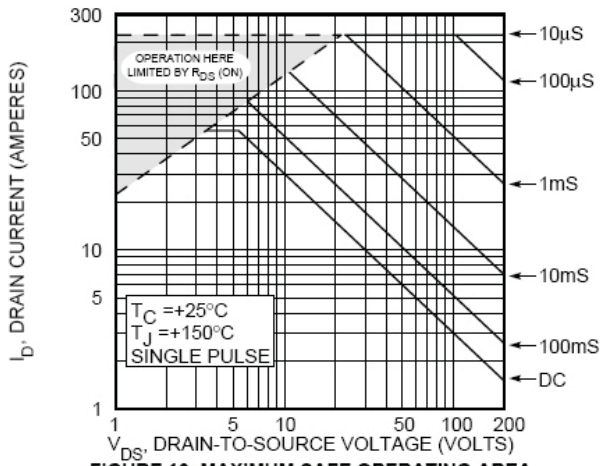


FIGURE 10, MAXIMUM SAFE OPERATING AREA

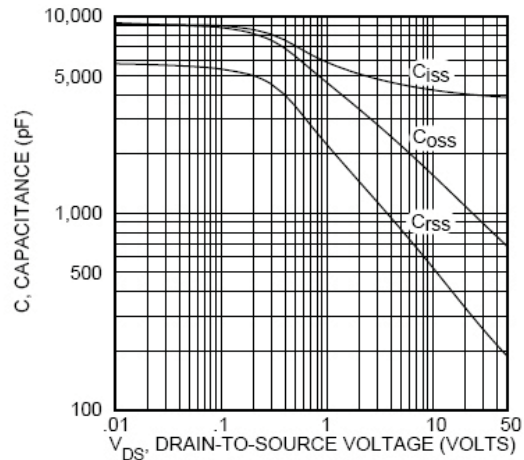


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

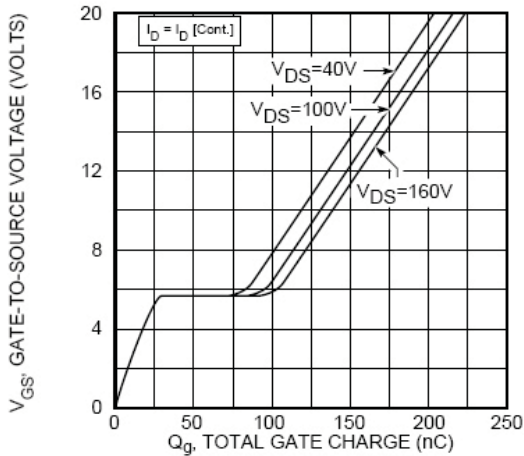


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

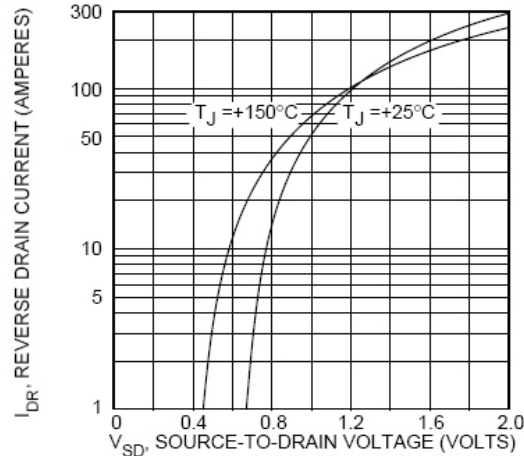
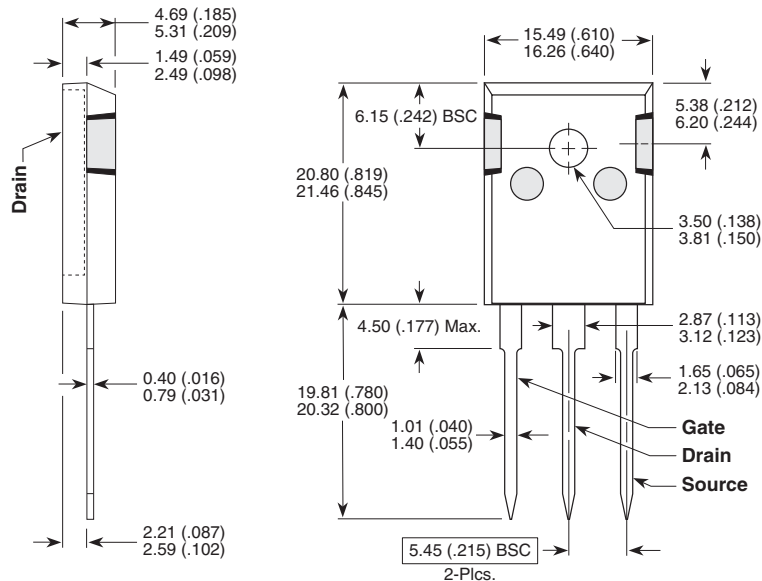


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

## TO-247 (B) Package Outline

e3 100% Sn Plated



Dimensions in Millimeters and (Inches)