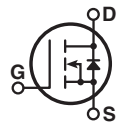
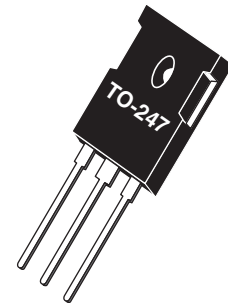



**POWER MOS V®**

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 ( $I_S = -I_{D(cont.)}, di_S/dt = 100A/\mu s$ )		280		nS
$Q_{rr}$	Reverse Recovery Time ( $I_S = -I_{D(cont.)}, di_S/dt = 100A/\mu s$ )		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	

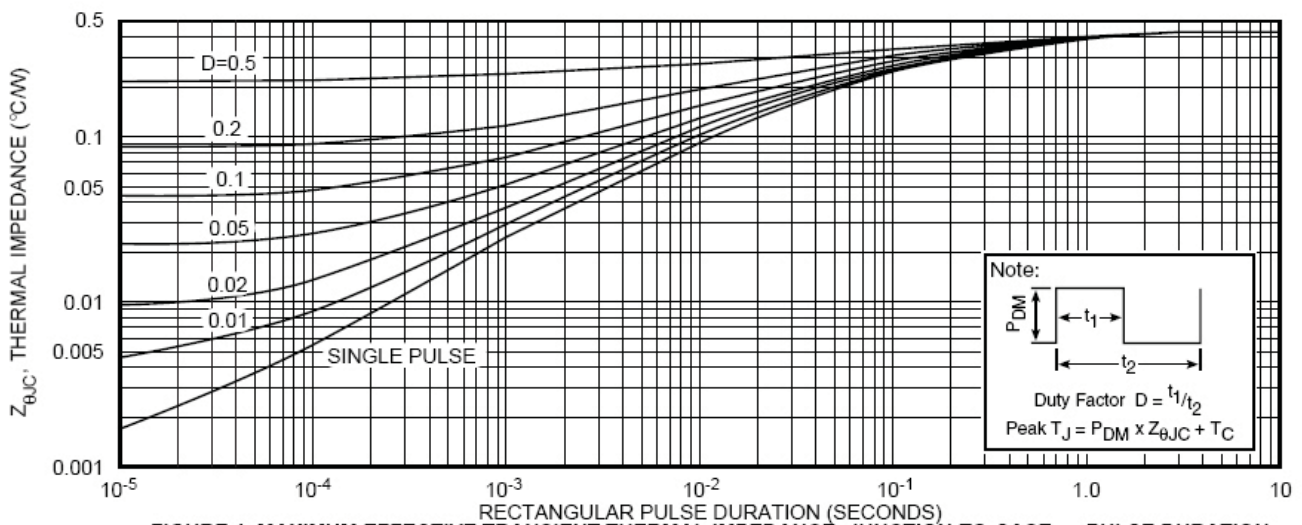
① Repetitive Rating: Pulse width limited by maximum junction temperature.

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)

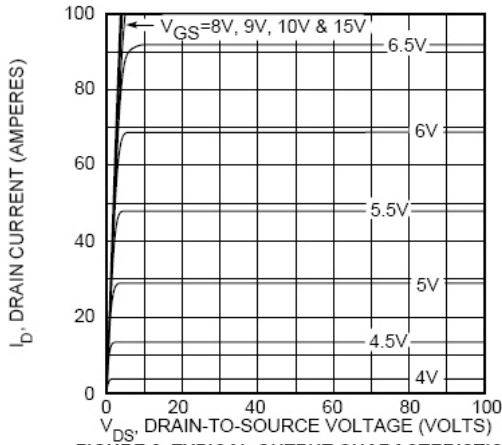


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

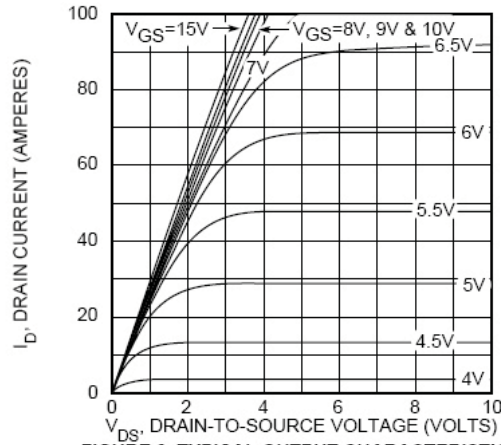


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

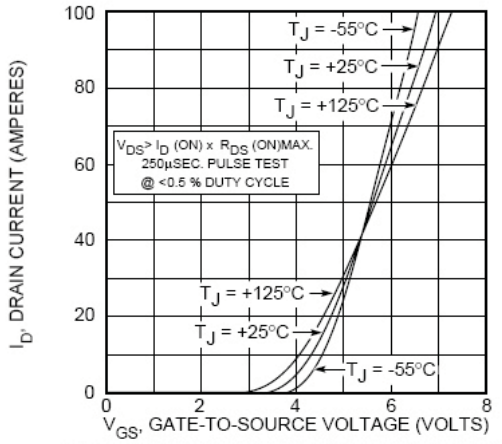


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

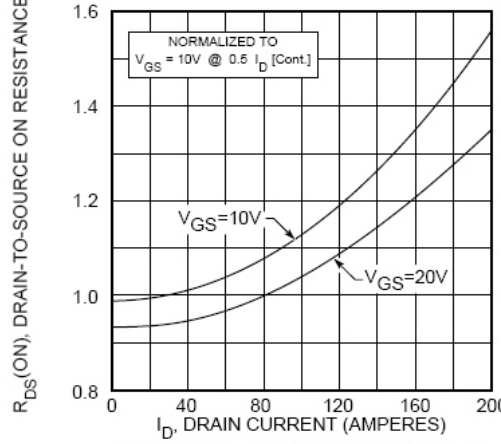


FIGURE 5,  $R_{DS(ON)}$  vs DRAIN CURRENT

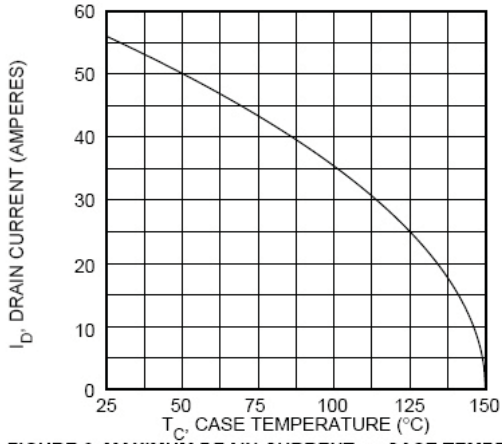


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

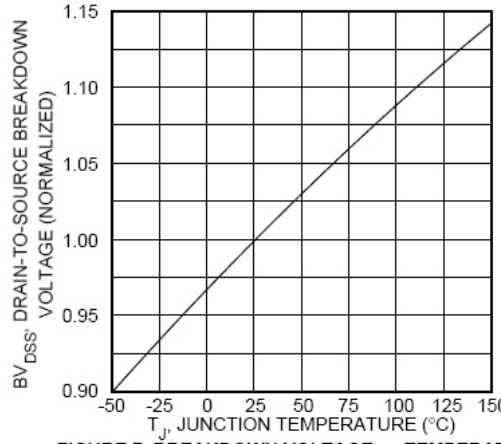


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

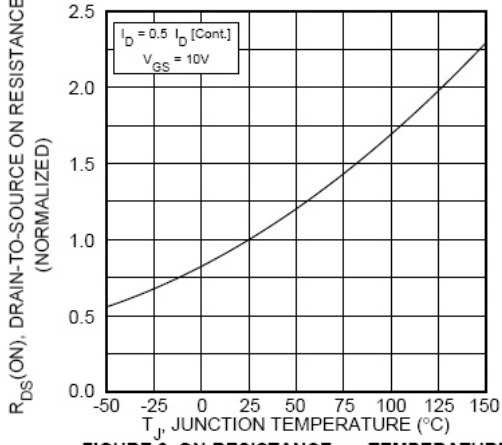


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

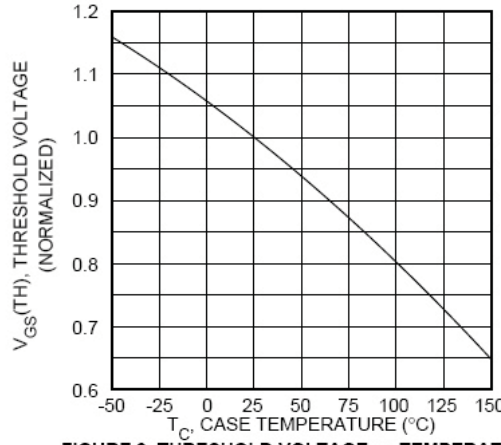


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

# Typical Performance Curves

APT20M45BVR(G)

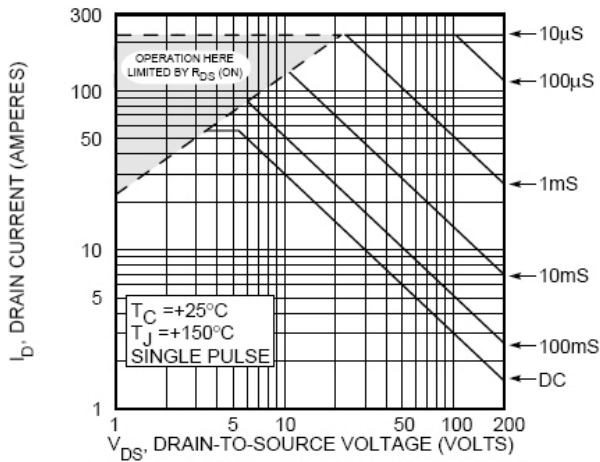


FIGURE 10, MAXIMUM SAFE OPERATING AREA

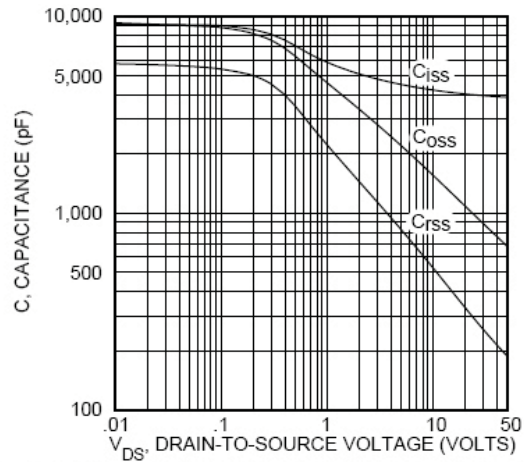


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

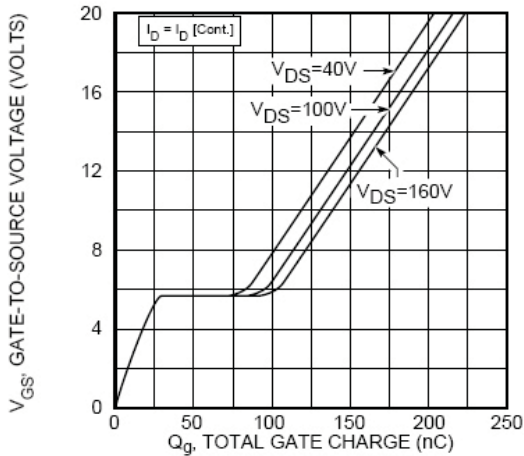


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

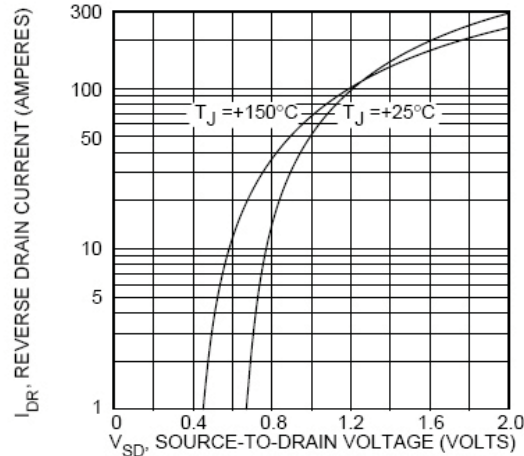
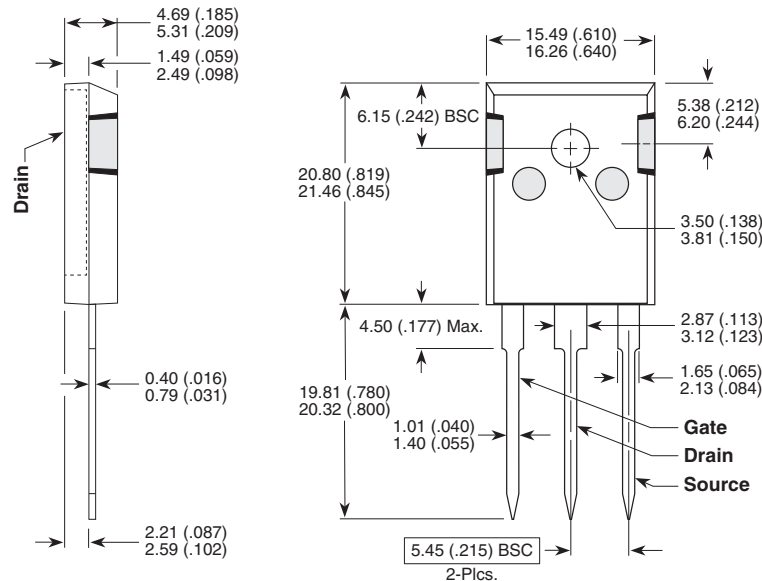


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

## TO-247 (B) Package Outline

e3 100% Sn Plated



Dimensions in Millimeters and (Inches)

Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 6,939,743, 7,352,045 5,283,201 5,801,417 5,648,283 7,196,634 6,664,594 7,157,886 6,939,743 7,342,262 and foreign patents. US and Foreign patents pending. All Rights Reserved.