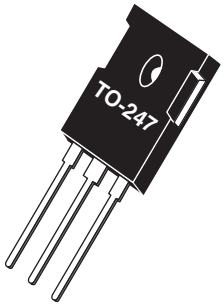
APT20M45BVR(G)

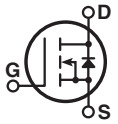
200V, 56A, 0.045Ω

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, increase packing density and reduces the on-resistance. Power MOS V® also achieves faster switching speeds through optimized gate layout.

APT20M45BVR(G)





FEATURES

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

Absolute Maximum Ratings

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

Symbol	Parameter	Ratings	Unit
V_{DSS}	Drain Source Voltage	200	Volts
I_D	Continuous Drain Current @ T_C = 25°C	56	Amps
I_{DM}	Pulsed Drain Current [1]	224	
V_{GS}	Gate-Source Voltage Continuous	±30	Volts
V_{GSM}	Gate-Source Voltage Transient	±40	
P_D	Total Power Dissipation @ T_C = 25°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 [1] (Repetitive and Non-Repatitive)	56	Amps
E_{AR}	Repetitive Avalanche Energy [1]	30	mJ
E_{AS}	Single Pulse Avalanche Energy [4]	1300	

Static Characteristics

T_J = 25°C unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit
BV_{DSS}	Drain-Source Breakdown Voltage (V_{GS} = 0V, I_D = 250µA)	200			Volts
$I_{D(on)}$	On State Drain Current [2] (V_{DS} > $I_{D(on)}$ x $R_{DS(on)}$ Max, V_{GS} = 10V)	56			Amps
$R_{DS(on)}$	Drain-Source On-State Resistance [2] (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	µA
	Zero Gate Voltage Collector Current (V_{GS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125°C)			250	
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 = 1.0mA)	2		4	Volts

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

Dynamic Characteristics

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 [1]	V_{GS} = 10V		130	195	
Q_{ge}	Gate-Source Charge	V_{DD}= 0.5V_{DSS}		30	45	nC
Q_{gd}	Gate- Drain ("Miller") Charge	I_D = $I_{D[cont.]}$@ 25°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°C		43	70	
t_f	Fall Time	R_G = 1.6Ω		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 [1] (Body Diode)			224	
V_{SD}	Diode Forward Voltage [2] (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/μs)		280		nS
$Q_{rr)}$	Reverse Recovery Time (I_S = -$I_{D[Cont.]}$, dI_S/dt = 100A/μs)		3.5		μC

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 μS, Duty Cycle < 2%

③ See MIL-STD-750 Method 3471

④ Starting T_j = +25°C, L = 830μH, R_G = 25Ω, Peak I_L = 56A

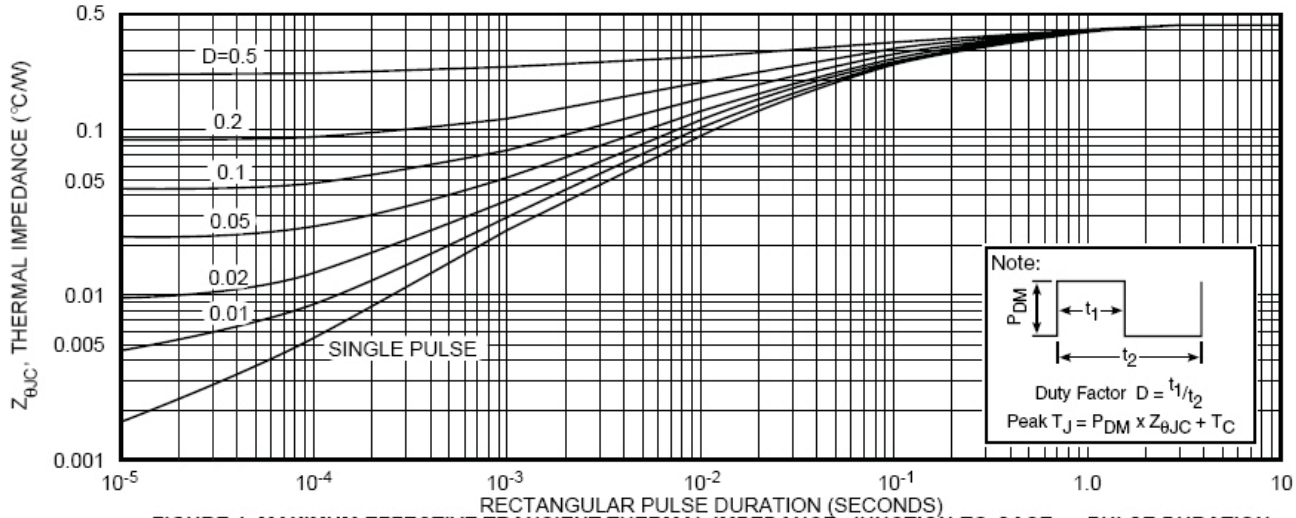


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

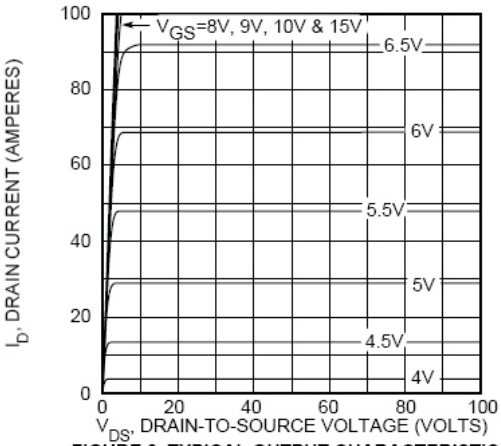


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

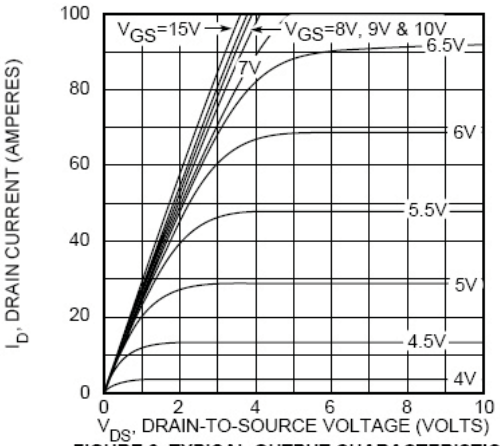


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

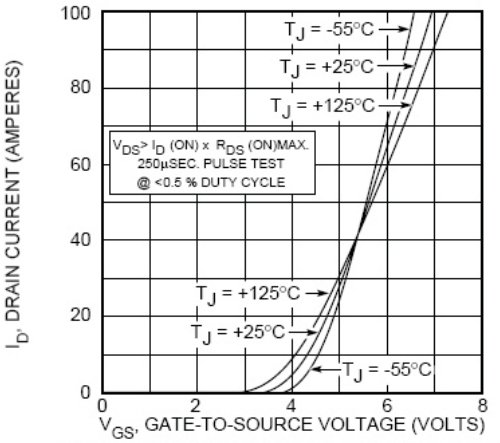


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

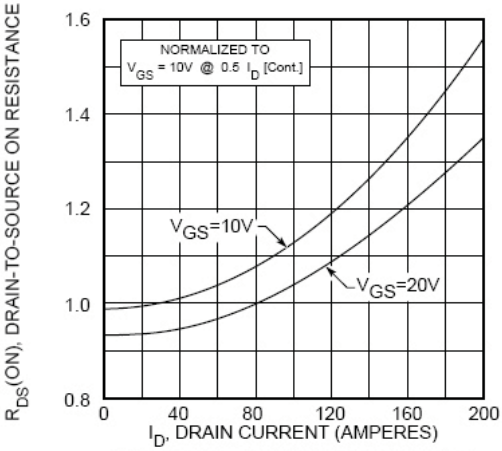


FIGURE 5, R_{DS}(ON) vs DRAIN CURRENT

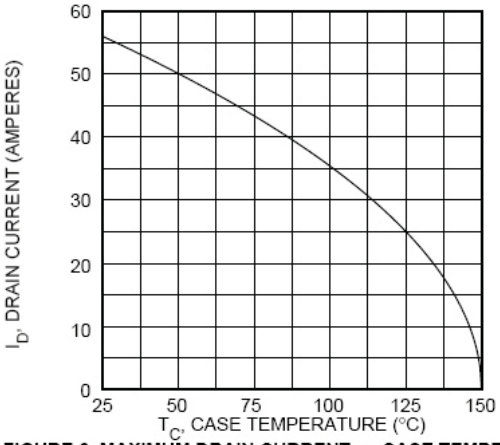


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

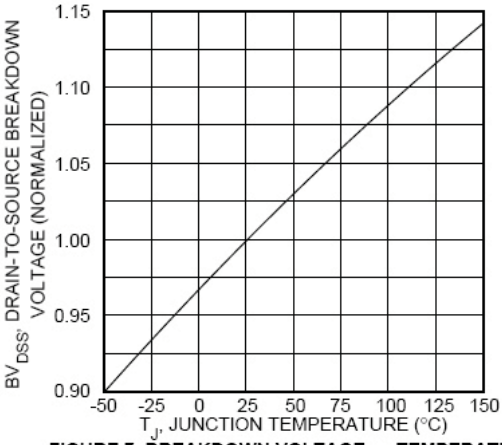


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

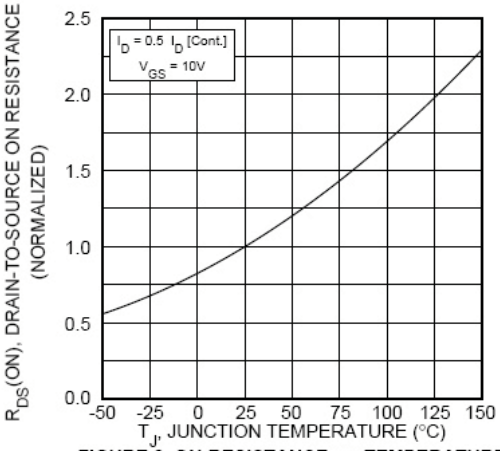


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

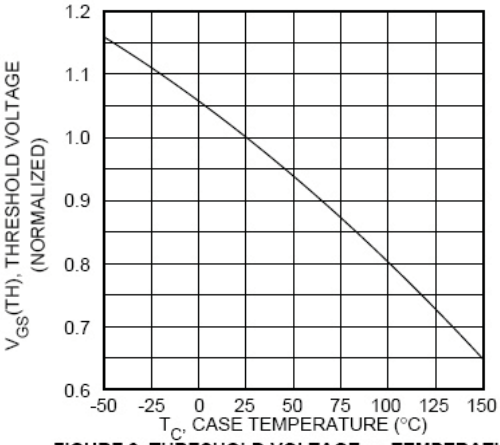


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

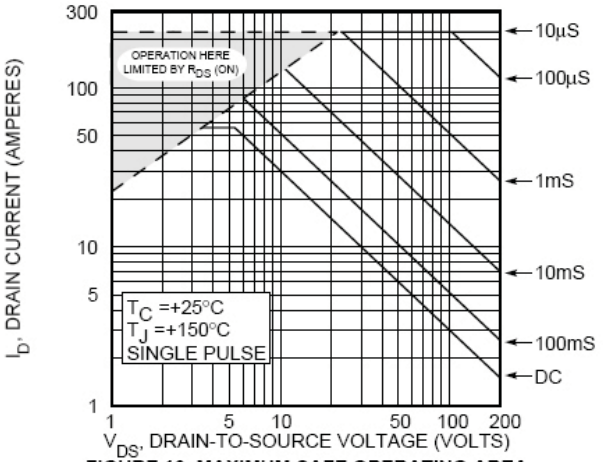


FIGURE 10, MAXIMUM SAFE OPERATING AREA

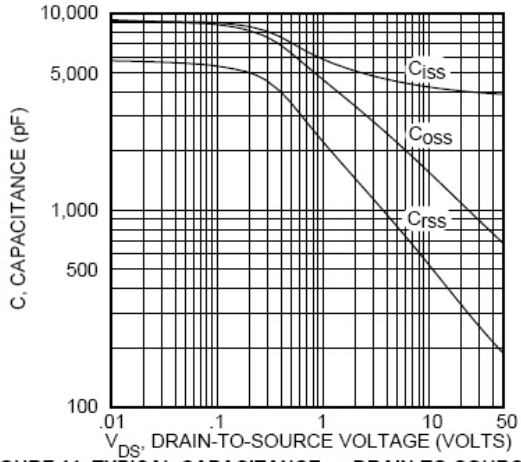


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

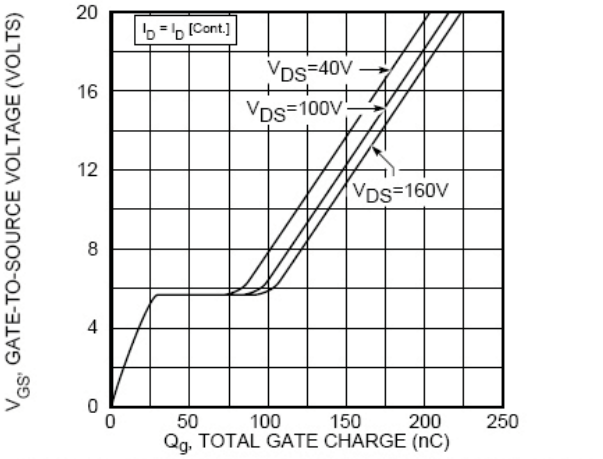


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

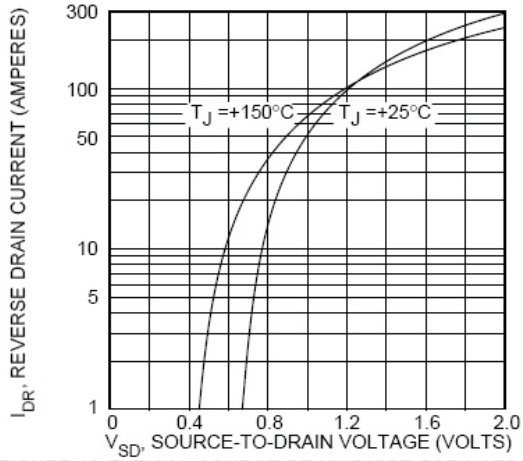
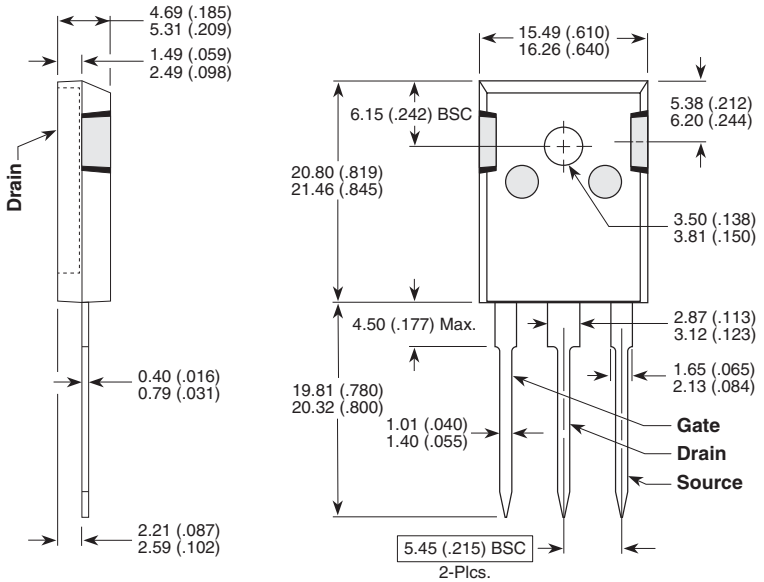


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-247 (B) Package Outline

e3 100% Sn Plated



Dimensions in Millimeters and (Inches)