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TECHNICAL DATA SHEET

N-CHANNEL MOSFET

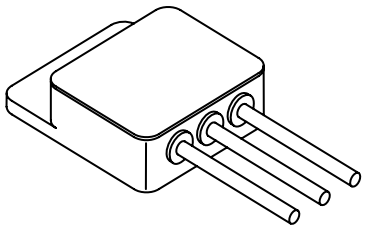
DEVICES

LEVELS

APT5012WVR
POWER MOS V®
500V 40A 0.120Ω

ABSOLUTE MAXIMUM RATINGS ***(T_C = +25°C unless otherwise noted)***

Parameters / Test Conditions	Symbol	Value	Unit
Drain – Source Voltage	V_{DS}	500	Vdc
Gate – Source Voltage	V_{GS}	± 30	Vdc
Gate – Source Transient	V_{GSM}	± 40	Vdc
Continuous Drain Current T_C = +25°C	I_D	40	Adc
Pulsed Drain Current T_C = +25°C	I_{DM}	160	Adc
Total Power Dissipation T_C = +25°C Linear Derating Factor	P_D	450 (1) 3.6	W W/°C
Drain to Source On State Resistance	$R_{ds(on)}$	0.120 (2)	Ω
Operating & Storage Junction Temperature Range	T_{op}, T_{stg}	-55 to +150	°C
Lead temperature: 0.063" from Case for 10 Se.	T_L	300	°C
Avalanche Current (3) (Repetitive/ Non-repetitive)	I_{AR}	40 (1)	Adc
	E_{AR}	50 (1)	mJ
	E_{AS}	2500 (4)	mJ



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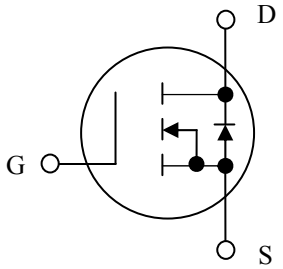

Note: (1) Repetitive Rating: Pulse width limited by maximum junction temperature.
(2) Pulse Test: Pulse width < 380μS, Duty Cycle < 2%.
(3) MIL-STD-750 Method 3471.
(4) Starting T_j = +25°C, L = 3.13mH, R_G = 25Ω, Peak I_L = 40A.

ELECTRICAL CHARACTERISTICS ***(T_A = +25°C, unless otherwise noted)***

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Drain-Source Breakdown Voltage V_{GS} = 0V, I_D = 250μAdc	$V_{(BR)DSS}$	500		Vdc
Gate-Source Voltage (Threshold) V_{DS} = V_{GS} = ±30, I_D = 2.5mA	$V_{GS(th)}$	2.0	4.0	Vdc
Gate Current V_{GS} = ±30V, V_{DS} = 0V	I_{GSS}		±100	nAdc
Drain Current V_{GS} = 0V, V_{DS} = 500V V_{GS} = 0V, V_{DS} = 400V, T_C = +125°C	I_{DSS1} I_{DSS2}		25 0.25	μAdc
Diode Forward Voltage V_{GS} = 0V, I_D = 31.5A pulsed	V_{SD}		1.3	Vdc

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DYNAMIC CHARACTERISTICS

Parameters / Test Conditions		Symbol	TYP	Max.	Unit
Capacitance:					
Input capacitance	V_{GS} = 0V	Ciss	7400	8900	pF
Output Capacitance	V_{DS} = 25V	Coss	1000	1400	
Reverse Transfer Capacitance	f =1 MHz	Crss	380	570	
Gate Charge:					
On-State Gate Charge (3)	V_{GS} = 10V	$Q_{g(on)}$	312	470	nC
Gate to Source Charge	V_{DS} = 250V	Q_{gs}	50	75	
Gate to Drain ("Miller") Charge	I_D = 40A	Q_{gd}	127	190	

SWITCHING CHARACTERISTICS

Parameters / Test Conditions		Symbol	TYP	Max.	Unit
Switching time tests:					
Turn-on delay time	I_D = 40A	$t_{d(on)}$	14	30	ns
Rinse time	V_{GS} = 15Vdc	t_r	165	80	
Turn-off delay time	V_{DD} = 250Vdc	$t_{d(off)}$	54	80	
Fall time	R_G = 0.6Ω	t_f	5	10	
Continuous Source Current (Body Diode)		I_S		40	A
Pulsed Source Current (1) (Body Diode)		I_{SM}		160	A
Diode Forward Voltage (2) V_{GS} = 0V, I_S = -40A		V_{SD}		1.3	V
Reverse Recovery Time	di/dt ≤ 100A/µs I_S = -40A	t_{rr}	620		ns
Reverse Recovery Charge	di/dt ≤ 100A/µs I_S = -40A	Q_{rr}	14.7		uC

THERMAL CHARACTERISTICS

Parameters / Test Conditions	Symbol	TYP	Max.	Unit
Junction to Case	$R_{\theta JC}$		0.28	°C/W
Junction to Ambient	$R_{\theta JA}$		40	°C/W

(1) Repetitive Rating: Pulse width limited by maximum junction temperature.
(2) Pulse Test: Pulse width < 380µS, Duty Cycle < 2%
(3) See MIL-STD-750 method 3471
(4) Starting T_j = +25°C, L = 3.13mH, R_G = 25Ω, Peak I_L = 40A

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GRAPHS

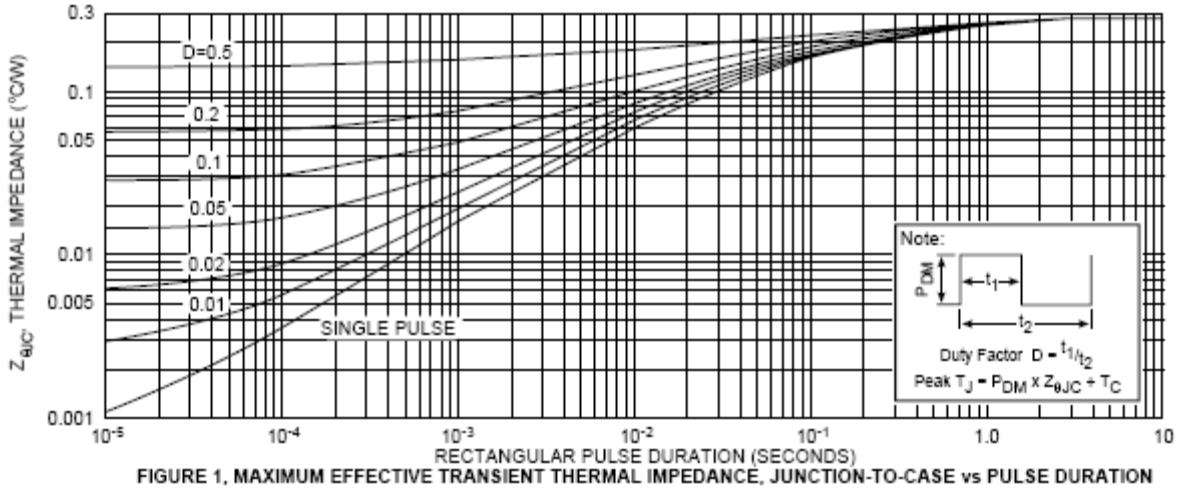

FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

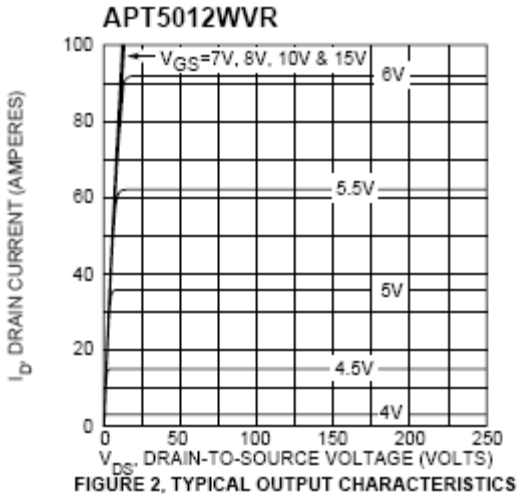

FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

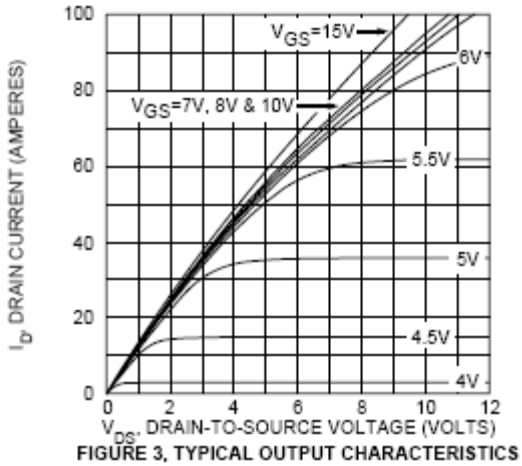

FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

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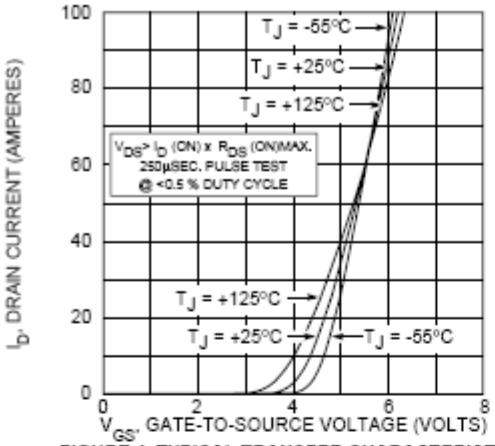

FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

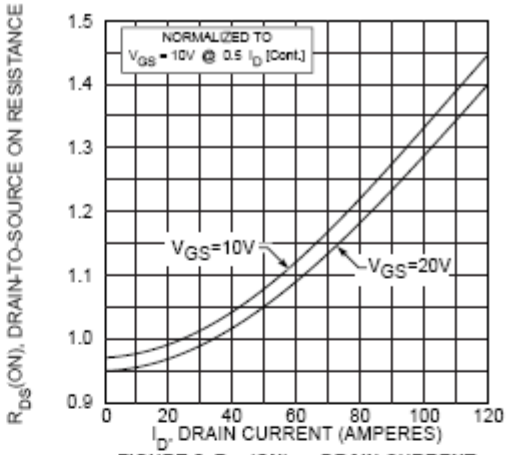

FIGURE 5, R_{DS}(ON) vs DRAIN CURRENT

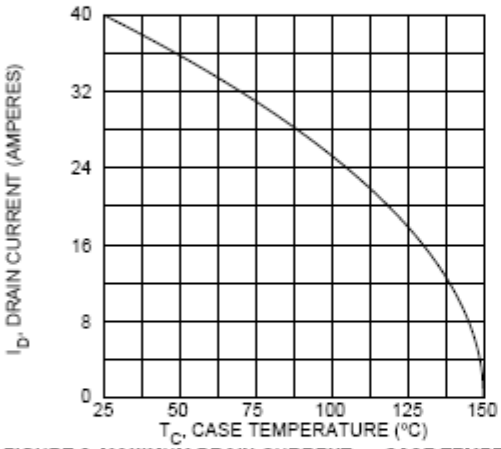

FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

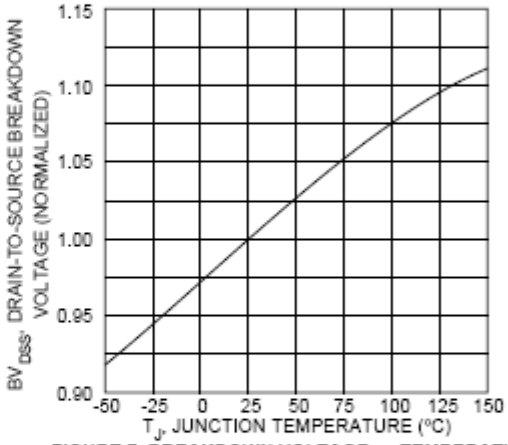

FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

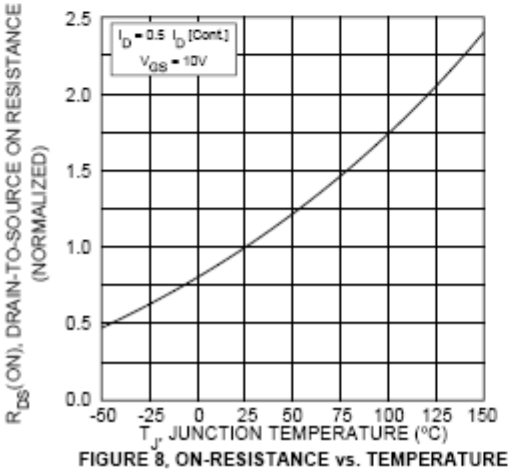

FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

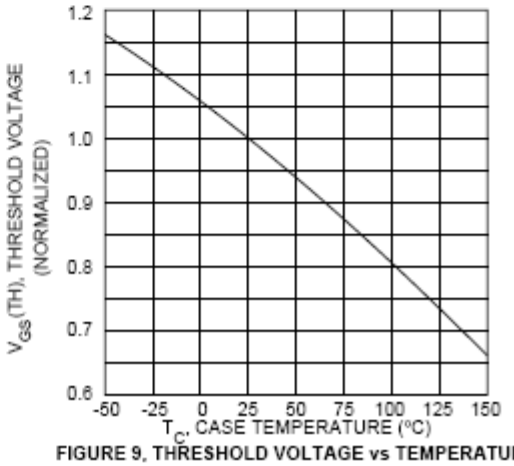

FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

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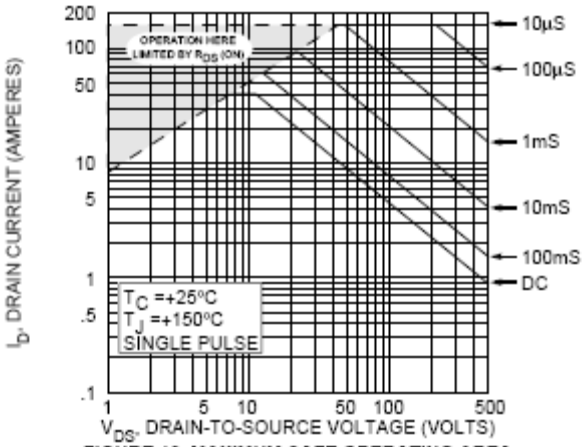

FIGURE 10, MAXIMUM SAFE OPERATING AREA

APT5012WVR

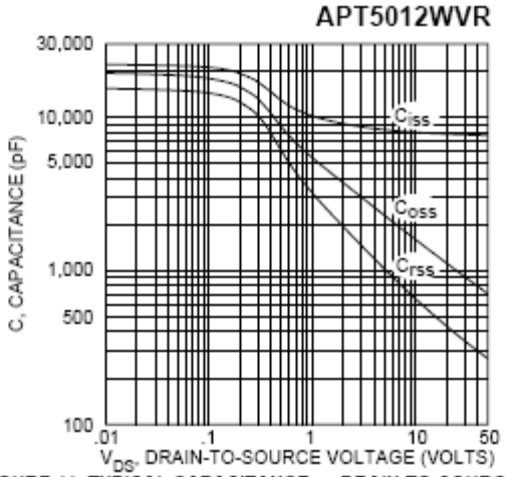

FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

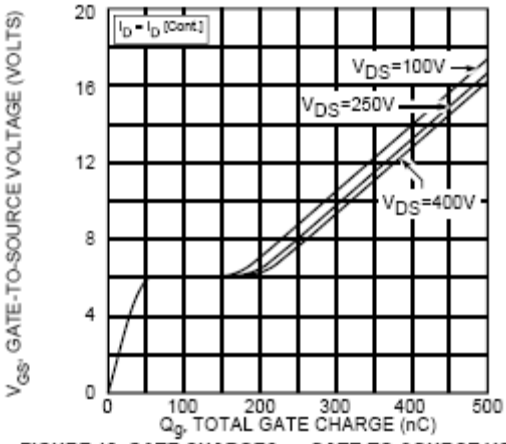

FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

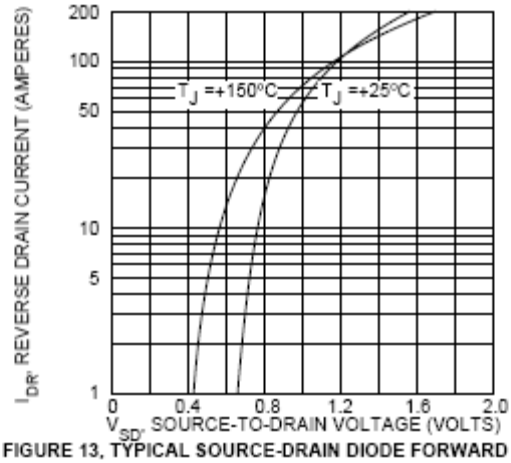

FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

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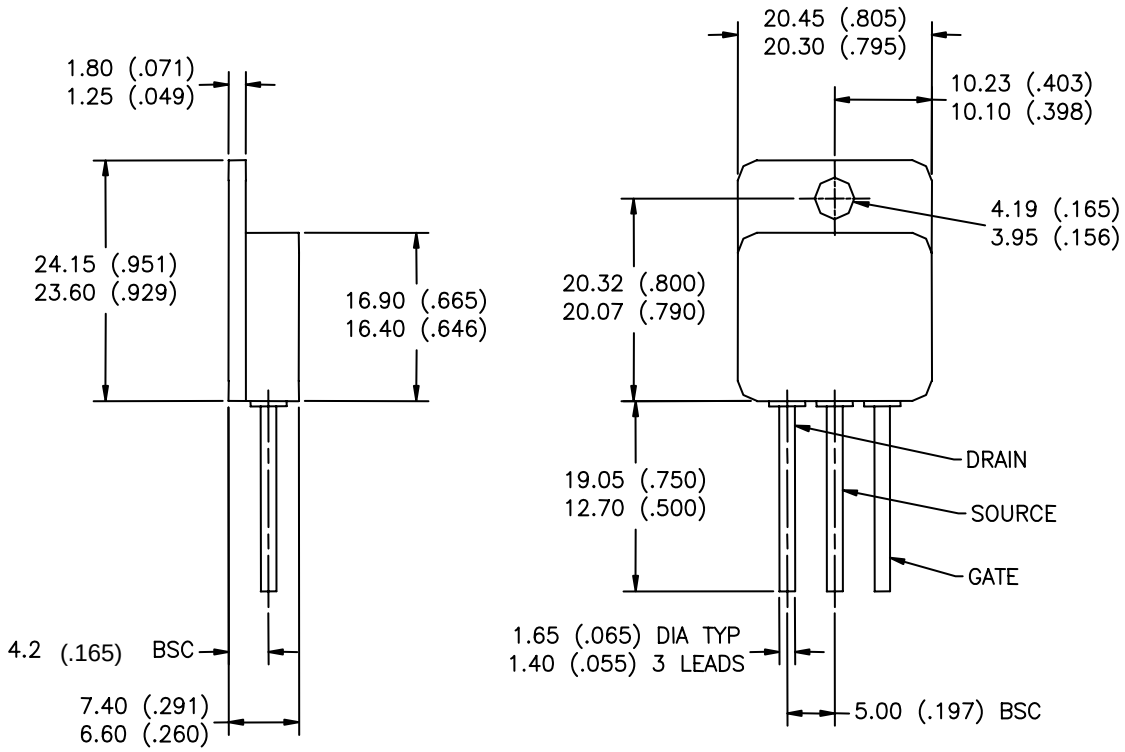
PACKAGE DIMENSIONS



DIMENSIONS IN MILLIMETERS AND (INCHES)