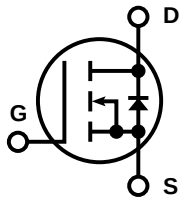
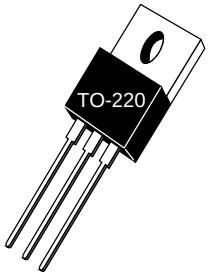




ADVANCED POWER TECHNOLOGY®

APT1004RKNG 1000V 3.6A 4.00Ω

POWER MOS IV®

N-CHANNEL ENHANCEMENT MODE HIGH VOLTAGE POWER MOSFETS

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

Symbol	Parameter	APT1004R2KNG		UNIT
V_{DSS}	Drain-Source Voltage	1000		Volts
I_D	Continuous Drain Current	3.5		Amps
I_{DM}	Pulsed Drain Current ①	14.0		Amps
V_{GS}	Gate-Source Voltage	±30		Volts
P_D	Total Power Dissipation @ T_C = 25°C, Derate Above 25°C	125		Watts
T_J,T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150		°C

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions / Part Number		MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage (V_{GS} = 0V, I_D = 250μA)	APT1004RKNG	1000			Volts
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = V_{DSS}, V_{GS} = 0V)				250	μA
	(V_{DS} = 0.8 V_{DSS}, V_{GS} = 0V, T_C = 125°C)				1000	
I_{GSS}	Gate-Source Leakage Current (V_{GS} = ±30V, V_{DS} = 0V)				±100	nA
I_D(ON)	On State Drain Current ②	APT1004RKNG	3.6			Amps
	(V_{DS} > I_D(ON) x R_{DS}(ON) Max, V_{GS} = 10V)					
V_{GS}(TH)	Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 1.0mA)		2		4	Volts
R_{DS}(ON)	Static Drain-Source On-State Resistance ②	APT1004RKNG			4.00	Ohms
	(V_{GS} = 10V, I_D = 0.5 I_D [Cont.])					

THERMAL CHARACTERISTICS

Symbol	Characteristic	MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction to Case			1.00	°C/W
$R_{\theta JA}$	Junction to Ambient			80	°C/W
T_L	Max. Lead Temp. for Soldering Conditions: 0.063" from Case for 10 Sec.			300	°C

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

USA
405 S.W. Columbia Street **Bend, Oregon 97702-1035** **Phone: (541) 382-8028** **FAX: (541) 388-0364**

050-0036 Rev D 03-2021

DYNAMIC CHARACTERISTICS

APT1004RKNG

Symbol	Characteristic	Test Conditions	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1 MHz		805	950	pF
C_{oss}	Output Capacitance			115	160	pF
C_{rss}	Reverse Transfer Capacitance			37	60	pF
Q_g	Total Gate Charge ③	V_{GS} = 10V, I_D = I_D [Cont.] V_{DD} = 0.5 V_{DSS}		35	55	nC
Q_{gs}	Gate-Source Charge			4.3	6.5	nC
Q_{gd}	Gate-Drain ("Miller") Charge			18	27	nC
t_d(on)	Turn-on Delay Time	V_{DD} = 0.5 V_{DSS} I_D = I_D [Cont.], V_{GS} = 15V R_G = 1.8Ω		10	20	ns
t_r	Rise Time			9	18	ns
t_d(off)	Turn-off Delay Time			32	48	ns
t_f	Fall Time			23	46	ns

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Characteristic / Test Conditions / Part Number		MIN	TYP	MAX	UNIT
I_S	Continuous Source Current (Body Diode)	**APT1004RKNG**			3.6	Amps
I_{SM}	Pulsed Source Current ① (Body Diode)	**APT1004RKNG**			14.4	Amps
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)		150	290	580	ns
Q_{rr}	Reverse Recovery Charge		0.8	1.65	3.3	µC

SAFE OPERATING AREA CHARACTERISTICS

Symbol	Characteristic	Test Conditions / Part Number	MIN	TYP	MAX	UNIT
SOA1	Safe Operating Area	V_{DS} = 0.4 V_{DSS}, I_{DS} = P_D / 0.4 V_{DSS}, t = 1 Sec.	125			Watts
SOA2	Safe Operating Area	I_{DS} = I_D [Cont.], V_{DS} = P_D / I_D [Cont.], t = 1 Sec.	125			Watts
I_{LM}	Inductive Current Clamped	**APT1004RKNG**	14.4			Amps

①Repetitive Rating: Pulse width limited by maximum junction temperature. See Transient Thermal Impedance Curve. (Fig.1)

②Pulse Test: Pulse width < 380 µS, Duty Cycle < 2%

③See MIL-STD-750 Method 3471

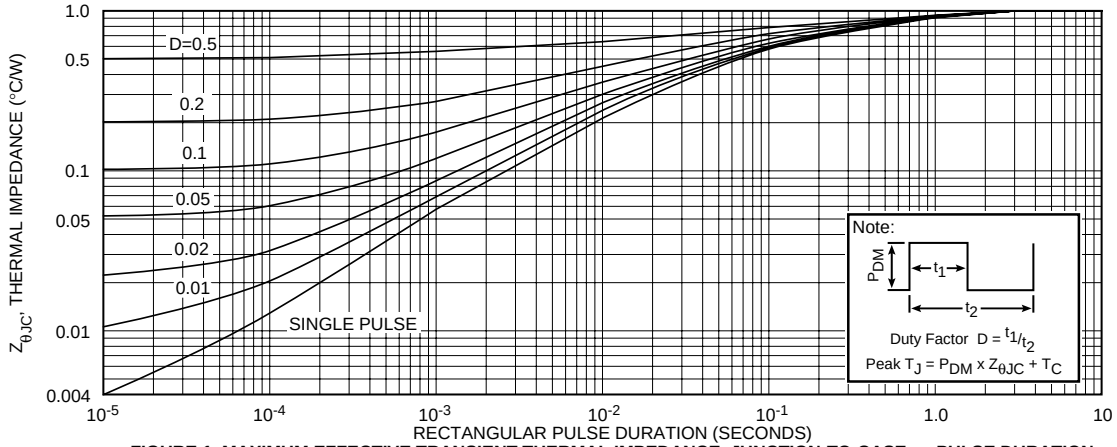


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

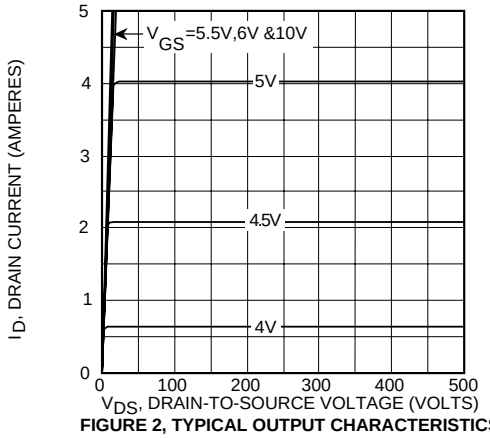


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

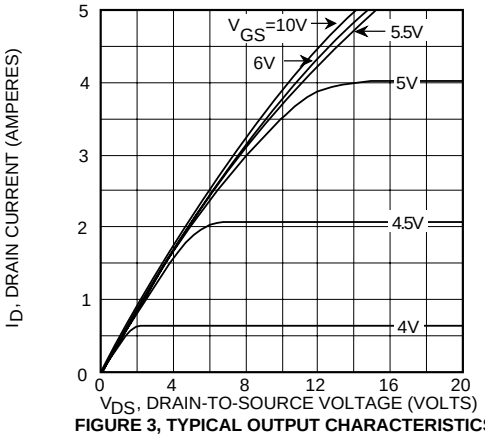


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

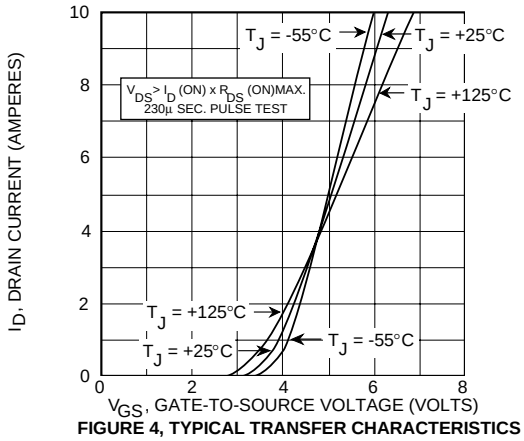


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

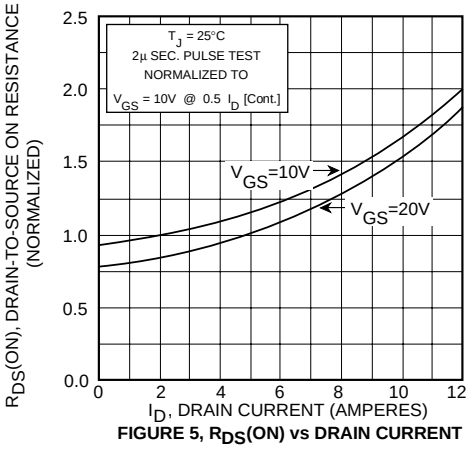


FIGURE 5, R_{DS}(ON) vs DRAIN CURRENT

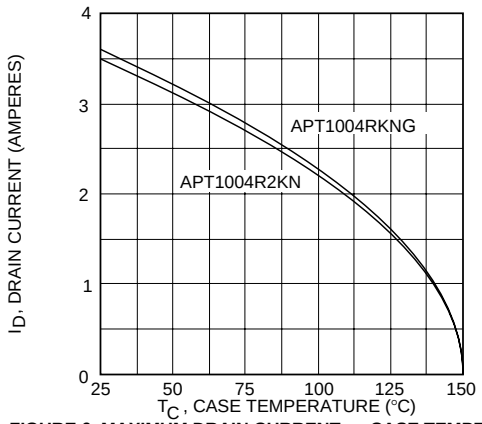


FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

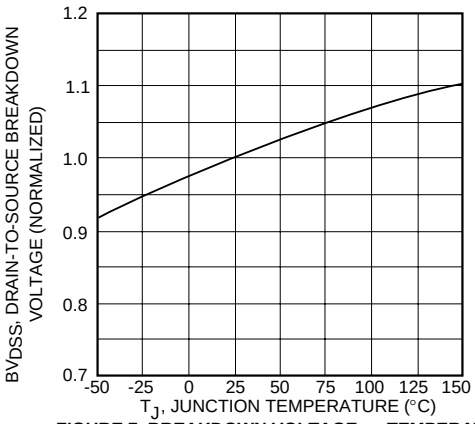


FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

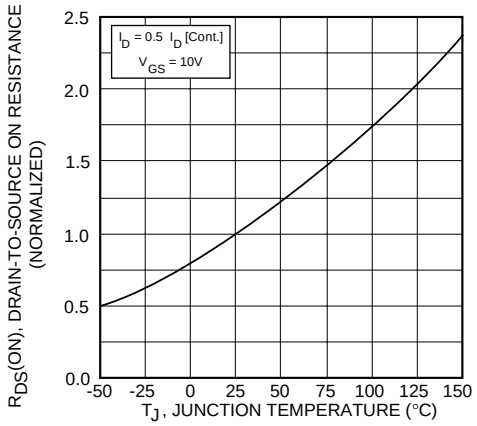


FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

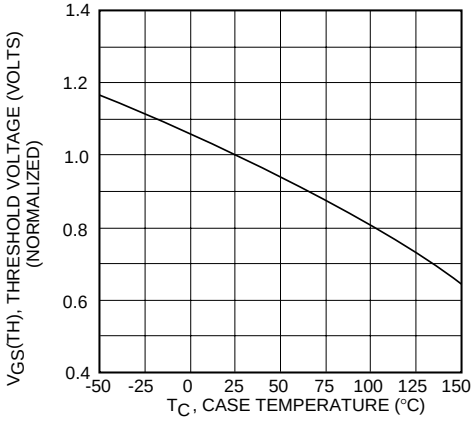


FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

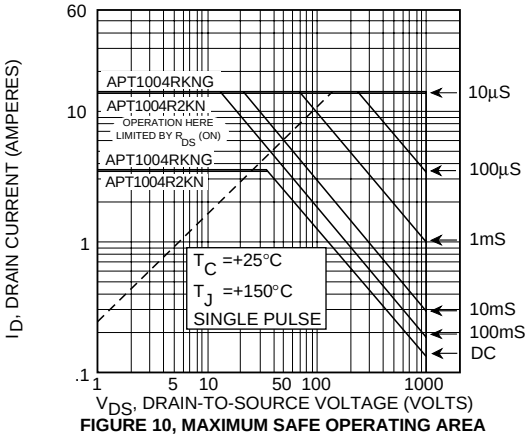


FIGURE 10, MAXIMUM SAFE OPERATING AREA

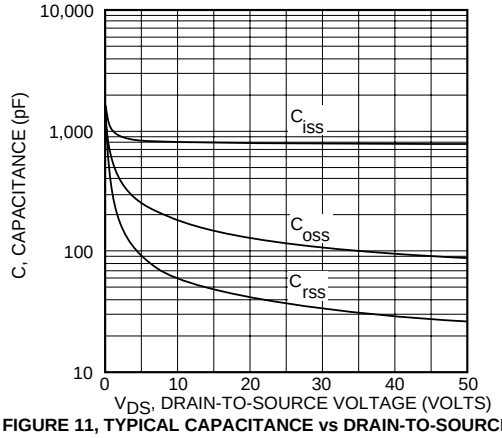


FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

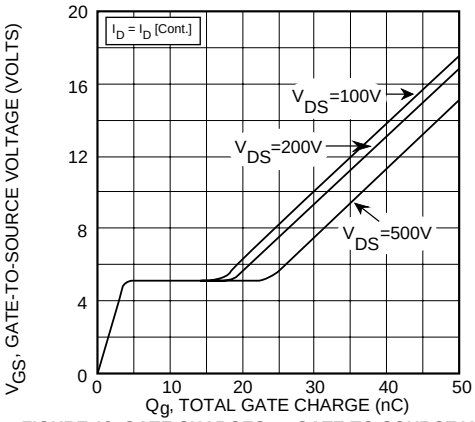


FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

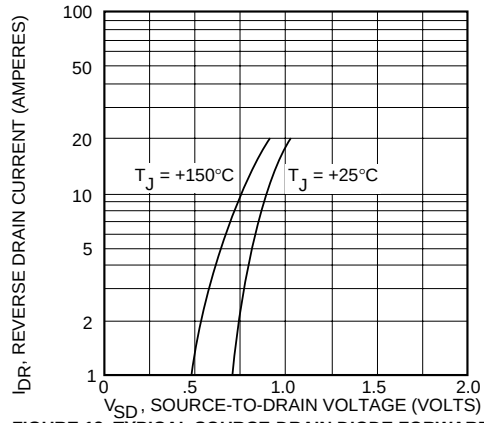
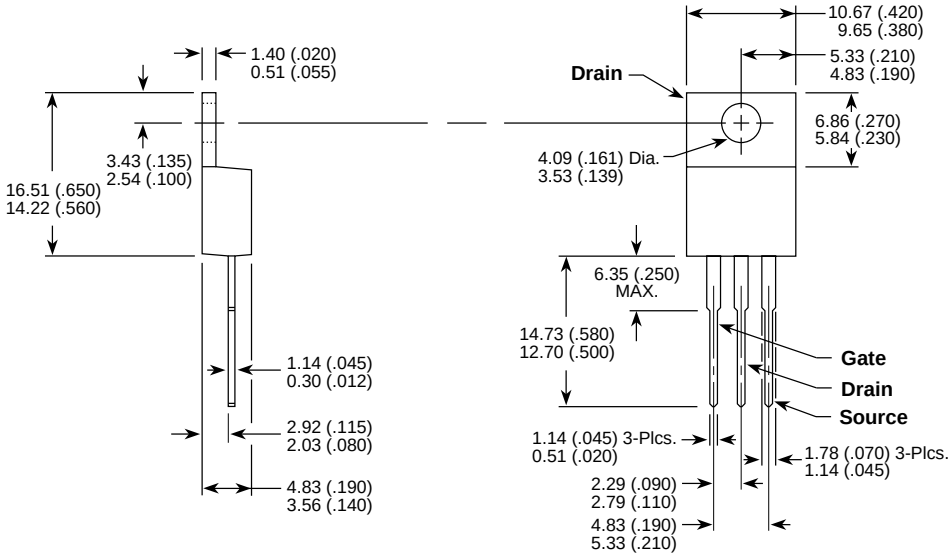


FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

TO-220AB Package Outline



Dimensions in Millimeters and (Inches)