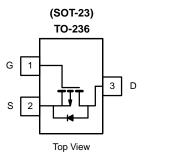
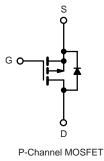


APM2309AC-TRL-VB Datasheet

P-Channel 30 V (D-S) MOSFET

PRODUC	CT SUMMARY		
V _{DS} (V)	R _{DS(on)} (Ω) Typ.	I _D (A) ^a	Q _g (Typ.)
	0.046 at V _{GS} = - 10 V	- 5.6	
- 30	0.049 at V _{GS} = - 6 V	- 5	11.4 nC
	0.054 at V _{GS} = - 4.5 V	-4.5	





FEATURES

- Trench Power MOSFET
- 100 % R_g Tested



- For Mobile Computing
 - Load Switch
 - Notebook Adaptor Switch
 - DC/DC Converter

ABSOLUTE MAXIMUM RATIN	IGS (T _A = 25 °C	, unless otherwise	noted)	
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V _{DS}	- 30	V
Gate-Source Voltage		V _{GS}	± 20	v
Continuous Drain Current (T ₁ = 150 °C)	T _C = 25 °C		- 5.6	
	T _C = 70 °C		- 5.1	
Continuous Drain Current $(T_J = 150^{\circ}C)$	T _A = 25 °C		- 5.4 ^{b,c}	
	T _A = 70 °C		- 4.3 ^{b,c}	A
Pulsed Drain Current (t = 100 µs)		I _{DM}	- 18	
Continous Source-Drain Diode Current	T _C = 25 °C		- 2.1	
Continous Source-Drain Diode Current	T _A = 25 °C	I _S	- 1 ^{b,c}	
	T _C = 25 °C		2.5	
Maria David Diasia dia d	T _C = 70 °C		1.6	W
Maximum Power Dissipation	T _A = 25 °C	P _D	1.25 ^{b,c}	
	T _A = 70 °C	1	0.8 ^{b,c}	
Operating Junction and Storage Temperature	e Range	T _J , T _{stq}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS Parameter Symbol Typical Maximum Unit Maximum Junction-to-Ambient^{b,d} $t \le 5 s$ R_{thJA} 75 100 °C/W Maximum Junction-to-Foot (Drain) 40 50 Steady State $\mathsf{R}_{\mathsf{thJF}}$

Notes:

a. Based on $T_C = 25 \text{ °C}$. b. Surface mounted on 1" x 1" FR4 board.

c. t = 5 s.

d. Maximum under steady state conditions is 166 °C/W.



Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static	Symbol	Test conditions	NV1111.	тур.	Wax.	Unit	
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 30			V	
V _{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$		00	- 19		v	
V _{DS} temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I _D = - 250 μA		- 13		mV/°0	
	, ,	V _{DS} = V _{GS} , I _D = - 250 μA	0.5	4	2.0	N	
Gate-Source Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}$, $V_{DS} = 200 \mu \text{A}$ $V_{DS} = 0 \text{ V}, \text{ V}_{GS} = \pm 20 \text{ V}$	- 0.5		- 2.0	V	
Gate-Source Leakage	I _{GSS}	$V_{DS} = 0 V, V_{GS} = \pm 20 V$ $V_{DS} = -30 V, V_{GS} = 0 V$			± 100	nA	
Zero Gate Voltage Drain Current	I _{DSS}	$V_{DS} = -30 \text{ V}, V_{GS} = 0 \text{ V}$ $V_{DS} = -30 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 55 \text{ °C}$			- 1 - 5	μA	
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \le -5 V, V_{GS} = -10 V$	- 2.5			А	
	D(01)	V _{GS} =- 10 V, I _D = - 4.4 A	-	0.046			
Drain-Source On-State Resistance ^a	R _{DS(on)}	$V_{GS} = -6 V, I_D = -4 A$		0.049		Ω	
		$V_{GS} = -4.5 \text{ V}, \text{ I}_{D} = -3.6 \text{ A}$		0.054		- 22	
Forward Transconductance ^a	9 _{fs}	$V_{DS} = -15 \text{ V}, \text{ I}_{D} = -3.4 \text{ A}$		18		S	
Dynamic ^b	915			10		0	
•	C			1205			
Input Capacitance	C _{iss}			1295			
Output Capacitance	C _{oss}	V _{DS} = - 15 V, V _{GS} = 0 V, f = 1 MHz		150		pF	
Reverse Transfer Capacitance	C _{rss}			130			
Total Gate Charge	Qg	Q_{g} $V_{DS} = -15 V, V_{GS} = -10 V, I_{D} = -5.4$		24	36	-	
Gate-Source Charge	Q _{gs}	V _{DS} = - 15 V, V _{GS} = - 4.5 V, I _D = - 5.4 A		11.4 3.4	17	nC	
Gate-Drain Charge	Q _{gd}	$v_{DS} = -13 v, v_{GS} = -4.3 v, I_D = -3.4 A$		3.8			
Gate Resistance	R _g	f = 1 MHz	1.5	7.7	15.4	0	
	· ·		1.5			Ω	
Turn-On Delay Time	t _{d(on)}			13	20		
Rise Time	tr	$V_{DD} = -15 V, R_L = 3.5 \Omega$		4	8		
Turn-Off Delay Time	t _{d(off)}	$\rm I_D \cong$ - 4.3 A, $\rm V_{GEN}$ = - 10 V, $\rm R_g$ = 1 Ω		38	57		
Fall Time	t _f			6	12	ns	
Turn-On Delay Time	t _{d(on)}			28	42		
Rise Time	t _r	$V_{DD} = -15 \text{ V}, \text{ R}_{L} = 3.5 \Omega$		16	24		
Turn-Off Delay Time	t _{d(off)}	$I_{D}\cong$ - 4.3 A, V_{GEN} = - 4.5 V, R_{g} = 1 Ω		30	45		
Fall Time	t _f			10	20		
Drain-Source Body Diode Characteristic	s			1		-	
Continuous Source-Drain Diode Current	۱ _S	T _C = 25 °C			- 2.1	A	
Pulse Diode Forward Current (t = $100 \mu s$)	I _{SM}				- 80		
Body Diode Voltage	V _{SD}	I _S = - 4.3 A, V _{GS} = 0 V		- 0.8	- 1.2	V	
Body Diode Reverse Recovery Time	t _{rr}			15	23	ns	
Body Diode Reverse Recovery Charge	Q _{rr}			7	14	nC	
Reverse Recovery Fall Time	ta	$I_F = -4.3 \text{ A}, \text{ dI/dt} = 100 \text{ A/}\mu\text{s}, \text{T}_J = 25 ^\circ\text{C}$		8			
Reverse Recovery Rise Time	t _b	1 1		7		ns	

Notes:

a. Pulse test; pulse width \leq 300 µs, duty cycle \leq 2 %.

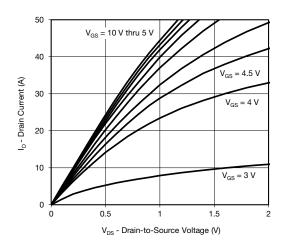
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.





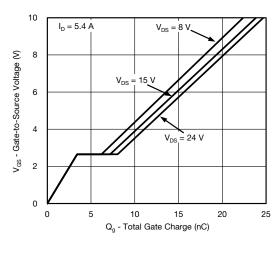




Output Characteristics



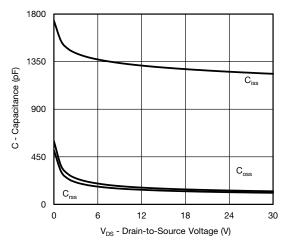
On-Resistance vs. Drain Current



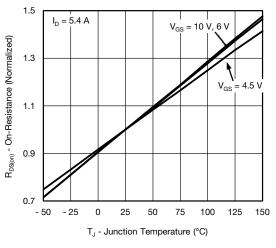
Gate Charge



Transfer Characteristics



Capacitance



On-Resistance vs. Junction Temperature



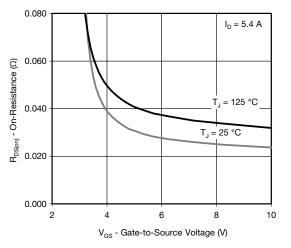
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



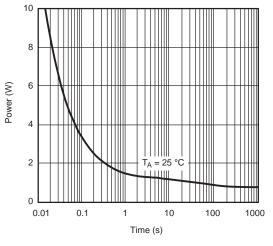
Source-Drain Diode Forward Voltage







On-Resistance vs. Gate-to-Source Voltage



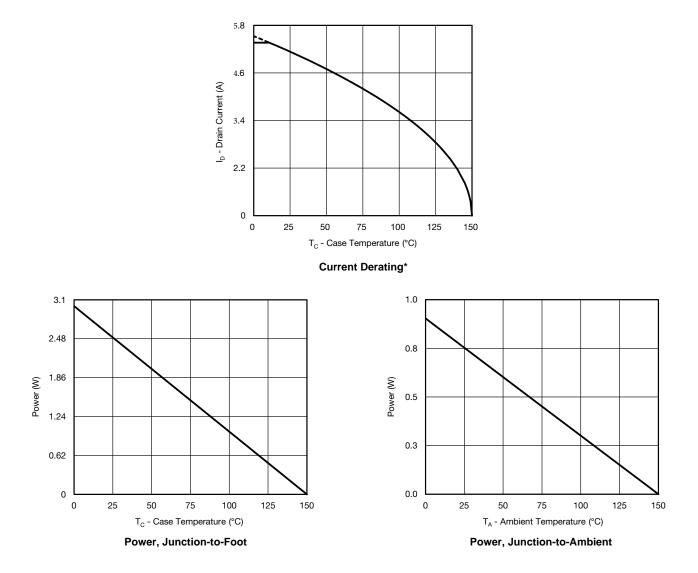
Single Pulse Power (Junction-to-Ambient)



Safe Operating Area, Junction-to-Ambient



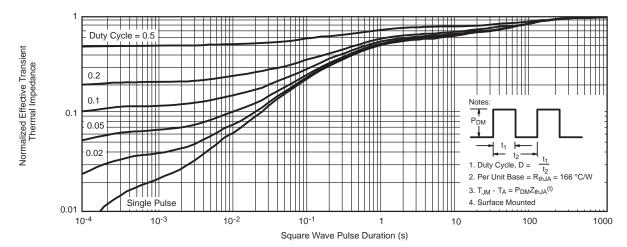
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



* The power dissipation P_D is based on $T_{J(max.)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot



SOT-23 (TO-236): 3-LEAD







Max 1.12 0.10 1.02 0.50 0.18 3.04 2.64 1.40	Min 0.035 0.0004 0.0346 0.014 0.003 0.110 0.083	Max 0.044 0.004 0.040 0.020 0.007 0.120 0.104		
0.10 1.02 0.50 0.18 3.04 2.64	0.0004 0.0346 0.014 0.003 0.110 0.083	0.004 0.040 0.020 0.007 0.120		
1.02 0.50 0.18 3.04 2.64	0.0346 0.014 0.003 0.110 0.083	0.040 0.020 0.007 0.120		
0.50 0.18 3.04 2.64	0.014 0.003 0.110 0.083	0.020 0.007 0.120		
0.18 3.04 2.64	0.003 0.110 0.083	0.007 0.120		
3.04 2.64	0.110 0.083	0.120		
2.64	0.083			
		0.104		
1.40	0.047			
	0.047	0.055		
0.95 BSC	0.037	4 Ref		
1.90 BSC		0.0748 Ref		
0.60	0.016	0.024		
0.64 Ref		0.025 Ref		
0.50 Ref) Ref		
8°	3°	8°		
_	0.64 Ref 0.50 Ref	0.64 Ref 0.025 0.50 Ref 0.026		



RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads Dimensions in Inches/(mm)



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