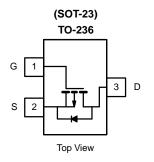
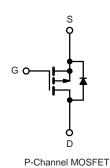


PM509BA-VB Datasheet

P-Channel 30 V (D-S) MOSFET

PRODUCT 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

- TrenchFET® Power MOSFET
- 100 % R_g Tested



APPLICATIONS

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

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage		V _{DS}	- 30	V
Gate-Source Voltage		V_{GS}	± 20	V
	T _C = 25 °C		- 5.6	
Continuous Drain Current (T _J = 150 °C)	T _C = 70 °C	l _D	- 5.1	
	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	- I _S	- 2.1	
	T _A = 25 °C		- 1 ^{b,c}	
Maximum Power Dissipation	T _C = 25 °C		2.5	
	T _C = 70 °C	P _D	1.6	W
	T _A = 25 °C		1.25 ^{b,c}	VV
	T _A = 70 °C		0.8 ^{b,c}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150	°C

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

Notes:

- a. Based on T_C = 25 °C. b. Surface mounted on 1" x 1" FR4 board.
- c. t = 5 s.
- d. Maximum under steady state conditions is 166 °C/W.



SPECIFICATIONS ($T_J = 25 ^{\circ}\text{C}$, Parameter	Symbol	Test Conditions	Min.	Tvn	Max.	Unit
Static	Symbol	rest Conditions	WIII.	Тур.	wax.	Unit
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 30			V
	ΔV _{DS} /T _J	VGS = 0 V, 1D = 200 μA	- 30	- 19		mV/°C
V _{DS} Temperature Coefficient		I _D = - 250 μA		_		
V _{GS(th)} Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	V V I 250A		4		
Gate-Source Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}$, $I_{D} = -250 \mu\text{A}$	- 0.5		- 2.0	V
Gate-Source Leakage	I _{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -30 V, V _{GS} = 0 V V _{DS} = -30 V, V _{GS} = 0 V, T _J = 55 °C			- 1 - 5	μA
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \le 0.000$ $V_{GS} = -10 \text{ V}$	- 2.5			Α
on state Brain Surrent	·D(on)	$V_{GS} = -10 \text{ V}, I_{D} = -4.4 \text{ A}$	2.0	0.046		
Drain-Source On-State Resistance ^a	P	V _{GS} = -6 V, I _D = -4 A	1 1			-
Dialit-Source Off-State Resistance	R _{DS(on)}	V _{GS} = - 4.5 V, I _D = - 3.6 A		0.049		Ω
Forward Transconductance ^a	~	V _{GS} = -4.5 V, I _D = -3.4 A		0.054		
	9 _{fs}	V _{DS} = - 15 V, I _D = - 3.4 A		18	<u> </u>	S
Dynamic ^b				1	Į.	
Input Capacitance	C _{iss}			1295		pF
Output Capacitance	C _{oss}	$V_{DS} = -15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		150		
Reverse Transfer Capacitance	C_{rss}			130		
Total Gate Charge	Q _g	$V_{DS} = -15 \text{ V}, V_{GS} = -10 \text{ V}, I_{D} = -5.4 \text{ A}$		24	36	nC
<u>-</u>				11.4	17	
Gate-Source Charge		$V_{DS} = -15 \text{ V}, V_{GS} = -4.5 \text{ V}, I_{D} = -5.4 \text{ A}$		3.4		
Gate-Drain Charge	Q_{gd}			3.8		
Gate Resistance	R_g	f = 1 MHz	1.5	7.7	15.4	Ω
Turn-On Delay Time	$t_{d(on)}$			13	20	
Rise Time	t _r	V_{DD} = - 15 V, R_L = 3.5 Ω		4	8	
Turn-Off Delay Time	t _{d(off)}	$I_D \cong -4.3 \text{ A}, V_{GEN} = -10 \text{ V}, R_g = 1 \Omega$		38	57	
Fall Time	t _f			6	12	
Turn-On Delay Time	t _{d(on)}			28	42	ns
Rise Time	t _r	$V_{DD} = -15 \text{ V}, R_{L} = 3.5 \Omega$		16	24	1
Turn-Off Delay Time	t _{d(off)}	$I_D \cong -4.3 \text{ A}, V_{GEN} = -4.5 \text{ V}, R_g = 1 \Omega$		30	45	
Fall Time	t _f	1		10	20	
Drain-Source Body Diode Characteristic	s					
Continuous Source-Drain Diode Current	Is	T _C = 25 °C			- 2.1	
Pulse Diode Forward Current (t = 100 μs)	I _{SM}				- 80	A
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	t _a	$I_F = -4.3 \text{ A, dI/dt} = 100 \text{ A/}\mu\text{s, T}_J = 25 ^{\circ}\text{C}$		8		ns
Reverse Recovery Rise Time	t _b	1		7		

Notes:

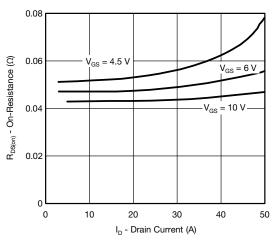
- a. Pulse test; pulse width $\leq 300~\mu s,$ duty cycle $\leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.

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.

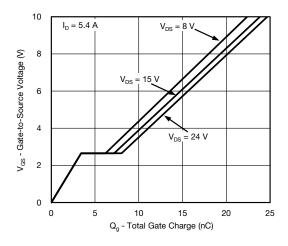




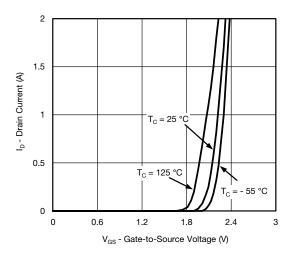
Output Characteristics



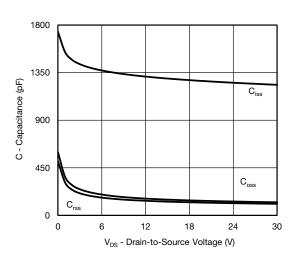
On-Resistance vs. Drain Current



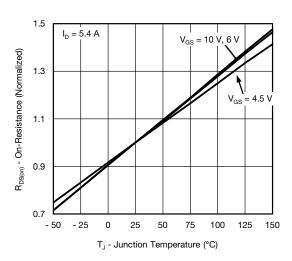
Gate Charge



Transfer Characteristics

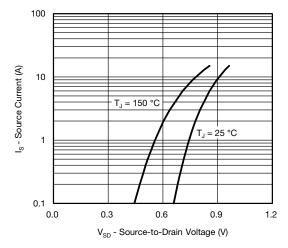


Capacitance

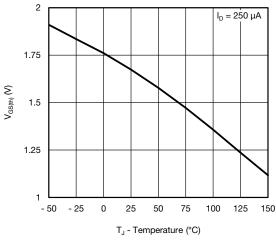


On-Resistance vs. Junction Temperature

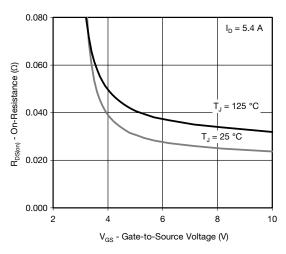




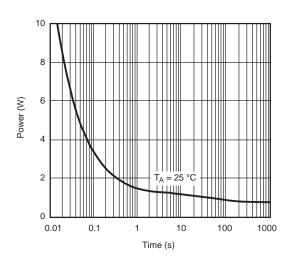
Source-Drain Diode Forward Voltage



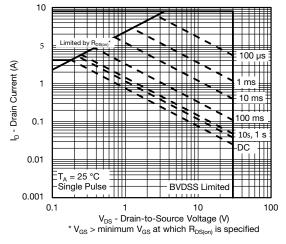
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage

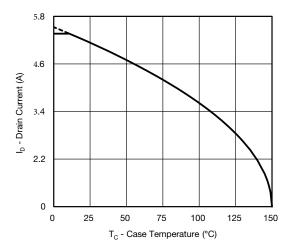


Single Pulse Power (Junction-to-Ambient)

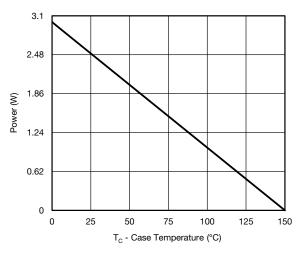


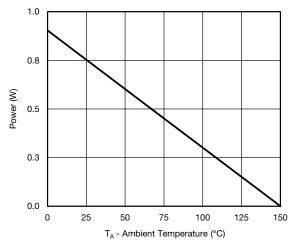
Safe Operating Area, Junction-to-Ambient





Current Derating*



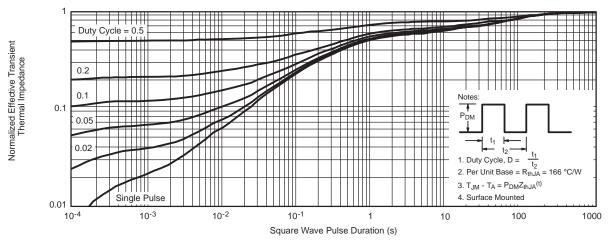


Power, Junction-to-Foot

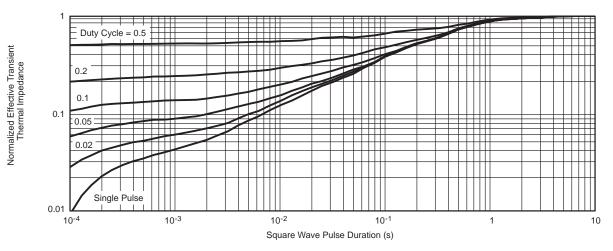
Power, Junction-to-Ambient

^{*} 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.





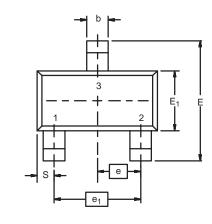
Normalized Thermal Transient Impedance, Junction-to-Ambient

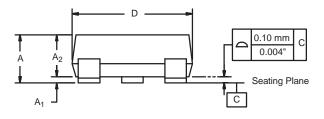


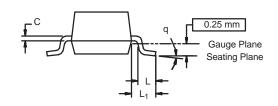
Normalized Thermal Transient Impedance, Junction-to-Foot



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





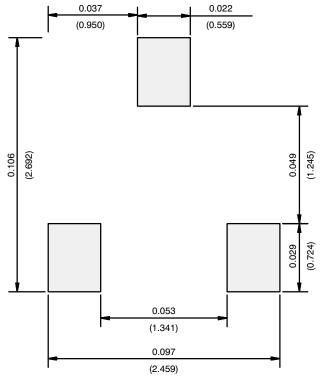


Min 0.89 0.01	Max 1.12	Min 0.035	Max	
0.01		0.035	0.044	
			0.044	
	0.10	0.0004	0.004	
0.88	1.02	0.0346	0.040	
0.35	0.50	0.014	0.020	
0.085	0.18	0.003	0.007	
2.80	3.04	0.110	0.120	
2.10	2.64	0.083	0.104	
1.20	1.40	0.047	0.055	
0.95 BSC		0.0374 Ref		
1.90 BSC		0.0748 Ref		
0.40	0.60	0.016	0.024	
0.64 Ref		0.025 Ref		
0.50 Ref		0.020 Ref		
3°	8°	3°	8°	
	0.085 2.80 2.10 1.20 0.95 1.90 0.40 0.64	0.085 0.18 2.80 3.04 2.10 2.64 1.20 1.40 0.95 BSC 1.90 BSC 0.40 0.60 0.64 Ref 0.50 Ref 3° 8°	0.085 0.18 0.003 2.80 3.04 0.110 2.10 2.64 0.083 1.20 1.40 0.047 0.95 BSC 0.0374 1.90 BSC 0.0748 0.40 0.60 0.016 0.64 Ref 0.025 0.50 Ref 0.020 3° 8° 3°	

DWG: 5479



RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads Dimensions in Inches/(mm)



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