

## FEATURES

TrenchFET® Power MOSFET

100 % Rg Tested



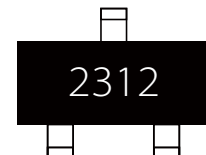
SOT-23

## APPLICATION

Case: SOT-23

DC/DC Converters Load switch

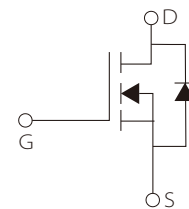
Load Switch for Portable Applications



Marking

## APPROVALS

<b>RoHS</b>	Compliance with 2011/65/EU
<b>HF</b>	Compliance with IEC61249-2-21:2003



Schematic Symbol

## ABSOLUTE MAXIMUM RATINGS( $T_a=25^{\circ}\text{C}$ )

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current ( $T_J = 150^{\circ}\text{C}$ )	$I_D$	$T_C=25^{\circ}\text{C}$	6 <sup>a</sup>
		$T_C=70^{\circ}\text{C}$	5.1
		$T_A=25^{\circ}\text{C}$	5 <sup>b,c</sup>
		$T_A=70^{\circ}\text{C}$	4 <sup>b,c</sup>
Pulsed Drain Current	$I_{DM}$	20	
Continuous Source-Drain Diode Current	$I_S$	$T_C=25^{\circ}\text{C}$	1.75
		$T_A=25^{\circ}\text{C}$	1.04 <sup>b,c</sup>
Maximum Power Dissipation	$P_D$	$T_C=25^{\circ}\text{C}$	2.1
		$T_C=70^{\circ}\text{C}$	1.3
		$T_A=25^{\circ}\text{C}$	1.25 <sup>b,c</sup>
		$T_A=70^{\circ}\text{C}$	0.8 <sup>b,c</sup>
Maximum Junction-to-Ambient <sup>b,d</sup>	$t \leq 5 \text{ s}$	$R_{thJA}$	80-100
Maximum Junction-to-Foot (Drain)	Steady State	$R_{thJF}$	40-60
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150	$^{\circ}\text{C}$

Notes:

a. Package limited

b. Surface Mounted on 1" x 1" FR4 board.

c.  $t = 5 \text{ s}$

d. Maximum under steady state conditions is 125  $^{\circ}\text{C}/\text{W}$

e. Based on  $T_C = 25^{\circ}\text{C}$

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
<b>Static</b>							
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	20			V	
V <sub>DS</sub> Temperature Coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> =250μA		25		mV/°C	
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>		-2.6				
Gate-Source Leakage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , V <sub>GS</sub> =250μA	0.45		1.0	V	
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±8V, V <sub>DS</sub> =0V			±100	nA	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V			1	μA	
		V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, T <sub>J</sub> =70°C			10		
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≤ 5V, V <sub>GS</sub> = 4.5V	20			A	
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5.0A		0.028			
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 4.7A		0.042		Ω	
		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 4.3A		0.050			
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 5.0A		24		S	
<b>Dynamic<sup>b</sup></b>							
Input capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz		865		pF	
Output capacitance	C <sub>OSS</sub>			105			
Reverse Transfer capacitance	C <sub>rss</sub>			55			
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 5.0A, V <sub>GS</sub> = 5V		12	18	nC	
				8.8	14		
Gate-source charge	Q <sub>gs</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 5.0A, V <sub>GS</sub> = 4.5V		1.1			
Gate-drain charge	Q <sub>gd</sub>			0.7			
Gate Resistance	R <sub>g</sub>	f = 1 MHz	0.5	2.4	4.8	Ω	
Turn-on Delay Time	td(on)	V <sub>DD</sub> = 10V, I <sub>D</sub> = 4A, R <sub>L</sub> = 2.2Ω V <sub>GEN</sub> = 4.5V, R <sub>g</sub> = 1Ω		8	16	ns	
Rising time	tf			17	26		
Turn-off Delay Time	td(off)			31	47		
Input capacitance	tf			8	16		
Turn-on Delay Time	td(on)	V <sub>DD</sub> = 10V, I <sub>D</sub> = 4A, R <sub>L</sub> = 2.2Ω V <sub>GEN</sub> = 5V, R <sub>g</sub> = 1Ω		5	10	ns	
Rising time	tf			13	20		
Turn-off Delay Time	td(off)			21	32		
Input capacitance	tf			6	12		
<b>Drain-Source Body Diode Characteristics</b>							
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25°C			1.75	A	
Pulse Diode Forward Current	I <sub>SM</sub>				20		
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = 4A, V <sub>GS</sub> = 0V		0.75	1.2	V	
Body Diode Reverse Recovery Time	T <sub>rr</sub>	I <sub>F</sub> = 4A, T <sub>C</sub> = 25°C dI <sub>F</sub> /dt = 100A/μs		12	20	ns	
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>				5	10	μC
Reverse Recovery Fall Time	I <sub>rrm</sub>				7		ns
Reverse Recovery Fall Time	I <sub>rrm</sub>				5		

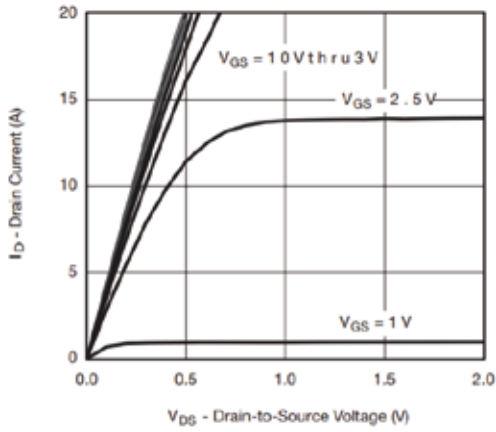
Notes:

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

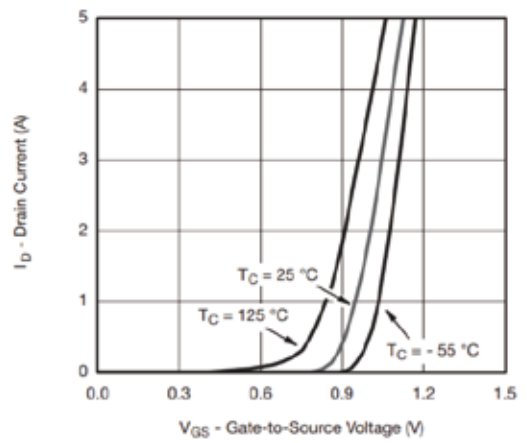
b. Guaranteed by design, not subject to production testing.

# PARAMETER CHARACTERISTIC CURVE

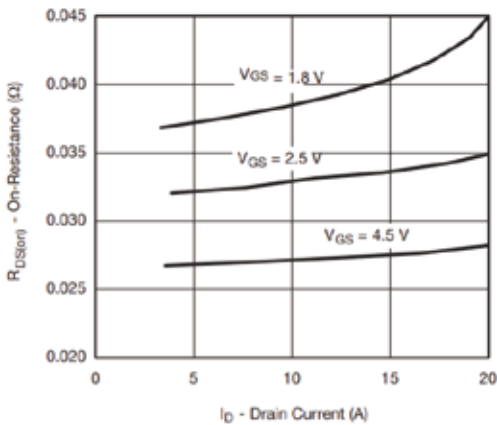
**Fig 1: Output Characteristics**



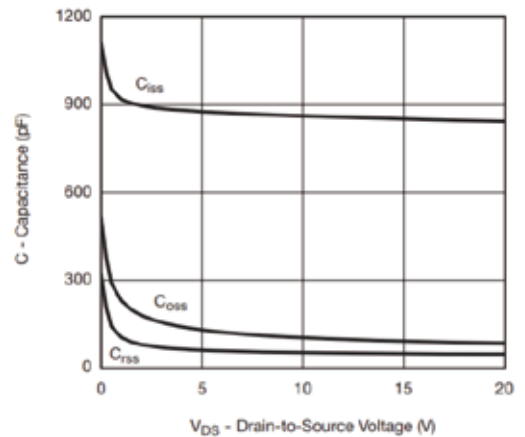
**Figure 2: Transfer Characteristics**



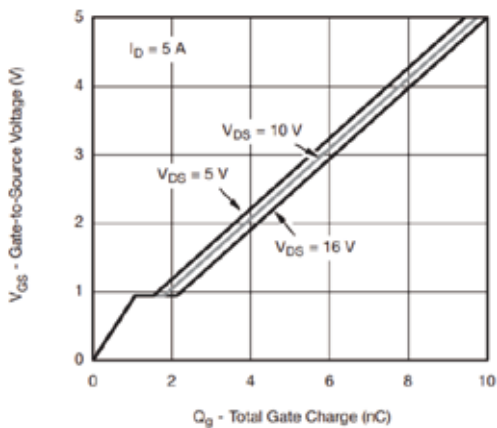
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



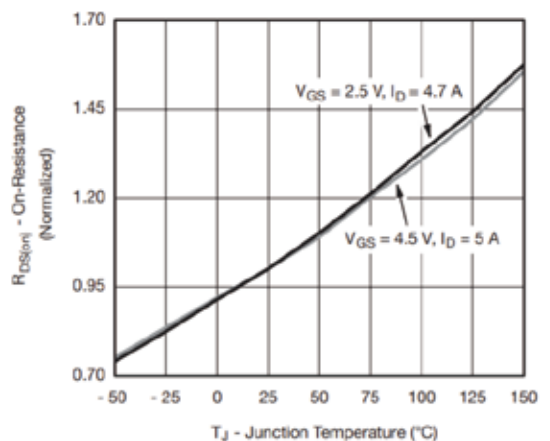
**Figure 4: Capacitance**



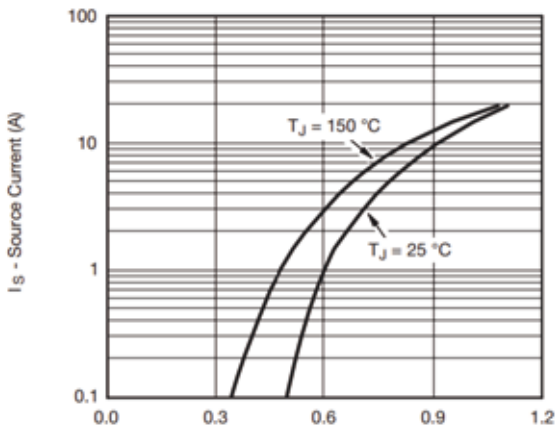
**Figure 5: Gate Charge**



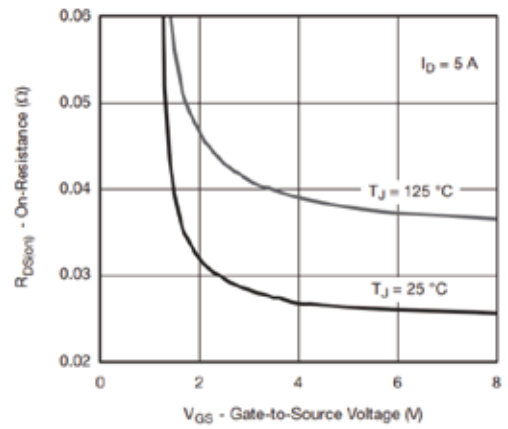
**Figure 6: On-Resistance vs. Junction Temperature**



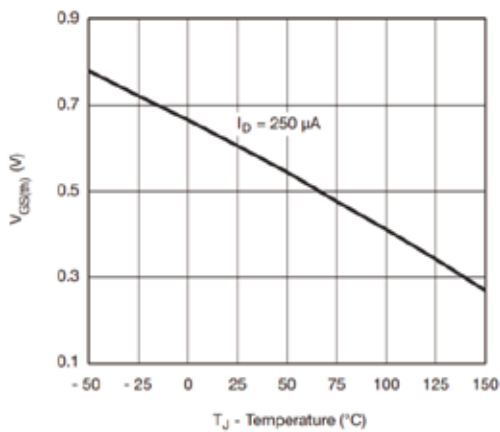
**Figure 7: Source-Drain Diode Forward Voltage**



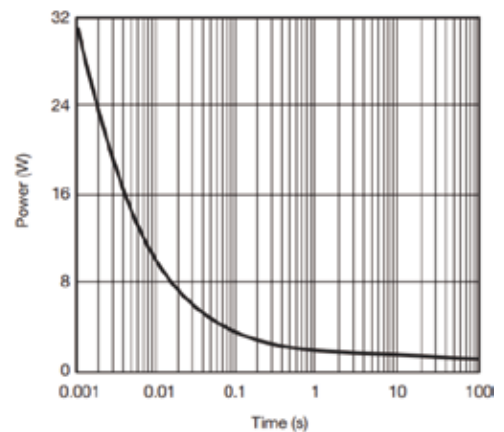
**Figure 8: On-Resistance vs. Gate-to-Source Voltage**



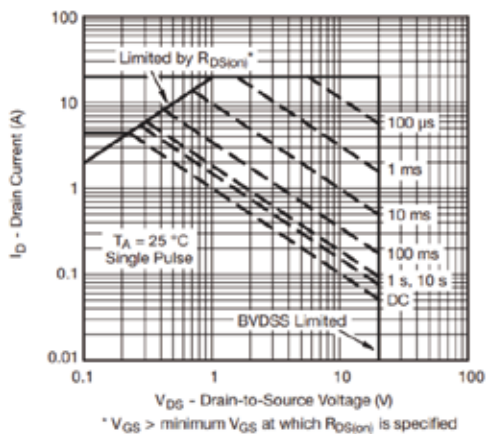
**Figure 9: Threshold Voltage**



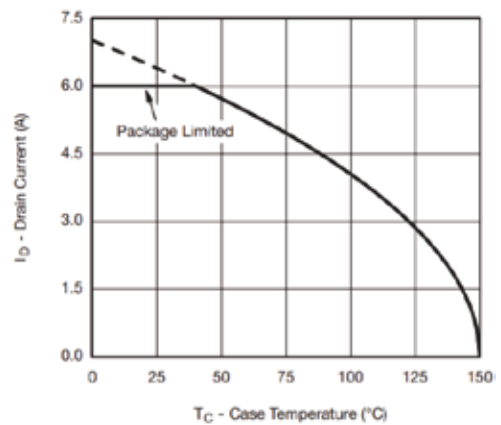
**Figure 10: Single Pulse Power (Junction-to-Ambient)**



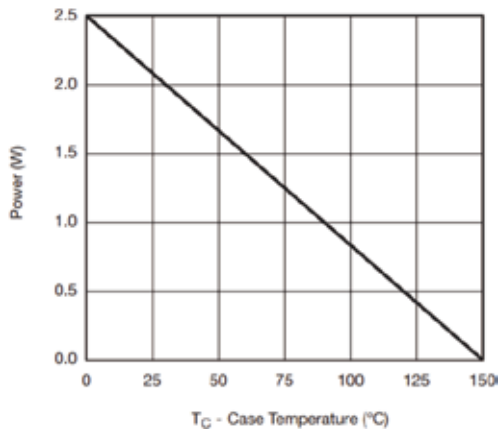
**Figure 11: Current Derating\***



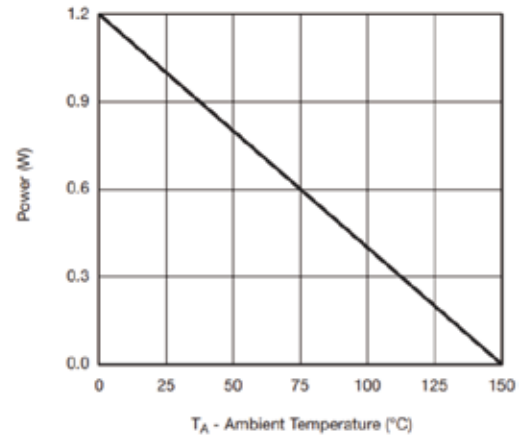
**Figure 12: Safe Operating Area, Junction-to-Ambient**



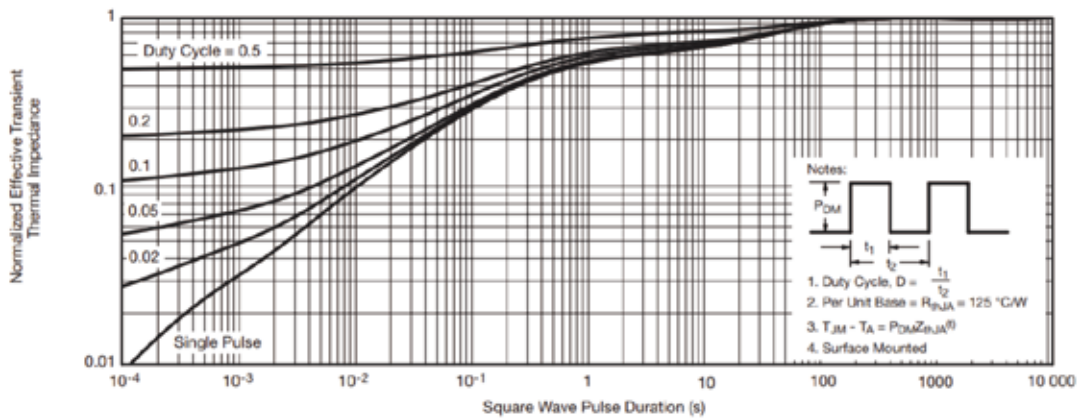
**Figure 13: Power Derating, Junction-to-Foot**

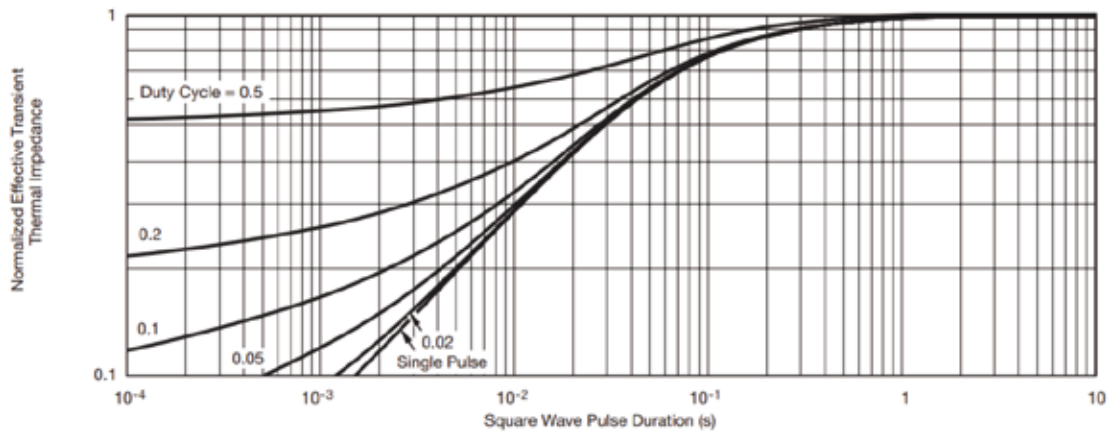


**Figure 14: Power Derating, Junction-to-Ambient**



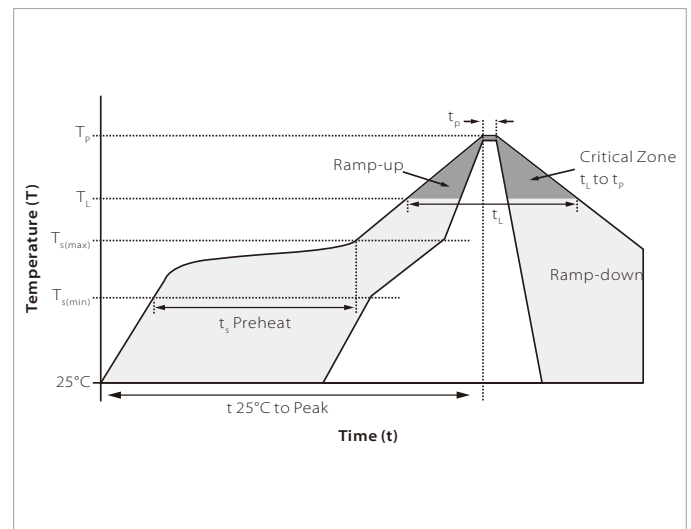
**Figure 15: Normalized Thermal Transient Impedance, Junction-to-Ambient**



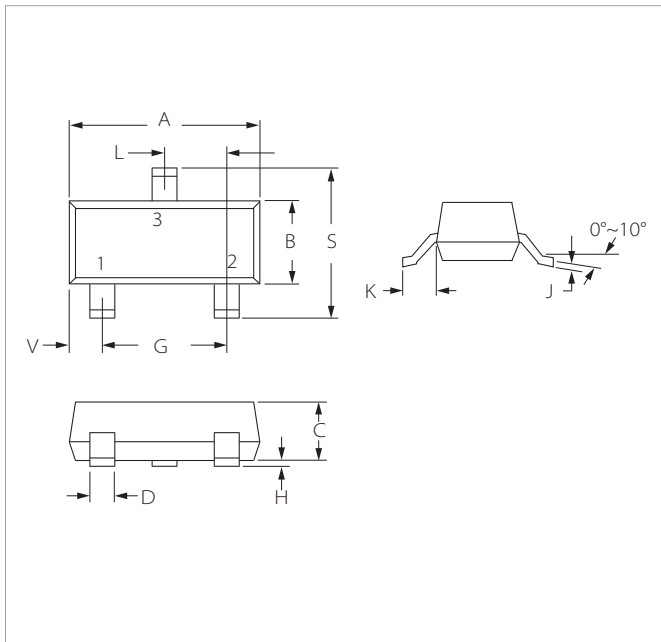
**Figure 16: Normalized Thermal Transient Impedance, Junction-to-Foot**


## SOLDERING PARAMETERS

Reflow Condition		Lead-free assembly
Pre Heat	Temperature Max ( $T_{s(min)}$ )	150°C
	Temperature Max ( $T_{s(max)}$ )	200°C
	Time (min to max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)		3°C/second max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	Temperature ( $T_L$ ) (Liquidus)	217°C
	Time (min to max) ( $t_L$ )	60 – 150 seconds
Peak Temperature ( $T_p$ )		260°C
Time within 5°C of actual peak Temperature ( $t_p$ )		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature ( $T_p$ )		8 minutes max.
Do not exceed		260°C

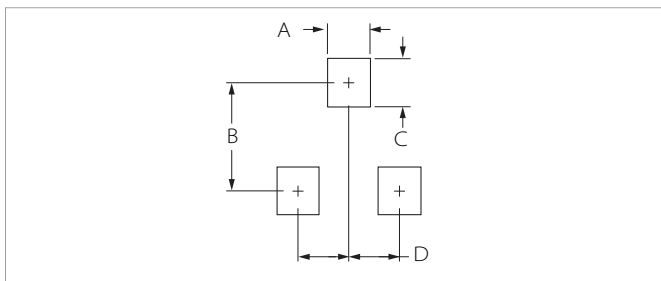


## SOT-23 PACKAGE INFORMATION



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.80	3.04	0.110	0.120
B	1.20	1.40	0.047	0.055
C	0.89	1.11	0.035	0.044
D	0.37	0.50	0.015	0.020
G	1.78	2.04	0.070	0.081
H	0.01	0.100	0.001	0.004
J	0.085	0.180	0.003	0.007
K	0.35	0.69	0.014	0.029
L	0.89	1.02	0.035	0.040
S	2.10	2.64	0.083	0.104
V	0.45	0.60	0.018	0.024

## RECOMMENDED PAD LAYOUT DIMENSIONS



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.71	0.97	0.028	0.038
B	1.88	2.13	0.074	0.084
C	0.71	0.97	0.028	0.038
D	0.81	1.07	0.032	0.042

## ORDERING INFORMATION

Part Number	Component Package	QTY/Reel	Reel Size
SNM2312S	SOT-23	3000PCS	7"

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