

## FEATURES

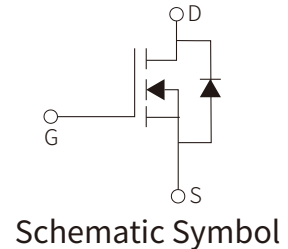
Ultra low on-resistance:  $V_{DS}=30V, R_{DS(ON)} \leq 31m\Omega$

@  $V_{GS}=10V, I_D=5A$

For PWM application

For Load switch application

Surface Mount device



## APPLICATION

Case: SOT-23

Case Material: Molded Plastic. UL flammability

Classification Rating: 94V-0

## APPROVALS

**RoHS** Compliance with 2011/65/EU

**HF** Compliance with IEC61249-2-21:2003

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

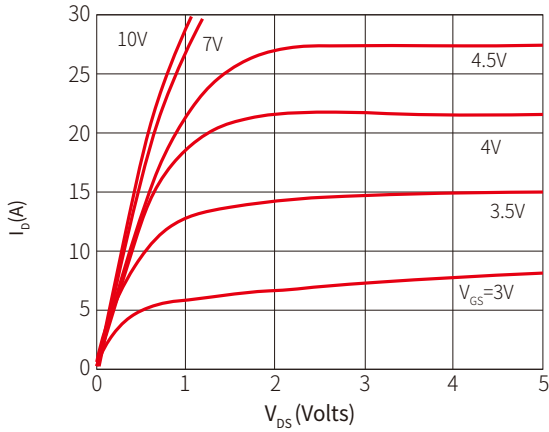
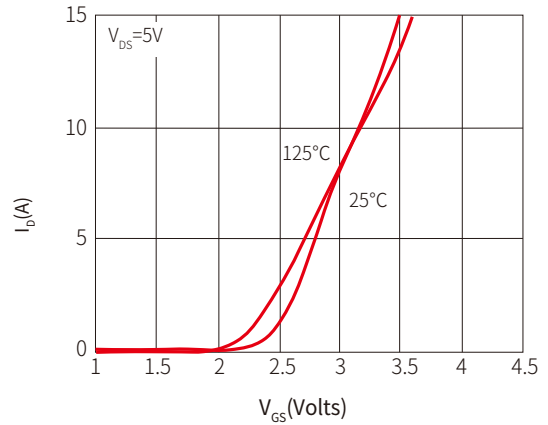
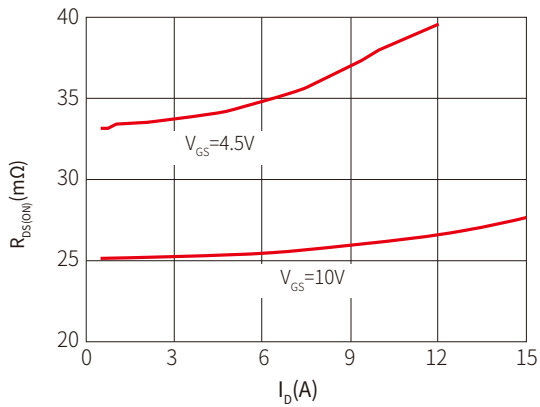
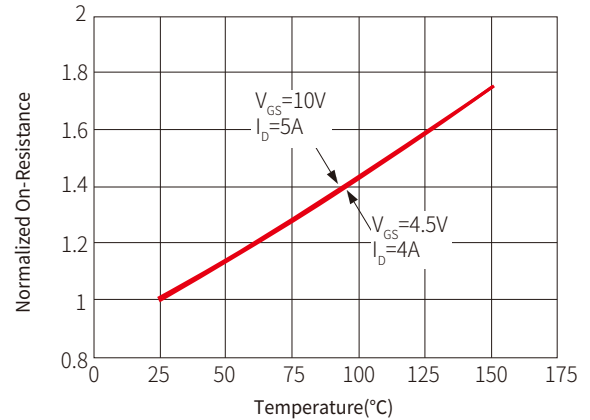
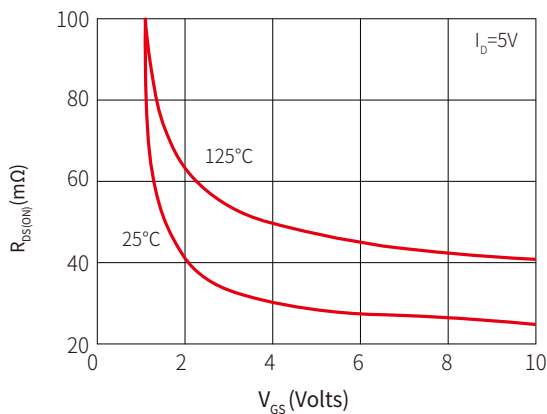
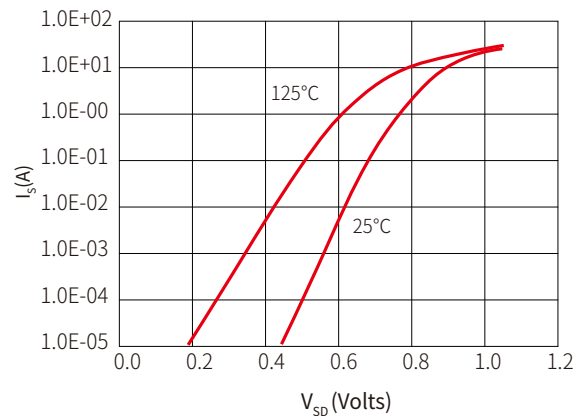
Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Drain Current-Continuous	$I_D$	5	A
Drain Current-Continuous	$I_D$	4	A
Pulsed Drain Voltage	$I_{DM}^*$	20	A
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Total Power Dissipation	$P_D$	1.40	W
Total Power Dissipation	$P_D$	0.9	W
Thermal resistance from Junction to ambient	$R_{\theta JA}$	125	$^\circ\text{C}/\text{W}$
Junction temperature	$T_J$	150	$^\circ\text{C}$
Storage temperature	$T_{STG}$	-55 to 150	$^\circ\text{C}$

## ELECTRICAL CHARACTERISTICS( $T_a=25^\circ\text{C}$ )

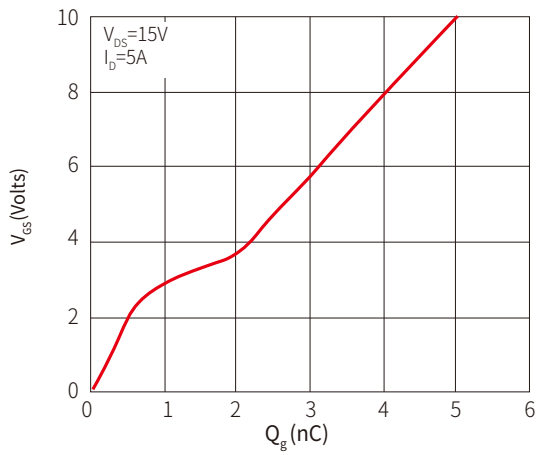
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-source Breakdown Voltage*	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30			V
Zero Gate Voltage Drain Current*	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$			1	$\mu A$
Gate-Body Leakage*	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 100$	nA
Gate Threshold Voltage*	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.8	2.4	V
Static Drain-Source On-Resistance*	$R_{DS(on)}$	$V_{GS}=10V, I_D=5A$		25.5	31	m $\Omega$
		$V_{GS}=10V, I_D=5A, T_J=125^\circ\text{C}$		41	50	
		$V_{GS}=4.5V, I_D=4A$		34	43	
On-State Drain Current	$I_{D(on)}$	$V_{DS}=5V, V_{GS}=10V$	20			A
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=5A$		15		S
Gate resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$	1.6	3.25	4.9	$\Omega$
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V, f=1.0\text{MHz}$		255	310	pF
Output Capacitance	$C_{oss}$			45		
Reverse Transfer Capacitance	$C_{rss}$			35	50	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=10V, R_L=3\Omega$ $V_{DS}=15V, R_{GEN}=3\Omega$		4.5		ns
Turn-On Rise Time	$t_r$			2.5		
Turn-Off Delay Time	$t_{d(off)}$			14.5		
Turn-Off Fall Time	$t_f$			3.2		
Diode forward voltage	$V_{SD}$	$I_S=1A, V_{GS}=0V$		0.76	1	V
Total Gate Charge	$Q_g$	$V_{GS}=10V, V_{DS}=15V, I_D=5A$		5.2	6.3	nC
Gate Source Charge	$Q_{gs}$			0.85		
Gate Drain Charge	$Q_{gd}$			1.3		
Diode forward current	$I_S$				1.5	A
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F=5A, di/dt=100A/\mu s$		8.5		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$	$I_F=4A, di/dt=100A/\mu s$		2.2		nC

\*Pulse test ; Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 0.5\%$

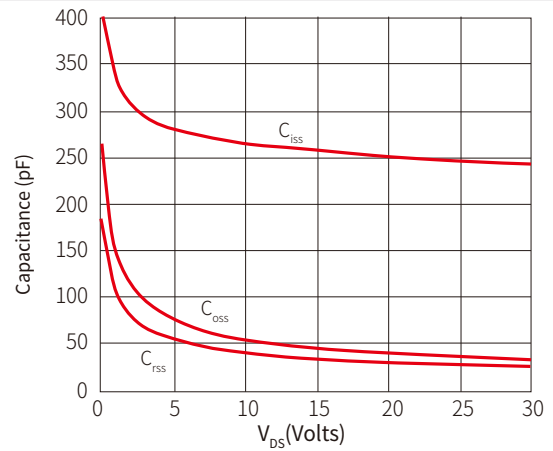
# PARAMETER CHARACTERISTIC CURVE

**Fig 1: On-Region Characteristics**

**Figure 2: Transfer Characteristics**

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

**Figure 4: On-Resistance vs. Junction Temperature**

**Figure 5: On-Resistance vs. Gate-Source Voltage**

**Figure 6: Body-Diode Characteristics**


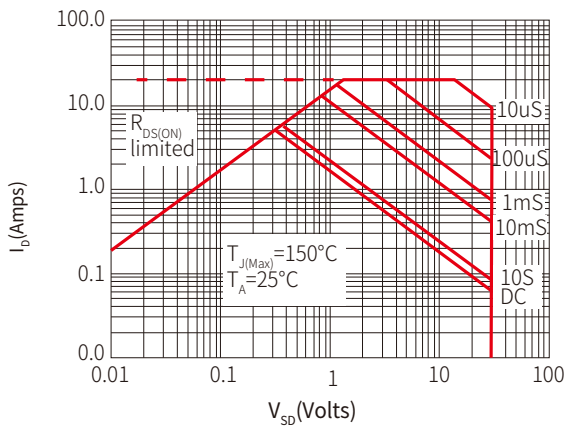
**Figure 7: Gate-Charge Characteristics**



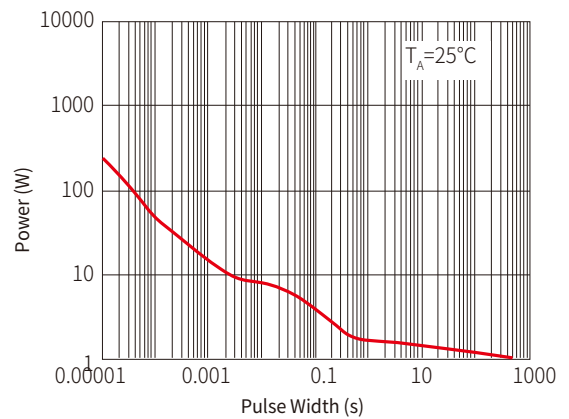
**Figure 8: Capacitance Characteristics**



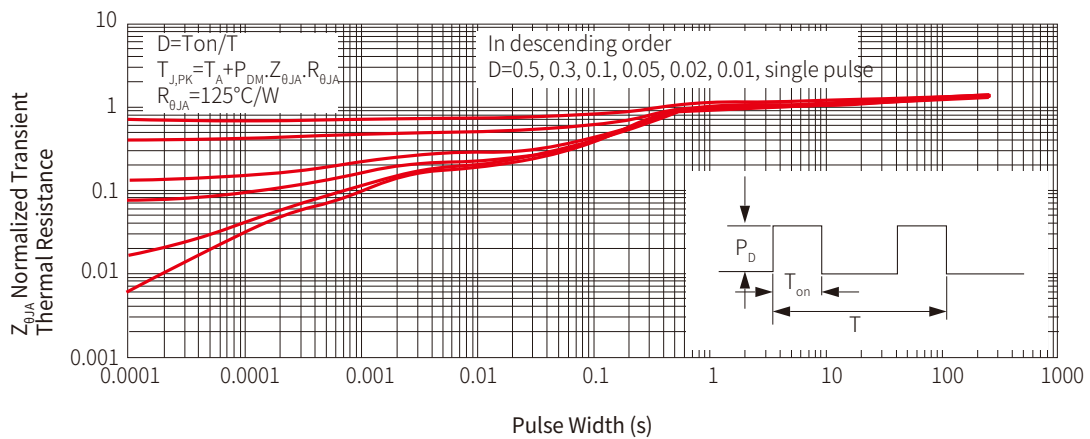
**Figure 9: Maximum Forward Biased Safe Operating Area**



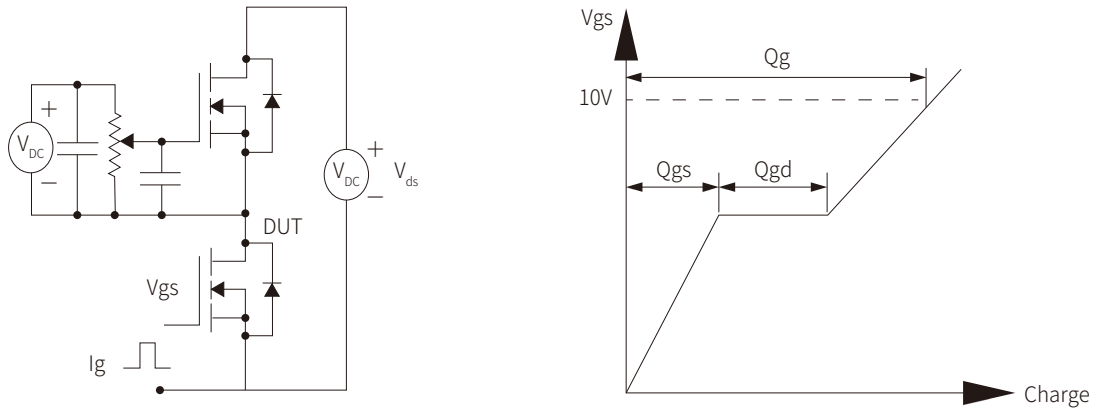
**Figure 10: Single Pulse Power Rating Junction-to-Ambient**



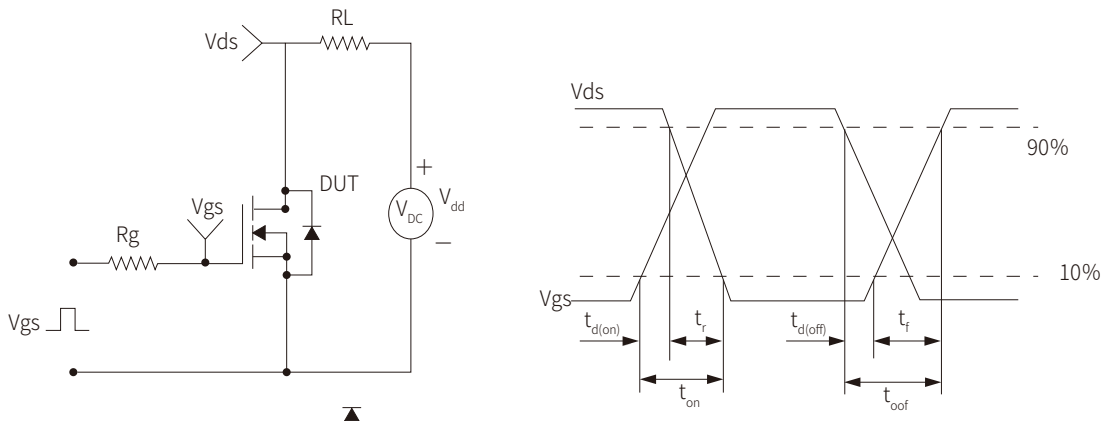
**Figure 11: Normalized Maximum Transient Thermal Impedance**



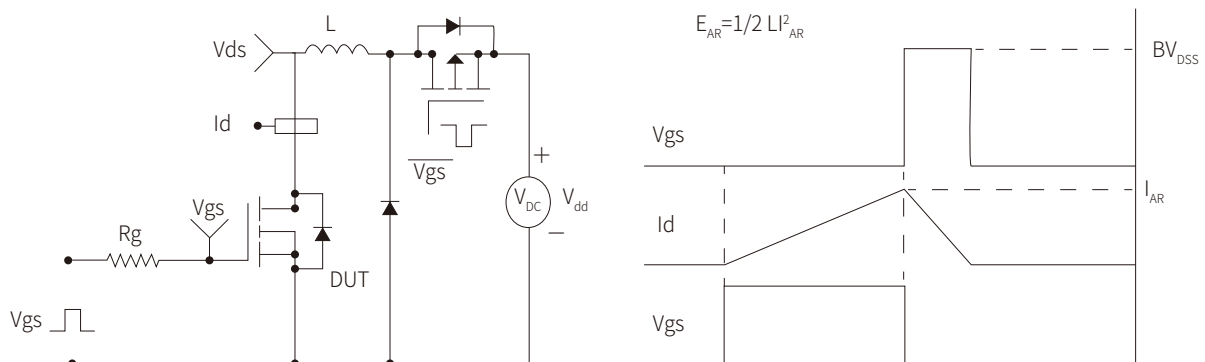
**Figure 12: Gate Charge Test Circuit & Waveform**

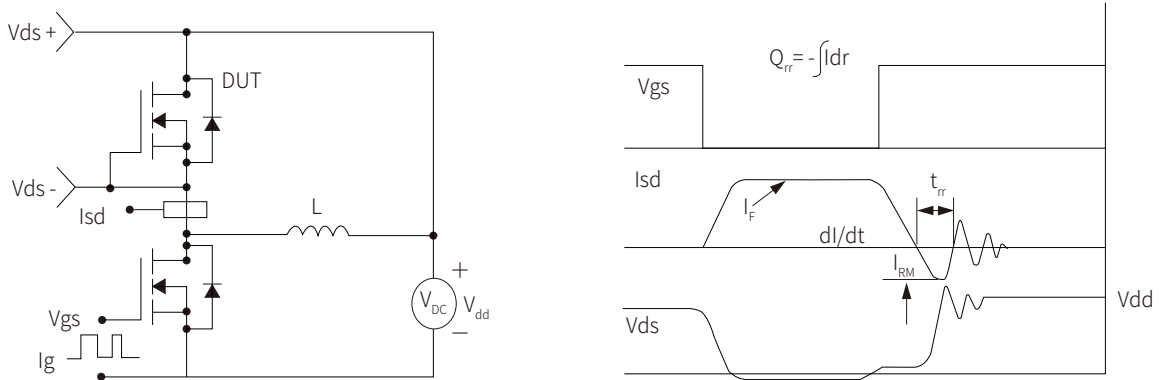


**Figure 13: Resistive Switching Test Circuit & Waveforms**



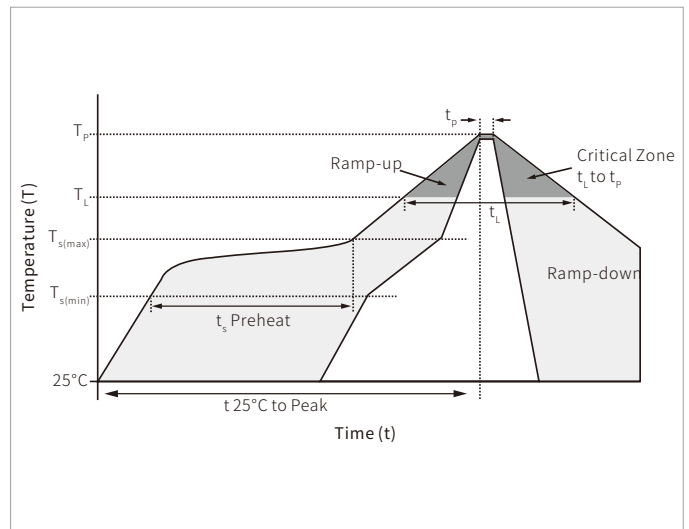
**Figure 14: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms**



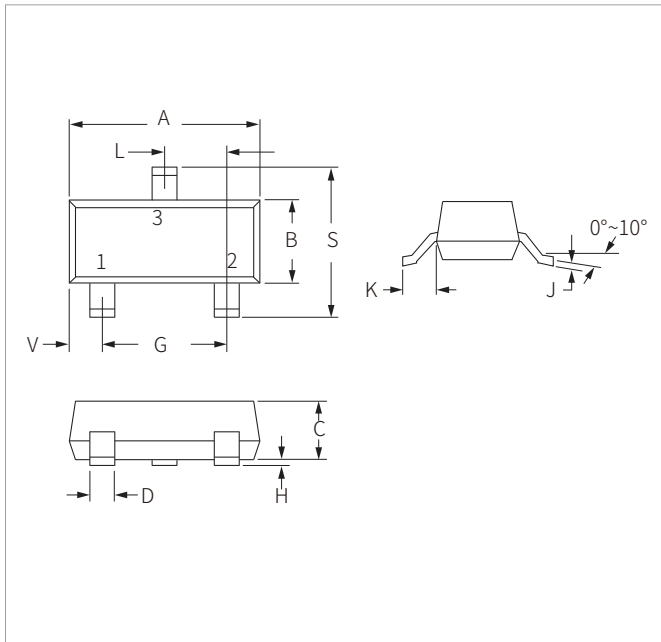
**Figure 15: Diode Recovery Test Circuit & Waveforms**


## 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) ( $t_r$ )	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

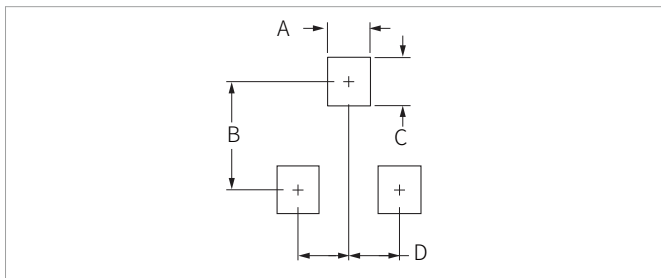


## SOT-23 PACKAGE INFORMATION



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.80	3.05	0.110	0.120
B	1.20	1.40	0.047	0.055
C	0.90	1.15	0.035	0.045
D	0.37	0.50	0.015	0.020
G	1.75	2.05	0.069	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	2.65	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
SNM3404S	SOT-23	3000PCS	7"

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