

## FEATURES

- | Low on-resistance:  $R_{DS(ON)} \leq 160\text{m}\Omega @ V_{GS}=10\text{V}$
- | For Low power DC to DC converter application
- | For Load switch application
- | Surface Mount device



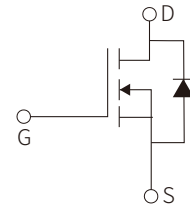
## APPLICATION

- | 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	$V_{DS}$	60	V
Drain Current-Continuous	$I_D$	3	A
Drain Current-Continuous	$I_D$	2.3	A
Pulsed Drain Voltage (Note 1)	$I_{DM}$	10	A
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Power dissipation	$P_D$	1.38	W
Thermal resistance from Junction to ambient	$R_{\theta JA}$	90	$^\circ\text{C}/\text{W}$
Junction temperature	$T_J$	150	$^\circ\text{C}$
Storage temperature	$T_{STG}$	-55 to 150	$^\circ\text{C}$

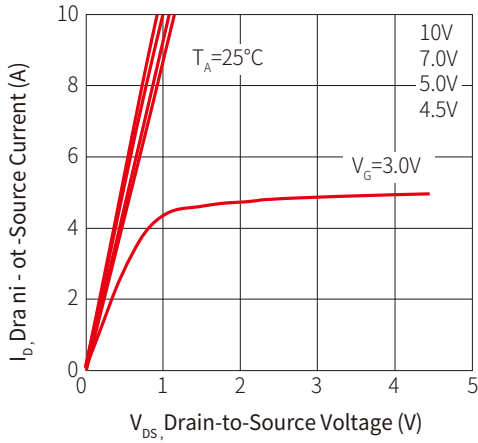
## ELECTRICAL CHARACTERISTICS( $T_a=25^{\circ}\text{C}$ )

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	60			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$			10	$\mu A$
Gate-Body Leakage	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 100$	nA
Gate Threshold Voltage (Note1)	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1		3.0	V
Static Drain-Source On-Resistance(Note1)	$R_{DS(on)}$	$V_{GS}=10V, I_D=2A$			160	m $\Omega$
		$V_{GS}=4.5V, I_D=1.7A$			220	
Forward Transconductance(Note1)	$g_{FS}$	$V_{DS}=5V, I_D=3A$		5		S
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V, f=1.0\text{MHz}$		490	780	pF
Output Capacitance	$C_{oss}$			55		
Reverse Transfer Capacitance	$C_{rss}$			40		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=10V, R_G=3.3\Omega$ $V_{DS}=30V, I_D=1A$ $R_D=30\Omega$		6		ns
Turn-On Rise Time	$t_r$			5		
Turn-Off Delay Time	$t_{d(off)}$			16		
Turn-Off Fall Time	$t_f$			3		
Diode forward voltage (note 1)	$V_{SD}$	$I_S=1.2A, V_{GS}=0V$			1.2	V
Total Gate Charge	$Q_g$	$V_{GS}=4.5V, V_{DS}=48V, I_D=3A$		6	10	nC
Gate Source Charge	$Q_{gs}$			1.6		
Gate Drain Charge	$Q_{gd}$			3		
Reverse Recovery Time	$t_{rr}$	$I_S=3A, V_{GS}=0V$ $di/dt=100A/\mu s$		25		ns
Reverse Recovery Charge	$Q_{rr}$			26		nC

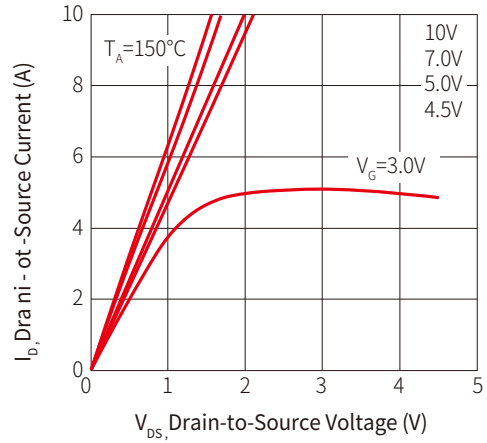
Note:1. Pulse test ; Pulse width  $\leq 400\mu s$ , Duty cycle  $\leq 2\%$

# PARAMETER CHARACTERISTIC CURVE

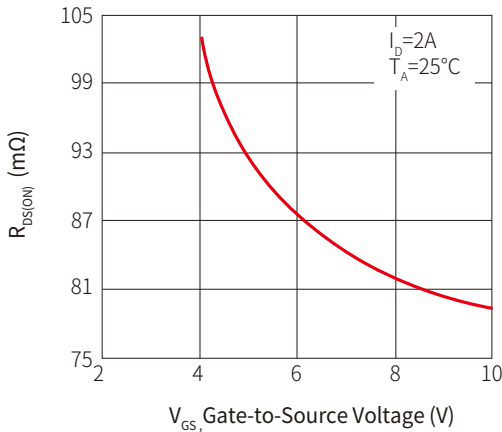
**Fig 1: Typical Output Characteristics**



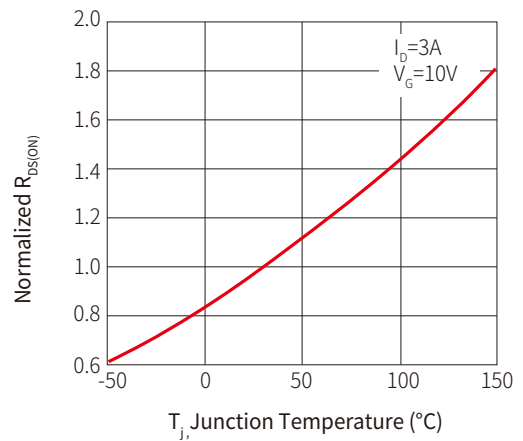
**Figure 2: Typical Output Characteristics**



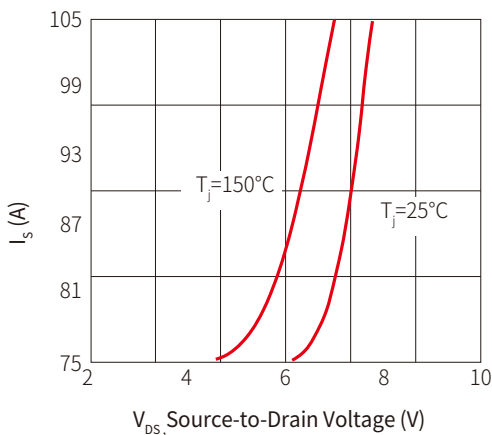
**Figure 3: On-Resistance v.s. Gate Voltage**



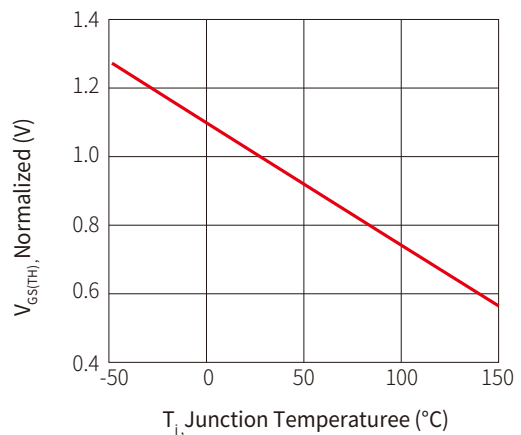
**Figure 4: Normalized OnResistance**

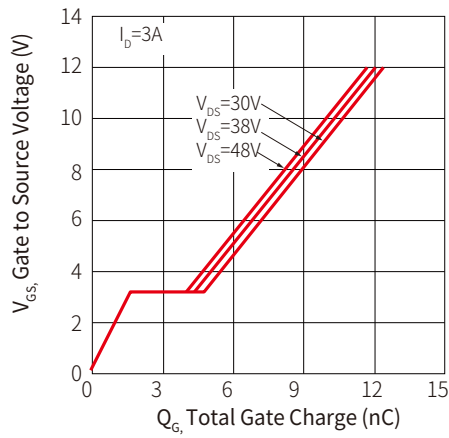
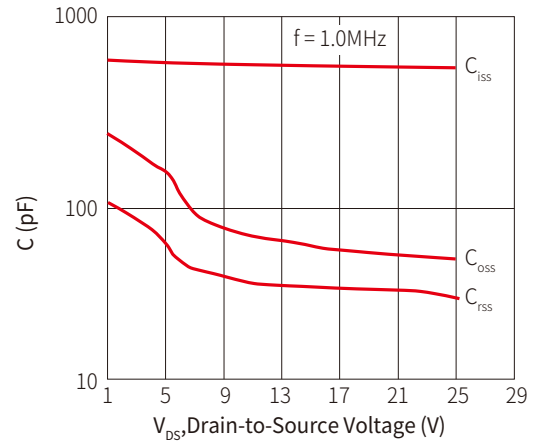
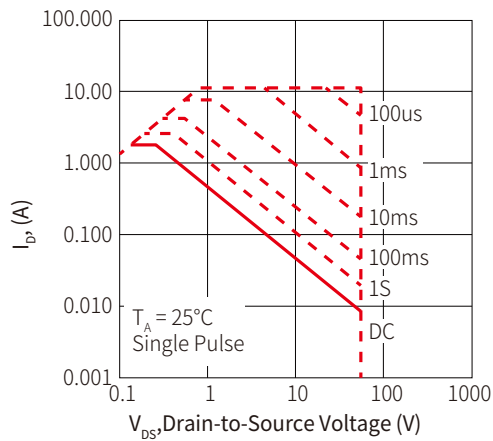
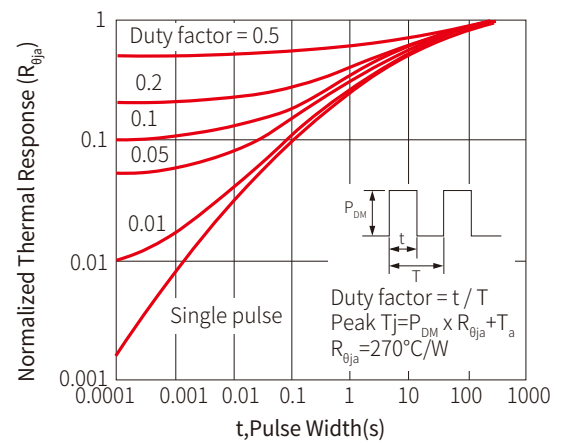
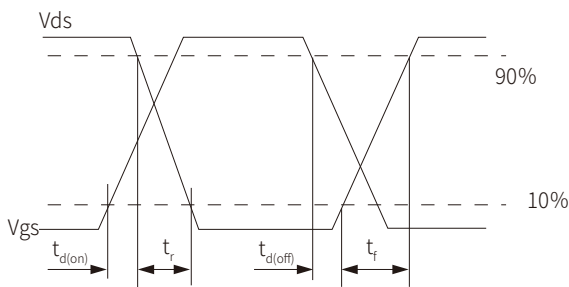
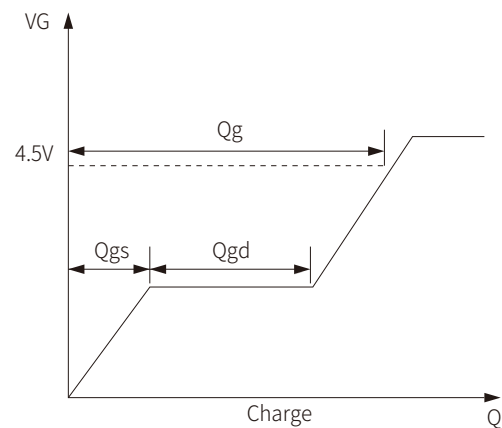


**Figure 5: Forward Characteristics of Reverse Diode**



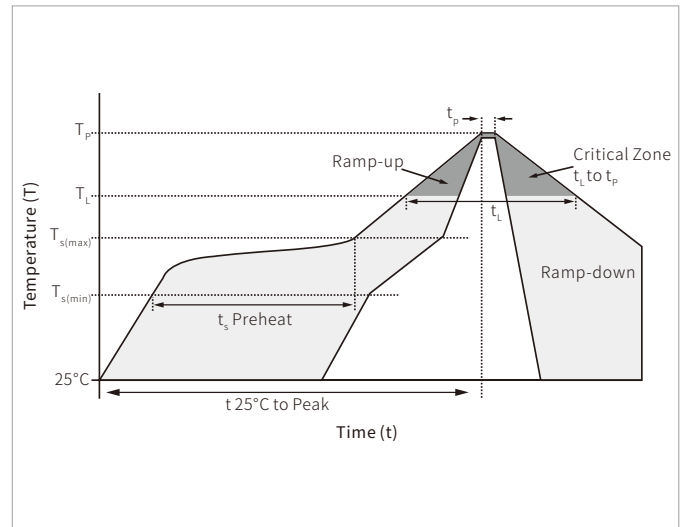
**Figure 6: Gate Threshold Voltage v.s. Junction Temperature**



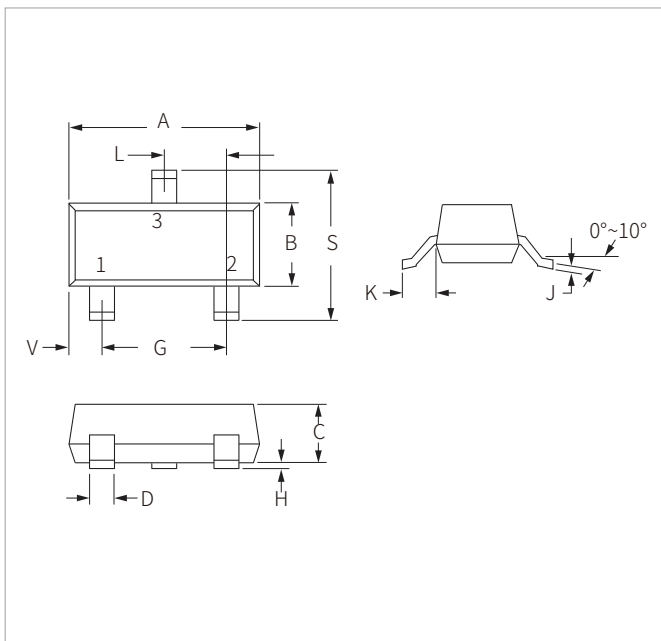
**Figure 7: Gate Charge Characteristics**

**Figure 8: Typical Capacitance Characteristics**

**Figure 9: Maximum Safe Operation Area**

**Figure 10: Effective Transient Thermal Impedance**

**Figure 11: Switching Time Circuit**

**Figure 12: Gate Charge Waveform**


## 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

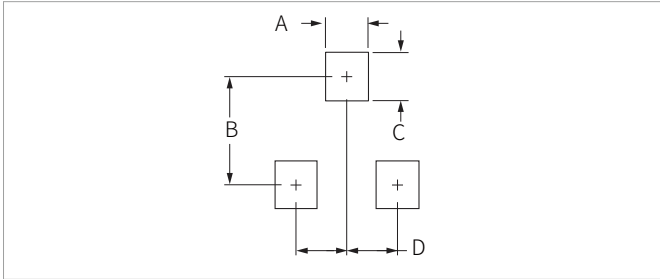


## SOT-23 PACKAGE INFORMATION



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.80	3.05	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
SNM2308S	SOT-23	3000PCS	7"

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