

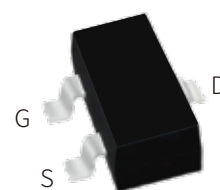
FEATURES

| $V_{DS}=20V, R_{DS(ON)} \leq 21m\Omega @ V_{GS}=4.5V, I_D=6.3A$

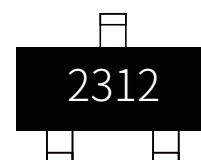
| Fast switching

| Ultra Low On-Resistance

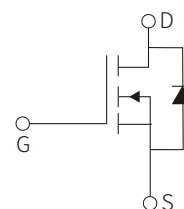
| Surface Mount device



SOT-23



Marking



Schematic Symbol

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($T_a=25^{\circ}C$)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	20	V
Drain Current-Continuous	$T_A=25^{\circ}C$	I_D	6.3	A
Drain Current-Continuous	$T_A=70^{\circ}C$	I_D	5.1	A
Pulsed Drain Current		I_{DM}	32	A
Gate-Source Voltage		V_{GS}	± 12	V
Total Power Dissipation	$T_A=25^{\circ}C$	P_D	1.3	W
Total Power Dissipation	$T_A=70^{\circ}C$	P_D	0.8	W
Linear Derating Factor			0.01	W/ $^{\circ}C$
Thermal resistance from Junction to ambient		$R_{\theta JA}$	100	$^{\circ}C/W$
Storage temperature		T_{STG}	-55 to 150	$^{\circ}C$

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

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=16V, V_{GS}=0V$			1	μA
Gate-Body Leakage	I_{GSS}	$V_{GS}=\pm 12V, V_{DS}=0V$			± 100	nA
Gate Threshold Voltage (Note1)	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=10\mu A$	0.5	0.9	1.1	V
Static Drain-Source On-Resistance(Note1)	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=6.3A$		16	21	m Ω
		$V_{GS}=2.5V, I_D=5.1A$		22	27	
Gate resistance	R_g			1.7		Ω
Input Capacitance	C_{iss}	$V_{DS}=16V, V_{GS}=0V, f=1.0\text{MHz}$		700		pF
Output Capacitance	C_{oss}			140		
Reverse Transfer Capacitance	C_{rss}			98		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=4.5V, R_g=6.8\Omega$ $V_{DD}=10V, I_D=1A$		4.9		ns
Turn-On Rise Time	t_r			7.5		
Turn-Off Delay Time	$t_{d(off)}$			19		
Turn-Off Fall Time	t_f			12		
Diode forward voltage (note 1)	V_{SD}	$I_S=6.3A, V_{GS}=0V, T_J=25^{\circ}\text{C}$			1.2	V
Total Gate Charge	Q_g	$V_{GS}=4.5V, V_{DS}=10V, I_D=6.3A$		8.9		nC
Gate Source Charge	Q_{gs}			0.68		
Gate Drain Charge	Q_{gd}			4.4		
Diode forward current(Body Diode)	I_S	integral reverse p-n junction diode			1.3	A
Pulsed Source Current(Body Diode)	I_{SM}				32	A
Reverse Recovery Time	t_{rr}	$I_F=1.3A, V_R=15V$ $dI/dt=100A/\mu s, T_J=25^{\circ}\text{C}$		12	18	ns
Reverse Recovery Charge	Q_{rr}			5.1	7.7	nC

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

PARAMETER CHARACTERISTIC CURVE

Fig 1: Typical Output Characteristics

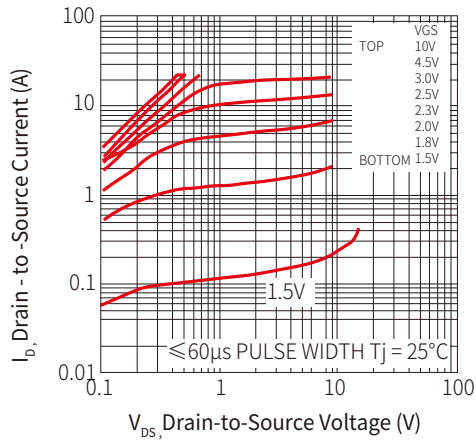


Figure 2: Typical Output Characteristics

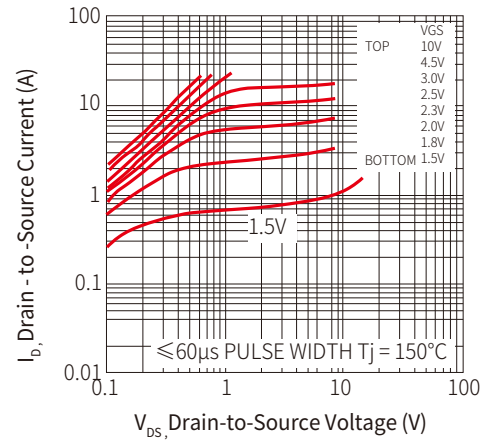


Figure 3: Typical Transfer Characteristics

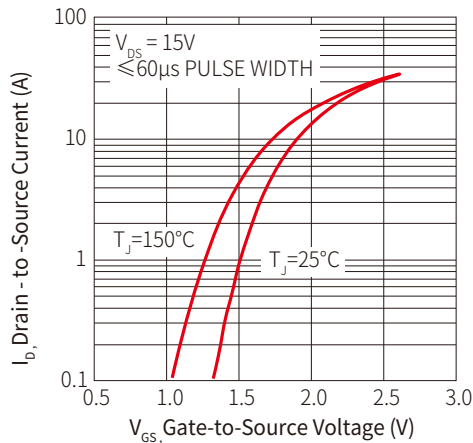


Figure 4: Normalized On-Resistance Vs. Temperature

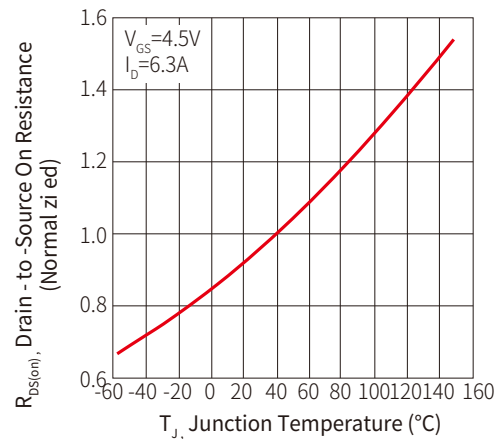


Figure 5: Typical Capacitance Vs. Drain-to-Source Voltage

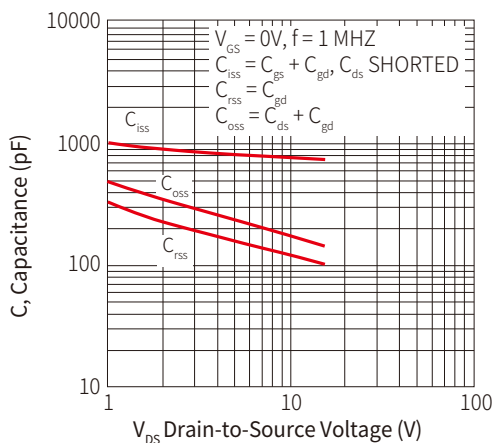


Figure 6: Typical Gate Charge Vs. Gate-to-Source Voltage

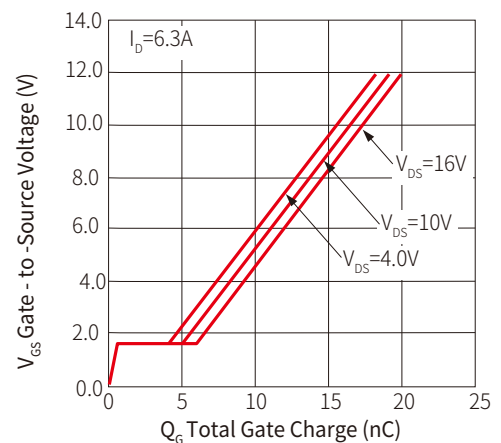


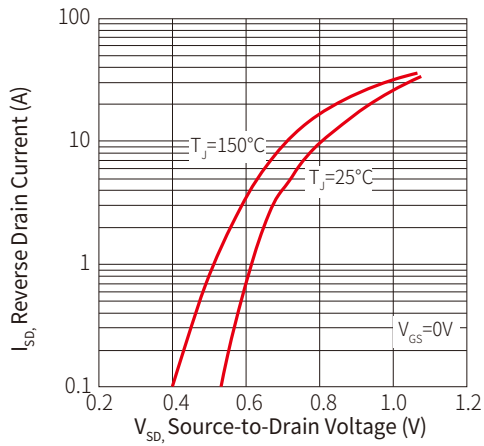
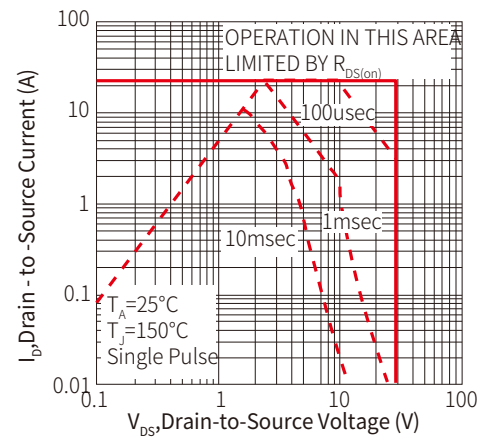
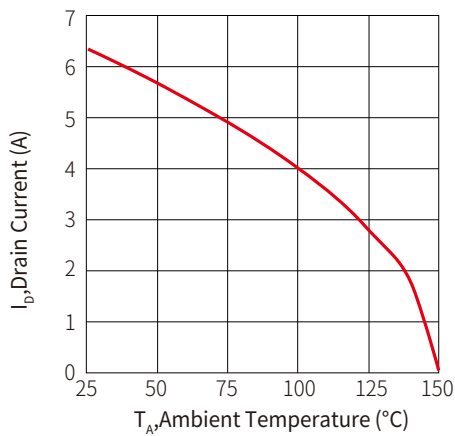
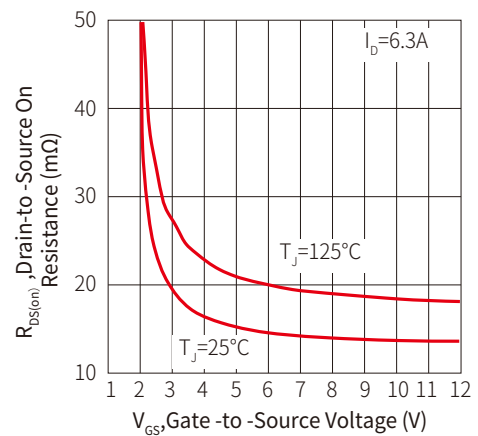
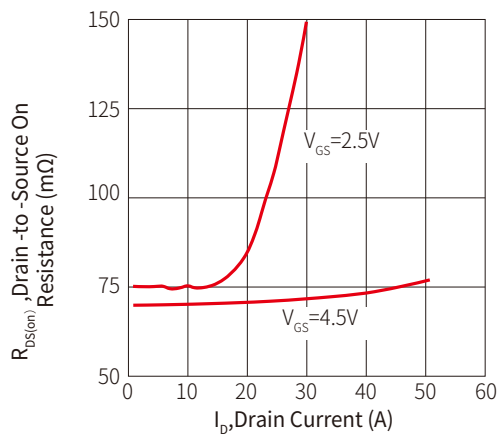
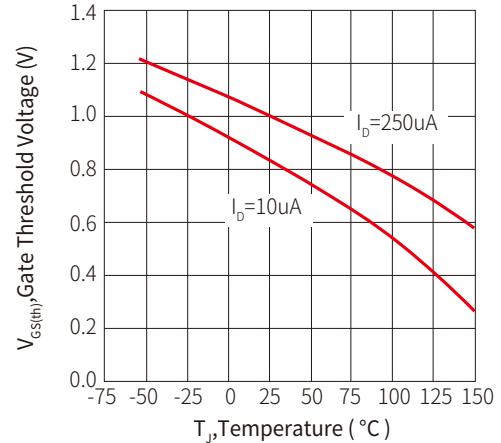
Figure 7: Typical Source-Drain Diode Forward Voltage

Figure 8: Maximum Safe Operating Area

Figure 9: Maximum Drain Current Vs. Ambient Temperature

Figure 10: Typical On-Resistance Vs. Gate Voltage

Figure 11: Typical On-Resistance Vs. Drain Current

Figure 12: Typical Threshold Voltage Vs. Junction Temperature


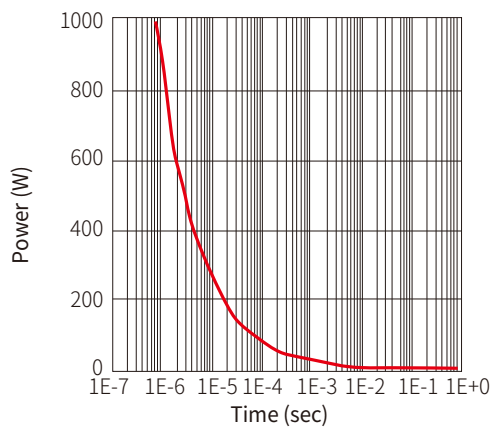
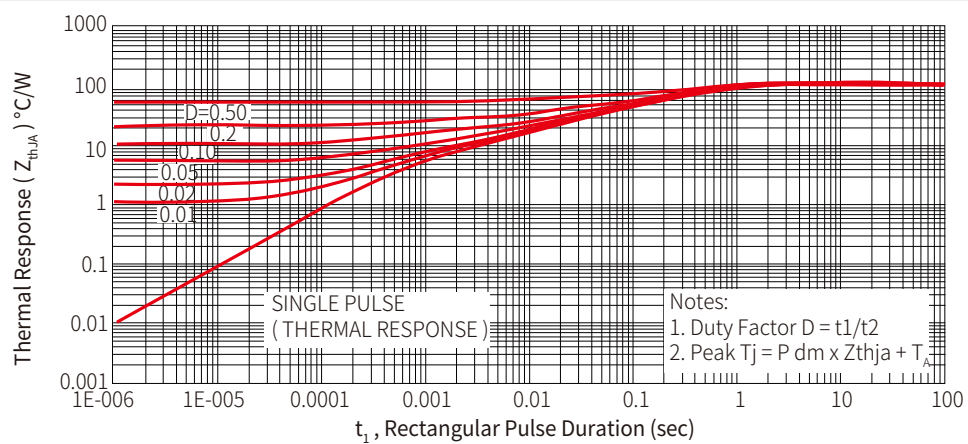
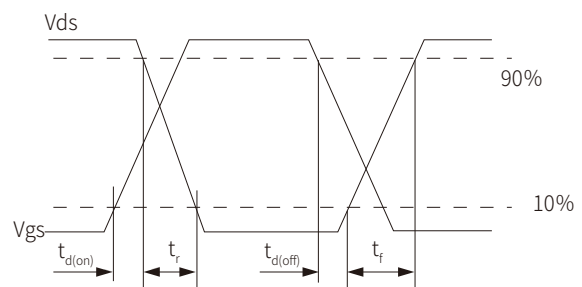
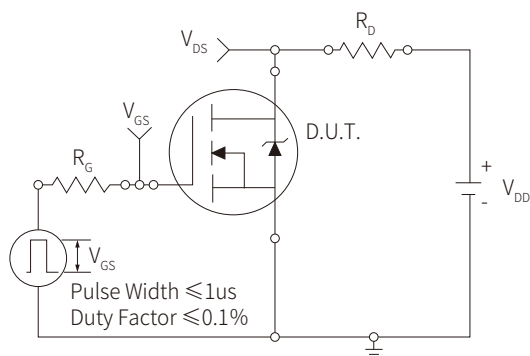
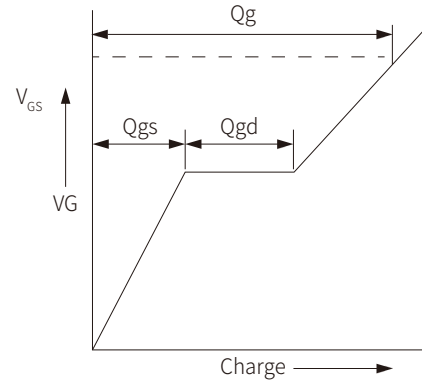
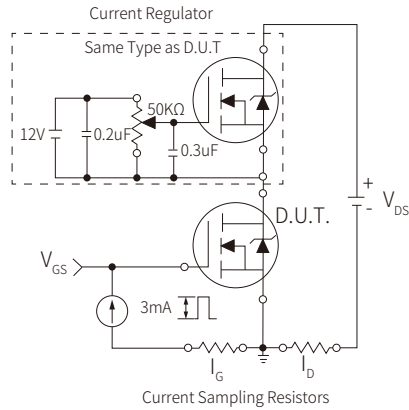
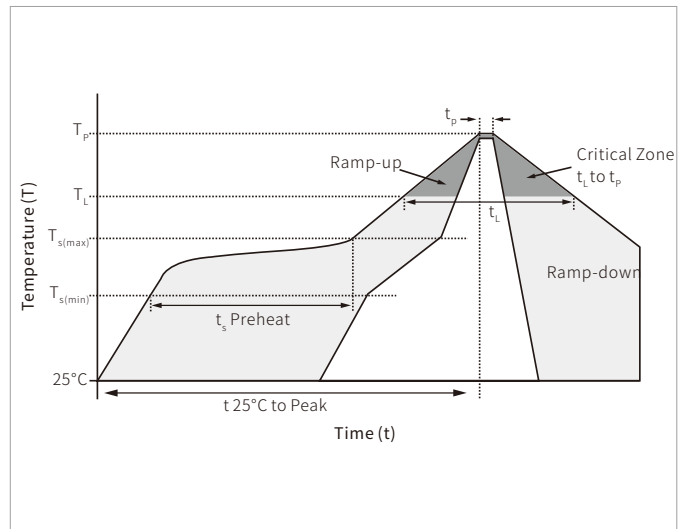
Figure 13: Typical Power Vs. Time

Figure 14: Typical Effective Transient Thermal Impedance, Junction-to-Ambient

Figure 15: Switching Time Test Circuit & Waveforms


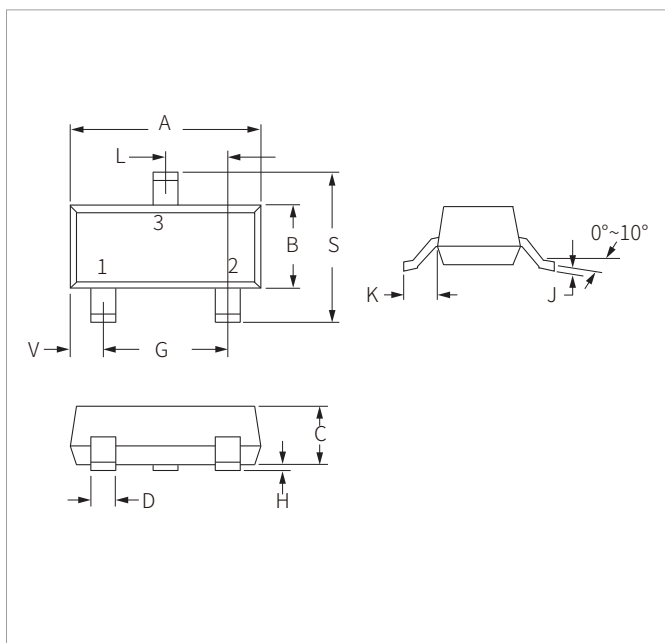
Figure 16: Basic Gate Charge Waveform & Test Circuit


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

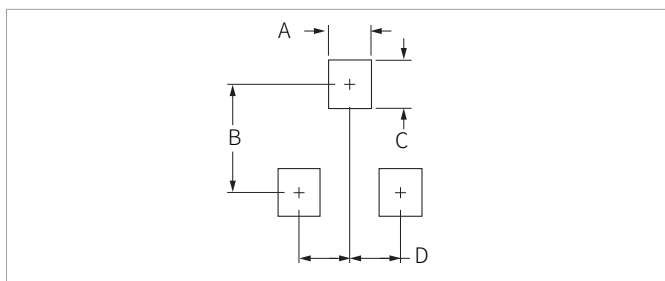


SOT-23 PACKAGE INFORMATION



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
SNM2312L	SOT-23	3000PCS	7"

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