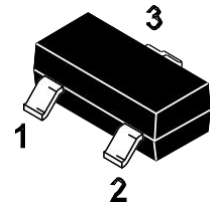


Features

- Fast Switching
- Low Gate Charge and $R_{DS(on)}$
- High power and current handling capability
- $V_{DS} = 20V, I_D = 2A$
 $R_{DS(on)} < 60m\Omega @ V_{GS} = 4.5V$

SOT-23



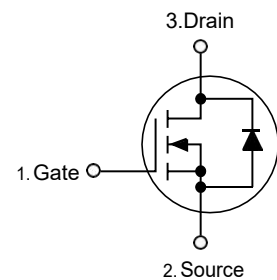
1. Gate 2. Source 3. Drain

Marking Code: 22S

Applications

- Battery protection
- Load Switch for Portable Devices
- Power management

Schematic Diagram



Absolute Maximum Ratings

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous	I_D	2	A
Maximum Power Dissipation	P_D	0.7	W
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Characteristics

Thermal Resistance, Junction-to-Ambient ^{Note2}	$R_{\theta JA}$	179	°C/W
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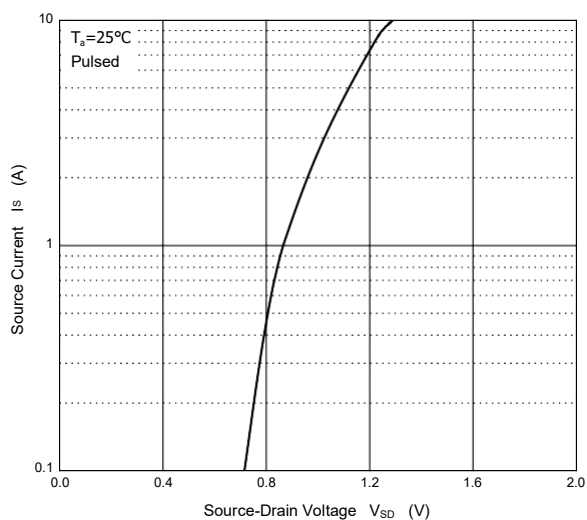
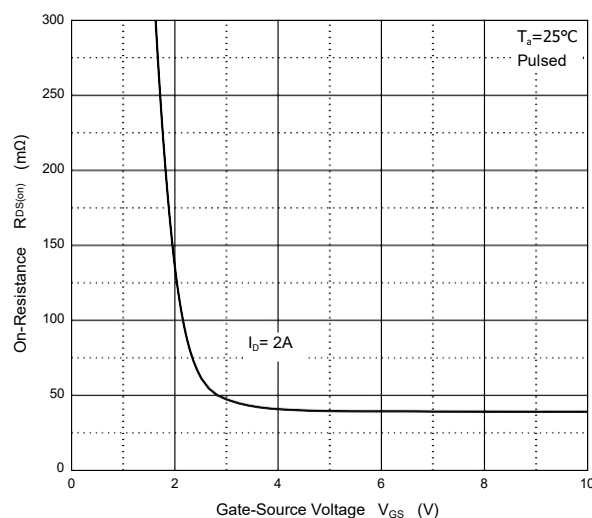
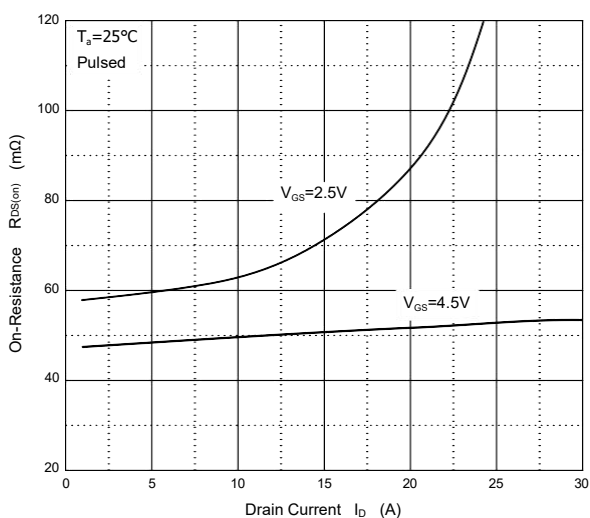
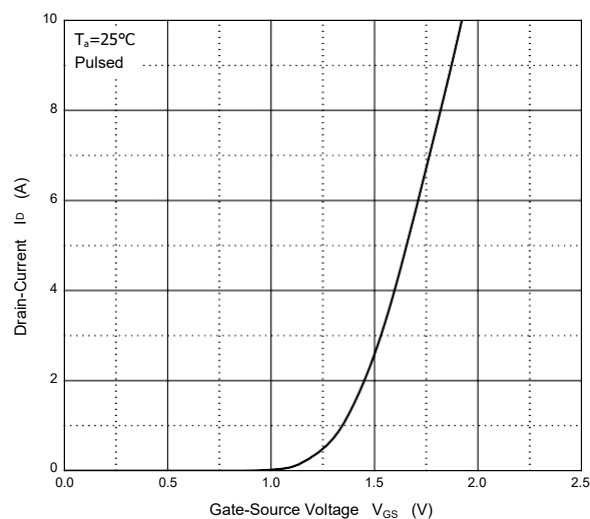
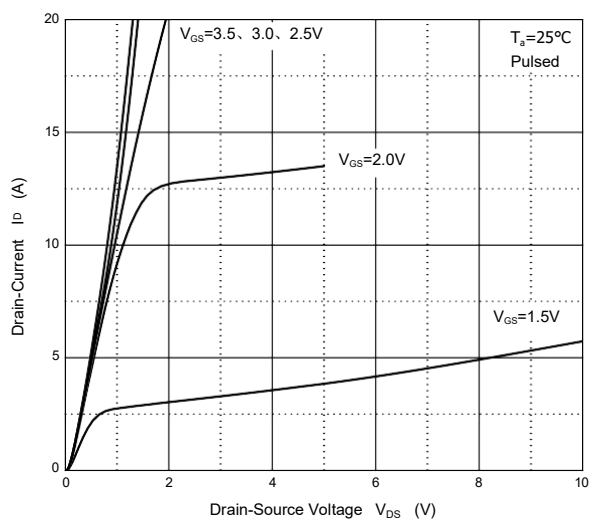
Electrical Characteristics

(Ta=25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	20	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=20V, V_{GS}=0V$	--	--	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 12V, V_{DS}=0V$	--	--	± 100	nA
Gate Threshold Voltage ^{Note2}	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.4	0.8	1.2	V
Drain-Source On-Resistance ^{Note2}	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=2A$	--	48	60	m Ω
		$V_{GS}=2.5V, I_D=1A$	--	60	80	m Ω
Forward Transconductance ^{Note2}	g_{FS}	$V_{DS}=5V, I_D=2A$	--	5	--	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=10V, V_{GS}=0V, f=1MHz$	--	260	--	pF
Output Capacitance	C_{oss}		--	48	--	pF
Reverse Transfer Capacitance	C_{rss}		--	27	--	pF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, R_L=3.3\Omega$ $V_{GS}=4.5V, R_{GEN}=6\Omega$	--	2.5	--	nS
Turn-on Rise Time	t_r		--	3.2	--	nS
Turn-off Delay Time	$t_{d(off)}$		--	21	--	nS
Turn-off Fall Time	t_f		--	3	--	nS
Total Gate Charge	Q_g	$V_{DS}=10V, I_D=2A, V_{GS}=4.5V$	--	2.9	5	nC
Gate-Source Charge	Q_{gs}		--	0.4	--	nC
Gate-Drain Charge	Q_{gd}		--	0.6	--	nC
Source-Drain Diode Characteristics						
Diode Forward Voltage ^{Note2}	V_{SD}	$V_{GS}=0V, I_S=2A$	--	--	1.2	V
Diode Forward Current ^{Note1}	I_S		--	--	2	A

Note: 1. Surface Mounted on FR4 Board, $t \leq 10$ sec.
2. Pulse Test: Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

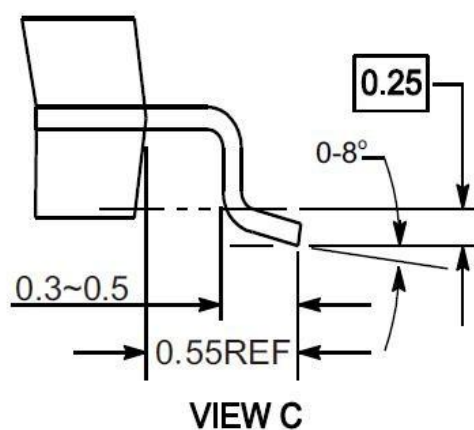
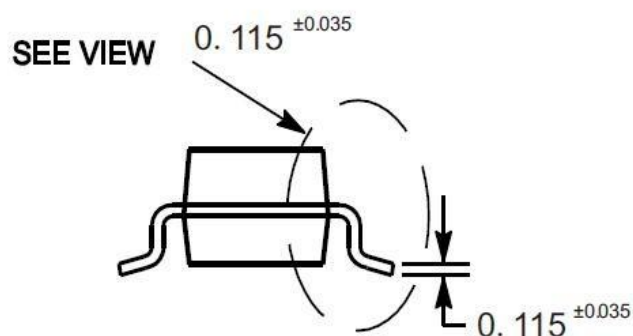
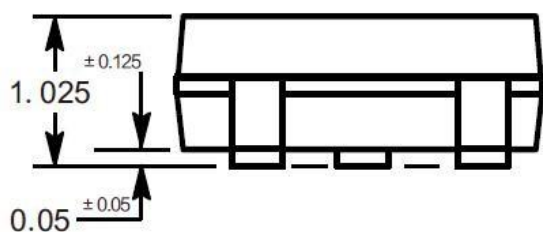
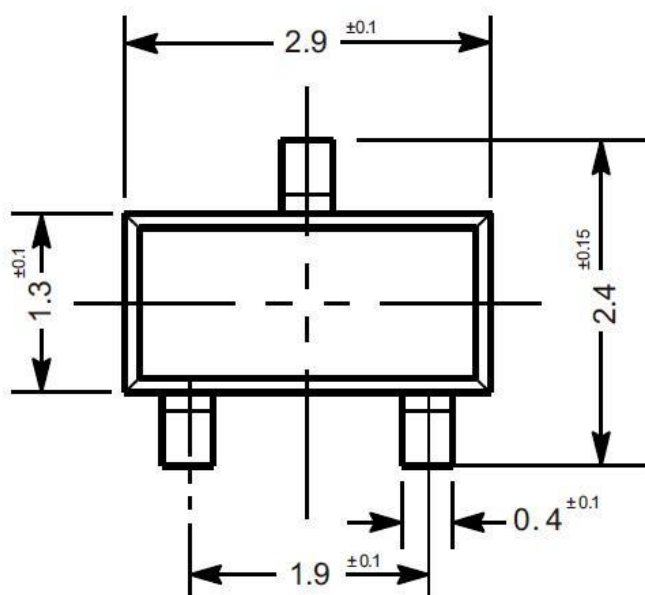
Typical Characteristic Curves



Package Outline

SOT-23

Dimensions in mm

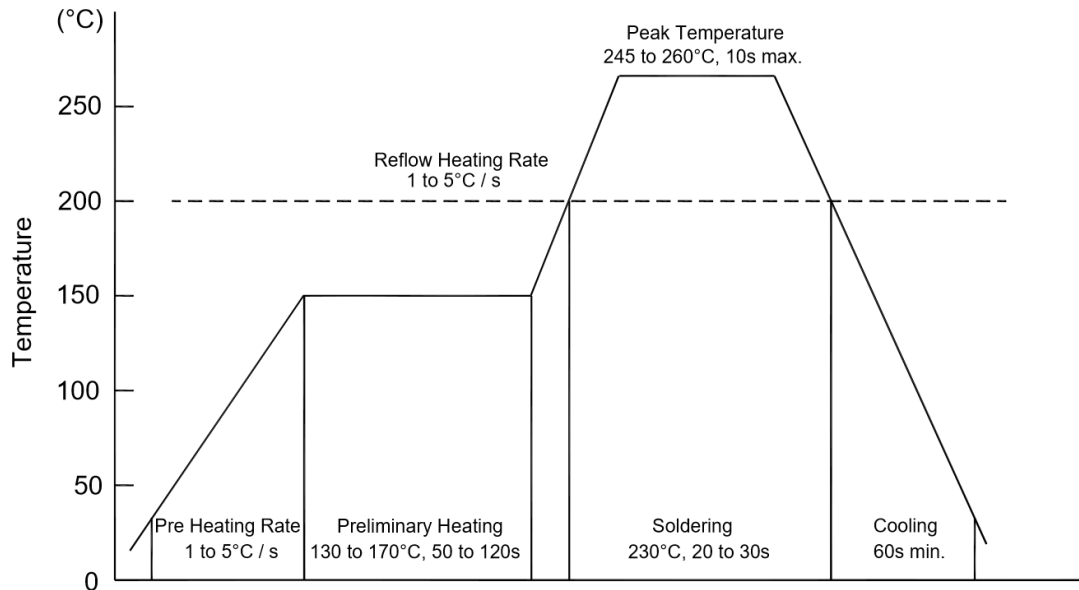


Ordering Information

Device	Package	Shipping
TN2302NSA-S	SOT-23	3,000PCS/Reel&7inches

Conditions of Soldering and Storage

◆ Recommended condition of reflow soldering



Recommended peak temperature is over 245 °C. If peak temperature is below 245 °C, you may adjust the following parameters:

- Time length of peak temperature (longer)
- Time length of soldering (longer)
- Thickness of solder paste (thicker)

◆ Conditions of hand soldering

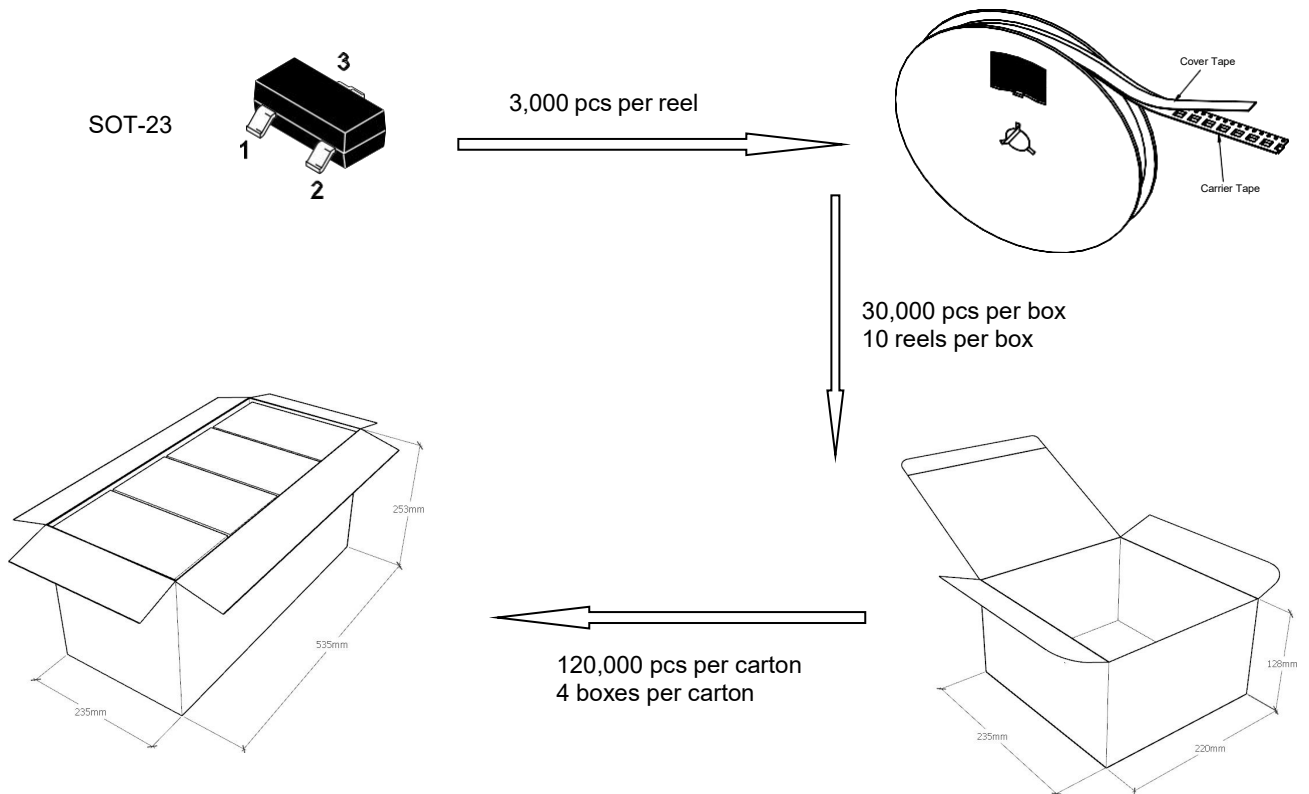
- Temperature: 370 °C
- Time: 3s max.
- Times: one time

◆ Storage conditions

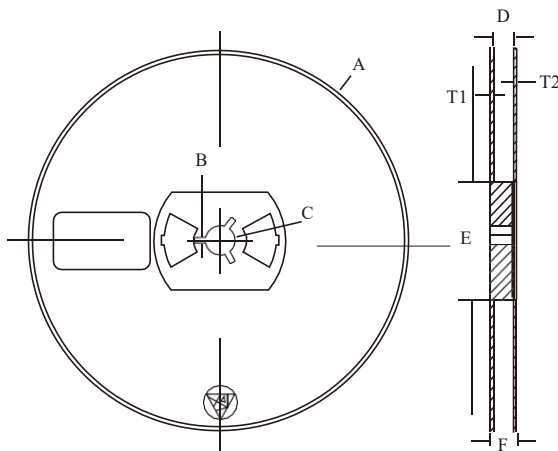
- **Temperature**
5 to 40 °C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

Package Specifications

- The method of packaging



◆ Embossed tape and reel data



Reel (7")

Symbol	Value (unit: mm)
A	$\varnothing 177.8 \pm 1$
B	2.7 ± 0.2
C	$\varnothing 13.5 \pm 0.2$
E	$\varnothing 54.5 \pm 0.2$
F	12.3 ± 0.3
D	$9.6 +2/-0.3$
T1	1.0 ± 0.2
T2	1.2 ± 0.2

