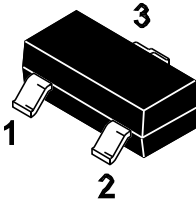


Features

- Rugged and reliable
- Low gate charge and $R_{DS(on)}$
- ESD protected(HBM) up to 2KV
- $V_{DS}= 50V, I_D= 0.5A$
 $R_{DS(on)} < 3\Omega @ V_{GS}= 10V$

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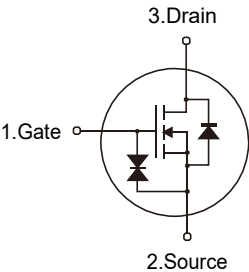
1. Gate 2.Source 3.Drain

Marking Code:T9

Applications

- Solid-state relays
- Battery operated systems
- Direct logic-level interface: TTL/CMOS

Schematic Diagram



Absolute Maximum Ratings

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	50	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	0.5	A
Maximum Power Dissipation	P_D	0.35	W
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Characteristics

Thermal Resistance,Junction-to-Ambient ^{Note1}	$R_{\theta JA}$	357	°C/W
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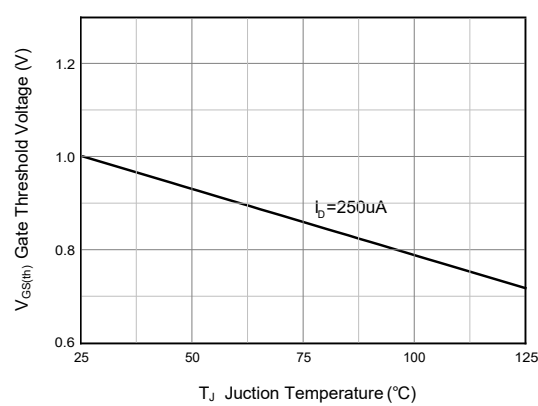
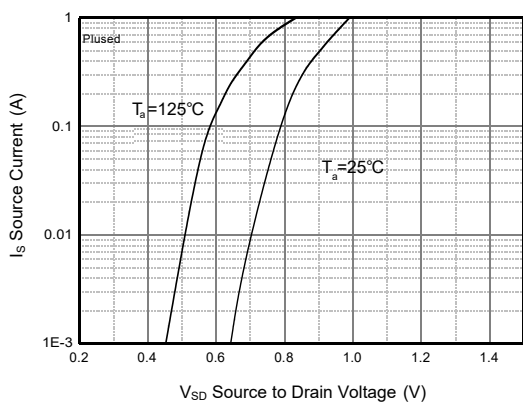
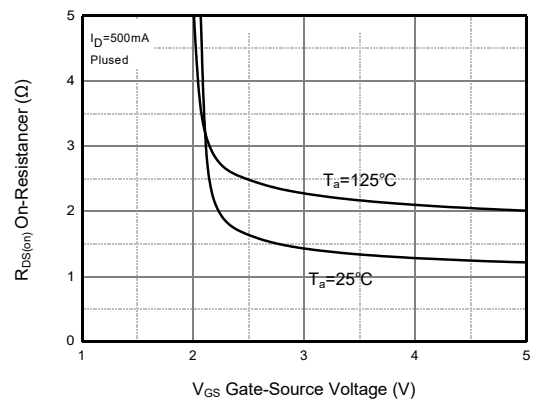
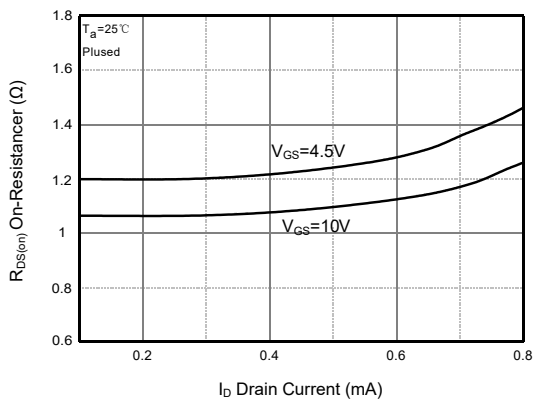
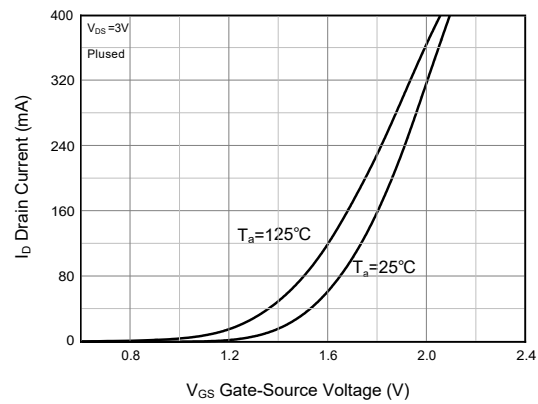
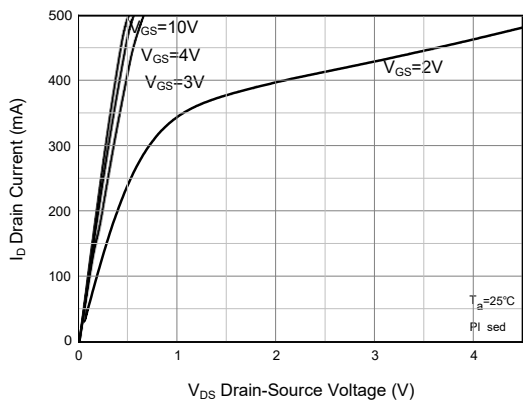
Electrical Characteristics

(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 =250μA	50	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =50V, V _{GS} =0V	--	--	0.5	μA
		V _{DS} =30V, V _{GS} =0V	--	--	100	nA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	--	--	±10	μA
Gate Threshold Voltage ^{Note2}	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	0.6	1	1.4	V
Drain-Source On-Resistance ^{Note2}	R _{DS(on)}	V _{GS} =10V, I _D =0.5A	--	1.1	3	Ω
		V _{GS} =4.5V, I _D =0.2A	--	1.2	4	Ω
Forward Transconductance ^{Note2}	g _{FS}	V _{DS} =10V, I _D =0.22A	--	1.4	--	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1MHz	--	26.5	--	pF
Output Capacitance	C _{oss}		--	12.9	--	pF
Reverse Transfer Capacitance	C _{rss}		--	5.9	--	pF
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V, I _D =0.29A V _{GS} =10V, R _{GEN} =6Ω	--	--	5	nS
Turn-on Rise Time	t _r		--	--	18	nS
Turn-off Delay Time	t _{d(off)}		--	--	36	nS
Turn-off Fall Time	t _f		--	--	14	nS
Source-Drain Diode Characteristics						
Diode Forward Voltage ^{Note2}	V _{SD}	V _{GS} =0V, I _S =0.5A	--	--	1.2	V
Diode Forward Current ^{Note1}	I _S		--	--	0.5	A

Note: 1. Surface Mounted on FR4 Board, t ≤ 10 sec.
2. Pulse Test: Pulse width≤300μs, duty cycle≤2%.

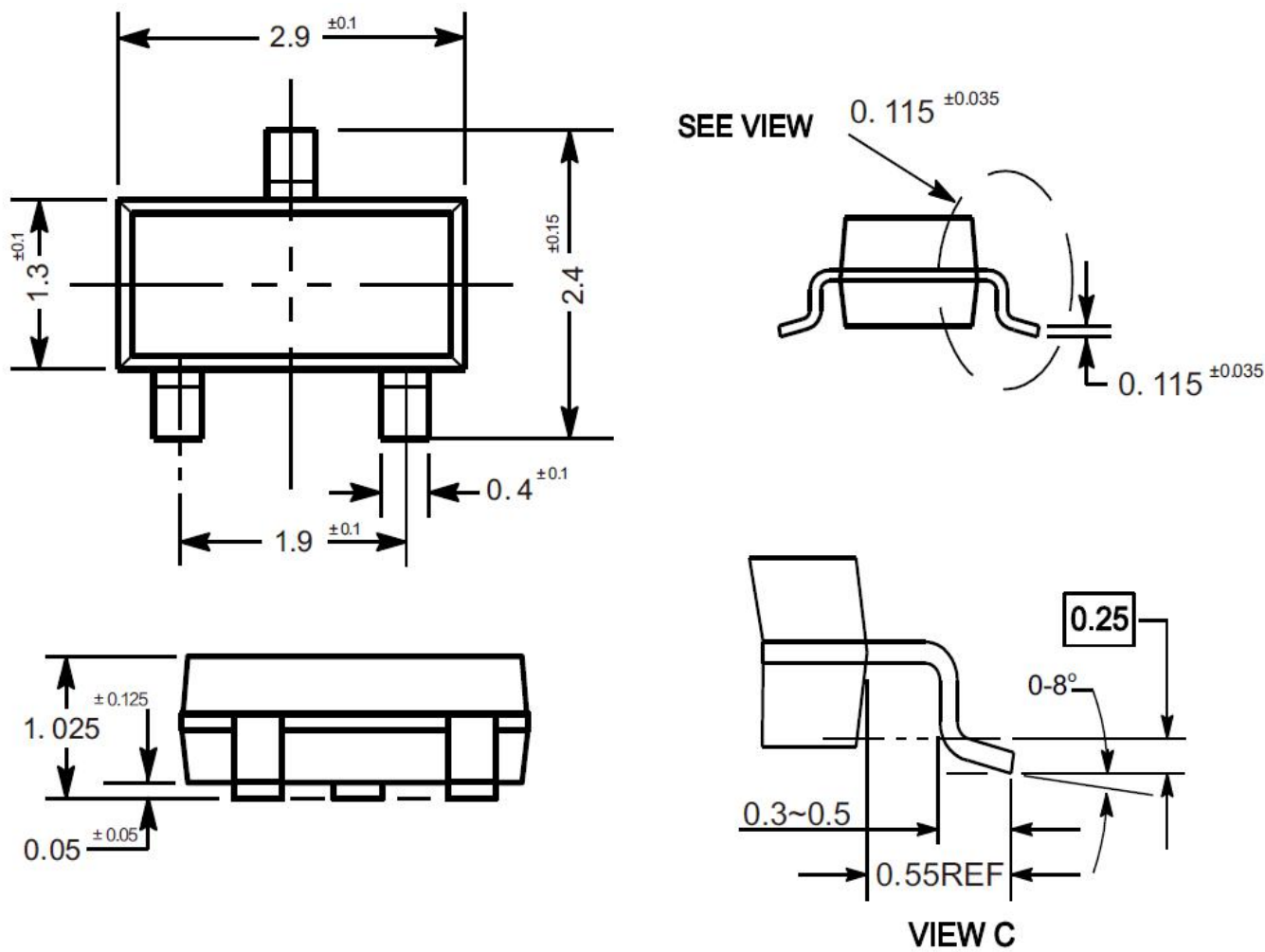
Typical Characteristic Curves



Package Outline

SOT-23

Dimensions in mm

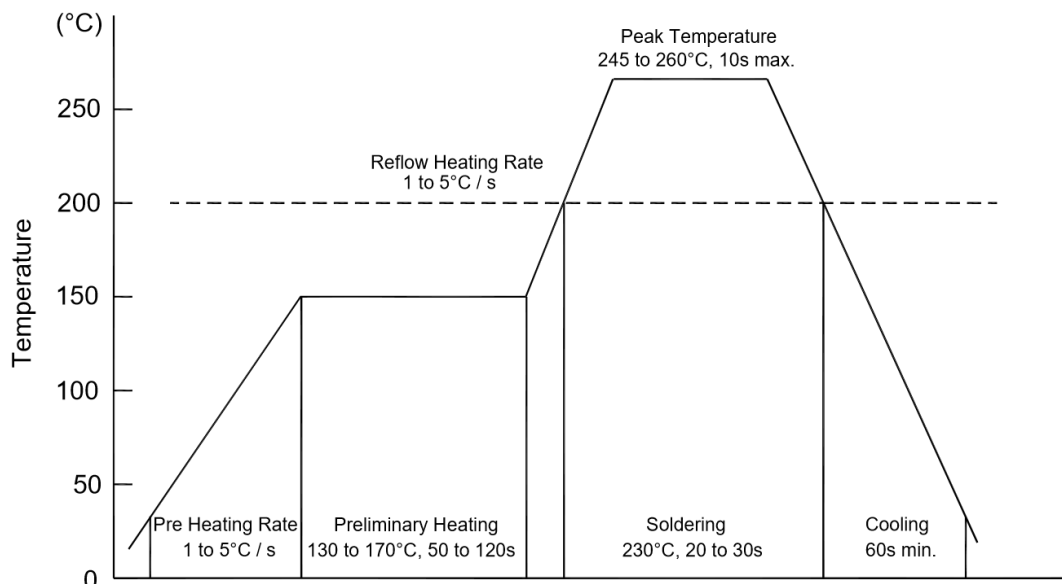


Ordering Information

Device	Package	Shipping
TN139NSA	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

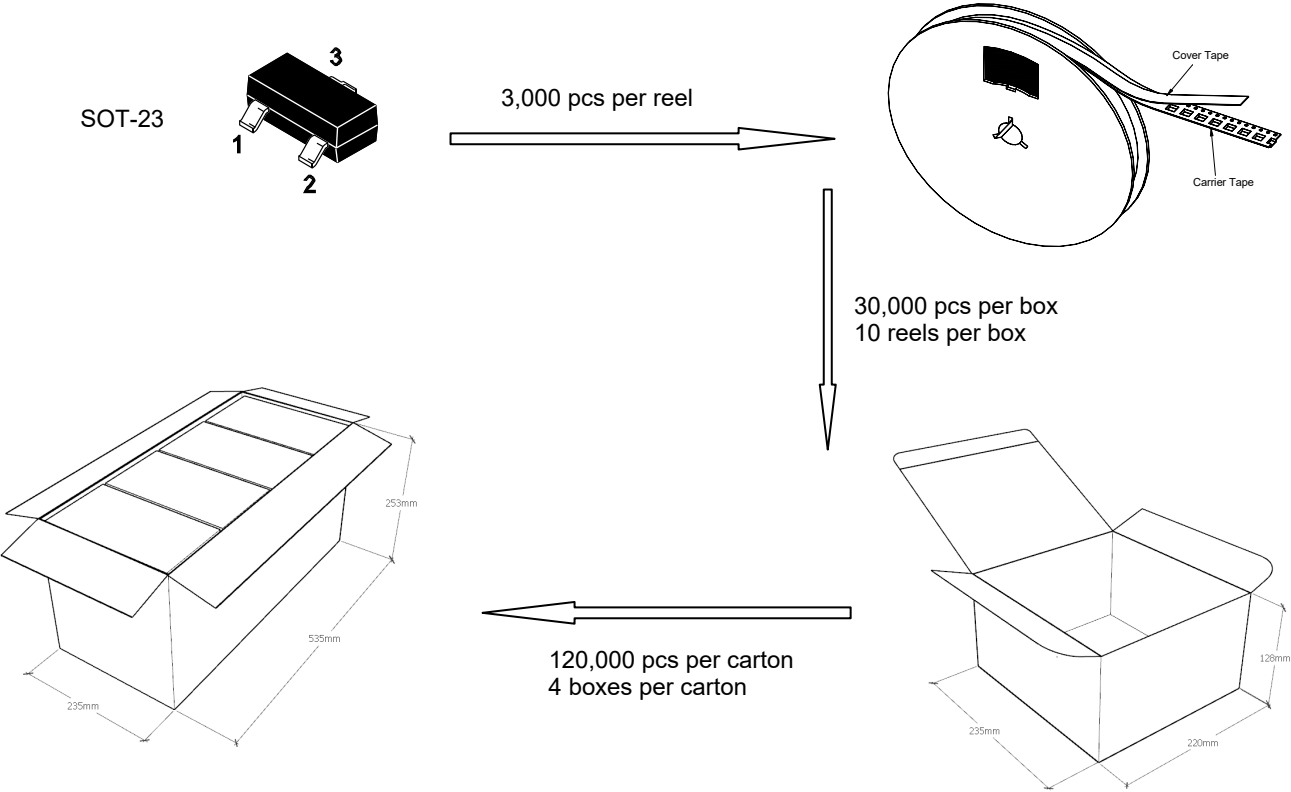
- Temperature: 370 °C
- Time: 3s max.
- Times: one time

◆ Storage conditions

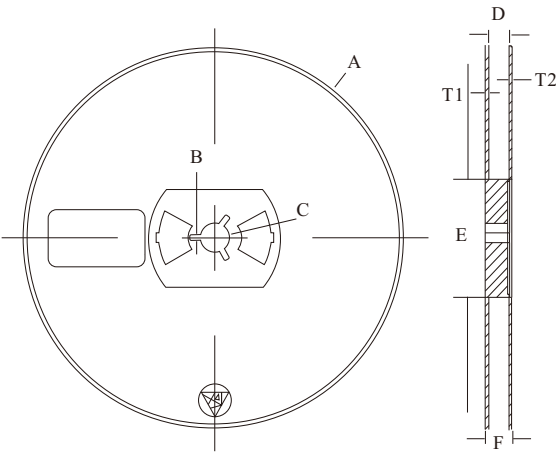
- **Temperature**
5 to 40 °C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

Package Specifications

- The method of packaging



◆ Embossed tape and reel data



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

Reel (7")

