TN2301BPSA

P-Channel Enhancement Mode Power MOSFET

Product Summary

- V_{DS}= -20V,I_D= -3.8A
- $R_{DS(on)}$< 47mΩ @V_{GS}= -4.5V
- $R_{DS(on)}$< 65mΩ @V_{GS}= -2.5V

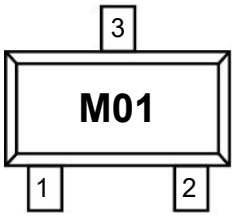
Features

- Advanced Trench Technology
- RoHS and Reach Compliant
- Halogen and Antimony Free
- Moisture Sensitivity Level 1

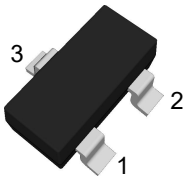
Application

- Load Switch
- PWM Application
- Power Management

Marking Code



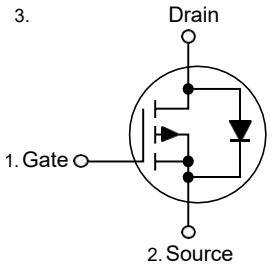
SOT-23



(Top View)

Pin	Description
1	Gate
2	Source
3	Drain

Schematic Diagram



Absolute Maximum Ratings

(Ta=25℃ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	20	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	$-I_D$	3.8	A
Drain Current-Pulsed Note1	$-I_{DM}$	15	A
Maximum Power Dissipation	P_D	1	W
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Characteristics

Thermal Resistance,Junction-to-Ambient Note2	$R_{\theta JA}$	125	°C/W

Electrical Characteristics

(Ta=25℃ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V, I_D = -250uA	-20	-	-	V
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = -4.5V, I_D = -2.8A		69	95	mΩ
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = -2.5V, I_D = -2.0A		83	138	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D = -250uA	-0.40		-0.90	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -9.6V, V_{GS} = 0V			-1	uA
Gate Body Leakage	I_{GSS}	V_{GS} = ±8V, V_{DS} = 0V			±100	nA
Gate Resistance	R_g					Ω
Forward Transconductance	g_{fs}	V_{DS} = -5V, I_D = -4.0A		6.5		S
Dynamic [3]						
Total Gate Charge	Q_g	V_{DS} = -6V, I_D = -2.8A V_{GS} = -4.5V		15.23		nC
Gate-Source Charge	Q_{gs}			5.49		
Gate-Drain Charge	Q_{gd}			2.74		
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = -6V, R_L = 6Ω I_D = 1A,VGEN=4.5V RG =6Ω		17.28		ns
Turn-On Rise Time	t_r			3.73		
Turn-Off Delay Time	$t_{d(off)}$			36.05		
Turn-Off Fall Time	t_f			6.19		
Input Capacitance	C_{iss}	V_{DS} = -6V, V_{GS} = 0V f = 1.0 MHz		882.51		pF
Output Capacitance	C_{oss}			145.54		
Reverse Transfer Capacitance	C_{rss}			97.26		
Source-Drain Diode						
Max. Diode Forward Current	I_S				-2.4	A
Diode Forward Voltage	V_{SD}	I_S = -0.75A, V_{GS} = 0V		-0.8	-1.2	V

Note: Pulse test: pulse width <= 300us, duty cycle<= 2%

Typical Characteristic Curves

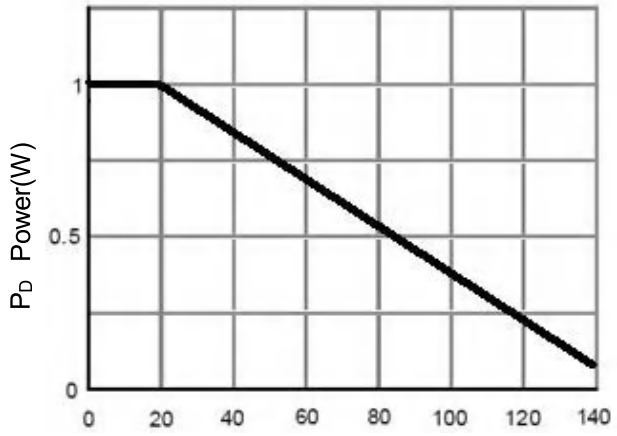


Figure 3 Power Dissipation

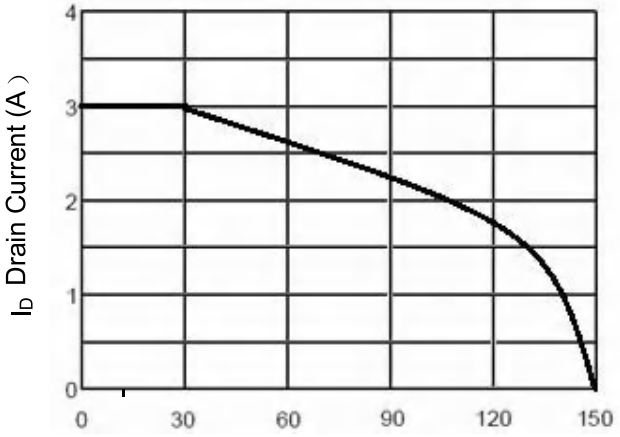


Figure 4 Drain Current

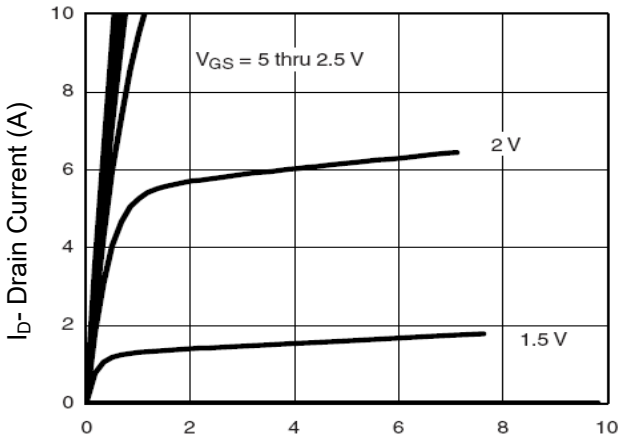


Figure 5 Output Characteristics

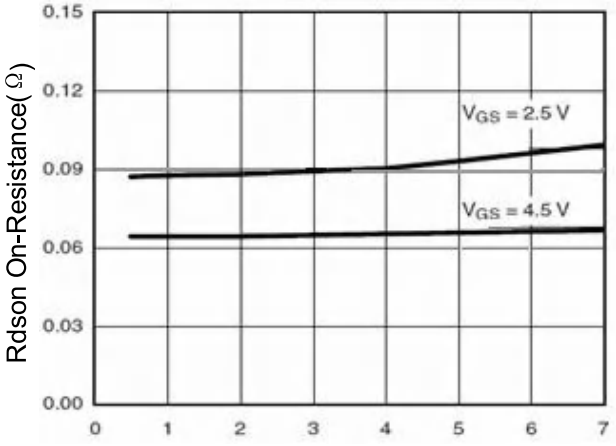


Figure 6 Drain-Source On-Resistance

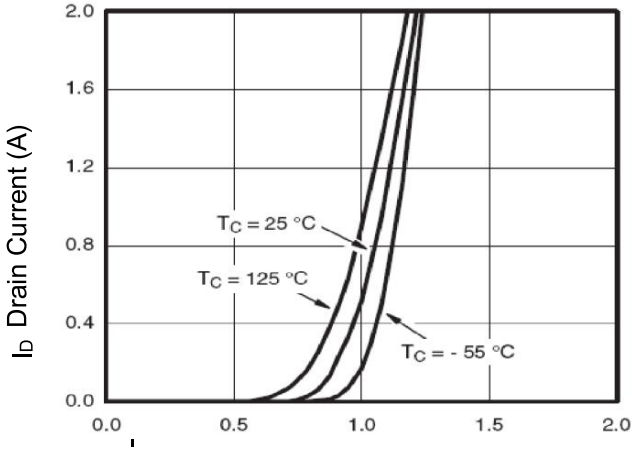


Figure 7 Transfer Characteristics

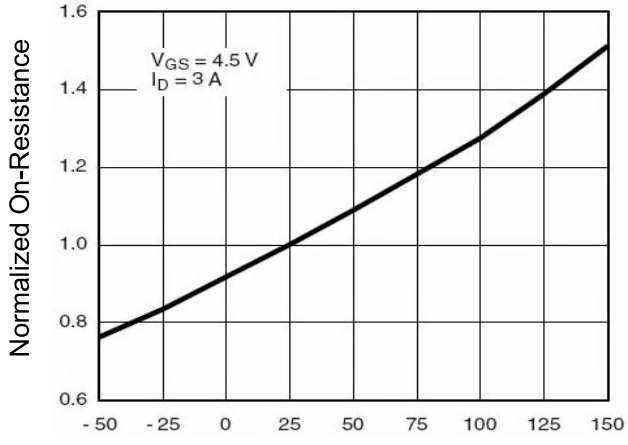


Figure 8 Drain-Source On-Resistance

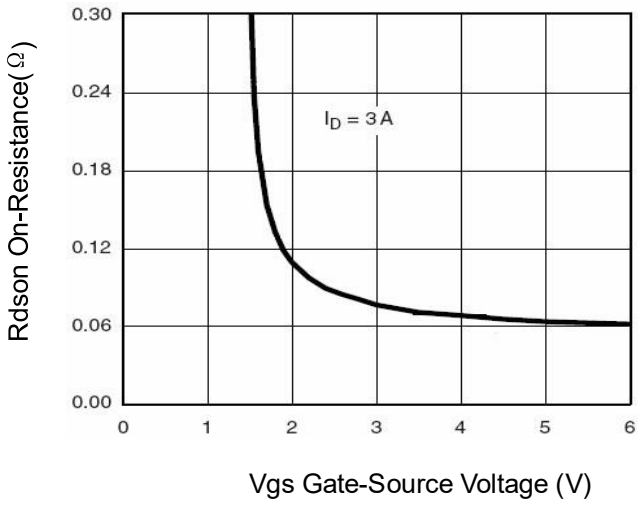


Figure 9 Rdson vs Vgs

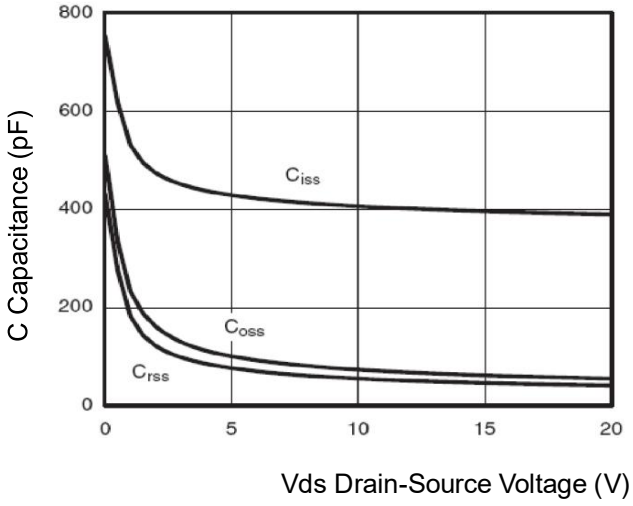


Figure 10 Capacitance vs Vds

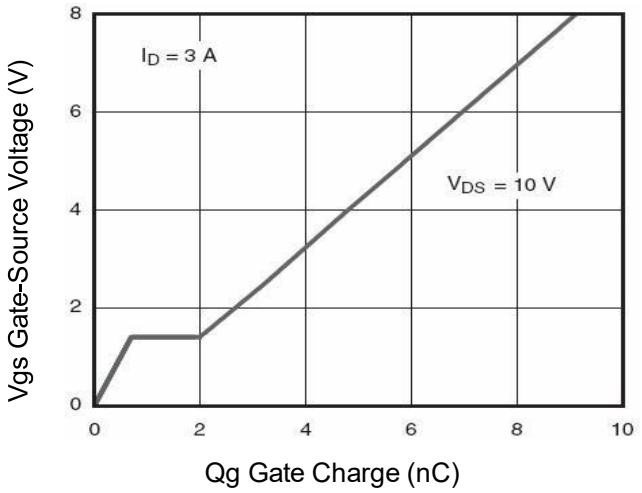


Figure 11 Gate Charge

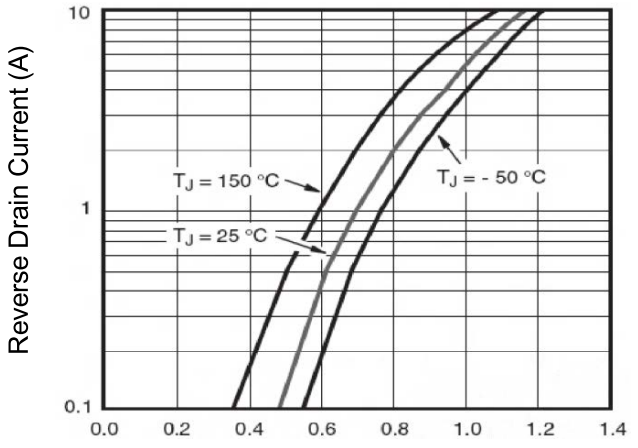


Figure 12 Source- Drain Diode Forward

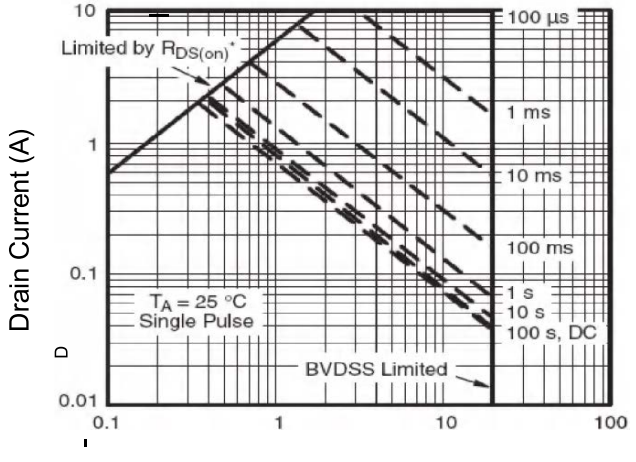


Figure 13 Safe Operation Area

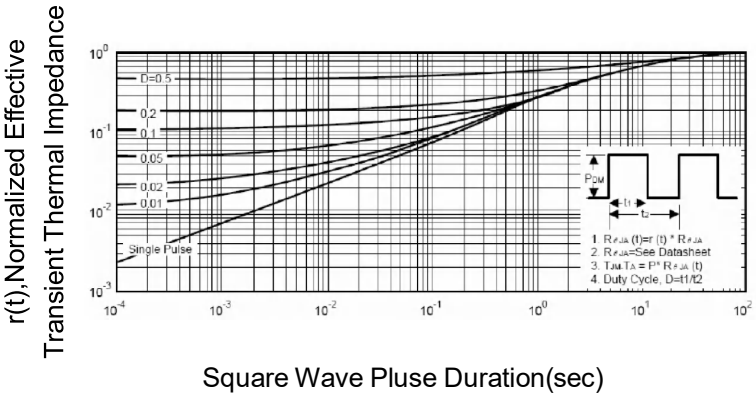
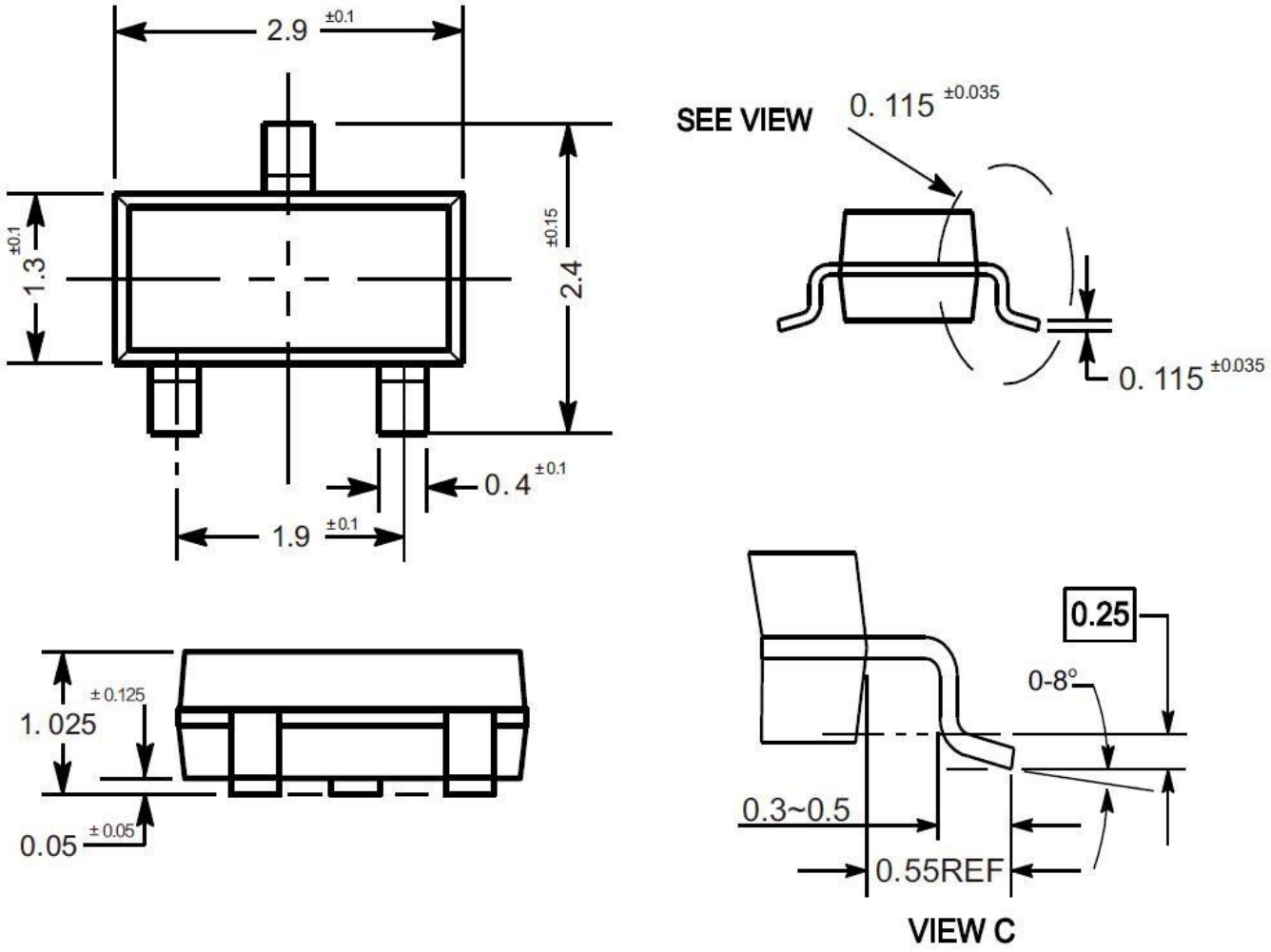


Figure 14 Normalized Maximum Transient Thermal Impedance

Package Outline

SOT-23

Dimensions in mm

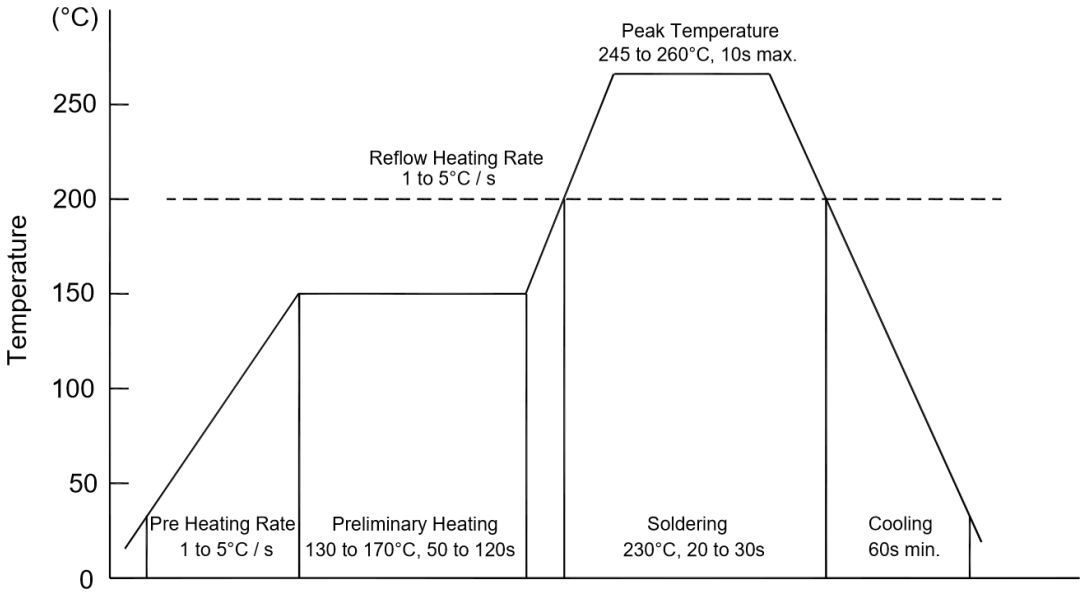


Ordering Information

Device	Package	Shipping
TN2301BPSA	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: 300°C
- Time: 3s max.
- Times: one time

◆ Storage conditions

- **Temperature**

  5 to 40°C

- **Humidity**

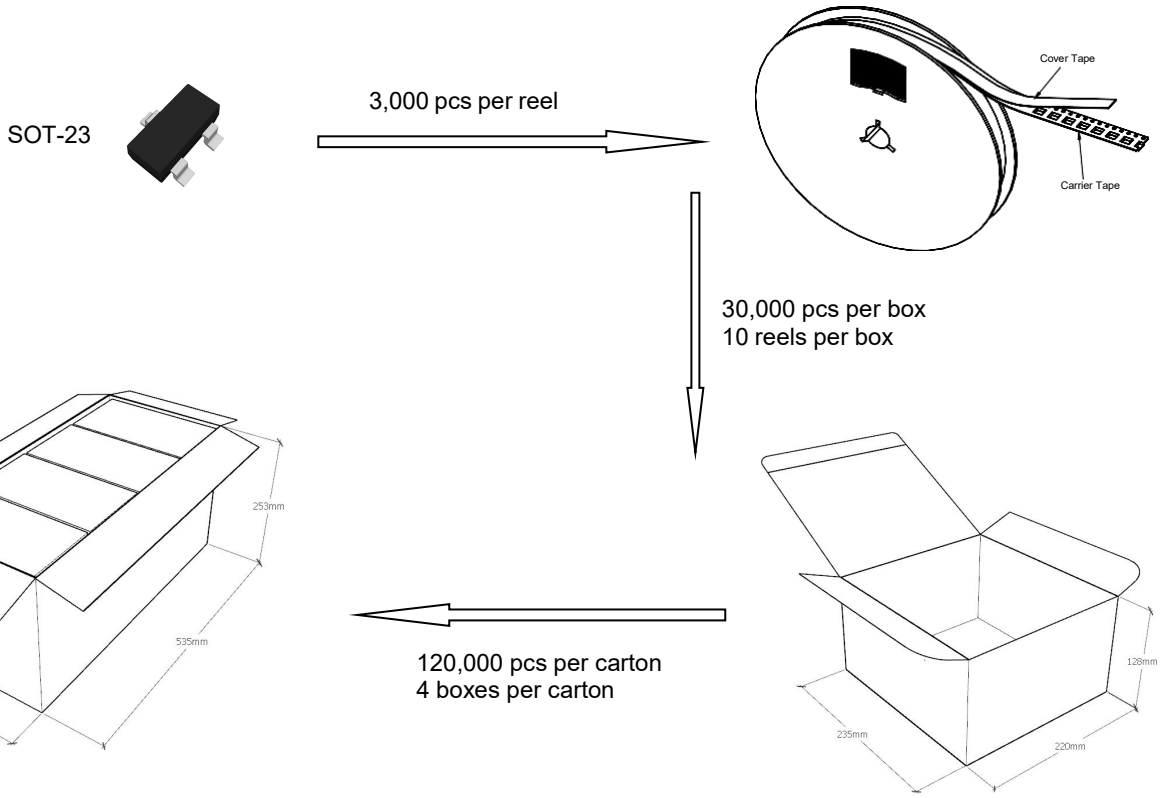
  30 to 80% RH

- **Recommended period**

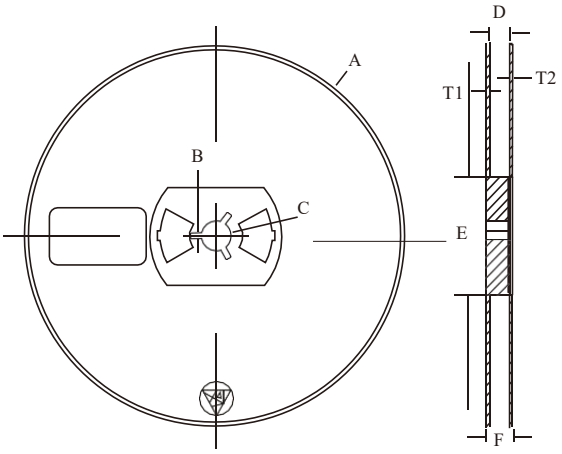
  One year after manufacturing

Package Specifications

- The method of packaging

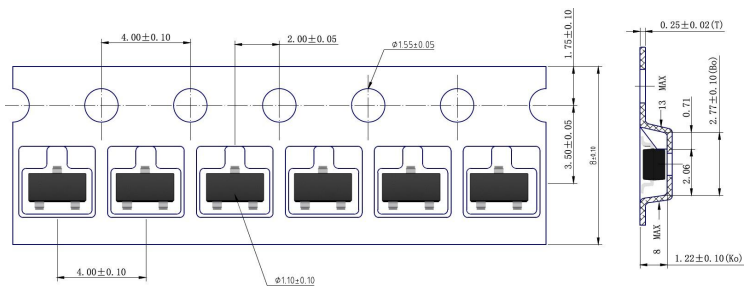


◆ Embossed tape and reel data



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")



Contact Information

TANI website: **http://www.tanisemi.com** Email:tani@tanisemi.com

For additional information, please contact your local Sales Representative.

Product Specification Statement

The product specification aims to provide users with a reference regarding various product parameters, performance, and usage. It presents certain aspects of the product's performance in graphical form and is intended solely for users to select product and make product comparisons, enabling users to better understand and evaluate the characteristics and advantages of the product. It does not constitute any commitment, warranty, or guarantee.

The product parameters described in the product specification are numerical values, characteristics, and functions obtained through actual testing or theoretical calculations of the product in an independent or ideal state. Due to the complexity of product applications and variations in test conditions and equipment, there may be slight fluctuations in parameter test values. TANI shall not guarantee that the actual performance of the product when installed in the customer's system or equipment will be entirely consistent with the product specification, especially concerning dynamic parameters. It is recommended that users consult with professionals for product selection and system design. Users should also thoroughly validate and assess whether the actual parameters and performance when installed in their respective systems or equipment meet their requirements or expectations. Additionally, users should exercise caution in verifying product compatibility issues, and TANI assumes no responsibility for the application of the product. TANI strives to provide accurate and up -to- date information to the best of our ability. However, due to technical, human, or other reasons, TANI cannot guarantee that the information provided in the product specification is entirely accurate and error-free. TANI shall not be held responsible for any losses or damages resulting from the use or reliance on any information in these product specifications.

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The design of the product is intended to meet civilian needs and is not guaranteed for use in harsh environments or precision equipment. It is not recommended for use in systems or equipment such as medical devices, aircraft, nuclear power, and similar systems, where failures in these systems or equipment could reasonably be expected to result in personal injury. TANI shall assume no responsibility for any consequences resulting from such usage.

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