

P-Channel Enhancement Mode Power MOSFET SOT-23-3

Product Summary

- $V_{DS} = -20V, I_D = -9A$
- $R_{DS(on)} < 25m\Omega @ V_{GS} = -4.5V$
- $R_{DS(on)} < 30m\Omega @ V_{GS} = -2.5V$

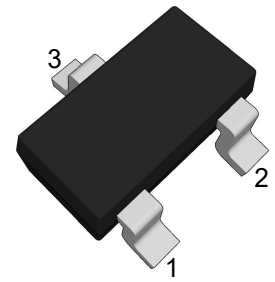
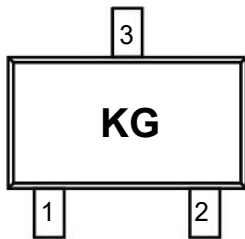
Features

- Advanced Trench Technology
- RoHS and Reach Compliant
- Halogen and Antimony Free
- Moisture Sensitivity Level 3

Application

- Load Switch
- PWM Application
- Power Management

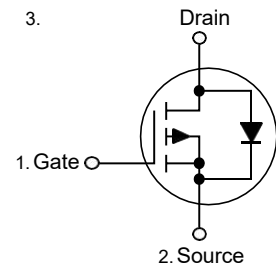
Marking Code



(Top View)

Pin	Description
1	Gate
2	Source
3	Drain

Schematic Diagram



Absolute Maximum Ratings

(Ta=25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous	$-I_D$	9	A
Drain Current-Pulsed ^{Note1}	$-I_{DM}$	30	A
Maximum Power Dissipation	P_D	1.3	W
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-55 to +150	°C

Thermal Characteristics

Thermal Resistance, Junction-to-Ambient ^{Note2}	$R_{\theta JA}$	96	°C/W
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Electrical Characteristics

(T_J=25°C unless otherwise specified)

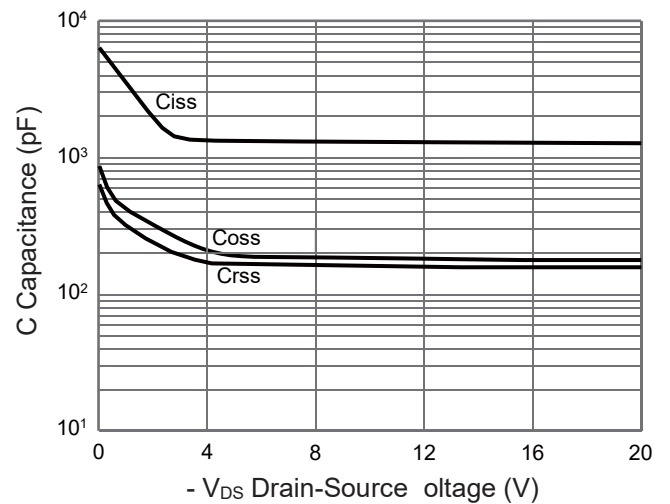
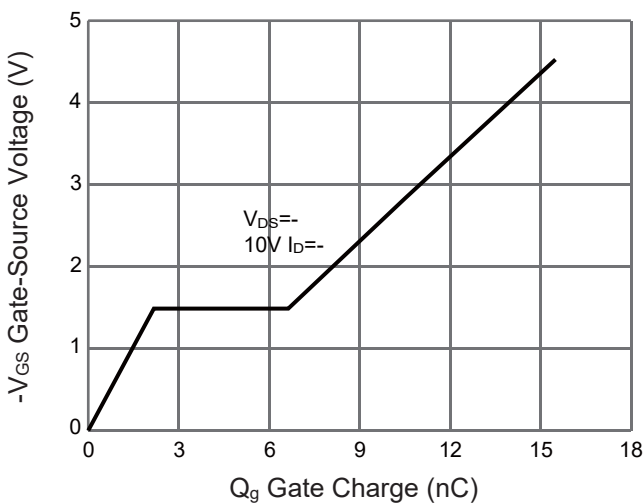
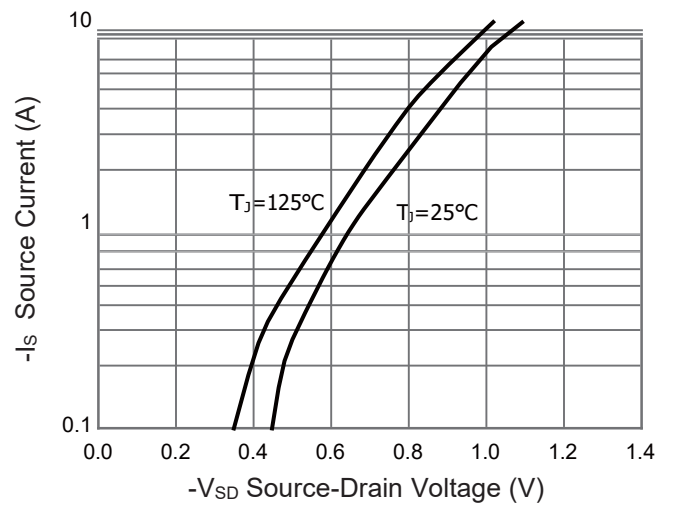
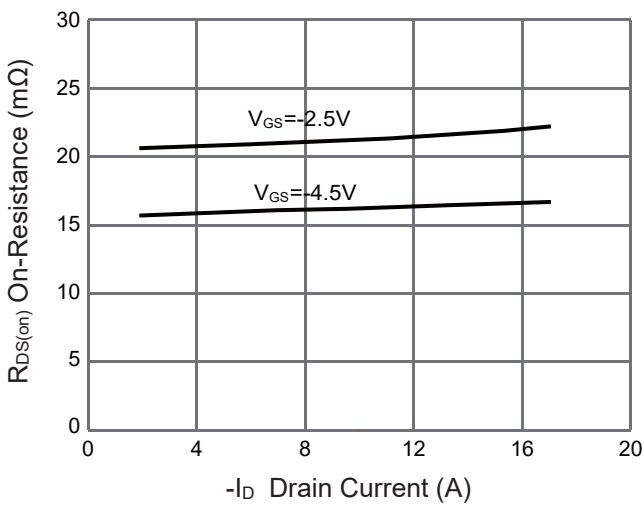
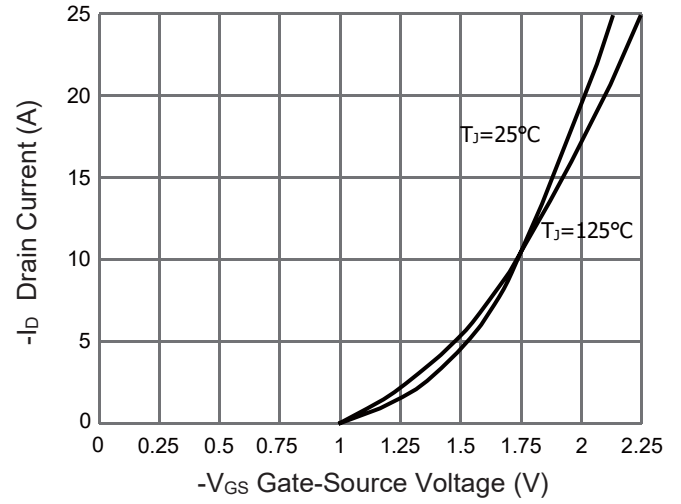
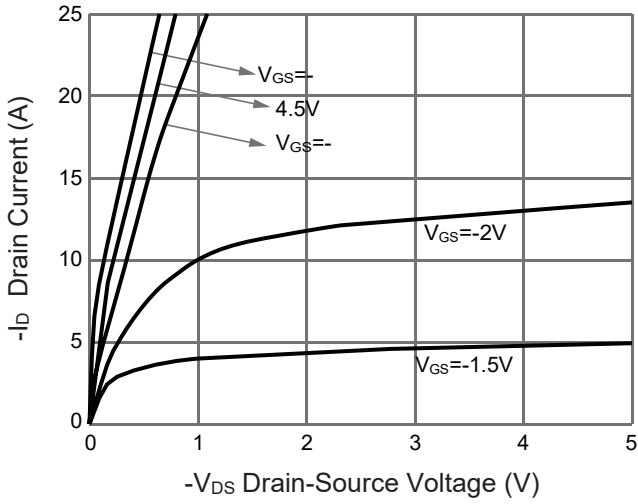
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	-V _{(BR)DSS}	V _{GS} =0V, I _D =-250μA	20	--	--	V
Zero Gate Voltage Drain Current	-I _{DSS}	V _{DS} =-20V, V _{GS} =0V	--	--	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V	--	--	±100	nA
Gate Threshold Voltage ^{Note3}	-V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	0.4	0.62	1.0	V
Drain-Source On-Resistance ^{Note3}	R _{DS(on)}	V _{GS} =-4.5V, I _D =-6A	--	16	25	mΩ
		V _{GS} =-2.5V, I _D =-6A	--	21	30	mΩ
Forward Transconductance ^{Note3}	g _{FS}	V _{DS} =-5V, I _D =-1A	--	8	--	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =-10V, V _{GS} =0V, f=1MHz	--	1315	--	pF
Output Capacitance	C _{oss}		--	180	--	pF
Reverse Transfer Capacitance	C _{rss}		--	153	--	pF
Gate Resistance	R _G	V _{DS} =0V, V _{GS} =0V, f=1MHz	--	14	--	Ω
Total Gate Charge	Q _g	V _{DS} =-10V, I _D =-3A, V _{GS} =-4.5V	--	15.3	--	nC
Gate-Source Charge	Q _{gs}		--	2.2	--	nC
Gate-Drain Charge	Q _{gd}		--	4.4	--	nC
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-10V, I _D =-7A, V _{GS} =-4.5V, R _{GEN} =2.5Ω	--	10	--	nS
Turn-on Rise Time	t _r		--	31	--	nS
Turn-off Delay Time	t _{d(off)}		--	28	--	nS
Turn-off Fall Time	t _f		--	8	--	nS
Source-Drain Diode Characteristics						
Diode Forward Voltage ^{Note3}	-V _{SD}	V _{GS} =0V, I _S =-9A	--	--	1.2	V
Diode Forward Current ^{Note2}	-I _S		--	--	9	A

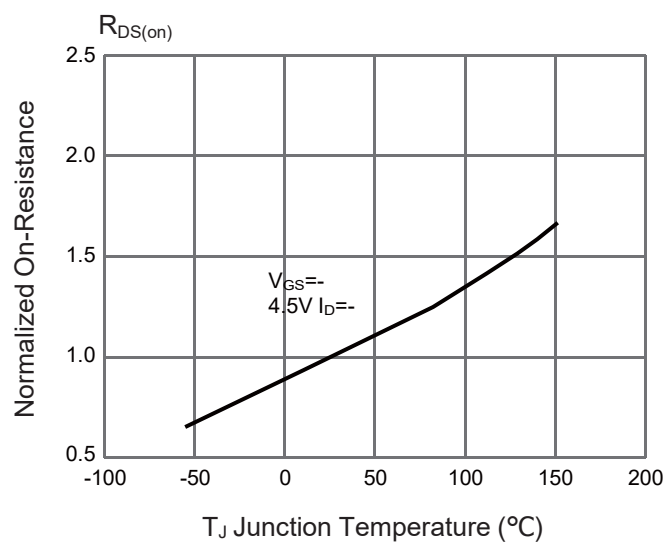
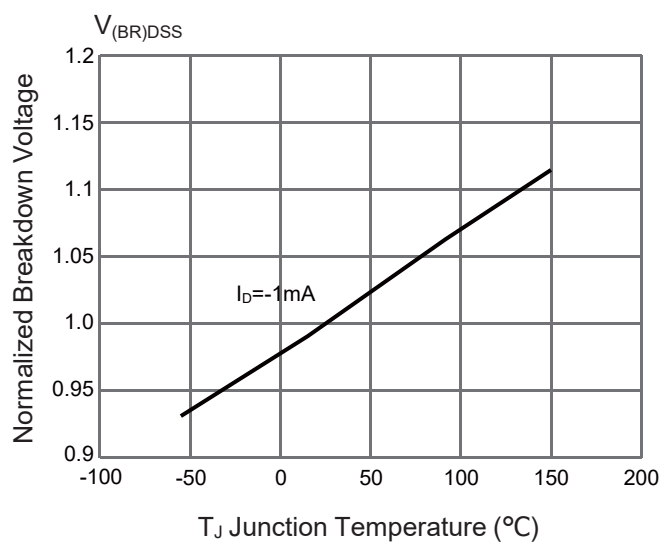
Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

2. Surface Mounted on FR4 Board, t ≤ 10 sec.

3. Pulse Test: Pulse width ≤ 300μs, duty cycle ≤ 2%.

Typical Characteristic Curves

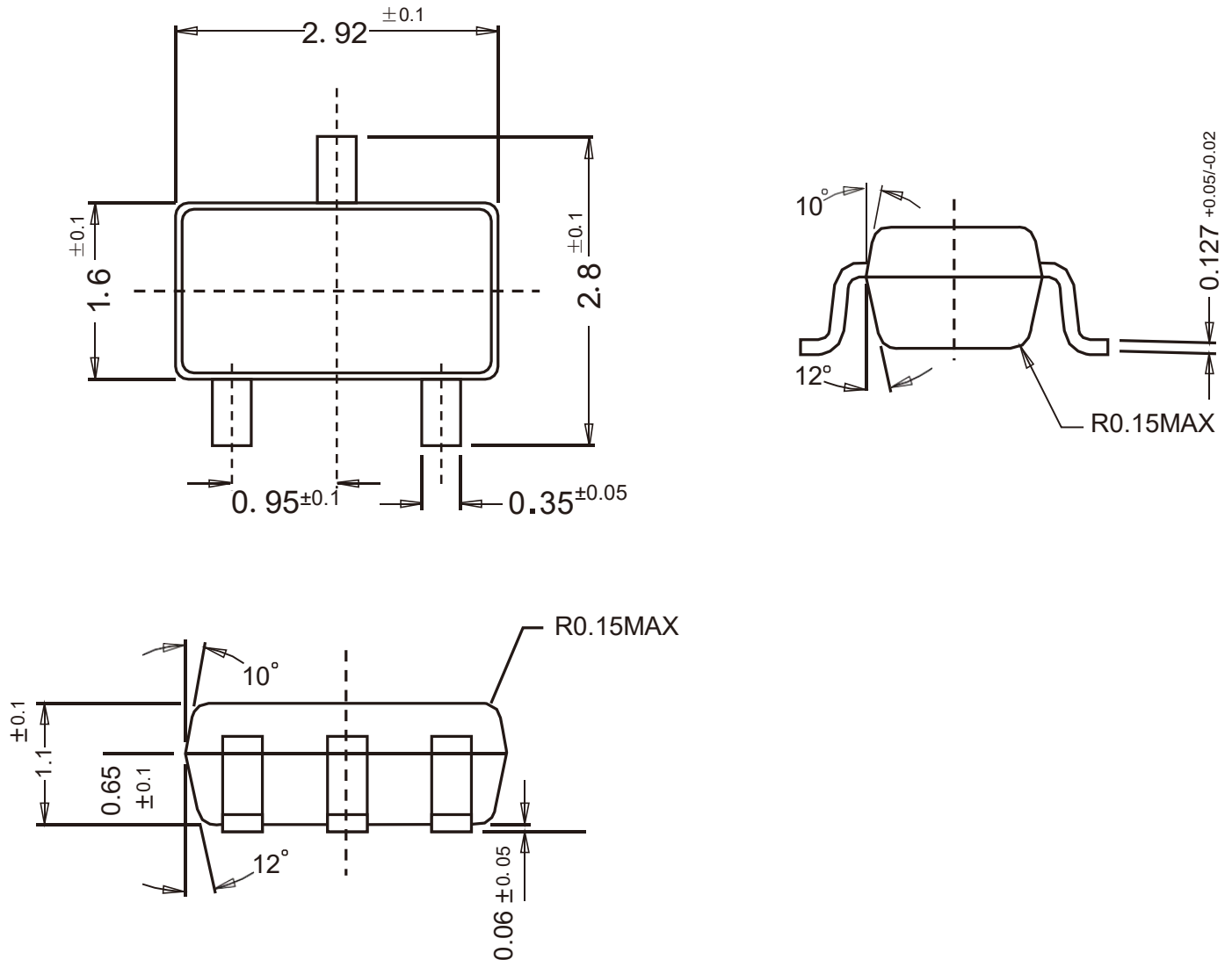




Package Outline

SOT-23-3

Dimensions in mm

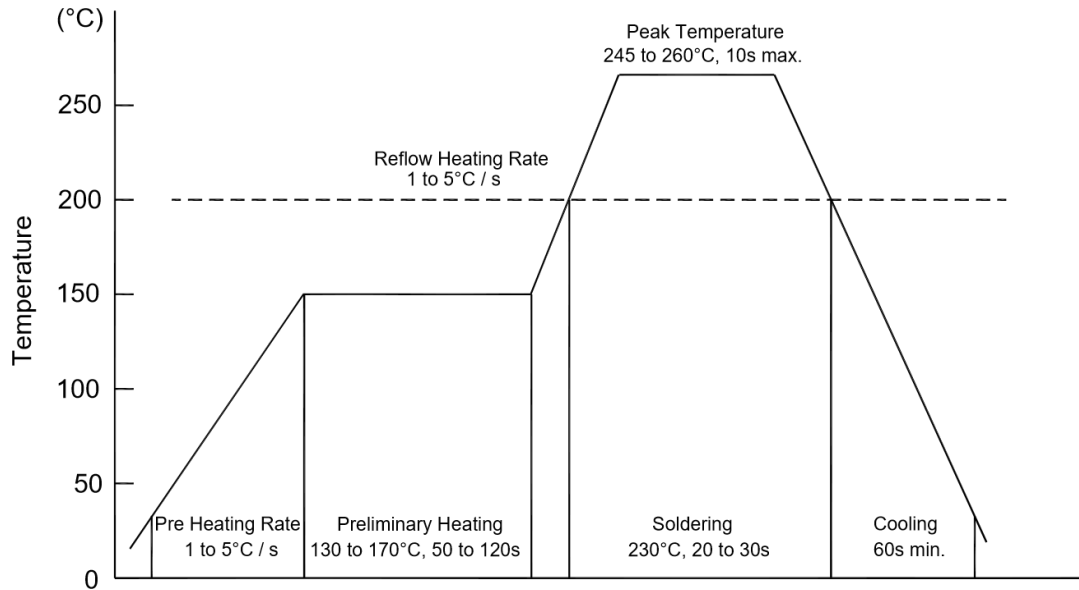


Ordering Information

Device	Package	Shipping
TN09P20SC	SOT-23-3	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

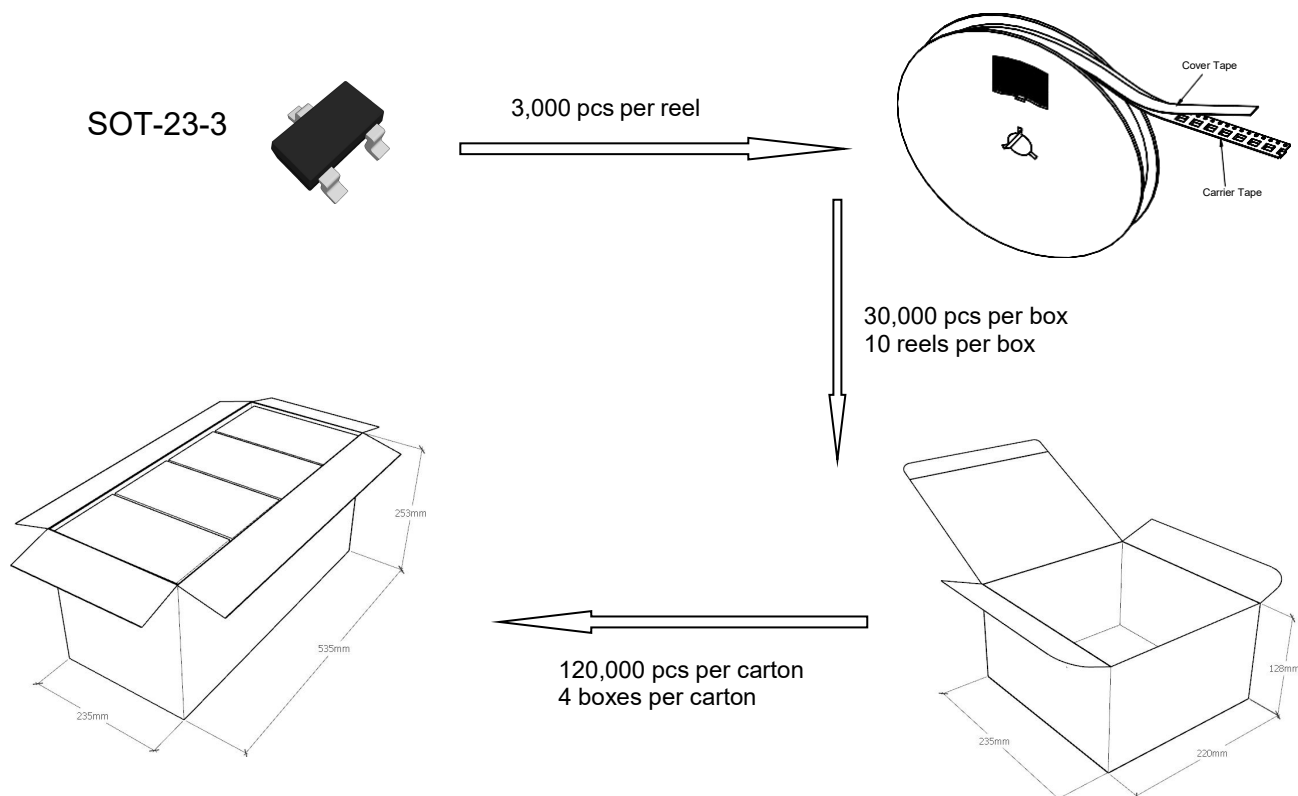
- Temperature: 370 °C
- Time: 3s max.
- Times: one time

◆ Storage conditions

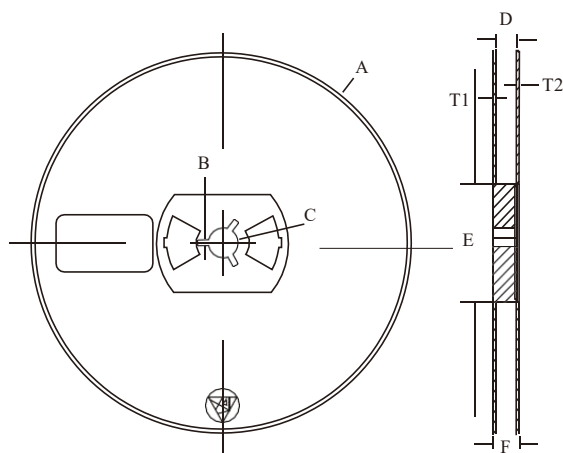
- **Temperature**
5 to 40 °C
- **Humidity**
30 to 80% RH
- **Recommended period**
One year after manufacturing

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")

