

## Product Summary

- $V_{DS} = -100V, I_D = -5A$
- $R_{DS(on)} < 350m\Omega @ V_{GS} = -10V$
- $R_{DS(on)} < 400m\Omega @ V_{GS} = -4.5V$

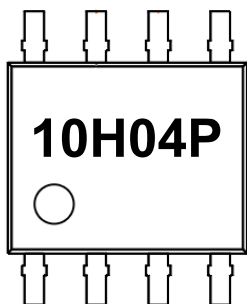
## Features

- Advanced Trench Technology
- 100% Avalanche Tested
- RoHS and Reach Compliant
- Halogen and Antimony Free
- Moisture Sensitivity Level 3

## Application

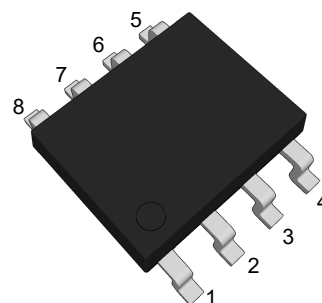
- Load Switch
- PWM Applications
- Power Management

## Marking Code



## P-Channel Enhancement Mode Power MOSFET

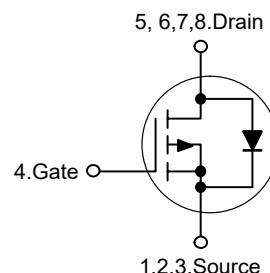
### SOP-8



(Top View)

Pin	Description
1,2,3	Source
4	Gate
5,6,7,8	Drain

## Schematic Diagram



## Absolute Maximum Ratings

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$-I_D$	5	A
Drain Current-Pulsed <sup>Note1</sup>	$-I_{DM}$	26.8	A
Maximum Power Dissipation	$P_D$	40	W
Single Pulse Avalanche Energy <sup>Note2</sup>	$E_{AS}$	109	mJ
Junction Temperature	$T_J$	150	°C
Storage Temperature Range	$T_{STG}$	-55 to +150	°C

## Thermal Characteristics

Thermal Resistance Junction-Case1 <sup>Note1</sup>	$R_{\theta JC}$	3.7	°C/W
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## Electrical Characteristics

(Ta=25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-100	---	---	V
△BV <sub>DSS</sub> /△T <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	---	---	V/ °C
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-15A	---	254	350	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A	---	290	400	
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-5A	---	---	---	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-1	-1.7	-2.5	V
△V <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	---	---	mV/ °C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-100V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	-1	uA
		V <sub>DS</sub> =-100V, V <sub>GS</sub> =0V, T <sub>J</sub> =100°C	---	---	-100	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-10V, I <sub>D</sub> =-4A	---	10	---	S
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =-50V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-3A	---	19.6	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	6	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	4.2	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =-50V, V <sub>GS</sub> =-10V, R <sub>G</sub> =3Ω	---	13.5	---	ns
T <sub>r</sub>	Rise Time		---	3.8	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	42	---	
T <sub>f</sub>	Fall Time		---	6.4	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-50V, V <sub>GS</sub> =0V, f=1MHz	---	1199	---	pF
C <sub>oss</sub>	Output Capacitance		---	33.8	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	28.2	---	

## Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,4</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-5	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,4</sup>		---	---	-20	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C	---	---	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =-3A, di/dt=100A/μs, T <sub>J</sub> =25°C	---	42.9	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	83.7	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3.The EAS data shows Max. rating. The test condition is T<sub>J</sub> = 25°C, V<sub>DD</sub>=-50V, V<sub>G</sub>=-10V, R<sub>G</sub>=25Ω, L=0.5mH.
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

Typical Characteristic Curves

Figure 1. Output Characteristics

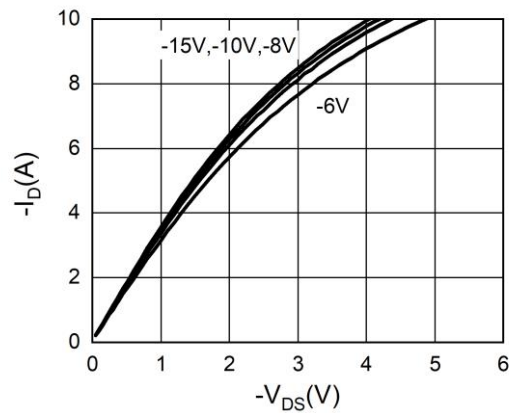


Figure 2. Transfer Characteristics

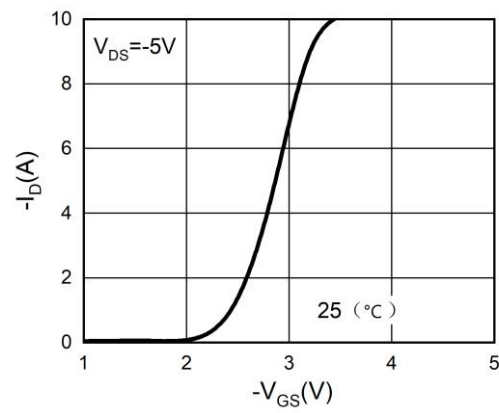


Figure 3. Power Dissipation

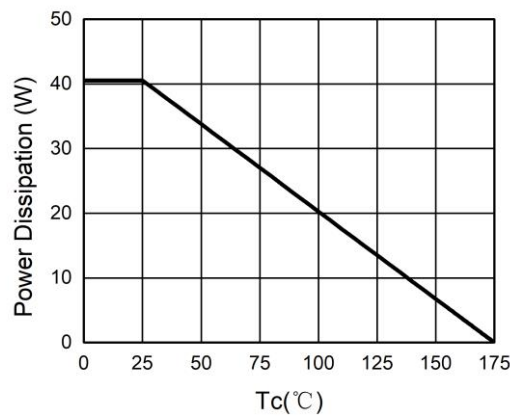


Figure 4. Drain Current

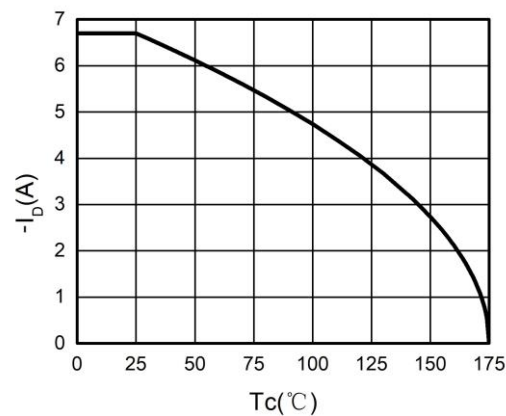


Figure 5. BVDS vs Junction Temperature

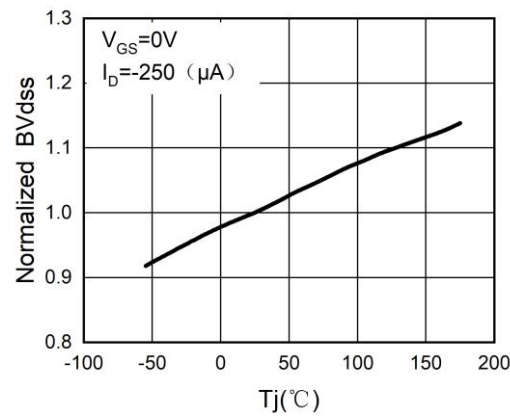
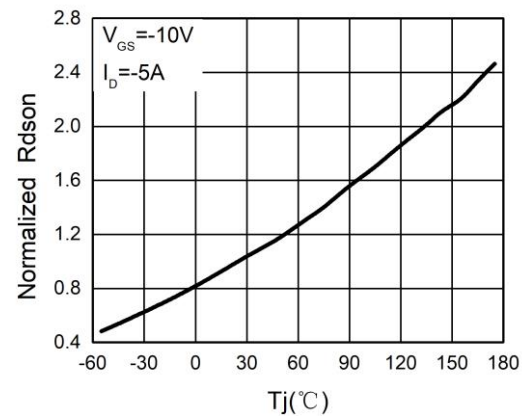


Figure 6. RDS(ON) vs Junction Temperature



Typical Characteristic Curves

Figure 7. Gate Charge Waveforms

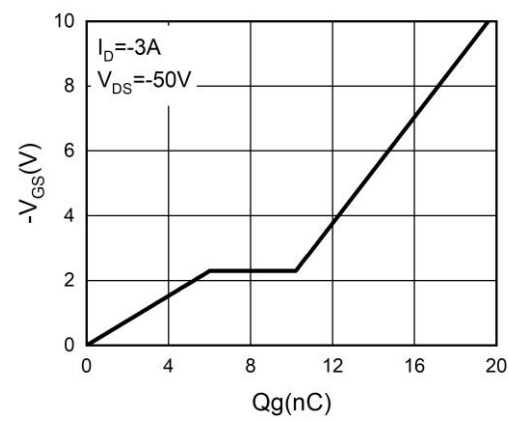


Figure 8. Capacitance

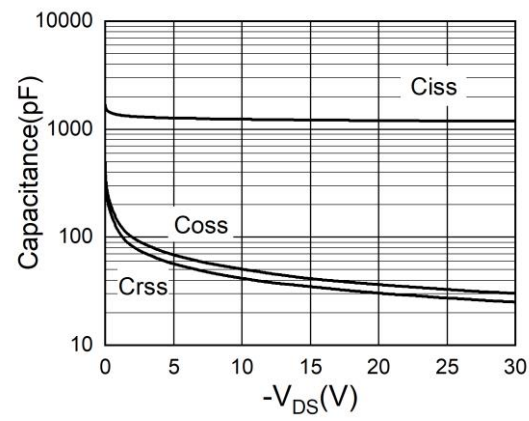


Figure 9. Body-Diode Characteristics

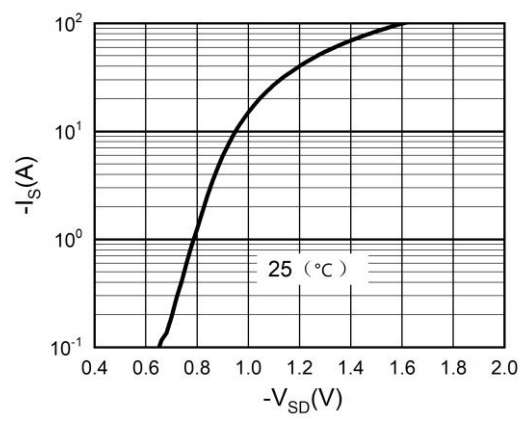
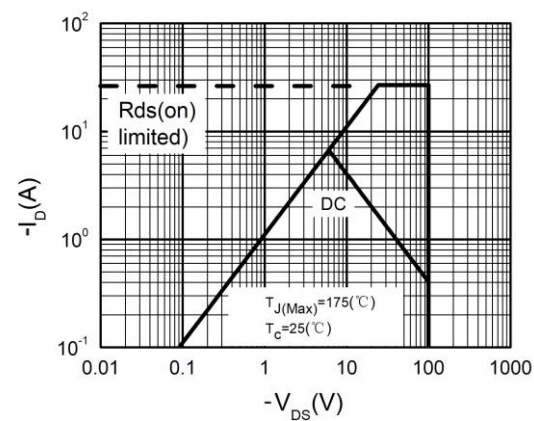


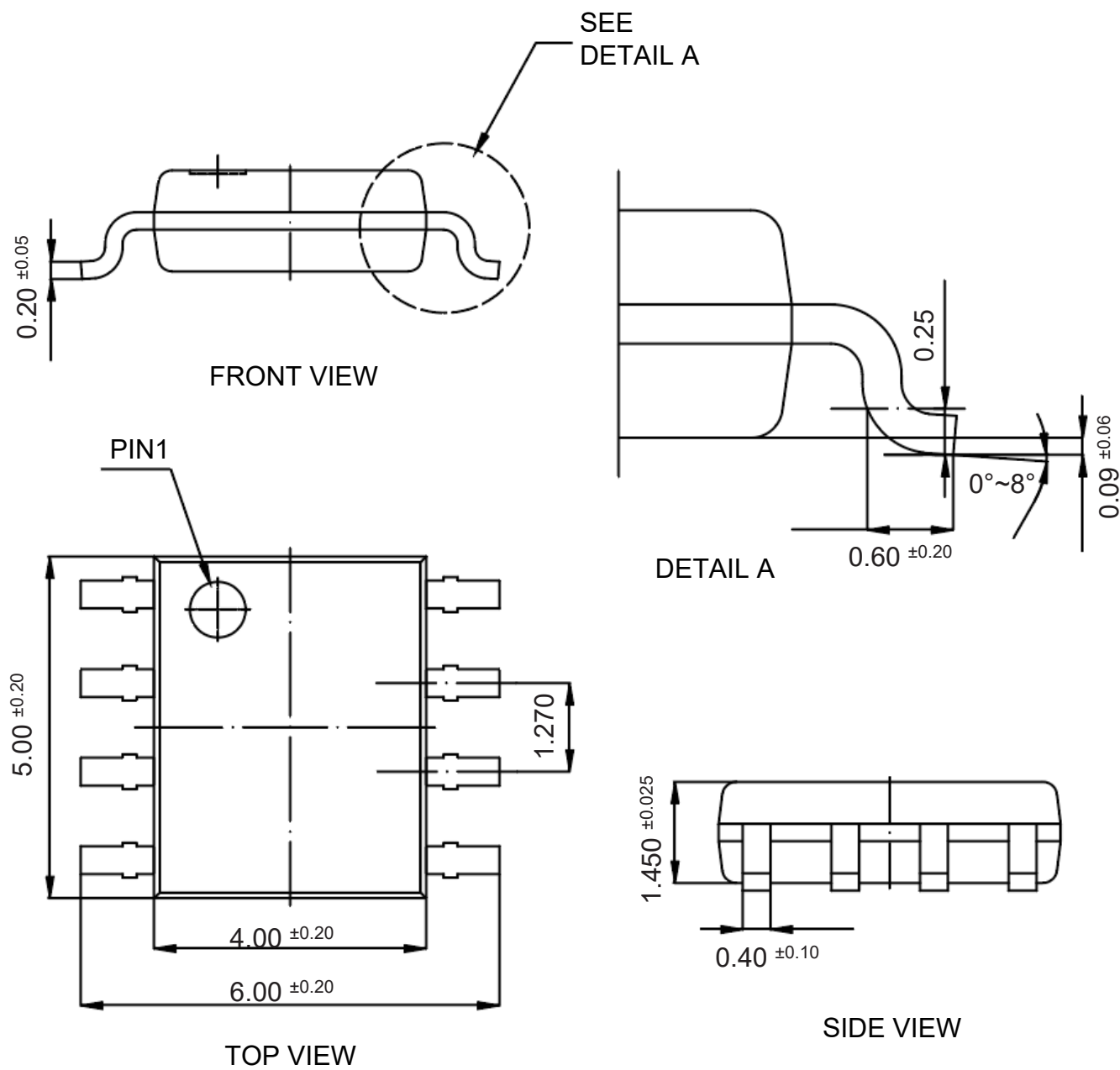
Figure 10. Maximum Safe Operating Area



Package Outline

SOP-8

Dimensions in mm

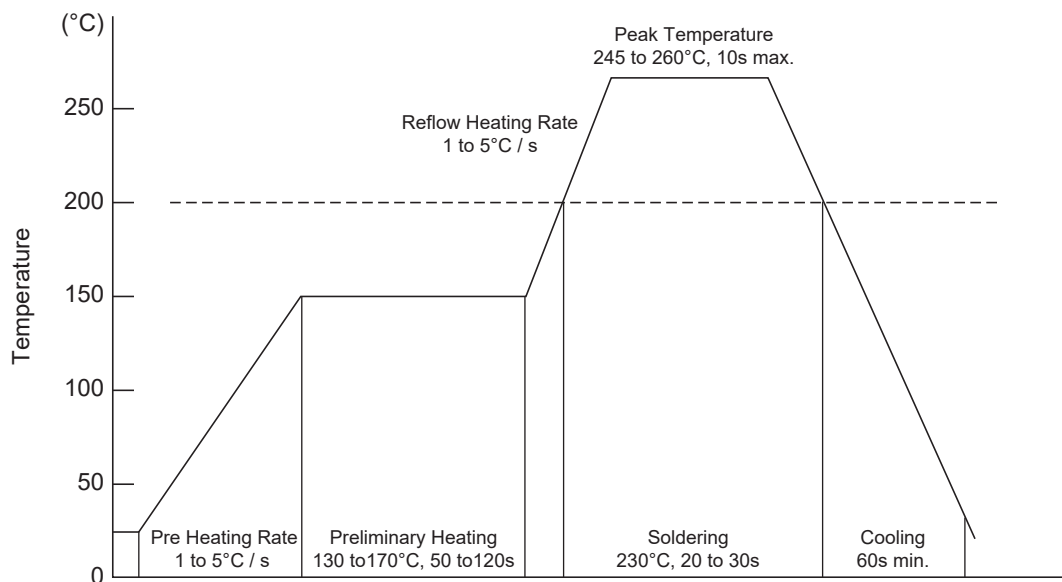


Ordering Information

Device	Package	Shipping
TN10H04PPA	SOP-8	4,000PCS/Reel&13inches

## 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

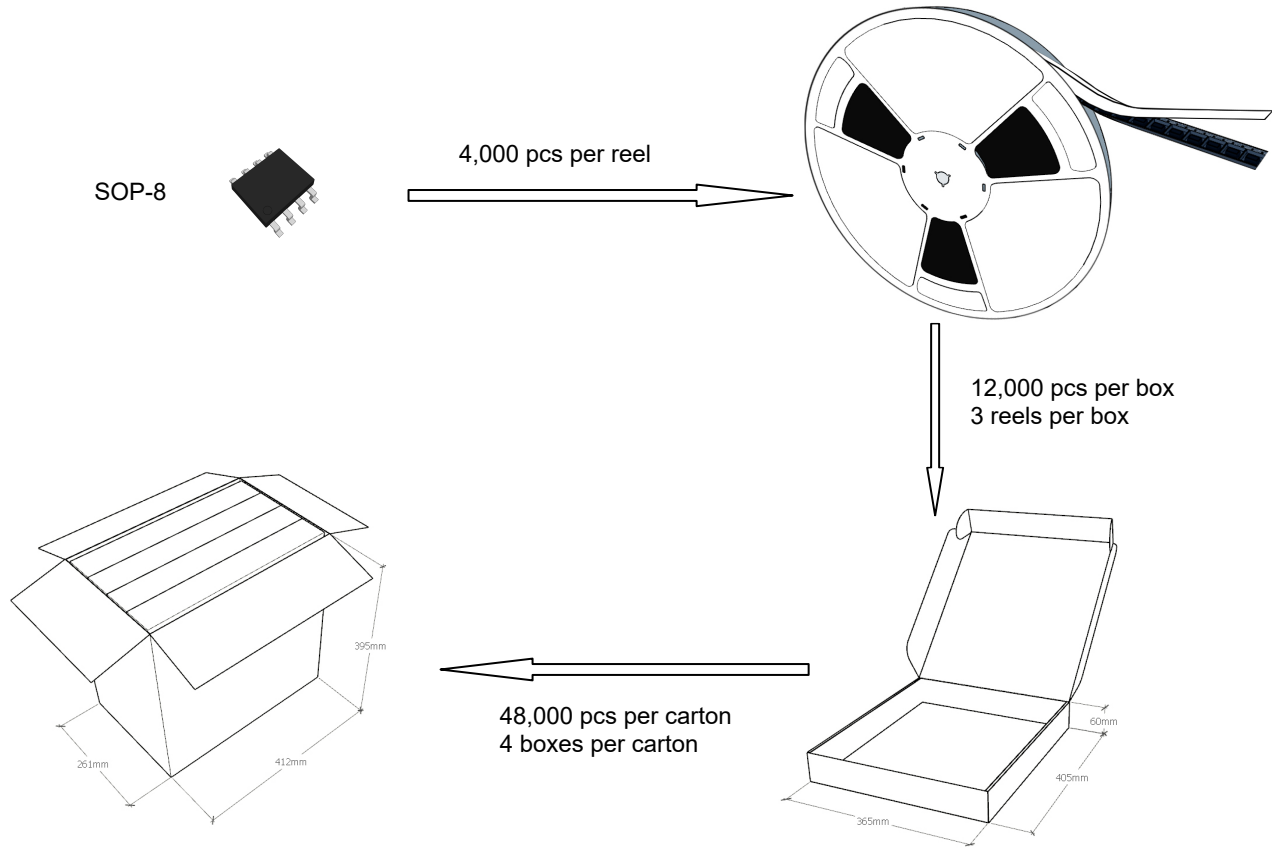
- Temperature: 300°C
- Time: 3s max.
- Times: one time

### ◆ Storage conditions

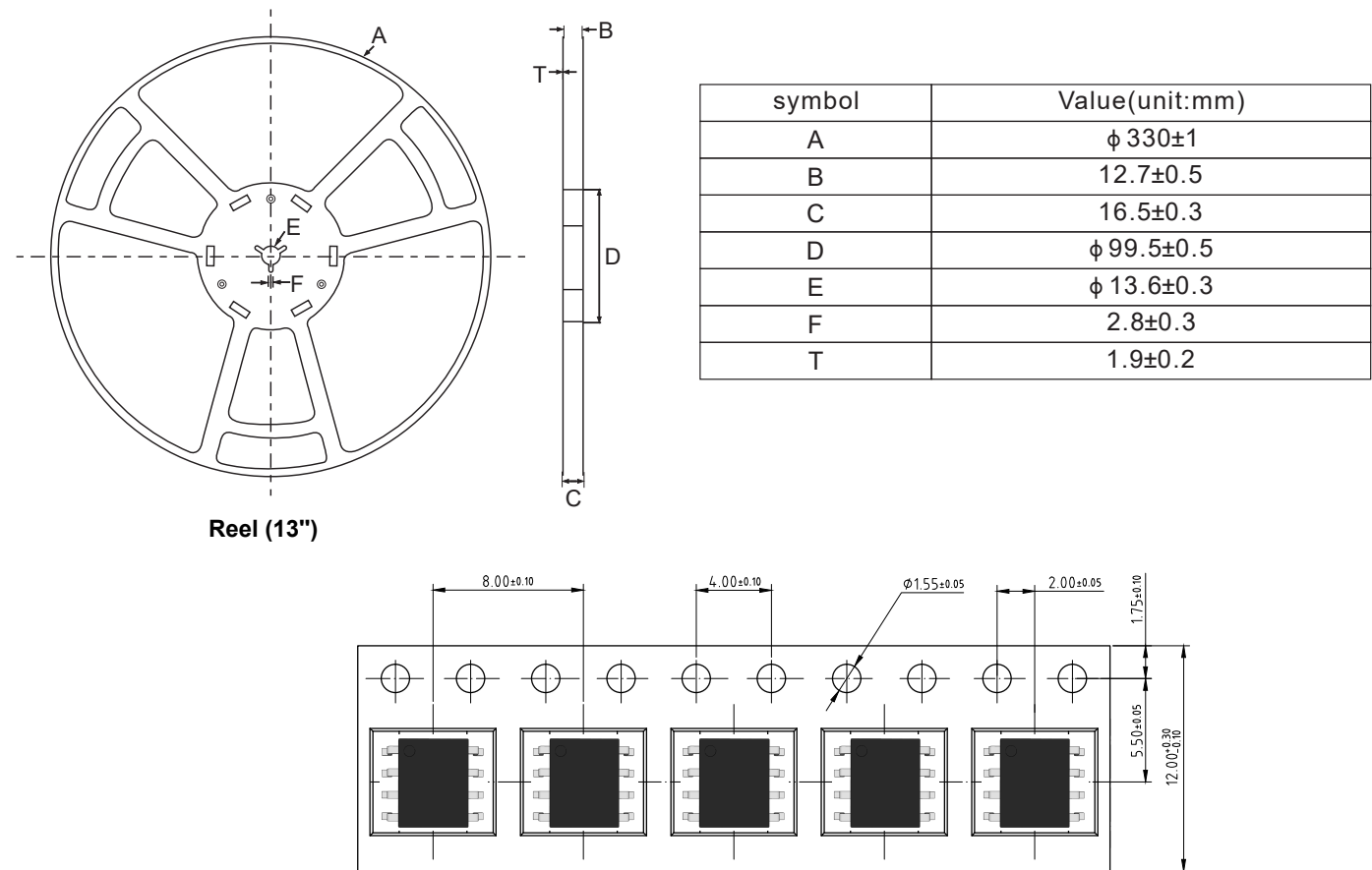
- **Temperature**  
5 to 40°C
- **Humidity**  
30 to 80% RH
- **Recommended period**  
One year after manufacturing

Package Specifications

- The method of packaging



◆ Embossed tape and reel data



## Contact Information

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For additional information, please contact your local Sales Representative.



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### Product Specification Statement

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