

# Power MOSFET

## 200 mAmps, 50 Volts

### N-Channel SOT-23

Typical applications are dc-dc converters, power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

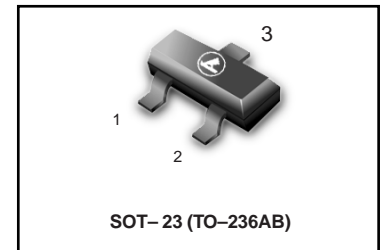
- Low Threshold Voltage ( $V_{GS(th)}$ : 0.5V...1.5V) makes it ideal for low voltage applications
- Miniature SOT-23 Surface Mount Package saves board space
- Pb-Free Package May be Available. The G-Suffix Denotes a Pb-Free Lead Finish
- We declare that the material of product are Halogen Free and compliance with RoHS requirements.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

#### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DSS}$	50	Vdc
Gate-to-Source Voltage – Continuous	$V_{GS}$	$\pm 20$	Vdc
Drain Current			mA
– Continuous @ $T_A = 25^\circ\text{C}$	$I_D$	200	
– Pulsed Drain Current ( $t_p \leq 10 \mu\text{s}$ )	$I_{DM}$	800	
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_D$	225	mW
Operating and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150	$^\circ\text{C}$
Thermal Resistance – Junction-to-Ambient	$R_{\theta JA}$	556	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes, for 10 seconds	$T_L$	260	$^\circ\text{C}$

## LBSS138LT1G

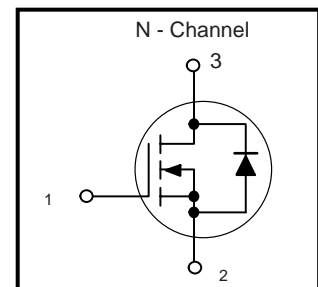
### S-LBSS138LT1G



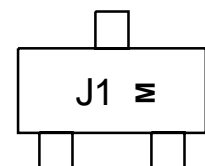
**200 mAmps**

**50 Volts**

$R_{DS(on)} = 3.5 \Omega$



**MARKING DIAGRAM & PIN ASSIGNMENT**



J1 = Device Code  
M = Month Code

#### ORDERING INFORMATION

Device	Package	Shipping
LBSS138LT1G S-LBSS138LT1G	SOT-23	3000 Tape & Reel
LBSS138LT3G S-LBSS138LT3G	SOT-23	10000 Tape & Reel

**LBSS138LT1G , S-LBSS138LT1G**

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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**OFF CHARACTERISTICS**

Drain-to-Source Breakdown Voltage ( $V_{GS} = 0 \text{ Vdc}$ , $I_D = 250 \mu\text{Adc}$ )	$V_{(BR)DSS}$	50	–	–	Vdc
Zero Gate Voltage Drain Current ( $V_{DS} = 25 \text{ Vdc}$ , $V_{GS} = 0 \text{ Vdc}$ ) ( $V_{DS} = 50 \text{ Vdc}$ , $V_{GS} = 0 \text{ Vdc}$ )	$I_{DSS}$	–	–	0.1 0.5	$\mu\text{Adc}$
Gate-Source Leakage Current ( $V_{GS} = \pm 20 \text{ Vdc}$ , $V_{DS} = 0 \text{ Vdc}$ )	$I_{GSS}$	–	–	$\pm 0.1$	$\mu\text{Adc}$

**ON CHARACTERISTICS** (Note 1.)

Gate-Source Threshold Voltage ( $V_{DS} = V_{GS}$ , $I_D = 1.0 \text{ mAdc}$ )	$V_{GS(th)}$	0.5	–	1.5	Vdc
Static Drain-to-Source On-Resistance ( $V_{GS} = 2.75 \text{ Vdc}$ , $I_D < 200 \text{ mAdc}$ , $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ ) ( $V_{GS} = 5.0 \text{ Vdc}$ , $I_D = 200 \text{ mAdc}$ )	$r_{DS(on)}$	–	5.6 –	10 3.5	Ohms
Forward Transconductance ( $V_{DS} = 25 \text{ Vdc}$ , $I_D = 200 \text{ mAdc}$ , $f = 1.0 \text{ kHz}$ )	$g_{fs}$	100	–	–	mmhos

**DYNAMIC CHARACTERISTICS**

Input Capacitance	( $V_{DS} = 25 \text{ Vdc}$ , $V_{GS} = 0$ , $f = 1 \text{ MHz}$ )	$C_{iss}$	–	40	50	pF
Output Capacitance	( $V_{DS} = 25 \text{ Vdc}$ , $V_{GS} = 0$ , $f = 1 \text{ MHz}$ )	$C_{oss}$	–	12	25	
Transfer Capacitance	( $V_{DG} = 25 \text{ Vdc}$ , $V_{GS} = 0$ , $f = 1 \text{ MHz}$ )	$C_{rss}$	–	3.5	5.0	

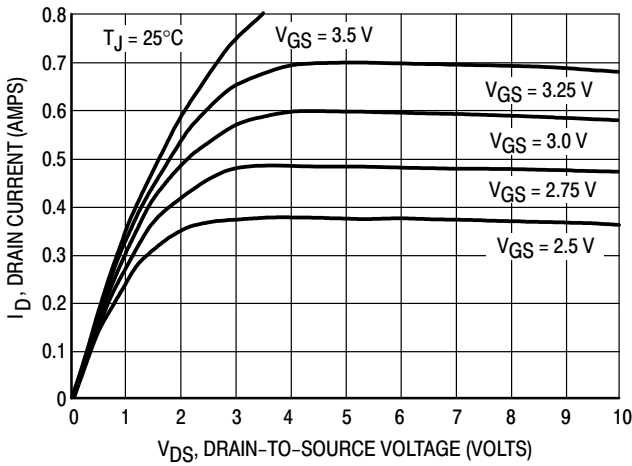
**SWITCHING CHARACTERISTICS** (Note 2.)

Turn-On Delay Time	( $V_{DD} = 30 \text{ Vdc}$ , $I_D = 0.2 \text{ Adc}$ ,)	$t_{d(on)}$	–	–	20	ns
Turn-Off Delay Time		$t_{d(off)}$	–	–	20	

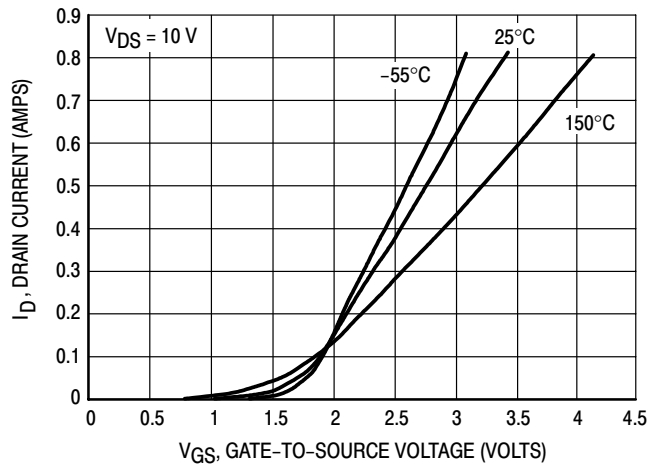
1. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
2. Switching characteristics are independent of operating junction temperature.

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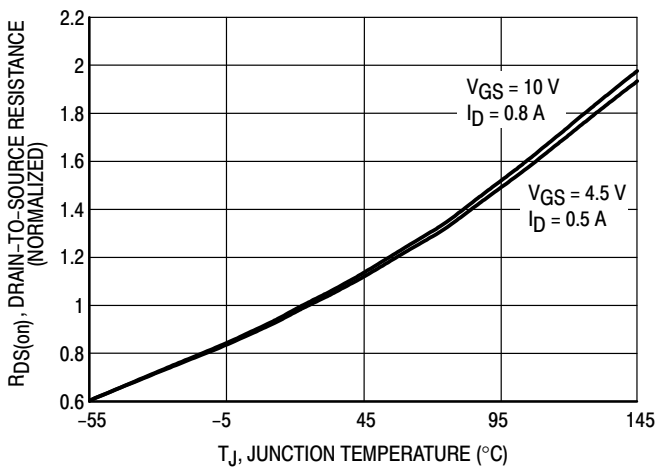
**TYPICAL ELECTRICAL CHARACTERISTICS**



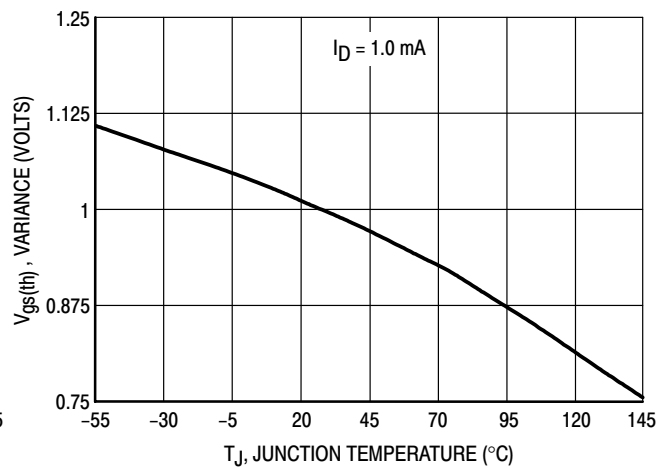
**Figure 1. On-Region Characteristics**



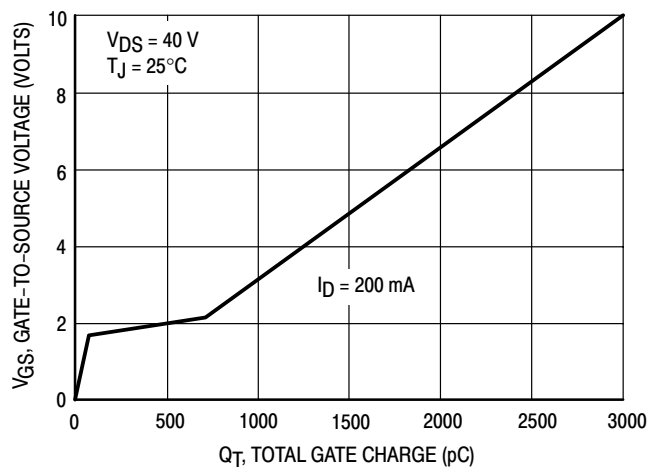
**Figure 2. Transfer Characteristics**



**Figure 3. On-Resistance Variation with Temperature**



**Figure 4. Threshold Voltage Variation with Temperature**



**Figure 5. Gate Charge**

TYPICAL ELECTRICAL CHARACTERISTICS

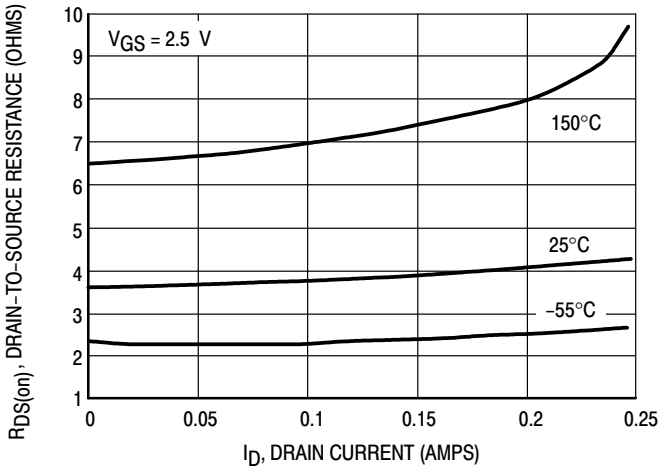


Figure 6. On-Resistance versus Drain Current

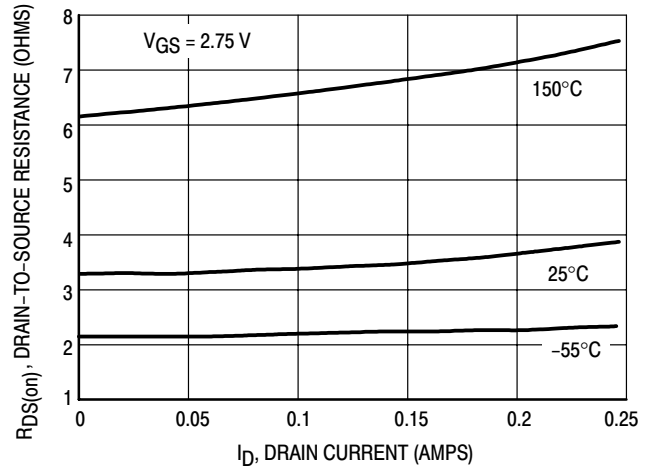


Figure 7. On-Resistance versus Drain Current

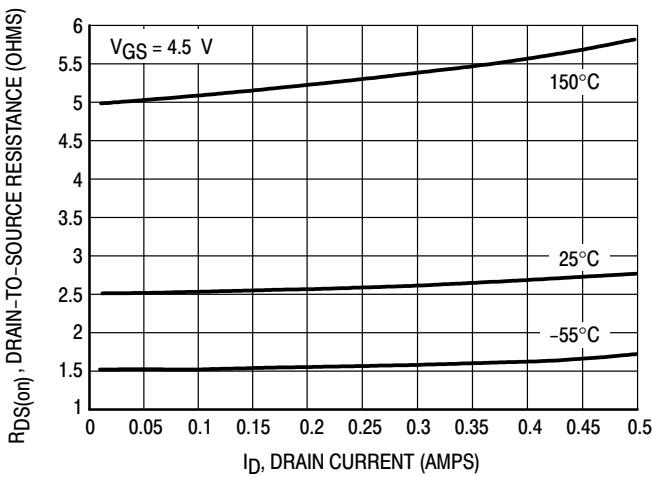


Figure 8. On-Resistance versus Drain Current

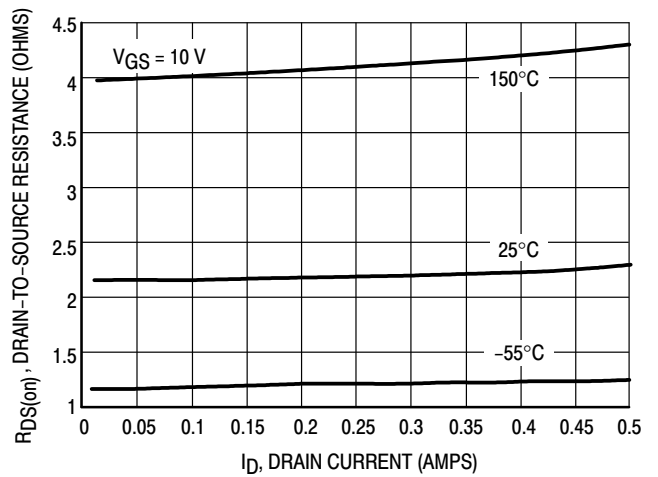


Figure 9. On-Resistance versus Drain Current

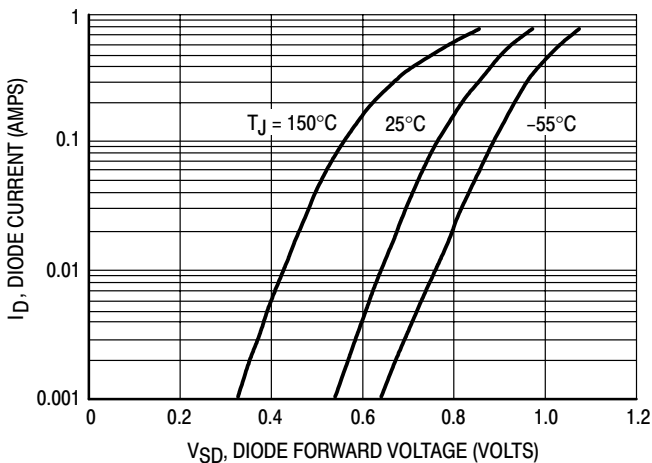


Figure 10. Body Diode Forward Voltage

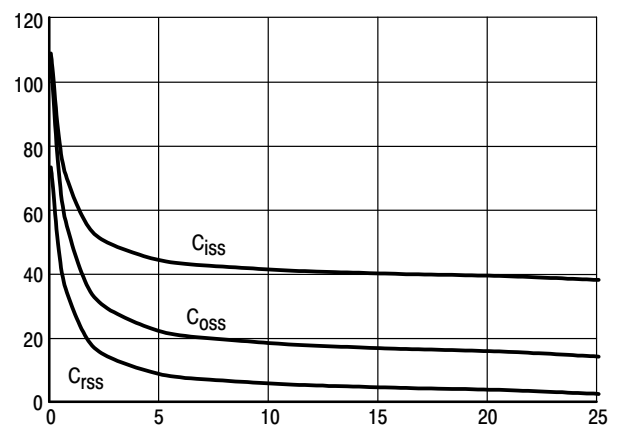
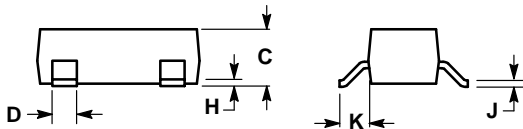
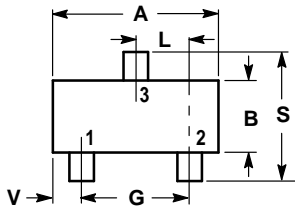


Figure 11. Capacitance

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SOT-23

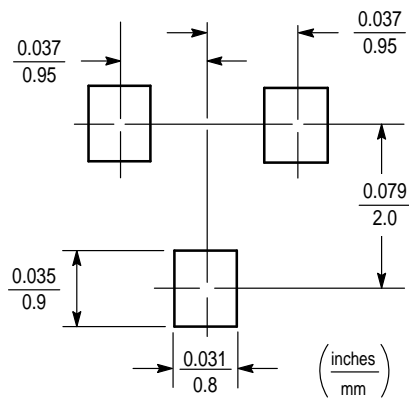


NOTES:

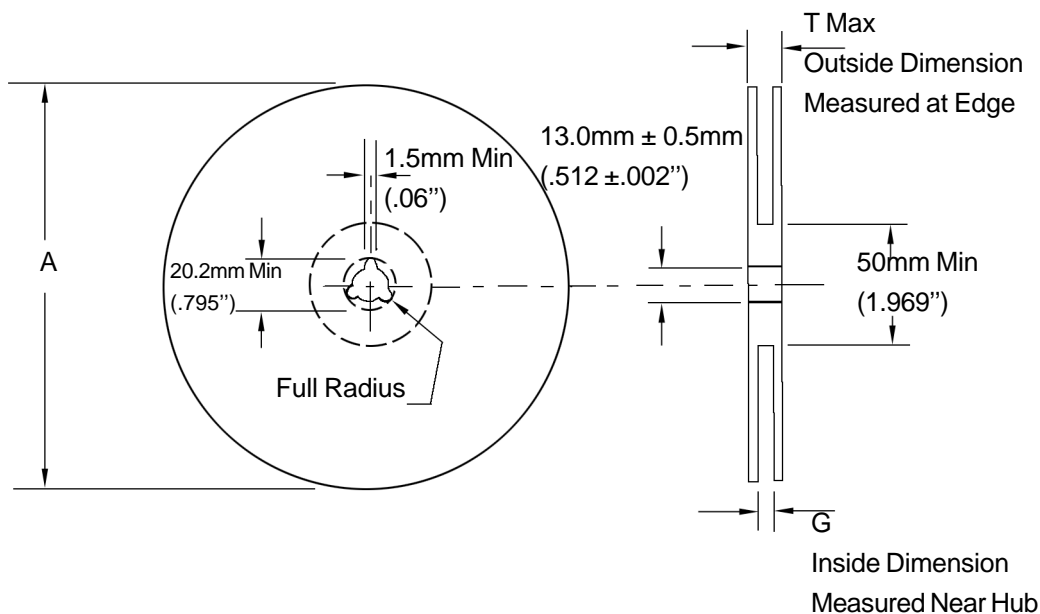
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

- PIN 1. BASE  
 2. EMITTER  
 3. COLLECTOR



## EMBOSSED TAPE AND REEL DATA FOR DISCRETES



Size	A Max	G	T Max
8 mm	178.0mm (7.0")	8.4mm+1.5mm, -0.0 (.33"+.039", -0.00)	10.9mm (.43")

### Reel Dimensions

Metric Dimensions Govern — English are in parentheses for reference only

#### Storage Conditions

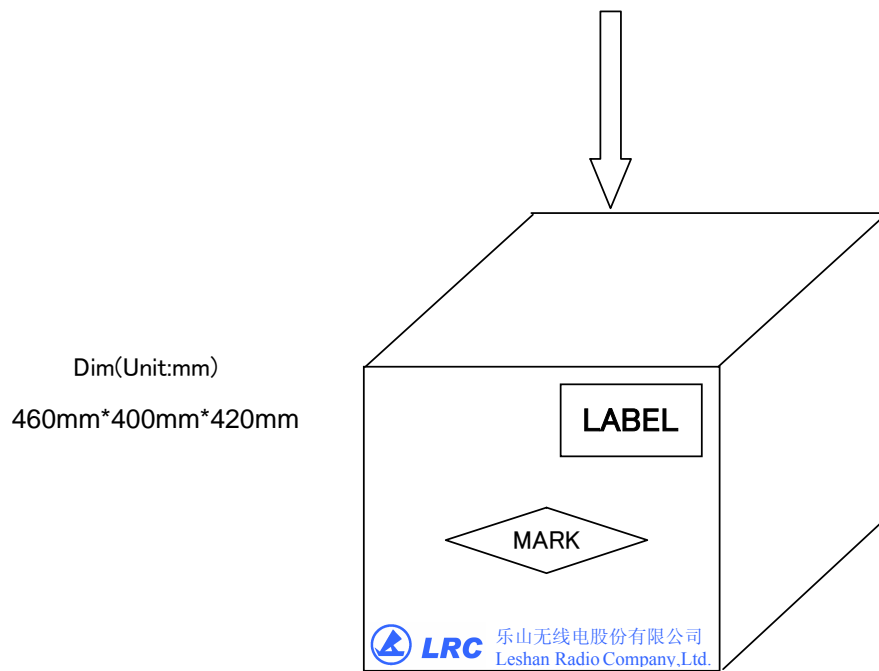
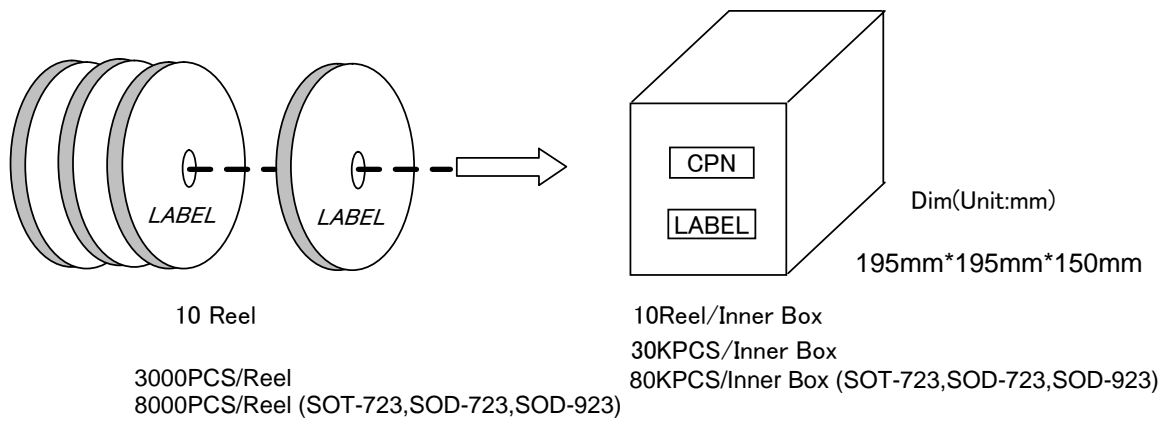
Temperature: 5 to 40 Deg.C (20 to 30 Deg. C is preferred)

Humidity: 30 to 80 RH (40 to 60 is preferred )

Recommended Period: One year after manufacturing

(This recommended period is for the soldering condition only. The characteristics and reliabilities of the products are not restricted to this limitation)

## Shipment Specification



12 Inner Box/Carton

360KPCS/Carton  
960KPCS/Carton (SOT-723,SOD-723,SOD-923)