

NTC Thermistor: TSM Series

SMD NTC Thermistor for Temperature Sensing



■ Features

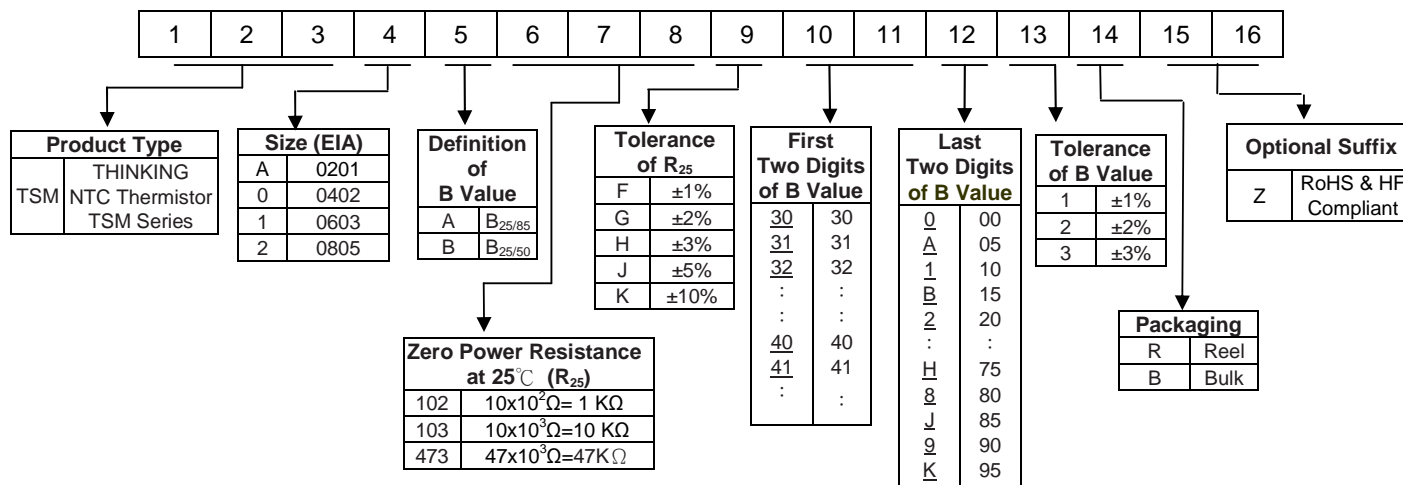
1. RoHS & HF compliant
2. EIA size: 0201, 0402, 0603, 0805
3. Highly reliable structure
4. Operating temperature range: -40 ~ +125 °C
5. Wide resistance range
6. Cost effective
7. Agency recognition: UL/cUL/TUV



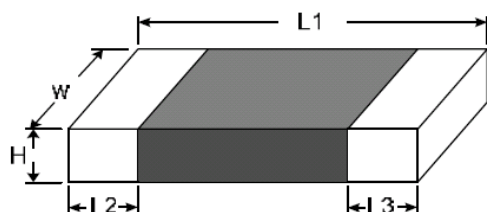
■ Recommended Applications

1. Battery pack
2. Motherboard/ Notebook computer/ Personal computer
3. Liquid crystal display
4. Cellular phones
5. Bluetooth headset

■ Part Number Code



■ Structure and Dimensions



(Unit: mm)

Part No.	Size	L1.	W	H max.	L2 & L3
TSM A	0201	0.60±0.05	0.30±0.05	0.35	0.15±0.05
TSM 0	0402	1.00±0.15	0.50±0.10	0.60	0.20±0.10
TSM 1	0603	1.60±0.15	0.80±0.15	0.95	0.40±0.15
TSM 2	0805	2.00±0.20	1.25±0.20	1.20	0.40±0.20

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Electrical Characteristics

Part No.	Zero Power Resistance at 25°C	Tolerance of R ₂₅ (±%)	B Value		Tolerance of B value (±%)	Max. Power Dissipation at 25°C P _{max} (mW)	Dissipation Factor δ(mW/°C)	Thermal Time Constant τ(Sec.)	Operating Temperature Range T _L -T _U (°C)	Safety Approvals								
	R ₂₅ (KΩ)		(K)	(K)						UL/cUL	TUV							
TSMAA682□34D*	6.8	1、2、3 5、10	25/85	3435	1、2、3	140	Approx. 1.4	Approx. 1.2	-40 ~ +125	√	√							
TSMAA103□34D*	10			3435						√	√							
TSMAB104□425*	100		25/50	4250						√	√							
TSMAB224□450*	220			4500						√	√							
TSM0A103□34D*	10	1、2、3 5、10	25/85	3435	1、2、3	170	Approx. 1.7	Approx. 2.0	-40 ~ +125	√	√							
TSM0A103□391*	10			3910						√	√							
TSM0A223□393*	22			3930						√	√							
TSM0A333□393*	33			3930						√	√							
TSM0A473□393*	47			3930						√	√							
TSM0A503□395*	50			3950						√	√							
TSM0A683□405*	68			4050						√	√							
TSM0A104□39H*	100			3975						√	√							
TSM0A224□405*	220			4050						√	√							
TSM0A474□409*	470			4090						√	√							
TSM0B474□470*	470			5、10						25/50	4700	2、3	√	√				
TSM1A202□340*	2			1、2、3、 5、10						25/85	3400	1、2、3					√	√
TSM1A222□34D*	2.2										3435						√	√
TSM1B222□395*	2.2			5、10						25/50	3950	2、3	√	√				
TSM1A472□34D*	4.7	1、2、3、 5、10	25/85	3435	1、2、3					√	√							
TSM1A472□367*	4.7			3670						√	√							
TSM1A502□34D*	5			3435						√	√							
TSM1A682□34D*	6.8			3435						√	√							
TSM1A682□430*	6.8	5、10		4300	2、3	√	√											
TSM1A103□34D*	10	1、2、3、 5、10	25/85	3435	1、2、3	210	Approx 2.1	Approx 3.1	-40~+125	√	√							
TSM1A103□39H*	10			3975						√	√							
TSM1B103□425*	10			25/50						4250	2、3	√	√					
TSM1A123□380*	12			25/85						3800	1、2、3	√	√					
TSM1A153□395*	15													3950	√	√		
TSM1A223□39H*	22													3975	√	√		
TSM1A333□39H*	33													3975	√	√		
TSM1A473□39H*	47													3975	√	√		
TSM1A503□39H*	50													3975	√	√		
TSM1A683□39H*	68													3975	√	√		
TSM1A104□405*	100													4050	√	√		
TSM1B104□425*	100													25/50	4250	2、3	√	√
TSM1A104□436*	100													25/85	4360	1、2、3	√	√
TSM1A154□406*	150																	
TSM1A204□410*	200	4100	√		√													
TSM1A224□410*	220	4100	√		√													
TSM1A334□415*	330	4150	√		√													
TSM1A474□410*	470	4100	√	√														
TSM1B474□446*	470	25/50	4460	2、3	√	√												
TSM2A102□320*	1	1、2、3、 5、10	25/85	3200	1、2、3	240	Approx 2.4	Approx 5.4	-40~+125	√	√							
TSM2A472□34D*	4.7			3435						√	√							
TSM2A502□34D*	5			3435						√	√							
TSM2A682□34D*	6.8			3435						√	√							
TSM2A103□34D*	10			3435						√	√							
TSM2A103□380*	10			3800						√	√							
TSM2A103□39H*	10			3975						√	√							
TSM2A153□395*	15			3950						√	√							
TSM2A203□395*	20			3950						√	√							
TSM2A223□380*	22			3800						√	√							
TSM2A223□39H*	22			3975						√	√							
TSM2A303□39H*	30			3975						√	√							
TSM2A473□39H*	47			3975						√	√							

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■ Electrical Characteristics

Part No.	Zero Power Resistance at 25°C	Tolerance of R ₂₅	B Value		Tolerance of B value	Max. Power Dissipation at 25°C	Dissipation Factor	Thermal Time Constant	Operating Temperature Range	Safety Approvals	
	R ₂₅ (KΩ)		(±%)	(K)						(±%)	P _{max} (mW)
TSM2A503□39H*	50	1、2、3、5、10	25/85	3975	1、2、3	240	Approx 2.4	Approx 5.4	-40~+125	✓	✓
TSM2A683□39H*	68			3975						✓	✓
TSM2A104□405*	100			4050						✓	✓
TSM2A204□410*	200			4100						✓	✓
TSM2A224□410*	220			4100						✓	✓

Note 1: □ = Tolerance of R₂₅

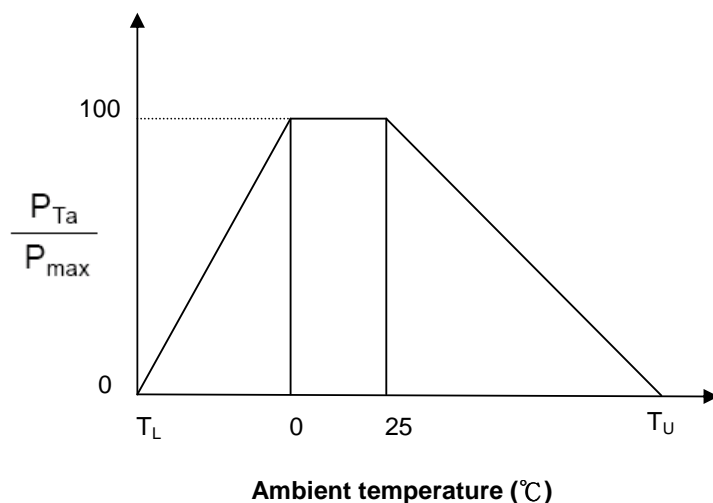
Note 2: * = Tolerance of B value

Note 3: UL&cUL File No. E138827

TUV File No. R 50167657

*Special specifications are available upon request

■ Max. Power Dissipation Derating Curve



T_U : Maximum operating temperature (°C)

T_L : Minimum operating temperature (°C)

For example :

Ambient temperature (T_a)=55°C

Maximum operating temperature (T_U)=125°C

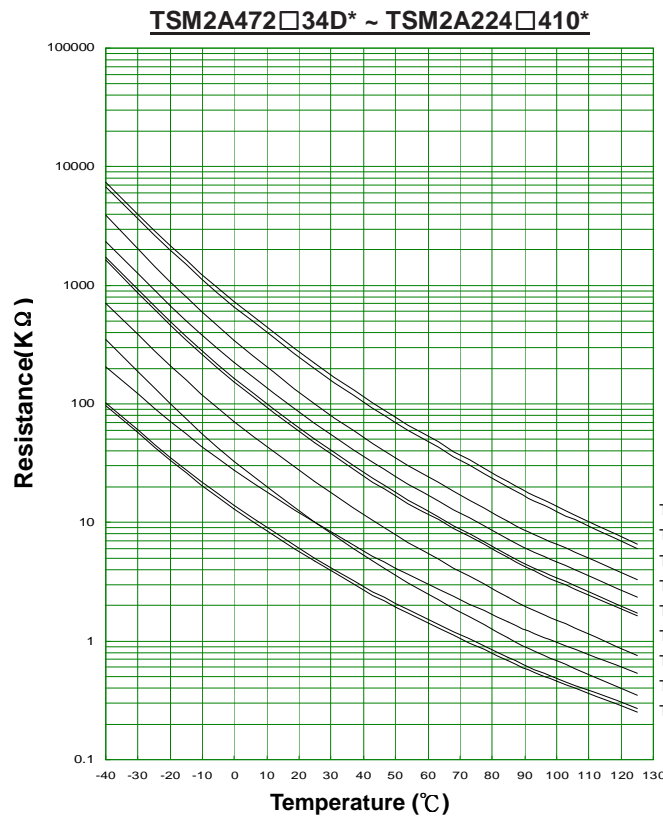
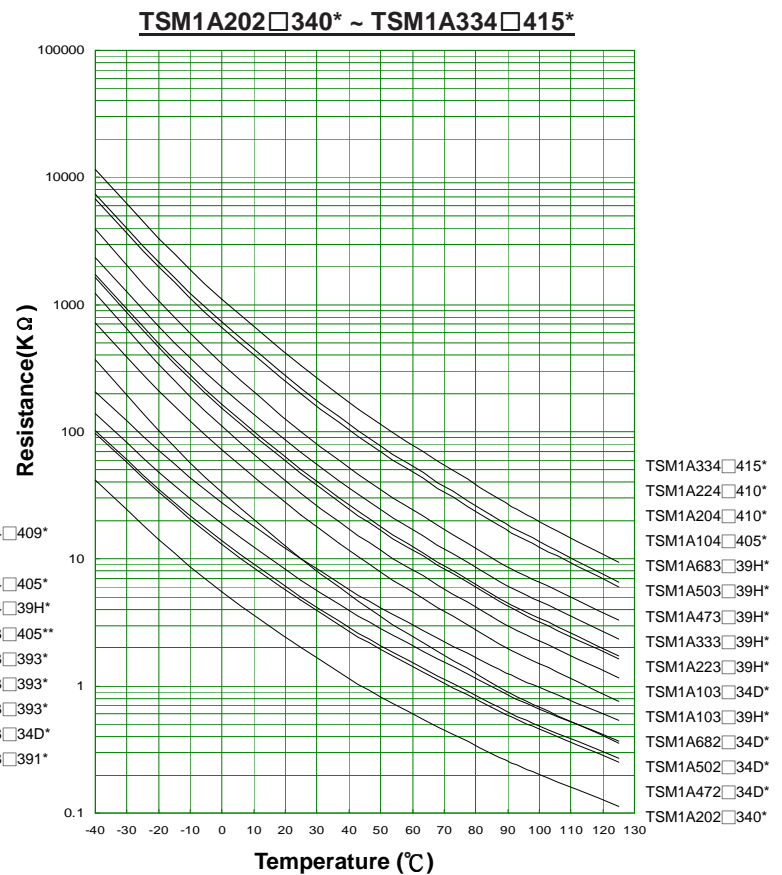
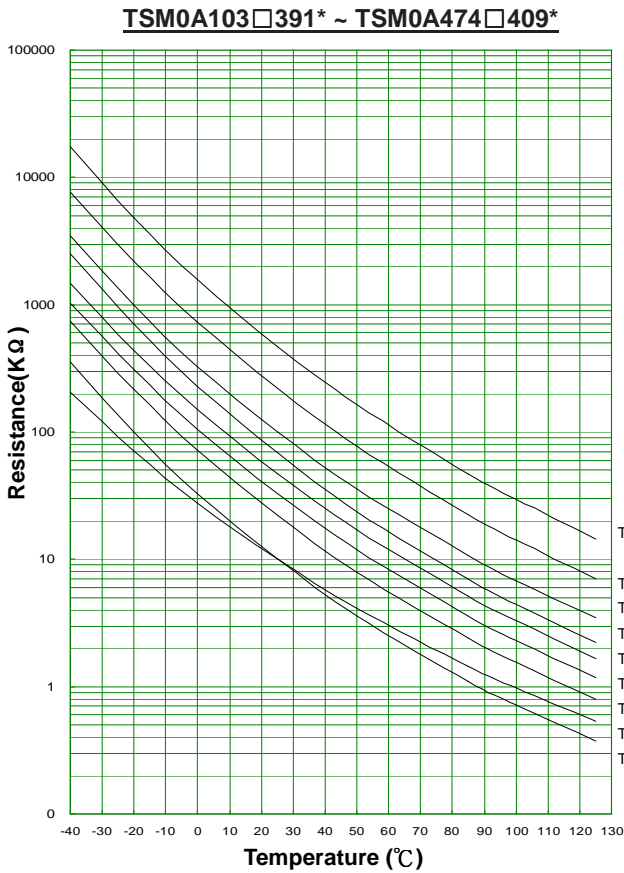
$P_{Ta} = (T_U - T_a) / (T_U - 25) \times P_{max} = 70\% P_{max}$

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■ R-T Characteristic Curves (representative)



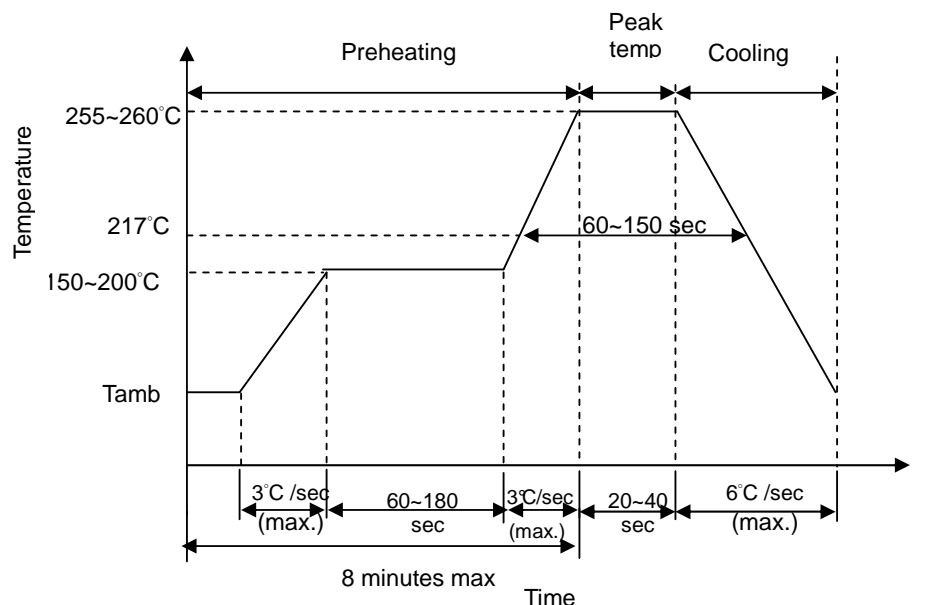
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■ Soldering Recommendation

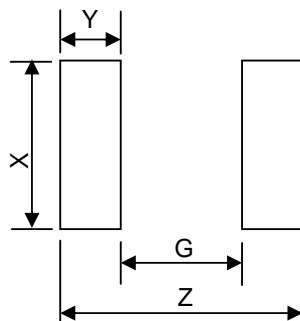
● IR-reflow Soldering Profile



● Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	360°C (max.)
Soldering Time	3 sec (max.)
Diameter of Soldering Iron-tip	Φ3mm (max.)

■ Recommended Soldering Pad Dimensions



Size	Z (mm)	G (mm)	X (mm)	Y (mm)
0201	0.8	0.3	0.3	0.25
0402	1.7	0.5	0.6	0.6
0603	3.0	1.0	1.0	1.0
0805	3.4	1.0	1.4	1.2

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■ Reliability

Item	Standard	Test conditions / Methods	Specifications															
Solderability	IEC60068-2-58	245 ± 5°C, 3 ± 0.3 sec	At least 95% of terminal electrode is covered by new solder															
Resistance to Soldering Heat	IEC60068-2-58	260 ± 5°C, 10 ± 1 sec.	No visible damage $\Delta R_{25}/R_{25}$ ≤ 3 %															
High Temperature Storage	IEC60068-2-2	125 ± 5°C, 1000 ± 24 hrs	No visible damage $\Delta R_{25}/R_{25}$ ≤ 5 %															
Damp Heat, Steady State	IEC60068-2-3	40 ± 2°C , 90~95% RH , 1000 ± 24 hrs	No visible damage $\Delta R_{25}/R_{25}$ ≤ 3 %															
Rapid Change of Temperature	IEC60068-2-14	<p>The conditions shown below shall be repeated 5 cycles on PCB</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40 ± 5</td> <td>30 ± 3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>5 ± 3</td> </tr> <tr> <td>3</td> <td>125 ± 5</td> <td>30 ± 3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>5 ± 3</td> </tr> </tbody> </table>	Step	Temperature (°C)	Period (minutes)	1	-40 ± 5	30 ± 3	2	Room temperature	5 ± 3	3	125 ± 5	30 ± 3	4	Room temperature	5 ± 3	No visible damage $\Delta R_{25}/R_{25}$ ≤ 3 %
Step	Temperature (°C)	Period (minutes)																
1	-40 ± 5	30 ± 3																
2	Room temperature	5 ± 3																
3	125 ± 5	30 ± 3																
4	Room temperature	5 ± 3																
Max. Power Dissipation	IEC 60539-1	25 ± 5°C, Pmax. , 1000 ± 24 hrs	No visible damage $\Delta R_{25}/R_{25}$ ≤ 5 %															

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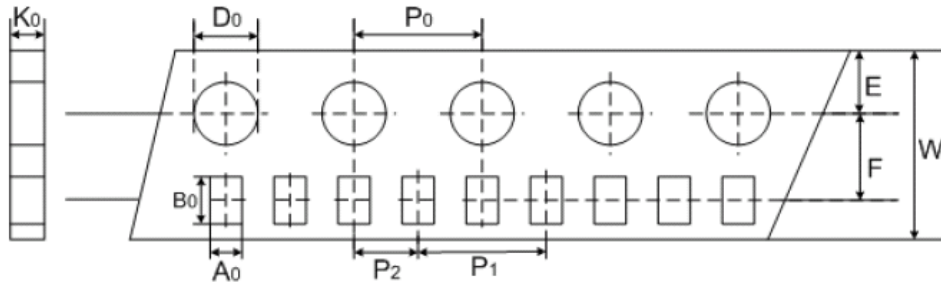
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■ Package

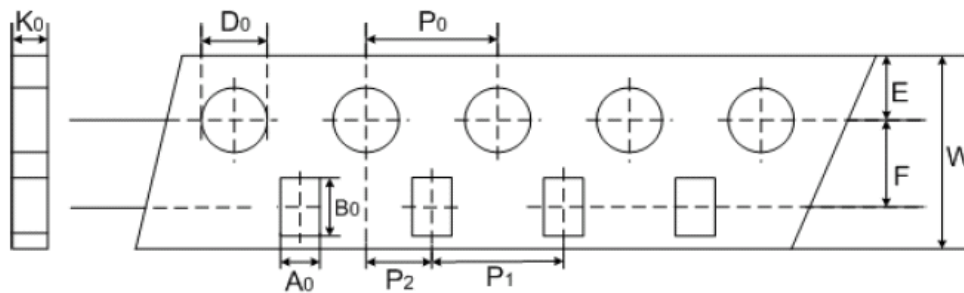
● Taping Specification

- ◆ 0201 & 0402 & 0603 & 0805 type



(Unit: mm)

Index Type	A_0	B_0	W	E	F	P_1	P_2	P_0	D_0	K_0
	± 0.05	± 0.12	± 0.2	± 0.1	± 0.05	± 0.1	± 0.05	± 0.1	± 0.1	± 0.1
0201	0.38	0.68	8	1.75	3.5	4	2	4	1.55	0.38
0402	0.62	1.12	8	1.75	3.5	4	2	4	1.55	0.60



(Unit: mm)

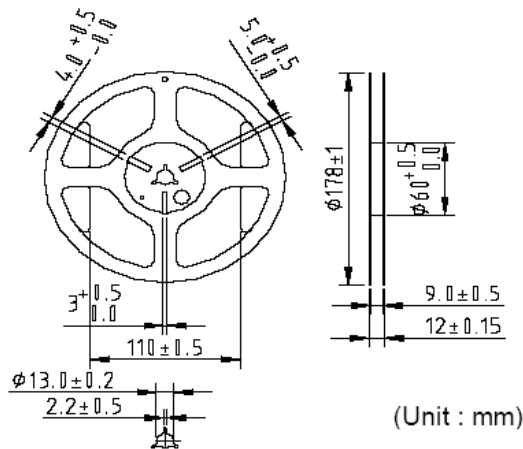
Index Type	A_0	B_0	W	E	F	P_1	P_2	P_0	D_0	K_0
	± 0.2	± 0.2	± 0.2	± 0.1	± 0.05	± 0.1	± 0.05	± 0.1	± 0.1	± 0.1
0603	1.1	1.9	8	1.75	3.5	4	2	4	1.55	0.95
0805	1.5	2.3	8	1.75	3.5	4	2	4	1.55	0.95

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■ Quantity



Type	Quantity (pcs/reel)
0201	15,000
0402	10,000
0603	4,000
0805	3,500

■ Storage Conditions of Products

- Storage Conditions :
 1. Storage Temperature: $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
 2. Relative Humidity: $\leq 75\% \text{RH}$
 3. Keep away from corrosive atmosphere and sunlight.
- Shelf Life : 1 year