

# APPROVAL SHEET

## TTL12、TTL25

$\pm 1\%$  ,  $\pm 0.5\%$

**High Power Thin Film Current Sensor**  
(RoHS Compliant、Halogen Free)

Size: 1206、2512



## FEATURES

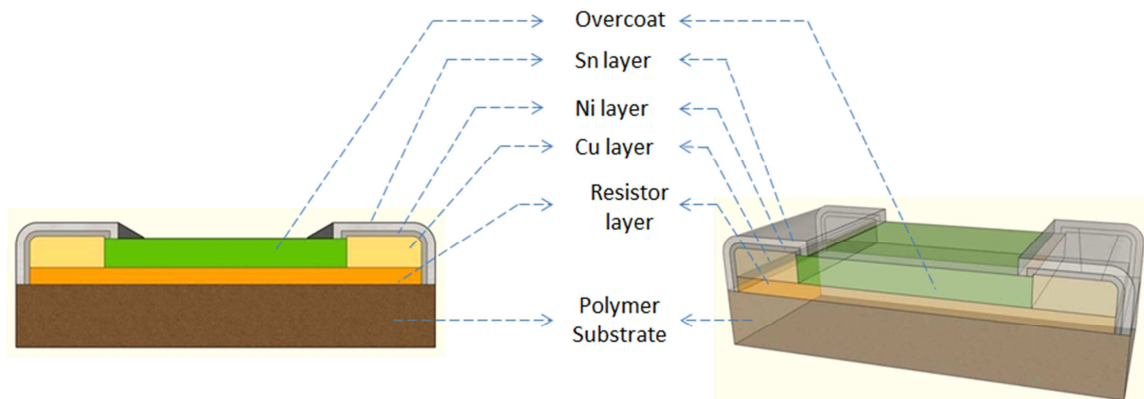
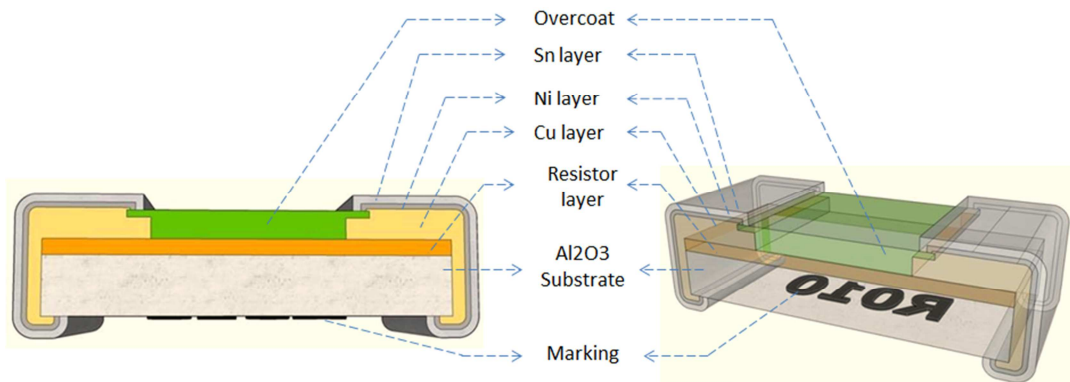
1. Extra high power rating and low TCR.
2. Extra low resistance and high precision.
3. High component and equipment reliability
4. Low resistances applied to current sensing
5. RoHS compliant & Halogen Free.
6. Suitable for lead free soldering.

## APPLICATIONS

- Current sensor
- Medical equipment
- Measuring instrument
- Communication device
- Power supply
- Computer

## DESCRIPTION

This specification describes TTL series current sensor – Extra high power and low TCR with lead-free terminations made by metal film or metal foil with substrate.



## Quick Reference Data

Series	Size	Functional code				Resistance Range	Resistance Tolerance
		Power(W)		TCR			
		M	P	Q	( ppm/°C )	mΩ	%
TTL	1206 (3216)	1/2	1		O : ±75	1~4 mΩ	±1%(F)
TTL	1206 (3216)	1/2	1		N : ±50	5~9 mΩ	±1%(F)
TTL	1206 (3216)		1		N : ±50	10~100 mΩ	±0.5%(D) ±1%(F)
TTL	1206 (3216)		1		P : ±100	5~100 mΩ	±0.5%(D) ±1%(F)
TTL	2512 (6432)		1	2	P : ±100	2~9 mΩ	±1%(F)
TTL	2512 (6432)		1	2	N : ±50 P : ±100	10~100 mΩ	±0.5%(D) ±1%(F)

Note :

1. This is the maximum voltage that may be continuously supplied to the resistor element, see "IEC publication 60115-8"
2. Max. Operation Voltage : So called RCWV (Rated Continuous Working Voltage) is determined by  

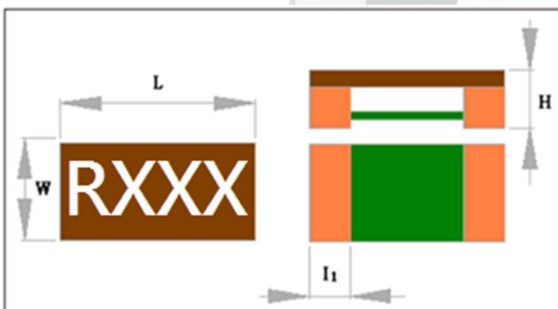
$$RCWV = \sqrt{\text{Rated Power} \times \text{Resistance Value}}$$

## DIMENSIONS:(unit:mm)

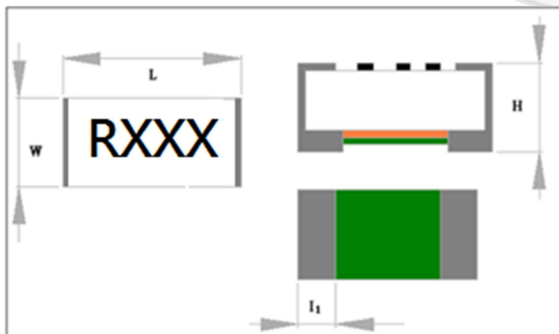
### 1206 Series

Type	Resistance Range(mΩ)	L(mm)	W(mm)	H(mm)	l1(mm)
TTL12PO TTL12MO	1	3.20±0.25	1.60±0.25	0.40±0.25	1.25±0.30
TTL12PO TTL12MO	2	3.20±0.25	1.60±0.25	0.40±0.25	1.05±0.30
TTL12PO TTL12MO	3	3.20±0.25	1.60±0.25	0.40±0.25	0.80±0.30
TTL12PO TTL12MO	4	3.20±0.25	1.60±0.25	0.40±0.25	0.60±0.30
TTL12PN TTL12MN	5~9	3.20±0.25	1.60±0.25	0.40±0.25	0.60±0.30
TTL12PP TTL12MP	5~100	3.30±0.20	1.70±0.20	0.65±0.20	0.68±0.30
TTL12PN TTL12MN	10~100	3.30±0.20	1.70±0.20	0.65±0.20	0.68±0.30

TTL12 PO(MO)\_(1~4mΩ) ; TTL12 PN(MN)\_(5~9mΩ)



TTL12 PP(MP)\_(5~100 mΩ) ; TTL12 PN(MN)\_(10~100 mΩ)



Mark (4digits)

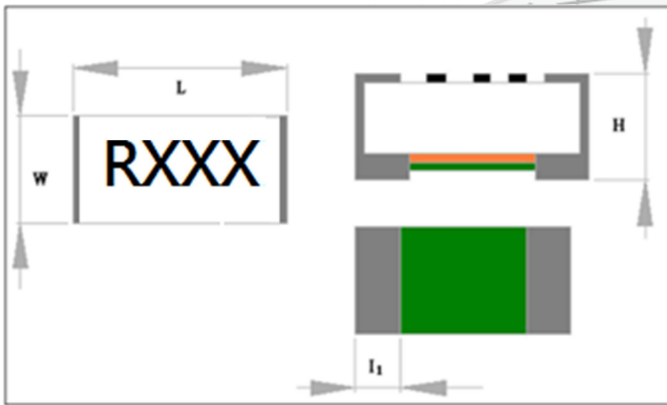


(R010=10 mΩ)

## 2512 Series

Type	Resistance Range(mΩ)	L(mm)	W(mm)	H(mm)	l1(mm)
TTL25QP TTL25PP	2	6.40±0.30	3.20±0.30	0.65±0.20	2.80±0.30
TTL25QP TTL25PP	3	6.40±0.30	3.20±0.30	0.65±0.20	2.60±0.30
TTL25QP TTL25PP	4~9	6.40±0.30	3.20±0.30	0.65±0.20	1.05±0.30
TTL25QP TTL25PP TTL25QN TTL25PN	10~100	6.40±0.30	3.20±0.30	0.65±0.20	1.05±0.30

TTL25QP(PP)\_ (2~100 mΩ) 、 TTL25QN(PN)\_ (10~100 mΩ)



Mark (4digits)



(R010=10 mΩ)

# FUNCTIONAL DESCRIPTION

## Product characterization

Power rating is based on continuous full load operation at rated ambient temperature of 70 °C. For resistors operated at ambient temp. in excess of 70 °C, the maximum load shall be derated in accordance with the following curve.

The power that the resistor can dissipate depends on the operating temperature; see Fig.1&Fig2

Temperature range of size 1206 to 2512: -55°C to +155°C (Fig.2)

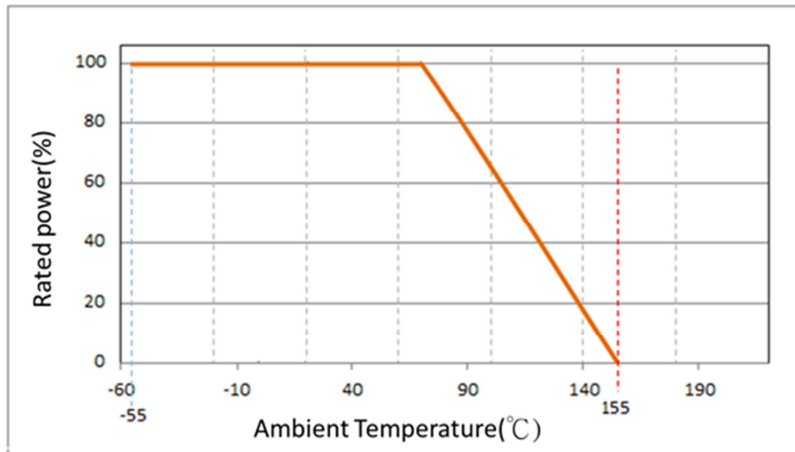
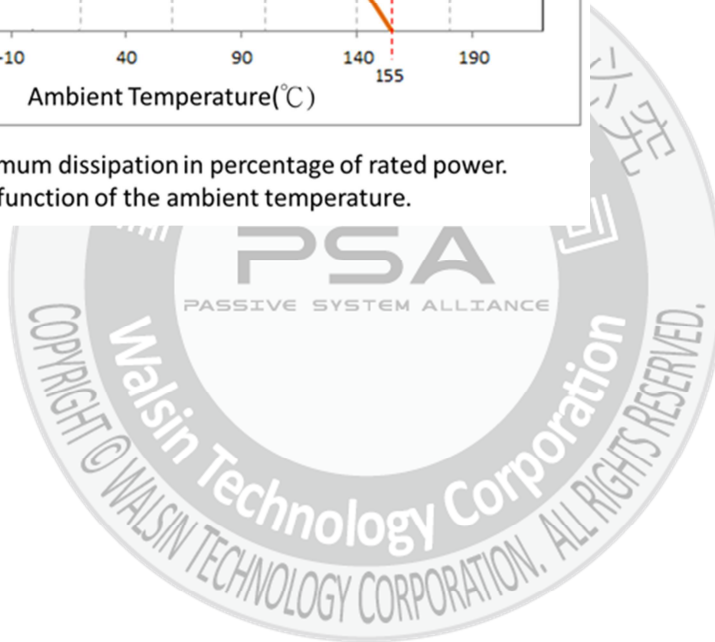


Fig.2 Maximum dissipation in percentage of rated power.  
As a function of the ambient temperature.



## MOUNTING

Due to their rectangular shapes and small tolerances, Surface Mountable Resistors are suitable for handling by automatic placement systems.

Chip placement can be on ceramic substrates and printed-circuit boards (PCBs).

Electrical connection to the circuit is by individual soldering condition.

The end terminations guarantee a reliable contact.

## SOLDERING CONDITION

The robust construction of chip resistors allows them to be completely immersed in a solder bath of 260°C for 10 seconds. Therefore, it is possible to mount Surface Mount Resistors on one side of a PCB and other discrete components on the reverse (mixed PCBs).

Surface Mount Resistors are tested for solderability at 235°C during 2 seconds within lead-free solder bath. The test condition for no leaching is 260°C for 30 seconds. Typical examples of soldering profile and condition that provide reliable joints without any damage are given in Fig 3. and Table 1.

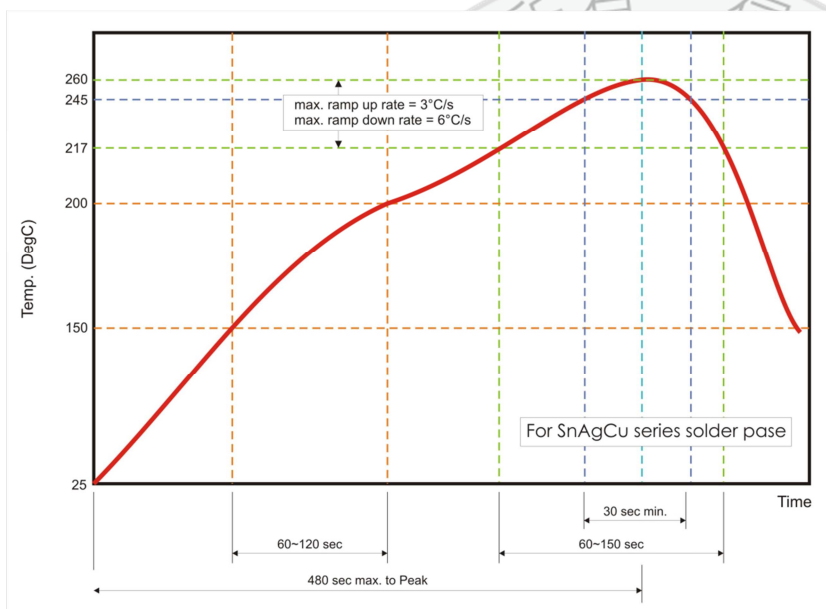


Fig. 3 Infrared soldering profile for Chip Resistors

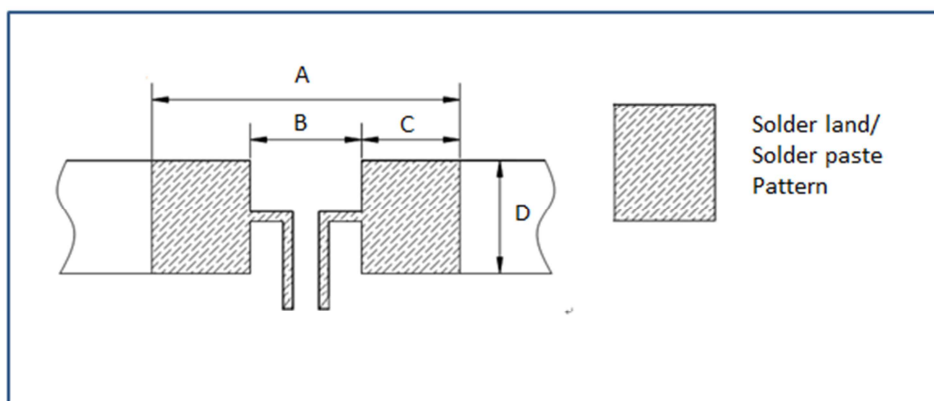
Table 1. Infrared soldering condition for Chip Resistors

Temperature Condition	Exposure Time
Average ramp-up rate (217°C to 260°C)	Less than 3°C/second
Between 150 and 200°C	Between 60-120 seconds
> 217°C	Between 60-150 seconds
Peak Temperature	260°C +0/-5°C
Time within 245°C	Min. 30 seconds
Ramp-down rate (Peak to 217°C)	Less than 6°C/second
Time from 25°C to Peak	No greater than 480 seconds

## CATALOGUE NUMBERS

TTL	12	P	O	XXXX	F	T	L
Type code	Size code	Power Rating	TCR	Resistance	Tolerance	Packaging code	Termination code
Low Resistance	12:1206 25:2512	Q:2 W P:1 W M:1/2 W	N:50 ppm/°C O:75ppm/°C P:100 ppm/°C	e.q R003=3mΩ R010=10mΩ R2L5=2.5mΩ	D: ±0.5% F: ±1%	T:7" Taped Reeled	L:Sn Base (Lead free)

### Recommend Solder Pad Dimensions



### Dimensions of solder Pad :

Type	Resistance Range	A(mm)	B(mm)	C(mm)	D(mm)
TTL12	1 mΩ	4.80	0.50	2.15	1.84
TTL12	2 mΩ	4.80	0.60	2.10	1.84
TTL12	3~100 mΩ	4.80	1.20	1.80	1.84
TTL25	2 mΩ	9.30	0.6	4.35	3.57
TTL25	3 mΩ	9.30	0.9	4.20	3.57
TTL25	4~100 mΩ	9.30	3.1	3.10	3.57



## TEST AND REQUIREMENTS(JIS C 5201-1 : 1998)

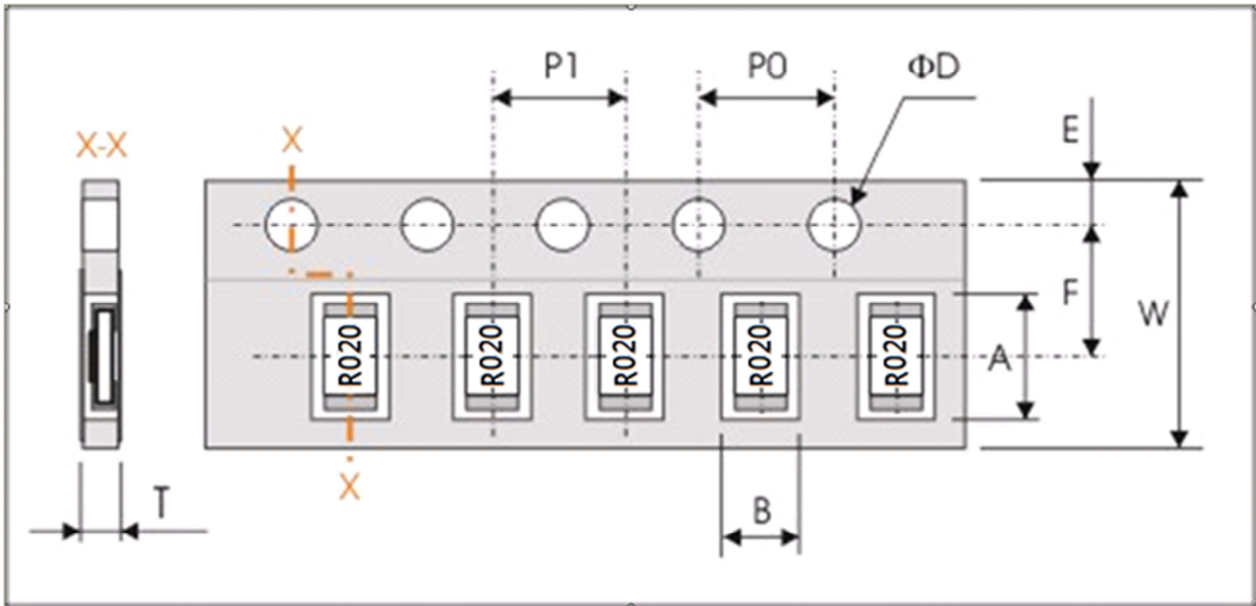
TEST	PROCEDURE	REQUIREMENT
		Resistor
DC resistance <b>IEC 60115-1 / JIS C 5201-1 , Clause 4.5</b>	D: ±0.5%,F: ±1%,	Within the specified tolerance
Temperature Coefficient of Resistance(T.C.R)	Natural resistance change per change in degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6$ (ppm/°C) R <sub>1</sub> : Resistance at reference temperature R <sub>2</sub> : Resistance at test temperature t <sub>1</sub> : 20°C+5°C-1°C t <sub>2</sub> : 125°C+5°C-1°C	Refer to “ QUICK REFERENCE DATA “
Short time overload (S.T.O.L) <b>IEC60115-1 4.13</b>	2.5 times of rated power for 5 seconds at room temperature	No visible damage ±(1.0%+0.0005Ω)
Resistance to soldering heat(R.S.H) <b>MIL-STD-202G-method 210F</b> <b>IEC 60115-1 4.18</b>	Condition B, no pre-heat of samples Through reflow, 275± 3 °C, 20±1 seconds	No visible damage ±(1.0%+0.0005Ω)
Solderability <b>IPC/JEDEC</b> <b>J-STD-002B test B</b>	SMD conditions: Dip into leadfree solder bath at 245± 3 °C Dipping time: 3± 0.5 seconds	good tinning (>95% covered) no visible damage
Thermal Shock <b>MIL-STD-202G-method 107</b>	-55°C 30min → Room Temp. 3min → +125 °C 30min→ Room Temp. 3min Number of cycles required is 100 time.	±(1.0%+0.0005Ω)
Endurance <b>MIL-STD-202G-method 108</b> <b>IEC 60115-1 4.25.1</b>	70±2°C, 1000 hours, loaded with RCWV,1.5 hours on and 0.5 hours off	±(2.0%+0.0005Ω)
Bending Strength <b>IEC60115-1 4.33</b>	Device mounted on PCB test board as described, only 1 board bending required Bending for 0201: 3mm 0402 and above: 2mm Holding time: minimum 60 seconds	±(1.0%+0.0005Ω)

High Temperature Exposure <b>MIL-STD-202G-method 108</b> <b>IEC 60115-1 4.25.3</b>	1,000 hours at maximum operating temperature depending on specification, unpowered No direct impingement of forced air to the parts Tolerances: 0201: 125± 3°C 0402 and above 155± 3°C	±(1.0%+0.0005Ω)
Moisture Load Life	The test environment is 60 °C /95% R.H . Test waveform is RCWV at 90 minute on, without power is 30 minute off. Test time is continuous 1000 hours.	± (2.0%+0.0005 Ω)
Low Temp. Storage <b>MIL-STD-202G-method 108</b> <b>IEC 60115-1 4.25.3</b>	1,000 hours at minimum operating temperature depending on specification, unpowered No direct impingement of forced air to the parts Tolerances: Any package size -55± 3°C	±(1.0%+0.0005Ω)
Mechanical Shock <b>IEC60115-1 4.21</b>	Peak value: A=100 g's Duration: 11 ms Velocity shock= 5 time	± (1.0%+0.0005 Ω)



# PACKAGING

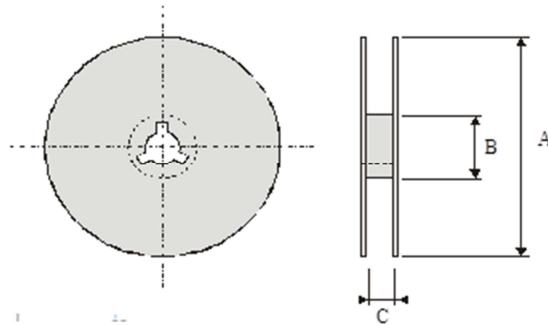
Paper Tape specifications (unit :mm)



Series No.	A	B	W	F	E
TTL12	3.65±0.20	2.05±0.20	8.00±0.30	3.50±0.20	1.75±0.10
TTL25	6.75±0.20	3.40±0.20	12.00±0.30	5.50±0.10	1.75±0.10

Series No.	P1	P0	ΦD	T
TTL12	4.00±0.10	4.00±0.10	Φ1.50 <sup>+0.1</sup> <sub>-0.0</sub>	Max 1.1
TTL25	4.00±0.10	4.00±0.10	Φ1.50 <sup>+0.1</sup> <sub>-0.0</sub>	Max 1.2

## Reel dimensions



Symbol	A (unit : mm)	B (unit : mm)	C (unit : mm)
(unit : mm)	$\Phi 178.0 \pm 5.0$	$\Phi 60.0 \pm 2.0$	$9.0 \pm 0.5$

## Taping quantity

- Chip resistors 4,000 pcs per reel ( TTL25)
- Chip resistors 5,000 pcs per reel ( TTL12)

