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SPECIFICATION FOR APPROVAL

DATE：

CUSTOMER：

PART NAME： Thick Film Wide Terminal Chip Resistor

CUSTOMER'S DWG. NO.：

CUSTOMER'S PART NO.：

PDC PART NO.： **WCF SERIES APPROVED**

DESCRIPTION.：

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ACTION / RESULT	" V "	CUSTOMER'S SIGNATURE	NOTE
FULL APPROVED			
CONDITIONAL APPROVED			
REJECTED			

OUR ACTION	SIGNATURE
PREPARED By	Jenny Tseng
CHECKED By	Tony Chou
APPROVED By	Byron Tsai

CUSTOMER SIGNATURE FOR ACCEPTANCE

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WCF_ME series. (AEC-Q200)
Wide Side Termination with Anti-Sulfur Thick-film Lead Free Chip Resistors

1. Features

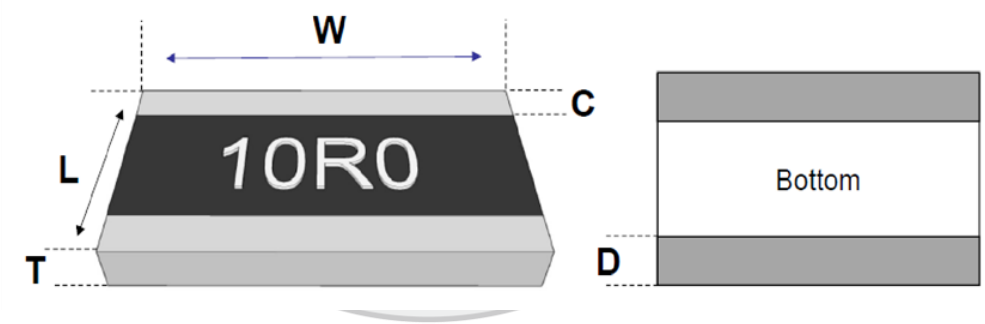
- High power rating to 2W and compact size.
- High reliability and high precision (1%).
- Compatible with wave and reflow soldering.
- Suitable for lead free soldering.
- Meet AEC-Q200, RoHS compliant & Halogen Free.
- Superior sulfur resistant capability (Refer to EIA-977 sulfur vapor test)

2. Applications

- Power supply.
- Industry controller.
- Digital meter, Consumer electronics, M/B.
- LED lighting.
- Automotive devices.

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3. Dimension and Construction



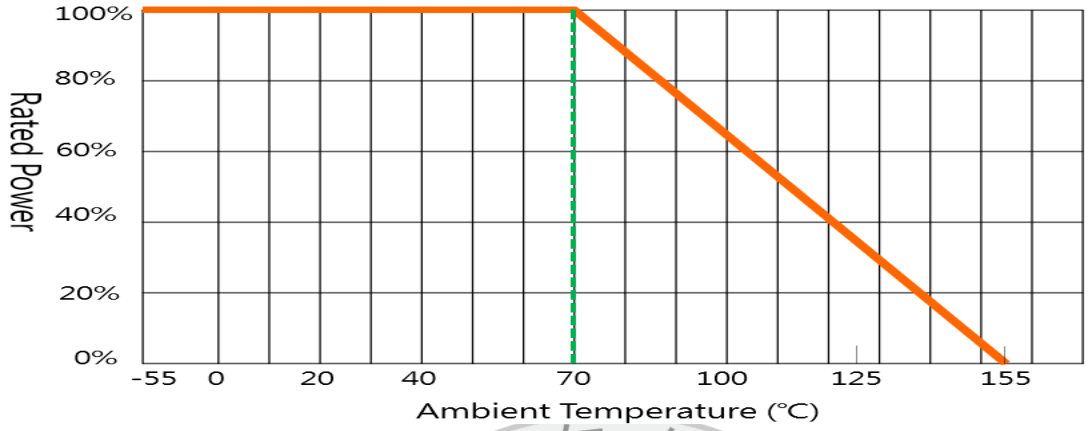
Unit：mm

Type	L	W	C	D	T
WCF06	1.60±0.20	3.20±0.20	0.25±0.20	0.40±0.20	0.60±0.15
WCF25	3.10±0.20	6.30±0.20	0.45±0.20	0.75±0.20	0.60±0.15

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4. Power Derating Curve

Operating Temperature Range: -55 to +155℃



5. Rating

Type	Size	Power Rating at 70℃	Max. RCWV	Max. Overload Voltage	Resistance Tolerance	Temperature Coefficient 25~155℃ (ppm/℃)	Resistance Range		Standard Resistance Values
							Min. (Ω)	Max. (Ω)	
WCF06	0612	1W	**200V**	**400V**	**±1%(F)**	**±200**	**1**	**4.64**	**E96/E24**
					±1%(F)	**±100**	**4.7**	**1 M**	**E96/E24**
					±5%(J)	**±200**	**1**	**4.3**	**E24**
					±5%(J)	**±100**	**4.7**	**1 M**	**E24**
WCF25	1225	2W	**200V**	**400V**	**±1%(F)**	**±200**	**1**	**4.64**	**E96/E24**
					±1%(F)	**±100**	**4.7**	**1 M**	**E96/E24**
					±5%(J)	**±200**	**1**	**4.3**	**E24**
					±5%(J)	**±100**	**4.7**	**1 M**	**E24**

Notes:

1. RCWV is the Rated Voltage, V= $\sqrt{P*R}$ or Max. Working Voltage whichever is lower.
2. V: Working Voltage(V), P: Rated Power(W), R: Resistance Value(Ω).
3. Please consider the resistance variance may from soldering pad/trace/amount influence, and recommend keep the surface temperature do not exceed 105℃ when operating.
4. TCR 25~ -55°C : Below 4.7 ohm is ±250ppm, ≧4.7 ohm is ±100ppm.

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6. Part Number

Type	Size	Tolerance.	Packing	Watt	R Codes	TCR	Special Code
WCF	**06** 0612 **25** 1225	**F** ±1% **J** ±5%	**T** 5Kpcs Paper 0612 **P** 4Kpcs Plastic 1225	**H** 1W **J** 2W	**XXXX** **XXX** ±1% 4 digits ±5% 3 digits	**L** 200 **N** 100	**ME** AEC-Q200 EIA-977

Example：

WCF06FTH10R0NME

➔0612 size, tolerance 1%, paper tape, 1W, 10Ω,100ppm, AEC-Q200, EIA-977

WCF25JPJ101 NME

➔1225 size, tolerance 5%, plastic tape, 2W, 100Ω,100ppm, AEC-Q200, EIA-977

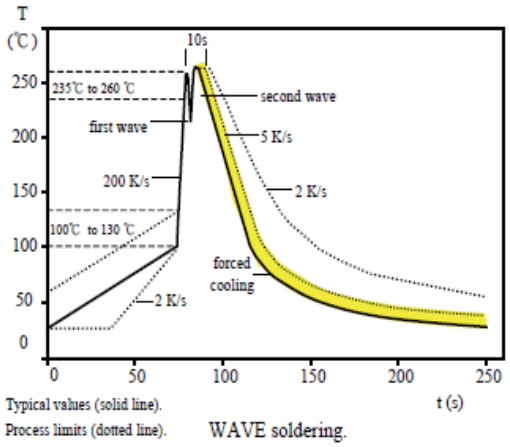
7. Marking/Soldering

Resistance value identify：

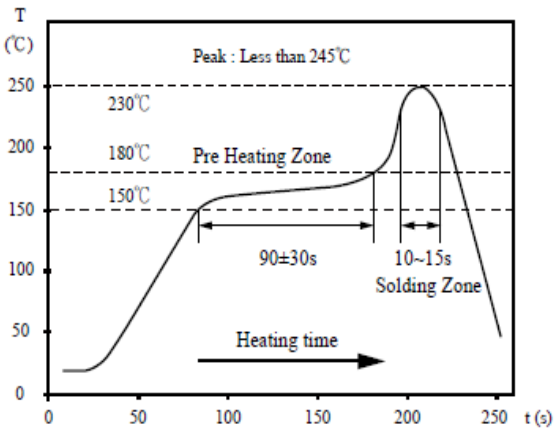
4 Digits marking to identify the resistance value

Example : **1000** → 100 x 10^0 = 100Ω **4R70** → 4.7 x 10^0 = 4.7Ω

Soldering Reference：Compatible for most industrial soldering request.



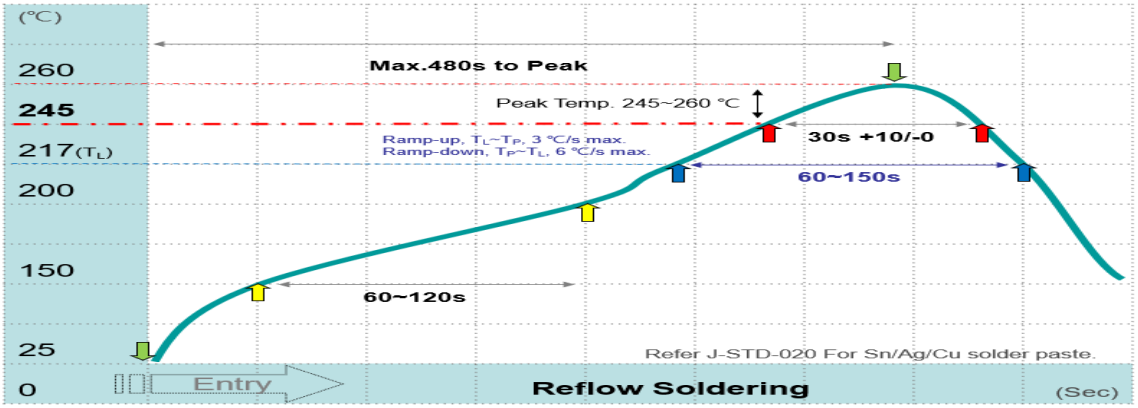
WAVE soldering.



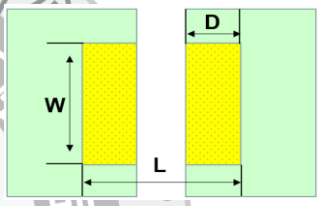
IR Reflow soldering.

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J-STD-020



Recommend Solder Pad Dimensions：

Product Size	W	D	L	Unit. mm
0612	3.50	1.00	2.60	
1225	6.80	2	5.50	

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8. Reliability Performance

AEC-Q200 (1)	Specification (2)	Refer Methods
Initial Limits (D.C. Resistance)	J：±5% F：±1%	**AEC-Q200 TABLE 7.1** **IEC 60115-1 / JIS C 5201-1, Clause 4.5** Measure the resistance within specified tolerance.
High Temperature Exposure (storage)	J：△R≦±(3%+0.1Ω) F：△R≦±(1%+0.1Ω)	**AEC-Q200 TABLE 7.3** Max. operating temperature, 1000 hours, Unpowered. Measure at 24±4 hours after tests end.
Temperature Cycling	ΔR≦±(1%+0.1Ω) No mechanical damage.	**AEC-Q200 TABLE 7.4** Unpowered. -55°C to Max. operating temperature but shall not exceed 155°C. 1000 Cycles. Min. dwell time 15 mins, transition time: Max. 1 min. Measure at least 24 hours after tests end.
Humidity Bias	J：△R≦±(3%+0.1Ω) F：△R≦±(1%+0.1Ω)	**AEC-Q200 TABLE 7.7** 1000 hours 85°C /85%RH, 10% of operating power. Measure at 24 ±2 hours after tests end. (for components with specified operating voltages higher or equal to 500V, 10% of operating voltage)
High Temperature Operating Life	J：△R≦±(3%+0.1Ω) F：△R≦±(1%+0.1Ω)	**AEC-Q200 TABLE 7.8** 1000 hours. Power shall be applied 90 mins ON and 30 mins OFF intermittently. Max. specified operating temperature at 100% rated power without derating. Measurement at 24±2 hours after test end.
External Visual	No visual damage and refer PDC marking code.	**AEC-Q200 TABLE 7.9** Inspect construction, marking and workmanship.
Physical Dimension	Within the spec.	**AEC-Q200 TABLE 7.10** Verify physical dimensions to the applicable component specification.
Resistance to Solvents	Marking must remain legible	**AEC-Q200 TABLE 7.12** In addition to the Method 215 solvents, add an Aqueous wash chemical.
Mechanical Shock	ΔR≦±(1%+0.1Ω) No mechanical damage.	**AEC-Q200 TABLE 7.13** Condition C, Peak value: 100g's, Wave: Half-sine, Duration: 6ms, Velocity change: 12.3ft/sec. Three shocks in each direction, for a total of 18 shocks.

PDC
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WCF_ME series. (AEC-Q200)
Wide Side Termination with Anti-Sulfur Thick-film Lead Free Chip Resistors

AEC-Q200 (1)	Specification (2)	Refer Methods
Vibration	ΔR≦±(1%+0.1Ω) No mechanical damage.	**AEC-Q200 TABLE 7.14** 5 g's for 20 min., 12 cycles each of 3 orientations. Test from 10 Hz-2000 Hz.
Resistance to Solder Heat	ΔR≦±(1%+0.1Ω) No mechanical damage.	**AEC-Q200 TABLE 7.15** SMD: Condition K. Infared/convection reflow soldering and time above 217℃, 60~150 sec.
ESD	△R≦±(1%+0.1Ω) No mechanical damage.	**AEC-Q200 TABLE 7.17** AEC-Q200-002, 1C, Direct contact, min.1KV.
Solderability	95% coverage min. good tinning, no visible damage.	**AEC-Q200 TABLE 7.18** SMD, J-STD-002, Coating durability category 2. B1: Baking 155℃ 4H, dipping 245±5℃ 5+0/-0.5s D: Baking 155℃ 4H, dipping 260±5℃ 30+0/-0.5s
Flammability	Refer to UL-94.	**AEC-Q200 TABLE 7.20** UL-94 V-0 or V-1 is acceptable.
Board Flex (SMD)	J：ΔR≦±(1%+0.1Ω) F：ΔR≦±(0.5%+0.1Ω) No mechanical damage.	**AEC-Q200 TABLE 7.21** AEC-Q200-005, 1.6±0.2 mm FR4 PCB board. Bending min. 2mm, 60+5/-0 sec.
Terminal Strength (SMD)	No mechanical damage.	**AEC-Q200 TABLE 7.22** AEC-Q200-006, component mounted on a PCB. Force 17.7N(1.8Kg) for 60 seconds.
Electrical	**Specification** (2)	**Refer Methods**
Short Time Overload	J：ΔR≦±(2%+0.1Ω) F：ΔR≦±(1%+0.1Ω)	**IEC 60115-1, Clause 4.13** 5 × Rated power for 5 seconds
Temperature Coefficient of Resistance	Within the spec.	**IEC 60115-1, Clause 4.8** Test temperature：(T_1) 25℃~ (T_2) -55℃/+155℃ TCR(ppm/℃) = (R_2-R_1)/R_1×1 / (T_2-T_1)×10^6
Environmental	**Specification** (2)	**Refer Methods**
Anti-Sulfur	ΔR≦±(2%+0.1Ω)	**EIA-977(Test B)** Sulfur 750 hours, 105±2°C

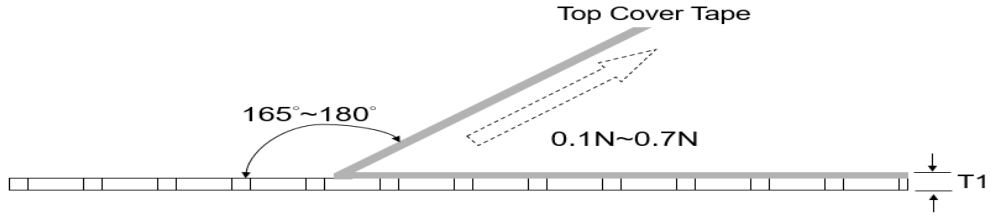
Remarks (1): Refer to AEC - Q200 - Rev E March 20, 2023.
Remarks (2): Specifications with +xΩ are applicable when the resistance >1KΩ.

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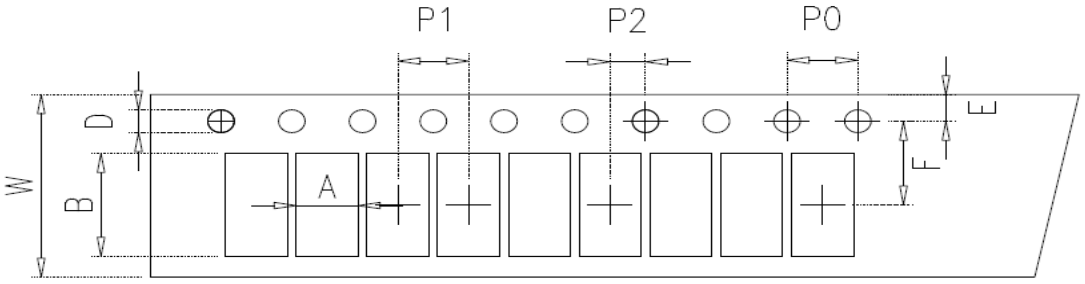
9. PACKAGING

9.1 Peel Strength of Top Cover Tape

The peel speed shall be about 300 mm/min and peel force of top cover tape shall between 0.1 to 0.7N.



9.2 Tape Packaging Dimensions (unit.mm)

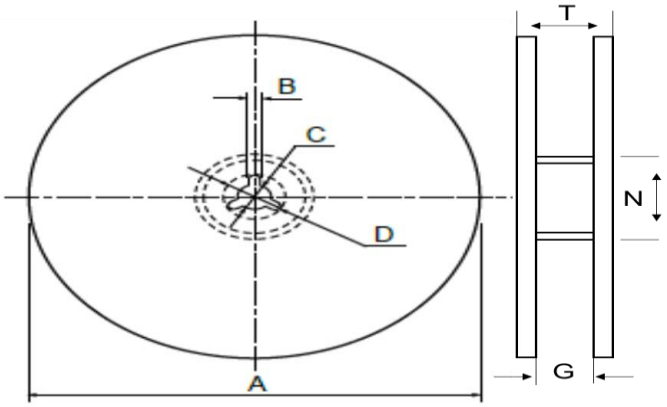


Unit:mm

Size	A	B	W	F	E	P1	P2	P0	D
0612	2.00±0.20	3.60±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
1225	3.50±0.20	6.70±0.20	12.00±0.30	5.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0

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9.3 Reel Dimensions (unit.mm)



Size	Packaging pcs/Reel	A	N	C	D	B	G	T
0612	T: 5k	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
	V: 10k	254.0±2.0	100.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
	W: 20k	330.0±2.0	100.0±1.5	13.0±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
1225	P: 4k	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	13.8±1.5	16.7max.
	X: 8k	254.0±2.0	100.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	13.8±1.5	20.0max.
	Y: 16k	330.0±2.0	100.0±1.5	13.0±0.5	20(Min.)	2.0±0.5	13.8±1.5	20.0max.

Remark: Standard packaging code, please refer to 6. Part No.

10. Storage &. Handling

… Products are recommended to be used up within one year to ensure shelf life.
Check solder ability in case shelf life extension is needed.

… To store products with the following conditions:
Temperature: 5 to 40℃；Humidity: 20 to 70% relative humidity.

… Moisture Sensitivity Levels: MSL=1

Precaution for use：

The AEC-Q200 series resistors is mainly used on general automotive equipment without safety considerations. Please contact our company in advanced if you intend to use resistor for designing the equipment which may damage itself and the safety of third party. If necessary, please consider to add the protect circuit in devising process and obtaining fully safety evaluation. The contents of the acknowledgment is only used for our parent company, marketing subsidiaries and official marketing agents who purchase our products. Not applicable for the other nonofficial channels.

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