

# DATA SHEET

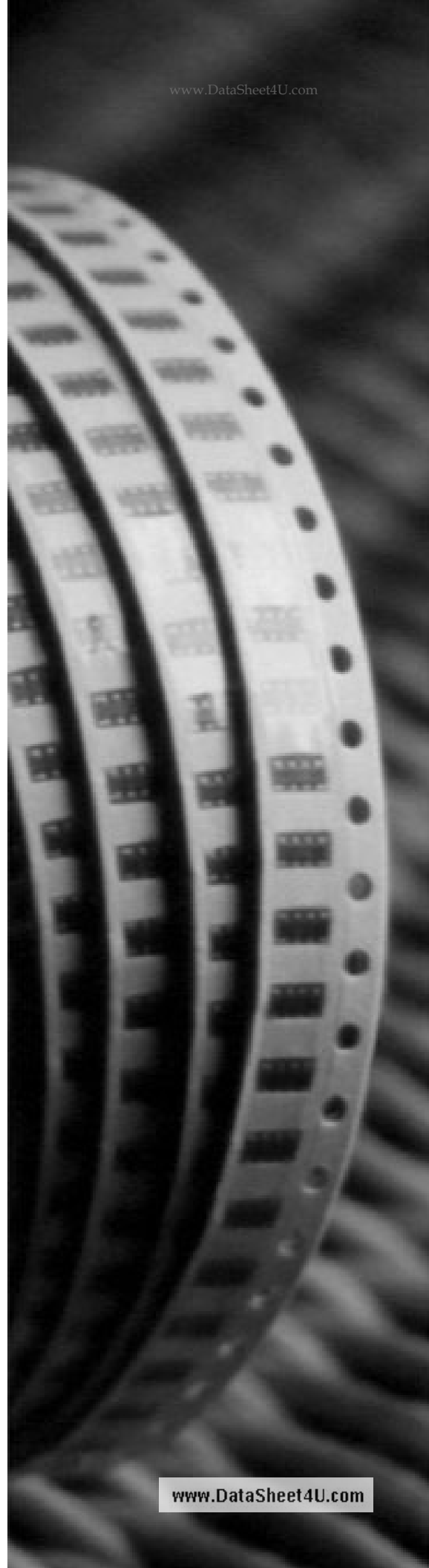
## CHIP RESISTORS ARRAY

TC164 (8Pin/4R)

5%



Product Specification – Mar. 24, 2004 V.4 Supersedes Date of Feb. 10, 2004



**SCOPE**

This specification describes TC164 series chip resistors made by thick film process.

**ORDERING INFORMATION**

Part number is identified by the series, size, tolerance, packing style, temperature coefficient, special type and resistance value.

**TC164 - X X X XX XXXX**  
(1) (2) (3) (4) (5)

**(1) TOLERANCE**

J = ±5%

**(2) PACKAGING TYPE**

R = Paper taping reel

**(3) TEMPERATURE CHARACTERISTIC OF RESISTANCE**

G = ±200ppm/°C  
-- = Base on spec

**(4) SPECIAL TYPE**

07 = 7 inch dia. Reel  
13 = 13 inch dia. Reel

**(5) RESISTANCE VALUE:**

56R, 560R, 5K6, 56K, 1M.

**MARKING**

**TC164**



Fig. 1 5% Marking, Value=56Ω

First two digits for significant figure and 3rd digit for number of zeros

Letter R: decimal place

**DIMENSION**

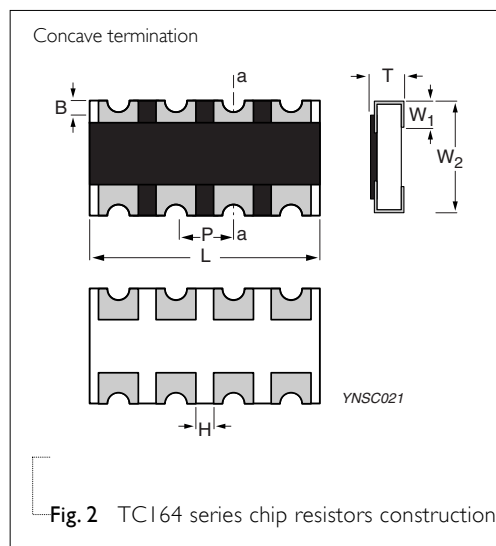


Fig. 2 TC164 series chip resistors construction

Table I

TYPE	TC164
B (mm)	0.3±0.15
H (mm)	0.5±0.15
P (mm)	0.8±0.05
L (mm)	3.2±0.20
T (mm)	0.6±0.1
W <sub>1</sub> (mm)	0.3±0.15
W <sub>2</sub> (mm)	1.6±0.15

**SCHEMATIC**

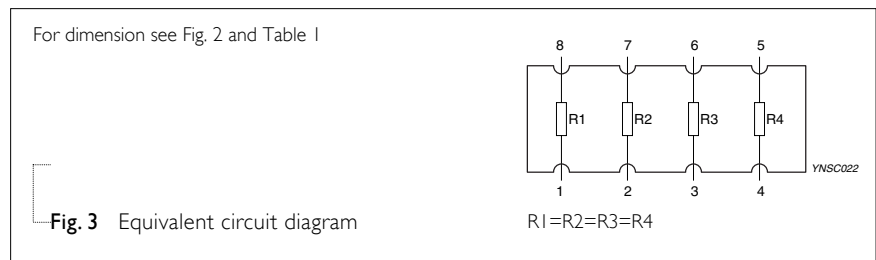
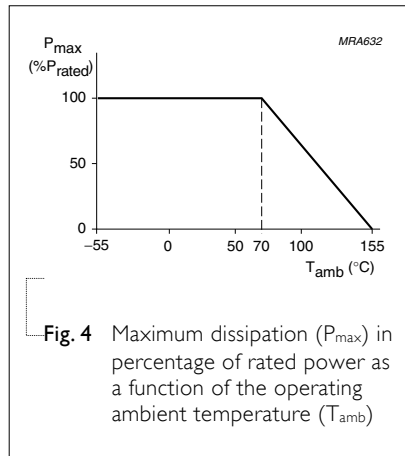


Fig. 3 Equivalent circuit diagram

**POWER RATING**

**RATED POWER AT 70°C,  
TC164 = 1/16W FOR ELEMENT**



**Fig. 4** Maximum dissipation (P<sub>max</sub>) in percentage of rated power as a function of the operating ambient temperature (T<sub>amb</sub>)

**RATED VOLTAGE:**

The DC or AC (rms) continuous working voltage corresponding to the rated power is determined by the following formula:

$$V = \sqrt{P \times R}$$

Where

V=Continuous rated DC or AC (rms) working voltage (V)

P=Rated power (W)

R=Resistance value (Ω)

**ELECTRICAL CHARACTERISTICS**

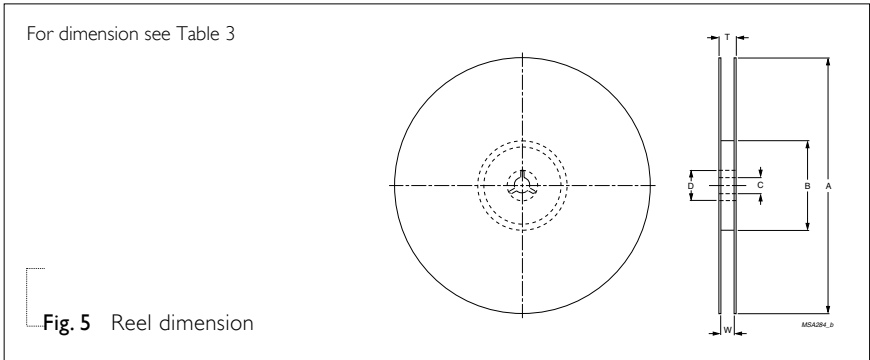
**Table 2**

CHARACTERISTICS	TC164 1/16W
Operating Temperature Range	-55°C to +155°C
Maximum Working Voltage	50V
Maximum Overload Voltage	100V
Dielectric Withstanding Voltage	100V
Number of Resistors	4
Resistance Range	10Ω to 1MΩ Zero Ohm Jumper <0.05Ω
Temperature Coefficient	±200ppm/°C
Jumper Criteria	Rated Current 1.0A Maximum Current 2.0A

**TAPING REEL**

Table 3

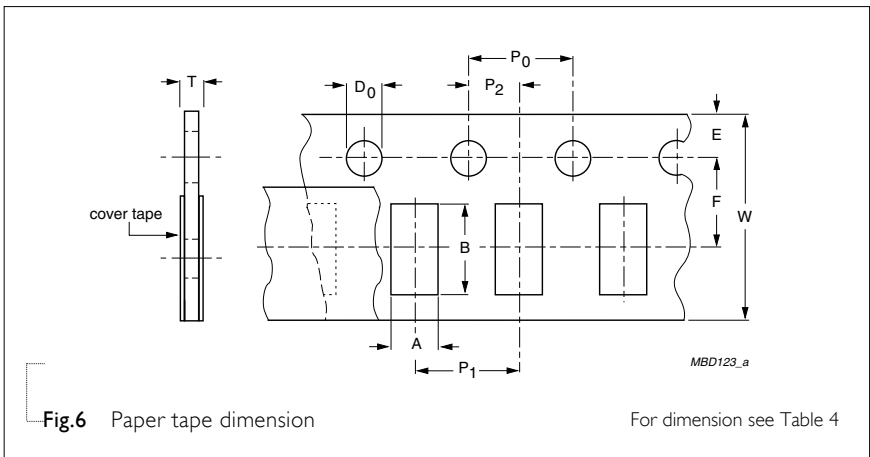
DIMENSION	TC164
Tape Width	8mm
ØA (mm)	180+0/-3
ØB (mm)	60+1/-0
ØC (mm)	13.0±0.2
ØD (mm)	21±0.8
W (mm)	9.0±0.3
T (mm)	11.4±1



**PAPER TAPE SPECIFICATION**

Table 4

DIMENSION	TC164
A (mm)	2.0±0.1
B (mm)	3.5±0.1
W (mm)	8.0±0.2
E (mm)	1.75±0.1
F (mm)	3.5±0.05
P <sub>0</sub> (mm)	4.0±0.1
P <sub>1</sub> (mm)	4.0±0.1
P <sub>2</sub> (mm)	2.0±0.05
ØD <sub>0</sub> (mm)	1.5+0.1/-0
T (mm)	0.85±0.1



**PACKING METHOD**

**LEADER/TRAILER TAPE SPECIFICATION**

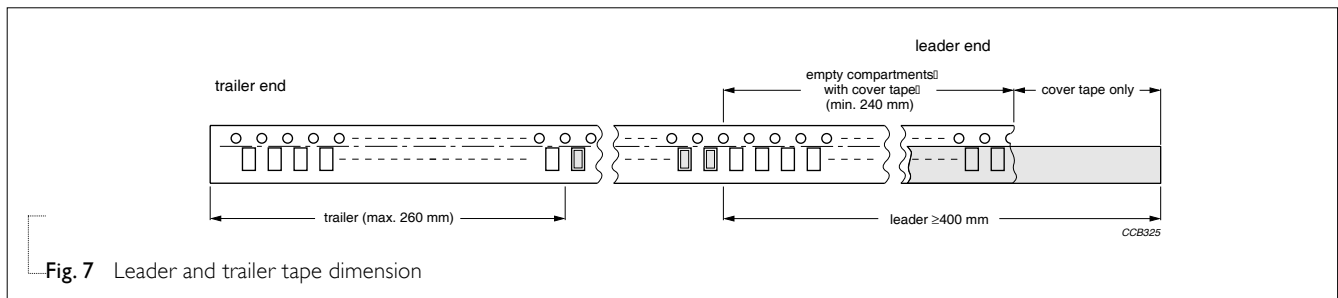


Table 5 Packing style and packaging quantity

PACKING STYLE	REEL DIMENSION	TC164
Paper Taping Reel (R)	7" (178 mm)	5,000
	13" (330 mm)	20,000

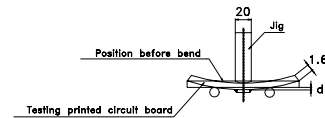
TYPE	TEST METHOD	Formula	ACCEPTANCE STANDARD				
<b>Temperature Coefficient of Resistance (T.C.R.)</b>	Measure resistance at +25°C or specified room temperature as R <sub>1</sub> , then measure at -55°C or +155°C respectively as R <sub>2</sub> . Determine the temperature coefficient of resistance from the following formula:	$T.C.R. = \frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/}^\circ\text{C)}$ <p>Where                      t<sub>1</sub>=+25°C or specified room temperature                      t<sub>2</sub>=-55°C or +155°C test temperature                      R<sub>1</sub>=resistance at reference temperature in ohms                      R<sub>2</sub>=resistance at test temperature in ohms</p>	Refer to table 2				
<b>Thermal Shock</b>	At -55±3°C for 2 minutes and at +155±2°C for 2 minutes as one cycle. After 5 cycles, the specimen shall be stabilized at room temp. Measure the resistance to determine ΔR/R(%) after one more hour.		±(1.0%+0.05Ω)				
<b>Low Temperature Operation</b>	Place the specimen in a test chamber maintained at -65 (+0/-5)°C. After one hour stabilization at this temperature, full rated working voltage shall be applied for 45 (+5/-0) minutes. Have 15 (+5/-0) minutes after remove the voltage, the specimen shall be removed from the chamber and stabilized at room temperature for 24 hrs. Measure the resistance to determine ΔR/R(%)		±(1.0%+0.05Ω) No visible damage				
<b>Short Time Overload</b>	Apply 2.5 times of rated voltage but not exceeding the maximum overload voltage for 5 seconds. Have the specimen stabilized at room temperature for 30 minutes minimum. Measure the resistance to determine ΔR/R(%)		±(2.0%+0.05Ω) No visible damage				
<b>Insulation Resistance</b>	Place the specimen in the jig and apply a rated continues overload voltage (R.C.O.V) for one minute as shown. Measure the insulation resistance.	<table border="1"> <tr> <td><b>Type</b></td> <td><b>TC164</b></td> </tr> <tr> <td><b>Voltage (DC)</b></td> <td>100V</td> </tr> </table>	<b>Type</b>	<b>TC164</b>	<b>Voltage (DC)</b>	100V	≥10,000MΩ
<b>Type</b>	<b>TC164</b>						
<b>Voltage (DC)</b>	100V						
<b>Dielectric Withstand Voltage</b>	Place the specimen in the jig and apply a specified value continuous overload voltage as shown for one minute.	<table border="1"> <tr> <td><b>Type</b></td> <td><b>TC164</b></td> </tr> <tr> <td><b>Voltage (AC)</b></td> <td>100Vrms</td> </tr> </table>	<b>Type</b>	<b>TC164</b>	<b>Voltage (AC)</b>	100Vrms	Breakdown voltage> specification and without open/short
<b>Type</b>	<b>TC164</b>						
<b>Voltage (AC)</b>	100Vrms						
<b>Resistance To Soldering Heat</b>	Immerse the specimen in the solder pot at 260±5°C. for 10±1 seconds. Have the specimen stabilized at room temperature for 30 minutes minimum. Measure the resistance to determine ΔR/R(%)		±(1.0%+0.05Ω) No visible damage				

TYPE	TEST METHOD	ACCEPTANCE STANDARD
<b>Moisture Resistance</b>	Place the specimen in the test chamber and subject to 42 damp heat cycles. Each one of which consists of the steps 1 to 7 as figure 9. The total length of test is 1,000 hours. Have the specimen stabilized at room temperature for 24 hours after testing. Measure the resistance to determine $\Delta R/R(\%)$ .	$\pm(2.0\%+0.05\Omega)$ No visible damage
<b>Life</b>	Place the specimen in the oven at $70\pm 2^\circ\text{C}$ . Apply the rated voltage to the specimen at the 1.5 hours on and 0.5 hour off cycle. The total length of test is 1,000 hours. Have the specimen stabilized at room temperature for one hour minimum after testing. Measure the $\Delta R/R(\%)$ .	$\pm(3.0\%+0.1\Omega)$ No visible damage
<b>Solderability</b>	Immerse the specimen in the solder pot at $235\pm 5^\circ\text{C}$ for 5 sec.	At least 95% solder coverage on the termination

**Bending Strength** Mount the specimen on a test board as shown in the figure 8. Slowly apply the force till the board is bent for  $5\pm 1$  sec. Measure the  $\Delta R/R(\%)$  at this position.

**Type** **TC164**  
**Bent Distance (d)** 1mm

$\pm(1.0\%+0.05\Omega)$   
No visible damage



**Fig. 8** Principle of the bending test

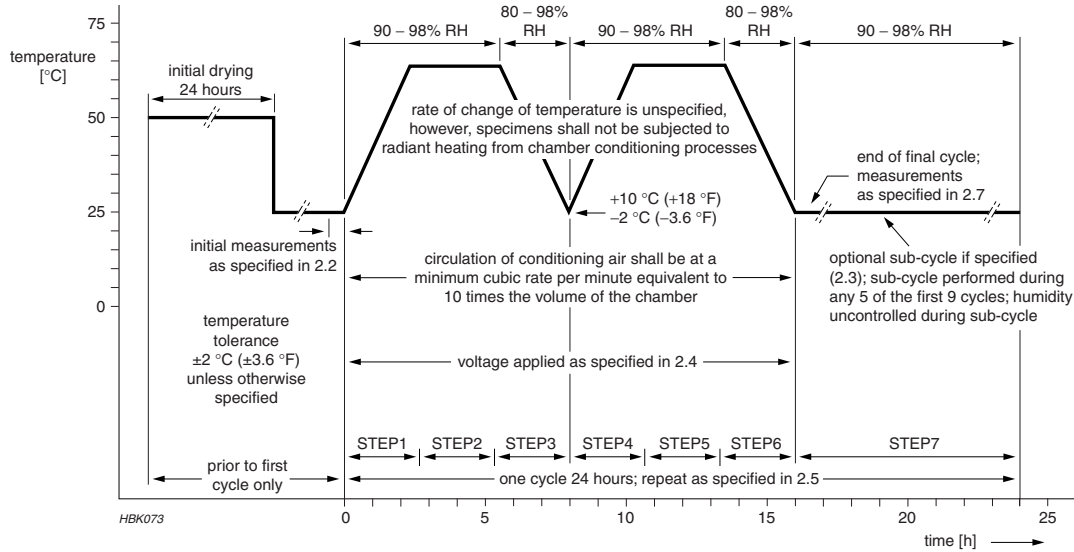


Fig. 9 Conditions by change of temperature