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SPECIFICATION FOR APPROVAL

DATE :

CUSTOMER : \_\_\_\_\_

PART NAME : \_\_\_\_\_ Lead Free Trimmable Chip Resistors

CUSTOMER'S DWG. NO. : \_\_\_\_\_

CUSTOMER'S PART NO. : \_\_\_\_\_

PDC PART NO. : **FTF SERIES APPROVED** \_\_\_\_\_

DESCRIPTION : \_\_\_\_\_

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

OUR ACTION	SIGNATURE
PREPARED By	<i>Jenny Tseng</i>
CHECKED By	<i>Tony Chou</i>
APPROVED By	<i>Byron Tsai</i>

CUSTOMER SIGNATURE FOR ACCEPTANCE

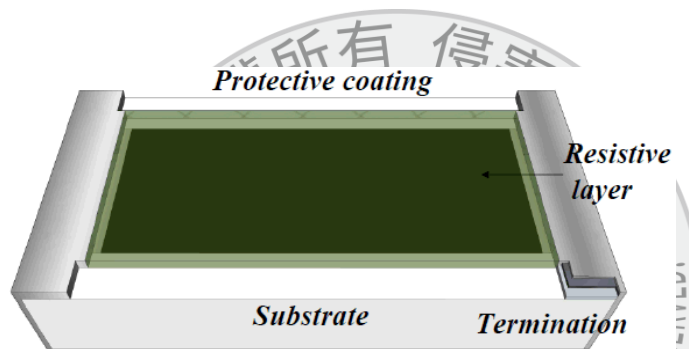
**Features**

- Small size and lightweight with size range per int'l standard
- Highly stable in auto-placement surface mounting application
- Available for fine tuning of the resistance value to obtain optimal circuit signals.
- RoHS compliant & Halogen Free.

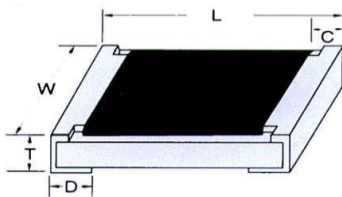
**Applications**

- Tuner
- Camcorder
- Photo sensor
- Mobile phone
- Portable audio
- Portable measuring equipment

**Configuration**



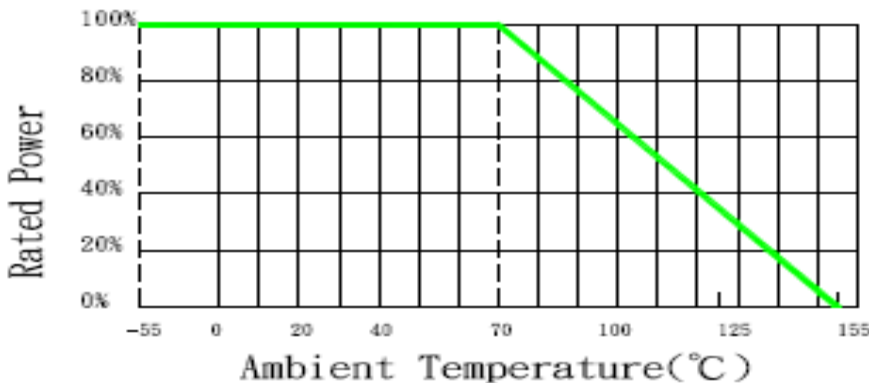
**Dimensions**



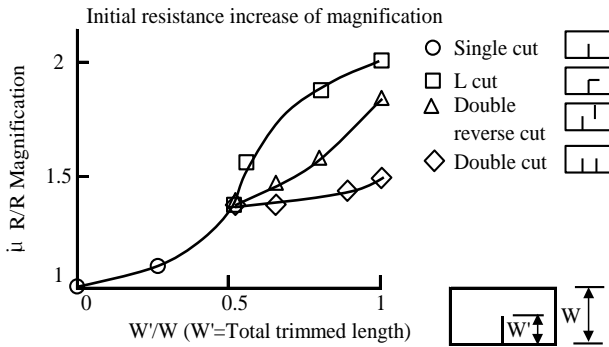
Size	L	W	C	D	T
0603	1.60±0.10	0.80±0.10	0.30±0.20	0.30±0.20	0.45±0.10
0805	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.10
1206	3.10±0.10	1.60±0.10	0.50±0.20	0.50±0.25	0.55±0.10
2010	5.00±0.20	2.50±0.20	0.60±0.25	0.60±0.25	0.60±0.10
2512	6.40±0.20	3.20±0.20	0.60±0.25	0.90±0.25	0.60±0.15

(unit: mm)

**Power Derating Curve**



■ Resistance rising rate



Trimming shall be performed by laser. The resistance rising limits the initial resistance value up to 2 times and the differences are depending on trimming patterns as shown at the left.

■ Rating

Type	Size	Power Rating at 70°C	Max. RCWV	Max. Overload Voltage	Resistance Tolerance (%)	Temperature Coefficient (TCR; ppm/°C)	Resistance Range		Standard Resistance Values
							Min.	Max.	
FTF03	0603	1/10W	50V	100V	0 ~ -30%(X) 0 ~ -20%(Y) 0 ~ -10%(Z)	±100	10Ω	1MΩ	E-24
FTF05	0805	1/8W	150V	300V					
FTF06	1206	1/4W	200V	400V					
FTF20	2010	1/2W	200V	400V					
FTF25	2512	1W	200V	400V					

$E = (P \times R)^{1/2}$  E : Working Voltage(V) , P : Rated Power (W) , R : Resistance Value(Ω)

■ Part Number

FTF	05	X	T	-	103
Type	Size	Tolerance	Packing		GM
FTF	03 : 0603	X : 0% ~ -30%	T : Paper tape - 5Kpcs		examples:
	05 : 0805	Y : 0% ~ -20%	V : Paper tape - 10Kpcs		<b>103</b> → $10 \times 10^3$
	06 : 1206	Z : 0% ~ -10%	W : Paper tape - 20Kpcs		= 10KΩ
	20 : 2010		P : Plastic tape - 4Kpcs		
	25 : 2512		X : Plastic tape - 8Kpcs		
			Y : Plastic tape - 16Kpcs		

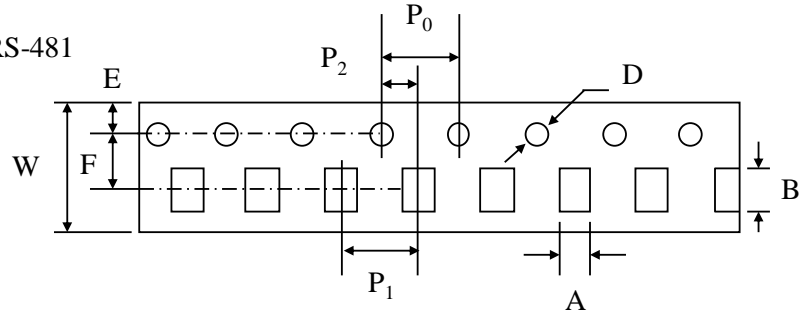
■ Standard resistance value

E3	10				22				47								
E6	10	15			22	33			47	68							
E12	10	12	15	18	22	27	33	39	47	56	68	82					
E24	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47
	51	56	62	68	75	82	91										

**SPECIFICATION**

■ **Tape And Reel Package**

• Taping specs are according to EIA RS-481

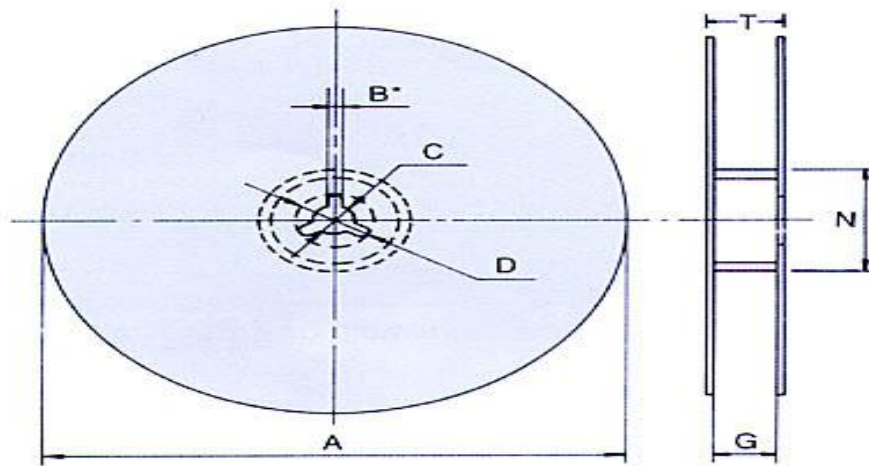


Accumulated dimensional tolerance  $40\pm 0.2\text{mm}$

Size	A	B	W	F	E	P1	P2	P0	D
0603	$1.10\pm 0.20$	$1.90\pm 0.20$	$8.00\pm 0.30$	$3.50\pm 0.05$	$1.75\pm 0.10$	$4.00\pm 0.10$	$2.00\pm 0.05$	$4.00\pm 0.10$	$1.50+0.10/-0$
0805	$1.65\pm 0.20$	$2.40\pm 0.20$	$8.00\pm 0.30$	$3.50\pm 0.05$	$1.75\pm 0.10$	$4.00\pm 0.10$	$2.00\pm 0.05$	$4.00\pm 0.10$	$1.50+0.10/-0$
1206	$2.00\pm 0.20$	$3.60\pm 0.20$	$8.00\pm 0.30$	$3.50\pm 0.05$	$1.75\pm 0.10$	$4.00\pm 0.10$	$2.00\pm 0.05$	$4.00\pm 0.10$	$1.50+0.10/-0$
2010	$2.80\pm 0.20$	$5.50\pm 0.20$	$12.00\pm 0.30$	$5.50\pm 0.05$	$1.75\pm 0.10$	$4.00\pm 0.10$	$2.00\pm 0.05$	$4.00\pm 0.10$	$1.50+0.10/-0$
2512	$3.50\pm 0.20$	$6.70\pm 0.20$	$12.00\pm 0.30$	$5.50\pm 0.05$	$1.75\pm 0.10$	$4.00\pm 0.10$	$2.00\pm 0.05$	$4.00\pm 0.10$	$1.50+0.10/-0$

(unit: mm)

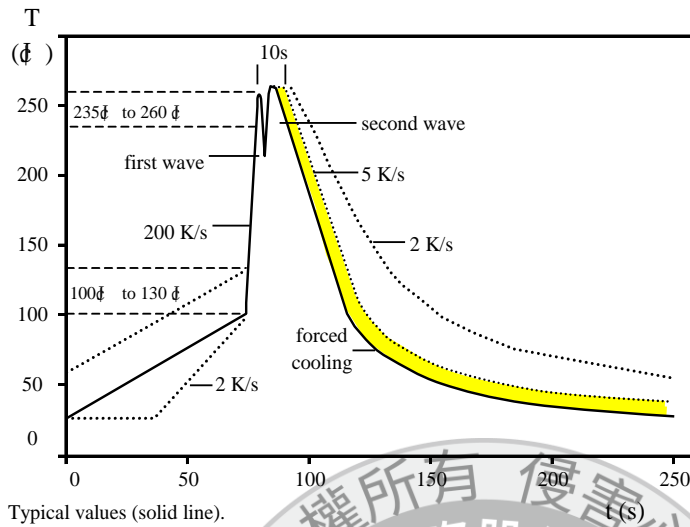
• Reel Package



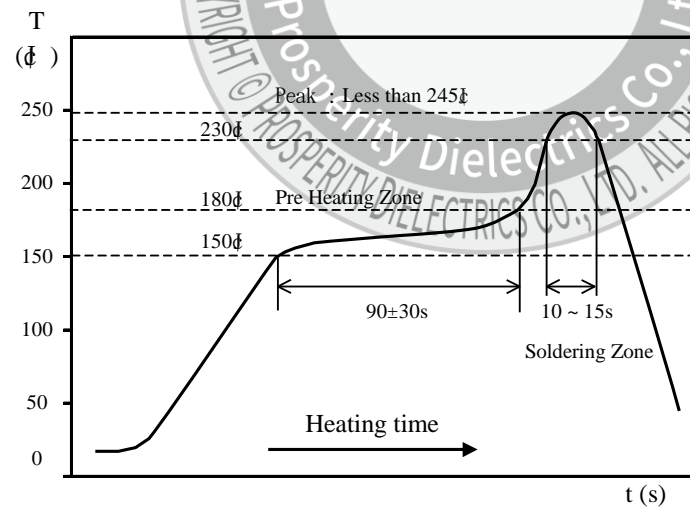
Size	Packaging Q'ty	A	N	C	D	B	G	T
0603 0805 1206	5Kpcs / Reel	$178.0\pm 2.0$	$60.0\pm 0.5$	$13.0\pm 0.5$	20min	$2.0\pm 0.5$	$10.0\pm 1.5$	14.9 max.
	10Kpcs / Reel	$254.0\pm 2.0$	$100.0\pm 1.0$	$13.5\pm 0.5$	20min	$2.0\pm 0.5$	$10.0\pm 1.5$	14.9 max.
	20Kpcs / Reel	$330.0\pm 2.0$	$100.0\pm 1.0$	$13.5\pm 0.5$	20min	$2.0\pm 0.5$	$10.0\pm 1.5$	14.9 max.
2010 2512	4Kpcs / Reel	$178.0\pm 2.0$	$60.0\pm 0.5$	$13.0\pm 0.5$	20min	$2.0\pm 0.5$	$13.8\pm 1.5$	16.7 max.
	8Kpcs / Reel	$254.0\pm 2.0$	$100.0\pm 1.0$	$13.5\pm 0.5$	20min	$2.0\pm 0.5$	$13.8\pm 1.5$	16.7 max.
	16Kpcs / Reel	$330.0\pm 2.0$	$100.0\pm 1.0$	$13.5\pm 0.5$	20min	$2.0\pm 0.5$	$13.8\pm 1.5$	20.0 max.

(unit: mm)

■ Soldering Temperature Curve



WAVE soldering



IR Reflow Soldering

## SPECIFICATION

### ■ Specification And Test Methods

ITEM	SPECIFICATION	TEST METHOD
DC Resistance	X : 0 ~ -30% , Y : 0 ~ -20% , Z : 0 ~ -10%	<b>IEC 60115-1 / JIS C 5201-1 , Clause 4.5</b> Measure the resistance value.
Short time Overload	$\Delta R \leq \pm (2\% + 0.1\Omega)$	<b>IEC 60115-1 / JIS C 5201-1 , Clause 4.13</b> 2.5×Rated voltage or Max. Overload Voltage for 5 sec. measure resistance after 30 minutes
Solderability	Over 95% of termination must be covered with solder	<b>IEC 60115-1 / JIS C 5201-1 , Clause 4.17</b> After immersing flux, dip in the 245±2°C molten solder bath for 3±0.5 sec.
Resistance to Solder Heat	$\Delta R \leq \pm (1\% + 0.1\Omega)$ No mechanical damage	<b>IEC 60115-1 / JIS C 5201-1 , Clause 4.18</b> With 260±5°C for 10±1 sec.
Temperature Coefficient of Resistance (TCR)	±100 ppm/°C	<b>IEC 60115-1 / JIS C 5201-1 , Clause 4.8</b> Test temperature : 25°C (T1) → -55°C (T2) 25°C (T1) → +155°C (T2) $TCR (ppm/^{\circ}C) = \frac{R2-R1}{R1} \times \frac{1}{T2-T1} \times 10^6$ T1: 25°C T2: Test temperature R1: Resistance at reference temperature (T1) R2: Resistance at test temperature (T2)
Load Life Humidity	$\Delta R \leq \pm (3\% + 0.1\Omega)$	<b>IEC 60115-1 / JIS C 5201-1 , Clause 4.24</b> Maintain the temperature of the resistor at 40±2°C and 90~95% R.H. with the rated voltage applied. Cycle ON for 1.5 hours and OFF for 0.5 hour for 1000+48/-0 hours. After 1~4 hour, measure the resistance value.
Load Life	$\Delta R \leq \pm (3\% + 0.1\Omega)$	<b>IEC 60115-1 / JIS C 5201-1 , Clause 4.25</b> Permanent resistance change after 1000+48/-0 hours (1.5 hours ON , 0.5 hour OFF) at RCWV or Max. Keep the resistor at 70±2°C ambient
Temperature Cycle	$\Delta R \leq \pm (1\% + 0.1\Omega)$ No mechanical damage	<b>IEC 60115-1 / JIS C 5201-1 , Clause 4.19</b> Repeat 5 cycles as follows -55°C (30 min.) + 25°C (2~3 min.) +155°C (30 min.) + 25°C (2~3 min.)
Insulation Resistance	Between termination and coating must be over 1000MΩ	<b>IEC 60115-1 / JIS C 5201-1 , Clause 4.6</b> Test voltage: 100±15V
Bending Strength	$\Delta R \leq \pm (1\% + 0.1\Omega)$ No mechanical damage	<b>IEC 60115-1 / JIS C 5201-1 , Clause 4.33</b> Resistance change after bended on the 90mm PCB. Bend: 3mm for 0603 、0805 , 2mm for 1206 、2010 、2512

All product specification and data are subject to change without notice