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SPECIFICATION FOR APPROVAL

DATE：

CUSTOMER：

PART NAME： Thin Film Lead Free & Halogen Free High Precision Chip Resistors

CUSTOMER'S DWG. NO.：

CUSTOMER'S PART NO.：

PDC PART NO.： **FAF SERIES APPROVED**

DESCRIPTION.：

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

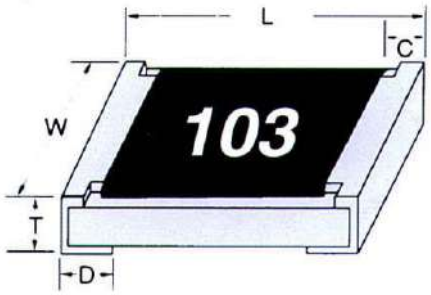
CUSTOMER SIGNATURE FOR ACCEPTANCE

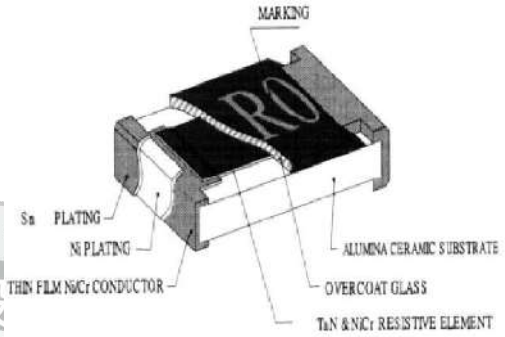
Thin Film Lead Free Type
High Precision Chip Resistors

*Features

Metal Thin Film TaN、Ni/Cr,…etc. Resistive element
Tolerance 1%, 0.5%, 0.25%, 0.1%, 0.05%, 0.01%
Compatible with both flow soldering and reflow soldering
Suitable for Lead Free soldering.
RoHS compliant & Halogen Free

*Configuation & Dimensions



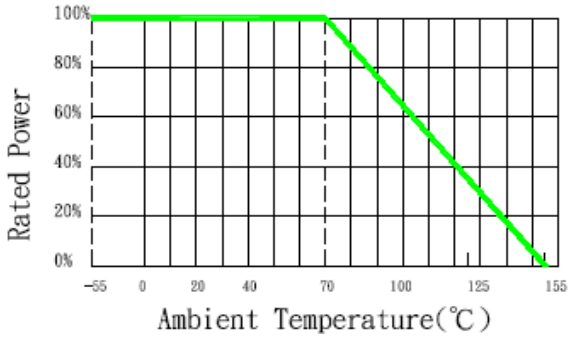


TYPE	L	W	C	D	T
0201	0.60 ± 0.03	0.30 ± 0.03	0.10 ± 0.05	0.15 ± 0.05	0.23 ± 0.03
0402	1.00 ± 0.05	0.50 ± 0.05	0.20 ± 0.10	0.25 ± 0.10	0.35 ± 0.05
0603	1.55 ± 0.10	0.80 ± 0.10	0.25 ± 0.15	0.30 ± 0.15	0.45 ± 0.15
0805	2.00 ± 0.10	1.25 ± 0.10	0.25 ± 0.20	0.40 ± 0.20	0.50 ± 0.15
1206	3.10 ± 0.10	1.60 ± 0.10	0.45 ± 0.20	0.45 ± 0.20	0.60 ± 0.15
1210	3.10 ± 0.10	2.60 ± 0.15	0.50 ± 0.20	0.50 ± 0.20	0.55 ± 0.10
2010	5.00 ± 0.10	2.50 ± 0.15	0.60 ± 0.20	0.50 ± 0.20	0.55 ± 0.10
2512	6.35 ± 0.10	3.20 ± 0.15	0.60 ± 0.20	0.50 ± 0.20	0.55 ± 0.10

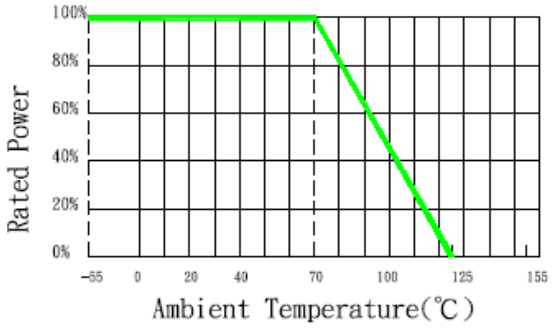
(unit: mm)

*Power Derating Curve

2512. 2010. 1210. 1206. 0805. 0603. 0402



0201



For resistors operated in ambient temperatures above 70℃, power rating must be derated in accordance with the curve above.

*Rating

Standard Type - General High Precision：

Standard Type	Power Rating @ 70℃	Max. RCWV (V)	Max. Overload Voltage (V)	Temperature Coefficient of Resistance (ppm/℃)	Resistance Tolerance (%)	Resistance Range		Standard Resistance Values
						Min.	Max.	
0201	1/32W	15	30	±25	±0.1 ±0.25 ±0.50 ±1.0	100Ω	12KΩ	E24 E96
0201	1/32W	15	30	±50	±0.1 ±0.25 ±0.50 ±1.0	100Ω	12KΩ	
0402	1/16W	25	50	±25 ±50	±0.05 ±0.1 ±0.25 ±0.50 ±1.0	10Ω	255KΩ	
0603	1/16W	50	100			4.7Ω	1MΩ	
0805	1/10W	100	200			4.7Ω	2MΩ	
1206	1/8W	150	300			4.7Ω	2.49MΩ	
1210	1/4W	200	400			4.7Ω	2.49MΩ	
2010	1/2W	200	400			4.7Ω	3MΩ	
2512	3/4W	200	400			4.7Ω	3MΩ	

Function Type - Power High Precision：

Power Enhance Type*	Power Rating @ 70℃	Max. RCWV (V)	Max. Overload Voltage (V)	Temperature Coefficient of Resistance (ppm/℃)	Resistance Tolerance (%)	Resistance Range		Standard Resistance Values
						Min.	Max.	
0201	1/20W	15	30	±25	±0.01~±1.0	27Ω	12KΩ	E24 E96
0201	1/20W	15	30	±50	±0.50~±1.0	27Ω	22KΩ	
0402	1/10W	25	50	±25 ±50	±0.01 ±0.05 ±0.1 ±0.25 ±0.50 ±1.0	10Ω	100KΩ	
0603	1/10W	75	150			4.7Ω	680KΩ	
0805	1/8W	150	300			4.7Ω	1MΩ	
1206	1/4W	200	400			4.7Ω	1MΩ	
1210	2/5W	200	400			10Ω	1MΩ	
2010	3/4W	200	400	±50		10Ω	1.5MΩ	
2512	1W	200	400			10Ω	1.5MΩ	

Function Type - Special TCR High Precision：

Narrow TCR Type*	Power Rating @ 70℃	Max. RCWV (V)	Max. Overload Voltage (V)	Temperature Coefficient of Resistance (ppm/℃)	Resistance Tolerance (%)	Resistance Range		Standard Resistance Values
						Min.	Max.	
0402	1/10W	25	50	±15	±0.01 ±0.05 ±0.1 ±0.25 ±0.50 ±1.0	10Ω	20KΩ	E24 E96
0603	1/10W	50	100			4.7Ω	100KΩ	
0805	1/8W	100	200			4.7Ω	200KΩ	
1206	1/4W	150	300			4.7Ω	300KΩ	
1210	2/5W	200	400			4.7Ω	400KΩ	
2010	3/4W	200	400			4.7Ω	900KΩ	
2512	1W	200	400			4.7Ω	1.5MΩ	
0402	1/10W	25	50	±10	±0.01 ±0.05 ±0.1 ±0.25 ±0.50 ±1.0	10Ω	20KΩ	E24 E96
0603	1/10W	50	100			4.7Ω	100KΩ	
0805	1/8W	100	200			4.7Ω	200KΩ	
1206	1/4W	150	300			4.7Ω	300KΩ	
1210	2/5W	200	400			4.7Ω	400KΩ	
2010	3/4W	200	400			4.7Ω	900KΩ	
2512	1W	200	400			4.7Ω	1.5MΩ	

Thin Film Lead Free Type
High Precision Chip Resistors

*Rating

Function Type - Ultra TCR High Precision：

Narrow TCR Type*	Power Rating @ 70℃	Max. RCWV (V)	Max. Overload Voltage (V)	Temperature Coefficient of Resistance (ppm/℃)	Resistance Tolerance (%)	Resistance Range		Standard Resistance Values
						Min.	Max.	
0402	1/10W	25	50	±5	±0.01 ±0.05 ±0.1 ±0.25 ±0.50 ±1.0	10Ω	10KΩ	E24 E96
0603	1/10W	50	100			4.7Ω	50KΩ	
0805	1/8W	100	200			4.7Ω	100KΩ	
1206	1/4W	150	300			4.7Ω	150KΩ	
1210	2/5W	200	400			4.7Ω	150KΩ	
2010	3/4W	200	400			4.7Ω	360KΩ	
2512	1W	200	400			4.7Ω	600KΩ	
0402	1/10W	25	50	±3	±0.01 ±0.05 ±0.1 ±0.25 ±0.50 ±1.0	10Ω	8KΩ	E24 E96
0603	1/10W	50	100			4.7Ω	40KΩ	
0805	1/8W	100	200			4.7Ω	80KΩ	
1206	1/4W	150	300			4.7Ω	120KΩ	
1210	2/5W	200	400			4.7Ω	150KΩ	
2010	3/4W	200	400			4.7Ω	360KΩ	
2512	1W	200	400			4.7Ω	600KΩ	
0402	1/10W	25	50	±2	±0.01 ±0.05 ±0.1 ±0.25 ±0.50 ±1.0	10Ω	8KΩ	E24 E96
0603	1/10W	50	100			4.7Ω	40KΩ	
0805	1/8W	100	200			4.7Ω	80KΩ	
1206	1/4W	150	300			4.7Ω	120KΩ	
1210	2/5W	200	400			4.7Ω	150KΩ	
2010	3/4W	200	400			4.7Ω	360KΩ	
2512	1W	200	400			4.7Ω	600KΩ	

Thin Film Lead Free Type
High Precision Chip Resistors

*Part Number

Type	Size	Tolerance	Packing info	Power Code	Marking	TCR Code
FAF	□□	□	□	□	□□□□ □□□	□
Thin Film	01-0201	T ±0.01%	0201~1210：	Standard type	4-Digits	B - 2 ppm
	02-0402	A ±0.05%	Paper tape:	fill in：	1R00=1Ω	C - 3 ppm
	03-0603	B ±0.10%	T - 5 Kpcs	" — "	3302=33KΩ	W - 5 ppm
	05-0805	C ±0.25%	V - 10Kpcs	* Function type	51R0=51Ω	V - 10 ppm
	06-1206	D ±0.50%	U - 15Kpcs	fill in：		S - 15 ppm
	12-1210	F ±1.00%	2010/2512：	T- 1/20W	0603：	Q - 25 ppm
	20-2010		Plastic tape:	A- 1/16W	3-Digits	P - 50 ppm
	25-2512		P - 4Kpcs	B- 1/10W	01C=1KΩ	
			X - 8Kpcs	C- 1/8W	Refer to.	
				D- 1/4W	Table 1.	
				E- 1/3W		
				R- 2/5W		
				F- 1/2W		
				G- 3/4W		
				H- 1W		

EX. Standard type, 1206, ±1%, Paper 5Kpcs, 1/8W, 1KΩ, 25ppm. **FAF06FT-1001Q**

EX. Narrow TCR type, 0603, ±0.1%, Paper 5Kpcs, 1/10W, 1KΩ, 10ppm. **FAF03BTB01BV**

* Resistance Marking

E - 24 SERIES

4 digit marking for 0805, 1206, 1210, 2010, 2512
examples: 4702 $470\times 10^2 = 47K\Omega$

3 digit marking for 0603
examples: 473 $47\times 10^3 = 47K\Omega$

E - 96 SERIES

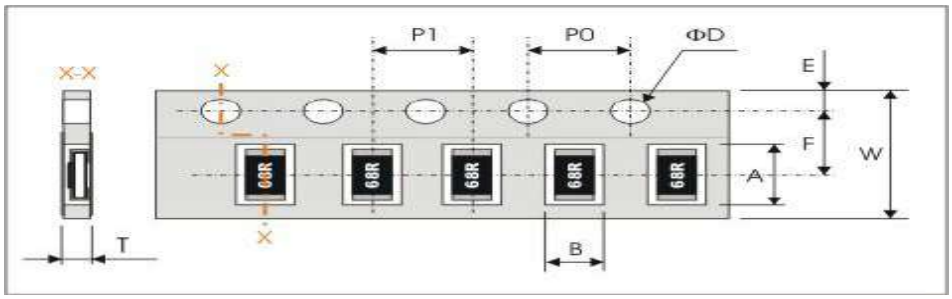
4 digit marking for 0805, 1206, 1210, 2010, 2512
examples: 4752 $475\times 10^2 = 47.5K\Omega$

3 digit included two numbers and one letter for 0603
examples: 02C $102\times 10^2 = 10.2K\Omega$

◎ No marking code for 0402、0201 size

* *Tape And Reel Package*

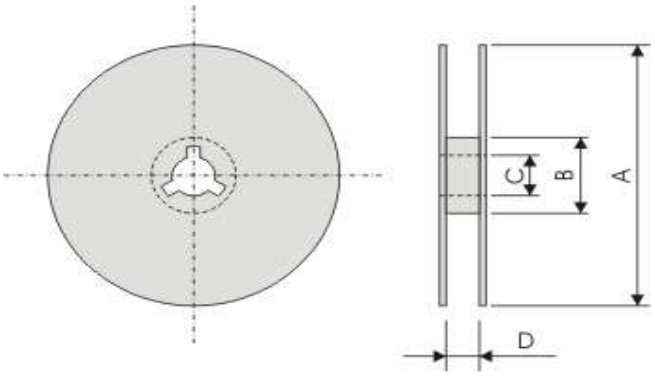
Paper Tape specifications (unit : mm)



Type	A	B	W	F	E	P1	P0	Ø D	T
0201	0.37±0.05	0.45±0.03	8.00±0.30	3.50±0.05	1.75±0.10	2.00±0.10	4.00±0.10	Ø 1.50+0.10/-0	0.45±0.05
0402	1.20±0.10	0.7±0.10	8.00±0.30	3.50±0.05	1.75±0.10	2.00±0.10	4.00±0.10	Ø 1.50+0.10/-0	0.40±0.05
0603	1.90±0.20	1.10±0.20	8.00±0.30	3.50±0.20	1.75±0.10	4.00±0.10	4.00±0.10	Ø 1.50+0.10/-0	0.65±0.05
0805	2.40±0.20	1.65±0.20	8.00±0.30	3.50±0.20	1.75±0.10	4.00±0.10	4.00±0.10	Ø 1.50+0.10/-0	Max. 1.0
1206	3.60±0.20	2.00±0.20	8.00±0.30	3.50±0.20	1.75±0.10	4.00±0.10	4.00±0.10	Ø 1.50+0.10/-0	Max. 1.0
1210	3.60±0.20	3.00±0.20	8.00±0.30	3.50±0.20	1.75±0.10	4.00±0.10	4.00±0.10	Ø 1.50+0.10/-0	Max. 1.0
2010	5.50±0.20	2.80±0.20	12.0±0.30	5.50±0.10	1.75±0.10	4.00±0.10	4.00±0.10	Ø 1.50+0.10/-0	Max. 1.2
2512	6.90±0.20	3.60±0.20	12.0±0.30	5.50±0.10	1.75±0.10	4.00±0.10	4.00±0.10	Ø 1.50+0.10/-0	Max. 1.2

(unit: mm)

Reel dimensions



unit: mm

Symbol	A	B	C	D
0201 0402 0603 0805 1206 1210 2010 2512	178.0±2.0	60.0±0.10	13.0±0.2	9.0±0.5

*Specification And Test Methods

ITEM	SPECIFICATION	TEST METHOD
DC Resistance	F: ± 1% , C:±0.25% , D: ±0.5% , B: ±0.1% , A: ±0.05%	**JIS C 5202 5.1 / IEC 60115-1 4.5** Measure the resistance value.
Short time Overload	F、C、D、B 、A: △ R ≦ ±(0.2% + 0.05Ω) 0201＞1KΩ：△ R ≦ ±(0.25% + 0.05Ω)	**JIS C 5202 5.5 / IEC 60115-1 4.13** 2.5×Rated voltage or Max. Overload Voltage for 5 sec. measure resistance after 30 minutes (0201 2 sec.)
Solderability	Over 95% of termination must be covered with solder	**IEC 60115-1 / JIS C 5201-1 , Clause 4.17** After immersing flux, dip in the 245±2℃ molten solder bath for 3±0.5 sec
Resistance to Solder Heat	F、C、D、B、A : △ R ≦ ±(0.1% + 0.05Ω)	**JIS C 5202 6.4 / IEC 60115-1 4.18** With 260±5℃ for 10±1 sec.
Temperature Coefficient of Resistance (TCR)	TCR CODE ： B… ± 2 ppm / ℃ C… ± 3 ppm / ℃ W… ± 5 ppm / ℃ V… ±10 ppm / ℃ S… ±15 ppm / ℃ Q… ±25 ppm / ℃ P… ±50 ppm / ℃	**JIS C 5202 5.2 / IEC 60115-1 4.8.4.2** T1 T2 Test temperature: 25℃ → -55℃ 25C → 125C $TCR(ppm/C)=\frac{R2-R1}{R1}\times\frac{1}{T2-T1}\times10^{6}$ T1: 25℃ T2: Test temperature R1: Resistance at reference temperature (T1) R2: Resistance at test temperature (T2)
Load Life Humidity	F、C、D、B、A:△ R ≦ ±(0.5% + 0.05Ω) 0201＞1KΩ：△ R ≦ ±(1.0% + 0.05Ω)	**JIS C 5202 7.9/ IEC 60115-1 4.24.2** Maintain the temperature of the resistor at 40±2℃ and 90～95% RH 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	F、C、D、B、A: △ R ≦ ±(0.5% + 0.05Ω) 0201＞1KΩ：△ R ≦ ±(1.0% + 0.05Ω)	**JIS C 5202 7.10/ IEC 60115-1 4.25.1** 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℃ ambient
Temperature Cycle	F、C、D、B、A: △R≦±(0.1% + 0.05Ω) 0201＞1KΩ：△ R ≦ ±(0.25% + 0.05Ω)	**JIS C 5202 7.4 / IEC 60115-1 4.19** Repeat 5 cycles as follows -55℃(30 min.)+25℃(2-3 min.) +155℃(30 min.)+25℃(2-3 min.)
Bending Strength	F、C、D、B、A: △R≦±(0.1% + 0.05Ω) 0201＞1KΩ：△ R ≦ ±(0.25% + 0.05Ω)	**IEC 60115-1 4.33** Resistance change after bended 3mm on the 90mm PCB.

*Appendix.

■ 0603 1% Marking Table (Table 1)

Code	E48	E96	Code	E48	E96	Code	E48	E96	Code	E48	E96
01	100	100	25	178	178	49	316	316	73	562	562
02		102	26		182	50		324	74		576
03	105	105	27	187	187	51	332	332	75	590	590
04		107	28		191	52		340	76		604
05	110	110	29	196	196	53	348	348	77	619	619
06		113	30		200	54		357	78		634
07	115	115	31	205	205	55	365	365	79	649	649
08		118	32		210	56		374	80		665
09	121	121	33	215	215	57	383	383	81	681	681
10		124	34		221	58		392	82		698
11	127	127	35	226	226	59	402	402	83	715	715
12		130	36		232	60		412	84		732
13	133	133	37	237	237	61	422	422	85	750	750
14		137	38		243	62		432	86		768
15	140	140	39	249	249	63	442	442	87	787	787
16		143	40		255	64		453	88		806
17	147	147	41	261	261	65	464	464	89	825	825
18		150	42		267	66		475	90		845
19	154	154	43	274	274	67	487	487	91	866	866
20		158	44		280	68		499	92		887
21	162	162	45	287	287	69	511	511	93	909	909
22		165	46		294	70		523	94		931
23	169	169	47	301	301	71	536	536	95	953	953
24		174	48		309	72		549	96		976

Code	A	B	C	D	E	F	G	H	X	Y	Z
Multiplier	10^{0}	10^{1}	10^{2}	10^{3}	10^{4}	10^{5}	10^{6}	10^{7}	10^{-1}	10^{-2}	10^{-3}

■ 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										
E96	100	102	105	107	110	113	115	118	121	124	127	130	133	137	140	143	147
	150	154	158	162	165	169	174	178	182	187	191	196	200	205	210	215	221
	226	232	237	243	249	255	261	267	274	280	287	294	301	309	316	324	332
	340	348	357	365	374	383	392	402	412	422	432	442	453	464	475	487	499
	511	523	536	549	562	576	590	604	619	634	649	665	681	698	715	732	750
	768	787	806	825	845	866	887	909	931	953	976						

All product specification and data are subject to change without notice