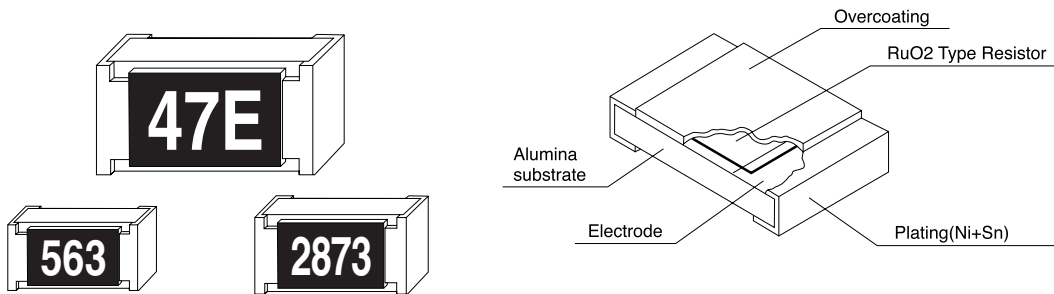


# THICK FILM CHIP RESISTORS

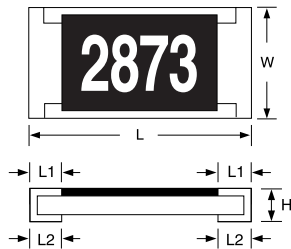
## CONSTRUCTION



### OPERATING TEMPERATURE RANGE

-55°C ~ +155°C

## DIMENSIONS



Unit: mm

Type	Dimensions	L	W	H	L1	L2
ATR 0402		1.00 ± 0.10	0.50 ± 0.05	0.30 ± 0.05	0.20 ± 0.10	0.25 ± 0.10
ATR 0603		1.55 ± 0.10	0.80 ± $\begin{smallmatrix} 0.10 \\ 0.05 \end{smallmatrix}$	0.45 ± 0.10	0.30 ± 0.15	0.30 ± 0.15
ATR 0805		2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.35 ± 0.20	0.35 ± 0.15
ATR 1206		3.05 ± 0.10	1.55 ± 0.10	0.55 ± $\begin{smallmatrix} 0.10 \\ 0.05 \end{smallmatrix}$	0.45 ± 0.20	0.35 ± 0.15
ATR 1210		3.05 ± 0.10	2.55 ± 0.10	0.55 ± 0.10	0.50 ± 0.20	0.50 ± 0.20
ATR 2010		5.00 ± 0.20	2.50 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
ATR 2512		6.30 ± 0.20	3.20 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20

## General Specifications

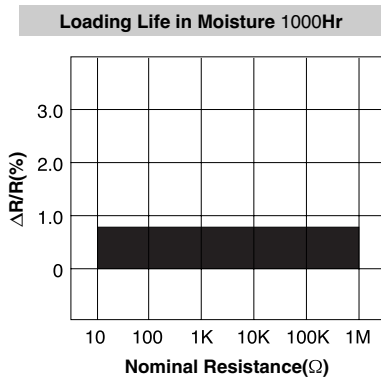
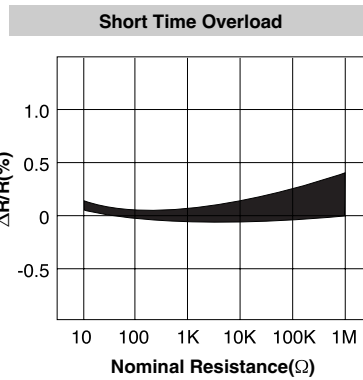
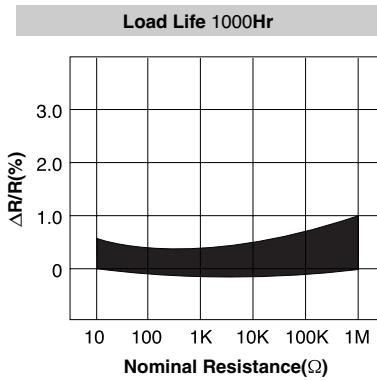
Type	Rated Power at 70°C	Max. Working Voltage	Max. Overload Voltage	T.C.R. (ppm/°C)	Resistance Range $\geq 1\Omega$				Jumper Rated Current	Jumper Resistance Value
					D(±0.5%) E-96	F(±1%) E-96	G(±2%) E-24	J(±5%) E-24		
ATR 0402	$\frac{1}{16}$ W	50V	100V	$\begin{smallmatrix} +500 \\ -200 \end{smallmatrix}$	-	1Ω~9.9Ω	1Ω~9.9Ω	1Ω~9.9Ω	1A	50mΩMAX
				± 200	100Ω~990Ω	10Ω~990Ω	10Ω~990Ω			
ATR 0603	$\frac{1}{10}$ W	50V	100V	± 100	100Ω~1MΩ	33Ω~1MΩ	-	-	1A	50mΩMAX
				± 200	10Ω~99Ω	$\begin{smallmatrix} 10\Omega\sim 32\Omega \\ 1.1M\sim 10M\Omega \end{smallmatrix}$	10Ω~10MΩ	10Ω~10MΩ		
				± 400	-	1Ω~9.9Ω	1Ω~9.9Ω	$\begin{smallmatrix} 1\Omega\sim 9.9\Omega \\ 11M\Omega\sim 26M\Omega \end{smallmatrix}$		
ATR 0805	$\frac{1}{8}$ W	150V	300V	± 100	100Ω~1MΩ	33Ω~1MΩ	-	-	2A	50mΩMAX
				± 200	-	$\begin{smallmatrix} 10\Omega\sim 32\Omega \\ 1.1M\sim 10M\Omega \end{smallmatrix}$	10Ω~10MΩ	10Ω~10MΩ		
				± 400	-	1Ω~9.9Ω	1Ω~9.9Ω	$\begin{smallmatrix} 1\Omega\sim 9.9\Omega \\ 11M\Omega\sim 26M\Omega \end{smallmatrix}$		
ATR 1206	$\frac{1}{4}$ W	200V	400V	± 100	100Ω~1MΩ	33Ω~1MΩ	-	-	2A	50mΩMAX
				± 200	-	$\begin{smallmatrix} 10\Omega\sim 32\Omega \\ 1.1M\sim 10M\Omega \end{smallmatrix}$	10Ω~10MΩ	10Ω~10MΩ		
				± 400	-	1Ω~9.9Ω	1Ω~9.9Ω	$\begin{smallmatrix} 1\Omega\sim 9.9\Omega \\ 11M\Omega\sim 26M\Omega \end{smallmatrix}$		
ATR 1210	$\frac{1}{3}$ W	200V	400V	± 100	100Ω~1MΩ	33Ω~1MΩ	-	-	2A	50mΩMAX
				± 200	-	$\begin{smallmatrix} 10\Omega\sim 32\Omega \\ 1.1M\sim 10M\Omega \end{smallmatrix}$	10Ω~10MΩ	10Ω~20MΩ		
				± 400	-	1Ω~9.9Ω	1Ω~9.9Ω	1Ω~9.9Ω		
ATR 2010	$\frac{3}{4}$ W	200V	400V	± 100	-	10Ω~1MΩ	-	-	2A	50mΩMAX
				± 200	-	-	10Ω~1MΩ	10Ω~1MΩ		
				± 400	-	-	-	1Ω~9.9Ω		
ATR 2521	1W	200V	400V	± 100	-	10Ω~1MΩ	-	-	2A	50mΩMAX
				± 200	-	-	10Ω~1MΩ	10Ω~1MΩ		
				± 400	-	-	-	1Ω~9.9Ω		

## CHARACTERISTICS

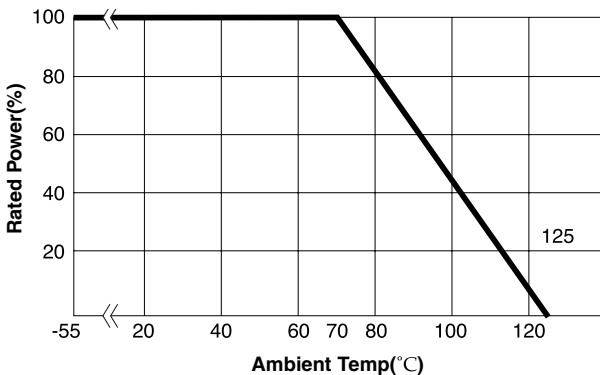
Item	0.5% · 1% (R ≥ 1Ω)	2% · 5% (R ≥ 1Ω)	Test Method
Temperature Cycling	± (0.5% + 0.05Ω)	± (1.0% + 0.05Ω)	JIS-C5202-7.4 Cycle between -55°C and +125°C for 5 cycles
Low Temperature Operation	± (0.5% + 0.05Ω)	± (1.0% + 0.05Ω)	MIL-R-55342-D 4.7.4 Followed by 45 Minutes of RCWV.
Short Time Overload	± (1.0% + 0.05Ω)	± (2.0% + 0.10Ω)	JIS-C5202-5.5 Apply rated voltage 2.5 times for 5 seconds
Resistance to Soldering Heat	± (1.0% + 0.05Ω)	± (1.0% + 0.05Ω)	JIS-C5202-6.10 Immerse for 10 sec. in solder at 260 ± 5°C
Loading Life in Moisture	± (1% + 0.05Ω)	± (2.0% + 0.1Ω)	JIS-C5202-7.9 40°C, 1000Hrs at RCWV, 1.5Hr ON, 0.5Hr OFF
Resistance to dry heat	± (1.0% + 0.05Ω)	± (2.0% + 0.10Ω)	JIS-C5202-7.2 96Hrs at 125°C
Load Life	± (1.0% + 0.05Ω)	± (3.0% + 0.10Ω)	JIS-C5202-7.10 70°C, 1000Hrs at RCWV, 1.5Hr ON, 0.5Hr OFF
Solderability	Coverage ≥ 95%	Coverage ≥ 95%	JIS-C5202-6.11 Immerse for 3 sec. in solder at 245 ± 3°C
Bending Strength	± (1.0% + 0.05Ω)	± (1.0% + 0.05Ω)	JIS-C5202-6.1.4 Amount of band: ATR0402, ATR0603, ATR0805=5mm, ATR1206, ATR1210=3mm, ATR2010, ATR2521=2mm
Intermittent Overload	± (5.0% + 0.10Ω)	± (5.0% + 0.10Ω)	JIS-C5202-5.8 Apply rated voltage 1sec ON, 25sec OFF, 10000 cycles
Dielectric Withstanding Voltage	No short or burned on the appearance		JIS-C5202-5.7 Apply 500VAC for 1min(ATR0402 300VAC, ATR0603 300VAC/1Min)
Terminal Strength	No evidence of mechanical damage		JIS-C5202-6.1.4 Apply 5N pushing force for 10sec.

\*RCWV=Rated Continuous Working Voltage

## CHARACTERISTIC DATA



## POWER DERATING CURVE



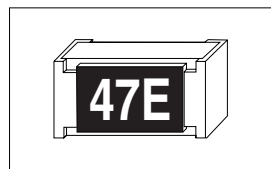
## MARKING

FOR E-24 & E-96

- 2%, 5% 3 digits indication
- first 2 digits are significant figures
- 3rd digit is multiplier( $10^x$ )
- EX. Marking -> 563
- $56 \times 10^3 = 56000\Omega = 56K\Omega$

- 1% 4 digits indication
- first 3 digits are significant figures
- 4th digit is multiplier( $10^x$ )
- EX. Marking -> 3922
- $392 \times 10^2 = 39200\Omega = 39.2K\Omega$

TYPE ATR0402: No marking Code



FOR ATR0603 1%(E-96)

- 3 digit indication
- first 2 significant for E-96 Part marking scheme.
- 3rd digit is multiplier:
- Y =  $10^{-2}$    X =  $10^{-1}$    A =  $10^0$    B =  $10^1$
- C =  $10^2$    D =  $10^3$    E =  $10^4$    F =  $10^5$

# THICK FILM CHIP RESISTORS

## ■ STANDARD RESISTANCE VALUES

• For 2%, 5%(E-24)

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

• For 1%(E-96)

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

## ■ ALTERNATE MARKING METHOD

• For ATR0603 1%(E-96)

Code	R Value	Code	R Value	Code	R Value	Code	R Value	Code	R Value	Code	R Value	Code	R Value
1	100	13	133	25	178	37	237	49	316	61	422	73	562
2	102	14	137	26	182	38	243	50	324	62	432	74	576
3	105	15	140	27	187	39	249	51	332	63	442	75	590
4	107	16	143	28	191	40	255	52	340	64	453	76	604
5	110	17	147	29	196	41	261	53	348	65	464	77	619
6	113	18	150	30	200	42	267	54	357	66	475	78	634
7	115	19	154	31	205	43	274	55	365	67	487	79	649
8	118	20	158	32	210	44	280	56	374	68	499	80	665
9	121	21	162	33	215	45	287	57	383	69	511	81	681
10	124	22	165	34	221	46	294	58	392	70	523	82	698
11	127	23	169	35	226	47	301	59	402	71	536	83	715
12	130	24	174	36	232	48	309	60	412	72	549	84	732

## ■ EXPLANATION OF PART NUMBERS

(EX)

ATR	0402	101	J	TP
<b>Type</b>	<b>Size</b>	<b>Nominal Resistance</b>	<b>Tolerance</b>	<b>Packing</b>
Thick Film Chip Resistors C: Sn/Pb Process T: Sn(Ti) Process	0402 0603 0805 1206 1210 2010 2512	<ul style="list-style-type: none"> <li>■ Resistors</li> <li>• 3-Digit: E24 Series Ex 2.2Ω=2R2 100Ω=101</li> <li>• 4-Digit: E96 Series Ex 10.2Ω=10R2 10KΩ=1002</li> <li>■ Jumper: 000</li> </ul>	D = ± 0.5% F = ± 1% G = ± 2% J = ± 5%	TH: 2mm Pitch Paper (Taping) 10000pcs TP: 4mm Pitch Paper (Taping) 5000pcs TE: 4mm Pitch Emboss (Taping) 4000pcs BA: Bulk Case