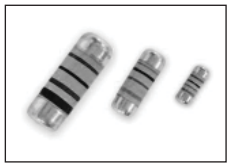
Metal Film MELF Resistors

NFR Series



FEATURES

- **SURFACE MOUNT IN SIZES 0102 (0805), 0204 (1406) AND 0207 (2410)**
- AVAILABLE IN PRECISION TOLERANCE AND TC (TO ±0.1% TOL. AND ±10PPM TC)
- ALL SIZES ARE AVAILABLE IN TAPE/REEL FOR AUTOMATIC MOUNTING
- SAC REFLOW SOLDERABLE (+260°C FOR 3 SECONDS)
- AVAILABLE IN ZERO OHM JUMPER

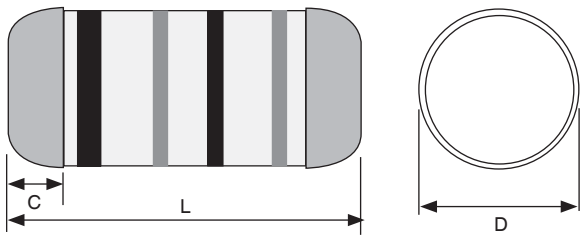
STANDARD POWER SPECIFICATIONS

Type	Size	Power Rating at 70°C	Max. *1 Working Voltage	Max. *2 Overload Voltage	Resistance Tolerance Code	Temperature Coefficient (ppm/°C)	Resistance Range (Ω)*3	Resistance Values	Operating Temperature Range
NFR0102W	0102 (0805)	0.125W	150V	300V	±0.1%(B) ±0.25% (C) ±0.5% (D) ±1% (F)	±15 (N)	100 ~ 56K	E-24 & E-96	-55°C ~ +155°C
					±0.1%(B) ±0.25% (C) ±0.5% (D) ±1% (F)	±25 (C)	100 ~ 100K	E-24 & E-96	
					±5% (J)			E-24	
					±0.5 (D) ±1% (F)	±50 (D)	1.0 ~ 1M	E-24 & E-96	
					±5% (J)		1.0 ~ 1M	E-24	
					±5% (J)	±100 (E)	0.22 ~ 2M	E-24	
NFR0204V	0204 (1406)	0.25W	200V	400V	±0.1%(B) ±0.25% (C) ±0.5% (D) ±1% (F)	±10 (B)	10 ~ 20K	E-24 & E-96	
					±0.1%(B) ±0.25% (C) ±0.5% (D) ±1% (F)	±15 (N)	10 ~ 300K	E-24 & E-96	
					±0.1 (B) ±0.25% (C) ±0.5% (D)	±25 (C)	10 ~ 1M	E-24 & E-96	
					±1% (F)		10 ~ 4.7M	E-24 & E-96	
					±5% (J)		10 ~ 4.7M	E-24	
					±0.1% (B)	±50 (D)	10 ~ 1M	E-24 & E-96	
					±0.25% (C) ±0.5% (D)		1.0 ~ 1M	E-24 & E-96	
					±1% (F)		0.2 ~ 10M	E-24 & E-96	
					±5% (J)		0.2 ~ 10M	E-24	
					±1% (F)	±100 (E)	0.1 ~ 10M	E-24 & E-96	
					±5% (J)		0.1 ~ 10M	E-24	

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DIMENSIONS (mm)

Type	Size	L	D	C
NFR0102	0102	2.0 ± 0.1	1.30 ± 0.05	0.5 min.
NFR0204	0204	3.5 ± 0.2	1.40 ± 0.15	0.5 min.
NFR0207	0207	5.9 ± 0.2	2.20 ± 0.20	0.5 min.



STANDARD POWER SPECIFICATIONS

Type	Size	Power Rating at 70°C	Max. *1 Working Voltage	Max. *2 Overload Voltage	Resistance Tolerance Code	Temperature Coefficient (ppm/°C)	Resistance Range (Ω)*3	Resistance Values	Operating Temperature Range
NFR0207U	0207 (2410)	0.50W	300V	500V	±0.1%(B) ±0.25% (C) ±0.5% (D) ±1% (F)	±10 (B)	10 ~ 20K	E-24 & E-96	-55°C ~ +155°C
					±0.1%(B) ±0.25% (C) ±0.5% (D) ±1% (F)	±15 (N)	10 ~ 300K	E-24 & E-96	
					±0.1 (B) ±0.25% (C) ±0.5% (D)	±25 (C)	10 ~ 1M	E-24 & E-96	
					±1% (F)		10 ~ 4.7M	E-24 & E-96	
					±5% (J)		10 ~ 4.7M	E-24	
					±0.1% (B)	±50 (D)	10 ~ 1M	E-24 & E-96	
					±0.25% (C) ±0.5% (D)		1.0 ~ 1M	E-24 & E-96	
					±1% (F)		0.2 ~ 10M	E-24 & E-96	
					±5% (J)		0.2 ~ 10M	E-24	
					±1% (F)	±100 (E)	0.1 ~ 10M	E-24 & E-96	
					±5% (J)		0.1 ~ 10M	E-24	

HIGH POWER SPECIFICATIONS

Type	Size	Power Rating at 70°C	Max. *1 Working Voltage	Max. *2 Overload Voltage	Resistance Tolerance Code	Temperature Coefficient (ppm/°C)	Resistance Range (Ω)*3	Resistance Values	Operating Temperature Range
NFR0102P	0102 (0805)	0.20W	200V	400V	±0.1%(B) ±0.25% (C) ±0.5% (D) ±1% (F)	±15 (N)	100 ~ 56K	E-24 & E-96	-55°C ~ +155°C
					±0.1%(B) ±0.25% (C) ±0.5% (D) ±1% (F)	±25 (C)	100 ~ 100K	E-24 & E-96	
					±5% (J)			E-24	
					±0.5 (D) ±1% (F)	±50 (D)	1.0 ~ 1.0M	E-24 & E-96	
					±5% (J)			E-24	
					±5% (J)	±100 (E)	0.51 ~ 2.0M	E-24	
NFR0204G	0204 (1406)	0.40W	200V	400V	±0.1%(B) ±0.25% (C) ±0.5% (D) ±1% (F)	±15 (N)	10 ~ 100K	E-24 & E-96	
					±0.1%(B) ±0.25% (C) ±0.5% (D) ±1% (F)	±25 (C)	10 ~ 1.0M	E-24 & E-96	
					±5% (J)			E-24	
					±0.1% (B)	±50 (D)	10 ~ 1.0M	E-24 & E-96	
					±0.25 (C) ±0.5 (D)		1.0 ~ 1.0M		
					±1% (F)				
					±1% (F)		0.2 ~ 1.0M	E-24 & E-96	
					±5% (J)			E-24	
					±1% (F)	±100 (E)	0.1 ~ 1.0M	E-24 & E-96	
					±5% (J)			E-24	

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HIGH POWER SPECIFICATIONS

Type	Size	Power Rating at 70°C	Max. *1 Working Voltage	Max. *2 Overload Voltage	Resistance Tolerance Code	Temperature Coefficient (ppm/°C)	Resistance Range (Ω)*3	Resistance Values	Operating Temperature Range
NFR0207T	0207 (2410)	1.0W	350V	700V	±0.1%(B) ±0.25% (C) ±0.5% (D) ±1% (F)	±15 (N)	10 ~ 100K	E-24 & E-96	
					±0.1%(B) ±0.25% (C) ±0.5% (D) ±1% (F)	±25 (C)	10 ~ 1.0M	E-24 & E-96	
					±5% (J)			E-24	
					±0.1% (B)	±50 (D)	10 ~ 1.0M	E-24 & E-96	
					±0.25 (C) ±0.5 (D)		1.0 ~ 1.0M		
					±1% (F)				
					±1% (F)		0.2 ~ 1.0M	E-24 & E-96	
					±5% (J)			E-24	
					±1% (F)	±100 (E)	0.1 ~ 1.0M	E-24 & E-96	
					±5% (J)			E-24	

ZERO OHM JUMPER SPECIFICATIONS

Type	Size	Maximum Current	Maximum Resistance	Operating Temperature Range
NFR0204ZOTRF	0204	Max. current 2A	Max. resistance 15mΩ	-55°C ~ +155°C
NFR0207ZOTRF	0207	Max. current 4A	Max. resistance 15mΩ	

PART NUMBER SYSTEM (0.1%, 0.25%, 0.5%, 1% TOLERANCE E-24 & E-96 VALUES)

NFR 0204 V F 1213 C TR F

- F — RoHS compliant
- TR — Tape & Reel Packaging
- C — Temperature Coefficient Code: B = ±10ppm, N = ±15ppm, C = ±25ppm, D = ±50ppm, E=±100ppm
- 1213 — Resistance Code: First 3 figures are significant, 4th digit is the multiplier, "R" indicates a decimal point.
- F — Tolerance Code: B = ±0.1%, C = ± 0.25%, D = ±0.5%, F = ±1%
- V — Power Rating Code: W = 0.125W, P = 0.2W, V = 0.25W, G = 0.40W, U = 0.50W, T = 1.0W
- 0204 — Size Code: See dimensions table
- NFR — Series

PART NUMBER SYSTEM (5% E-24 VALUES)

NFR 0204 V J 103 E TR F

- F — RoHS compliant
- TR — Tape & Reel Packaging
- E — Temperature Coefficient Code: C = ±25ppm, D = ±50ppm, E=±100ppm
- 103 — Resistance Code: First 2 figures are significant, 3rd digit is the multiplier, "R" indicates a decimal point.
- J — Tolerance Code: J = ±5%
- V — Power Rating Code: W = 0.125W, P = 0.2W, V = 0.25W, G = 0.40W, U = 0.50W, T = 1.0W
- 0204 — Size Code: See dimensions table
- NFR — Series

Note *1 - Maximum allowable continuous Working Voltage for all resistors is the lower of the two values:

"Maximum Working Voltage" as specified above or the result of the following formula

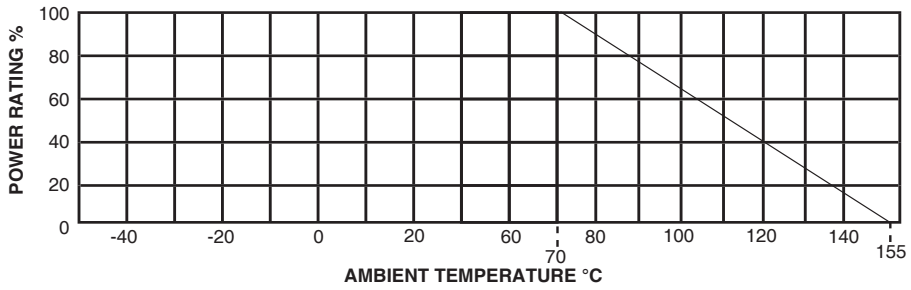
$$\sqrt{\text{Power rating (Watts) x Resistance (Ohms)}}$$

Note * - Maximum Overload Voltage for all resistors is the lower of the two values:

"Maximum Overload Voltage" as specified above or the result of the following formula

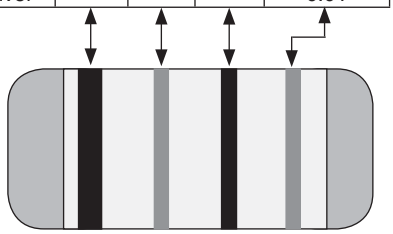
$$2.5x\sqrt{\text{Power rating (Watts) x Resistance (Ohms) for 5 sec.}}$$

Power Derating Curve: For operation above 70°C, power rating must be derated according to the following chart:



COLOR CODING

Color	Significant Figure			Multiplier
	1st	2nd	3rd*	
Black	0	0	0	1
Brown	1	1	1	10
Red	2	2	2	100
Orange	3	3	3	1,000
Yellow	4	4	4	10,000
Green	5	5	5	100,00
Blue	6	6	6	1,000,000
Violet	7	7	7	10,000,000
Grey	8	8	8	-
White	9	9	9	-
Gold	-	-	-	0.1
Silver	-	-	-	0.01

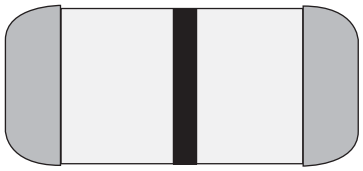


Note: 3 bands for 2%* & 5% tolerance parts,
4 bands for 1% tolerance parts.
*2% tolerance parts identified by reel label

E-24 & E-96 VALUES

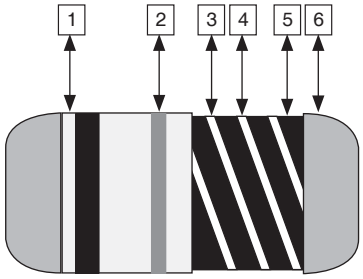
E-24 Values	E-96 Values			
100	100	102	105	107
110	110	113	115	118
120	121	124	127	130
130	133	137	140	143
150	147	150	154	158
160	162	165	169	174
180	178	182	187	191
200	196	200	205	210
220	215	221	226	232
240	237	243	249	255
270	261	267	274	280
300	287	294	301	309
330	316	324	332	340
360	348	357	365	374
390	383	392	402	412
430	422	432	442	453
470	464	475	487	499
510	511	523	536	549
560	562	576	590	604
620	619	634	649	665
680	681	698	715	732
750	750	768	787	806
820	825	845	866	887
910	909	931	953	976

ZERO OHM MARKING



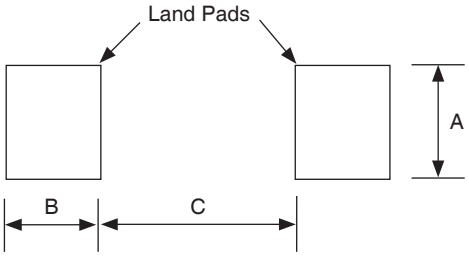
CONSTRUCTION

Item		Material
1	Insulation Coating	Epoxy
2	Marking	Epoxy
3	Cutting Line	-
4	Ceramic Core	Ceramic
5	Resistive Film	Metal Film
6	Terminal	Fe/Cu/Ni/Sn

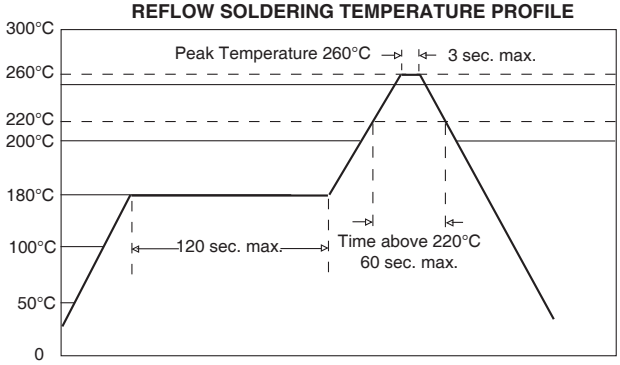


LAND PATTERN DIMENSIONS (mm)

Type	Case Size	A	B	C
NFR0102	0102	1.5	0.8	1.0
NFR0204	0204	1.6	1.2	1.6
NFR0207	0207	2.4	1.7	3.0



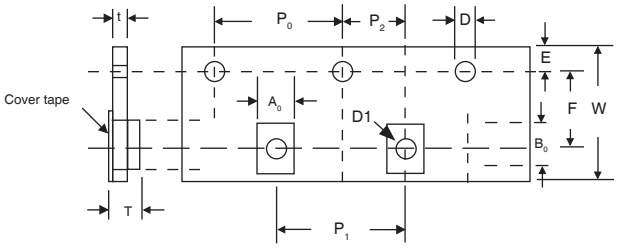
REFLOW SOLDERING TEMPERATURE PROFILE



CARRIER TAPE DIMENSIONS (mm)

Type	Case Size	A	B	W	F	E	D	D_1	P_0	P_1	P_2	T
NFR0102	0102	1.45±0.1	2.25±0.1	8.0±0.1	3.5±0.05	1.75±0.1	1.5±0.1	0.9 min	4.0±0.1	4.0±0.1	2.0±0.1	1.70±0.1
NFR0204	0204	1.60±0.1	3.70±0.1	8.0±0.1	3.5±0.05	1.75±0.1	1.5±0.1	0.9 min	4.0±0.1	4.0±0.1	2.0±0.1	1.87±0.1
NFR0207	0207	2.4±0.1	6.05±0.1	12.0±0.1	5.5±0.05	1.75±0.1	1.5±0.1	1.4 min.	4.0±0.1	4.0±0.1	2.0±0.1	2.80±0.1

EMBOSSED PLASTIC CARRIER



REEL DIMENSIONS AND QUANTITY (mm)

Type	Case Size	A	B	C	W	T	Qty
NFR0102	0102	178 ± 1.5	60.0 ± 1.0	13.0 ± 0.2	9.0 ± 0.5	12.0 ± 0.15	3,000
NFR0204	0204						
NFR0207	0207	178 ± 1.5	60.0 ± 1.0	13.0 ± 0.5	13.2 ± 0.5	15.5 ± 0.20	2,000

