Technical Note TN004 - Methods for Marking Values on Resistors

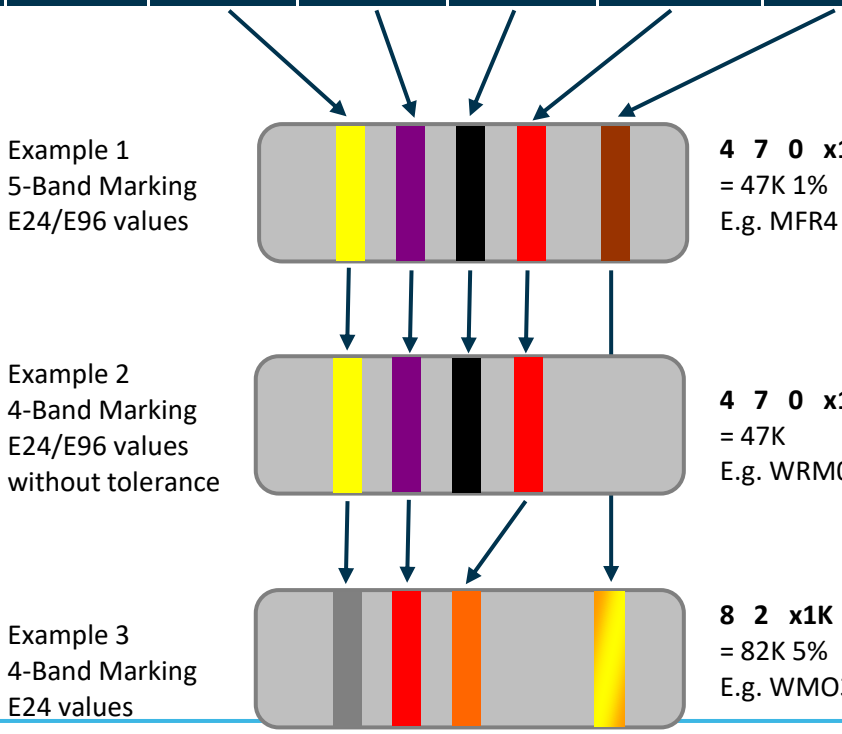
Introduction

TT Electronics resistors may have values marked in various ways, and an indication of which marking method applies is given on the product datasheet. For legend marked parts, alphanumeric characters show the value and tolerance, and these are generally coded in the same way as in the part number itself, except that in some cases a tolerance may be indicated as a percentage rather than a code (e.g. “5%” rather than “J”). This document explains the coding used in cases which are not so self-explanatory; colour band marking and EIA96 coding.

Colour Code used on Band-marked Resistors

Through-hole and MELF style resistors with colour band marking use the below colour code (reference IEC60062). To establish the correct orientation, the tolerance band is either wider than, or at a greater separation from, the other bands.

Colour	Value 1	Value 2	Value 3	Multiplier	Tolerance	
Silver				x 0.01	10%	K
Gold				x 0.1	5%	J
Black	0	0	0	x 1		
Brown	1	1	1	x 10	1%	F
Red	2	2	2	x 100	2%	G
Orange	3	3	3	x 1K		
Yellow	4	4	4	x 10K		
Green	5	5	5	x 100K	0.5%	D
Blue	6	6	6	x 1M	0.25%	C
Violet	7	7	7	x 10M	0.1%	B
Grey	8	8	8	x 100M	0.05%	A
White	9	9	9	x 1G		
Blank					20%	M



Example 1
5-Band Marking
E24/E96 values

4 7 0 x100 1%
= 47K 1%
E.g. MFR4 E96

Example 2
4-Band Marking
E24/E96 values
without tolerance

4 7 0 x100
= 47K
E.g. WRM0204 E96

Example 3
4-Band Marking
E24 values

8 2 x1K 5%
= 82K 5%
E.g. WMO3S E24

Marking Codes used on Chip Resistors

Where space allows, chip resistors are marked with value in 3 or 4 characters. The coding is 2 or 3 digits followed by one multiplier expressing the number of zeros. For example 472 = 4700 ohms = 4K7, 1331 = 1330 ohms = 1K33, 330 = 33 ohms = 33R (N.B. not 330R). Lower values use "R" as a decimal point. For example 4R7 = 4.7 ohms, 34R8 = 34.8 ohms. Tolerance is not marked. For E96 values on 0603, the EIA-96 codes below are used, comprising 2 digits followed by 1 letter, **e.g. "07B" = 1K15.**

CODE	Letter							CODE	Letter						
Digits	S or Y	R or X	A	H or B	C	D	E	Digits	S or Y	R or X	A	H or B	C	D	E
01	1R0	10R	100R	1K0	10K	100K	1M0	49	3R16	31R6	316R	3K16	31K6	316K	3M16
02	1R02	10R2	102R	1K02	10K2	102K	1M02	50	3R24	32R4	324R	3K24	32K4	324K	3M24
03	1R05	10R5	105R	1K05	10K5	105K	1M05	51	3R32	33R2	332R	3K32	33K2	332K	3M32
04	1R07	10R7	107R	1K07	10K7	107K	1M07	52	3R4	34R	340R	3K4	34K	340K	3M4
05	1R1	11R	110R	1K1	11K	110K	1M1	53	3R48	34R8	348R	3K48	34K8	348K	3M48
06	1R13	11R3	113R	1K13	11K3	113K	1M13	54	3R57	35R7	357R	3K57	35K7	357K	3M57
07	1R15	11R5	115R	**1K15**	11K5	115K	1M15	55	3R65	36R5	365R	3K65	36K5	365K	3M65
08	1R18	11R8	118R	1K18	11K8	118K	1M18	56	3R74	37R4	374R	3K74	37K4	374K	3M74
09	1R21	12R1	121R	1K21	12K1	121K	1M21	57	3R83	38R3	383R	3K83	38K3	383K	3M83
10	1R24	12R4	124R	1K24	12K4	124K	1M24	58	3R92	39R2	392R	3K92	39K2	392K	3M92
11	1R27	12R7	127R	1K27	12K7	127K	1M27	59	4R02	40R2	402R	4K02	40K2	402K	4M02
12	1R3	13R	130R	1K3	13K	130K	1M3	60	4R12	41R2	412R	4K12	41K2	412K	4M12
13	1R33	13R3	133R	1K33	13K3	133K	1M33	61	4R22	42R2	422R	4K22	42K2	422K	4M22
14	1R37	13R7	137R	1K37	13K7	137K	1M37	62	4R32	43R2	432R	4K32	43K2	432K	4M32
15	1R4	14R	140R	1K4	14K	140K	1M4	63	4R42	44R2	442R	4K42	44K2	442K	4M42
16	1R43	14R3	143R	1K43	14K3	143K	1M43	64	4R53	45R3	453R	4K53	45K3	453K	4M53
17	1R47	14R7	147R	1K47	14K7	147K	1M47	65	4R64	46R4	464R	4K64	46K4	464K	4M64
18	1R5	15R	150R	1K5	15K	150K	1M5	66	4R75	47R5	475R	4K75	47K5	475K	4M75
19	1R54	15R4	154R	1K54	15K4	154K	1M54	67	4R87	48R7	487R	4K87	48K7	487K	4M87
20	1R58	15R8	158R	1K58	15K8	158K	1M58	68	4R99	49R9	499R	4K99	49K9	499K	4M99
21	1R62	16R2	162R	1K62	16K2	162K	1M62	69	5R11	51R1	511R	5K11	51K1	511K	5M11
22	1R65	16R5	165R	1K65	16K5	165K	1M65	70	5R23	52R3	523R	5K23	52K3	523K	5M23
23	1R69	16R9	169R	1K69	16K9	169K	1M69	71	5R36	53R6	536R	5K36	53K6	536K	5M36
24	1R74	17R4	174R	1K74	17K4	174K	1M74	72	5R49	54R9	549R	5K49	54K9	549K	5M49
25	1R78	17R8	178R	1K78	17K8	178K	1M78	73	5R62	56R2	562R	5K62	56K2	562K	5M62
26	1R82	18R2	182R	1K82	18K2	182K	1M82	74	5R76	57R6	576R	5K76	57K6	576K	5M76
27	1R87	18R7	187R	1K87	18K7	187K	1M87	75	5R9	59R	590R	5K9	59K	590K	5M9
28	1R91	19R1	191R	1K91	19K1	191K	1M91	76	6R04	60R4	604R	6K04	60K4	604K	6M04
29	1R96	19R6	196R	1K96	19K6	196K	1M96	77	6R19	61R9	619R	6K19	61K9	619K	6M19
30	2R0	20R	200R	2K0	20K	200K	2M0	78	6R34	63R4	634R	6K34	63K4	634K	6M34
31	2R05	20R5	205R	2K05	20K5	205K	2M05	79	6R49	64R9	649R	6K49	64K9	649K	6M49
32	2R1	21R	210R	2K1	21K	210K	2M1	80	6R65	66R5	665R	6K65	66K5	665K	6M65
33	2R15	21R5	215R	2K15	21K5	215K	2M15	81	6R81	68R1	681R	6K81	68K1	681K	6M81
34	2R21	22R1	221R	2K21	22K1	221K	2M21	82	6R98	69R8	698R	6K98	69K8	698K	6M98
35	2R26	22R6	226R	2K26	22K6	226K	2M26	83	7R15	71R5	715R	7K15	71K5	715K	7M15
36	2R32	23R2	232R	2K32	23K2	232K	2M32	84	7R32	73R2	732R	7K32	73K2	732K	7M32
37	2R37	23R7	237R	2K37	23K7	237K	2M37	85	7R5	75R	750R	7K5	75K	750K	7M5
38	2R43	24R3	243R	2K43	24K3	243K	2M43	86	7R68	76R8	768R	7K68	76K8	768K	7M68
39	2R49	24R9	249R	2K49	24K9	249K	2M49	87	7R87	78R7	787R	7K87	78K7	787K	7M87
40	2R55	25R5	255R	2K55	25K5	255K	2M55	88	8R06	80R6	806R	8K06	80K6	806K	8M06
41	2R61	26R1	261R	2K61	26K1	261K	2M61	89	8R25	82R5	825R	8K25	82K5	825K	8M25
42	2R67	26R7	267R	2K67	26K7	267K	2M67	90	8R45	84R5	845R	8K45	84K5	845K	8M45
43	2R74	27R4	274R	2K74	27K4	274K	2M74	91	8R66	86R6	866R	8K66	86K6	866K	8M66
44	2R8	28R	280R	2K8	28K	280K	2M8	92	8R87	88R7	887R	8K87	88K7	887K	8M87
45	2R87	28R7	287R	2K87	28K7	287K	2M87	93	9R09	90R9	909R	9K09	90K9	909K	9M09
46	2R94	29R4	294R	2K94	29K4	294K	2M94	94	9R31	93R1	931R	9K31	93K1	931K	9M31
47	3R01	30R1	301R	3K01	30K1	301K	3M01	95	9R53	95R3	953R	9K53	95K3	953K	9M53
48	3R09	30R9	309R	3K09	30K9	309K	3M09	96	9R76	97R6	976R	9K76	97K6	976K	9M76