

Technical Note TN003 - Methods for Coding Resistor Values in Part Numbers

Introduction

TT Electronics resistors have part numbers from a mixture of European and USA origins, and for some products both are valid. The datasheets indicate how part numbers are constructed, including a brief definition with example of the coding method for the resistance value. This document gives a full definition of the two coding methods. Appendix A shows a full range of examples across the entire value range.

European Value Coding Method

Between three and six characters are used. These characters may be significant digits, zeros or a multiplier letter.

- **Significant Digits**

For E24¹ values the number of significant digits can be one or two, and most have two.

For E96¹ & E192¹ values the number of significant digits can be one, two or three, and most have three.

- **Zeros**

These are used according to the following rules:

1. Never use leading zeros (e.g. do not use "0R33" or "03K3")
2. Use as many zeros as required between the multiplier letter and the closest significant digit (e.g. "100K", "R02")
3. Only use trailing zeros to bring the total number of characters up to a minimum of three (e.g. use "R10" rather than "R1", but do not use "R100" or "1K40")

- **Multiplier Letter**

This is used in place of a decimal point and indicates the multiplier applied to the units of measure. L indicates milliohms (and is used for products whose ohmic range is predominantly below one milliohm), R indicates ohms (and is also commonly used for values in the milliohm range), K indicates kilohms ($\times 10^3$), M indicates megohms ($\times 10^6$), G indicates gigohms ($\times 10^9$) and T indicates teraohms ($\times 10^{12}$).

USA Value Coding Method

For most of the value range only numerical characters are used. The majority of TT Electronics products with USA value coding use four numerical characters. The datasheet will indicate if only three characters are to be used.

For a four character code, the first three digits are made up of the significant digits followed by enough zeros to give a total of three digits. The final digit is a multiplier which indicates how many zeros must be added to form the number expressing the value in ohms.

For example, 3304 indicates "330" + 4 zeros = 3,300,000 Ω , or 3.3M Ω .

Note that the final digit may be zero. Hence 825 Ω is coded as 8250, and it is important to remember that this code does **not** mean 8250 Ω , or 8.25k Ω , which would in fact be coded as 8251.

For low ohmic values (below 100 Ω), the multiplier would need to be less than zero, so this method cannot be used. Therefore, the value coding method becomes similar to the European one, using R as a multiplier letter. The only difference is that, where necessary, trailing zeros are added to bring the total number of characters up to **four** (e.g. 0.1 Ω = R1 and then two zeros are added to give a four character code R100).

For the small minority of cases where three character codes are used, similar principles apply, and the formats and examples are given in brackets in the list of Appendix A.

Note 1 – For a list of E24, E96 and E192 standard resistance values, see <https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Resistors/ApplicationNotes/TN005-EIA-Standard-Values-for-Resistors.pdf>

Appendix A: Coding Formats and Examples

Value Range	Number of significant digits	Example Value	European		USA ²	
			Format	Example	Format	Example
$\mu\Omega$	1	50 $\mu\Omega$	R000d	R00005	R0000d	R00005
			L0d0 ³	L050 ³		
	1	500 $\mu\Omega$	R000d	R0005	R000d	R0005
			Ld00 ³	L500 ³		
	2	750 $\mu\Omega$	R000dd	R00075	R000dd	R00075
			Ldd0 ³	L750 ³		
m Ω	1	2m Ω	R00d	R002	R00d	R002
			R00dd	R0025		
	2	2.5m Ω	R0d	R02	R0d0 (R0d)	R020 (R02)
			R0dd	R033		
	1	20m Ω	Rd0	R20	Rd00 (Rd0)	R200 (R20)
			Rdd	R33		
2	33m Ω	Rdd0	R330	Rdd0 (Rdd)	R330 (R33)	
		Rddd	R825			
Ω	1	2 Ω	dR0	2R0	dR00 (dR0)	2R00 (2R0)
			dRd	3R3		
	2	3.3 Ω	dRdd	8R25	dRdd	8R25
			ddR	33R		
	3	82.5 Ω	ddRd	82R5	ddRd	82R5
			dddR	825R		
1	20 Ω	d0R	20R	d0R0 (d0m)	20R0 (200)	
		ddR	33R			
2	33 Ω	ddRd	330R	ddR0 (ddm)	33R0 (330)	
		dddR	330R			
3	82.5 Ω	dddR	825R	dddm	8250	
		dddR	825R			
k Ω	1	2k Ω	dK0	2K0	d00m (d0m)	2001 (202)
			dKd	3K3		
	2	3.3k Ω	dKdd	8K25	dd0m (ddm)	3301 (332)
			ddK	33K		
	3	8.25k Ω	ddKd	82K5	dddm	8251
			dddK	825K		
1	20k Ω	d0K	20K	d00m (d0m)	2002 (203)	
		ddK	33K			
2	33k Ω	ddKd	330K	dd0m (ddm)	3302 (333)	
		dddK	330K			
3	82.5k Ω	dddKd	825K	dddm	8252	
		dddK	825K			
M Ω	1	2M Ω	dM0	2M0	d00m (d0m)	2004 (205)
			dMd	3M3		
	2	3.3M Ω	dMdd	8M25	dd0m (ddm)	3304 (335)
			ddM	33M		
	3	8.25M Ω	ddMd	82M5	dddm	8254
			dddM	825M		
1	20M Ω	d0M	20M	d00m (d0m)	2005 (206)	
		ddM	33M			
2	33M Ω	ddMd	330M	dd0m (ddm)	3305 (336)	
		dddM	330M			
3	82.5M Ω	dddMd	825M	dddm	8256	
		dddM	825M			
G Ω	1	2G Ω	dG0	2G0	d00m (d0m)	2007 (208)
			dGd	3G3		
	2	3.3G Ω	dGdd	8G25	dd0m (ddm)	3307 (338)
			ddG	33G		
	3	82.5G Ω	ddGd	82G5	dddm	8258
			dddG	825G		
1	20G Ω	d0G	20G	d00m (d0m)	2008 (209)	
		ddG	33G			
2	33G Ω	ddGd	330G	dd0m (ddm)	3308 (339)	
		dddG	330G			
3	82.5G Ω	dddGd	825G	dddm	8259	
		dddG	825G			
T Ω	1	2T Ω	dT0	2T0	TT Electronics products in this value range use European coding only.	
			dTd	3T3		
	2	3.3T Ω	ddT	33T		
			dddT	330T		
	1	20T Ω	d0T	20T		
			ddT	33T		
2	33T Ω	ddT	33T			
		dddT	330T			
1	100T Ω	d00T	100T			

Note 2 – Alternate formats and examples shown in brackets are for the less common three-character coding. Unless stated otherwise on the datasheet, four character coding should be used.

Note 3 – Alternate coding used for products whose ohmic range is predominantly below one milliohm, and where indicated on the datasheet.