Carbon Film Resistor
.33 Watt
5%

5043CX .....J
(2322 211....)

FEATURES

Low Cost

DESCRIPTION

Resistors of 10 Ω to 100 KΩ have a homogeneous film of pure carbon deposited on a high grade ceramic body. Resistors R < 10 Ω have an electroless-deposited nickel film; while resistors R > 100 KΩ have a film of chrome-silicon. After a helical groove has been cut in the resistive layer; solder plated, copper leads are welded onto the end caps. The resistors are coated with a tan lacquer which provides electrical, mechanical, and climatic protection. The encapsulation is resistant to all cleaning solvents in accordance with MIL-STD-202E, Method 215 and IEC 68-2-45.

MASS: 23 g per 100 units

MOUNTING:

The resistors are suitable for processing on automatic insertion equipment in addition to cutting and bending machines.

QUICK REFERENCE DATA

Resistance Range	1Ω to 10 MΩ; E24 Series
Resistance Tolerance	± 5%
Temperature Coefficient	See Figure 4
Abs. Max. Dissipation at T_{amb} = 70°C; See Note 1 below	0.330 W
Max. Continuous Operating Voltage	250 V (DC or RMS)
Operating Temperature Range	-55°C to +155°C
Basic Specification	IEC 115-1 and 115-2
Stability after: Load Climatic Tests R ≤ 220 KΩ R > 220 KΩ Resistance to Soldering Heat Short Time Overload, 500 V max.	 See Figure 2 ΔR/R Max: 1.5% + 0.10 Ω ΔR/R Max: 3.0% ΔR/R Max: 0.5% + 0.05 Ω ΔR/R Max: 1.0% + 0.05 Ω

Note 1. Dissipation at T_{amb} = 70° C which causes the maximum permissible hot-spot temperature of 155° C to occur, irrespective of the resistance drift provoked by this condition.

MARKING

The nominal resistance and tolerance are marked on the resistors with a four band color code as described in "General Introduction - Leaded Resistors".The packing is also marked and includes resistance value, tolerance, TCR, catalogue number, quantity, production period, batch number, and source code.

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ELECTRICAL DATA

Standard values of nominal resistance are taken from the E24 series for resistors with a tolerance of ±5%.

The maximum continuous working voltage, or limiting voltage, (DC or RMS) is 250 V. This is the maximum voltage that may be continuously applied to the resistor element.

Figure 2 is a performance nomogram showing the relationship between power dissipation (P), ambient temperature (T_{amb}), hot-spot temperature (T_m), resistance value (R), and max. resistance drift ($\Delta R/R$) after 1000 hours of operation.

For continuous operation longer or shorter than 1000 hours (t_x), the stability can be approximated by multiplying the drift ($\Delta R/R$) after 1000 hours by the square root of the time ratio as in the following equation:

$$(\Delta R/R \text{ after X hrs}) = (\Delta R/R \text{ after 1000 hrs}) \times (tx/1000)^{1/2}$$

Notes on the nomogram

1. The nomogram should not be extended beyond the maximum permissible hot-spot temperature of 155° C.
2. The resistance change given by the nomogram for P = 0 at a particular ambient temperature is indicative of the shelf life stability of a resistor at that temperature.
3. The stability lines do not give exact values for $\Delta R/R$, but represent a probability of 95% that the real values will be smaller than those obtained from the nomogram.

MECHANICAL DATA

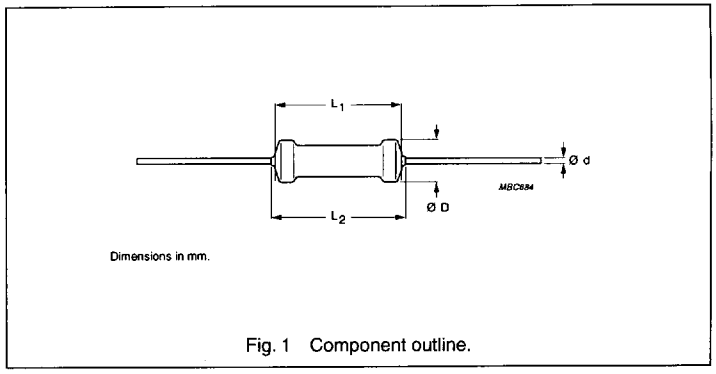

Fig. 1 Component outline.

Table I Component Dimensions Dimensions in inches (mm).

Type	D Max	L1 Typ.	L2 Max.	d (mm)
5043CX	.098" (2.5)	.256" (6.5)	.295" (7.5)	.024" (0.6)

4. In the nomogram, the maximum continuous operating voltage of the resistors has not been taken into consideration.
5. IEC Publication 115-1 is still based on the conventional method of rating resistors by a fixed "rated dissipation" at 70° C requiring at that dissipation a fixed maximum permissible drift. In this specification, however, the rated dissipation is no longer specified and also the guaranteed resistance drift is made dependent on the working conditions. Figure 3 is added to bridge the gap between the system of IEC 115-1 and this system. In Figure 3, the permissible dissipation at 70° C for a resistance drift of 1.5% maximum after 1000 hours is given, taking into consideration that the hot-spot temperature should not rise above 155° C (horizontal part of the curve). In this specification, the curve of Figure 3 replaces the rated dissipation.

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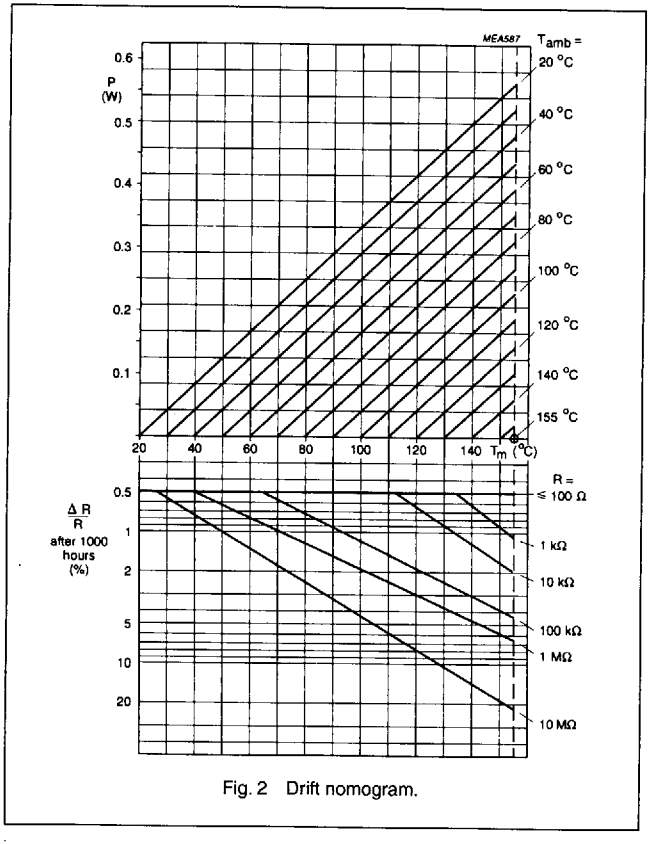

Fig. 2 Drift nomogram.

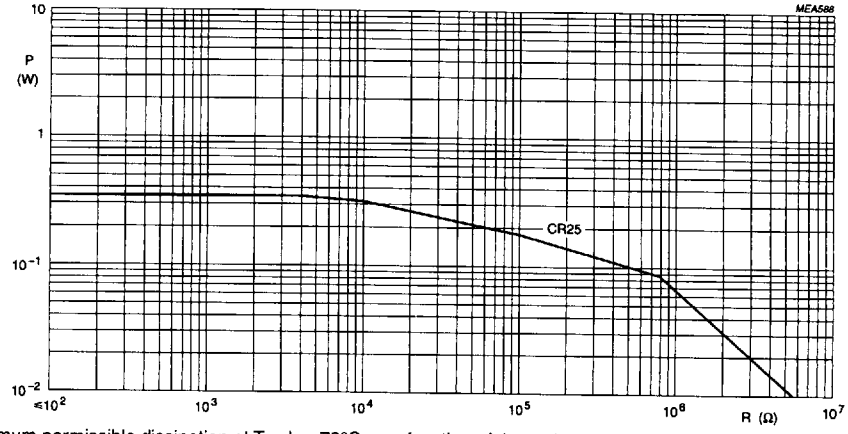

Fig. 3 Maximum permissible dissipation at Tamb = 70°C as a function of the resistance value for a resistance dr of 1.5% after 100 hours, or for a maximum termperature of 155°C without reaching the resistance drift 1.5%., Limiting voltage being taken into account.

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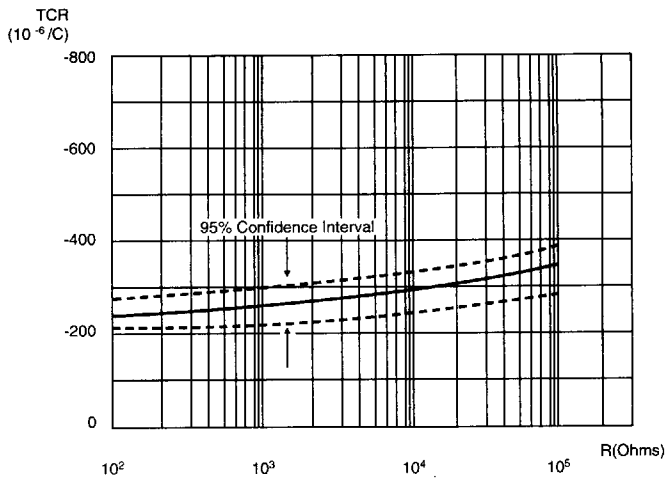
TEMPERATURE COEFFICIENT



For values < 10 ohms, the TCR is ±200 x 10 -6 /C
For values ≥ 100 ohms, the TCR is ±250 x 10 -6 /C

Fig. 4 Temperature Coefficent (TCR) as a function of the resistance value.

NOISE

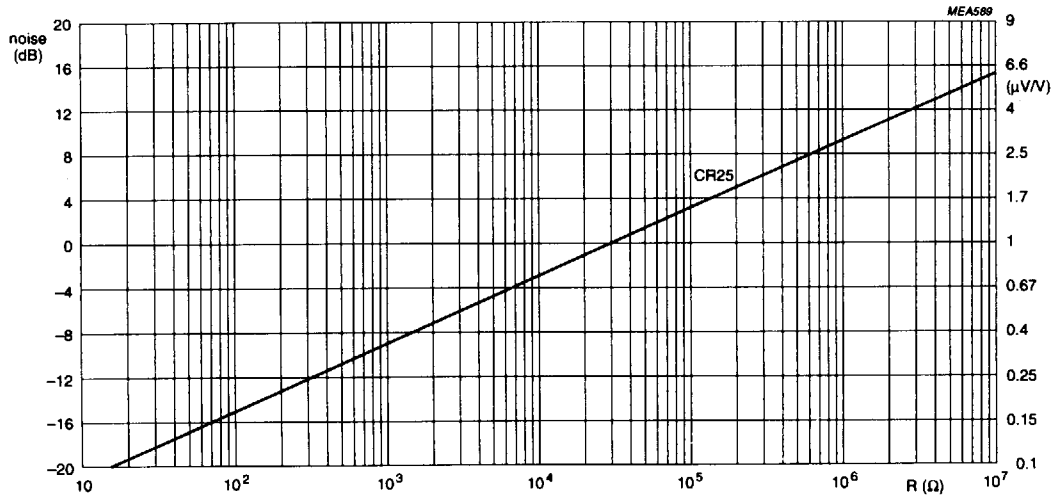


Fig. 5 Noise as a function of the resistance value; 0dB = 1 μV/V*N*

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HIGH FREQUENCY BEHAVIOR

The behavior of a resistor at high frequencies is influenced not only by its construction, but also by external factors such as the length of the leads, environmental stray capacitances, and the measuring equipment. These factors must be considered when measuring high frequency behavior. Table II gives typical values under test conditions at 250 MHz using the measuring arrangement shown in Figure 6.

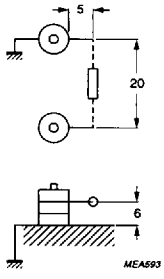

Fig. 6 Measuring arrangement.

Table II Frequency: 250 MHz

R_{NOM} (Ω)	$\frac{\lvert Z \rvert}{R_{NOM}}$	θ (deg)
10	2.97	70
22	1.61	51
56	1.07	28
100	1.02	22
220	0.99	9
560	0.97	–5
1000	0.92	–15
2200	0.82	–35
5600	0.41	–66

ORDERING INFORMATION

Philips, North America, Part Number

Table III

Resistance Range	Tol. ±%	Series	Part Number 5000 Reel
1 Ω to 10 MΩ	5	E24	5043CX.....J

The "....." in the part number represents the value of the resistor. The format of the value is composed of five digits. Place the significant figures, separated by a "R", "K", or "M" as the decimal place, and finish out the remainder of the five digits with "0's" if required.

Examples:

100 Ω = 100R0
51,000 Ω = 51K00
4,700 Ω = 4K700
330,000 Ω = 330K0

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INTERNATIONAL PART NUMBER

Table IV The resistor part numbers start with 2322 211. The last 3 digits indicate resistance as listed in this table and Table V.

Resistance Range	Tol ±%	Series		
			500 Reel	5000 Ammo
1Ω to10 MΩ	5	E24	2322 211 23...	2322 211 73...

Table V To complete the part number, insert the first two digits of the resistance value in ohms followed by:

Normal Resistance Range	Last Digit of Part Number
1 Ω to 9.1 Ω	8
10 Ω to 91 Ω	9
100 Ω to 910 Ω	1
1 KΩ to 9.1 KΩ	2
10 KΩ to 91 KΩ	3
100 KΩ to 910 KΩ	4
1 MΩ to 9.1 MΩ	5
10 MΩ	6

Examples:

100 Ω = 101
51,000 Ω = 513
4,700 Ω = 472
330,000 Ω = 334

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PACKAGING

The 5043CX Series is available in tape and reel standard as well as ammo, bulk, and radial form on tape and reel as a special. For specials, contact the factory for dimensions and availability.

Table VI Taping Dimensions, 5000 Reel
Values in inches (mm)

TYPE	a	A	$B_1 - B_2$ max.	S	T per 10 spacings
5043CX	.236 ± 0.020 (6 ±0.5)	2.067 ± 0.059 (52.5 ± 1.5)	±0.047 (± 1.2)	0.200 (5)	0.039 (1)

Table VII Reel Dimensions, 5000 Reel
Values in inches (mm)

TYPE	Q	V
5043CX	12.00 (305)	2.87 (73)

Table VIII Dimensions of Ammopack Box
Values in inches (mm)

TYPE	M	N	P
5043CX	3.07 (78)	3.86 (98)	10.63 (270)