High Voltage Precision Thick Film Resistors

T40 Series

Features:

- Working voltage up to 100kV
- Resistances up to 30G
- TCR down to 25ppm/°C
- Termination variants
- Sets of resistors with matched characteristics

All Pb-free parts comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

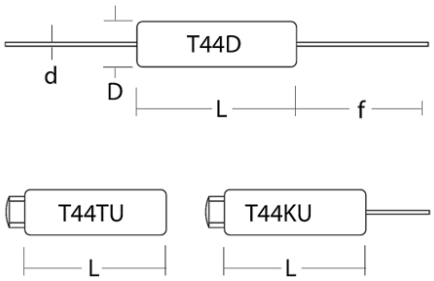
Electrical Data

		T43	T44	T48
Power rating at 20°C	W	1.5	3.5	10
Limiting element voltage in air	V	4	14	50
Limiting element voltage in oil	V	8	28	100
Resistance range	Ω	10K to 5G0	10K to 10G	10K to 30G
Resistance tolerance	%	1, 2, 5		
Standard TCR	ppm/°C	≤1G0: 100, >1G0: 250		
Low TCR	ppm/°C	≤1G0: 25, 50		
Values		E24 preferred, custom on request		
Thermal impedance	°C/W	31	27	13
Ambient temperature range	°C	-55 to 150		

Physical Data

Dimensions in mm and weight in g

Type	L max.	D max.	f min.	d nom.	PCB mounting centres	Min. bend radius	Wt. nom.
T43D	25.4	8.4	32	0.8	31.8	1.2	3.1
T44D	50.8				57.2		5.6
T48D	150				156.4		18.5
T43KU	30.2	8.5			-	-	3.9
T44KU	53.2						7.4
T48KU	152.2						19.3
T43TU	32.6		-	-			5.8
T44TU	55.6						8.2
T48TU	154.8						20.2



Construction

A ruthenium oxide based resistive film is fired onto the surface of a high quality former. Turned brass caps are fitted. A helical cut is made into the film to adjust its resistive value, lacquer protection is applied and finally a protective sleeve is fitted to provide mechanical protection and electrical insulation. For use in oil protection code H (without the sleeve) should be used, in order to avoid trapped air.

Terminations

Two termination types are used to offer three styles. These two types are wire and screw terminations. Style D has two wire terminations, style TU has two screw terminations, and style KU has one of each. This permits resistors to be screwed together in a series chain, with the end members having axial wires for soldering.

Wire terminations used on styles D and KU are tinned copper wire. They meet the strength requirements of IEC 60115-1 clause 9.5 and the solderability requirements of IEC 60115-1 clause 11.1.

Screw terminations used on styles TU and KU are turned brass tapped with UNF-10 x 4.2mm deep. UNF10 is 32 TPI, 60° thread angle, 4.72mm ±0.07 outside diameter, 3.83mm core diameter. All KU and TU resistors are supplied with 8mm long brass coupling studs.

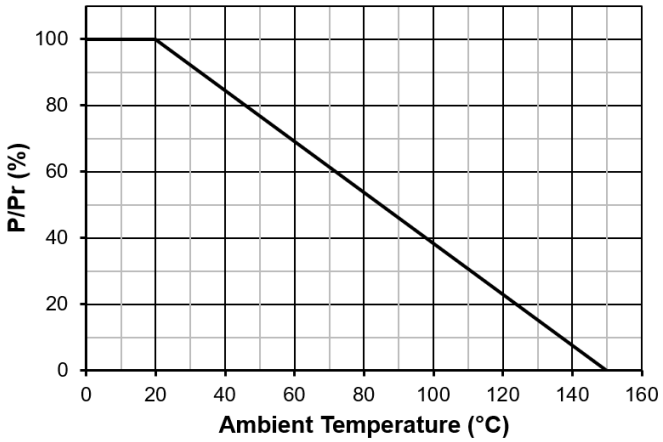
Marking

The type, resistance value, tolerance and date code are legend marked. The resistance value marking conforms to IEC 60062.

Performance Data

Test		Maximum	Typical
Load at rated power: 1000 hours at 20°C	**±ΔR%**	≤1G0: 3, >1G0: 5	0.3
Shelf-life test: 12 months at room temperature	**±ΔR%**	0.3	0.1
Noise (in a decade of frequency)	**µV/V**	-	<2.5
Voltage coefficient of resistance (magnitude)	**ppm/V**	-	<1

Temperature Derating



Application Notes

Matched Sets

Matched sets can be supplied for use as precision voltage dividers. These may be screwed together to form sticks and, by selecting the KU style of termination, a wire connection can be provided at each end of the stick.

Enquiries are welcomed for special resistors and sets when resistor length, operating voltage or resistance value are outside the catalogued range.

For voltage dividers with a low resistance section below the minimum available value of 10K, it is normal practice to use a resistor from the RC Series, obtainable down to 1R0.

Mounting

Due to the high voltage which can appear between the end cap and any adjacent metal part, resistors should be mounted at an adequate distance from other conductors. An appropriate number of resistors may be screwed together as a stick to provide an assembly which will be capable of withstanding any desired voltage, providing no individual resistor is subject to a greater stress or power dissipation than is recommended in this data sheet, and that appropriate anti-corona devices are fitted.

The axial termination should not be bent closer than twice the diameter of the terminal wire from the body of the resistor.

Oil Immersion & Potting

For some high voltage applications it is required to immerse the components in oil to reduce the effects of corona and surface tracking. A special lacquer-only version of the resistor is available, suitable for immersion in transformer oil.

When resistors are required to be potted, the preferred encapsulant is a silicone compound.

Ordering Procedure

Example: T44D-4M7JI (T44 wire-ended and sleeved, 4.7 megohms ±5%, standard TCR ±100ppm/°C, Pb-free)

T	4	4	D			-	4	M	7		J	I
1			2		3		4				5	6

1 Type	2 Termination	3 Protection	4 Value	5 Tolerance	6 Packing & Finish
T43	D = wire + wire	Omit for lacquered & sleeved	E24 3/4 characters K = kilohms M = megohms G = gigohms	F = ±1%	I = Bulk pack 10 per box, Pb-free
T44	KU = wire + screw			G = ±2%	
T48	TU = screw + screw	H = lacquered only (for use in oil)		J = ±5%	

Low TCR Part Numbers

For 25 and 50ppm/°C TCR grades, replace the codes for columns 1, 2 & 3 with the 6-digit codes below.

Example: 424471-4M7JI (T44 wire-ended and sleeved, 4.7 megohms ±5%, low TCR ±25ppm/°C, Pb-free)

T43			T44			T48		
Termination & Protection	**TCR** ppm/°C	**Code**	**Termination & Protection**	**TCR** ppm/°C	**Code**	**Termination & Protection**	**TCR** ppm/°C	**Code**
D	50	424363	**D**	50	424463	**D**	50	424863
	25	424371		25	424471		25	424871
DH	50	424367	**DH**	50	424467	**DH**	50	424867
	25	424218		25	424518		25	424818
TU	50	424360	**TU**	50	424460	**TU**	50	424860
	25	424366		25	424466		25	424866
TUH	50	424362	**TUH**	50	424462	**TUH**	50	424862
	25	424389		25	424489		25	424889
KU	50	424388	**KU**	50	424488	**KU**	50	424888
	25	424377		25	424477		25	424877
KUH	50	424364	**KUH**	50	424464	**KUH**	50	424864
	25	424390		25	424490		25	424890