

## Wirewound Resistors, Industrial Power, Flat



### FEATURES

- High temperature silicon coating
- Mounting accommodations ideally suited to high density packaging
- Self-stacking hardware for horizontal or vertical placement
- Withstands high vibrations without loosening
- Mounting hardware functions as a heat sink allowing greater heat dissipation and less derating of stacked units
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

STANDARD ELECTRICAL SPECIFICATIONS					
GLOBAL MODEL	HISTORICAL MODEL	POWER RATING $P_{25^{\circ}\text{C}}$ W	RESISTANCE RANGE $\Omega$ $\pm 5\%$	RESISTANCE RANGE $\Omega$ $\pm 10\%$	WEIGHT (typical) g
FSOT30...14 / FSOT30...16 FSOT30...15 / FSOT30...17	HL-24-09 / HL-24-16 NHL-24-09 / NHL-24-16	30	1.0 to 11K 1.0 to 1.2K	0.10 to 11K 1.0 to 1.2K	20.14
FSOT40...14 / FSOT40...16 FSOT40...15 / FSOT40...17	HL-40-09 / HL-40-16 NHL-40-09 / NHL-40-16	40	1.0 to 26K 1.0 to 3K	0.10 to 26K 1.0 to 3K	30.07
FSOT55...14 / FSOT55...16 FSOT55...15 / FSOT55...17	HL-55-09 / HL-55-16 NHL-55-09 / NHL-55-16	55	1.0 to 54K 1.0 to 6.8K	0.10 to 54K 1.0 to 6.8K	51.25
FSOT70...14 / FSOT70...16 FSOT70...15 / FSOT70...17	HL-70-09 / HL-70-16 NHL-70-09 / NHL-70-16	70	1.0 to 77K 1.0 to 9.4K	0.10 to 77K 1.0 to 9.4K	60.48
FSOT95...14 / FSOT95...16 FSOT95...15 / FSOT95...17	HL-95-09 / HL-95-16 NHL-95-09 / NHL-95-16	95	1.0 to 99.9K 1.0 to 12.4K	0.10 to 99.9K 1.0 to 12.4K	76.51

TECHNICAL SPECIFICATIONS		
PARAMETER	UNIT	FSOT...XX FLAT RESISTOR CHARACTERISTICS
Temperature Coefficient	ppm/ $^{\circ}\text{C}$	$\pm 90$ for 0.1 $\Omega$ to 0.99 $\Omega$ ; $\pm 50$ for 1 $\Omega$ to 9.9 $\Omega$ ; $\pm 30$ for 10 $\Omega$ and above
Dielectric Withstanding Voltage	$V_{AC}$	1000, from terminal to mounting hardware
Short Time Overload	-	10 x rated power for 5 s
Maximum Working Voltage	V	$(P \times R)^{1/2}$
Insulation Resistance	$\Omega$	1000 M $\Omega$ minimum dry, 100 M $\Omega$ minimum after moisture test
Operating Temperature Range	$^{\circ}\text{C}$	-55 to +350

GLOBAL PART NUMBER INFORMATION																	
Global Part Numbering example: FSOT3009E10R00JE14																	
F	S	O	T	3	0	0	9	E	1	0	R	0	0	J	E	1	4
GLOBAL MODEL	TERMINAL DESIGNATION	TERMINAL FINISH	RESISTANCE VALUE	TOLERANCE	PACKAGING CODE	SPECIAL											
FSOT30 (see "Standard Electrical Specifications" table above for additional P/N's)	09 16	E = lead (Pb)-free	R = decimal K = thousand 10R00 = 10.0 $\Omega$ 1K000 = 1 k $\Omega$	J = $\pm 5.0\%$ K = $\pm 10.0\%$	E = lead (Pb)-free cell and bulk pack	(dash number) (up to 2 digits) from 1 to 99 as applicable 14 = standard, 09 terminal 15 = non-inductive, 09 terminal 16 = standard, 16 terminal 17 = non-inductive, 16 terminal											

**DIMENSIONS** in inches [millimeters]  
**TYPE FSOT...XX FLAT STYLE**



MODEL	DIMENSIONS in inches [millimeters]				TERMINAL DESIGNATION	
	A	B	C	DISTANCE BETWEEN TERMINALS (ref.)	STANDARD	OPTIONAL
	± 0.063 [1.59]	± 0.063 [1.59]	± 0.031 [0.79]			
FSOT30	1.250 [31.75]	2.500 [63.50]	2.000 [50.80]	0.718 [18.24]	09E	16E
FSOT40	2.000 [50.80]	3.250 [82.55]	2.750 [69.85]	1.468 [37.29]	09E	16E
FSOT55	3.500 [88.90]	4.750 [120.65]	4.250 [107.95]	2.968 [75.39]	09E	16E
FSOT70	4.750 [120.65]	6.000 [152.40]	5.500 [139.70]	4.218 [107.14]	09E	16E
FSOT95	6.000 [152.40]	7.250 [184.15]	6.750 [171.45]	5.468 [138.89]	09E	16E

**POWER RATING**

Vishay FSOT flat resistor wattage ratings are based on mounting horizontally to 10" x 10" x 0.04" [254.0 mm x 254.0 mm x 1.02 mm] steel plate in 25 °C ambient with no air flow.

**EXCLUSIVE BRACKET DESIGN**

Mounting strap fits snugly through resistor core and is bound against unit by two eccentric spacers. The bracket eliminates expensive cements and improves heat transfer and power handling capabilities.

**MATERIAL SPECIFICATIONS**

**Element:** copper-nickel alloy of nickel-chrome alloy, depending on resistance value

**Core:** ceramic, steatite

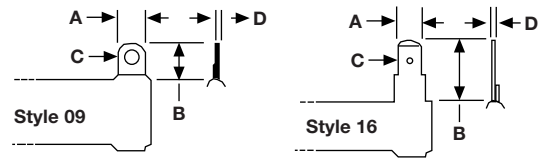
**Coating:** special high temperature silicone

**Standard Terminals:** model "E" terminals are tinned steel

**Terminal Bands:** steel

**Part Marking:** HEI, model, wattage, value, tolerance, date code

**TERMINAL DIMENSIONS**



DIMENSION	DIMENSIONS in inches [millimeters]	
	STYLE 09	STYLE 16
A	0.188 [4.76]	0.188 [4.76]
B	0.500 [12.70]	0.563 [14.29]
C	0.104 [2.64]	0.050 [1.27]
D	0.020 [0.51]	0.020 [0.51]

**TERMINAL FINISH**

"E" Finish - 100 % Sn coated steel.

**NON-INDUCTIVE**

Models of equivalent physical and electrical specifications are available with non-inductive (Aryton-Perry) winding. For non-inductive models, maximum resistance values are lower, see STANDARD ELECTRICAL SPECIFICATIONS table.

**DERATING**



Derating is required for ambient temperatures above 25 °C per the above graph.

PERFORMANCE		
TEST	CONDITIONS OF TEST	TEST LIMITS
Thermal Shock	Rated power applied until thermally stable, then a minimum of 15 min at -55 °C	± (2.0 % + 0.05 Ω) ΔR
Short Time Overload	10x rated power for 5 s	± (2.0 % + 0.05 Ω) ΔR
Dielectric Withstanding Voltage	1000 V <sub>RMS</sub> , 1 min	± (0.1 % + 0.05 Ω) ΔR
Low Temperature Storage	-55 °C for 24 h	± (2.0 % + 0.05 Ω) ΔR
High Temperature Exposure	250 h at + 350 °C	± (2.0 % + 0.05 Ω) ΔR
Moisture Resistance	MIL-STD-202 Method 106, 7b not applicable	± (2.0 % + 0.05 Ω) ΔR
Shock, Specified Pulse	MIL-STD-202 Method 213, 100 g's for 6 ms, 10 shocks	± (0.2 % + 0.05 Ω) ΔR
Vibration, High Frequency	Frequency varied 10 Hz to 2000 Hz, 20 g peak, 2 directions 6 h each	± (0.2 % + 0.05 Ω) ΔR
Load Life	1000 h at rated power, + 25 °C, 1.5 h "ON", 0.5 h "OFF"	± (3.0 % + 0.05 Ω) ΔR



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