

## 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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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А