



## 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
FSOT10 FSOT10-NI	FSOT-10 FSOT-10-NI	10	1.0 to 15K 1.0 to 1.8K	0.10 to 15K 1.0 to 1.8K	0.41
FSOT15 FSOT15-NI	FSOT-15 FSOT-15-NI	15	1.0 to 26K 1.0 to 3.6K	0.10 to 26K 1.0 to 3.6K	0.47
FSOT20 FSOT20-NI	FSOT-20 FSOT-20-NI	20	1.0 to 71K 1.0 to 9.8K	0.10 to 71K 1.0 to 9.8K	0.74
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

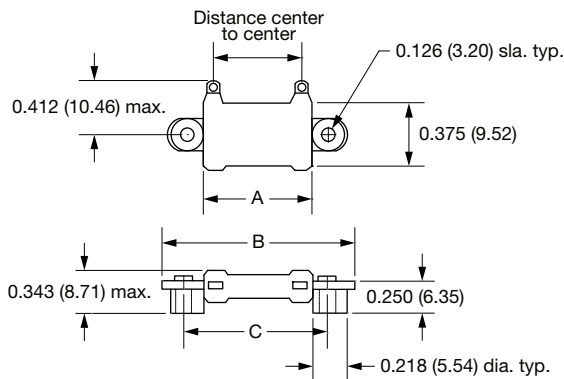
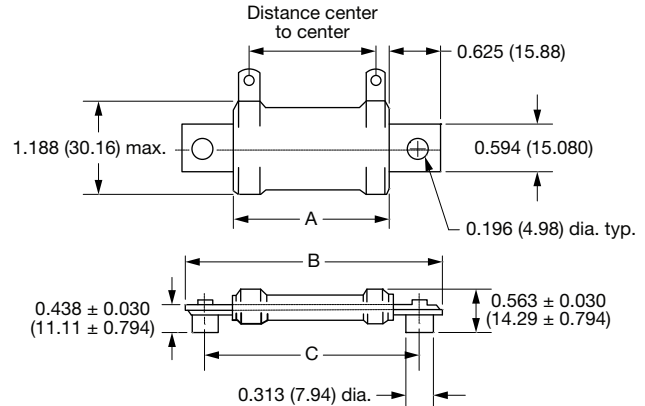
TECHNICAL SPECIFICATIONS		
PARAMETER	UNIT	FSOT, FSOT...XX FLAT RESISTOR CHARACTERISTICS
Temperature coefficient	ppm/ $^{\circ}\text{C}$	$\pm 90$ for 0.1 $\Omega$ to 0.99 $\Omega$ ; $\pm 50$ for 1 $\Omega$ to 9.9 $\Omega$ ; $\pm 30$ for 10 $\Omega$ and above
Dielectric withstanding voltage	$V_{AC}$	1000, 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**

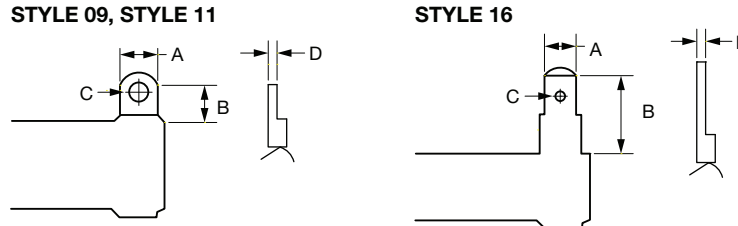
 Global Part Numbering Example: **FSOT3009E10R00JE14**

<b>F</b>	<b>S</b>	<b>O</b>	<b>T</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>E</b>	<b>1</b>	<b>0</b>	<b>R</b>	<b>0</b>	<b>0</b>	<b>J</b>	<b>E</b>	<b>1</b>	<b>4</b>
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GLOBAL MODEL (6 digits)	TERMINAL DESIGNATION (2 digits)	TERMINAL FINISH (1 digit)	RESISTANCE VALUE (5 digits)	TOLERANCE	PACKAGING CODE	SPECIAL
<b>FSOT30</b> (see "Standard Electrical Specifications" table above for additional P/N's)	<b>09</b> <b>16</b> <b>11 (only FSOT10, FSOT15, FSOT20)</b>	<b>E</b> = lead (Pb)-free	<b>R</b> = decimal <b>K</b> = thousand <b>10R00</b> = 10.0 Ω <b>1K500</b> = 1.5 kΩ	<b>J</b> = ± 5.0 % <b>K</b> = ± 10.0 %	<b>E</b> = lead (Pb)-free cell and bulk pack	(dash number) (up to 2 digits) From <b>1 to 99</b> as applicable; leave empty if 11 terminal <b>NI</b> = non-inductive (11 terminal only) <b>14</b> = standard, 09 terminal <b>15</b> = non-inductive, 09 terminal <b>16</b> = standard, 16 terminal <b>17</b> = non-inductive, 16 terminal

**DIMENSIONS in inches [millimeters]**
**FSOT10 / FSOT15 / FSOT20**

**FSOT...XX FLAT 30 / 40 / 55 / 70 / 95**


MODEL	A ± 0.063 [1.59]	B ± 0.063 [1.59]	C ± 0.031 [0.79]	DISTANCE CENTER TO CENTER (ref.)	TERMINAL DESIGNATION	
					STANDARD	OPTIONAL
FSOT10	0.750 [19.05]	1.3125 [33.34]	1.000 [25.40]	0.531 [13.49]	11E	-
FSOT15	1.000 [25.40]	1.5625 [39.69]	1.250 [31.75]	0.781 [19.84]	11E	-
FSOT20	2.062 [52.37]	2.625 [66.68]	2.313 [58.75]	1.843 [46.81]	11E	-
FSOT30...XX	1.250 [31.75]	2.500 [63.50]	2.000 [50.80]	0.718 [18.24]	09E	16E
FSOT40...XX	2.000 [50.80]	3.250 [82.55]	2.750 [69.85]	1.468 [37.29]	09E	16E
FSOT55...XX	3.500 [88.90]	4.750 [120.65]	4.250 [107.95]	2.968 [75.39]	09E	16E
FSOT70...XX	4.750 [120.65]	6.000 [152.40]	5.500 [139.70]	4.218 [107.14]	09E	16E
FSOT95...XX	6.000 [152.40]	7.250 [184.15]	6.750 [171.45]	5.468 [138.89]	09E	16E

**TERMINAL DIMENSIONS** in inches [millimeters]


DIMENSION	STYLE 09	STYLE 11	STYLE 16
A	0.188 [4.78]	0.125 [3.18]	0.188 [4.76]
B	0.458 [11.63]	0.255 [6.48]	0.563 [14.29]
C	0.104 [2.64]	0.081 [2.06]	0.050 [1.27]
D	0.020 [0.51]	0.020 [0.51]	0.020 [0.51]

**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

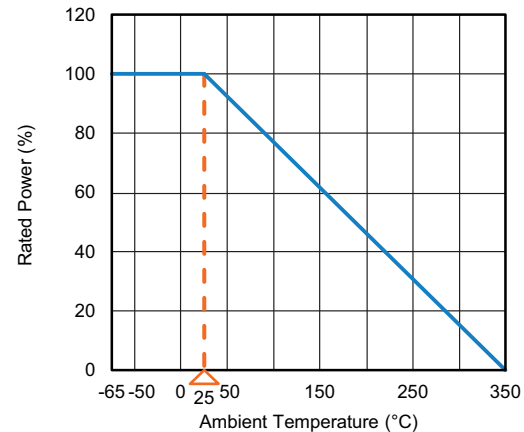
**Part Marking:** HEI, model, wattage, value, tolerance, date code

**TERMINAL 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	10 x 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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