

## Thin Film Metallized Plates - Custom Substrates



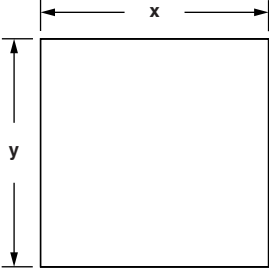
### FEATURES

- Metalization on 1, 2, or 6 surfaces
- Various substrate materials
- Tantalum nitride or nickel chromium resistor material
- Sputtered / plated metal systems
- Sizes from 0.020" x 0.020" to 4.500" x 4.500"
- High volume
- Quick delivery available

### APPLICATIONS

Vishay EFI metallized plates can be used as stand-offs, jumpers or bonding pads in hybrid packages when diced to small sizes; they are also available with no metallization (bare ceramic) for use as spacers or insulators. Larger sized plates can be used where the customer wants to pattern and etch substrates in-house.

SUBSTRATE MATERIALS				
MATERIAL CODE	MATERIAL	SURFACE FINISH ( $\mu$ " CLA)		APPLICATION
A	Alumina (99.6)	A	< 3 front / < 4 back as-fired	Cost effective material with wide range of applications
		L	< 12 lapped	
		P	< 1 polished	
B	Beryllium oxide	L	15 to 40 lapped	Highest thermal conductivity (285 W/mC)
		P	< 3 polished	
N	Aluminum nitride	L	10 to 20 lapped	High thermal conductivity (170 W/mC)
		P	< 2 polished	

PLATE SIZE	
	
X (mils)	Y (mils)
20	20
50	50
100	100
200	200
500	500
1000	1000
2000	2000
4500	4500

#### Note

- For any plates smaller than 1.000" x 1.000" or where plate size is not available, metal is only available on one or two surfaces (front or back)

**RESISTOR MATERIAL**


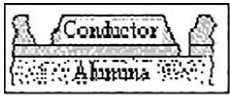
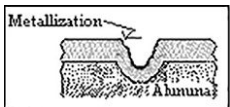
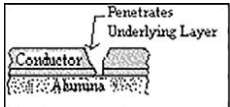

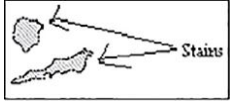
Typical reasons for using NiCr resistor material are for long term stability and high sheet rho. Typical recommended uses for TaN are for non-hermetic applications where self-passivation is important.

<b>RESISTOR MATERIAL</b>			
<b>RESISTOR CODE</b>	<b>RESISTOR MATERIAL</b>	<b>SHEET RHO (<math>\Omega</math>/SQ) <math>\pm 20\%</math></b>	<b>TCR (ppm/<math>^{\circ}</math>C) TYPICAL VALUES</b>
A	NiCr	25	$\pm 50$
B	NiCr	50	$\pm 100$
C	NiCr	100	$\pm 200$
D	NiCr	200	$\pm 250$
1	TaN	25	$\pm 50$
2	TaN	50	$\pm 100$
3	TaN	75	$\pm 250$

<b>METAL STACK</b>			
<b>METAL CODE</b>	<b>METAL STACK</b>	<b>TYPICAL APPLICATION</b>	<b>TYPICAL ATTACHMENT METHOD</b>
1	TiW (500 Å to 1000 Å) / Au (50 $\mu$ m min.)	Au and Al wirebondable	Epoxy
2	TiW (500 Å to 1000 Å) / Au (100 $\mu$ m min.)	Au and Al wirebondable	Epoxy
3	TiW (500 Å to 1000 Å) / Au (15 $\mu$ m to 40 $\mu$ m) / Ni (20 $\mu$ m to 80 $\mu$ m) / Au (50 $\mu$ m min.)	Au and Al wirebondable and solderable	Epoxy or solder
4	TiW (500 Å to 1000 Å) / Au (15 $\mu$ m to 40 $\mu$ m) / Ni (20 $\mu$ m to 80 $\mu$ m) / Au (100 $\mu$ m min.)	Au and Al wirebondable and solderable	Epoxy or solder
5	TiW (500 Å to 1000 Å) / Pd (1500 Å to 2500 Å) / Au (50 $\mu$ m min.)	Au and Al wirebondable and solderable	Epoxy or solder
6	TiW (500 Å to 1000 Å) / Pd (1500 Å to 2500 Å) / Au (100 $\mu$ m min.)	Au and Al wirebondable and solderable	Epoxy or solder
7	Cr (500 Å to 1500 Å) / Cu (5000 Å to 7000 Å) / Au (100 $\mu$ m min.)	Au and Al wirebondable	Epoxy
8	Cr (500 Å to 1500 Å) / Cu (500 $\mu$ m min.) / Ni (20 $\mu$ m to 80 $\mu$ m) / Au (100 $\mu$ m min.)	Au and Al wirebondable and solderable. High power applications for low metal resistivity	Epoxy or solder

**VISUAL INSPECTION**

VEFI uses internal visual inspection criteria as shown in the table below for metal non-patterned substrates. For any plates smaller than 1.000" x 1.000" or where plate size is not available, metal burrs will be acceptable along part edges where plates are sawn to size.

<b>SURFACE PERFECTION INSPECTION CRITERIA <sup>(1)</sup></b>				
<b>SCHEMATIC ILLUSTRATION</b>	<b>DEFECT TYPE</b>	<b>DEFECT SIZE</b>	<b>FRONT <sup>(2)</sup></b>	<b>BACK <sup>(3)</sup></b>
	NODULES BUMPS	> 10 mil dia. (>0.254 mm)	0.25/sq"	0.25/sq"
		5 mil to 10 mil dia. (0.127 mm to 0.254 mm)	1/sq"	2/sq"
		3 mil to 5 mil dia. (0.076 mm to 0.127 mm)	3/sq"	6/sq"
		2 mil to 3 mil dia. (0.05 mm to 0.076 mm)	3/sq"	6/sq"
		< 2 mil dia. (< 0.05 mm)	NIF	NIF
	METALIZATION VOIDS PINHOLES	> 2 mil dia. (> 0.05 mm)	None	None
		1 mil to 2 mil dia. (0.0254 mm to 0.05 mm)	5/sq"	10/sq"
		< 1 mil high (< 0.0254 mm)	NIF	NIF
	CRATERS DEPRESSIONS (hole into ceramic)	> 10 mil dia. (> 0.254 mm)	None	None
		5 mil to 10 mil dia. (0.127 mm to 0.254 mm)	1/sq"	3/sq"
		2 mil to 5 mil dia. (0.05 mm to 0.127 mm)	4/sq"	4/sq"
		1 mil to 2 mil dia. (0.0254 mm to 0.05 mm)	15/sq"	15/sq"
		< 1 mil dia. (0.0254 mm)	NIF	NIF
	SCRATCHES <sup>(4)</sup> (excluding surface abrasions)	> 1/2 mil wide (> 0.0127 mm)	1/sq"	NIF
		< 1/2 mil wide (< 0.0127 mm)	NIF	NIF
	BLISTERS	> 10 mil dia. (> 0.254 mm)	None	None
		5 mil to 10 mil dia. (0.127 mm to 0.254 mm)	1/sq"	1/sq"
		2 mil to 5 mil dia. (0.05 mm to 0.127 mm)	2/sq"	2/sq"
		1 mil to 2 mil dia. (0.0254 mm to 0.05 mm)	4/sq"	4/sq"
		1/2 mil to 1 mil dia. (0.0127 mm to 0.0254 mm)	6/sq"	6/sq"
		1/4 mil to 1/2 mil dia. (0.006 mm to 0.0127 mm)	16/sq"	16/sq"
		< 1/4 mil dia. (< 0.006 mm)	NIF	NIF
	STAINS-SPOTS <sup>(5)</sup>	> 4 mil. (> 0.1 mm)	None	None
		2 mil to 4 mil (0.05 mm to 0.1 mm)	1/sq"	2/sq"
		1 mil to 2 mil (0.0254 mm to 0.05 mm)	2/sq"	4/sq"
		< 1 mil (< 0.0254 mm)	3/sq"	5/sq"

**Notes**

- NIF = not inspected for
- (1) Exclusion area for 1" x 1" and greater plates: Front and Rear: 100 mils (2.54 mm) from substrate edge
- (2) A-face 100 % inspection method: 3x to 8x magnification. Higher magnification may be used for defect verification
- (3) B-face 100 % inspection method: Unaided eye. Higher magnification may be used for defect verification
- (4) Scratch or probe mark exposing underlying material that is > 200 mils long
- (5) Contamination: Not removable by distilled water or common solvents



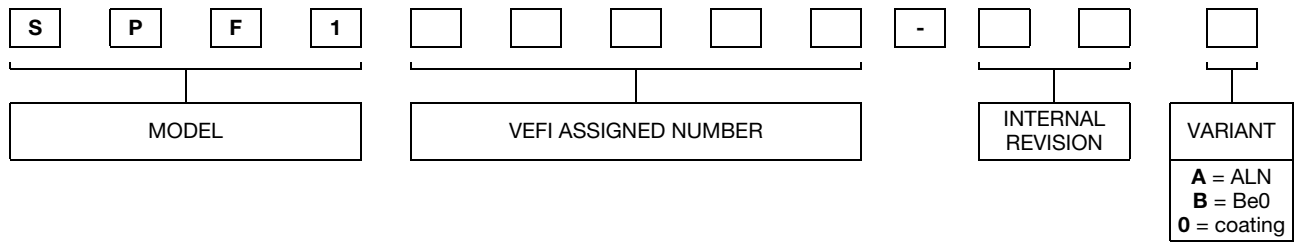
**GLOBAL PART NUMBER INFORMATION**

Standard Global Part Number: **SPF1AA02021A11BX**

Global Part Number Description: **SPF1 Al<sub>2</sub>O<sub>3</sub> As-Fired 20 mils x 20 mils 10 mils Thick NiCr 25 Ω/sq Front: TiW / Au (50 μ" min.) Back: TiW / Au (50 μ" min.) BX**

<b>S</b>	<b>P</b>	<b>F</b>	<b>1</b>	<b>A</b>	<b>A</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>A</b>	<b>1</b>	<b>1</b>	<b>B</b>	<b>X</b>
MODEL	MATERIAL	FINISH	PLATE SIZE X (MILS)	PLATE SIZE Y (MILS)	THICKNESS (MILS)	RESISTOR	METAL FRONT	METAL BACK	PACKAGING CODE						
SPF1	A = Al <sub>2</sub> O <sub>3</sub> B = BeO N = AlN	A = as-fired L = lapped P = polished	02 = 20 05 = 50 10 = 100 20 = 200 50 = 500 11 = 1000 21 = 2000 45 = 4500	02 = 20 05 = 50 10 = 100 20 = 200 50 = 500 11 = 1000 21 = 2000 45 = 4500	1 = 10 2 = 15 3 = 20 4 = 25	N = none Otherwise see Resistor Material table	N = none Otherwise see Metal Stack table	N = none Otherwise see Metal Stack table	BX = box 1 min. / 1 mult. W1 = waffle pack 1 min. / 1 mult.						

Custom Global Part Number: **SPF1 xxxx - xx x**



**Note**

- Plates 1" x 1" and greater will be individually packaged in glassine envelopes in the box

**CONTACT INFORMATION**

For design assistance, contact: [efi@vishay.com](mailto:efi@vishay.com)



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