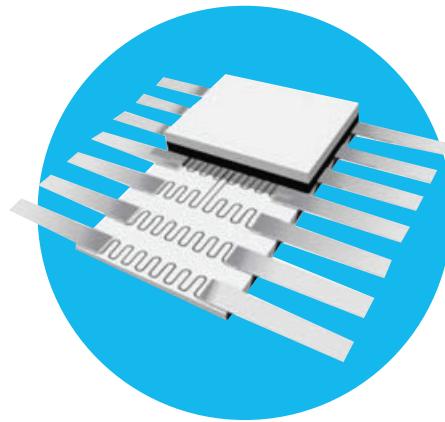


# TaNFilm® Precision Flat Pack Networks

## 8900 Series

- Precision absolute and ratio tolerances available
- Qualified to MIL-PRF-83401 /03, /10 and /15
- Qualified to characteristics M, K and H
- Custom schematics readily available
- Absolute TCR to  $\pm 15\text{ppm}/^\circ\text{C}$



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

TaNFilm® resistor networks are designed for use in applications requiring a high degree of reliability, stability, tight tolerance and TCR tracking, and low noise. The sputtering process for resistor formation has been perfected to allow a continuous feed production line under high vacuum conditions, thus, insuring uniformity of properties between networks. Laser trimming makes tight ratios easily achievable. The gold plated copper leads are solid phase welded to a large area of gold conductor pads on the ceramic substrate assuring the most reliable termination and long term stability. The Tantalum Nitride resistor material is passivated for environmental protection insuring excellent performance far superior to military requirements.

Our TaNFilm® process enables us to manufacture networks containing different resistance values and still maintain tight tolerances and tracking characteristics. The nature of our photo-etch process makes it readily adaptable to meet each individual customer's needs. Custom circuit designs and special mechanical configurations can be easily achieved with a modest set up charge while maintaining our high standards of precision and reliability.

## Electrical Data

Schematic	Resistance Range ( $\Omega$ )	Absolute Tolerance	Optional Ratio Tolerance	Absolute TCR ( $\text{ppm}/^\circ\text{C}$ )	Tracking TCR ( $\text{ppm}/^\circ\text{C}$ )	Element Power (mW)
A	10 - 49.9	F, G, J	F, G	$\pm 50; \pm 100; \pm 300$	$\pm 20$	50
	50.0 - 199	F, G, J	D, F, G	$\pm 25; \pm 50; \pm 100; \pm 300$	$\pm 10$	
	200 - 999	B, D, F, G, J	A, B, D, F, G	$\pm 25; \pm 50; \pm 100; \pm 300$	$\pm 5$	
	1.0K - 100K	B, D, F, G, J	T, Q, A, B, D, F, G	$\pm 15; \pm 25; \pm 50; \pm 100; \pm 300$	$\pm 5$	
	101K - 200K	B, D, F, G, J	A, B, D, F, G	$\pm 25; \pm 50; \pm 100; \pm 300$	$\pm 5$	
B	50 - 149	B, D, F, G, J	B, D, F, G	$\pm 300; \pm 100$	$\pm 50$	25
	150 - 499	B, D, F, G, J	B, D, F, G	$\pm 300; \pm 100; \pm 50$	$\pm 20$	
	500 - 999	B, D, F, G, J	B, D, F, G	$\pm 25; \pm 50; \pm 100; \pm 300$	$\pm 5$	
	1.0K - 150K	B, D, F, G, J	B, D, F, G	$\pm 15; \pm 25; \pm 50; \pm 100; \pm 300$	$\pm 5$	

### General Note

TT Electronics reserves the right to make changes in product specification without notice or liability.  
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8900 Series

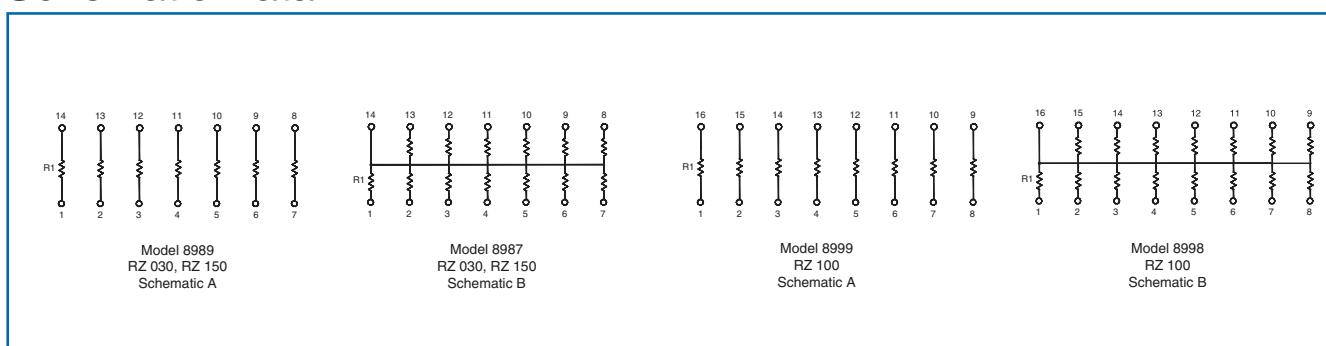
## MIL-PRF-83401 Qualification Data

Specification	Size	Schematic	Resistance Range (Ω)	Absolute Tolerance (%)	Characteristic
MIL-PRF-83401/03 MIL-PRF-83401/15	14-Pin	A, B	20 - 121K	F, G, J	K, M
			100 - 100K	B, D, F, G, J	H, K, M
MIL-PRF-83401/10	16-Pin	A, B	100 - 100K	B, D, F, G, J	H, K, M

## Package Specification Data (MIL and Commercial)

Schematic	Package Power (mW)		Power Derating	Voltage Rating	Temperature Range	Substrate	Lead Finish	Noise
	14-pin	16-pin						
A	350	400	100% from 0°C to 70°C derated linearly to 0% at 125°C	$\sqrt{PxR}$ not to exceed 50V	-65°C to +125°C	99.6% Alumina	Gold Plate (60/40 Sn/Pb available)	<-30dB
B	325	375						

## Schematic Data



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## Physical Data

# of leads	Dimension L
14	0.375" ± .010
16	0.390" ± .020

## Environmental Data

Test per MIL-PRF-83401	MIL-PRF-83401 Limits (ΔR%)				TaNFilm® Test Data (ΔR%)	
	M	K	H	V	Max	Typical
<b>Thermal Shock and Power Conditioning</b>	0.7	0.7	0.5	0.25	0.1	0.02
<b>Low Temperature Operation</b>	0.5	0.25	0.1	0.1	0.1	0.01
<b>Short Term Overload</b>	0.5	0.25	0.1	0.1	0.05	0.01
<b>Terminal Strength</b>	0.25	0.25	0.25	0.1	0.1	0.01
<b>Resistance to Solder Heat</b>	0.25	0.25	0.1	0.2	0.1	0.02
<b>Moisture Resistance</b>	0.5	0.5	0.4	0.25	0.1	0.03
<b>Shock</b>	0.25	0.25	0.25	0.25	0.1	0.03
<b>Vibration</b>	0.25	0.25	0.25	0.1	0.1	0.03
<b>Life</b>	2.0	0.5	0.5	0.1	0.1	0.03
<b>High Temperature Exposure</b>	1.0	0.5	0.2	0.1	0.1	0.03
<b>Low Temperature Storage</b>	0.5	0.25	0.1	0.1	0.1	0.02
<b>25°C Double Load</b>	2.0	0.5	0.5	0.1	0.05	0.03

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## Commercial and MIL-Screened (Non-QPL) Ordering Data

**Prefix** ..... **FP** - **8999** - **03** - **1001** - **B** - **F**

**Model** .....

8987 = 14-pin Flat Pack, schematic B, gold terminations  
8987SD = 14-pin Flat Pack, schematic B, 60/40 Sn/Pb terminations  
8987HR = 14-pin HI-REL Flat Pack, schematic B, gold terminations  
8989 = 14-pin Flat Pack, schematic A, gold terminations  
8989SD = 14-pin Flat Pack, schematic A, 60/40 Sn/Pb terminations  
8989HR = 14-pin HI-REL Flat Pack, schematic A, gold terminations  
  
8998 = 16-pin Flat Pack, schematic B, gold terminations  
8998SD = 16-pin Flat Pack, schematic B, 60/40 Sn/Pb terminations  
8998HR = 16-pin HI-REL Flat Pack, schematic B, gold terminations  
8999 = 16-pin Flat Pack, schematic A, gold terminations  
8999SD = 16-pin Flat Pack, schematic A, 60/40 Sn/Pb terminations  
8999HR = 16-pin HI-REL Flat Pack, schematic A, gold terminations

**Absolute TCR** .....

**Commercial Screening**  
01 =  $\pm 100\text{ppm}/^\circ\text{C}$ ; 02 =  $\pm 50\text{ppm}/^\circ\text{C}$ ; 03 =  $\pm 25\text{ppm}/^\circ\text{C}$ ; 11 =  $\pm 15\text{ppm}/^\circ\text{C}$

**MIL-PRF-83401 Group A Screening**

04 =  $\pm 300\text{ppm}/^\circ\text{C}$  Characteristic M; 05 =  $\pm 100\text{ppm}/^\circ\text{C}$  Characteristic K  
06 =  $\pm 50\text{ppm}/^\circ\text{C}$  Characteristic H; 07 =  $\pm 25\text{ppm}/^\circ\text{C}$  Characteristic H

**Resistance** .....

Standard 4-digit MIL resistance code  
Example: 1001 =  $1000\Omega$ ; 50R0=50 $\Omega$

**Absolute Tolerance** .....

J =  $\pm 5\%$ ; G =  $\pm 2\%$ ; F =  $\pm 1.0\%$ ; D =  $\pm 0.5\%$ ; B =  $\pm 0.1\%$

**Optional Ratio Tolerance to  $R_1$**  .....

F =  $\pm 1.0\%$ ; D =  $\pm 0.5\%$ ; C =  $\pm 0.25\%$ ; B =  $\pm 0.1\%$ ; A =  $\pm 0.05\%$ ; Q =  $\pm 0.02\%$ ; T =  $\pm 0.01\%$

**Notes**

HI-REL models include a precap inspection and thermo-compression bonded leads.  
TCR codes 01, 02, 03, and 11 are not available on HI-REL models.  
Custom schematics and screening available. Contact factory for ordering information.

## MIL-PRF-83401 Ordering Data

**Prefix** ..... **M83401** - **03** - **K** - **1001** - **F** - **A**

**Specification Sheet** .....

03 = 14-pin Flat Pack  
10 = 16-pin Flat Pack  
15 = 14-pin HI REL Flat Pack

**Characteristic** .....

M, K, H

**Resistance** .....

Standard 4-digit MIL resistance code  
Example: 1001 =  $1000\Omega$ ; 50R0=50 $\Omega$

**Absolute Tolerance** .....

J =  $\pm 5\%$ ; G =  $\pm 2\%$ ; F =  $\pm 1.0\%$ ; D =  $\pm 0.5\%$ ; B =  $\pm 0.1\%$

**Schematic** .....

A = Isolated; B = Bussed Schematic

Standard lead termination is gold plate.  
Contact factory for optional 60/40 Sn/Pb hot solder dip finish.

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