



**Thin Film Technology Corp.**

**Product Family:** Anti-Sulfur Thick Film Chip Resistors

**Part Number Series:** TFAS Series



	<p><b>Construction:</b></p> <ul style="list-style-type: none"> <li>• High purity alumina substrate</li> <li>• 100% matte tin over Ni terminations</li> <li>• Halogen free</li> <li>• RoHS compliant and Pb free</li> <li>• EIA-977-B 105°C Anti-Sulfur Resistant</li> </ul>	<p><b>Features:</b></p> <ul style="list-style-type: none"> <li>• 0402, 0603, 0805, 1206 &amp; 1210 English case sizes</li> <li>• Power up to 1/3W</li> <li>• Resistance from 1Ω to 10MΩ + Jumpers available</li> <li>• TCR down to ±100ppm/°C</li> <li>• Tolerance down to ±1.0.%</li> <li>• Moisture Sensitivity Level (MSL) = 1</li> </ul>
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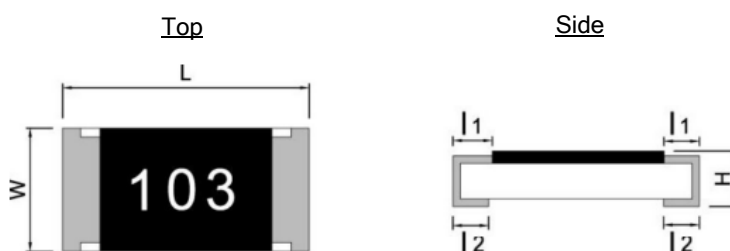
**Description:**

These anti-sulfur thick film resistors are engineered for server applications and environments prone to sulfur exposure. With robust construction, they ensure reliable performance by resisting corrosion and degradation caused by sulfur, making them ideal for electronic systems deployed in challenging conditions where sulfur contamination is a concern.

**Part Numbering:** Ex: TFAS0603R1002F-T5

Series Name	English Size (Metric Size)	Temp. Coefficient of Resistance (TCR)	Resistance Value	Resistance Tolerance	T&R Packaging Quantity
TFAS	0402 (1005) 0603 (1608) 0805 (2012) 1206 (3216) 1210 (3225)	R = ±100ppm/°C S = ±200ppm/°C W = 200/+400ppm/°C	4 digits with the first 3 being significant. The last digit specifies the number of zeros. "R" denotes decimal position as necessary Ex. 16R4 = 16.4Ω 2001 = 2kΩ JUMP = Jumper	F = ±1.0% J = ±5.0%	-T5 = 5,000 -T10 = 10,000 (see electrical table)

**Product Dimensions:**



All dimensions are in inches, mm in parentheses.

Dimension (Metric)	L	W	H	l <sub>1</sub>	l <sub>2</sub>
TFAS0402 (1005)	0.039 ±0.002 (1.00 ±0.05)	0.020 ±0.002 (0.50 ±0.05)	0.014 ±0.002 (0.35 ±0.05)	0.008 ±0.004 (0.20 ±0.10)	0.010 ±0.004 (0.25 ±0.10)
TFAS0603 (1608)	0.063 ±0.004 (1.60 ±0.10)	0.031 ±0.004 (0.80 ±0.10)	0.018 ±0.006 (0.45 ±0.15)	0.012 ±0.004 (0.30 ±0.10)	0.012 ±0.006 (0.30 ±0.15)
TFAS0805 (2012)	0.079 ±0.004 (2.00 ±0.10)	0.049 ±0.004 (1.25 ±0.10)	0.020 ±0.006 (0.50 ±0.15)	0.016 ±0.008 (0.40 ±0.20)	0.016 ±0.008 (0.40 ±0.20)
TFAS1206 (3216)	0.122 ±0.004 (3.10 ±0.10)	0.063 ±0.004 (1.60 ±0.10)	0.024 ±0.006 (0.60 ±0.15)	0.020 ±0.008 (0.50 ±0.20)	0.018 ±0.008 (0.45 ±0.20)
TFAS1210 (3225)	0.122 ±0.004 (3.10 ±0.10)	0.102 ±0.004 (2.60 ±0.10)	0.022 ±0.004 (0.55 ±0.10)	0.020 ±0.008 (0.50 ±0.20)	0.020 ±0.008 (0.50 ±0.20)

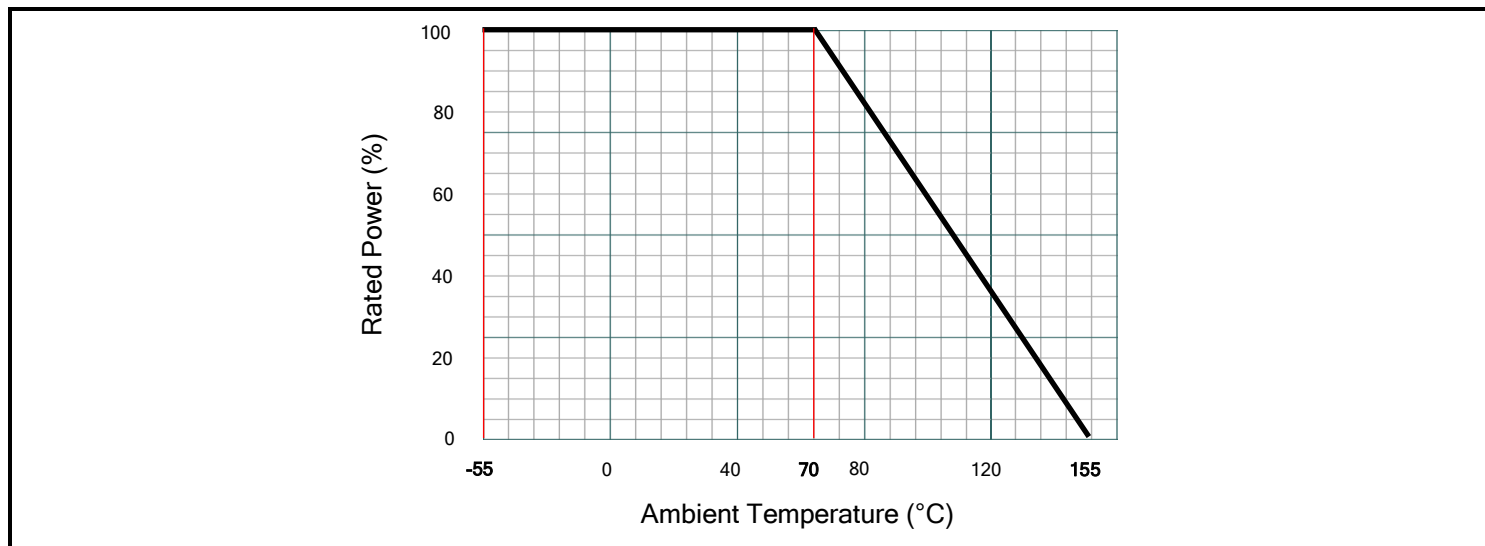
**Electrical Specifications:**

Type	TFAS0402			TFAS0603		
Metric Size	1005			1608		
Power Rating	1/16W (0.063W)			1/10W (0.10W)		
Resistance Range	1Ω~10Ω	10Ω~1MΩ	1MΩ~10MΩ	1Ω~10Ω	10Ω~1MΩ	1MΩ~10MΩ
Resistance Tolerance % (code)	±1.0%(F), ±5.0%(J)					
TCR ppm/°C (code)	200/+400(W)	±100(R)	±200(S)	200/+400(W)	±100(R)	±200(S)
Max. Operating Voltage	50V			75V		
Max. Overload Voltage	100V			150V		
Operating Temp. Range	-55°C ~ +155°C					
Packaging (code)	10,000 pcs/reel (-T10)			5,000 pcs/reel (-T5)		

Type	TFAS0805			TFAS1206			TFAS1210		
Metric Size	2012			3216			3225		
Power Rating	1/8W (0.125W)			1/4W (0.25W)			1/3W (0.33W)		
Resistance Range	1Ω~10Ω	10Ω~1MΩ	1MΩ~10MΩ	1Ω~10Ω	10Ω~1MΩ	1MΩ~10MΩ	1Ω~10Ω	10Ω~1MΩ	1MΩ~10MΩ
Resistance Tolerance % (code)	±1.0%(F), ±5.0%(J)								
TCR ppm/°C (code)	200/+400 (W)	±100(R)	±200(S)	200/+400 (W)	±100(R)	±200(S)	200/+400 (W)	±100(R)	±200(S)
Max. Operating Voltage	150V			200V					
Max. Overload Voltage	300V			400V					
Operating Temp. Range	-55°C ~ +155°C								
Packaging (code)	5,000 pcs/reel (-T5)								

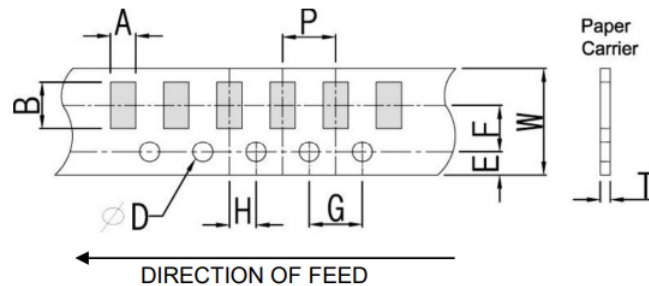
**Conditions for Jumper:**

Type	TFAS0402	TFAS0603	TFAS0805	TFAS1206	TFAS1210
Metric Size	1005	1608	2012	3216	3225
Max. Current	3A		10A		
Resistance Value	50mΩ Max				

**Power Derating Curve:**

**Reliability Specifications:**

Test	Procedure	Specification
Short Time Overload IEC-60115-1 4.13	Applied voltage: 2.5X rated voltage or 2X maximum operating voltage, whichever is less. Test duration: 5 seconds	$\pm 0.50\% + 0.05\Omega$
Resistance to Soldering Heat IEC-60115-1 4.18	Dip into 270°C $\pm 5^\circ\text{C}$ solder bath until fully immersed 10 $\pm 1$ seconds	$\pm 0.50\% + 0.05\Omega$
Load Life MIL-STD-202, Method 210	Test Temperature: 125°C $\pm 2^\circ\text{C}$ Applied power: 35% of operational power rated voltage Test period: 1000 hours	$\pm 1.0\% + 0.05\Omega$
Moisture Load Life MIL-STD-202, Method 103	Test Condition: 85°C/85 RH Applied power: 10% or rated power Test period: 1000 hours with power cycling	$\pm 1.0\% + 0.05\Omega$
Temperature Cycle JESD22, Method JA-104	-55°C ~ +155°C, 5-10 minute dwell, 1,000 cycles	$\pm 0.50\% + 0.05\Omega$
High Temperature Exposure MIL-STD-202, Method 108	Test Temperature: 155°C $\pm 3^\circ\text{C}$ No load Test period: 1000 hours	$\pm 1.0\% + 0.05\Omega$
Mechanical Shock MIL-STD-202, Method 213	1/2 sine pulse 1,500 peak Velocity 15.4 ft./second	Within specified product tolerance
Vibration MIL-STD-202, Method 204	5 G's for 20 minutes 3 orientations 12 cycles	$\pm 1.0\% + 0.05\Omega$
Solderability	Dip into 235°C solder bath until fully immersed (SAC solder) 2 $\pm 0.5$ seconds	Minimum 95% coverage of new solder
Flower of Sulfur EIA-977-B	Temperature: 107.5°C $\pm 2.5^\circ\text{C}$ Duration: 750hrs	$\Delta R/R$ max. $\pm 2.0\%$ after sulfuration test

**Paper Tape Dimensions:**

All dimensions are in mm.

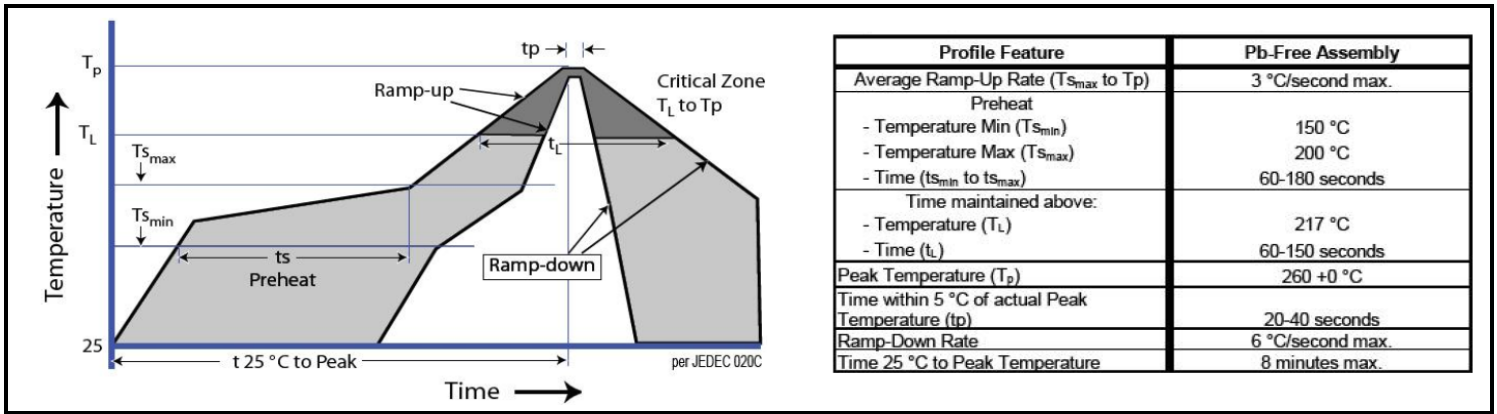
Type	A	B	W	E	F	G	H	T	$\Phi D$	P
TFAS0402	0.70 $\pm 0.10$	1.20 $\pm 0.10$	8.00 $\pm 0.20$	1.75 $\pm 0.10$	3.50 $\pm 0.05$	4.00 $\pm 0.10$	2.00 $\pm 0.05$	0.45 $\pm 0.10$	1.50-0/+0.10	2.00 $\pm 0.10$
TFAS0603	1.05 $\pm 0.20$	1.80 $\pm 0.20$	8.00 $\pm 0.20$	1.75 $\pm 0.10$	3.50 $\pm 0.05$	4.00 $\pm 0.10$	2.00 $\pm 0.05$	0.60 $\pm 0.10$	1.50-0/+0.10	4.00 $\pm 0.10$
TFAS0805	1.55 $\pm 0.20$	2.30 $\pm 0.20$	8.00 $\pm 0.20$	1.75 $\pm 0.10$	3.50 $\pm 0.05$	4.00 $\pm 0.10$	2.00 $\pm 0.05$	0.75 $\pm 0.10$	1.50-0/+0.10	4.00 $\pm 0.10$
TFAS1206	1.90 $\pm 0.20$	3.50 $\pm 0.20$	8.00 $\pm 0.20$	1.75 $\pm 0.10$	3.50 $\pm 0.05$	4.00 $\pm 0.10$	2.00 $\pm 0.05$	0.75 $\pm 0.10$	1.50-0/+0.10	4.00 $\pm 0.10$
TFAS1210	2.85 $\pm 0.20$	3.50 $\pm 0.20$	8.00 $\pm 0.20$	1.75 $\pm 0.10$	3.50 $\pm 0.05$	4.00 $\pm 0.10$	2.00 $\pm 0.05$	0.75 $\pm 0.10$	1.50-0/+0.10	4.00 $\pm 0.10$

**Reel Dimensions:**

Type	A	$\Phi B$	$\Phi C$	$\Phi D$	W	$\Phi M$
TFAS0402						
TFAS0603						
TFAS0805	2.00 $\pm 0.50$	13.5 $\pm 1.00$	21.0 $\pm 1.00$	60.0 $\pm 1.00$	11.5 $\pm 2.00$	178 $\pm 2.00$
TFAS1206						
TFAS1210						

All dimensions are in mm.

**Soldering Profile:**



**Marking Information:**

0402 : no marking	0603 : 3 digits code	0805~1206 : 3 digits code (5%)	0805~1206 : 4 digits code (1% and below)

Standard E96 Values and 0603 Resistance Codes																																
R-Value	100	102	105	107	110	113	115	118	121	124	127	130	133	137	140	143	147	150	154	158	162	165	169	174								
Code	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24								
R-Value	178	182	187	191	196	200	205	210	215	221	226	232	237	243	249	255	261	267	274	280	287	294	301	309								
Code	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48								
R-Value	316	324	332	340	348	357	365	374	383	392	402	412	422	432	442	453	464	475	487	499	511	523	536	549								
Code	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72								
R-Value	562	576	590	604	619	634	649	665	681	698	715	732	750	768	787	806	825	845	866	887	909	931	953	976								
Code	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96								
E96 Multiplier Code																																
Code	A				B				C				D				E				F											
Multiplier	$10^0$				$10^1$				$10^2$				$10^3$				$10^4$				$10^5$											
Examples of 0603~1206 : 3 digits code for E24 values ( $\pm 5\%$ )																																
R-Value	4.7 $\Omega$				33 $\Omega$				470 $\Omega$				5.6K $\Omega$				62K $\Omega$				680K $\Omega$											
Code	4R7				330				471				562				623				684											
Examples of 0805~1206: 4 digits code for type																																
R-Value	5.6 $\Omega$				10 $\Omega$				22.6 $\Omega$				100 $\Omega$				1.1K $\Omega$				10K $\Omega$				332K $\Omega$				1M $\Omega$			
Code	5R60				10R0				22R6				1000				1101				1002				3323				1004			

**Storage Conditions:**

**Environment Conditions:**  
 Products should be stored under the following environmental conditions.

- Temperature: +5 to +35°C
- Humidity: 45 to 85% relative humidity
- Do not keep products in environments where they may be subject to particulate contamination or harmful gases such as sulfuric acid or hydrogen chloride as it may cause oxidation on electrodes, resulting in poor solderability.
- Products should be stored in a space that does not expose it to high temperatures, vibration, or direct sunlight.
- Products should be stored in the original airtight packaging until use.