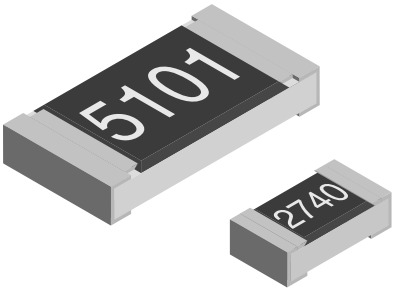
TNPW

Vishay Dale

Thin Film, Rectangular, Resistor Chips



TNPW Precision Thin Film Flat Chip Resistors are the perfect choice for most fields of modern electronics where reliability and stability is of major concern. Typical applications include telecommunication, industrial, medical equipment, high-end computer and audio/video electronics.

FEATURES

- Metal film layer on high quality ceramic
- Protective top coat
- Available with tin lead or lead (Pb)-free solder contacts
- Excellent stability at different environmental conditions
- Low temperature coefficient and tight tolerances

APPLICATIONS

- Automotive
- Telecommunication
- Medical Equipment
- Industrial Equipment

STANDARD ELECTRICAL SPECIFICATIONS

TYPE	POWER RATING $P_{70°C}$ (W)		RESISTANCE RANGE (Ω)	TEMPERATURE COEFFICIENT (ppm/K)	TOLERANCE	E-SERIES
	EN 140401-801	EIA 575				
TNPW0402	0.063	0.063	10R - 100K	± 25, ± 50	± 0.5%, ± 1%	24-192
			47R - 100K	± 10, ± 15, ± 25, ± 50	± 0.1%	
TNPW0603	0.100	0.063	10R - 332K	± 25, ± 50	± 0.1%, ± 0.5%, ± 1% [1]	24-192
			47R - 332K	± 10, ± 15	± 0.1%	
TNPW0805	0.125	0.100	10R - 1M0	± 25, ± 50	± 0.1%, ± 0.5%, ± 1% [1]	24-192
			47R - 1M0	± 10, ± 15	± 0.1%	
TNPW1206	0.250	0.125	10R - 2M0	± 25, ± 50	± 0.1%, ± 0.5%, ± 1% [1]	24-192
			47R - 2M0	± 10, ± 15	± 0.1%	
TNPW1210	0.33 [2]	0.250	10R - 3M01	± 25, ± 50	± 0.5%, ± 1% [1]	24-192
			47R - 2M13	± 10, ± 15, ± 25, ± 50	± 0.1%	
TNPW2010	0.40 [2]	0.400	10R - 4M99	± 25, ± 50	± 0.5%, ± 1%	24-192
			47R - 1M0	± 25, ± 50	± 0.1%	
TNPW2512	0.50 [2]	0.500	10R - 8M87	± 25, ± 50	± 0.5%, ± 1%	24-192
			47R - 1M0	± 25, ± 50	± 0.1%	

[1] ±1% resistors are only available in E24/E96
[2] Size not specified in EN-140401-801
• Extended values available on request

• Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material
• TNPW 0402 without marking

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	TNPW0402		TNPW0603		TNPW0805		TNPW1206		TNPW1210		TNPW2010		TNPW2512	
Rated Dissipation at 70°C (EN-140401-801 | EIA 575)	W	0.063	0.063	0.1	0.063	0.125	0.1	0.25	0.125	0.33	0.25		0.4		0.5
Limiting Element Voltage [4]	V ≦	25		75		100		100		100		150		200	
Thermal Resistance [3]	K/W	≤ 870		≤ 550		≤ 440		≤ 220		≤ 140		≤ 90		≤ 70	
Insulation Resistance	Ω	> 10^9													
Category Temperature Range	°C	- 55 / + 125 (+ 155)													
Failure Rate	h^{-1}	0.3 •10^{-9}													
Weight / 1000pcs	g	0.65		2		5.5		10		16		28		39	

[3] Measuring conditions in acc. with EN 140401-801 [4] Rated voltage: $\sqrt{P \times R}$

For Technical Questions, contact: ff3aresistors@vishay.com

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ORDERING INFORMATION

Products can be ordered by using either the product description or the part number. Please note that products can be ordered with or without Lead (Pb)-free termination.

PRODUCT DESCRIPTION for products with TIN LEAD termination

TNPW-0805	**13K2**	**0.1%**	**T-9**	**RT1**
MODEL	RESISTANCE VALUE	TOLERANCE	TC	PACKAGING [1]
TNPW-0402	10R = 10Ω	± 0.1 %	T-2 = ± 50 ppm/K	RT7
TNPW-0603	100R = 100Ω	± 0.5 %	T-9 = ± 25 ppm/K	R52
TNPW-0805	13K2 = 13.2kΩ	± 1.0 %	T-10 = ± 15 ppm/K	RT1
TNPW-1206	1M = 1MΩ		T-13 = ± 10 ppm/K	RT6
TNPW-1210				R75
TNPW-2010				R02
TNPW-2512				R67

[1] Please refer to the PACKAGING table on page 158. (Lead (Pb)-free products can be ordered using a different packaging code, plus suffx e3)

PART NUMBER for products with TIN LEAD termination

T	N	P	W	1	2	0	6	1	K	3	2	D	E	T	A		

MODEL	VALUE	TOLERANCE	T.C.	PACKAGING			SPECIAL
TNPW 0402	R = Decimal	B = ± 0.1%	Y = ± 10 ppm/K	TA = RT1	5000	paper tape	up to 2 digits
TNPW 0603	K = Thousand	C = ± 0.25%	X = ± 15 ppm/K	TC = RT6	20000	paper tape	
TNPW 0805	M = Million	D = ± 0.5%	E = ± 25 ppm/K	TD = RT7	10000	paper tape	
TNPW 1206		F = ± 1.0%	H = ± 50 ppm/K	TF = R02	4000	blister tape	
TNPW 1210				TG = R67	2000	blister tape	
TNPW 2010				CN = R52	1000	paper tape	
TNPW 2512				TY = R75	1000	blister tape	

Part Numbering: TNPW12061K32DETA (Product Description: TNPW-1206 1K32 0.5% T-9 RT1)

PRODUCT DESCRIPTION for products with LEAD (Pb) FREE termination

TNPW0805	**13K2**	**0.1%**	**T9**	**ET1**	**e3**
MODEL	RESISTANCE VALUE	TOLERANCE	TC	PACKAGING [1]	LEAD FREE STATUS
TNPW0402	10R = 10Ω	± 0.1 %	T2 = ± 50 ppm/K	ET7	e3 = Pure tin termination
TNPW0603	100R = 100Ω	± 0.5 %	T9 = ± 25 ppm/K	E52	
TNPW0805	13K2 = 13.2kΩ	± 1.0 %	T10 = ± 15 ppm/K	ET1	
TNPW1206	1M = 1MΩ		T13 = ± 10 ppm/K	ET6	
TNPW1210				E75	
TNPW2010				E02	
TNPW2512				E67	

[1] Please refer to the PACKAGING table on page 158. (Lead (Pb)-free products can be ordered using a different packaging code, plus suffx e3)

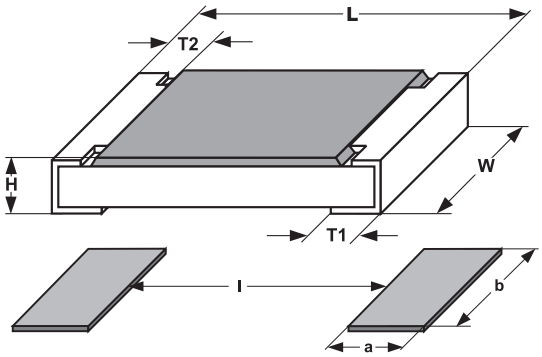
PART NUMBER for products with LEAD (Pb) FREE termination

T	N	P	W	1	2	0	6	1	K	3	2	D	E	E	A		

MODEL	VALUE	TOLERANCE	T.C.	PACKAGING			SPECIAL
TNPW 0402	R = Decimal	B = ± 0.1%	Y = ± 10 ppm/K	EA = ET1	5000	paper tape	up to 2 digits
TNPW 0603	K = Thousand	C = ± 0.25%	X = ± 15 ppm/K	EC = ET6	20000	paper tape	
TNPW 0805	M = Million	D = ± 0.5%	E = ± 25 ppm/K	ED = ET7	10000	paper tape	
TNPW 1206		F = ± 1.0%	H = ± 50 ppm/K	EF = E02	4000	blister tape	
TNPW 1210				EG = E67	2000	blister tape	
TNPW 2010				EN = E52	1000	paper tape	
TNPW 2512				EY = E75	1000	blister tape	

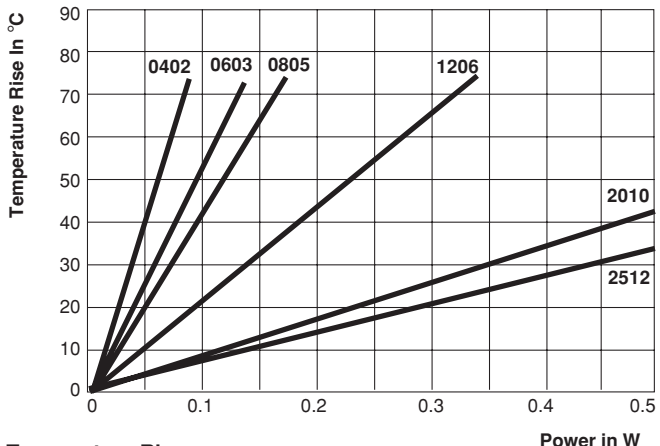
Part Numbering: TNPW12061K32DEEA (Product Description: TNPW-1206 1K32 0.5% T-9 ET1 e3)

DIMENSIONS

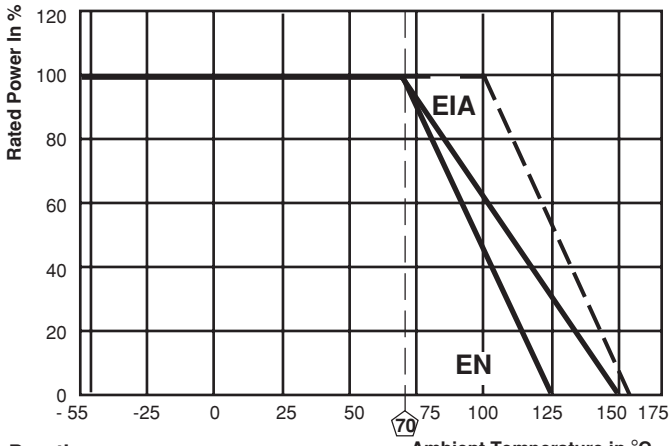


SIZE		DIMENSIONS millimeters				
INCH	METRIC	L	W	H	T1	T2
0402	1005	1.0 ± 0.05	0.5 ± 0.05	0.35 ± 0.05	0.2 ± 0.1	
0603	1608	1.6 ± 0.2	0.81 ± 0.2	0.4 ± 0.1	0.3 ± 0.2	
0805	2012	2.0 ± 0.2	1.24 ± 0.2	0.4 ± 0. 1	0.4 ± 0.25	
1206	3216	3.2 ± 0.15	1.6 ± 0.15	0.61 ± 0.15	0.5 ± 0.25	
1210	3225	3.2 ± 0.15	2.49 ± 0.15	0.61 ± 0.15	0.46 ± 0.2	
2010	5025	5.0 ± 0.15	2.5 ± 0.15	0.61 ± 0.15	0.6 ± 0.25	
2512	6332	6.3 ± 0.2	3.1 ± 0.15	0.61 ± 0.15	0.6 ± 0.25	

		SOLDER PAD DIMENSIONS millimeters					
SIZE		REFLOW SOLDERING			WAVE SOLDERING		
INCH	METRIC	a	b	l	a	b	l
0402	1005	0.4	0.6	0.5	-	-	-
0603	1608	0.5	0.9	1.0	0.9	0.9	1.0
0805	2012	0.7	1.3	1.2	0.9	1.3	1.3
1206	3216	0.9	1.7	2.0	1.1	1.7	2.3
1210	3225	0.9	2.5	2.0	1.1	2.5	2.3
2010	5025	1.0	2.5	3.9	1.2	2.5	3.9
2512	6332	1.0	3.2	5.2	1.2	3.2	5.2



Temperature Rise



Derating

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PACKAGING							
MODEL	**TAPE WIDTH [mm]**	**PITCH [mm]**	**REEL DIAMETER [mm/inch]**	**PIECES PER REEL**	**TIN LEAD PACKAGING CODE**	**LEAD FREE (e3) PACKAGING CODE**	**TYPE OF CARRIER TAPE**
TNPW 0402	8	2	180 / 7	10,000	RT7	ET7	Paper
TNPW 0603 TNPW 0805 TNPW 1206 TNPW 1210	8	4	180 / 7	1,000	R52[1]	E52[1]	Paper
TNPW 0603 TNPW 0805 TNPW 1206 TNPW 1210	8	4	180 / 7	5,000	RT1	ET1	Paper
TNPW 0603 TNPW 0805 TNPW 1206 TNPW 1210	8	4	330 / 13	20,000	RT6	ET6	Paper
TNPW 2010	12	4	180 / 7	1,000	R75	E75	Blister
				4,000	R02	E02	Blister
TNPW 2512	12	8	180 / 7	1,000	R75	E75	Blister
				2,000	R67	E67	Blister

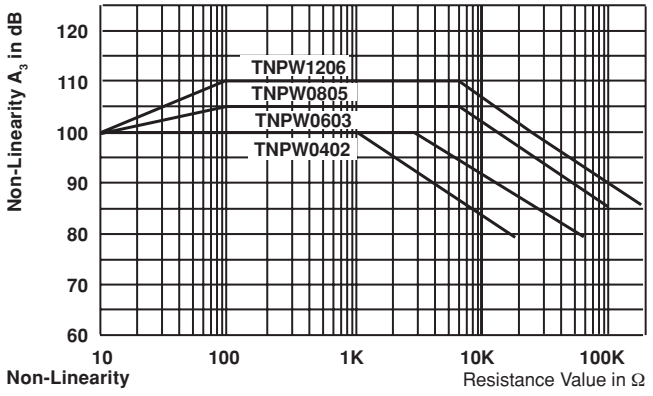
[1] R52 and E52 only for precision resistors with tolerance ± 0.1% and temperature coefficient ≤ ± 25 ppm/k

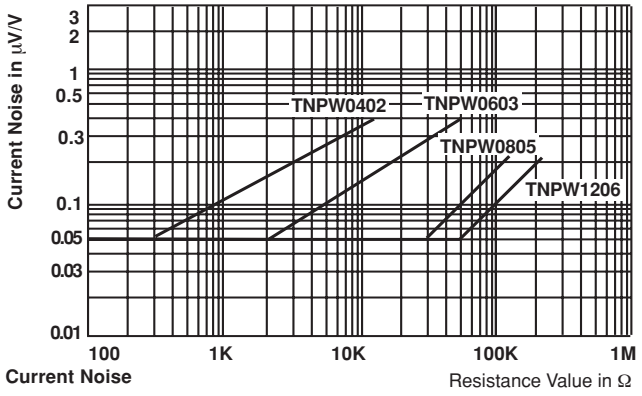
DESCRIPTION

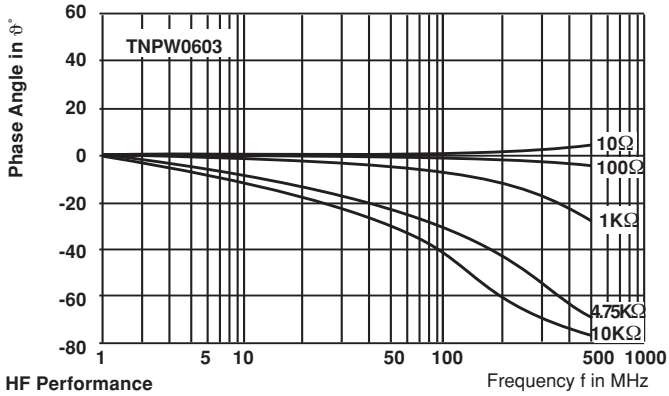
Production is strictly controlled and follows an extensive set of instructions established for reproducibility. A homogeneous film of metal alloy is deposited on a super high grade ceramic substrate and conditioned to achieve the desired temperature coefficient. A special laser is used to achieve the target value by smoothly cutting a meander groove in the resistive layer without damaging the ceramics.

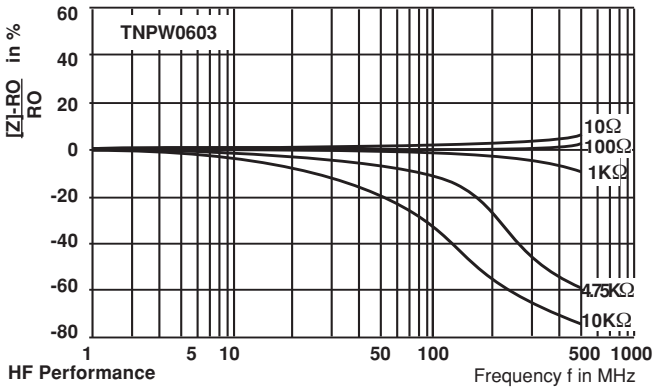
ASSEMBLY

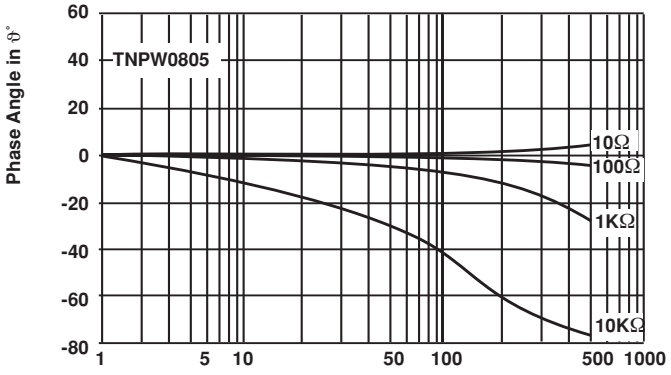
The resistors are suitable for processing on automatic SMD assembly systems. Beside tin lead termination TNPW is also available with lead free pure tin termination. The pure tin plating of the (Pb) lead-free resistors types provides compatibility with lead (Pb)-free and lead-containing soldering processes. The immunity of the plating against tin whisker growth has been proven under extensive testing.



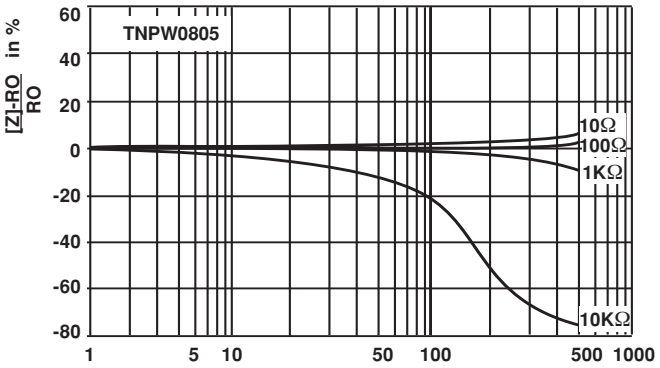




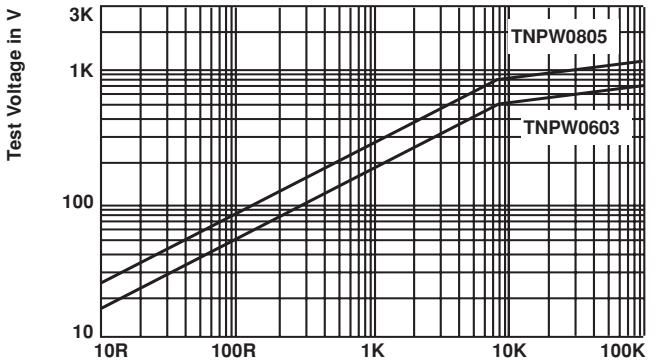




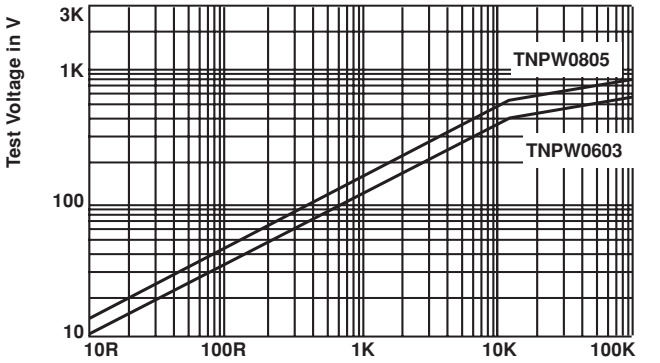
HF Performance
Frequency f in MHz



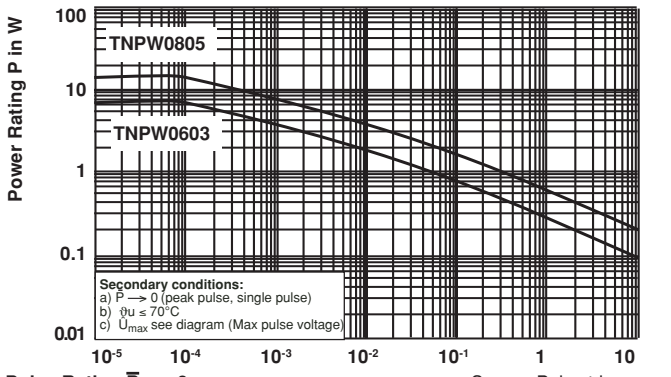
HF Performance
Frequency f in MHz



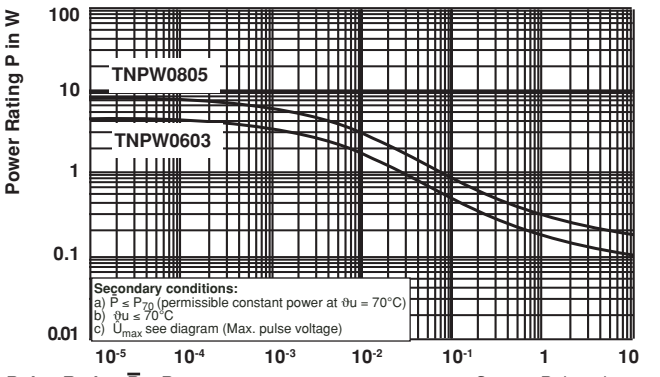
Single-Pulse High Voltage Overload Test
1.2 / 50µs EN140000 4.27
Resistance Value in Ω



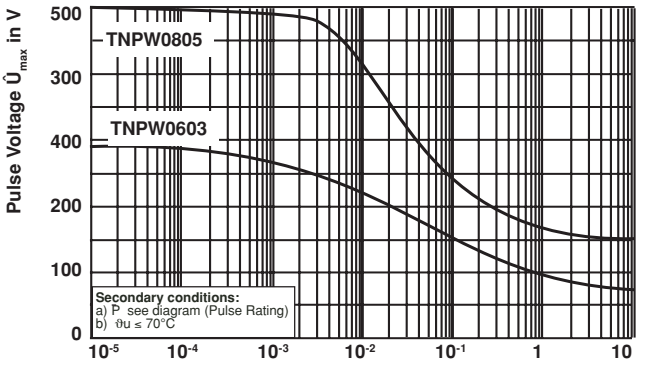
Single-Pulse High Voltage Overload Test
10 / 700µs EN140000 4.27
Resistance Value in Ω



Pulse Rating $\overline{P} \rightarrow 0$
Square Pulse t_i in s



Pulse Rating $\overline{P} \leq P_{70}$
Square Pulse t_i in s



Maximum Pulse Voltage
Square Pulse t_i in s

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PERFORMANCE

TEST	CONDITIONS OF TEST	TEST RESULTS TNPW0402 TO TNPW2512 TOLERANCES		
		± 0.1 % ; ± 0.25 %		
		< 100R	≥ 100R	± 0.5 % ; ± 1.0%
Endurance Test at 70°C IEC 60115-1 4.25.1	1000 hours at 70°C, 1.5 hours "ON", 0.5 hours "OFF"	≤ ± 0.1%	≤ ± 0.05%	≤ ± 0.25%
Endurance at UCT IEC 60115-1 4.25.3	1000 hours at 125 °C without load	≤ ± 0.1%	≤ ± 0.05%	≤ ± 0.5%
Overload Test IEC 60115-1 4.13	Short time overload for 2 seconds 2.5 x rated voltage or ≤ 2 x limiting element voltage	≤ ± 0.05%	≤ ± 0.02%	≤ ± 0.1%
Thermal Shock IEC 60115-1 4.19, IEC 60068-2-14	Rapid change between upper and lower category temperature	≤ ± 0.05%	≤ ± 0.02%	≤ ± 0.1%
Damp Heat Steady State IEC 60115-1 4.24, IEC 60068-2-3	56 days at 40°C and 93% relative humidity	≤ ± 0.1%	≤ ± 0.05%	≤ ± 0.5%
Resistance to Soldering Heat IEC 60115-1 4.18, IEC 60068-2-20	10 seconds at 260°C solder bath temperature	≤ ± 0.05%	≤ ± 0.02%	≤ ± 0.1%

APPLICABLE SPECIFICATIONS

- CECC40000 / 40400
- EN140400
- EIA 575
- EN 140401-801
- EN 60115-1
- IEC 60286-3

Mouser Electronics

Authorized Distributor

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Vishay:

TNPW12066043BR75 TNPW08058250DR75 TNPW08051091BR75 TNPW08051491BR75 TNPW08051373BR75 TNPW12062842BR75 TNPW12062912BR75 TNPW12062982BR75 TNPW12068761BR75 TNPW06037K87BETY TNPW060315K0BETY TNPW06031K50BETY TNPW060324K9BETY TNPW12062743BR75 TNPW120612R1FR75 TNPW120620R0FR75 TNPW08054640FR75 TNPW12061762BR75 TNPW08055051BR75 TNPW08058002BR75 TNPW12061004BR75-T10 TNPW08052343BR75 TNPW08052743BR75 TNPW12065301BR75 TNPW12067501BR75T10 TNPW08056871BR75 TNPW08053052BR75 TNPW08051841BR75 TNPW06036190BR75 TNPW08053240BR75 TNPW120650R5BR75 TNPW08058060FR75 TNPW08053612BR75 TNPW12061913FR75 TNPW080533R2DR75 TNPW08053321DR75 TNPW12062103BR75 TNPW08053790BR75 TNPW12069533BR75 TNPW08051743FR75 TNPW12062130BR75 TNPW08052581BR75 TNPW08054481BR75 TNPW12064931BR75 TNPW12065831BR75 TNPW12067412BR75 TNPW08051093BR75 TNPW08052842BR75 TNPW12062291BR75 TNPW12065691BR75 TNPW12063791BR75 TNPW08056262BR75 TNPW08052260BR75 TNPW12062432FR75 TNPW12063011FR75 TNPW12063740FR75 TNPW12065621FR75 TNPW12065622FR75 TNPW08058660FR75 TNPW12063650BR75 TNPW12061013BR75 TNPW08051433BR75 TNPW08054270BR75 TNPW080571R5BR75 TNPW12063090BR75 TNPW12063703BR75 TNPW12069882BR75 TNPW08051371BR75 TNPW08051540BR75 TNPW08051690BR75 TNPW12065971BR75 TNPW080524R9BETY TNPW08052800BR75 TNPW080510R0BR75 TNPW080517R4BR75 TNPW080524R3BR75 TNPW080538R3BR75 TNPW080582R5BR75 TNPW12061470BR75 TNPW12061651BR75 TNPW12062K00BYTY TNPW12068982DR75 TNPW08051473BR75 TNPW120666R5BR75 TNPW080536R5BR75 TNPW08051150BR75 TNPW08052100BR75 TNPW08052781BR75 TNPW08052292BR75 TNPW08053122BR75 TNPW08051012BR75 TNPW08051172BR75 TNPW08051452BR75 TNPW080520R0BR75 TNPW120622R0FR75-T2 TNPW12066572BR75 TNPW080527R4DR75 TNPW08053902BR75 TNPW0805523RBYTY TNPW08058161BR75