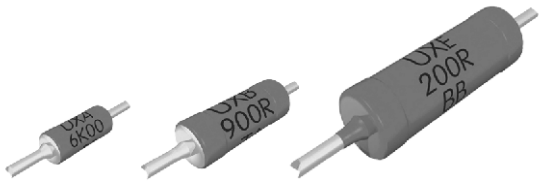
High Precision Thin Film Leaded Resistors



FEATURES

- Superior thin film technology
- Exceptional low TCR: ± 02 ppm/K to ± 10 ppm/K
- Super tight tolerance: ± 0.01 % to ± 0.25 %
- Exceptional overall stability: Class 0.02
- Wide resistance range: 22 Ω to 1 MΩ
- Lead (Pb)-free solder contacts
- Pure tin plating provides compatibility with lead (Pb)-free and lead containing soldering processes
- Compliant to RoHS directive 2002/95/EC

Pb-free

RoHS COMPLIANT

DESCRIPTION

UXA 0204, UXB 0207 and UXE 0414 high precision leaded thin film resistors combine the proven reliability of the professional products with an exceptional level of precision and stability. Therefore they are perfectly suited for applications in the fields of precision test and measuring equipment and particularly for the design of calibration references and standards.

APPLICATIONS

- Precision test and measuring equipment
- Design of calibration references and standards

METRIC SIZE			
DIN	0204	0207	0414
CECC	A	B	D

TECHNICAL SPECIFICATIONS			
DESCRIPTION	**UXA 0204**	**UXB 0207**	**UXE 0414**
CECC Size	A	B	D
Resistance Range	22 Ω to 221 kΩ	10 Ω to 1 MΩ	22 Ω to 511 kΩ
Resistance Tolerance	± 0.25 %; ± 0.1 %; ± 0.05 %; ± 0.01 %		± 0.1 %; ± 0.05 %
Temperature Coefficient	± 10 ppm/K; ± 05 ppm/K; ± 02 ppm/K		± 10 ppm/K; ± 05 ppm/K
Operation Mode	Precision		
Climatic Category (LCT/UCT/days)	20/125/56		
Rated Dissipation:			
P_{85}	0.05 W	0.125 W	0.25 W
P_{70}	0.1 W	0.25 W	0.5 W
Operating Voltage, $U_{max.}$ AC/DC	200 V	250 V	300 V
Film Temperature	125 °C		
Max. Resistance Change at P_{70} for Resistance Range, $\Delta R/R$ max., After:	100 Ω to 100 kΩ	100 Ω to 250 kΩ	100 Ω to 100 kΩ
2000 h	≤ 0.05 %	≤ 0.05 %	≤ 0.05 %
Max. Resistance Change at P_{85} for Resistance Range, $\Delta R/R$ max., After:	100 Ω to 100 kΩ	100 Ω to 250 kΩ	100 Ω to 100 kΩ
1000 h	≤ 0.02 %	≤ 0.02 %	≤ 0.02 %
8000 h	≤ 0.04 %	≤ 0.04 %	≤ 0.04 %
225 000 h	≤ 0.12 %	≤ 0.12 %	≤ 0.12 %
Permissible Voltage Against Ambient :			
1 Minute; U_{ins}	300 V	500 V	800 V
Continuous	75 V	75 V	75 V
Failure Rate: $FIT_{observed}$	≤ 0.1 x 10^{-9}/h	≤ 0.1 x 10^{-9}/h	≤ 0.1 x 10^{-9}/h

Note

- These resistors do not feature a limited lifetime when operated within the permissible limits. However, resistance value drift increasing over operating time may result in exceeding a limit acceptable to the specific application, thereby establishing a functional lifetime.

PART NUMBER AND PRODUCT DESCRIPTION UX SERIES

PART NUMBER: UXB02070F1001AC100

U	X	B	0	2	0	7	0	F	1	0	0	1	A	C	1	0	0

MODEL/SIZE	VARIANT	TCR	VALUE	TOLERANCE	PACKAGING (1)	SPECIAL
UXA0204 **UXB0207** **UXE0414**	**0** = Neutral	**H** = ± 2 ppm/K **G** = ± 5 ppm/K **F** = ± 10 ppm/K	**3 digit value** **1 digit multiplier** MULTIPLIER **9** = $*10^{-1}$ **2** = $*10^{2}$ **0** = $*10^{0}$ **3** = $*10^{3}$ **1** = $*10^{1}$ **4** = $*10^{4}$	**T** = ± 0.01 % **A** = ± 0.05 % **B** = ± 0.1 % **C** = ± 0.25 %	**C1** **CU** **R1** **R2** **RP**	Up to 2 digits **00** = Standard

PRODUCT DESCRIPTION: UXB 0207-10 0.05 % C1 1K0

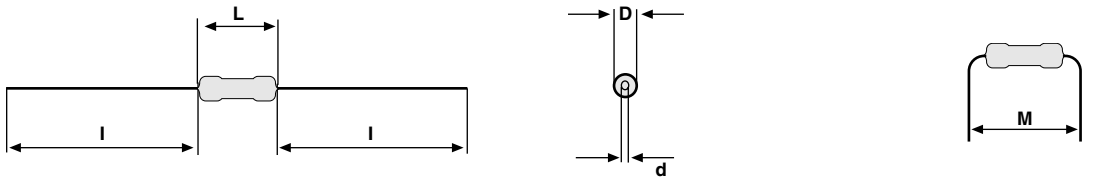
UXB	0207	10	0.05 %	C1	1K0
MODEL	SIZE	TCR	TOLERANCE	PACKAGING (1)	RESISTANCE VALUE
UXA **UXB** **UXE**	**0204** **0207** **0414**	**± 2 ppm/K** **± 5 ppm/K** **± 10 ppm/K**	**± 0.01 %** **± 0.05 %** **± 0.1 %** **± 0.25 %**	**C1** **CU** **R1** **R2** **RP**	**1K0** = 1.0 kΩ **47K** = 47 kΩ **50R5** = 50.5 Ω

Notes

(1) Please refer to table PACKAGING, see next page

- The PART NUMBER is shown to facilitate the introduction of a unified part numbering system.

DIMENSIONS



DIMENSIONS - Leaded resistor types, mass and relevant physical dimensions

TYPE	$D_{max.}$ (mm)	$L_{max.}$ (mm)	$d_{nom.}$ (mm)	$l_{min.}$ (mm)	$M_{min.}$ (mm)	MASS (mg)
UXA 0204	1.6	3.6	0.5	29.0	5.0	125
UXB 0207	2.5	6.3	0.6	28.0	7.5	220
UXE 0414	4.0	11.9	0.8	31.0	15.0	750

SCRIPT MARKING - Printed resistance value and letter coding for TCR and tolerance

RESISTANCE VALUE	TOL. (%)	LETTER CODE	TCR (ppm/K)	LETTER CODE
Clear text code for value	± 0.25	C	± 10	B
	± 0.1	B	± 05	A
	± 0.05	A	± 02	T
	± 0.01	T	-	-

PACKAGING

MODEL	REEL		BOX	
	BANDOLIER ON REEL	CODE	PIECES/BOX	CODE
UXA	1000	R1	100 1000	CU C1
UXB	1000 5000	R1 RP	100 1000	CU C1
UXE	2500	R2	100 1000	CU C1

TEMPERATURE COEFFICIENT AND RESISTANCE RANGE				
DESCRIPTION		RESISTANCE VALUE (1)		
TCR	TOLERANCE	UXA 0204	UXB 0207	UXE 0414
± 10 ppm/K (2)	± 0.25 %	22 Ω to 221 kΩ	10 Ω to 1 MΩ	-
	± 0.1 %	43 Ω to 221 kΩ	10 Ω to 1 MΩ	22 Ω to 511 kΩ
	± 0.05 %	100 Ω to 180 kΩ	24 Ω to 301 kΩ	100 Ω to 301 kΩ
	± 0.01 %	200 Ω to 150 kΩ	24 Ω to 301 kΩ	-
± 05 ppm/K (2)	± 0.25 %	47 Ω to 150 kΩ	10 Ω to 1 MΩ	-
	± 0.1 %	47 Ω to 150 kΩ	10 Ω to 1 MΩ	47 Ω to 301 kΩ
	± 0.05 %	100 Ω to 150 kΩ	24 Ω to 221 kΩ	100 Ω to 301 kΩ
	± 0.01 %	200 Ω to 150 kΩ	24 Ω to 221 kΩ	-
± 02 ppm/K (3)	± 0.25 %	100 Ω to 100 kΩ	100 Ω to 150 kΩ	-
	± 0.1 %	100 Ω to 100 kΩ	100 Ω to 150 kΩ	-
	± 0.05 %	150 Ω to 100 kΩ	150 Ω to 150 kΩ	-
	± 0.01 %	200 Ω to 100 kΩ	200 Ω to 150 kΩ	-

Notes

(1) Resistance values to be selected from the E192 series, for other values please contact the factory

(2) TCR 10 and TCR 05 are specified over the temperature range from - 20 °C to + 85 °C

(3) TCR 02 is specified over the temperature range from 0 °C to + 60 °C

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 high grade ceramic body (85 % Al_2O_3) and conditioned to achieve the desired temperature coefficient. Nickel plated steel termination caps are firmly pressed on the metallized rods. Special laser devices are used repeatedly to achieve the target value by slowly and smoothly cutting a helical groove in the resistive layer without damaging the ceramics. A further conditioning is applied in order to stabilise the trimming result. Connecting wires of electrolytic copper plated with pure tin are welded to the termination caps. The resistors are covered by protective coating designed for electrical, mechanical and climatic protection.The terminations receive a final pure tin on nickel plating. Script marking designates the resistance value plus coded TCR and tolerance.

The result of the determined production is verified by an accelerated ageing (burn-in) and extensive testing procedure performed on 100 % of the individual resistors. Only accepted products are stuck directly on the adhesive tapes in accordance with **IEC 60286-1**.

ASSEMBLY

The resistors are suitable for processing on automatic insertion equipment and cutting and bending machines. Excellent solderability is proven, even after extended storage. They are suitable for automatic soldering using wave or dipping. The encapsulation is resistant to all cleaning solvents commonly used in the electronics industry, including alcohols, esters and aqueous solutions. The suitability of conformal coatings, if applied, shall be qualified by appropriate means to ensure the long-term stability of the whole system. The resistors are completely lead (Pb)-free, the pure tin plating 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. All products comply with **GADSL** (4) and the **CEFIC-EECA-EICTA** (5) list of legal restrictions on hazardous substances. This includes full compliance with the following directives:

- 2000/53/EC End of Vehicle Life Directive (ELV) and Annex II (ELVII)
- 2002/95/EC Restriction of the use of Hazardous Substances Directive (RoHS)
- 2002/96/EC Waste Electrical and Electrical Equipment Directive (WEEE)

APPROVALS

Where applicable, the resistors are tested in accordance with **CECC 40101-806** which refers to **EN 60115-1** and **EN 140100**.

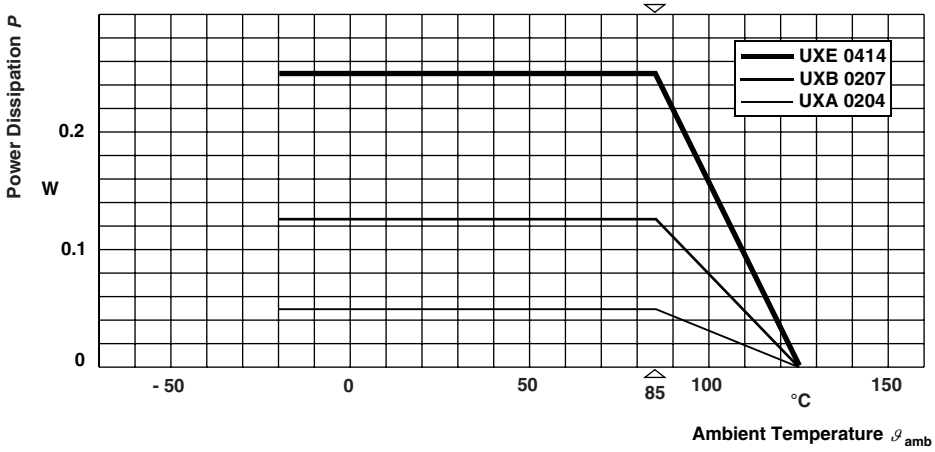
Vishay BEYSCHLAG has achieved **"Approval of Manufacturer"** in accordance with **IEC QC 001002-3, clause 2**. The release certificate for **"Technology Approval Schedule"** in accordance with **CECC 240001** based on **IEC QC 001002-3, clause 6** is granted for the Vishay BEYSCHLAG manufacturing process.

Notes

(4) Global Automotive Declarable Substance List, see www.gadsl.org

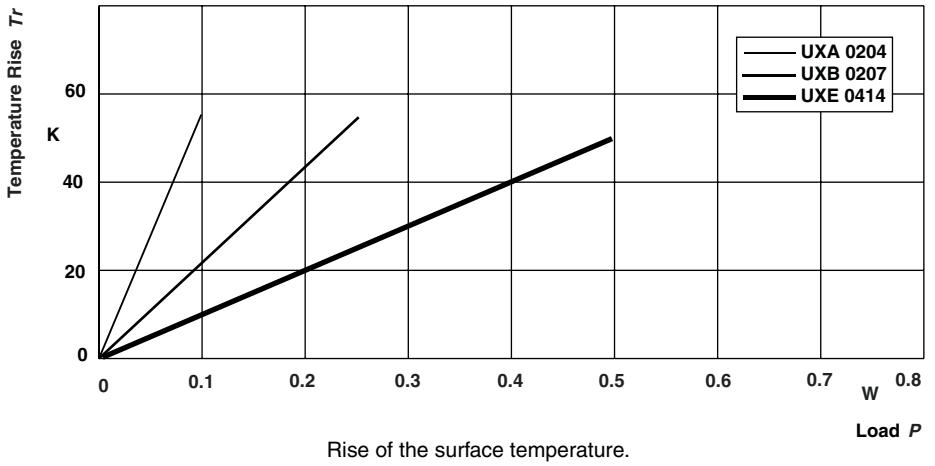
(5) CEFIC (European Chemical Industry Council), EECA (European Electronic Component Manufacturers Association), EICTA (European trade organisation representing the information and communications technology and consumer electronics), see www.eicta.org/index.php?id=1053&id_article=340

FUNCTIONAL DESCRIPTION



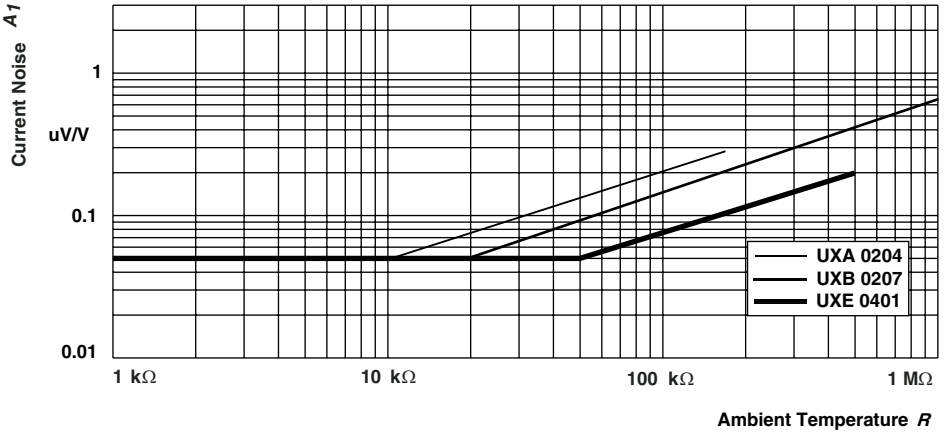
Specification of TCR 02 is valid from 0 °C to 60 °C.

Derating - Precision Operation



Rise of the surface temperature.

Temperature Rise



Current Noise A_1 in accordance with IEC 60195

TESTS AND REQUIREMENTS

Essentially all tests are carried out in accordance with the following specifications:

EN 60115-1, Generic specification (includes tests)

EN 140100, Sectional specification (includes schedule for qualification approval)

CECC 40101-806, Detail specification (includes schedule for conformance inspection)

Most of the components are approved in accordance with the European CECC-system, where applicable. The Test Procedures and Requirements table contains only the most important tests. For the full test schedule refer to the documents listed above. The testing also covers most of the requirements specified by EIA/IS-703 and JIS-C-5202.

The tests are carried out in accordance with IEC 60068-2-xx test method and under standard atmospheric conditions in accordance with IEC 60068-1, 5.3. Climatic category LCT/UCT/56 (rated temperature range: Lower category temperature, upper category temperature; damp heat, long term, 56 days) is valid.

Unless otherwise specified the following values apply:

Temperature: 15 °C to 35 °C

Relative humidity: 45 % to 75 %

Air pressure: 86 kPa to 106 kPa (860 mbar to 1060 mbar).

For testing the components are mounted on a test board in accordance with IEC 60115-1, 4.31 unless otherwise specified.

In the Test Procedures and Requirements table only the tests and requirements are listed with reference to the relevant clauses of IEC 60115-1 and IEC 60068-2-xx test method. A short description of the test procedure is also given.

TEST PROCEDURES AND REQUIREMENTS

IEC 60115-1 CLAUSE	IEC 60068-2-xx TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)		
			Stability for product types:			
			UXA 0204	100 Ω to 100 kΩ	22 Ω to < 100 Ω; > 100 kΩ to 221 kΩ	-
			UXB 0207	100 Ω to 250 kΩ	40.2 Ω to < 100 Ω; > 250 kΩ to 301 kΩ	10 Ω to < 40.2 Ω; > 301 kΩ to 1 MΩ
			UXE 0414	100 Ω to 100 kΩ	22 Ω to < 100 Ω; > 100 kΩ to 511 kΩ	-
4.5	-	Resistance ($\Delta R/R$)		± 0.25 %; ± 0.1 %; ± 0.05 %; ± 0.01 %		
4.8	-	Temperature coefficient	At 20/LCT/20 °C and 20/UCT/20 °C	± 10 ppm/K; ± 05 ppm/K; ± 02 ppm/K		
4.25.1	-	Endurance	Room temperature; $U = \sqrt{P_{70} \times R}$ or $U = U_{max.}$; 1.5 h ON; 0.5 h OFF			
			70 °C; 2000 h	± (0.05 % R + 0.01 Ω)	± (0.05 % R + 0.01 Ω)	± (0.05 % R + 0.01 Ω)
			85 °C; 1000 h	± (0.02 % R + 0.01 Ω)	± (0.03 % R + 0.01 Ω)	± (0.04 % R + 0.01 Ω)
			85 °C; 8000 h	± (0.04 % R + 0.01 Ω)	± (0.06 % R + 0.01 Ω)	± (0.08 % R + 0.01 Ω)
4.25.3	-	Endurance at upper category temperature	125 °C; 1000 h	± (0.04 % R + 0.01 Ω)	± (0.06 % R + 0.01 Ω)	± (0.08 % R + 0.01 Ω)
4.24	78 (Cab)	Damp heat, steady state	(40 ± 2) °C; 56 days; (93 ± 3) % RH	± (0.04 % R + 0.01 Ω)	± (0.05 % R + 0.01 Ω)	± (0.06 % R + 0.01 Ω)

TEST PROCEDURES AND REQUIREMENTS

IEC 60115-1 CLAUSE	IEC 60068-2-xx TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)		
			Stability for product types:			
			UXA 0204	100 Ω to 100 kΩ	22 Ω to < 100 Ω; > 100 kΩ to 221 kΩ	-
			UXB 0207	100 Ω to 250 kΩ	40.2 Ω to < 100 Ω; > 250 kΩ to 301 kΩ	10 Ω to < 40.2 Ω; > 301 kΩ to 1 MΩ
			UXE 0414	100 Ω to 100 kΩ	22 Ω to < 100 Ω; > 100 kΩ to 511 kΩ	-
4.23		Climatic sequence:				
4.23.2	2 (Ba)	Dry heat	125 °C; 16 h			
4.23.3	30 (Db)	Damp heat, cyclic	55 °C; 24 h; 90 % to 100 % RH; 1 cycle			
4.23.4	1 (Aa)	Cold	- 55 °C; 2 h			
4.23.5	13 (M)	Low air pressure	8.5 kPa; 2 h; 15 °C to 35 °C			
4.23.6	30 (Db)	Damp heat, cyclic	55 °C; 5 days; 95 % to 100 % RH; 5 cycles	± (0.04 % R + 0.01 Ω) no visible damage	± (0.05 % R + 0.01 Ω) no visible damage	± (0.06 % R + 0.01 Ω) no visible damage
4.13	-	Short time overload	Room temperature; $U = 2.5 \times \sqrt{P_{70} \times R}$ or $U = 2 \times U_{max.}$; 5 s	± (0.01 % R + 0.01 Ω) no visible damage	± (0.01 % R + 0.01 Ω) no visible damage	± (0.02 % R + 0.01 Ω) no visible damage
4.19	14 (Na)	Rapid change of temperature	30 min at LCT = - 55 °C 30 min at UCT = 125 °C 5 cycles	± (0.01 % R + 0.01 Ω) no visible damage	± (0.01 % R + 0.01 Ω) no visible damage	± (0.02 % R + 0.01 Ω) no visible damage
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol + 23 °C; toothbrush method	Marking legible; no visible damage		
4.18.2	20 (Tb)	Resistance to soldering heat	Unmounted components; (260 ± 3) °C; (10 ± 1) s	± (0.01 % R + 0.01 Ω) no visible damage	± (0.01 % R + 0.01 Ω) no visible damage	± (0.02 % R + 0.01 Ω) no visible damage
4.17	20 (Ta)	Solderability	+ 235 °C; 2 s solder bath method SnPb40	Good tinning (≥ 95 % coverage, no visible damage)		
			+ 245 °C; 3 s solder bath method SnAg3Cu0.5			
4.22	6 (B4)	Vibration	6 h; 10 Hz to 2000 Hz 1.5 mm or 196 m/s^2	± (0.01 % R + 0.01 Ω)	± (0.01 % R + 0.01 Ω)	± (0.02 % R + 0.01 Ω)
4.16	21 (Ua_1) 21 (Ub) 21 (Uc)	Robustness of terminations	Tensile, bending and torsion	± (0.01 % R + 0.01 Ω)	± (0.01 % R + 0.01 Ω)	± (0.02 % R + 0.01 Ω)
4.7	-	Voltage proof	$U_{RMS} = U_{ins}$; 60 s	No flashover or breakdown		

12NC INFORMATION FOR HISTORICAL CODING REFERENCE

- The resistors have a 12-digit Part Number starting with 2312.
- The subsequent 4 digits indicate the resistor type, specification and packaging; see the 12NC Part Number table.
- The remaining 4 digits indicate the resistance value:
  - The first 3 digits indicate the resistance value.
  - The last digit indicates the resistance decade in accordance with the 12NC Indicating Resistance Decade table.

Last Digit of 12NC Indicating Resistance Decade

RESISTANCE DECADE	LAST DIGIT
10 Ω to 99.9 Ω	9
100 Ω to 999 Ω	1
1 kΩ to 9.99 kΩ	2
10 kΩ to 99.9 kΩ	3
100 kΩ to 999 kΩ	4

12NC Example

The Part Number of a UXA 0204 resistor, value 47 kΩ and TCR 10 with ± 0.1 % tolerance, supplied on bandolier in a box of 1000 units is: 2312 662 34703.

12NC PART NUMBER - Resistor type and packaging

DESCRIPTION			2312				
			BANDOLIER IN BOX	BANDOLIER IN BOX	BANDOLIER ON REEL	BANDOLIER ON REEL	BANDOLIER ON REEL
TYPE	TCR	TOL.	CU 100 units	C1 1000 units	R1 1000 units	R2 2500 units	RP 5000 units
UXA 0204	± 10 ppm/K	± 0.25 %	562 2....	662 2....	462 2....	-	-
		± 0.1 %	562 3....	662 3....	462 3....	-	-
		± 0.05 %	562 4....	662 4....	462 4....	-	-
		± 0.01 %	562 7....	662 7....	462 7....	-	-
		(1)	562 91...	662 91...	462 91...	-	-
	± 05 ppm/K	± 0.25 %	563 2....	663 2....	463 2....	-	-
		± 0.1 %	563 3....	663 3....	463 3....	-	-
		± 0.05 %	563 4....	663 4....	463 4....	-	-
		± 0.01 %	563 7....	663 7....	463 7....	-	-
		(1)	563 91...	663 91...	463 91...	-	-
	± 02 ppm/K	± 0.25 %	564 2....	664 2....	464 2....	-	-
		± 0.1 %	564 3....	664 3....	464 3....	-	-
		± 0.05 %	564 4....	664 4....	464 4....	-	-
		± 0.01 %	564 7....	664 7....	464 7....	-	-
		(1)	564 91...	664 91...	464 91...	-	-
UXB 0207	± 10 ppm/K	± 0.25 %	572 2....	672 2....	472 2....	-	577 2....
		± 0.1 %	572 3....	672 3....	472 3....	-	577 3....
		± 0.05 %	572 4....	672 4....	472 4....	-	577 4....
		± 0.01 %	572 7....	672 7....	472 7....	-	577 7....
		(1)	572 91...	672 91...	472 91...	-	577 91...
	± 05 ppm/K	± 0.25 %	573 2....	673 2....	473 2....	-	578 2....
		± 0.1 %	573 3....	673 3....	473 3....	-	578 3....
		± 0.05 %	573 4....	673 4....	473 4....	-	578 4....
		± 0.01 %	573 7....	673 7....	473 7....	-	578 7....
		(1)	573 91...	673 91....	473 91...	-	578 91...
	± 02 ppm/K	± 0.25 %	574 2....	674 2....	474 2....	-	579 2....
		± 0.1 %	574 3....	674 3....	474 3....	-	579 3....
		± 0.05 %	574 4....	674 4....	474 4....	-	579 4....
		± 0.01 %	574 7....	674 7....	474 7....	-	579 7....
		(1)	574 91...	674 91...	474 91...	-	579 91...
UXE 0414	± 10 ppm/K	± 0.1 %	592 3....	692 3....	-	597 3....	-
		± 0.05 %	592 4....	692 4....	-	597 4....	-
		(1)	592 91...	692 91...	-	597 91...	-
	± 05 ppm/K	± 0.1 %	593 3....	693 3....	-	598 3....	-
		± 0.05 %	593 4....	693 4....	-	598 4....	-
		(1)	593 91...	693 91...	-	598 91...	-

Note

(1) Readable 12NC coding of resistance values is restricted to values with three significant digits. For resistance values with more than three significant digits, a non readable sequential number will be issued by the factory for each requested combination of resistance value and tolerance.

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Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001
Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

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Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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