Vitreous Wirewound Resistors with Ferrules

DESIGN SUPPORT TOOLS

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3D Models Available

The GWK series, with completely welded construction, is the perfect choice for high continuous power dissipation up to 260 W with the option for a non-inductive type (GWK Ni). The components of this series are well suited for harsh environments and exhibit a long lifetime. With their high pulse power capabilities, they are an ideal choice for inrush limiters. Typical applications include but are not limited to drive systems, power supplies, frequency inverters, AC and DC filters, and snubber resistors. Specific application requirements (ohmic value, rated power, peak voltage, pulse shape, pulse duration, termination style, and environmental conditions) can be submitted to Vishay for a recommendation of the most suitable product.

FEATURES

RoHS COMPLIANT

HALOGEN FREE

- Excellent pulse load capability
- Non inductive type (Ni) available
- Different caps options:
  - GDK style with different inner threads
  - GZK made from drawn brass, nickel plated
- Easy to change when mounted with spring clips
- Non-flammable and enhanced humidity protection
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Inrush current limiter
- Capacitor charge / discharge
- Snubber resistor
- Brake resistor
- Filter resistor

TECHNICAL SPECIFICATION

TYPE / VARIANT	RATED DISSIPATION P_{40}	RESISTANCE RANGE (1)	RESISTANCE TOLERANCE	OPERATING VOLTAGE $U_{max.}$	TEMPERATURE COEFFICIENT
GWK 10	10 W	1.8 Ω to 16 kΩ	± 10 %	280 V	+100 ppm/K to +180 ppm/K
		6.8 Ω to 16 kΩ	± 5 %		
		270 Ω to 16 kΩ	± 2 %		
GWK 10 Ni	7 W	2.4 Ω to 1 kΩ	± 10 %		
		15 Ω to 1 kΩ	± 5 %		
GWK 20	20 W	2.2 Ω to 27 kΩ	± 10 %	400 V	
		12 Ω to 27 kΩ	± 5 %		
		360 Ω to 27.8 kΩ	± 2 %		
GWK 20 Ni	13 W	4.7 Ω to 1.8 kΩ	± 10 %		
		20 Ω to 1.8 kΩ	± 5 %		
GWK 40	30 W	3.3 Ω to 43 kΩ	± 10 %	580 V	
		12 Ω to 43 kΩ	± 5 %		
		470 Ω to 43 kΩ	± 2 %		
GWK 40 Ni	20 W	6.8 Ω to 2.7 kΩ	± 10 %		
		20 Ω to 2.7 kΩ	± 5 %		
GWK 60	40 W	6.2 Ω to 82 kΩ	± 5 %, ± 10 %	850 V	
		47 Ω to 82 kΩ	± 2 %		
GWK 60 Ni	25 W	13 Ω to 5.1 kΩ	± 5 %, ± 10 %		
GWK 100	80 W	8.2 Ω to 82 kΩ	± 5 %, ± 10 %	1200 V	
		47 Ω to 82 kΩ	± 2 %		
GWK 100 Ni	50 W	27 Ω to 10 kΩ	± 5 %, ± 10 %		
GWK 150	100 W	12 Ω to 110 kΩ	± 5 %, ± 10 %	1600 V	
		30 Ω to 110 kΩ	± 2 %		
GWK 150 Ni	60 W	36 Ω to 15 kΩ	± 5 %, ± 10 %		
GWK 200	160 W	20 Ω to 180 kΩ	± 2 %,± 5 %, ± 10 %	2300 V	
GWK 200 Ni	100 W	56 Ω to 22 kΩ	± 5 %, ± 10 %		
GWK 300	260 W	36 Ω to 330 kΩ	± 2 %,± 5 %, ± 10 %	4000 V	
GWK 300 Ni	180 W	100 Ω to 43 kΩ	± 5 %, ± 10 %		

Notes

- The operating temperature range for these resistors is from -55 °C up to 350 °C

(1) Resistance values are to be selected for ± 10 % from the E12 series, and for ± 5 % and ± 2 % from the E24 series

For technical questions, contact: ww1resistors@vishay.com

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PACKAGING

TYPE	PACKAGING CODE	QUANTITY	FORMAT	DIMENSION OF PACKAGE
All	LX	Variable	Bulk, separately packed with paper	Box size selection according to quantity and product size

PART NUMBER AND PRODUCT DESCRIPTION

Part Number: GWK100J1000KLX000

G	W	K	1	0	0	J	1	0	0	0	K	L	X	0	0	0

TYPE	VARIANT/ TERMINAL	RESISTANCE	TOLERANCE	PACKAGING	SPECIAL
GWK010 = GWK 10 **GWK020** = GWK 20 **GWK040** = GWK 40 **GWK060** = GWK 60 **GWK100** = GWK 100 **GWK150** = GWK 150 **GWK200** = GWK 200 **GWK300** = GWK 300	**I** = GZK **J** = GDK (also known as GDR M4)	**3 digit value** **1 digit multiplier** MULTIPLIER **8** = $*10^{-2}$ **9** = $*10^{-1}$ **0** = $*10^{0}$ **1** = $*10^{1}$ **2** = $*10^{2}$ **3** = $*10^{3}$	**G** = ± 2 % **J** = ± 5 % **K** = ± 10 %	**LX** = loose pack, without quantity	**000** = standard **3 digit code** = customized version (1)

Product Description: GWK100 GDK 100R 10 %

GWK100	GDK	100R	10 %
TYPE	VARIANT / TERMINAL	RESISTANCE	TOLERANCE
GWK10 **GWK20** **GWK40** **GWK60** **GWK100** **GWK150** **GWK200** **GWK300**	**GZK** **GDK**	**1R8** = 1.8 Ω **330K** = 330 kΩ	± **2 %** ± **5 %** ± **10 %**

Notes

- The products can be ordered using either the PRODUCT DESCRIPTION or the PART NUMBER

(1) For special variants, special windings, or the non inductive (GWK Ni) versions, please contact: ww1resistors@vishay.com

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DESCRIPTION

The rugged design and durable coating of vitreous wirewound resistors enables them to withstand extreme environmental stress. For this reason they are well suited for use in demanding environmental conditions. The glaze is fired layer by layer several times at high temperatures (> 600 °C). This vitreous coating is designed for high stability and a long lifetime in humid environments and is resistant to all cleaning chemicals commonly used in the electronic industry.

Production is strictly controlled and follows an extensive set of instructions established for reproducibility. The winding is done with specific materials on a specially developed fine ceramic body (Al_2O_3). The ceramic used meets the highest requirements against mechanical resistance, thermal shock, dielectric strength, and insulation resistance at high temperatures. With different diameters and turn spacings, a large ohmic value range can be offered. The resistors are marked with resistance and tolerance.

The GWK series meets single lot / date code packaging requirements.

MATERIALS

Vishay acknowledges the following systems for the regulation of hazardous substances:

- IEC 62474, Material Declaration for Products of and for the Electrotechnical Industry, with the list of declarable substances given therein (1)
- The Global Automotive Declarable Substance List (GADSL) (2)
- The REACH regulation (1907/2006/EC) and the related list of substances with very high concern (SVHC) (3) for its supply chain

The products do not contain any of the banned substances as per IEC 62474, GADSL, or the SVHC list, see www.vishay.com/how/leadfree.
Hence the products fully comply with the following directives:

- 2000/53/EC End-of-Life Vehicle Directive (ELV) and Annex II (ELV II)
- 2011/65/EU Restriction of the Use of Hazardous Substances Directive (RoHS) with amendment 2015/863/EU
- 2012/19/EU Waste Electrical and Electronic Equipment Directive (WEEE)

Vishay pursues the elimination of conflict minerals from its supply chain, see the Conflict Minerals Policy at www.vishay.com/doc?49037.

ASSEMBLY

The resistors are available with two different termination styles.

The GDK style has machined caps made from brass material CW608N which is plated with nickel. The standard internal thread size is M4 according to DIN 13-1. For custom inner thread sizes, contact: ww1resistors@vishay.com.

The GZK style has termination caps made from drawn brass plated with nickel.

It is easy to install / replace these components with either termination style if they are mounted with spring clips. For details about mounting accessories offered, see the datasheet: www.vishay.com/doc?21015.

For special windings or non-inductive (GWK Ni) versions, please contact: ww1resistors@vishay.com.

3D-Models are available upon request, please contact: ww1resistors@vishay.com.

APPLICATION INFORMATION

The power dissipation of the resistor generates a temperature rise with respect to the ambient. The permissible dissipation is derated for temperatures above 40 °C, as shown in the derating diagram, in order to avoid overheating of the resistor. The heat dissipated from the resistor may affect adjacent components, therefore proper clearance is required in order to avoid overheating.

The resistive wire is hermetically encapsulated. All materials used are non-flammable and inorganic.

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.

RELATED PRODUCTS

In lower continuous power applications and less demanding environmental conditions, a cemented coated alternative like the ZWK series might be suitable. See the datasheet:

“Cemented Wirewound Resistors with Ferrules”
www.vishay.com/doc?21012

For rated dissipation up to 500 W and different terminals, there is the vitreous coated GWS series. See the datasheet:

“Vitreous Wirewound Resistors with Lugs”
www.vishay.com/doc?21003

For low ohmic values and rated dissipation up to 1000 W, there is the vitreous coated GBS series. See the datasheet:

“Vitreous Wirewound Resistor with Corrugated Ribbon”
www.vishay.com/doc?21004

Notes

(1) The IEC 62474 list of declarable substances is maintained in a dedicated database, which is available at http://std.iec.ch/iec62474
(2) The Global Automotive Declarable Substance List (GADSL) is maintained by the American Chemistry Council, and available at www.gadsl.org
(3) The SVHC list is maintained by the European Chemical Agency (ECHA) and available at http://echa.europa.eu/candidate-list-table

For technical questions, contact: ww1resistors@vishay.com

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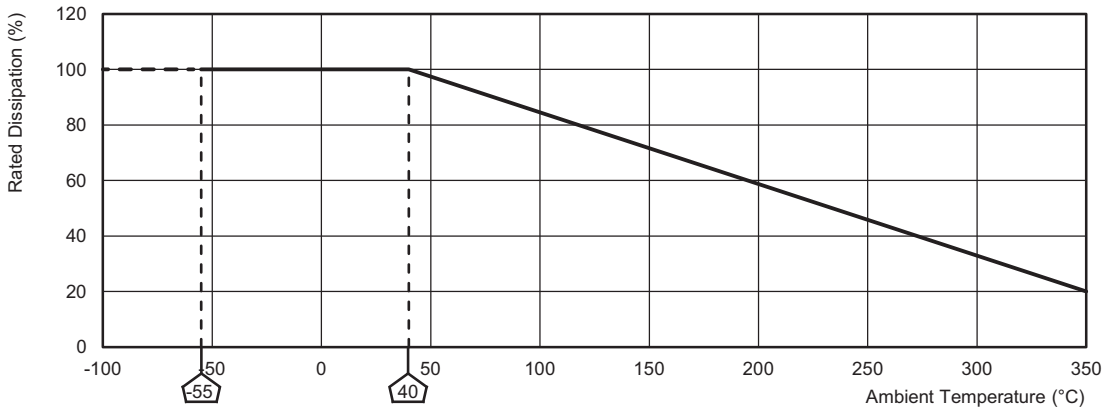
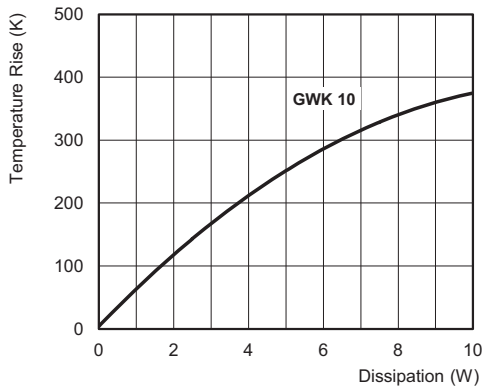
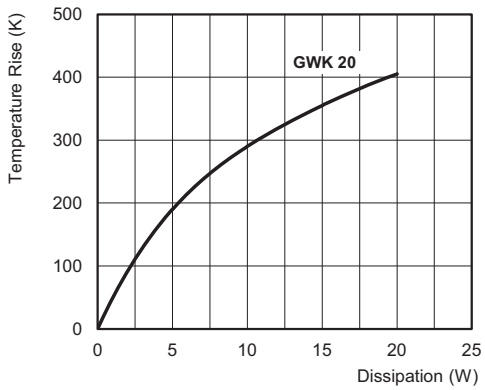
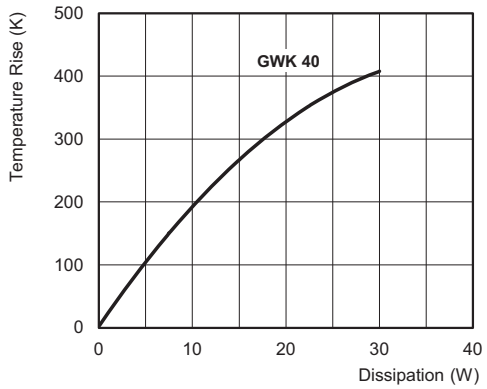
DERATING

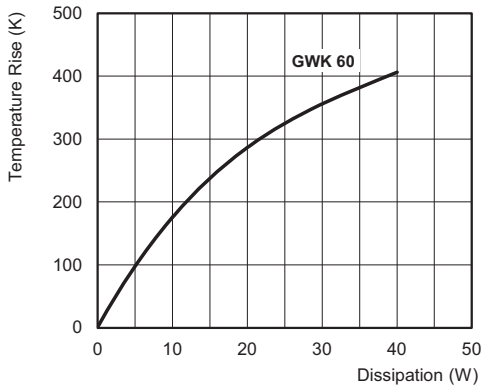


TEMPERATURE RISE









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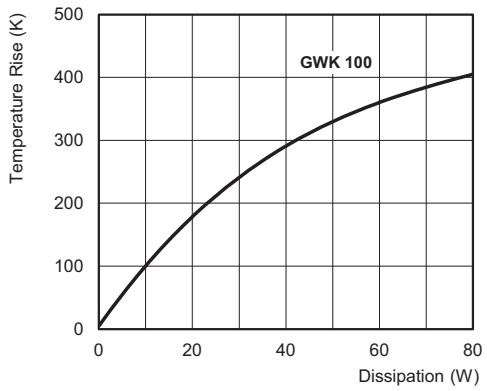
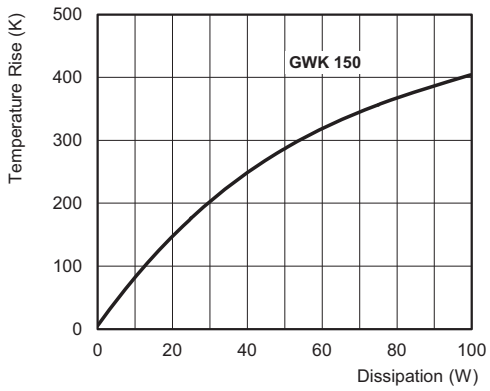
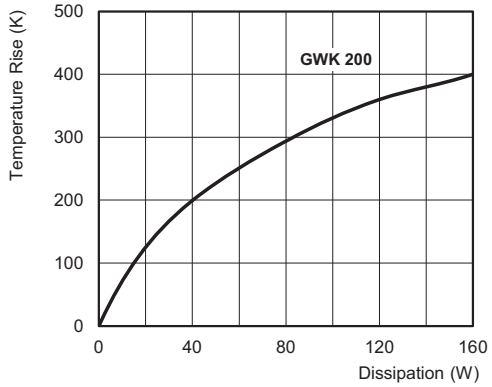
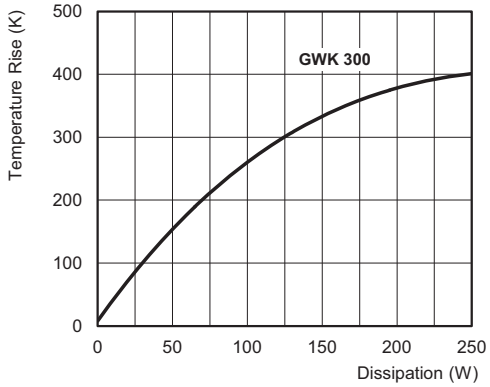
TEMPERATURE RISE









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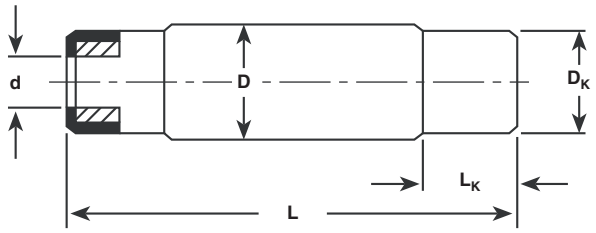
DIMENSIONS AND MASS

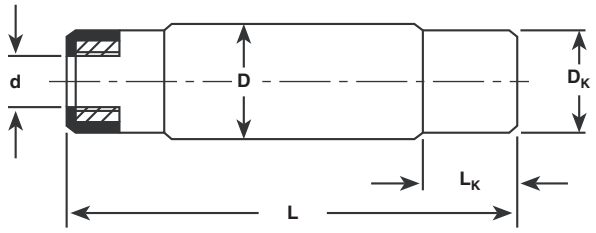
GZK TERMINATION



GWK 20 to GWK 300 with GZK termination (caps made from drawn brass, nickel pated)

TYPE / VARIANT	D (mm)	L (mm)	D_K (mm)	L_K (mm)	d (mm)	MASS (g)
GWK 20 GWK 20 Ni	12.3 ± 0.8	51.0 ± 1.3	11.0	10.0	4.5	10
GWK 40 GWK 40 Ni	15.3 ± 0.8	61.0 ± 1.5	14.0	13.0	5.5	25
GWK 60 GWK 60 Ni	15.3 ± 0.8	81.0 ± 2.0	14.0	13.0	5.5	35
GWK 100 GWK 100 Ni	22.0 ± 1.0	101.0 ± 2.5	21.0	16.0	10.0	85
GWK 150 GWK 150 Ni	22.0 ± 1.0	121.0 ± 3.0	21.0	16.0	10.0	100
GWK 200 GWK 200 Ni	22.0 ± 1.0	166.5 ± 4.2	21.0	16.0	10.0	150
GWK 300 GWK 300 Ni	22.0 ± 1.0	266.5 ± 6.7	21.0	16.0	10.0	250

GDK TERMINATION



GWK 10 to GWK 300 for GDK termination (machined caps with inner thread)

TYPE / VARIANT	D (mm)	L (mm)	D_K (mm)	L_K (mm)	d [1] (mm)	MASS (g)
GWK 10 GWK 10 Ni	7.5 ± 0.8	46.3 ± 1.3	7.0	11.0	M2	7
GWK 20 GWK 20 Ni	12.3 ± 0.8	51.0 ± 1.3	11.0	10.0	M4	15
GWK 40 GWK 40 Ni	15.3 ± 0.8	61.0 ± 1.5	14.0	13.0	M4	30
GWK 60 GWK 60 Ni	15.3 ± 0.8	81.0 ± 2.0	14.0	13.0	M4	35
GWK 100 GWK 100 Ni	22.0 ± 1.0	101.0 ± 2.5	21.0	16.0	M4	90
GWK 150 GWK 150 Ni	22.0 ± 1.0	121.0 ± 3.0	21.0	16.0	M4	100
GWK 200 GWK 200 Ni	22.0 ± 1.0	166.5 ± 4.2	21.0	16.0	M4	150
GWK 300 GWK 300 Ni	22.0 ± 1.0	266.5 ± 6.7	21.0	16.0	M4	250

Note

[1] For special inner threads, please contact: ww1resistors@vishay.com

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PULSE HANDLING FOR SHORT PULSES

For single pulses up to 100 ms duration the following energy resistance chart can be used to calculate the energy a resistor can handle. Look to the resistance value or the next higher value of the model you need and follow this row to the energy per ohm column to the left. The energy per ohm value multiplied by the resistance value is the energy the resistor can handle for pulses less than or equal to 100 ms. This energy divided by 0.1 s is the power the resistor can handle for 100 ms. For the power the resistor can handle for 10 ms divide the energy by 0.01 s. The maximum pulse power is limited at 625 x rated power.

Do not use this chart for GWK Ni styles. For more information and assistance please contact ww1resistors@vishay.com.

ENERGY RESISTANCE CHART

GWK10		GWK 20		GWK 40		GWK 60		GWK 100		GWK 150		GWK 200		GWK 300	
Energy/Ω (Ws/Ω)	*R* (Ω)	Energy/Ω (Ws/Ω)	*R* (Ω)	Energy/Ω (Ws/Ω)	*R* (Ω)	Energy/Ω (Ws/Ω)	*R* (Ω)	Energy/Ω (Ws/Ω)	*R* (Ω)	Energy/Ω (Ws/Ω)	*R* (Ω)	Energy/Ω (Ws/Ω)	*R* (Ω)	Energy/Ω (Ws/Ω)	*R* (Ω)
1.17E - 04	16.0K	1.15E - 04	27.0K	1.15E - 04	43.0K	1.15E - 04	82.0K	2.80E - 04	82.0K	2.80E - 04	110K	2.80E - 04	180K	2.79E - 04	330K
1.17E - 04	13.0K	1.16E - 04	24K	1.15E - 04	36.0K	1.15E - 04	68.0K	2.80E - 04	62.0K	2.80E - 04	82.0K	2.80E - 04	130K	2.80E - 04	240K
1.72E - 04	9.1K	1.70E - 04	16.0K	1.69E - 04	24.0K	1.68E - 04	43.0K	4.41E - 04	43.0K	4.40E - 04	56.0K	4.40E - 04	91.0K	4.40E - 04	160K
2.88E - 04	6.2K	2.83E - 04	11.0K	2.82E - 04	18.0K	2.81E - 04	33.0K	7.52E - 04	30.0K	7.51E - 04	39.0K	7.51E - 04	62.0K	7.50E - 04	120K
4.53E - 04	4.3K	4.47E - 04	7.5K	4.45E - 04	11.0K	4.42E - 04	22.0K	1.20E - 03	22.0K	1.20E - 03	30.0K	1.20E - 03	47.0K	1.20E - 03	82.0K
7.72E - 04	3.0K	7.65E - 04	5.1K	7.58E - 04	8.2K	7.54E - 04	15.0K	1.84E - 03	15.0K	1.83E - 03	20.0K	1.83E - 03	33.0K	1.83E - 03	62.0K
1.24E - 03	2.2K	1.23E - 03	3.9K	1.22E - 03	5.6K	1.21E - 03	11.0K	2.93E - 03	10.0K	2.93E - 03	15.0K	2.93E - 03	22.0K	2.92E - 03	39.0K
1.91E - 03	1.5K	1.87E - 03	2.7K	1.86E - 03	3.9K	1.84E - 03	7.5K	4.53E - 03	3.0K	4.51E - 03	4.3K	4.49E - 03	6.8K	4.48E - 03	12.0K
3.06E - 03	1.1K	3.00E - 03	1.8K	2.98E - 03	2.7K	2.95E - 03	5.1K	7.12E - 03	2.2K	7.09E - 03	3.0K	7.05E - 03	4.7K	7.04E - 03	9.1K
5.05E - 03	330	4.79E - 03	560	4.70E - 03	820	4.58E - 03	1.6K	1.14E - 02	1.6K	1.14E - 02	2.0K	1.13E - 02	3.3K	1.13E - 02	6.2K
8.11E - 03	220	7.61E - 03	390	7.44E - 03	560	7.20E - 03	1.1K	1.85E - 02	1.1K	1.84E - 02	1.5K	1.83E - 02	2.4K	1.83E - 02	4.3K
1.31E - 02	160	1.23E - 02	300	1.19E - 02	430	1.17E - 02	750	2.98E - 02	750	2.97E - 02	1.0K	2.94E - 02	1.6K	2.94E - 02	3.0K
2.06E - 02	110	2.01E - 02	200	1.94E - 02	300	1.89E - 02	560	4.81E - 02	560	4.78E - 02	750	4.75E - 02	1.2K	4.73E - 02	2.2K
3.56E - 02	75	3.24E - 02	150	3.16E - 02	200	3.04E - 02	390	1.14E - 01	390	1.14E - 01	560	7.23E - 02	1.0K	7.20E - 02	1.8K
5.77E - 02	56	5.30E - 02	100	5.10E - 02	150	4.93E - 02	270	1.79E - 01	300	1.78E - 01	390	1.13E - 01	910	1.13E - 01	1.6K
1.34E - 01	43	1.24E - 01	75	1.21E - 01	110	7.49E - 02	220	2.81E - 01	200	2.79E - 01	270	1.77E - 01	620	1.76E - 01	1.1K
2.14E - 01	30	1.98E - 01	51	1.90E - 01	75	1.17E - 01	200	4.81E - 01	150	4.79E - 01	180	2.77E - 01	430	2.76E - 01	750
3.47E - 01	20	3.14E - 01	36	3.00E - 01	56	1.83E - 01	150	7.75E - 01	100	7.69E - 01	130	4.75E - 01	300	4.72E - 01	560
5.96E - 01	15	5.48E - 01	24	5.22E - 01	36	2.88E - 01	100	1.19E + 00	68	1.17E + 00	100	7.62E - 01	220	7.57E - 01	390
9.93E - 01	10	8.86E - 01	18	8.41E - 01	27	4.96E - 01	68	1.87E + 00	51	1.85E + 00	68	1.17E + 00	150	1.16E + 00	270
1.54E + 00	7.5	1.38E + 00	13	1.29E + 00	20	7.98E - 01	51	2.92E + 00	36	2.89E + 00	47	1.83E + 00	110	1.81E + 00	200
2.52E + 00	5.1	2.21E + 00	9.1	2.05E + 00	15	1.23E + 00	36	4.61E + 00	27	4.56E + 00	36	2.85E + 00	82	2.82E + 00	150
4.00E + 00	3.9	3.48E + 00	6.8	3.26E + 00	10	1.93E + 00	27	7.46E + 00	18	7.36E + 00	24	4.50E + 00	56	4.45E + 00	100
6.58E + 00	2.7	5.64E + 00	4.7	5.26E + 00	6.8	3.05E + 00	18	1.21E + 01	12	1.19E + 01	18	7.24E + 00	39	7.16E + 00	68
1.12E + 01	1.8	9.11E + 00	3.6	8.50E + 00	5.1	4.84E + 00	13	1.97E + 01	8.2	1.93E + 01	12	1.17E + 01	27	1.15E + 01	51
		1.56E + 01	2.2	1.42E + 01	3.3	7.86E + 00	9.1					1.89E + 01	20	1.86E + 01	36
						1.29E + 01	6.2								

For technical questions, contact: ww1resistors@vishay.com

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