# Vitreous Wirewound Resistors with Corrugated Ribbon

## FEATURES

- High power rating up to 1000 W
- Excellent pulse load capability
- Low ohmic values
- Adjustable type (E) available
- Corrugated ribbon construction aids rapid cooling
- Non-flammable and enhanced humidity protection
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

HALOGEN FREE

The GBS series, with completely welded construction, is the perfect choice for high continuous power dissipation up to 1000 W and is offered with an optional adjustable type. The components of this series are well suited for harsh environments and exhibit a long lifetime. With their high pulse power capability, they are the ideal choice for inrush limiters. Typical applications include but are not limited to drive systems, power supplies, frequency inverters, AC filters, and snubber resistors. Particular requirements can be submitted to a Vishay Draloric application engineer specifying peak voltage, pulse shape, pulse time, and environmental conditions for review.

## APPLICATIONS

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

## TECHNICAL SPECIFICATION

| TYPE | RATED DISSIPATION $P_{40}$ WM50 WM110 | RATED DISSIPATION $P_{40}$ WM10 | RESISTANCE RANGE (1) TCR +650 ppm/K to +750 ppm/K WM10 | RESISTANCE RANGE (1) TCR -10 ppm/K to -80 ppm/K WM50 | RESISTANCE RANGE (1) TCR +100 ppm/K to +180 ppm/K WM110 | RESISTANCE TOLERANCE |
|---|---|---|---|---|---|---|
| **GBS 20/100**<br>**GBS 20/100 E** | 80 W<br>50 W | 50 W | 0.13 Ω to 0.51 Ω | 0.56 Ω to 2.2 Ω | 1.3 Ω to 6.2 Ω | ± 5 %, ± 10 % |
| **GBS 20/165**<br>**GBS 20/165 E** | 160 W<br>100 W | 100 W | 0.27 Ω to 1.0 Ω | 1.1 Ω to 4.7 Ω | 2.4 Ω to 12 Ω | |
| **GBS 20/265**<br>**GBS 20/265 E** | 300 W<br>180 W | 180 W | 0.47 Ω to 1.8 Ω | 2.0 Ω to 7.5 Ω | 4.3 Ω to 22 Ω | |
| **GBS 30/100**<br>**GBS 30/100 E** | 150 W<br>90 W | 90 W | 0.10 Ω to 0.43 Ω | 0.47 Ω to 3.3 Ω | 1.0 Ω to 8.2 Ω | |
| **GBS 30/133**<br>**GBS 30/133 E** | 200 W<br>120 W | 120 W | 0.15 Ω to 0.62 Ω | 0.68 Ω to 5.1 Ω | 1.5 Ω to 12 Ω | |
| **GBS 30/165**<br>**GBS 30/165 E** | 250 W<br>150 W | 150 W | 0.20 Ω to 0.91 Ω | 1.0 Ω to 6.8 Ω | 2.0 Ω to16 Ω | |
| **GBS 30/215**<br>**GBS 30/215 E** | 300 W<br>200 W | 200 W | 0.27 Ω to 1.1 Ω | 1.2 Ω to 9.1 Ω | 2.7 Ω to 24 Ω | |
| **GBS 30/265**<br>**GBS 30/265 E** | 375 W<br>250 W | 250 W | 0.30 Ω to 1.3 Ω | 1.5 Ω to 11 Ω | 3.9 Ω to 27 Ω | |
| **GBS 30/330**<br>**GBS 30/330 E** | 450 W<br>350 W | 350 W | 0.39 Ω to 1.8 Ω | 2.0 Ω to 15 Ω | 5.1 Ω to 36 Ω | |
| **GBS 45/370**<br>**GBS 45/370 E** | 750 W<br>550 W | 550 W | 0.75 Ω to 3.0 Ω | 3.3 Ω to 24 Ω | 8.2 Ω to 56 Ω | |
| **GBS 60/370**<br>**GBS 60/370 E** | 1000 W<br>700 W | 700 W | 0.91 Ω to 3.9 Ω | 4.3 Ω to 33 Ω | 10 Ω to 75 Ω | |

**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 % 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: GBS60AA13750KLX000**

| G | B | S | 6 | 0 | A | A | 1 | 3 | 7 | 5 | 0 | K | L | X | 0 | 0 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| TYPE | VARIANT / TERMINAL | TCR / MATERIAL | RESISTANCE | TOLERANCE | PACKAGING | SPECIAL |
|---|---|---|---|---|---|---|
| **GBS202S** = GBS 20/100<br>**GBS204L** = GBS 20/165<br>**GBS207D** = GBS 20/265<br>**GBS302S** = GBS 30/100<br>**GBS303P** = GBS 30/133<br>**GBS304L** = GBS 30/165<br>**GBS305Z** = GBS 30/215<br>**GBS307D** = GBS 30/265<br>**GBS3096** = GBS 30/330<br>**GBS45AA** = GBS 45/370<br>**GBS60AA** = GBS 60/370 | **0** = neutral<br>**1** = E<br>(adjustable) | **1** = WM 50<br>-10 ppm/K to<br>-80 ppm/K<br>**3** = WM 110<br>100 ppm/K to<br>180 ppm/K<br>**4** = WM 10<br>650 ppm/K to<br>750 ppm/K | **2 digit value**<br>**1 digit multiplier**<br>MULTIPLIER<br>**8** = $*10^{-2}$<br>**9** = $*10^{-1}$<br>**0** = $*10^{0}$ | **J** = ± 5 %<br>**K** = ± 10 % | **LX** =<br>loose pack<br>without<br>quantity | **000** = standard<br>**3 digit code** =<br>customized version |

**Product Description: GBS60/370 E 110 75R 10 %**

| GBS60/370 | E | 110 | 75R | 10 % |
|---|---|---|---|---|
| TYPE | VARIANT / TERMINAL | TCR / MATERIAL | RESISTANCE | TOLERANCE |
| **GBS20/100**<br>**GBS20/165**<br>**GBS20/265**<br>**GBS30/100**<br>**GBS30/133**<br>**GBS30/165**<br>**GBS30/215**<br>**GBS30/265**<br>**GBS30/330**<br>**GBS45/370**<br>**GBS60/370** | Neutral<br>**E** (adjustable) | **50** = WM 50<br>**110** = WM 110<br>**10** = WM 10 | **R10** = 0.1 Ω<br>**75R** = 75 Ω | ± **5 %**<br>± **10 %** |

**Note**

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



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## DESCRIPTION

Vitreous wirewound resistors are best suited for the use in demanding environmental conditions. Their rugged design and durable coatings enable these resistors to withstand extreme environmental stress. The vitreous coating is designed for high stability and a long lifetime in humid environments. The coating 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 meets the highest requirements against mechanical resistance, thermal shocks, dielectric strength, and insulation resistance at high temperatures. With different corrugated ribbons and turn spacings, low ohmic values can be offered. With this construction, rapid cooling is also possible. The glaze is fired layer by layer, several times, at a high temperature (> 600 °C). The resistors are marked with resistance, tolerance, and winding material.

The GBS 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 fitted with lugs for soldering. The terminals of the resistors are completely lead (Pb)-free. The special tin plating used provides compatibility with lead (Pb)-free and lead-containing soldering processes.

Special lugs may be available on request, please inquire at ww1resistors@vishay.com.

3D-Models are available on request, please inquire at ww1resistors@vishay.com.

Different mounting accessories are available for fixing, see the datasheet: www.vishay.com/doc?21015.

The slider of the adjustable type should be only moved after removal of voltage and sufficient loosening of the screw.

## 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, hence proper clearance will be required in order to avoid overheating.

All materials used are non-flammable and inorganic.

These resistors do not features 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 the cement coated alternative, like the ZBS series might be suitable, see the datasheet:

“Cemented Wirewound Resistors with Corrugated Ribbon”
www.vishay.com/doc?21011

For high ohmic values, there is the vitreous coated GWS series, see the datasheet:

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

**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.



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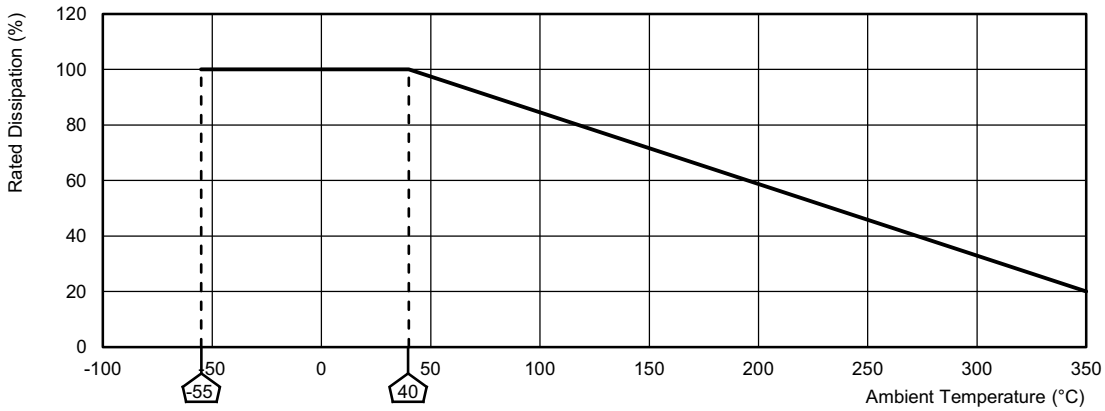
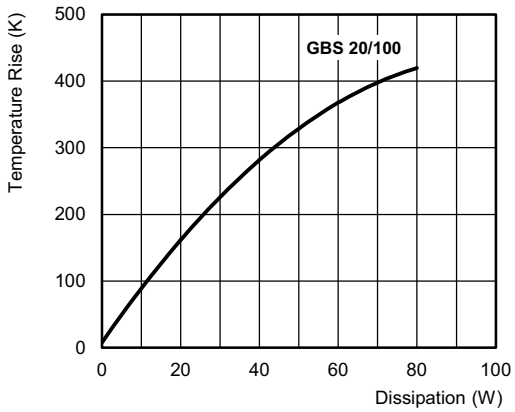
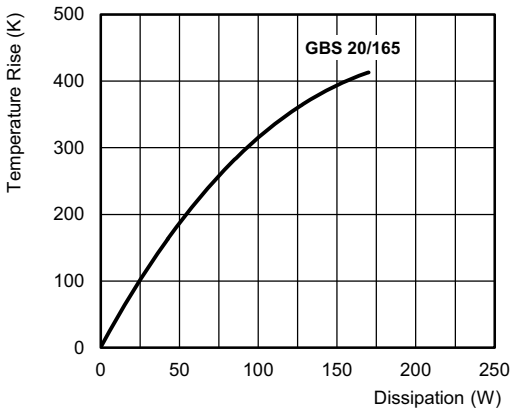
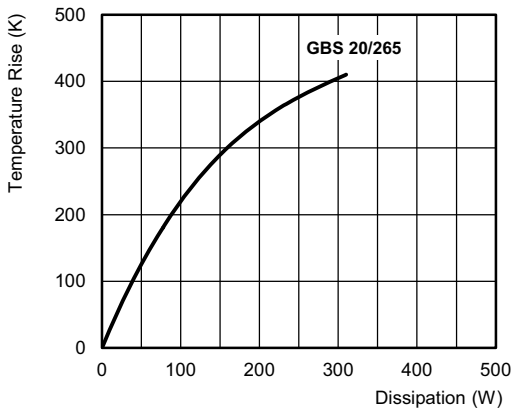
## DERATING

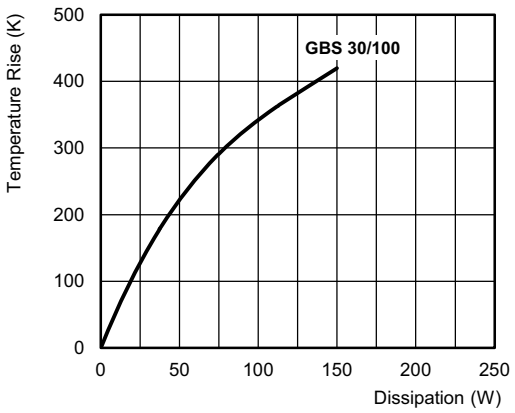



## TEMPERATURE RISE



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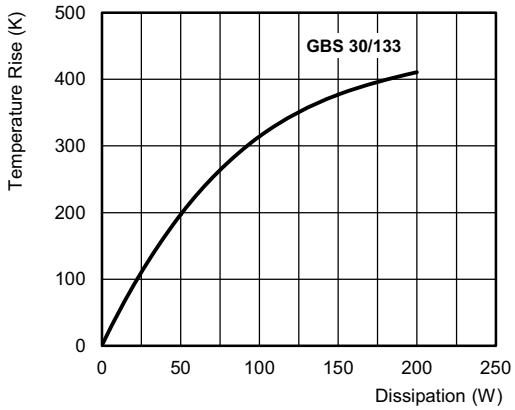


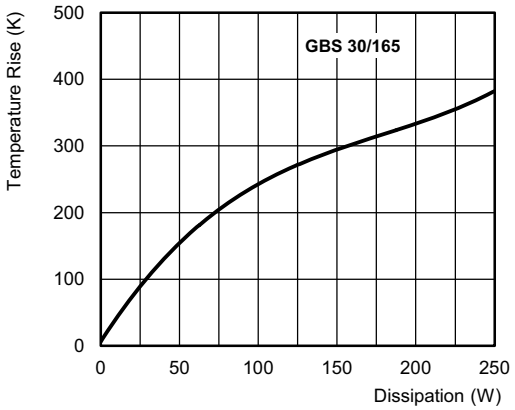


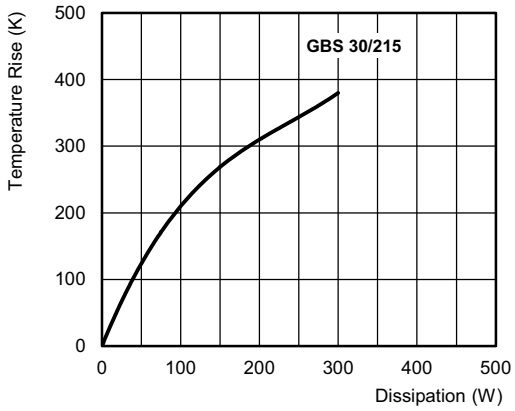


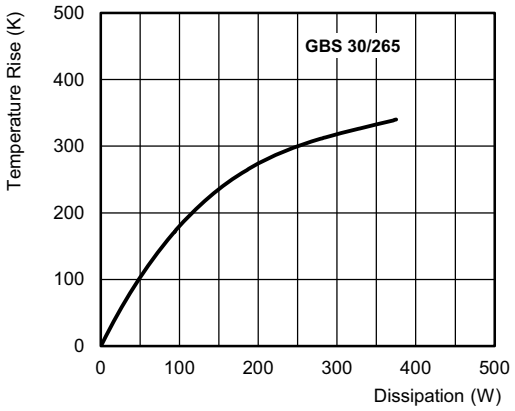


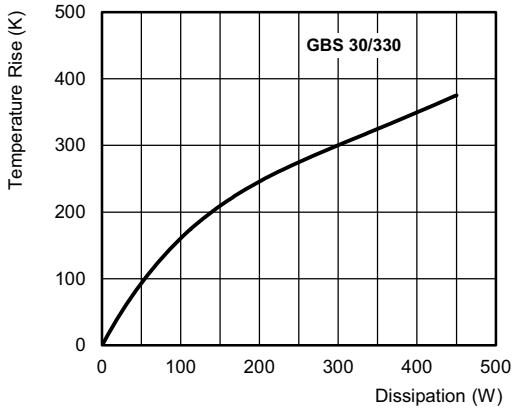


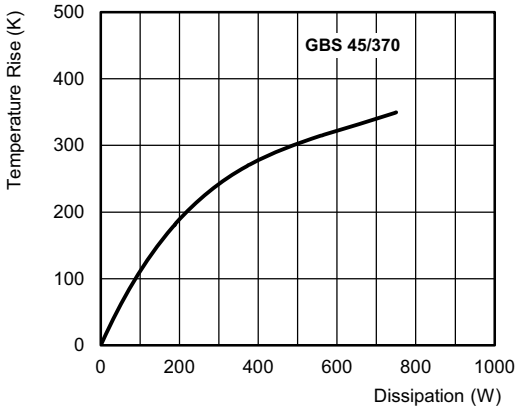




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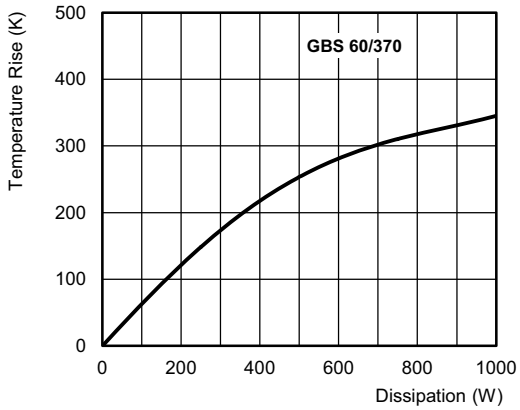
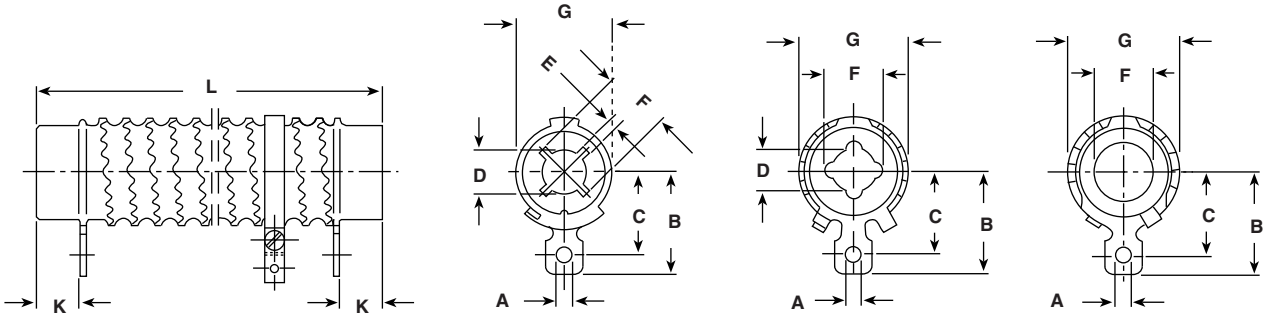



## DIMENSIONS AND MASS




| TYPE / VARIANT | L (mm) | K (mm) | A (mm) | B (mm) | C (mm) | D (mm) | E (mm) | F (mm) | G (mm) | MASS (g) |
|---|---|---|---|---|---|---|---|---|---|---|
| **GBS 20/100 GBS 20/100 E** | 100.0 ± 2.5 | 15.0 | 4.2 | 26.5 | 22.0 | 10.0 | 1.5 | 14.0 | 24.0 | 100 |
| **GBS 20/165 GBS 20/165 E** | 165.0 ± 4.0 | 15.0 | 4.2 | 26.5 | 22.0 | 10.0 | 1.5 | 14.0 | 24.0 | 150 |
| **GBS 20/265 GBS 20/265 E** | 265.0 ± 6.6 | 15.0 | 4.2 | 26.5 | 22.0 | 10.0 | 1.5 | 14.0 | 24.0 | 250 |
| **GBS 30/100 GBS 30/100 E** | 100.0 ± 2.5 | 15.0 | 5.2 | 34.0 | 28.0 | 14.0 | - | 18.5 | 37.0 ± 1.0 | 200 |
| **GBS 30/133 GBS 30/133 E** | 133.0 ± 3.3 | 15.0 | 5.2 | 34.0 | 28.0 | 14.0 | - | 18.5 | 37.0 ± 1.0 | 250 |
| **GBS 30/165 GBS 30/165 E** | 165.0 ± 4.0 | 15.0 | 5.2 | 34.0 | 28.0 | 14.0 | - | 18.5 | 37.0 ± 1.0 | 300 |
| **GBS 30/215 GBS 30/215 E** | 215.0 ± 5.4 | 15.0 | 5.2 | 34.0 | 28.0 | 14.0 | - | 18.5 | 37.0 ± 1.0 | 400 |
| **GBS 30/265 GBS 30/265 E** | 265.0 ± 6.6 | 15.0 | 5.2 | 34.0 | 28.0 | 14.0 | - | 18.5 | 37.0 ± 1.0 | 500 |
| **GBS 30/330 GBS 30/330 E** | 330.0 ± 8.0 | 15.0 | 5.2 | 34.0 | 28.0 | 14.0 | - | 18.5 | 37.0 ± 1.0 | 600 |
| **GBS 45/370 GBS 45/370 E** | 370.0 ± 9.0 | 15.0 | 5.2 | 42.5 | 37.0 | - | - | 30.0 | 52.0 ± 1.0 | 1000 |
| **GBS 60/370 GBS 60/370 E** | 370.0 ± 9.0 | 15.0 | 5.2 | 51.5 | 45.5 | - | - | 45.0 | 67.0 ± 1.0 | 1200 |



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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.**

Стандарт Электрон Связь

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Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

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С нами вы становитесь еще успешнее!

**Наши контакты:**

**Телефон:** +7 812 627 14 35

**Электронная почта:** sales@st-electron.ru

**Адрес:** 198099, Санкт-Петербург,
Промышленная ул, дом № 19, литера Н,
помещение 100-Н Офис 331