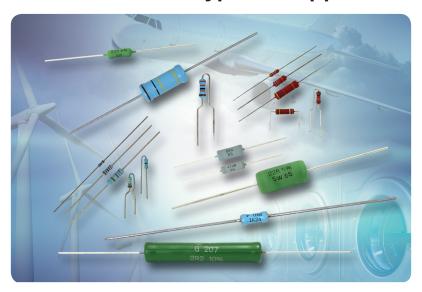


Vishay Draloric / Beyschlag

Vishay Draloric / Beyschlag Leaded Resistor Solutions for All Types of Applications



KEY BENEFITS

- Broad portfolio
- High performance products
- Application-specific product range

FEATURES

- Resistor solutions for application-specific requirements, such as:
 - High pulse load
 - High voltage
 - High power
 - High reliability
 - High frequency
 - Fusible

RESOURCES

- For technical questions contact: filmresistorsleaded@vishay.com, ww1resistors@vishay.com, ww1resistors@vishay.com,
- Sales contacts: www.vishay.com/doc?99914





Vishay Draloric / Beyschlag

Accuracy Classification

General	Standard (e.g. TCR 100 / 5 %)	Professional (e.g. TCR 50 / 1 %)	Precision (e.g. TCR 15 / 0.1 %)	Ultra Precision (e.g. TCR 5 / 0.01 %)	Jumper
Metal Film (pp. 3 to 7)	SFR16 SFR25 SFR25H CCF07 CCF55	MBA/SMA 0204 MBB/SMA 0207 MBE/SMA 0414 MRS16 MRS25	MBA/SMA 0204 MBB/SMA 0207 MBE/SMA 0414	UXA UXB UXE MPR24	MBA/SMA 0204 MBB/SMA 0207 MBE/SMA 0414
Carbon Film (p. 8)	LCA				
Wirewound (pp. 10 to 12)	Z300-C00	AC	PAC Z300-C00		DBU

Resistor Solutions for Specific Application Requirements

Application-Specific	High Pulse Load	High Power / High Temperature	High Voltage	High Reliability	Fusible
Metal Film (pp. 3 to 7)	PR02-FS	PR01 PR02 PR03	HVR25 HVR37	MBA/SMA 0204 VG06 MBB/SMA 0207 VG06 MBE/SMA 0414 VG06	NFR25 NFR25H PR02-FS
Carbon Film (p. 8)	CBB 0207				
Metal Glaze (p. 8)			VR25 VR37 VR68		
Metal Oxide (p. 9)		WK2 WR4 WR5 WK8			
Wirewound (pp. 10 to 12)	Z300-Cxx	G200			AC01-CS AC03-CS AC05-CS

Application-Specific	Lamp Resistor	Non-Inductive	Fully Green	AEC-Q200 Qualified	High Frequency
Metal Film (pp. 3 to 7)	PR02L PR02.5L PR02.5LS	PR02-FS	MBA/SMA 0204 MBB/SMA 0207 MBE/SMA 0414	MBA/SMA 0204 MBB/SMA 0207 MBE/SMA 0414 PR01 PR02	MBA/SMA 0204 HF
Metal Glaze (p. 8)				VR25	
Wirewound (pp. 10 to 12)		AC-NI		AC-AT	



Vishay Draloric / Beyschlag

Metal Film Resistors	S					
Product	Model	Power (W)	Resistance Range	TCR ppm/°C	Tolerance (%)	Features
SFR Standard	SFR16S	0.5	1 Ω to 3 MΩ 4.99 Ω to 3 MΩ		± 5	Good long term stability due to metal film tochnology
			4.00 12 to 0 WILZ		± 1	technology High power rating: 0.5 W in 0204 (SFR16S)
ggt	SFR25	0.4	0.22 Ω to 10 MΩ	± 100	± 5	and 0207 (SFR25H) sizes • High power rating: 0.5 W in 0207 (CCF07,
/			1 Ω to 10 MΩ	± 250	± 1	CCF55) sizeHigh operating voltage:
	SFR25H	0.5	0.22 Ω to 10 MΩ		± 5	350 V (SFR25H) • Wide resistance range from 0.22 Ω to 10 MΩ
	01112011	0.5	1 Ω to 10 MΩ		± 1	Flame-retardant epoxy conformal coating
Standard Standard	CCF07	0.25 / 0.50	10 Ω to 1 MΩ 1.1 MΩ to 2 MΩ	± 100 ± 250	±2/±5 ±5	 Good long term stability due to metal film technology High power rating: 0.5 W in 0204 (SFR16S) and 0207 (SFR25H) size High power rating:
	CCF55	0.25 / 0.50	10 Ω to 3.01 MΩ	± 100	± 1	 0.5 W in 0207 (CCF07, CCF55) size High operating voltage: 350 V (SFR25H) Wide resistance range from 0.22 Ω to 10 MΩ Flame-retardant epoxy conformal coating
PR01 / 02 / 03 High Power /	PR01 AEC-Q200	0.6 1	0.22 Ω to 1 Ω 1 Ω to 1 MΩ	± 250 ± 250	±5 ±1/±5	High power rating:
High Temperature	PR02 AEC-Q200	1.2 2	0.33 Ω to 1 Ω 1 Ω to 1 MΩ	± 250 ± 250	± 5 ± 1 / ± 5	1 W in 0207 (PR01) size, 3 W for PR03 • High maximum operating
	PR03	1.6 3	0.68 Ω to 1 Ω 1 Ω to 1 MΩ	± 250 ± 250	± 5 ± 1 / ± 5	temperature: +200 °C • AEC-Q200 qualified (PR01,
	PR01 double kink	0.6 1	0.22 Ω to 1 Ω 1 Ω to 1 ΜΩ	± 250 ± 250	± 5 ± 5 • Non mee	PR02) • Non-flammable lacquer, meets UL 94V0
	PR02 double kink	1.2 2	0.33 Ω to 1 Ω 1 Ω to 1 ΜΩ	± 250 ± 250	± 5 ± 5	requirements FeCu lead wire version available for lower solder spot temperature
	PR03 double kink	1.6 3	0.68 Ω to 1 Ω 1 Ω to 1 ΜΩ	± 250 ± 250	± 5 ± 5	Kinked and radial versions available

SELECTOR GUIDE



Metal Film Resistors	S					
Product	Model	Power (W)	Resistance Range	TCR ppm/°C	Tolerance (%)	Features
PR02-FS High Pulse, Fusible, Non-Inductive, Flameproof	PR02-FS	2 W	1 Ω to 100 Ω	± 250	± 10 ± 20	 Defined fusing behavior Inherent non-inductive design High power rating: 2 W in 0411 size High maximum operating temperature: +200 °C Meets UL1412 safety requirements Non-flammable lacquer, meets UL 94V0 requirements Superior surge handling capability > 600 V (1.2 / 50 µs pulse) Radial version is available
HVR25 / HVR37 High Voltage	HVR25	0.25	100 KΩ to 10 MΩ 100 KΩ to 10 MΩ	± 200	± 5 ± 1	 Special resistive metal film for high voltage handling High pulse load capability (up to 10 kV) Meets pulse handling and safety requirements under
	HVR37	0.5	100 KΩ to 10 MΩ 100 KΩ to 10 MΩ	± 200	± 5 ± 1	Clause 14.1.a: IEC 60065, EN 60065 (no formal safety approval certificate) Lower cost alternative to VR25, VR37
UXx Ultra Precision	UXA 0204	0.1	22 Ω to 221 KΩ	± 10, ± 5 ± 2	± 0.25 / ± 0.1	
	UXB 0207	0.25	10 Ω to 1 MΩ	± 10, ± 5 ± 2	± 0.05 / ± 0.01	TCR down to 2 ppm/K – tolerance down to 0.01 %
	UXE 0414	0.5	22 Ω to 511 KΩ	± 10, ± 5	± 0.1 / ± 0.05	Excellent long term stability due to advanced
MPR24 Ultra Precision	MPR24	0.125	4.99 Ω to 1 MΩ	± 25, ± 15	± 0.05 / ± 0.02 / ± 0.01	metal film technology: < 0.02 % (1000 h) • Wide resistance range from 10 Ω to 1 MΩ (UXB
	IVIF N24	0.25	4.55 1/ to 1 MI	± 10, ± 5	± 0.5 / ± 0.25 / ± 0.1	0207)
MBA/SMA HF High Frequency	MBA/SMA 0204 HF	0.25 / 0.4	1.5 Ω to 470 Ω	± 50	±2/±1	 Specialty product for RF applications Low inductance, non-helical trimmed product Suitable for more than 3 GHz



Metal Film Resistors	S					
Product	Model	Power (W)	Resistance Range	TCR ppm/°C	Tolerance (%)	Features
MBx/SMA Professional	MBA/SMA 0204	0.25 / 0.4	0.22 Ω to 10 MΩ	± 50, ± 25		Very good long term stability due to advanced metal film technology: < 0.25 % (1000 h) High power rating: 0.6 W in 0207 (MBB/SMA 0207)
	MBB/SMA 0207	0.4 / 0.6	0.22 Ω to 22 MΩ	± 50, ± 25	±5/±1/ ±0.5	 size High operating voltage: 350 V (MBB/SMA 0207) Wide resistance range from 0.22 Ω to 22 MΩ, 0 Ω AEC-Q200 qualified Available as IECQ-CECC version, approved acc. to
€ AEC-Q200	MBE/SMA 0414	0.65 / 1.0	0.22 Ω to 22 MΩ	± 50, ± 25		 EN140101-806 Lead wire bending options available Lead wire material options available for MBA/SMA 0201 (Ni, NiSn, Fe, CuAg)
MBx/SMA Precision	MBA/SMA 0204	0.07 / 0.25	0.22 Ω to 332 kΩ	± 25, ± 15		TCR down to 15 ppm/K – tolerance down to 0.1 % Excellent long term stability due to advanced metal film technology: < 0.03 % (1000 h)
	MBB/SMA 0207	0.11 / 0.4	10 Ω to 1 MΩ	± 25, ± 15	± 0.25, ± 0.1	 High power rating: 0.6 W in 0207 (MBB/SMA 0207) size High operating voltage: 350 V (MBB/SMA 0207) Wide resistance range from 10 Ω to 1 MΩ (MBB/SMA 0207) AEC-Q200 qualified Available as IECQ-CECC version, approved acc. to EN140101-806 Lead wire bending options available
€ AEC-Q200	MBE/SMA 0414	0.17 / 0.65	22 Ω to 1.5 MΩ	± 25, ± 15		



Metal Film Resistor	s					
Product	Model	Power (W)	Resistance Range	TCR ppm/°C	Tolerance (%)	Features
MBx/SMA VG06 High Reliability	MBA/SMA 0204 VG06	0.4	1 Ω to 5.11 MΩ	± 50, ± 15	± 1 / ± 0.1	
Authorized States	MBB/SMA 0207 VG06	0.6	1 Ω to 10 MΩ	± 50, ± 15	± 1 / ± 0.1	 IECQ-CECC approved to EN 140101-806, version E Established reliability, failure rate level E7
•	MBE/SMA 0414 VG06	1	1 Ω to 21.5 MΩ	± 50, ± 15	± 1 / ± 0.1	
MRS Professional	MRS16	0.4	4.99 Ω to 1 MΩ			 Very good long term stability due to advanced metal film technology: 0.25 % (1000 h) High power rating: 0.6 W in 0207 size
	MRS25	0.6	1 Ω to 1 MΩ	± 50	±1	 High operating voltage: 350 V (MBB/SMA 0207) Wide resistance range from 0.22 Ω to 22 MΩ, 0 Ω Lead wire bending options available
NFR25 / NFR25H Fusible	NFR25	0.33		Refer to		 Performs dual functions: current limiting resistor under normal conditions, fuse under overload conditions
	NFR25H 0	0.5	0.22 Ω to 15 kΩ	Refer to datasheet	± 5	 Overload protection without risk of fire due to non-flammable coating Cost effective compared to combination of resistor + glass fuse
PRL Lamp Resistor	PR02L	2				High stability during lamp ignitions
	PR2.5L	2.5	2 kΩ to 70 kΩ	± 250	± 5	Suitable for high temperature operations
	PR2.5LS	2.5				(600 °C)



Carbon Film Resistors									
Product	Model	Power (W)	Resistance Range	TCR ppm/°C	Tolerance (%)	Features			
CBB High Pulse Load	CBB 0207	0.6	10 Ω to 1.5 MΩ	-250*	± 2	Excellent pulse load capability due to carbon film: up to 6 kV or 140 W Small 0207 size High power rating: 0.6 W High operating voltage: 350 V			
LCA Standard	LCA0207	0.35	0.22 Ω to 5.1 MΩ	200*	±2/±5	Better pulse load stability due to carbon film			
	LCA0414	0.6	0.22 Ω to 10 MΩ	-200*	± 2 / ± 5	technology • Wide resistance range from 0.22 Ω to 10 MΩ			

^{*}Note: The TCR mentioned is applicable for most of the ohmic range. For specific details and TCR, refer to product datasheet.

Metal Glaze Resisto	Metal Glaze Resistors								
Product	Model	Power (W)	Resistance Range	TCR ppm/°C	Tolerance (%)	Features			
VRxx High Voltage	VR25, AEC-Q200	0.25	100 kΩ to 22 MΩ	± 200	±1/±5/ ±10	 Very high operating voltage: 1600 V in 0207 (VR25), 10 kV for VR68 High pulse load 			
	VR37, AEC-Q200	0.5	100 kΩ to 33 MΩ	± 200	±1/±5	capability up to 10 kV Resistance value up to 68 MΩ AEC-Q200 qualified (VR25, VR37)			
	VR68,	1	100 kΩ to 68 MΩ	± 200	±1/±5	 Compliance to safety requirements of IEC 60065, EN 60065; VDE 0860; UL1676; CQC (VR37, VR68) 			



Metal Oxide Resistors									
Product	Model	Power (W)	Resistance Range	TCR ppm/°C	Tolerance (%)	Features			
WK / WR High Power / High Temperature	WK2, AEC-Q200	1	0.22 Ω to 1 MΩ	± 50 / ± 100 / ± 200	±1/±2/ ±5	 High power rating: 1 W in 0207 (WK2) size, 4 W for WK8 High operating voltage: 500 V (WK2), 750 W for WK8 High maximum operating temperature: +200 °C AEC-Q200 qualified (WK2) Excellent pulse load rating due to metal 			
	WR4, AEC-Q200	2	0.33 Ω to 1 MΩ						
	WR5	3	0.22 Ω to 560 kΩ	± 200	±2/±5				
	WK8	4	0.22 Ω to 100 kΩ			oxide film Non-flammable lacquer			



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Product	Model	Power (W)	Resistance Range	TCR (ppm/K)*	Tolerance (%)*	Features
AC, AC-AT Professional,	AC 01, AC01-AT	1 W	0.1 Ω to 2.4 kΩ			
Non-Inductive	AC 03, AC03-AT	3 W	0.1 Ω to 5.1 kΩ			High power dissipation in small sizeHigh pulse energy
	AC 04, AC04-AT	4 W	0.10 Ω to 6.8 kΩ	- 10 80 /	. 5	handling Non-flammable
	AC 05, AC05-AT	5 W	0.10 Ω to 10 kΩ	100180	± 5	cement coatingNon-inductive design available
AEC-Q200	AC 07, AC07-AT	7 W	0.10 Ω to 15 kΩ			 Radial and Z-bend terminations available
	AC 10, AC10-AT	10 W	0.68 Ω to 27 kΩ			
PAC Precision	PAC 01	1 W	0.10 Ω to 2.2 kΩ		± 1	 High power dissipation in small size TCR = ± 100 ppm/K; 1 % tolerance Non-flammable cement coating Higher temperature derating, 275 °C Radial and kinked lead forming available
	PAC 02	2 W	0.10 Ω to 3.6 kΩ			
	PAC 03	3 W	0.10 Ω to 4.7 kΩ	± 100		
	PAC 04	4 W	0.10 Ω to 8.2 kΩ			
	PAC 05	5 W	0.10 Ω to 10 kΩ			
	PAC 06	6 W	0.10 Ω to 12 kΩ			
<u>Z300</u>	Z301	1 W	0.30 Ω to 2 kΩ		±5/±10	
Professional and Precision	ZDA0411	2 W	0.47 Ω to 4.3 kΩ on request		±5/±10 ±1/±2	High power dissipation
	Z302	3 W	0.10 Ω to 3.3 kΩ 0.22 Ω to 510 Ω		±5/±10 ±1/±2	in small size High pulse energy handling
	Z303	4 W	0.10 Ω to 3.9 kΩ 1 Ω to 1 kΩ	-1080 / 100180	±5/±10 ±1/±2	Non-flammable cement coating
	Z305	6 W	1 Ω to 2.4 kΩ 1.2 Ω to 2.4 kΩ	100180	±5/±10 ±1/±2	Non-inductive design availableRadial and Z-bend
	Z306	8 W	0.10 Ω to 16 kΩ 1 Ω to 4.7 kΩ		±5/±10 ±1/±2	terminations available
	Z307	10 W	0.20 Ω to 30 kΩ 1 Ω to 8.2 kΩ		±5/±10 ±1/±2	

Note: E = adjustable — Ni = non-inductive

^{*} Ohmic values are not available in all tolerances and TC values. For more details, refer to datasheets at www.vishay.com or contact your local sales office.



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Wirewound Resistor	rs					
Product	Model	Power (W)	Resistance Range	TCR (ppm/K)*	Tolerance (%)*	Features
Z300-C00 Standard	Z301-C00	1 W	0.30 Ω to 2 kΩ			
Standard	ZDA0411-C00	2 W	0.47 Ω to 4.3 kΩ			Non-flammable cement coating
	Z302-C00	3 W	0.22 Ω to 3.3 kΩ	000	. 10 / . 5	High power
	Z303-C00	4 W	0.47 Ω to 3.9 kΩ	200	± 10 / ± 5	dissipation in small size
	Z304-C00	5 W	0.62 Ω to 5.6 kΩ			 Radial and Z-bend termination
	Z305-C00	6 W	0.15 Ω to 10 kΩ			
Z300-Cxx High Pulse Load	Z301-C	1 W	0.30 Ω to 2 kΩ			High surge voltage
rigii Puise Load	ZDA0411-C	2 W	0.47 Ω to 4.3 kΩ			handling (up to 12 kV; 1.2 / 50 µs pulse) Non-flammable cement coating
15	Z302-C	3 W	0.22 Ω to 3.3 kΩ	200	. 40 / . 5	
	Z303-C	4 W	0.47 Ω to 3.9 kΩ		± 10 / ± 5	High power dissipation
	Z304-C	5 W	0.62 Ω to 5.6 kΩ			in small size Radial and Z-bend
	Z305-C	6 W	0.15 Ω to 10 kΩ			terminations
G200 High Power /	G202	4 W	0.10 Ω to 10 kΩ			High power rating up
High Temperature	G204	7 W	0.10 Ω to 39 kΩ	100 to 180	± 10 / ± 5 /	to 17 W • Humidity protection by vitreous coating
Ma.	G206	13 W	0.15 Ω to 68 kΩ	100 to 100	± 2	IECQ-CECC qualified versions available:
•	G207	17 W	0.20 Ω to 120 kΩ			FDG, FDK, FDP
Safety Resistor ACCS Fusible	AC01CS	1 W	3 Ω to 100 Ω			UL1412-recognized fusible wirewound
Fusible	AC03CS	3 W	4.7 Ω to 100 Ω	200	± 5	resistor High surge handling capability, up to 6 kV Safe and silent fusing
	AC05CS	5 W	10 Ω to 100 Ω			

Note: E = adjustable - Ni = non-inductive

^{*} Ohmic values are not available in all tolerances and TC values. For more details, refer to datasheets at www.vishay.com or contact your local sales office.



Jumper Resistors						
Product	Model	Power (W)	Resistance Range	TCR ppm/°C	Tolerance (%)	Features
<u>DB.U</u>	DB1U	N/A	0.006 Ω max.	N/A	N/A	 High operating current: 5 A, 8 A, 12 A Low resistance: 6 mΩ, 4.5 mΩ, 2.5 mΩ Suitable for automatic insertion Radial version available
	DB2U		0.0045 Ω max.			
	DB4U		0.0025 Ω max.			



Vishay Draloric / Beyschlag

Vishay Intertechnology – A Global Industry Leader

Vishay Intertechnology components are used in virtually all types of electronic devices and equipment, in the industrial, computing, automotive, consumer, telecommunications, military, aerospace, power supplies, and medical markets. Vishay has manufacturing plants in the Americas, Asia, Europe, and Israel, as well as sales offices worldwide. Vishay Intertechnology has a diverse portfolio of semiconductors and passive components, including diodes, MOSFETs (metal-oxide semiconductor field-effect transistors), optoelectronic products, selected integrated circuits (ICs), resistors, inductors, and capacitors. This enables it to provide "one-stop shop" service and offer many different parts for each customer design. Its innovations in technology, successful acquisition strategy, superior product quality, and "one-stop shop" service to customers have made the Company a global industry leader.

www.vishay.com

The most important manufacturers of fixed film resistors are the Vishay Draloric, Vishay Beyschlag, and Vishay BCcomponents brands.

About Draloric

In 1900, in Germany, Mr. Philip Rosenthal, as a sideline to his established business of porcelain tableware, started to manufacture ceramics for electronic applications. Starting in 1910, these were also made in Selb, Germany. In 1936, this electronic ceramics activity was separated from Rosenthal AG and made part of a joint venture with AEG named Rosenthal Isolatoren GmbH, or "RIG."

The RIG name lasted until 1974, when AEG took over all of RIG and renamed it "CRL" because of its portfolio of passive components. The name was changed again in 1974 to Draloric Electronic GmbH. With the acquisition of Draloric Electronic GmbH by the electronics division of Corning Glass Works in 1981, the name was changed to Corning-Draloric, which lasted until its acquisition by Vishay Intertechnology in 1987.

Vishay Draloric is a leading brand for MELF resistors and ceramic capacitor products. The Vishay Draloric product portfolio also includes thin film flat chip resistors, leaded film and wirewound resistors, and large ceramic power capacitors. As part of Vishay Intertechnology, Draloric Electronic has had production sites in Israel since 1989, and in the Czech Republic since 1991.

Draloric competitors Roederstein GmbH (resistors and capacitors), and Vitramon GmbH (capacitors only) were acquired by Vishay Intertechnology in 1993 and 1994, respectively, and merged with Draloric Electronic GmbH, which has its headquarters in Selb. Since then, the

name Vishay Draloric has been used as a brand name for resistor products.

Visit us at:

www.vishay.com/company/brands/draloric/

About Beyschlag

A look back into the history of the company shows a solid business based on natural growth. From the moment the company was founded in 1931, the customer has always come first. At the time, Dr. Bernhard Beyschlag started producing rectifiers in Berlin, Germany to meet the growing needs of the new radio industry. Soon, carbon film resistors were in production. The company spent periods in Hitzacker and Westerland on the Island of Sylt before finally relocating to Heide in 1974. From the early 1970s, Beyschlag belonged to Philips Components, until 1999, when Philips divested itself of its passive components business to allow the foundation of BCcomponents. In 2002, BCcomponents was bought by Vishay.

For more than 80 years, Beyschlag has stood for expertise in thin film technology, continuous innovation, excellence in service and logistics and customer-oriented solutions.

Visit us at:

www.vishay.com/company/brands/beyschlag/

About BCcomponents

BCcomponents (Beyschlag Centralab components), a leading manufacturer of passive electronic components, emerged from Philips Electronics Components division in January 1999. Building upon the tradition of excellence associated with Beyschlag, Philips, and Centralab, BCcomponents carried out, in close cooperation with customers, a continuous process of product innovation and improvement. This tradition of excellence included the development of several products that have become industry standards, such as SMD Mini-MELF resistors (branded Vishay Beyschlag) and a range of aluminum capacitors with industry-leading temperature capabilities. BCcomponents earned the status of preferred supplier to many of the world's leading electronics companies.

Vishay acquired BCcomponents in December 2002. The former BCcomponents product portfolio is now divided into Vishay Beyschlag and Vishay BCcomponents. Products branded Vishay Beyschlag include thin film and carbon film MELF resistors, thin film and cermet film chip resistors, and leaded metal film and carbon film resistors. The latest developments include thin film chip arrays, and thin and thick film chip fuses. Products branded Vishay BCcomponents include leaded metal film and metal glaze resistors, non-linear and variable components, and ceramic, aluminum, and film capacitors.

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