

1. Product Overview

The OKLED-KS2DK-1 is an entry-level educational LED kit designed specifically for Key Stage 2 (KS2) students in the UK National Curriculum (ages 7-11, Grades 3-6). This solderless kit provides a safe, hands-on introduction to basic electrical circuits, allowing students to explore series and parallel circuits using pre-welded PCB experiment boards and breadboards.

The kit is part of OptoSupply Easy-Plug Science Boards series, featuring onboard integrated protection to prevent component damage from incorrect wiring. It serves as an ideal foundation for KS2 science curriculum requirements, covering essential topics such as simple circuit construction, switches, batteries, and bulbs.

Designed for classroom use with 2-3 students per kit, the OKLED-KS2DK-1 offers an immediate "light-up" success experience with its pre-welded experiment board, then progresses to breadboard-based activities that build foundational electronics skills. The kit bridges theoretical knowledge with practical investigation, aligning perfectly with the UK National Curriculum Science programme of study for electricity.

2. Safety Compliance & KS2 Curriculum Suitability

Safety Compliance

- 100% solderless design — No soldering required, fully compliant with KS2 safety regulations prohibiting soldering for this age group
- Onboard PCB integrated protection — Prevents component burnout from reversed polarity or overvoltage
- Choking hazard prevention — All components are sized to prevent swallowing hazards ($\geq 5\text{mm}$ diameter)
- Low voltage operation — 4.5V DC maximum, safe for student handling
- Battery box with on/off switch — For controlled power management and safe circuit handling
- RoHS compliant materials — All components meet environmental and safety standards
- Quick-connect terminals — No exposed live parts during normal operation

Curriculum Suitability — Key Stage 2 (Ages 7-11)

This kit aligns with the UK National Curriculum Science requirements for the "Electricity" topic, typically taught in Years 4, 5 and 6. It enables students to:

- Construct simple series circuits with bulbs, switches, and batteries
- Identify and name basic circuit components: cells, wires, bulbs, switches
- Understand that a complete loop is required for a lamp to light
- Recognize how a switch opens and closes a circuit
- Investigate how changing components affects circuit behavior
- Introduce concepts of electrical conductors and insulators
- Provide foundation for Green Tech / Solar energy concepts (extendable with add-on modules)

3. Kit Contents

Packaging: 1 kit per box

Box Dimensions: 200 x 135 x 45mm

4. Material & Technical Features

4.1 5mm Round LED (OSXXXX5A3XA)

4.2 Pre-welded LED Experiment PCB Board (OEB-KS2-EPB01)

- Board material: FR-4 PCB, green solder mask
- Onboard components: 3 LEDs (Red, Yellow, Green) + 330Ω current-limiting resistors
- Protection: Reverse polarity protection, overcurrent protection
- Connection: Quick-connect spring terminals (no soldering needed)
- Operating voltage: 3-5V DC
- Board size: 40 x 60mm

4.3 Battery Box (OECB534V)

- Type: 3x AA battery holder (No. 5 battery)
- Output voltage: 4.5V DC
- Features: On/off switch, 150mm lead wires

- Material: Black plastic housing

4.4 Breadboard (OEB3546A7-W)

- Type: Mini solderless breadboard
- Tie points: 170 points
- Color: White
- Features: Self-adhesive back, interlocking design

4.5 Carbon Film Resistor

Specifications:

Power Rating

Max Working Voltage

Max Overload Voltage

Resistance Range

1/4W

250V

500V

0.1Ω - 22MΩ

Color Coding: 4-band color code system for resistance value identification

5. KS Student Practical Operation (Lesson Workflow)

Lesson Duration: 45-60 minutes

Target Age: 7-11 years (KS2, Years 3-6)

Group Size: 2-3 students per kit

Part 1: Introduction to Circuits (10 minutes)

1. Teacher introduces basic concepts: electricity, circuits, components (battery, wires, bulb/LED)
2. Students identify all components in the kit and learn their names and functions
3. Safety briefing: low voltage safety, correct handling of LEDs and batteries, no water near circuits
4. Teacher demonstrates the pre-welded PCB board and explains what LEDs are

Part 2: Pre-welded Board Experiment (10 minutes)

1. Students connect battery box to the pre-welded PCB experiment board using quick terminals
2. Observe LED illumination — identify which LEDs light up and their colours
3. Flip the switch on/off to understand circuit control and the function of switches
4. Teacher explains series circuit concept using the onboard LED arrangement
5. Guided question: "What happens when we disconnect one wire? Why?"

Part 3: Breadboard Basics (15 minutes)

1. Introduction to breadboard — how it works internally, rows and columns, power rails
2. Guided activity: Build a simple single-LED circuit on breadboard
 - Connect battery to breadboard power rails (red = positive, black = negative)
 - Insert LED (note polarity: long leg = positive/anode, short leg = negative/cathode)
 - Add 330Ω current-limiting resistor in series with the LED
 - Complete the circuit and observe LED lighting up
3. Troubleshooting exercise: What happens if LED is reversed? Why do we need resistors?
4. Students record their first successful circuit in their worksheet

Part 4: Investigation & Exploration (15 minutes)

1. Try different colored LEDs — observe brightness and color differences
2. Test both 330Ω and 470Ω resistors — compare brightness and discuss why resistance matters
3. Challenge activity: Can you make 2 LEDs light up at the same time? (introduction to series vs parallel circuits)
4. Students record observations in worksheet: draw circuit diagrams, note brightness levels, answer prediction questions
5. Extension: What happens if you add more LEDs? What if you use more batteries? (teacher-supervised)

Part 5: Wrap-up & Discussion (10 minutes)

1. Students share their findings and what they discovered
2. Teacher summarizes key learning points: complete circuits, switches, LED polarity, resistors
3. Class discussion: Where do we find LEDs in everyday life? Why are they useful?
4. Clean up and component organization — students learn to sort and care for equipment

6. Educational Learning Objectives (KS Match)

Key Stage 2 Science Curriculum Alignment

Working Scientifically

- Ask relevant questions and use different types of scientific enquiries to answer them
- Set up simple practical enquiries, comparative and fair tests
- Make systematic and careful observations
- Record findings using simple scientific language, drawings, labelled diagrams, and tables
- Report on findings from enquiries, including conclusions and causal explanations
- Use results to draw simple conclusions, make predictions, suggest improvements and raise further questions

Electricity Topic (Year 4/5/6)

Curriculum Objective

Kit Activity Match

Identify common appliances that run on electricity

Introduction discussion, LED applications in everyday life

Construct a simple series electrical circuit, identifying and naming its basic parts (cells, wires, bulbs, switches)

Pre-welded board activity + breadboard single LED circuit

Identify whether a lamp will light in a simple series circuit based on whether it is part of a complete loop

Circuit building and troubleshooting exercises

Recognize that a switch opens and closes a circuit

Battery box switch demonstration and investigation

Recognize some common conductors and insulators

Extension activity: testing materials for conductivity

Compare and give reasons for variations in how components function (brightness of bulbs)

Different resistor values investigation, color brightness comparison

Use recognized symbols when representing a simple circuit in a diagram

Worksheet circuit diagram drawing activities

Cross-curricular Links

- Design & Technology: Designing and making — build functional products, understand how electrical components work
- Mathematics: Measuring, recording data, making comparisons, counting and pattern recognition
- Computing: Understanding how electronic devices work (foundation for later programming and microcontrollers)
- English: Scientific writing, recording observations, explaining findings

Skills Developed

- Fine motor skills: Handling small components, inserting into breadboards, connecting wires
- Problem solving and logical thinking: Troubleshooting circuits, predicting outcomes, testing hypotheses
- Teamwork and collaboration: Working in pairs/groups, sharing equipment, discussing findings
- Scientific method: Observation, prediction, testing, recording, concluding
- Basic electrical principles: Understanding circuits, current, voltage, resistance (introductory level)

Differentiation

Lower KS2 (Years 3-4): Focus on pre-welded board, simple single LED circuits, identifying components, basic circuit concepts.

Upper KS2 (Years 5-6): Progress to multi-LED circuits, resistor comparison, series vs parallel introduction, more detailed circuit diagrams.

7. Conclusion

The OKLED-KS2DK-1 provides an excellent, age-appropriate introduction to electrical circuits for Key Stage 2 students. Its solderless design and onboard protection features ensure a safe learning environment while maintaining educational value, fully aligning with UK National Curriculum safety requirements for this age group.

The kit bridges theoretical knowledge with hands-on practice, allowing students to directly experience core concepts of electricity that align with the UK National Curriculum Science programme of study. Starting with the pre-welded experiment board for immediate success, students progress to breadboard activities that build foundational skills for more advanced electronics learning in later Key Stages. This graduated approach ensures students build confidence before tackling more complex challenges.

As part of OptoSupply comprehensive educational LED kit series, the OKLED-KS2DK-1 serves as the ideal starting point for KS2 science education. It prepares students for more advanced kits within the KS2 range, such as the OKLED-KS2DK-2 with solar energy modules, flashing LEDs, and full-colour RGB LEDs, as well as KS3 soldering kits as they progress through their education.

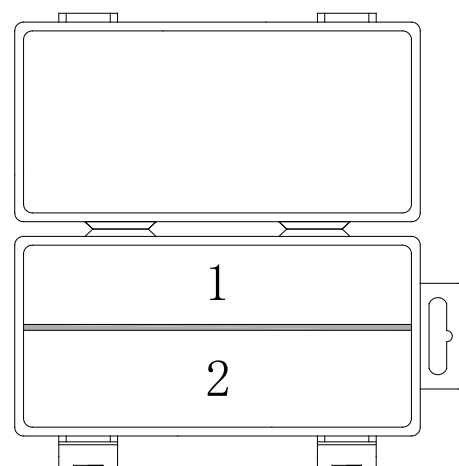
With its focus on practical investigation, scientific enquiry, and curriculum alignment, the OKLED-KS2DK-1 is more than just a kit of components — it is a complete teaching solution that inspires curiosity and builds lasting understanding of electrical science.

■ Kit Part list

■ Product Picture

137pcs/Box (Dimensions: 200*135*45mm)

Section	Contents	Pcs	P/N	Spec
1	5mm LED, Red	5	OSR5JA5A34A	Page6
	5mm LED, Yellow	5	OSY5JA5A34A	
	5mm LED, Blue	5	OSB5YU5A34A	
	5mm LED, Pure Green	5	OSG5TA5A34A	
	5mm LED, Warm White	5	OSM5YK5A32A	
	5mm LED, Cool White	5	OSW5YK5A32A	
	5mm Flashing LED, Red	2	OSR5JS5A34A	Page 7
	5mm Flashing LED, Yellow	2	OSY5JS5A34A	
	5mm Flashing LED, Blue	2	OSB5YS5A34A	
	5mm Flashing LED, Pure Green	2	OSG5TS5A34A	
	5mm Flashing LED, Warm White	2	OSM5YS5A32A	
	5mm Flashing LED, Cool White	2	OSW5YS5A32A	
	5mm Color Changing LED, RGB	2	OST1DA5B322A	Page8
2	Battery box No. 5, 3 batteries, 4.5V	1	OECB534V	Page 9
	5.5V Small Solar Module	1	OSSF6540BP-WH100	Page 10
	Breadboards	1	OEB3546A7-W	Page 11
	Breadboards connector wires	30		Page12
	220Ω Carbon Film Resistor, 0.25W±0.5%	20		
	330Ω Carbon Film Resistor, 0.25W±0.5%	20		
	470Ω Carbon Film Resistor, 0.25W±0.5%	20		



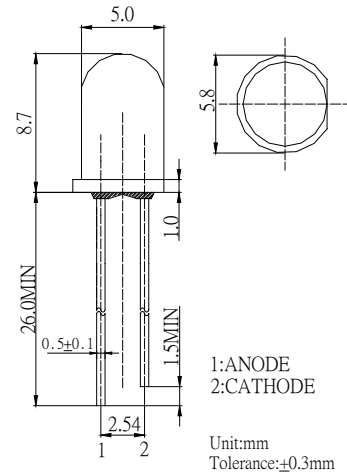
■Features

- High Luminous Intensity
- 5mm Round Standard Directivity
- Long Lifetime Operation
- UV Resistance
- Color Diffused / White Diffused (W, M only)

■Applications

- General Purpose Indicators
- Decorations
- Toys & Games
- General Use

■Outline Dimension



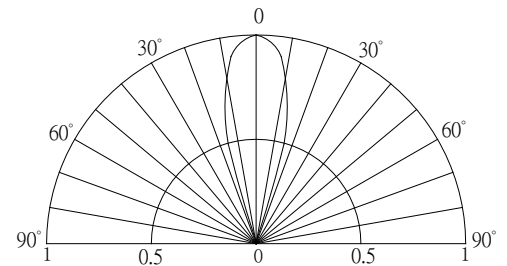
■Absolute Maximum Rating

(Ta=25°C)

Item	Symbol	Value		Unit
		W/B	R/Y/YG	
DC Forward Current	I _F	30	30	mA
Pulse Forward Current#	I _{FP}	100	100	mA
Reverse Voltage	V _R	5	5	V
Power Dissipation	P _D	102	78	mW
Operating Temperature	T _{opr}	-30 ~ +85		°C
Storage Temperature	T _{stg}	-40 ~ +100		°C
Lead Soldering Temperature	T _{sol}	260°C/5sec		-

#Pulse width Max 0.1ms, Duty ratio max 1/10

■Directivity



■Electrical -Optical Characteristics

(Ta=25°C)

Part Number	Color			V _F (V)			I _R (μA)	I _v (mcd)*			λ _D (nm)*			2θ1/2(deg)
				Min.	Typ.	Max.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Typ.
				I _F =20mA			V _R =5V	I _F =20mA			I _F =20mA			
OSW5YK5A32A	Cool White	W		-	2.9	3.4	10	1120	1560	-	CCT:8500-18000K			30
OSM5YK5A32A	Warm White	M		-	2.9	3.4	10	750	1120	-	CCT:2700-3300K			30
OSB5YU5A34A	Blue	B	■	-	2.9	3.4	10	220	330	-	465	470	475	30
OSG5TA5A34A	Pure Green	PG	■	-	2.9	3.4	10	1120	1560	-	520	525	530	30
OSY5JA5A34A	Yellow	Y	■	-	2.1	2.6	10	220	330	-	585	590	595	30
OSR5JA5A34A	Red	R	■	-	2.1	2.6	10	220	330	-	620	625	630	30

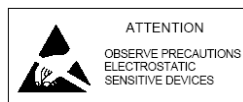
*1 Tolerance of measurements of dominant wavelength is ±1nm

*2 Tolerance of measurements of chromaticity coordinate is ±10%

*3 Tolerance of measurements of luminous intensity is ±15%

*4 Tolerance of measurements of forward voltage is ±0.1V

LED & Application Technologies



■Features

- High Luminous Intensity
- 5mm Round Standard Directivity
- UV Resistant Epoxy
- Color Diffused / White Diffused (W, M only)

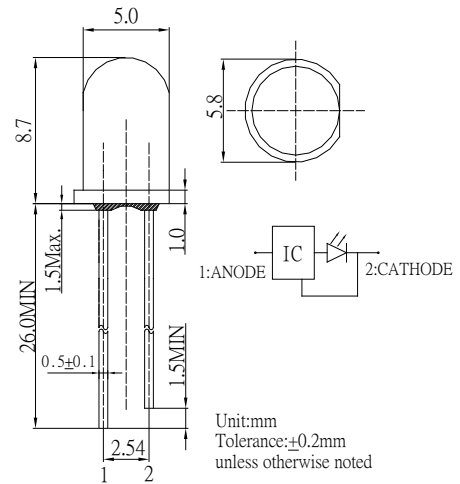
■Applications

- Toys
- Games
- Audio / Other Lighting

■Warning

- Do not install in reverse

■Outline Dimension

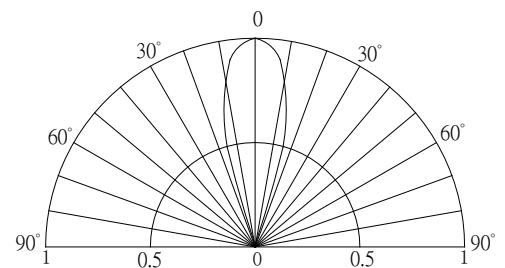


■Absolute Maximum Rating

(Ta=25°C)

Item	Symbol	Value	Unit
Power Supply	Voltage	5	V
Duty Cycle	Duty	1/2	-
Operating Temperature	Topr	-30 ~ +85	°C
Storage Temperature	Tstg	-40 ~ +100	°C
Lead Soldering Temperature	Tsol	260°C/5sec	-

■Directivity



■Electrical -Optical Characteristics (Ta=25°C)

Part Number	Color			V _F (V)			I _v (mcd)*			λD(nm)*			Fled (H _z)*	2θ1/2(deg)
				Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Typ.	Typ
				I _F =20mA			I _F =20mA							
OSW5YS5A32A	Cool White	W		3.0	3.5	5.0	1120	1560	-	CCT:8500-18000K			1.8	30
OSM5YS5A32A	Warm White	M	■	3.0	3.5	5.0	750	1120	-	CCT:2700-3300K				
OSB5YS5A34A	Blue	B	■	3.0	3.5	5.0	220	330	-	465	470	475		
OSG5TS5A34A	Pure Green	G	■	3.0	3.5	5.0	1120	1560	-	520	525	530		
OSY5JS5A34A	Yellow	Y	■	3.0	3.5	5.0	220	330	-	585	590	595		
OSR5JS5A34A	Red	R	■	3.0	3.5	5.0	220	330	-	620	625	630		

*1 Tolerance of measurements of chromaticity coordinates is ±10%

*2 Tolerance of measurements of dominant wavelength is ±1nm

*3 Tolerance of measurements of luminous intensity is ±15%

*4 Tolerance of measurements of forward voltage is ±0.1V

*5 Tolerance of measurements of Frequency is ±20%

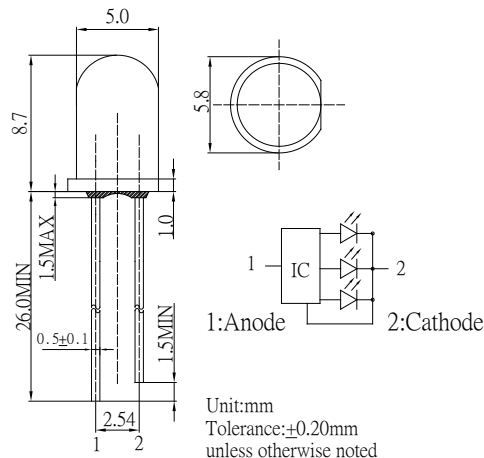
■Features

- High Luminous Intensity
- 5mm Round Standard Directivity
- Color Changing Type
- White Diffused Type

■Applications

- General Purpose Indicators
- Decorations
- Toys & Games
- General Use

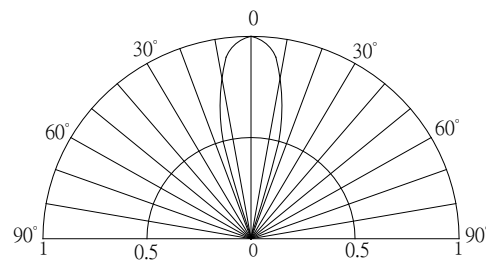
■Outline Dimension



■Absolute Maximum Rating (Ta=25°C)

Item	Symbol	Value	Unit
IC Output Current	I _{op}	100	mA
Blinking Cycle	T	33	S
Power Supply	Voltage	5.0	V
Operating Temperature	T _{opr}	-30 ~ +85	°C
Storage Temperature	T _{stg}	-40 ~ +100	°C
Lead Soldering Temperature	T _{sol}	260°C/5sec	°C

■Directivity



■Electrical -Optical Characteristics (Ta=25°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
DC Forward Voltage	V _{dd}	I _F =20mA	3.8	4.5	5	V
DC Reverse Current	I _R	V _R =5V	-	-	10	μA
Domi. Wavelength	λ _D (Red)	I _F =20mA	620	625	640	nm
	λ _D (Blue)	I _F =20mA	465	470	475	nm
	λ _D (Green)	I _F =20mA	520	525	530	nm
Luminous Intensity	I _v (Red)	I _F =20mA	220	330	500	mcd
	I _v (Blue)	I _F =20mA	330	500	750	mcd
	I _v (Green)	I _F =20mA	500	750	1120	mcd
50% Power Angle	2θ _{1/2}	I _F =20mA	-	30	-	deg

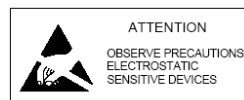
*1 Tolerance of measurements of forward voltage is ±0.1V

*2 Tolerance of measurements of Frequency is ±20%

*3 Tolerance of measurements of dominant wavelength is ±1nm

*4 Tolerance of measurements of luminous intensity is ±15%

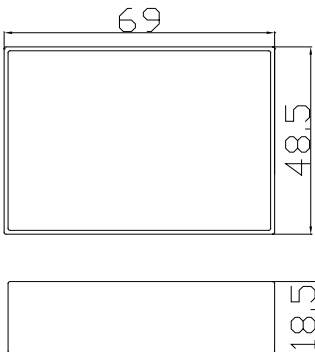
LED & Application Technologies



Color:

Black

■Product Information & Outline Dimension:

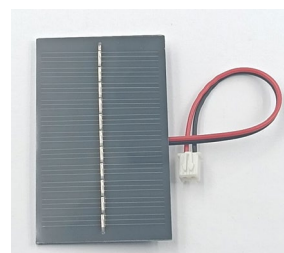
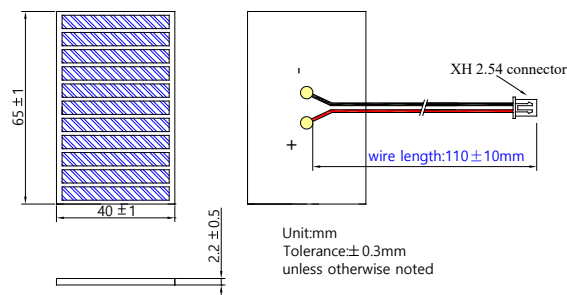
P/N	Item	Product Picture	Outline Dimension
OECS534V	Battery box No. 5, 3 batteries, 4.5V		 Unit: mm Tolerance: ±1mm

Features:

Copes easily with devices required drive voltage

Since multiple cells can be simultaneously connected in a series when the solar cells are formed, unlike the fabrication technique used with crystalline silicon solar cells in which multiple solar cells are severed and connected, it is easy to create cells with a variety of voltages.

Outline Dimension:



View of Electrical Properties of Amorton:

Voc : Open-circuit voltage

Isc : Short-circuit current

Vpm : Optimum power operating voltage

Ipm : Optimum power operating current

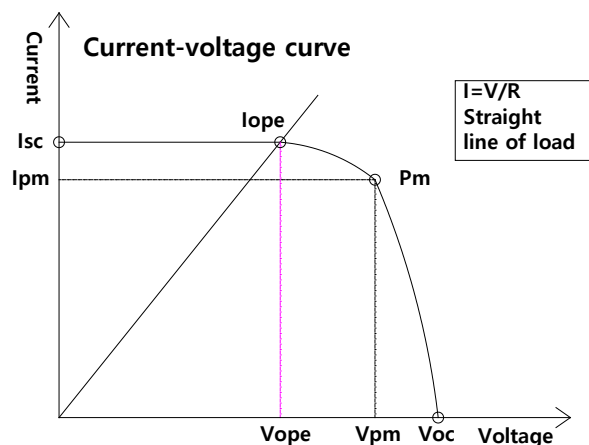
Pm : Maximum power = Vpm x Ipm

Vopec : Operating voltage (specified voltage)

Iope : Operating current

※ Current drastically changes under Vpm or higher.

For keeping the stable current under the anticipated illumination level, set the Vopec as high as or lower than the Vpm



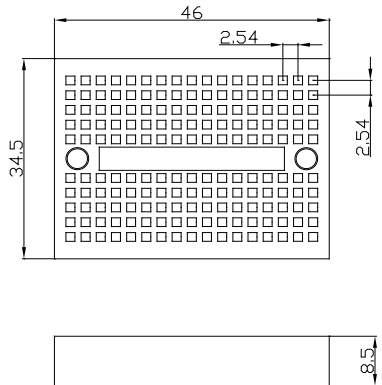
Specification and Selection Table:

P/N	Dimension	Cells	Operating Current	Power	Short Circuit current(Isc)	Operating Voltage	Open Circuit Voltage	Applications Cell
OSSFA6540BP-WH100	65*40*2.2mm	11	55mA	0.3W	58mA	5.5V	6.6V	3.7V

Color:

White

■Product Information & Outline Dimension:

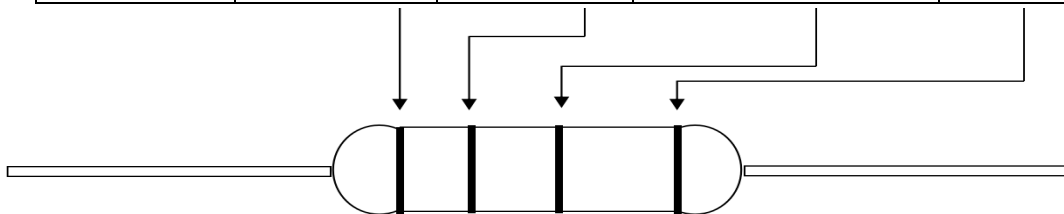
P/N	Item	Product Picture	Outline Dimension
OEB3546A7-W	Breadboards		 Unit: mm Tolerance: ±1mm

■ Specifications

Power Rating	Maximum Working Voltage	Maximum Overload Voltage	Dimension (mm)					Resistance Range
			A	B	C	D	E	
1/4W	250V	500V	45±3	19.5±3	6.0±1	0.35±0.1	2.3±0.3	0.1E-22M

■ Color Coding

Color	1 st digit	2 nd digit	Multiplier	Tolerance
Black	0	0	1Ω	
Silver			0.01Ω	±10%
Golden			0.1Ω	±5%
Brown	1	1	10Ω	±1%
Red	2	2	100Ω	±2%
Orange	3	3	1KΩ	
Yellow	4	4	10KΩ	
Green	5	5	100KΩ	±0.5%
Blue	6	6	1MΩ	±0.25%
Violet	7	7	10MΩ	±0.1%
Gray	8	8		
White	9	9		



LED & Application Technologies

