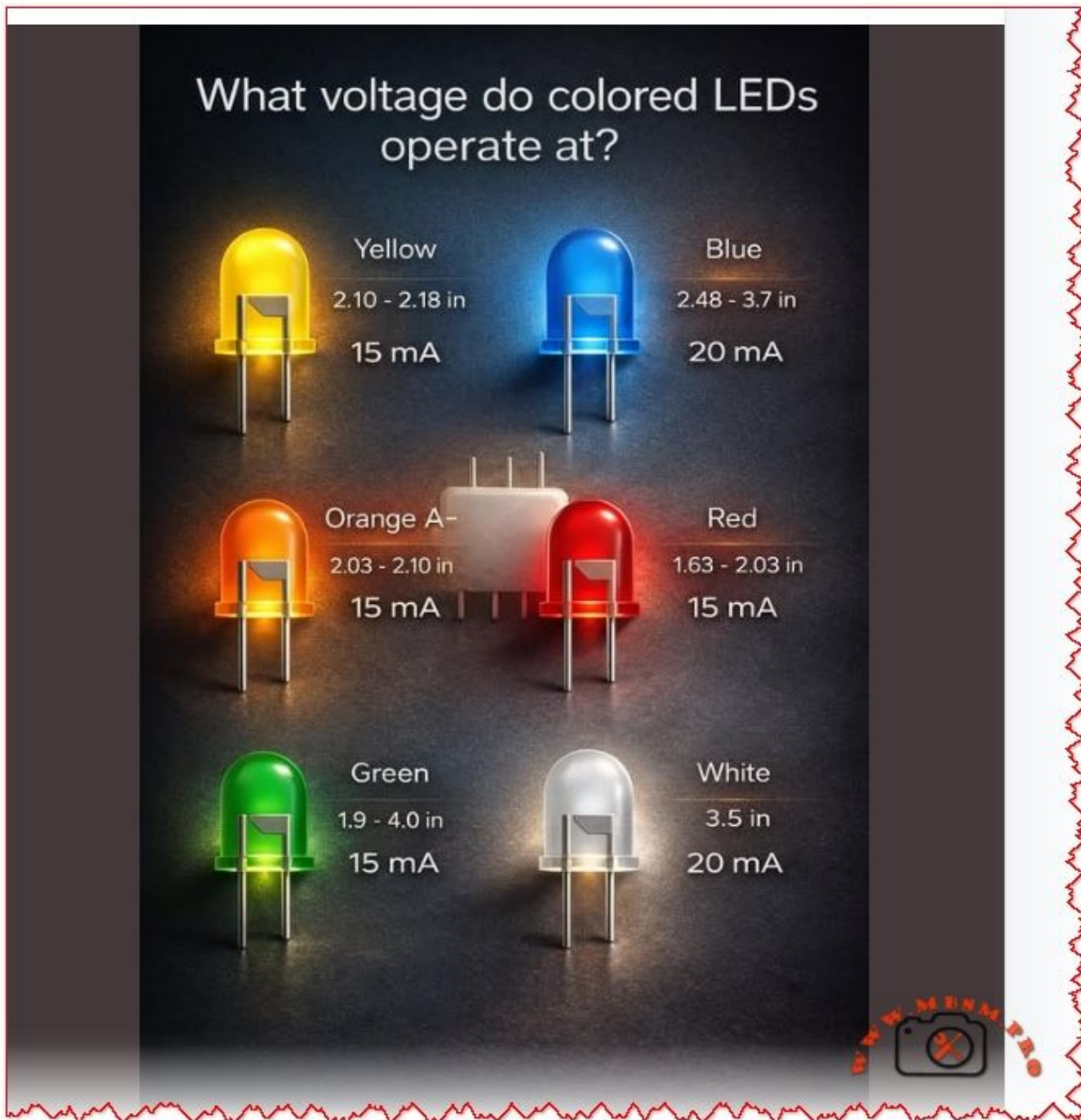


Typical forward voltages vary by LED color

Category: Electronic

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Typical forward voltages vary by LED color – red ~1.6–2.0 V, green ~1.9–4.0 V, blue/white ~2.5–3.7+ V – always size a series resistor or constant-current driver to protect the LED.

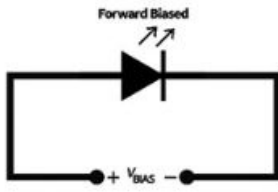
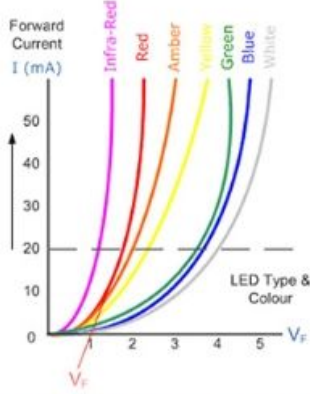
LED Forward Voltage Guide and Practical Selection for Engineers

Why this matters Choosing the right LED and drive method prevents failures, ensures consistent brightness, and optimizes efficiency. **Forward voltage (Vf)**


depends on semiconductor material and color; using nominal Vf from datasheets or trusted references is essential.

Color LED	Name Color	Voltage Drop (Forward Voltage)
	White	3.0- 5.0 Volts
	Ultraviolet	3.1- 4.4 Volts
	Violet	2.8- 4.0 Volts
	Blue	2.5- 3.7 Volts
	Green	1.6- 4.0 Volts
	Yellow	2.0- 2.4 Volts
	Orange	2.0- 2.1 Volts
	Red	1.5- 2.0 Volts
	Infrared	1.2- 1.9 Volts

semanytech.com

Refer to the Datasheet for more details™



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Typical Forward Voltages by Color

Color	Typical Vf Range	Typical If
Red	1.63 – 2.03 V	15 mA
Orange	2.03 – 2.10 V	15 mA
Yellow	2.10 – 2.18 V	15 mA
Green	1.9 – 4.0 V	15 mA
Blue	2.48 – 3.7 V	20 mA
White	~3.5 V	20 mA

(Values synthesized from standard LED references and calculators; always confirm with the component datasheet.)

How to Size a Series Resistor

Formula:

$$R = \frac{V_{SUPPLY} - V_f}{I_f}$$

Example: For 12 V supply, blue LED Vf = 3.2 V, If = 20 mA →

$$R = \frac{12 - 3.2}{0.02} = 440 \Omega$$

Power on resistor:

$$P_R = (V_{SUPPLY} - V_f) \cdot I_f$$

Comparison Table LED Drive Options

Drive Method	Pros	Cons	Best Use
Series resistor	Simple, cheap	Wasteful at high $V_{in}-V_f$; brightness varies with V_{in}	Indicator LEDs, low-cost boards
Constant current driver	Stable brightness, efficient	More complex, costlier	High-power LEDs, strings, lighting
PWM with resistor	Dimmable, efficient average power	Requires filtering for analog loads	LED dimming, displays

Common Mistakes and How to Avoid Them

- **Using nominal V_f without margin** – always allow tolerance and temperature shift; V_f drops with temperature for some colors.
- **No current limiting** – leads to thermal runaway and failure; use resistor or CC driver.
- **Ignoring resistor power rating** – calculate PR and choose resistor with margin.
- **Series too many LEDs without checking total V_f** – ensure supply > sum(V_f) + margin.
- **Assuming all green/white LEDs share same V_f** – modern green/amber/white vary widely; check datasheet.

Engineering Tips and Best Practices

- **Prefer constant-current drivers** for multi-LED strings or >20 mA devices.
- **Use 0.1 μ F ceramic + electrolytic decoupling** on driver inputs to stabilize supply.
- **Thermal management:** high-power LEDs need heatsinking; junction temperature affects V_f and lifetime.
- **Measure V_f under operating current** when designing – bench test with regulated current source.
- **For SMD LEDs,** consult manufacturer SMD tables; V_f can differ from through-hole types.

Focus Keyphrase

LED forward voltage by color typical V_f ranges resistor calculation constant current driver selection for indicators and lighting

SEO Title

Mbsmpro.com, LED Forward Voltage Chart, Red Green Blue White Yellow Orange, V_f Ranges, Resistor Calculation, Driver Selection

Meta Description

Complete LED forward voltage guide with color V_f ranges, resistor sizing formula, drive method comparison, common mistakes, and engineering tips for reliable LED designs.

Slug

led-forward-voltage-chart-resistor-calculation-driver-selection

Tags

LED, Forward Voltage, Vf, Resistor Calculation, Constant Current, Indicator LED, White LED, Blue LED, Mbsmgroup, Mbsm.pro, mbsmpro.com, mbsm

Excerpt (first 55 words)

Typical LED forward voltages vary by color: red ~1.6–2.0 V, green ~1.9–4.0 V, blue/white ~2.5–3.7+ V. This guide explains Vf ranges, resistor sizing formula, constant-current drivers, common mistakes, and practical engineering tips to design reliable LED circuits.



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