

## LED Assortment 3 mm / 5 mm (500 pcs.)

Part-No.: 23O191, 23O192



This round LED assortment is perfect for standard applications and experiments with semiconductor light. Please note that LEDs always need to be driven with current-limitation (pre-resistor, selection see below or constant-current-source) to avoid any damages of the component. Anode = positive / Cathode = negative voltage. LEDs are not shock-sensitive and have a low power consumption.



### Selection of pre-resistor if supply-voltage is DC constant voltage source

$U_B$  = Source voltage (Volt)       $U_F$  = Forward voltage (Volt)  
 $I_F$  = Forward current (Ampere)       $R$  = Resistor Value (Ohm)

#### Example 1

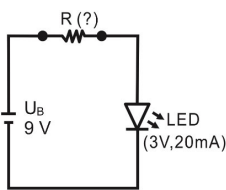
$U_B = 9\text{ V}$   
 LED =  $U_F$  typ. 3 V,  $I_F$  max. 20 mA

$$U_R = U_B - U_F = 6\text{ V}$$

$$R = \frac{U_R}{I_F}$$

$$R = \frac{6\text{ V}}{0.02\text{ A}}$$

$$R = 300\Omega$$



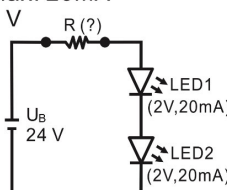
#### Example 2

$U_B = 24\text{ V}$   
 LED1 =  $U_F$  typ. 2 V,  $I_F$  max. 20mA  
 LED2 =  $U_F$  typ. 2 V,  $I_F$  max. 20mA  
 $U_R = U_B - (U_{F1} + U_{F2}) = 20\text{ V}$

$$R = \frac{U_R}{I_F}$$

$$R = \frac{20\text{ V}}{0.02\text{ A}}$$

$$R = 1000\Omega$$

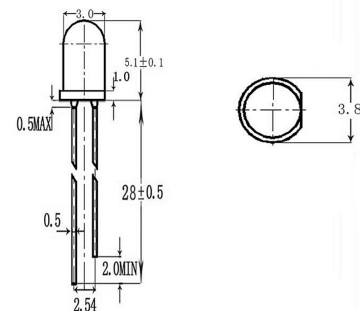


**Attention:** Please use the next bigger available resistor-value as pre-resistor. The max. power rating of the resistor should not be overdriven. Operation only within the operating parameters of the components.

**Technical data:** Operating-Temp.: -25 ... +85 °C · Lead soldering temp. max. 270 °C (5 s, one time only) · Storage-Temp.: -30 ... +100 °C · Reverse voltage: max. 5 V · Reverse current: max. 1.0 µA (@  $U_R = 5\text{ V}$ )  
 Lifetime within the operating parameters: min. 50,000 h · Package type: diffused (White = clear) · Content per Set: 500 pcs.

### LED Assortment 3 mm Part-No.: 23O191

LED-Ø	Color	Luminous int. $I_v$ (max.)	Viewing angle (half light)	Package-type	Wavelength/Color-Temp. (typ.)	Forward voltage $U_F$ (typ.)	Forward current $I_F$ (max.)	Content	Part-No. Single item
3 mm	Red	700 mcd	30 °	Diffused-Red	625 nm	2 V	20 mA	100 pcs.	2111O155
3 mm	Green	2500 mcd	30 °	Diffused-Green	520 nm	3 V	20 mA	100 pcs.	2111O152
3 mm	Yellow	700 mcd	30 °	Diffused-Yellow	590 nm	2 V	20 mA	100 pcs.	2111O154
3 mm	Blue	1300 mcd	30 °	Diffused-Blue	460 nm	3 V	20 mA	100 pcs.	2111O151
3 mm	White	8000 mcd	25 °	Clear	8000 K	3 V	20 mA	100 pcs.	2111O177



### LED Assortment 5 mm Part-No.: 23O192

LED-Ø	Color	Luminous int. $I_v$ (max.)	Viewing angle (half light)	Package-type	Wavelength/Color-Temp. (typ.)	Forward voltage $U_F$ (typ.)	Forward current $I_F$ (max.)	Content	Part-No. Single item
5 mm	Red	700 mcd	30 °	Diffused-Red	625 nm	2 V	20 mA	100 pcs.	2111O160
5 mm	Green	2500 mcd	30 °	Diffused-Green	520 nm	3 V	20 mA	100 pcs.	2111O157
5 mm	Yellow	700 mcd	30 °	Diffused-Yellow	590 nm	2 V	20 mA	100 pcs.	2111O159
5 mm	Blue	1300 mcd	30 °	Diffused-Blue	460 nm	3 V	20 mA	100 pcs.	2111O156
5 mm	White	15000 mcd	25 °	Clear	8000 K	3 V	20 mA	100 pcs.	2111O182

