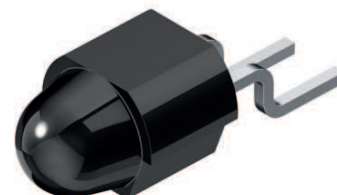


High Power Infrared Emitter (940nm) in SMR® Package

Version 1.3

SFH 4542



Features:

- High Power Infrared LED
- SMR® (Surface Mount Radial) package
- Same package as photodiode SFH 2500
- Short switching times

Applications

- Sensor technology
- Discrete interrupters
- Discrete optocouplers

Notes

Depending on the mode of operation, these devices emit highly concentrated non visible infrared light which can be hazardous to the human eye. Products which incorporate these devices have to follow the safety precautions given in IEC 60825-1 and IEC 62471.

Ordering Information

Type:	Radiant Intensity	Ordering Code
	I_e [mW/sr] $I_F = 100 \text{ mA}$, $t_p = 20 \text{ ms}$	
SFH 4542	230 (≥ 100)	Q65110A8093
SFH 4542-BWCW	160 ... 500	Q65111A7727

Note: Measured at a solid angle of $\Omega = 0.01 \text{ sr}$

Maximum Ratings ($T_A = 25\text{ °C}$)

Parameter	Symbol	Values	Unit
Operation and storage temperature range	$T_{op}; T_{stg}$	-40 ... 85	°C
Reverse voltage	V_R	5	V
Forward current	I_F	100	mA
Surge current ($t_p \leq 100\text{ }\mu\text{s}$, $D = 0$)	I_{FSM}	1	A
Power consumption	P_{tot}	180	mW
ESD withstand voltage (acc. to ANSI/ ESDA/ JEDEC JS-001 - HBM)	V_{ESD}	2	kV
Thermal resistance junction - ambient ^{1) page 9}	R_{thJA}	300	K / W

Characteristics ($T_A = 25\text{ °C}$)

Parameter		Symbol	Values	Unit
Peak wavelength ($I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$)	(typ)	λ_{peak}	950	nm
Centroid wavelength ($I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$)	(typ)	$\lambda_{centroid}$	940	nm
Spectral bandwidth at 50% of I_{max} ($I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$)	(typ)	$\Delta\lambda$	42	nm
Half angle	(typ)	ϕ	± 10	°
Dimensions of active chip area	(typ)	L x W	0.3 x 0.3	mm x mm
Rise and fall time of I_e (10% and 90% of $I_{e\max}$) ($I_F = 100\text{ mA}$, $R_L = 50\text{ }\Omega$)	(typ)	t_r, t_f	12	ns
Forward voltage ($I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$)	(typ (max))	V_F	1.5 (≤ 1.8)	V
Forward voltage ($I_F = 1\text{ A}$, $t_p = 100\text{ }\mu\text{s}$)	(typ (max))	V_F	2.3 (≤ 3)	V
Reverse current ($V_R = 5\text{ V}$)		I_R	not designed for reverse operation	μA
Total radiant flux ($I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$)	(typ)	Φ_e	65	mW
Temperature coefficient of I_e or Φ_e ($I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$)	(typ)	TC_I	-0.5	% / K
Temperature coefficient of V_F ($I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$)	(typ)	TC_V	-1.3	mV / K
Temperature coefficient of wavelength ($I_F = 100\text{ mA}$, $t_p = 20\text{ ms}$)	(typ)	TC_λ	0.3	nm / K

Grouping ($T_A = 25\text{ °C}$)

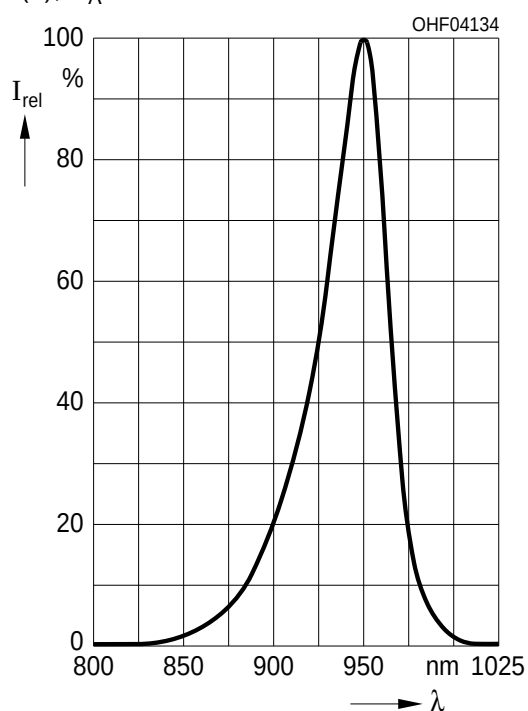
Group	Min Radiant Intensity	Max Radiant Intensity	Typ Radiant Intensity
	$I_F = 100\text{ mA}, t_p = 20\text{ ms}$ $I_{e, \min} [\text{mW / sr}]$	$I_F = 100\text{ mA}, t_p = 20\text{ ms}$ $I_{e, \max} [\text{mW / sr}]$	$I_F = 1\text{ A}, t_p = 25\text{ }\mu\text{s}$ $I_{e, \text{typ}} [\text{mW / sr}]$
SFH4542 - AW	100	200	1000
SFH4542 - BW	160	320	1700
SFH4542 - CW	250	500	2600

Note: measured at a solid angle of $\Omega = 0.01\text{ sr}$

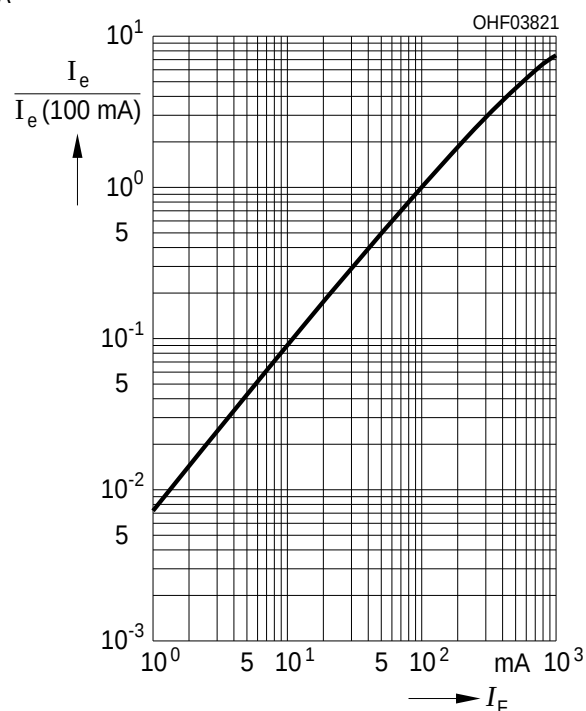
Only one group in one packing unit (variation lower 2:1).

Relative Spectral Emission ^{2) page 9}

$$I_{\text{rel}} = f(\lambda), T_A = 25\text{ °C}$$

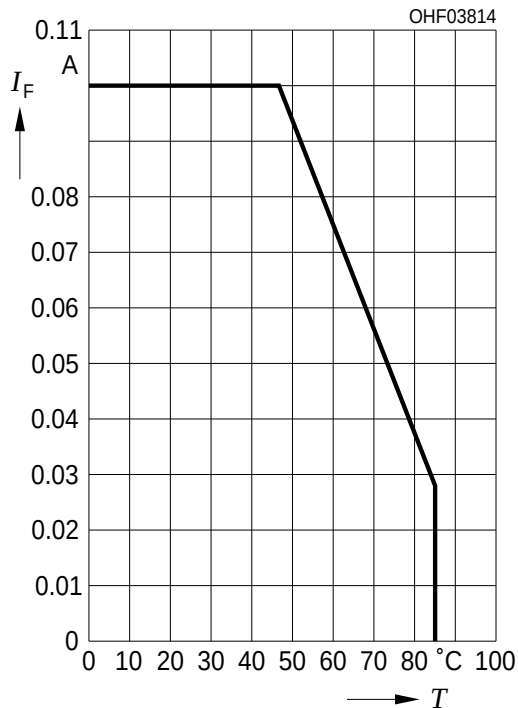
**Radiant Intensity** ^{2) page 9}

$$I_e / I_e(100\text{ mA}) = f(I_F), \text{ single pulse, } t_p = 25\text{ }\mu\text{s}, T_A = 25\text{ °C}$$

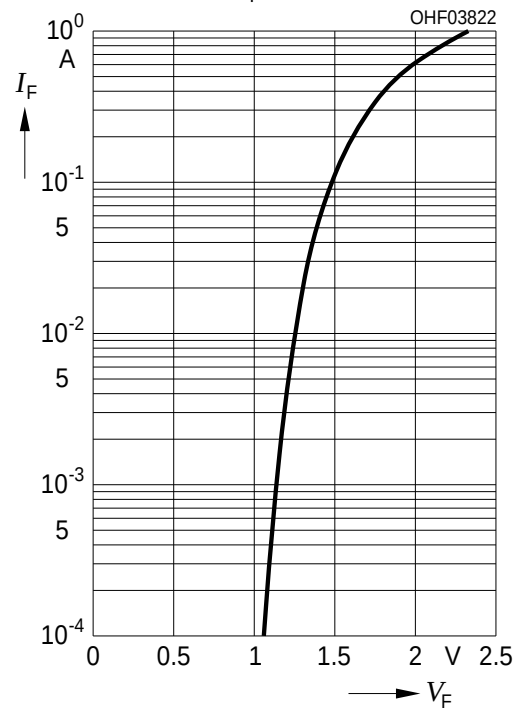


Max. Permissible Forward Current

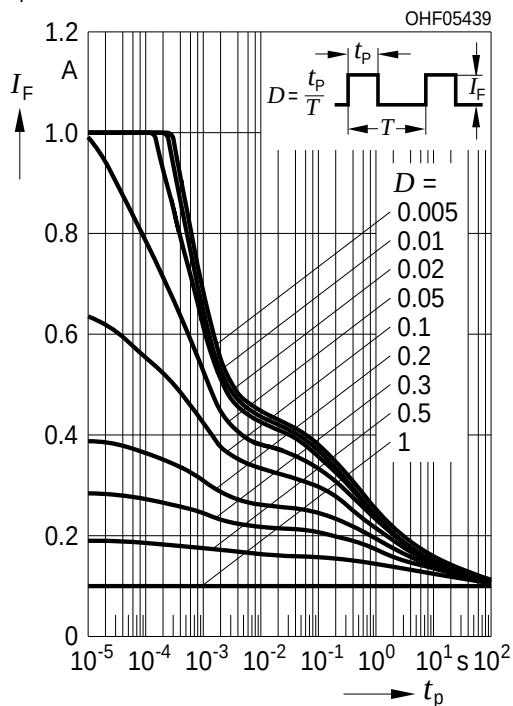
$$I_F = f(T_A), R_{thJA} = 300 \text{ K/W}$$

**Forward Current** ^{2) page 9}

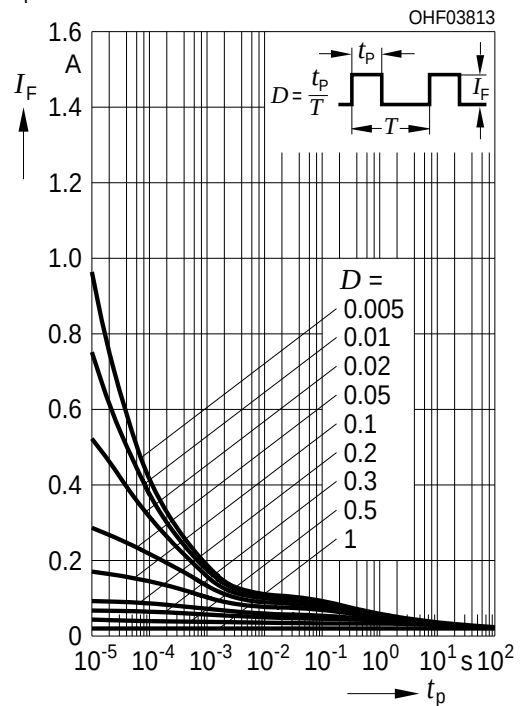
$$I_F = f(V_F), \text{ single pulse, } t_p = 100 \mu\text{s}, T_A = 25^\circ\text{C}$$

**Permissible Pulse Handling Capability**

$$I_F = f(t_p), T_A = 25^\circ\text{C}, \text{ duty cycle } D = \text{parameter}$$

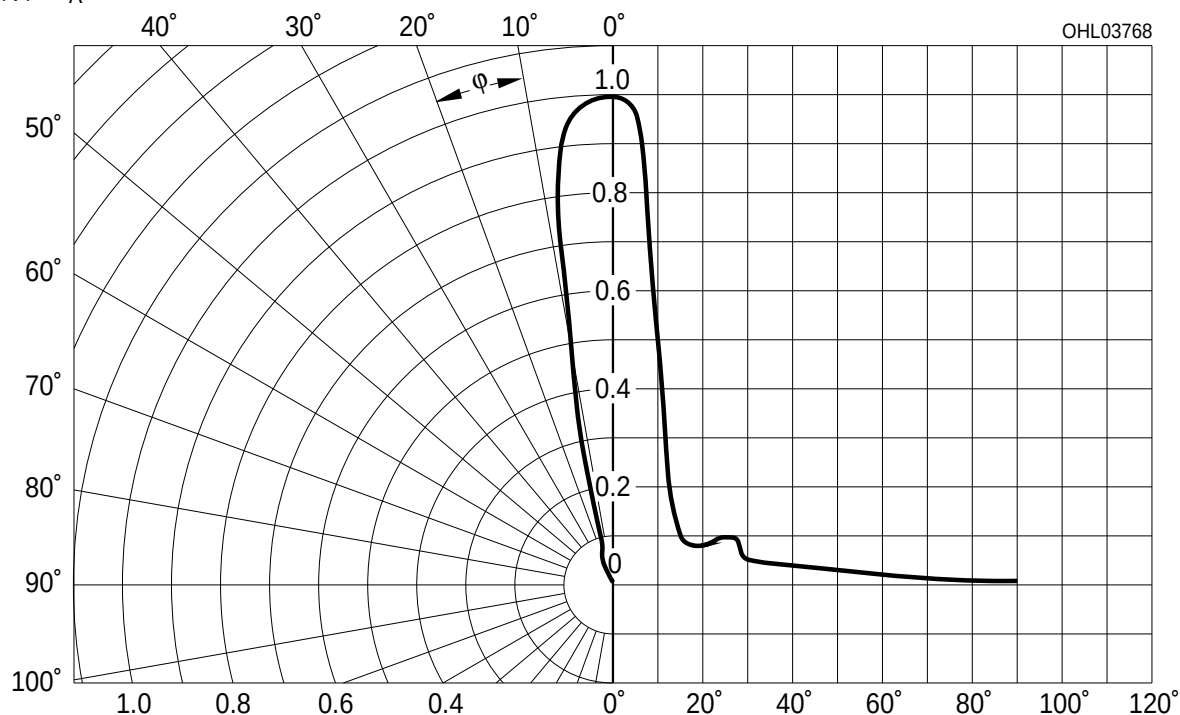
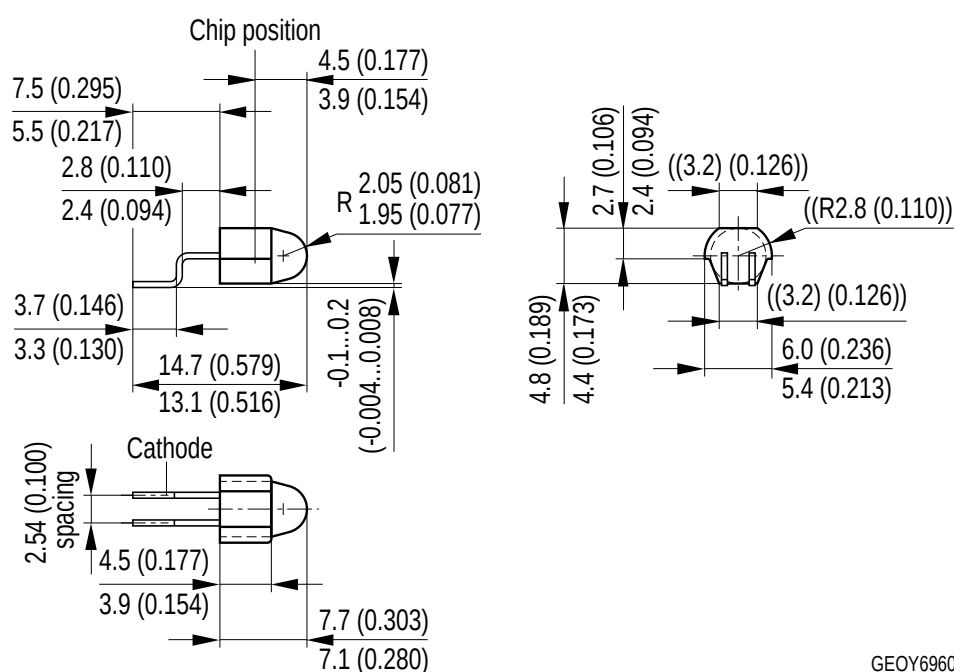
**Permissible Pulse Handling Capability**

$$I_F = f(t_p), T_A = 85^\circ\text{C}, \text{ duty cycle } D = \text{parameter}$$



Radiation Characteristics ^{2) page 9}

$$I_{\text{rel}} = f(\phi), T_A = 25^\circ\text{C}$$

**Package Outline**

GEOY6960

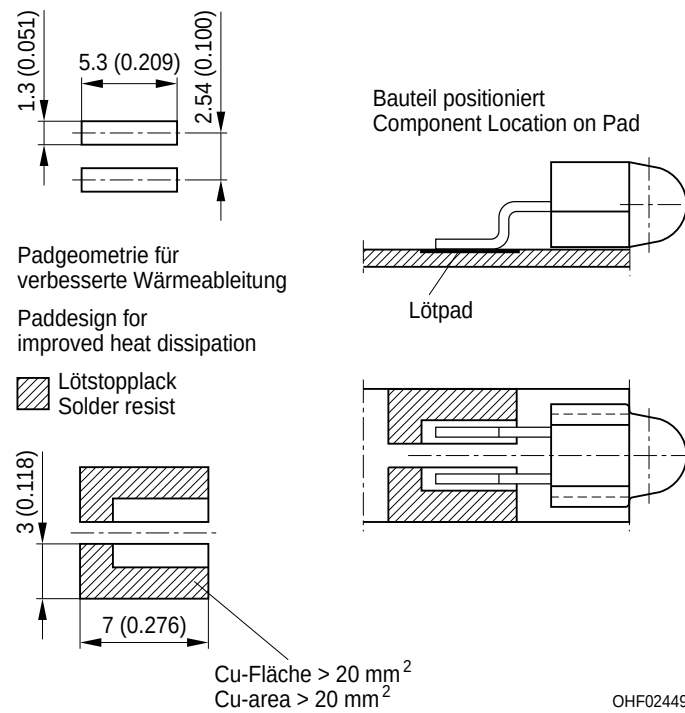
Dimensions in mm (inch).

Approximate Weight:

0.2 g

Note

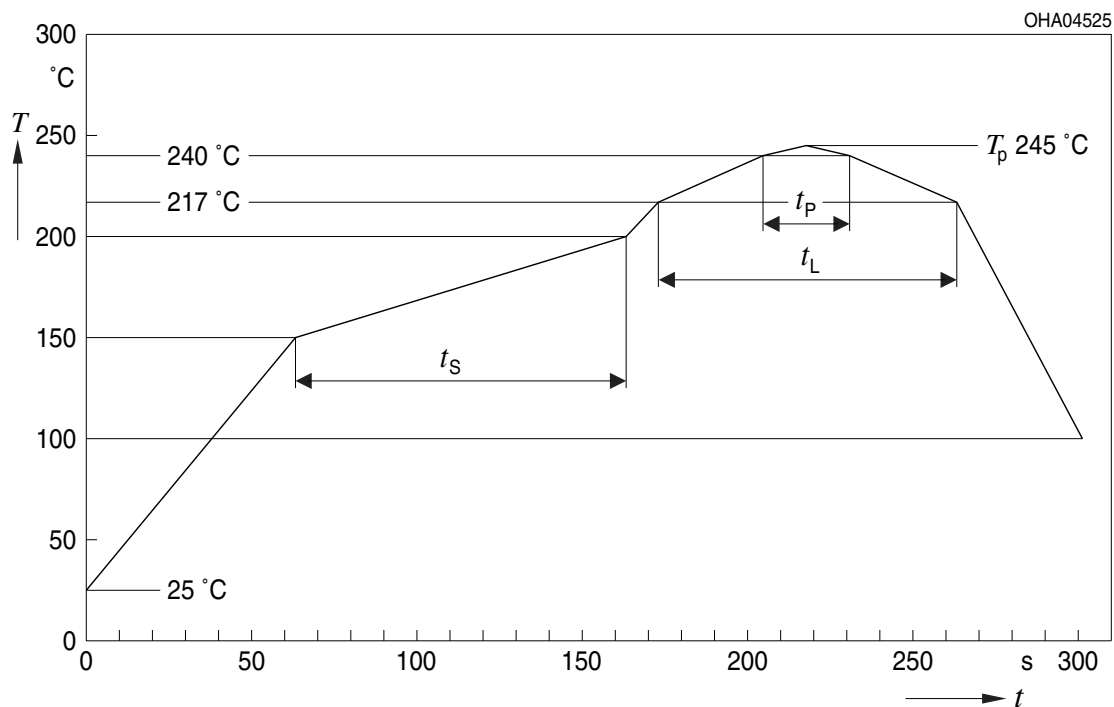
Packing information is available on the internet (online product catalog).

Recommended Solder Pad

Dimensions in mm (inch).

Reflow Soldering Profile

Product complies to MSL Level 3 acc. to JEDEC J-STD-020D.01



OHA04612

Profile Feature Profil-Charakteristik	Symbol Symbol	Pb-Free (SnAgCu) Assembly			Unit Einheit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat*) 25 °C to 150 °C			2	3	K/s
Time t_S T_{Smin} to T_{Smax}	t_S	60	100	120	s
Ramp-up rate to peak*) T_{Smax} to T_P			2	3	K/s
Liquidus temperature	T_L	217			$^{\circ}\text{C}$
Time above liquidus temperature	t_L		80	100	s
Peak temperature	T_P		245	260	$^{\circ}\text{C}$
Time within 5 °C of the specified peak temperature $T_P \pm 5 \text{ K}$	t_P	10	20	30	s
Ramp-down rate* T_P to 100 °C			3	6	K/s
Time 25 °C to T_P				480	s

All temperatures refer to the center of the package, measured on the top of the component

* slope calculation DT/Dt : Dt max. 5 s; fulfillment for the whole T-range

Disclaimer

Language english will prevail in case of any discrepancies or deviations between the two language wordings.

Attention please!

The information describes the type of component and shall not be considered as assured characteristics.

Terms of delivery and rights to change design reserved. Due to technical requirements components may contain dangerous substances.

For information on the types in question please contact our Sales Organization.

If printed or downloaded, please find the latest version in the Internet.

Packing

Please use the recycling operators known to you. We can also help you – get in touch with your nearest sales office.

By agreement we will take packing material back, if it is sorted. You must bear the costs of transport. For packing material that is returned to us unsorted or which we are not obliged to accept, we shall have to invoice you for any costs incurred.

Components used in life-support devices or systems must be expressly authorized for such purpose!

Critical components* may only be used in life-support devices** or systems with the express written approval of OSRAM OS.

*) A critical component is a component used in a life-support device or system whose failure can reasonably be expected to cause the failure of that life-support device or system, or to affect its safety or the effectiveness of that device or system.

**) Life support devices or systems are intended (a) to be implanted in the human body, or (b) to support and/or maintain and sustain human life. If they fail, it is reasonable to assume that the health and the life of the user may be endangered.

Glossary

- ¹⁾ **Thermal resistance:** junction -ambient, mounted on PC-board (FR4), padsize 20 mm² each
- ²⁾ **Typical Values:** Due to the special conditions of the manufacturing processes of LED, the typical data or calculated correlations of technical parameters can only reflect statistical figures. These do not necessarily correspond to the actual parameters of each single product, which could differ from the typical data and calculated correlations or the typical characteristic line. If requested, e.g. because of technical improvements, these typ. data will be changed without any further notice.

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