MLX75305

Light-to-Voltage SensorEyeC

1. Features and Benefits

- Converts light intensity to voltage
- High linearity
- Low temperature dependency
- Supply voltage range 3V to 5.5V
- Open drain output voltage output
- Automotive Cavity SO8 package
- Designed for automotive applications
- Solder reflow 260degC, MSL3
- Automotive qualified AEC-Q100 Grade 1
- Operating temperature -40 up to 125degC
- RoHS compliant lead-free

2. Application Examples

- General
  - Ambient Light Sensor
  - LCD Backlight Sensor
  - LED Power Monitoring
- Automotive
  - Automatic light dimming of instrument panels and displays
  - Electrochrome Dimming
  - Headlights on/off control
- Printers/Copiers
  - Paper feed detection
  - Paper size and orientation detection
  - Toner cartridge presence detection

3. Functional Diagram

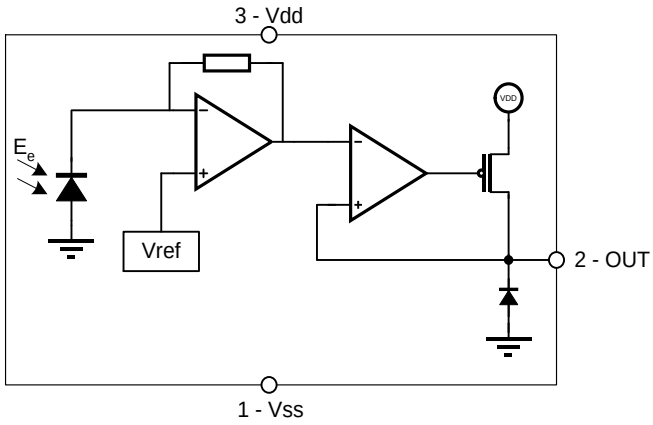

Figure 1

4. General Description

The Melexis SensorEyeC series are CMOS integrated optical sensor ICs including photodiode, transimpedance amplifier and output transistor on one chip. These sensors are designed for high-volume automotive and non-automotive applications.

The MLX75305 Light-to-Voltage SensorEyeC converts ambient or LED light intensity into an output voltage.

The MLX75305 block diagram is shown above and contains following blocks: a photodiode, a transimpedance amplifier to convert and amplify the photocurrent of the photodiode and an open drain output buffer stage.

5. Ordering Information

Product	Temperature	Package	Option Code	Packing Form
MLX75305	K (-40°C to 125°C)	XD	AAA-000	RE
MLX75305	K (-40°C to 125°C)	XD	ABA-000	RE

Legend:

Temperature Code:	K for Temperature Range -40°C to 125°C
Package Code:	XD for SOIC-8 package
Option Code:	AAA-xxx: Responsivity Gain10 ABA-xxx: Responsivity Gain1
Packing Form:	RE for Reel
Ordering Example:	MLX75305EXD-AAA-000-RE

Table 1

Contents

6. Pin Definitions and Descriptions

Pin #	Name	Description	Type
1	Vss	Ground connection	Ground
2	OUT	Analog output	Open drain output
3	Vdd	Power supply	Supply
4	N.C.	Not connected	Floating
5..8	N.C.	Not connected	Floating

Table 2

7. Absolute Maximum Ratings

Valid for all MLX75305 versions. All voltages are referenced to Vss.

Symbol	Rating	Value	Unit
Vdd	Supply Voltage, VDD (over voltage)	-0.3 to 7	V
Vout	DC Output Voltage	-0.3 to Vdd+0.3	V
Iout	DC Output Current, per Pin	±20	mA
TStg	Storage Temperature Range, TS	-40 to 125	°C
VESD-HBM	ESD Sensitivity (Human Body Model according to CDF-AEC-Q100)	4	kV
VESD-MM	ESD Sensitivity (Machine Model according to CDF-AEC-Q100)	200	V

Table 3

Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

8. General Electrical Specifications

All voltages are referenced to Vss.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	Test[1]
Vdd	Supply Voltage		3		5.5	V	V
Idd	Static Power Supply Current	At Vdd=5.5V, unloaded output			2	mA	V
Vdark	Dark level	(a), (c) Ee=0 Tamb=-40 .. 85˚C Tamb=85 .. 125˚C	 4 4		 160 210	 mV mV	 V V
Re10	Responsivity Gain 10 (option code A)	(a), Vout range = 50mV..4.5V, 25˚C	-15%	70	+15%	mV/(µW/cm^2)	V
Re1	Responsivity Gain 1 (option code B)	(a), Vout range = 50mV..4.5V, 25˚C	-15%	7	+15%	mV/(µW/cm^2)	V
NLAO	RMS Non Linearity	(a), in the 10..90% Output Range			+/-2	%	V
TC	Temperature Coefficient	(b), Ee=46µW/cm² For visual light: For NIR (λ=850nm):		 -0.16 0.06		 %/C %/C	 X X
λ0.3	Spectral Bandwidth	Tamb=25˚C	500		1000	nm	X
Emax	Absolute Maximum Irradiance	Vdd=5V, λ=850nm, Tamb=25˚C		50*E Vout		µW/cm^2	X
Spd	Area of photodiode			0.36		mm^2	D
VOH	Maximum Output voltage high	(a), Ee=15*EVout...Emax	4.9	4.95		V	V
tVdd_rise	Vdd rise time	10..90% of Vdd		4		µs	V
tsetup	Electrical setup-time	(a), Vout within Vdd/2 +/- 5%		70	140	µs	V

[1] *The column Test indicates if the specific parameter is tested in production. Following symbols are used:*
V: the specific parameter is tested in production
X: the specific parameter is verified in characterization, but is not tested in production (e.g. timings and capacitances)
D: the specific parameter is guaranteed by design and is not tested as such in production

ton	Turn-on time	(a), Vout > VOH_min		6	50	µs	
toff	Turn-off time	(a), Vout > VOH_min		6	50	µs	V
tr	Rise time	(a), Vout > VOH_min		10	22	µs	V
tf	Fall time	(a), Vout > VOH_min		10	22	µs	V
TA	Operating Temperature Range	Temperature Code K	-40		125	°C	V

Table 4

(a) Vdd=5V, RL=10kOhm, CL=50pF, λ= 850nm

(b) Vdd=5V, RL=10kOhm, CL=50pF

(c) The dark level is ratio metric with the Vdd power supply voltage

9. Spectral Responsivity and Linear Optical Response Curve

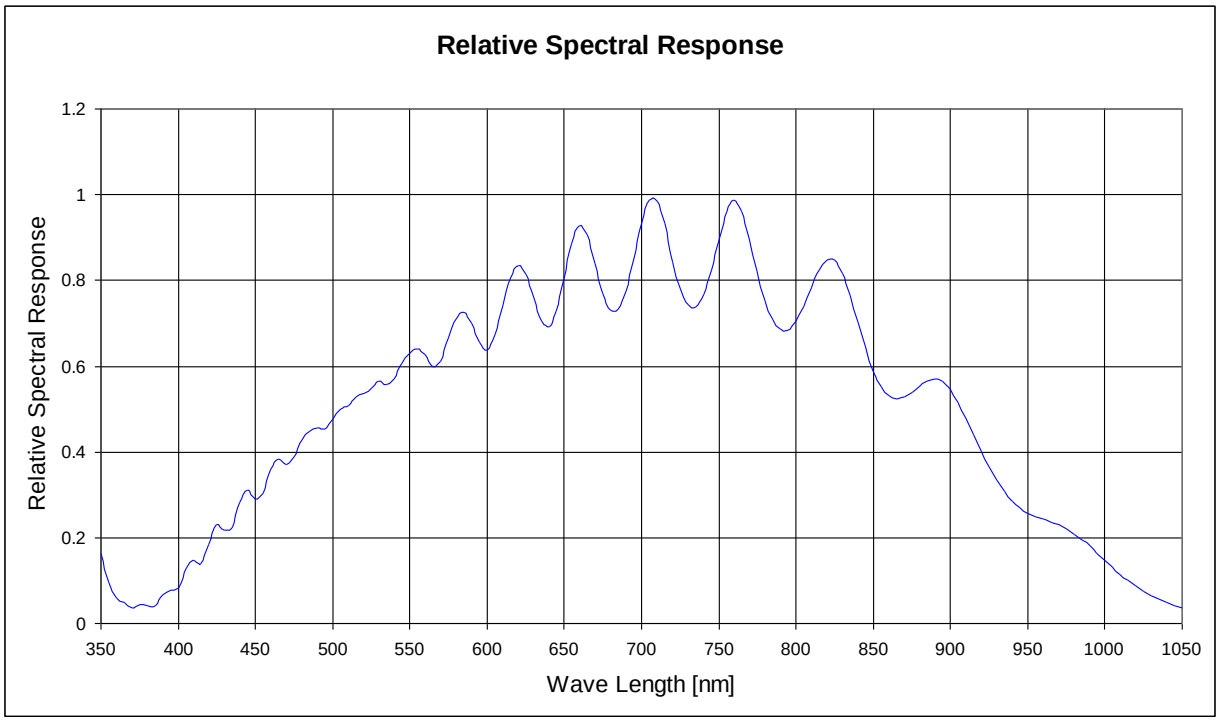

Figure 2

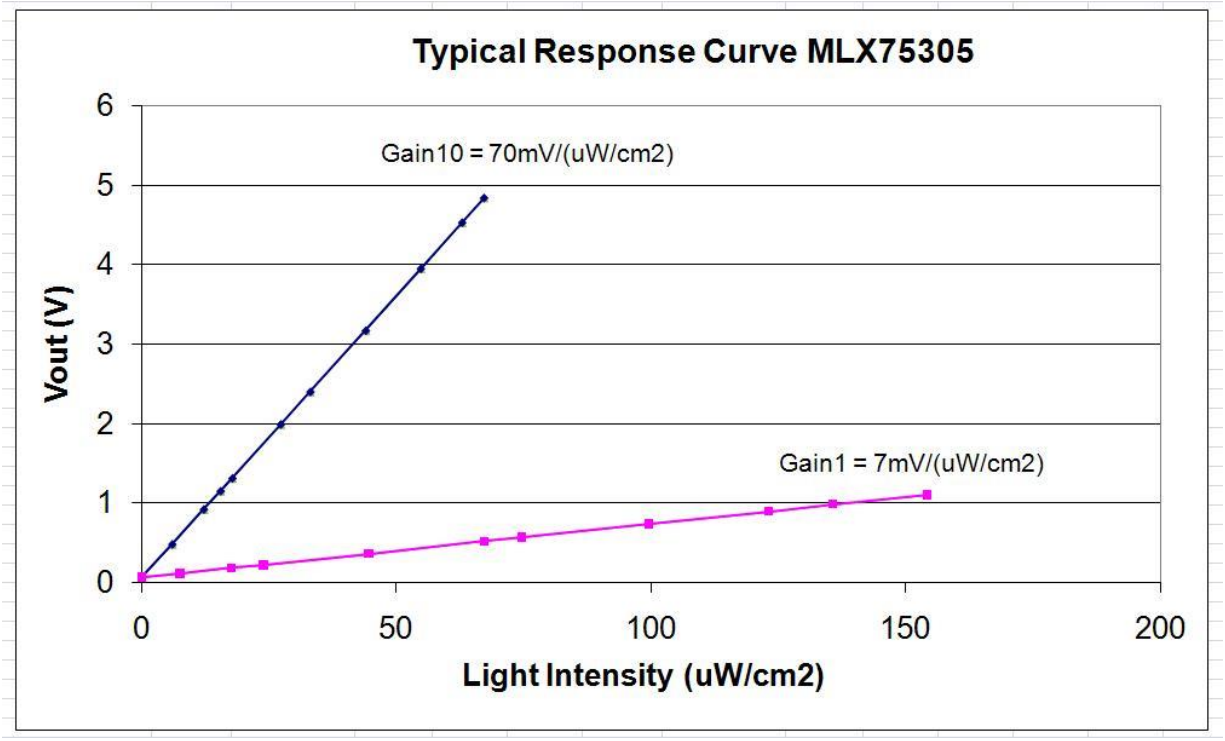

Figure 3

10. Timing diagrams

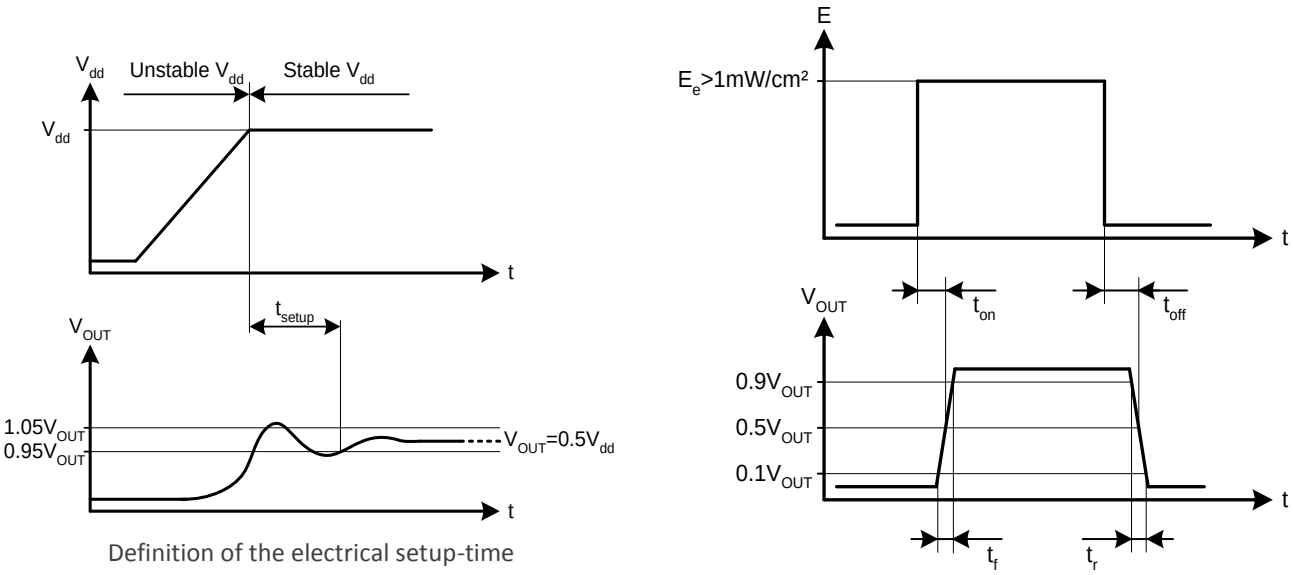

Figure 4

11. Applications Information

A typical connection diagram is shown in the figure below. A load resistor R_L is needed to get the voltage level out. The load capacitance C_L is typically formed by the input capacitance of the component that is connected to the sensor output, the wiring capacitance and the output capacitance of the sensor itself.

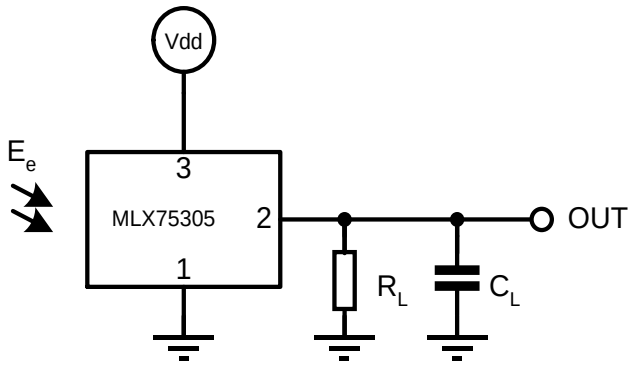

Figure 5

Decoupling capacitors between *Vdd* and *Vss* (1uF in parallel with 100nF) are highly recommended in all configurations.

Recommendation: every change in the application should be agreed by both parties.

12. SO8 Open Cavity Package Information

SO8 open cavity package, MSL3, 260˚C soldering profile.

Dimensions and marking for MLX75305EXD-AAA-000-RE and MLX75305KXD-AAA-000-RE (gain 10)

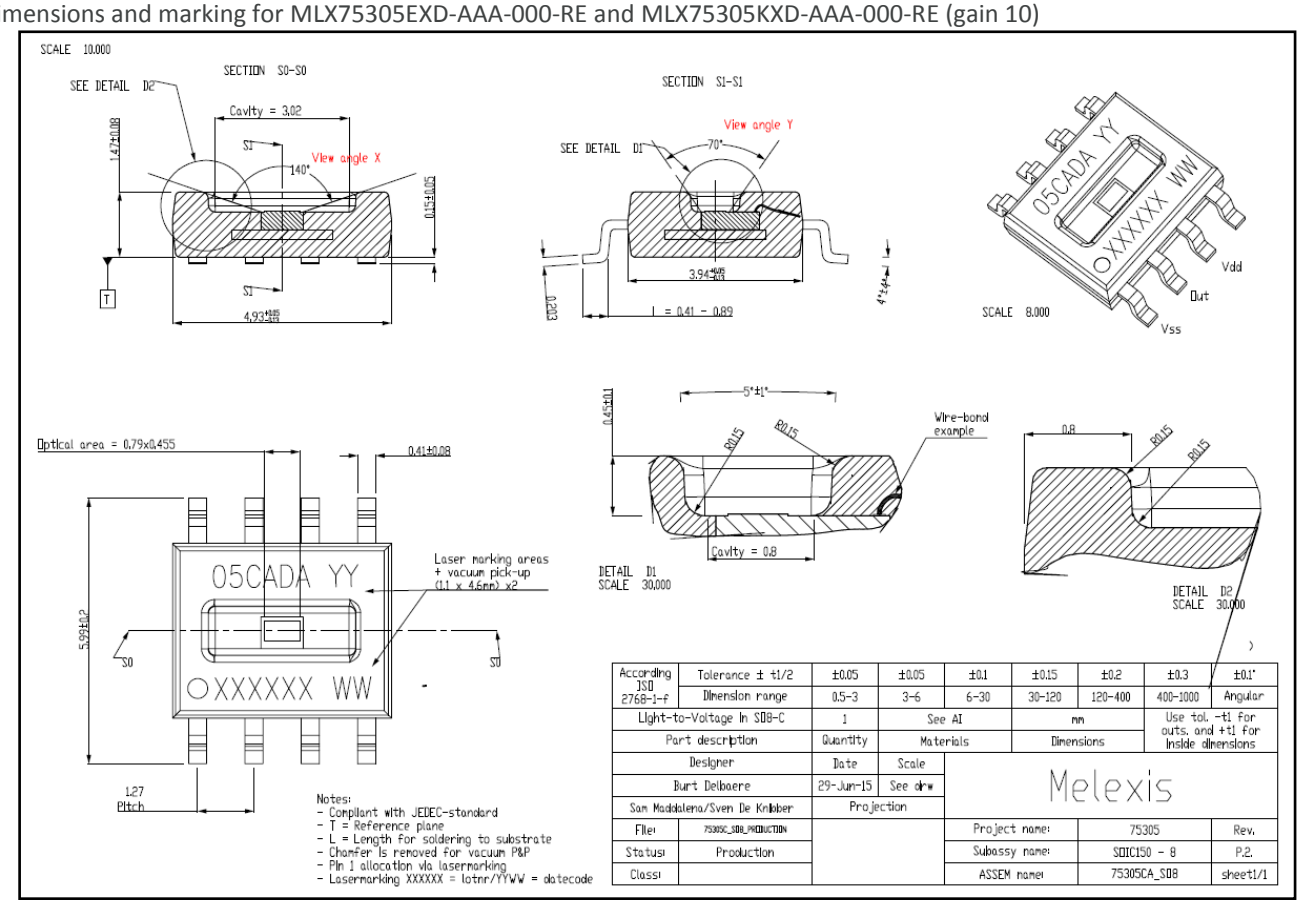

Figure 6

Dimensions and marking for MLX75305EXD-ABA-000-RE and MLX75305KXD-ABA-000-RE (gain 1)

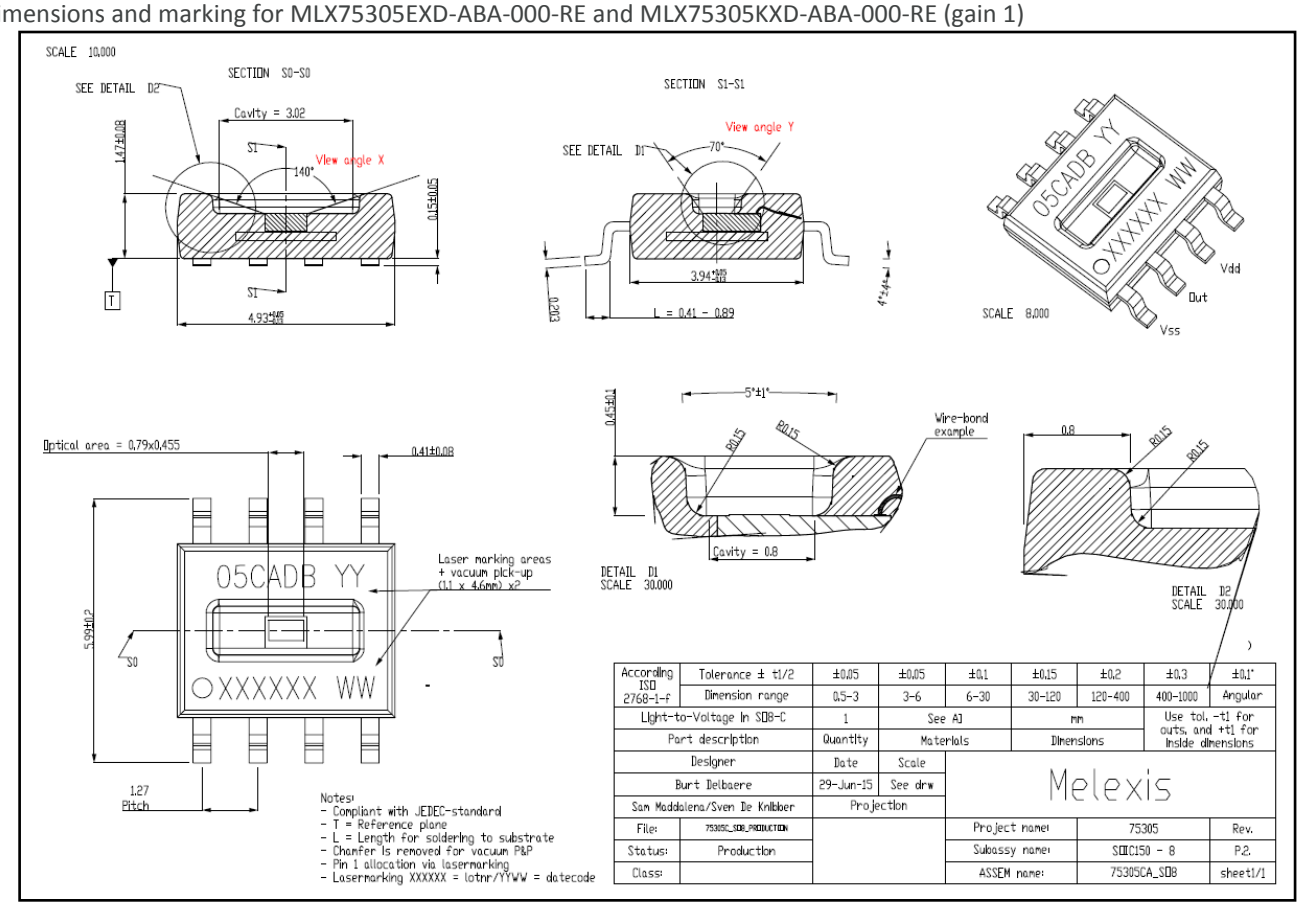

Figure 7

13. Standard Information

Our products are classified and qualified regarding soldering technology, solderability and moisture sensitivity level according to standards in place in Semiconductor industry.

For further details about test method references and for compliance verification of selected soldering method for product integration, Melexis recommends reviewing on our web site the General Guidelines soldering recommendation. For all soldering technologies deviating from the one mentioned in above document (regarding peak temperature, temperature gradient, temperature profile etc), additional classification and qualification tests have to be agreed upon with Melexis.

For package technology embedding trim and form post-delivery capability, Melexis recommends to consult the dedicated trim&form recommendation application note: lead trimming and forming recommendations

Melexis is contributing to global environmental conservation by promoting **lead free** solutions. For more information on qualifications of **RoHS** compliant products (RoHS = European directive on the Restriction Of the use of certain Hazardous Substances) please visit the quality page on our website: http://www.melexis.com/en/quality-environment

14. ESD Precautions

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Always observe Electro Static Discharge control procedures whenever handling semiconductor products.

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