

# MC100EPT622

## 3.3V LVTTTL/LVCMOS to LVPECL Translator

The MC100EPT622 is a 10-Bit LVTTTL/LVCMOS to LVPECL translator. Because LVPECL (Positive ECL) levels are used only +3.3 V and ground are required. The device has an OR-ed enable input which can accept either LVPECL (ENPECL) or TTL/LVCMOS inputs (ENTTL). If the inputs are left open, they will default to the enable state. The device design has been optimized for low channel-to-channel skew

- 450 ps Typical Propagation Delay
- Maximum Frequency > 1.5 GHz Typical
- PECL Mode
- Operating Range:  $V_{CC} = 3.0\text{ V to }3.8\text{ V}$  with  $V_{EE} = 0\text{ V}$
- PNP LVTTTL Inputs for Minimal Loading
- Q Output Will Default HIGH with Inputs Open
- The 100 Series Contains Temperature Compensation.

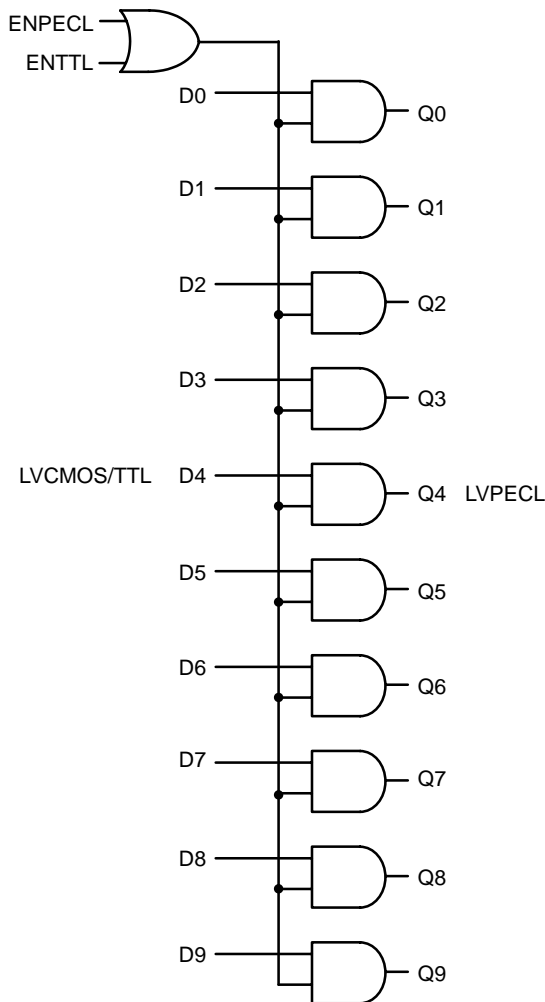


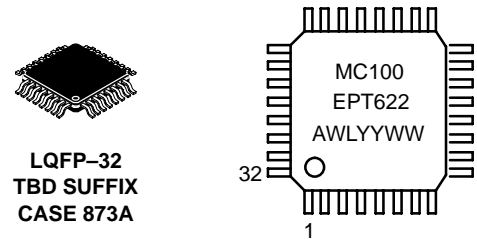
Figure 1. Logic Symbol



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### MARKING DIAGRAM\*



A = Assembly Location  
 WL = Wafer Lot  
 YY = Year  
 WW = Work Week

\*For additional information, see Application Note AND8002/D

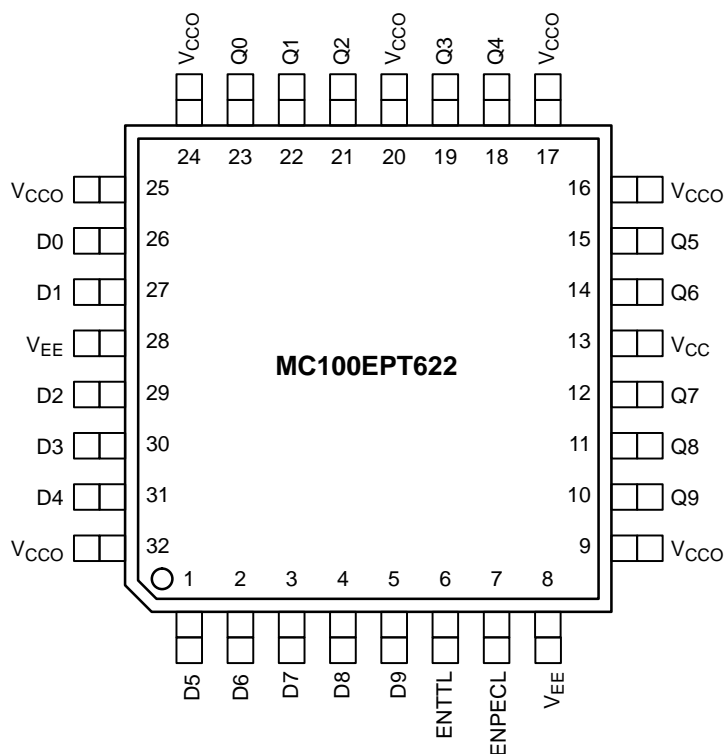
### ORDERING INFORMATION

| Device          | Package | Shipping         |
|-----------------|---------|------------------|
| MC100EPT622FA   | LQFP32  | 250 Unit Trays   |
| MC100EPT622FAR2 | LQFP32  | 2000 Tape & Reel |

### TRUTH TABLE

| ENPECL | ENTTL | D | Q |
|--------|-------|---|---|
| H      | X     | H | H |
| H      | X     | L | L |
| X      | H     | H | H |
| X      | H     | L | L |
| L      | L     | X | L |

# MC100EPT622



## PIN DESCRIPTION

| PIN             | FUNCTION              |
|-----------------|-----------------------|
| D0:9            | Data Input (TTL)      |
| Q0:9            | Data Output (PECL)    |
| ENTTL           | Enable Control (TTL)  |
| ENPECL          | Enable Control (PECL) |
| V <sub>CC</sub> | Positive Supply       |
| V <sub>EE</sub> | Ground                |

Warning: All V<sub>CC</sub> and V<sub>EE</sub> pins must be externally connected to Power Supply to guarantee proper operation.

Figure 1. 32-Lead LQFP Pinout (Top View)

## ATTRIBUTES

| Characteristics  | Value   |
|--|---|
| Internal Input Pulldown Resistor                       | N/A   |
| Internal Input Pullup Resistor                         | N/A   |
| ESD Protection   | Human Body Model<br>Machine Model<br>Charged Device Model |
|  | > 2 kV<br>> 200 V<br>> 2 kV                               |
| Moisture Sensitivity, Indefinite Time Out of Drypack   | Level 2   |
| Flammability Rating                                    | Oxygen Index: 28 to 34<br>UL 94 V-0 @ 0.125 in            |
| Transistor Count                                       | 596 Devices   |
| Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test |   |

## MAXIMUM RATINGS (Note 1)

| Symbol           | Parameter                                | Condition 1           | Condition 2                      | Rating      | Units        |
|------------------|--|-----------------------|----------------------------------|-------------|--------------|
| V <sub>CC</sub>  | Power Supply                             | V <sub>EE</sub> = 0 V |                                  | 5           | V            |
| V <sub>I</sub>   | Input Voltage                            | V <sub>EE</sub> = 0 V | V <sub>I</sub> ≤ V <sub>CC</sub> | 5 to 0      | V            |
| I <sub>out</sub> | Output Current                           | Continuous<br>Surge   |                                  | 50<br>100   | mA<br>mA     |
| T <sub>A</sub>   | Operating Temperature Range              |                       |                                  | -40 to +85  | °C           |
| T <sub>stg</sub> | Storage Temperature Range                |                       |                                  | -65 to +150 | °C           |
| θ <sub>JA</sub>  | Thermal Resistance (Junction-to-Ambient) | 0 LFPM<br>500 LFPM    | 32 LQFP<br>32 LQFP               | 80<br>55    | °C/W<br>°C/W |
| θ <sub>JC</sub>  | Thermal Resistance (Junction-to-Case)    | std bd                | 32 LQFP                          | 12 to 17    | °C/W         |
| T <sub>sol</sub> | Wave Solder                              | <2 to 3 sec @ 248°C   |                                  | 265         | °C           |

1. Maximum Ratings are those values beyond which device damage may occur.

# MC100EPT622

## TTL INPUT DC CHARACTERISTICS $V_{CC} = 3.3\text{ V}$ , $GND = 0.0\text{ V}$ , $T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$

| Symbol    | Characteristic         | Condition                | Min  | Typ  | Max  | Unit          |
|-----------|------------------------|--------------------------|------|------|------|---------------|
| $I_{IH}$  | Input HIGH Current     | $V_{IN} = 2.7\text{ V}$  |      |      | 20   | $\mu\text{A}$ |
| $I_{IHH}$ | Input HIGH Current MAX | $V_{IN} = V_{CC}$        |      |      | 100  | $\mu\text{A}$ |
| $I_{IL}$  | Input LOW Current      | $V_{IN} = 0.5\text{ V}$  |      |      | -0.6 | $\text{mA}$   |
| $V_{IK}$  | Input Clamp Voltage    | $I_{IN} = -18\text{ mA}$ | -1.2 | -0.9 |      | $\text{V}$    |
| $V_{IH}$  | Input HIGH Voltage     |                          | 2.0  |      |      | $\text{V}$    |
| $V_{IL}$  | Input LOW Voltage      |                          |      |      | 0.8  | $\text{V}$    |

## PECL INPUT DC CHARACTERISTICS $V_{CC} = 3.3\text{ V}$ , $GND = 0.0\text{ V}$ , $T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$

| Symbol   | Characteristic     | Condition                 | Min  | Typ | Max  | Unit          |
|----------|--------------------|---------------------------|------|-----|------|---------------|
| $I_{IH}$ | Input HIGH Current | $V_{IN} = 2420\text{ mV}$ |      |     | 150  | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current  | $V_{IN} = 1490\text{ mV}$ |      |     | 200  | $\mu\text{A}$ |
| $V_{IH}$ | Input HIGH Voltage |                           | 2075 |     | 2420 | $\text{mV}$   |
| $V_{IL}$ | Input LOW Voltage  |                           | 1490 |     | 1675 | $\text{mV}$   |

## PECL OUTPUT DC CHARACTERISTICS $V_{CC} = 3.3\text{ V}$ , $GND = 0.0\text{ V}$ (Note 2)

| Symbol   | Characteristic              | $-40^\circ\text{C}$ |      |      | $25^\circ\text{C}$ |      |      | $85^\circ\text{C}$ |      |      | Unit        |
|----------|-----------------------------|---------------------|------|------|--------------------|------|------|--------------------|------|------|-------------|
|          |                             | Min                 | Typ  | Max  | Min                | Typ  | Max  | Min                | Typ  | Max  |             |
| $I_{EE}$ | Power Supply Current        | 85                  | 115  | 145  | 90                 | 120  | 155  | 95                 | 130  | 155  | $\text{mA}$ |
| $V_{OH}$ | Input High Voltage (Note 3) | 2155                | 2280 | 2405 | 2155               | 2280 | 2405 | 2155               | 2280 | 2405 | $\text{mV}$ |
| $V_{OL}$ | Input Low Current (Note 3)  | 1355                | 1480 | 1605 | 1355               | 1480 | 1605 | 1355               | 1480 | 1605 | $\text{mV}$ |

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lpm is maintained.

- Input and output parameters vary 1:1 with  $V_{CC}$ .
- All loading with  $50\ \Omega$  to  $V_{CC} - 2.0\text{ V}$ .

## AC CHARACTERISTICS $V_{CC} = 3.0\text{ V}$ to $3.8\text{ V}$ (Note 4)

| Symbol                                 | Characteristic  | $-40^\circ\text{C}$ |                          |                          | $25^\circ\text{C}$ |                          |                          | $85^\circ\text{C}$ |                          |                          | Unit         |
|--|---|---------------------|--------------------------|--------------------------|--------------------|--------------------------|--------------------------|--------------------|--------------------------|--------------------------|--------------|
|  |   | Min                 | Typ                      | Max                      | Min                | Typ                      | Max                      | Min                | Typ                      | Max                      |              |
| $f_{\text{max}}$                       | Maximum Frequency (See Figure 2)  | 1.0                 | 1.5                      |                          | 1.0                | 1.5                      |                          | 1.0                | 1.5                      |                          | $\text{GHz}$ |
| $t_{\text{PLH}}$ ,<br>$t_{\text{PHL}}$ | Propagation Delay to Output (Figure 3, Note 5)<br>D to Q<br>ENPECL to Q<br>ENTTL to Q         | 100<br>200<br>300   | 450<br>450<br>450        | 800<br>850<br>800        | 100<br>200<br>300  | 500<br>500<br>500        | 800<br>850<br>800        | 100<br>200<br>300  | 500<br>500<br>500        | 800<br>850<br>800        | $\text{ps}$  |
| $t_{\text{JITTER}}$                    | Random Clock Jitter (RMS) (See Figure 2)  |                     | 0.7                      | 3.0                      |                    | 0.7                      | 3.0                      |                    | 0.7                      | 3.0                      | $\text{ps}$  |
| $t_r / t_f$                            | Output Rise/Fall Times (20% – 80%)  | 100                 | 200                      | 450                      | 100                | 200                      | 250                      | 100                | 200                      | 300                      | $\text{ps}$  |
| $T_{\text{SKEW}}$                      | Duty Cycle Skew (Note 6)<br>D to Q<br>Channel 0–7<br>Channel 8–9<br>ENPECL to Q<br>ENTTL to Q |                     | 120<br>200<br>120<br>120 | 300<br>500<br>350<br>250 |                    | 120<br>200<br>120<br>120 | 300<br>500<br>350<br>250 |                    | 120<br>200<br>120<br>120 | 300<br>500<br>350<br>250 | $\text{ps}$  |

- Measured using a 2.4 V source, 50% duty cycle clock source. All loading with  $50\ \Omega$  to  $V_{CC} - 2.0\text{ V}$ .
- 1.5 V to 50% point of the output.
- Duty cycle skew  $|t_{\text{PLH}} - t_{\text{PHL}}|$  on the specific path.

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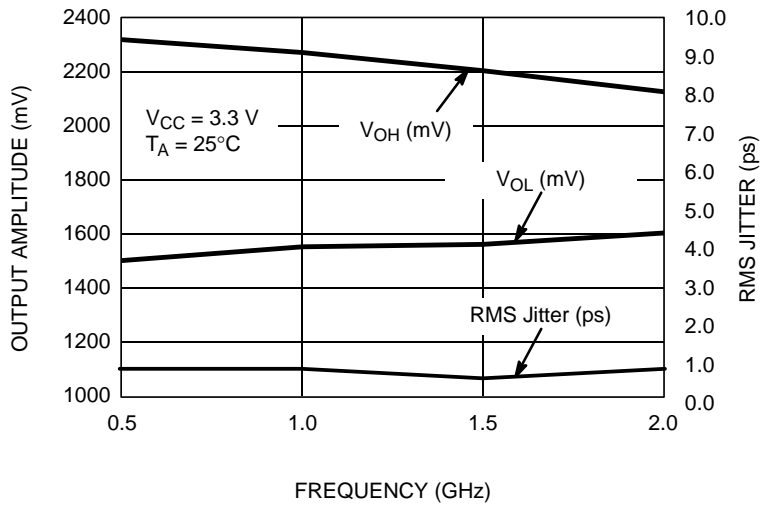


Figure 2. Average Output Amplitude/Jitter (3.3 V, 25°C)

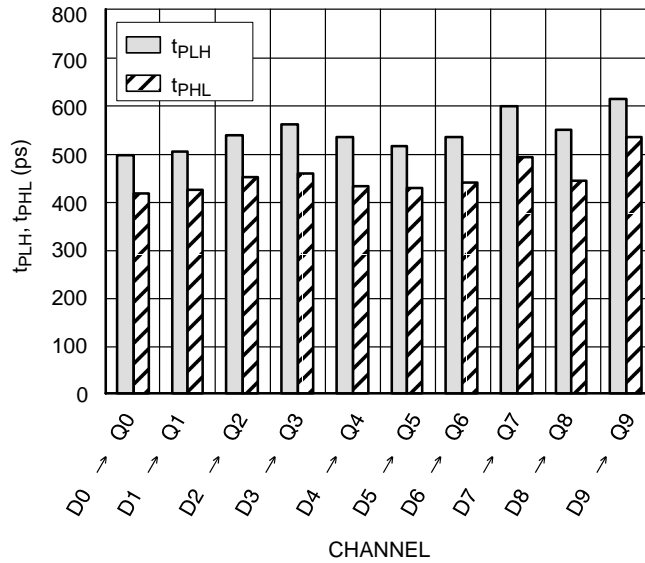


Figure 3. Average Propagation Delay (3.3 V, 25°C)

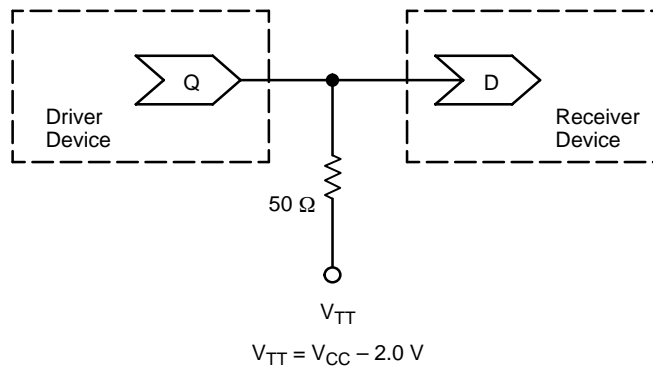


Figure 4. Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020 – Termination of ECL Logic Devices.)

**Resource Reference of Application Notes**

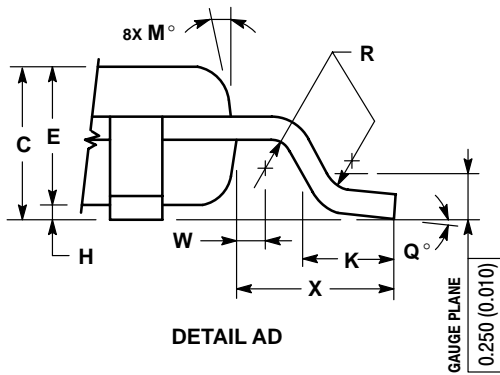
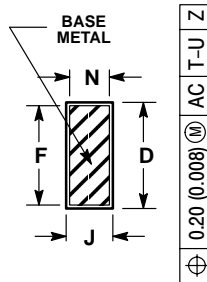
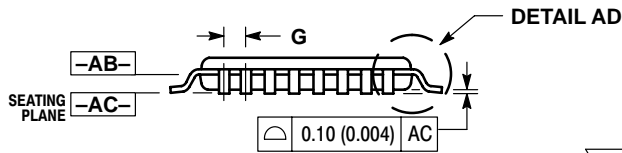
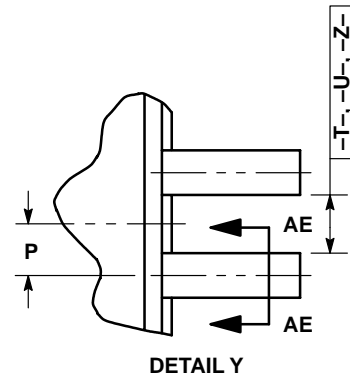
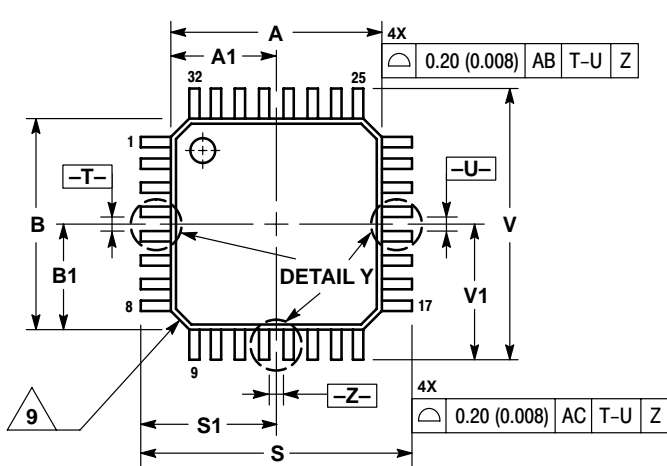
- AN1404** – ECLinPS Circuit Performance at Non–Standard  $V_{IH}$  Levels
- AN1405** – ECL Clock Distribution Techniques
- AN1406** – Designing with PECL (ECL at +5.0 V)
- AN1650** – Using Wire–OR Ties in ECLinPS Designs
- AN1672** – The ECL Translator Guide
- AND8002** – Marking and Date Codes
- AND8009** – ECLinPS Plus™ SPICE Modeling Kit
- AND8020** – Termination of ECL Logic Devices

For an updated list of Application Notes, please see our website at <http://onsemi.com>.

# MC100EPT622

## PACKAGE DIMENSIONS

LQFP  
TBD SUFFIX  
32-LEAD PLASTIC PACKAGE  
CASE 873A-02  
ISSUE A



SECTION AE-AE

- NOTES:
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  - CONTROLLING DIMENSION: MILLIMETER.
  - DATUM PLANE -AB- IS LOCATED AT BOTTOM OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE BOTTOM OF THE PARTING LINE.
  - DATUMS -T-, -U-, AND -Z- TO BE DETERMINED AT DATUM PLANE -AB-.
  - DIMENSIONS S AND V TO BE DETERMINED AT SEATING PLANE -AC-.
  - DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.250 (0.010) PER SIDE. DIMENSIONS A AND B DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE -AB-.
  - DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. DAMBAR PROTRUSION SHALL NOT CAUSE THE D DIMENSION TO EXCEED 0.520 (0.020).
  - MINIMUM SOLDER PLATE THICKNESS SHALL BE 0.0076 (0.0003).
  - EXACT SHAPE OF EACH CORNER MAY VARY FROM DEPICTION.

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 7.000 BSC   |       | 0.276 BSC |       |
| A1  | 3.500 BSC   |       | 0.138 BSC |       |
| B   | 7.000 BSC   |       | 0.276 BSC |       |
| B1  | 3.500 BSC   |       | 0.138 BSC |       |
| C   | 1.400       | 1.600 | 0.055     | 0.063 |
| D   | 0.300       | 0.450 | 0.012     | 0.018 |
| E   | 1.350       | 1.450 | 0.053     | 0.057 |
| F   | 0.300       | 0.400 | 0.012     | 0.016 |
| G   | 0.800 BSC   |       | 0.031 BSC |       |
| H   | 0.050       | 0.150 | 0.002     | 0.006 |
| J   | 0.090       | 0.200 | 0.004     | 0.008 |
| K   | 0.500       | 0.700 | 0.020     | 0.028 |
| M   | 12° REF     |       | 12° REF   |       |
| N   | 0.090       | 0.160 | 0.004     | 0.006 |
| P   | 0.400 BSC   |       | 0.016 BSC |       |
| Q   | 1°          | 5°    | 1°        | 5°    |
| R   | 0.150       | 0.250 | 0.006     | 0.010 |
| S   | 9.000 BSC   |       | 0.354 BSC |       |
| S1  | 4.500 BSC   |       | 0.177 BSC |       |
| V   | 9.000 BSC   |       | 0.354 BSC |       |
| V1  | 4.500 BSC   |       | 0.177 BSC |       |
| W   | 0.200 REF   |       | 0.008 REF |       |
| X   | 1.000 REF   |       | 0.039 REF |       |

**Notes**

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