![Texas Instruments logo]

LP8873-Q1 Automotive Display LED-Backlight Driver with Four 150mA Channels

1 Features

- AEC-Q100 qualified for automotive applications:
  - Device temperature grade 1: –40°C to +125°C, T_A
- Input voltage operating range 3V to 48V
- Four high-precision current sinks
  - Up to 150mA DC current for each channel
  - Current matching 1% (typical)
  - High dimming ratio 32 000:1 using 152Hz LED output PWM frequency
  - Up to 16-bit LED PWM dimming resolution with I2C, or PWM input
  - Support independent PWM dimming control for each channel
- Auto-phase shift PWM dimming and direct PWM dimming
- Hybrid dimming and 12-bit analog dimming
- Up to 48V V_{OUT} boost or SEPIC DC/DC converter
  - Integrated 5.4A switching FET
  - Support boost/sepic operation
  - Higher efficiency with 60mΩ R_{DSON} and fast switching
  - Boost selectable dual random spread spectrum for reduced EMI
  - Adjustable soft start of converter
  - Boost sync input to set boost switching frequency from an external clock
  - Output voltage automatically discharged when boost is disabled
- Extensive fault detection and protection
  - Up to 1MHz I2C control interface with CRC check
  - Bit-integrity (CRC) error detection on internal configuration registers and non-volatile memory (NVM)
  - Input voltage OVP, UVLO and OCP
  - Boost overcurrent and overvoltage protection
  - LED open, short and short to ground fault detection
  - Thermal warning and thermal shutdown
- Small solution size and low cost
  - Dynamically programmable wide switching frequency from 100kHz to 2.2MHz
  - Available in 4mm × 4mm HotRod™ QFN package with wettable flank

2 Applications

- Backlight for:
  - Automotive infotainment and clusters
  - Smart mirrors
  - Central Information Display (CID)
  - Head-up display (HUD)
  - Camera Monitoring Systems

3 Description

The LP8873-Q1 is an automotive high-efficiency, low-EMI and easy-to-use LED driver with integrated DC-DC power switch. The DC-DC converter supports both boost and SEPIC topology configuration. The four high-precision current sinks support PWM phase shifting that is automatically adjusted based on the number of channels in use. LED brightness can be controlled globally through the I²C interface or PWM input.
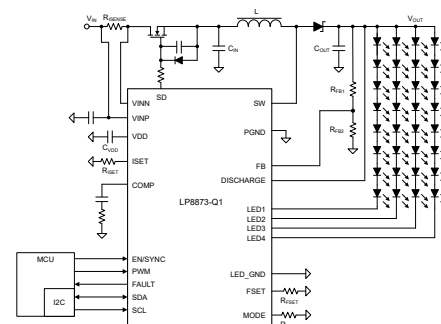
The boost converter has adaptive output voltage control based on the headroom voltages of the LED current sinks. This feature minimizes the power consumption by adjusting the boost voltage to the lowest sufficient level in all conditions.

The LP8873-Q1 supports built-in hybrid PWM dimming and analog current dimming, which reduces EMI, extends the LED lifetime, and increases the total optical efficiency.

Device Information

PART NUMBER[1]	PACKAGE	BODY SIZE (NOM)
LP8873-Q1	HTSSOP (28)	9.70mm × 4.40mm
	QFN (24)[2]	4.00mm × 4.00mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.
(2) Product preview.

Simplified Schematic

Table of Contents

4 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
July 2025	*	Initial Release

Product Folder Links: *LP8873-Q1*

5 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGE OPTION ADDENDUM

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
LP8873QPWPRQ1	Active	Production	HTSSOP (PWP) | 28	2500 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	LP8873Q
LP8873QRBBRQ1	Active	Production	VQFN-HR (RBB) | 24	3000 | LARGE T&R	-	SN	Level-2-260C-1 YEAR	-40 to 125	LP8873Q

(1) Status: For more details on status, see our product life cycle.

(2) Material type: When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) RoHS values: Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

(4) Lead finish/Ball material: Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) MSL rating/Peak reflow: The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) Part marking: There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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TAPE AND REEL INFORMATION

REEL DIMENSIONS

TAPE DIMENSIONS

A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LP8873QPWPRQ1	HTSSOP	PWP	28	2500	330.0	16.4	6.9	10.2	1.8	12.0	16.0	Q1
LP8873QRBBRQ1	VQFN-HR	RBB	24	3000	330.0	12.4	4.25	4.25	1.15	8.0	12.0	Q2

TAPE AND REEL BOX DIMENSIONS

*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LP8873QPWPRQ1	HTSSOP	PWP	28	2500	353.0	353.0	32.0
LP8873QRBBRQ1	VQFN-HR	RBB	24	3000	360.0	360.0	36.0

This image is a representation of the package family, actual package may vary.
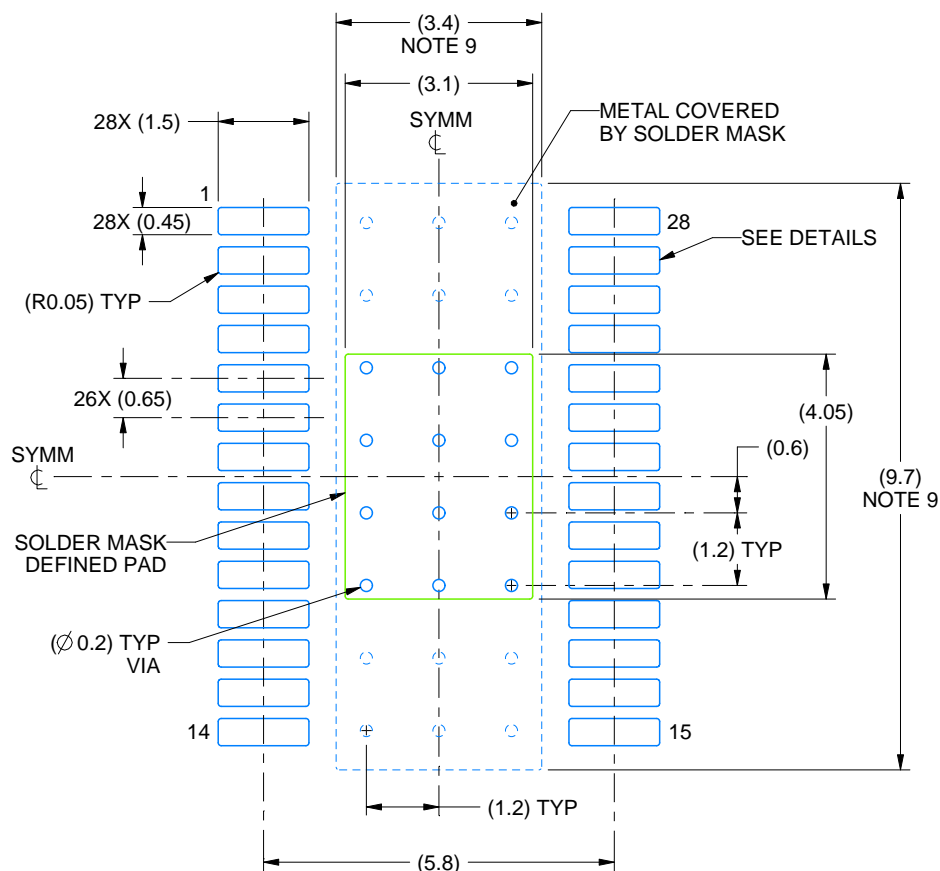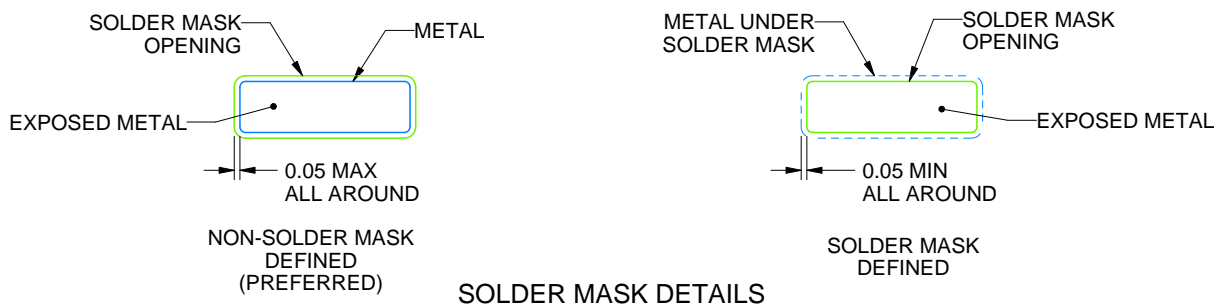Refer to the product data sheet for package details.

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4224480/A   08/2018

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NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MO-153.
5. Features may differ or may not be present.

PWP0028M

LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 8X

SOLDER MASK OPENING
METAL
EXPOSED METAL
0.05 MAX
ALL AROUND
NON-SOLDER MASK DEFINED
(PREFERRED)

METAL UNDER SOLDER MASK
SOLDER MASK OPENING
EXPOSED METAL
0.05 MIN
ALL AROUND
SOLDER MASK DEFINED

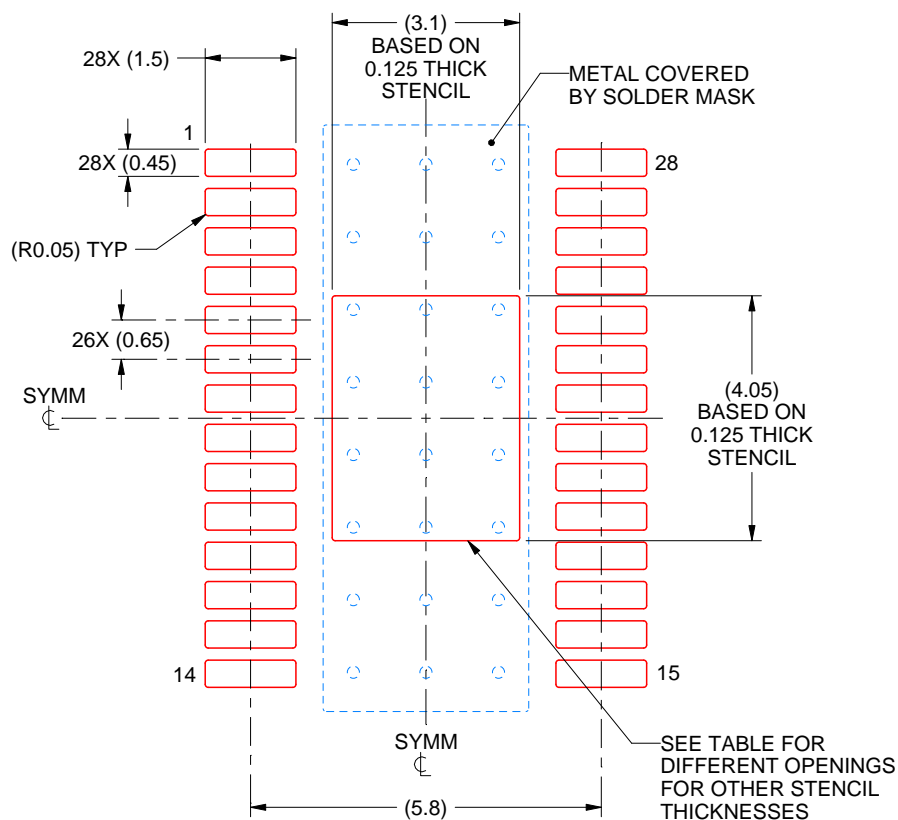SOLDER MASK DETAILS

4224480/A   08/2018

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
8. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature numbers SLMA002 (www.ti.com/lit/slma002) and SLMA004 (www.ti.com/lit/slma004).
9. Size of metal pad may vary due to creepage requirement.
10. Vias are optional depending on application, refer to device data sheet. It is recommended that vias under paste be filled, plugged or tented.

TEXAS
INSTRUMENTS
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28X (1.5)

28X (0.45)

(R0.05) TYP

26X (0.65)

SYMM

(3.1)
BASED ON
0.125 THICK
STENCIL

METAL COVERED
BY SOLDER MASK

(4.05)
BASED ON
0.125 THICK
STENCIL

SEE TABLE FOR
DIFFERENT OPENINGS
FOR OTHER STENCIL
THICKNESSES

SYMM

(5.8)

SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 8X

STENCIL THICKNESS	SOLDER STENCIL OPENING
0.1	3.47 X 4.53
0.125	3.10 X 4.05 (SHOWN)
0.15	2.83 X 3.70
0.175	2.62 X 3.42

4224480/A   08/2018

NOTES: (continued)

11. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
12. Board assembly site may have different recommendations for stencil design.

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