

## LP3913

# Power Management IC for Flash Memory Based Portable Media Players

### General Description

The LP3913 is a programmable system power management unit that is optimized for Flash Memory based Portable Media Players.

The LP3913 incorporates 2 low-dropout LDO voltage regulators, 3 integrated Buck DC/DC converters with Dynamic Voltage Scaling (DVS), a 4-channel 8-bit A/D converter, and a dual source Li-Ion/polymer battery charger. The charger has the capability to charge and maintain a single cell battery from a regulated wall adapter or USB power. When both USB and adapter sources are present, then the adapter source takes precedence and switching between USB and adapter power sources is seamless. In addition, the battery charger supports power routing, which allows system usage immediately after an external power source has been detected. The LP3913 also incorporates some advanced battery management functions such as battery temperature measurement, reverse current blocking for USB, LED charger status indication, thermally regulated internal power FETs, battery voltage monitoring, over-current protection and a 10 hour safety timer.

The 4-channel A/D converter measures the battery voltage and charge current, which can be used for fuel gauging. Two undedicated channels can be used to measure other analog parameters such as discharge current, battery temperature, keyboard resistor scanning and more.

The various IC parameters are programmable through a 400 kHz I<sup>2</sup>C compatible interface.

The LP3913 is available in a thermally-enhanced 6x6x0.8 mm 48 LLP package and operates over an ambient temperature range of -40°C to +85°C.

### Features

- 2 low-dropout regulators -- LDO1 is used for general purpose applications, LDO2 is used for low-noise analog applications. Both LDOs have programmable output voltages.
- Green and Red LED charger status drivers
- 4-channel 8-bit dual slope a/d converter
- 3 High-efficiency DVS Buck converters
- 400 kHz I<sup>2</sup>C compatible interface
- Linear constant-current / constant-voltage charger for single cell lithium-ion batteries
- USB and Adapter charging
- System power supply management
- 6x6x0.8mm 48 LLP package
- Voltage and thermal supervisory circuits
- Continuous battery voltage monitoring
- Interrupt Request output with 8 sources
- LP3913 is pin for pin and software compatible with the LP3910 Hard Drive based PMIC

### Key Specifications

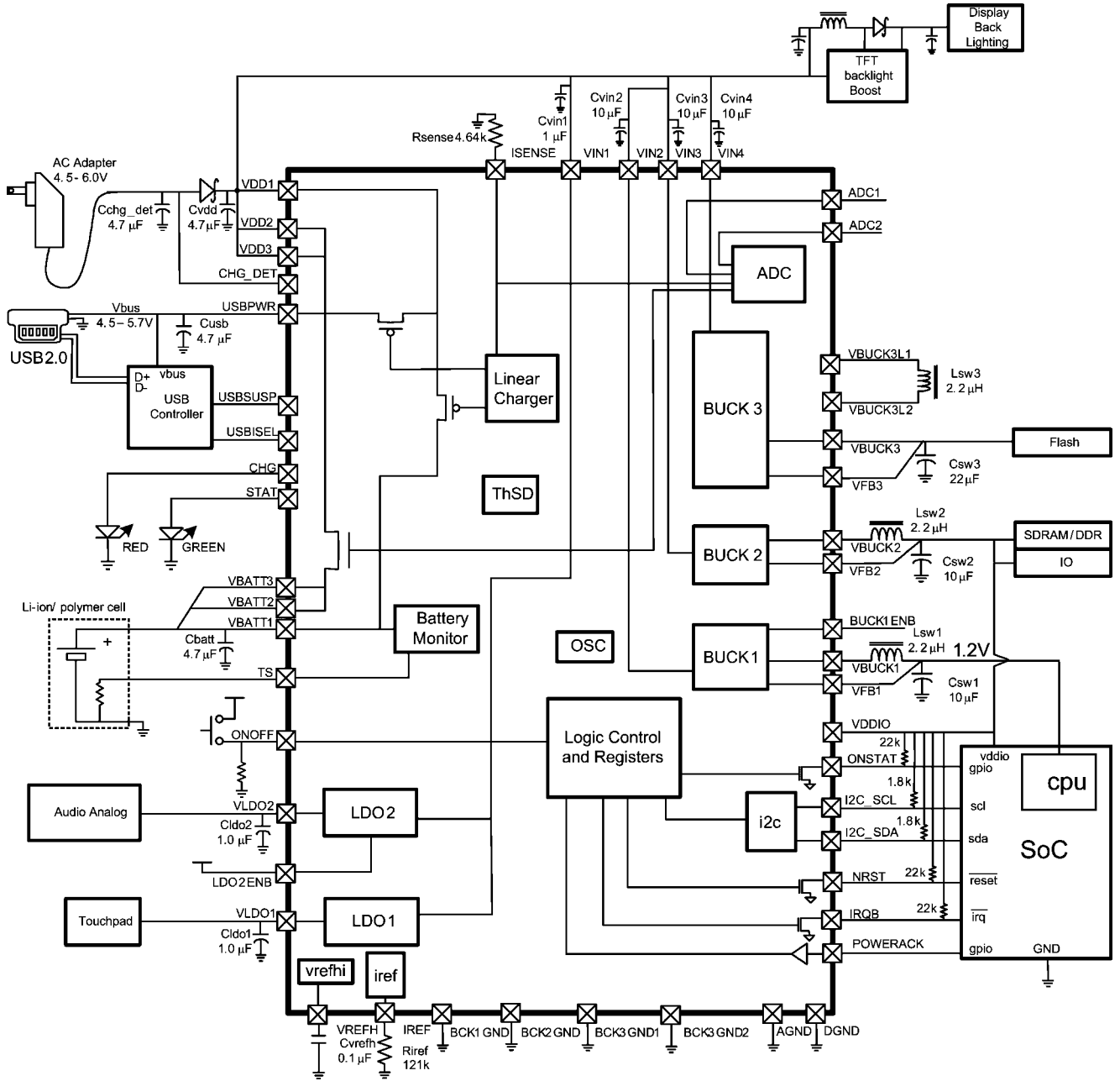
- LDO1: 150 mA, 1.2V–3.3V
- LDO2: 150 mA, 1.3V–3.3V
- Buck1: 600 mA, 0.8V–2.0V
- Buck2: 600 mA, 1.8V–3.3V
- Buck3: 500 mA, 1.8V–3.3V
- 50 mΩ battery path resistance
- 100 mA–1000 mA full-rate charge current using wall adapter
- Selectable 0.05C and 0.1C EOC current
- USB current limit of 100 mA, 500 mA, and 800 mA
- USB pre-qual current of 50 mA
- Selectable 4.1V, 4.2V or 4.38V battery termination voltages
- 0.35% battery termination accuracy
- ±1 LSB INL/DNL on 8-bit a/d converter

### Applications

- Flash-based portable media players
- Portable gaming devices
- Portable navigation systems

# Typical Application Circuit

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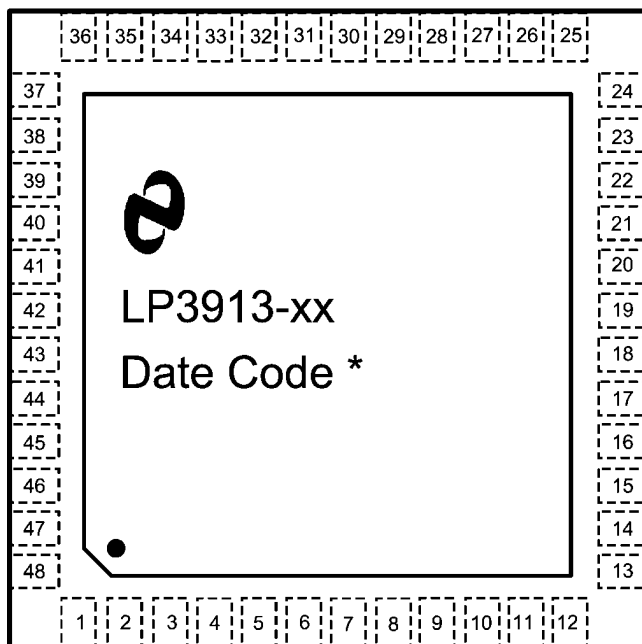
30000101

FIGURE 1. Application Diagram

## Connection Diagram

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Device Connection Diagram



30000102

48 LLP Package (Top View)  
SQF48A

The physical placement of the package marking will vary from part to part.

(\*) UZXYTT format: 'U' – wafer fab code; 'Z' – assembly code; 'XY' 2 digit date code; 'TT' – die run code

See [http://www.national.com/quality/marketing\\_conventions.html](http://www.national.com/quality/marketing_conventions.html) for more information on marking information.

## Ordering Information

Order Number	Package Type	NSC Package Drawing	Top Mark	Supplied As
LP3913SQ-AB	48-lead LLP	SQF48A	LP3913SQ-AB	250 tape & reel
LP3913SQX-AB	48-lead LLP	SQF48A	LP3913SQX-AB	3000 tape & reel

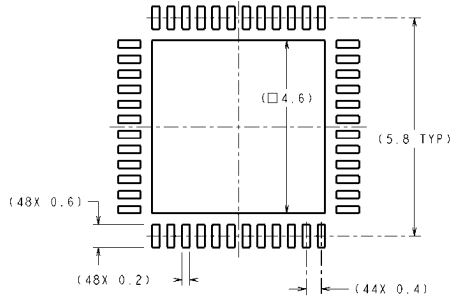
## Device Default Options

Order Number	LDO1	LDO2	Buck1	Buck2	BuckBoost	Other Options
LP3910SQ-AB	2.0V	3.3V	1.2V	3.3V	1.8V	Standard Defaults
LP3910SQX-AB	2.0V	3.3V	1.2V	3.3V	1.8V	Standard Defaults

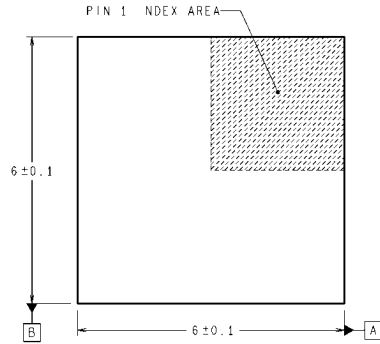
# Physical Dimensions

inches (millimeters) unless otherwise noted

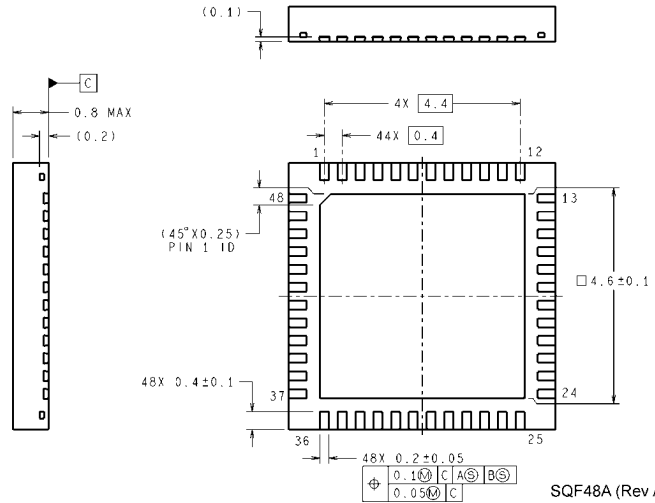
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RECOMMENDED LAND PATTERN



DIMENSIONS ARE IN MILLIMETERS  
DIMENSIONS IN ( ) FOR REFERENCE ONLY



SQF48A Package: 6x6x0.8mm 48-Pin LLP Package with 0.4mm Pitch

SQF48A (Rev A)

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## Notes

## Notes

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