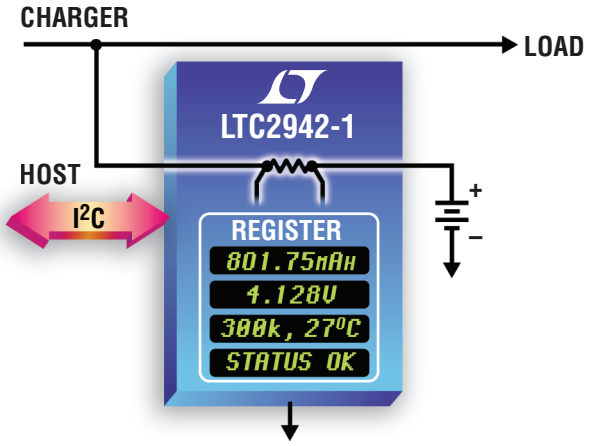
I²C Battery Gas Gauges



Measure Charge, Voltage and Temperature

For applications requiring accurate battery gas gauging, the LTC®2941 and LTC2942 coulomb counters provide tiny and easy-to-use solutions. The LTC2941/LTC2942 use a continuous-time analog integrator, resulting in minimal offset and gain error and better overall charge accuracy. The bidirectional analog integrator accommodates both battery charge and discharge, and a programmable prescaler allows for a wide range of battery capacities. The LTC2942 incorporates a 14-bit ΔΣ ADC to measure battery voltage and die temperature. The LTC2941-1 and LTC2942-1 also integrate a 50mΩ sense resistor to provide up to ±1A measurement range. Charge, voltage* and temperature* are all communicated to the host system over an I²C/SMBus compatible interface.

Features

- Indicates Accumulated Battery Charge and Discharge
- SMBus/I²C Interface
- 14-Bit ADC Measures Battery Voltage and Temperature (*LTC2942)
- High Side Current Sense with ±50mV Sense Range
- Integrated 50mΩ High Side Sense Resistor with ±1A Range (LTC2941-1/LTC2942-1)
- 1% Voltage and Charge Accuracy
- ±50mV Sense Voltage Range
- Programmable High/Low Thresholds for All Measured Parameters
- Configurable Alert Output/Charge Complete Input
- Quiescent Current <100µA

Linear Technology I²C Battery Gas Gauges

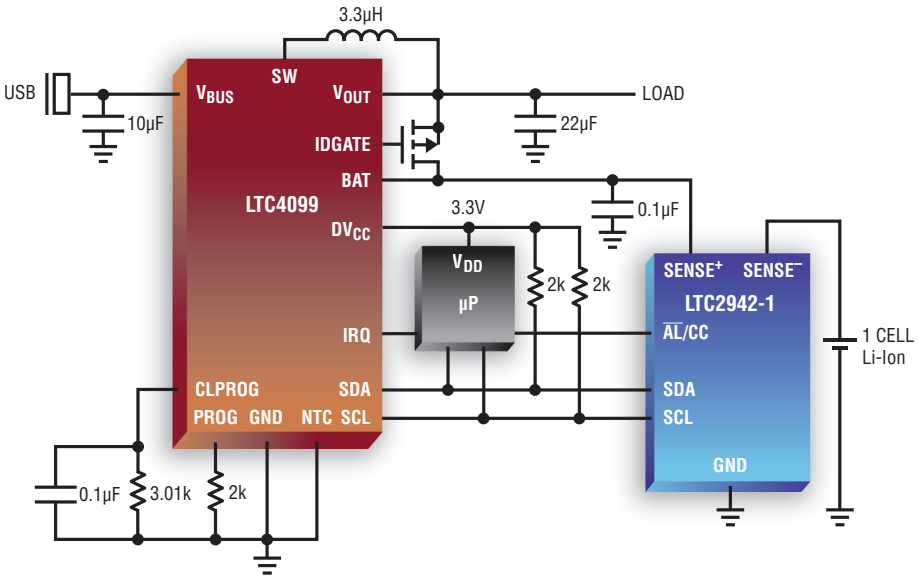
	LTC2941/ LTC2941-1	LTC2942/ LTC2942-1
Operating Voltage Range	2.7V to 5.5V	2.7V to 5.5V
Voltage and Temperature Measurement	No	Yes
Integrated Sense Resistor	No/Yes	No/Yes
Package	2mm × 3mm DFN-6	2mm × 3mm DFN-6

Total Charge Error (TCE) Over Temperature

Part	Sense Resistor	TCE
LTC2942-1	N/A	2.8%
LTC2942	±1%, 100ppm/°C ($0.10)	5.1%
	±0.1%, 50ppm/°C ($0.30)	3.9%
	±0.1%, 15ppm/°C ($3.75)	3.6%

LINEAR TECHNOLOGY

Power Manager Products for Li-Ion Batteries



The LTC2941/LTC2942 battery gas gauges are ideal companions to Linear Technology's extensive family of single-cell Li-Ion battery chargers and USB power managers. Pairing with the LTC4099 I²C controlled USB power manager/charger provides a powerful combination that enables I²C programmability of charge functions and complete I²C monitoring of battery state-of-charge information.

The LTC4099's switchmode topology features PowerPath™ control, which seamlessly manages power flow between a wall adapter or USB port and the device's Li-Ion/Polymer battery, while preferentially providing power to the system load. This revolutionary input current-limited switching regulator design allows higher charge current than conventional linear approaches, while meeting USB specifications.

USB Power Managers for 1-Cell Li-Ion/Polymer Batteries

Part Number	Maximum Charge Current (A)	Power Manager Topology	Input Voltage (V)	Optional External Ideal Diode Controller	Package	Comments and Features
LTC4055/ LTC4055-1	1	Linear	4.3 to 5.5	No	4mm × 4mm QFN-16	Bat-Track™, LTC4055-1 Has 4.1V V_{FLOAT}
LTC4160/ LTC4160-1	1.2	Switching	4.35 to 5.5	Yes	3mm × 4mm QFN-20	Bidirectional Switcher Generates 5V at 0.5A for USB On-the-Go Applications, 6.1V OVP, Bat-Track, Instant-On Operation, LTC4160-1 Has 4.1V V_{FLOAT}
LTC4089	1.2	Linear	4.35 to 5.5 USB, 6 to 36 Wall (40V Max)	Yes	3mm × 6mm DFN-22	Bat-Track, Instant-On Operation
LTC4089-1/ LTC4089-5	1.2	Linear	4.35 to 5.5 USB, 6 to 36 Wall (40V Max)	Yes	3mm × 6mm DFN-22	Instant-On Operation, LTC4089-1 Has Bat-Track and for 4.1V Li-Ion, LTC4089-5 Has 5V Output and for 4.2V Li-Ion
LTC4067	1.25	Linear	4.35 to 5.5	Yes	3mm × 4mm DFN-14	13V OVP
LTC4088/ LTC4088-1/ LTC4088-2	1.5	Switching	4.25 to 5.5	Yes, 30mΩ	3mm × 4mm DFN-14	Bat-Track, charge current reduces to maintain 3.6V output at load. LTC4088 has 3.3V LDO while LTC4088-1 and LTC4088-2 do not. Power-up charger state is off for LTC4088-1 and on for LTC4088-2.
LTC4098/ LTC4098-1	1.5	Switching	4.35 to 5.5 USB, Up to 38V Wall (60V Abs Max)	Yes, 30mΩ	3mm × 4mm QFN-20	66V OVP, Bat-Track, Instant-On Operation, LTC4098-1 Has 4.1V V_{FLOAT}
LTC4099	1.5	Switching	4.35 to 5.5 USB, Up to 38V Wall (60V Abs Max)	Yes, 30mΩ	3mm × 4mm QFN-20	I²C Control, Overtemperature Battery Conditioning Circuit, 66V OVP, Bat-Track, Instant-On Operation
LTC4090/ LTC4090-5	1.5	Linear	4.35 to 5.5 USB, 6 to 36 Wall (60V Max)	Yes	3mm × 6mm DFN-22	Bat-Track, Instant-On Operation, LTC4090-5 Has 5V Output and No Bat-Track
LTC4066/ LTC4066-1	1.5	Linear	4.3 to 5.5	No	4mm × 4mm QFN-24	LTC4066-1 Has 4.1V V_{FLOAT}
LTC4085/ LTC4085-1/ LTC4085-3	1.5	Linear	4.35 to 5.5	Yes, 50mΩ	3mm × 4mm DFN-14	LTC4085-1 Has 4.1V V_{FLOAT}, LTC4085-3 Has 3.95V V_{FLOAT}
LTC4155	3.5	Switching	4.35 to 5.5 USB, 77V OVP	Yes‡	4mm × 5mm QFN-28	I²C Control, USB OTG, V_{FLOAT} = 4.05V/4.1V/4.15V/4.2V
LTC4156^†	3.5	Switching	4.35 to 5.5 USB, 77V OVP	Yes‡	4mm × 5mm QFN-28	I²C Control, USB OTG, V_{FLOAT} = 3.45V/3.55V/3.6V/3.8V for Lithium Iron Phosphate

^ Future product, contact factory for details.
† $LiFePO_4$ compatible.
‡ Required external PFET serves as ideal diode.