

SBS 1.1-COMPLIANT GAS GAUGE ENABLED WITH IMPEDANCE TRACK™ TECHNOLOGY FOR USE WITH THE bq29330

FEATURES

- Next Generation Patented Impedance Track™ Technology accurately Measures Available Charge in Li-Ion and Li-Polymer Batteries
- Better than 1% Error Over Lifetime of the Battery
- Instant Accuracy – No Learning Cycle Required
- Supports the Smart Battery Specification SBS V1.1
- Powerful 8-Bit RISC CPU With Ultra-Low Power Modes
- Works With the TI bq29330 Analog Front-End (AFE) Protection IC to Provide Complete Pack Electronics Solution
- Full Array of Programmable Protection Features
 - Voltage, Current and Temperature
- Fully Integrated High Accurate Clock
- Flexible Configuration for 2 to 4 Series Li-Ion and Li-Polymer Cells
- Integrated Field Programmable FLASH Memory Eliminates the Need for External Configuration Memory
- Smart Battery Charger Control Feature
- Two 16-Bit Delta-Sigma Converter
 - Accurate Voltage and Temperature Measurements
 - Integrating Coloumb Counter for Charge Flow
 - Better Than 0.65 nVh of Resolution
 - Self-Calibrating
- Supports SHA-1 Authentication
- 20-Pin TSSOP (PW)

APPLICATIONS

- Notebook PCs
- Medical and Test Equipment
- Portable Instrumentation

DESCRIPTION

The bq20z70 SBS-compliant gas gauge IC, incorporating patented Impedance Track™ technology, is designed for battery-pack or in-system installation. The bq20z70 measures and maintains an accurate record of available charge in Li-ion or Li-polymer batteries using its integrated high-performance analog peripherals. The bq20z70 monitors capacity change, battery impedance, open-circuit voltage, and other critical parameters of the battery pack, and reports the information to the system host controller over a serial-communication bus. It is designed to work with the bq29330 analog front-end (AFE) protection IC to maximize functionality and safety, and minimize component count and cost in smart battery circuits.

The Impedance Track technology continuously analyzes the battery impedance, resulting in superior gas-gauging accuracy. This enables remaining capacity to be calculated with discharge rate, temperature, and cell aging all accounted for during each stage of every cycle.

AVAILABLE OPTIONS

T _A	PACKAGE ⁽¹⁾	
	20-PIN TSSOP (PW) Tube	20-PIN TSSOP (PW) Tape and Reel
–40°C to 85°C	bq20z70PW ⁽²⁾	bq20z70PWR ⁽³⁾

(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at www.ti.com.

(2) A single tube quantity is 50 units.

(3) A single reel quantity is 2000 units

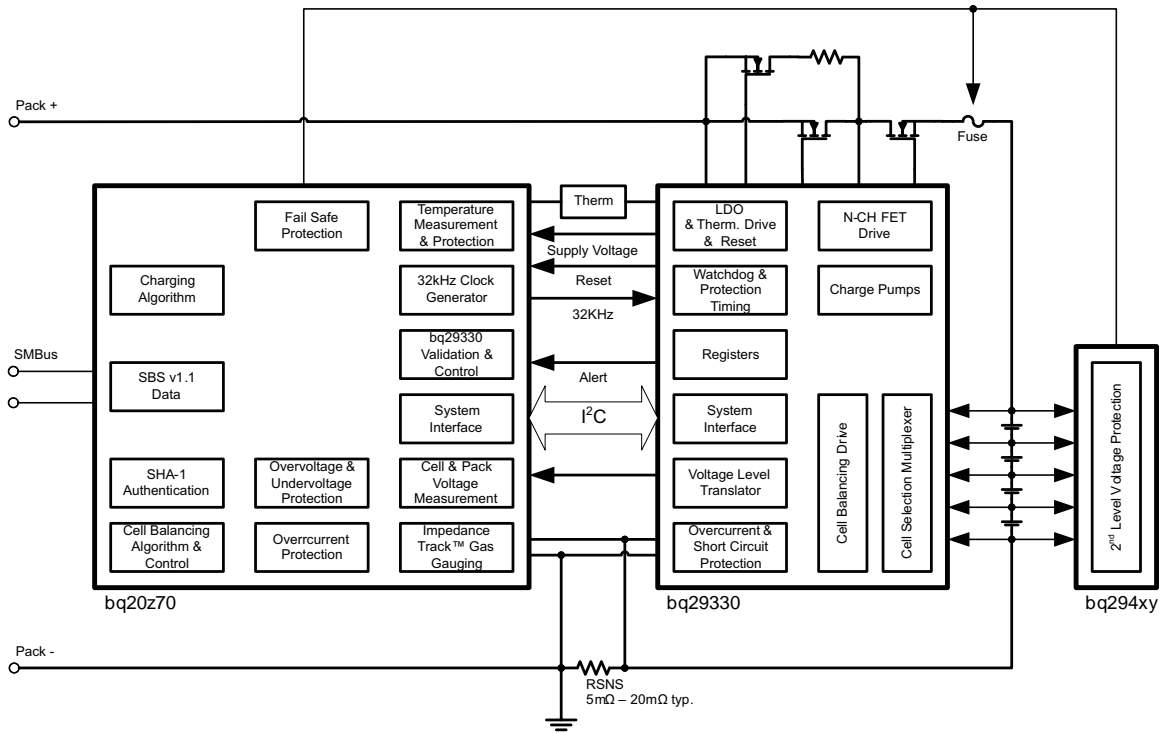


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bq20z70

SLUS686B—NOVEMBER 2005—REVISED JULY 2007



TSSOP (PW) (TOP VIEW)

XALERT	1	20	VCELL-
TS2	2	19	VCELL+
TS1	3	18	VCC
CLKOUT	4	17	VSS
PRES	5	16	MRST
PFIN	6	15	SRN
SAFE	7	14	SRP
SMBD	8	13	VSS
NC	9	12	SCLK
SMBC	10	11	SDATA

FEATURE SET

Primary (1st Level) Safety Features

The bq20z70 supports a wide range of battery and system protection features that can easily be configured. The primary safety features include:

- Cell over/under voltage protection
- Charge and Discharge overcurrent
- Short Circuit
- Charge and Discharge Overtemperature
- AFE Watchdog

Secondary (2nd Level) Safety Features

The secondary safety features of the bq20z70 can be used to indicate more serious faults via the SAFE (pin 7). This pin can be used to blow an in-line fuse to permanently disable the battery pack from charging

Charge Control Features

Gas Gauging

Authentication

Power Modes

CONFIGURATION

Oscillator Function

System Present Operation

BATTERY PARAMETER MEASUREMENTS

Charge and Discharge Counting

Voltage

Current

Auto Calibration

Temperature

FEATURE SET (continued)

COMMUNICATIONS

The bq20z70 uses SMBus v1.1 with Master Mode and package error checking (PEC) options per the SBS specification.

SMBus On and Off State

The bq20z70 detects an SMBus off state when SMBC and SMBD are logic-low for ≥ 2 seconds. Clearing this state requires either SMBC or SMBD to transition high. Within 1 ms, the communication bus is available.

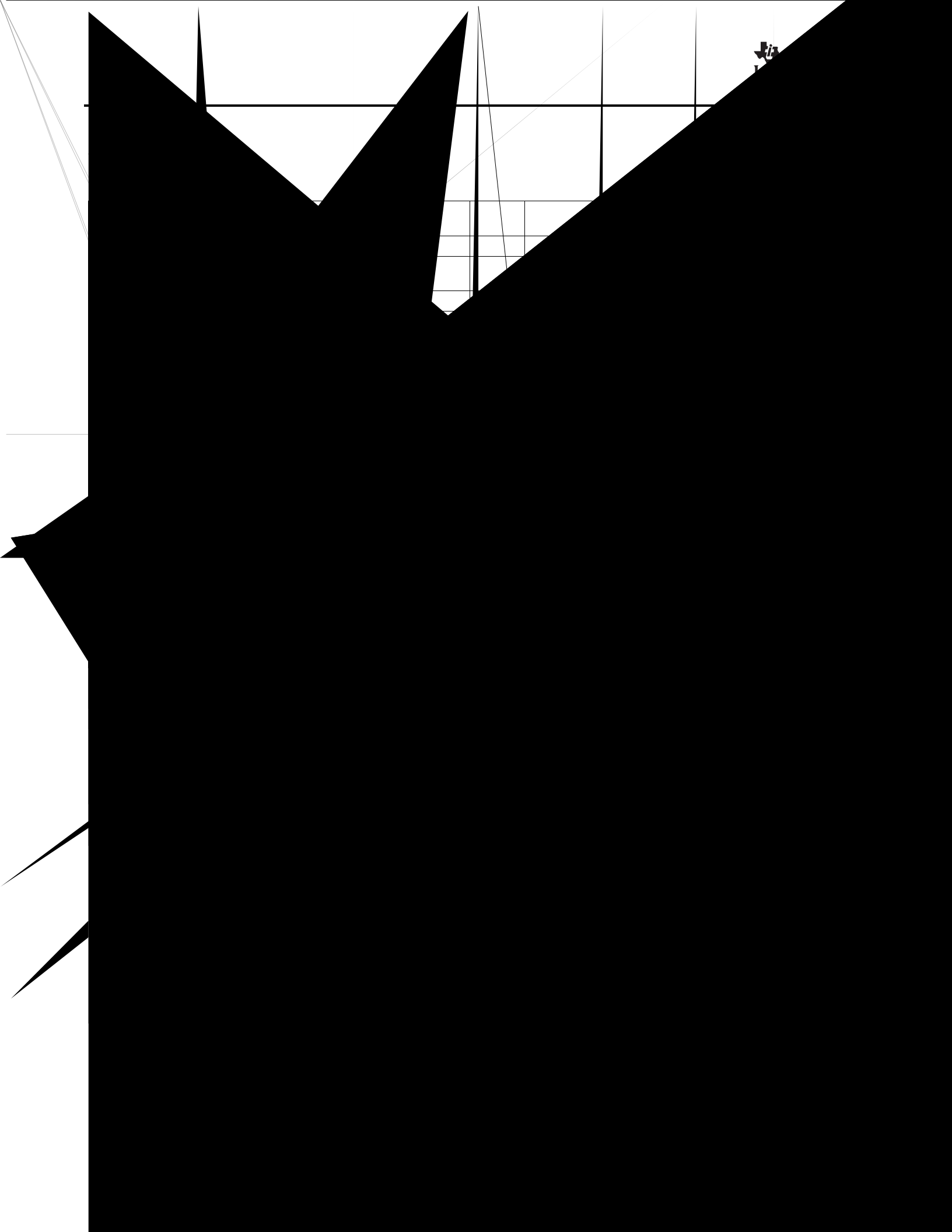


Table 2. EXTENDED SBS COMMANDS

SBS Cmd	Mode	Name	Format	Size in Bytes	Min Value	Max Value	Default Value	Unit
0x45	R	AFEData	String	11+1	—	—	—	ASCII
0x46	R/W	FETControl	hex	1	0x00	0xff	—	
0x4f	R	StateOfHealth	unsigned int	1	0	100	—	%
0x51	R	SafetyStatus	hex	2	0x0000	0xffff	—	
0x53	R	PFStatus	hex	2	0x0000	0xffff	—	
0x54	R	OperationStatus	hex	2	0x0000	0xffff	—	
0x55	R	ChargingStatus	hex	2	0x0000	0xffff	—	
0x57	R	ResetData	hex	2	0x0000	0xffff	—	
0x5a	R	PackVoltage	unsigned int	2	0	65535	—	mV
0x5d	R	AverageVoltage	unsigned int	2	0	65535	—	mV
0x60	R/W	UnSealKey	hex	4	0x00000000	0xffffffff	—	
0x61	R/W	FullAccessKey	hex	4	0x00000000	0xffffffff	—	
0x62	R/W	PFKey	hex	4	0x00000000	0xffffffff	—	
0x63	R/W	AuthenKey3	hex	4	0x00000000	0xffffffff	—	
0x64	R/W	AuthenKey2	hex	4	0x00000000	0xffffffff	—	
0x65	R/W	AuthenKey1	hex	4	0x00000000	0xffffffff	—	
0x66	R/W	AuthenKey0	hex	4	0x00000000	0xffffffff	—	
0x70	R/W	ManufacturerInfo	String	8+1	—	—	—	
0x71	R/W	SenseResistor	unsigned int	2	0	65535	—	Ω
0x77	R/W	DataFlashSubClassID	hex	2	0x0000	0xffff	—	
0x78	R/W	DataFlashSubClassPage1	hex	32	—	—	—	
0x79	R/W	DataFlashSubClassPage2	hex	32	—	—	—	
0x7a	R/W	DataFlashSubClassPage3	hex	32	—	—	—	
0x7b	R/W	DataFlashSubClassPage4	hex	32	—	—	—	
0x7c	R/W	DataFlashSubClassPage5	hex	32	—	—	—	
0x7d	R/W	DataFlashSubClassPage6	hex	32	—	—	—	
0x7e	R/W	DataFlashSubClassPage7	hex	32	—	—	—	
0x7f	R/W	DataFlashSubClassPage8	hex	32	—	—	—	

Application Schematic

The application schematic is on the following page.

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
BQ20Z70PW	NRND	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
BQ20Z70PW-V150	NRND	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
BQ20Z70PW-V150G4	NRND	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
BQ20Z70PW-V160	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
BQ20Z70PW-V160G4	ACTIVE	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
BQ20Z70PWG4	NRND	TSSOP	PW	20	70	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
BQ20Z70PWR	NRND	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
BQ20Z70PWR-V150	NRND	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
BQ20Z70PWR-V150G4	NRND	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
BQ20Z70PWR-V160	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
BQ20Z70PWR-V160G4	ACTIVE	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
BQ20Z70PWRG4	NRND	TSSOP	PW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in hr (0d-Fremernt) (0d-Fr25 (tha) ((weight) -305.625 (in) -30rt) -305.62

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