48V Data-Acquisition System with Integrated Current Sense Amplifier for Two-Wheeler Battery Management Applications

MAXREFDES1277

Introduction

The MAXREFDES1277 reference design enables quick evaluation of the MAX17852/53 for 48V two-Wheeler battery management applications (BMS).

This design showcases capabilities of the MAX17852/53 like individual 14-cell voltage measurements, pack voltage, temperature (up to four sensors using general purpose inputs/outputs [GPIOs]), pack current (MAX17852 only) measurement, and passive cell balancing.

The MAX17852/53 supports ASIL-D requirements for cell voltage, temperature, current, communication, and failure mode effects analysis (FMEA).

Other features include the following:

- 3 to 14 cell voltage measurement with ±2mV accuracy at 5°C to 40°C
- Supports flexi pack configuration
- Pack current measurement using external current sense resistor
- Passive cell balancing up to 300mA with internal switch with odd or even cell balancing scheme (single cell or group)
  - Auto cell balancing configuration with undervoltage (UV) threshold and timer options
  - Manual cell balancing configuration
- Four configurable auxiliary inputs for temperature, voltage, or GPIO
- Internal die temperature measurement
- Individually configurable safety alert
  - Overvoltage (OV), undervoltage, overtemperature and undertemperature faults
  - One cell-mismatch alert
- Selectable universal asynchronous receiver-transmitter (UART) or serial peripheral interface (SPI)
- UART configurations with packet error checking (PEC)
  - Dual UART configuration with redundancy
  - Single UART configuration
- Single-side component placement
- Compatible with MAX17852EVKIT software along with MINIQUSB board

Hardware Specification

Table 1 shows an overview of the design specification.

Table 1. Design Specification

PARAMETER	SYMBOL	MIN	TYP	MAX
Operating Range	V_{IN}	9V		65V
Current Consumption				
	Active Mode		5.4mA	
	Standby Mode		2.3mA	
	Shutdown Mode		0.1µA	
Number of Channels				14
Measuring Range Per Channel		0V		5V
Voltage Accuracy (5°C to 40°C)			2mV	
Current Measurement at Gain = 256			5mA Resolution	
Auxiliary Inputs (J7, J8, J9, J10)		0V		5V
Cell Balancing Current (Per Channel)				Up to 300mA
Communication Interface				
	UART			2Mbps
	SPI			10Mhz

Designed–Built–Tested

This document describes the hardware shown in Figure 1.

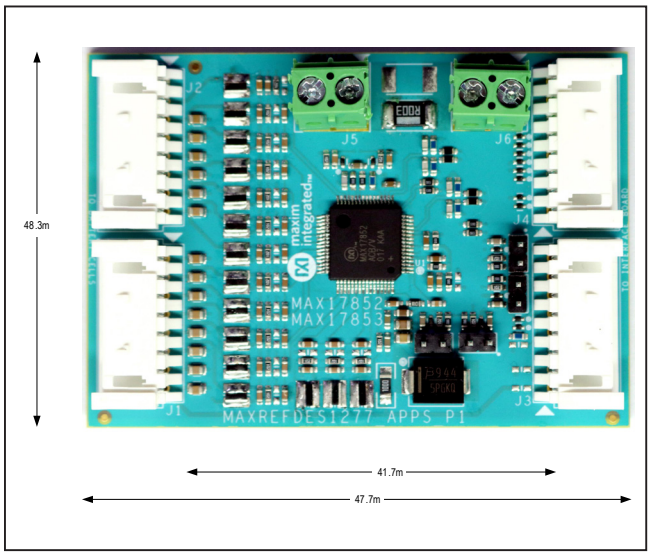
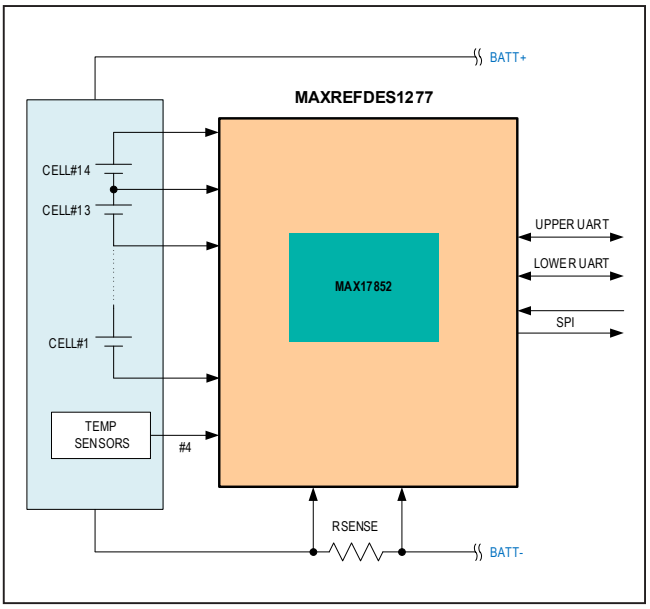


Figure 1. MAXREFDES1277 hardware.

Typical Application



Design Resources

Download the complete set of **Design Resources** including schematics, bill of materials, PCB layout, and test files.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	4/21	Initial release	—