

Blues Wireless

Mojo 1.1

v4

Version (Release Date) and Comments

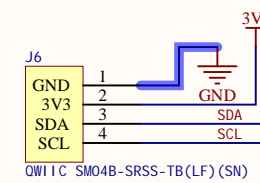
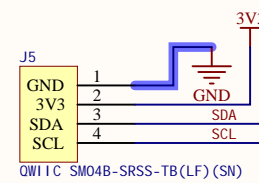
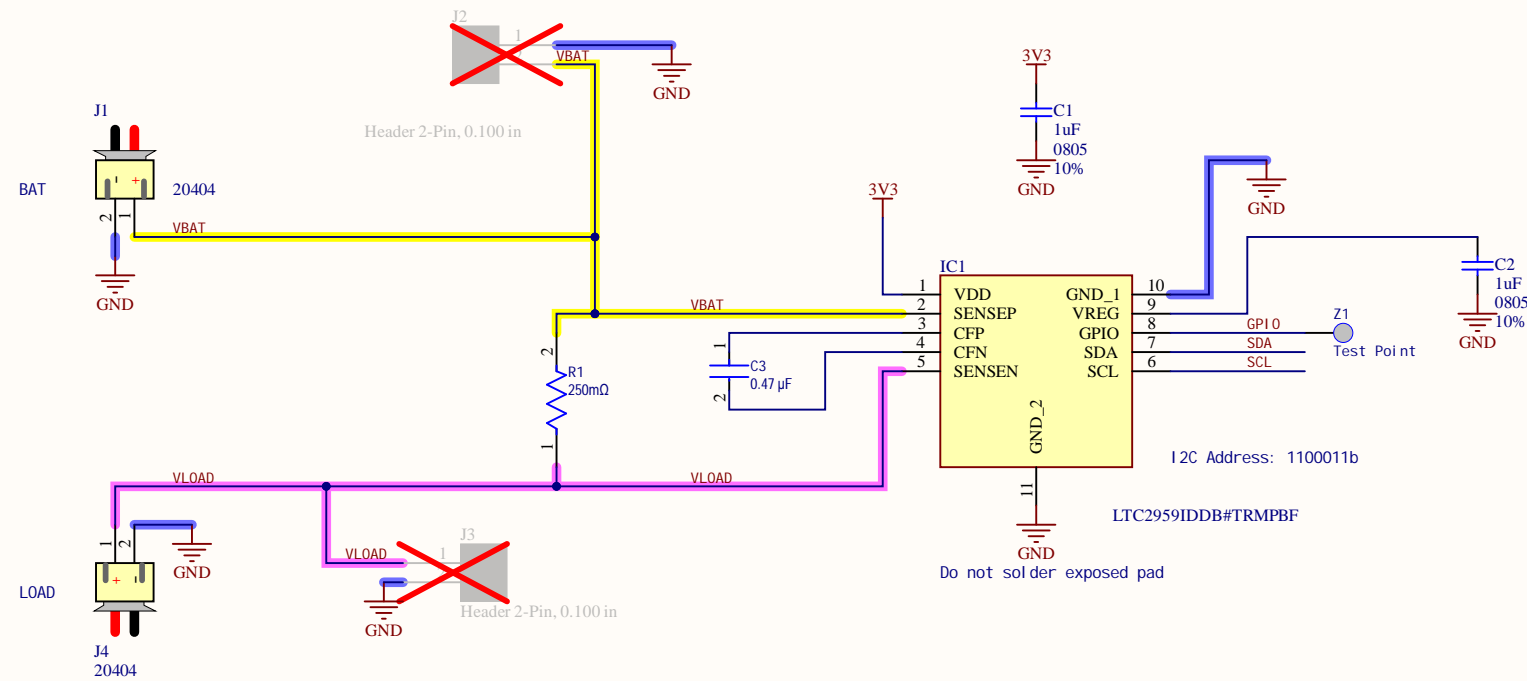
v1 (2024-03-11)
Initial Version

v2 (2024-03-21)
Add 22K I2C SDA/SCL pullups
3v3 labeled as "VIO" in serigraphy

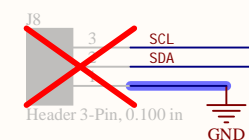
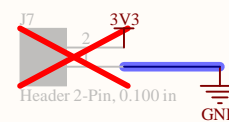
v3 (2024-04-15)
Changed sense resistor to 0R250.
Reposition Vbat/Vout. Updated layout as needed.
Moved GPIO test point to bottom and tented.
Serigraphy changes.
Updated battery connector to preferred supplier PN

v4 (2024-06-07)
Made backside serigraphy bigger.

Variant Name	Description
Normal	Normal product configuration




Mounting Headers



Mounting Screws



Title			ToyBuilder Labs 1100 S Garfield Avenue Alhambra, CA 91801		
Size: B	Number: 2.	Revision: v4			
Date: 6/7/2024	Time: 3:59:23 PM	Sheet 2 of 3	Normal / (626) 908-4010		
File: Mojo_SchDoc					

	1	2	3	4	5	6																																				
A	<div><div>Power supply voltages and curents</div><div>Other design calculations</div><div>Board bringup details</div><div>Test points & Expected waveform / measurements</div><div>Notes on LTC2959 Sensor</div><div>Sensor has 50mV Sense Range</div><div>V=IR :: I(range)=V(range)/R</div><div>Resistor / Current Sense Range (lower range = finer resolution current sensing)</div><div>0.500 Ohm 0.1A 0.250 Ohm 0.2A 0.100 Ohm 0.5A 0.050 Ohm 1.0A</div><div>0.050 Ohm 1.0A 0.025 Ohm 2.0A 0.010 Ohm 5.0A 0.005 Ohm 10.0A</div><div>0.025 Ohm 20.0A 0.001 Ohm 50.0A blank blank</div><div>0.050 Ohm sensor (there are 2 pcs) is the datasheet's reference value with 533nAh LSB</div></div>	<div><div>Power-Up Sequence</div><div>When V_{DD} rises above a threshold of approximately 1.45V, the LTC2959 generates an internal power-on reset (POR) signal that sets all registers to their default state. In the default state, the coulomb counter is active while the multi-purpose ADC operates in sleep mode. The accumulated charge register is set to mid-scale (80000000h) and all ADC channel outputs are set to 0000h. All threshold registers and the min-max tracking registers are set to their default values. The min/max tracking registers of the ADC will update upon completion of the first ADC conversion. The GPIO pin is configured as an analog input; the ALERT and Charge Complete functionalities are not enabled at startup.</div></div>	<div><div>Coulomb Counter</div><table><tr><td>V_{SENSE}</td><td>Sense Voltage Differential Input Range</td><td>V_{SENSEP} – V_{SENSEN}</td><td>●</td><td>±50</td><td>mV</td></tr><tr><td>TCE</td><td>Total Charge Error (Note 4)</td><td>10mV ≤ V_{SENSE} ≤ 50mV Continuously 1mV ≤ V_{SENSE} ≤ 10mV Continuously 10mV ≤ V_{SENSE} ≤ 50mV Pulses with t_{PULSE} > 1ms</td><td>● ●</td><td>0.1 ±1 0.2 ±2 1</td><td>% % %</td></tr><tr><td>V_{OS}</td><td>Offset Voltage</td><td></td><td>●</td><td>±1 ±10</td><td>μV</td></tr><tr><td>R_{IDR}</td><td>Differential Input Resistance Across SENSEP and SENSEN</td><td></td><td></td><td>800</td><td>kΩ</td></tr><tr><td>Q_{LSB}</td><td>Charge LSB (Note 5)</td><td>R_{SENSE} = 50mΩ</td><td></td><td>533</td><td>nAh</td></tr><tr><td>E_{DB}</td><td>Deadband Inaccuracy</td><td>Deadband = 20μV</td><td></td><td>±10</td><td>%</td></tr></table></div>	V _{SENSE}	Sense Voltage Differential Input Range	V _{SENSEP} – V _{SENSEN}	●	±50	mV	TCE	Total Charge Error (Note 4)	10mV ≤ V _{SENSE} ≤ 50mV Continuously 1mV ≤ V _{SENSE} ≤ 10mV Continuously 10mV ≤ V _{SENSE} ≤ 50mV Pulses with t _{PULSE} > 1ms	● ●	0.1 ±1 0.2 ±2 1	% % %	V _{OS}	Offset Voltage		●	±1 ±10	μV	R _{IDR}	Differential Input Resistance Across SENSEP and SENSEN			800	kΩ	Q _{LSB}	Charge LSB (Note 5)	R _{SENSE} = 50mΩ		533	nAh	E _{DB}	Deadband Inaccuracy	Deadband = 20μV		±10	%	<div><div>Note 4:</div><div>The coulomb counter measures static signals as well as dynamic inputs (current pulses). It may take several short pulses to increment/decrement the ACR.</div></div>		
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B	<div><div>V(sensep) has 65V max limit, but as a practical matter, you are limited by your battery's ability to supply voltage.</div></div>																																									
C																																										
D																																										
					<div><div>Title</div><div>Size: BNumber: .Revision:</div><div>Date: 6/7/2024Time: 3:59:24 PMSheet 3 of 3</div><div>File: Design Notes.SchDoc</div></div>	<div><div><div>ToyBuilder Labs</div><div>1100 S Garfield Avenue</div><div>Alhambra, CA 91801</div></div><div>+1 (626) 808-4010</div><div><div><div></div><div>ToyBuilder</div><div>LABS</div></div></div></div>																																				
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