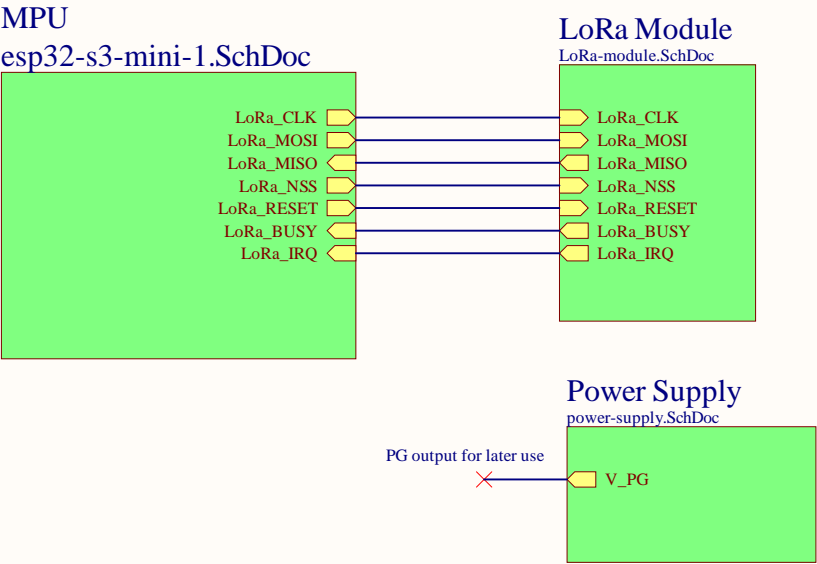


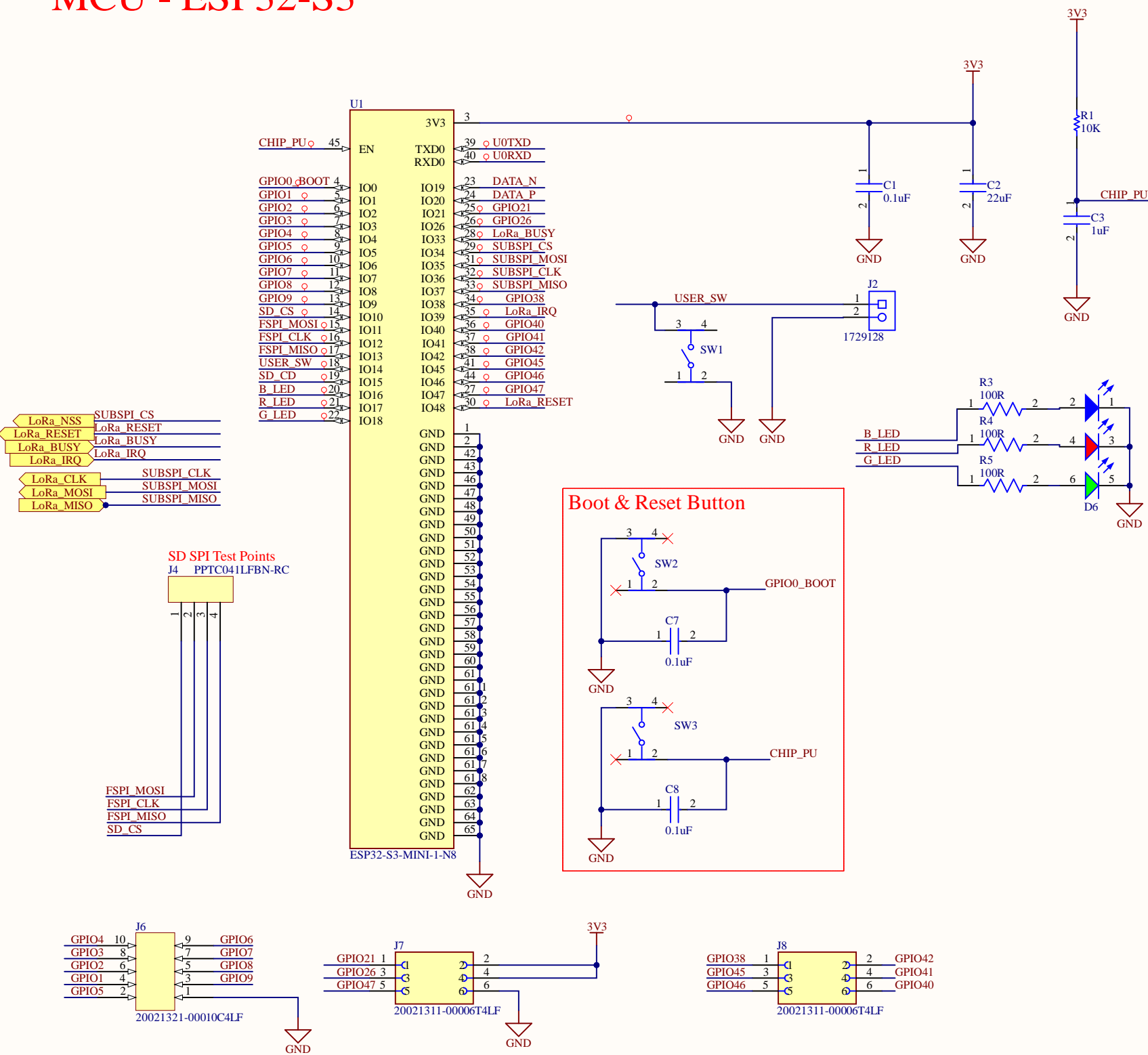


FLoRa Communications
Petal v0.0
Top-level Overview
1 October 2024

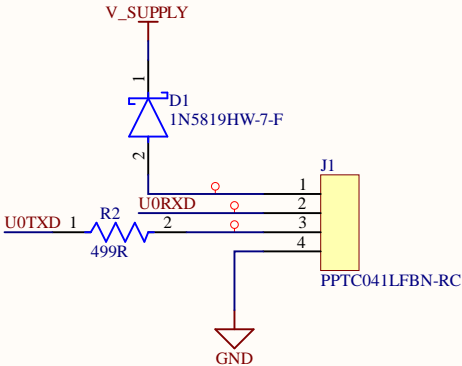


APPROVALS		DATE	PROJECT		<div>Altium</div>				
ENG:	*	--/--/--	*						
DSN:	*	--/--/--							
CHK:	*	--/--/--							
REFERENCE DOCUMENTS			*		PROJECT REVISION: Version DOCUMENT REVISION: control disabled DESIGN ITEM: Version control disabled				
BOM: <BOM DOC NO>					TITLE				
ASSY DWG: <ASSY DWG NO>									
FAB DWG: <FAB DWG NO>									
PCB DWG: <PCB DWG NO>									
			SIZE	CAGE CODE	DWG NO.				REV
			A3	?????	<SCH DWG NO>				
			SCALE:		FILE NAME			FLoRa0.0.SchDoc	SHEET 1 OF 5

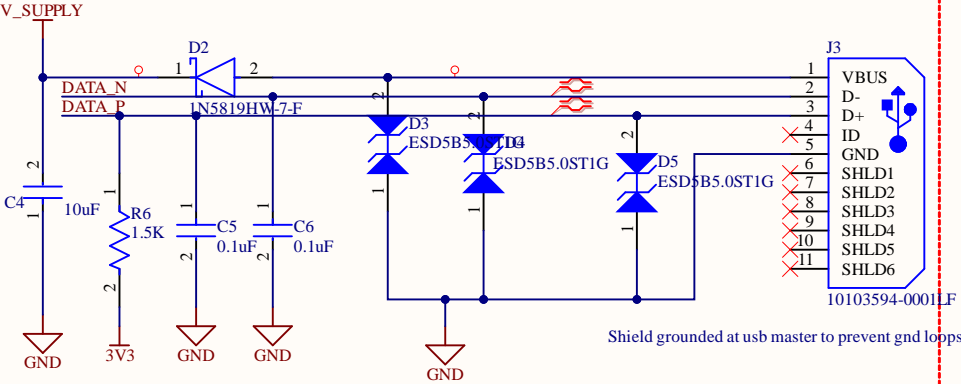
MCU - ESP32-S3



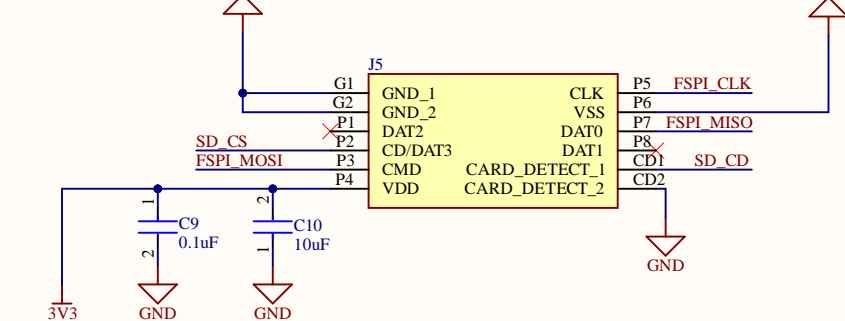
Programming Header - USB-UART



Micro USB Port

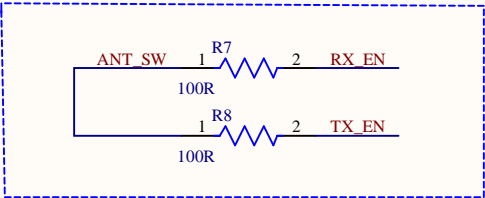
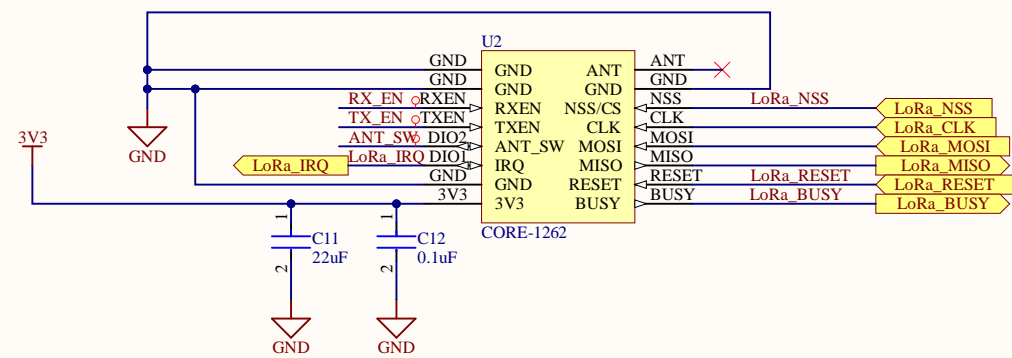


Card Reader



*				Copyright © NRG measurement			
Project				Variant: [No Variations]			
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Size: B		DWG NO: *			Revision: A		
Date: 12/18/2024					Sheet 2 of 5		

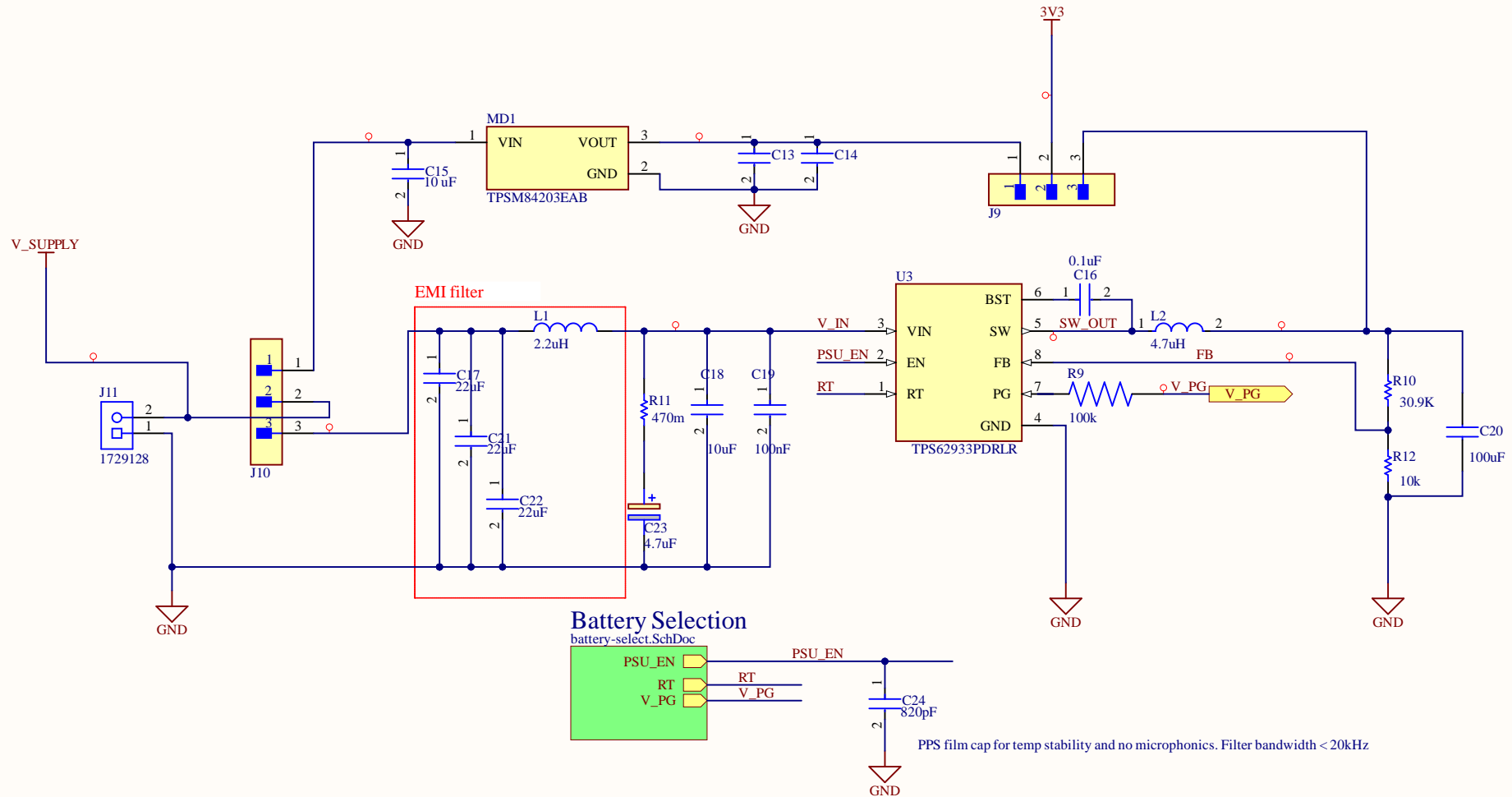
LoRa Module - WAVE Core1262



RF Switch RC Filter resistors. Caps are internal to module

Title		
Size	Number	Revision
A4		
Date:	12/18/2024	Sheet of
File:	LoRa-module.SchDoc	Drawn By:

POWER SUPPLY - TPS62933P - V_{in} (3.8-15V) - V_{out} (3.3V)



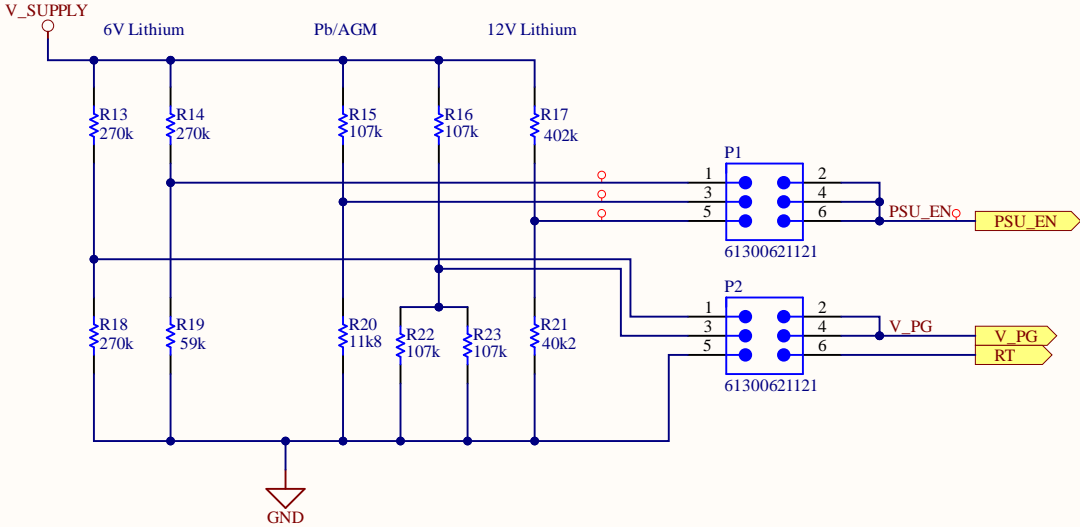
Title		
Size A4	Number	Revision
Date:	12/18/2024	Sheet of
File:	power-supply.SchDoc	Drawn By:

A

	Cell Voltage	Battery Voltage	Charge	R1	R2	Vbat_max	Ven_max
LiFePO4x2	3	6	10%				
	3.3	6.6	70%	268292.7	58201.06	8	1.526522
		11.51	10%				
2VPb/AGM		12.06	50%	106329.8	11777.19	13	1.318577
		12	10%				
12V Lithium		13	30%	400696.9	40167.66	14.4	1.389667
	Disconnect						
	Reconnect						

BATTERY SELECTION
Last Updated: 23 Sept 2024

B



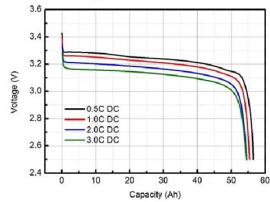
C

D

LiFePO4 Batteries

Chromatopower.com				
Percentage (SOC)	1.0Ah	12V	24V	48V
100% Charging	3.65	14.6	29.2	58.4
100% Rest	3.40	13.6	27.2	54.4
90%	3.35	13.4	26.8	53.6
80%	3.32	13.3	26.6	53.1
70%	3.30	13.2	26.4	52.8
60%	3.27	13.1	26.1	52.3
50%	3.26	13.0	26.1	52.2
40%	3.25	13.0	26.0	52.0
30%	3.22	12.9	25.8	51.5
20%	3.20	12.8	25.6	51.2
10%	3.16	12.8	25.6	51.0
0%	3.00	12.0	24.0	48.0

1. Rate discharge curve at 25°C



12V Batteries

Battery Type and Voltage			
State of Charge	Lead Acid	AGM	Lithium
100%	12.70	13.00	14.40
90%	12.50	12.75	13.30
80%	12.42	12.50	13.25
70%	12.32	12.30	13.20
60%	12.20	12.15	13.20
50%	12.06	12.05	13.15
40%	11.90	11.95	13.10
30%	11.75	11.81	13.00
20%	11.58	11.66	12.90
10%	11.31	11.51	12.00
0%	10.50	10.50	10.00

Fig. 7 The curve of discharge for lead-acid battery at different currents

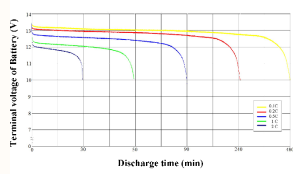


Figure 9-4. Adjustable V_{IN} Undervoltage Lockout

$$R_1 = \frac{V_{START} \times \frac{V_{EN_FALL}}{V_{EN_RISE}} - V_{STOP}}{I_p \times \left(1 - \frac{V_{EN_FALL}}{V_{EN_RISE}}\right) + I_h}$$

(3)

$$R_2 = \frac{R_1 \times V_{EN_FALL}}{V_{STOP} - V_{EN_FALL} + R_1 \times (I_p + I_h)}$$

(4)

$$V_{EN} = \frac{R_2 \times V_{IN} + R_1 \times R_2 \times (I_p + I_h)}{R_1 + R_2}$$

(5)

where

- I_p is 0.7 μA.
- I_h is 1.4 μA.
- V_{EN_FALL} is 1.17 V.
- V_{EN_RISE} is 1.21 V.
- V_{START} is the input voltage enabling the device.
- V_{STOP} is the input voltage disabling the device.

Title		
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Date:	12/18/2024	Sheet of
File:	battery-select.SchDoc	Drawn By: