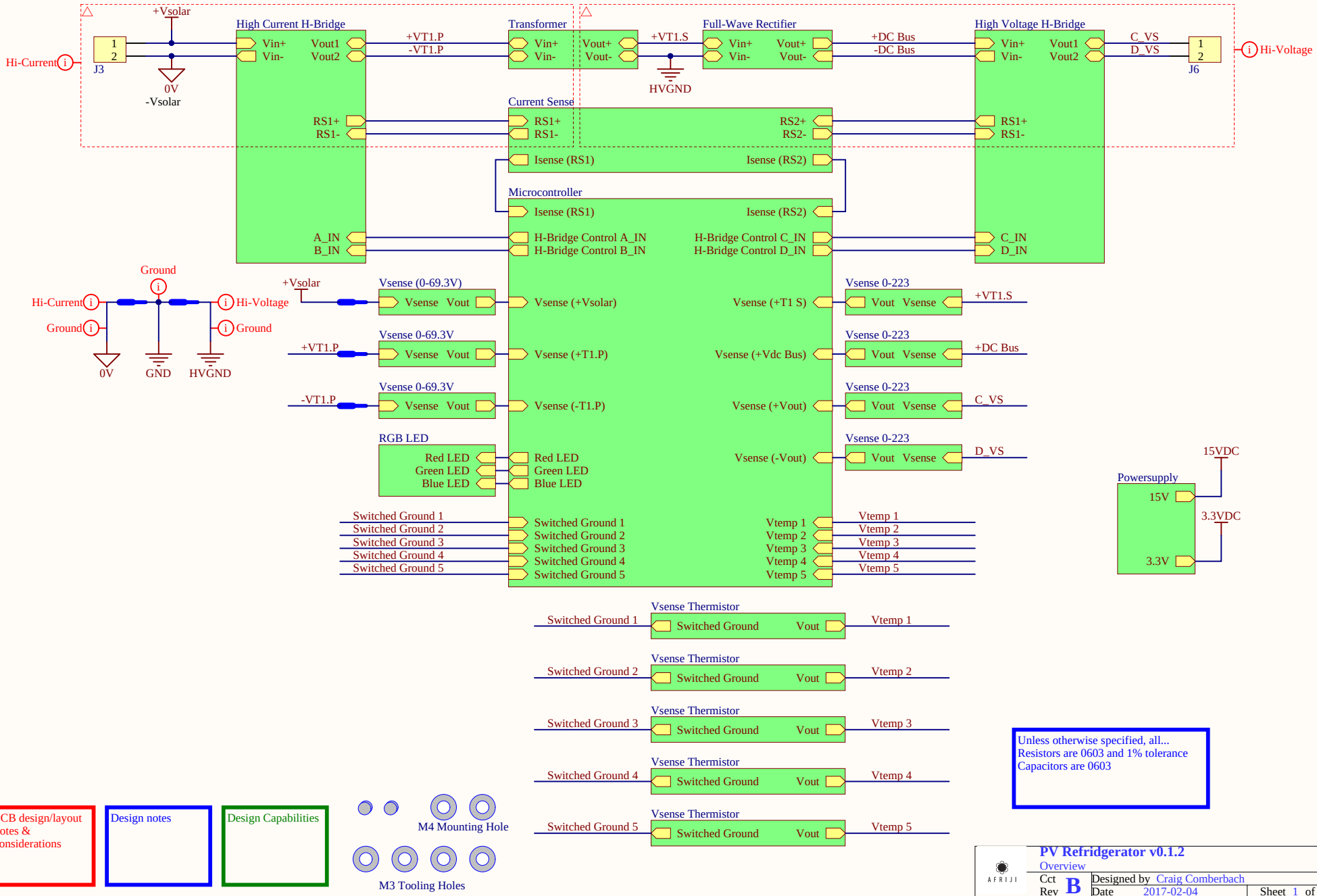
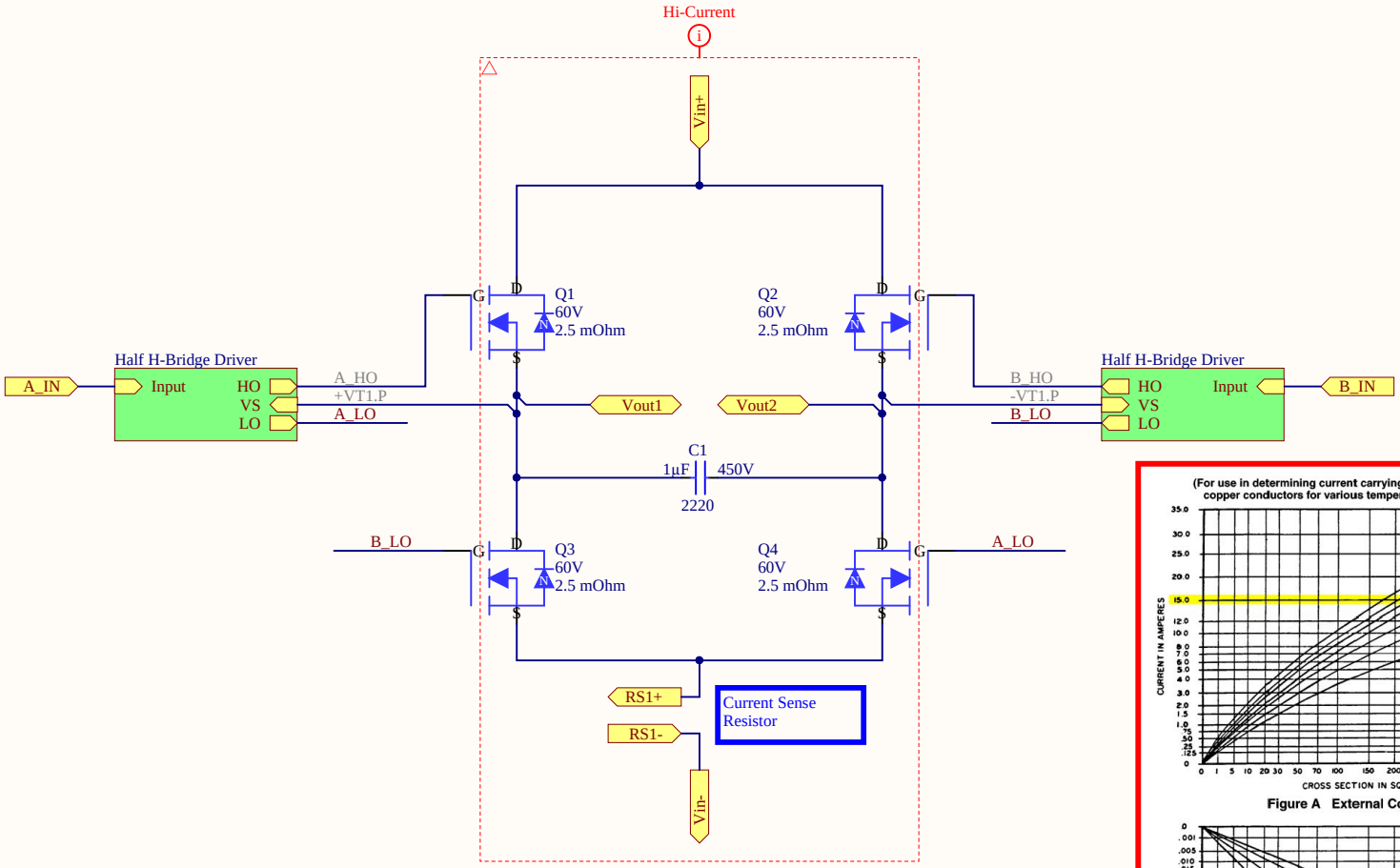
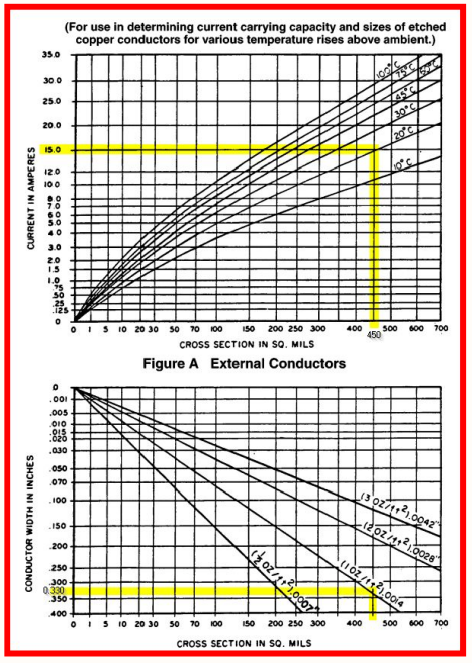


PV Refridgerator v0.1.2

Overview

Cct Rev	B	Designed by Craig Comberbach	
		Date 2017-02-04	Sheet 1 of 26



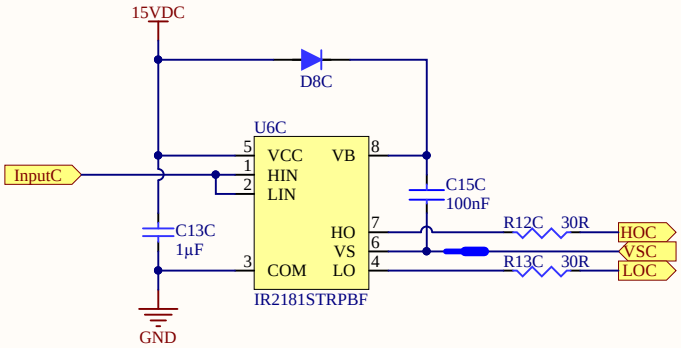


PCB design/layout notes & considerations

Design notes

Design Capabilities

AFRIJI	**PV Refridgerator v0.1.2**	
	High Current H-Bridge	
Cct Rev **A**	Designed by Mike MacKay	
	Date 2017-01-26	Sheet 2 of 26



PCB design/layout notes & considerations

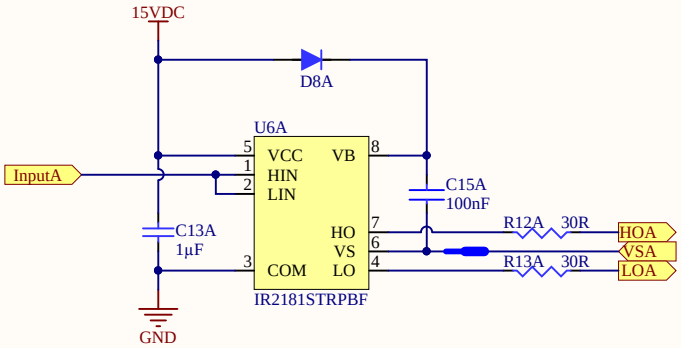
Design notes

Design Capabilities

PV Refridgerator v0.1.2

N-FET Driver

Cct		Designed by	Mike MacKay
Rev	A	Date	2017-02-04
		Sheet	3.1 of 26



PCB design/layout notes & considerations

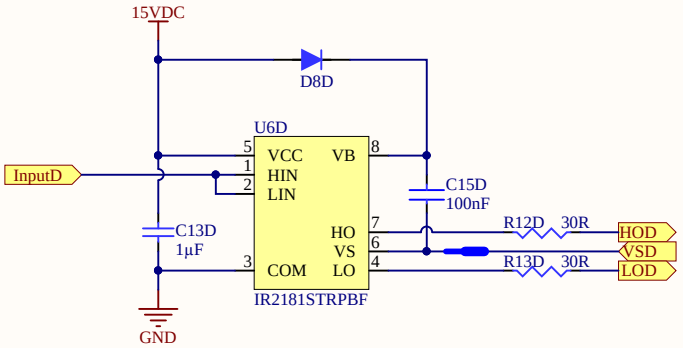
Design notes

Design Capabilities

PV Refridgerator v0.1.2

N-FET Driver

Cct		Designed by	Mike MacKay
Rev	A	Date	2017-02-04
		Sheet	3.1 of 26



PCB design/layout notes & considerations

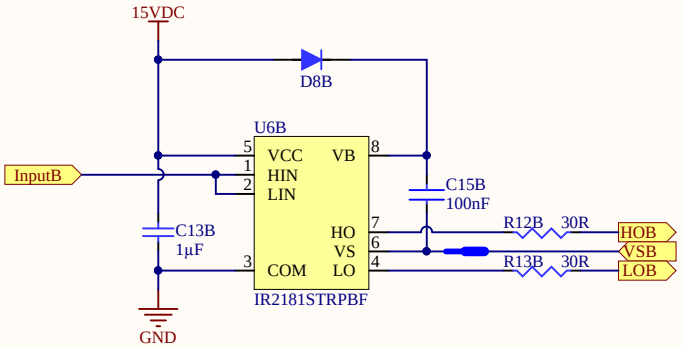
Design notes

Design Capabilities

PV Refridgerator v0.1.2

N-FET Driver

Cct		Designed by	Mike MacKay
Rev	A	Date	2017-02-04
		Sheet	3.2 of 26



PCB design/layout notes & considerations

Design notes

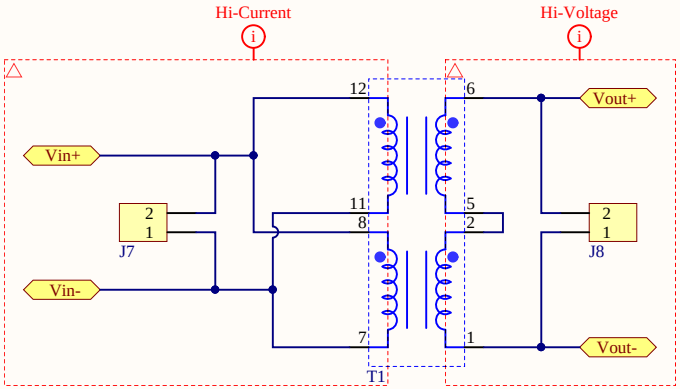
Design Capabilities

PV Refridgerator v0.1.2

N-FET Driver

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-02-04	Sheet 3.2 of 26

Use a 14-guage terminal block with only 4 leads



VPS24-5400

1. Maximum Power: 130.0VA
2. Primary – Series: 230VAC, 50/60Hz; Parallel: 115VAC, 50/60Hz
3. Secondary: Series: 24.0V CT@ 5.4A; Parallel: 12.0V @ 10.8A

Input: Series – 6 and 1, Jumper 5 to 2
Parallel – 6 and 1, Jumper 6 to 2 and 5 to 1
Output: Series – 12 and 7, Jumper 11 to 8
Parallel – 12 and 7, Jumper 12 to 8 and 11 to 7

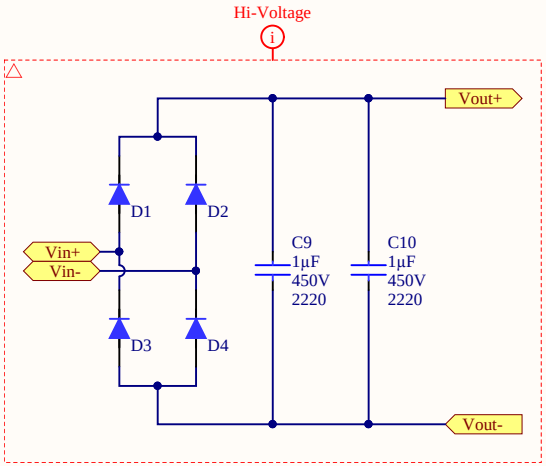
PCB design/layout notes & considerations

Design notes

Design Capabilities

AFRIJI

PV Refridgerator v0.1.2
Transformer
Cct Rev A
Designed by Mike MacKay
Date 2017-01-26
Sheet 5 of 26



PCB design/layout notes & considerations

Design notes

Design Capabilities

PV Refridgerator v0.1.2

Full-Wave Rectifier

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-01-26	Sheet 6 of 26

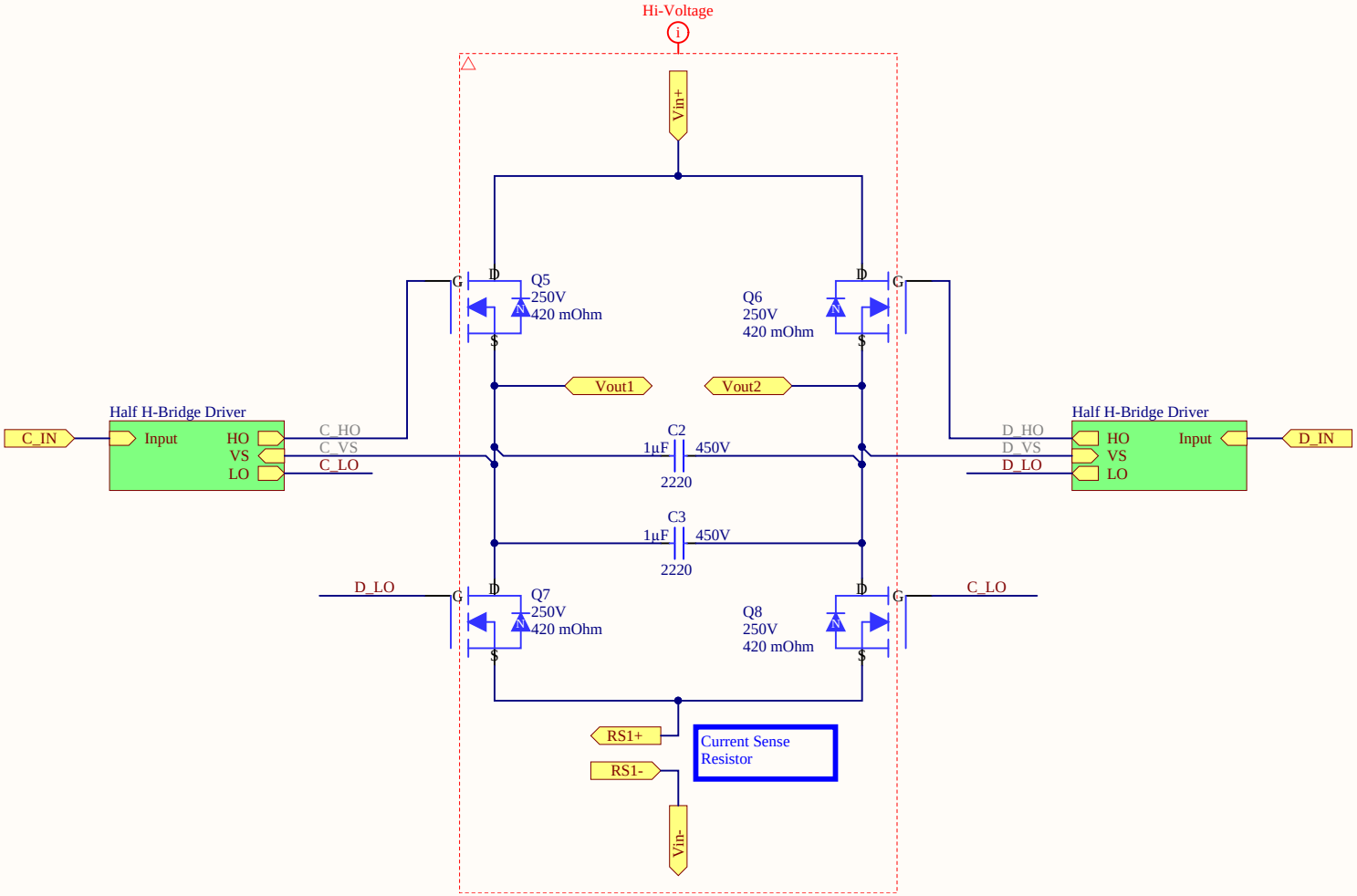


Table 6-1 Electrical Conductor Spacing

Voltage Between Conductors (DC or AC Peaks)	Minimum Spacing						
	Bare Board				Assembly		
	B1	B2	B3	B4	A5	A6	A7
0-15	0.05 mm	0.1 mm	0.1 mm	0.05 mm	0.13 mm	0.13 mm	0.13 mm
16-30	0.05 mm	0.1 mm	0.1 mm	0.05 mm	0.13 mm	0.25 mm	0.13 mm
31-50	0.1 mm	0.6 mm	0.6 mm	0.13 mm	0.13 mm	0.4 mm	0.13 mm
51-100	0.1 mm	0.6 mm	1.5 mm	0.13 mm	0.13 mm	0.5 mm	0.13 mm
101-150	0.2 mm	0.6 mm	3.2 mm	0.4 mm	0.4 mm	0.8 mm	0.4 mm
151-170	0.2 mm	1.25 mm	3.2 mm	0.4 mm	0.4 mm	0.8 mm	0.4 mm
171-250	0.2 mm	1.25 mm	6.4 mm	0.4 mm	0.4 mm	0.8 mm	0.4 mm
251-300	0.2 mm	1.25 mm	12.5 mm	0.4 mm	0.4 mm	0.8 mm	0.8 mm
301-500	0.25 mm	2.5 mm	12.5 mm	0.8 mm	0.8 mm	1.5 mm	0.8 mm
> 500 See para. 6.3 for calc.	0.0025 mm /volt	0.005 mm /volt	0.025 mm /volt	0.00305 mm /volt	0.00305 mm /volt	0.00305 mm /volt	0.00305 mm /volt

B1 - Internal Conductors
B2 - External Conductors, uncoated, sea level to 3050 m
B3 - External Conductors, uncoated, over 3050 m
B4 - External Conductors, with permanent polymer coating (any elevation)
A5 - External Conductors, with conformal coating over assembly (any elevation)
A6 - External Component lead/termination, uncoated
A7 - External Component lead termination, with conformal coating (any elevation)

PCB design/layout notes & considerations

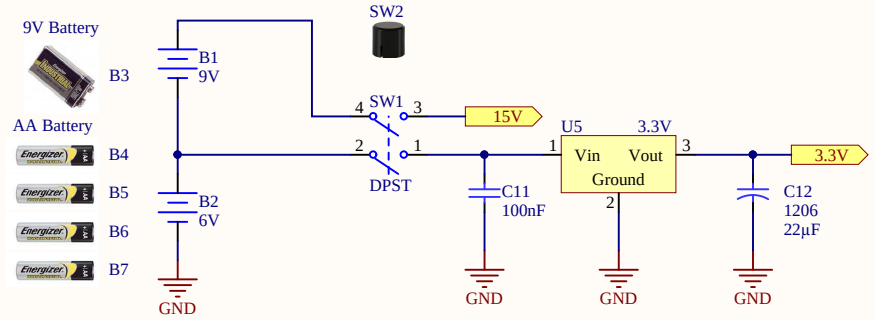
Design notes

Design Capabilities

AFRIJI

PV Refridgerator v0.1.2
High Voltage H-Bridge

Cct		Designed by	Mike MacKay
Rev	A	Date	2017-01-26
		Sheet	7 of 26



PCB design/layout notes & considerations

Design notes

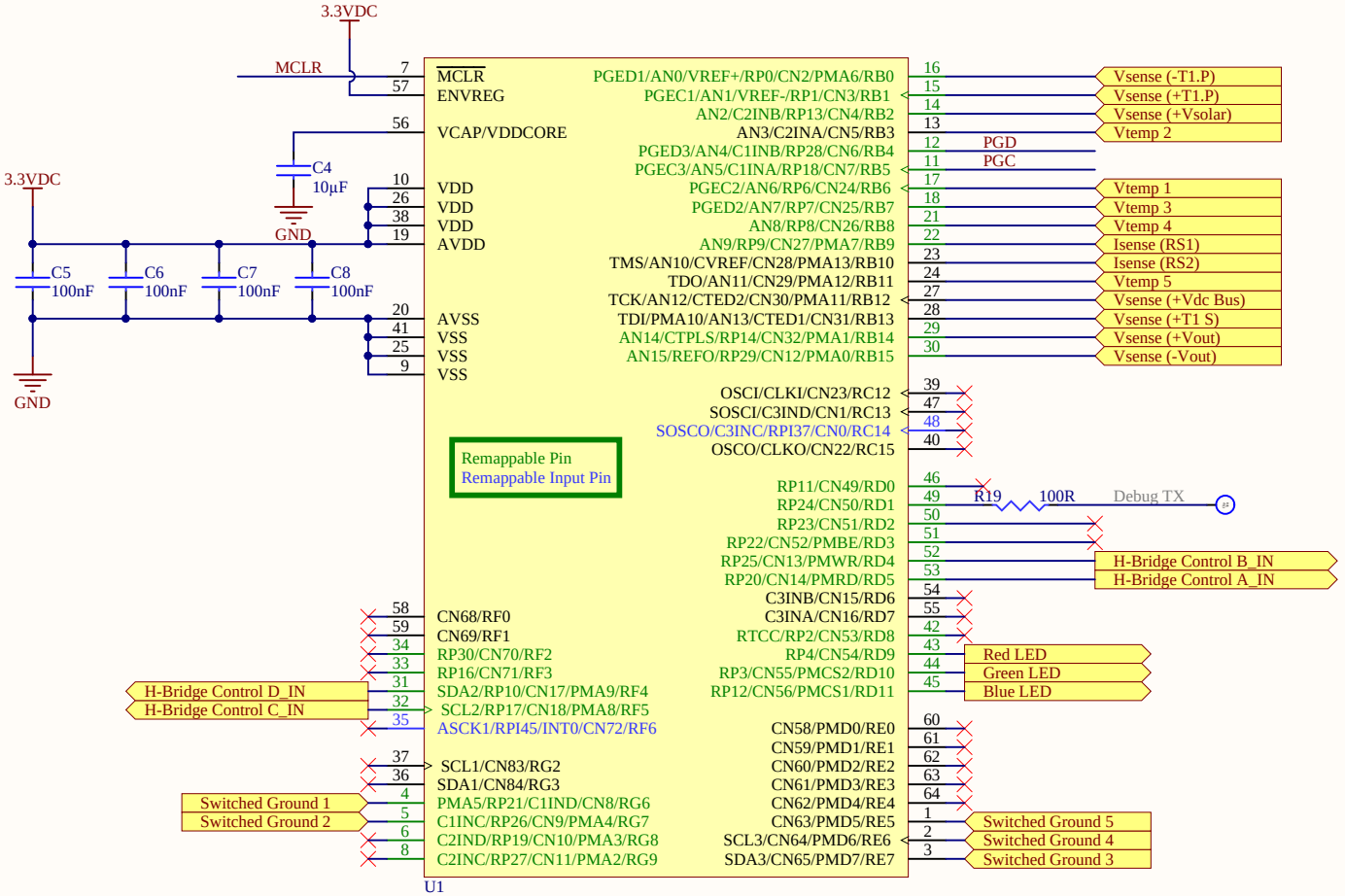
Design Capabilities

PV Refridgerator v0.1.2

3.3VDC Powersupply

Cct Rev	B	Designed by	Craig Comberbach
		Date	2017-02-10
		Sheet	9 of 26

Order the 10x10mm version



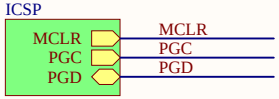
32 Pin 0.1" Header
J1

32 Pin 0.1" Header
J2

BOB1

TQFP-64 Breakout Board

ICSP



PCB design/layout notes & considerations

Design notes

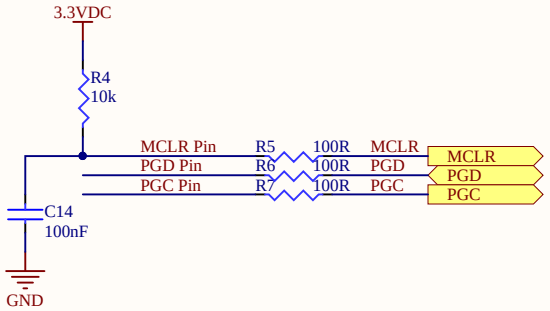
Design Capabilities

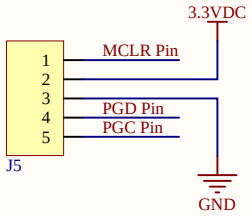
AFRIJI

PV Refridgerator v0.1.2

Microcontroller

Cct Rev	A	Designed by Craig Comberbach	
		Date 2017-02-04	Sheet 10 of 26





PCB design/layout notes & considerations

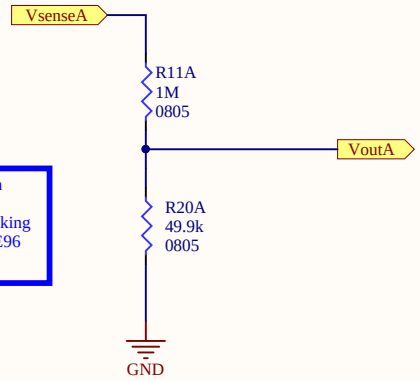
Design notes

Design Capabilities

PV Refridgerator v0.1.2

ICSP

Cct		Designed by	Craig Comberbach
Rev	B	Date	2017-02-06
		Sheet	11 of 26



50k resistor costs 2$+ in bulk, 100k is 0.15$ each. 2x 100k in parallel is 50k, I choose cost savings!
50k is not a standard value in any of the En series despite looking like it should be. 49.9k oddly enough is part of the standard E96 (+/-1%) and E192 (+/- 0.5%, 0.25%, and 0.1%) series.

PCB design/layout notes & considerations

Design notes

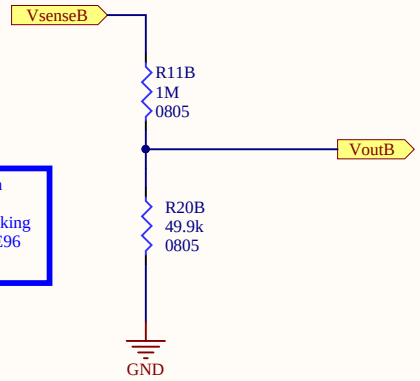
Design Capabilities

AFRIJI

PV Refridgerator v0.1.2

Vsense from 0 to 69.3V

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-02-08	Sheet 12 of 26



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PCB design/layout notes & considerations

Design notes

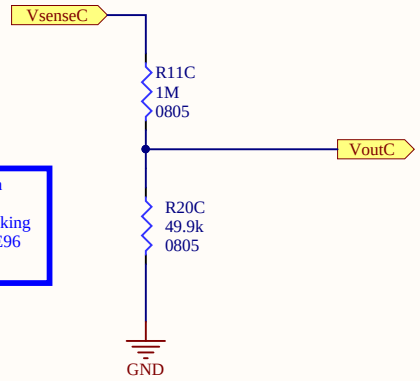
Design Capabilities

AFRIJI

PV Refridgerator v0.1.2

Vsense from 0 to 69.3V

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-02-08	Sheet 12 of 26



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PCB design/layout notes & considerations

Design notes

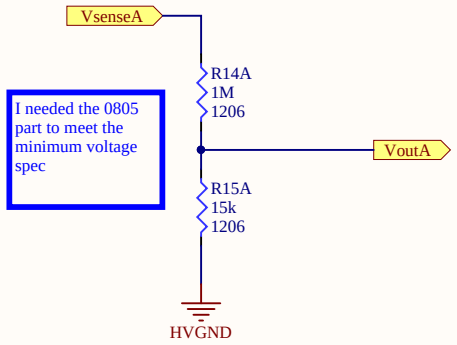
Design Capabilities

AFRIJI

PV Refridgerator v0.1.2

Vsense from 0 to 69.3V

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-02-08	Sheet 12 of 26



PCB design/layout notes & considerations

Design notes

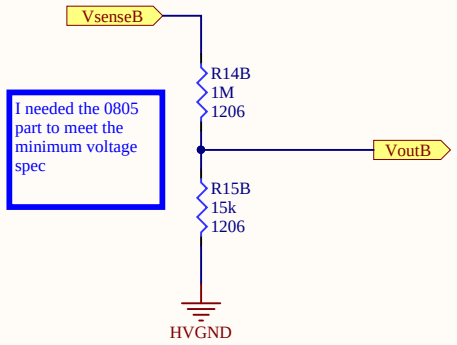
Design Capabilities

AFRIJI

PV Refridgerator v0.1.2

Vsense from 0 to 223.3V

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-02-08	Sheet 13 of 26



PCB design/layout notes & considerations

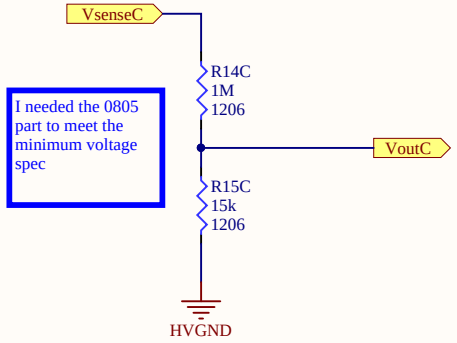
Design notes

Design Capabilities

PV Refridgerator v0.1.2

Vsense from 0 to 223.3V

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-02-08	Sheet 13 of 26



PCB design/layout notes & considerations

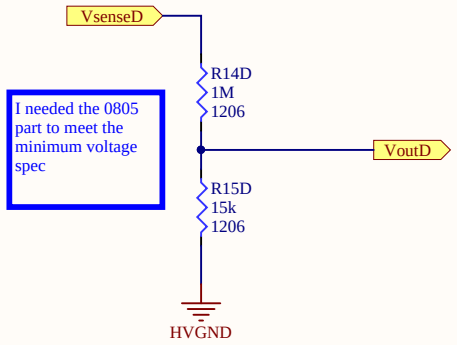
Design notes

Design Capabilities

PV Refridgerator v0.1.2

Vsense from 0 to 223.3V

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-02-08	Sheet 13 of 26



PCB design/layout notes & considerations

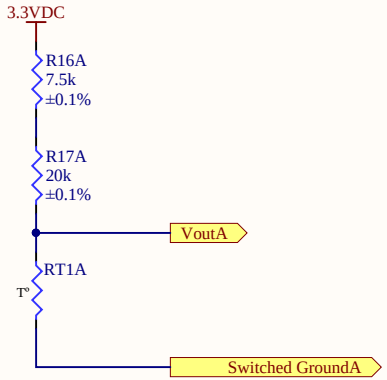
Design notes

Design Capabilities

PV Refridgerator v0.1.2

Vsense from 0 to 223.3V

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-02-08	Sheet 13 of 26



PCB design/layout notes & considerations

Design notes

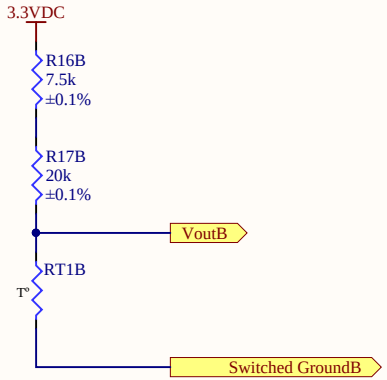
Design Capabilities

AFRIJI

PV Refridgerator v0.1.2

Vsense from 0 to 223.3V

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-02-08	Sheet 14 of 26



PCB design/layout notes & considerations

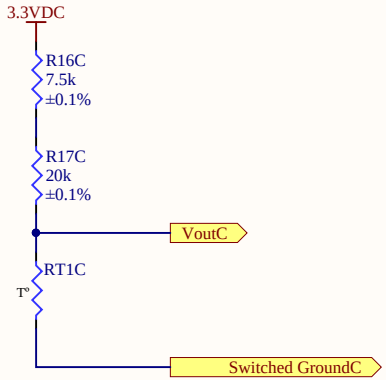
Design notes

Design Capabilities

PV Refridgerator v0.1.2

Vsense from 0 to 223.3V

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-02-08	Sheet 14 of 26



PCB design/layout notes & considerations

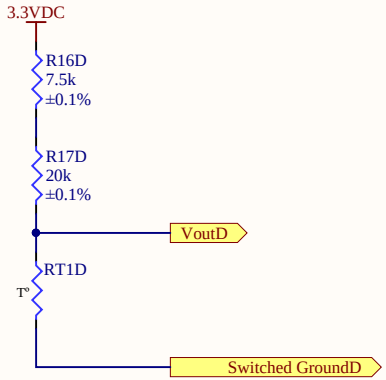
Design notes

Design Capabilities

PV Refridgerator v0.1.2

Vsense from 0 to 223.3V

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-02-08	Sheet 14 of 26



PCB design/layout notes & considerations

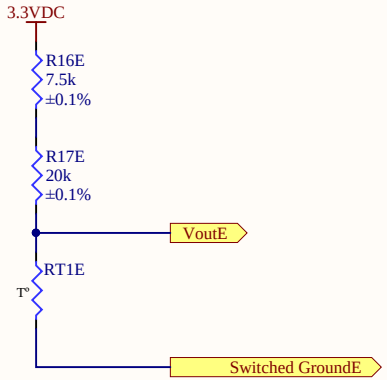
Design notes

Design Capabilities

PV Refridgerator v0.1.2

Vsense from 0 to 223.3V

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-02-08	Sheet 14 of 26



PCB design/layout notes & considerations

Design notes

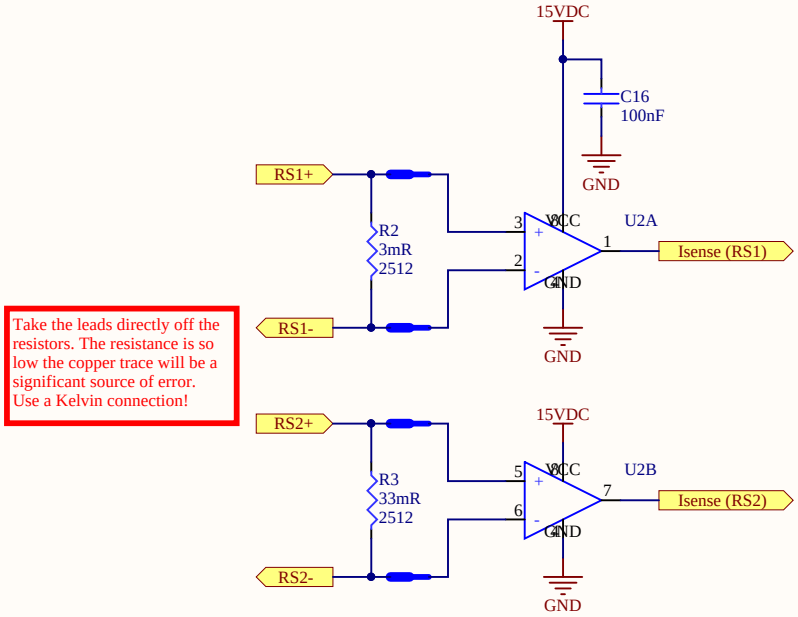
Design Capabilities

AFRIJI

PV Refridgerator v0.1.2

Vsense from 0 to 223.3V

Cct Rev	A	Designed by Mike MacKay	
		Date 2017-02-08	Sheet 14 of 26



PCB design/layout notes & considerations

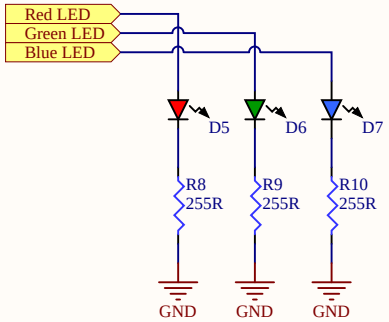
Design notes

Design Capabilities

PV Refridgerator v0.1.2

Vsense from 0 to 69.3V

Cct		Designed by	Mike MacKay
Rev	A	Date	2017-02-08
		Sheet	15 of 26



PCB design/layout notes & considerations

Design notes

Design Capabilities

PV Refridgerator v0.1.2

RGB LED

Cct Rev	A	Designed by Craig Comberbach	
		Date 2017-02-06	Sheet 16 of 26