ORANGE: Input Signal

GREEN: 1KHz – 10KHz
Tri. Oscillator

CYAN: Comparator
Output

+15V
12.5V
2.5V
GND

+15V
GND

PAGE 2:

RX TIMING
DIAGRAM

PAGE 3:

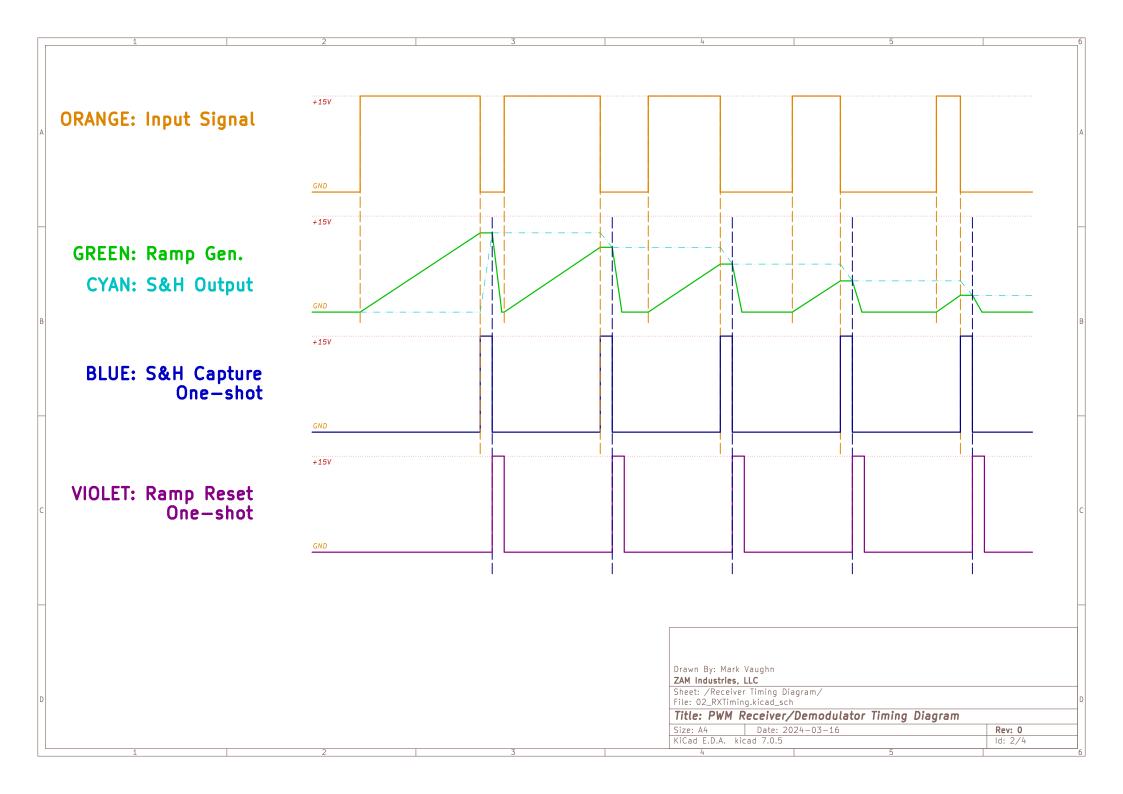TX/RX BLOCK
DIAGRAM

PAGE 4:

FULL SYSTEM
SCHEMATIC

Drawn By: Mark Vaughn
ZAM Industries, LLC
Sheet: /
File: Lab_08.kicad_sch
Title: PWM Modulator/Transmitter Timing Diagram
Size: A4 | Date: 2024-03-16 | Rev: 0
KiCad E.D.A. kicad 7.0.5 | Id: 1/4

ORANGE: Input Signal

+15V

GND

GREEN: Ramp Gen.

CYAN: S&H Output

+15V

GND

BLUE: S&H Capture
One-shot

+15V

GND

VIOLET: Ramp Reset
One-shot

+15V

GND

Title: PWM Receiver/Demodulator Timing Diagram

Size: A4 | Date: 2024-03-16 | Rev: 0
KiCad E.D.A. kicad 7.0.5 | Id: 2/4

INPUT

LEVEL SHIFT

TRIANGLE OSCILLATOR

+

−

FS1000A TX MODULE

MX-RM-5V RX MODULE

LEVEL SHIFT

RAMP GENERATOR
Enable
Output
Reset

ONE-SHOT

ONE-SHOT

SAMPLE & HOLD
Input
Output
Capture

FILTER

OUTPUT

MODULATOR/TRANSMITTER

INPUT

J1
Banana Jack

R10
1M
GND

Level Shift
+15V
R18 68K
R19 680K
R23 68K
U4B TL274
7
+15V
R20 100K
R22 100K
GND

Schmitt Trigger
R26 47K
R25 1K
U8A LM393
+15V
R28 2K2
GND

Transmit Module
+15V
D7 3.3V
R30 2K2
GND
U10 FS1000A
VCC
DATA
GND
TX

Frequency Adjust
U4D TL274
+15V
RV1 10K
15V to 14V
R1 150K
GND
+15V
Q3 PNP B
R11 120R
+15V

TRIANGLE_OUT
12Vpk-pk

Symmetry Trim
+15V
R4 100K
R8 100R
RV2 10K
R2 100R
U3A TLV274
+15V
R5 100R
R7 100R
GND

D3 D5
D4 D6
C6 0.01uF
GND
U4C TL274
9 8 10
R21 1K8
R16 1.2K
R17 1.2K
+15V
GND

Q4 NPN B
R12 120R
GND

+15V V+ U9E Opamp_Quad V- GND
+15V V+ U8C LM393 V- GND
U8B LM393

Triangle Oscillator

RECEIVER/DEMODULATOR

Receive Module
U1 MX-RM-5V
VCC
DATA
DATA
GND
RX
+5V
GND

Level Shift
+15V
R6 1K
R9 1K
R3 10K
Q1 NPN B
GND

Ramp Gen.
+15V
Q2 PNP B
Offset Calibrate
D1
D2
RV3 10K
R13 10K
R14 100R
+15V
Q5 PNP B
C5 0.01uF
GND

U5D CD4066BE 11 12 10
U5B CD4066BE
U5C CD4066BE
RESET
GND

Sample & Hold
U5A CD4066BE
CAPTURE
C8 100pF
GND
U7A TL082

Filter
C10 0.001uF
R27 1.5K
R29 39K
C11 470pF
GND
U7B TL082

J2 Banana Jack

OUTPUT

+15V
U2 LM7805
VI VO
GND
C1 0.1uF
C2 220uF
C3 220uF
C4 0.1uF
+5V
GND

+15V RC = 1% of cycle time
R15 1K
C7 0.01uF
GND
+15V
U6A 4538
R
Clk+
RxCx
Q
6 CAPTURE
Clk-
Cx
GND
One-Shot

+15V RC = 2% of cycle time
R24 2K2
C9 0.01uF
GND
+15V
U6B 4538
R
Clk+
RxCx
Q
6 RESET
Clk-
Cx
GND
One-Shot

+15V
Vdd
Vss
U5E CD4066BE
GND
VDD
U6C 4538
VSS
+15V
GND
+15V
V+
U7C TL082
V-
GND