



## PM4 Technical Info Document: Graphic LCD 2 Channel 500MHZ RF Meter

### Dual Channel 500MHZ RF Meter: PM4



PM4: Graphic LCD/CPU loaded with PM4 Firmware

Our present projects, uses dedicated CPU and hardware to address a specific task, like [SWM3](#) or [FC3](#) etc.

Graphic CPU used in PM4 is a core of our "[INFINITY](#)" Project and is developed keeping in mind that we use same CPU/LCD/Hardware for various Purposes or Projects, saving a lot of money in hardware.

This is important for homebrewers as the RF measurement sometimes, is only a once a month (or a year!) requirement in a Radio Room!!

PM4 is designed to work as a standalone unit. A PC program may be available in future from [Tony/I2TZK](#).

PM4 is a dual channel 500MHZ RF Meter designed in two boards and interconnected by a D9 Male to Male Cable (usually supplied with Graphic LCD/CPU KIT):

1. [Graphic CPU](#) and
2. Sensor unit with 2 X AD8307 Log amplifiers

## PM4 RF Meter Hardware Details:

- ➔ "[Fox Delta INFINITY](#)" Graphic CPU with PIC18F4550
- ➔ [Graphic CPU hardware details:](#)
  - 128 x 64 Graphic LCD with Back light control
  - DC12V or USB Powered
  - Expansion slot for relays and alarms (FRC16) (not ready yet)
  - 8 DIP Switches for CPU Configuration
- ➔ RF Measurement Sensor has Two AD8307s and BNC Connectors
- ➔ Powder Coated Free Cases for CPU and Sensor.

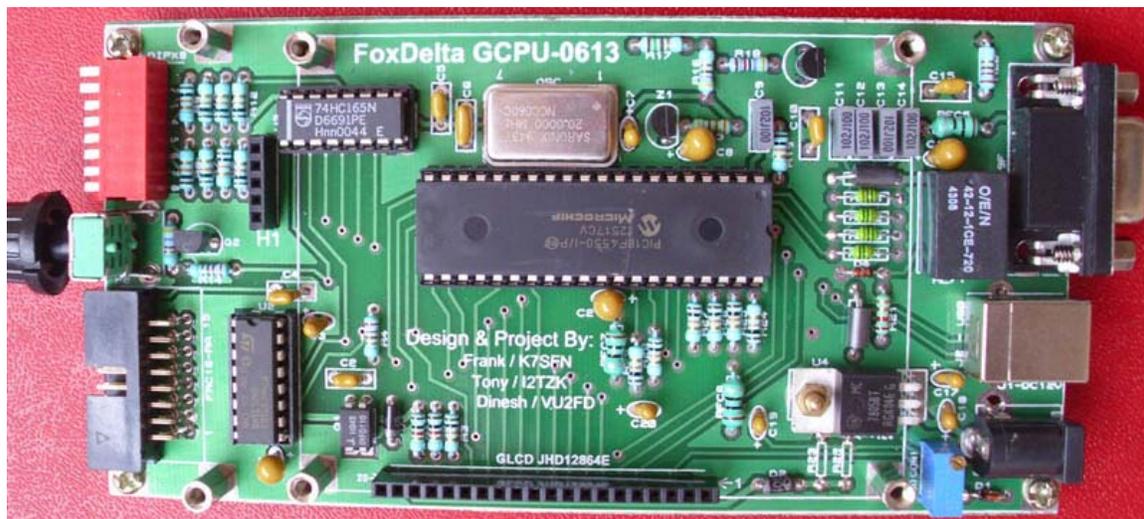
## Graphic CPU/LCD:

Graphic CPU is a single board Single CPU type hardware. Uses a JHD12864E type Graphic LCD and PIC 18F4550 processor.

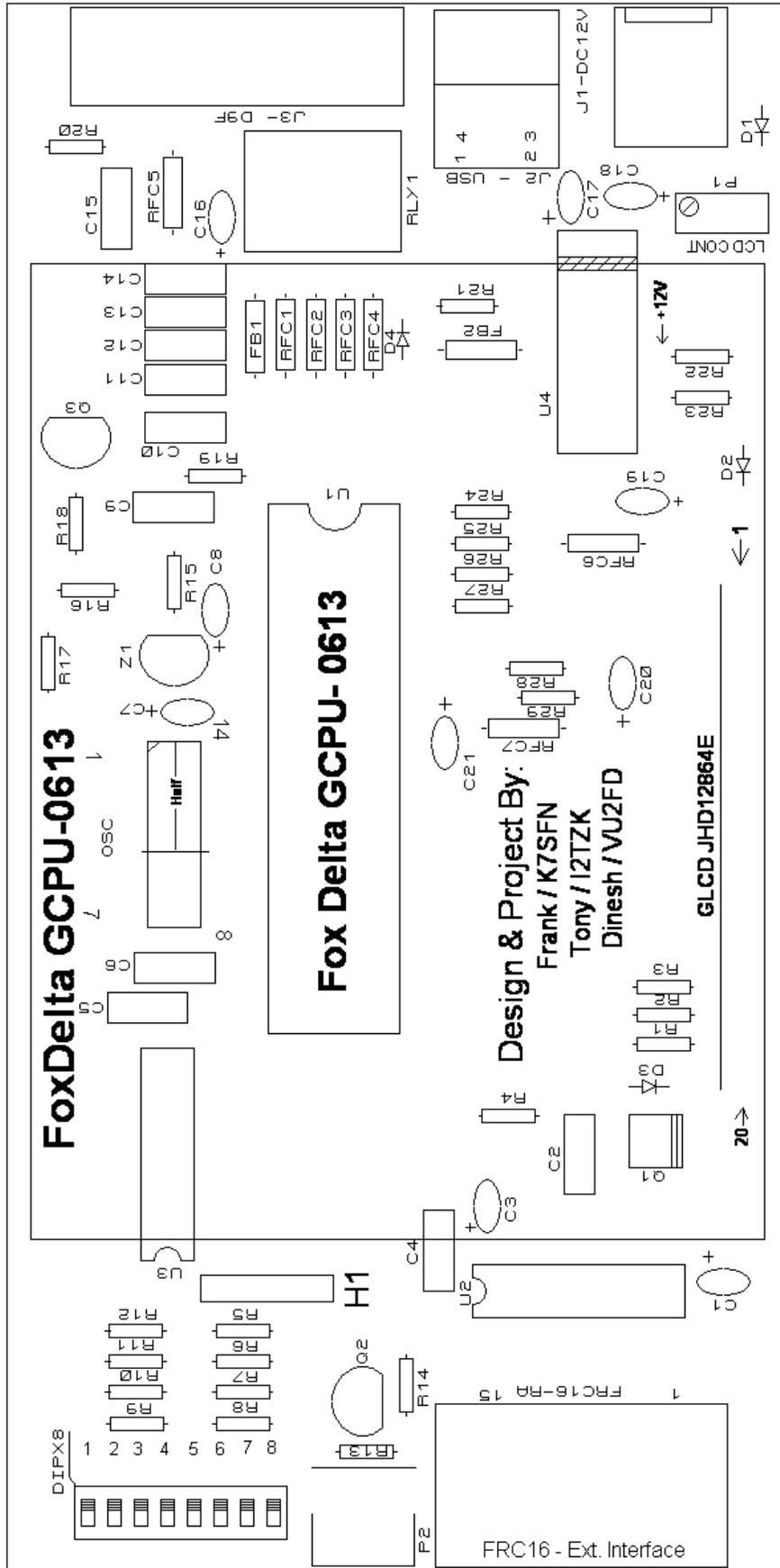
Graphic CPU has 4 analog A/D inputs at its D9 socket. Also has 2XI2C plus +5 and a Ground line.

For PM4 purpose, we are using 2 of the analog lines, +5V and a Ground to power sensor board remotely connected using a D9 Male to Male cable.

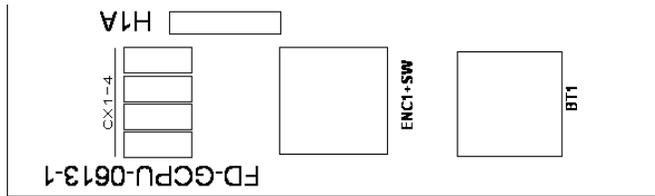
## GCPU-0613: LCD Removed:



**GCPU-0613 PCB TOP SIDE Silk:**



## GCPU-0613 Keyboard PCB:



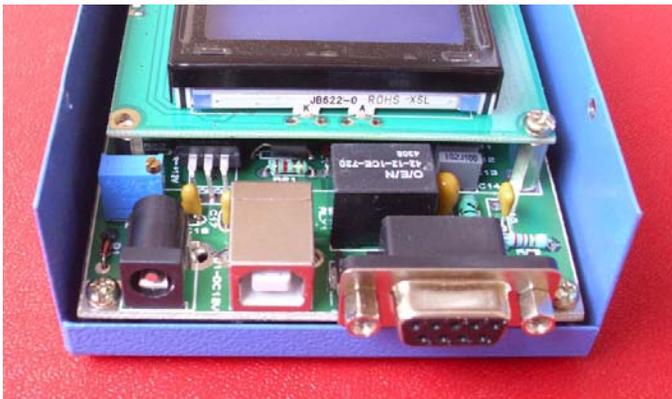
## PM4 CPU Side View: LEFT SIDE



On this side we have:

1. 8XDIP switch used for CPU configuration
2. Backlight Dimmer Control
3. FRC16 Connector for Relay and alarm operation. (Add-on board is under development)
4. Keyboard with 1 push button and one Rotary encoder with button. (4XCX1-4 are key-bounce capacitors: Option)

## PM4 CPU SIDE VIEW: RIGHT SIDE



This side has:

1. D9 connector with 4XA/D, 2XI2C, +5V and a Ground
2. USB Connector for USB Power and Communications
3. DC12V Connector
4. Relay on this board is simply to change power from USB to DC12V

## PM4 Graphic CPU:



In above picture:

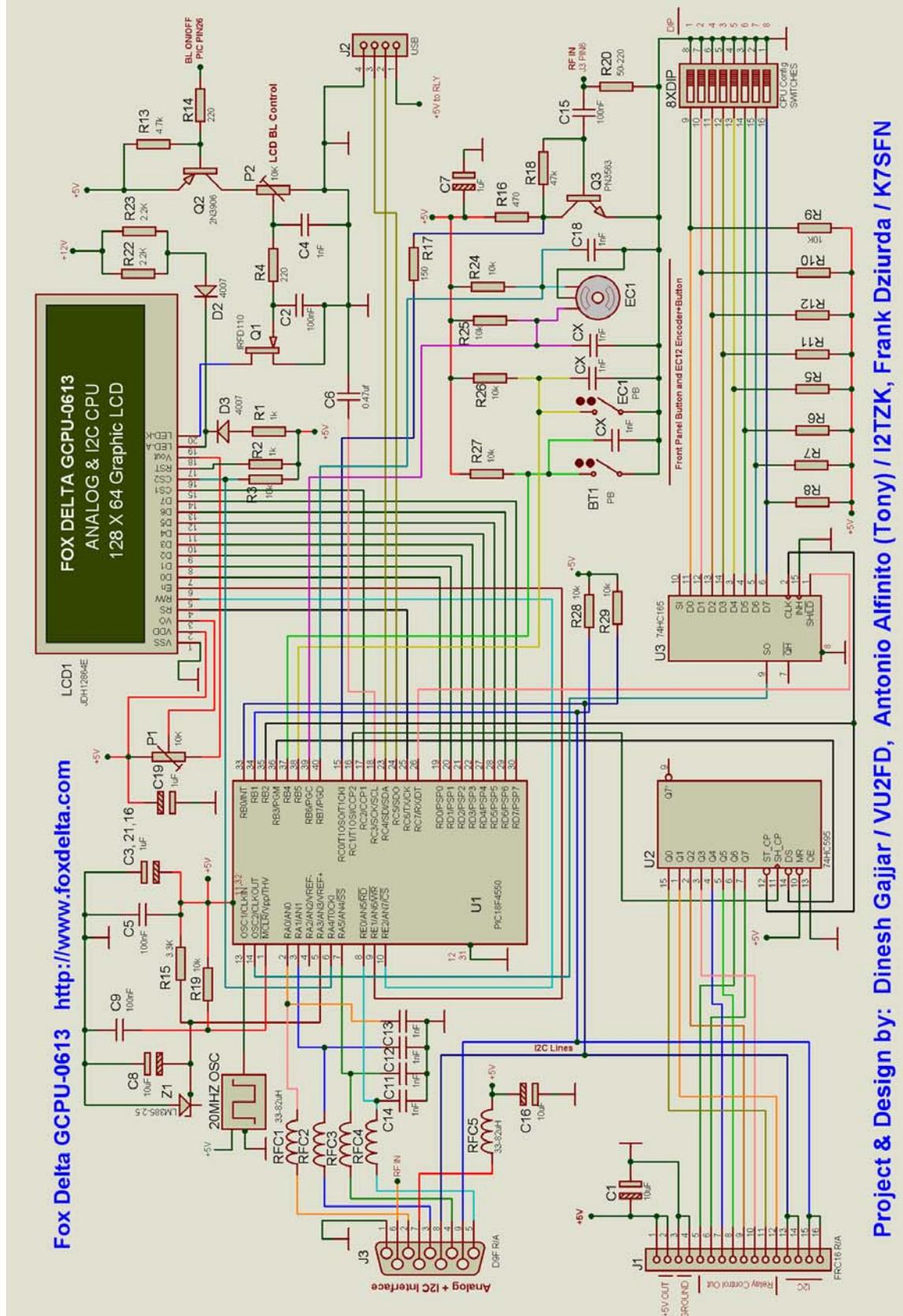
1. P1 is an LCD Contrast Preset (10 Turn)
2. FB1 and FB2 are Ferrite beads
3. R22 and R23 are present but are installed on the bottom side.

Another View of Graphic CPU:



1. Q1 is a backlight dimmer FET
2. GLCD header is a 20PIN SIL
3. All spacers for LCD and keyboard are 9mm long

**GCPU-0613 Schematic:**



Fox Delta GCPU-0613 <http://www.foxdelta.com>

Project & Design by: Dinesh Gajjar / VU2FD, Antonio Alfinito (Tony) / I2TZK, Frank Dziurda / K7SFN

**GCPU-0613 KIT PARTS LIST:**

Qty	Part ID	Part Details
1	U1	PIC18F4550 Pre-Programmed DIP40
1	LCD	128X64 Graphic LCD: JHD128X64E
1	Q1	IRFD110
1	Z1	LM385-2.5V
1	J1	DC 12V connector
1	J2	USB PCB Connector
1	J3	D9F R/A PCB Connector: 4XA/D + I2C + 5V
1	Q2	BC557B or 2N3906 or 2N2907 (GP PNP)
1	Q3	2N3553 RF Transistor TO92
2	D2, 3	1N4007
2	D1, 4	1N4148
1	BT1	12MM Push Button
1	FD-GCPU-0613	Double Sided PTH PCB Main Board
1	FD-GCPU-0613-1	Double Sided PTH PCB Keyboard
1	P1	10K Preset (LCD Contrast)
1	P2	10K POT + Knob (LCD Backlight Control)
1	ENC1	Alps EC12 Encoder with Switch
1	OSC	20MHZ Crystal Oscillator
1	DIP8	8XDIP SWITCH
1	U2	74HC595 DIP16
	U3	74HC165 DIP16
1	U4	7805 5V regulator
2	DIP16	IC Sockets
1	RLY	OEN42 12V 1CO Relay (USB/DC Select)
1	40DIP	IC Socket
7	RFC1, 2, 3, 4, 5, 6, 7,	10uH RFC
2	FB1, 2	Ferrite Beads
1	Set	Nuts / Bolts for LCD and KB Mounting
1	FRC16	PCB R/A FRC16 Socket for Extension
1	LCD Header	0.1IN 20PIN Header Male+Female for LCD
1	KB Header: H1/1A	0.1IN 5PIN Header Male+Female
1	Case	Free Powder Coated Metal Case
1	Set	LCD and KB Spacers (4+2)
1	Cable	D9 Male to Male 1Mtrs Long

QTTY	Capacitors	
3	C1, 8, 16	10uF Tantalum
7	C3, 7, 17, 18, 19, 20, 21	1uF Tantalum
5	C4, 11, 12, 13, 14	0.001uf Poly/Mylar
1	C6	0.47uf Poly/Mylar
5	C2, 15, 9, 10, 5	0.1uf Poly/Mylar

QTTY	All Resistors ¼ W 5%	
16	R3, 5, 6, 7, 8, 9, 10, 11, 12, 19, 24, 25, 26, 27, 28, 29	10K
1	R21	2.2 Ohms
2	R1, 2,	1K
2	R22, 23	2.2K
X	R20	R-Termination (50 to 220 Ohms)
2	R4, 14	220 Ohms
1	R13	4.7K
1	R15	3.3K
1	R18	47K
1	R16	470 Ohms
1	R17	150 Ohms

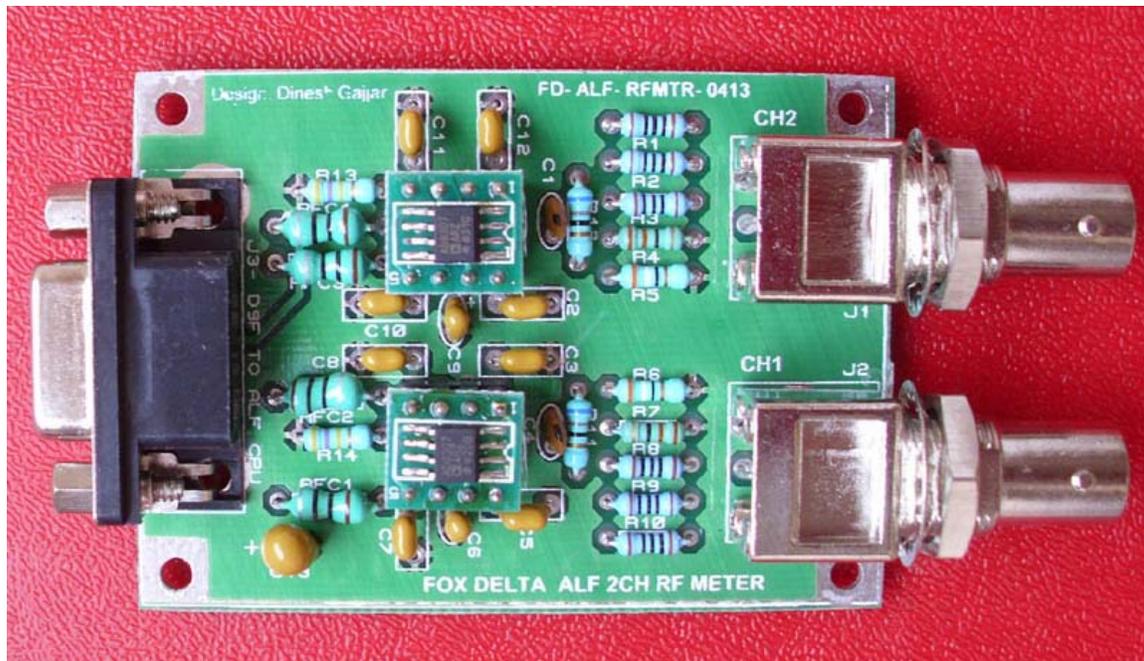
### PM4 Sensor board:

Sensor board uses two AD8307s. This Board is powered by GCPU.

AD8307s are in SO8 and are soldered on a DIP8 Carrier Board for this project/kits. However, you may buy DIP8 AD8307s if you like.

Sensor board uses 2 X BNC right angle PCB Connectors.

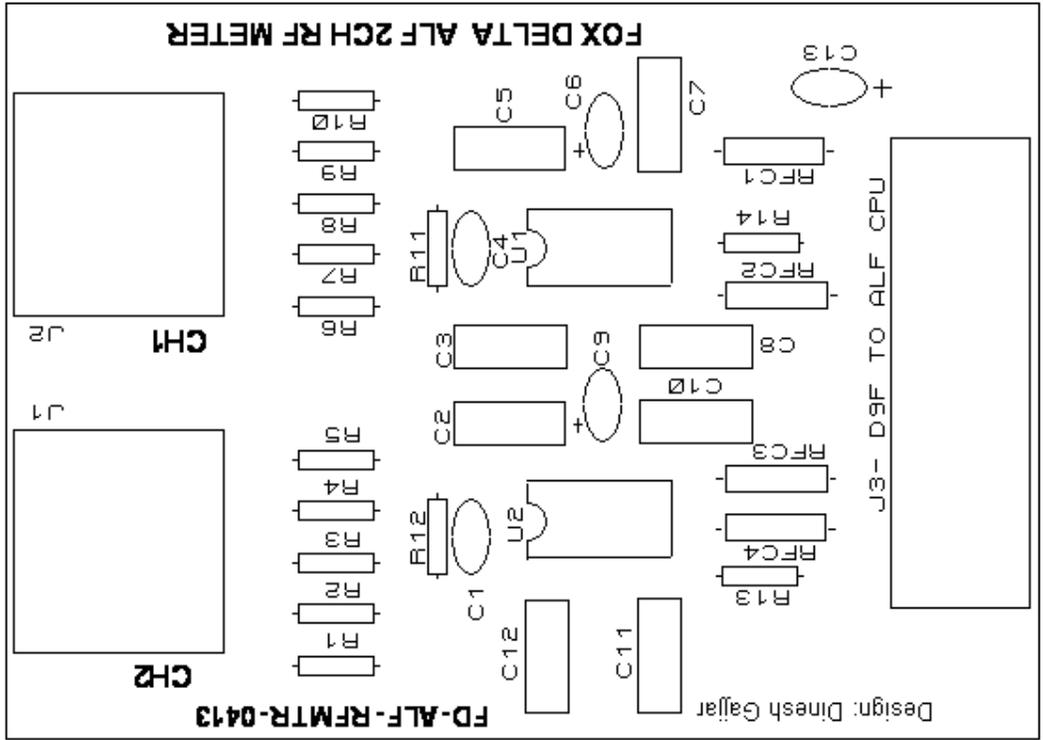
### Sensor Board View:



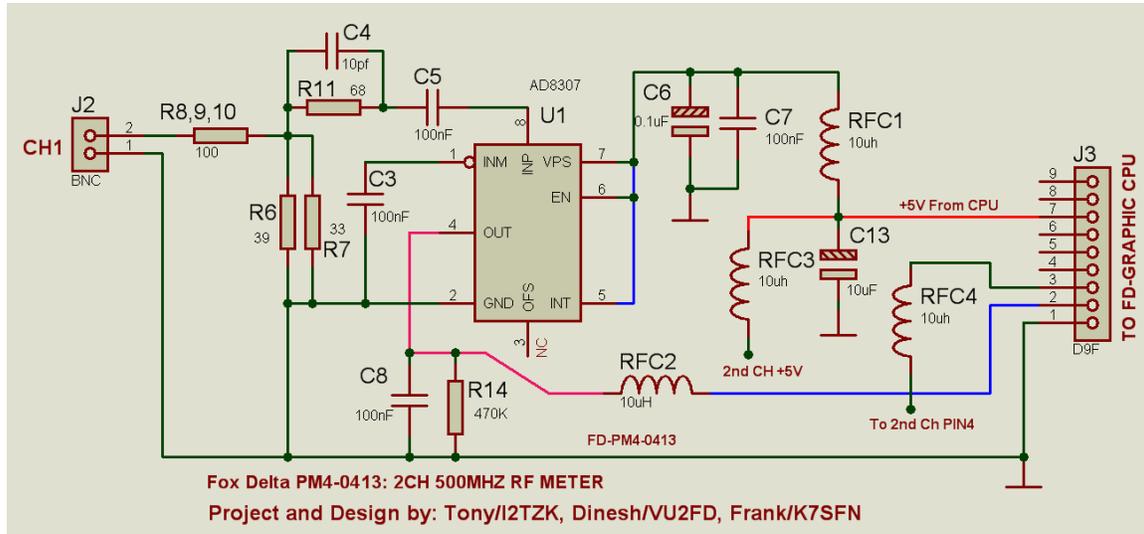
### Note:

1. Kits are supplied with AD8307s on DIP8 carrier PCBs. Not DIP8 AD8307.
2. BNC connectors in picture are MX416A (Full Metal) Present kits are supplied with MX416 (Plastic) for easy soldering. MX416A may be available as an option

**Sensor Board PCB Silk:**



**Sensor Board Schematic:**



In picture above: only one channel of AD8307 of sensor board is drawn.

## Parts List of PM4-Sensor Board:

Quantity	Part No.	Part ID
2	U1, U2	AD8307 SOIC on DIP8 Carrier PCB
2	J1, J2	BNC Socket MX416
2	IC Sockets	DIP8 (Solid Pins)
1	J3	D9F R/A PCB Socket
1	PCB	2CH RF METER DSPTH PCB
1	Metal Case	Free Powder Coated Metal Case
2	R6, 4	33 ohms
2	R5, 7	39 ohms
2	R12, 11	68 ohms
6	R1, 2, 3, 8, 9, 10	100 ohms
2	R13, 14	470K
2	C9, 6	0.1uF Tantalum
1	C13	10uF Tantalum
2	C1, 4	10pf Ceramic
8	C11, 12, 2, 3, 8, 10, 5, 7	0.1uf Poly/Mylar
4	RFC1, 2, 3, 4	10uH RFC
1	Set	Hardware (Case + nut and bolts)

### Assembly:

At moment no assembly document is available. You may use this document and schematic, silk pictures as a guide for kit assembly.

### Firmware and FW Guide:

PM4 firmware is written by Tony/I2TZK and is free for use by Amateur Radio Community. Please visit Tony's website for future updates.

A Firmware guide for PM4 is posted on [PM4 webpage](#).

### Test Report:

PM4 test report is being made by Frank/K7SFN and will be posted on PM4 webpage soon

73s

Dinesh/VU2FD, Tony/I2TZK, Frank/K7SFN  
20<sup>th</sup> July 2013

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For more details please visit <http://www.foxdelta.com>