Application Note

UT-210/UT-211 IT9517/IT9518 TX Module User Guide

Aug., 2016

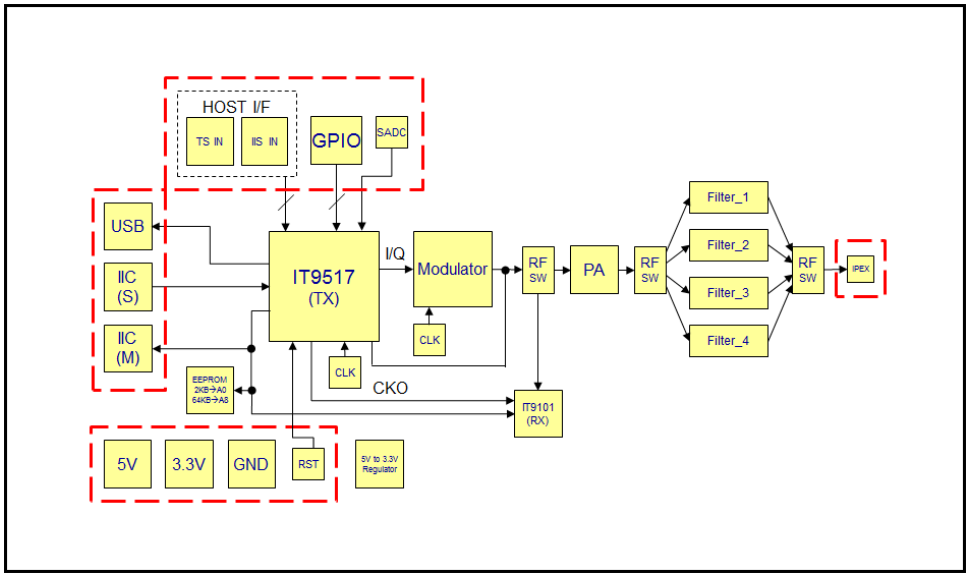
Reversion History

Reversion	Change List	Note
1.0		Initial version
1.1	Switch between internal and external LO/Mixer	
1.2	Device type	

Table of Contents

1 INTRODUCTION

1.1 Block Diagram

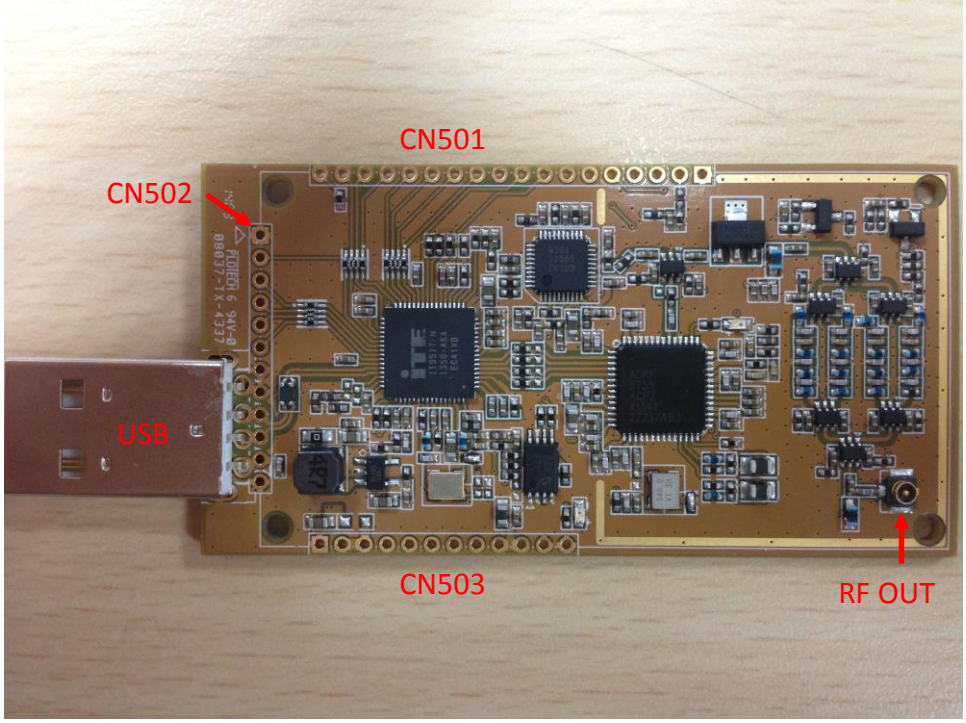


Model information

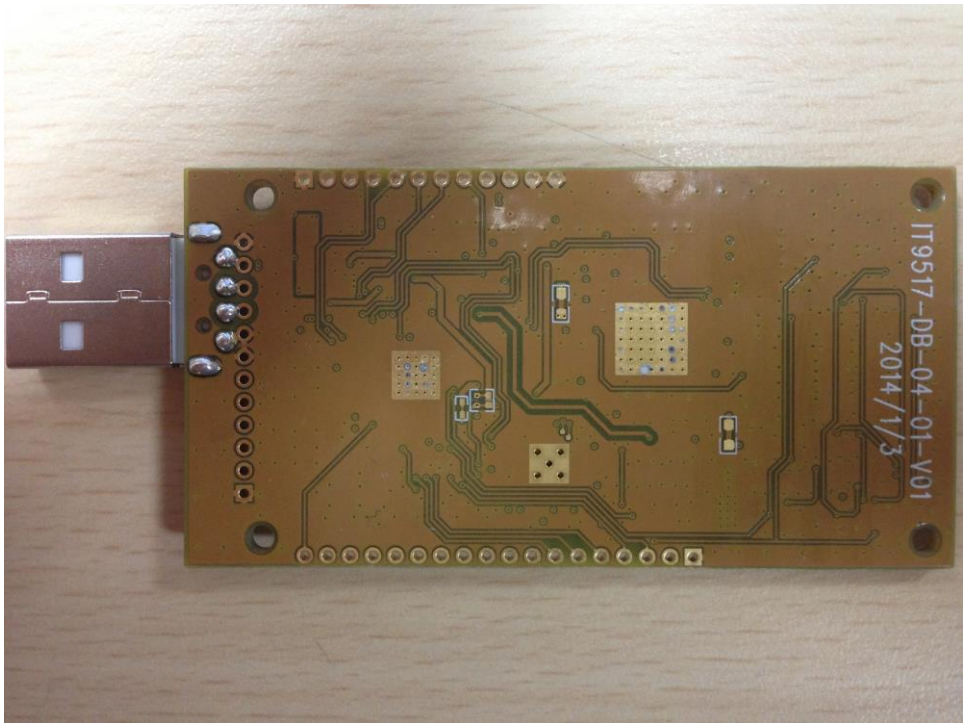
UT-210: IT9518+ADRF6755 (external mixer)

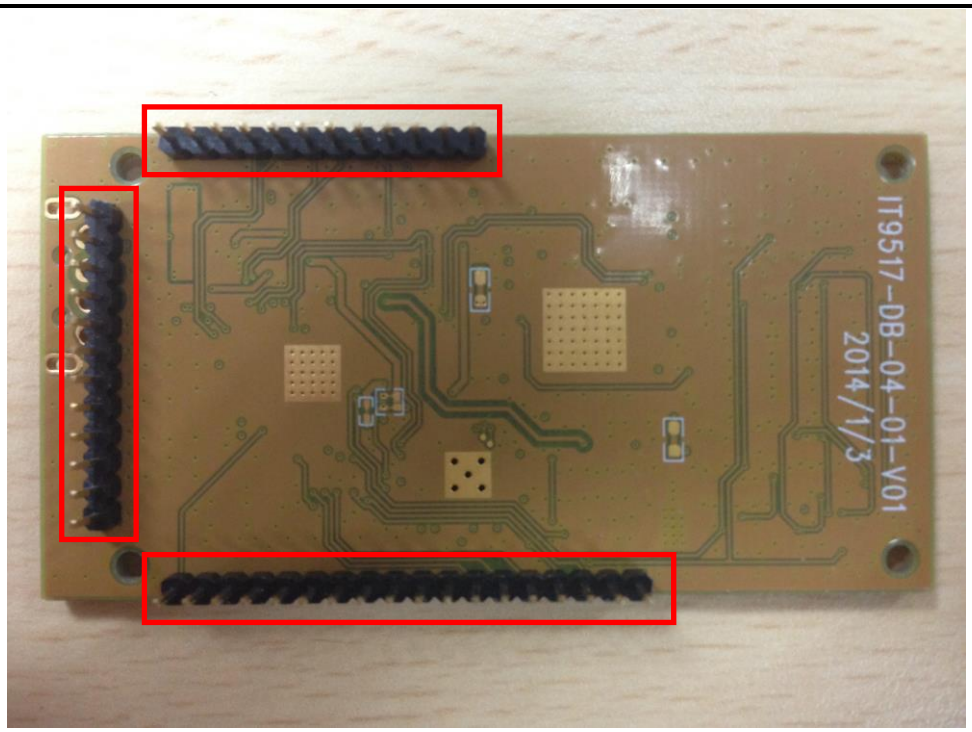
UT-211: IT9517 only (internal mixer)

1.2 PCB Overview – Top



1.3 PCB Overview – Bottom




IT9517-DB-04-01-V01
2014/1/3

2 SPECIFICATIONS

2.1 Supply Voltage = 5V (UT210, IT9517 with ADRF6755)

Parameter	MIN.	TYP.	MAX.	Unit
Supply Voltage	4.75	5	5.25	V
Frequency Range	100	-	950	MHz
MER Performance*1	35	-	-	dB
Output Power @ 950M	-4	-	-	dBm
Consumption Current	-	560	-	mA
Operation Temperature	0	-	50	°C

*1 **Measure with modulation parameters**

Channel BW = 6MHz、Constellation = 16QAM、Guard Interval = 1/32、Code Rate = 2/3、FFT Mode = 8K

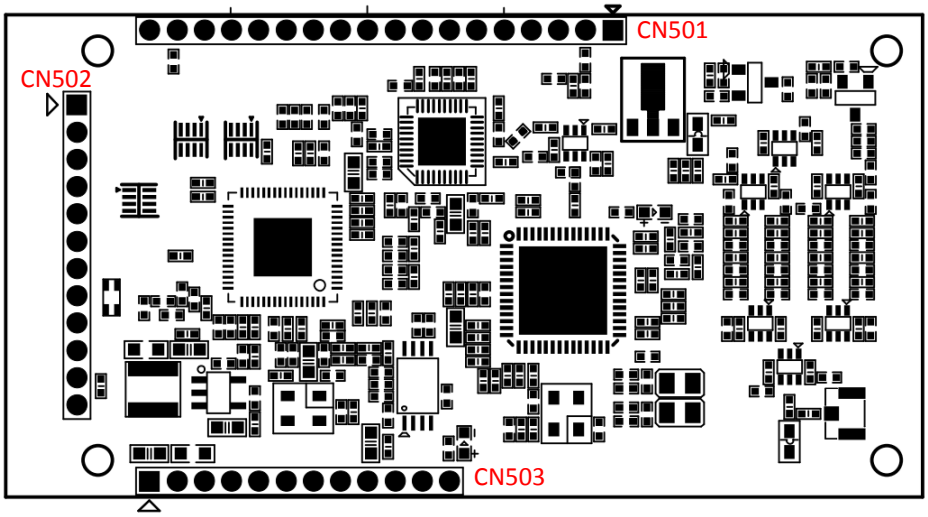
2.2 Supply Voltage = 5V (UT-211, IT9517 only)

Parameter	MIN.	TYP.	MAX.	Unit
Supply Voltage	4.75	5	5.25	V
Frequency Range	100	-	950	MHz
MER Performance*1	30	-	-	dB
Output Power @ 950MHz	-10	-	-	dBm
Consumption Current	-	240	-	mA
Operation Temperature	0	-	50	°C

*1 **Measure with modulation parameters**

Channel BW = 6MHz、Constellation = 16QAM、Guard Interval = 1/32、Code Rate = 2/3、FFT Mode = 8K

2.3 Pin Definition



- CN501:

Pin No	Pin Name	Type	Description
1	GND	GND	Connect to ground.
2	SADC_IN	I	Slow ADC Input.
3	RST_SL	I/O	Strapping / Reset other devices. (default: Low)
4	RF_EN	I/O	Strapping / RF output enable. (default: Low)
5	GPIOH5	I/O	Strapping / RF band switch_2. (default: Low)
6	GPIOH6	I/O	Strapping / 7-SEG_B / GPIO. (default: High)
7	GPIOH7	I/O	Strapping / IR / GPIO. (default: High)
8	GPIOH4	I/O	UART_TXD / 7-SEG_A / GPIO.
9	GPIOH8	I/O	UART_RXD / 7-SEG_C / GPIO.
10	GND	GND	Connect to ground.
11	HOSTB0	I	TS_MPDATA[7]
12	HOSTB1	I	TS_MPDATA[6] / I2S_MCK
13	HOSTB2	I	TS_MPDATA[5] / I2S_BCK
14	HOSTB3	I	TS_MPDATA[4] / I2S_LRCK
15	HOSTB4	I	TS_MPDATA[3] / I2S_D0
16	HOSTB5	I	TS_MPDATA[2] / I2S_D1
17	HOSTB6	I	TS_MPDATA[1] / I2S_D2
18	BOND	I	0: TS Input Mode / 1: I2S Input Mode.

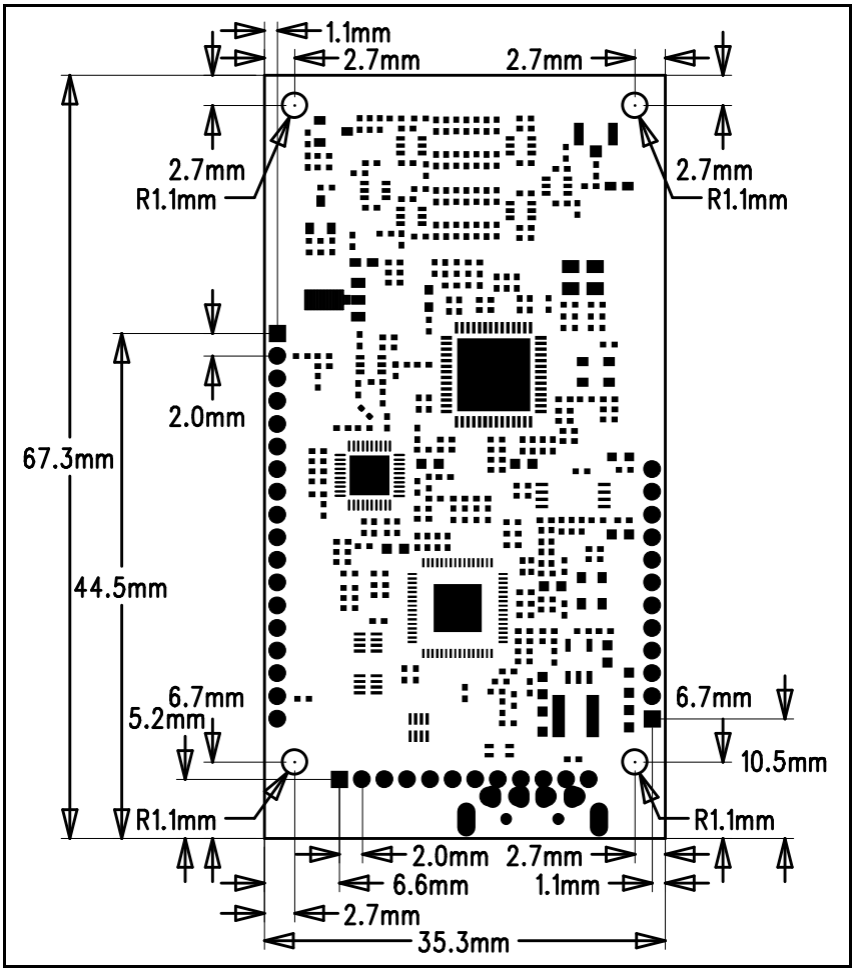
- CN502:

Pin No	Pin Name	Type	Description
1	GND	GND	Connect to ground.
2	HOSTB7	I	TS_MPDATA[0]
3	HOSTB8	I	TS_CLK
4	HOSTB9	I	TS_VLD
5	HOSTB10	I	TS_SYNC
6	HOSTB11	I	TS_FAIL
7	GND	GND	Connect to ground.
8	GND	GND	Connect to ground.
9	DP	I/O	Differential Positive signal for USB
10	DM	I/O	Differential Negative signal for USB
11	VBUS	PWR	+ 5V power supply.
12	GND	GND	Connect to ground.

- CN503:

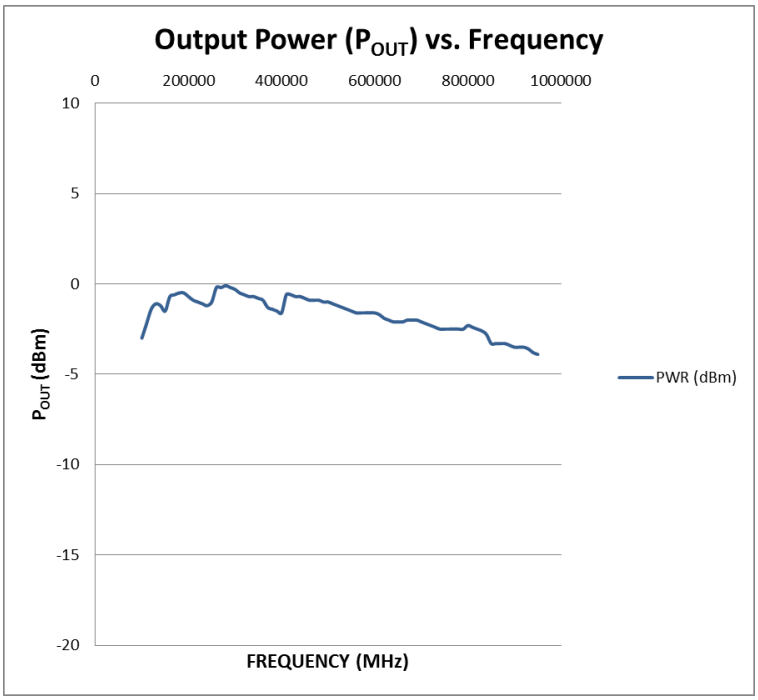
Pin No	Pin Name	Type	Description
1	GND	GND	Connect to ground.
2	3.3V	PWR	+ 3.3V power supply. (Option)
3	3.3V	PWR	+ 3.3V power supply. (Option)
4	SDA_S	I/O	Two-wire bus serial data line. (default address: 0x38)
5	SCL_S	I/O	Two-wire bus serial clock line. (default address: 0x38)
6	SCL_M	I/O	Two-wire bus serial data line. (Master)
7	SDA_M	I/O	Two-wire bus serial clock line. (Master)
8	RESETN	I	Power-on Reset. (Low Active)
9	5V	PWR	+ 5V power supply. (Option)
10	5V	PWR	+ 5V power supply. (Option)
11	GND	GND	Connect to ground.
12	GND	GND	Connect to ground.

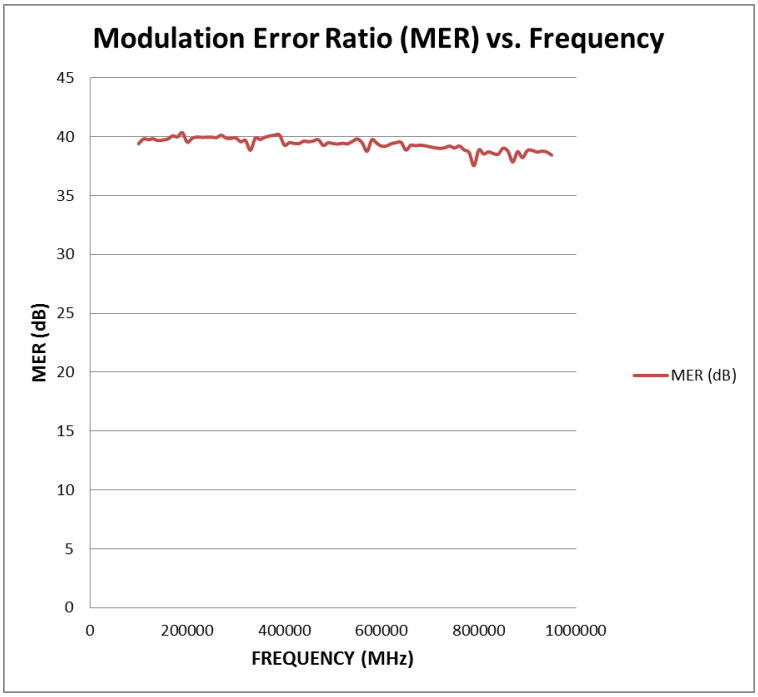
2.4 TX Module Dimension



3 TYPICAL PERFORMANCE CHARACTERISTICS

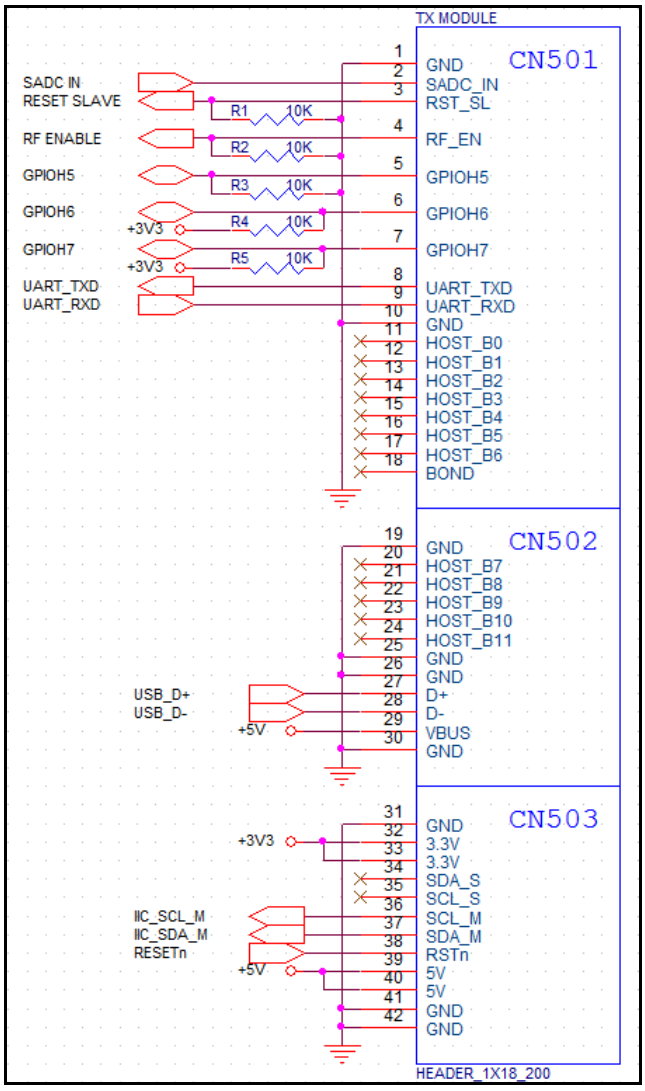
3.1 UT-210 (IT9518 with ADRF6755)





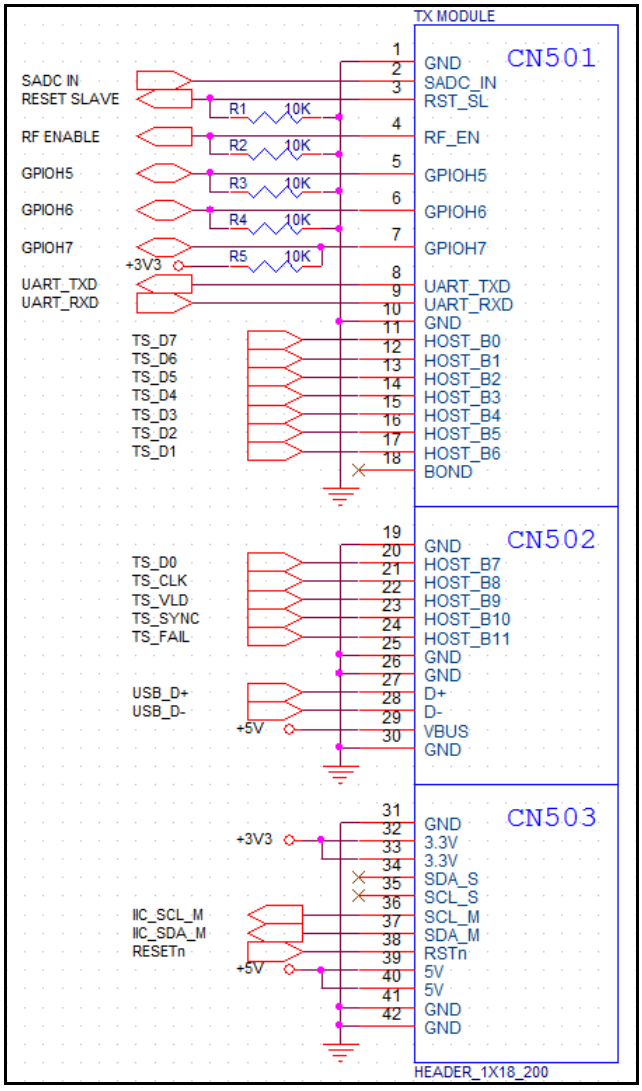
4 SYSTEM SETTING

4.1 USB mode



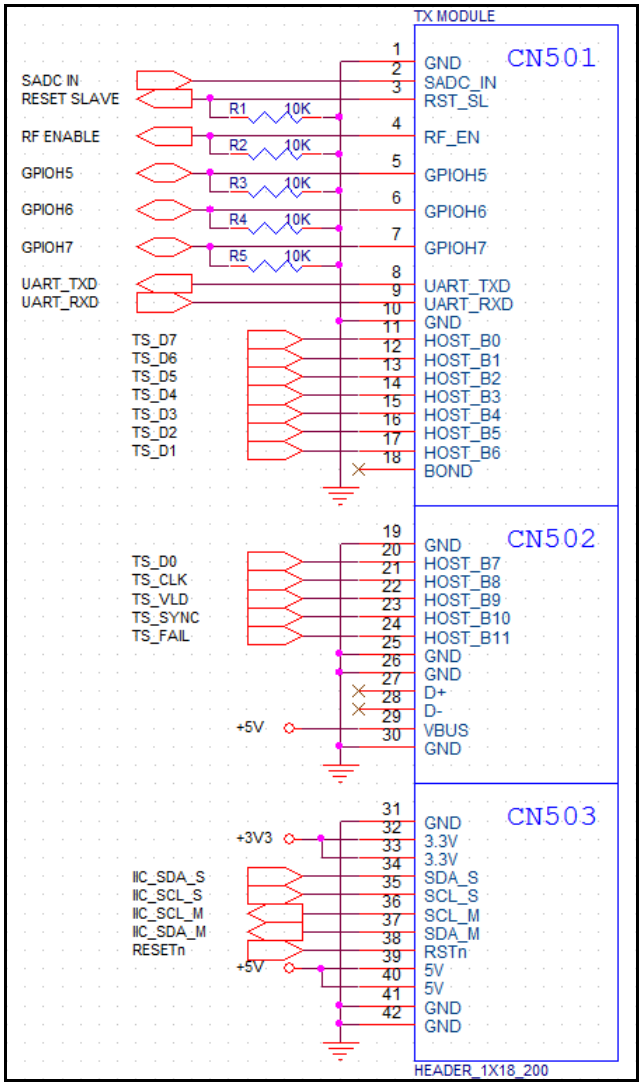
- Hardware strapping setting:
  1. CN501: pin3, pin4, and pin5 should been pulled low.
  2. CN501: pin6 and pin7 should been pulled high.

4.2 TS IN / USB control mode



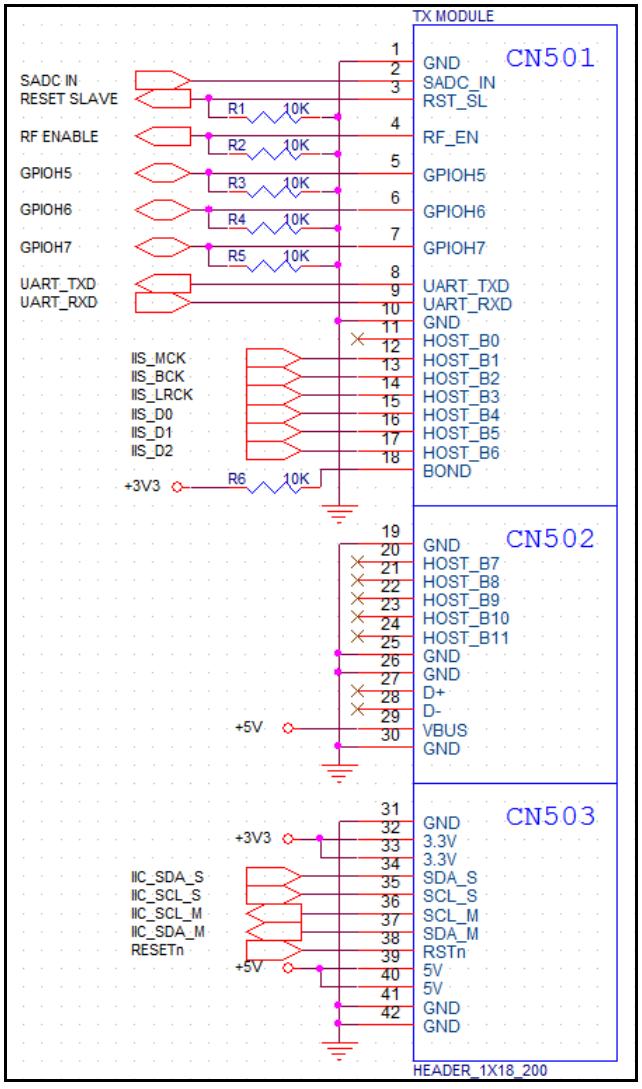
- Hardware strapping setting:
  1. CN501: pin3, pin4, pin5, and pin6 should been pulled low.
  2. CN501: pin7 should been pulled high.

4.3 TS IN / IIC mode



- Hardware strapping setting:
  1. CN501: pin3, pin4, pin5, pin6, and pin7 should been pulled low.

4.4 IIS IN / IIC mode



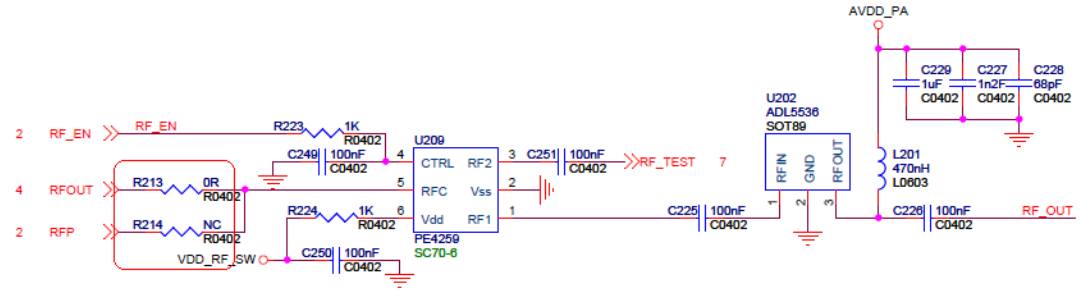
- Hardware strapping setting:
  1. CN501: pin3, pin4, pin5, pin6, and pin7 should been pulled low.
- IIS selection:
  1. CN501: pin18 should been pulled high.

5 Switch between internal and external LO/Mixer

This chapter shows how to switch between internal and external mixer while the modulator chip is IT9517.
If the modulator chip is IT9518, it can only use external LO/Mixer.

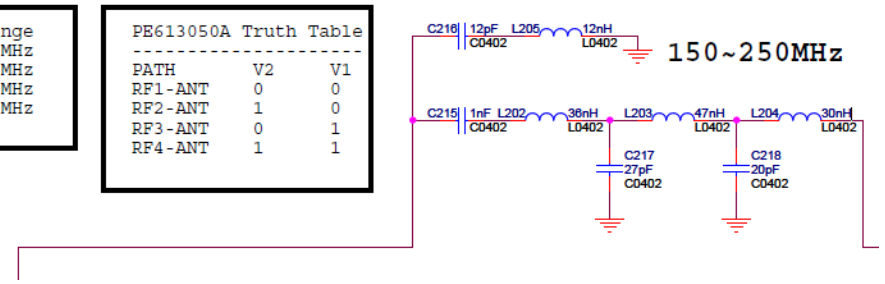
5.1 Board modification

Refer to the schematic. R213/R214 determines the RF path,
RFOUT is from ADRF6755, while RFP is from IT9517 directly.
If external mixer is used, remove R214 and put R213 (0 ohm).
If internal mixer is used, remove R213 and put R214 (0 ohm).

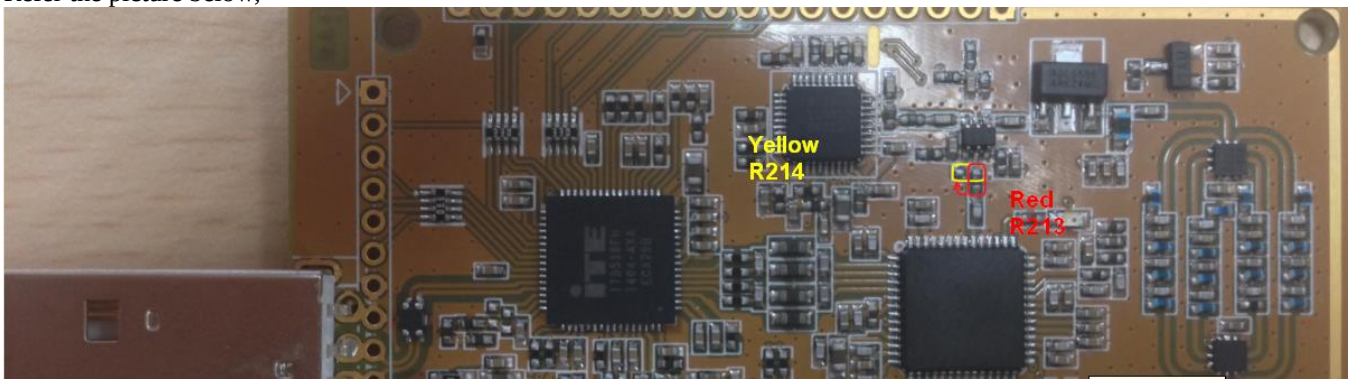


LPF_SW_1	LPF_SW_2	Freq Range
0	0	-> 400~950MHz
0	1	-> 250~400MHz
1	0	-> 150~250MHz
1	1	-> ~150MHz

PE613050A Truth Table		
PATH	V2	V1
RF1-ANT	0	0
RF2-ANT	1	0
RF3-ANT	0	1
RF4-ANT	1	1



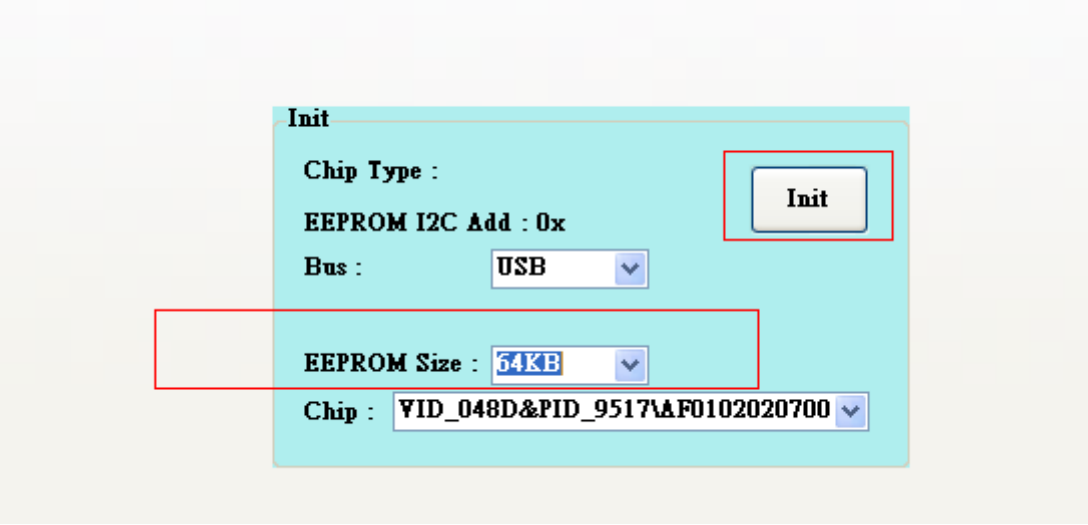
Refer the picture below,



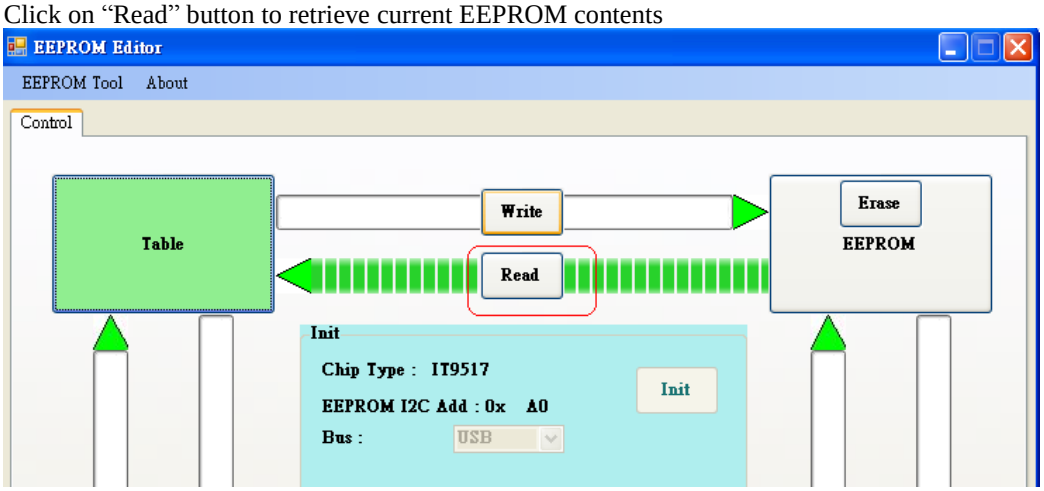
5.2 EEPROM Settings

The device type in EEPROM should be set properly for Windows or Linux driver to work properly,
Device type: refer to details below

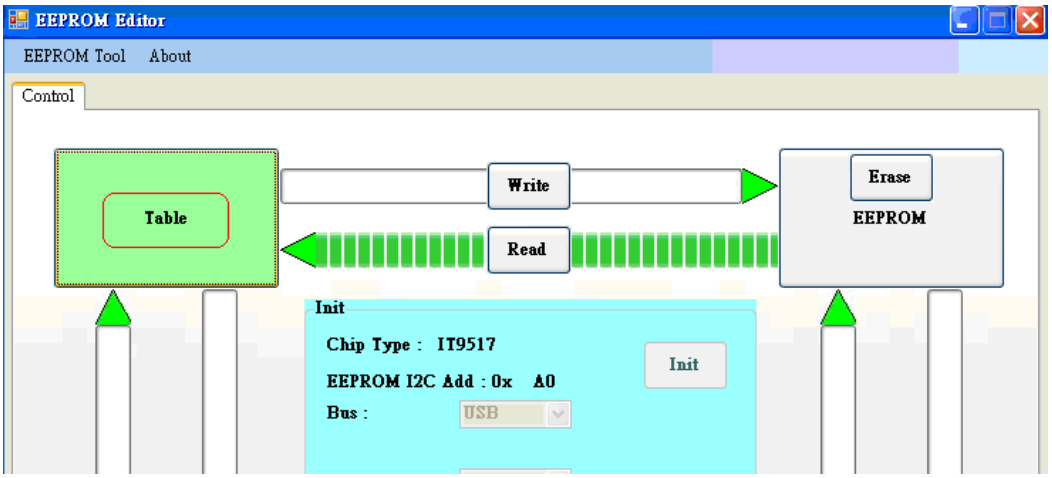
EEPROM Editor usage,
Launch ITE EEPROM Editor
Select EEPROM Size 64KB for IT9510 Tx module,
Then click on “Init”



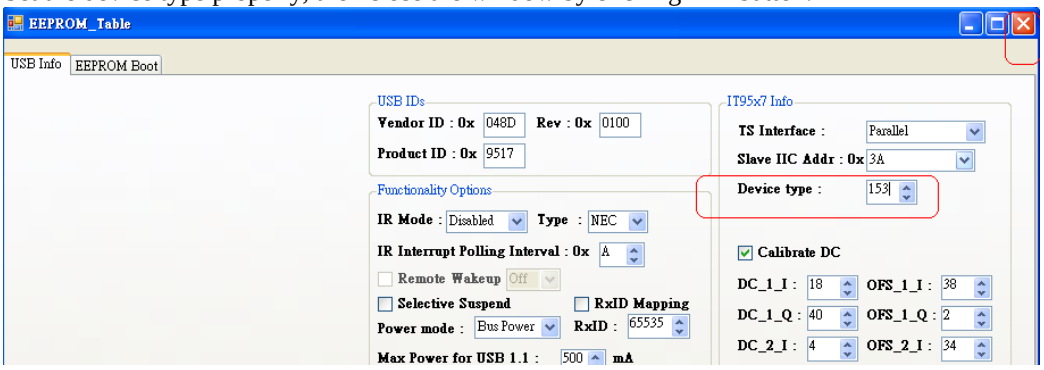
Click on “Read” button to retrieve current EEPROM contents



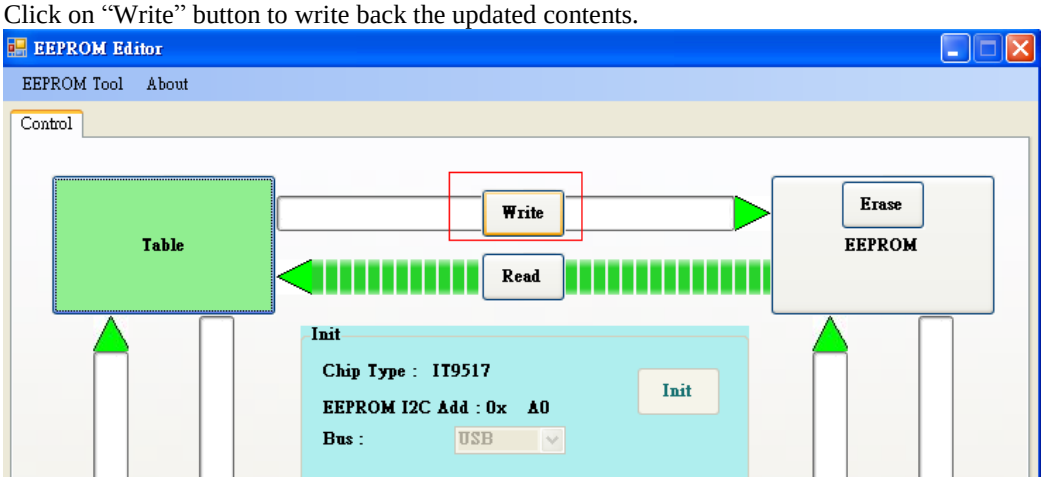
Ckick on “Table” to edit the contents



Set the device type properly, then close the window by clicking "X" button.



Click on "Write" button to write back the updated contents.



5.3 Device Types for Various Board Configurations

UT-211(without ADRF6755)

Device Type	GPIO1	GPIO2	GPIO3	GPIO4	GPIO5	GPIO6	GPIO7	GPIO8	Board Type
99h	Reset Slave	RF Enable	Filter_1	UART--TXD	Filter_2	NA	IrDA	UART--RXD	Tx Module w/o Orion
9Bh	Reset Slave	RF Enable	Filter_1	UART--TXD	Filter_2	NA	IrDA	UART--RXD	Tx Module_V02 w/ Orion
9Dh	Reset Slave	RF Enable	Filter_1(*)	UART--TXD	Filter_2(*)	NA	IrDA	UART--RXD	Tx Module_V03 w/o Orion

UT-210 (with ADRF6755)

D9h	Reset Slave	RF Enable	Filter_1	UART--TXD	Filter_2	NA	IrDA	UART--RXD	Tx Module w/o Orion (ADRF6755_40MHz)
DAh	Reset Slave	RF Enable	Filter_1	UART--TXD	Filter_2	NA	IrDA	UART--RXD	Tx Module_V02 w/o Orion (ADRF6755_20MHz)
DBh	Reset Slave	RF Enable	Filter_1	UART--TXD	Filter_2	NA	IrDA	UART--RXD	Tx Module_V02 w/ Orion (ADRF6755_20MHz)
DCh	Reset Slave	RF Enable	Filter_1(*)	UART--TXD	Filter_2(*)	NA	IrDA	UART--RXD	Tx Module_V03 w/o Orion (ADRF6755_20MHz)
DDh	Reset Slave	RF Enable	Filter_1(*)	UART--TXD	Filter_2(*)	NA	IrDA	UART--RXD	Tx Module_V03 w/ Orion (ADRF6755_20MHz)

Note

1. Default CH selection for Eagle1: GPIOH4, GPIOH5, GPIOH6, GPIOH8
2. Default CH selection for Eagle2: GPIOH3, GPIOH4, GPIOH6, GPIOH8
3. ~~3-wire Serial Interface for external LO: GPIOH3-->CLK, GPIOH4-->DATA, GPIOH5-->LE~~
4. Eagle1: 00~7Fh (w/o ADRF6755: 00~3Fh; w/ ADRF6755: 40~7F)
5. Eagle2: 80~FFh (w/o ADRF6755: 90~BFh; w/ ADRF6755: D0~FF)
6. U/V filter switch: GPIOH8 (for Eagle1); ~~GPIOH3 (for Eagle2)~~
7. filter_1 & filter_2 control:

	filter_1	filter_2
> 400MHz	0	0
<= 400MHz	0	1
<= 250MHz	1	0
<= 150MHz	1	1

8. filter_1(*) & filter_2(*) control (for TX module V03):

	filter_1(*)	filter_2(*)
> 2600MHz	0	0
<= 1400MHz	0	1
<= 250MHz	1	0
<= 950MHz	1	1