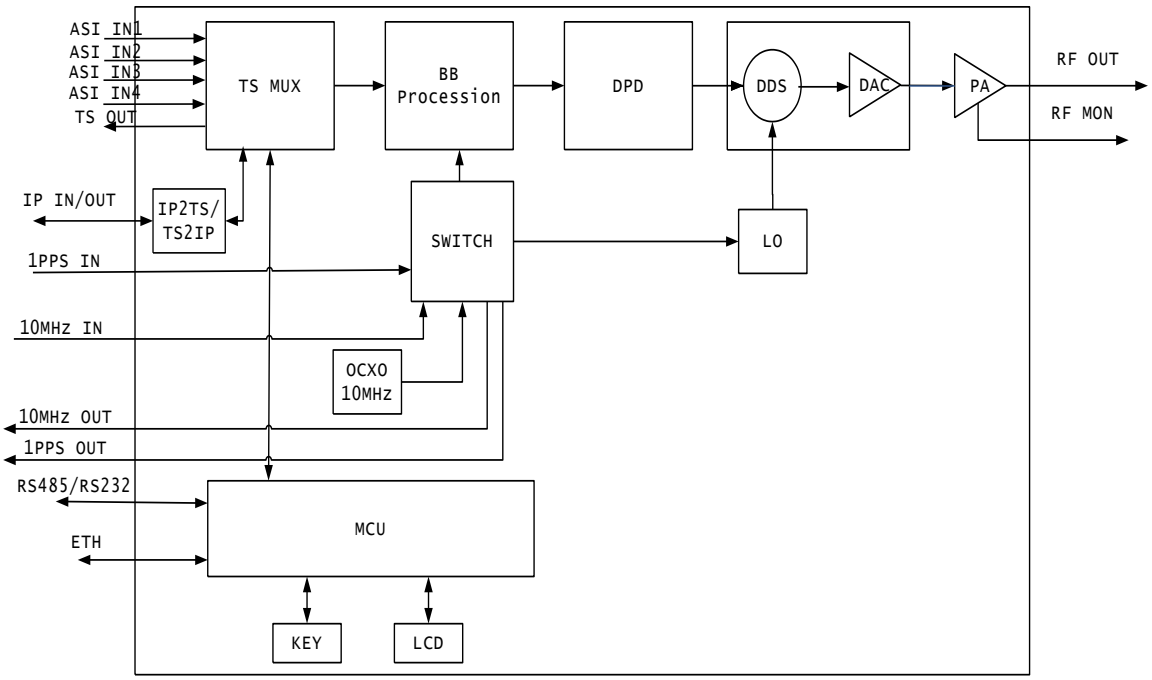
CONTENTS

1. Introduction

The DVB-S2 exciter is composed of source procession, FEC, modulation, baseband procession, DAC, control system and display system.It is compliant with ETSI EN 302 307. The following block diagram 1 shows the architecture of this production.

Directive Digital frequency Synthesis and Digital Up Convertion are used to obtain outstanding performance.

Remote management, operation and monitoring can be implemented via RS232 and RJ45. Exicter upgrading is easily implemented through RJ45.



Figre 1. exciter diagram

2. Production Overview

2.1 Front panel view

Figre 2. front panel

LCD: 40×2 LCD with backlight.
Function button: LEFT、RIGHT、UP、DOWN、OK、ESC。
TS: Green, light on indicates one of 4 ASI input is locked
GPS: Green, light on indicates OCXO is locked to reference 10MHz clock
IP: Green, light on indicates TS from TsoIP input is locked
RFON: Green, light on indicates RF output is normal
TSErr: Red, light on indicates all paths of the TS input are unlocked
SYSErr: Red, light on indicates system fault

2.2 rear panel view

Figre 3. rear panel

ASI IN1	ASI1 input, BNC-K female, input impedance 75 Ω
ASI IN2	ASI2 input, BNC-K female, input impedance 75 Ω
ASI IN3	ASI2 input, BNC-K female, input impedance 75 Ω

ASI IN4	ASI3 input, BNC-K female, input impedance 75 Ω
ASI OUT	ASI output, BNC-K female, output impedance 75 Ω
10M OUT	10MHz clock output, BNC-K female, output impedance 50 Ω
1PPS IN	1PPS input, BNC-K female, TTL
10M IN	10MHz input, BNC-K female, input impedance 50 Ω
RF OUT	RF output, N-K female, output impedance 50 Ω
RF TEST	RF monitor, BNC-K female, output impedance 50 Ω
RF IN	Feedback input, BNC-K female, input impedance 50 Ω
RS232/RS485	Remote monitor interface, DB9 male
NMS	network management port,RJ45,support TCP/UDP
DATA	TSoIP net port, RJ45
Power switch	Rocker switch with light
power input	three prong socket with fuse

3. Character Description

3.1 Main Characteristics

1) Support ETSI EN 302 307.
2) Easy to set bandwidth, maxmuim symbol rate is 60MSPS, maxmuim payload reachs 120Mbps.
3) Directive Digital frequency Synthesis and Digital Up Convertion are used to obtain outstanding performance.
4) Total and effective TS rate display.
5) Real-time temperature monitor and display, temperature overhigh warning.
6) Remote management, operation and monitoring can be implemented via RS232 and RJ45. Exicter upgrading is easily implemented through RJ45.
7) Two user interface LCD and WEB.

3.2 Parameter Description

3.2.1 Physical Parameter

TABLE 1. DVB-S2 exciter physical parameter

No.	item	parameter
1	ambient temperature	Operating Range : 5 ℃ ～ 45 ℃ Maxmimum Range: -10 ℃ ～ 50 ℃
	relative humidity	Operating Range: ≤ 90% (20 ℃) Maxmimum Range: ≤ 95%
	atmospheric pressure	86 kPa ～ 106 kPa
2	Power voltage range	100V～ 240V AC
	Power frequency	50 Hz ～ 60 Hz
3	Size	Normal 1U chassis

4	weight	Net : 3.5 kg, Gross : 5 kg

3.2.2 Technique Parameter

TABLE 2. DVB-S2 exciter technique parameters

No.	Item	parameter	
1	TS input	4 paths ASI input with hot backup, auto/manual seitch	
		1 path TsoIP input,support TCP/UDP,support unicast/multicast, support IGMPV2	
2	FEC and MOD	Symbol rate	0.4-60.0MSPS, stepsize 0.1MSPS
		LDPC type	Normal or short
		LDPC rate	1/4, 1/3, 2/5, 1/2, 3/5, 2/3,3/4, 4/5, 5/6, 8/9, 9/10
		data Modulation	QPSK, 8PSK, 16APSK,32APSK
		Roll off	0.35,0.25,0.2
3	RF output	Center frequency	950-1650Mhz, stepsize 1Khz
		Signle tone testing mode	continous wave(CW)
		Output level	-39.9 dBm ～ +9.9 dBm, stepsize 0.1dBm
		RFMON level	RF monitor output,10dB less than RFOUT
		Power stable	< ±0.2 dB (24 hours)
		frequency stable	With internal OCXO: $<1\times10^{-8}$ With outer reference: $<1\times10^{-12}$
		MER	> 46 dB
		In-band flat	< ±0.5 dB

		shoulder	< -58 dBc @fc±4.2 MHz BW=8MHz
		Phase noise	< -80 dBc @10Hz
			< -100 dBc@100Hz
			< -110 dBc@1kHz
			< -115 dBc@10kHz
			< -120 dBc@100kHz
			< -130 dBc@1MHz
4	Internal clock	stable	< ±0.01 ppm（typical）
		aging rate	< ±0.3 ppm/year
	External 10M	Input level	AC couple,V_{P-P} ≥ 300 mV
	External 1PPS	Input level	TTL,positive trigger
6	Control	Local control	Keyboard on Front panel,LCD and LED indication
		Remote control	WEB,RS232/RS485,support remote upgrade

4. Operation manual

Multiple operation modes are supported.

- Via the key buttons and the LCD;
- Via the web server ;
- Via the RS232/RS485.

Only the first method is descripted in the following paragraphs.

When turn on the power, The LCD will display the initialization information—“System Starting, Please Wait”. A few seconds later, the LCD will display “System Initialization Completed”, and then display the main menu.

The LCD will change to the standby mode when there are no operations for 60 seconds. And the LCD will display the all STATUS submenus information alternately.

In the STANDBY MODE, press ‘ESC’ will change to the QUERY/SET MODE from the STANDBY MODE.

In this mode, all the parameters can be viewed and modified. And in the menu items select mode, you can press the“L” or “R”to move the cursor “>” to the desired submenu， then press“OK”to enter submenu. In the submenu, pressing“ESC”will return to the parent menu。

4.1 BUTTON Descriptions

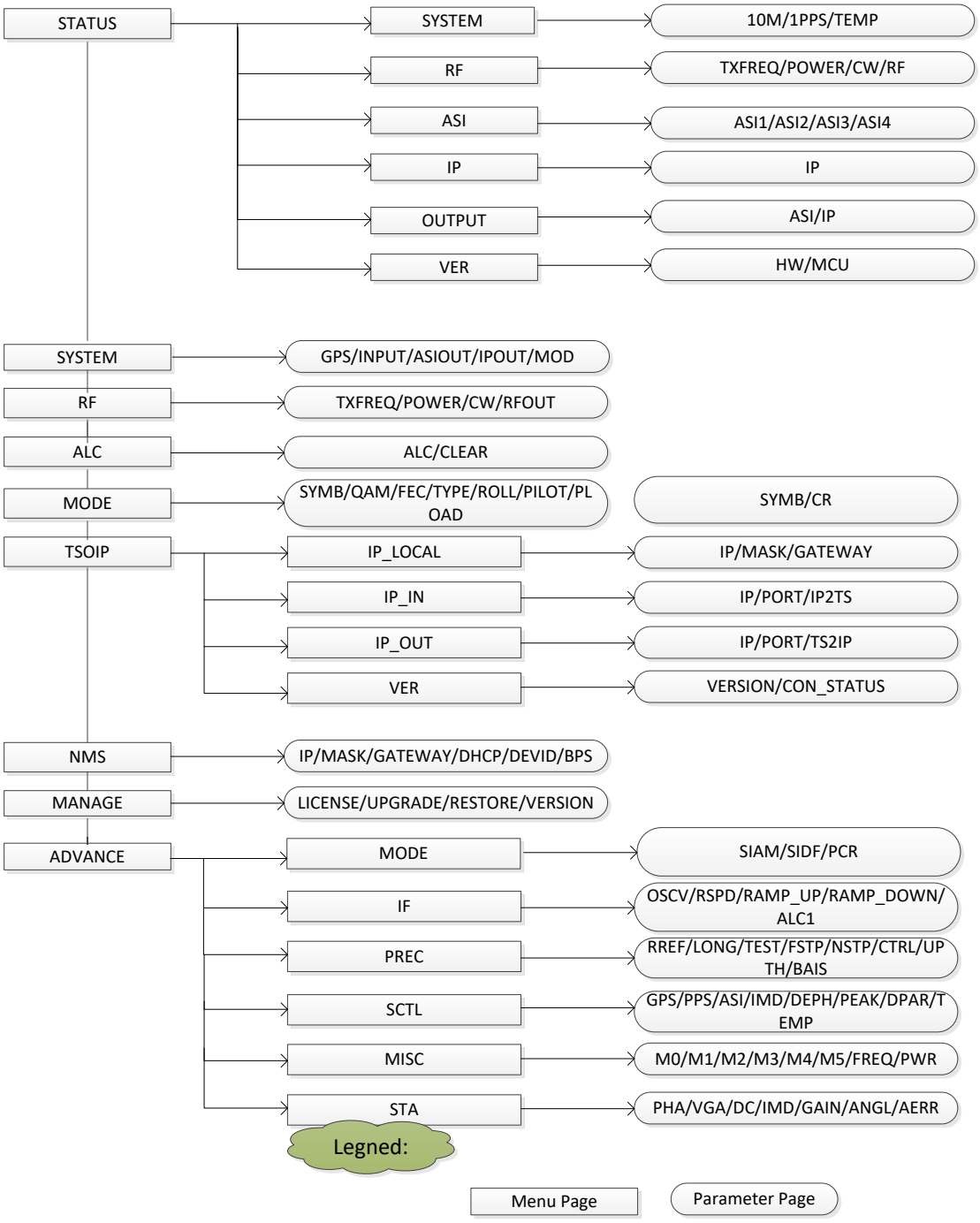
There are six buttons on the front panel. And they have different functions in the different Menu. All the parameters can be accessed via them.

- L (LEFT)： Press this key to move the cursor one position to the left
- R (RIGHT)： Press this key to move the cursor one position to the right.
- U (UP)：In menu mode, it acts the same function with L; in the parameters edit mode, press this key to increase the value of the current parameter.
- D (DOWN)：In menu mode, it acts the same function with L; in the parameter edit mode, press this key to decrease the value of the current parameter.

- OK（CONFIRM）: In menu mode, press this key to enter the submenu. In the parameter edit mode, press this key to save the changed value.

- ESC(ESC): In menu mode, press this key to return the parent menu, In the parameter edit mode, press this key to restore the changed value, and the cursor will changed to '>' from '?'. If the cursor is '>', press this key to return the parent menu.

4.2 MENU TREE


STATUS
SYSTEM
10M/1PPS/TEMP
RF
TXFREQ/POWER/CW/RF
ASI
ASI1/ASI2/ASI3/ASI4
IP
IP
OUTPUT
ASI/IP
VER
HW/MCU
SYSTEM
GPS/INPUT/ASIOUT/IPOUT/MOD
RF
TXFREQ/POWER/CW/RFOUT
ALC
ALC/CLEAR
MODE
SYMB/QAM/FEC/TYPE/ROLL/PILOT/PLOAD
SYMB/CR
TSOIP
IP_LOCAL
IP/MASK/GATEWAY
IP_IN
IP/PORT/IP2TS
IP_OUT
IP/PORT/TS2IP
VER
VERSION/CON_STATUS
NMS
IP/MASK/GATEWAY/DHCP/DEVID/BPS
MANAGE
LICENSE/UPGRADE/RESTORE/VERSION
ADVANCE
MODE
SIAM/SIDF/PCR
IF
OSCV/RSPD/RAMP_UP/RAMP_DOWN/ALC1
PREC
RREF/LONG/TEST/FSTP/NSTP/CTRL/UPTH/BAIS
SCTL
GPS/PPS/ASI/IMD/DEPH/PEAK/DPAR/TEMP
MISC
M0/M1/M2/M3/M4/M5/FREQ/PWR
STA
PHA/VGA/DC/IMD/GAIN/ANGL/AERR
Legned:
Menu Page
Parameter Page

4.3 LCD MENU

MAIN MENU is shown in TABLE 3

TABLE 3. MAIN MENU

MAIN MENU								
STATUS	SYSTEM	RF	ALC	MODE	TSOIP	NMS	MANAGE	ADVANCE

4.3.1 STATUS MENU

STATUS MENU is shown in TABLE 4。All parameters under the STATUS MENU are read-only.

TABLE 4. STATUS MENU

STATUS					
SYSTEM	RF	ASI	IP	OUTPUT	VER

4.3.1.1 SYSTEM STATUS

SYSTEM STATUS menu is shown in TABLE 5。

TABLE 5. SYSTEM STATUS

10M	1PPS	TEMP
LOCK	LOCK	40℃

Note: Value and characters in the table are only for explanatory notes (the same for following tables).

① NET NET MODE: MFN, SFN. Current available exciter supports MFN only.
② 10M GPS_10M status:ERR (unlock) , LOCKED.
③ 1PPS 1PPS status :ERR (unlock) , LOCK, NA(Not support);

4.3.1.2 RF STAUTS

RS STATUS is shown in TABLE6

TABLE 6. RF STATUS

TXFREQ	POWER	CW	RF
474MHz	-5.5	OFF	ON

① TXFREQ TX Center Frequency, Range 950MHz~1650MHz,step size 1Khz .
② POWER RFOUT power, Range -39.9～+9.9dBm , step size 0.1dBm .
③ CW Continous wave : OFF, ON.
④ RF RF Output switch: OFF, ON.
⑤ LO LO Locked status: LOCKED、UNLOCK。

4.3.1.3 ASI STAUTS

ASI STATUS menu is shown in TALBE 7

TABLE 7. ASI STATUS

ASI1	ASI 2	ASI3	ASI4
0.00Mbps	0.00Mbps	0.00Mbps	0.00Mbps

① ASI1 The effect rate(-E) , the total rate (-T) and input status (UNLOCK,LOCKED,USED,OVERFLOW) are displayed alternatly。

② ASI2 The effect rate(-E) , the total rate (-T) and input status (UNLOCK,LOCKED,USED,OVERFLOW) are displayed alternatly。

③ ASI3 The effect rate(-E) , the total rate (-T) and input status (UNLOCK,LOCKED,USED,OVERFLOW) are displayed alternatly。

④ ASI4 The effect rate(-E) , the total rate (-T) and input status (UNLOCK,LOCKED,USED,OVERFLOW) are displayed alternatly。

4.3.1.4 IP STAUTS

IP STATUS menu is shown in TABLE 8

TABLE 8. TSOIP STATUS

IP
0.00Mbps

IP: The effect rate(-E) , the total rate (-T) and input status (UNLOCK,LOCKED,USED,OVERFLOW) are displayed alternatly。

4.3.1.5 OUTPUT STATUS

OUTPIT STATUS menu is show in TABLE 9

TABLE 9. OUTPUT STATUS

ASI	IP
ASI1	ASI2

ASIOUT: The choice of ASI OUT. NA is displayed when all ASI are unlocked.

IPOUT: The choice of IP OUT. NA is displayed when all ASI are unlocked.

4.3.1.6 VER STAUTS

VER STATUS menu is shown in TABLE 10

TABLE 10. VER STATUS

HW：V1.1_160128
MCU：V1.2_160127

① HW version of hardware.

② MCU version of software.

All parameters except the STATUS MENU are modifiable and operation instructions are as following:

1) In the parameters menu, you can press “L” or “R” to move the cursor “>” to the target parameter and change the value by pressing “U” or “D”.

the cursor will change to “?” from “>” when parameter value is changed. Save the value by pressing “OK”, then the cursor change to ‘>’ again. You can press “ESC” to restore the previous value when you do not want to save the new value.

2) In the parameters menu, pressing “ESC” to return parent menu when the cursor is “>”.
3) If you want to change the TXFREQ, it is recommended to disconnect the power amplifier.

4.3.2 SYSTEM MENU

SYSTEM MENU is shown in TABLE 11。

TABLE 11. SYSTEM MENU

GPS	INPUT	ASIOUT	IPOUT	MOD
AUTO	AUTO	AUTO	AUTO	DVBS2
GPS	ASI1	ASI1	ASI1	DVBS
INT	…	…	…	
	ASI4	ASI4	ASI4	
	IP	IP	IP	

1) GPS 10MHz source, include AUTO,GPS（external reference clock）,INT（internal 10MHz）. when set to “AUTO”, it will use GPS firstly when GPS is available.
2) INPUT Select the input source, include “ASI1”、 “ASI2”、 “ASI3”、“ASI4” 、 “IP” and “AUTO”。If set to AUTO, the path which is locked and has highest priority will be selected.
3) ASIOUT Select source for ASI output, include “ASI1”、 “ASI2”、 “ASI3”、 “ASI4” 、 “IP” and “AUTO”。
4) IPOUT Select source for IP output, include “ASI1”、 “ASI2”、 “ASI3”、 “ASI4” 、 “IP” and “AUTO”。
5) MOD Select mode type, include “DVBS2” and “DVBS”。

4.3.3 RF MENU

RF MENU is shown in TABLE 13

TABLE 12. RF MENU

TXFREQ	POWER	CW	RFOUT
950M	-10.0dBm	OFF	ON
950M	-39.9	ON	OFF
...	...		
1650M	+9.9		

TABLE 13.

1) TXFREQ center frequency of transmitting signal, range :950.000MHz~1650.000MHz, step size:1KHz.
2) POWER power setting of RFOUT, range:-39.9 dBm～+9.9 dBm, step size:0.1 dBm.
3) CW single tone, include OFF and ON.
4) OUTPUT RFOUT switch, include ON and OFF.

4.3.4 ALC MENU

ALC MENU is shown in TABLE 14.

TABLE 14. PREC submenu

ALC	CLEAR
OFF	NO
ON	YES

1) ALC include 2 items:“OFF”和“ON”.
   - OFF:.
   - ON:.
2) CLEAR range.

4.3.5 MODE MENU

MODE MENU and MOD set to “DVBS2”is shown in TABLE 15.

TABLE 15. MODE submenu（DVBS2）

SYMB	QAM	FEC	TYPE	ROLL	PILOT	PLOAD
38.0M	8PSK	5/6	NML	0.25	ON	XX.XM
0.4M	QPSK	1/4	SHRT	0.35	OFF	
…	16APSK	1/3		0.2		
60.0M	32APSK	2/5				
		1/2				
		3/5				
		2/3				
		3/4				
		4/5				
		5/6				
		8/9				
		9/10				

1) SYMB symbol rate, 0.4-60.0MSPS with stepsize 0.1MSPS.

2) QAM constellation for bit mapping: QPSK, 8PSK, 16APSK and 32APSK.
3) FEC LDPC rate: 1/4,1/3,2/5,1/2,3/5,2/3,3/4,4/5, 5/6,8/9, 9/10. 9/10 is invalid for short LDPC.
4) TYPE length of LDPC,Nldpc=64800,when NML(normal);Nldpc=16200 when SHRT（short）.
5) ROLL roll-off factor for square root raised cosine filter: 0.35, 0.25 and 0.2.
6) PILOT whether pilot block is present.
7) PLOAD display the max payload of current mode.

MODE MENU and MOD set to “DVBS” is shown in TABLE 16.

TABLE 16. MODE submenu（DVBS）

SYMB	CR
38.0M	3/4
0.4M	1/2
…	2/3
60.0M	5/6
	7/8

1) SYMB symbol rate, 0.4-60.0MSPS with stepsize 0.1MSPS.
2) CR code rate for DVBS: 1/2, 2/3, 3/4, 5/6, 7/8.

4.3.6 TSOIP MENU

TSOIP MENU is shown in TABLE 17.

TABLE 17. TSoIP submenu

TSoIP										
IP_LOCAL			IP_IN			IP_OUT			VER	
IP	MASK	GATEWAY	IP	PORT	IP2TS	IP	PORT	TS2IP	VERSION	CON_STA
192.168.001.150	255.255.255.000	192.168.001.001	224.100.100.2	2000	ENA	224.100.100.1	21000	ENA		Normal
000.000.000.000	000.000.000.000	000.000.000.000	000.000.000.000	00000	DISA		00000	DISA		Unconnect
000.000.000.001	000.000.000.001	000.000.000.001	000.000.000.001	00001			00001			Abnormal
…	…	…	…	…			…			

255.255.255.255	255.255.255.255	255.255.255.255	255.255.255.255	65535			65535			

There are 4 submenu in TSOIP MENU: IP_LOCAL, IP_IN, IP_OUT and VER.

(1) IP_LOCAL

1) IP — IP address of TSoIP net port,000.000.000.000 ～ 255.255.255.255, (default: 192.168.001.200)
2) MASK — netmask, 000.000.000.000 ～ 255.255.255.255. (default : 255.255.255.000)
3) GW — gateway, 000.000.000.000 ～ 255.255.255.255. (default: 192.168.001.001)

(2) IP_IN

1) IP — destination IP address of TsoIP IP input stream, when unicast, It must be the same as IP in IP LOCAL submenu. When multicast,valid address should be set.
2) PORT — destination port of TsoIP IP input stream,00000 ～ 65535.
3) IP2TS — enable switch for TSoIP input. DIS will disable IP input.ENA will enable TsoIP input function.

(3) IP_OUT

1) IP — destination IP address of TsoIP IP output stream, 000.000.000.000 ～ 255.255.255.255. Support unicast and multicast.
2) PORT — destination port of TsoIP IP output stream 00000～ 65535.
3) TS2IP — enable switch for TSoIP output. DIS will disable IP output.ENA will enable TsoIP output function.

(4) VER

1) VERSION — TSOIP version
2) CON_STATUS — status of connection between MCUs of NMS and DATA PORT.

4.3.7 NMS MENU

NMS MENU is shown in TABLE 18.

TABLE 18. NMS submenu

IP	MASK	GATEWAY	DHCP	DEVID	BPS
192.168.001.100	255.255.255.000	192.168.001.001	OFF	0016	38400
000.000.000.000	000.000.000.000	000.000.000.000	ON	0000	9600
000.000.000.001	000.000.000.001	000.000.000.001		9999	38400
...	...	...			57600
255.255.255.255	255.255.255.255	255.255.255.255			115200

1) IP IP address of NMS net port,000.000.000.000 ～ 255.255.255.255.
2) MASK netmask of of NMS net port,000.000.000.000 ～ 255.255.255.255.
3) GATEWAY gateway of of NMS net port,000.000.000.000 ～ 255.255.255.255.
4) DHCP to enable or disable DHCP, when DHCP is enable, IP/MASK/GATEWAY will be read only.
5) DEVID device ID
6) BPS baudrate of COM port

4.3.8 MANAGE MENU

MANAGE MENU is shown in TABLE 19.

TABLE 19. MANAGE submenu

MANAGE MENU							
LICENSE		UPGRADE			RESOTRE	VERSION	
SN	LICENSE	MCU	TSOIP	FPGA	NO	HW	MCU
16-chars, read only	16-chars	NO	NO	NO	YES	version	version
		YES	YES	YES			

1) LICENSE SN is the unique serial numner of a exciter, real only. LICENSE is not required for current exciter.
2) UPGRADE when MCU of exciter need to be upgraded, set MCU to YES firstly, Then upgrade MCU via GUI software. Operation is not need for TSOIP and FPGA.
3) RESTORE Set to YES, all parameters exclude FREQ and POWER will be restored to default value
4) VERSION versions for hardware and software

Note： UPGRADE/RESTORE is supplied for professional person only. When misoperation happened, reboot the exciter to quit upgrading mode.

4.3.9 ADVANCE MENU

ADVANCE MENU is shown in TABLE 20.

TABLE 20. ADVANCE submenu

ADVANCE MENU					
MODE	IF	PREC	SCTL	MISC	STA

Note: ADVANCE MENU is supplied for manufacturer only. Operation is not allowed to ADVANCE MENU.

5. Connecting with PA

1) Before feed the exciter RFOUT in PA, make sure the power of exciter RFOUT is in the desired input range of PA.

6. Trouble shooting

6.1 Input

1) INPUT NONE
   - Message: display on LCD ASI INPUT NA
   - Cause : all of the 4 paths ASI input and 1 IP input are unlocked; TS source is set as manual selection and the slected path is unlocked.
   - Method : Make sure source is correct and cable is connected correctly; set input selection to AUTO.

2) ASI1 IN UNLOCK
   - Message: display on LCD ASI1 IN UNLOCK
   - Cause : TS form ASI1 input is unlocked.
   - Method : Make sure source is correct and cable is connected correctly.

3) ASI2 IN UNLOCK
   - Message: display on LCD ASI2 IN UNLOCK
   - Cause : TS form ASI2 input is unlocked.
   - Method : Make sure source is correct and cable is connected correctly.

4) ASI3 IN UNLOCK
   - Message: display on LCD ASI3 IN UNLOCK
   - Cause : TS form ASI3 input is unlocked.
   - Method : Make sure source is correct and cable is connected correctly.

5) ASI4 IN UNLOCK
   - Message: display on LCD ASI4 IN UNLOCK
   - Cause : TS form ASI4 input is unlocked.
   - Method : Make sure source is correct and cable is connected correctly.

6) IP IN UNLOCK
   - Message: display on LCD IP IN UNLOCK
   - Cause : TS form IP input is unlocked.
   - Method : Make sure source is correct and cable is connected correctly; IP address and Port are set correctly; TsoIP is enabled.

7) 10M UNLOCK
   - Message: display on LCD 10M UNLOCK; GPS light off.
   - Cause : Frequency and amplitude of external 10MHz clock is abnormal.
   - Method : Make sure external timing equipment is working well.

8) 1PPS UNLOCK

- Message: display on LCD 1PPS UNLOCK
- Cause : 1PPS is unconnected; external timing equipment is malfunctioned.
- Method : Make sure external timing equipment is working well.

6.2 Output

1) RF output lost

- Message: LCD display RF OFF; RF light is off on front panel.
- Cause : RF output switch is off; LO on PCB is lost.
- Method : Make sure the RF output switch is on; reboot the exciter, if this warning is always on, please connect the manufacturer.

History

Document history		
V1.0	December 3, 2020	