This Equipment Under Test (EUT) is a ATSC Set Top Box, it used to receive the digital TV signal (ATSC) and demodulate to Audio / Video signal out put via the RF tuner. This EUT is powered by 120V/AC. Besides , it can also modulated the ATSC signal to TV receiver via RF output terminal which is designed to convert the Audio / Video signal to standard NTSC CH3 or CH4 RF signal. There are two different channels available, Channel 3 and Channel 4, it can be selected by the switch on the back panel. A coaxial cable (75 ohm, 0.8m) is provided with this device. Power and channel-select buttons are located on the front panel, most of the input or output terminals are located at the back panel including a smart antenna terminal that can be connected to a terrestrial antenna, the EUT can control the terrestrial antenna gain and direction automatically to optimize the receiving signal via the smart antenna terminal.

When the EUT is switched on, the software stored in the flash U8 (2 M-byte) and the memory U2 (16 x 16M DDR) is active, controls the MCU U1 (ZR39741) to search the ATSC TV signal via RF tuner, the RF tuner demodulates the RF signal to IF signal and transmit to the MCU U1, the MCU U1 demodulates the IF signal to audio / video signal and outputs via the A / V output terminal after the IC2 (CE2752, audio decoder) and U7 (4558, audio filter and amplifier), and U6 (FMS6143, video filter and amplifier). Also, the MCU U1 transmits the audio / video signal to the RF tuner, the RF tuner modulates the A / V signal to NTSC RF signal and output via the RF output terminal.

IC Function：
U1 (ZR39741) MCU, Program search, demodulation and decode
U2 （Memory） Software store
U8 （FLASH） Software store
IC1 （AF1071）Reset IC
IC2 (CE2752) Audio Decode IC
U6（FMS6143）CVBS active filter and amplifier
U7（4558）Audio active filter and amplifier
U13（AP1530）DC converter, convert 5V to 1.8V
U15(AP1513) DC converter, convert 5V to 3.3V
U10(TNY277) MCU of the built-in SMPS
D14, transformer, transfer 3.3V to 2.6V

The RF Tuner specification is attached as the following pages.

SBU Technology - Tuners

DTT 7685x

ATSC half NIM with ch 3 / 4 modulator

Specification

20 Apr 2007

Features

- Receives digital off-air and cable signal
- Receiving frequency 55.25MHz to 864.25MHz
- Built-in 5-33V DC-DC converter (optional)
- Single power supply to the tuner, IF VGA & modulator section
- Wide Band AGC (bus control switch-able) to optimum strong signal performance
- Read RF AGC information via I2C Bus
- Tuner power standby mode via I2C Bus
- Modulator Video / Sound inputs and Ch3 / 4 RF output
- Available in both vertical and horizontal mount versions
- Meet A-74 requirement
- RoHS compliance

MODEL	DESCRIPTION	PRODUCT REF. NO.
DTT 76850	ATSC half NIM with Ch 3 /4 modulator, Horizontal mount LH	21682310
DTT 76851	ATSC half NIM with Ch 3 /4 modulator, Vertical mount	21686000

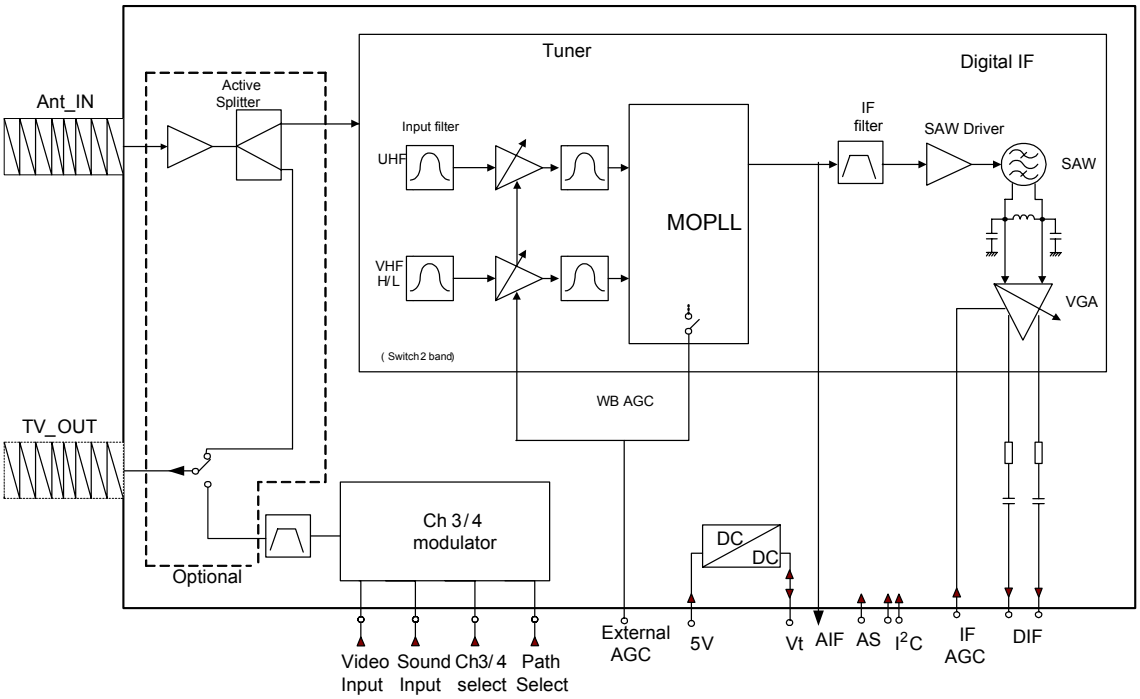
Table of content

1. Brief description

DTT 7685x is a newly developed ATSC half NIM with ch 3 / 4 modulator to be used in ATSC digital (VSB & QAM), it consists of:

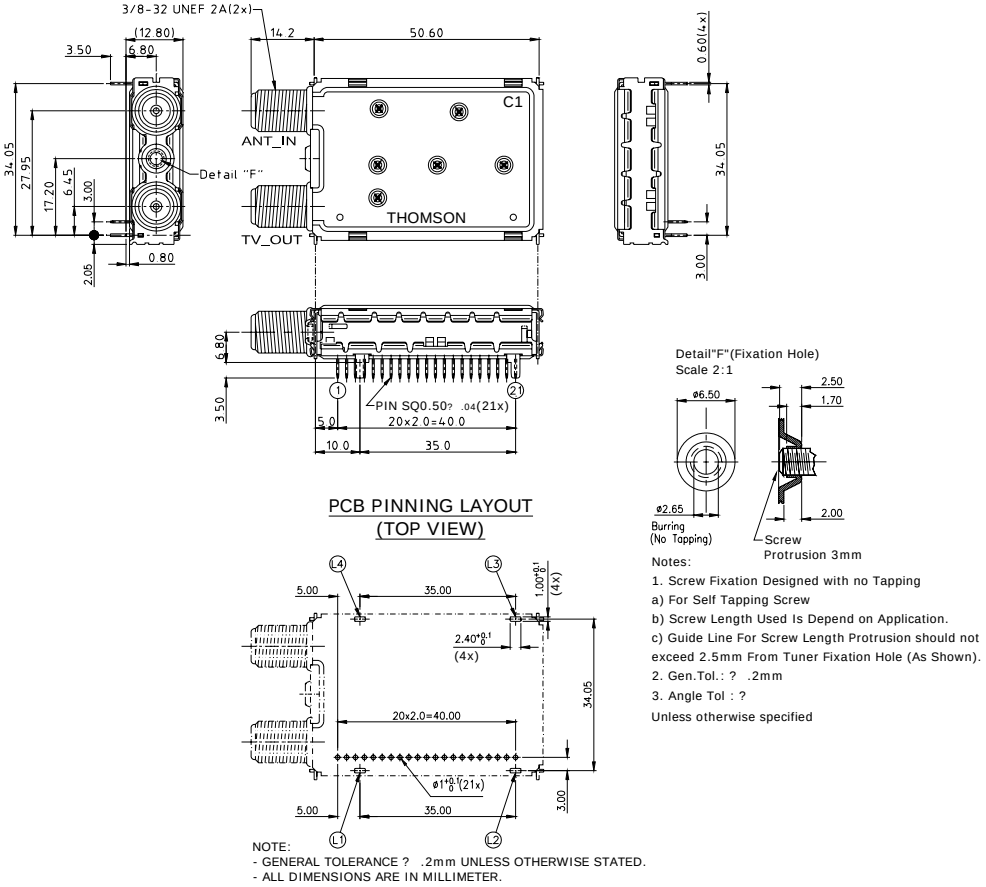
a. A switch 2 bands RF tuner, which receives NTSC / ATSC signal & down-converts it to an IF frequency of 44MHz for digital and 45.75MHz for analog IF.
b. A digital IF Stage, which consists of one SAW filters & gain controllable IF amplifiers and outputs a 1.0Vp-p IF signal with a good IF selectivity.
c. An analog modulator which modulates base-band video and sound to RF channel 3 or 4.
d. An active splitter (optional), which is designed with 50 /50 split, with good signal handling & also provide sufficient gain compensation for the splitting loss & with right return loss for cable reception
e. RF switch at TV_OUT (optional) provides good isolation from Ant_IN to TV_OUT at ch 3 / 4.

2. Block diagram



3. Mechanical Specification

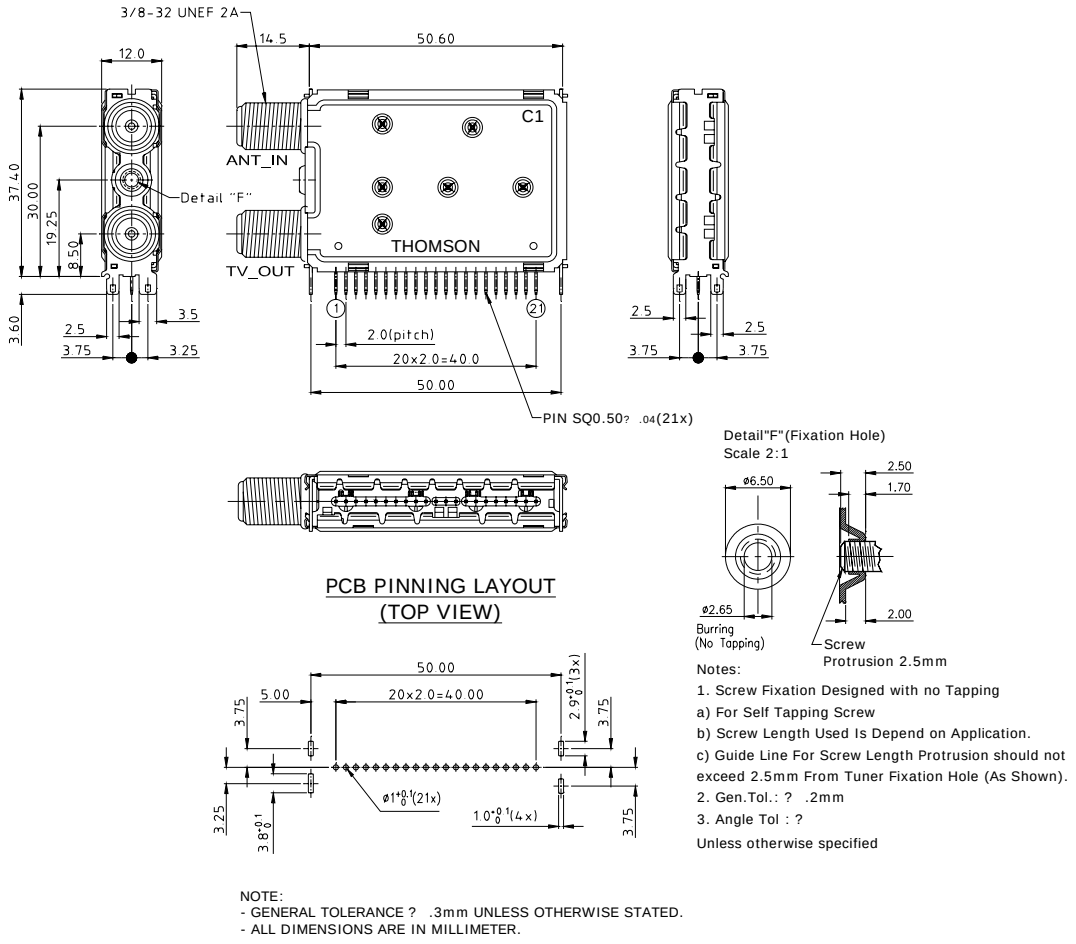
3.1 Horizontal Mounting LH (DTT 76850)



Notes:
1. Screw Fixation Designed with no Tapping
a) For Self Tapping Screw
b) Screw Length Used Is Depend on Application.
c) Guide Line For Screw Length Protrusion should not exceed 2.5mm From Tuner Fixation Hole (As Shown).
2. Gen.Tol.: ? .2mm
3. Angle Tol : ?
Unless otherwise specified

Note: please refer to the application section 12.7 for lug L1~L4 proper connection.

3.2 Vertical Mounting (DTT 76851)



Notes:

1. Screw Fixation Designed with no Tapping
   a) For Self Tapping Screw
   b) Screw Length Used Is Depend on Application.
   c) Guide Line For Screw Length Protrusion should not exceed 2.5mm From Tuner Fixation Hole (As Shown).
2. Gen.Tol.: ? .2mm
3. Angle Tol : ?

Unless otherwise specified

NOTE:
- GENERAL TOLERANCE ? .3mm UNLESS OTHERWISE STATED.
- ALL DIMENSIONS ARE IN MILLIMETER.

4. Pin Definitions

Pins No	Pins Name	Pins Description :
1	--	--
2	Vcc1	Supply for Tuner +5V
3	Path Sel	*Select modulator carrier On /Off (Optional)
4	Ch3/4	Select RF frequency CH3 / CH4
5	RF AGC	External RF AGC input
6	Audio in	Base band sound input
7	Video in	Base band video input
8	Vcc2	Modulator supply +5V
9	--	--
10	--	--
11	--	--
12	GND	Ground
13	--	--
14	SCL	I²C clock
15	SDA	I²C data
16	As	Tuner address select
17	IF out	IF output
18	IF AGC	IF amplifier AGC control 0…3.3 V
19	GND	Ground
20	D-IF out	Digital IF output balanced
21	D-IF out	Digital IF output balanced

Note: 1. both "—"no connection & "int" in the application should leave it open

*2. Path sel (Mode On/Off select) is also controlled by I^2C. Please refer to 3rd table on page 13 for details.

5. Operational Conditions

No	Parameter	Unit	Min	Typ	Max	Remarks
1.	Ambient temperature	°C	0	25	60	
2.	Relative humidity	%	-	-	90	
3.	+5.0 V supply	V	4.75	5	5.25	Ripple ≤ 10mVpp
4.	+5.0 V current @ pin2	mA		190		
5.	+5.0 V current @ pin8	mA		50		

6. Standard Test Conditions

No	Parameter	Unit	Min	Typ.	Max	Remarks
1.	Ambient temperature	°C	23	25	27	
2.	Relative humidity	%	45	60	75	
3.	+5Vdc supply	V	4.9	5.0	5.1	
4.	Input Impedance	Ω	-	75	-	
5.	Nominal Input level	dBuV	-	60	-	(1.0mV) into 75Ω
6.	Nominal Video I/P	Vp-p		1		@75Ω loaded
7.	Nominal Sound I/P	Vp-p		1		@600Ω loaded

Note: A proper function is guaranteed within the specified supply voltage and environmental conditions but a certain deterioration of performance parameters may occur at the limits of operational conditions.

7. Electrical Characteristics

7.1 RF Section

No	Parameters		Unit	Min	Typ	Max	Remarks
1.	Frequency Range	Analog Band - 1 Band - 2 Band - 3 Digital Band - 1 Band - 2 Band – 3	MHz	 55.25 151.25 421.25 -- 57.00 153.00 423.00	-	 145.25 415.25 859.25 -- 147.00 417.00 863.00	
2.	IF Frequency	Center Picture Chroma Sound	MHz		44 45.75 42.17 41.25		
3.	Frequency Margin		MHz	3			
4.	Tracking	PC-CC Tilt PC-SC Tilt	dB	-3		+3 +5	
5.	V.S.W.R.		-		2	6	
6.	Noise Figure	Air Channels Cable channels	dB		6 6	8 10	
7.	Voltage Gain	@ pin 17	dB		39		
8.	AGC Range	B1 B2 B3	dB	50 45 40	70 58 58		
9.	1% Cross Modulation	(N±1) (N±2)	dBuV		69 74		Unwanted: 80% AM. S/I=46dB @ 75Ω load open.
10.	CB Rejection	0.5 - 30MHz 30 - 41MHz	dBuV	101 81			
11.	IF Rejection		dB	60	88		
12.	Beat Rejection	CH06 CH05	dB	50 55	55 60		
13.	FM Beat Susceptibility	88.1 – 92MHz 92.1 - 107.9MHz	dBuV	59 69	63 73		
14.	FM Rejection on CH06	88.1 - 90.1MHz 90.1 - 107.9MHz	dB	2 5			
15.	Half-IF Susceptibility	Air Channels Cable Channels	dB	25 18	35 25		
16	Adjacent Channel Rejection		dB	55	60		
17.	Image Rejection	CH06 CH14-CH55 All other channel	dB	70 60 50	74 70 68		
18.	LO Phase Noise	1kHz 10kHz 100kHz	dBc/Hz	-52 -85 -106	-62 -90 -112		
19.	Oscillator Stability	at 25°C ± 15°C	ppm			30	4MHz crystal ref.

No	Parameters		Unit	Min	Typ	Max	Remarks
20.	LO Voltage at the Antenna	5 -- 54MHz 54 -- 864MHz 864 -- 1810MHz	dBuV			10 33 51	
21.	Tuning Response Time		ms		30	100	
22.	Differential D-IF out	Pin 20 & 21	Vp-p		1.0		
23.	IF AGC Voltage		V	0.5		3.3	
24.	IF AGC Range		dB	43	48		
25.	LO Level at IF Output		dBuV			88	
26.	Overall Tuner Gain		dB	72	80		See Appendix 12.5 For testing condition

7.2 Ch 3/ 4 modulator performance

No	Parameters	Unit	Min	Typ.	Max	Remarks
1.	Video carrier frequency accuracy	KHz	-25		25	
2.	Video carrier output level	dBuV	70	73		No signal
3.	Video carrier frequency stability	KHz	-25		25	Ta = 25°C ±10
4.	Audio carrier output ratio	dB	13.0	15.5	18.0	
5.	Audio 2nd harmonic distortion	dB	50	65		fpc+2x4.5MHz
6.	Audio 3rd harmonic distortion	dB	45	55		fpc+3x4.5MHz
7.	Video harmonic distortion	dB	45	72		
8.	Video modulation depth	%	75	80	85	10 step grey scale @1Vp-p input,75Ω loaded
9.	Video S/N	dB		50		Un-weighted @1Vp-p input, 50% white
10.	Video frequency response	dB	-1.1		0.3	0.75 ~3.75MHz
11.	Differential gain	%	-5		5	
12.	Differential phase	°C	-5		5	
13.	Audio modulation depth	%	90	100	110	Sound I/P = 1KHz @ 1vp-p, 100% equals to 25kHz dev
14.	Audio distortion	%		1	2	Sound I/P = 1KHz;
15.	Audio S/N	dB	45	50		Sound I/P = 1KHz; Video Color bar

8. Application Information

8.1 Tuner I2C control

Write Data format: (MSB is transmitted first)

Name	Byte	B7	B6	B5	B4	B3	B2	B1	B0	Ack
Address Byte 1	**AB1**	1	1	0	0	0	MA1	MA0	0	A
Prog. Divider Byte 2	**DB2**	0	N14	N13	N12	N11	N10	N9	N8	A
Prog. Divider Byte 3	**DB3**	N7	N6	N5	N4	N3	N2	N1	N0	A
Control Data Byte 4	**CD4**	1	C1	C0	R4	R3	R2	R1	R0	A
Control Data Byte 5	**CD5**	BS1	BS0	SL1	SL0	P3	P2	P1	P0	A
Control Data Byte 6	**CD6**	X	0	ATC	IFE	X	AT2	AT1	AT0	A
Control Data Byte 7	**CD7**	SAS	X	AGD	ADS	T3	T2	T1	T0	A

Following is the detail breakdown of each byte:

a) MA1, MA2 : address bits
b) N14- N0 : programmable division ratio bits
c) R4 - R0 : reference divider ratio select
d) C1, C0 : charge pump current select
e) BS1 – BS0 : band select bits
f) SL1 – SL0 : Power down modes
g) SAS : Saw filter drive output select
h) P3 – P0 : Port P3 – P0 output states
i) ADS : ADC input select
j) ATC : AGC decay current
k) AGD : AGC disable
l) AT2:AT0 : AGC setting
m) T3 – T0 : test mode
n) IFE : IF AGC amplifier enables
o) POR : power ON reset indicator
p) FL : phase lock flag
q) AGF : AGC active flag
r) V2:V0 : ADC out
s) X : don't care

Read Data format: (MSB is transmitted first)

Name	Byte	B7	B6	B5	B4	B3	B2	B1	B0	Ack
Address Byte 1	**AB1**	1	1	0	0	0	MA1	MA0	1	A
Status Byte	**SB2**	POR	FL	0	0	AGF	V2	V1	V0	A

Tuner Address (AB1):

Tuner Address (Hex)	MA1	MA0	Voltage at Pin16 AS
C0	0	0	(0 to 0.1) *Vcc
C2	0	1	Open Circuit
C4	1	0	(0.4 to 0.6) *Vcc
C6	1	1	(0.9 to 1) *Vcc

Programmable Divider Byte 2 & 3 (DB2 and DB3)

Divider Ratio (N14 to N0):
N = Fosc (MHz)/62.5 kHz
N =16384*N14 + 8192*N13 + 4096*N12 + 2048*N11 + 1024*N10 + 512*N9 + 256*N8 + 128*N7 + 64*N6 + 32*N5 + 16* N4 + 8*N3 + 4*N2 + 2*N1 + N0

Control Data Byte (CD4):

Charge Pump Current select:

C1	C0	Typ. current in (uA)
0	0	155
0	1	330
1	0	690
1	1	1450

Default state in power up: 00

Control Data byte (CD7):

Test Mode (T3, T2, T1 & T0)

Mode	T3	T2	T1	T0
Normal Operation	0	0	0	0
AGC sink Iagc= -100uA	0	0	1	0
AGC source Iagc= 10uA, P0=output of AGC bias DAC	0	0	1	1

Default state in power up: 0000

Power mode select (CD5):

SL1	SL0	Power mode	Section status				Power (mA) (excluding IFamp)
			IIC interface & registers	Crystal oscillator	PLL & VCO	Converter & IF stages	
0	X	Sleep	Enabled	Enabled	Disabled	Disabled	9
1	0	PLL & VCO	Enabled	Enabled	Enabled	Disabled	42
1	1	Full function	Enabled	Enabled	Enabled	Enabled	***Full***

Default state in power up: 01

Control Data byte (CD4):

Reference Divider Ratio

R4	R3	R2	R1	R0	Ratio	Fref (kHz)
0	0	0	1	1	16	250
0	0	1	0	0	32	125
0	0	1	0	1	64	62.5
0	0	1	1	0	128	31.25
0	1	0	1	1	20	200
0	1	1	0	0	40	100
0	1	1	0	1	80	50
0	1	1	1	0	160	25
1	0	0	1	1	24	166
1	0	1	0	0	48	83.33
1	0	1	0	1	96	41.67
1	0	1	1	0	192	20.83
1	1	0	1	1	28	142.8
1	1	1	0	0	56	71.42
1	1	1	0	1	112	35.71
1	1	1	1	0	224	17.85

Default state in power up: 10011

Tuner Band Switch Byte (CD5)

	Modulator path off (P1=0)	Modulator path on (P1=1)
Band	**CD5 (Hex)**	**CD5 (Hex)**
Band VHF-L (1)	39	3B
Band VHF-H (2)	7C	7E
Band UHF (3)	B5	B7
Band VHF-L (1) with FM trap enabled	38	3A

IF AGC amplifier Enable (CD6)

IFE	IF AGC Amplifier Function
0	Power down
1	Normal operation

Saw Drive output select (CD7)

SAS	SAWF output Drive
0	Analogue output enabled
1	Digital output enabled

AGC setting control bits (CD6)

Wideband AGC Take Over Point setting (AT2, AT1, AT0)

IF Output Level @pin17 (dBuV@75Ω)	AT2	AT1	AT0
105	0	0	0
103	0	0	1
101	0	1	0
99	0	1	1
97	1	0	0
94	1	0	1
91	1	1	0
87	1	1	1

Default state in power up: 000

a) Recommend wideband AGC TOP setting “0 1 1” for digital reception
b) Recommend external conventional AGC for analog reception

AGC Function (CD7)

AGD	Remarks
0	AGC enabled
1	AGC disabled

Wideband AGC Time Constant ATC (CD6)

ATC	Remarks
0	IAGC = 10uA; (Time constant ≈ 100mS)
1	IAGC = 0.3uA; (Time constant ≈ 3S)

ADC input select (CD7)

ADS	Status
0	AGC detector output
1	Disabled

ADC Output

Input Level (V)	V2	V1	V0
Less 0.28Vcc	0	0	0
0.34Vcc to 0.44Vcc	0	0	1
0.5Vcc to 0.6Vcc	0	1	0
0.66Vcc to 0.76Vcc	0	1	1
More 0.8Vcc	1	0	0

Read Status Byte (SB2)

Bit	Description
POR (Bit0)	The power-on reset indicator. This is set to logic “1” if the Vcc supply to the device has dropped below 3V (at 25°C).
FL (Bit1)	The PLL lock flag. It indicates whether the device is phase locked. A logic “1” is present if the devide is locked.
AGF (Bit4)	The AGC detector flag. Logic”0” means Vagc < 4V (gain reduction) Logic”1” means Vagc > 4 V (max gain)

9. Electrostatic Discharge

9.1 Test

Each front-end must be capable of normal performance following its subjection to the following tests:

MIL STD 883C HBM
Test is performed with a voltage discharge from a 100 PF capacitor over a 1500 Ω series resistance in the discharge path. There is a direct contact between the test probe head and the unit under test, using the test points and conditions detailed below:

- Test to pins 1 through LAST PIN:
  3 successive ESD discharges of 2 KVDC between each pin and the front-end frame.

IEC 1000-4-2
Test is performed with a voltage discharge from a 150 PF capacitor over a 330 Ω series resistance in the discharge path. There is a direct contact between the test probe head and the unit under test, using the test points and conditions detailed below:

- Test for antenna input socket ± **8 KVDC**

9.2 Handling

Anyone handling a front-end must wear a properly grounded anti - static discharge bracelet to minimize ESD damage.
After each front-end is aligned and tested, it will be packed with anti - static poly foam or material prior to transportation and storage. This protective foam is to remain in place until the front-end is assembled and soldered onto the receiver main board.

10. Reliability Test Procedure & Conditions

Note: Room temperature = 25 °C ± 2 °C

10.1 Heat Load Test

- Measure the DUTs at room temperature
- Load the DUTs into chamber of the following conditions:

Temperature	= 60 °C
Period	= 500 hrs
Cycle	= 1.5 hrs on; 0.5 hrs off
Quantity	= 10 pcs

- Cool-down 0.5 hr at room temperature, then measured the DUTs within 1 hr
- The test shall be continued to 1000 cycles for information only

10.2 Humidity Load Test

- Measure the DUTs at room temperature
- Load the DUTs into chamber of the following conditions:

Temperature	= 40 ± 5 °C
Period	= 24 hrs
Cycle	= constantly on
Quantity	= 20 pcs

- Cool-down 0.5 hr at room temperature, then measured the DUTs within 1 hr
- Load the DUTs again into chamber of the following conditions:

Temperature	= 40 ± 5 °C
Humidity	= 90 to 95 %
Period	= 500 hrs
Cycle	= 1.5 hrs on; 0.5 hrs off
Quantity	= 20 pcs

- Cool down 0.5 hr at room temperature, then measured the DUTs within 1 hr

10.3 Cold Test

- Measure the DUTs at room temperature
- Load the DUTs into chamber of the following conditions:

Temperature	= - 20 ± 5°C
Period	= 500 hrs
Cycle	= constantly on
Quantity	= 10 pcs

- Warm up for 2 hrs at room temperature, then measured the DUTs within 1 hr

10.4 Thermal Shock

- Measure the DUTs at room temperature
- Load the DUTs into chamber of the following conditions:

Temperature	= - 25 °C for 60 min ↓ ↑ 85 °C for 60 min
Period	= 200 cycles
Power	= power off
Quantity	= 10 pcs

- Cool-down 0.5 hr at room temperature then measured the DUTs within 1 hr

10.5 Temperature Cycle Test

- Measure the DUTs at room temperature
- Load the DUTs into chamber of the following conditions:

Temperature	= -5 °C for 16 hrs then 60 °C for 8 hrs
Period	= 500 hrs
Cycle	= constantly on
Quantity	= 10 pcs

- Cool down 0.5 hr at room temperature, then measured the DUTs within 1hr

10.6 Vibration Test

Frequency	: 3.5 Hz
Vertical amplitude	: 15 to 25 mm
Duration	: 1 hr
Quantity	: 1 carton

10.7 Drop Test

- Packaged apparatus: < or = 50 kg
- Height: < 32 … 50Kg: 0.5m
  18 … 32Kg: 0.55m
  10 … 18Kg: 0.65m
  5 … 10Kg: 0.8m
- 1 corner + 3 edges + 6 faces

  Drop on the weakest corner (point G)
  Drop on the shortest edge in contact with point G
  Drop on average edge in contact with point G
  Drop on the longest edge in contact with point G
  Drop flat wise on the side of minimum surface
  Drop flat wise on the side of opposite minimum surface
  Drop flat wise on the side of average surface
  Drop flat wise on the side of opposite average surface
  Drop flat wise on the side of maximum surface
  Drop flat wise on the side of opposite maximum surface

- Quantity: 1 carton

10.8 Life Test

- Measure the DUTs at room temperature
- Load the DUTs into chamber of the following conditions:

Temperature	= 60 °C
Period	= 500 hrs
Cycle	= constantly on
Quantity	= 20 pcs

- Cool down 0.5 hr at room temperature, then measured the DUTs within 1 hr

10.9 Reliability Test Requirement

1 Initial value measurement and after test measurement shall be done at standard conditions stated in Section 6.

2 Measurement or check shall be done at the interval of 0 hour (initial), 96H, 168H, 300H and 500H.

3 For test items 10.1, 10.2, 10.3 & 10.8, the tested units shall meet the following after duration of 96 hours, (Data compared with initial value).

- Unit is functional:

Frequency synthesizer is tunable on all channels for tuner as specified in section 7.1 and there is no visible defect in the received picture.

- Tuner Performance:	Max.
a) Change of Power Gain	3dB
b) Change of tilt (overall curve)	3dB

4 For all test items stated in this section, measurement shall be done to check whether the unit is functional (per item 3 definition) at each interval hour as specified in item 2.

5 For test item 10.4, measurement shall be done to check whether the unit is functional (per item 3 definition) at 50, 100, 150 & 200 cycles.

6 For test items 6 & 7, unit shall be functional (per item 3 definition) after test.

11. Appendix

11.1 Packaging

	INDIVIDUAL	MASTER BOX	PALLET
1. TYPE	DTT76850/51	Carton	Wood
2. QUANTITIES Tuners Cartons	 1 -	 65 1	 5200 80 boxes
3. WEIGHT (Approximate)	0.035kg	3.34kg	267.2kg
4. DIMENSIONS L × H × D (in mm)	65.5x34.5x16.3	463x393x62	1200x800x150

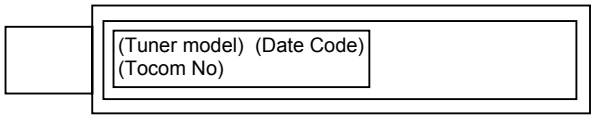
(*): not include antenna terminal

11.2 Identification / Traceability

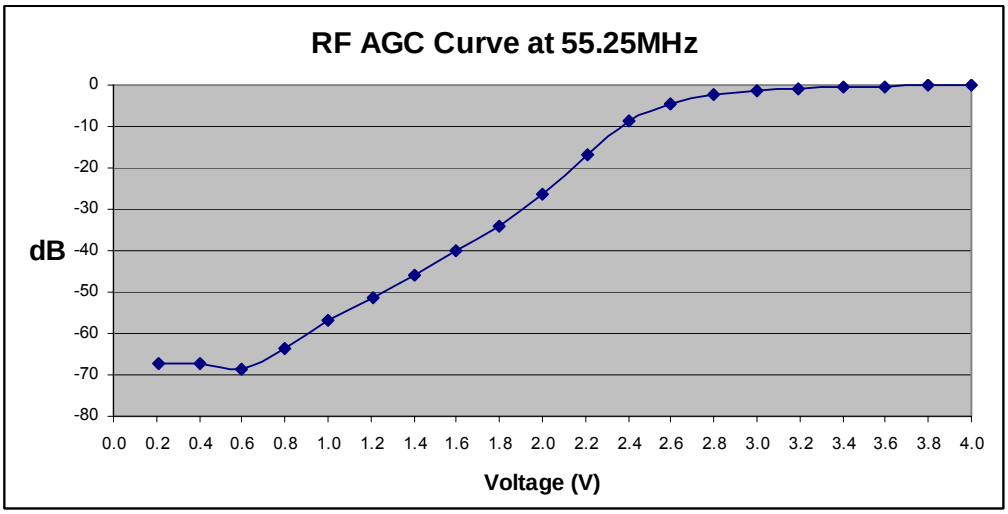
PACKAGING LABEL:

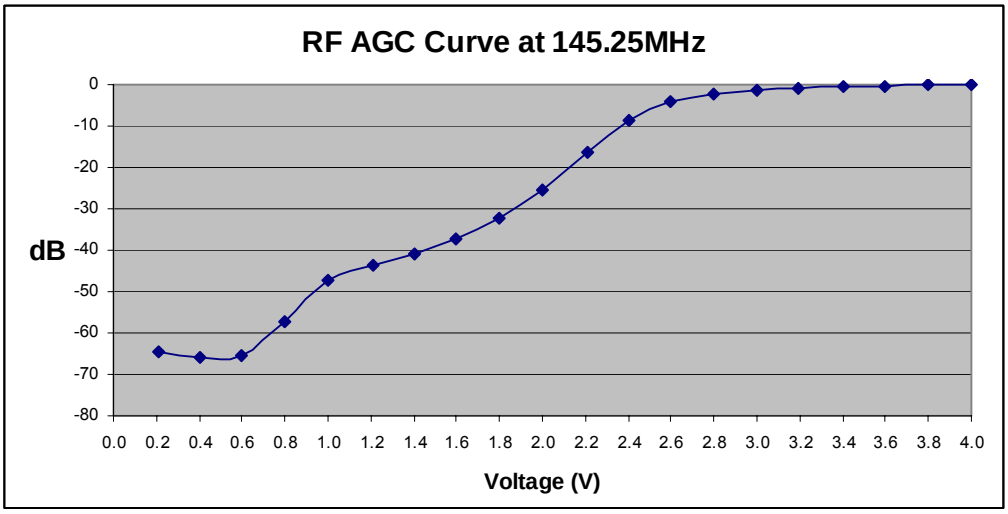
(Tuner Model)
TOCOM NO. : xxxxxxxx
QTY. : xx PCS
Order NO. :
Customer P/N :
CTN. NO. : Carton Label No.

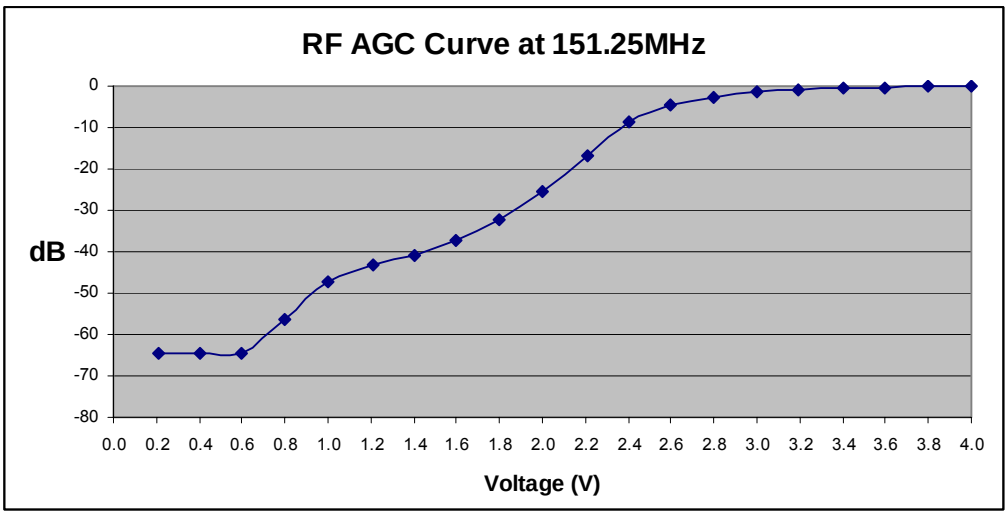
TUNER LABEL:

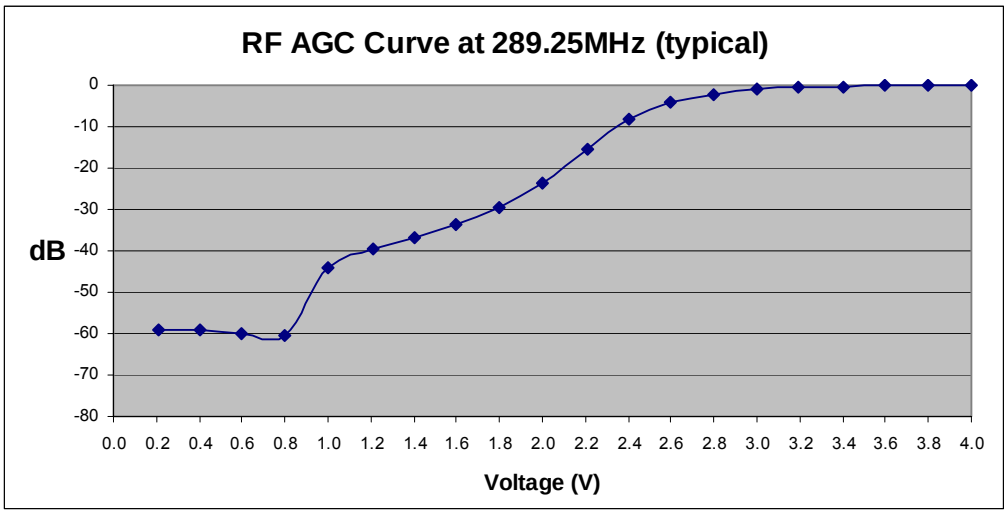


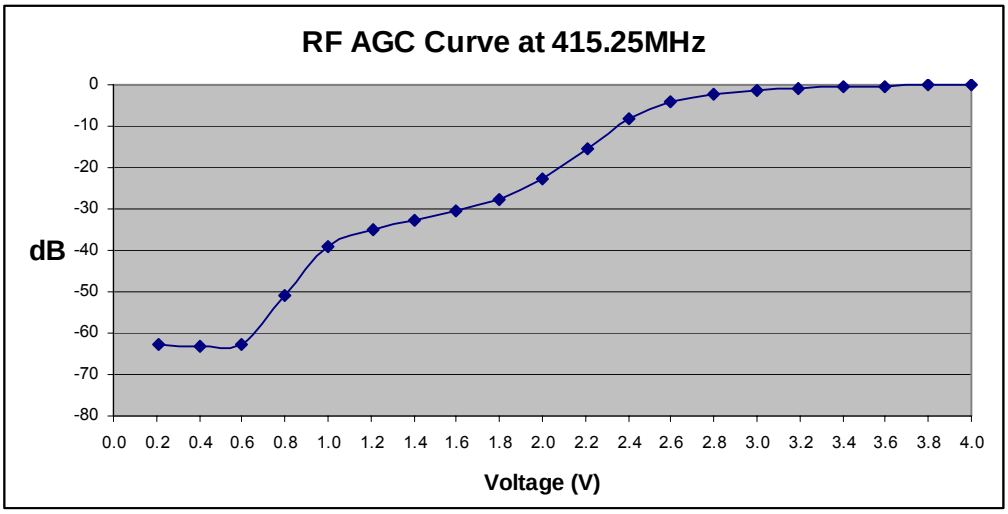
11.3 RF AGC Slope (Typical Curve)

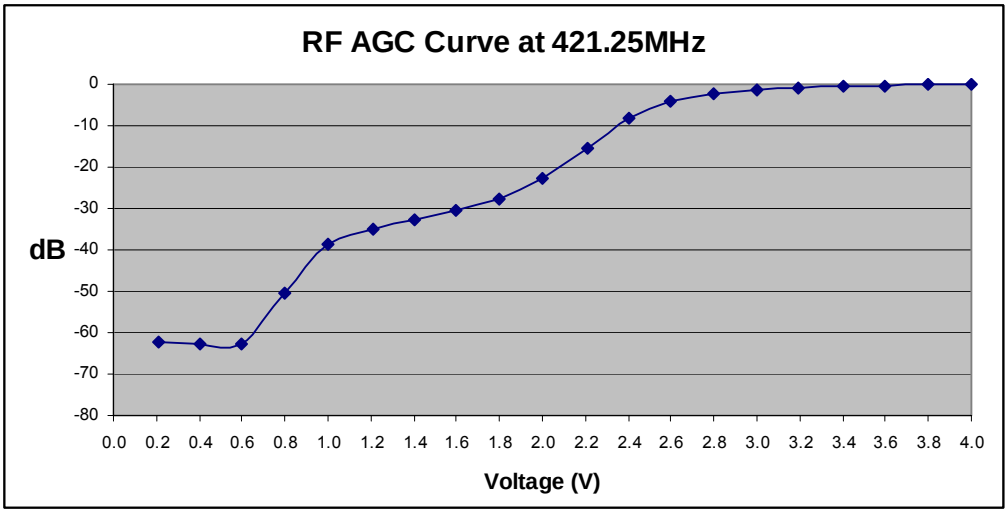


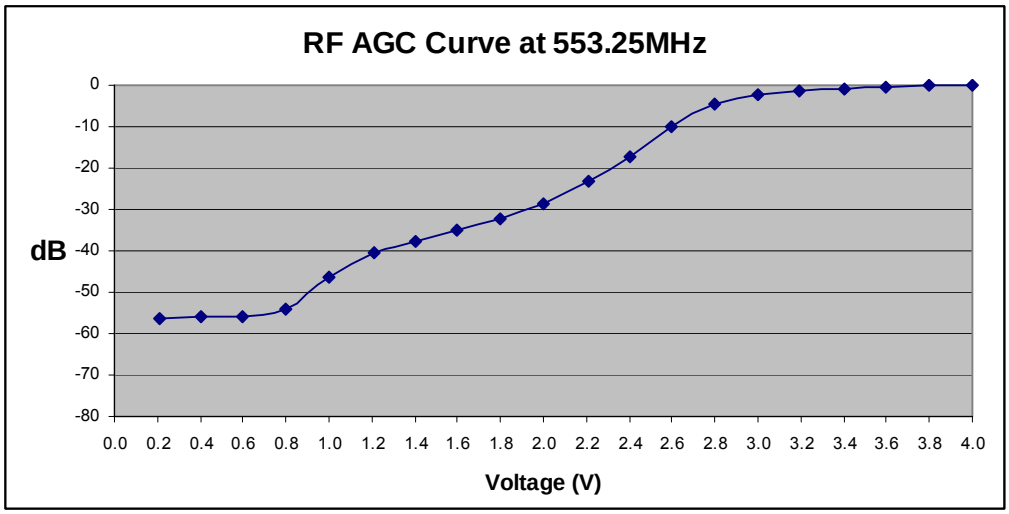


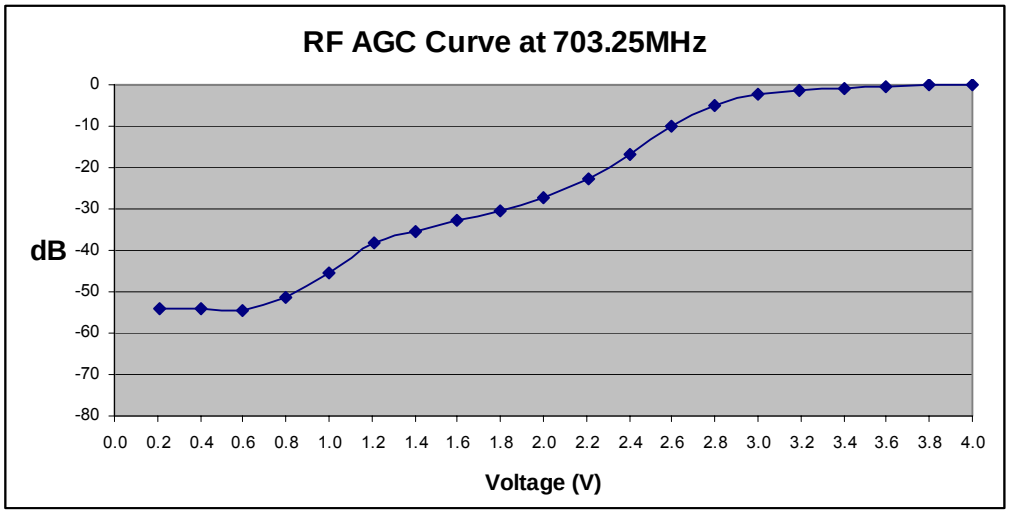


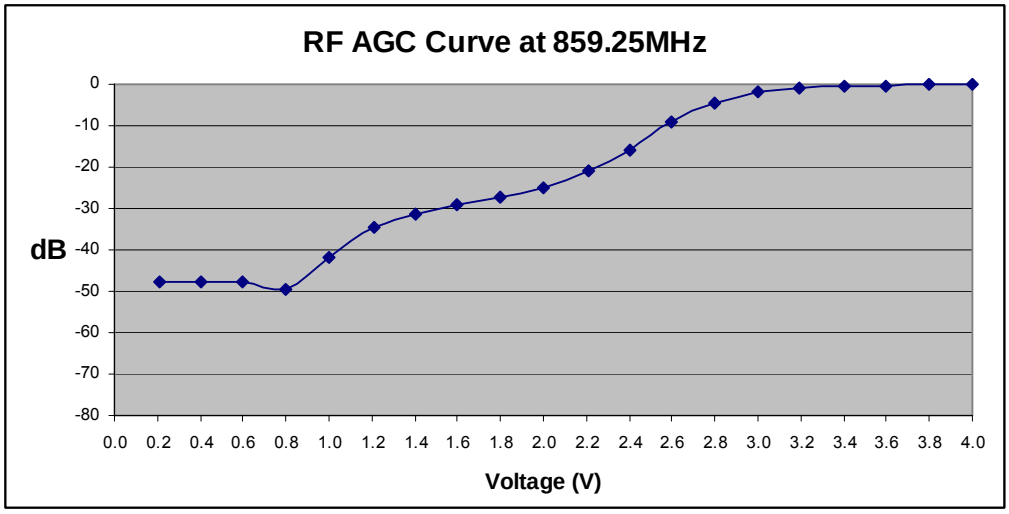

RF AGC Curve at 289.25MHz (typical)
dB
0
-10
-20
-30
-40
-50
-60
-70
-80
0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0
Voltage (V)


RF AGC Curve at 415.25MHz
dB
0
-10
-20
-30
-40
-50
-60
-70
-80
0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0
Voltage (V)

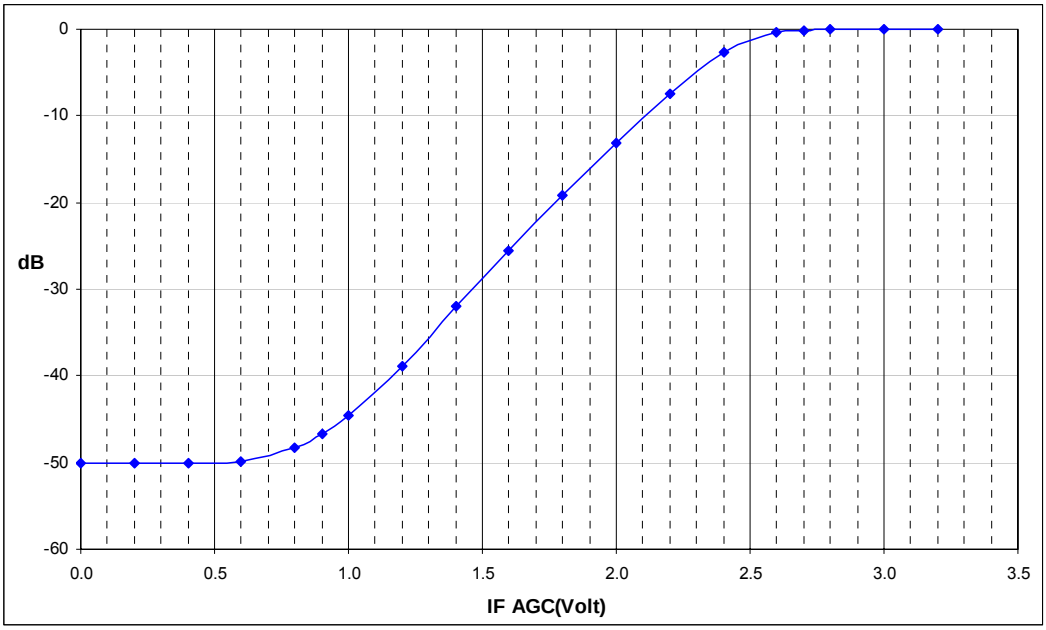

RF AGC Curve at 421.25MHz
dB
0
-10
-20
-30
-40
-50
-60
-70
-80
0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0
Voltage (V)


RF AGC Curve at 553.25MHz
dB
0
-10
-20
-30
-40
-50
-60
-70
-80
0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0
Voltage (V)


RF AGC Curve at 703.25MHz
dB
0
-10
-20
-30
-40
-50
-60
-70
-80
0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0
Voltage (V)


RF AGC Curve at 859.25MHz
dB
0
-10
-20
-30
-40
-50
-60
-70
-80
0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0
Voltage (V)

11.4 Digital IF AGC Slope



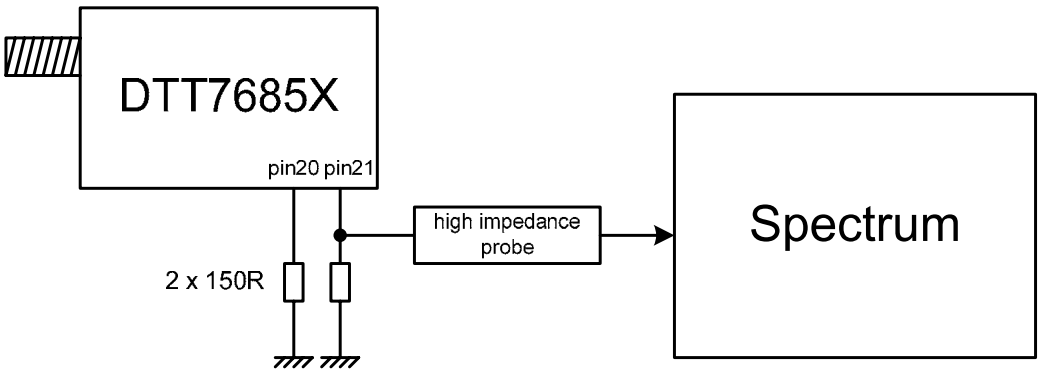
11.5 Digital IF AGC Time Constant (Bandwidth)

The dominant IF AGC time constant τ = 1kΩ × 1nF = 1 µSec typ.

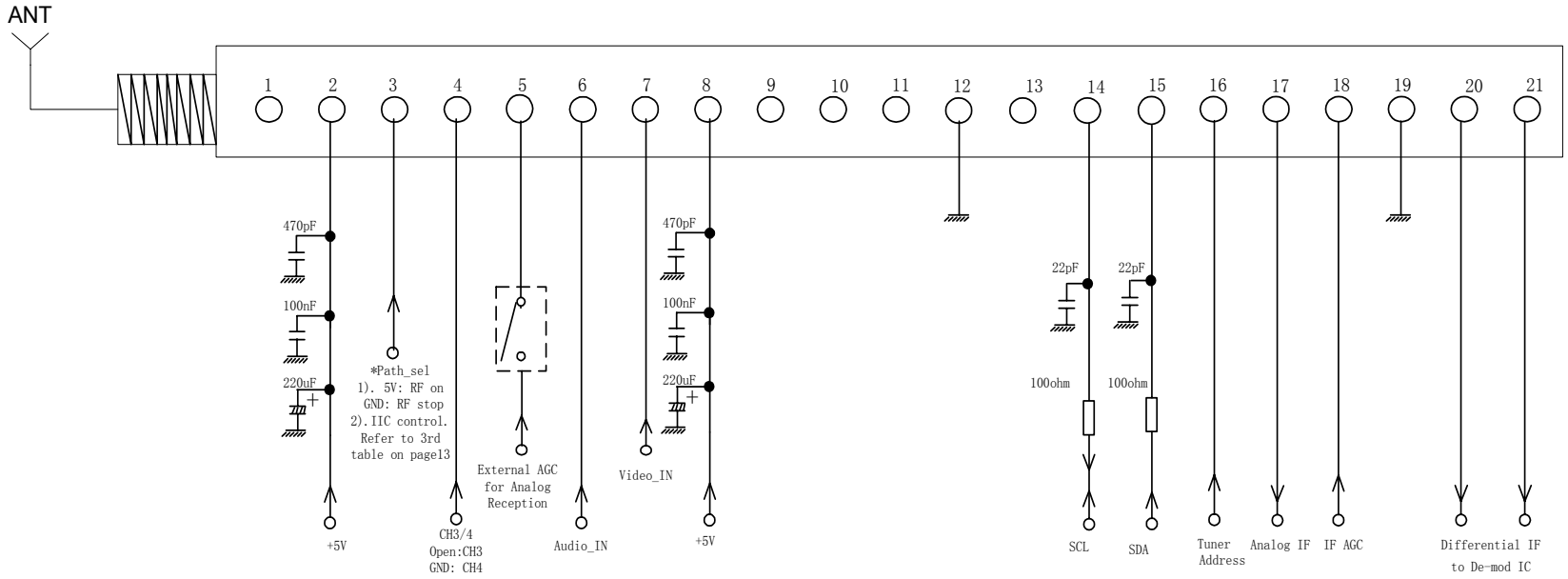
The equivalent bandwidth BW = 1/(2ππτ) = 159 kHz typ.

11.6 Overall Gain Testing Method

RF AGC: for max gain
IF AGC : 3.0V



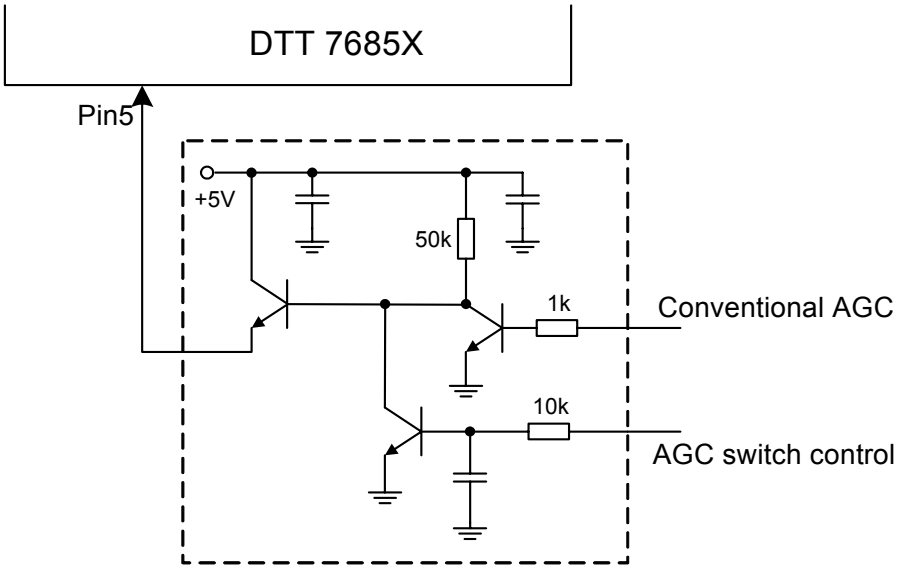
11.7 Application Diagram



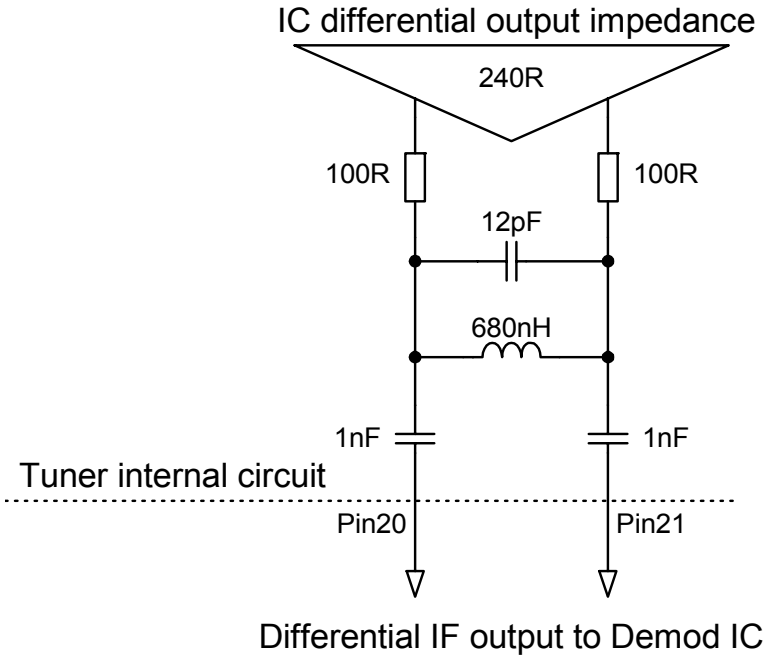
Application note:

1) All tuner supply line, CLK & DATA line decoupling Ceramic capacitor should be place near to Tuner in PCB layout
2) The supply ripple must not more then 10mVp-p
3) Recommend CD6 setting hex “33” for digital reception
4) To ensure correct Time Constant & Filtering for analog application
5) Lug 3 and 4 (L3 & L4) are for holding the tuner module only, do not connect them to a ground plane else it may result in immunity deterioration. Do ensure sufficient isolation of these 2x lugs away from the ground plane to prevent stray capacitance coupling.
6) Lug 1 and 2 (L1 & L2) are for connection to a ground plane. The ground plane should be large for lesser ground inductance hence providing better grounding for the tuner module.
8) For analog reception, set AGD bit to “1” to disable internal wideband AGC

11.8 Recommend AGC switch circuit for analogue reception only



11.9 Internal Differential IF Circuit



13. Revision

Date of Changes	Index	Modification	Pages
4 Oct 06	--	Preliminary spec	1 - 32
8 Jan 07	--	Preliminary spec updates	1 - 31
20 Apr 07	--	Update Horizontal mount tuner mechanical spec, add lug L1~L4 connection information & modulator output level.	All

For more information, contact our nearest sales office or e-mail any request to tuners@thomson.net.

THOMSON – Business Units Tuners

NORTH AMERICA THOMSON Tuners - 12950 Saratoga Ave, Saratoga CA 95070, USA
Tel. + 1 408 387 51 31 - Fax. + 1 408 255 94 14

ASIA THOMSON Tuners – 8 Jurong Hall Road #29-01/06 – The JTC Summit – SINGAPORE 609434
Tel. + 65 6 379 17 98 Fax. + 65 6 379 17 75

EUROPE & LATIN AMERICA THOMSON Tuners - 46 quai A Le Gallo - 92648 Boulogne Cedex – FRANCE
Tel. + 33 1 41 86 50 15 - Fax. + 33 1 41 86 56 75

JAPAN THOMSON Tuners Japan – Daini-yanagiya Bldg., 5F
(Grass Valley Japan, Ltd)
1-12-8 Nihonbashi, Chuo-ku
Tokyo 103-0027, JAPAN
Tel. + 81 3 6848 6390 Fax +81 3 6848 6391