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APPROVED BY: DATE 30.JUL.2010		REPRESENTATIVE DIVISION
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DEVICE SPECIFICATION for
DIGITAL DBS TUNER

MODEL NO. BS2S7HZ7803

□ CUSTOMER'S APPROVAL

DATE

BY

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Description: This specification covers L-band to I and Q base-band tuner intended for use in digital modulated satellite receiver.

[1] GENERAL SPECIFICATIONS

1-1	Receiving frequency range		950MHz to 2150MHz
1-2	Input signal level per channel		-65dBm to -25dBm
1-3	Nominal RF input impedance		75ohm (F-connector)
1-4	Local frequency range		950MHz to 2150MHz
1-5	Channel Selection system		PLL synthesizer(Clock:16MHz)
1-6	AGC input voltage		0V to 3.3V 0V : Max. gain 3.3V : Min. gain
1-7	I/Q Output LPF cut off frequency(-3dB)		10MHz to 34MHz, variable(2 MHz step)
1-8	Nominal I/Q output level		0.6Vp-p at 1kohm load impedance
1-9	Nominal I/Q output impedance		50 ohm
1-10	Operating Voltage	B2,B4	3.3V ± 0.165 V DC
1-11	Absolute maximum rating voltage		
		B1A	25V DC, 400mA Max.
		B2,B4	-0.3~4.0V DC
		AGC,SDA,SCL	-0.3~B2+0.3V DC
	Note)Breakdown voltage of each terminal is provided for in the state of nominal voltage.		
1-12	Circuit block diagram		Figure 1
1-13	Connection diagram		Figure 2
1-14	Mass		21g
1-15	Storage condition		
		Temperature	15 deg.C to 35 deg.C
		Humidity	25 %RH to 75 %RH
		Period	6 months
1-16	Environmental characteristics		RoHS compliant

(RoHS refers to the "DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.")

1-17 Attention items:

1) This unit contains components that can be damaged by electro-static discharge. Before handling this unit, ground your hands, tools, working desks and equipment to protect the unit from Electronic Static Destroy.

2) Avoid following actions;

a)to store this unit in the place of the high temperature and humidity.

b)to expose this unit to corrosive gases.

[2] MECHANICAL SPECIFICATIONS

2-1 Dimension and mounting details Figure 3

2-2 F-connector Strength:

Chassis must not be deformed at 0.98N*m of the bending moment and must be connected electrically.

2-3 F-connector clamping torque:

Chassis must not be deformed when the nut is built at 0.98N*m of the clamping torque and must be connected electrically.

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[3] ENVIRONMENTAL SPECIFICATIONS (ELECTRICAL FUNCTIONAL OPERATION GUARANTEE)

3-1 Operating Temperature -10℃ to +60℃
Humidity Less than 85%

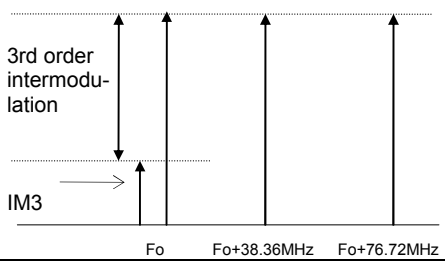
3-2 Storage Temperature -20℃ to +85℃
Humidity Less than 95%

[notice] Water vapor pressure 6643Pa max. No condensation. Please be careful that sudden temperature changes may cause condensation during storage, and such condensation may cause corrosion.

[4] Test condition

4-1 Supply voltage B2,B4 3.3V ± 0.1V DC
4-2 Ambient temperature 25℃ ± 5℃
4-3 Ambient humidity 65% ± 5%
4-4 I/Q output level 0.6Vp-p at 1kohm load impedance

[5] ELECTRICAL SPECIFICATIONS (Testing Condition is showed from 4-1 to 4-4)

No.	ITEM		SPECIFICATION MIN.	TYP.	MAX.	UNIT	CONDITION
5-1	Noise Figure			8	12	dB	at AGC voltage=0V
5-2	RF input VSWR			2.0	2.5		950MHz to 2150MHz
5-3	Gain deviation			7	10	dB	950MHz to 2150MHz
5-4	AGC control range		65	80		dB	AGC voltage: 0 to 3.3V
5-5	3rd order intermodulation(2 tone) 		40	60		dB	input level is -25dBm Desired signal : Fo undesired signal : (Fo+38.36MHz,Fo+76.72MHz) or (Fo-38.36MHz,Fo-76.72MHz) LPF_Fc=22MHz
5-6	I/Q phase balance		-3	0	+3	deg.	freq. offset is 100kHz
5-7	I/Q gain balance		-2	0	+2	dB	freq. offset is 100kHz
5-8	Pass band flatness of BB LPF				2	dB	0.1MHz to fc×0.7
5-9	Local oscillator signal leak at RF input terminal			-68	-63	dBm	950 to 2150 MHz
5-10	Phase noise	1kHz offset		-85		dBc/Hz	measured at I/Q out
		10kHz offset		-85		dBc/Hz	
		100kHz offset		-95		dBc/Hz	
5-11	PLL lock up time				15	ms	within VT±5% VT is tuning voltage
5-12	Current consumption	B2 3.3V		170	200	mA	
		B4 3.3V		25	40	mA	
		AGC		15	50	uA	
5-13	Clock out level		2.0		3.3	Vpp	Rectangular wave form (*1)
5-14	Clock out frequency error		-80	0	+80	ppm	-10℃ to +60℃
5- 15	RF output VSWR			2.0	2.5		950MHz to 2150MHz measured at RF out
5- 16	RF output gain		-5	0	+5	dB	

*1: Since the amplitude value is influenced of the circuit connected to the latter part from the "CLOCK OUT" terminal, please check in an actual circuit.

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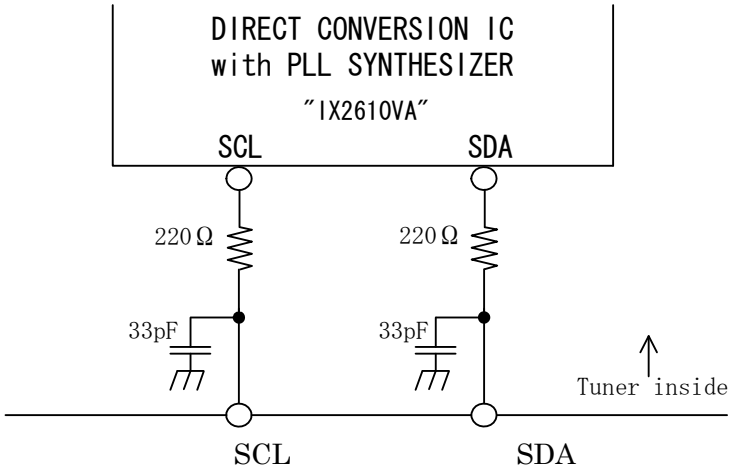
6-3. I2C bus characteristic(SCL,SDA)

Item	MIN	MAX	UNIT
Input high voltage	2	3.6	V
Input low voltage	-0.3	0.8	
SCL clock rate		400	kHz

6-4. The interface of this tuner is as following figure.



[7] PIN LIST

PIN NAME	PIN No.	PIN DESCRIPTION
B1B	1	Voltage supply of LNB B. Please ground it with a 1000pF ceramic capacitor.
B1A	2	Voltage supply of LNB A. Please ground it with a 1000pF ceramic capacitor.
B4	3	3.3V supply for RF Booster Amp of tuner.
B2	4	3.3V supply for tuner. Please keep a ripple at power supply less than 10mVp-p.
Q out	5	Output for Baseband "Q"
I out	6	Output for Baseband "I"
AGC	7	AGC voltage input.
SDA	8	I^2C-Bus for PLL IC. Bus clock speed is 400kHz maximum.
SCL	9	
CLK OUT	10	4MHz output.(rectangular wave form)

[9] Reliability

9-1. High temperature high humidity load (40deg.C, 90% RH, 500h)

1) After leaving DUT at room temperature and humidity for 24h or longer, measure the initial value.
2) After cycling DUT in the constant chamber at 40deg.C/90-95% RH in on state, for total 500h, leave the DUT at room temperature and humidity for 2h and then measure value after test.
3) Must meet the specifications of Table 17.
4) The contact resistance of F-connector must be less than 0.02 ohm. (*)

9-2. High temperature load (70deg.C, 40% RH, 500h)

1) After leaving DUT at room temperature and humidity for 24h or longer, measure the initial value.
2) After leaving DUT in the constant chamber at 70+/-2deg.C/40% RH for total 500h, leave the DUT at room temperature and humidity for 2h and then measure value after test.
3) Must meet the specifications of Table 17.

9-3. Cold test (-25deg.C, 500h)

1) After leaving DUT at room temperature and humidity for 24h or longer, measure the initial value.
2) After leaving DUT in the constant temperature chamber at -25deg.C for 500h, leave the DUT at room temperature and humidity for 2h and then measure the values after test.
3) Must meet the specifications of Table 17.

9-4. Shock (686 m/s^2, 6 planes, 3 times)

1) After leaving DUT at room temperature and humidity for 24h or longer, measure the initial values.
2) Using the shock tester, apply shock of 686 m/s^2 three times to each of 6 planes and then measure the values.
3) Must meet the specifications of Table 17.
4) This test is to be conducted using a single tuner.

9-5. Vibration (10-55 Hz, 1.5 mm, in each of three mutually perpendicular directions, each 2 times)

1) After leaving DUT at room temperature and humidity for 24h or longer, measure the initial values.
2) Using the vibration tester, apply motion having an amplitude of 1.5 mm (constant), the frequency being varied uniformly between 10 and 55 Hz, to DUT, for 2h in each of three mutually perpendicular directions (X, Y and Z, total of 6h). After the test, measure the values.
3) Must meet the specifications of Table 17.
4) This test is to be conducted using a single tuner.

9-6. Heat shock test (1 cycle=1h (-25deg.C; 0.5h, 85deg.C;0.5h), 100 cycles))

1) After leaving DUT at room temperature and humidity for 24h or longer, measure the initial value.
2) Using the heat shock tester, apply heat shock to DUT. After the test, measure the values.
3) Must meet the specifications of Table 17.
4) The contact resistance of F-connector must be less than 0.02 ohm. (*)

9-7. Solderability of terminal

Pretreatment of heating terminal at 150deg.C for 1h is performed and leave it at room temperature for 2h or longer. Immerse 1.9 mm length of terminal (from the tip) to be soldered into rosin (JIS-K-5902), isopropyl alcohol (JIS-K-8839 or JIS-K-1522, rosin concentration (10-35% range) approx. 25% by weight unless otherwise specified) or equivalent solution for 3–5s, and then immerse the length of the terminal into a pool of molten solder (Sn/3.0Ag/0.5Cu, or equivalent) at 240 +/-2deg.C for 3s.Dipped terminal portion shall be wetted by more than 95%.
(Excluding the cutting plane of the chassis)

9-8. Soldering heat resistance

Immerse the terminal mounted on a PCB (1.6t thick) into solder at 350±5deg.C for 3.0-3.5 seconds or at 260 +/-5deg.C for 10 +/-1 seconds. Remove the PCB from the solder and leave it for 1 hour at room temperature. The test sample shall show no degradation in appearance and electrical characteristics.

9-9. ESD protection

Table 16; ESD Test Condition (IEC61000-4-2 Compliant)

terminal	Limits	condition
RF_IN (coaxial center)	+/-6kV DC	Air discharge (The varistor is connected between LNB terminal and GND.) 150pF/330ohm, each 5 times
Others	+/-200V DC	Contact discharge 150pF/330ohm, each 5 times

Table 17

item	specification	condition
I/Q phase noise	(initial values)±2.0 dB	IQ output level: 0.3Vp-p (differential 0.6Vp-p) RF input lebel:-45dBm
NF	Less than 12dB	Measured at IQ out .AGC voltage=0V
I/Q gain balance	(initial values)±1.0dB	IQ output level: 0.3Vp-p (differential 0.6Vp-p) RF input lebel:-45dBm
I/Q phase balance	(initial values)±2.0deg.	
Local frequency	(initial values)±100KHz	Measured at IQ out

(*)Method of measuring contact resistance

Center-contact

Insert the gauge pin(φ0.8mm) to F-connector.

Measure the resistance between the gauge and the center-contact of F-connector.

Outer-shell

Connect the plug(3/8-32 UNEF-2B) to F-connector at 29.4N・cm of the clamping torque.

Measure the resistance between the plug and chassis.

(Measuring device: Milliohm meter)

・F-connector is made from iron. If the plating is peeled off, rust might occur to surface of F-connector. But it makes no influence of electric specifications, under contact resistance is less than 0.02 ohm.

・The cutting plane of chassis and shield cover is not plated, therefore rust might occur. But it makes no influence of electric specifications.

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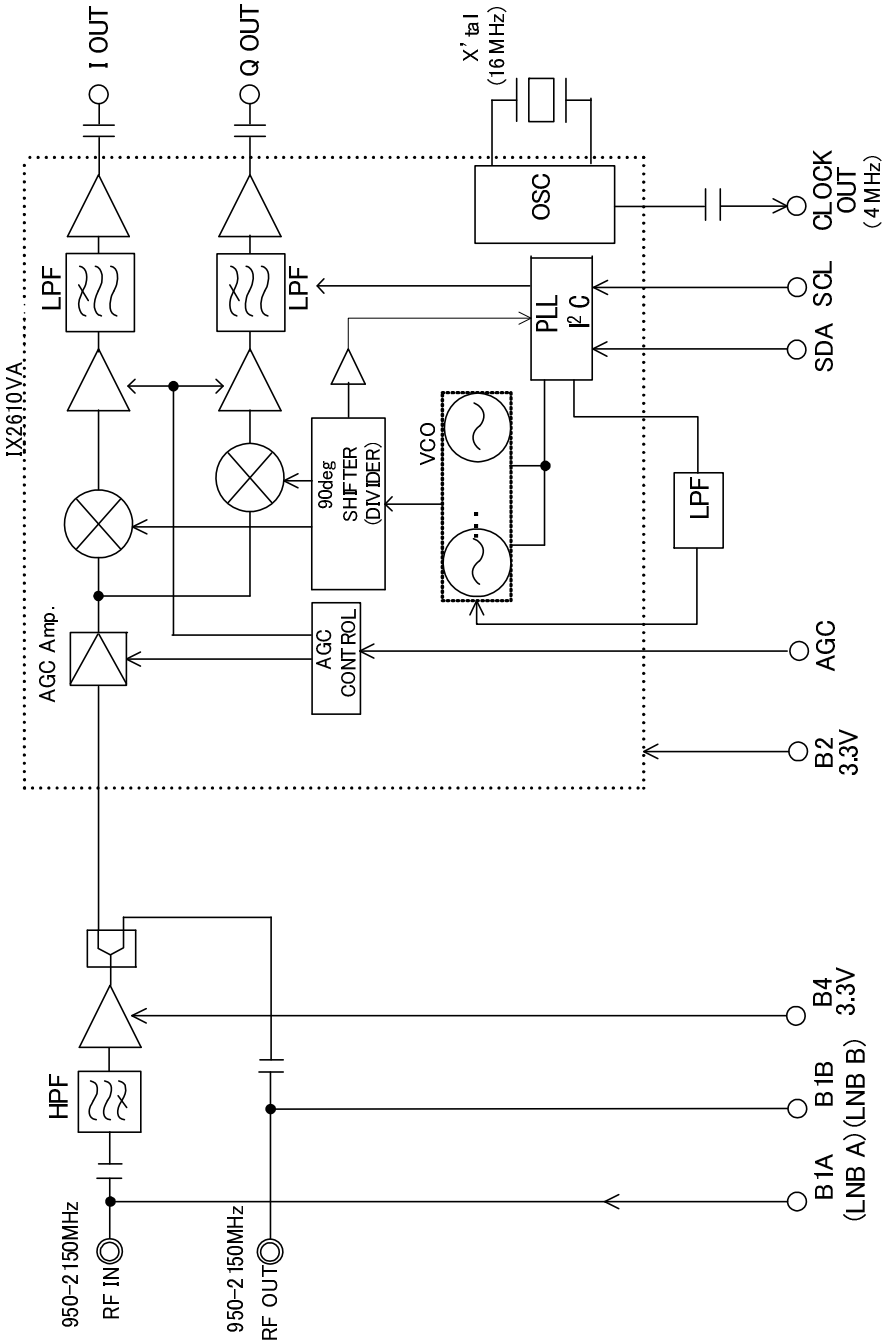

Fig.1 CIRCUIT BLOCK DIAGRAM

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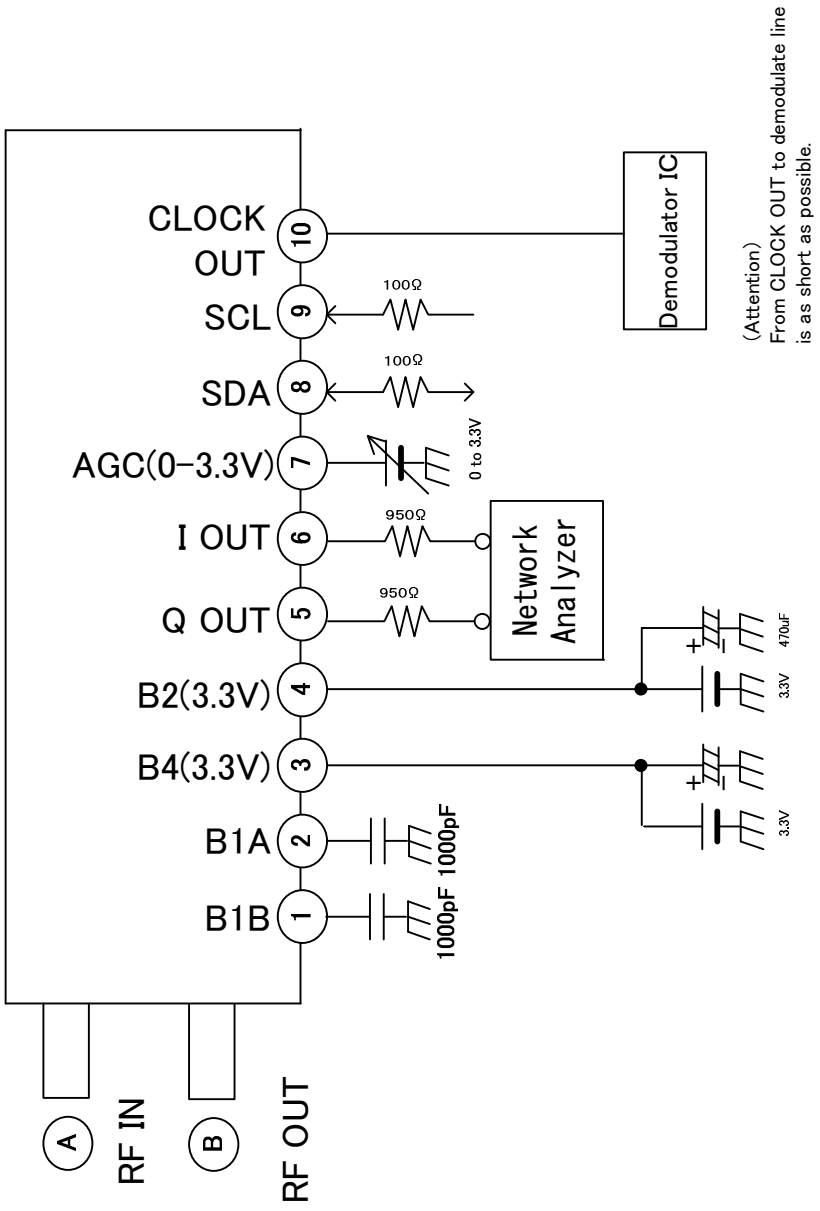

Fig.2 Connection diagram

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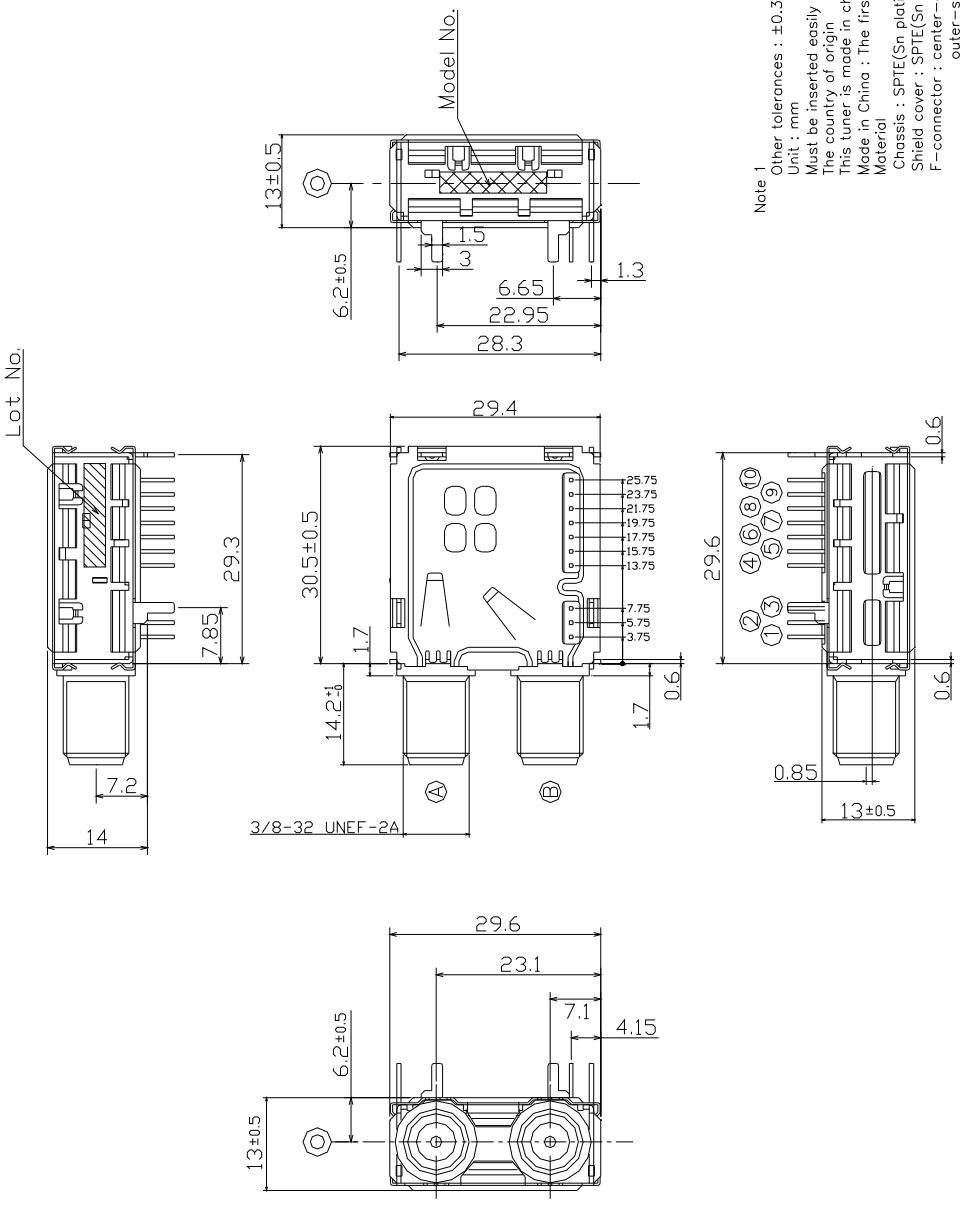
Fig.3 Dimension and mounting details



Note 1
Other tolerances : ±0.3mm
Unit : mm
Must be inserted easily into PWB hole.(next page)
The country of origin
This tuner is made in china.
Made in China : The first letter of lot number is " W "
Material
Chassis : SPTE(Sn plating)
Shield cover : SPTE(Sn plating)
F-connector : center-contact;Bronze(Cu and Sn plating)
outer-shell;Fe(Cu and Ni plating)
Pin : BRASS(Cu or Ni , and Sn plating)

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Recommended dimension of pin holes on mother PWB.

(Viewed from mounting side)

– Reference drawing –

Unit : mm

DEAD SPACE

(Do not wire the signal line etc. through this area to prevent the short-ciucuit to chassis)

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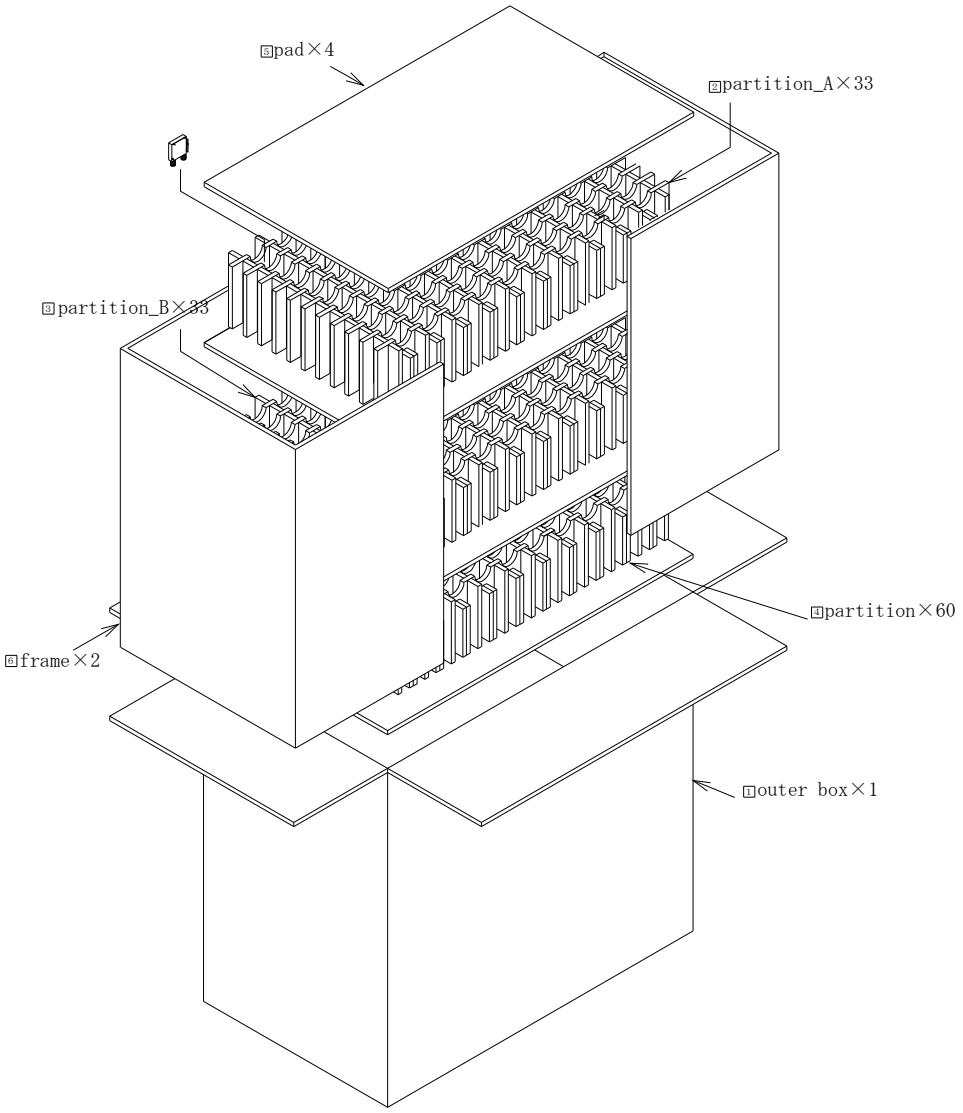

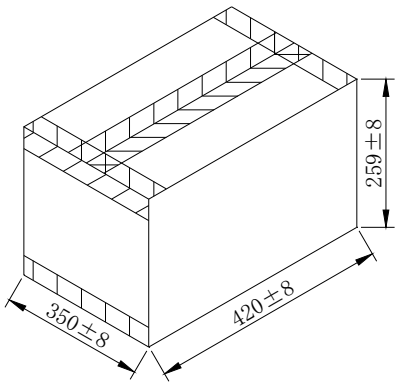

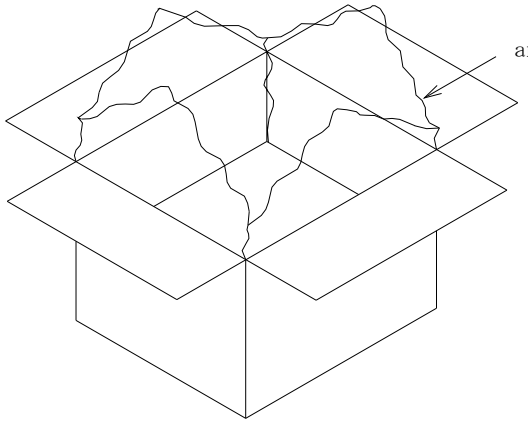

Unit : mm
Quantity: 300pcs

Fig.4 Packing figure