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ELECTRONIC COMPONENTS GROUP
SHARP CORPORATION

SPECIFICATION

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PAGE 11

REPRESENTATIVE DIVISION

- ELECTRONIC COMPONENTS DIV.
- OPTICAL DEVICE DIV.
- PHOTO VOLTAICS DIV.
-

DEVICE SPECIFICATION FOR

LOW NOISE BLOCK DOWNCONVERTER

MODEL No. B S C H 8 4 P 2 0

CUSTOMER'S APPROVAL

DATE _____

BY _____

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SHARP CORPORATION ELECTRONIC COMPONENTS ENGINEERING DEPT

PRESENTED BY M. Yamauchi

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General Description

The Low Noise Block Down-Converter specified is used in combination with an antenna for Ku band.

And this converter can receive both left or right hand circularly polarized signals by electrical switching.

Attached Reference Materials

1. Block diagram (See PAGE 6)
2. Outline drawing (See PAGE 7)

1. GENERAL SPECIFICATIONS

1-1 Input component	:Feed-Horn (matched numerical angle:78°)
1-2 Receiving frequency range	:12.2GHz to 12.7GHz
1-3 Local oscillation frequency	:11.25GHz
1-4 Output component	:F-type female connector *1 (See PAGE 3)
1-5 Nominal output impedance	:75 Ω
1-6 Supply voltage	:11.8V~19V (omitting 14V~16.0V)
1-7 Power supply system	:IF output overlapping system
1-8 Exterior material	:Diecast aluminum
1-9 Weight	:320±25g
1-10 SW method for L/R LNB	:Voltage comparator

2. AMBIENT CONDITIONS

2-1 Operating temperature	: -30°F ~ +150°F (-34.4°C ~ +65.5°C)
2-2 Storage temperature	: -40°F ~ +160°F (-40°C ~ +71.1°C)
2-3 Humidity	: Operating: 0% ~ 95%RH @100°F(37.8℃) : Storage : 0% ~ 95%RH @100°F(37.8℃)
2-4 Ambient pressure	:(1.01±0.3)×10 ⁵ Pa (0.7~1.3 atm)

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3. ELECTRICAL CHARACTERISTICS

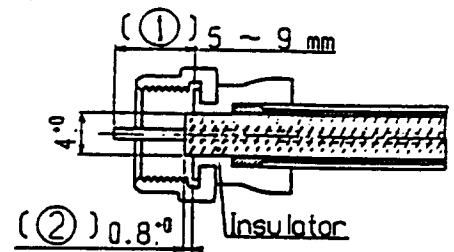
Unless otherwise indicated, each of the following specified values is applicable under normal ambient temperature and humidity conditions.

(Normal ambient temperature and humidity ⇨ +15°C~+35°C, 60±20%RH)

No.	Item	Specification				Condition		
		Min	Typ	Max	Unit	Tem	Hu	Note
3-1	Noise figure			1.1	dB	A	B	in 12.2~12.7GHz *2 *3
3-2	Conversion gain	50		62	dB	A	B	overall 12.2~12.7 GHz
3-3	Gain frequency characteristics			5	dBpp	A	B	within all band
				±0.5	dB	A	B	within any 25MHz
3-4	Local oscillation frequency and drift							
3-4-1	Local oscillation frequency		11.25		GHz	B	B	
3-4-2	Initial drift			±2	MHz	A	B	*4
3-4-3	Drift associated with temperature change			±3	MHz	C	B	*5
3-4-4	Local Uncertainty			±5	MHz	C	B	*6
3-5	Cross polar discrimination	20	25		dB	B	B	
3-6	1dB Compression Point	-3.0	0.0		dBm	B	B	
3-7	Output VSWR			2.0		B	B	75 Ω
3-8	Current consumption			200	mA	B	B	
3-9	Supply voltage (output1 and output2)	11.8		14.0	V	C	B	RHCP selected
		16.0		19.0	V	C	B	LHCP selected
3-10	L. O. SSB phase noise			-50	dBc/Hz	B	B	at 1KHz offset
				-70	dBc/Hz	B	B	at 10KHz offset
				-90	dBc/Hz	B	B	at 100KHz offset
				-110	dBc/Hz	B	B	at 1MHz offset
3-11	f/D ratio		0.59			B	B	

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*1 When a coaxial cable is connected to F-type connector(①), length of bared core area into the connector should be within 5~9mm, and the length of exposed insulator area(②) should be within 0.8mm.



*2 Measuring accuracy for noise figure $\Rightarrow \pm 0.2\text{dB}$

*3 Input is referenced to INPUT of LNB(not includes feed horn) and includes polarizer element in measurement.

Tem: temperature A $\Rightarrow +25 \pm 2^\circ\text{C}$

B $\Rightarrow +15^\circ\text{C} \sim +35^\circ\text{C}$

C $\Rightarrow -30^\circ\text{F} \sim +150^\circ\text{F} (-34.4^\circ\text{C} \sim +65.5^\circ\text{C})$

Hu: humidity A $\Rightarrow 60 \pm 5\% \text{RH}$

B $\Rightarrow 60 \pm 20\% \text{RH}$

*4 $+72^\circ\text{F} (+22^\circ\text{C})$, 15min, warm-up with power applied.

*5 Reference frequency at 25°C and $60 \pm 20\% \text{RH}$.

*6 Total converter oscillator frequency uncertainty $\pm 5\text{MHz}$ after environmental testing, including aging effects.

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4. RELIABILITY TESTING

4-1 Low temperature shelf test (unpacked condition)

After the test samples are left at -40°C for 500 hours and then at normal temperature and humidity for 2 hours, normal operation shall be observed without any defects in appearance.

4-2 High temperature and humidity shelf test (unpacked condition)

After the test samples are left at 60°C 95%RH for 500 hours and then at normal temperature and humidity for 2 hours, normal operation shall be observed without any defects in appearance.

4-3 Heat cycle test (unpacked condition)

The test samples are first subjected to 50 heat cycles, each consisting of three stages ; 1 hour at -40°C, 2 hours at 55°C and 95%RH, and 1 hour at 65°C.

After samples are subsequently left at normal temperature and humidity for 2 hours, normal operation shall be observed in each internal part without any defects in appearance.

4-4 Electrostatic shock test

A 100pF capacitor is charged to the specified voltage and discharged through a 150 ohm resistor to any exposed part of the ODU , including the center conductor of the output "F" connector. There shall be no failure of any component up to + or -20000 volts. Test are to be made in increments of 2000 volts. (See ATTACHMENT 1)

4-5 Lightning resistance test

Lightning resistance test shall be conducted at the non-operative LNB output terminal. No failure up to ± 3 KV discharged via 10 Ω resistor.

(See ATTACHMENT 1)

4-6 Vibration test (packaged condition)

Apply vibration(full amplitude of 1.5mm at 5~50Hz) in specified direction(s) and duration according to as-packaged component weight shown below;

- a) For components weighting 10kg or less, 0.5 hour in each of the X,Y and Z-directions.
- b) For those weighting over 10kg but no more than 50kg, 30 minutes in only one direction, along either side of the component packing.

After the test, normal operation shall be observed without any defects in appearance.

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4-7 Drop test (packaged condition)

- One corner : One optionally selected corner of the plane which constitutes the bottom of the packing.
- 3 edges : One short and two long edges which define the corner selected for the drop test; start with the shorter edge and follow with the remaining longer ones.
- 6 planes : Start with the plane of smallest area then follow in order of increasing area.

Drop test height : 65 cm

After the above drop tests are completed, normal operation shall be observed in each test sample without any defects in appearance.

4-8 High temperature aging test

Subject the test samples to a cyclic aging test in an environment of $70 \pm 5^\circ\text{C}$, 10~15%RH, with the source voltage stepped up by 10% of the rated value. Each cycle shall consist of an ON period of 25 minutes duration and an OFF period of 5 minutes duration.

After 500 hours of testing, normal operation shall be observed without any defects in appearance. (Check at specified measurement check points (250 hours and 500 hours after test start.))

4-9 Leakage test

Air penetration (air leakage) to the inside of LNB shall be 4.5×10^{-2} cc/sec or less, when air pressure of 0.45 kg/cm^2 is loaded externally to LNB.

4-10 Solar radiation (See ATTACHMENT 2)

4-11 Corrosion (See ATTACHMENT 3)

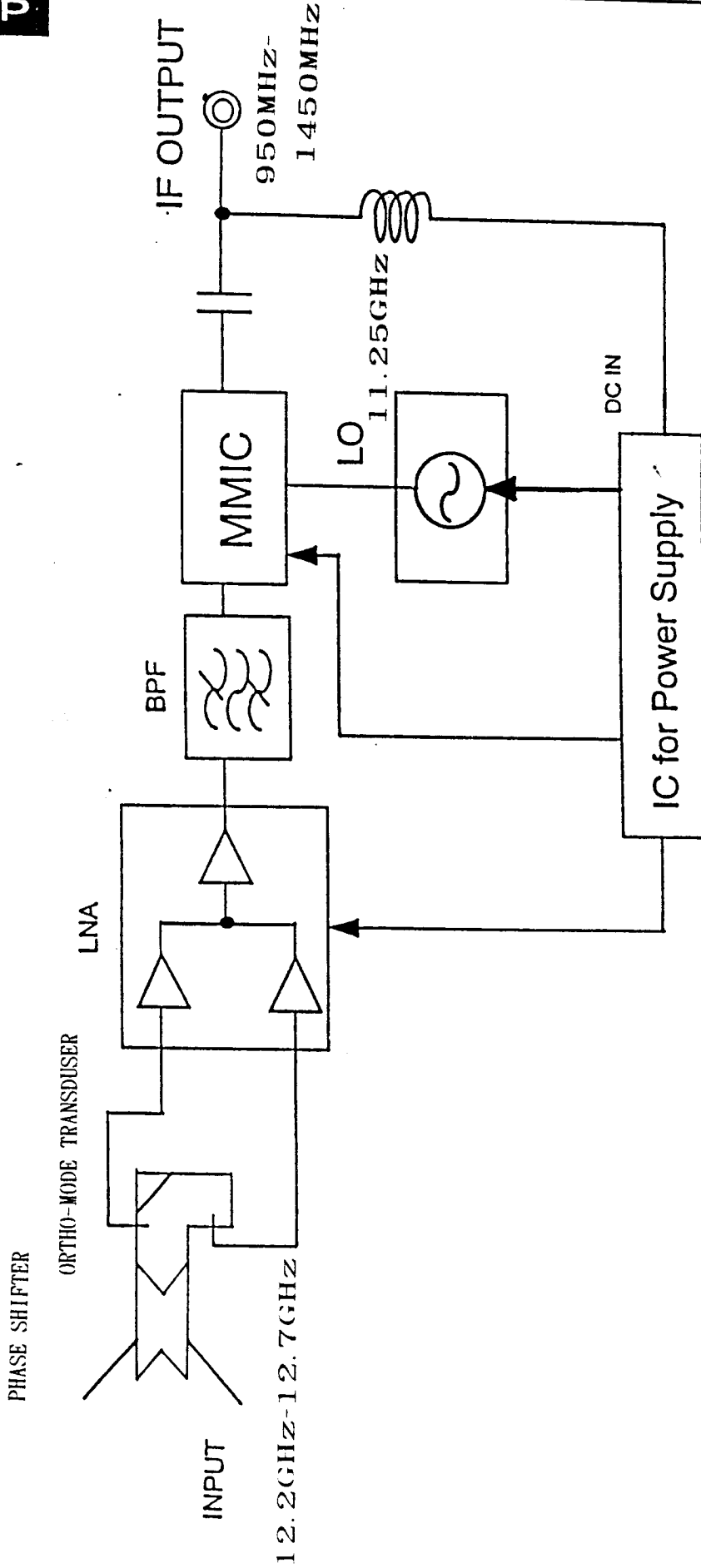
5. RELIABILITY ITEMS (ASSURED IN DESIGN STAGE)

5-1 Design life

Theoretical life for reference 10 years (MTBF).

5-2 Altitude

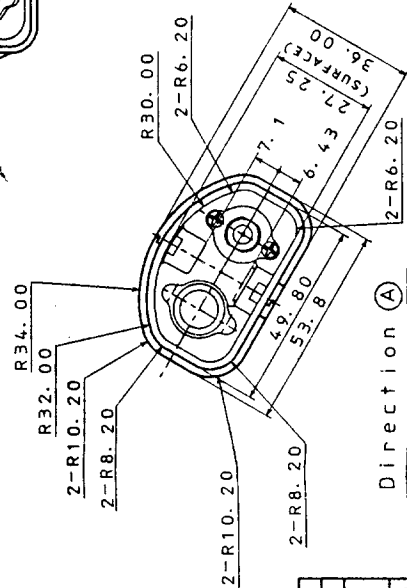
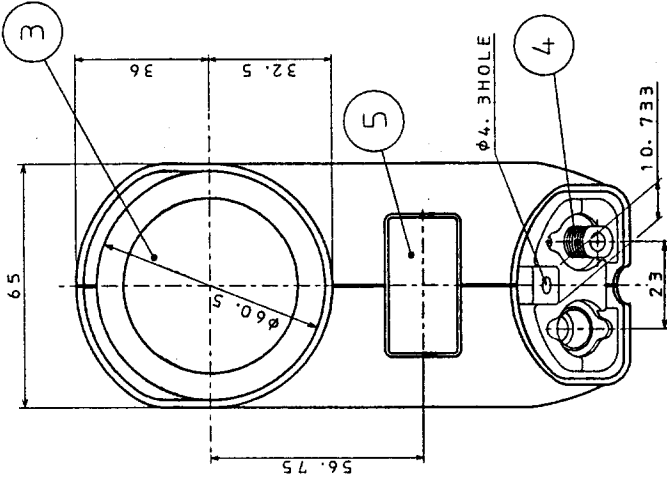
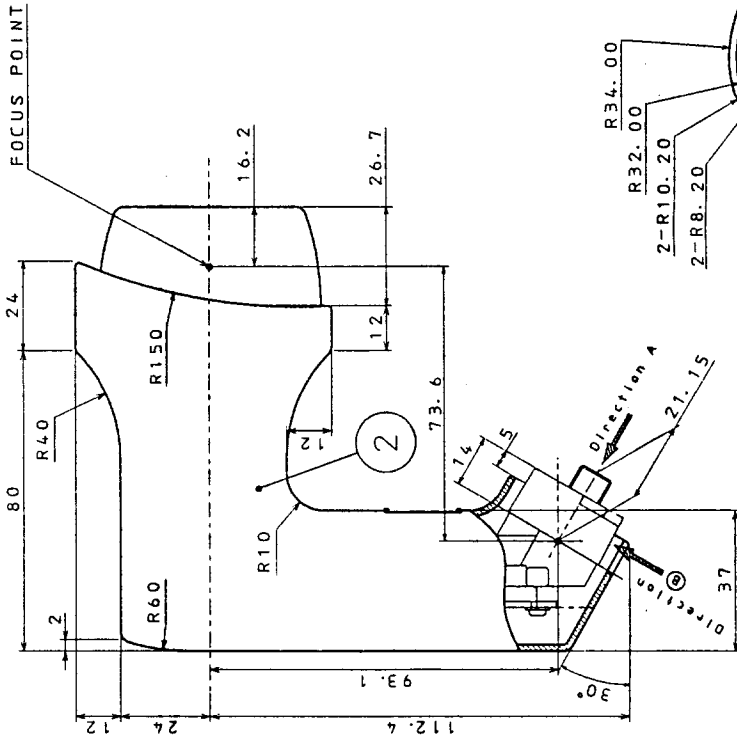
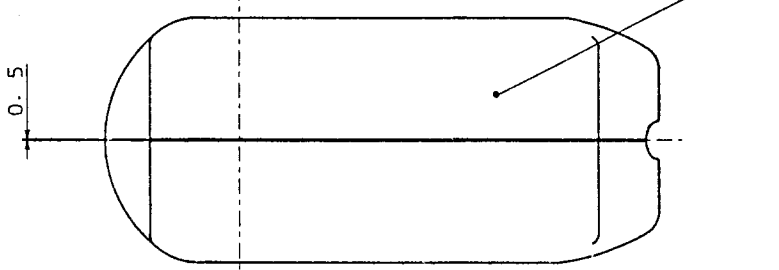
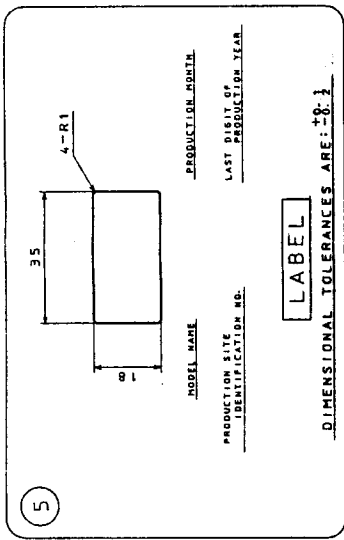
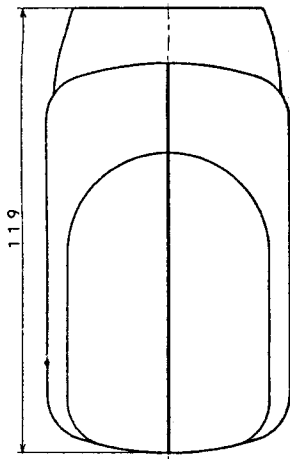
20000ft (0.459 atm) without damage.



LNB BLOCK DIAGRAM

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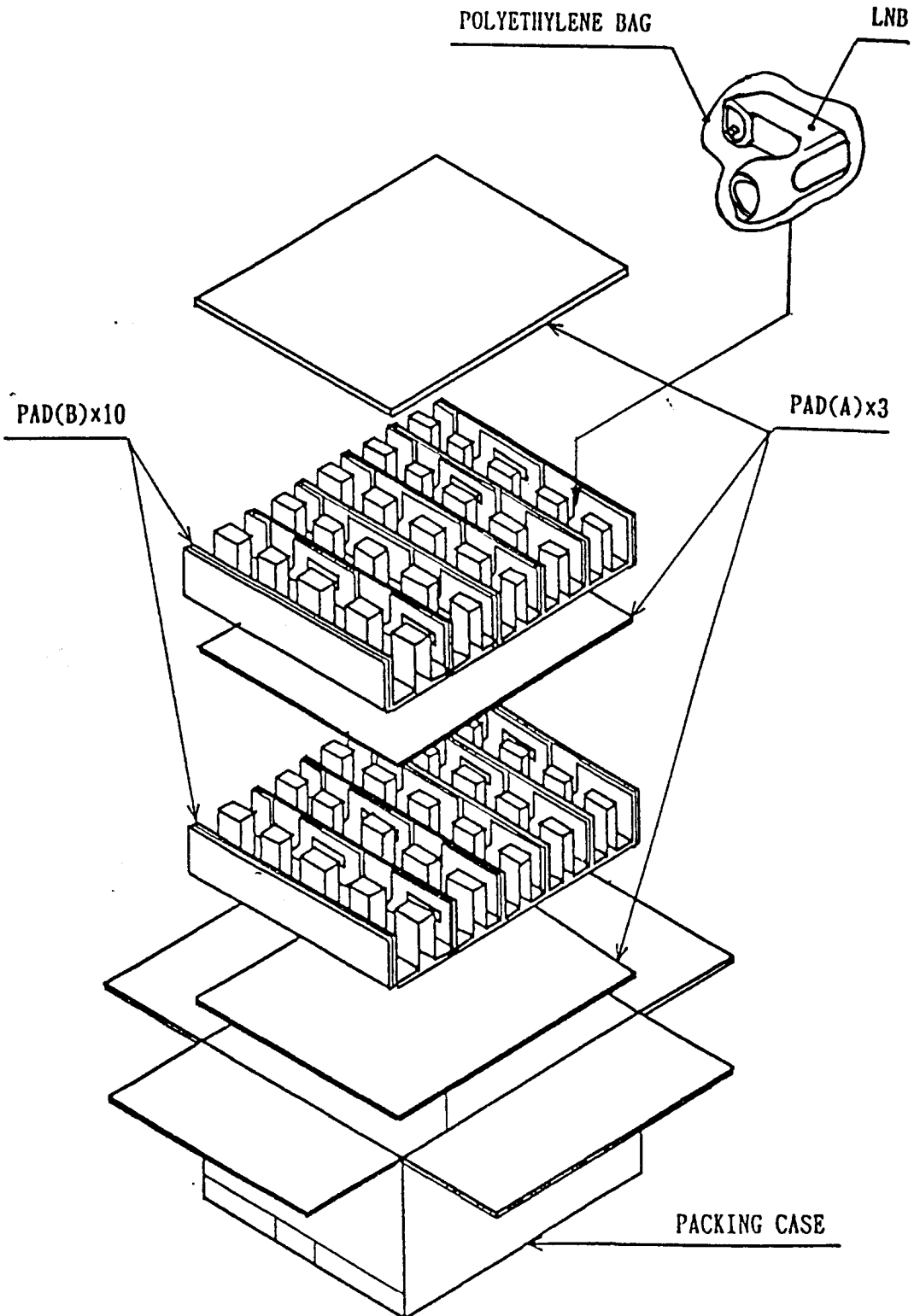
DATE : 1996. SEP. 4	
DATE	REVISE



DIMENSIONAL TOLERANCES
 ARE: X.XX = ±0.25
 X.X = ±0.5
 X. = ±1 (UNIT: mm)

No.	Description	Material	Color	Qty	Remarks
5	Label	PET		1	
4	Output Connector	Zn Alloy Die Castings		1	F Type
3	Horn-Cap	Poly-Propylene	Semitransparent White	1	
2	Feed-Horn	Al Alloy Die Castings		1	Covered Resin
1	Converter	Al Alloy Die Castings	Gray	1	Covered Resin

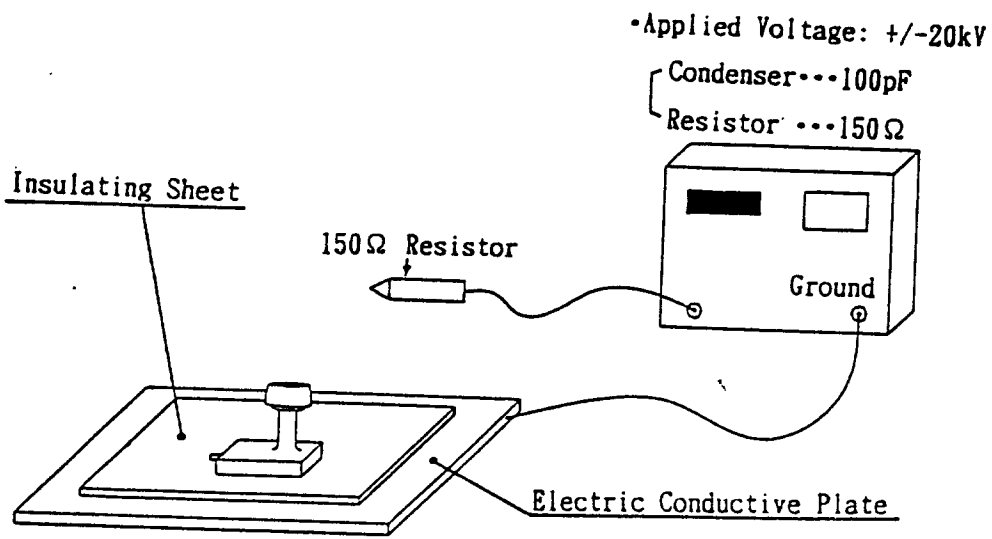
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CONSTRUCTION FOR SHIPPING CARTON (40PCS.)



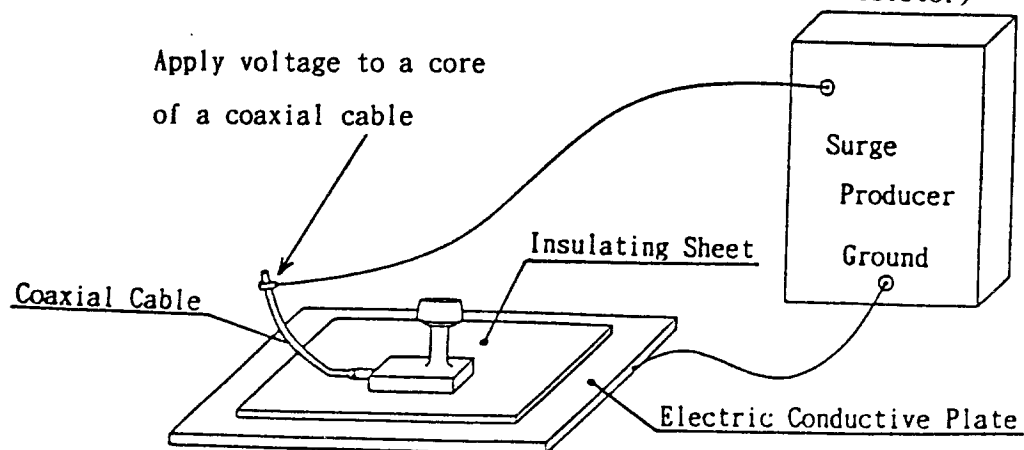
☆ Static Electricity



There shall be no failure of any component up to + or -20000 volts.
 Tests are to be made in increments of 2000 volts.

☆ Lightning Surge

Open-Circuit Voltage : +/-3kV
 Voltage Front Time : 1.2μs
 Voltage Duration : 50μs
 (+10Ω resistor)



After the ten times impression (13kV×5 at 10-seconds intervals,
 -3kV×5 at 10-seconds intervals) onto a core of a coaxial cable
 plugged in an F-connector, no failure in performances can be seen.

☆ Solar Radiation

To conduct a weatherability test, in conformity to Japanese Industrial Standards(JIS), JIS D 0205 (General Rules of Weatherability for Automobile Parts).

[A] Main Conditions

1. Test Equipment : Sunshine Weather Meter
2. Light Source : Sunshine Carbon Arc Lamp
3. Average Voltage Discharge : 50 V ($\pm 2\%$)
4. Average Current Discharge : 60 A ($\pm 2\%$)
5. Black Panel Temperature : $63 \pm 3^\circ\text{C}$
6. Water Jet Time : 18 minutes during 120 minutes irradiation
7. Test Time : 500 H Continual Irradiation
(intermediate Checkup after 300 H)
8. Others : Water-proof Plug to be attached to F-connecter(Female)

[B] Judgement Criteria

There should be no major defects in practical performances.

As for appearances, the products should conform to the following, after removing stains from a surface.

	after 300 H	after 500 H
Items to be Observed	Plastic Resin & Coating	
Discoloration	Color difference ≤ 5	Color difference ≤ 8
Crazing	No remarkable one	No extreme one
Choking	No remarkable one	No extreme one
Cracks	No remarkable one	No extreme one
Exfoliation, Puff	None	No remarkable one
Leakage Test	No problem	No problem

SHARP**ATTACHMENT 3**☆ Corrosion

To conduct Brine spray test, in conformity to Japanese Industrial Standards(JIS), JIS Z 2371(Methods of Salt Spray Testing).

[A] Major Conditions

1. Temperature : 35 ± 2°C
2. Brine Concentration : 5 ± 1%
3. Test Time : 100 H Continual Spray
4. Others : Water-proof Plug to be attached to
F-connector(Female)

[B] Judgement Criteria

After 100 H, there should be no major defects in practical performances. As for appearances, the products should conform to the following after removing stains from a surface.

Items to be Observed	Plastic Resin & Coating
Puff	No remarkable one (six puffs or less whose diameter is ≤ 4mm in the whole area.)
Exfoliation	No remarkable one (six exfoliations or less whose diameter is ≤ 5mm in the whole area.)
Rust	Corroded area should be within 10%
Leakage test	No problem