RD-R2825-1.0

March 26, 2014

SPECIFICATION

FOR APPROVAL

ATTEN: _____

APPROVED

BY _____

BY _____

Model No. NJR2825

If this specification is acceptable, we would like you to return one copy to us with your signature of approval.

NEW JAPAN RADIO CO.,LTD.	
QUALITY ASSURANCE SECTION MICROWAVE COMPONENT DIVISION	
APPROVED BY	
CHECKED BY	
DRAWN BY	

1 SPECIFICATIONS

1.1 Low Noise Block Converter – LNB

1.1.1 LNB Electrical Specifications

The LNB **shall** comply with electrical, mechanical, and environmental performances as per the requirements outlined in this spec. Additionally, the LNB is intended to operate in BPSK, QPSK, 8PSK, and 16-APSK modes.

Table 1: LNB Electrical Specifications

Item	LNB Electrical Specification		Min	Nom	Max	Units
Input/Output Frequency Range						
1	Input Frequency		19.2		20.2	GHz
2	Output Frequency Range		950		1950	MHz
LNB Input Characteristics						
3	Input Composite Signal Level (up to 1000 MHz BW)		-125		-73	dBm
4	Noise Figure	@ +25 deg C			1.3	dB
		over all environmental conditions			1.6	
Gain/Output Characteristics						
5	LNB Gain		65		75	dB
6	Output P1dB		+10			dBm
7	IF Output IP3		+20			dBm
8	Tx Band Intermodulation Interference Rejection and spurious products (Tx at >29.0GHz with input level up to -43dBm at LNB input) [OMT+TRF isolation ≥ 80dB]				-20	dBc
9	Pass Band Flatness (with respect to 1450 MHz)				+/- 4	dB
10	Gain ripple variation over any 45MHz				+/- 1	dB
11	Group delay variation over any 45MHz				2	ns p-p
Local Oscillator Characteristics						
12	Frequency Conversion		No Inversion			
13	LNB Type		Internal Reference PLL			
14	LO Frequency			18.25		GHz

15	LO Initial Offset at +25 deg C				+/- 1	ppm
16	LO Stability over temperature				+/- 3	ppm
17	LO Drift Rate (over all environmental conditions)				+/- 22	ppb/s
18	LO Discrete Frequency Jump (over all environmental conditions)				+/- 10	ppb
19	Phase noise: (Mask as target over all environmental conditions. **Shall** meet Integrated Phase Error Specification)	0.1 KHz			-60	dBc/Hz
		1 KHz			-75	
		10 KHz			-78	
		100 KHz			-90	
		1000 KHz			-105	
20	Integrated Phase Jitter (DSB) (1KHz – 1MHz)				2.0	Deg RMS
Spurious Characteristics						
21	IF Spurious Output with RF Input level from -118 dBm to -73 dBm -125 dBm to -119 dBm.		-27 -20			dBc
22	Tx Signal Immunity	IF Spurious output with Tx Signal (29.0-31.0GHz) of -43dBm max input to LNB			-20	dBc
		Gain Suppression with Tx Signal of -20dBm max input to the LNB			0.2	dB
		Noise Figure degradation with Tx Signal of -20dBm max input to the LNB			0.2	dB
23	LO Leakage at Waveguide				-37	dBm/ 100KHz
24	Image Rejection		40			dB
DC Power Characteristics						
25	DC Power: The LNB DC power from the Rx coax is NOT supported from the ICM or SCM. LNB DC power must be provided by the AIM with optional power On/Off control via AIM		+12		+30	VDC
26	DC Power Consumption				4	W
27	Supply Voltage Noise Immunity		100			mVp-p

	10Hz – 2MHz				
28	Supply Voltage Noise Emission 10Hz – 2MHz			150	mVp-p
29	LNB MTBF	The LNB MTBF calculation per Telecordia Parts Count Reliability Predictive Method (MIL-HDBK-217F) **shall** be 1,000,000 hours at +40 °C.			

1.1.2 LNB Interface

Table 2: LNB Input/Output Interface Specifications

Item	LNB Electrical Specification	Min	Nom	Max	Units
Interface Characteristics					
1	Input Waveguide	Grooved WR-42. Waveguide location and orientation as per CMSF-R2825(1)-1.0.			
2	Input VSWR	2.1 **:** 1			
3	Output Connector	N-type Connector			
4	Output Impedance		50		ohm

1.1.3 LNB Mechanical

Table 3: LNB Mechanical Specifications

Item	LNB Mechanical Specification		Min	Nom	Max	Units
1	General Description		The LNB **shall** be housed in a solid, fully-sealed aluminum die cast enclosure with cooling fins for the outdoor environment.			
2	Main Body Envelop Dimension		Refer to CMSF-R2825(1)-1.0			
3	Weight				0.4	kg
4	*Center of Gravity (CG). Relative to W/G input flange surface	X	45.2		55.2	mm
		Y	-5		5	
		Z	3.2		13.2	
5	Input Waveguide		Grooved WR-42 with #4-40 tapped mounting holes. Waveguide location and orientation as per CMSF-R2825(1)-1.0			
6	Waveguide Hardware Kit		Silicon-typ-R2825-1.0e O-ring, #4-40, Stainless-Steel screws with captive lock-washers.			
7	Earth Grounding Tag		M4, (6mm depth inner thread or equiv.)			

Item	LNB Mechanical Specification	Min	Nom	Max	Units
8	Passivation	RoHS Compliant Chromate			
9	Finish	Powder coated cured or spray paint equiv.			
10	Color	Semi-dull White or equiv.			

The physical mechanical attributes of the LNBs from NJRC is shown in CMSF-R2825(1)-1.0

1.2 Environmental Specifications

The following sections describe the environmental specifications for the LNB.

1. The term “operational” used below indicates compliance to all of the performance and functional specifications listed in this specification as they apply to the LNB.
2. The term “survival” used below indicates the capability to be exposed for short intervals to the specified environment and recover without damage to a fully “operational” condition. Unless otherwise specified, all non-operational configurations are un-powered.
3. The term “storage” used below indicates the capability to be exposed for long intervals to the specified environment and recover without damage to a fully “operational” condition. All units in storage are in a power-off state.

1.2.1 Temperature

1.2.1.1 Operational Temperature

The LNB **shall** remain operational over an ambient air temperature range of -40 °C to +73 °C at sea level without any degradation of performance per IEC-60945 and IEC-60721-3-6, Class 6K4.

In the remote event that the LNB do not comply to full performance at a temperature below -25 °C, the default fall back is with the de-ice system enabled in order to maintain an internal radome temperature above -25 °C. The maximum allowable outside radome air temperature transition rate for the stabilized Antenna system is 3 °C per minute, but no more than 20 °C per hour.

1.2.1.2 Survival Temperature

The LNB **shall** survive over an ambient air temperature range of –40 C to +80 °C when tested in accordance with IEC60068-2-1; Method-Ad, and IEC60068-2-2; Method-Bd. The LNB are powered on and in a non-functional state.

1.2.1.3 Storage Temperature

The LNB **shall** have a storage temperature range of –40 °C to +85 °C when tested in accordance with IEC-60945 Dry Heat and Low Temperature storage test method.

The term “storage” indicates the capability to be exposed for long intervals to the specified environment and recover without damage to a fully “operational” condition. All units in storage are in a power-off state.

1.2.2 Waterproofing

The LNB with IP65 rating **shall** remain watertight when subject to 12.5mm nozzle, 100 l/min at 3m water spray per IEC 60945 water proofing test specification.

1.2.3 Salt Environment

The LNB **shall** not show any sign of oxidation or degradation of the exterior surface finish when subjected to a corrosion (salt mist) test per IEC 60945.

1.2.4 Humidity

The LNB **shall** remain operational over a relative humidity range of 20% to 100% condensing when tested at 40 °C. The maximum humidity transition rate is 20% per hour.

1.2.5 Altitude

The LNB, in a non-operational configuration, **shall** survive without damage when exposed to altitudes up to 15,000 feet or 4572 meter (air freight). The maximum rate of change is 2,000 feet per minute or 610 meter per minute.

1.2.6 Vibration

1.2.6.1 Operational Vibration

The LNB **shall** remain operational with no performance degradation when tested under IEC 60945.

Table 4: Terminal Operational Vibration

IEC 60945 Operational Vibration	
Frequency (Sinusoidal)	Displacement
1 to 13.2 Hz	+/- 1mm
13.2 to 100 Hz	7m/s^2
Frequency Sweep Rate	0.5 Octaves/min

1.2.6.2 Survival Vibration

The LNB will survive, although it may not meet its operational specifications, when exposed to vibration per IEC 60721 as specified below:

Table 5: Terminal Survival Vibration

Environmental Condition	Test Level	Test Protocol	Reference
Systematic Vibration Amplitude Acceleration	 5.0 millimeters (0-Peak) 2.0 G (20 m/s^2)	IEC 60068-2-6, Method Fc	IEC 60721-3-6, Class 6M3 Modified by

Frequency Range	1Hz-150 Hz		IEC 60721-4-6

Additionally, the LNB will meet the following endurance test at its resonance frequency without damage or degradation:

- DNV Standard No. 2.4, Class C

1.2.7 Shock

1.2.7.1 Operational Shock

The LNB **shall** meet the following shock profile with performance degradation or data transmission error as per the table below. All shock tests are half sine on x, y, z axis. Test method per IEC 60068-2-27 Method Ea.

Table 6: BUC/LNB Shock Profile

Shock Test	Transient Errors	Soft Errors	Hard Errors	Physical Damage
2g, 20ms	0%	0%	0%	0%
4g, 20ms	5%	0%	0%	0%
10g, 11ms	25%	10%	0%	0%
20g, 7ms	50%	10%	0%	0%

Transient Errors	The system automatically recovers without significant loss of time or data. An example of this type of error is a bit error.
Soft Errors	The error is a temporary alteration of data that is recoverable without reset. An example of this type of error is a loss of lock.
Hard Errors	The error requires manual intervention for recovery, and results in an unplanned reset or causes permanent corruption of data.
Physical Damage	This is a permanent change in system characteristics or damage to a system component rendering the product unsuitable for sale as new. This does not include cosmetic damage caused by shock and vibration test fixtures.

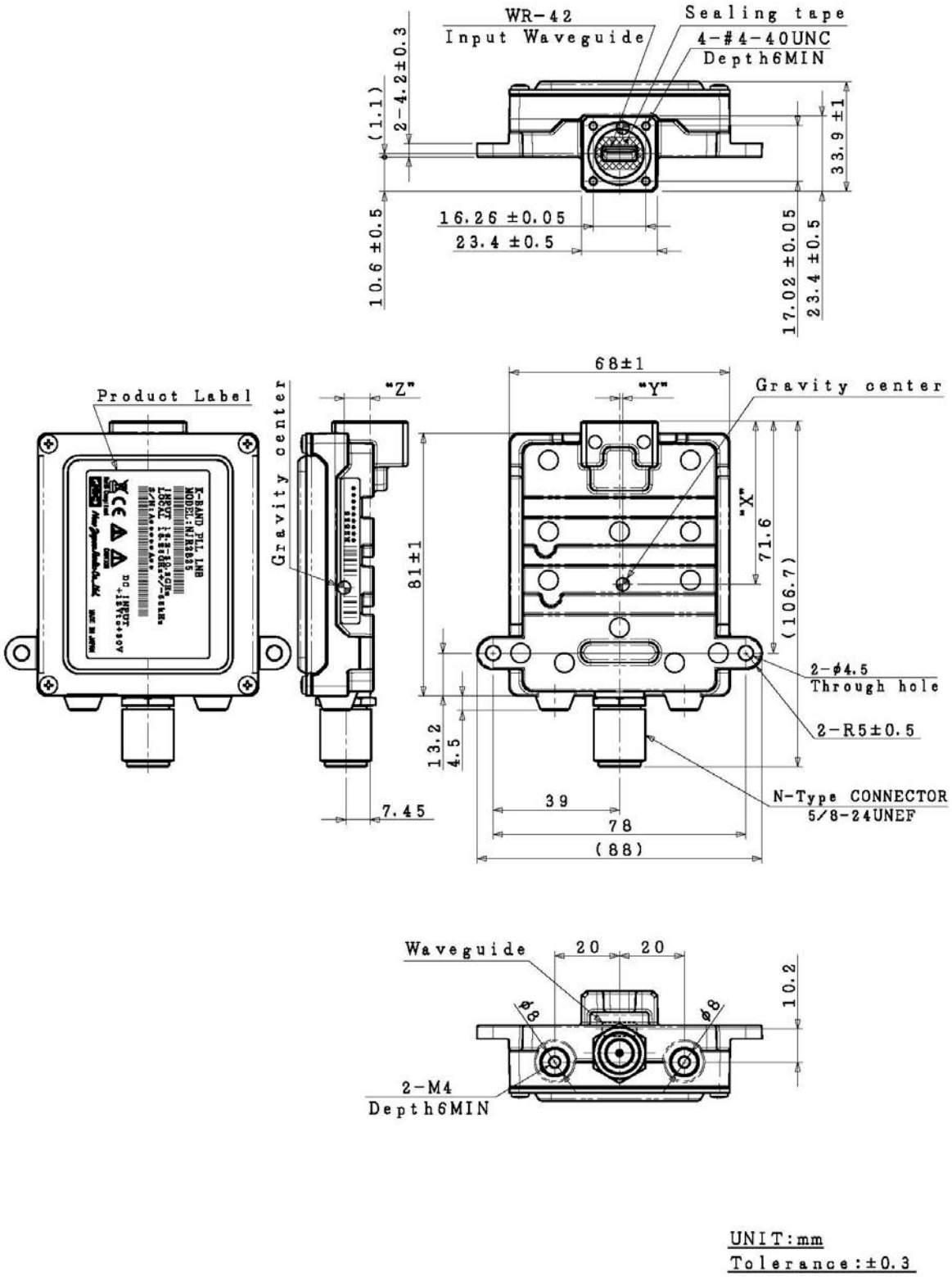
1.2.7.2 Survival Shock

The LNB will survive, although it may not meet its operational specifications, when exposed to the following IEC-60721 per table below.

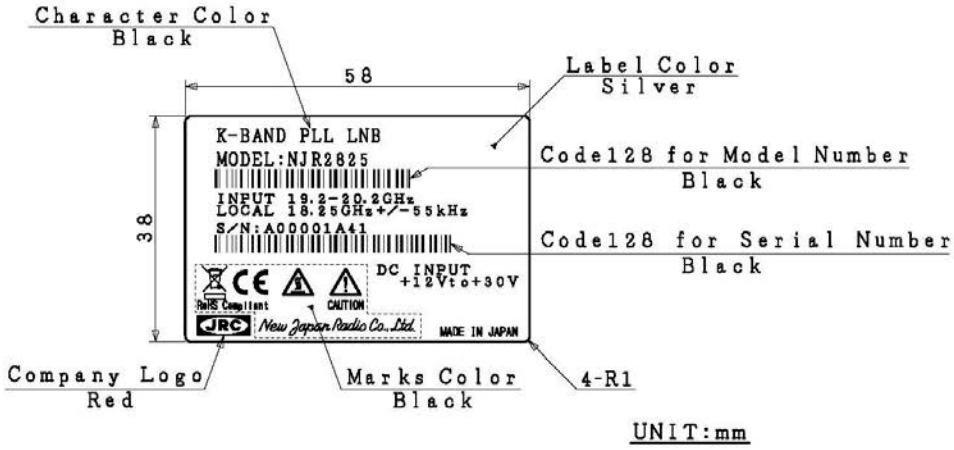
Environmental Condition	Test Level	Test Protocol	Reference

Shock (Transient Vibration) Response Spectrum Peak Accel., m/s^2 Duration, ms		II 300 6		IEC 60068-2-27, Method Ea: Shock (half-sine)	IEC 60721-3-6, Class 6M3 Modified by IEC 60721-4-6
Number of Cycles Directional Changes	3 each direction 6				
Shock (Bump) Peak Accel., m/s^2 Duration, ms Number of Cycles Directional Changes	250 6 100 ea. direction 6			IEC 60068-2-29, Method Eb: Bump (Spectrum II)	IEC 60721-3-6, Class 6M3 Modified by IEC 60721-4-6

CMSF-R2825(1)-1.0: LNB Mechanical Dimension

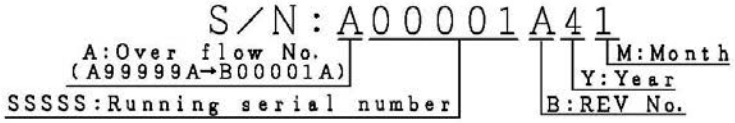


LNB Label



- Definition of Serial Number -

Serial Number(ASSSSSBYM)-ALPHANUMERIC(9 characters)



1. Serial number:ASSSSSBYM

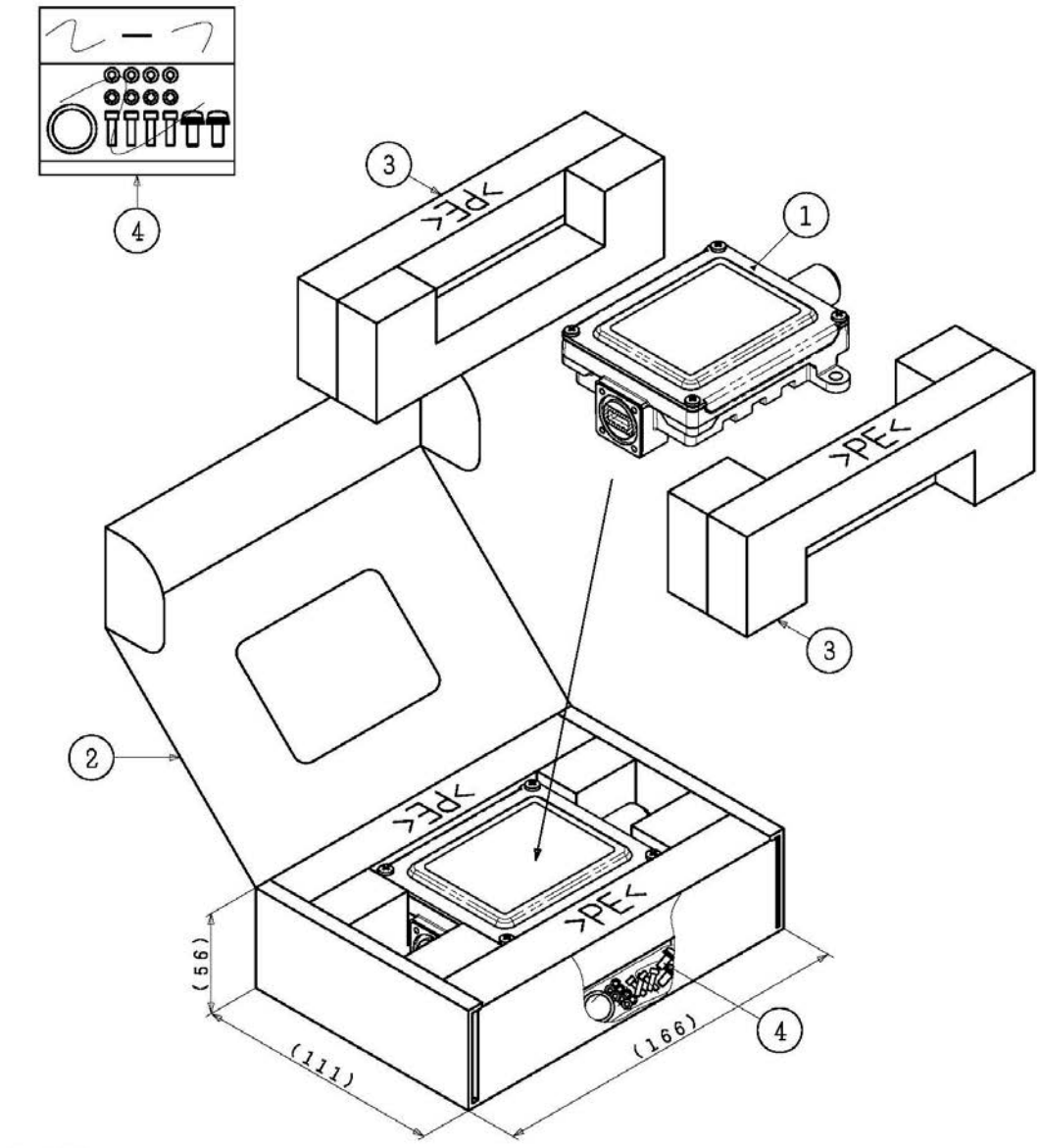
A:Over flow No.(A99999A→B00001A)
SSSSSS:Running serial number,
starting 00001
B:REV No.
Y:Production year
M:Production month

LNB Packing

PACKAGE

Accessories

- O-ring
- Hexagon Socket Head Bolts
  #4-40×3/8Inch 4pieces(SUS) for Waveguide Flange Holes
- Plain Washers
  M2.6 type 4pieces(SUS) for Weveguide Flange Holes
- Spring lock washers
  M2.6 type 4pieces(SUS) for Weveguide Flange Holes
- Cross Recessed Head Screws
  M4×10 2 pieces(SUS, SW and W) for Ground Holes



①:LNB
②:Single Wall Corrugated Fiberboard
③:Polyethylene Foam For Package Cushioning
④:Accessories

UNIT:mm