Released

Ku-band 8W BUC

RF Frequency:
13.75 to 14.5 GHz and 14.0 to 14.5 GHz

Model No. NJT8318 series

RF Frequency	:	14.0 to 14.5 GHz / 13.75 to 14.5 GHz
LO Frequency	:	13.05 GHz / 12.80 GHz
IF Frequency	:	950 to 1,450 MHz / 950 to 1,700 MHz
Output Power @ 1dB G.C.P.	:	+39 dBm (8W)
IF / Ref. (10MHz) Input:		N-type / F-type, Female Connector
DC Power Input	:	MS Connector / IF Connector (*)
M&C Option	:	FSK Communication M&C RS-232C Interface M&C

Specifications
Rev.03 August 26, 2016

*) MS Connector models are available to apply DC voltage via either MS Connector or IF Connector.

Caution

1. NJRC strives to produce reliable and high quality microwave components. NJRC's microwave components are intended for specific applications and require proper maintenance and handling. To enhance the performance and service of NJRC's microwave components, the devices, machinery or equipment into which they are integrated should undergo preventative maintenance and inspection at regularly scheduled intervals. Failure to properly maintain equipment and machinery incorporating these products can result in catastrophic system failures.

2. To ensure the highest levels of reliability, NJRC products must always be properly handled. The introduction of external contaminants (e.g. dust, oil or cosmetics) can result in failures of microwave components.

3. NJRC offers a variety of microwave components intended for particular applications. It is important that you select the proper component for your intended application. You may contact NJRC's sales office or sales representatives, if you are uncertain about the products listed in the catalog and the specification sheets.

4. Special care is required in designing devices, machinery or equipment, which demand high levels of reliability. This is particularly important when designing critical components or systems whose foreseeable failure can result in situations that could adversely affect health or safety. In designing such critical devices, equipment or machinery, careful consideration should be given to, amongst other things, their safety design, fail-safe design, back-up and redundancy systems, and diffusion design.

5. The products listed in the catalog and specification sheets may not be appropriate for use in certain equipment where reliability is critical or where the products may be subjected to extreme conditions. You should consult our sales office or sales representatives before using the products in any of the following types of equipment.
   * Aerospace Equipment
   * Equipment Used in the Deep Sea
   * Power Generator Control Equipment (nuclear, steam, hydraulic)
   * Life Maintenance Medical Equipment
   * Fire Alarm/Intruder Detector
   * Vehicle Control Equipment (automobile, airplane, railroad, ship, etc.)
   * Various Safety Equipment

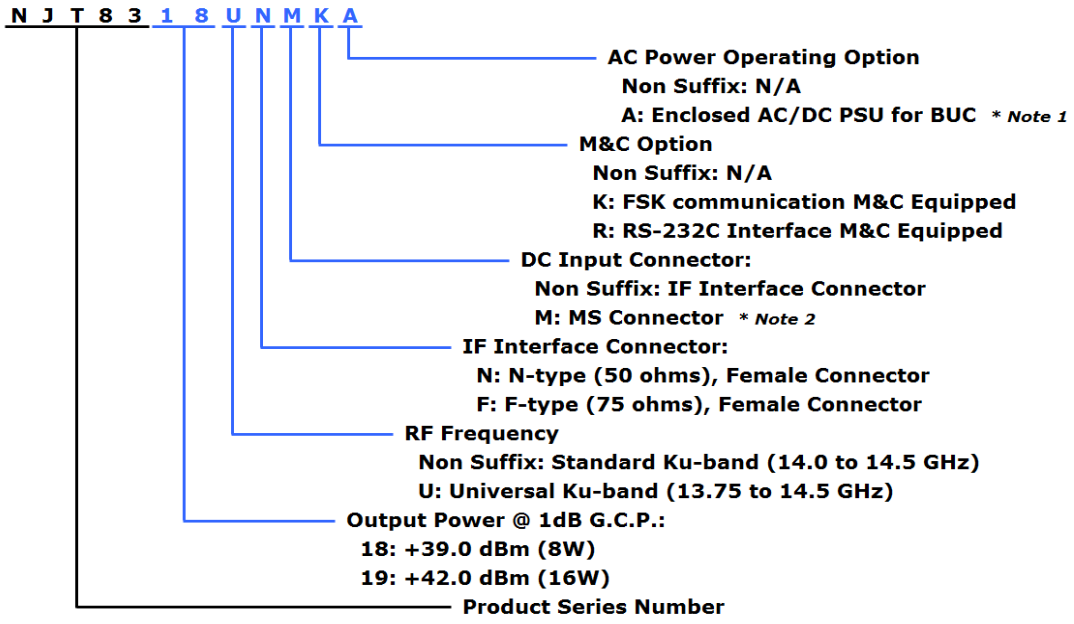
6. NJRC's products have been designed and tested to function within controlled environmental conditions. Do not use products under conditions that deviate from methods or applications specified in the catalog and specification sheets. Failure to employ NJRC's products in the proper applications can lead to deterioration, destruction or failure of the products. NJRC shall not be responsible for any bodily injury, fires or accidents, property damage or any consequential damages resulting from the misuse or misapplication of its products. PRODUCTS ARE SOLD WITHOUT WARRANTY OF ANY OF KIND, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

7. The product specifications and descriptions listed in the catalog and specification sheets are subject to change at any time, without notice.

* Above Specifications are subject to change without notice.

Model Number

- **Numbering System**



- **Line-up**

Model No.	RF Frequency	Local Frequency	IF Frequency	Output Power @ P1dB	IF Connector	Power Supply	Port for Voltage Input	M&C Option
NJT8318N	14.0 to 14.5 GHz (Standard Ku-band)	13.05 GHz	950 to 1,450 MHz	8W Linear (+39dBm min.)	N-type	+18 to +60 V DC Power	IF Connector	N/A
NJT8318F					F-type			
NJT8318NM					N-type		MS Connector * Note 2 (IF Connector Option)	
NJT8318FM					F-type			
NJT8318NA					N-type	AC Power	IF Connector * Note 1	
NJT8318FA					F-type			
NJT8318NK					N-type	+18 to +60 V DC Power	IF Connector	FSK M&C
NJT8318FK					F-type			
NJT8318NMK					N-type		MS Connector (IF Connector Option) * Note 2	
NJT8318FMK					F-type			
NJT8318NMR					N-type			RS-232C M&C
NJT8318FMR					F-type			
NJT8318NMRA					N-type	AC Power	IF Connector * Note 1	
NJT8318FMRA					F-type			
NJT8318UN	13.75 to 14.5 GHz (Universal Ku-band)	12.80 GHz	950 to 1,700 MHz		N-type	+18 to +60 V DC Power	IF Connector	N/A
NJT8318UF					F-type			
NJT8318UNM					N-type		MS Connector * Note 2 (IF Connector Option)	
NJT8318UFM					F-type			
NJT8318UNA					N-type	AC Power	IF Connector * Note 1	
NJT8318UFA					F-type			
NJT8318UNK					N-type	+18 to +60 V DC Power	IF Connector	FSK M&C
NJT8318UFK					F-type			
NJT8318UNMK					N-type		MS Connector (IF Connector Option) * Note 2	
NJT8318UFMK					F-type			
NJT8318UNMR					N-type			RS-232C M&C
NJT8318UFMR					F-type			
NJT8318UNMRA					N-type	AC Power	IF Connector * Note 1	
NJT8318UFMRA					F-type			

*Note1: Additional indoor 150W AC/DC PSU is enclosed for AC Power Option and DC Power is supplied at IF connector of BUC from AC/DC PSU via IF cable.

*Note2: MS Connector models are available to apply DC voltage via either MS Connector or IF Connector.

* Above Specifications are subject to change without notice.

1. Electrical Specifications

1-1.	Output Frequency Range <Universal Ku-band> <Standard Ku-band>	 13.75 to 14.5 GHz 14.0 to 14.5 GHz
1-2.	Input Frequency Range <Universal Ku-band> <Standard Ku-band>	 950 to 1,700 MHz 950 to 1,450 MHz
1-3.	Maximum IF Input Level (without damage)	+13 dBm max.
1-4.	Conversion Type	Single, fixed L.O.
1-5.	L.O. Frequency <Universal Ku-band> <Standard Ku-band>	 12.80 GHz 13.05 GHz
1-6.	Frequency Sense	Positive
1-7.	Output Power @ 1dB G.C.P. (P1dB)	+39 dBm min. over temperature
1-8.	Linear Gain	65 dB nom., 59 dB min.
1-9.	Gain Variation over frequency @ fixed temperature <Universal Ku-band> <Standard Ku-band>	 5 dBp-p max. over 750 MHz 2 dBp-p max. over 54 MHz 5 dBp-p max. over 500 MHz 2 dBp-p max. over 54 MHz
1-10.	Gain Stability over temperature @ fixed frequency	4 dBp-p max. 2 dBp-p typ.
1-11.	IM3	-28 dBc typ., -24 dBc max. @ total power <= +39 dBm - 3 dB
1-12.	ACPR	-28 dBc typ. @ Pout = +38 dBm
1-13.	Requirement for External Reference [Frequency] [Input Power] [Phase Noise]	 10 MHz (sine-wave) -5 to +5 dBm @ Input port -125 dBc/Hz max. @ 100 Hz -135 dBc/Hz max. @ 1 kHz -140 dBc/Hz max. @ 10 kHz
1-14.	L.O. Phase Noise	-60 dBc/Hz max. @ 100 Hz -70 dBc/Hz max. @ 1 kHz -80 dBc/Hz max. @ 10 kHz -90 dBc/Hz max. @ 100 kHz -100 dBc/Hz max. @ 1MHz
1-15.	Spurious @ P1dB Output [in band] [in receive and] [Out-of-band]	 -50 dBc max. @ RF Frequency -70 dBm max. @ 10.95 to 12.75 GHz -50 dBc max.
1-16.	Receive Band Noise Density <Universal Ku-band> <Standard Ku-band>	 Tx: 14.0 to 14.5 GHz -156 dBm/Hz max. @10.95 to 12.75 GHz Tx: 13.75 to 14.0 GHz -156 dBm/Hz max. @10.95 to 12.25 GHz -125 dBm/Hz max. @12.25 to 12.75 GHz Tx: 14.0 to 14.5GHz -156 dBm/Hz max. @ 10.95 to 12.75 GHz

* Above Specifications are subject to change without notice.

1-17.	Noise Figure	20 dB max.
1-18.	Group Delay over any 54MHz	2.5 nS p-p max.
1-19.	Input Impedance <N-type Model> <F-type Model>	 50 ohms nom. 75 ohms nom.
1-20.	Input V.S.W.R.	2 : 1 max.
1-21.	Output V.S.W.R.	2 : 1 max.
1-22.	Output Load VSWR for Non Damage	2 : 1 max.
1-23.	DC Power Requirement [Voltage Range] [Power Consumption]	 +24 / +48 VDC (+18 to +60 VDC) 65 W typ. @ No IF signal 80W typ., 90 W max. @ Pout = +39 dBm
1-24.	Mute	Shut off the HPA in case of L.O. unlocked, no 10 MHz reference signal, or Over temperature. * Note 3
1-25.	LED Indicator	GREEN: L.O. locked RED: L.O. unlocked (or no 10 MHz reference signal)
1-26.	Monitor and Control <FSK Communication M&C> [Interface] [Functions] [Performance]	 650kHz FSK Signal on IF Connector Monitor: Tx Output Power / Temperature / Tx Status / Alarm (Over temperature * Note 3 / L.O. unlock) / Step Attenuator Control: Transmit On/Off / Step Attenuator Tx Output Power: Detector Range: 15 dB (up to P1dB) Reading Accuracy: +/- 1.0 dB Step Attenuator: Attenuator Range: 0 to 15.5 dB Attenuator Step: 0.5 dB **Details are mentioned on Appendix of "Specifications of Monitor & Control".*

* Above Specifications are subject to change without notice.

1-26.	Monitor and Control <RS-232C Interface M&C > [Interface] [Functions] [Performance]	 RS-232C Interface on MS connector Monitor: Tx Output Power / Temperature / Tx Status / Alarm (Over temperature * Note 3 / L.O. unlock) / Step Attenuator Control: Transmit On/Off / Step Attenuator Tx Output Power: Detector Range: 15 dB (up to P1dB) Reading Accuracy: +/- 1.0 dB Step Attenuator: Attenuator Range: 0 to 15.5 dB Attenuator Step: 0.5 dB **Details are mentioned on Appendix of "Specifications of Monitor & Control".*

*Note3: Regardless of cooling fan status, the unit will operate until status of over temperature which turn out at internal temperature of around 100 °C, and the Mute and Alarm will function at status of over temperature.

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2. Mechanical Specifications

2-1.	Input Interface [IF Connector] [DC Input]	 N-type or F-type, female IF / Ref. / FSK M&C Signal (/ DC) Input IF Connector or MS Connector * Note 4 - MS Connector - Part No.: PT02E-14-12P (025) Mating connector: PT06E-14-12S (470) Assignment:  **Pin A: N.C.** **Pin B: N.C.** **Pin C: N.C.** **Pin D: N.C.** **Pin E: GND COMMON (RS-232C)** **Pin F: N.C.** **Pin G: RS-232C TxD*** **Pin H: RS-232C RxD*** **Pin J: DC Power (+) / Prime** **Pin K: DC Power (-) / Return; GND COMMON (RS-232C)** **Pin L: N.C.** **Pin M: N.C.** ** Pin G: RS-232C TxD and Pin H: RS-232C RxD are available for only RS-232C Interface M&C models.*
2-2.	Output Interface	Waveguide, WR-75 (with Groove)
2-3.	Cooling	Forced-air-cooled
2-4.	Dimension & Housing	180(L) × 130(W) × 80(H) mm [7.09” (L) x 5.12” (W) x 3.15” (H)] without interface connectors and screws
2-5.	Weight	2.4 kg [5.3 lbs]

*Note4: MS Connector models are available to apply DC voltage via either MS Connector or IF Connector.
Caution: DO NOT apply DC voltage via both MS Connector and IF Connector.
If DC voltage is applied on both connectors, it may damage the unit or the unit may not operate properly.

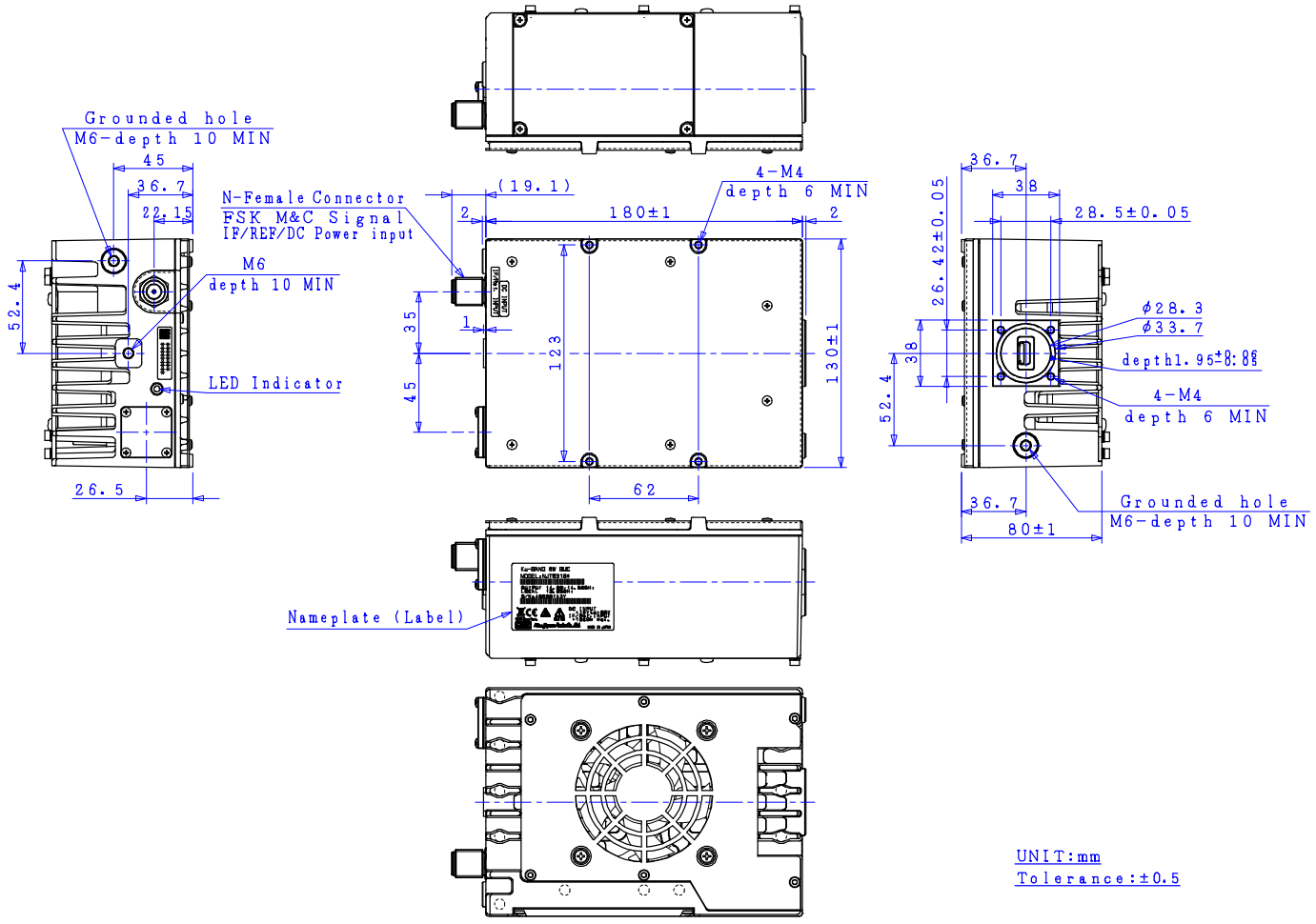
3. Environmental Specifications

3-1.	Temperature Range (ambient) [Operating] [Storage]	 Operation Guarantee: -40 to +75 °C Performance Guarantee: -40 to +55 °C -40 to +75 °C
3-2	Humidity	0 to 100 %
3-3.	Altitude	15,000 feet (4,572 m)
3-4.	Vibration	5 G [49.03 m/s^2] (3 axis, 50 Hz to 2 kHz) 1 mm p-p (3 axis, 5 to 50 Hz)
3-5.	Shock	30 G [294.20 m/s^2] (3 axis)
3-6	Waterproof / Dustproof (IP Code)	IP 67
3-7.	Regulations	EU Directive (CE Marking) EMC (2004/108/EC)
3-8.	Comply with RoHS (Restricting the use of Hazardous Substances) directives	

* Above Specifications are subject to change without notice.

4. Outline Drawing

- IF / Ref. Input: N-type Female Connector
- DC Input: IF Connector

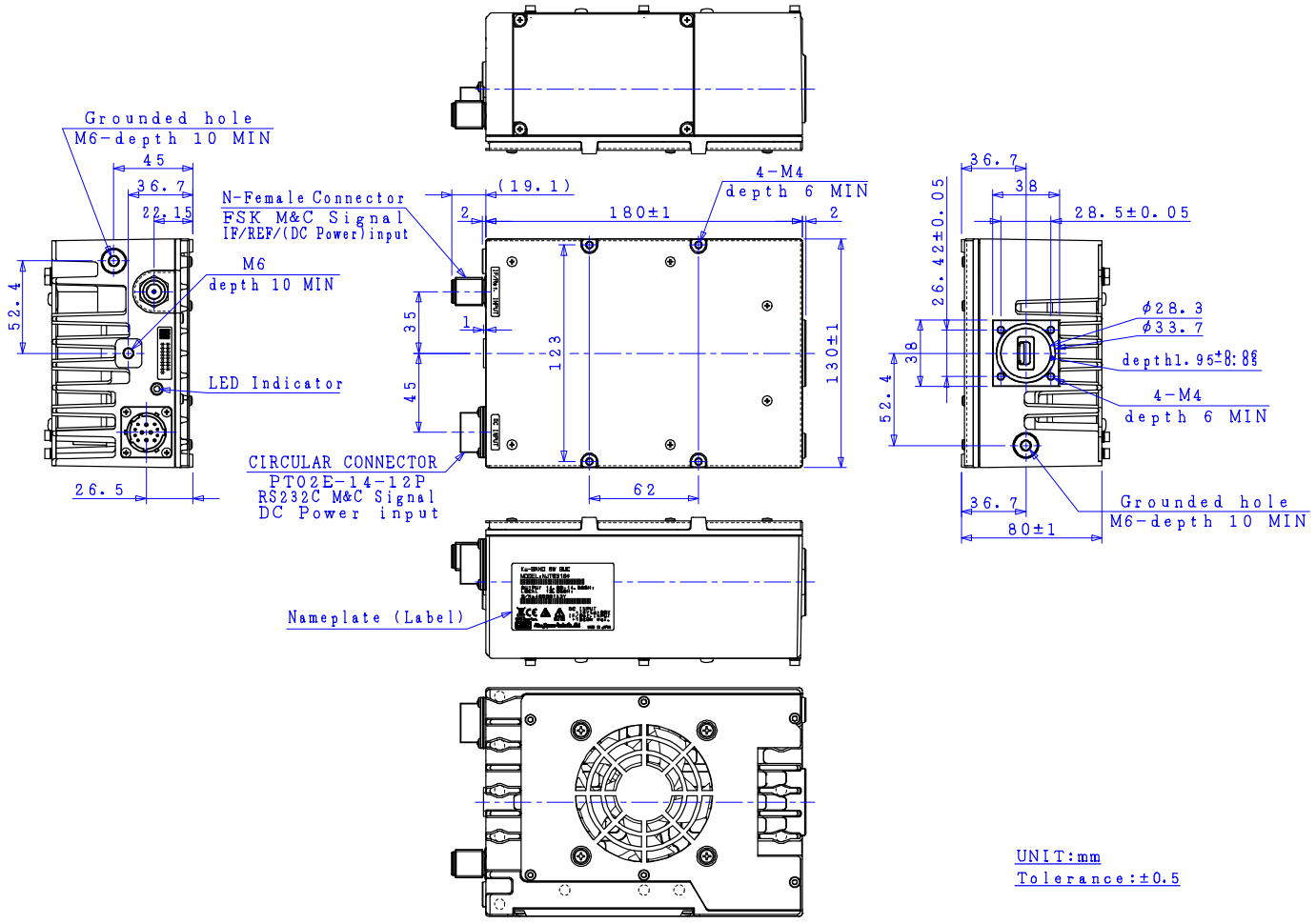


Accessories

- O-ring, Qty (1), for waveguide flange
- Wrench Key, Qty (1), M4, Hexagon
- Bolts, Qty (4), M4 x 10, Hexagon socket head with spring washer and flat washer, SUS, for waveguide flange
- Screws, Qty (2), M6 x 10, Phillips head with spring washer and flat washer, SUS, for grounded hole

* Above Specifications are subject to change without notice.

- IF / Ref. Input: N-type Female Connector
- DC Input: MS Connector

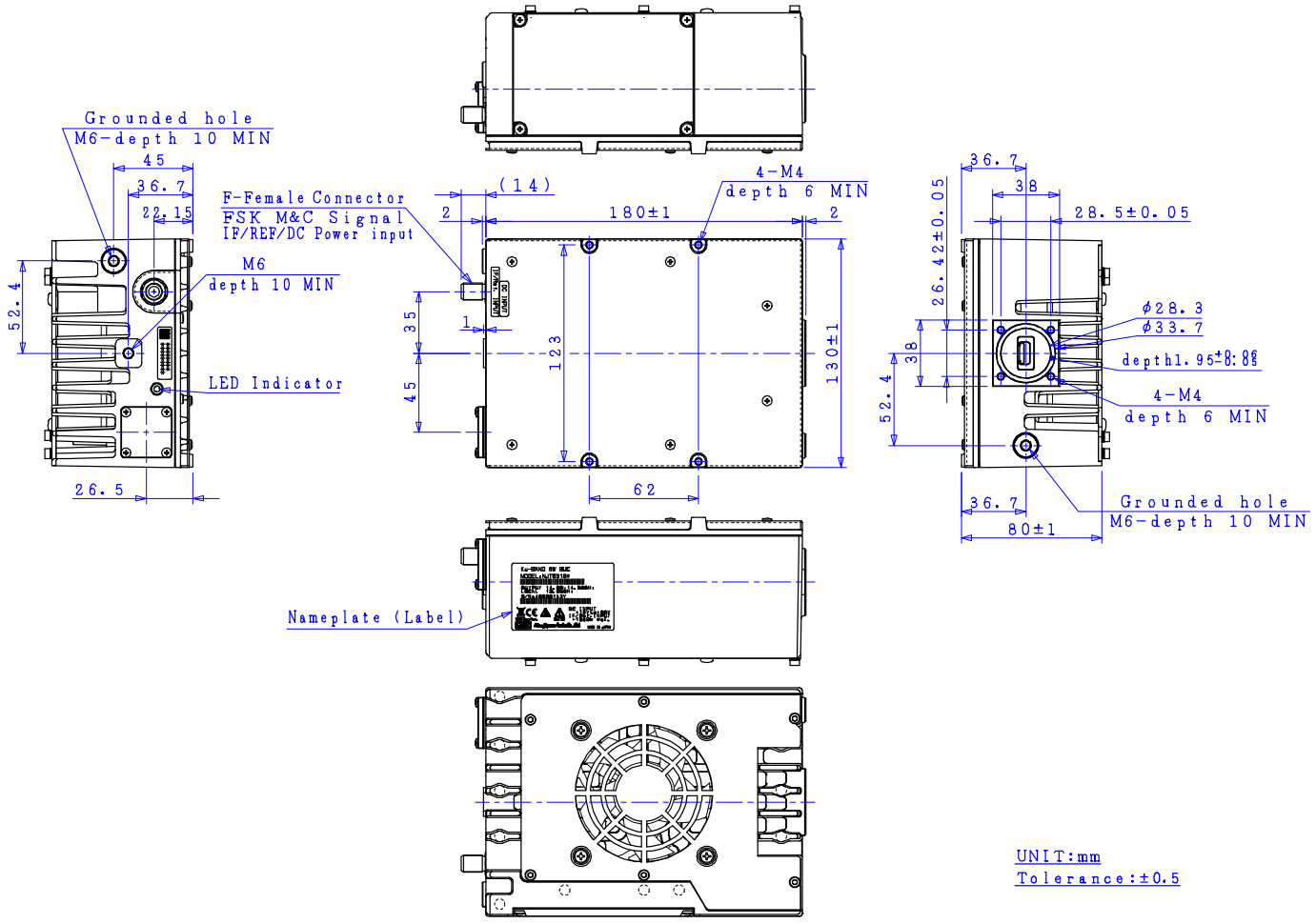


Accessories

- O-ring, Qty (1), for waveguide flange
- Wrench Key, Qty (1), M4, Hexagon
- Bolts, Qty (4), M4 x 10, Hexagon socket head with spring washer and flat washer, SUS, for waveguide flange
- Screws, Qty (2), M6 x 10, Phillips head with spring washer and flat washer, SUS, for grounded hole
- Connector, Qty (1), MS Mating connector: PT06E-14-12S (470)

* Above Specifications are subject to change without notice.

- IF / Ref. Input: F-type Female Connector
- DC Input: IF Connector

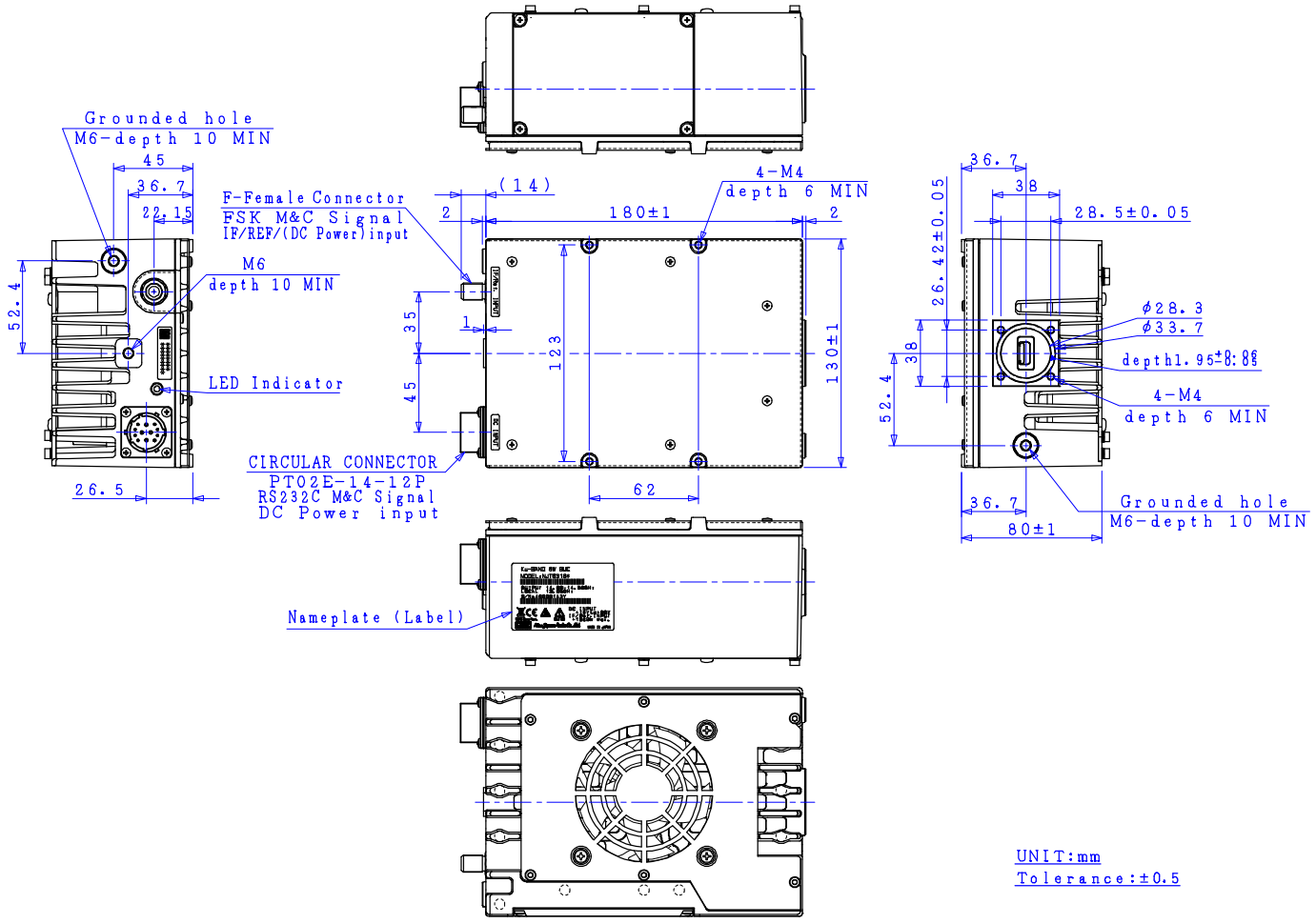


Accessories

- O-ring, Qty (1), for waveguide flange
- Wrench Key, Qty (1), M4, Hexagon
- Bolts, Qty (4), M4 x 10, Hexagon socket head with spring washer and flat washer, SUS, for waveguide flange
- Screws, Qty (2), M6 x 10, Phillips head with spring washer and flat washer, SUS, for grounded hole

* Above Specifications are subject to change without notice.

- IF / Ref. Input: F-type Female Connector
- DC Input: MS Connector



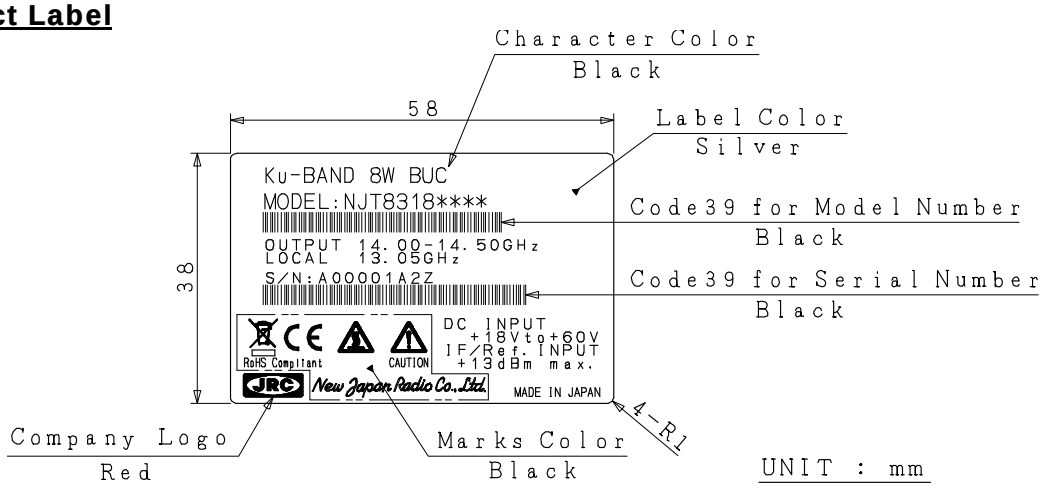
Accessories

- O-ring, Qty (1), for waveguide flange
- Wrench Key, Qty (1), M4, Hexagon
- Bolts, Qty (4), M4 x 10, Hexagon socket head with spring washer and flat washer, SUS, for waveguide flange
- Screws, Qty (2), M6 x 10, Phillips head with spring washer and flat washer, SUS, for grounded hole
- Connector, Qty (1), MS Mating connector: PT06E-14-12S (470)

* Above Specifications are subject to change without notice.

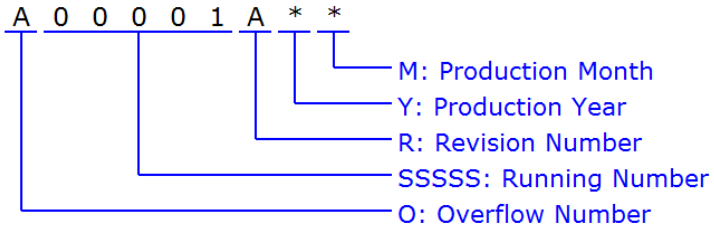
5. Label

Product Label



Definition of Serial Number

Serial Number (OSSSSSRYM) - ALPHANUMERIC (9 characters)



O: Overflow Number - ALPHABET (1 character)
"A" to "Z", e.g.: A99999 ⇒ B00001

SSSSS: Running Number - NUMBER (5 digits)
"00001" to "99999"

R: Revision Number - ALPHABET (1 character)
"A" to "Z"

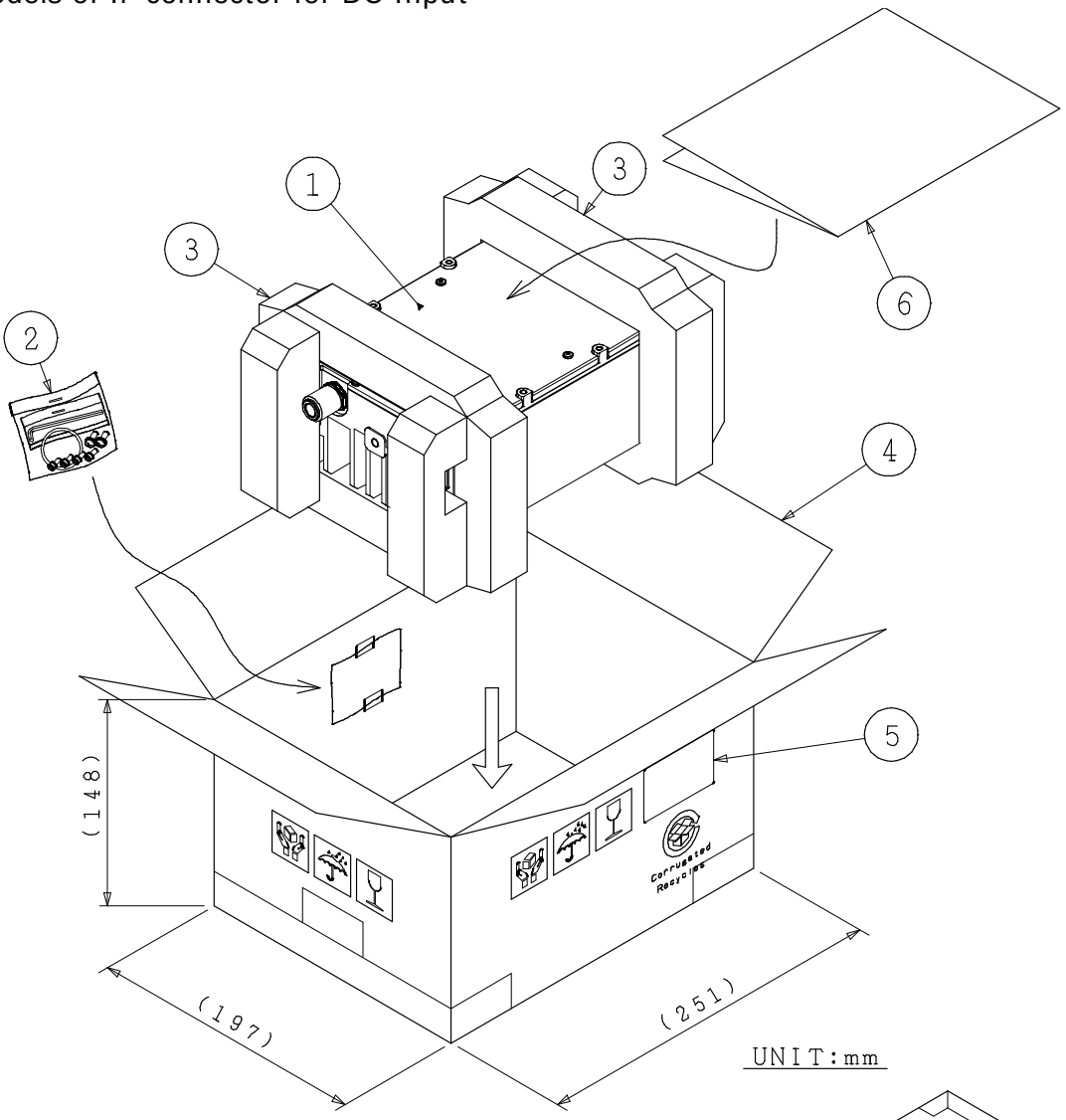
Y: Production Year - NUMBER (1 digit)
Calendar Number, e.g.: 2009:9, 2010:0, 2011:1, 2012:2 ····

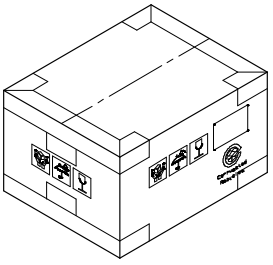
M: Production Month - ALPHANUMERIC (1character)
"1" to "9", "X" as October, "Y" as November, "Z" as December

* Above Specifications are subject to change without notice.

6. Package

- Models of IF connector for DC Input

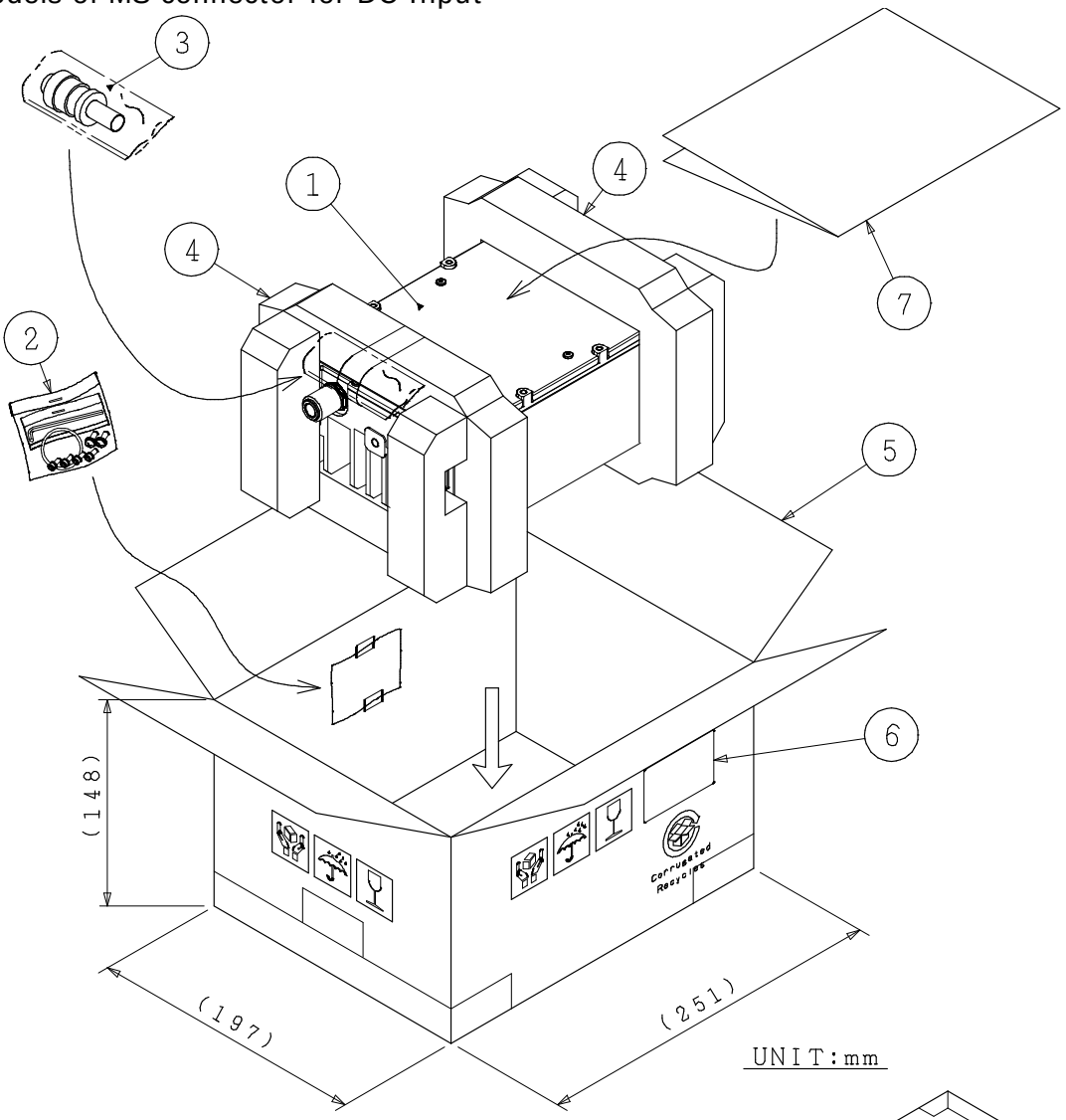


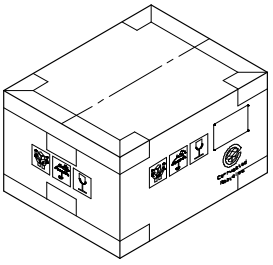


①:BUC
②:Accessories
・O-RING
・Hexagon Socket Head Bolts
M4×10 4Pieces(SUS, SW and W)
・Hexagon Wrench Keys(M4 Type)
・Cross Recessed Head Machine Screw
M6×10 2Pieces(SUS, SW)
③:Polyethylene foam for package cushioning
④:Double-faced corrugated fiberboard
⑤:Label
⑥:Test Data

* Above Specifications are subject to change without notice.

- Models of MS connector for DC Input





①:BUC
②:Accessories
・O-RING
・Hexagon Socket Head Bolts
M4×10 4Pieces(SUS, SW and W)
・Hexagon Wrench Keys(M4 Type)
・Cross Recessed Head Machine Screw
M6×10 2Pieces(SUS, SW)
③:Accessory
・MS mating connector
④:Polyethylene foam for package cushioning
⑤:Double-faced corrugated fiberboard
⑥:Label
⑦:Test Data

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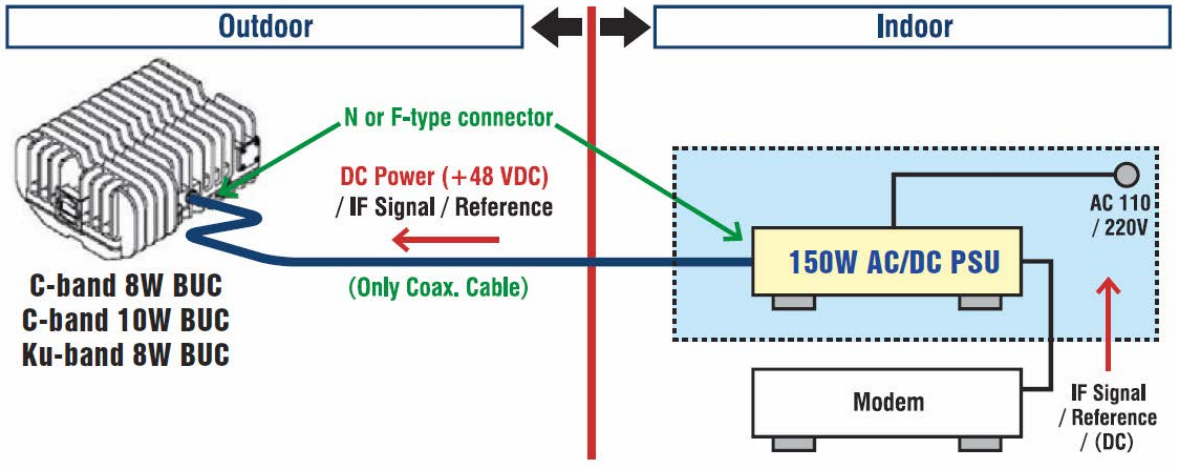
AC Power Operating Option

1. Overview

The power supply unit (PSU) provides a DC power to operate NJRC's Ku-band 8W BUCs (NJT5118, NJT5218 and NJT8318 series), C-band 8W BUCs (NJT5760 and NJT5761 series), and C-band 10W BUCs (NJT5672, NJT5763 and NJT5764 series) via a coaxial cable.

The features are

- Indoor power supply unit with up to 150 W and +48 V DC power output.
- Regardless of Any Types of Modem.
- DC power output can be turned on/off by mechanical switch on the front panel.
- The mode of DC power output can be selected out of in the following mode options by DIP switch on the front panel.
  - Option 1: To keep supplying DC power regardless of modem output status
  - Option 2: To control power DC output on/off by synchronization of input DC voltage on/off from modem
- Directly connect the coaxial cable for IF signal, 10 MHz reference and DC power from modem.
- One Coaxial Cable Solution.
- Compatible with 1U rack-mount.



* Above Specifications are subject to change without notice.

AC Power Operating Option

2. Electrical Specifications

2-1.	Input AC Voltage Range [Rated Range] [Absolute Maximum Rating]	 100 to 240 VAC 90 to 264 VAC
2-2.	Input AC Frequency Range	50/60 Hz
2-3.	Maximum Input AC Apparent Power	200 VA
2-4.	Output Voltage	+48 VDC
2-5.	Output Voltage Accuracy	+/- 10 %
2-6.	Output Current Range	0 to 3.2 A
2-7.	Maximum Output Power	150 W
2-8.	Standby Mode Power ・ No Connect BUC ・ Non DC Power Output	10 W max.
2-9.	Efficiency	80 % typ. at 120 VAC, full load
2-10.	Power Factor	0.98 typ. at 120 VAC, full load
2-11.	Output ON/OFF Control	・ Rocker Switch on the Front Panel ・ Mode of DC Power Output Option 1: To keep supplying Option 2: Synchronization with input DC voltage on/off
2-12.	IF Frequency Range	950 to 1,700 MHz
2-13.	IF Input/ Output Impedance < N-type Model > < F-type Model >	 50 ohms nom. 75 ohms nom.
2-14.	IF Input/ Output VSWR	2 : 1 max.
2-15.	IF Insertion Loss	1.5 dB max.
2-16.	Input DC Voltage Range at IF Input Interface	+24 / +48 VDC In case of option 2 in mode of DC power output, 50mA min. is needed from modem.
2-17.	Protection	・ Internal Primary Current Fuse ・ Short Protection
2-18.	LED Indicator [DC Output (Power)] [Fan Alarm]	 GREEN: Supply a DC Power to BUC GREEN: Normal Condition RED: Abnormal Condition and must be Replacement

* Above Specifications are subject to change without notice.

AC Power Operating Option

3. Mechanical Specifications

3-1.	AC Input Interface	IEC320-C14 inlet
3-2.	IF Input Interface < N-type Model > < F-type Model >	 N-type, female (50 ohms) F-type, female (75 ohms)
3-3.	IF Output Interface < N-type Model > < F-type Model >	 N-type, female (50 ohms) F-type, female (75 ohms)
3-4.	Cooling	Forced Air by Fan
3-5.	Dimension & Housing without Interface and Switch	(W) 290 x (D) 200 x (H) 44 mm [(W) 11.42" x (D) 7.87" x (H) 1.73"]
3-6.	Weight	1.6 kg [3.5 lbs]

4. Environmental Specifications

4-1.	Temperature Range (ambient) [Operating] [Storage]	 0 to +50 °C -30 to +85 °C
4-2.	Humidity [Operating] [Storage]	 30 to 90 %Rh non-condensing 10 to 95 %Rh
4-3.	Vibration	Non Operation 19.6 m/s^2 Constant (10 to 55 Hz,Sweep time:1min., 3 axis,1hr)
4-4.	Shock	20 G [196.1 m/s^2] (3 axis)
4-5.	Compliance Standard	EN55022 EN55024 EN61000-3-2/3 EN60950-1 / UL60950-1 EN62311
4-6.	Regulations	EU Directive (CE Marking) EMC (2004/108/EC) Low Voltage (2006/95/EC) UL Citification
4-7.	Comply with RoHS (Restricting the use of Hazardous Substances) directives	

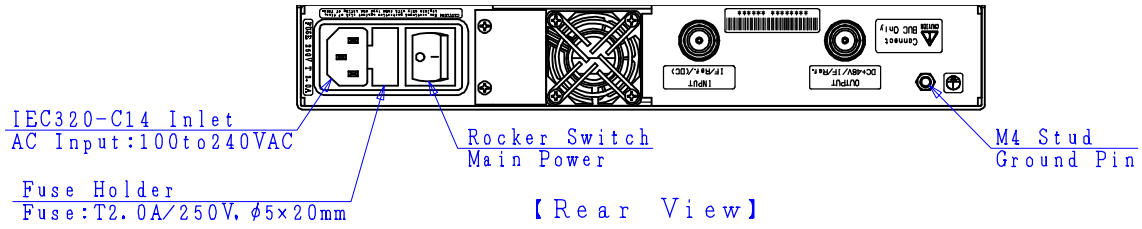
5. Accessories

- AC power cable of 2 m (with 3 pins American plug) , Qty (1)
- Coaxial cable of 1 m (Option)
- 1U rack-mount kit (Option)

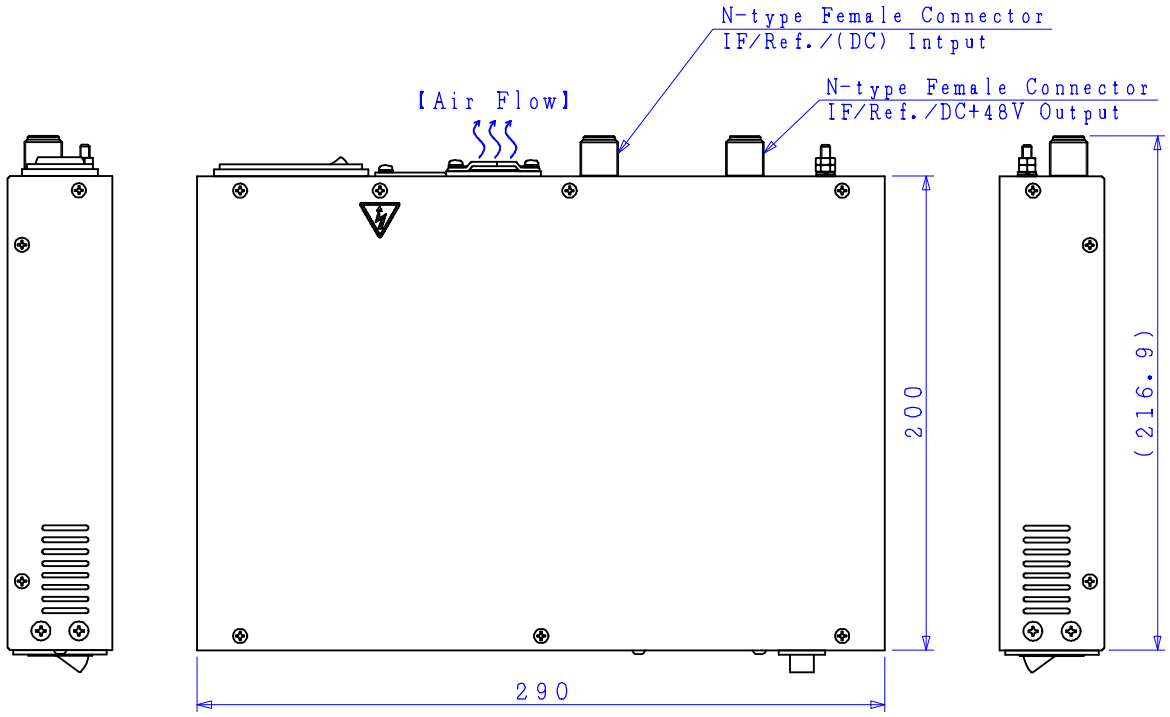
* Above Specifications are subject to change without notice.

6. Outline Drawing

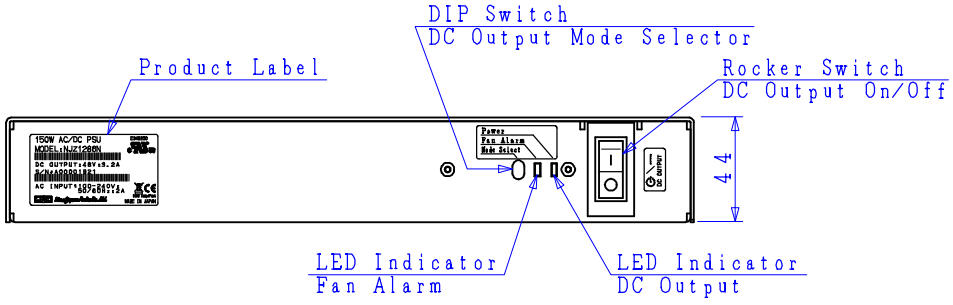
- IF Interface : N-type Female Connector



【Rear View】



【Top View】



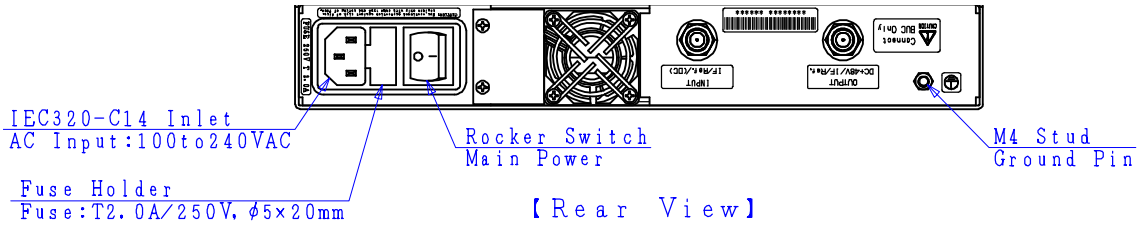
【Front View】

UNIT : mm

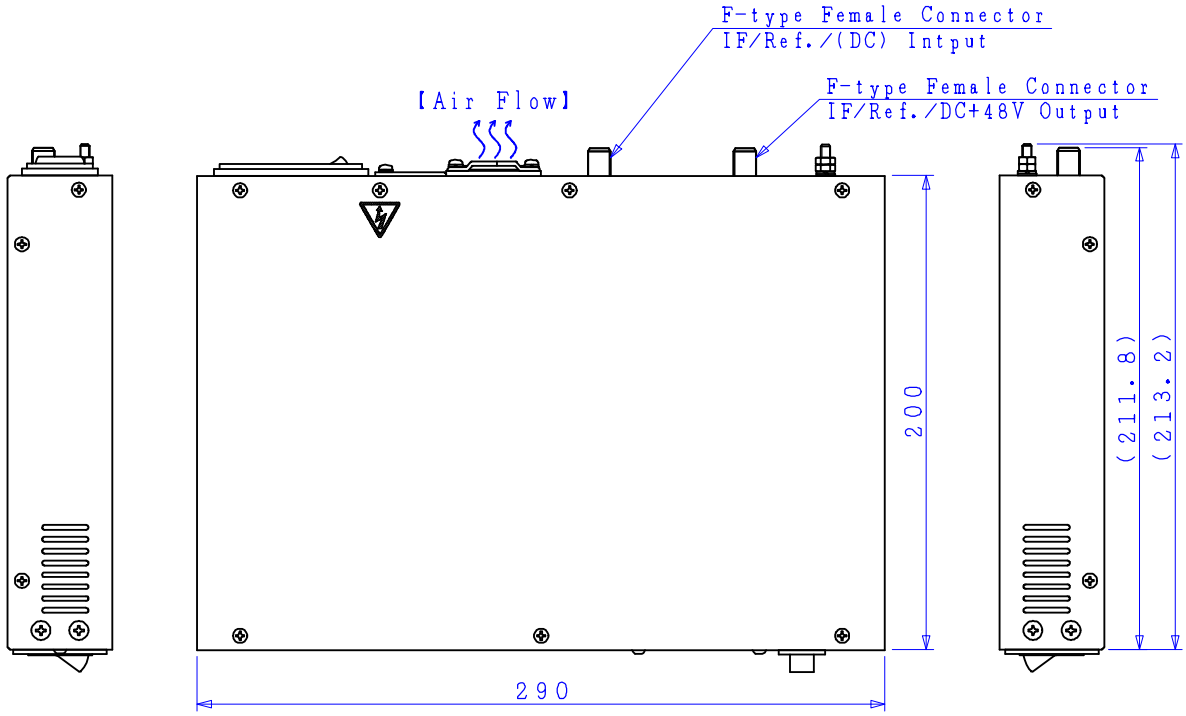
* Above Specifications are subject to change without notice.

AC Power Operating Option

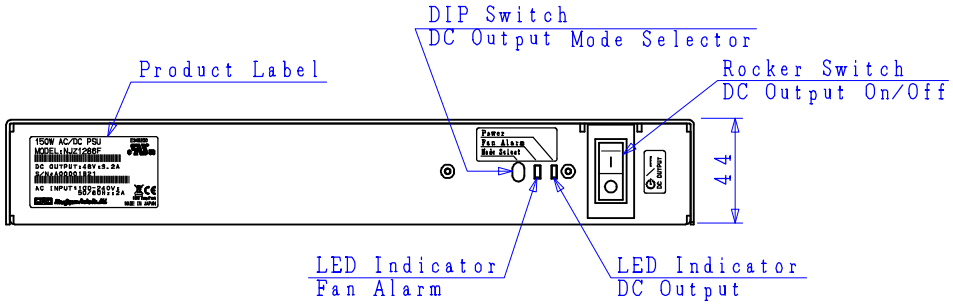
- IF Interface : F-type Female Connector



【Rear View】



【Top View】



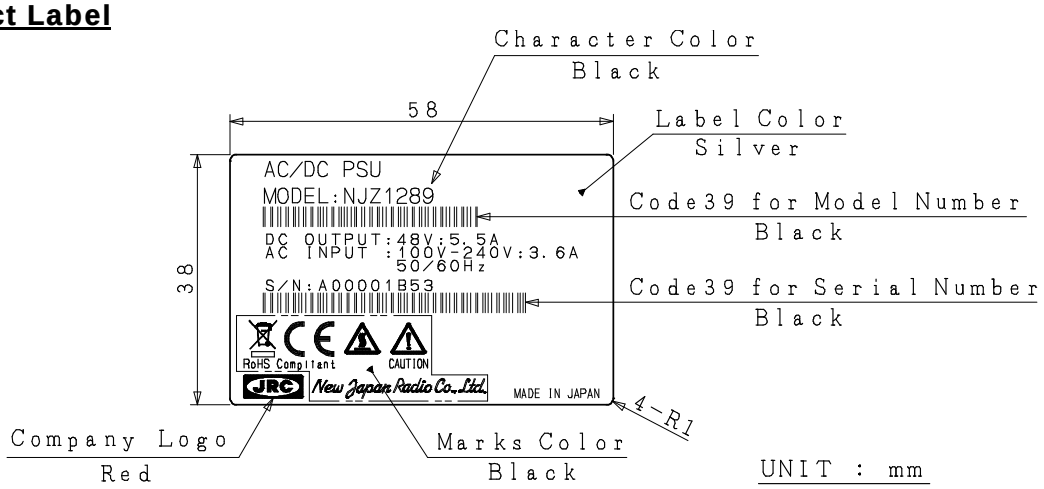
【Front View】

UNIT : mm

* Above Specifications are subject to change without notice.

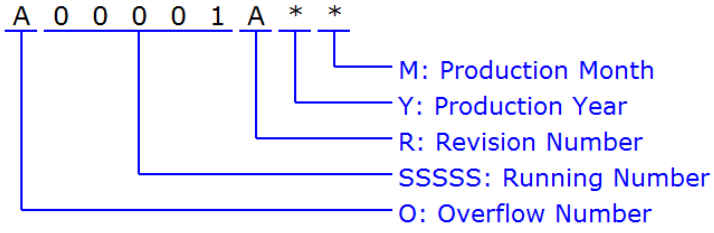
7. Label

Product Label



Definition of Serial Number

Serial Number (OSSSSSRYM) - ALPHANUMERIC (9 characters)



O: Overflow Number - ALPHABET (1 character)
"A" to "Z", e.g.: A99999 ⇒ B00001

SSSSS: Running Number - NUMBER (5 digits)
"00001" to "99999"

R: Revision Number - ALPHABET (1 character)
"A" to "Z"

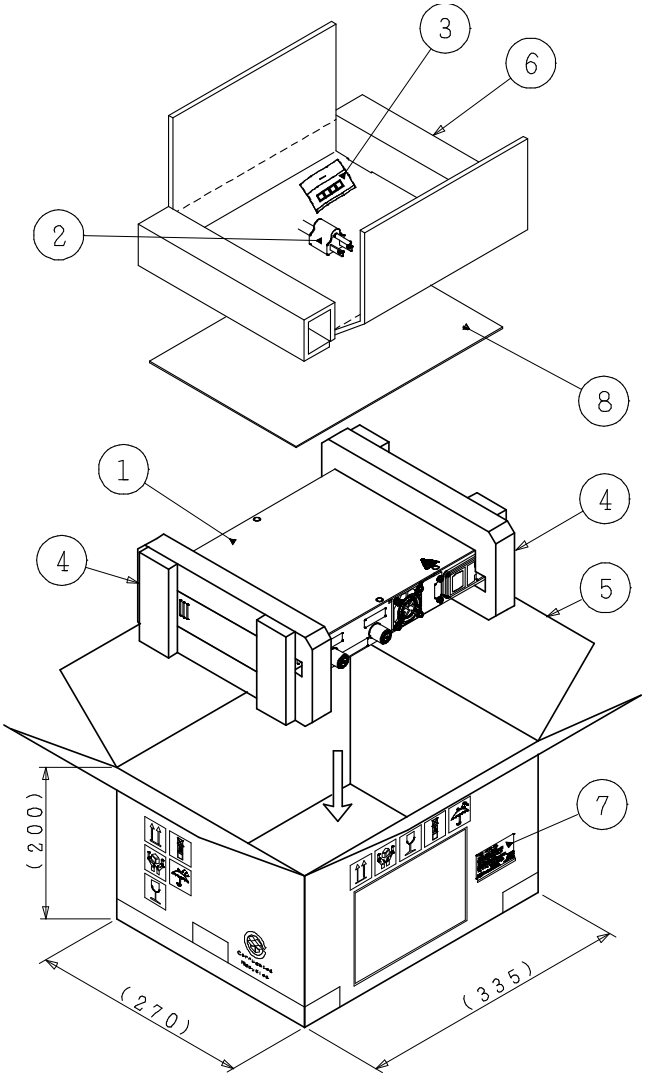
Y: Production Year - NUMBER (1 digit)
Calendar Number, e.g.: 2009:9, 2010:0, 2011:1, 2012:2 ····

M: Production Month - ALPHANUMERIC (1character)
"1" to "9", "X" as October, "Y" as November, "Z" as December

* Above Specifications are subject to change without notice.

8. Package

Package for PSU



Pictorial Marking for handling of Goods

- THIS WAY UP
- HANDLE WITH CARE
- FRAGILE
- LAYERS LIMIT:5
- KEEP DRY

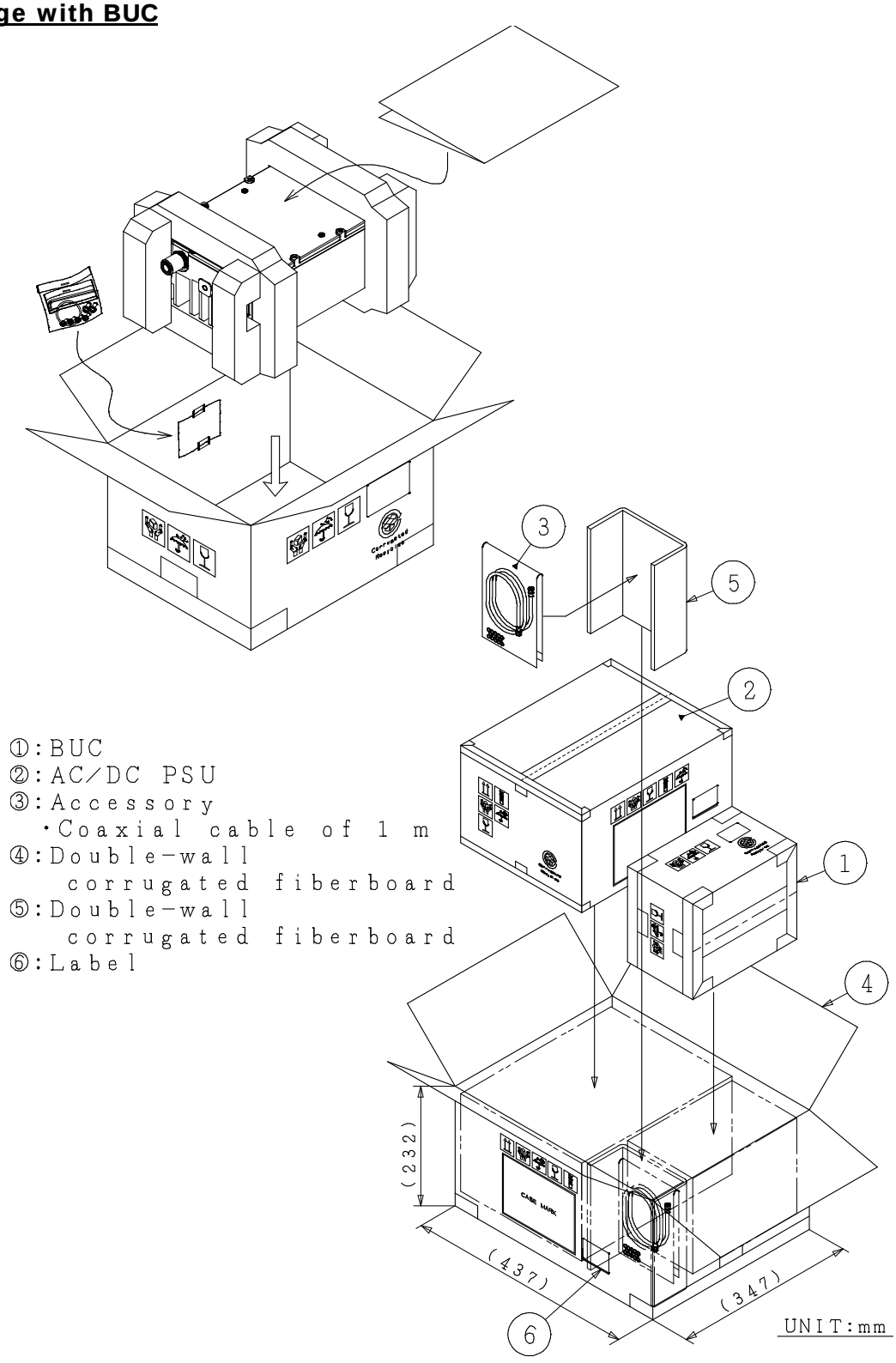
①:150W AC/DC PSU
②:Accessory
・AC power cable of 2m
③:Accessory
・Cushioning pad(4 pieces)
④:Polyethylene Foam For Package Cushioning
⑤:Corrugated Fiberboard(Double Wall)
⑥:Corrugated Fiberboard(Single Wall)
⑦:Label
⑧:User's Manual

UNIT:mm

* Above Specifications are subject to change without notice.

AC Power Operating Option

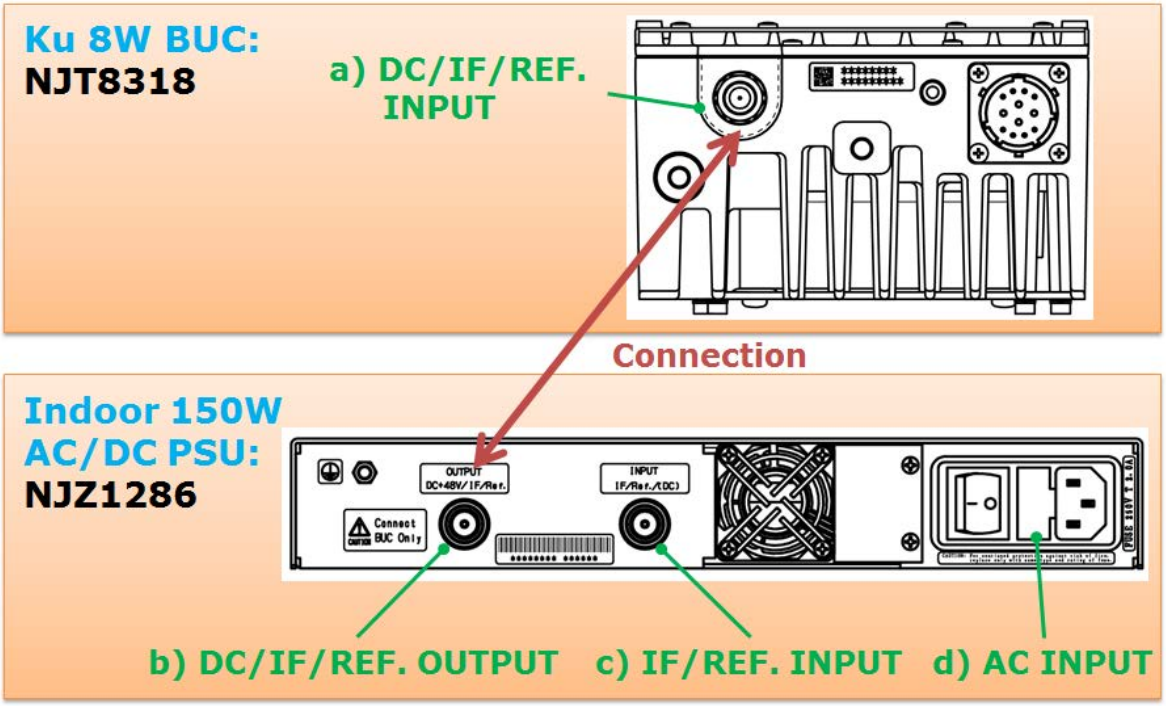
Package with BUC



* Above Specifications are subject to change without notice.

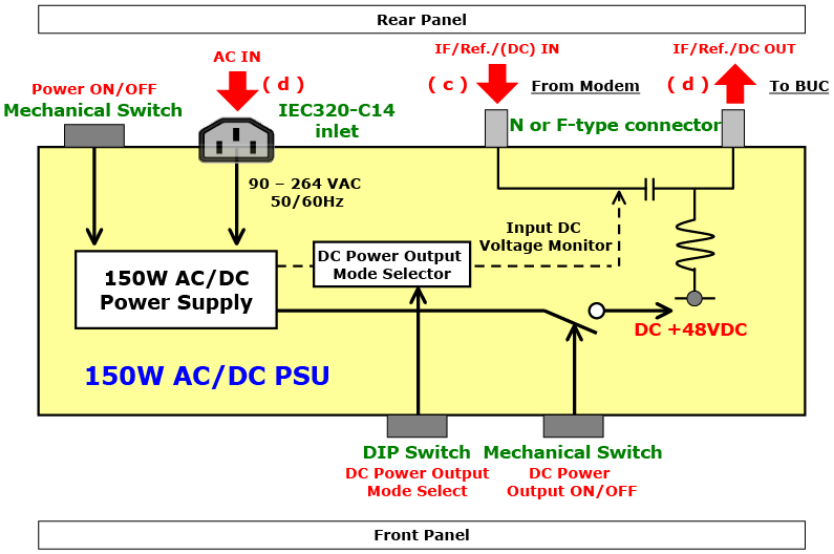
AC Power Operating Option

9. Connection Overview between Ku 8W BUC and 150W AC/DC PSU



10. Basic Operation

Diagram



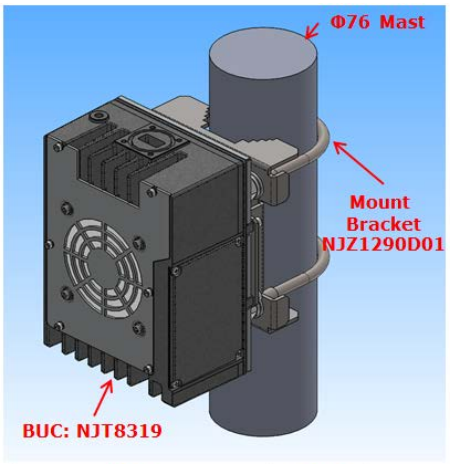
1) Main power can be turned on/off by mechanical switch on the rear panel.
2) DC power output can be turned on/off by mechanical switch on the front panel.
3) DC power output mode can be selected by customer in following two mode options by DIP switch on the front panel.
   Option 1: Possible always to supply DC power regardless of Modem output status.
   Option 2: Possible to control power DC output on/off by synchronization of input DC voltage on/off from modem.

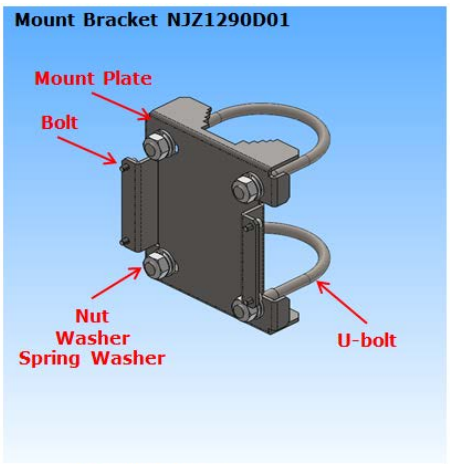
* Above Specifications are subject to change without notice.

Mounting Bracket Option

1. Φ76 Mast Mount Bracket of NJT8318 series

- **Model No. NJZ1290D01**





Item	Qty	Description
Mount Plate	1	SUS
Bolt	4	SUS, M4, with W & SW, for fixing BUC
U-bolt	2	SUS, 65A(2-1/2"), M10
Nut	4	SUS, M10
Washer	4	SUS, for M10
Spring Washer	4	SUS, for M10

* Above Specifications are subject to change without notice.

M&C Option for Ku-band 8W BUC: NJT8318

Appendix)
Specifications of Monitor & Control

Rev. 4.0
July 13, 2016

1. Interface Specifications

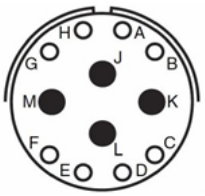
1-1. FSK Communication M&C

(1) Physical Interface	IF Connector: N-type or F-type, female Combine with IF signal and 10MHz Reference signal
(2) Transmitter Outputs	
a. Frequency	650 kHz ±5%
b. FSK deviation	±60 kHz nom. (+60 kHz mark)
c. Deviation tolerance	±50 kHz min. / ±70 kHz max.
d. Output Level	-10 dBm nom.
e. Output impedance	50 Ω
f. Start Tone	710 kHz (mark) / 10ms min
(3) Receiver Inputs	
a. Locking range	± 32.5 kHz
b. Input impedance	50 Ω
c. Input Sensitivity	-15 dBm min.

1-2. RS-232C Interface M&C

(1) Physical Interface: MS Connector: P/N PT02E-14-12P (025)

Pin Assignment:



Pin A: N.C.
Pin B: N.C.
Pin C: N.C.
Pin D: N.C.
Pin E: GND COMMON (RS-232C)
Pin F: N.C.
Pin G: RS-232C TxD*
Pin H: RS-232C RxD*
Pin J: DC Power (+) / Prime
Pin K: DC Power (-) / Return;
GND COMMON (RS-232C)
Pin L: N.C.
Pin M: N.C.

(2) Transmitter Outputs	
a. Output Voltage Swing	±5V min. /±5.4V typ.
b. Output Resistance	300Ω min. / 10MΩ typ.
(3) Receiver Inputs	
a. Input Voltage Range	±15 V
b. Input Threshold low	+0.6 V min.
c. Input Threshold High	+2.4 V max
d. Input Resistance	7 kΩ max

Appendix)

Rev. 4.0

2. Transmission Protocol

a. Operation Mode Binary
b. Transfer Rate 9600 bit/s
c. Data Format 1 start bit, 8 data bits, 1 stop bit
No Parity

ST	D0	D1	D2	D3	D4	D5	D6	D7	SP

Transmit ⟶

(The least significant bit (LSB) is sent first.)

ST: Start bit
D0: Data(LSB)

D7: Data(MSB)
SP: Stop bit

d. Maximum Response Time 50 ms
e. Massage Rate 1 every 20 ms

3. Packet Format

a. Data Packet Length 7 Bytes
b. Byte Configuration

Byte	Command (IDU to BUC)	Response (BUC to IDU)
1st	BUC Address (*1)	BUC Address (*2)
2nd	Command	Data Byte 1
3rd	Data Byte 1	Data Byte 2
4th	Data Byte 2	Data Byte 3
5th	Data Byte 3	Data Byte 4
6th	Data Byte 4	Data Byte 5
7th	Check Sum (*3)	Check Sum (*3)

*1: Initial setting of a BUC address is 0x01.
*2: Responder address is shifted left by 4 bits.
*3: Algebraic sum of bytes 1 through 6.
*Note: Spare bytes are always filled with 0xAA (10101010).

Appendix)

Rev. 4.0

4. Command & Response Message Structure

The BUC status is stored to internal EEPROM.
The last BUC state is stored to internal EEPROM, so when the BUC is re-turned DC power on again, the state is reproduced last BUC condition.

4-1. Command Message Structure (IDU to BUC)

a. Request Status

This command can acquire output power level, alarm status, BUC class, and temperature etc.

Byte	Name	Description	Value
1	Address	BUC Address	0x01 (to 0x0F)
2	Command	Request Status	0x01
3	Data Byte 1	Not used	0xAA
4	Data Byte 2	Not used	0xAA
5	Data Byte 3	Not used	0xAA
6	Data Byte 4	Not used	0xAA
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)

01	01	AA	AA	AA	AA	CHK

b. Set Transmit On/Off State

This command can set a state of transmit on and transmit off.

Byte	Name	Description	Value
1	Address	BUC Address	0x01 (to 0x0F)
2	Command	Tx On/Off	0x02
3	Data Byte 1	Tx Control	Off:0x00/On:0x01
4	Data Byte 2	Not used	0xAA
5	Data Byte 3	Not used	0xAA
6	Data Byte 4	Not used	0xAA
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)

01	02	01	AA	AA	AA	CHK

c. Set Attenuator

This command can set the step attenator with 0.5 dB step in the BUC.

Byte	Name	Description	Value
1	Address	BUC Address	0x01 (to 0x0F)
2	Command	Set Attenuator	0x05
3	Data Byte 1	Attenuator Selection 1 or 2	Att.1 0x01 Att.2 0x02 *1
4	Data Byte 2	Setting Att. in 10dB digit	0x00 or 0x01 *2
5	Data Byte 3	Setting Att. in 1dB digit	0x00 to 0x09 *2
6	Data Byte 4	Setting Att. bit in 0.5dB digit	0x00 or 0x05 *2
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)

01	05	01	01	02	05	CHK

*1: Att.1 is available, Att.2 is not available.

*2: Dynamic range and step size of the step attenuator: 15.5dB in 0.5dB step

ex) 12.5dB : Data byte 2 is 0x01
Data byte 3 is 0x02
Data byte 4 is 0x05

Appendix)

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d. Get Attenuator

This command can check the step attenator setting value in the BUC.

Byte	Name	Description	Value
1	Address	BUC Address	0x01 (to 0x0F)
2	Command	Get Attemuator	0x06
3	Data Byte 1	Attenuator Selection 1 or 2	Att.1 0x01 Att.2 0x02 *1
4	Data Byte 2	Not used	0xAA
5	Data Byte 3	Not used	0xAA
6	Data Byte 4	Not used	0xAA
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)

01	06	01	AA	AA	AA	CHK

*1: Att.1 is available, Att.2 is not available.

4-2. Response Message Structure (BUC to IDU)

a. Request Status

Byte	Name	Description	Value
1	Address	BUC Address shifted left by 4	0x10 (to 0xF0)
2	Level Byte 1	MS byte of Tx Output Power	*1
3	Level Byte 2	LS byte of Tx Output Power	*1
4	Temperature	Temperature in deg. C	*2
5	Status Byte 1	Bit 0: Temperature Out-of-Range	1:Fail , 0:Normal *3
		Bit 1: PLL Out-of-Lock	1:Fail , 0:Normal *3
		Bit 2: Checksum Error	1:Error , 0:Norma *3
		Bit 3: Tx Status	1:Tx On , 0:Tx Of *3
		Bits 4 thru 7: BUC Power Class	0x1 to 0xA *3
6	Status Byte 2	Bits 0 - 3: Not used	Fixed 0xA
		Bits 4 - 7: Software Version	0x0 to 0xF
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)

10	0F	0A	D8	48	1A	CHK

*1: Data Field Definition for Tx Output Power

Output power is the number which changed hexadecimal data into the decimal number and was divided by 100.

ex) Output Power Data — Output Power

Level Byte 1 is 0x0F
Level Byte 2 is 0x0A } 0x0F0A → +38.50 dBm

*2: Data Field Definition for Temperature

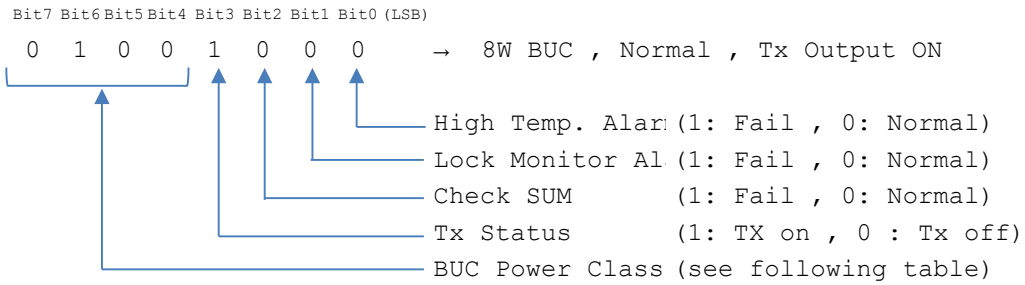
Temperature data is from -128°C to +127°C in two's complement (1°C step).

ex) Temperature Data

Byte of Temperature is 0xD8 → 11011000 = -40 °C
Byte of Temperature is 0xFF → 11111111 = -1 °C
Byte of Temperature is 0x40 → 01000000 = 64 °C

*3: Data Field Definition for Status Byte 1

ex) Status Byte 1 is 0x48



BUC Power Class table

Value	0x1	0x2	0x3	0x4	0x5	0x6	0x7	0x8	0x9	0xA
Power	2W	4W	5W	8W	10w	16W	20W	25W	40W	60W

*4: Data Field Definition for Status Byte 2

ex) Status Byte 2 is 0x1A→ Firmware Version Ver.1

Appendix)

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b. Set Transmit On/Off State

i) In case of FSK Communication M&C

The BUC responds the same message as 'Request Status' after the BUC set the taransmit on/off state in accordance with the command message

ex)

10	0F	0A	D8	48	1A	CHK

ii) In case of RS-232C Interface M&C

Byte	Name	Description	Value
1	Address	BUC Address shifted left by 4	0x10 (to 0xF0)
2	Command	Tx On/Off	0x02
3	Data Byte 1	Tx Control	Off:0x00/On:0x01
4	Data Byte 2	Not used	0xAA
5	Data Byte 3	Not used	0xAA
6	Data Byte 4	Not used	0xAA
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)

10	02	01	AA	AA	AA	CHK

c. Set Attenuator

Byte	Name	Description	Value
1	Address	BUC Address shifted left by 4	0x10 (to 0xF0)
2	Command	Set Attenuator	0x05
3	Data Byte 1	Attenuator Selection 1or 2	Att.1 0x01 Att.2 0x02 ***1**
4	Data Byte 2	Set Att. bit in 10 dB digit	0x00 or 0x01
5	Data Byte 3	Set Att. bit in 1 dB digit	0x00 to 0x09
6	Data Byte 4	Set Att. bit in 0.5 dB digit	0x00 or 0x05
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)

10	05	01	01	02	05	CHK

*1: Att.1 is available, Att.2 is not available.

d. Get Attenuator

Byte	Name	Description	Value
1	Address	BUC Address shifted left by 4	0x10 (to 0xF0)
2	Command	Get Attenuator	0x06
3	Data Byte 1	Attenuator Selection 1or 2	Att.1 0x01 Att.2 0x02 ***1**
4	Data Byte 2	Set Att. bit in 10 dB digit	0x00 or 0x01
5	Data Byte 3	Set Att. bit in 1 dB digit	0x00 to 0x09
6	Data Byte 4	Set Att. bit in 0.5 dB digit	0x00 or 0x05
7	Checksum	Algebraic sum of bytes 1 - 6	

ex)

10	06	01	01	02	05	CHK

*1: Att.1 is available, Att.2 is not available.