

# DBS3900 IBS V100R001C02 DRH3980A&3909A&3918A& 3918B&3921A&3921B&3926A Hardware Description

Issue Draft A

Date 2013-08-10



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# **About This Document**

# **Purpose**

This document provides reference for planning and deploying a DC DRH. It presents the exterior and describes the ports, functions, cable types, connector specifications, and cable connections of the DRH.

### **Product Versions**

The following table lists the product versions related to this document.

Product Name	Product Version	
DBS3900 IBS	V100R001C02	

# Scope of application

The following table lists the DRH related to this document.

DRH Name	DRH Version
DRH3980A	V100R001C02
DRH3909A	V100R001C02
DRH3918A	V100R001C02
DRH3918B	V100R001C02
DRH3921A	V100R001C02
DRH3921B	V100R001C02
DRH3926A	V100R001C02

## **Intended Audience**

This document is intended for:

- Site installation engineers
- System engineers
- Site maintenance engineers

# Organization

1 Changes in the DRH3908A&3909A&3918A&3918B&3921A&3921B&3926A Hardware Description

This chapter describes the changes in the DRH3980A&3909A&3918A&3918B&3921A&3921B&3926A Hardware Description.

2 DRH Introduction

This chapter describes the function and exterior of the DRH as well as the ports and indicators on the DRH.

3 DRH Cables

This chapter describes DRH cables.

4 DRH Auxiliary Devices

This chapter describes DRH auxiliary devices.

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# Changes in the DRH3980A&3909A&3918A&3918B&3921A&392 1B&3926A Hardware Description

This chapter describes the changes in the DRH3980A&3909A&3918A&3918B&3921A&3921B&3926A Hardware Description.

Issue Draft A (2013-08-10)

This is the Draft A version.

# 2 DRH Introduction

This chapter describes the function and exterior of the DRH as well as the ports and indicators on the DRH.

# 2.1 DRH Exterior

This section describes the exterior and dimensions of an DRH.

Figure 2-1 shows an DRH.

Figure 2-1 DRH exterior

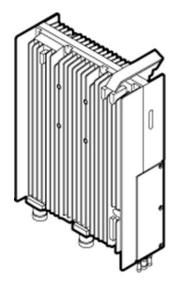
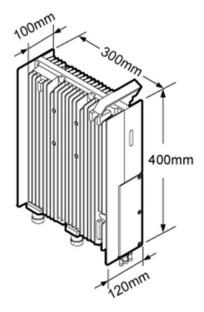


Figure 2-2 shows DRH dimensions.

Figure 2-2 DRH dimensions



### 2.2 DRH Functions

This section describes the main functions of the DRH.

The Distributed Remote Head (DRH) performs the following functions:

- Receives downlink baseband data from the DCU and sends uplink baseband data to the DCU.
- Receives RF signals from the antenna system, down-converts the signals to intermediate frequency (IF) signals, amplifies the IF signals, and performs analog-to-digital conversion. The transmit (TX) channel filters downlink signals, performs digital-to-analog conversion, and up-converts RF signals to the TX band.
- Multiplexes receive (RX) and TX signals on the RF channel, which enables these signals to share the same antenna path. It also filters the RX and TX signals.
- The DRH can be powered by the AC/DC power module. In this case, this DRH is called AC DRH.

An DRH consists of a high-speed interface unit, signal processing unit, power amplifier, and dual-duplexer. Figure 2-3 shows the logical structure of the DRH.

High-speed interface module TXA TX/RXA PA TXB Duplexer **CPRI** TRX DEU RXA-LNA TX/RXB RXB-LNA-Antenna system Power Extension interface module

Figure 2-3 Logical structure of the DRH

# 2.3 DRH Technical Specifications

This section describes technical specifications of an DRH, including supported modes, frequency bands, RF specifications, engineering specifications, and antenna capabilities.

For details about technical specifications of an DRH, see section "Technical Specifications" in the *DBS3900 IBS V100R001C02 Product Description*.

#### 2.4 DRH Ports

This section describes ports on the DRH panels. An DRH has a bottom panel, cabling cavity panel, and indicator panel.

#### **2.4.1 2T2R DRH Ports**

Table 2-1 DRH types with 2T2R

DRH Name	Product Version	
DRH3980A	V100R001C02	
DRH3918B	V100R001C02	

Figure 2-4 shows the ports on the 2T2R DRH panels.

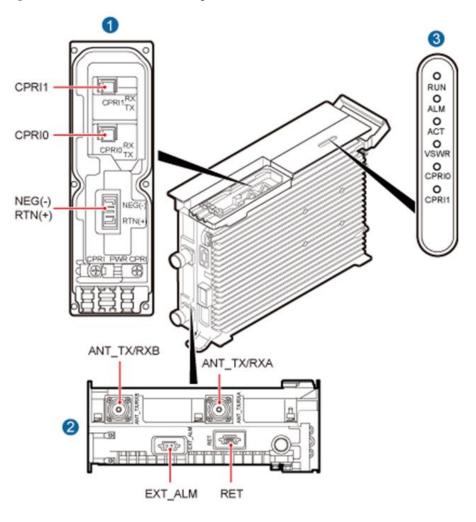


Figure 2-4 Ports on the 2T2R DRH panels

Table 2-2 describes ports and indicators on the 2T2R DRH panels.

Table 2-2 Ports and indicators on 2T2R DRH panels

Item	Silkscreen	Description
(1) Ports in the	RTN(+)	Power supply socket
cabling cavity	NEG(-)	
	CPRI0	Optical/electrical port 0
	CPRI1	Optical/electrical port 1
(2) Ports at the bottom	ANT_TX/RXA	TX/RX port A
	ANT_TX/RXB	TX/RX port B
	EXT_ALM	Port for alarm reporting
	RET	Not use in C02 version
(3) Indicators	RUN	For details, see 2.5 DRH Indicators.

Item	Silkscreen	Description
	ALM	
	ACT	
	VSWR	
	CPRI0	
	CPRI1	

# 2.5 DRH Indicators

This section describes six indicators on a DRH. They indicate the running status.

For detailed positions of DRH indicators, see 2.4 DRH Ports.

Table 2-3 describes DRH indicators.

**Table 2-3** DRH indicators

Indicator s	Color	Status	Description
RUN	Green	Steady on	There is power supply, but the module is faulty.
		Steady off	There is no power supply, or the module is faulty.
		Blinking (on for 1s and off for 1s)	The module is running properly.
		Blinking (on for 0.125s and off for 0.125s)	Software is being loaded to the module, or the module is not started.
ALM	Red	Steady on	Alarms are generated, and the module must be replaced.
		Blinking (on for 1s and off for 1s)	Alarms are generated. The alarms may be caused by the faults on the related boards or ports. Therefore, you need to locate the fault before deciding whether to replace the module.
		Steady off	No alarm is generated.
ACT	ACT Green Steady		The module is running properly with TX channels enabled or the software is being loaded without DRH running.
		Blinking (on for	The module is running properly with TX

Indicator s	Color	Status	Description	
		1s and off for 1s)	channels disabled.	
VSWR	Red	Steady off	No Voltage Standing Wave Ratio (VSWR) alarm is generated.	
		Steady on	VSWR alarms are generated.	
CPRI0	Red or	Steady green	The CPRI link is functioning properly.	
green		Steady red	An optical module fails to transmit or receive signals because the optical module is faulty or the fiber optic cable is broken.	
		Blinking red (on for 1s and off for 1s)	The CPRI link is out of lock because of failure in clock lock between two modes or mismatched data rates over CPRI ports.	
		Steady off	The optical module cannot be detected, or the CPRI cable is not connected properly.	
CPRI1	Red or	Steady green	The CPRI link is functioning properly.	
green	green	Steady red	An optical module fails to transmit or receive signals because the optical module is faulty or the fiber optic cable is broken.	
		Blinking red (on for 1s and off for 1s)	The CPRI link is out of lock because of failure in clock lock between two modes or mismatched data rates over CPRI ports.	
		Steady off	The optical module cannot be detected, or the CPRI cable is not connected properly.	

# 2.6 DRH Antennas(Only for U.S.A and Canada)

Туре	Description
Omnidirectional Ceiling Antenna	Frequency: 698MHz to 2700MHz; Maximum gain: 5dBi
Directional Ceiling Antenna	Frequency: 698MHz to 2700MHz; Maximum gain: 6dBi
Wall Mount Antenna	Frequency: 698MHz to 2700MHz; Maximum gain: 8dBi
Yagi Directional antenna	Frequency: 698MHz to 2700MHz; Maximum gain: 11dBi

Directional Outdoor Antenna	Frequency: 698MHz to 2700MHz; Maximum gain: 11.4dBi
Dual-polarized Omnidirectional Ceiling Antenna	Frequency: 698MHz to 2700MHz; Maximum gain: 5dBi
Dual-polarized Wall Mount Antenna	Frequency: 698MHz to 2700MHz; Maximum gain: 9dBi

# 3 DRH Cables

This chapter describes DRH cables.

# 3.1 DRH Cable List

This section describes DRH cable connections.

Table 3-1 lists DRH cables.

Table 3-1 DRH cables

Cable	One End		The Other End	
	Connector	Installation Position	Connector	Installation Position
3.2 DRH PGND Cable	OT terminal (M6, 16 mm <sup>2</sup> or 0.025 in. <sup>2</sup> )	Ground terminal on the DRH	OT terminal (M8, 16 mm <sup>2</sup> or 0.025 in. <sup>2</sup> )	Ground terminal on the ground bar
3.3 DRH Power Cable	Tool-less female connector (press fit type)	NEG(-) and RTN(+) ports on the DRH	Tool-less female connector (pressfit type)	One of DRH0 to DRH5 ports on the EPU One of LOAD0 to
			(1	LOAD5 ports on the DCDU-11B
3.4 DRH Alarm Cable	Waterproofed DB15 male connector	EXT_ALM port on the DRH	Cord end terminal	External alarm device
3.5 CPRI Fiber Optic	DLC connector	CPRI0 port on the DRH	DLC connector	CPRI port on the WBBP in the DPC
Cable		CPRI1 port on the DRH		CPRI0 port on the DRH
3.6 DRH RF Jumper	DIN male connector	ANT_TX/RX A or ANT_TX/RX B port on the DRH	Depend on Antenna connector	Antenna system

#### 3.2 DRH PGND Cable

An DRH PGND cable connects an DRH and a ground bar, ensuring the proper grounding of the DRH. The maximum length of the DRH PGND cable is 8 m (26.25 ft).

#### **Exterior**

An DRH PGND cable is green or green and yellow with a cross-sectional area of 16 mm<sup>2</sup> (0.025 in.<sup>2</sup>). This cable has an OT terminal at each end. Figure 3-1 shows an DRH PGND cable.

Figure 3-1 PGND cable



(1) OT terminal (M6, 16 mm<sup>2</sup> or 0.025 in.<sup>2</sup>) (2) OT terminal (M8, 16 mm<sup>2</sup> or 0.025 in.<sup>2</sup>)

- MOTE
  - If the customer prepares the PGND cable, a copper-core cable with a cross-sectional area of 16 mm<sup>2</sup> (0.025 in.<sup>2</sup>) or larger is recommended.
  - One OT terminal must be added to each end of the PGND cable onsite.
  - You can determine the color of the cable and whether to use corresponding two-hole OT terminals based on local regulations.

Figure 3-2 shows a two-hole OT terminal.

Figure 3-2 Two-hole OT terminal



# 3.3 DRH Power Cable

The DRH power cable is a -48 V DC shielded cable. It feeds -48 V DC power to an DRH. The default length of an DRH power cable is 50 m (164.04 ft).

#### **Exterior**

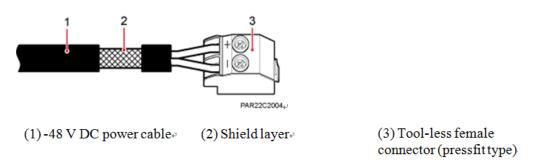
#### M NOTE

Quote the corresponding extension package if you want to purchase DRH power cables of the following lengths:

- Longer than 50 m (164.04 ft) and shorter than or equal to 100 m (328.08 ft)
- Longer than 100 m (328.08 ft) and shorter than or equal to 150 m (492.12 ft)

There are two types of DRH power cables in terms of cross-sectional areas: 3.3 mm<sup>2</sup> (0.005 in.<sup>2</sup>) (12 AWG) complying with North American standards and 4 mm<sup>2</sup> (0.006 in.<sup>2</sup>) complying with European standards. An DRH power cable has a tool-less female connector (pressfit type) at one end and a bare wire at the other end. A corresponding terminal is added to the bare wire based on the requirements of the connector on the external power device, as shown in Figure 3-3.

Figure 3-3 DRH power cable



#### **Pin Assignment**

Table 3-2 lists the specifications of a DRH power cable.

Table 3-2 Specifications of a DRH power cable

Cable	Wire	Wire Color in Most Regions		Wire Color in Other Regions
		North American Standard	Europea n Standar d	UK
DRH	RTN(+)	Black	Brown	Blue
power cable	NEG(-)	Blue	Blue	Gray

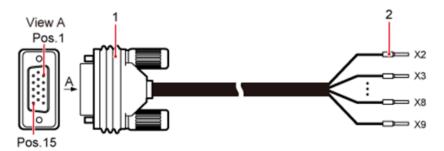
#### 3.4 DRH Alarm Cable

The DRH alarm cable, a shielded straight-through cable, transmits alarm signals from an external device to an DRH so that the base station monitors the operating status of external devices. The length of the DRH alarm cable is 5 m (16.40 ft).

#### **Exterior**

An alarm cable has a waterproofed DB15 male connector at one end and eight cord end terminals at the other end, as shown in Figure 3-4.

Figure 3-4 Alarm cable



(1) Waterproofed DB15 male connector

(2) Cord end terminal

#### **Pin Assignment**

Table 3-3 describes the pin assignment for the wires of an DRH alarm cable.

Table 3-3 Pin assignment for the wires of an DRH alarm cable

DRH Alarm Port	Pin of the Waterpro ofed DB15 Male Connecto r	Color	Туре	Cord End Terminal	Description
Dry contact	X1.2	White and blue	Twisted pair	X2	SWITCH_INPUT0+
	X1.3	Blue		X3	SWITCH_INPUT0- (GND)
	X1.6	White and orange	Twisted pair	X4	SWITCH_INPUT1+
	X1.7	Orange		X5	SWITCH_INPUT1- (GND)

DRH Alarm Port	Pin of the Waterpro ofed DB15 Male Connecto r	Color	Туре	Cord End Terminal	Description
RS485	X1.10	White and green	Twisted pair	X6	APM RX-
	X1.11	Green		X7	APM RX+
	X1.13	White and brown	Twisted pair	X8	APM TX-
	X1.14	Brown		X9	APM TX+

# 3.5 CPRI Fiber Optic Cable

CPRI fiber optic cables are classified into multi-mode fiber optic cables and single-mode fiber optic cables. They transmit CPRI signals.

#### M NOTE

- An ODF can be used when the distance between a DPC and an DRH or the distance between interconnected DRHs is longer than 100 m (328.08 ft).
- A single-mode fiber optic cable connects a DPC to an ODF or connects an ODF to an DRH.

#### **Exterior**

Figure 3-5 shows a fiber optic cable between a DPC and an DRH or between DRHs, with a DLC connector at each end.

Figure 3-5 Fiber optical cable between a DPC and an DRH or between DRHs

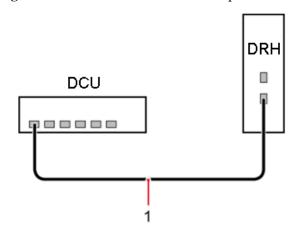


- (1) DLC connector
- (2) Branch optical fiber
- (3) Label on the branch optical fiber

When a fiber optical cable connects a DPC and an DRH, the optical fibers on the DPC side and DRH side are 0.34~m (0.013~in.) and 0.03~m (0.0012~in.) long, respectively. When a fiber optical cable connects two DRHs, the optical fibers on both DRH sides are 0.03~m (0.0012~in.) long.

Figure 3-6 shows the connections for a CPRI fiber optic cable between a DPC and an DRH.

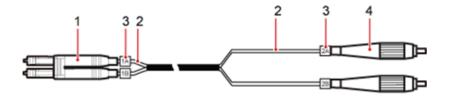
Figure 3-6 Connections for a CPRI fiber optic cable between a DPC and an DRH



(1) CPRI fiber optic cable between a DPC and an DRH

Figure 3-7 shows a single-mode fiber optic cable between a DPC and an ODF or between an ODF and an DRH, with a DLC connector at one end and an FC connector at the other end.

**Figure 3-7** Single-mode fiber optic cable between a DPC and an ODF or between an ODF and an DRH



(1) DLC connector

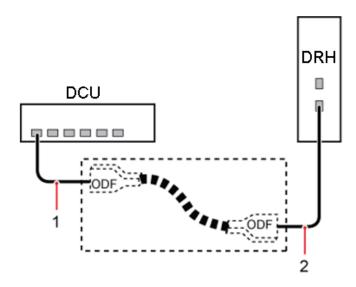
- (2) Branch optical fiber
- (3) Label on the branch optical fiber
- (4) FC connector

When a single-mode fiber optic cable connects a DPC and an ODF, the optical fibers on the DPC side and ODF side are 0.34 m (0.013 in.) and 0.8 m (0.031 in.) long, respectively.

When a single-mode fiber optic cable connects an ODF and an DRH, the optical fibers on the DRH side and ODF side are 0.03 m (0.013 in.) and 0.8 m (0.031 in.) long, respectively.

Figure 3-8 shows the connections for a single-mode CPRI fiber optic cable between a DPC and an ODF or between an ODF and an DRH.

**Figure 3-8** Connections for a single-mode fiber optic cable between a DPC and an ODF or between an ODF and an DRH



- (1) Single-mode CPRI fiber optic cable between a DPC and an ODF
- (2) Single-mode CPRI fiber optic cable between an ODF and an DRH

#### **Ⅲ** NOTE

A CPRI fiber optic cable must be connected to optical modules in the CPRI ports. A multi-mode fiber optic cable and single-mode fiber optic cable are connected to multi-mode optical modules and single-mode optical modules, respectively.

### **Pin Assignment**

Table 3-4, Table 3-5, and Table 3-6 describe the labels on and recommended connections for fiber optic cables of an optical assembly.

**Table 3-4** Labels on and recommended connections for optical fibers of an optical assembly between a DPC and an DRH

Label	Connected To
1A	CPRI RX port on the DRH
1B	CPRI TX port on the DRH
2A	TX port on the DPC
2B	RX port on the DPC

**Table 3-5** Labels on and recommended connections for optical fibers of a fiber optic cable between DRHs

Label	Connected To	
1A	CPRI RX port on DRH 1	
1B	CPRI TX port on DRH 1	
2A	CPRI TX port on DRH 0	
2B	CPRI RX port on DRH 0	

**Table 3-6** Labels on and recommended connections for optical fibers of a single-mode optical assembly between a DPC and an ODF or between an ODF and an DRH

Label	Connected To	
1A	RX port on the DPC or CPRI RX port on the DRH	
1B	TX port on the DPC or CPRI TX port on the DRH	
2A	ODF	
2B	ODF	

# 3.6 DRH RF Jumper

The 1/2" DRH RF jumper transmits and receives RF signals between an DRH and an antenna. A fixed-length RF jumper used by an DRH is 2 m (6.56 ft), 3 m (9.84 ft), 4 m (13.12 ft), 6 m (19.68 ft), or 10 m (32.81 ft) long. A variable-length RF jumper used by an DRH has a maximum length of 10 m (32.81 ft).

#### M NOTE

If the customer prepares the RF jumper, the length of the RF jumper should be as short as possible and not exceed  $2\ m$  (6.56 ft).

#### **Exterior**

An RF jumper has a DIN male connector at one end and a customized connector at the other end.

Figure 3-9 shows an RF jumper with a DIN male connector at each end.

Figure 3-9 RF jumper



# 4 DRH Auxiliary Devices

This chapter describes DRH auxiliary devices.

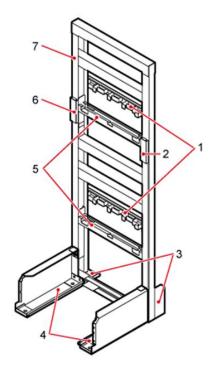
# 4.1 IFS06

An Indoor Floor installation Support (IFS06) is used for installing indoor DRHs.

#### **Exterior**

Figure 4-1 shows an IFS06.

Figure 4-1 IFS06



(1) Cable tray	(2) Ground bar 2	(3) Rear foot	(4) Front foot
(5) Adjustable beam	(6) Ground bar 1	(7) Main frame	-

#### **Function**

- It can be installed on the ground.
- It supports the installation of six DRHs.
- The upper and lower adjustable beams on an IFS06 can be moved up and down to fit for heights of DRHs.

#### **Specifications**

Table 4-1 describes IFS06 specifications.

Table 4-1 IFS06 specifications

Item	Specification	
Dimensions (H x W x D)	1730 mm (79 in.) x 600 mm (23.62 in.) x 600 mm (23.62 in.)	
Weight	45 kg (99.23 lb)	

# 5 Appendix

## 5.1 U.S.A Regulatory Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device does not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

If this device is modified without authorization from Huawei, the device may no longer comply with FCC requirements for Class B digital devices. In that a case, your right to use the device may be limited by FCC regulations. Moreover, you may be required to correct any interference to radio or television communications at your own expense.

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This device generates, uses and radiates radio frequency energy. If it is not installed and used in accordance with the instructions, it may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this device does cause harmful interference to radio or television reception, which can be determined by turning the device off and on, the user may take one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Reinforce the separation between the device and receiver.
- Connect the device into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or TV technician for assistance.



# WARNING

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. The minimum installed and operated distance between the radiator and your body of each model as below.

For DRH3926A, please keep 2.01m or more.

WARNING: This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.



# CAUTION

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user authority to operate the equipment.

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# 5.2 Canada Regulatory Compliance

#### 5.2.1 RSS-Gen statement

This device complies with Industry Canada licence-exempt RSS standard(s).

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autoris é aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radio dectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

#### **5.2.2 RSS-102 statement:**

The device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

Le dispositif rencontre l'exemption des limites courantes d'évaluation dans la section 2.5 de RSS 102 et la conformit é àl'exposition de RSS-102 rf, utilisateurs peut obtenir l'information canadienne sur l'exposition et la conformit é de rf.

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. The minimum installed and operated distance between the radiator and your body of each model as below.

For DRH3926A, please keep 2.01m or more.

Cet équipement est conforme à l'exposition aux rayonnements IC limites établies pour unenvironnement non contr d é Cet émetteur ne doit pas être Co-plac éou ne fonctionnant en

même temps qu'aucune autre antenne ou émetteur.La distance d'installation et d'op ération entre le radiateur et votre corps de chaque équipement doit être au minimum :

Pour DRH3926A, 2.01m ou plus.

#### **Some Information**

- (a) The nominal passband gain is 37dB;
- (b) The nominal bandwidth of band 2600M (DRH3926A)is 73.07MHz;
- (c) The rated mean output power is 2\*20W;
- (d) The input and output impedance are  $50\Omega$ ;
- (e) The following notice:"The Manufacture's rated output power of this equipment is for single carrier operation. For situations when multiple carrier signals are present, the rating would have to be reduced by 3.5dB, especially where the output signal is re-radiated and can cause interference to adjacent band users. This power reduction is to be by means of input power or gain reduction and not by an attenuator at the output of the device."