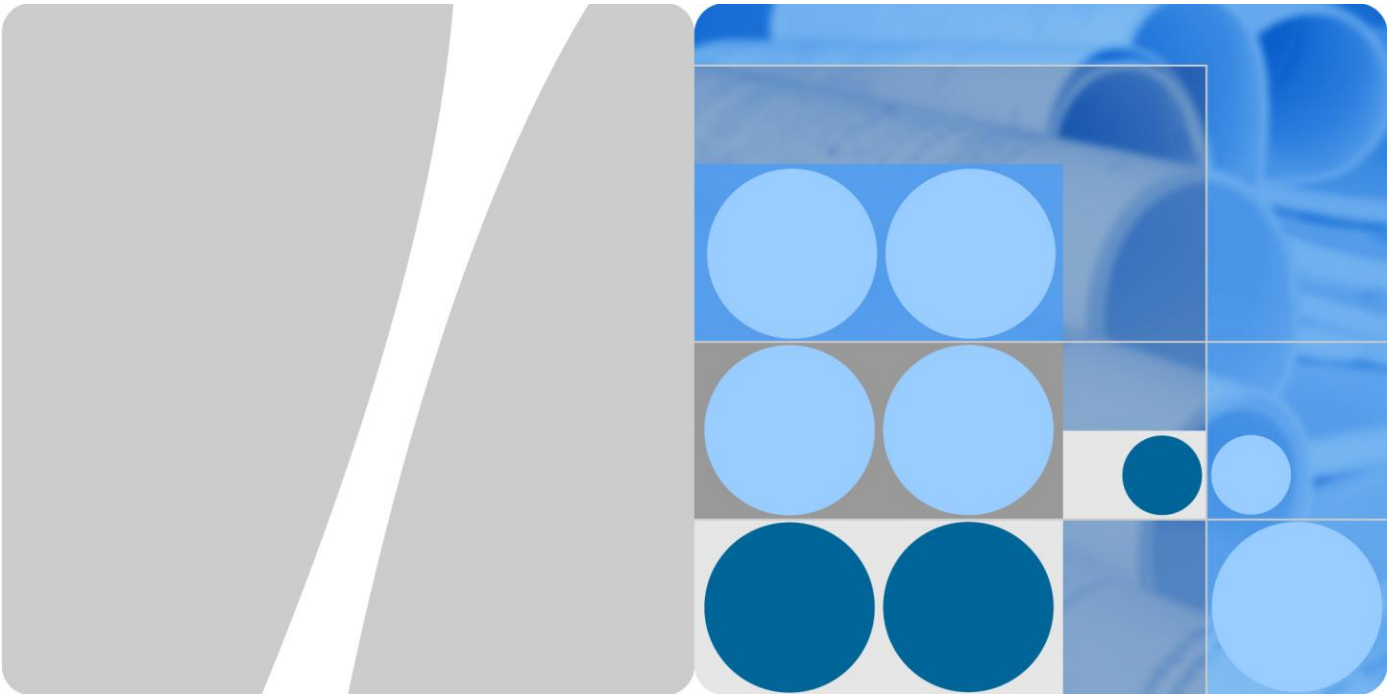
2 x 40W



RRU3908 Description

Issue V1.6

Date 2012-05-02

HUAWEI TECHNOLOGIES CO., LTD.

HUAWEI

Trademarks and Permissions


and other Huawei trademarks are trademarks of Huawei Technologies Co., Ltd.

All other trademarks and trade names mentioned in this document are the property of their respective holders.

Notice

The purchased products, services and features are stipulated by the contract made between Huawei and the customer. All or part of the products, services and features described in this document may not be within the purchase scope or the usage scope. Unless otherwise specified in the contract, all statements, information, and recommendations in this document are provided "AS IS" without warranties, guarantees or representations of any kind, either express or implied.

The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base
Bantian, Longgang
Shenzhen 518129
People's Republic of China

Website: http://www.huawei.com

Email: support@huawei.com

Contents

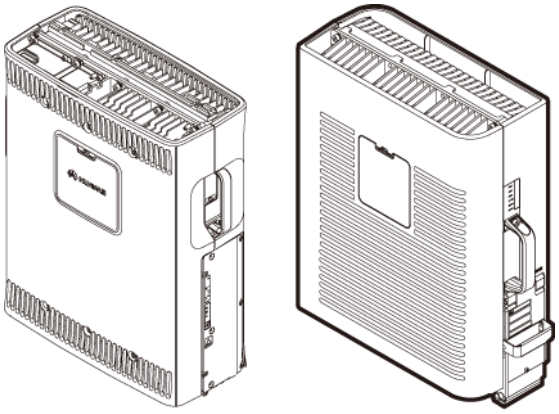
1 Introduction

The RRU3908 is an outdoor remote radio unit. It is the radio frequency (RF) part of a distributed base station and can be located near antennas. The RRU3908 can modulate, demodulate, combine, and divide baseband and RF signals. It also processes baseband and RF signal data. With the Software Defined Radio (SDR) technology, the RRU3908 can work either in GU or GL dual-mode through software configuration modification.

1.1 Appearance

Figure 1-1 shows the appearance of the RRU3908 (DC).

Figure 1-1 Appearance of the RRU3908 (DC)



1.2 Physical Ports

RRUs have a modular design. Its external ports are located in the cabling cavity and at the bottom of the module.

Table 1-1 Physical ports on the RRU3908 V1

Port	Connector	Quantity	Function
RF port	DIN	2	Connects to an antenna
Interconnection port for receiving RF signals	DB2W2	1	Connects to the another RF module
Common public radio interface (CPRI) port	DLC	2	Connects to the baseband unit (BBU3900)
Power supply socket	OT	2	Receives -48 V DC power
RET port	DB9	1	Connects to a remote control unit (RCU)
MON port	DB15	1	Port for monitoring and maintenance

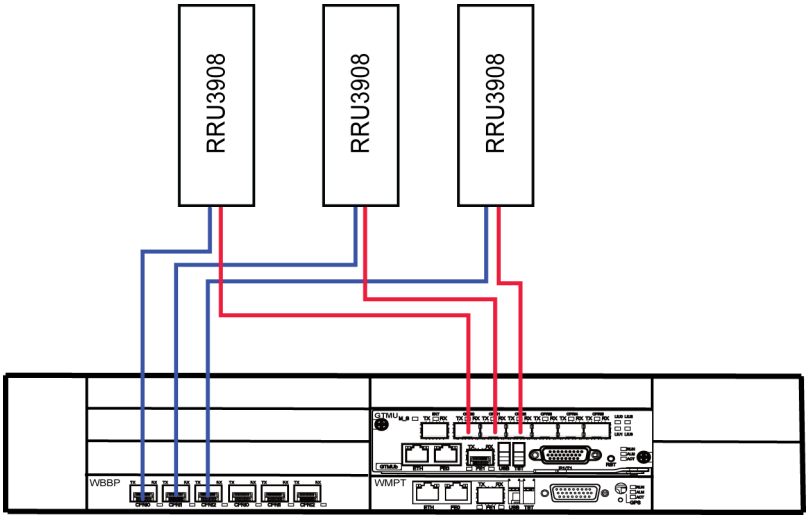
Table 1-2 Physical ports on the RRU3908 V2

Port	Connector	Quantity	Function
RF port	DIN	2	Connects to an antenna
Interconnection port for receiving RF signals	DB2W2	1	Connects to the another RF module
Common public radio interface (CPRI) port	DLC	2	Connects to the baseband unit (BBU3900)
Power supply socket	Easy power receptacle (pressfit type)	2	Receives -48 V DC power
RET port	DB9	1	Connects to a remote control unit (RCU)
MON port	DB15	1	Port for monitoring and maintenance

A BBU3900 and RRU3908 are connected through a CPRI port using an electrical or optical cable to transmit CPRI signals.

The BBU3900 and the RRU3908 are connected in dual-star topology. In this topology, the CPRI port on the GTMU or UBRI is connected to CPRI_W on the RRU3908, and the CPRI port on the WBBP or LBBP is connected to CPRI_E on the RRU3908, as shown in Figure 1-2.

Figure 1-2 Dual-star topology



2 Technical Specifications

2.1 Frequency Band

Table 2-1 RRU3908 V1 frequency band

Frequency Band (MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
850	824–849	869–894
900	880–905	925–950
	890–915	935–960
1800	1710–1755	1805–1850
	1740–1785	1835–1880
1900	1850–1890	1930–1970
	1870–1910	1950–1990

Table 2-2 RRU3908 V2 frequency band

Frequency Band (MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)
850	824–849	869–894
900	880–915	925–960
	890–915	935–960

2.2 Capacity

Table 2-3 Single-mode capacity

Mode	Capacity
GSM	● Each RRU3908 V1 supports 6 TRXs. ● Each RRU3908 V2 supports 8 TRXs.
UMTS	Each RRU3908 supports 4 carriers. NOTE When operating in the 900 MHz frequency band, RRU3908 V2 supports 3 or 4 UMTS carriers.
LTE	● RRU3908 V1 (1800 MHz): Each RRU3908 V1 supports 1 carrier. The LTE bandwidth is 5, 10, 15, or 20 MHz. NOTE RRU 3908V1 is hardware ready for LTE in the 850 MHz, 900 MHz and 1900 MHz. ● RRU3908 V2: Each RRU3908 V2 supports 1 carrier. The LTE bandwidth is 1.4, 3, 5, 10, 15, or 20 MHz.

Table 2-4 Dual-mode capacity

Mode	Capacity
GSM + UMTS	● RRU3908 V1: For detailed specifications, see Table 2-8. ● RRU3908 V2: For detailed specifications, see Table 2-10 and Table 2-11.
GSM + LTE	RRU3908 V2 (900 MHz): For detailed specifications, see Table 2-12.

2.3 Receiver Sensitivity

Table 2-5 RRU3908 V1 receiver sensitivity

Mode	Frequency Band (MHz)	1-Way Receiver Sensitivity (dBm)	2-Way Receiver Sensitivity (dBm)	4-Way Receiver Sensitivity (dBm)
GSM	850/900/1800/1900	-113	-115.8	-118.5 (theoretical value)
UMTS	850/900/1900	-125.5	-128.3	-131
LTE	1800	-106.3	-109.1	-111.8

Table 2-6 RRU3908 V2 receiver sensitivity

Mode	Frequency Band (MHz)	1-Way Receiver Sensitivity (dBm)	2-Way Receiver Sensitivity (dBm)	4-Way Receiver Sensitivity (dBm)
GSM	850/900 PGSM	-113.5	-116.3	-119 (theoretical value)
	900 EGSM	-113.3	-116.1	-118.8 (theoretical value)
UMTS	850/900 PGSM	-125.5	-128.3	-131
	900 EGSM	-125.3	-128.1	-130.8
LTE	900 PGSM	-106.3	-109.1	-111.8
	900 EGSM	-106.1	-108.9	-111.6

NOTE

- The receiver sensitivity of GSM, as recommended in 3GPP TS 51.021, is measured in the central band (80% of the entire operating band, excluding the edge band) at the antenna connector on the condition that the channel rate is 13 kbit/s and the Bit Error Rate (BER) is not higher than 2%.
- The receiver sensitivity of UMTS, as recommended in 3GPP TS 25.104, is measured in the entire operating band at the antenna connector on the condition that the channel rate is 12.2 kbit/s and the BER is not higher than 0.001.
- The receiver sensitivity of LTE is measured, as recommended in 3GPP TS 36.104, under a 5 MHz channel bandwidth based on the FRC A1-3 in Annex A.1 (QPSK, R = 1/3, 25 RBs) standard.

2.4 Output Power

NOTE

- RRU3908 modules operating in GSM mode and in the 900 or 1800 MHz frequency band comply with the standard EN 301 502 V9.2.1.
- RRU3908 modules operating in UMTS, LTE, or Multi-Standard Radio (MSR) mode and in 900 or 1800 MHz frequency band comply with the standard ETSI EN 301 908 V5.2.1 and 3GPP TS 37.104.
- RRU3908 modules operating in GSM mode and in the 850 or 1900 MHz frequency band comply with the standard 3GPP TS 45.005 V10.2.0 & 3GPP TS 51.021 V10.2.0.
- RRU3908 modules operating in UMTS, LTE, or Multi-Standard Radio (MSR) mode and in 850 or 1900 MHz frequency band comply with the standard 3GPP TS 37.104 V10.4.0 & TS 37.141 V10.4.0.
- For S1, S2, S3, S4, S5, and S6, the GSM output power in 8PSK mode is the same as that in GMSK mode with the improvement in the hardware capability. With the GBFD-118104 Enhanced EDGE Coverage feature, RF modules working in GSM mode with the S7 or S8 configuration can also have the same power no matter they use the GMSK or 8PSK modulation scheme. This feature is under license control and therefore you must purchase the license before you can use this feature.
- *: The UMTS mode is supported in terms of hardware.
- The output power is 1 dB lesser than the standard power when the RRU3908 is located at a height of 3500 m to 4500m; and is 2 dB lesser than the standard power when the RRU3908 is located at a height of 4500 m to 6000m.
- Factors such as the site-to-site distance, frequency-reuse factor, power control algorithm, and traffic model affect the gain achieved by dynamic power allocation. Therefore, in most cases, the network planning can be based on the power specification achieved by dynamic power allocation.
- In power sharing mode, the power control and DTX functions must be enabled. In GBSS8.1, the dynamic power sharing feature is mutually exclusive with the GBFD-113201 Concentric Cell, GBFD-114501 Co-BCCH Cell, GBFD-118001 BCCH Dense Frequency Multiplexing, and GBFD-117501 Enhanced Measurement Report (EMR) features. In GBSS9.0 and later versions, the dynamic power sharing feature can be used together with these features. However, the dynamic power sharing feature currently cannot be used together with the GBFD-117002 IBCA (Interference Based Channel Allocation), GBFD-117001 Flex MAIO, GBFD-118701 RAN Sharing, and GBFD-114001 Extended Cell features in GBSS8.1, GBSS9.0, and later versions.
- Power sharing assumes a random distribution of UEs in the cell.

Table 2-7, Table 2-8 list the typical configurations of the RRU3908 V1.

Table 2-7 Typical RRU3908 V1 configuration (850 MHz/900 MHz/1800 MHz/1900 MHz, single-mode)

Number of GSM Carriers	Number of UMTS Carriers	Number of LTE Carriers	Output Power per GSM Carrier (W)	Output Sharing Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)	Output Power per LTE Carrier (W)
1	0	0	40	40	0	0
2	0	0	40	40	0	0
3	0	0	20	20	0	0
4	0	0	15	20	0	0
5	0	0	12	12	0	0
6	0	0	10	12	0	0
0	1	0	0	0	40	0
0	1	0	0	0	2 x 30	0
0	2	0	0	0	30	0
0	2	0	0	0	2 x 15	0
0	3*	0	0	0	20*	0
0	4*	0	0	0	15*	0
0	0	1 (MIMO)	0	0	0	2 x 30

Table 2-8 Typical RRU3908 V1 configuration (900 MHz, GU Non-MSR)

Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
1	1	40	30
1	1	30	40
1	2	30	20
2	1	20	30
2	1	15	40
2	2	15	20
3	1	10	30
3	2	10	10
4	1	7.5	20

Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
4	2	7.5	10
5	1	6	20

NOTE

LTE bandwidth is 5 or 10 MHz. GSM plus LTE bandwidth must not exceed 15 MHz.

Table 2-9, Table 2-10, Table 2-11, and Table 2-12 list the typical configurations of the RRU3908 V2.

Table 2-9 Typical RRU3908 V2 configuration (850 MHz/900 MHz, single-mode)

Number of GSM Carriers	Number of UMTS Carriers	Number of LTE Carriers	Output Power per GSM Carrier (W)	Output Sharing Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)	Output Power per LTE Carrier (W)
1	0	0	40	40	0	0
2	0	0	40	40	0	0
3	0	0	20	20	0	0
4	0	0	20	20	0	0
5	0	0	13	15	0	0
6	0	0	13	15	0	0
7	0	0	10	13	0	0
8	0	0	10	13	0	0
0	1	0	0	0	60	0
0	1 (MIMO)	0	0	0	2 x 40	0
0	2	0	0	0	40	0
0	2 (MIMO)	0	0	0	2 x 20	0
0	3	0	0	0	20	0
0	3 (MIMO)	0	0	0	2 x 10	0
0	4	0	0	0	20	0
0	4 (MIMO)	0	0	0	2 x 10	0
0	0	1 (2T2R)	0	0	0	2 x 40

Table 2-10 Typical RRU3908 V2 configuration (850 MHz/900 MHz, GU Non-MSR)

Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
1	1	40	40
2	1	20	40
3	1	13	40
4	1	10	40
5	1	6	20
1	2	40	20
2	2	20	20
3	2	13	20
4	2	10	20

Table 2-11 Typical RRU3908 V2 configuration (850 MHz/900 MHz, GU MSR)

Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
1	1	20	2 x 20
2	1	20	2 x 20
3	1	20	20
3	1	15	2 x 10
4	1	13	20
4	1	15	2 x 10
5	1	10	30

NOTE

When there are no more than three GSM carriers, LTE bandwidth can be 1.4, 3, 5, 10, or 15 MHz in the 900 MHz frequency band. When there are more than three GSM carriers, LTE bandwidth can be 1.4, 3, 5, or 10 MHz in the 900 MHz frequency band.

Table 2-12 Typical RRU3908 V2 configuration (900 MHz, GL MSR)

Number of GSM Carriers	Number of LTE Carriers	Output Power per GSM Carrier (W)	Output Power per LTE Carrier (W)
1	1	20	2 x 20

2	1	20	2 x 20
3	1	15	2 x 10
4	1	15	2 x 10
4	1	12	2 x 15

2.5 Power Consumption

NOTE

- The typical power consumption and the maximum power consumption are measured when the base station works at a temperature of 25℃.
- The typical power consumption for GSM is reached when the base station works with 30% load and power control and DTX are enabled. The maximum power consumption for GSM is reached when the base station works with 100% load.
- The typical power consumption for UMTS is reached when the base station works with 40% load. The maximum power consumption for UMTS is reached when the base station works with 100% load.
- The typical power consumption for LTE is reached when the base station works with 50% load. The maximum power consumption for LTE is reached when the base station works with 100% load.

Table 2-13 Power consumption of the DBS3900 (configured with RRU3908 V1, 900 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	S2/2/2	20	760	910
	S4/4/4	20	730	1070
	S6/6/6	12	730	1070
UMTS	3 x 1	20	490	590
	3 x 2	20	640	790
	3 x 3	20	880	1100
	3 x 4	15	880	1110
GSM+ UMTS	GSM S2/2/2 + UMTS 3 x 1	GSM: 20 UMTS: 20	870	1090
	GSM S4/4/4 + UMTS 3 x 1	GSM: 10 UMTS: 20	820	1050
	GSM S4/4/4 + UMTS 3 x 2	GSM: 10 UMTS: 10	820	1050

Table 2-14 Power consumption of the DBS3900 (configured with RRU3908 V1, 1800 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	S2/2/2	20	615	720
	S4/4/4	20	855	1190
LTE	3 x 10 MHz	40	750	880

Table 2-15 Power consumption of the DBS3900 (configured with RRU3908 V2, 850 MHz/900 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	S2/2/2	20	550	650
	S4/4/4	20	770	1085
	S6/6/6	13	740	1085
UMTS	3 x 1	20	450	520
	3 x 2	20	565	710
GSM + UMTS	GSM S2/2/2 + UMTS 3 x 1	GSM: 20 UMTS: 40	920	1170
	GSM S3/3/3 + UMTS 3 x 1	GSM: 13 UMTS: 40	890	1170
	GSM S4/4/4 + UMTS 3 x 1	GSM: 10 UMTS: 40	880	1180
LTE	3 x 10 MHz	2 x 20	675	800

2.6 Input Power

Table 2-16 Input power

Item	Specifications
Input power	–48 V DC; voltage range: –36 V DC to –57 V DC

2.7 Equipment Specifications

Table 2-17 Equipment specifications

Item	Specifications
Dimensions (H x W x D)	485 mm x 380 mm x 170 mm (with the housing)
Weight	23 kg (with the housing)

2.8 Environment Specifications

Table 2-18 Environment specifications

Item	Specifications	
Operating temperature	RRU3908 V2	–40℃ to + 55℃ (without solar radiation) –40℃ to + 50℃ (with solar radiation)
	RRU3908 V1	–40℃ to + 50℃ (without solar radiation) –40℃ to + 45℃ (with solar radiation)
Relative humidity	5% RH to 100% RH	
Absolute humidity	1 g/m^3 to 30 g/m^3	
Atmospheric pressure	70 kPa to 106 kPa	
Operating environment	The RRU complies with the following standards: • 3GPP TS 45.005 • 3GPP TS 25.141 • 3GPP TS 36.141 • 3GPP TS 37.141 • ETSI EN 300019-1-4 V2.1.2 (2003-04) Class 4.1: "Non-weather protected locations."	
Shockproof protection	NEBS GR63 zone4	
Ingress Protection (IP) rating	IP65	

3 Acronyms and Abbreviations

Abbreviation	Full Name
3GPP	3rd Generation Partnership Project
BBU	Baseband Unit
BER	Bit Error Ratio
CPRI	Common Public Radio Interface
DTX	Discontinuous Transmission
GSM	Global Service Mobile
GTMU	GSM Timing and Main Control Unit
LBBP	LTE BaseBand Processing Unit
LTE	Long Term Evolution
MIMO	Multi-input and Multi-output
MSR	Multi-Standard Radio
RAN	Radio Access Network
SDR	Software Defined Radio
UBRI	Universal Baseband Radio Interference Board
UMTS	Universal Mobile Telecommunications System
WBBP	WCDMA Baseband Processing unit