

RRU3953&RRU3953w Description

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1 Overview

The RRU3953/RRU3953w is the outdoor remote radio unit which is powered by a power cabinet. It is the RF module of the distributed base station and is installed close to the antenna. The RRU3953/RRU3953w performs modulation, demodulation, data processing, and combination and division of baseband signals and RF signals. By using the software-defined radio (SDR) technology, the RRU3953 can work in GU, GL, UL, GUL, GM, UM, or GUM multi-mode through software configurations, the RRU3953w can work in GL dual-mode through software configurations.

The RRU3953/RRU3953w adopts a dual-transmitter and four-receiver design, which further improves the output power and the carrier capacity.

The software version of the RRU3953(1800 MHz/1900 MHz) is SRAN10.1, which is compatible with the N-1 and N-2 versions of MBTS, MBSC, and OSS NEs. Therefore, the RRU3953 can be used with products of SRAN8.0, SRAN9.0 and SRAN10.1 versions. All these three versions include the RRU3953 software components. The RRU3953 used in SRAN9.0, SRAN10.0 and SRAN11.0 has no impact on the KPI of products.

The software version of the RRU3953(900 MHz, not including LTE (NB-IoT)) is SRAN11.0, which is compatible with the N-1 and N-2 versions of MBTS, MBSC, and OSS NEs. Therefore, the RRU3953 can be used with products of SRAN9.0, SRAN10.1 and SRAN11.0 versions. All these three versions include the RRU3953 software components. The RRU3953 used in SRAN9.0, SRAN10.1 and SRAN11.0 has no impact on the KPI of products.

The software version of the RRU3953(900 MHz, including LTE (NB-IoT)) is SRAN12.0

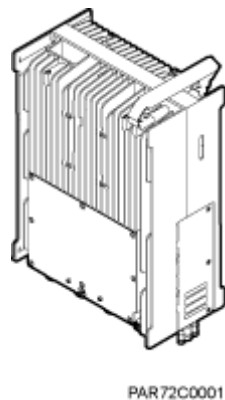
The software version of the RRU3953(2100 MHz) is SRAN12.0, which is compatible with the N-1 and N-2 versions of MBTS, MBSC, and OSS NEs. Therefore, the RRU3953 can be used with products of SRAN10.1, SRAN11.1 and SRAN12.0 versions. All these three versions include the RRU3953 software components. The RRU3953 used in SRAN10.1, SRAN11.1 and SRAN12.0 has no impact on the KPI of products.

The software version of the RRU3953w is SRAN10.1, which is compatible with the N-1 versions of MBTS, MBSC, and OSS NEs. Therefore, the RRU3953w can be used with products of SRAN9.0 and SRAN10.1 versions. All these two versions include the RRU3953w software components. The RRU3953w used in SRAN9.0 and SRAN10.1 has no impact on the KPI of products.

1.1 Appearance

Figure 1-1 shows the appearance of the RRU3953/RRU3953w.

Figure 1-1 Appearance of the RRU3953/RRU3953w



1.2 Physical Ports

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

Figure 1-2 shows the physical ports on the RRU3953/RRU3953w and Table 1-1 describes these ports.

Figure 1-2 Physical ports on the RRU3953/RRU3953w

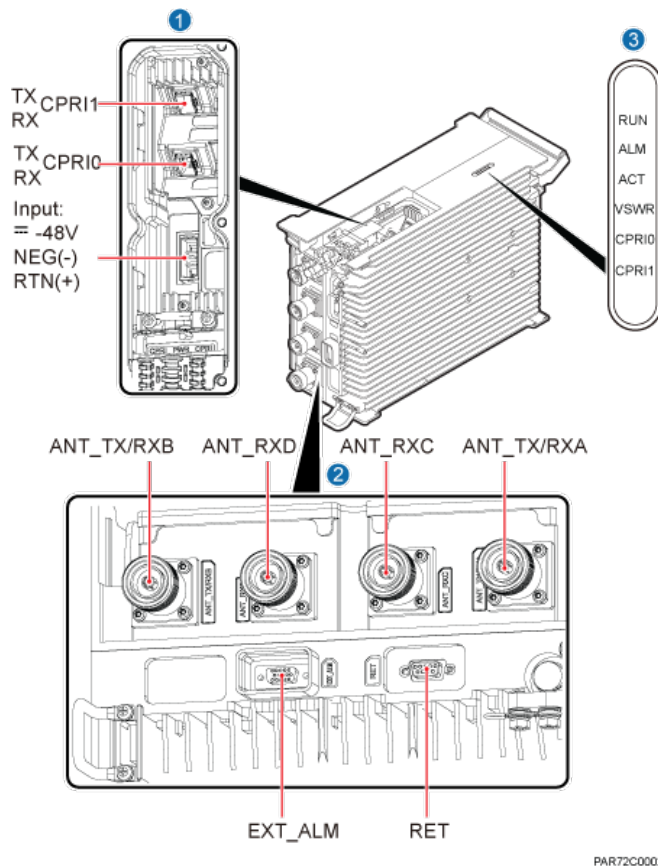


Table 1-1 Physical ports on the RRU3953/RRU3953w

Port	Connector	Quantity	Description
RF port	DIN	4	Connects to the antenna system.
CPRI port	DLC	2	Connects to the baseband unit (BBU).
Power supply port	Tool-less female connector (pressfit type)	1	Supplies –48 V DC power input.
RET port	DB9	1	Connects to the remote control unit (RCU).
Alarm port	DB15	1	Receives alarm signals from the external devices.

2 Technical Specifications

2.1 Frequency Band

Table 2-1 RRU3953/RRU3953w frequency band

Type	Frequency Band (MHz)	RX Frequency Band (MHz)	TX Frequency Band (MHz)	IBW (MHz)
RRU3953	900 EGSM	880 to 915	925 to 960	35
	900 PGSM	890 to 915	935 to 960	25
	1800	1710 to 1785	1805 to 1880	45
	1900	1850 to 1910	1930 to 1990	40
	2100	1920 to 1980	2110 to 2170	60
RRU3953w	1800	1710 to 1785	1805 to 1880	75

2.2 Capacity

Table 2-2 Single-mode capacity

Mode	Capacity
GSM	Each RRU3953/RRU3953w supports eight TRXs.
UMTS	(Only 900MHz/1900 MHz/2100MHz frequency band supported) Each RRU3953 supports: <ul style="list-style-type: none"> • Six carriers without MIMO • Four carriers with MIMO
LTE (FDD)	Each RRU3953(1800MHz/1900MHz/2100MHz) supports two carriers. The LTE (FDD) bandwidth is 1.4, 3, 5, 10, 15, or 20 MHz. Each RRU3953w supports two carriers. The LTE (FDD) bandwidth is 5, 10, 15, or 20 MHz.

LTE (NB-IoT)	(Only 900MHz frequency band supported)Each RRU3953 supports 1 carrier.
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Table 2-3 Multi-mode capacity

Mode	Capacity
GSM+UMTS	(Only 900MHz/1900MHz frequency band supported) For detailed specifications, see Table 2-8 and Table 2-9.
GSM+LTE (FDD)	(Only 1800MHz/1900MHz frequency band supported) For detailed specifications, see Table 2-10.
UMTS+LTE (FDD)	(Only 1900MHz/2100MHz frequency band supported)For detailed specifications, see Table 2-11 and Table 2-12.
GSM+UMTS +LTE (FDD)	(Only 1900MHz frequency band supported) For detailed specifications, see Table 2-13.
GSM+LTE (NB-IoT)	(Only 900MHz frequency band supported) For detailed specifications, see Table 2-15.
UMTS+ LTE (NB-IoT)	(Only 900MHz frequency band supported) For detailed specifications, see Table 2-16.
GSM+UMTS + LTE (NB-IoT)	(Only 900MHz frequency band supported) For detailed specifications, see Table 2-17.

2.3 Receiver Sensitivity

Table 2-4 RRU3953/RRU3953w receiver sensitivity

Mode	Frequency Band (MHz)	1-Way Receiver Sensitivity (dBm)	2-Way Receiver Sensitivity (dBm)	4-Way Receiver Sensitivity (dBm)
GSM	900 EGSM	-113.8	-116.6	-119.3 (theoretical value)
	900 PGSM	-113.6	-116.4	-119.1 (theoretical value)
	1800	-114.0	-116.8	-119.5 (theoretical value)
	1900	-113.7	-116.5	-119.2 (theoretical value)
UTMS	900 EGSM	-125.9	-128.7	-131.4

	900 PGSM	-125.7	-128.5	-131.2
	1900	-125.8	-128.6	-131.3
	2100	-125.8	-128.6	-131.3
LTE (FDD)	1800	-106.6	-109.4	-112.1
	1900	-106.3	-109.1	-111.8
	2100	-106.5	-109.3	-112.0
LTE (NB-IoT)	900 EGSM	-127.3	-130.1	-132.8
	900 PGSM	-127.3	-130.1	-132.8

**NOTE**

- The receiver sensitivity of GSM, as recommended in 3GPP TS 51.021, is measured in the central band at the antenna connector on 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 condition that the channel rate reaches 12.2 kbit/s and the bit error rate (BER) is not higher than 0.001.
- The receiver sensitivity of LTE (FDD), as recommended in 3GPP TS 36.104, is measured under a 5 MHz channel bandwidth based on the FRC A1-3 in Annex A.1 (QPSK, R = 1/3, 25 RBs) standard.
- LTE (NB-IoT) receiver sensitivity is measured, as recommended in 3GPP TS 36.104, under a 200 KHz channel bandwidth and a 15 KHz subcarrier spacing based on the FRC A14-1 in Annex A.14 ($\pi/2$ BPSK, R = 1/3, 1 RB) standard.

2.4 Output Power

NOTE

- In Table 2-5, the RRU3953 supports a maximum power of 2 x 80 W, and supports a maximum power of 2 x 60 W when working in GO mode. (1) indicates that the RRU3953 also supports the configuration of 40 W+80 W when working in the 1900 MHz frequency band and in GO mode.
- In Table 2-6, Table 2-7, Table 2-8, Table 2-9 and Table 2-10, (2) indicates that the configuration is supported only when the RRU3953 works in the 1900 MHz frequency band.
- In Table 2-7, Table 2-8, and Table 2-9, (3) indicates that the configuration is supported only when the RRU3953 works in the 900 MHz frequency band.
- RRU3953/RRU3953w modules working in GSM mode and in the 900 MHz/1800 MHz/1900 MHz frequency band comply with the standard EN 301 502 V9.2.1. RRU3953 modules working in LTE (FDD) or multi-standard radio (MSR) mode and in the 900 MHz/1800 MHz/1900 MHz frequency band comply with the standards ETSI EN 301 908 V5.2.1 and 3GPP TS 37.104.
- For the RRU3953/RRU3953w working in GSM mode: When the S1 or S2 configuration is used and the maximum output power is 60 W per carrier, the corresponding 60 W power license must be obtained.
- The output power is 1 dB less than the standard power when the RRU3953/RRU3953w is located at a height of 3500 m to 4500 m; and is 2 dB less than the standard power when the RRU3953/RRU3953w is located at a height of 4500 m to 6000 m.
- Factors such as the inter-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 the 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.
- The **output power per carrier** in the output power tables indicates the maximum output power supported by the network performance.
- When two LTE (FDD) carriers are configured, it is recommended that the power spectrum density (PSD) of the two carriers be set to the same value.
Power spectrum density = Carrier output power/Carrier bandwidth (1.4 MHz and 3 MHz bandwidths are considered as 5 MHz bandwidth in this formula.)
- For RRU3953w, the scenario where the third-order intermodulated signal falls in the receive frequency range of a configured carrier is not supported.

Table 2-5 Typical output power for the RRU3953 (900 MHz, single-mode)

Number of GSM Carriers	Number of UMTS Carriers	Number of LTE (FDD) Carriers	Output Power per GSM Carrier (W)	Output Power per GSM Carrier (W) in the Dynamic Power Sharing Mode	Output Power per UMTS Carrier (W)	Output Power per LTE (FDD) Carrier (W)	Bandwidth Supported by the LTE (FDD) (MHz)
1	0	0	60	60	0	0	/
2	0	0	60	60	0	0	/
3	0	0	30	30	0	0	/
4	0	0	30	30	0	0	/
5	0	0	20	25	0	0	/
6	0	0	20	25	0	0	/
7	0	0	15	20	0	0	/
8	0	0	15	20	0	0	/
0	1	0	0	0	80	0	/
0	2	0	0	0	80	0	/
0	3	0	0	0	40	0	/
0	4	0	0	0	40	0	/
0	5	0	0	0	26	0	/
0	6	0	0	0	26	0	/
0	1 (MIMO)	0	0	0	2x60	0	/
0	2 (MIMO)	0	0	0	2x 40	0	/
0	3 (MIMO)	0	0	0	2x 26	0	/
0	4 (MIMO)	0	0	0	2x 20	0	/

Table 2-6 Typical output power for the RRU3953/RRU3953w (1800 MHz/1900 MHz, single-mode)

Number of GSM Carriers	Number of UMTS Carriers	Number of LTE (FDD) Carriers	Output Power per GSM Carrier (W)	Output Power per GSM Carrier (W) in the Dynamic Power Sharing Mode	Output Power per UMTS Carrier (W)	Output Power per LTE (FDD) Carrier (W)	Bandwidth Supported by the LTE (FDD) (MHz)
1	0	0	60	60	0	0	/
2	0	0	60	60	0	0	/
3	0	0	30	30	0	0	/
4	0	0	30	30	0	0	/
5	0	0	20	25	0	0	/
6	0	0	20	25	0	0	/
7	0	0	15	20	0	0	/
8	0	0	15	20	0	0	/
1 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	80 ⁽¹⁾	80 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	/ ⁽¹⁾
2 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	40 ⁽¹⁾	40 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	/ ⁽¹⁾
3 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	40 ⁽¹⁾	40 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	/ ⁽¹⁾
4 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	27 ⁽¹⁾	27 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	/ ⁽¹⁾
5 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	20 ⁽¹⁾	20 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	/ ⁽¹⁾
6 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	20 ⁽¹⁾	20 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	/ ⁽¹⁾
7 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	16 ⁽¹⁾	20 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾	/ ⁽¹⁾
0 ⁽²⁾	1 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	80 ⁽²⁾	0 ⁽²⁾	/ ⁽²⁾
0 ⁽²⁾	2 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	80 ⁽²⁾	0 ⁽²⁾	/ ⁽²⁾
0 ⁽²⁾	3 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	40 ⁽²⁾	0 ⁽²⁾	/ ⁽²⁾
0 ⁽²⁾	4 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	40 ⁽²⁾	0 ⁽²⁾	/ ⁽²⁾
0 ⁽²⁾	5 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	25 ⁽²⁾	0 ⁽²⁾	/ ⁽²⁾
0 ⁽²⁾	6 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	25 ⁽²⁾	0 ⁽²⁾	/ ⁽²⁾
0 ⁽²⁾	1 (MIMO) ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	2x40 ⁽²⁾	0 ⁽²⁾	/ ⁽²⁾

0 ⁽²⁾	2 (MIMO) (2)	0 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	2x40 ⁽²⁾	0 ⁽²⁾	/ ⁽²⁾
0 ⁽²⁾	3 (MIMO) (2)	0 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	2x20 ⁽²⁾	0 ⁽²⁾	/ ⁽²⁾
0 ⁽²⁾	4 (MIMO) (2)	0 ⁽²⁾	0 ⁽²⁾	0 ⁽²⁾	2x20 ⁽²⁾	0 ⁽²⁾	/ ⁽²⁾
0	0	1 (MIMO)	0	0	0	2x40	1.4, 3
0	0	1 (MIMO)	0	0	0	2x60	5, 10, 15, 20
0	0	2 (MIMO)	0	0	0	2x40	1.4, 3, 5, 10, 15, 20

Table 2-7 Typical output power for the RRU3953 (2100 MHz, single-mode)

Number of UMTS Carriers	Number of LTE (FDD) Carriers	Output Power per UMTS Carrier (W)	Output Power per LTE (FDD) Carrier (W)	Bandwidth Supported by the LTE (FDD) (MHz)
1	0	80	0	/
2	0	80	0	/
3	0	40	0	/
4	0	40	0	/
5	0	26	0	/
6	0	26	0	/
1 (MIMO)	0	2x80	0	/
2 (MIMO)	0	2x40	0	/
3 (MIMO)	0	2x26	0	/
4 (MIMO)	0	2x20	0	/
2 + 1 (MIMO)	0	Non-MIMO Carrier: 40 MIMO Carrier: 2x40	0	/
2 + 2 (MIMO)	0	Non-MIMO Carrier: 26 MIMO Carrier: 2x26	0	/

2 + 3 (MIMO)	0	Non-MIMO Carrier: 20 MIMO Carrier: 2x20	0	/
4 + 1 (MIMO)	0	Non-MIMO Carrier: 26 MIMO Carrier: 2x26	0	/
4 + 2 (MIMO)	0	Non-MIMO Carrier: 20 MIMO Carrier: 2x20	0	/
6 + 1 (MIMO)	0	Non-MIMO Carrier: 20 MIMO Carrier: 2x20	0	/
0	1 (MIMO)	0	2x80	5, 10, 15, 20
0	1 (MIMO)	0	2x40	5, 10, 15, 20

Table 2-8 Typical output power for the RRU3953 (900 MHz/1900 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 ⁽²⁾	1 ⁽²⁾	80 ⁽²⁾	80 ⁽²⁾
1 ⁽²⁾	2 ⁽²⁾	80 ⁽²⁾	40 ⁽²⁾
1 ⁽²⁾	3 ⁽²⁾	80 ⁽²⁾	27 ⁽²⁾
1 ⁽²⁾	4 ⁽²⁾	80 ⁽²⁾	20 ⁽²⁾
2	1	40	80
2	2	40	40
2	3	40	27
2	4	40	20
3	1	27	80
3	2	27	40
3	3	27	27
3	4	27	20
4	1	20	80

Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
4	2	20	40
4	3	20	27
4	4	20	20
5	1	16	80
5	2	16	40
5	3	16	27
6	1	12	80
6	2	12	40
6 ⁽²⁾	3 ⁽²⁾	10 ⁽²⁾	27 ⁽²⁾
7 ⁽²⁾	1 ⁽²⁾	6 ⁽²⁾	80 ⁽²⁾

Table 2-9 Typical output power for the RRU3953 (900 MHz/1900 MHz, GU MSR)

Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
1 ⁽³⁾	1 ⁽³⁾	30 ⁽³⁾	50 ⁽³⁾
1	1	40	40
1 ⁽³⁾	2 ⁽³⁾	30 ⁽³⁾	50 ⁽³⁾
1	2	40	40
1	3	40	40
1 ⁽³⁾	4 ⁽³⁾	40 ⁽³⁾	20 ⁽³⁾
1 ⁽²⁾	4 ⁽²⁾	40 ⁽²⁾	26 ⁽²⁾
2 ⁽³⁾	1 ⁽³⁾	30 ⁽³⁾	50 ⁽³⁾
2	1	40	40
2 ⁽³⁾	2 ⁽³⁾	30 ⁽³⁾	50 ⁽³⁾
2	2	40	40
2 ⁽³⁾	3 ⁽³⁾	20 ⁽³⁾	40 ⁽³⁾
2	3	40	20
2 ⁽³⁾	4 ⁽³⁾	40 ⁽³⁾	20 ⁽³⁾
3	1	40	40

Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
3	2	20	40
3 ⁽³⁾	2 ⁽³⁾	25 ⁽³⁾	30 ⁽³⁾
3 ⁽³⁾	2 ⁽³⁾	30 ⁽³⁾	20 ⁽³⁾
3 ⁽³⁾	3 ⁽³⁾	25 ⁽³⁾	25 ⁽³⁾
3 ⁽³⁾	3 ⁽³⁾	20 ⁽³⁾	30 ⁽³⁾
3 ⁽³⁾	4 ⁽³⁾	20 ⁽³⁾	20 ⁽³⁾
4	1	20	40
4 ⁽³⁾	1 ⁽³⁾	27 ⁽³⁾	40 ⁽³⁾
4	2	20	40
4 ⁽³⁾	2 ⁽³⁾	25 ⁽³⁾	30 ⁽³⁾
4 ⁽³⁾	2 ⁽³⁾	30 ⁽³⁾	20 ⁽³⁾
4 ⁽³⁾	3 ⁽³⁾	15 ⁽³⁾	20 ⁽³⁾
4 ⁽³⁾	4 ⁽³⁾	15 ⁽³⁾	25 ⁽³⁾
5	1	20	40
5 ⁽³⁾	1 ⁽³⁾	27 ⁽³⁾	27 ⁽³⁾
5	2	20	20
5	2	15	30
5 ⁽³⁾	2 ⁽³⁾	20 ⁽³⁾	30 ⁽³⁾
6	1	20	40
6	2	20	20
6 ⁽²⁾	2 ⁽²⁾	15 ⁽²⁾	30 ⁽²⁾
7 ⁽²⁾	1 ⁽²⁾	15 ⁽²⁾	30 ⁽²⁾
7 ⁽³⁾	1 ⁽³⁾	16 ⁽³⁾	30 ⁽³⁾
7 ⁽³⁾	1 ⁽³⁾	20 ⁽³⁾	20 ⁽³⁾
1 ⁽³⁾	1 (MIMO) ⁽³⁾	30 ⁽³⁾	2x50 ⁽³⁾
1	1 (MIMO)	40	2x40
2 ⁽³⁾	1 (MIMO) ⁽³⁾	30 ⁽³⁾	2x50 ⁽³⁾
2	1 (MIMO)	40	2x40
3	1 (MIMO)	20	2x40

Number of GSM Carriers	Number of UMTS Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)
3 ⁽³⁾	1 (MIMO) ⁽³⁾	25 ⁽³⁾	2x30 ⁽³⁾
4	1 (MIMO)	20	2x40
4 ⁽³⁾	1 (MIMO) ⁽³⁾	25 ⁽³⁾	2x30 ⁽³⁾
4 ⁽³⁾	1 (MIMO) ⁽³⁾	30 ⁽³⁾	2x20 ⁽³⁾
1 ⁽³⁾	2 (MIMO) ⁽³⁾	20 ⁽³⁾	2x30 ⁽³⁾
1	2 (MIMO)	40	2x20
2 ⁽³⁾	2 (MIMO) ⁽³⁾	20 ⁽³⁾	2x30 ⁽³⁾
2	2 (MIMO)	40	2x20
3 ⁽³⁾	2 (MIMO) ⁽³⁾	15 ⁽³⁾	2x20 ⁽³⁾
3 ⁽²⁾	2 (MIMO) ⁽²⁾	20 ⁽²⁾	2x20 ⁽²⁾
4 ⁽³⁾	2 (MIMO) ⁽³⁾	15 ⁽³⁾	2x20 ⁽³⁾
4 ⁽²⁾	2 (MIMO) ⁽²⁾	20 ⁽²⁾	2x20 ⁽²⁾
1 ⁽³⁾	3 (MIMO) ⁽³⁾	20 ⁽³⁾	2x20 ⁽³⁾
2 ⁽³⁾	3 (MIMO) ⁽³⁾	15 ⁽³⁾	2x20 ⁽³⁾

Table 2-10 Typical output power for the RRU3953/RRU3953w (1800 MHz/1900 MHz, GL MSR)

Number of GSM Carriers	Number of LTE (FDD) Carriers	Output Power per GSM Carrier (W)	Output Power per LTE (FDD) Carrier (W)	Bandwidth Supported by the LTE (FDD) (MHz)
1	1 (MIMO)	40	2x40	1.4, 3, 5, 10, 15, 20
1	1 (MIMO)	30	2x50	1.4, 3, 5, 10, 15, 20
2	1 (MIMO)	40	2x40	1.4, 3, 5, 10, 15, 20
2	1 (MIMO)	30	2x50	1.4, 3, 5, 10, 15, 20
3	1 (MIMO)	20	2x40	1.4, 3, 5, 10, 15, 20
3	1 (MIMO)	25	2x30	1.4, 3, 5, 10, 15, 20
3	1 (MIMO)	30	2x20	1.4, 3, 5, 10, 15, 20
4	1 (MIMO)	20	2x40	1.4, 3, 5, 10, 15, 20
4	1 (MIMO)	25	2x30	1.4, 3, 5, 10, 15, 20

Number of GSM Carriers	Number of LTE (FDD) Carriers	Output Power per GSM Carrier (W)	Output Power per LTE (FDD) Carrier (W)	Bandwidth Supported by the LTE (FDD) (MHz)
4	1 (MIMO)	30	2x20	1.4, 3, 5, 10, 15, 20
5	1 (MIMO)	20	2x20	1.4, 3, 5, 10, 15, 20
5	1 (MIMO)	16	2x30	1.4, 3, 5, 10, 15, 20
6	1 (MIMO)	20	2x20	1.4, 3, 5, 10, 15, 20
7 ⁽²⁾	1 (MIMO) ⁽²⁾	15 ⁽²⁾	2x20 ⁽²⁾	1.4, 3, 5, 10, 15, 20 ⁽²⁾
1	2 (MIMO)	20	2x30	1.4, 3, 5, 10, 15, 20
1	2 (MIMO)	20	Carrier1: 2x40 Carrier2: 2x20	1.4, 3, 5, 10, 15, 20
1 ⁽²⁾	2 (MIMO) ⁽²⁾	30 ⁽²⁾	Carrier1: 2x20 ⁽²⁾ Carrier2: 2x30 ⁽²⁾	1.4, 3, 5, 10, 15, 20 ⁽²⁾
1 ⁽²⁾	2 (MIMO) ⁽²⁾	40 ⁽²⁾	2x20 ⁽²⁾	1.4, 3, 5, 10, 15, 20 ⁽²⁾
2	2 (MIMO)	20	2x30	1.4, 3, 5, 10, 15, 20
2	2 (MIMO)	20	Carrier1: 2x40 Carrier2: 2x20	1.4, 3, 5, 10, 15, 20
2 ⁽²⁾	2 (MIMO) ⁽²⁾	30 ⁽²⁾	Carrier1: 2x20 ⁽²⁾ Carrier2: 2x30 ⁽²⁾	1.4, 3, 5, 10, 15, 20 ⁽²⁾
2 ⁽²⁾	2 (MIMO) ⁽²⁾	40 ⁽²⁾	2x20 ⁽²⁾	1.4, 3, 5, 10, 15, 20 ⁽²⁾
3	2 (MIMO)	20	2x20	1.4, 3, 5, 10, 15, 20
3	2 (MIMO)	20	Carrier1: 2x25 Carrier2: 2x15	1.4, 3, 5, 10, 15, 20
4	2 (MIMO)	20	2x20	1.4, 3, 5, 10, 15, 20
4	2 (MIMO)	20	Carrier1: 2x25 Carrier2: 2x15	1.4, 3, 5, 10, 15, 20

Number of GSM Carriers	Number of LTE (FDD) Carriers	Output Power per GSM Carrier (W)	Output Power per LTE (FDD) Carrier (W)	Bandwidth Supported by the LTE (FDD) (MHz)
4	2 (MIMO)	10	Carrier1: 2x40 Carrier2: 2x20	Carrier1: 10, 15, 20 Carrier2: 1.4, 3, 5, 10, 15, 20

Table 2-11 Typical output power for the RRU3953 (1900 MHz, UL MSR)

Number of UMTS Carriers	Number of LTE (FDD) Carriers	Output Power per UMTS Carrier (W)	Output Power per LTE (FDD) Carrier (W)	Bandwidth Supported by the LTE (FDD) (MHz)
1	1 (MIMO)	40	2x40	1.4, 3, 5, 10, 15, 20
1 (MIMO)	1 (MIMO)	2x40	2x40	1.4, 3, 5, 10, 15, 20
2	1 (MIMO)	40	2x40	1.4, 3, 5, 10, 15, 20
2 (MIMO)	1 (MIMO)	2x20	2x40	1.4, 3, 5, 10, 15, 20
3	1 (MIMO)	20	2x40	1.4, 3, 5, 10, 15, 20
3 (MIMO)	1 (MIMO)	2x15	2x30	1.4, 3, 5, 10, 15, 20
4	1 (MIMO)	20	2x20	1.4, 3, 5, 10, 15, 20
4 (MIMO)	1 (MIMO)	2x15	2x20	1.4, 3, 5, 10, 15, 20
1	2 (MIMO)	40	2x20	1.4, 3, 5, 10, 15, 20
1	2 (MIMO)	20	Carrier1: 2x20 Carrier2: 2x40	1.4, 3, 5, 10, 15, 20
1	2 (MIMO)	20	2x30	1.4, 3, 5, 10, 15, 20
2	2 (MIMO)	40	2x20	1.4, 3, 5, 10, 15, 20
2	2 (MIMO)	20	Carrier1: 2x20 Carrier2: 2x40	1.4, 3, 5, 10, 15, 20

Number of UMTS Carriers	Number of LTE (FDD) Carriers	Output Power per UMTS Carrier (W)	Output Power per LTE (FDD) Carrier (W)	Bandwidth Supported by the LTE (FDD) (MHz)
2	2 (MIMO)	20	2x30	1.4, 3, 5, 10, 15, 20
3	2 (MIMO)	20	2x20	1.4, 3, 5, 10, 15, 20
4	2 (MIMO)	20	2x20	1.4, 3, 5, 10, 15, 20
2+1(MIMO)	1 (MIMO)	Non-MIMO carrier: 20 MIMO carrier: 2x10	2x20	1.4, 3, 5, 10, 15, 20

Table 2-12 Typical output power for the RRU3953 (2100 MHz, UL MSR)

Number of UMTS Carriers	Number of LTE (FDD) Carriers	Output Power per UMTS Carrier (W)	Output Power per LTE (FDD) Carrier (W)	Bandwidth Supported by the LTE (FDD) (MHz)
1	1 (MIMO)	40	2x40	5, 10, 15, 20
1 (MIMO)	1 (MIMO)	2x40	2x40	5, 10, 15, 20
2	1 (MIMO)	40	2x40	5, 10, 15, 20
2 (MIMO)	1 (MIMO)	2x20	2x40	5, 10, 15, 20
3	1 (MIMO)	20	2x40	5, 10, 15, 20
3 (MIMO)	1 (MIMO)	2x20	2x20	5, 10, 15, 20
4	1 (MIMO)	26	2x26	5, 10, 15, 20
6	1 (MIMO)	20	2x20	5, 10, 15, 20
2	2 (MIMO)	20	2x30	5, 10, 15, 20
4	2 (MIMO)	20	2x20	5, 10, 15, 20

Table 2-13 Typical output power for the RRU3953 (1900 MHz, GUL MSR)

Number of GSM Carriers	Number of UMTS Carriers	Number of LTE (FDD) Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)	Output Power per LTE (FDD) Carrier (W)	Bandwidth Supported by the LTE (FDD) (MHz)
1	1	1 (MIMO)	40	40	2x40	5, 10
2	1	1 (MIMO)	20	40	2x40	5, 10
3	1	1 (MIMO)	20	40	2x20	5, 10
4	1	1 (MIMO)	10	40	2x20	5, 10
1	2	1 (MIMO)	40	20	2x40	5, 10
2	2	1 (MIMO)	20	20	2x40	5, 10
3	2	1 (MIMO)	20	20	2x20	5, 10
4	2	1 (MIMO)	10	20	2x20	5, 10

Table 2-14 Typical output power of the RRU3953 (900 MHz, LTE (NB-IoT))

Number of LTE (NB-IoT) Carriers	Output Power per LTE (NB-IoT) Carrier (W)
1	20
1 (SFB)	2x20

Table 2-15 Typical output power of the RRU3953 (900 MHz, GM MSR)

Number of GSM Carriers	Number of LTE (NB-IoT) Carriers	Output Power per GSM Carrier (W)	Output Power per LTE (NB-IoT) Carrier (W)
1	1	40	10
2	1	40	10
3	1	20	5

Number of GSM Carriers	Number of LTE (NB-IoT) Carriers	Output Power per GSM Carrier (W)	Output Power per LTE (NB-IoT) Carrier (W)
4	1	20	5
5	1	15	5
6	1	15	5
1	1 (SFB)	40	2x10
2	1 (SFB)	40	2x10
3	1 (SFB)	20	2x5
4	1 (SFB)	20	2x5
5	1 (SFB)	15	2x5
6	1 (SFB)	15	2x5

Table 2-16 Typical output power of the RRU3953 (900 MHz, UM MSR)

Number of UMTS Carriers	Number of LTE (NB-IoT) Carriers	Output Power per UMTS Carrier (W)	Output Power per LTE (NB-IoT) Carrier (W)
1	1	60	20
2	1	60	20
3	1	30	10
1	1 (SFB)	60	2x20
2	1 (SFB)	60	2x20
3	1 (SFB)	30	2x10

Table 2-17 Typical output power of the RRU3953 (900 MHz, GUM MSR)

Number of GSM Carriers	Number of UMTS Carriers	Number of LTE (NB-IoT) Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)	Output Power per LTE (NB-IoT) Carrier (W)
1	1	1	60	60	10
2	1	1	30	60	10
3	1	1	20	60	10

Number of GSM Carriers	Number of UMTS Carriers	Number of LTE (NB-IoT) Carriers	Output Power per GSM Carrier (W)	Output Power per UMTS Carrier (W)	Output Power per LTE (NB-IoT) Carrier (W)
1	1	1 (SFB)	60	60	2x10
2	1	1 (SFB)	30	60	2x10
3	1	1 (SFB)	20	60	2x10

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°C.
- The typical power consumption for GSM is reached when the base station works with 30% load. 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 (FDD) is reached when the base station works with 50% load. The maximum power consumption for LTE (FDD) is reached when the base station works with 100% load.
- This section describes the power consumption of an entire base station. Board configurations in a BBU are as follows:
 - GSM: one GTMU
 - UMTS: one UMPTb1 and one WBBPf3 in 3x1 and 3x2 scenarios, one UMPTb1 and two WBBPf3s in 3 x 3 and 3 x 4 scenarios.
 - LTE (FDD): one UMPTb1 and one LBBPd1 when one carrier is configured

Table 2-18 Power consumption of the DBS3900 (Ver.D) (-48 V) (configured with the RRU3953, 900MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	S4/4/4	30	930	1390
UMTS	3x4	40	1250	1775
GSM+UMTS	GSM S2/2/2 + UMTS 3x2	GSM: 40 UMTS: 40	1310	1785

Table 2-19 Power consumption of the DBS3900 (Ver.D) (-48 V) (configured with the RRU3953/RRU3953w, 1800 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	S4/4/4	20	835	1185
	S5/5/5	20	905	1335
	S6/6/6	20	965	1490
LTE (FDD)	3x10 MHz, 1 carrier	2x20	690	850
	3x10 MHz, 2 carrier	2x20	930	1230
GSM+LTE (FDD)	GSM S2/2/2 + LTE (FDD) 3x10MHz, 1 carrier	GSM: 20 LTE (FDD): 2x20	970	1230
	GSM S3/3/3 + LTE (FDD) 3x10 MHz, 1 carrier	GSM: 20 LTE (FDD): 2x20	1025	1390
	GSM S4/4/4 + LTE (FDD) 3x10 MHz, 1 carrier	GSM: 20 LTE (FDD): 2x20	1120	1590

Table 2-20 Power consumption of the DBS3900 (Ver.D) (-48 V) (configured with the RRU3953, 1900 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
GSM	S2/2/2	20	610	710
	S4/4/4	20	750	1070
	S6/6/6	20	1090	1625
UMTS	3x1	20	535	620
	3x2	20	655	790
LTE (FDD)	3x10MHz	2x20	745	890
GSM+UMTS	GSM S2/2/2 + UMTS 3x1	GSM: 20 UMTS: 20	820	1000
	GSM S3/3/3 + UMTS 3x1	GSM: 20 UMTS: 20	1035	1315

	GSM S4/4/4 + UMTS 3x1	GSM: 20 UMTS: 20	1095	1475
GSM+LTE (FDD)	GSM S2/2/2 + LTE (FDD) 3x10MHz	GSM: 20 LTE (FDD):2x20	1040	1290
	GSM S3/3/3 + LTE (FDD) 3x10MHz	GSM: 20 LTE (FDD): 2x20	1105	1465
	GSM S4/4/4 + LTE (FDD) 3x10MHz	GSM: 20 LTE (FDD): 2x20	1200	1650
UMTS+LTE (FDD)	UMTS 3x2 + LTE (FDD) 3x10MHz	UMTS: 20 LTE (FDD): 2x20	1070	1340
	UMTS 3x3 + LTE (FDD) 3x10MHz	UMTS: 20 LTE (FDD): 2x20	1250	1600
	UMTS 3x4 + LTE (FDD) 3x10MHz	UMTS: 20 LTE (FDD): 2x20	1355	1780
GSM+UMTS+ LTE (FDD)	GSM S2/2/2 + UMTS 3x1 + LTE (FDD) 3x10MHz	GSM: 20 UMTS: 20 LTE (FDD): 2x20	1240	1550
	GSM S2/2/2 + UMTS 3x2 + LTE (FDD) 3x10MHz	GSM: 20 UMTS: 20 LTE (FDD): 2x20	1345	1735


Table 2-21 Power consumption of the DBS3900 (Ver.D) (-48 V) (configured with the RRU3953, 2100 MHz)

Mode	Configuration	Output Power per Carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
UMTS	3x2	40	840	1090
LTE (FDD)	3x10MHz	2x40	840	1240

UMTS+LTE (FDD)	UMTS 3x2 + LTE (FDD) 3x10MHz	UMTS: 40 LTE (FDD): 2x40	1450	1970
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2.6 Input Power

Table 2-22 Input power

Item	Specifications
Input power	-48 V DC; voltage range: -36 V DC to -57 V DC  NOTE The RRU3953/RRU3953w supports AC power supply when connected to an external AC/DC power module or an OPM15M. For details, see <i>AC/DC Power Module User Guide</i> and <i>OPM15M User Guide</i> .

2.7 Equipment Specifications

Table 2-23 Equipment specifications

Item	Specifications
Dimensions (H x W x D)	400 mm x 300 mm x 150 mm (without the housing)
Weight	20 kg (without the housing)

2.8 CPRI Port Specifications

Table 2-24 CPRI port specifications

Item	Specifications
Number of CPRI ports	2
CPRI data rate	1.25 Gbit/s, 2.5 Gbit/s, 4.9 Gbit/s, or 9.8 Gbit/s
Topology	Star, chain, or dual-star

Cascading level	<p>CPRI MUX:</p> <ul style="list-style-type: none"> • GU: 6 levels • GL: 4 levels • UL: 4 levels • GUL: 4 levels • GM: 4 levels • UM: 4 levels • GUM: 4 levels
Maximum distance from the BBU	<ul style="list-style-type: none"> • GU: 40 km • GL/UL/GUL: The maximum distances of the RRUs from the BBU vary with the types of BBP in LTE (FDD) mode as follows: <ul style="list-style-type: none"> ▪ LBBPd1/UBBPd3: 20 km ▪ LBBPd2/UBBPd4: 40 km ▪ LBBPd3/UBBPd5/UBBPd6: <ul style="list-style-type: none"> -Number of LTE (FDD) cells ≤ 3: 40 km -Number of LTE (FDD) cells > 3: 20 km • GM/UM/GUM: 20 km

2.9 Environment Specifications

Table 2-25 Environment specifications

Item	Specifications
Operating temperature	-40°C to +50°C (with solar radiation) -40°C to +55°C (without 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: <ul style="list-style-type: none"> • 3GPP TS 45.005 • 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
Protection class	IP65

3 Acronyms and Abbreviations

Table 3-1 Acronyms and abbreviations

Abbreviation	Full Name
3GPP	3rd Generation Partnership Project
BBU	Baseband unit
BER	Bit error rate
CPRI	Common public radio interface
DTX	Discontinuous transmission
GSM	Global System for Mobile Communications
GTMU	GSM transmission and timing and management unit
LBBP	LTE baseband processing unit
LTE	Long Term Evolution
MIMO	Multiple-input multiple-output
MSR	Multi-standard radio
RAN	Radio access network
RRU	Remote radio unit
SDR	Software-defined radio
UBRI	Universal baseband radio interface unit
UMTS	Universal Mobile Telecommunications System
WBBP	WCDMA baseband processing unit