

## Tune Up Procedure

### **Tune-up procedure**

During manufacturing each device is individually calibrated. Measurement is performed in a fully calibrated setup using an Agilent 8960 base station simulator (system tester).

Measurement procedure is outlined below:

#### **Measurement Procedure:**

1. Set the device to operational voltage and on a predefined channel in a special test mode.
2. The actual output power is measured at several power levels.
3. The gain factors of each individual device are adjusted until the target value is met. The appropriate gain control settings for each output power level are stored in each device individually (for each power level).
4. The maximum gains of each individual device are adjusted and measured until the target value is met. The production target power with tolerance compiles with the maximum power in test report.

Then these appropriate gain settings are stored in each device individually. The user has no possibility to change these settings later on, and during manufacturing each device will be individual calibrated in this range. The measurement is done in a fully calibrated setup, which is based on the base station simulator. Furthermore, the highest power level is verified afterwards in a call measurement on each channel.

Please find below target values of the maximum level of the production unit:

**Nominal Target Burst Average power for Production Unit**

Mode	GSM 850 (Nominal)	GSM 1900 (Nominal)
GPRS/EDGE (GMSK, 1 Tx slot)	<b>32.5±1</b>	<b>29.5±1</b>
GPRS/EDGE (GMSK, 2 Tx slots)	<b>32.5±1</b>	<b>29.5±1</b>
GPRS/EDGE (GMSK, 3 Tx slots)	<b>32±1</b>	<b>29±1</b>
GPRS/EDGE (GMSK, 4 Tx slots)	<b>31.5±1</b>	<b>27.5±1</b>
EDGE (8PSK, 1 Tx slot)	<b>27±1</b>	<b>26±1</b>
EDGE (8PSK, 2 Tx slots)	<b>27±1</b>	<b>26±1</b>
EDGE (8PSK, 3 Tx slots)	<b>26±1</b>	<b>25±1</b>
EDGE (8PSK, 4 Tx slots)	<b>25±1</b>	<b>24±1</b>

**Power unit: dBm**

### Nominal Target Power for Production Unit

Mode	WCDMA Band V (Nominal)	WCDMA Band II (Nominal)	WCDMA Band IV (Nominal)
RMC 12.2K	23.5±1	23.5±1	23.5±1
HSDPA Subtest-1	23.5±1	23.5±1	23.5±1
DC-HSDPA Subtest-1	23.5±1	23.5±1	23.5±1
HSUPA Subtest-5	23±1	23±1	23±1

Power unit: dBm

### HSPA and HSPA+ Target MPR level

Since the tolerance of each subtest may differ across all subtests, the MPR deviations are expected for some HSPA and HSPA+ subtests which may differ from the specification of 3GPP, according to the chipset implementation in this model. The MPR settings are permanently implemented configured into firmware and cannot be disabled by the end user or UMTS carrier network. The target MPR level shown below:

HSDPA Subtest	Band V	Band II	Band IV
1	0	0	0
2	0	0	0
3	0.5	0.5	0.5
4	0.5	0.5	0.5
DC-HSDPA Subtest	Band V	Band II	Band IV
1	0	0	0
2	0	0	0
3	0.5	0.5	0.5
4	0.5	0.5	0.5
HSUPA Subtest	Band V	Band II	Band IV
1	0	0	0
2	2	2	2
3	1	1	1
4	2	2	2
5	0	0	0

Unit: dB

### Nominal Target Power for Production Unit

LTE Band 2				
Modulation	BW (MHz)	RB size	Target MPR	Nominal Power
QPSK	20	≤ 18	22.5±1	0
QPSK	20	> 18	22.5±1	0
16QAM	20	≤ 18	21.5±1	1
16QAM	20	> 18	21.5±1	1
QPSK	15	≤ 16	22.5±1	0
QPSK	15	> 16	22.5±1	0
16QAM	15	≤ 16	21.5±1	1
16QAM	15	> 16	21.5±1	1
QPSK	10	≤ 12	22.5±1	0
QPSK	10	> 12	22.5±1	0
16QAM	10	≤ 12	21.5±1	1
16QAM	10	> 12	21.5±1	1
QPSK	5	≤ 8	22.5±1	0
QPSK	5	> 8	22.5±1	0
16QAM	5	≤ 8	21.5±1	1
16QAM	5	> 8	21.5±1	1
QPSK	3	≤ 4	22.5±1	0
QPSK	3	> 4	22.5±1	0
16QAM	3	≤ 4	21.5±1	1
16QAM	3	> 4	21.5±1	1
QPSK	1.4	≤ 5	22.5±1	0
QPSK	1.4	> 5	22.5±1	0
16QAM	1.4	≤ 5	21.5±1	1
16QAM	1.4	> 5	21.5±1	1

Power unit: dBm

### Nominal Target Power for Production Unit

LTE Band 4				
Modulation	BW (MHz)	RB size	Target MPR	Nominal Power
QPSK	20	≤ 18	22.5±1	0
QPSK	20	> 18	22.5±1	0
16QAM	20	≤ 18	21.5±1	1
16QAM	20	> 18	21.5±1	1
QPSK	15	≤ 16	22.5±1	0
QPSK	15	> 16	22.5±1	0
16QAM	15	≤ 16	21.5±1	1
16QAM	15	> 16	21.5±1	1
QPSK	10	≤ 12	22.5±1	0
QPSK	10	> 12	22.5±1	0
16QAM	10	≤ 12	21.5±1	1
16QAM	10	> 12	21.5±1	1
QPSK	5	≤ 8	22.5±1	0
QPSK	5	> 8	22.5±1	0
16QAM	5	≤ 8	21.5±1	1
16QAM	5	> 8	21.5±1	1
QPSK	3	≤ 4	22.5±1	0
QPSK	3	> 4	22.5±1	0
16QAM	3	≤ 4	21.5±1	1
16QAM	3	> 4	21.5±1	1
QPSK	1.4	≤ 5	22.5±1	0
QPSK	1.4	> 5	22.5±1	0
16QAM	1.4	≤ 5	21.5±1	1
16QAM	1.4	> 5	21.5±1	1

**Power unit: dBm**

### Nominal Target Power for Production Unit

LTE Band 5				
Modulation	BW (MHz)	RB size	Target MPR	Nominal Power
QPSK	10	≤ 12	22.5±1	0
QPSK	10	> 12	22.5±1	0
16QAM	10	≤ 12	22±1	0.5
16QAM	10	> 12	22±1	0.5
QPSK	5	≤ 8	22.5±1	0
QPSK	5	> 8	22.5±1	0
16QAM	5	≤ 8	22±1	0.5
16QAM	5	> 8	22±1	0.5
QPSK	3	≤ 4	22.5±1	0
QPSK	3	> 4	22.5±1	0
16QAM	3	≤ 4	22±1	0.5
16QAM	3	> 4	22±1	0.5
QPSK	1.4	≤ 5	22.5±1	0
QPSK	1.4	> 5	22.5±1	0
16QAM	1.4	≤ 5	22±1	0.5
16QAM	1.4	> 5	22±1	0.5

Power unit: dBm

### Nominal Target Power for Production Unit

LTE Band 7				
Modulation	BW (MHz)	RB size	Target MPR	Nominal Power
QPSK	20	≤ 18	22.5±1	0
QPSK	20	> 18	22.5±1	0
16QAM	20	≤ 18	21.5±1	1
16QAM	20	> 18	21.5±1	1
QPSK	15	≤ 16	22.5±1	0
QPSK	15	> 16	22.5±1	0
16QAM	15	≤ 16	21.5±1	1
16QAM	15	> 16	21.5±1	1
QPSK	10	≤ 12	22.5±1	0
QPSK	10	> 12	22.5±1	0
16QAM	10	≤ 12	21.5±1	1
16QAM	10	> 12	21.5±1	1
QPSK	5	≤ 8	22.5±1	0
QPSK	5	> 8	22.5±1	0
16QAM	5	≤ 8	21.5±1	1
16QAM	5	> 8	21.5±1	1

Power unit: dBm

**Nominal Target Power for Production Unit**

LTE Band 13				
Modulation	BW (MHz)	RB size	Target MPR	Nominal Power
QPSK	10	≤ 12	22.5±1	0
QPSK	10	> 12	22.5±1	0
16QAM	10	≤ 12	22±1	0.5
16QAM	10	> 12	22±1	0.5
QPSK	5	≤ 8	22.5±1	0
QPSK	5	> 8	22.5±1	0
16QAM	5	≤ 8	22±1	0.5
16QAM	5	> 8	22±1	0.5

**Power unit: dBm**

**Nominal Target Power for Production Unit**

LTE Band 17				
Modulation	BW (MHz)	RB size	Target MPR	Nominal Power
QPSK	10	≤ 12	22.5±1	0
QPSK	10	> 12	22.5±1	0
16QAM	10	≤ 12	22±1	0.5
16QAM	10	> 12	22±1	0.5
QPSK	5	≤ 8	22.5±1	0
QPSK	5	> 8	22.5±1	0
16QAM	5	≤ 8	22±1	0.5
16QAM	5	> 8	22±1	0.5

**Power unit: dBm**

### LTE Target MPR level

The device implements maximum power reduction per 3GPP 36.101 requirements where the MPR target is as below table. The MPR settings are permanently implemented configured into firmware and cannot be disabled by the end user or LTE carrier network. The following table lists the target MPR level:

#### For Band 2:

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR Target (dB)						3GPP MPR (dB)
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	1	1	1	1	1	1	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	1	1	1	1	1	1	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	2	2	2	2	2	2	≤ 2

#### For Band 4:

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR Target (dB)						3GPP MPR (dB)
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	1	1	1	1	1	1	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	1	1	1	1	1	1	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	2	2	2	2	2	2	≤ 2

#### For Band 5:

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]				MPR Target (dB)				3GPP MPR (dB)
	1.4 MHz	3 MHz	5 MHz	10 MHz	1.4 MHz	3 MHz	5 MHz	10 MHz	
QPSK	> 5	> 4	> 8	> 12	1	1	1	1	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	1	1	1	1	≤ 1
16 QAM	> 5	> 4	> 8	> 12	2	2	2	2	≤ 2

#### For Band 7:

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]				MPR Target (dB)				3GPP MPR (dB)
	5 MHz	10 MHz	15 MHz	20 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 8	> 12	> 16	> 18	1	1	1	1	≤ 1
16 QAM	≤ 8	≤ 12	≤ 16	≤ 18	1	1	1	1	≤ 1
16 QAM	> 8	> 12	> 16	> 18	2	2	2	2	≤ 2

#### For Band 13:

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]		MPR Target (dB)		3GPP MPR (dB)
	5 MHz	10 MHz	5 MHz	10 MHz	
QPSK	> 8	> 12	1	1	≤ 1
16 QAM	≤ 8	≤ 12	1	1	≤ 1
16 QAM	> 8	> 12	2	2	≤ 2



**For Band 17:**

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]		MPR Target (dB)		3GPP MPR (dB)
	5 MHz	10 MHz	5 MHz	10 MHz	
QPSK	> 8	> 12	1	1	≤ 1
16 QAM	≤ 8	≤ 12	1	1	≤ 1
16 QAM	> 8	> 12	2	2	≤ 2