Tune-up procedure

Each device is individually calibrated during manufacturing. Measurement is performed in a full calibrated setup using Wideband Radio Communication Tester or spectrum analyzer and power meter.

Measurement procedure is outlined below:

1. Set the device to operational voltage and on a predefined band class and channel.
2. The maximum output power is measured when the power control bit is set as all UP bits. The WWAN RF output power will be adjusted equal or lower than tested power shown in the test report.
3. The WIFI specific RF characteristics were measured by spectrum analyzer and power meter.

The user has no possibility to change these settings.

Tune up procedure shall be over the power range or at specific operating power levels.

1. It must provide an operational voltage to turn on the device and on one certain channel in service mode by means of company proprietary software.
2. The Base station simulator measures the WWAN device specific RF characteristics.
3. The maximum gains of each individual device are adjusted until the target value met.

GSM Bands

Mode	Target Power (dBm)		Tolerance (dB)
	GSM 850	PCS 1900	
GSM (GMSK, 1Tx-slot)	31.0	27.5	(-1.5,+0.5)
GPRS (GMSK, 1Tx-slot)	31.0	27.5	(-1.5,+0.5)
GPRS (GMSK, 2Tx-slot)	29.0	25.0	(-1.5,+0.5)
GPRS (GMSK, 3Tx-slot)	27.5	23.5	(-1.5,+0.5)
GPRS (GMSK, 4Tx-slot)	25.5	21.5	(-1.5,+0.5)
EDGE (8PSK, 1Tx-slot)	24.5	23.5	(-1.5,+0.5)
EDGE (8PSK, 2Tx-slot)	23.5	21.5	(-1.5,+0.5)
EDGE (8PSK, 3Tx-slot)	21.0	19.5	(-1.5,+0.5)
EDGE (8PSK, 4Tx-slot)	18.5	16.5	(-1.5,+0.5)

WCDMA Band

Band	Mode	Target Power (dBm)			Tolerance (dB)
		Band II	Band IV	Band V	
WCDMA	RMC 12.2K	22.0	22.0	22.5	(-1.5,+0.5)
	HSDPA Subtest-1	21.0	20.0	21.5	(-1.5,+0.5)
	HSDPA Subtest-2	19.0	19.0	19.5	(-1.5,+0.5)
	HSDPA Subtest-3	18.0	18.5	19.0	(-1.5,+0.5)
	HSDPA Subtest-4	18.0	18.0	18.0	(-1.5,+0.5)
	HSUPA Subtest-1	19.5	20.5	21.0	(-1.5,+0.5)
	HSUPA Subtest-2	20.0	21.0	21.5	(-1.5,+0.5)
	HSUPA Subtest-3	18.5	19.0	20.0	(-1.5,+0.5)
	HSUPA Subtest-4	20.5	21.0	22.0	(-1.5,+0.5)
	HSUPA Subtest-5	19.0	20.0	20.0	(-1.5,+0.5)

LTE Band

Band	Mode	Target Power (dBm)	Tolerance (dB)
LTE Band 2	QPSK /16QAM/64QAM	23.0	(-1.5,+0.5)
LTE Band 4	QPSK /16QAM/64QAM	23.0	(-1.5,+0.5)
LTE Band 5	QPSK /16QAM/64QAM	23.0	(-1.5,+0.5)
LTE Band 7	QPSK /16QAM/64QAM	23.0	(-1.5,+0.5)
LTE Band 12	QPSK /16QAM/64QAM	23.0	(-1.5,+0.5)
LTE Band 13	QPSK /16QAM/64QAM	23.0	(-1.5,+0.5)
LTE Band 17	QPSK /16QAM/64QAM	23.0	(-1.5,+0.5)
LTE Band 66	QPSK /16QAM/64QAM	23.0	(-1.5,+0.5)
LTE Band 71	QPSK /16QAM/64QAM	23.0	(-1.5,+0.5)

2.4G WLAN

Band	Mode	Target Power (dBm)	Tolerance (dB)
2.4G WLAN	802.11b	16.0	(-1.5,+0.5)
	802.11g	16.0	(-1.5,+0.5)
	802.11n HT20	15.0	(-1.5,+0.5)

BT

Band	Mode	Target Power (dBm)	Tolerance (dB)
BT	GFSK	6.5	(-1.5,+0.5)
	π/4-DQPSK	4.5	(-1.5,+0.5)
	8-DPSK	4.5	(-1.5,+0.5)
	LE	0.5	(-1.5,+0.5)

Maximum Power Reduction (MPR)

LTE

Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel Bandwidth / RB Configurations						LTE MPR Setting (dB)
	BW 1.4 MHz	BW 3 MHz	BW 5 MHz	BW 10 MHz	BW 15 MHz	BW 20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	1
16QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	1
16QAM	> 5	> 4	> 8	> 12	> 16	> 18	2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	3

WCDMA

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs} (1)	CM (dB)(2)	MPR
1	2 / 15	15 / 15	64	2 / 15	4 / 15	0.0	0
2	12 / 15 (3)	15 / 15 (3)	64	12 / 15 (3)	24 / 15	1.0	0
3	15 / 15	8 / 15	64	15 / 8	30 / 15	1.5	0.5
4	15 / 15	4 / 15	64	15 / 4	30 / 15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 8 ⇔ A_{hs} = β_{hs} / β_c = 30 / 15 ⇔ β_{hs} = 30 / 15 * β_c.

Note 2: CM = 1 for β_c / β_d = 12 / 15, β_{hs} / β_c = 24 / 15.

Note 3: For subtest 2 the β_c / β_d ratio of 12 / 15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 11 / 15 and β_d = 15 / 15.