

Tune-up Procedure

During manufacturing each phone will be individually calibrated.

The measurement is done in a fully calibrated setup, which is based on Anritsu MT8820C (adjustment of gain factors) or Agilent 8960 or RS CMU200 or RS CMW500 (control of power levels).

Furthermore, the highest power level is verified afterwards in a call or data measurement on three channels (low, mid and high).

Procedure:

1. Set the phone to operational voltage and on one certain channel in a special service mode by means of company proprietary software.
2. The actual power is measured at several power levels.
3. The gain factors of each individual phone are adjusted via the Board-test SW using automatic adjustment arithmetic until the Tune-up value is met.
- 4 . The Tune-up value is below:

GSM Speech

GSM850			
Channel	Channel 128	Channel 190	Channel 251
Target (dBm)	33	33	33
Tune-up(dBm)	± 1.5	± 1.5	± 1.5
GSM 1900			
Channel	Channel 850	Channel 610	Channel 512
Target (dBm)	30.5	30.5	30.5
Tune-up(dBm)	± 1	± 1	± 1

GPRS and EGPRS (GMSK Modulation)

GSM 850 GPRS (GMSK)				
Channel		128	190	251
1 Txslot	Target (dBm)	32.5	32.5	32.5
	Tune-up(dB)	± 1.5	± 1.5	± 1.5
2 Txslots	Target (dBm)	30.5	30.5	30.5
	Tune-up(dB)	± 1.5	± 1.5	± 1.5
3 Txslots	Target (dBm)	28.5	28.5	28.5
	Tune-up(dB)	± 1.5	± 1.5	± 1.5
4 Txslots	Target (dBm)	26.5	26.5	26.5
	Tune-up(dB)	± 1.5	± 1.5	± 1.5
GSM 850 EGPRS (GMSK)				
Channel		128	190	251
1 Txslot	Target (dBm)	33	33	33
	Tune-up(dB)	± 1.5	± 1.5	± 1.5
2 Txslots	Target (dBm)	30.5	30.5	30.5
	Tune-up(dB)	± 1.5	± 1.5	± 1.5
3 Txslots	Target (dBm)	28.5	28.5	28.5
	Tune-up(dB)	± 1.5	± 1.5	± 1.5
4 Txslots	Target (dBm)	26.5	26.5	26.5
	Tune-up(dB)	± 1.5	± 1.5	± 1.5
GSM 850 EGPRS (8PSK)				

Channel		128	190	251
1 Txslot	Target (dBm)	29.5	29.5	29.5
	Tune-up(dB)	± 1	± 1	± 1
2 Txslots	Target (dBm)	28	28	28
	Tune-up(dB)	± 1	± 1	± 1
3 Txslots	Target (dBm)	26	26	26
	Tune-up(dB)	± 1	± 1	± 1
4 Txslots	Target (dBm)	24	24	24
	Tune-up(dB)	± 1	± 1	± 1
GSM 1900 GPRS (GMSK)				
Channel		850	610	512
1 Txslot	Target (dBm)	29.5	29.5	29.5
	Tune-up(dB)	± 1	± 1	± 1
2 Txslots	Target (dBm)	28	28	28
	Tune-up(dB)	± 1	± 1	± 1
3 Txslots	Target (dBm)	26	26	26
	Tune-up(dB)	± 1	± 1	± 1
4 Txslots	Target (dBm)	24	24	24
	Tune-up(dB)	± 1	± 1	± 1
GSM 1900 EGPRS (GMSK)				
Channel		850	610	512
1 Txslot	Target (dBm)	29.5	29.5	29.5
	Tune-up(dB)	± 1	± 1	± 1
2 Txslots	Target (dBm)	27.5	27.5	27.5
	Tune-up(dB)	± 1	± 1	± 1
3 Txslots	Target (dBm)	26	26	26
	Tune-up(dB)	± 1	± 1	± 1
4 Txslots	Target (dBm)	24	24	24
	Tune-up(dB)	± 1	± 1	± 1
GSM 1900 EGPRS (8PSK)				
Channel		850	610	512
1 Txslots	Target (dBm)	28.5	28.5	28.5
	Tune-up(dB)	± 1	± 1	± 1
2 Txslots	Target (dBm)	26	26	26
	Tune-up(dB)	± 1	± 1	± 1
3 Txslots	Target (dBm)	25	25	25
	Tune-up(dB)	± 1	± 1	± 1
4 Txslots	Target (dBm)	23	23	23
	Tune-up(dB)	± 1	± 1	± 1

2) WCDMA

WCDMA 850 CS					
Channel	Channel 4133			Channel 4183	Channel 4232
Target (dBm)	23.3			23.3	23.3
Tune-up(dB)	±1.5			±1.5	±1.5
WCDMA 900 CS					
Channel	Channel 2712			Channel 2787	Channel 2863
Target (dBm)	23.3			23.3	23.3
Tune-up(dB)	±1.5			±1.5	±1.5
WCDMA 1900 CS					
Channel	Channel 9263			Channel 9400	Channel 9537
Target (dBm)	23.3			23.3	23.3
Tune-up(dB)	±1.5			±1.5	±1.5
WCDMA 1700 CS					
Channel	Channel 1313			Channel 1412	Channel 1512
Target (dBm)	23.3			23.3	23.3
Tune-up(dB)	±1.5			±1.5	±1.5
Item	band	FDD VIII result			
	ARFCN	Chnannel	2712	2788	2863
HSUPA	1	Target (dBm)	20	20	20
	Tune-up(dB)		±1.5	±1.5	±1.5
	2	Target (dBm)	20	20	20
	Tune-up(dB)		±1.5	±1.5	±1.5
	3	Target (dBm)	21	21	21
	Tune-up(dB)		±1.5	±1.5	±1.5
	4	Target (dBm)	19.5	19.5	19.5
	Tune-up(dB)		±1.5	±1.5	±1.5
	5	Target (dBm)	22	22	22
Tune-up(dB)		±1.5	±1.5	±1.5	
Item	band	FDD II result			
	ARFCN	Channel	9263	9400	9537
HSUPA	1	Target (dBm)	20	20	20
	Tune-up(dB)		±1.5	±1.5	±1.5
	2	Target (dBm)	20	20	20
	Tune-up(dB)		±1.5	±1.5	±1.5
	3	Target (dBm)	21	21	21

	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	4	Target (dBm)	19.5	19.5	19.5
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	5	Target (dBm)	22	22	22
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
Item	band	FDD VIII result			
	Subtest	Channel	2712	2788	2863
DC-HSDPA	1	Target (dBm)	22	22	22
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	2	Target (dBm)	22	22	22
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	3	Target (dBm)	21.5	21.5	21.5
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	4	Target (dBm)	21.5	21.5	21.5
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
Item	band	FDD II result			
	Subtest	Channel	9263	9400	9537
DC-HSDPA	1	Target (dBm)	22	22	22
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	2	Target (dBm)	22	22	22
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	3	Target (dBm)	21.5	21.5	21.5
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	4	Target (dBm)	21.5	21.5	21.5
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
Item	band	FDD V result			
	ARFCN	Chnannel	4133	4183	4232
HSUPA	1	Target (dBm)	20	20	20
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	2	Target (dBm)	20	20	20
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	3	Target (dBm)	21	21	21
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	4	Target (dBm)	19.5	19.5	19.5
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	5	Target (dBm)	22	22	22
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
Item	band	FDD IV result			
	ARFCN	Channel	1313	1412	1512
HSUPA	1	Target (dBm)	20	20	20

	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	2	Target (dBm)	20	20	20
	Tune-up(dB)		± 1	± 1.5	± 1.5
	3	Target (dBm)	21	21	21
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	4	Target (dBm)	19.5	19.5	19.5
	Tune-up(dB)		± 1.5	± 1.5	± 1
	5	Target (dBm)	22	22	22
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
Item	band	FDD V result			
	Subtest	Channel	4133	4183	4232
DC-HSDPA	1	Target (dBm)	22	22	22
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	2	Target (dBm)	22	22	22
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	3	Target (dBm)	21.5	21.5	21.5
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	4	Target (dBm)	21.5	21.5	21.5
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
Item	band	FDD IV result			
	Subtest	Channel	1313	1412	1512
DC-HSDPA	1	Target (dBm)	22	22	22
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	2	Target (dBm)	22	22	22
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	3	Target (dBm)	21.5	21.5	21.5
	Tune-up(dB)		± 1.5	± 1.5	± 1.5
	4	Target (dBm)	21.5	21.5	21.5
	Tune-up(dB)		± 1.5	± 1.5	± 1.5

3) LTE

Item	band	LTE2 result			
	Subtest	Channel	18600 (1930MHz)	18900 (1950MHz)	19199(1970MHz)
FDD	Target (dBm)		23	23	23
	Tune-up(dB)		± 1	± 1	± 1

Item	band	LTE4result			
	Subtest	Channel	19950 (1720MHz)	20175 (1747.5MHz)	20399 (1775MHz)
FDD	Target (dBm)		23	23	23
	Tune-up(dB)		± 1	± 1	± 1
Item	band	LTE7 result			
	Subtest	Channel	20850 (2505MHz)	21100 (2535MHz)	20300 (2565MHz)
FDD	Target (dBm)		22	22	22
	Tune-up(dB)		± 1	± 1	± 1
Item	band	LTE28 result			
	Subtest	Channel	27210 (885MHz)	27460 (897.5MHz)	27659 (910MHz)
FDD	Target (dBm)		23	23	23
	Tune-up(dB)		± 1	± 1	± 1

Table 11.5-1 Maximum Power Reduction (MPR) for Band 1, LTE Band 3, Band 7, Band 8 and Band20.

Band	MPR
Band 1	
Band 3	
Band 7	
Band 8	
Band 20	

	MPR (dB)
QPSK	1
16 QAM	1
16 QAM	2

4) WiFi

WiFi 802.11b (2.4GHz)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	16	17	16
Tune-up(dB)	± 1	± 1	± 1
WiFi 802.11g (2.4GHz) 6Mbps-54 Mbps:6Mbps			
Data Rate	Channel 1	Channel 6	Channel 11
Target (dBm)	12	13	13
Tune-up(dB)	± 1	± 1	± 1
WiFi 802.11n-20 (2.4GHz) MCS0~7:MCS0			
Data Rate	Channel 1	Channel 6	Channel 11
Target (dBm)	12	13	13
Tune-up(dB)	± 1	± 1	± 1
WiFi 802.11n-40 (2.4GHz) MCS0~5			
Data Rate	Channel 3	Channel 6	Channel 9
Target (dBm)	13	13	12
Tune-up(dB)	± 1	± 1	± 1
WiFi 802.11n-40 (2.4GHz) MCS6~7			
Data Rate	Channel 3	Channel 6	Channel 9
Target (dBm)	13	13	13
Tune-up(dB)	± 1	± 1	± 1

5) Bluetooth

GFSK			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	7.5	9	8
Tune-up(dB)	± 1	± 1	± 1
DQPSK			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	6.5	8	7
Tune-up(dB)	± 1	± 1	± 1
8DPSK			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	6.5	8	7
Tune-up(dB)	± 1	± 1	± 1

The appropriate gain control settings are stored in RF table (a special section in Flash marked with Read only and untouchable for end user) each phone individually (for each power level).

The user has no possibility to change these settings later on.