Tune-up Procedure

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

1. It must provide an operational voltage (3.45~4.2V DC) to turn on the Mobile Data Terminal and on one certain channel in service mode by means of company proprietary software.

2. Base station simulator (Rohde& Schwarz CMW500) measures the WCDMA ,LTE phone specific RF characteristics.

3. The maximum gain of each individual Mobile Data Terminals are adjusted until the target value met.

Full Conducted RF Output Power:

Technology/Band	Mode	Target Power and Tolerance (dBm)
GSM 850	GSM	32.5±1 dBm
	GPRS 1Tx slot	32.5±1 dBm
	GPRS 2Tx slot	29.5±1 dBm
	GPRS 3Tx slot	27.5±1 dBm
	GPRS 4Tx slot	26.5±1 dBm
	EDGE 1Tx slot	26.5±1 dBm
	EDGE 2Tx slot	23.0±1 dBm
	EDGE 3Tx slot	21.0±1 dBm
	EDGE 4Tx slot	20.5±1 dBm
GSM 1900	GSM	28.5±1 dBm
	GPRS 1Tx slot	28.5±1 dBm
	GPRS 2Tx slot	26.0±1 dBm
	GPRS 3Tx slot	23.5±1 dBm
	GPRS 4Tx slot	23.0±1 dBm
	EDGE 1Tx slot	24.5±1 dBm
	EDGE 2Tx slot	21.0±1 Bm
	EDGE 3Tx slot	19.5±1 dBm
	EDGE 4Tx slot	18.0±1 dBm
WCDMA II	AMR	21.5±1 dBm
	RMC	21.5±1 dBm
	HSDPA	21.5±1 dBm
	HSUPA	19.0~22.0 dBm
WCDMA IV	AMR	22.0±1 dBm
	RMC	22.0±1 dBm

	HSDPA	22.0±1 dBm
	HSUPA	19.0~21.5 dBm
WCDMA V	AMR	23.5±1 dBm
	RMC	23.5±1 dBm
	HSDPA	22.5±1 dBm
	HSUPA	21.0~23.5 dBm
CDMA BC0	1xRTT	23.5±1 dBm
	1xEVDO Rev0	21.5±1 dBm
	1xEVDO RevA	21.5±1 dBm
	1xEVDO RevB	21.0±1 dBm
LTE 2	QPSK	22.5±1 dBm
LTE 4	QPSK	22.5±1 dBm
LTE 5	QPSK	23.5±1 dBm
LTE 7	QPSK	22.0±1 dBm
LTE 12	QPSK	22.5±1 dBm
LTE 17	QPSK	22.5±1 dBm
LTE 18	QPSK	22.5±1 dBm
LTE 19	QPSK	22.5±1 dBm
LTE 25	QPSK	22.0±1 dBm
LTE 26	QPSK	22.5±1 dBm
LTE 30	QPSK	22.0±1 dBm
LTE 38	QPSK	21.5±1 dBm
LTE 40	QPSK	22.0±1 dBm
LTE 41	QPSK	21.5±1 dBm
LTE 66	QPSK	22.0±1 dBm
BT	1M	14.0±1dBm
	2M	13.5±1 dBm
	3M	14.0±1 dBm
	LE	0.0±1 dBm

Down Conducted RF Output Power:

Technology/Band	Mode	Target Power and Tolerance (dBm)
GSM 850	GSM	31.0±1 dBm
	GPRS 1Tx slot	31.0±1 dBm
	GPRS 2Tx slot	29.5±1 dBm
	GPRS 3Tx slot	27.5±1 dBm
	GPRS 4Tx slot	26.5±1 dBm
	EDGE 1Tx slot	26.0±1 dBm
	EDGE 2Tx slot	23.5±1 dBm
	EDGE 3Tx slot	21.5±1 dBm
	EDGE 4Tx slot	21.0±1 dBm
GSM 1900	GSM	27.0±1 dBm
	GPRS 1Tx slot	27.0±1 dBm
	GPRS 2Tx slot	25.0±1 dBm
	GPRS 3Tx slot	24.0±1 dBm
	GPRS 4Tx slot	23.0±1 dBm
	EDGE 1Tx slot	24.5±1 dBm
	EDGE 2Tx slot	21.5±1 Bm
	EDGE 3Tx slot	19.5±1 dBm
	EDGE 4Tx slot	18.5±1 dBm
WCDMA II	AMR	16.5±1 dBm
	RMC	16.5±1 dBm
	HSDPA	16.0±1 dBm
	HSUPA	14.0~17.5 dBm
WCDMA IV	AMR	18.5±1 dBm
	RMC	18.5±1 dBm
	HSDPA	17.0±1 dBm
	HSUPA	16.0~18.0 dBm
WCDMA V	AMR	22.0±1 dBm
	RMC	22.0±1 dBm
	HSDPA	20.5±1 dBm
	HSUPA	19.0~21.5 dBm
CDMA BC0	1xRTT	20.5±1 dBm
	1xEVDO Rev0	20.0±1 dBm
	1xEVDO RevA	20.0±1 dBm
	1xEVDO RevB	19.5±1 dBm
LTE 2	QPSK	17.0±1 dBm
LTE 4	QPSK	18.0±1 dBm
LTE 5	QPSK	22.0±1 dBm

LTE 7	QPSK	15.5±1 dBm
LTE 12	QPSK	21.5±1 dBm
LTE 17	QPSK	21.5±1 dBm
LTE 18	QPSK	21.5±1 dBm
LTE 19	QPSK	21.0±1 dBm
LTE 25	QPSK	17.5±1 dBm
LTE 26	QPSK	21.0±1 dBm
LTE 30	QPSK	18.5±1 dBm
LTE 38	QPSK	19.0±1 dBm
LTE 40	QPSK	20.5±1 dBm
LTE 41	QPSK	20.0±1 dBm
LTE 66	QPSK	17.5±1 dBm
2.4G WLAN Ant. 0	802.11b	11.5±1 dBm
	802.11g	11.5±1 dBm
	802.11n(HT20)	11.5±1 dBm
	802.11n(HT40)	12.0±1 dBm
2.4G WLAN Ant. 1	802.11b	12.0±1 dBm
	802.11g	12.0±1 dBm
	802.11n(HT20)	11.5±1 dBm
	802.11n(HT40)	12.0±1 dBm
2.4G WLAN Ant. 0+1	802.11b	15.0±1 dBm
	802.11g	14.5±1 dBm
	802.11n(HT20)	14.5±1 dBm
	802.11n(HT40)	15.0±1 dBm
5.2G WLAN Ant. 0	802.11a (6Mbps)	10.5±1 dBm
	802.11n(HT20)	10.5±1 dBm
	802.11n(HT40)	12.5±1 dBm
	802.11ac(VHT20)	10.5±1 dBm
	802.11ac(VHT40)	12.0±1 dBm
	802.11nac(VHT80)	11.5±1 dBm
5.2G WLAN Ant. 1	802.11a (6Mbps)	6.0±1 dBm
	802.11n(HT20)	6.0±1 dBm
	802.11n(HT40)	6.0±1 dBm
	802.11ac(VHT20)	6.0±1 dBm
	802.11ac(VHT40)	6.0±1 dBm
	802.11nac(VHT80)	4.5±1 dBm
5.2G WLAN Ant. 0+1	802.11a (6Mbps)	12.0±1 dBm
	802.11n(HT20)	12.0±1 dBm
	802.11n(HT40)	13.5±1 dBm
	802.11ac(VHT20)	12.5±1 dBm
	802.11ac(VHT40)	12.5±1 dBm

	802.11nac(VHT80)	12.5±1 dBm
5.3G WLAN Ant. 0	802.11a (6Mbps)	11.0~14.5dBm
	802.11n(HT20)	11.0~15.0dBm
	802.11n(HT40)	14.5~17.5dBm
	802.11ac(VHT20)	11.0~15.0dBm
	802.11ac(VHT40)	14.5~17.0dBm
	802.11nac(VHT80)	14.5±1 dBm
5.3G WLAN Ant.1	802.11a (6Mbps)	6.5~11.5dBm
	802.11n(HT20)	6.5~11.0dBm
	802.11n(HT40)	7.5~11.5dBm
	802.11ac(VHT20)	7.0~11.5dBm
	802.11ac(VHT40)	7.0~11.5dBm
	802.11nac(VHT80)	6.5±1 dBm
5.3G WLAN Ant.0+1	802.11a (6Mbps)	12.5~16.0dBm
	802.11n(HT20)	12.5~16.5dBm
	802.11n(HT40)	15.5~18.5dBm
	802.11ac(VHT20)	12.5~16.5dBm
	802.11ac(VHT40)	15.0~18.0dBm
	802.11nac(VHT80)	15.0±1 dBm
5.5G WLAN Ant.0	802.11a (6Mbps)	9.5±1 dBm
	802.11n(HT20)	9.5±1 dBm
	802.11n(HT40)	10.0~13.0dBm
	802.11ac(VHT20)	9.5±1 dBm
	802.11ac(VHT40)	7.5~13.0dBm
	802.11nac(VHT80)	7.5~12.0dBm
5.5G WLAN Ant.1	802.11a (6Mbps)	5.0±1 dBm
	802.11n(HT20)	5.5±1 dBm
	802.11n(HT40)	6.0~9.0dBm
	802.11ac(VHT20)	5.5±1 dBm
	802.11ac(VHT40)	6.0±1 dBm
	802.11nac(VHT80)	4.0~6.5dBm
5.5G WLAN Ant.0+1	802.11a (6Mbps)	10.5±1 dBm
	802.11n(HT20)	11.0±1 dBm
	802.11n(HT40)	13.0±1 dBm
	802.11ac(VHT20)	11.0±1 dBm
	802.11ac(VHT40)	13.0±1 dBm
	802.11nac(VHT80)	9.5~13.0dBm
5.8G WLAN Ant.0	802.11a (6Mbps)	10.0±1 dBm
	802.11n(HT20)	10.0±1 dBm
	802.11n(HT40)	11.5±1 dBm
	802.11ac(VHT20)	10.0±1 dBm

	802.11ac(VHT40)	11.5±1 dBm
	802.11nac(VHT80)	11.0±1 dBm
5.8G WLAN Ant.1	802.11a (6Mbps)	6.0±1 dBm
	802.11n(HT20)	6.0±1 dBm
	802.11n(HT40)	6.0±1 dBm
	802.11ac(VHT20)	6.0±1 dBm
	802.11ac(VHT40)	6.5±1 dBm
	802.11nac(VHT80)	6.0±1 dBm
5.8G WLAN Ant.0+1	802.11a (6Mbps)	11.5±1 dBm
	802.11n(HT20)	11.5±1 dBm
	802.11n(HT40)	12.5±1 dBm
	802.11ac(VHT20)	11.5±1 dBm
	802.11ac(VHT40)	12.5±1 dBm
	802.11nac(VHT80)	12.0±1 dBm

Then this appropriate gain settings are stored in each Mobile Data Terminal individually.
The user has no possibility to change these settings later on, and during manufacturing each phone will be individual calibrated. The measurement is done in fully calibrated setup, which is based on a Rohde& Schwarz CMW500 base station simulator. Furthermore, the highest power level is verified afterwards in a call measurement on three channels (low, middle and high).