Title: Power Tune up procedure for GE864-QUAD V2

VERIFICATION AND APPROVALS

Function Responsible (A.Sgroi):

1 RF power structure and function

1.1 *Final amplifier stage structure*

The final amplifier stage consists of a power amplifier module and a RF power control circuit. These modules are together providing the corresponding RF power levels at the antenna pad.
The RF power amplifier module is supplied directly from the supply voltage input.
Operating voltage is 3.4 - 4.2 volts. Current consumption is directly related to the different power levels with an approximate maximum peak current consumption of 2 Amperes.
The RF power control circuit sets the RF power amplifier module output by regulating the power amplifier gain in accordance to the values stored after the factory tune up procedure.

1.2 *Range of operating RF power levels for GSM 1900 (PCS)*

GSM 1900 supports 16 power levels as described in the GSM 1900 system specification. The nominal power levels and tolerances are indicated in the following table

Power Control Level	Nominal Output Power	Tolerances	
	dBm	-	+
0	30	-2 dB	1 dB
1	28	-3 dB	3 dB
2	26	-3 dB	4 dB
3	24	-3 dB	4 dB
4	22	-3 dB	4 dB
5	20	-3 dB	4 dB
6	18	-3 dB	4 dB
7	16	-3 dB	4 dB
8	14	-3 dB	4 dB
9	12	-4 dB	5 dB
10	10	-4 dB	5 dB
11	8	-4 dB	5 dB
12	6	-4 dB	5 dB
13	4	-4 dB	5 dB
14	2	-5 dB	6 dB
15	0	-5 dB	6 dB

Table 1: GSM 1900 transmitter output power according to 3GPP TS 51.010-1 (Power class 1)

Our cellular device is tuned with power levels well inside the limits of the GSM 1900 system.

1.3 *Range of operating RF power levels for GSM 850*

GSM 850 supports 15 power levels as described in the GSM 850 system specification. The nominal power levels and tolerances are indicated in the following table

Power Control Level	Nominal Output Power	Tolerances	
	dBm	-	+
5	33	-2 dB	1 dB
6	31	-3 dB	3 dB
7	29	-3 dB	4 dB
8	27	-3 dB	4 dB
9	25	-3 dB	4 dB
10	23	-3 dB	4 dB
11	21	-3 dB	4 dB
12	19	-3 dB	4 dB
13	17	-3 dB	4 dB
14	15	-3 dB	4 dB
15	13	-3 dB	4 dB
16	11	-5 dB	6 dB
17	9	-5 dB	6 dB
18	7	-5 dB	6 dB
19	5	-5 dB	6 dB

Table 2: GSM 850 transmitter output power according to 3GPP TS 51.010-1 (Power class 4)

Our cellular device is tuned with power levels well inside the limits of the GSM 850 system.

1.4 *Tune-up procedure*

Our devices are tuned up in our production by the use of special software in our test equipment and in the cellular device itself. After tuning the actual RF power levels settings are stored in the internal memory and the cellular device software is finalised with the final customer version.
There are no user tuneable parts in our cellular devices.
Our cellular devices are normally tuned to the nominal RF power level as shown in the table above, except for power level 0 (in case of PCS 1900) and 5 (in case of GSM 850) where power is slightly decreased respect nominal and accuracy is increased to fit inside tolerance.
The reduction of power level is done in order to extend the talk time for our cellular devices and fit regulatory limits in radiated power at maximum power levels.