ERICSSON

To: Joe DiChoso
FCC Application Processing Branch

From: Jim Sponsler
Date: 9-20-99

Applicant:	Ericsson Inc
Re:	FCC ID AXATR-393-A2
Correspondence Reference Number:	9641
731 Confirmation Number:	EA94900
Date of Original E-Mail:	09/15/99 (08/26/99)

This is in response to Kwok Chan's query on August 26, 1999 and your Correspondence 9641. I have included Kwok's email for your reference.

From your email concerning: AXATR-393-A2/ EA94900:

Joe:

This is a dual band, dual mode, Ericsson handset in the SAR queue, EA 94900 -

1. The 731 form (or on EAS) is requesting 400 mW ERP for AMPS and TDMA in the cellular band, and 400 mW EIRP in the PCS band. The radiated measurements indicate maximum outputs of 220 mW ERP for AMPS and TDMA modes in the cellular band and 546 mW EIRP in the PCS band (estimated antenna gain is about -1 dBi). Maximum peak conducted outputs in the SAR report are around 462 mW for AMPS, 407 mW for cellular TDMA and 398 mW for PCS/TDMA. The radiated outputs will go on the grant and ERP/EIRP will be indicated in grant comments.

2. The tune-up procedure for AMPS mode calls for +1.0/-1.5 dB tolerance for the high and low channels. Low channel SAR for the AMPS mode is 1.35 W/kg. A +1.0 dB tolerance will put SAR for this channel above the 1.6 W/kg limit. Please clarify how should this be resolved - reduce tolerance or lowering output etc.

Our response:

1. The power declared on the grant should be 220mW for the 800 band and 546mW for the 1900 band as detailed in your comments.
2. We have updated our tune-up procedure to reflect a +/- 0.5 dB tolerance on power levels 0, 1 and 2. For your reference I have sent in an up dated page for tune-up procedure.

If you have any questions, feel free to contact me.

Have a good day.

Jim Sponsler
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ALIGNMENT PROCEDURE

PARA. 2.1033(c) (9)
Alignment Procedures:

Due to the high accuracy of the I/O, the modulation, transmit voice, DTMF, SAT and data deviations are all preset in the DSP software and are not normally set in production and /or field. These procedures give the test method to verify the phone has proper deviations.

1.0 RADIO TUNE/TEST INSTRUCTIONS

1.1 800 MHz and 1900 MHz FILTERING
SAW and fixed ceramic elements, therefore no tuning is required at 800 MHz or 1900 MHz.

REFERENCE FREQUENCY ADJUSTMENT

TEST SETUP
Testing of the VCTCXO circuit is temperature dependent and should be carried out at an ambient room temperature of +23°C to +27°C. Any frequency adjustments should be made **1.0 hour** after re-flow soldering to allow for relaxation of thermal stress. Additionally, the adjustment accuracy depends on having the transceiver completely closed up in the case. If this is not possible at board level with some kind of fixture or the fixture is suspect, this test must be re-done (checked) at final test.

Terminate ANT (X301) into a frequency counter with a 50Ω input impedance.

Enter the following test commands:
**** *The same channel should be used for all parts of this test* ****
@2705 *(read thermistor A/D from Patti)*
check result 1
@80 *(initialize the transceiver- carrier off and audio muted)*
@6502 *(AFC off)*
@E11401FF *(center DAC3)*
@3Czzxxxx *(select a MID-CHANNEL PCS BAND)*
@840A *(set the transmitter power level 10)*
@81 *(turn the transmitter on)*
check result 2

TEST RESULTS
1. Verify that the returned value is in the range 41 to 54 hex. (A higher temperature corresponds to a lower reading).
2. Wait until output is stable (<±42Hz variation in frequency). Log output frequency and calculate error in Hz.

Verify that the transmitter frequency is <±100Hz of the channel frequency.

If necessary, adjust DAC3 with the commands *@E1140xxx* where xxx is 000 to 3FF (each step is approx. 48Hz) to achieve a transmitter frequency that is <±100Hz of the channel frequency plus 0.35ppm. DAC3 calibration limits are 110h and 300h.

END OF TEST
@80 *(carrier off and audio muted)*

1.3 SET TRANSMIT RF POWER

TEST SETUP
Before testing, provide the antenna (TP1) with a 50 ohm load capable of dissipating 1 W (average power).

PARA. 2.983

TEST SETUP

Before testing, provide the antenna (X301) with a 50Ω load capable of dissipating 1W (average power). Use 4.8 V at battery terminals

Enter the following test commands:

@6502 *(set DCTCXO control voltage)*
@3C000383 *(tune to MID-CHANNEL CELLULAR BAND, CHAN 383)*
@81 *(turn on carrier output)*

For each power level, 0 through 10, repeat the following setup and adjust the power level to comply with the Calibration Goal Mid-Channel column of the table in test results below:

@840x *(x is power level to be set, 0=pl 2, 3=pl3,..., A=pl 10)*
@3900yyy *(yyy is hex setting corresponding to power level as follows:)*

Each hex setting is approx. 0.15dB.

Record the VGA hex setting for power levels 0 - 10.

@222D *(store power level value)*

NOTE: you MUST store a value here, EVEN if it's the same as the initial guess. *Levels 0, 1 & 2 are set when level 0 is set.*

For Power Levels 0 - 10 with Low and High Channel, verify that output power meets Low and High Channel Power Limits column of the table in test results below.

NOTE: Before changing channels the carrier is to be turned off using the @82 command. After tuning to the desired channel using the @3C00xxxx command, turn on the carrier output using @81.

TEST RESULTS

Verify that the power levels for each of the setup settings is within the tolerance shown below. Use Calibration Goal Mid-Channel for calibration of levels 0 through 10.

POWER LEVEL	POWER OUTPUT	Calibration Goal Mid-Channel	Low and High Channel Power Limits
0,1,2	+26.0dBm	±0.5dB	+0.5dB/-0.5dB
3	+22.5dBm	±0.5dB	+2.0dB/-2.0dB
4	+19.0dBm	±0.5dB	+2.0dB/-2.5dB
5	+15.5dBm	±0.5dB	+2.0dB/-3.0dB
6	+12.0dBm	±0.5dB	+1.5dB/-3.5dB
7	+ 8.0dBm	±0.5dB	+1.5dB/-3.5dB
8	+ 4.0dBm	±0.25dB	±2.5dB
9	+0.0dBm	±0.25dB	±5.5dB
10	- 4.0dBm	±0.25dB	±8.5dB

END OF TEST

@82 *(turn carrier off)*

Repeat for MID-CHANNEL PCS BAND, 1100

ALIGNMENT PROCEDURE

PARA. 2.983

TRANSMIT DEVIATION

TEST SETUP

Set the modulation test equipment to have 50 Hz high-pass and 15kHz low-pass filtering, and use Average detector.

Inject a 1004 Hz signal into the system connector input (X1200-2 ATMS and X1200-4 AGND). Adjust the level of the input signal to 45mV RMS.

Enter the following test commands:

@6502	*(AFC off)*
@3Czzxxxx	*(tune to MID-CHANNEL CELLULAR BAND)*
@8400	*(set attenuation to power level 0)*
@81	*(turn the carrier on)*
@88	*(un-mute the transmit path)*
@AC	*(turn on the compander)*
@2C0001	*(disable auto-writes to PATTI addr. 40, 48, & 88)*
@2C482C	*(Tx PGA = -2.5dB, Rx PGA = +2.5dB)*
@2C4005	*(audio to system connector)*

Record the average deviation level. Multiply by 1.414 to get peak deviation.

TEST RESULTS

The transmit peak deviation should be 2.9kHz±500Hz

NOTE: Use of an Average detector (not peak) and multiplying the number measured by 1.414 to get peak removes the incidental FM from the measurement.

END OF TEST

@80 *(reset transceiver*

ALIGNMENT PROCEDURE

PARA. 2.983

DTMF DEVIATION AND HIGH FREQUENCY

TEST SETUP

Set modulation analyzer for 50Hz HP and 15kHz LP, and use Average detector.

Enter the following test commands:

@3Czzxxxx	*(tune to MID-CHANNEL CELLULAR BAND)*
@88	*(open transmit audio)*
@8400	*(set attenuation to power level 0)*
@81	*(turn the carrier on)*
@AA0D	*(turn on DTMF high tone)*

Turn off injected audio signal to TU.

TEST RESULTS

Verify that the mobile transmitted tone is 1143Hz ±1.5% and the Average deviation 3.64kHz ± 10%. This corresponds to a peak radian deviation of (3.64kHz ±10% X 1.414) / 1.143kHz = 4.5 ±10%.

NOTE: Use of an Average detector (not peak) and multiplying the number measured by 1.414 to get peak removes the incidental FM from the measurement.

END OF TEST

@AB *(turn DTMF off)*
@80 *(initialize transceiver)*

ALIGNMENT PROCEDURE

PARA. 2.983

SAT DEVIATION

TEST SETUP

Set modulation analyzer for 50Hz HP and 15kHz LP *NOTE: Use of an Average detector (not peak) and multiplying the number measured by 1.414 to get peak removes the incidental FM from the measurement.* Apply an on-channel RF signal to the antenna connector at –50dBm, 6030.0Hz tone at ±2kHz deviation *(this is required for the phone to transpond the tone)*.

Enter the following test commands:

@3Czzxxxx	*(tune to MID-CHANNEL CELLULAR BAND)*
@6502	*(lock the VCTCXO)*
@8400	*(power level 0)*
@81	*(turn on transmitter)*
@A002	*(turn SAT on (6030 Hz))*
@85	*(mute receive audio)*
@87	*(mute transmit audio)*

TEST RESULTS

Verify that the mobile transmitted frequency is 6030Hz ±1Hz and the Average frequency deviation is:
1.414 KHz ±10%. This corresponds to a peak deviation of (1.414kHz ±10%) X 1.414 = 2.0kHz ±10%.

NOTE: Use of an Average detector (not peak) and multiplying the number measured by 1.414 to get peak removes the incidental FM from the measurement.

END OF TEST

@80 *(initialize transceiver)*

DATA (SIGNALING TONE) DEVIATION

TEST SETUP

Set modulation analyzer for 50Hz HP and 15kHz LP, and use Average detector.

Enter the following test command:

@3Czzxxxx	*(tune to MID-CHANNEL CELLULAR BAND)*
@6502	*(lock the VCTCXO)*
@8400	*(set attenuation to power level 0)*
@81	*(turn the carrier on)*
@8F	*(turn on 10kHz data tone)*

TEST RESULTS

Verify that the Average transmit deviation level is 5.66kHz ±10%. This corresponds to a peak deviation of (5.66kHz ±10%) X 1.414 = 8.0kHz ±10%.

NOTE: Use of an Average detector (not peak) and multiplying the number measured by 1.414 to get peak removes the incidental FM from the measurement.

END OF TEST

@80 *(initialize transceiver)*

ALIGNMENT PROCEDURE

RECEIVER ALIGNMENT

Calibrate FRANK ASIC center Frequency

Initiate the following test command

@B00000

This center's the Filter inside the FRANK ASIC to 120 kHz