Nemko Test Report:	3L0029RUS1Supplement
Applicant:	Nokia Mobile Phones, Inc. 6021 Connection Drive Irving, Texas 75039
Equipment Under Test: **(E.U.T.)**	Model 2220
In Accordance With:	**FCC Parts 2 and 22** 800 MHz Cellular Subscriber Units
Tested By:	Nemko Dallas Inc. 802 N. Kealy Lewisville, TX 75057-3136
Authorized By:	 Tom Tidwell, Frontline Manager
Date:	5/5/03
Total Number of Pages:	16

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Section 1. Modulation Characteristics

NAME OF TEST: Modulation Characteristics Audio Frequency Response	PARA. NO.: 2.1047
TESTED BY: David Light	DATE: 5/5/03

Test Results: N/A.

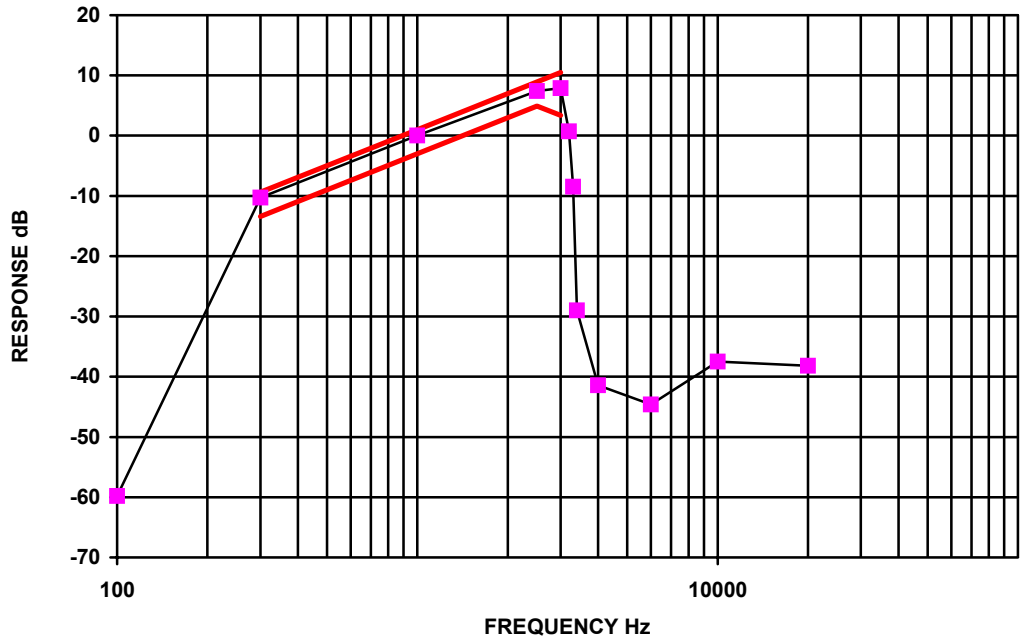
Measurement Data: See attached graph

Equipment Used: Wavetek 3600 D

Wavetek Cellular Test System Model 3600D s/n 9228038 Cal'd 11/25/02 Due 11/25/03

Temperature: 24 °C

Relative Humidity: 36 %



Graph 1

NAME OF TEST: Modulation Characteristics Audio Low-Pass Filter Response	PARA. NO.: 2.1047
TESTED BY: David Light	DATE: 5/5/03

Test Results: N/A.

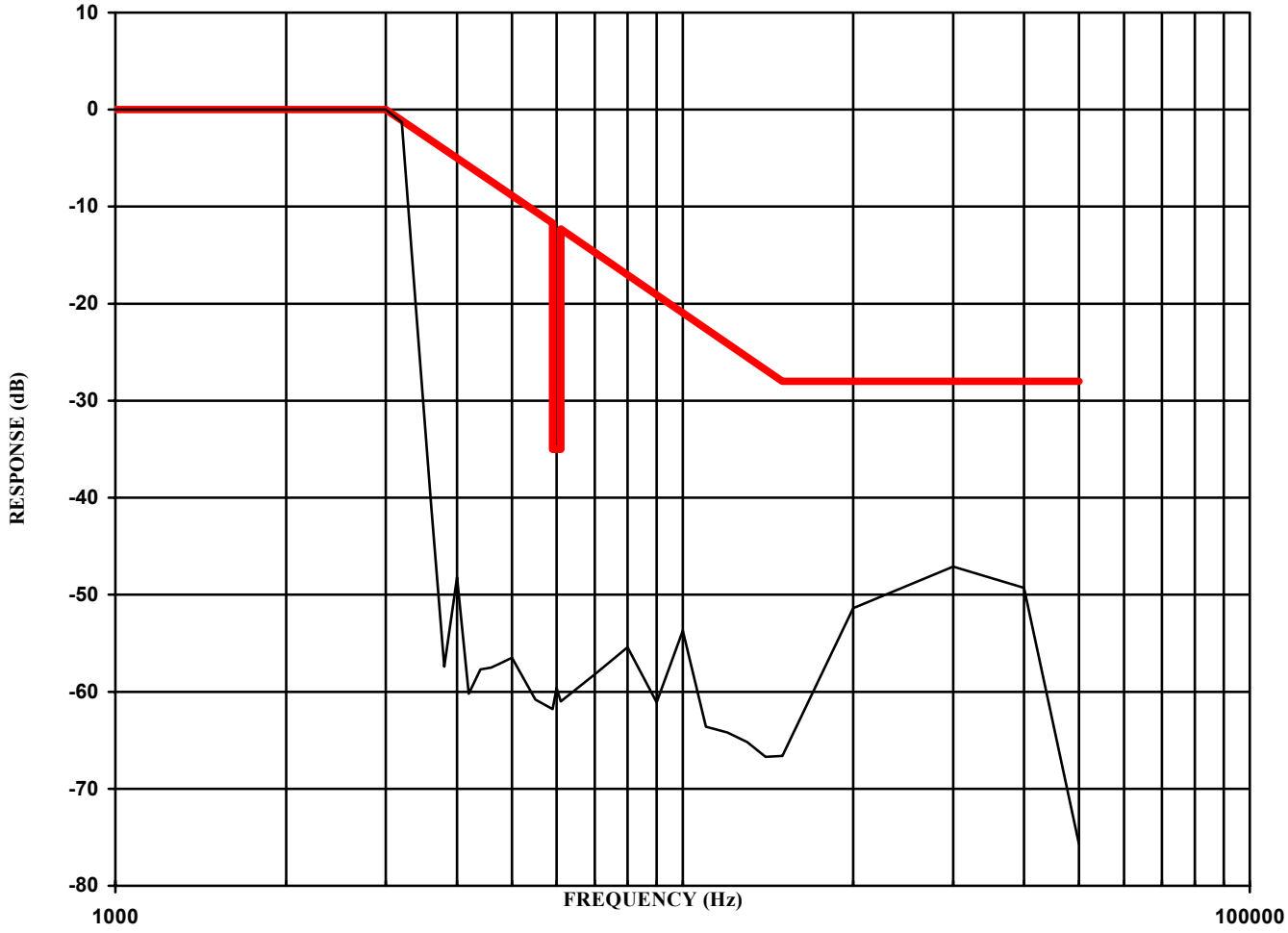
Measurement Data: See attached graph

Equipment Used: Wavetek 3600 D, Spectrum Analyzer # 1036

Wavetek Cellular Test System Model 3600D s/n 9228038 Cal'd 11/25/02 Due 11/25/03

Temperature: 24 °C

Relative Humidity: 36 %


10
0
-10
-20
-30
-40
-50
-60
-70
-80
RESPONSE (dB)
1000
FREQUENCY (Hz)
100000

Graph 2

NAME OF TEST: Modulation Characteristics Modulation Limiting	PARA. NO.: 2.1047
TESTED BY: David Light	DATE: 6Feb03

Test Results: Complies.

Measurement Data: See attached graph

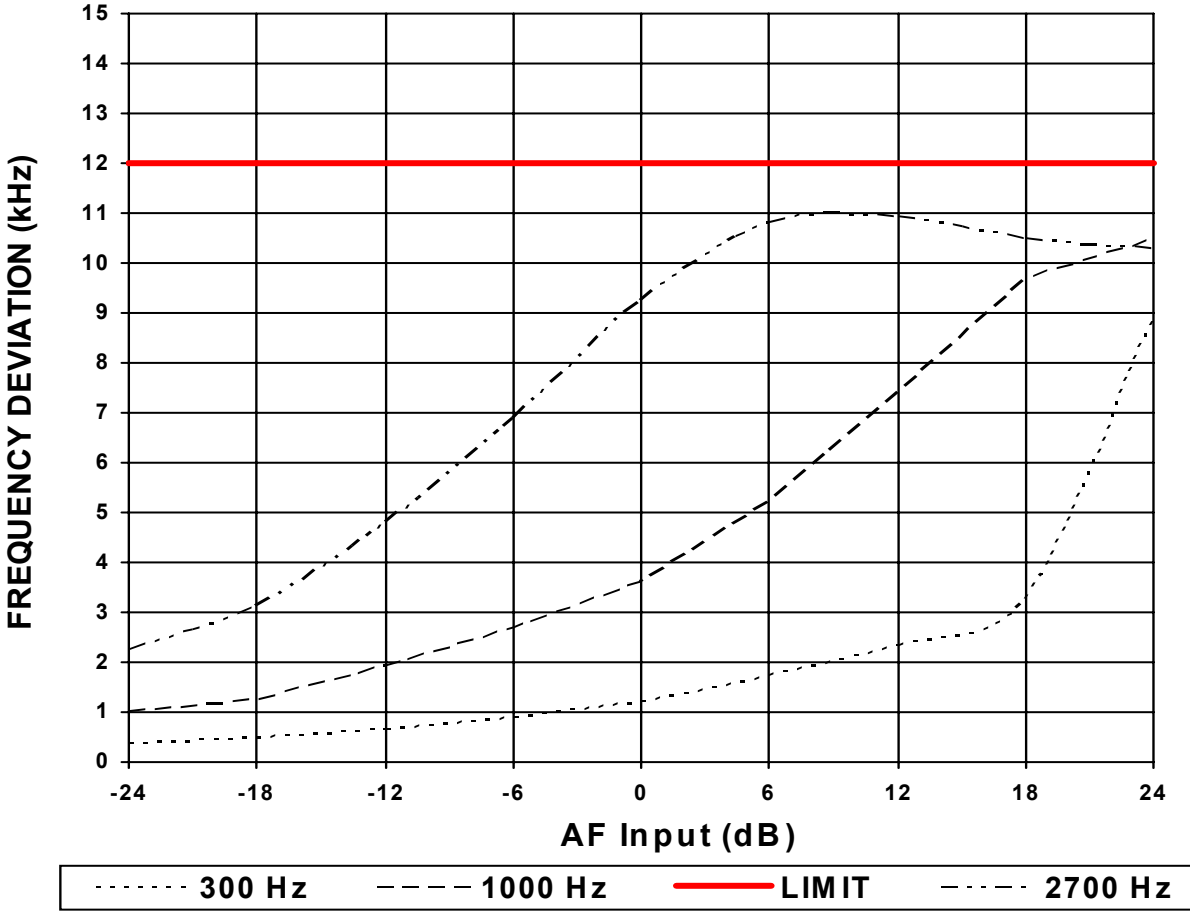
Equipment Used: Wavetek 3600D

Temperature: 23 °C

Relative Humidity: 32 %

Modulation	Deviation (Hz)
Voice	11315
SAT	2035
SAT + Voice	12890
SAT + DTMF	11345
ST	7855
Wideband Data	7290

Note: The audio input was varied from 30% modulation (+/- 3.6 kHz deviation) to at least 20 dB higher than the saturation point.


FREQUENCY DEVIATION (kHz)
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
-24
-18
-12
-6
0
6
12
18
24
AF Input (dB)
300 Hz
1000 Hz
LIMIT
2700 Hz

Graph 3

Section 2. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 22.917
TESTED BY: David Light	DATE: 5/5/03

Test Results: N/A.

Measurement Data: See attached graphs.

Test Plots – Occupied Bandwidth

Nemko Dallas, Inc.

Dallas Headquarters:
802 N. Kealy
Lewisville, TX 75057
Tel: (972) 436-9600
Fax: (972) 436-2667

Test Plot: **Occupied Bandwidth**

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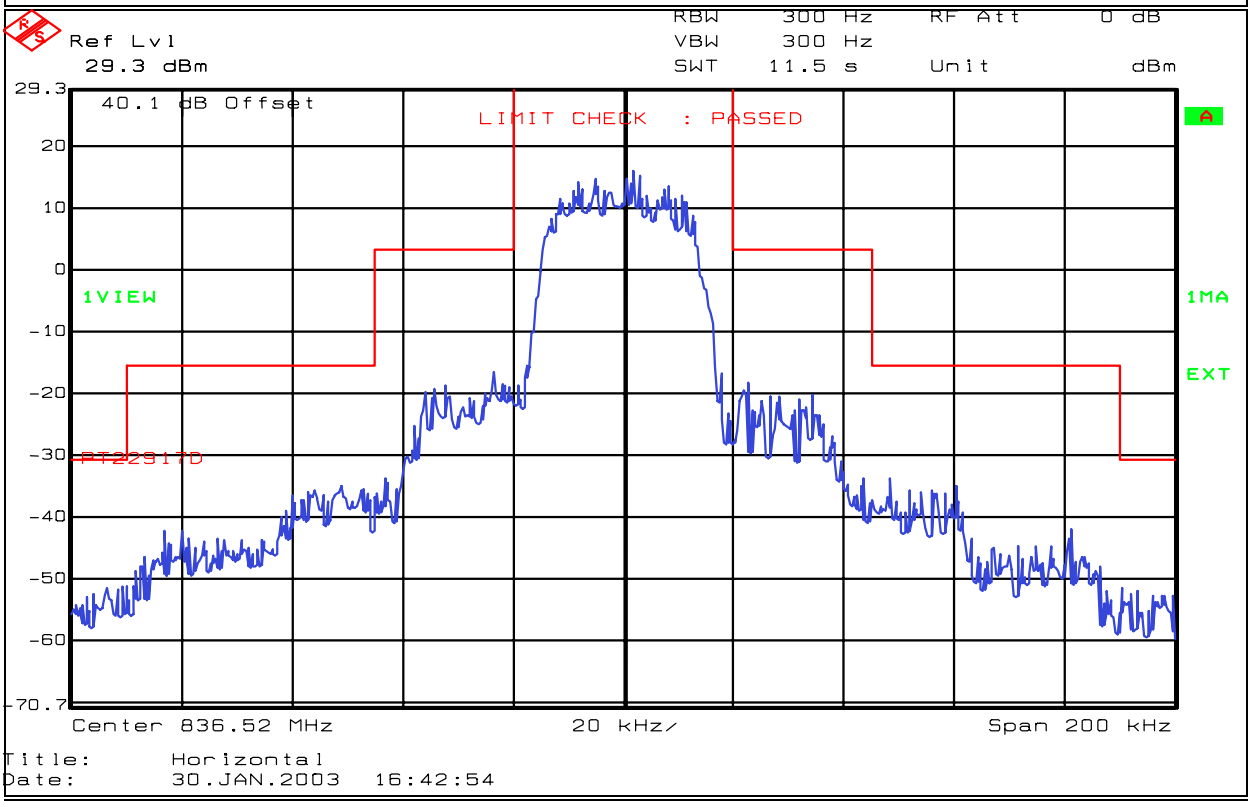
Job No.:	3L0023	Date:	5/5/2003
Specification:	Part 2	Temperature(°C):	22
Tested By:	David Light	Relative Humidity(%)	20
E.U.T.:	2260		
Configuration:	Antenna port		



Notes: Channel 384 AMPS TDMA

ANNEX A - TEST DETAILS

NAME OF TEST: Audio Frequency Response PARA. NO.: 2.1047

Minimum Standard: Para. No. 15-19-B. From 300 to 3000 Hz the audio frequency response shall not vary more than +1 to –3 dB from a true 6dB octave pre-emphasis characteristic as referred to 1000 Hz level (with the exception of a permissible 6dB per octave roll-off from 2500 to 3000 Hz).

Method Of Measurement:

Operate the transmitter with the compressor disabled, and monitor the output with a frequency deviation meter or standard test receiver without standard 750-microsecond de-emphasis, with expander disabled, and without C-message weighted filter (see 6.6.2). Apply a sine wave audio input to the transmitter external audio input port, vary the modulating frequency from 300 to 3000 Hz and observe the input levels necessary to maintain a constant ±2.9 kHz system deviation.

NAME OF TEST: Audio Low Pass Filter Response PARA. NO.: 2.1047

Minimum Standard: Para. No. 22.915 (d). For mobile stations, signals must be attenuated as a function of frequency as follows:

i. In the frequency ranges 3.0 to 5.9 Hz and 6.1 to 15 kHz, 40 log (f/3) dB.
ii. In the frequency range 5.9 to 6.1 kHz, 35 dB
iii. In the frequency range above 15 kHz, 28 dB.

Method Of Measurement:

Adjust the audio input frequency to 1000 Hz and adjust the input level to 20 dB greater than that required to produce ±8 kHz deviation. Note the output level on the frequency deviation meter or standard test receiver. Using the output level as reference (0dB), vary the modulating frequency from 3000 Hz to 30,000 Hz and observe the change in output while maintaining a constant audio input level.

NAME OF TEST: Modulation Limiting **PARA. NO.: 2.1047**

Minimum Standard: None

Method Of Measurement:

Voice: A 1 kHz audio tone is injected at levels between -45 and +20 dBVrms. The peak deviation is noted. This is repeated with a 300 Hz tone and a 3 kHz tone.

SAT: A SAT tone is generated by the mobile station and the peak deviation is measured.

Wideband Data: Wideband data is generated by the mobile station and the peak deviation is measured.

ST: ST data is generated by the mobile station and the peak deviation is measured.

ANNEX B - TEST DIAGRAMS

Para. No. 2.1047 – Audio Frequency Response, Audio Low Pass Filter Response And Modulation Limiting