

Nemko Test Report:	6L0801RUS1rev5	
Applicant:	E. F. Johnson 1440 Corporate Drive Irving, TX 75038	
Equipment Under Test: (E.U.T.)	242-5377-001AAYB6	
In Accordance With:	FCC Part 90, Subpart I Private Land Mobile Transmitter	
Tested By:	Nemko USA Inc. 802 N. Kealy Lewisville, TX 75057-3136	
TESTED BY: David I	Light, Senior Wireless Engineer DATE:	31-August, 2007
APPROVED BY:	Last Cartwell DATE:	31-August, 2007
Total Number of Pages:	51	

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FCC PART 90, SUBPART I PRIVATE LAND MOBILE TRANSMITTER

EQUIPMENT: 242-5377-001AAYB6 PROJECT NO.: 6L0801RUS1rev5

Section 1.	Summary of Test Results		
Manufacturer:	E. F. Johnson		
Model No.:	242-5377-001AAYB6		
Serial No.:	Prototype		
General:	All measurements are traceab	le to na	ational standards.
	conducted on a sample of the equi npliance with FCC Part 90, Subpar measurements.	•	•
New	Submission		Production Unit
Clas	s II Permissive Change		Pre-Production Unit
THIS	TEST REPORT RELATES ONLY TO	THE IT	EM(S) TESTED.
THE FOLLOWING I	DEVIATIONS FROM, ADDITIONS TO SPECIFICATIONS HAVE BE See " Summary of Test	EN MAD	

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Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
RF Power Output	90.205	Complies
Audio Frequency Response	TIA EIA-603.3.2.6	Complies
Audio Low-Pass Filter Response	TIA EIA-603.3.2.6	Complies
Modulation Limiting	TIA EIA-603.3.2.6	Complies
Occupied Bandwidth	90.210	Complies
Spurious Emissions at Antenna Terminals	90.210	Complies
Field Strength of Spurious Emissions	90.210	Complies
Frequency Stability	90.213	Complies
Transient Frequency Behavior	90.214	NA
Adjacent Channel Power	90.543	Complies

Footnotes:

Transient Frequency Behavior is not required for this frequency band.

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Section 2. General Equipment Specification

Transmitter						
Supply Voltage Input:	13.6 Vdc					
Frequency Range:	762 to 77 792 to 80 806 to 82 851 to 86	06 MHz - 24 MHz				
Type(s) of Modulation:	F3E (Voice)	F1D	F2D	D7W (QAM)	Othe	
Emission Designator:	16K0F3E, 14K0F3E, 11K0F3E, 8K10F1E*, 8K10F1D*					
	* The two modulations have the same characteristics and need to be tested only once. The only difference is in the application of the bit stream, either data or vocoded voice.					
Output Impedance:	50 ohms					
RF Power Output (rated):	35 watts					
Channel Spacing(s):	12.5 kHz	, 25 kHz				
Operator Selection of Operating Frequency:	Pre-prog	rammed	channel	selection		
Power Output Adjustment Capability:	Manual					

FCC PART 90, SUBPART I PRIVATE LAND MOBILE TRANSMITTER

EQUIPMENT: 242-5377-001AAYB6 PROJECT NO.: 6L0801RUS1rev5

System	Descri	ption
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35 Watt 700/800 MHz Land Mobile Radio transceiver.

FCC PART 90, SUBPART I PRIVATE LAND MOBILE TRANSMITTER

EQUIPMENT: **242-5377-001AAYB6** PROJECT NO.: **6L0801RUS1rev5**

Section 3. RF Power Output

NAME OF TEST: RF Power Output PARA. NO.: 1046

TESTED BY: Kevin Rose DATE: 10 Jan. 2007

Measurement Results: Complies.

Measurement Data:

Channel	Output Power	Output Power
MHz	(dBm)	(W)
769.0125	44.52	28.31
799.0125	44.42	27.67
814.5125	45.79	37.93
859.5125	45.63	36.55

Channel MHz	Output Power (dBm)	Output Power (W)
769.0125	40.21	10.49
799.0125	39.92	9.82
814.5125	39.90	9.78
859.5125	40.13	10.30

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Section 4. Modulation Characteristics

NAME OF TEST: Modulation Characteristics PARA. NO.: 2.1047

TESTED BY: Kevin Rose DATE: 10 Jan. 2007

Measurement Results: Complies.

Measurement Data: See following pages

Description of modulation: Modulation input to the radio is voice via a microphone. The radio has three modes of operation:

- 1) Narrow band voice for 12.5 kHz channels
- 2) Wideband voice for 25 kHz channels
- 3) Data modulation. In this mode the voice input signal goes through a Vocoder to translate the audio to data.

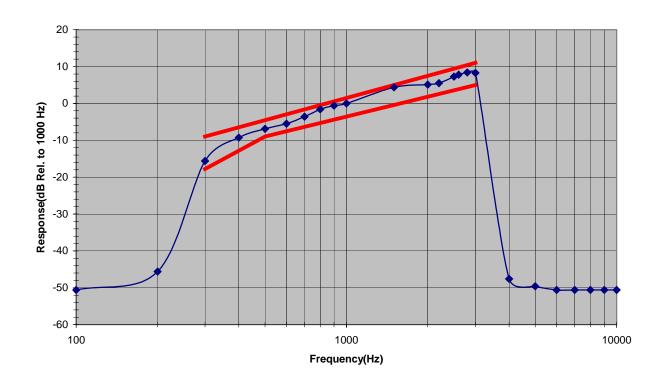
Description of base band filters: The radio has a low-pass audio filter.

Equipment Used: 1036-1081-1535

Section 4.1 Audio Frequency Response

NAME OF TEST: Audio Frequency Response PARA. NO.: 2.1047(a)

TESTED BY: Kevin Rose DATE: 10 Jan. 2007

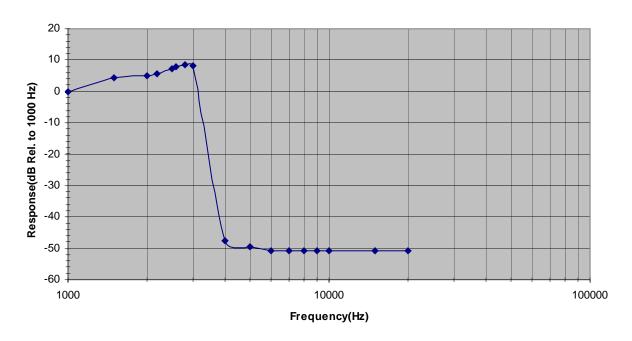


Section 4.2 Audio Low-Pass Filter Response

NAME OF TEST: Audio Low-Pass Filter Response PARA. NO.: 2.1047(a)

TESTED BY: Kevin Rose DATE: 10 Jan. 2007

AF Low Pass Filter Response(dB Rel. to 1000 Hz)

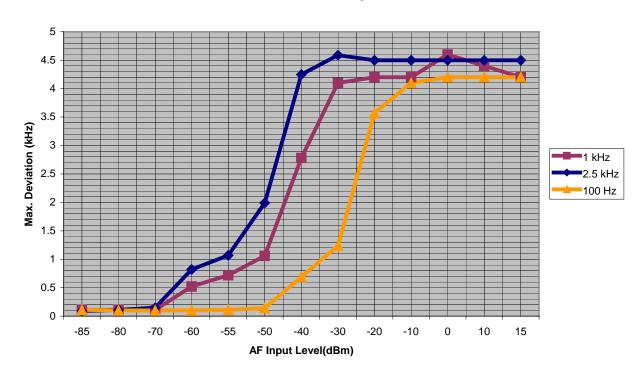


Section 4.3 Modulation Limiting

NAME OF TEST: Modulation Limiting PARA. NO.: 2.1047(b)

TESTED BY: Kevin Rose DATE: 10 Jan. 2007

Modulation Limiting



Maximum deviation for non-voice modulation: +/-3 kHz.

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EQUIPMENT: 242-5377-001AAYB6 PROJECT NO.: 6L0801RUS1rev5

Section 5. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth PARA. NO.: 2.1049

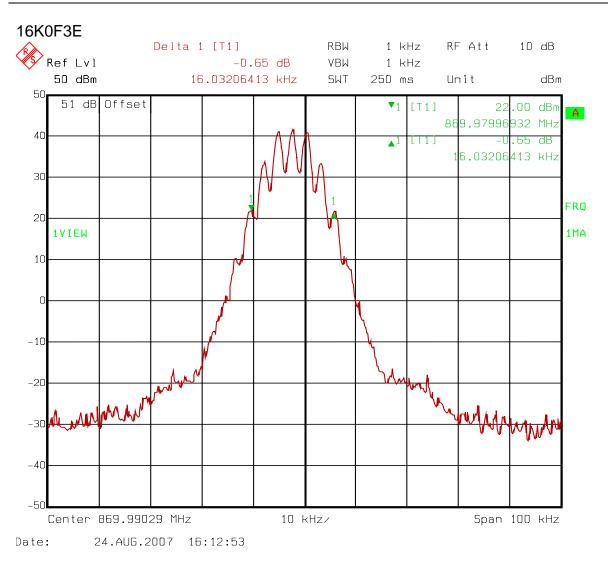
TESTED BY: Kevin Rose DATE: 10 Jan. 2007

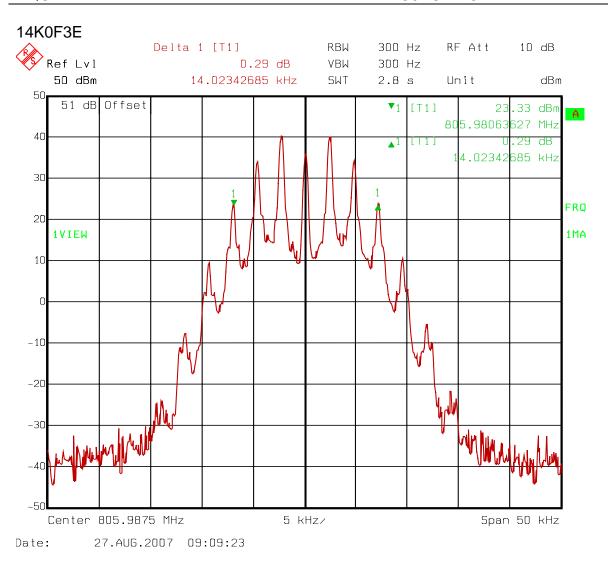
Measurement Results: Complies.

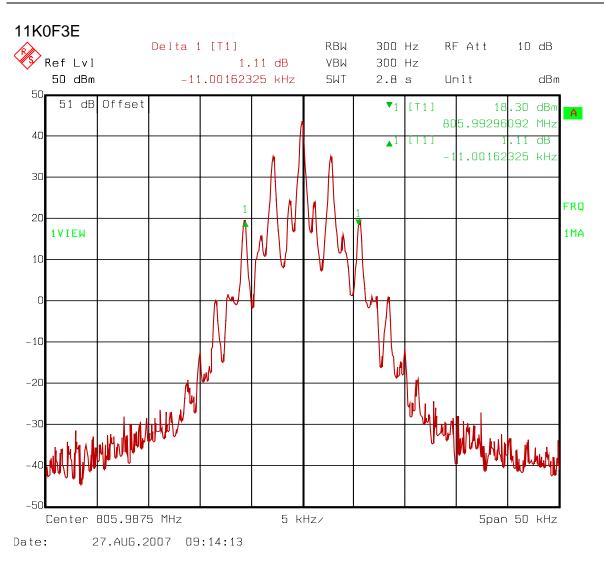
Measurement Data: See attached data

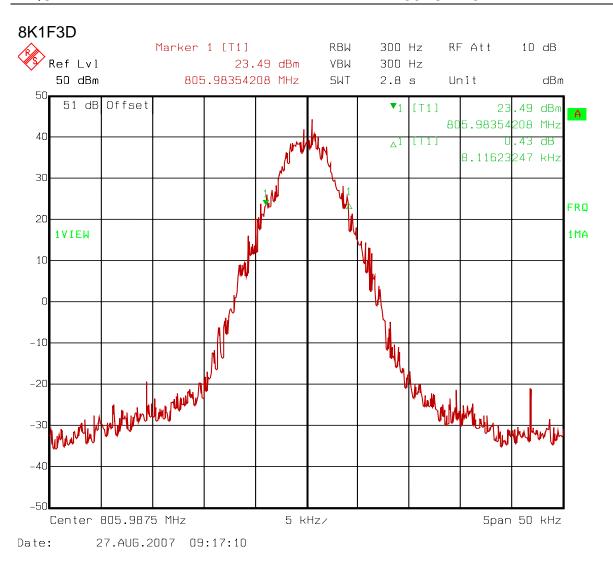
All emission masks were configured per part 2.1047

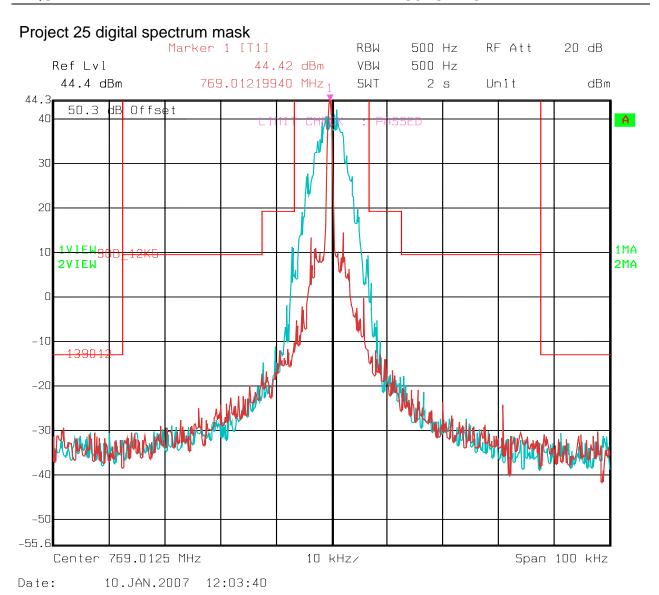
Equipment Used: 1036-1081-1535

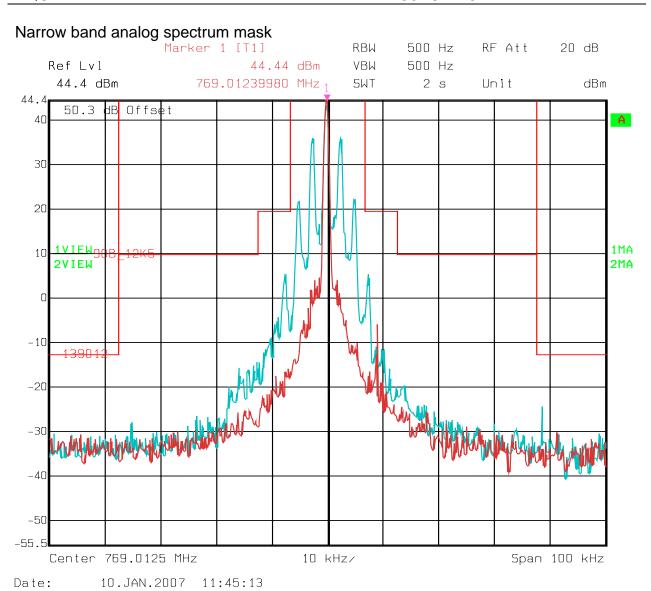


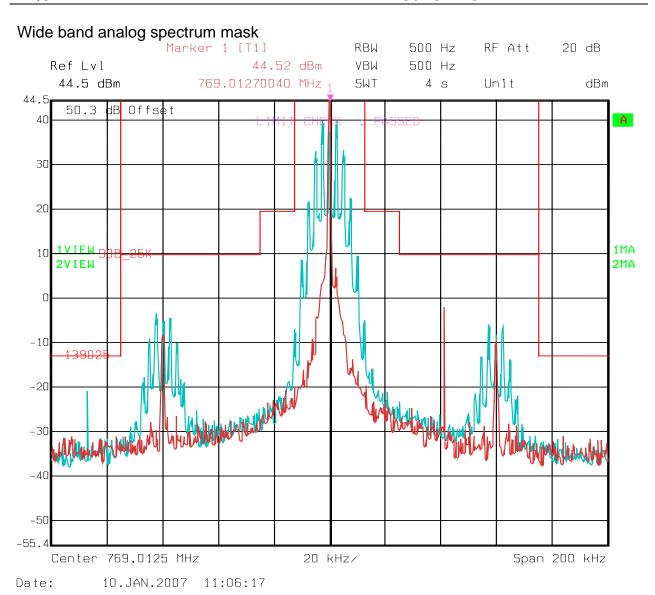


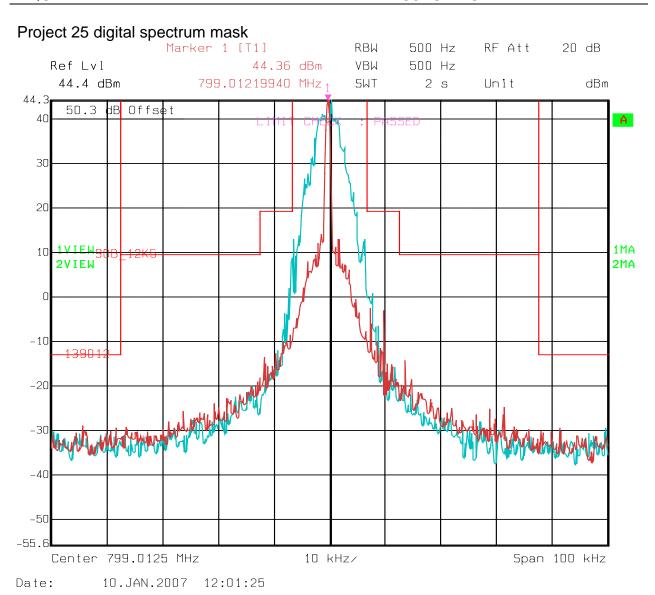


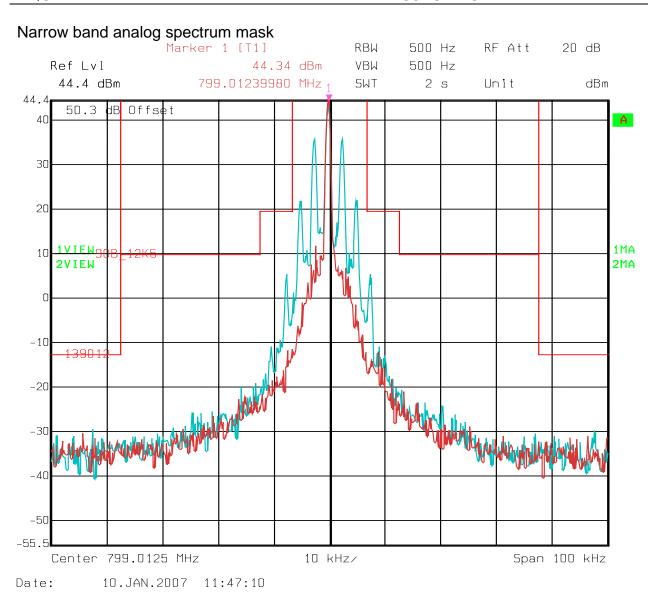


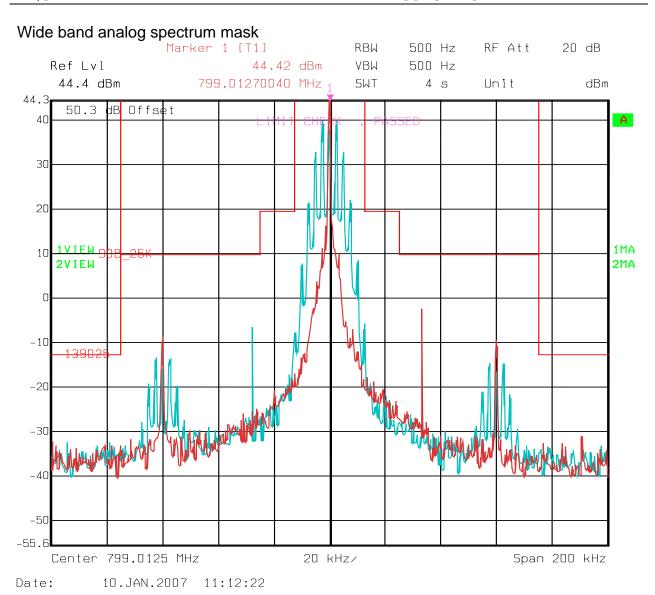


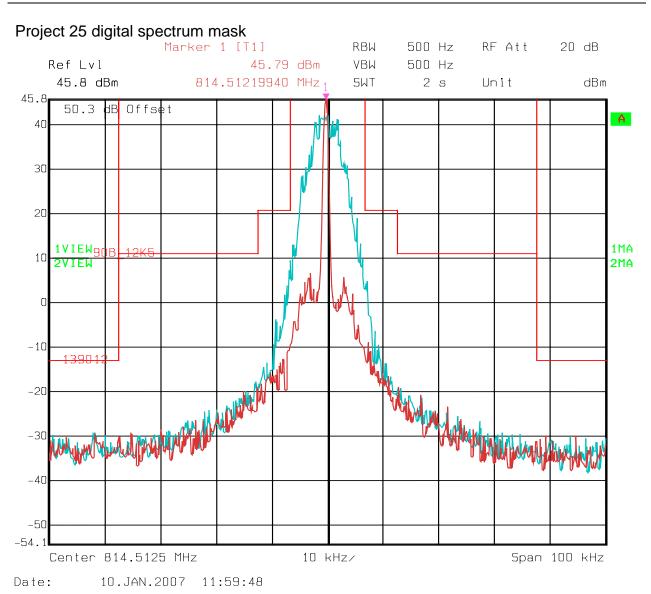


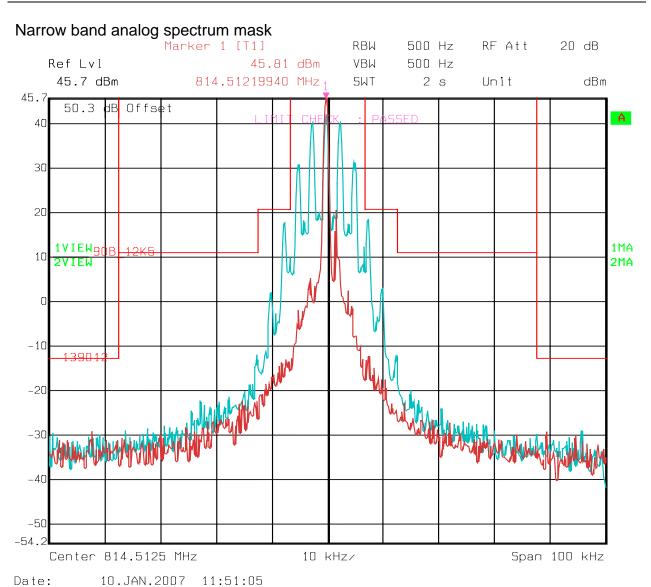


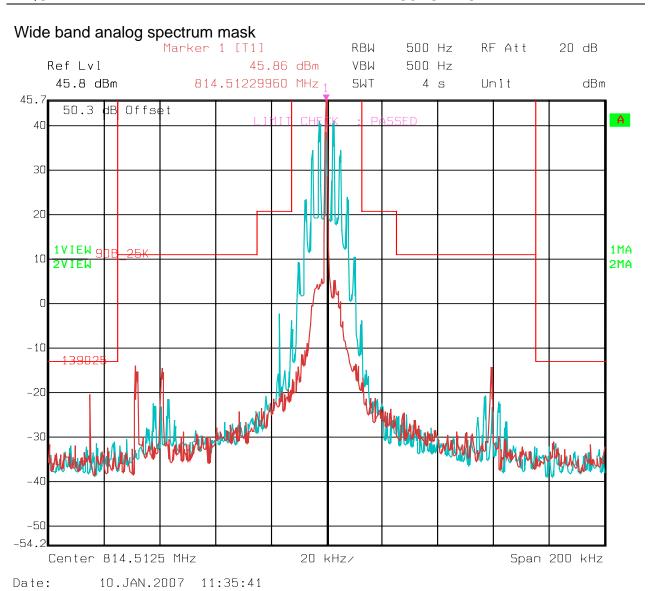


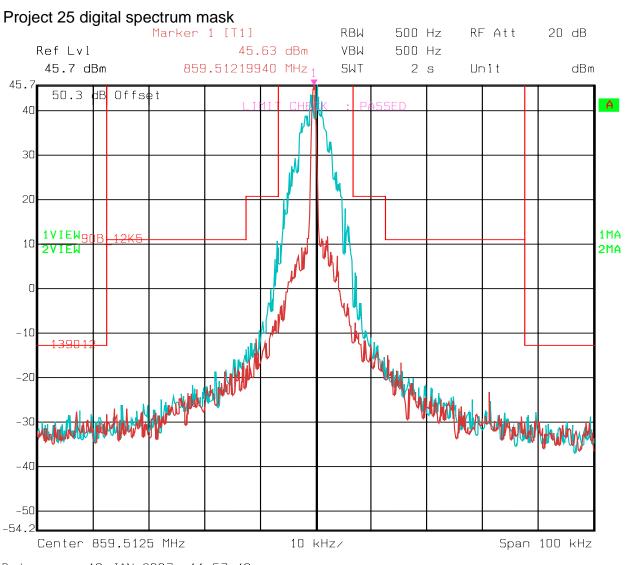


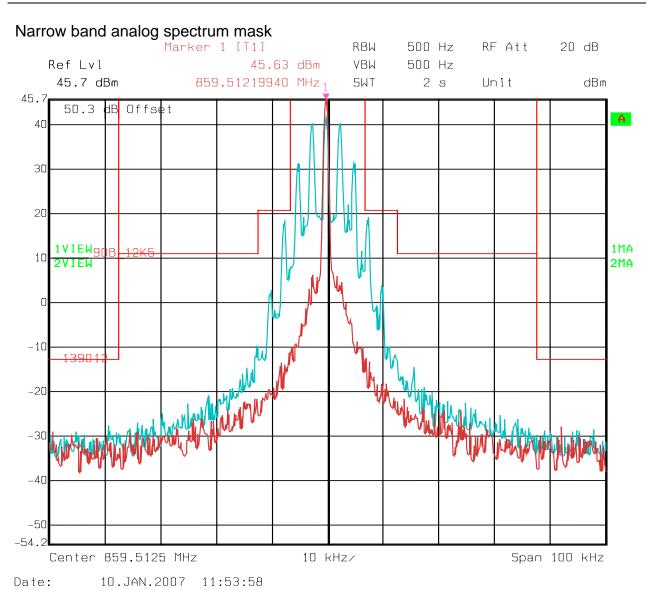


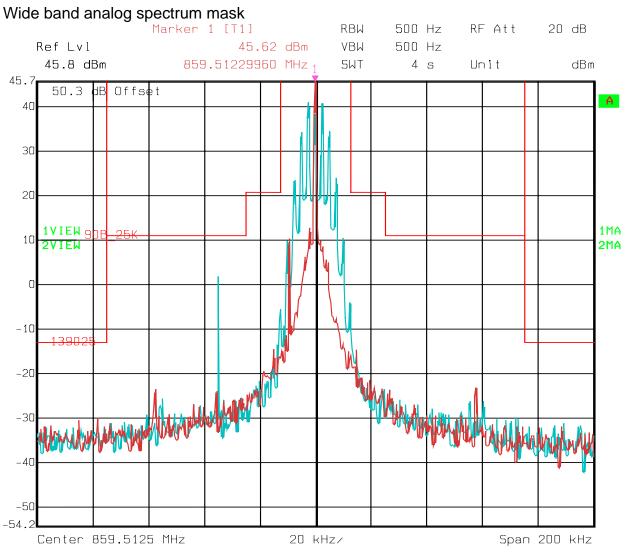












FCC PART 90, SUBPART I PRIVATE LAND MOBILE TRANSMITTER

EQUIPMENT: 242-5377-001AAYB6 PROJECT NO.: 6L0801RUS1rev5

Section 6. Spurious Emissions at Antenna Terminals

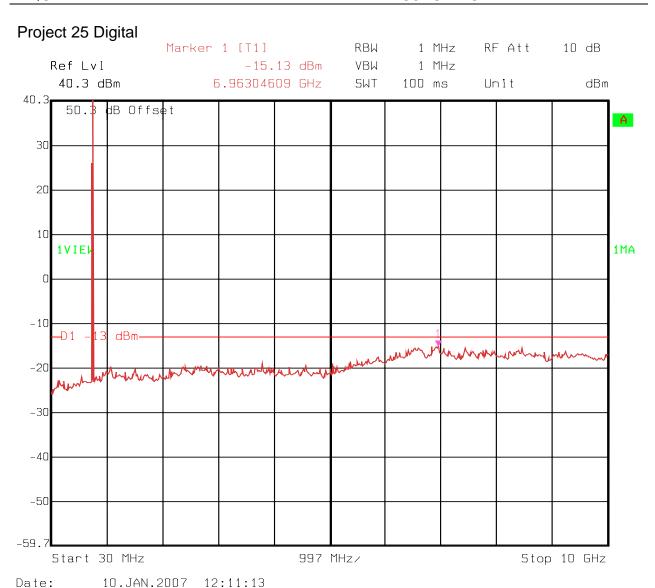
NAME OF TEST: Spurious Emissions @ Antenna Terminals PARA. NO.: 2.1051

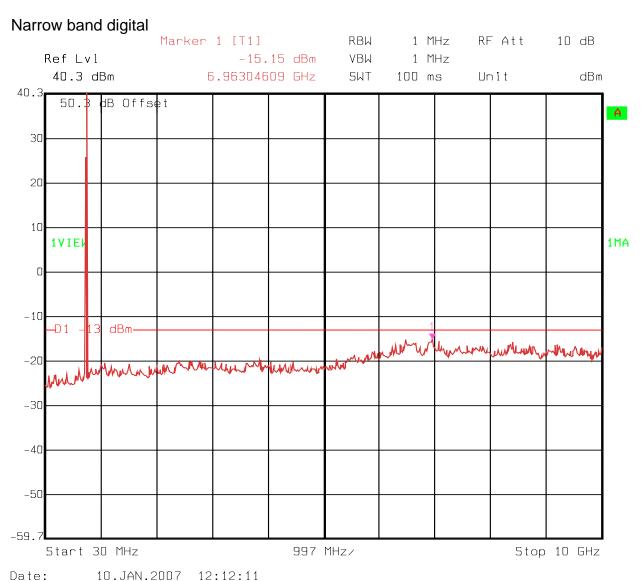
TESTED BY: Kevin Rose DATE: 10 Jan. 2007

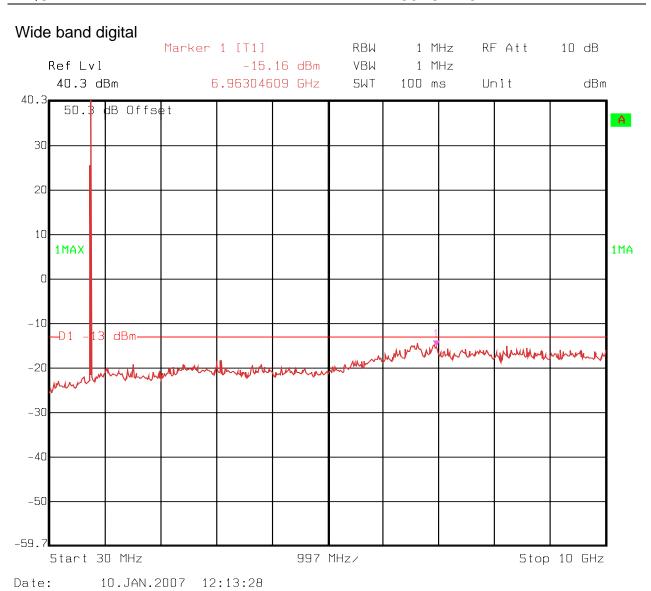
Measurement Results: Complies.

Measurement Data: See attached data

Equipment Used: 1036-1081-1535







The radio was tested on three channels. The noise floor data presented is representative of all channels and modulations tested.

FCC PART 90, SUBPART I PRIVATE LAND MOBILE TRANSMITTER

EQUIPMENT: 242-5377-001AAYB6 PROJECT NO.: 6L0801RUS1rev5

Section 7. Field Strength of Spurious Emissions

NAME OF TEST: Field Strength of Spurious Emissions PARA. NO.: 2.1053

TESTED BY: Kevin Rose DATE: 10 Jan. 2007

Measurement Results: Complies.

Measurement Data: See attached data

Note: The frequency spectrum was searched from 30 MHz to 10 GHz. No emissions within 20 dB of the specification limit were detected.

The spectrum was investigated in the 1559 to 1610 MHz band per 90.543. There were no emissions detected above the noise floor which was at least 20 dB below the specification limit of -70 dBW EIRP.

Receiver Settings: RBW=VBW=100 kHz below 1000 MHz

RBW=VBW=1 MHz above 1000 MHz

Peak detector

Measurement Distance: 3 Meters

Equipment Used: 1464-1484-1485-993-1311-759-791

Photographs of Test Setup



FCC PART 90, SUBPART I PRIVATE LAND MOBILE TRANSMITTER

EQUIPMENT: 242-5377-001AAYB6 PROJECT NO.: 6L0801RUS1rev5

Section 8. Frequency Stability

NAME OF TEST: Frequency Stability PARA. NO.: 90.213 / 90.539

TESTED BY: David Light DATE: 29 August 2007

Measurement Results: Complies.

Measurement Data: See attached data

Limit: 0.4 ppm

Equipment Used: 1036-1081-283-1535

FCC PART 90, SUBPART I PRIVATE LAND MOBILE TRANSMITTER

easurement ncertainty:	17		Standard Test Frequency 769.012291		Standard Test Frequency 769			_MHz	
emp (^o C)	Measured Frequency (MHz)	Rho	Test Voltage	Freqeuncy Error (Hz)	Limit (+/-Hz)	Error (ppm)	Comment		
20	769.012291			0	307.6	0.00			
20	769.012291			0	307.6	0.00			
20	769.012291			0	307.6	0.00			
50	769.012147			-144	307.6	-0.19			
40	769.012272			-19	307.6	-0.02			
30	769.012280			-11	307.6	-0.01			
10	769.012185			-106	307.6	-0.14			
0	769.012150			-141	307.6	-0.18			
-10	769.012211			-80	307.6	-0.10			
-20	769.012237			-54	307.6	-0.07			
-30	769.012110			-181	307.6	-0.24			
Notes:				-	-	-			

FCC PART 90, SUBPART I PRIVATE LAND MOBILE TRANSMITTER

EQUIPMENT: 242-5377-001AAYB6 PROJECT NO.: 6L0801RUS1rev5

Section 9. Adjacent Channel Power

NAME OF TEST: Adjacent Channel Power PARA. NO.: 90.543

TESTED BY: David Light DATE: 29 August. 2007

Measurement Results: Complies.

Measurement Data: See attached data

Limit:

Equipment Used: 1036-1081-283-1535

EQUIPMENT: 242-5377-001AAYB6 PROJECT NO.: 6L0801RUS1rev5

Test Data - Adjacent Channel Power (799.0125 MHz)

25 kHz Analog Channel

Offset from center Frequency (kHz)	Measurement Bandwidth (kHz)	Maximum ACP (dBc)	Measured ACP (dBc)
15.625	6.25	-40	-52.0
21.875	6.25	-60	-67.3
37.50	25.00	-60	-61.0
62.50	25.00	-65	-66.5
87.50	25.00	-65	-66.8
150.0	100	-65	-65.9
250.0	100	-65	-68.2
350.0	100	-65	-71.0
>400 to 12 MHz	30 (s)	-75	-75.9
12 MHz to paired RX band	30 (s)	-75	-78.3
In the paired RX band	30 (s)	-100	-105.0

12.5 kHz analog channel

Offset from center	Measurement	Maximum ACP	Measured ACP
Frequency (kHz)	Bandwidth (kHz)	(dBc)	(dBc)
9.375	6.25	-40	-57.0
15.625	6.25	-60	-63.4
21.875	6.25	-60	-66.0
37.5	25.00	-60	-68.8
62.5	25.00	-65	-67.7
87.5	25.00	-65	-70.2
150.0	100	-65	-67.0
250.0	100	-65	-68.0
350.0	100	-65	-70.7
>400 to 12 MHz	30 (s)	-75	-75.9
12 MHz to paired RX band	30 (s)	-75	-77.0
In the paired RX band	30 (s)	-100	-105.4

Test Data - Adjacent Channel Power

Project 25 digital channel

Offset from center Frequency (kHz)	Measurement Bandwidth (kHz)	Maximum ACP (dBc)	Measured ACP (dBc)
9.375	6.25	-40	-42.6
15.625	6.25	-60	-64.2
21.875	6.25	-60	-67.0
37.5	25.00	-60	-66.0
62.5	25.00	-65	-65.2
87.5	25.00	-65	-67.8
150.0	100	-65	-68.6
250.0	100	-65	-67.8
350.0	100	-65	-70.0
>400 to 12 MHz	30 (s)	-75	-81.0
12 MHz to paired RX band	30 (s)	-75	-81.0
In the paired RX band	30 (s)	-100	-105.1

Section 10. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	05/26/06	05/26/08
1479	Bi Conical Antenna 20-330 Mhz	A. H. Systems SAS-200/540	496	07/27/06	07/27/07
283	Environmental Chamber with controller # 1189006	ENVIROTRONICS SH27 & 2030-22844	129010083	06/19/06	06/19/07
1081	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	06/15/06	06/15/07
1464	Spectrum analyzer	Hewlett Packard 8563E	3551A04428	01/14/05	01/15/07
1485	Cable	Storm PR90-010-216	N/A	10/02/06	10/02/07
1484	Cable	Storm PR90-010-072	N/A	10/02/06	10/02/07
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	04/20/06	04/20/07
759	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	02/13/06	02/13/07
1306	Antenna biconical	Nemko USA, Inc. BCON 30300	212	02/10/06	02/10/07
1535	Attentuator, coaxial	Bird Electronics 8322	469	CBU	N/A
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/01/05	08/02/07
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	04/20/06	04/20/07

ANNEX A - TEST METHODOLOGIES

FCC PART 90, SUBPART I PRIVATE LAND MOBILE TRANSMITTER

EQUIPMENT: 242-5377-001AAYB6 PROJECT NO.: 6L0801RUS1rev5

NAME OF TEST: RF Power Output PARA. NO.: 2.1046

Minimum Standard: Para. No. 90.205(a). The maximum allowable station ERP is

dependent upon the stations HAAT and required service area

and will be authorized in accordance with Table 1 of

90.205(d).

Method Of Measurement:

Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter. Power output is measured with the maximum rated input level.

Integral Antenna:

The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to an isotropic radiator. This antenna is fed with a signal at the spurious frequency. The level of the signal is adjusted to repeat the previously measured level. The resulting eirp is the signal level fed to the reference antenna corrected for gain referenced to an isotropic radiator.

NAME OF TEST: Spurious Emissions at Antenna PARA. NO.: 2.1051

Terminals

Minimum Standard: 90.210, Table 1

Table 1

Frequency Band (MHz)	Mask for equipment with Low Pass Filter	Mask for equipment without Low Pass Filter
Below 25	A or B	A or C
25 - 50	В	С
72 - 76	В	С
150 - 174	B, D or E	C, D or E
150 Paging only	В	С
220 - 222	F	F
421 - 512	B, D or E	C, D or E
450 paging only	В	Н
806 - 821/851 - 866	В	G
821 - 824/ 866 - 869	В	Н
896 - 901/ 935 - 940	I	J
902 - 928	K	K
929 - 930	В	G
Above 940	В	С
All other bands	В	С

MASK	Spurious Limit	FS Limit Below 1 GHz	FS Limit Above 1 GHz
A,B,C,G,H,I	-13dBm	84.4 dB _µ V/m@3m	82.2 dBμV/m@3m
D,J	-20dBm	77.4 dBμV/m@3m	75.2 dBμV/m@3m
E,F,K	-25dBm	72.4 dB _µ V/m@3m	70.2 dB _μ V/m@3m

Test Method: RBW: 1% of emission bandwidth in the 0 - 1 GHz range.

1 MHz at frequencies above 1 GHz.

 $VBW: \Rightarrow RBW$

The spectrum is searched up to 10 times the fundamental frequency.

FCC PART 90, SUBPART I PRIVATE LAND MOBILE TRANSMITTER

EQUIPMENT: 242-5377-001AAYB6 PROJECT NO.: 6L0801RUS1rev5

NAME OF TEST: Occupied Bandwidth PARA. NO.: 2.1049

Minimum Standard: Not defined. Input/Output

Method Of Measurement:

<u>Analog</u>

Spectrum analyzer settings: RBW=VBW=300 Hz

Span: 100 kHz Sweep: Auto

<u>iDEN</u>

RBW=VBW= 300 Hz

Span: 100 kHz Sweep: Auto

FCC PART 90, SUBPART I PRIVATE LAND MOBILE TRANSMITTER

EQUIPMENT: 242-5377-001AAYB6 PROJECT NO.: 6L0801RUS1rev5

NAME OF TEST: Field Strength of Spurious PARA. NO.: 2.1051

Minimum Standard: Para. No. 90.210, see table 1 for applicable mask.

Method Of Measurement: TIA/EIA-603-1992

The antenna substitution method is used to determine the equivalent radiated power at spurious frequencies. The spurious emissions are measured at a distance of 3 meters. The EUT is then replaced with a reference substitution antenna with a known gain referenced to an isotropic radiator. This antenna is fed with a signal at the spurious frequency. The level of the signal is adjusted to repeat the previously measured level. The resulting eirp is the signal level fed to the reference antenna corrected for gain referenced to an isotropic radiator.

MASK	Spurious Limit	FS Limit Below 1 GHz	FS Limit Above 1 GHz
A,B,C,G,H,I	-13dBm	84.4 dB _μ V/m@3m	82.2 dBμV/m@3m
D,J	-20dBm	77.4 dBμV/m@3m	75.2 dBμV/m@3m
E,F,K	-25dBm	72.4 dBμV/m@3m	70.2 dBμV/m@3m

NAME OF TEST: Frequency Stability PARA. NO.: 2.1055

Minimum Standard:

Para. No. 90.213. The transmitter carrier frequency

shall remain

within the assigned frequency below in ppm.

Table 2

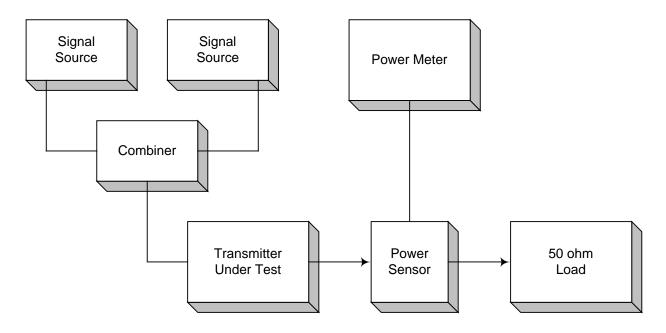
Frequency Band	Fixed And Base	Mobile Stations		
(MHz)	Stations	> 2 Watts o/p pwr	< 2 Watts o/p pwr	
Below 25	100	100	200	
25 - 50	20	20	50	
72 - 76	5	-	50	
150 - 174	5	5	5	
220 - 222	0.1	1.5	1.5	
421 - 512	2.5	5	5	
806 - 821	1.5	2.5	2.5	
821 - 824	1.0	1.5	15	
851 - 866	1.5	2.5	2.5	
866 - 869	1.0	1.5	1.5	
869 - 901	0.1	1.5	1.5	
902 - 928	2.5	2.5	2.5	
929 - 930	1.5	-	-	
935 - 940	0.1	1.5	1.5	
1427 - 1435	300	300	300	
Above 2450	-	-	-	

FCC PART 90, SUBPART I PRIVATE LAND MOBILE TRANSMITTER

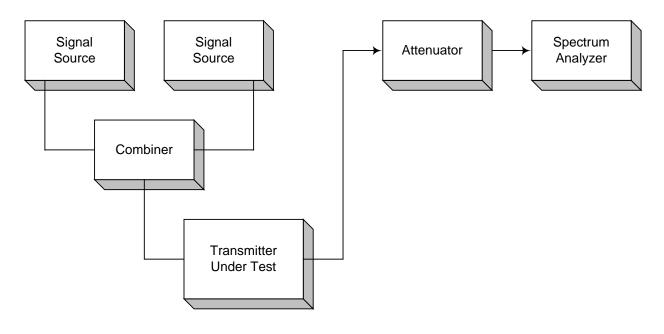
EQUIPMENT: 242-5377-001AAYB6 PROJECT NO.: 6L0801RUS1rev5

ANNEX B - TEST DIAGRAMS

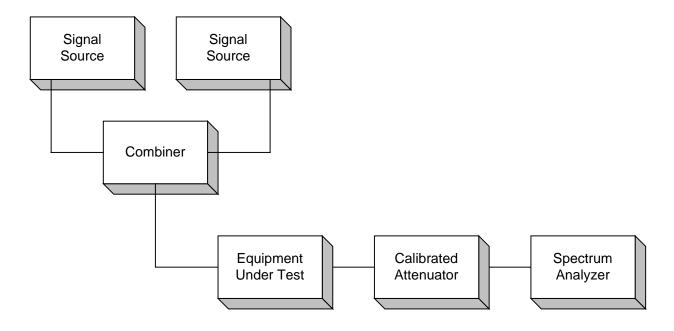
Para. No. 2.1046 - R.F. Power Output



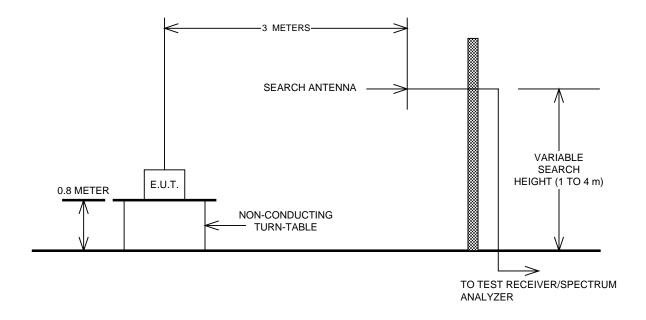
Para. No. 2.1049 - Occupied Bandwidth



Para. No. 2.1051 - Spurious Emissions at Antenna Terminals



Para. No. 2.1053 - Field Strength of Spurious Radiation



Para. No. 2.1055 Frequency Stability

