



Nemko Test Report: 7817RUS1Rev1

Applicant: K & A Wireless, LLC
2617 Juan Tabo Blvd. NE Ste A
Albuquerque, NM 87112
USA

Equipment Under Test: TV462458575T2
(E.U.T.)

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 Light, Senior Wireless Engineer

DATE: 09 October 2007

APPROVED BY: 

Michael Cantrell

DATE: 10 October, 2007

Total Number of Pages: 27

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Section 1. Summary of Test Results

Manufacturer: K & A Wireless

Model No.: TV462458575T2

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 90, Subpart I and TIA EIA-603: 2004

<input checked="" type="checkbox"/>	New Submission	<input checked="" type="checkbox"/>	Production Unit
<input type="checkbox"/>	Class II Permissive Change	<input type="checkbox"/>	Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.
See "Summary of Test Data".

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This report applies only to the items tested.

Summary Of Test Data

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

Footnotes:

The radio has no audio circuitry.

The radio does not contain modulation limiting circuitry.

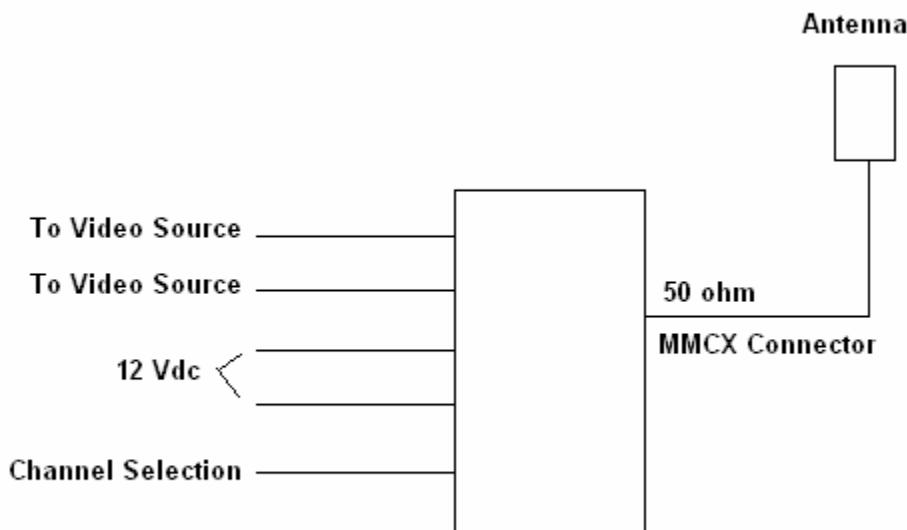
Transient frequency behavior is not applicable to this band.

Section 2. General Equipment Specification**Transmitter**

Supply Voltage Input:	12 Vdc nominal				
Frequency Range:	2458 to 2474 MHz				
Necessary Bandwidth:	11.4 MHz (99% BW)				
Type(s) of Modulation:	F3F	F1D	F2D	D7W (QAM)	Other
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emission Designator:	11M4F3F				
Output Impedance:	50 ohms				
Channel Spacing(s):	16 MHz				
Operator Selection of Operating Frequency:	Switchable between two channels				
Power Output Adjustment Capability:	None				

System Description

The TV462458575T2 is a video transmitter integrated into handle/holder of camera. Designed for emergency rescue operations.

System Diagram

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Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.985
TESTED BY: David Light	DATE: 05 October 2007

Measurement Results: Complies.

Measurement Data:

Frequency (MHz)	Measured Power (dBm)	Measured Power (Watts)	Rated Power (dB)
2458	28.53	0.713	0.750
2474	28.69	0.740	0.750

Measurement Conditions:

Temperature: 22 °C

Humidity: 45 %

Measurement Uncertainty: +/- 1.7 dB

Test Equipment Used: 1036-1082-1472

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.989
TESTED BY: David Light	DATE:

Measurement Results: Complies.

Note regarding Mask selection: Part 90.210 does not have a specific mask for equipment operating in the 2458 – 2474 MHz frequency range. Mask B and C are specified for “all other bands”, for equipment with an audio low pass filter and for equipment without an audio low pass filter, respectively. While the equipment in this application does not have an audio low pass filter, Mask C is not appropriate as it does not allow for equipment with the designated bandwidth in this application. Therefore, compliance is shown with Mask B.

The equipment was modulated using a video camera designed for normal usage.

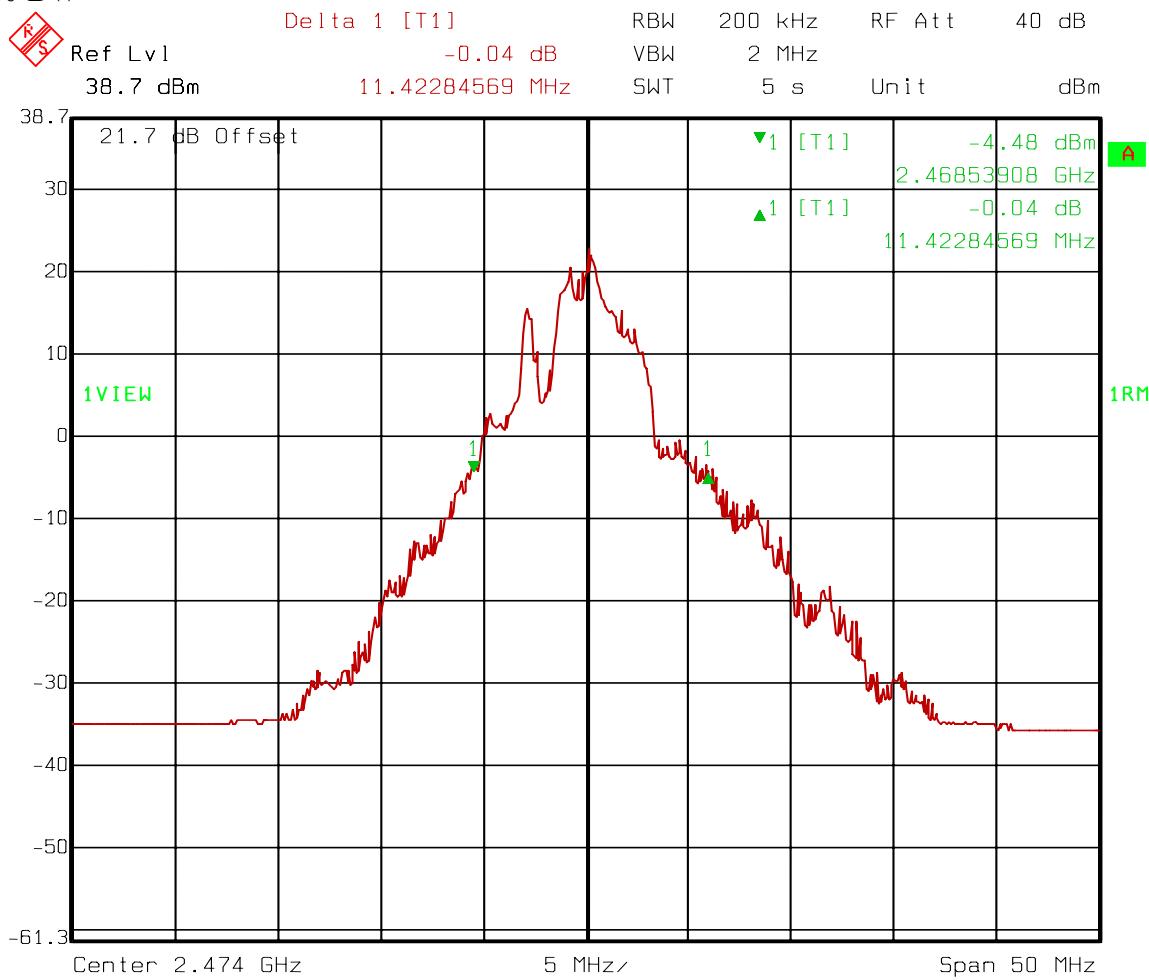
Measurement Data: See attached data**Measurement Conditions:****Temperature:** 22 °C**Humidity:** 45 %**Measurement Uncertainty:** +/- 1x10⁻⁷ ppm**Test Equipment Used:** 1036-1082-1472

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Test Data – Occupied Bandwidth

99% BW

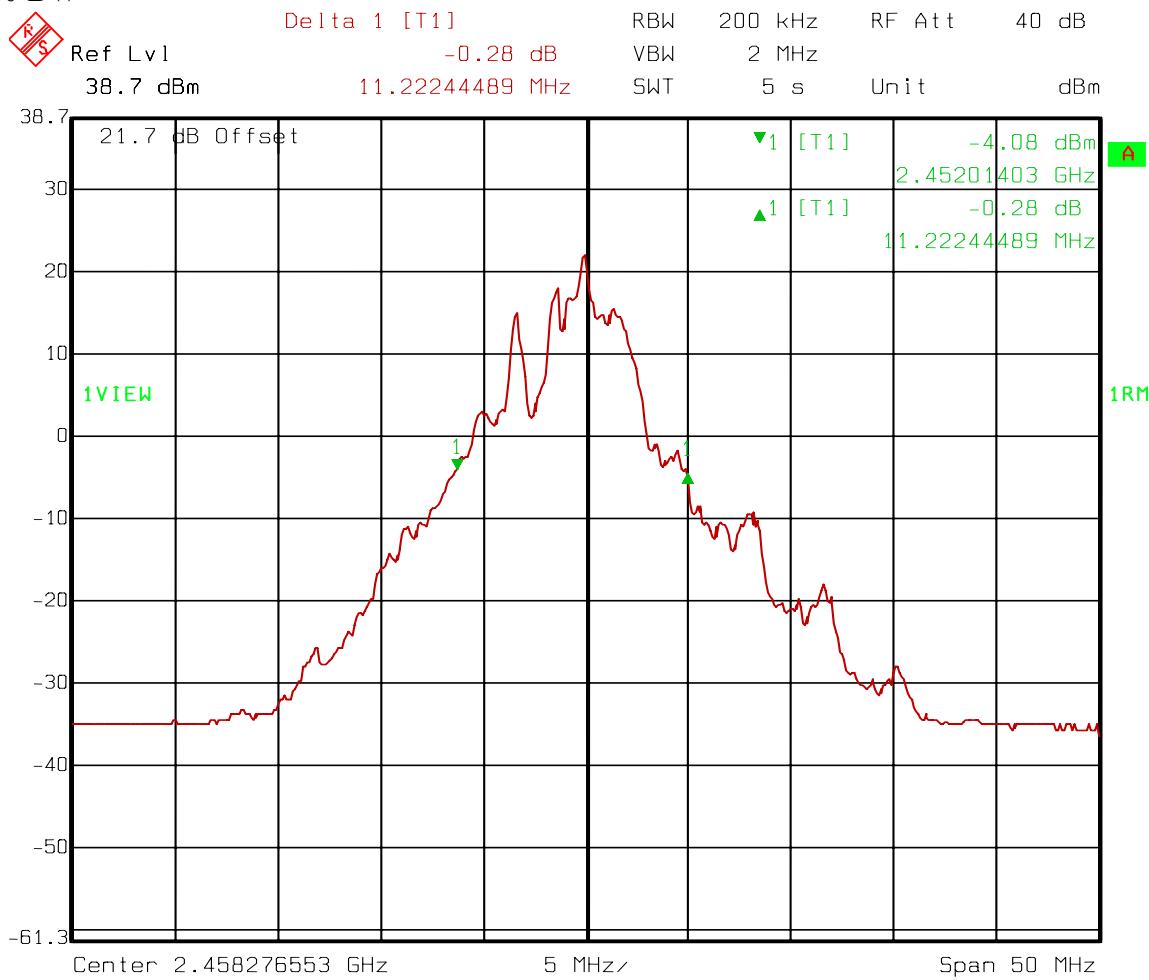


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Test Data – Occupied Bandwidth

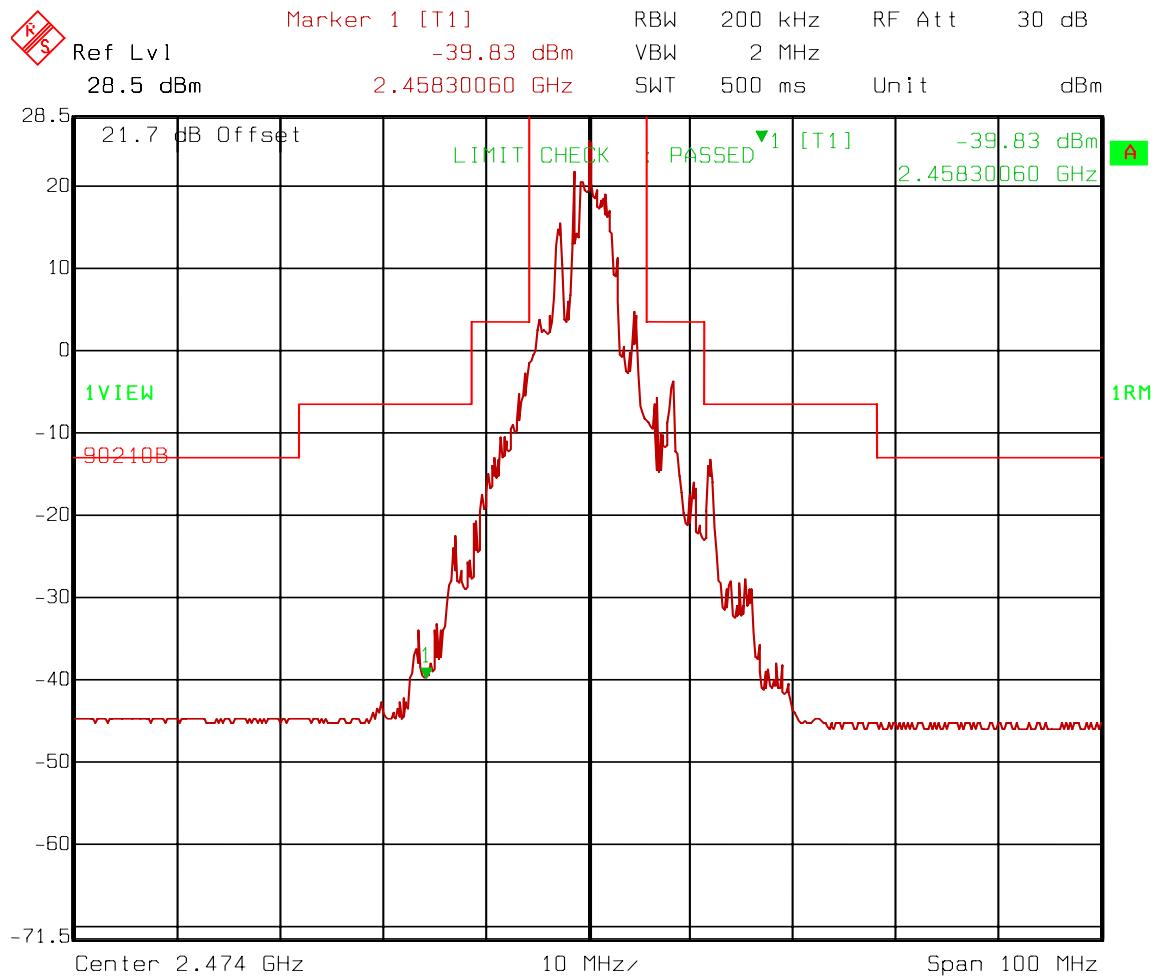
99% BW



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Test Data – Occupied Bandwidth

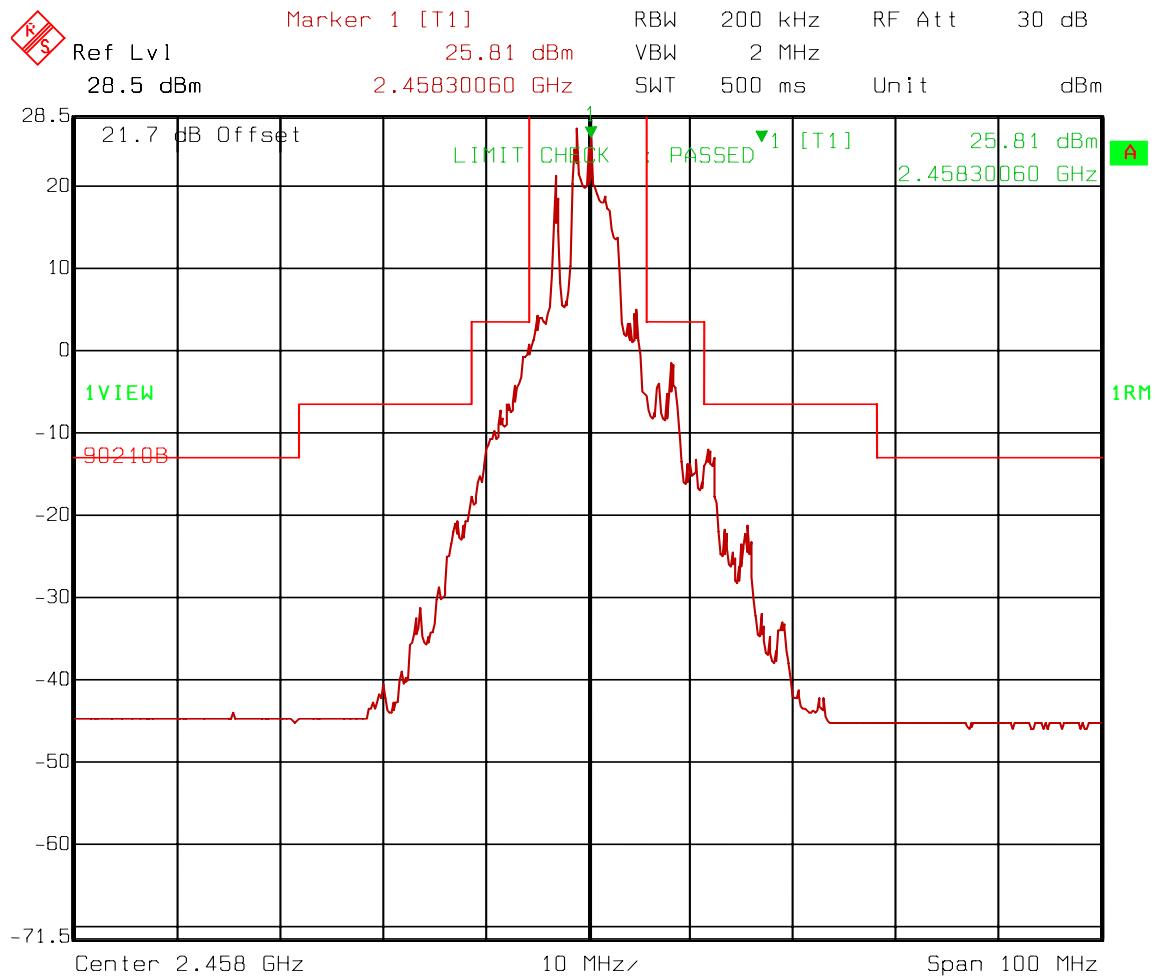


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Test Data – Occupied Bandwidth



Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals PARA. NO.: 2.991

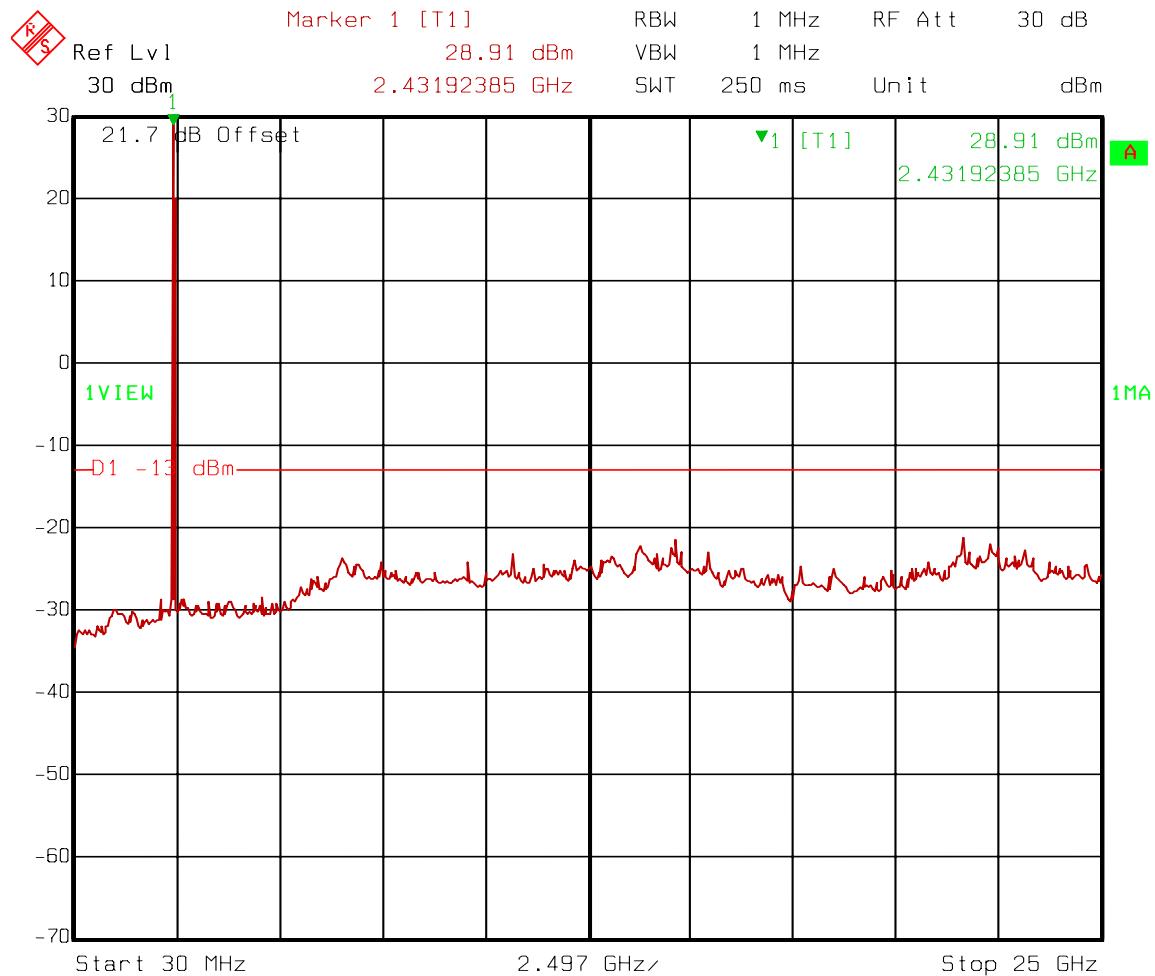
TESTED BY: David Light DATE: 05 October 2007

Measurement Results: Complies.**Measurement Data:** See attached data**Measurement Conditions:****Temperature:** **22** °C**Humidity:** **45** %**Measurement Uncertainty:** +/- 1.7 dB**Test Equipment Used:** 1036-1082-1472

EQUIPMENT: TV462458575T2

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Test Data – Spurious Emissions



Date: 05.OCT.2007 12:52:26

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Section 6. Field Strength of Spurious Emissions

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.993
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TESTED BY: David Light	DATE: 05 October 2007
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Measurement Results: Complies.

Measurement Data: See attached data

Measurement Conditions:

Temperature: **22** °C

Humidity: **45** %

Measurement Uncertainty: +/- 1.7 dB

Test Equipment Used: 1036-1484-1485-993-759-760-1016-791

EQUIPMENT: TV462458575T2**PROJECT NO.:** **7817RUS1**
Rev1**Test Data - Radiated Emissions**

Frequency (MHz)	Meter Reading (dBm)	Substitution Level (dBm)		Pre-Amp Gain (dB)	Substitution Antenna Gain (dBD)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarity	Comments
4948	-45.2	-36.4		32.6	9.1	-27.3	-13.0	-14.3	V	Transmit @ 2474 MHz
7422	-53.3	-45.1		32.6	9.5	-35.7	-13.0	-22.7	V	
9896	-56.8	-51.1		36.1	9.8	-41.4	-13.0	-28.4	V	
12370	-61.0	-51.0		34.7	10.0	-41.0	-13.0	-28.0	V	
14844	-62.3	-44.9		32.1	7.1	-37.8	-13.0	-24.8	V	
7422	-47.0	-40.2		32.6	9.5	-30.8	-13.0	-17.8	H	

Notes: The spectrum was searched from 30 MHz to 24 GHz. All emissions are reported.

Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.995
TESTED BY: David Light	DATE: 09 October 2007

Measurement Results: Complies.**Measurement Data:** See attached data**Measurement Conditions:****Temperature:** **22** °C**Humidity:** **45** %**Measurement Uncertainty:** +/- **1X10⁻⁷** ppm**Test Equipment Used:** 1036-1082-1472-283-619

Test Data – Frequency Stability

Standard Test Frequency 2474.000000 MHz							
Temp (°C)	Measured Frequency (MHz)		Test Voltage	Frequency Error (Hz)	Limit (+/-Hz)	Error (ppm)	Comment
20	2473.973150		12 Vdc	-26850	2474.0	-10.9	Nominal
20	2473.973950		3.7 Vdc	-26050	2474.0	-10.5	Battery cutoff
20	2473.973890		24 Vdc	-26110	2474.0	-10.6	
50	2473.968992		12 Vdc	-31008	2474.0	-12.5	
40	2473.971000		12 Vdc	-29000	2474.0	-11.7	
30	2473.973850		12 Vdc	-26150	2474.0	-10.6	
10	2473.979510		12 Vdc	-20490	2474.0	-8.3	
0	2473.983000		12 Vdc	-17000	2474.0	-6.9	
-10	2473.985920		12 Vdc	-14080	2474.0	-5.7	
-20	2473.981300		12 Vdc	-18700	2474.0	-7.6	
-30	2473.980910		12 Vdc	-19090	2474.0	-7.7	
Notes:							

EQUIPMENT: TV462458575T2**PROJECT NO.:** **7817RUS1**
Rev1**Section 8. 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
1082	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	CBU	N/A
1472	20db Attenuator DC 18 Ghz	Omni Spectra 20600-20db	NONE	CBU	N/A
993	Horn antenna	A.H. Systems SAS-200/571	XXX	08/31/07	08/31/09
759	ANTENNA, LOG PERIODIC	A.H. SYSTEMS SAS-200/510	556	03/30/07	03/29/08
760	Antenna biconical	Electro Metrics MFC-25	477	01/19/07	01/19/08
791	PREAMP, 25dB	Nemko USA, Inc. LNA25	398	05/01/07	04/30/08
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	05/01/07	04/30/08
1484	Cable	Storm PR90-010-072	N/A	05/02/07	05/01/08
1485	Cable	Storm PR90-010-216	N/A	05/02/07	05/01/08
283	Environmental Chamber with controller # 1189006	ENVIROTRONICS SH27 & 2030-22844	129010083	CNR	NA
619	THERMOMETER	FLUKE 51	4520028	03/01/07	02/29/08

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ANNEX A - TEST METHODOLOGIES

NAME OF TEST: RF Power Output**PARA. NO.: 2.985**

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:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

NAME OF TEST: Occupied Bandwidth**PARA. NO.: 2.989****Minimum Standard:** Para. No. 90.210, see table 1 below for applicable mask.**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	B	C
72 - 76	B	C
150 - 174	B, D or E	C, D or E
150 Paging only	B	C
220 - 222	F	F
421 - 512	B, D or E	C, D or E
450 paging only	B	H
806 - 821/ 851 - 866	B	G
821 - 824/ 866 - 869	B	H
896 - 901/ 935 - 940	I	J
902 - 928	K	K
929 - 930	B	G
Above 940	B	C
All other bands	B	C

Test Method:

RBW: 1% of emission bandwidth in 0 - 1 GHz range. 1 MHz at frequencies above 1 GHz.

VBW: \Rightarrow RBW

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

NAME OF TEST: Field Strength of Spurious**PARA. NO.: 2.993****Minimum Standard:** Para. No. 90.210, see table 1 for applicable mask.**Calculation of Field Strength Limit**

An example of attenuation requirement of $50 + 10 \log P$ is equivalent to -20 dBm (1×10^{-5} Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$$GP/4\pi R^2 = E^2/120\pi$$

For emissions ≤ 1 GHz:

$G = 1.64$ (Dipole Gain)

$P = 10^{-5}$ Watts (Maximum spurious output power)

$R = 3m$ (Measurement Distance)

$$E = \frac{\sqrt{30GP}}{R} = E = \frac{\sqrt{30 \times 1.64 \times 10^{-5}}}{3} = 0.00739 \text{ V/m} = 77.4 \text{ dB}\mu\text{V/m}$$

For emissions > 1 GHz:

$G = 1$ (Isotropic Gain)

$P = 1 \times 10^{-5}$ Watts (Maximum spurious output power)

$R = 3m$ (Measurement Distance)

$$E = 77.4 - 20 \log \sqrt{1.64} = 75.2 \text{ dB}\mu\text{V/m} @ 3m$$

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 dB μ V/m @ 3m
D,J	-20dBm	77.4 dB μ V/m @ 3m	75.2 dB μ V/m @ 3m
E,F,K	-25dBm	72.4 dB μ V/m @ 3m	70.2 dB μ V/m @ 3m

NAME OF TEST: Frequency Stability**PARA. NO.: 2.995**

Minimum Standard: Para. No. 990.213. The transmitter carrier frequency shall remain within the assigned frequency below in ppm.

Table 2

Frequency Band (MHz)	Fixed And Base Stations	Mobile 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	-	-	-

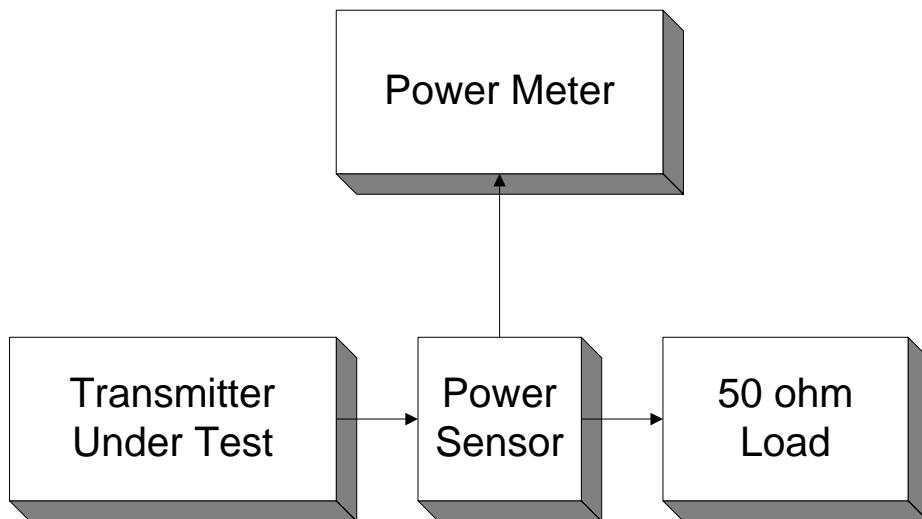
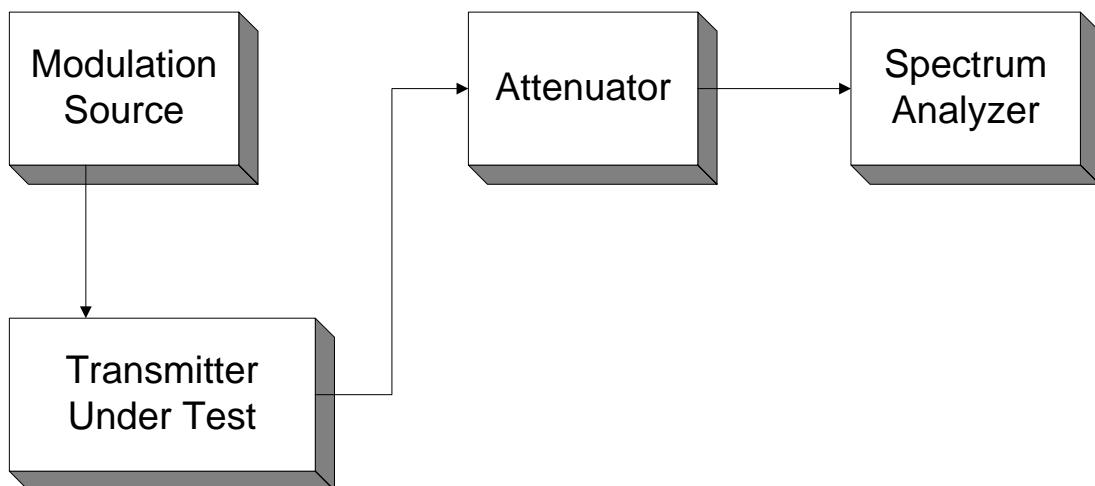
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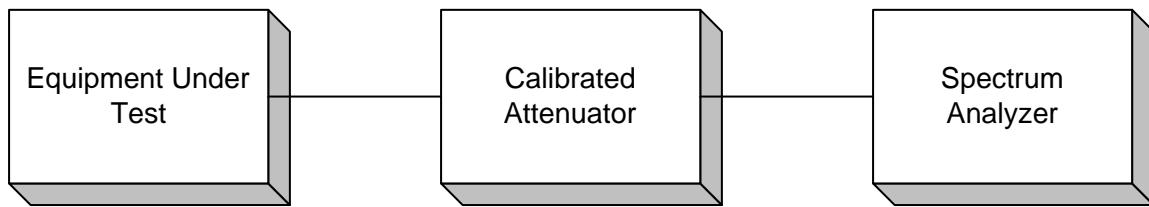
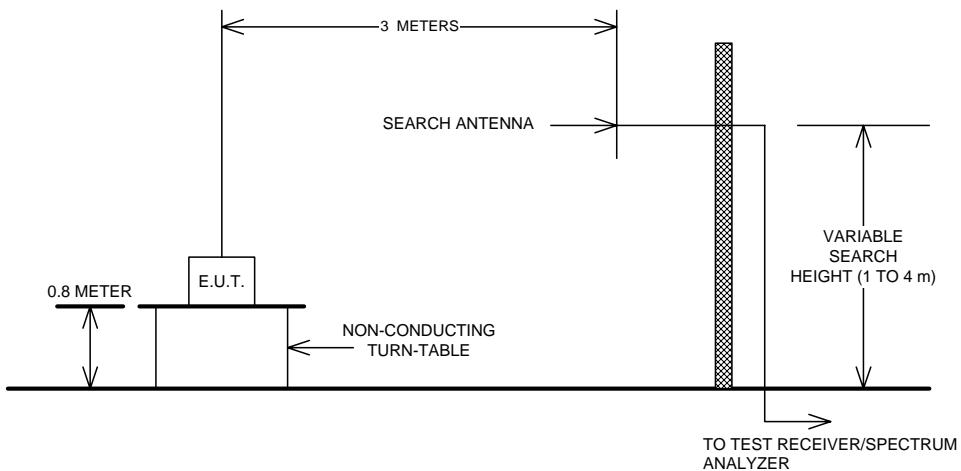
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ANNEX B - TEST DIAGRAMS

Para. No. 2.985 - R.F. Power Output**Para. No. 2.989 - Occupied Bandwidth**

EQUIPMENT: TV462458575T2**PROJECT NO.:** **7817RUS1**
Rev1**Para. No. 2.991 - Spurious Emissions at Antenna Terminals****Para. No. 2.993 - Field Strength of Spurious Radiation****Para. No. 2.995 - Frequency Stability**