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# Report On

FCC and Industry Canada Testing of the  
ETELM SAS NetisB25

In accordance with FCC 47 CFR Part 90, FCC 47 CFR Part 2 and  
Industry Canada RSS-119

COMMERCIAL-IN-CONFIDENCE

FCC ID: 0024845661  
IC: 20543-BSTETRA800

Document 75930525 Report 01 Issue 1

September 2015



Product Service

TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North,  
Fareham, Hampshire, United Kingdom, PO15 5RL  
Tel: +44 (0) 1489 558100. Website: [www.tuv-sud.co.uk](http://www.tuv-sud.co.uk)

COMMERCIAL-IN-CONFIDENCE

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**PREPARED FOR**

ETELM SAS  
Avenue des deux lacs  
PA Villejust  
Courtaboeuf Cedex  
91971  
France

**PREPARED BY**

  
**Natalie Bennett**  
Senior Administrator, Project Support

**APPROVED BY**

  
**Mark Jenkins**  
Authorised Signatory

**DATED**

09 September 2015

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**ENGINEERING STATEMENT**

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 90, FCC 47 CFR Part 2 and Industry Canada RSS-119. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s):



M Russell



T Guy





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## **SECTION 1**

### **REPORT SUMMARY**

FCC and Industry Canada Testing of the  
ETELM SAS NetisB25

In accordance with FCC 47 CFR Part 90, FCC 47 CFR Part 2 and Industry Canada RSS-119



## 1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC and Industry Canada Testing of the ETELM SAS NetisB25 to the requirements of FCC 47 CFR Part 90, FCC 47 CFR Part 2 and Industry Canada RSS-119.

Objective	To perform FCC and Industry Canada Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	ETELM SAS
Model Number(s)	NETIS B25
Serial Number(s)	2000063 0361
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 90 (2014) FCC 47 CFR Part 2 (2014) Industry Canada RSS-119 (Issue 11, 2011)
Incoming Release Date	Application Form 22 May 2015
Disposal Reference Number	Held Pending Disposal
Date	Not Applicable
Order Number	Not Applicable
Date	
Start of Test	7807 22 May 2015
Finish of Test	22 June 2015
Name of Engineer(s)	M Russell T Guy
Related Document(s)	ANSI C63.4: 2009



## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 90, FCC 47 CFR Part 2 and Industry Canada RSS-119 is shown below.

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 90	Part 2	RSS-119			
<b>Transmit</b>						
2.1	90.205 (k)	2.1046	5.4	Maximum Conducted Output Power	Pass	
2.2	90.207	-	-	Type of Emissions	Pass	
2.3	-	2.1049	5.5.8	Occupied Bandwidth	Pass	
2.4	90.210 (g)	2.1051	5.8.10	Spurious Emissions at Antenna Terminals	Pass	
2.5	90.210 (g)	2.1051	5.8.10	Emission Mask	Pass	
2.6	90.213 (a)	2.1055	5.3	Frequency Stability	Pass	
2.7	90.221 (c)	-	-	Adjacent Channel Power	Pass	
2.8	-	2.1047 (d)	-	Modulation Characteristics	Pass	



## 1.3 APPLICATION FORM

POWER CHARACTERISTICS				
Maximum TX power	25	W		
Minimum TX power	W (if variable)			
Is transmitter intended for :				
Continuous duty	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Intermittent duty	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
If intermittent state DUTY CYCLE				
Transmitter ON	seconds			
Transmitter OFF	seconds			

ANTENNA CHARACTERISTICS				
<input checked="" type="checkbox"/> Antenna connector	State impedance 50 Ohm			
<input type="checkbox"/> Temporary antenna connector	State impedance Ohm			
<input type="checkbox"/> Integral antenna	Type	State impedance dBi		
<input type="checkbox"/> External antenna	Type	State impedance dBi		

MODULATION CHARACTERISTICS				
<input type="checkbox"/> Amplitude	<input type="checkbox"/> Frequency			
<input checked="" type="checkbox"/> Phase	<input type="checkbox"/> Other (please provide details):			
Can the transmitter operate un-modulated? <input type="checkbox"/> Yes <input type="checkbox"/> No				

CLASS OF EMISSION USED				
ITU designation or Class of Emission:				
1 (if applicable) 2 (if applicable) 3				
If more than three classes of emission, list separately:				

BATTERY POWER SUPPLY				
Model name/number	Identification/Part number			
Manufacturer	Country of Origin			

ANCILLARIES (If applicable)				
Model name/number	Identification/Part number			
Manufacturer	Country of Origin			

EXTREME CONDITIONS					
Extreme test voltages (Max)	55.2	V	Extreme test voltages (Mix)	40.8	V
Nominal DC Voltage	48	V	DC Maximum Current	15	A
Maximum temperature	55	°C	Minimum temperature	-10	°C



EQUIPMENT DESCRIPTION	
Model Name/Number	NetisB25
Part Number	362
Hardware Version	
Software Version	9.05c
FCC ID (if applicable)	0024845661
Industry Canada ID (if applicable)	20543-BSTETRA800
Technical Description (Please provide a brief description of the intended use of the equipment)	Tetra Base Station which can work in stand-alone mode or which can be connected to others Base Station to create a Tetra Network.

POWER SOURCE					
<input type="checkbox"/> AC mains	State voltage				
AC supply frequency	(Hz)	VAC	Max Current	15	A
Hz					
<input type="checkbox"/> Single phase		<input type="checkbox"/> Three phase			
And / Or					
<input checked="" type="checkbox"/> External DC supply					
Nominal voltage	48 V	Max Current	15	A	
Extreme upper voltage	55.2 V				
Extreme lower voltage	40.8 V				
Battery					
<input type="checkbox"/> Nickel Cadmium		<input type="checkbox"/> Lead acid (Vehicle regulated)			
<input type="checkbox"/> Alkaline		<input type="checkbox"/> Leclanche			
<input type="checkbox"/> Lithium		<input type="checkbox"/> Other Details :			
Volts nominal.					
End point voltage as quoted by equipment manufacturer			V		

FREQUENCY INFORMATION					
Frequency Range	851 to 868.975	MHz			
Channel Spacing (where applicable)	5				
Receiver Frequency Range (if different)	806 to 823.975	MHz			
Channel Spacing (if different)					
Test Frequencies*	Bottom	851	MHz	Channel Number (if applicable)	2040
	Middle	860	MHz	Channel Number (if applicable)	2400
	Top	868.975	MHz	Channel Number (if applicable)	2759
Intermediate Frequencies		45	MHz		
Highest Internally Generated Frequency :			TX freq+45	MHz	

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Signature:

Name: VELTZ

Position held: Tests Manager

Date: 22/05/15



## 1.4 PRODUCT INFORMATION

### 1.4.1 Technical Description

The Equipment Under Test (EUT) was a ETELM SAS NetisB25. A full technical description can be found in the manufacturer's documentation.

## 1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 48 V DC supply.

FCC Measurement Facility Registration Number  
90987 Octagon House, Fareham Test Laboratory

Industry Canada Company Address Code  
IC2932B-1 Octagon House, Fareham Test Laboratory

## 1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard were made during testing.

## 1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.



Product Service

## **SECTION 2**

### **TEST DETAILS**

FCC and Industry Canada Testing of the  
ETELM SAS NetisB25

In accordance with FCC 47 CFR Part 90, FCC 47 CFR Part 2 and Industry Canada RSS-119



## 2.1 MAXIMUM CONDUCTED OUTPUT POWER

### 2.1.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.205 (k)  
FCC 47 CFR Part 2, Clause 2.1046  
Industry Canada RSS-119, Clause 5.4

### 2.1.2 Equipment Under Test and Modification State

NETIS B25 S/N: 2000063 0361 - Modification State 0

### 2.1.3 Date of Test

22 June 2015

### 2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.1.5 Test Procedure

The test was performed in accordance with KDB 971168 D01 v02r02, clause 5.2.1.

### 2.1.6 Environmental Conditions

Ambient Temperature	19.2°C
Relative Humidity	61.5%



## 2.1.7 Test Results

48 V DC Supply

### Transmit, Maximum Conducted Output Power Results

851.000 MHz		854.000 MHz		860.00 MHz		861.500 MHz		868.975 MHz	
dBm	W	dBm	W	dBm	W	dBm	W	dBm	W
44.15	26.00	44.17	26.12	43.86	24.32	44.01	25.18	43.72	23.55

### FCC 47 CFR Part 90, Limit Clause 90.205

Frequency (MHz)	Limit
< 25	1000 W
25 to 50	300 W
72 to 76	300 W
150 to 174	Refer to 90.205 (d) of the specification
217 to 220	Refer to 90.259 of the specification
220 to 222	Refer to 90.729 of the specification
421 to 430	Refer to 90.279 of the specification
450 to 470	Refer to 90.205 (h) of the specification
470 to 512	Refer to 90.307 and 90.309 of the specification
758 to 775 and 788 to 805	Refer to 90.541 and 90.542 of the specification
806 to 824, 851 to 869, 869 to 901 and 935 to 940	Refer to 90.635 of the specification
902 to 927.25	LMS systems operating pursuant to subpart M of the specification : 30 W
927.25 to 928	LMS equipment: 300 W
929 to 930	Refer to 90.494 of the specification
1427 to 1429.5 and 1429.5 to 1432	Refer to 90.259 of the specification
2450 to 2483.5	5 W
4940 to 4990	Refer to 90.1215 of the specification
5850 to 5925	Refer to subpart M of the specification
All other frequency bands	On a case by case basis

### Industry Canada RSS-119, Limit Clause 5.4

The output power shall be within  $\pm 1.0$  dB of the manufacturer's rated power.

Typical transmitter output powers are 110 watts for base and/or fixed stations (paging transmitters excepted), and 30 watts for mobile stations. Higher powers may be certified, but it should be noted that mobile stations are normally only licensed up to 30 watts. See the SRSP relevant to the operating frequency for equipment power limits.



Product Service

## 2.2 TYPE OF EMISSIONS

### 2.2.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.207

### 2.2.2 Equipment Under Test and Modification State

NETIS B25 S/N: 2000063 0361 - Modification State 0

### 2.2.3 Date of Test

23 June 2015

### 2.2.4 Test Equipment Used

No test equipment applicable for this test.

### 2.2.5 Test Procedure

The class of emission has been chosen in accordance with FCC 47 CFR Part 90.207(a). A plot showing the bandwidth of the emission has been included for reference.

### 2.2.6 Environmental Conditions

Ambient Temperature	21.0°C
Relative Humidity	49.9%



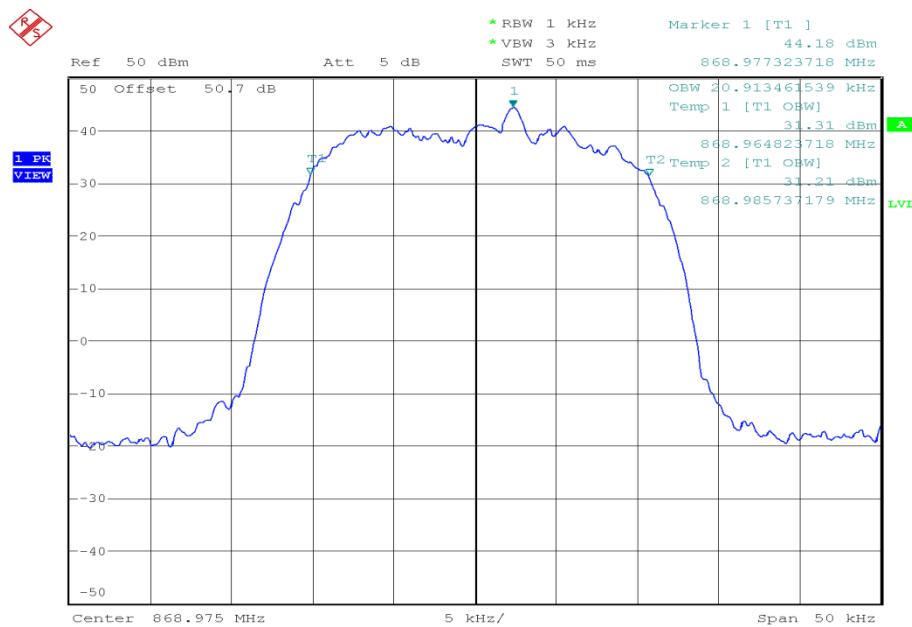
## 2.2.7 Test Results

48 V DC Supply

### Transmit, Type of Emissions Result

The class of the emission has been declared as G1D.

### Transmit, Type of Emissions Plot



Date: 21.JUN.2015 20:44:29

### FCC 47 CFR Part 90, Limit Clause 90.207

The class of emission declared is authorised for use within the scope of specification.



Product Service

## 2.3 OCCUPIED BANDWIDTH

### 2.3.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049  
Industry Canada RSS-119, Clause 5.5.8

### 2.3.2 Equipment Under Test and Modification State

NETIS B25 S/N: 2000063 0361 - Modification State 0

### 2.3.3 Date of Test

22 June 2015

### 2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.3.5 Test Procedure

The test was performed in accordance with KDB 971168 D01 v02r02, clause 4.2.

### 2.3.6 Environmental Conditions

Ambient Temperature	21.9°C
Relative Humidity	54.8%



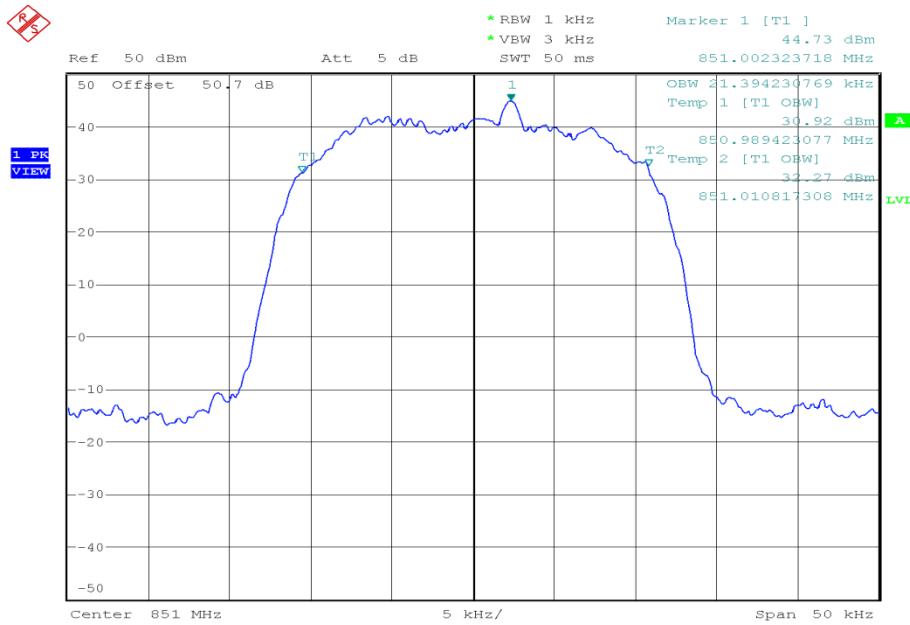
### 2.3.7 Test Results

48 V DC Supply

#### Transmit, Occupied Bandwidth Results

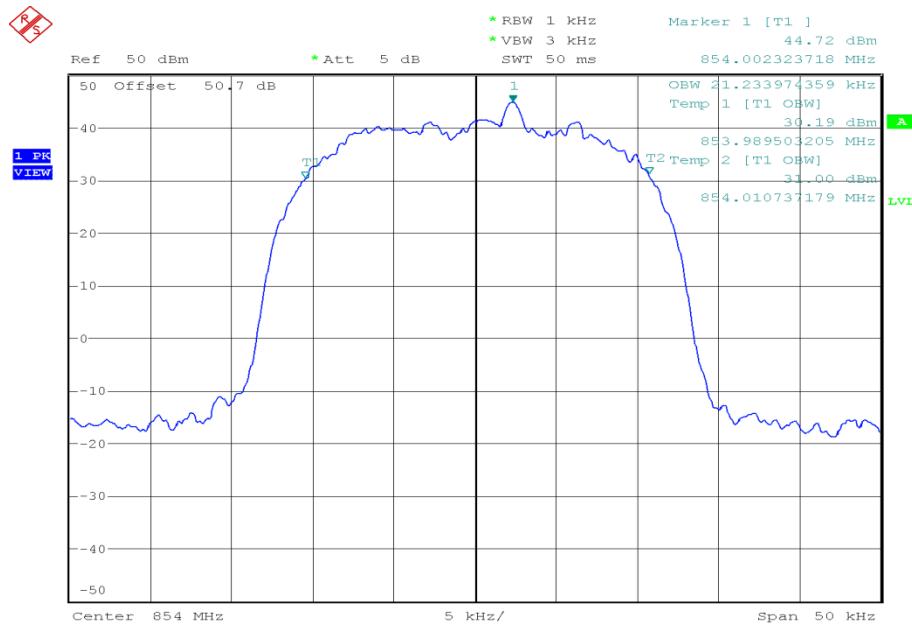
851.000 MHz	854.000 MHz	860.000 MHz	861.500 MHz	868.975 MHz
kHz	kHz	kHz	kHz	kHz
21.39	21.23	21.31	21.39	20.91

#### Transmit, 851.000 MHz, Occupied Bandwidth Plot

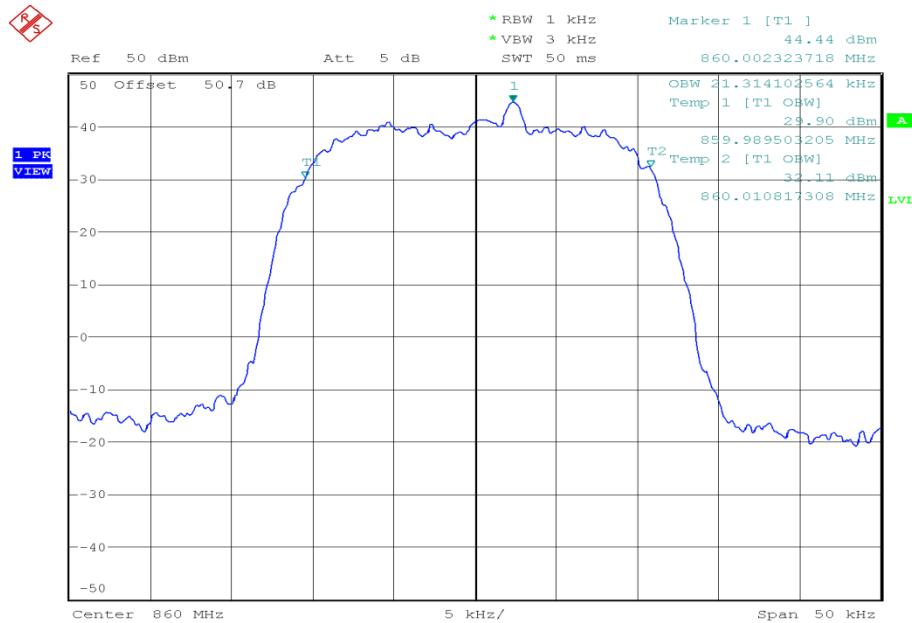




Product Service

Transmit, 854.000 MHz, Occupied Bandwidth Plot

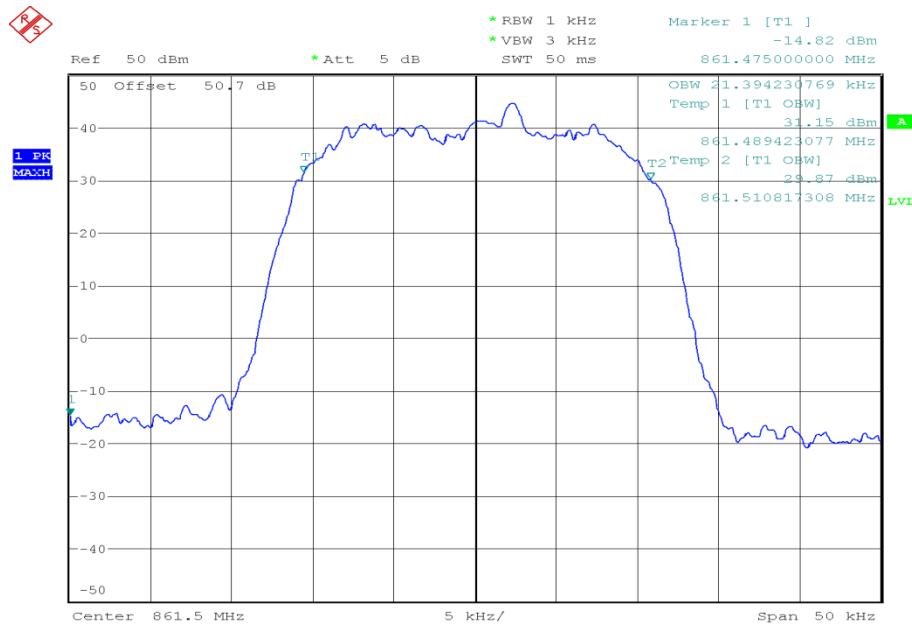
Date: 21.JUN.2015 23:15:20

Transmit, 860.000 MHz, Occupied Bandwidth Plot

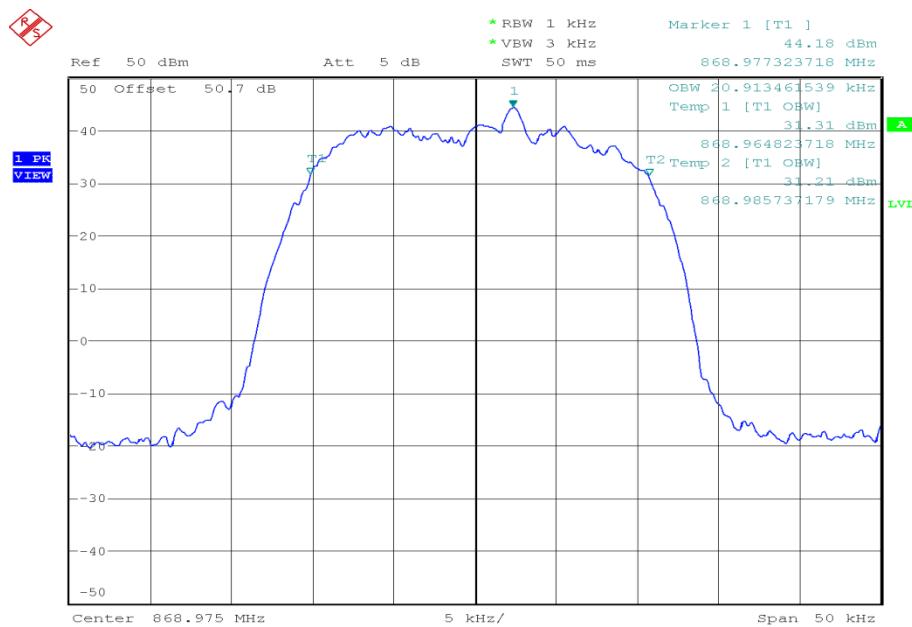
Date: 21.JUN.2015 20:38:34



### Transmit, 861.500 MHz, Occupied Bandwidth Plot



### Transmit, 868.975 MHz, Occupied Bandwidth Plot





Product Service

Remarks

Equipment designed to operate with a 25 kHz channel bandwidth may be authorised up to a 22 kHz bandwidth if the equipment meets the adjacent channel power requirements of FCC 47 CFR Part, clause 90.221 and Industry Canada RSS-119, clause 5.8.9.1.

FCC 47 CFR Part 2, Limit Clause

None Specified.

Industry Canada RSS-119, Limit Clause 5.5.8

Frequency Band (MHz)	Related SRSP for Channelling Plan and e.r.p.	Channel Spacing (kHz)	Authorised Bandwidth (kHz)	Spectrum Masks with Audio Filter	Spectrum Masks Without Audio Filter
27.41-28.0 and 29.7-50.0	N/A	20	20	B	C
72-76	N/A	20	20	B	C
138-144; 148-149.9 and 150.05-174	SRSP-500	30	20	B	C
		15	11.25	D	D
		7.5	6	E	E
217-218 and 219-220	N/A	12.5	11.25	D or I	D or J
220-222	SRSP-512	5	4	F	F
406.1-430 and 450-470	SRSP-501	25	20	B	C (G, Note 1)
		25	22	Y	Y
		12.5	11.25	D	D
764-776 and 794-806	SRSP-511	6.25	Note 2	Section 5.8.9	Section 5.8.9
		12.5			
		25			
806-821-851-866 and 821-824/866-869	SRSP-502	50			
		25	20	B	G
		25			
		12.5	22	Y	Y
		12.5	11.25	D	D
896-901/935-940	SRSP-506	12.5	13.6	I	J (G, Note 3)
929-930 and 931-932	SRSP-504 (for aging)	25	20	B	G
928-929/952-953 and 932-932.5/941-941.5	SRSP-505	25	20	B	G
		12.5	11.25	D	D
932.5-935/941.5-944	SRSP-507	25	20	B	G
		12.5	11.25	D	D



## 2.4 SPUIOUS EMISSIONS AT ANTENNA TERMINALS

### 2.4.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.210 (g)  
 FCC 47 CFR Part 2, Clause 2.1051  
 Industry Canada RSS-119, Clause 5.8.10

### 2.4.2 Equipment Under Test and Modification State

NETIS B25 S/N: 2000063 0361 - Modification State 0

### 2.4.3 Date of Test

22 June 2015 & 23 June 2015

### 2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.4.5 Test Procedure

For emissions within 854 MHz to 869 MHz and within 250% from the centre of the authorized bandwidth, measurements were performed against FCC 47 CFR Part 90, clause 90.210, emission mask G. The EUT was connected to a spectrum analyser via a cable and attenuator. The spectrum emission mask measurement function of the spectrum analyser was used with the RBW configured to 100 Hz with RMS detector and trace averaging.

For emissions 851 MHz to 869 MHz within 50 kHz from the edge of the authorised bandwidth, measurements were performed against Industry Canada RSS-119, clauses 4.2.2 and 5.8.10.

For emissions greater than 250% of the centre of the authorised bandwidth, measurements were performed in accordance with KDB 971168 D01 v02r02. A 1.5 GHz high pass filter was used between 1.5 GHz and 3 GHz.

### 2.4.6 Environmental Conditions

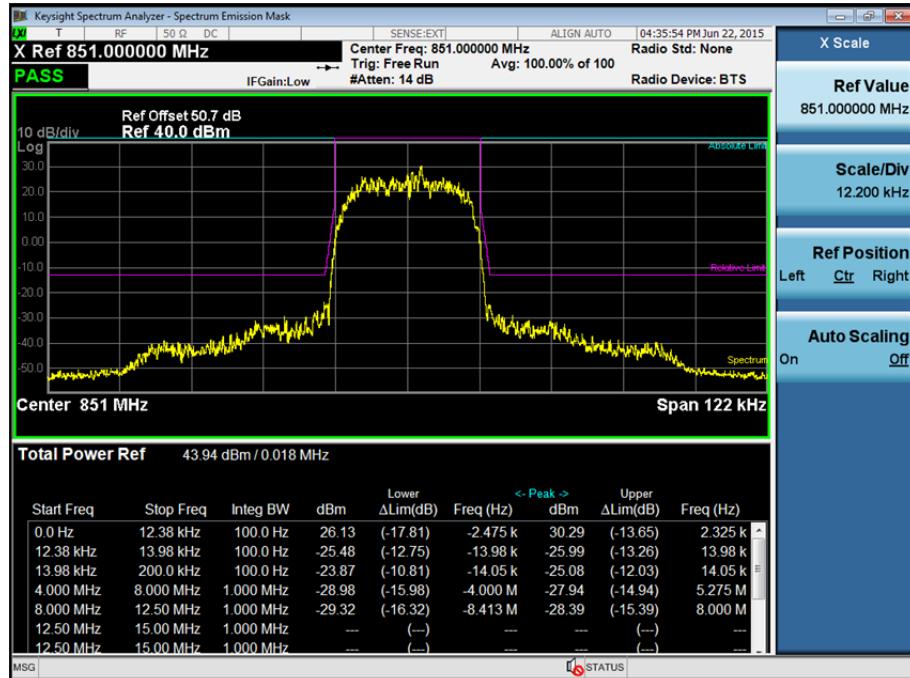
Ambient Temperature	19.9 - 22.8°C
Relative Humidity	43.8 - 52.7%



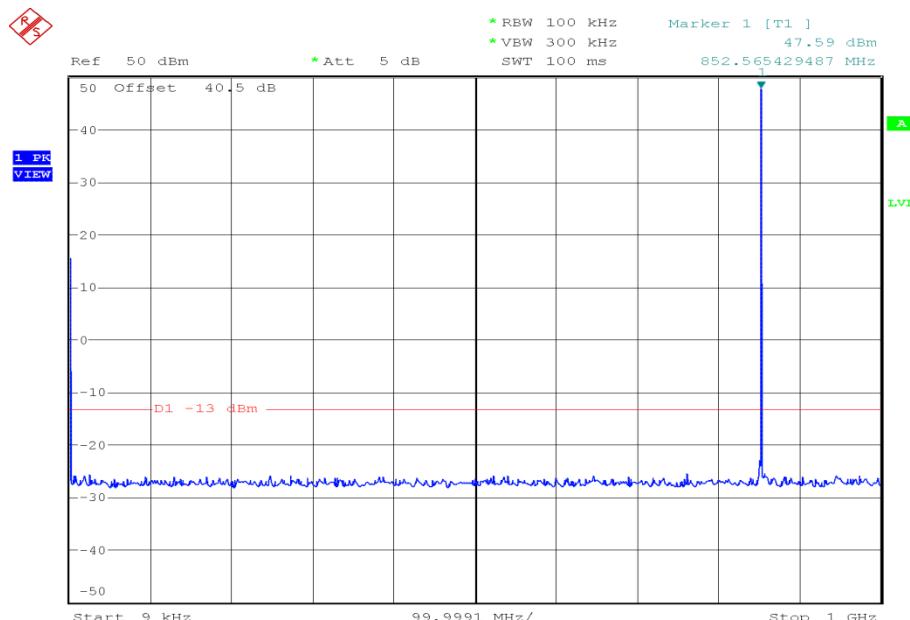
## 2.4.7 Test Results

48 V DC

### Transmit, 851.000 MHz, Emission Mask Y, Spurious at Antenna Terminals Plot



### Transmit, 851.000 MHz, 9 kHz to 1 GHz, Spurious at Antenna Terminals Plot

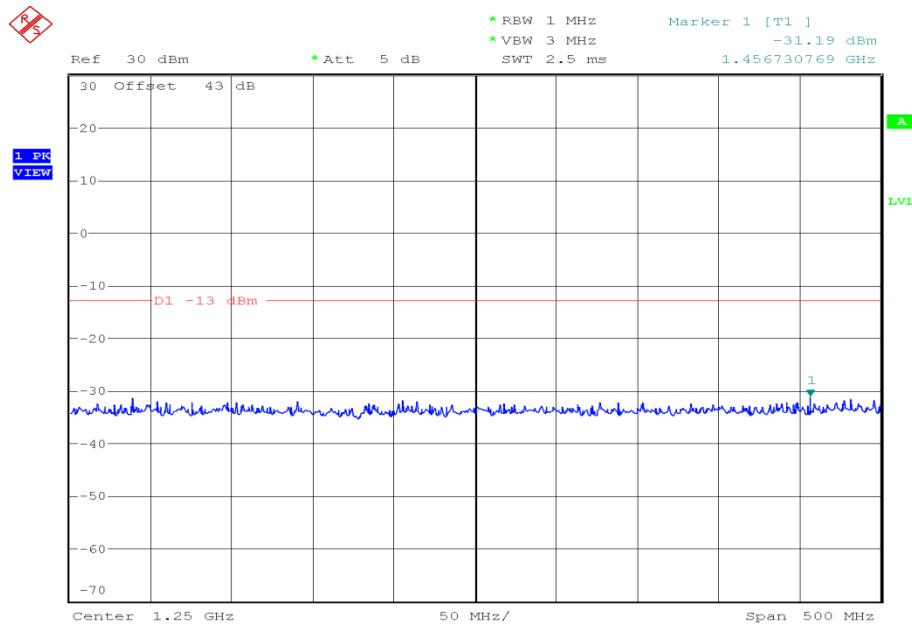


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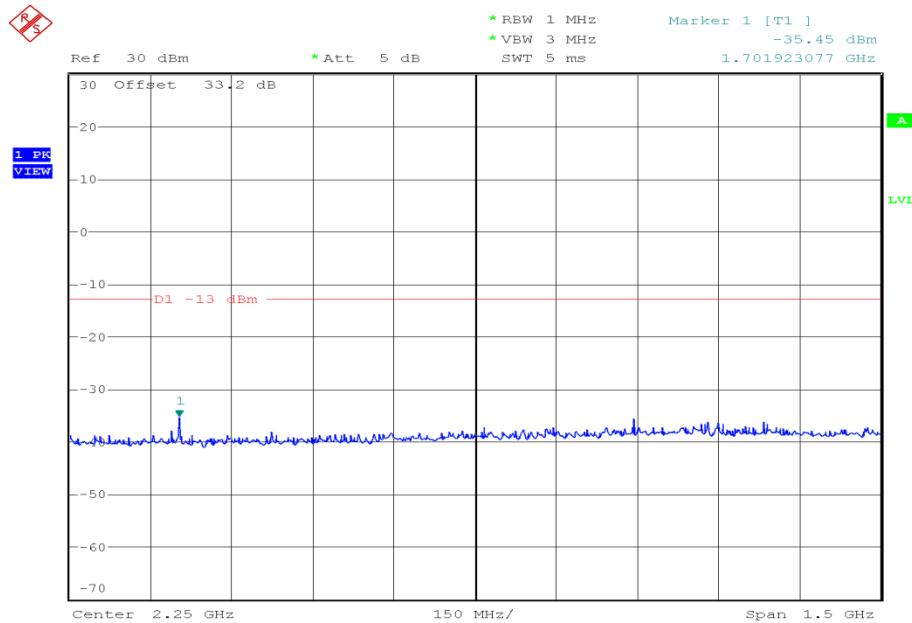
Product Service

### Transmit, 851.000 MHz, 1 GHz to 1.5 GHz, Spurious at Antenna Terminals Plot



Date: 22.JUN.2015 16:52:08

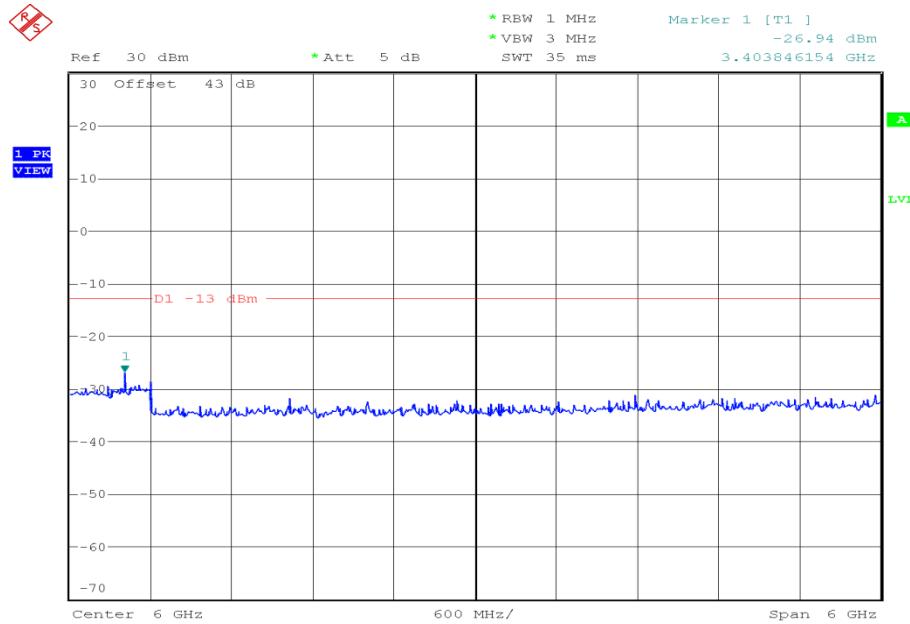
### Transmit, 851.000 MHz, 1.5 GHz to 3 GHz, Spurious at Antenna Terminals Plot



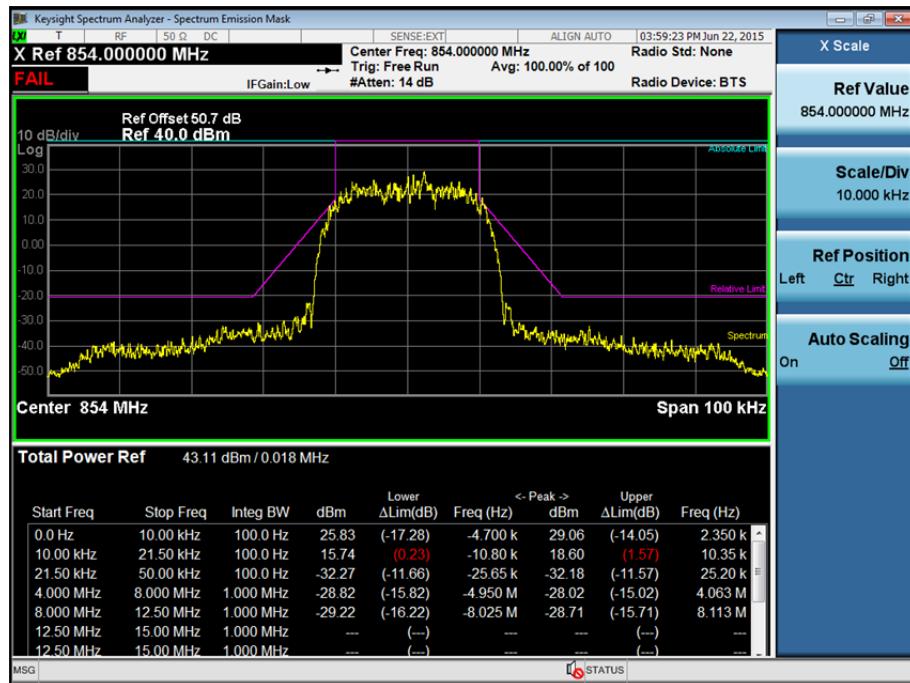
Date: 22.JUN.2015 17:04:18



Product Service

Transmit, 851.000 MHz, 3 GHz to 9 GHz, Spurious at Antenna Terminals Plot


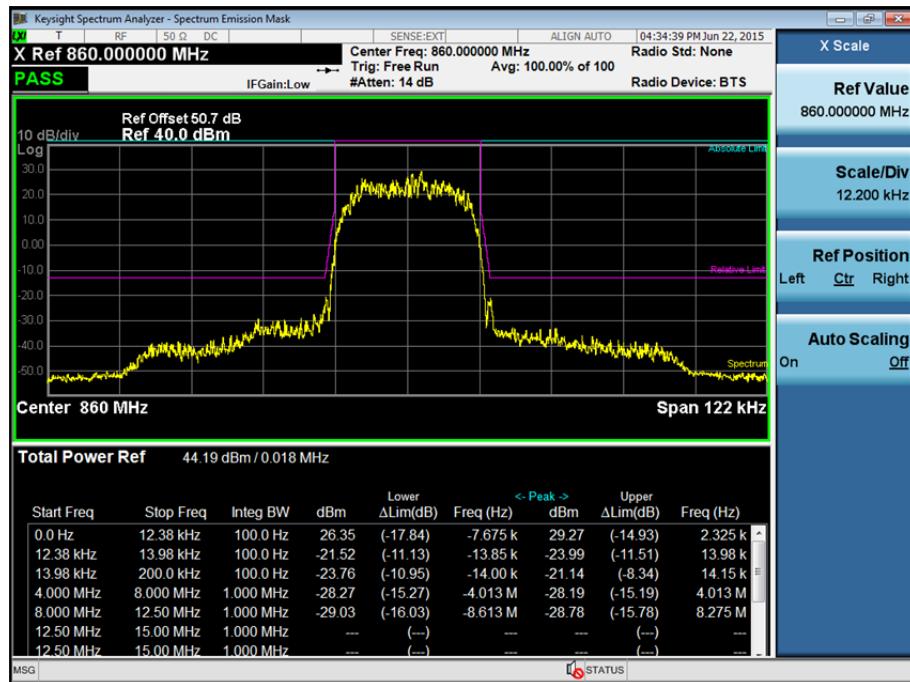
Date: 22.JUN.2015 16:53:30

Transmit, 854.000 MHz, Emission Mask G, Spurious at Antenna Terminals Plot


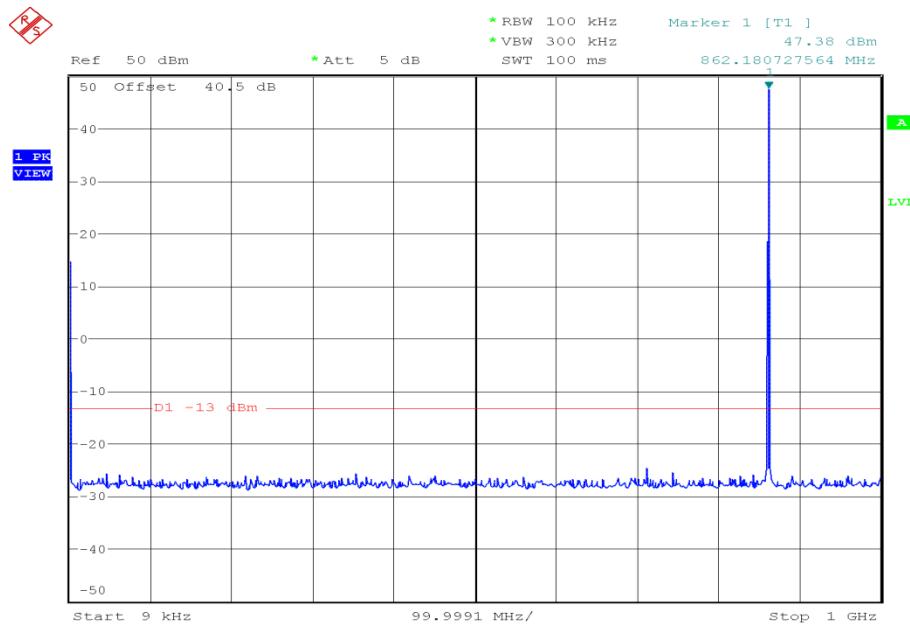


Product Service

### Transmit, 860.000 MHz, Emission Mask Y, Spurious at Antenna Terminals Plot



### Transmit, 860.000 MHz, 9 kHz to 1 GHz, Spurious at Antenna Terminals Plot

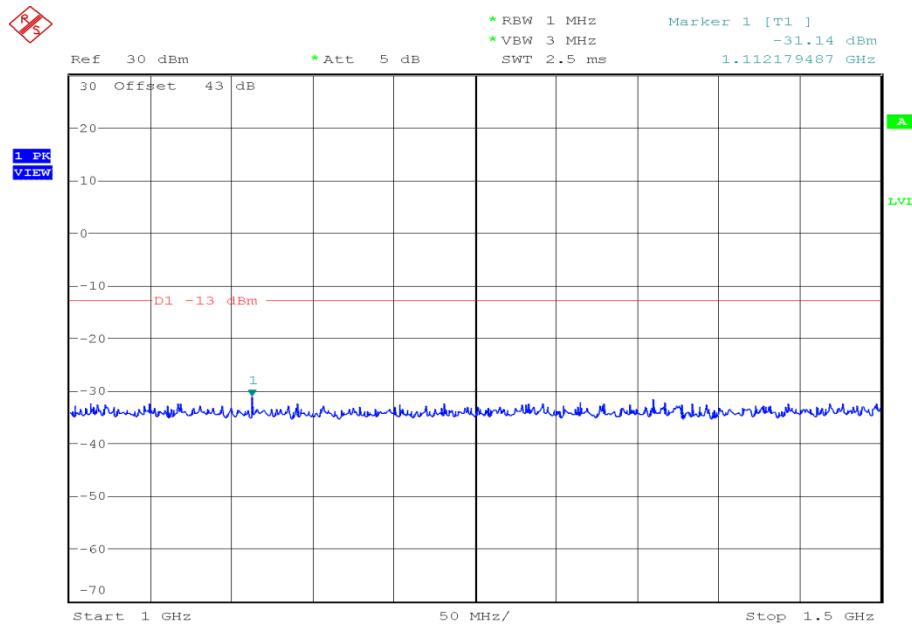


Date: 22.JUN.2015 16:24:03



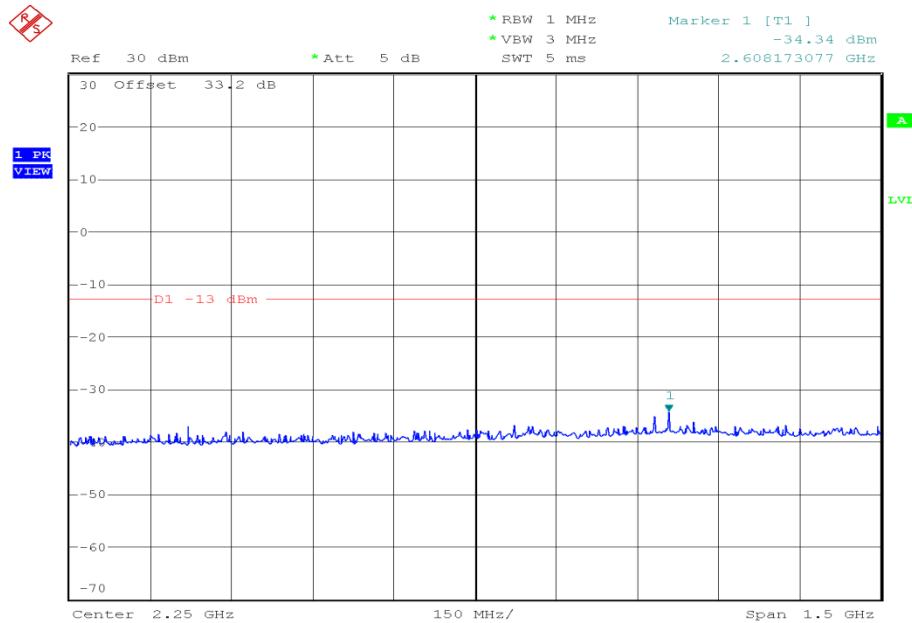
Product Service

### Transmit, 860.000 MHz, 1 GHz to 1.5 GHz, Spurious at Antenna Terminals Plot



Date: 22.JUN.2015 16:55:21

### Transmit, 860.000 MHz, 1.5 GHz to 3 GHz, Spurious at Antenna Terminals Plot

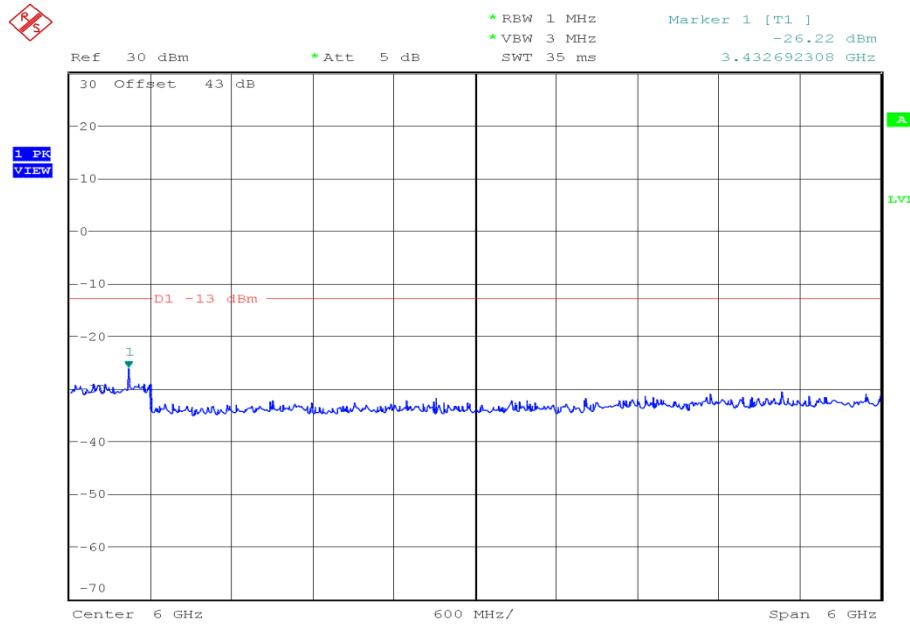


Date: 22.JUN.2015 16:45:37



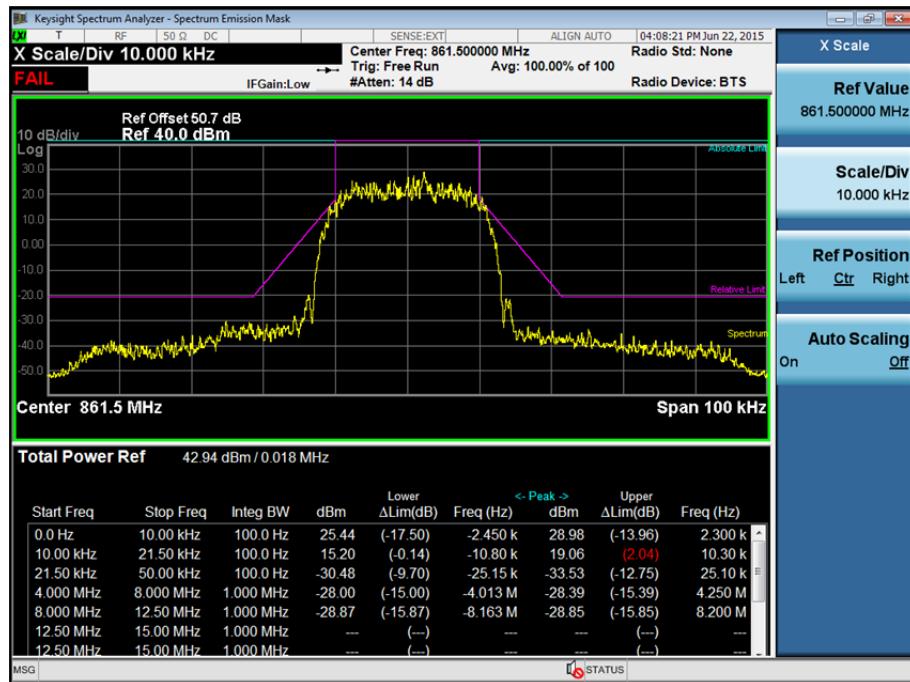
Product Service

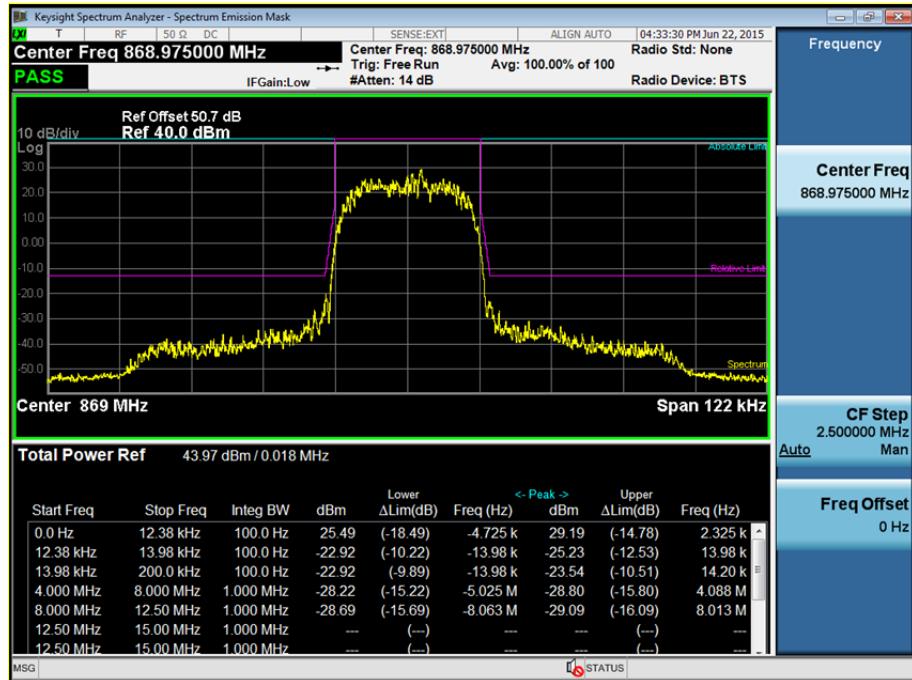
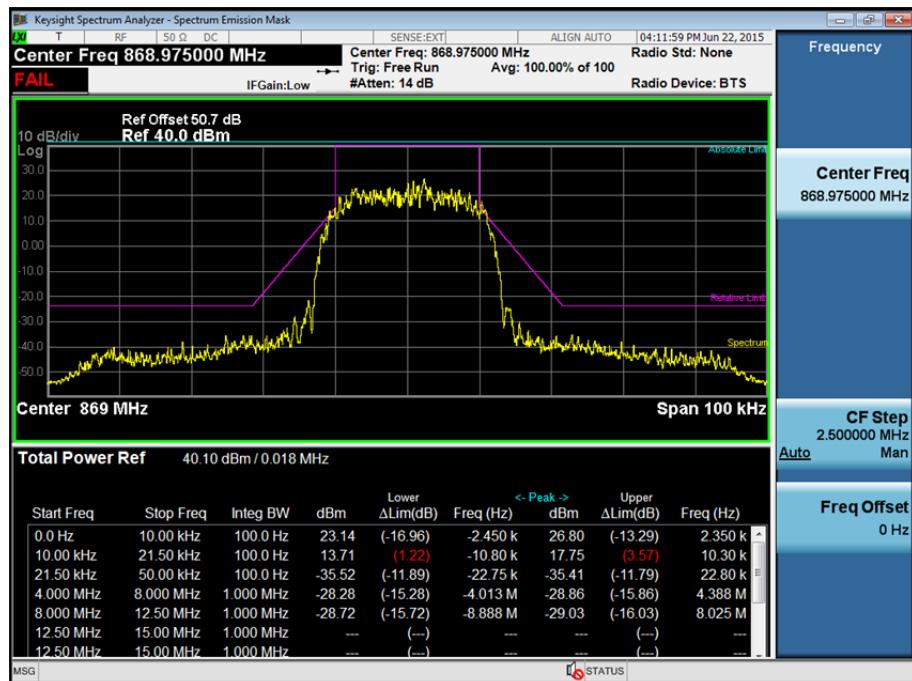
### Transmit, 860.000 MHz, 3 GHz to 9 GHz, Spurious at Antenna Terminals Plot



Date: 22.JUN.2015 16:54:34

### Transmit, 861.500 MHz, Emission Mask G, Spurious at Antenna Terminals Plot

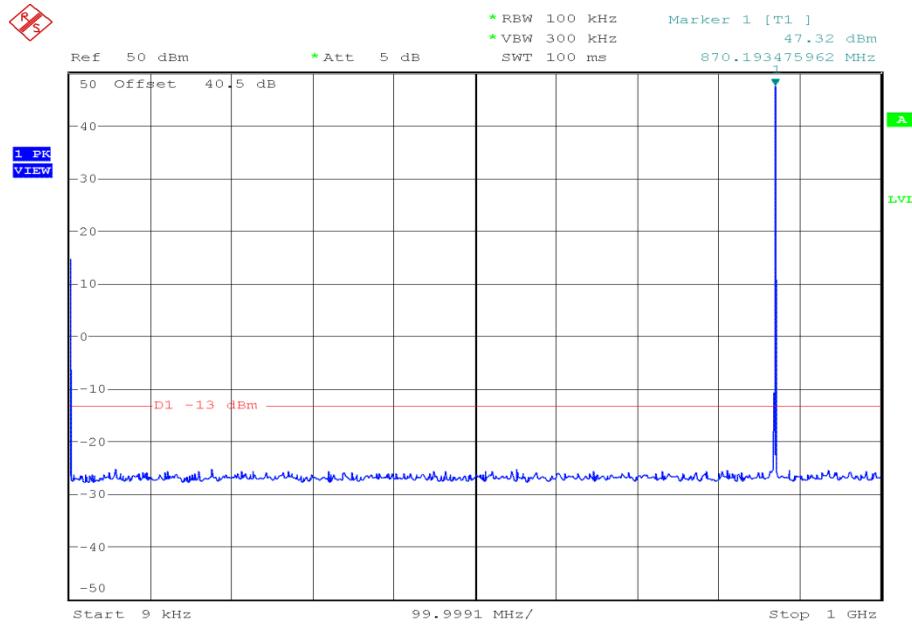



Transmit, 868.975 MHz, Emission Mask Y, Spurious at Antenna Terminals Plot

Transmit, 868.975 MHz, Emission Mask G, Spurious at Antenna Terminals Plot




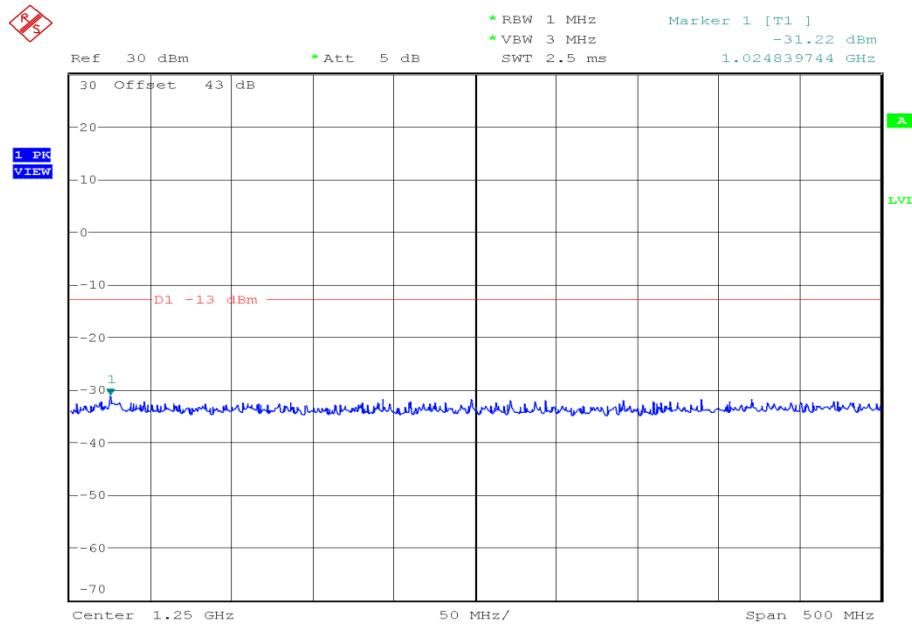
Product Service

### Transmit, 868.975 MHz, 9 kHz to 1 GHz, Spurious at Antenna Terminals Plot



Date: 22.JUN.2015 16:30:15

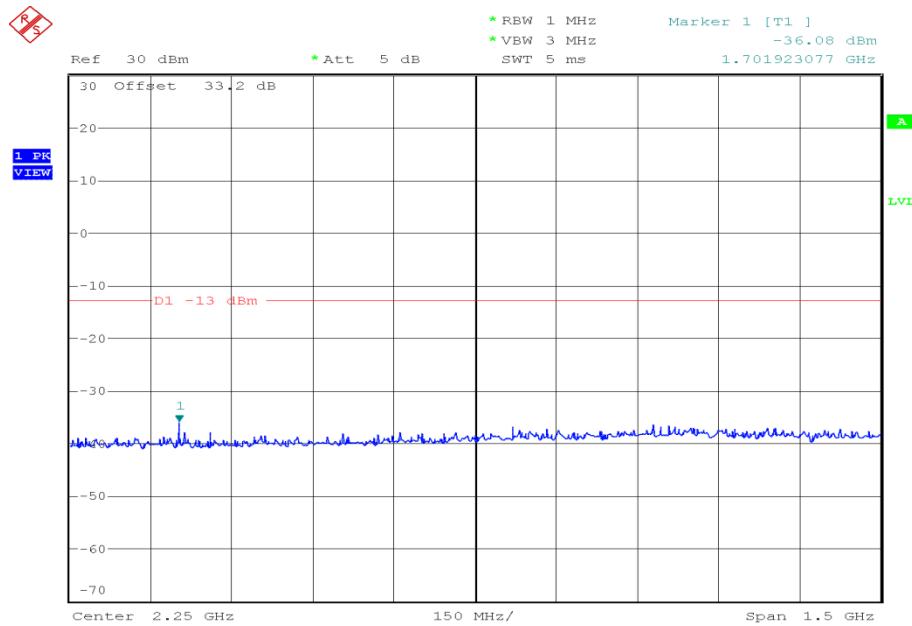
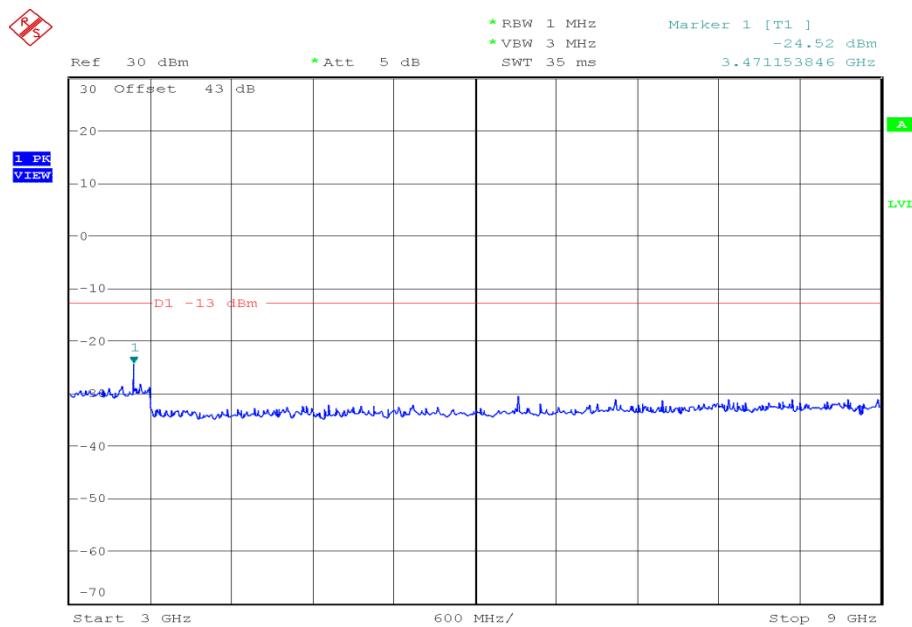
### Transmit, 868.975 MHz, 1 GHz to 1.5 GHz, Spurious at Antenna Terminals Plot



Date: 22.JUN.2015 16:56:37



Product Service

Transmit, 868.975 MHz, 1.5 GHz to 3 GHz, Spurious at Antenna Terminals PlotTransmit, 868.975 MHz, 3 GHz to 9 GHz, Spurious at Antenna Terminals Plot



### Remarks

As specified in FCC document 12-114, TETRA equipment exceeds the Part 90 occupied bandwidth limits and emission masks: it operates with a bandwidth of up to 22 kilohertz, and excursions of up to five decibels from Part 90 emission masks B, C and G. In 2009, the TETRA Association requested waivers of the Part 90 occupied bandwidth limits and emission masks in order to permit implementation of TETRA technology in the United States.

### FCC 47 CFR Part 90, Limit Clause 90.210(g)

For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least  $116 \log(f_d/6.1)$  dB, or  $50 + 10 \log(P)$  dB or 70 dB, whichever is the lesser attenuation;
- (2) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log(P)$  dB.

### Industry Canada RSS-119, Limit Clause 5.8.10

Emission Mask Y Displacement Frequency, $f_d$ (kHz)	Minimum Attenuation (dB)	Resolution Bandwidth (Hz)
$12.375 < f_d \leq 13.975$	whichever is the lesser attenuation: $30 + 16.67(f_d - 12.375)$ or $55 + 10 \log_{10}(p)$	Specified in Section 4.2.2
$f_d > 13.975$	whichever is the lesser attenuation: $57$ or $55 + 10 \log_{10}(p)$	Specified in Section 4.2.2



## 2.5 EMISSION MASK

### 2.5.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.210 (g)  
 FCC 47 CFR Part 2 , Clause 2.1051  
 Industry Canada RSS-119, Clause 5.8.10

### 2.5.2 Equipment Under Test and Modification State

NETIS B25 S/N: 2000063 0361 - Modification State 0

### 2.5.3 Date of Test

25 June 2015

### 2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.5.5 Test Procedure

Radiated; A preliminary profile of the Spurious Radiated Emissions was obtained up to the 10th harmonic by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, the list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

The EUT was set to transmit on maximum power with both channels operating simultaneously.

For any emissions found the EUT was then removed from the chamber and replaced with a substitution antenna. Using a signal generator the level was adjusted to achieve the same value on the measuring instrument as previously recorded with the EUT. The final result was determined by a calculation using the signal generator level, antenna gain and cable loss.

The measurements were performed at a 3m distance unless otherwise stated.

### 2.5.6 Environmental Conditions

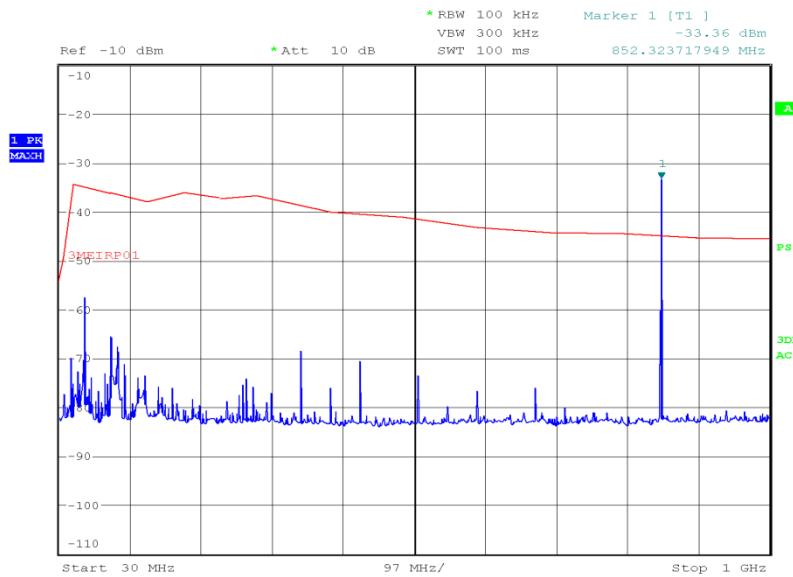
Ambient Temperature	21.1°C
Relative Humidity	41.5%



## 2.5.7 Test Results

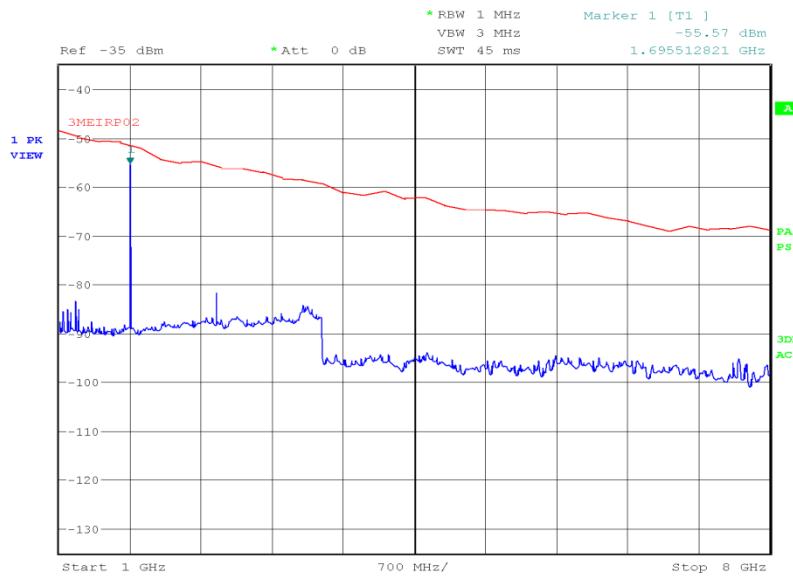
48 V DC

### Transmit, 851.000 MHz, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



Date: 25.JUN.2015 15:50:53

### Transmit, 851.000 MHz, 1 GHz to 8 GHz, Spurious Radiated Emissions Plot

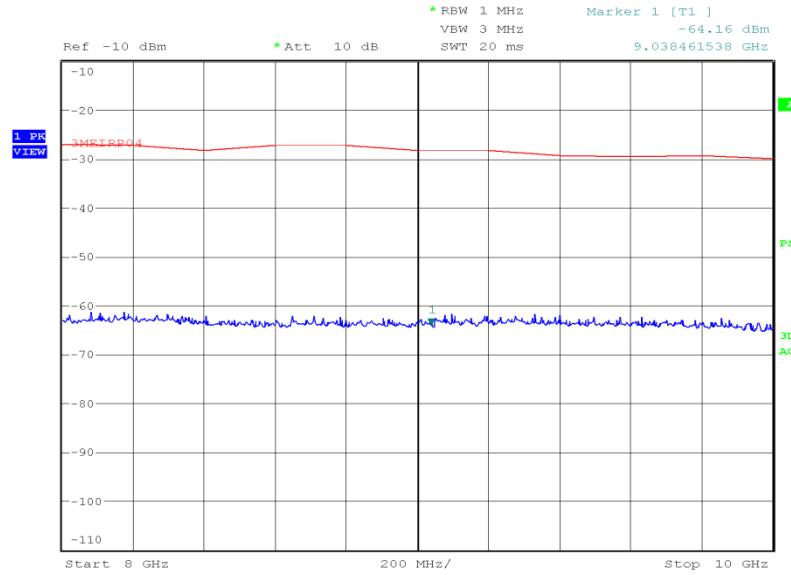


Date: 25.JUN.2015 14:41:38



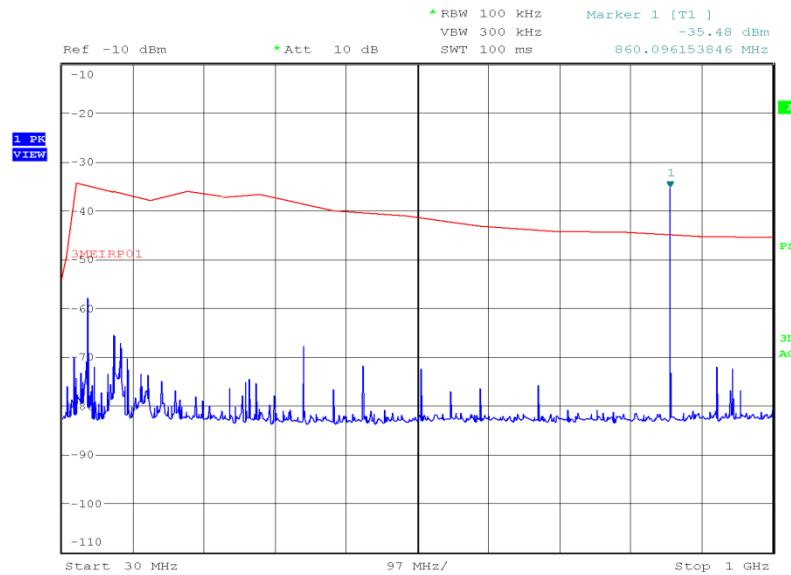
Product Service

### Transmit, 851.000 MHz, 8 GHz to 10 GHz, Spurious Radiated Emissions Plot



Date: 25.JUN.2015 15:23:47

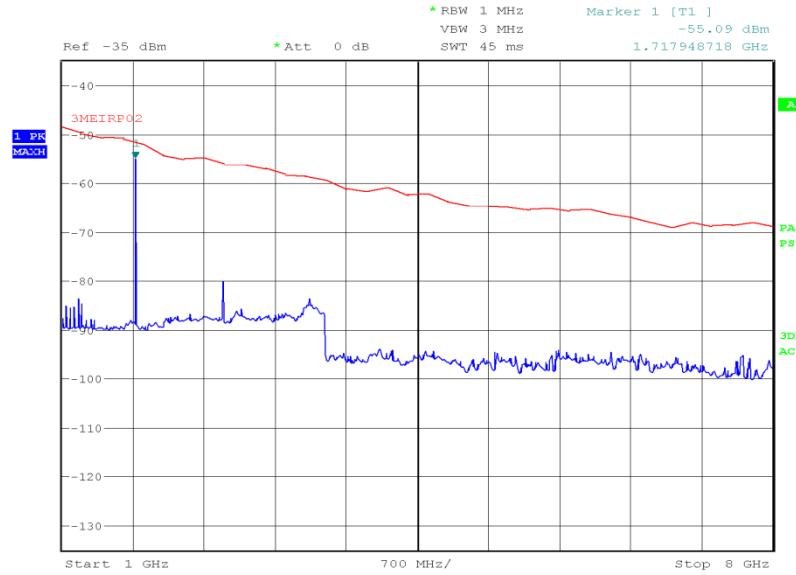
### Transmit, 860.000 MHz, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



Date: 25.JUN.2015 15:54:50

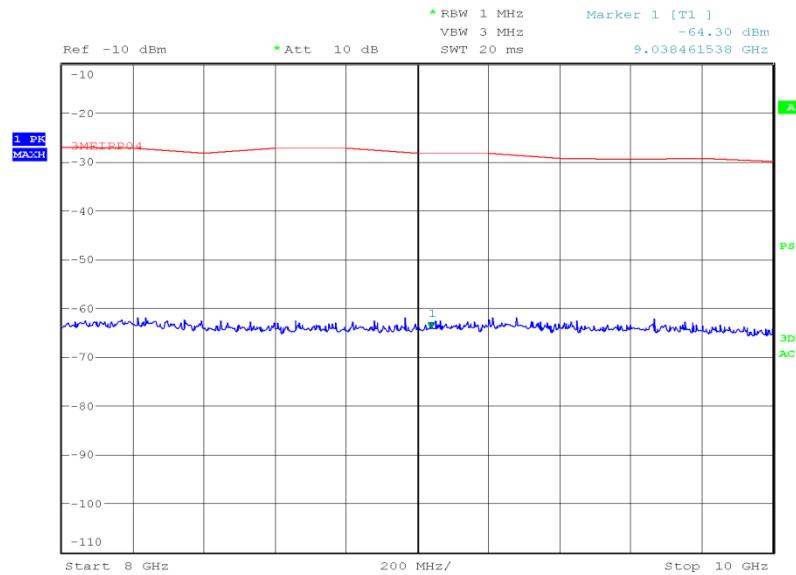


### Transmit, 860.000 MHz, 1 GHz to 8 GHz Spurious Radiated Emissions Plot



Date: 25.JUN.2015 14:55:45

### Transmit, 860.000 MHz, 8 GHz to 10 GHz, Spurious Radiated Emissions Plot

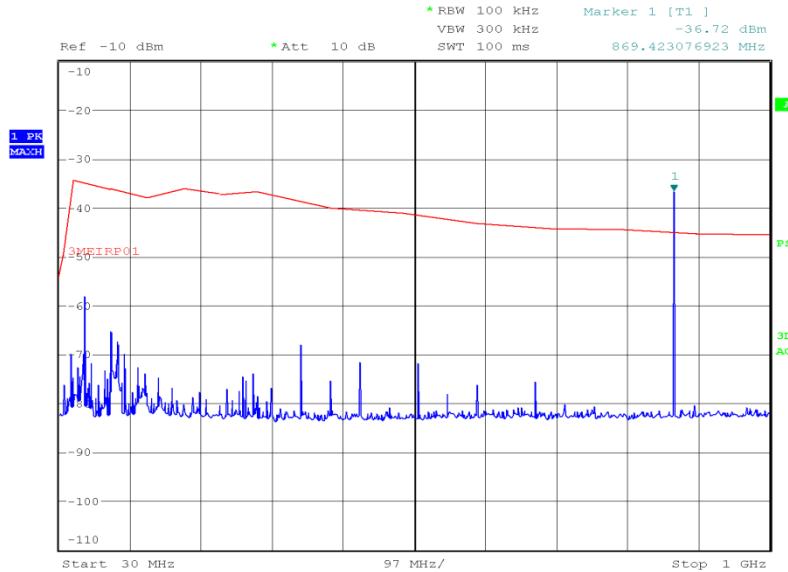


Date: 25.JUN.2015 15:20:47



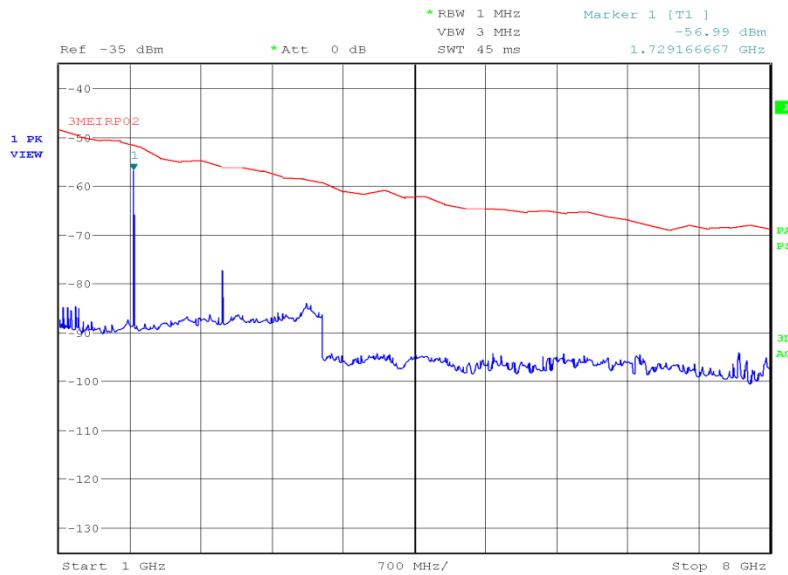
Product Service

### Transmit, 868.975 MHz, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



Date: 25.JUN.2015 15:44:13

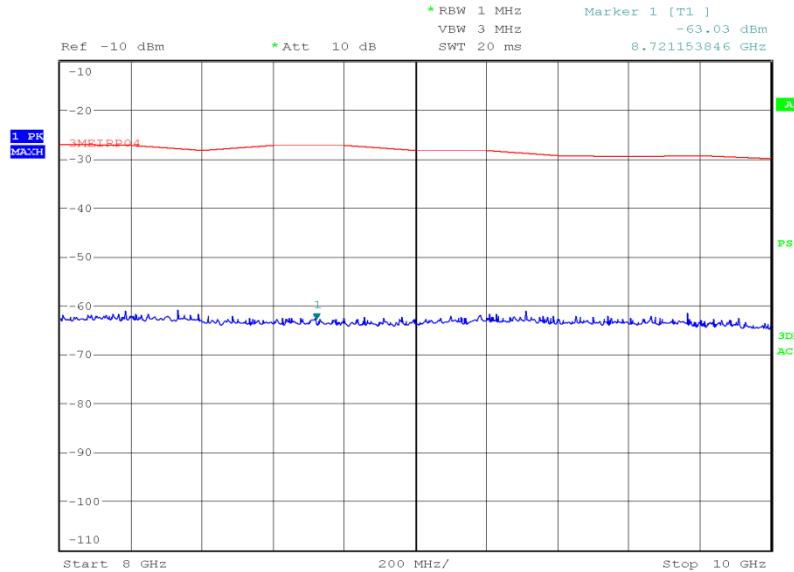
### Transmit, 868.975 MHz, 1 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 25.JUN.2015 14:46:24



### Transmit, 868.975 MHz, 8 GHz to 10 GHz, Spurious Radiated Emissions Plot



Date: 25.JUN.2015 15:28:41

#### Remarks

The EUT was transmitting into a 50ohm load for the duration of the test.

#### FCC 47 CFR Part 90, Limit Clause 90.210(g)

For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least  $116 \log(f_d/6.1)$  dB, or  $50 + 10 \log(P)$  dB or 70 dB, whichever is the lesser attenuation;

(2) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log(P)$  dB.

#### Industry Canada RSS-119, Limit Clause 5.8.10

Emission Mask Y Displacement Frequency, $f_d$ (kHz)	Minimum Attenuation (dB)	Resolution Bandwidth (Hz)
$12.375 < f_d \leq 13.975$	whichever is the lesser attenuation: $30 + 16.67(f_d - 12.375)$ or $55 + 10 \log_{10}(p)$	Specified in Section 4.2.2
$f_d > 13.975$	whichever is the lesser attenuation: $57$ or $55 + 10 \log_{10}(p)$	Specified in Section 4.2.2



## 2.6 FREQUENCY STABILITY

### 2.6.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.213 (a)  
 FCC 47 CFR Part 2, Clause 2.1055  
 Industry Canada RSS-119, Clause 5.3

### 2.6.2 Equipment Under Test and Modification State

NETIS B25 S/N: 2000063 0361 - Modification State 0

### 2.6.3 Date of Test

23 June 2015, 24 June 2015 & 25 June 2015

### 2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.6.5 Test Procedure

Measurements were performed in accordance with FCC 47 CFR Part 2, clause 2.1055.

#### Remarks

This test was performed with an unmodulated carrier with a +2.25 kHz frequency offset to that of the centre frequency of the channel. A GPS signal was supplied to the EUT as representative of normal operation. The EUT was connected via a cable and attenuator to a frequency counter and the frequency was recorded.

The test was performed on 1 channel in the range 851 MHz to 854 MHz and 1 channel in the range 854 MHz to 869 MHz as the limit requirements as stated in FCC 47 CFR Part 90.213 differ between these sub-bands.

### 2.6.6 Environmental Conditions

Ambient Temperature	20.0 - 23.3°C
Relative Humidity	44.8 - 60.2%



## 2.6.7 Test Results

### Transmit, 851.000 MHz, TETRA, pi/4 DQPSK, Frequency Tolerance Under Temperature Variations Results

Temperature Interval	Fundamental Frequency Deviation (ppm)
-30 °C	0.032
-20 °C	0.037
-10 °C	0.026
0 °C	0.070
+10 °C	0.016
+20 °C	-0.040
+30 °C	0.045
+40 °C	0.042
+50 °C	-0.053

### Transmit, 868.975 MHz, TETRA, pi/4 DQPSK, Frequency Tolerance Under Temperature Variations Results

Temperature Interval	Fundamental Frequency Deviation (ppm)
-30 °C	0.037
-20 °C	0.039
-10 °C	0.021
0 °C	0.045
+10 °C	0.024
+20 °C	0.059
+30 °C	0.028
+40 °C	0.027
+50 °C	-0.031

### Transmit, 851.000 MHz, TETRA, pi/4 DQPSK, Frequency Tolerance Under Voltage Variations Results

Voltage	Fundamental Frequency Deviation (ppm)
48 V DC	-0.040
40.8 V DC	-0.039
55.2 V DC	0.060



Transmit, 860.000 MHz, TETRA, pi/4 DQPSK, Frequency Tolerance Under Voltage Variations Results

Voltage	Fundamental Frequency Deviation (ppm)
48 V DC	0.066
40.8 V DC	0.031
55.2 V DC	0.036

Transmit, 868.975 MHz, TETRA, pi/4 DQPSK, Frequency Tolerance Under Voltage Variations Results

Voltage	Fundamental Frequency Deviation (ppm)
48 V DC	0.059
40.8 V DC	0.040
55.2 V DC	0.056

FCC 47 CFR Part 90, Limit Clause 90.213

In the frequency range 851 to 854 MHz, the frequency error shall not exceed 1.0 ppm.

In the frequency range 854 to 869 MHz, the frequency error shall not exceed 1.5 ppm.

Industry Canada RSS-119, Limit Clause 5.3

The frequency error shall not exceed 1.5 ppm.



## 2.7 ADJACENT CHANNEL POWER

### 2.7.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.221 (c)

### 2.7.2 Equipment Under Test and Modification State

NETIS B25 S/N: 2000063 0361 - Modification State 0

### 2.7.3 Date of Test

22 June 2015

### 2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.7.5 Test Procedure

The EUT was configured to operate at maximum power with modulation as described in the manufacturer's documentation. The EUT was connected to a spectrum analyser using a cable and attenuator. The adjacent channel power measurement function of the spectrum analyser was used configured using the TETRA radio standard mode.

### 2.7.6 Environmental Conditions

Ambient Temperature	22.4°C
Relative Humidity	42.8%



## 2.7.7 Test Results

### Transmit, Adjacent Channel Power Results

Channel Separation: 25 kHz

Temperature	Voltage	Frequency Offset (kHz)	851.000 MHz	854.000 MHz	860.000 MHz	861.500 MHz	868.975 MHz
			dBc	dBc	dBc	dBc	dBc
+22.4°C	48 V DC	+25	-56.1	-58.1	-58.8	-59.6	-59.4
		-25	-56.7	-57.2	-56.4	-57.2	-59.2
		+50	-70.0	-70.4	-70.3	-70.3	-71.2
		-50	-69.8	-70.2	-70.0	-69.6	-70.3
		+75	-81.7	-81.0	-80.3	-80.6	-82.1
		-75	-81.9	-81.2	-80.6	-80.8	-82.2

### Transmit, 851.000 MHz, Adjacent Channel Power Plot

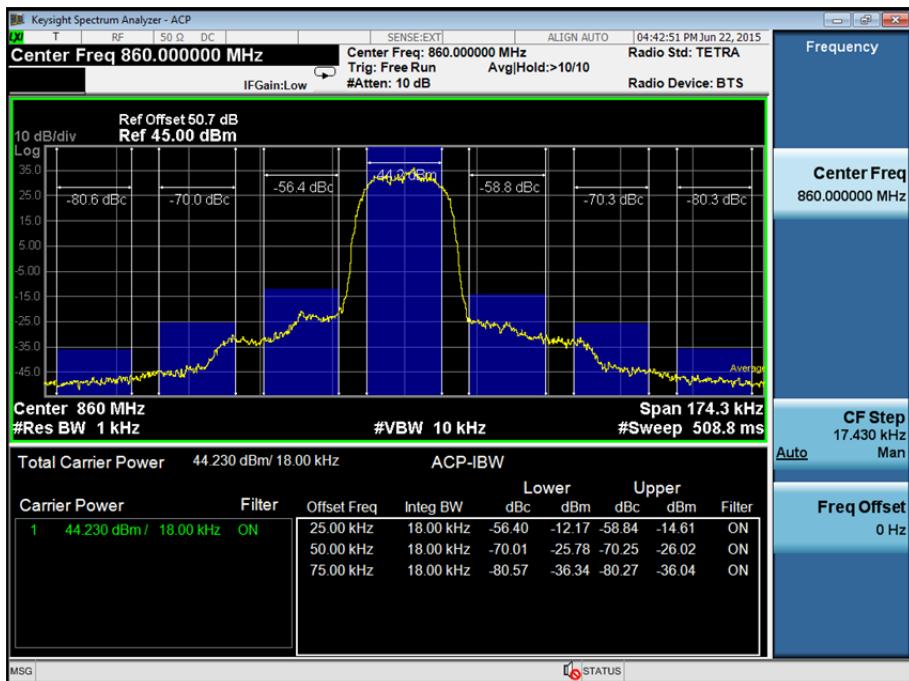




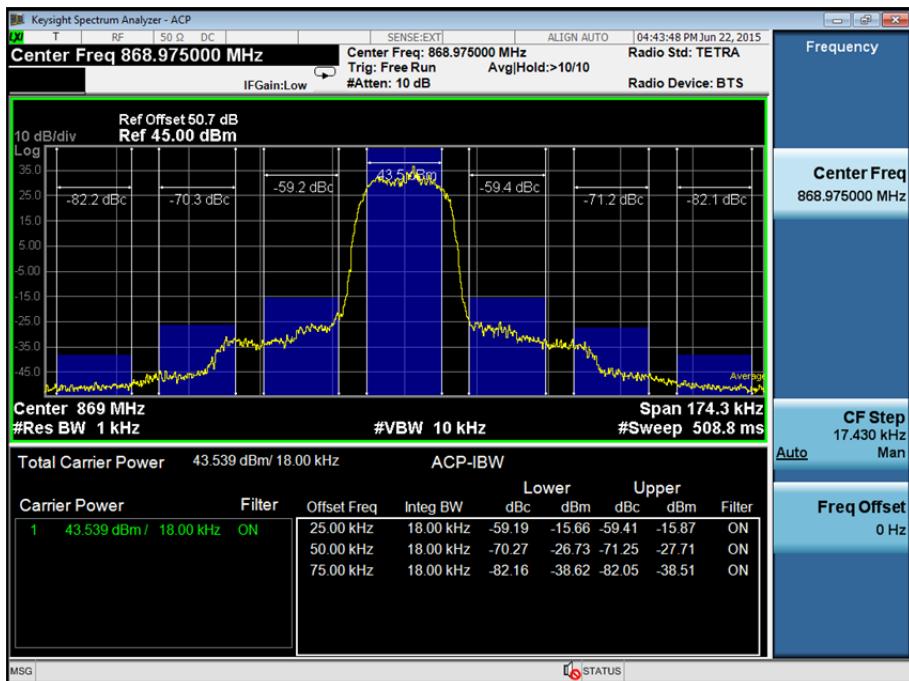
### Transmit, 854.000 MHz, Adjacent Channel Power Plot



### Transmit, 860.000 MHz, Adjacent Channel Power Plot




Transmit, 861.500 MHz, Adjacent Channel Power Plot

Transmit, 868.975 MHz, Adjacent Channel Power Plot




Product Service

FCC 47 CFR Part 90, Limit Clause 90.221 (b)(c)

Maximum adjacent power levels for frequencies in the 450–470 MHz band

Frequency Offset	Maximum ACP (dBc) for devices 1 watt and less	Maximum ACP (dBc) for devices above 1 watt
25 kHz	-55 dBc	-60 dBc
50 kHz	-70 dBc	-70 dBc
75 kHz	-70 dBc	-70 dBc

Maximum adjacent power levels for frequencies in the 809–824/854–869 MHz band.

Frequency Offset	Maximum ACP (dBc) for devices less than 15 watts	Maximum ACP (dBc) for devices 15 watts and above
25 kHz	-55 dBc	-55 dBc
50 kHz	-65 dBc	-65 dBc
75 kHz	-65 dBc	-70 dBc

In any case, no requirement in excess of -36 dBm shall apply

On any frequency removed from the assigned frequency by more than 75 kHz, the attenuation of any emission must be at least  $43 + 10 \log (P_{\text{watts}})$  dB.



## 2.8 MODULATION CHARACTERISTICS

### 2.8.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1047 (d)

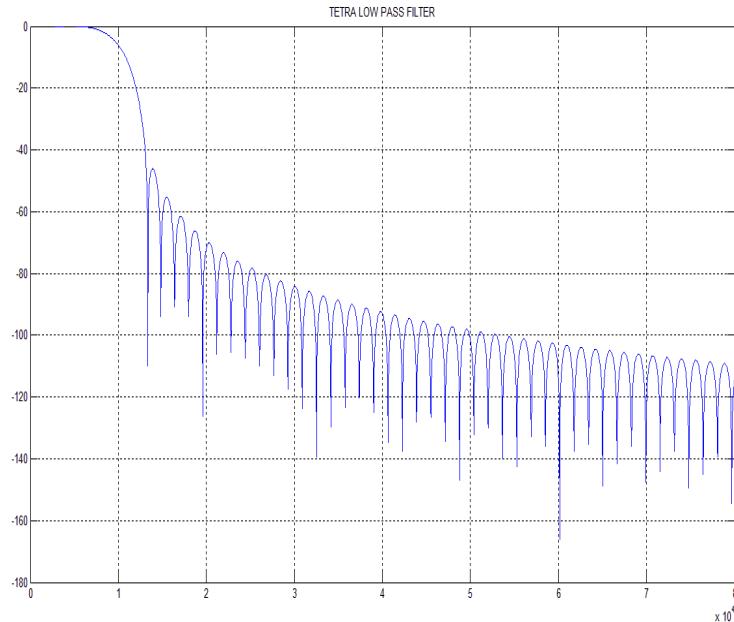
### 2.8.2 Equipment Under Test

NETIS B25 S/N: 2000063 0361

### 2.8.3 Test Results

48 V DC Supply

Transmit, Modulation Characteristics, Customer Description



FCC 47 CFR Part 2, Limit Clause 2.1047 (d)

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.



Product Service

## **SECTION 3**

### **TEST EQUIPMENT USED**



### 3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
<b>Section 2.1 – Maximum Conducted Output Power</b>					
Multimeter	Fluke	75 Mk3	455	12	23-Jul-2015
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	20-Jan-2016
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
Attenuator (20dB, 150W)	Narda	769-20	3367	12	29-May-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	3-Sep-2015
'N' - 'N' RF Cable (1m)	Rhophase	NPS-1803-1000-NPS	3700	12	24-Nov-2015
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	30-Jun-2015
1m N-Type Cable	Rhophase		4233	12	12-Mar-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Sep-2015
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	16-Feb-2016
<b>Section 2.3 - Occupied Bandwidth</b>					
Multimeter	Fluke	75 Mk3	455	12	23-Jul-2015
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	28-Jul-2015
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	20-Jan-2016
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
Attenuator (20dB, 150W)	Narda	769-20	3367	12	29-May-2016
'N' - 'N' RF Cable (1m)	Rhophase	NPS-1803-1000-NPS	3700	12	24-Nov-2015
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	30-Jun-2015
1m N-Type Cable	Rhophase		4233	12	12-Mar-2016
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	28-Jul-2015
<b>Section 2.4 - Spurious Emissions at Antenna Terminals</b>					
Receiver	Schaffner	SCR 3502	277	-	TU
Multimeter	Fluke	75 Mk3	455	12	23-Jul-2015
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	28-Jul-2015
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	20-Jan-2016
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	12-Dec-2015
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	16-Sep-2015
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
Attenuator (20dB, 150W)	Narda	769-20	3367	12	29-May-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	3-Sep-2015
'N' - 'N' RF Cable (1m)	Rhophase	NPS-1803-1000-NPS	3700	12	24-Nov-2015
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	30-Jun-2015
1m N-Type Cable	Rhophase		4233	12	12-Mar-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Sep-2015
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	28-Jul-2015
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	16-Feb-2016



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
<b>Section 2.5 – Emission Mask</b>					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	29-Apr-2016
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	22	28-Nov-2015
Antenna (Bilog)	Schaffner	CBL6143	287	24	3-Feb-2016
Dual Power Supply Unit	Thurlby	PL320	288	-	TU
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	1002	12	19-Sep-2015
Pre-Amplifier	Phase One	PS04-0086	1533	12	23-Dec-2015
Screened Room (5)	Rainford	Rainford	1545	24	26-Jun-2015
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Filter	Daden Anthony Ass	MH-1500-7SS	2778	12	5-Feb-2016
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	27-Oct-2015
Tilt Antenna Mast	maturo GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	maturo GmbH	NCD	3917	-	TU
<b>Section 2.6 - Frequency Stability</b>					
Counter	Hewlett Packard	53181A	159	12	27-May-2016
Multimeter	Fluke	75 Mk3	455	12	23-Jul-2015
Temperature Chamber	Montford	2F3	467	-	O/P Mon
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
Climatic Chamber	Climatec	Climatec 1	2124	12	18-Nov-2015
Digital Thermometer	Digitron	T208	2831	12	31-Jul-2015
Attenuator (10dB, 50W)	Aeroflex / Weinschel	47-10-34	3166	12	16-Sep-2015
Attenuator (20dB, 150W)	Narda	769-20	3367	12	29-May-2016
'N' - 'N' RF Cable (1m)	Rhophase	NPS-1803-1000-NPS	3700	12	24-Nov-2015
1m N-Type Cable	Rhophase		4233	12	12-Mar-2016
<b>Section 2.7 - Adjacent Channel Power</b>					
Multimeter	Fluke	75 Mk3	455	12	23-Jul-2015
Power Supply Unit	Farnell	H60-25	1092	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	28-Jul-2015
Hygrometer	Rotronic	I-1000	3220	12	24-Jul-2015
Attenuator (20dB, 150W)	Narda	769-20	3367	12	29-May-2016
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	3-Sep-2015
'N' - 'N' RF Cable (1m)	Rhophase	NPS-1803-1000-NPS	3700	12	24-Nov-2015
DC - 8 GHz Attenuator	Lucas Weinschel	24-30-33	3963	12	30-Jun-2015
1m N-Type Cable	Rhophase		4233	12	12-Mar-2016
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	24-Sep-2015
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	28-Jul-2015
PXA Signal Analyser	Agilent Technologies	N9030A PXA	4409	12	16-Feb-2016

TU – Traceability Unscheduled

O/P MON – Output Monitored with Calibrated Equipment



### 3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
Spurious Emissions at Antenna Terminals	± 3.454 dB
Maximum Conducted Output Power	± 0.70 dB
Adjacent Channel Power	± 3.0 dB
Type of Emissions	-
Occupied Bandwidth	± 16.74 kHz
Emission Mask	± 3.08 dB
Frequency Stability	± 46.70 Hz
Modulation Characteristics	-



Product Service

## **SECTION 4**

### **ACCREDITATION, DISCLAIMERS AND COPYRIGHT**



Product Service

#### 4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA  
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