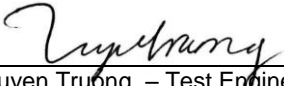





# Test Report

Curtis-Straus LLC, a wholly owned subsidiary of BV CPS

Report No	EP0016-1
Client	Trimble Navigation
Address	1 Merrill Street Woburn, MA 01801
Phone	(781) 305-4321
Items tested	M6E-NANO
FCC ID	QV5MERCURY6EN
IC	5407A-MERCURY6EN
FRN	0008403743
Equipment Type	Part 15.247 Frequency Hopper
Equipment Code	DSS
FCC/IC Rule Parts	47 CFR 15.247, RSS-210
Test Dates	January 19-20 and 22, 2015, March 9, 2015
Results	As detailed within this report
Prepared by	 Tuyen Truong – Test Engineer
Authorized by	 Christopher Reynolds – EMC Supervisor
Issue Date	3/24/2015
Conditions of Issue	This Test Report is issued subject to the conditions stated in the 'Conditions of Testing' section on page 38 of this report.

Curtis-Straus LLC is accredited by the American Association for Laboratory Accreditation for the specific scope of accreditation under Certificate Number 1627-01. This report may contain data which is not covered by the A2LA accreditation.



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Form Final Report REV 7-20-07 (DW)



## Summary

This test report supports an application for certification of a transmitter operating pursuant to 47 CFR 15.247. The product is the M6E-NANO RFID Module. It is a frequency hopping transmitter that operates in the range 917.4-927.2MHz. Product was tested with a MTI Wireless antenna (MT-263020 8dBi) and a LAIRD Technology antenna (FG9026 8.15dBi) respectively.

We found that the product met the above requirements without modification. Khaled ElMahgoub from Trimble Navigation Limited was present during the testing. The test sample was received in good condition.

## Test Methodology

Radiated emission and AC Line conducted testing was performed according DA 00-705 document specified in ANSI C63.10 (2009) and C63.4 (2003). Radiated Emissions were maximized by rotating the device around its axes as well as varying the test antenna's height and polarity. The device antenna was maximized separately.

Conducted emission at the antenna port was performed, as required by rule section.

The EUT operating voltage is 5VDC

Low operating channel frequency = 917.4MHz

Mid operating channel frequency = 922.4MHz

High operating channel frequency = 927.2MHz

The following bandwidths were used during radiated spurious and line conducted emissions.

Frequency	RBW	VBW
0.15-30MHz	9kHz	30kHz
30-1000MHz	120kHz	300kHz
1-10GHz	1MHz	3MHz

### Release Control Record

Issue No.	Reason for change	Date Issued
1	Original Release	March 19, 2015



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**Product Tested - Configuration Documentation**

EUT Configuration																																					
<b>Work Order:</b> P0016 <b>Company:</b> Trimble Navigation <b>Company Address:</b> 1 Merrill Street Woburn, MA 01801 <b>Contact:</b> Khaled EIMahgoub <b>Person Present:</b> Khaled EIMahgoub																																					
<table border="1"> <thead> <tr> <th></th> <th>MN</th> <th>SN</th> </tr> </thead> <tbody> <tr> <td><b>EUT:</b></td> <td>M6E-NANO</td> <td>451467701514</td> </tr> <tr> <td>MTI Wireless Edge</td> <td></td> <td></td> </tr> <tr> <td>Antenna:</td> <td>MT-263020/TRH/A/K</td> <td>--</td> </tr> <tr> <td>LAIRD Technology</td> <td></td> <td></td> </tr> <tr> <td>Antenna:</td> <td>FG9026</td> <td>--</td> </tr> <tr> <td colspan="3"><b>EUT Description:</b> NANO Embedded UHF RFID Module</td> </tr> <tr> <td colspan="3"><b>EUT Max Frequency:</b> 48MHz</td> </tr> <tr> <td colspan="3"><b>EUT TX Frequency:</b> 917.4-927.2MHz</td> </tr> </tbody> </table>												MN	SN	<b>EUT:</b>	M6E-NANO	451467701514	MTI Wireless Edge			Antenna:	MT-263020/TRH/A/K	--	LAIRD Technology			Antenna:	FG9026	--	<b>EUT Description:</b> NANO Embedded UHF RFID Module			<b>EUT Max Frequency:</b> 48MHz			<b>EUT TX Frequency:</b> 917.4-927.2MHz		
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<b>EUT Ports:</b>																																					
Port Label	Port Type	No. of ports	No. Populated	Cable Type	Shielded	Ferrites	Length	Max Length	In/Out NEBS Type	Comment																											
RS232	DB9	1	1	DB9	Yes	None	1.5m	>3m	Indoor																												
Antenna port	MMCX	1	1	Coaxial	Yes	None	1m	>3m	Indoor	Redundant																											
<b>Host Dev Kit Ports</b>		<b>No. of ports</b>	<b>No. Populated</b>	<b>Cable Type</b>	<b>Shielded</b>	<b>Ferrites</b>	<b>Length</b>																														
12 VDC Power	DC Input/GPIO	1	1	2-wire conductor	no	1 molded on DC input side	1m																														
<b>Software / Operating Mode Description:</b>																																					
EUT is set to transmit on Low (917.4MHz), Mid (922.4MHz) and High (927.2MHz) channels from 917 to 928MHz																																					



## Statement of Conformity

The M6E-NANO has been found to conform to the following parts of 47 CFR and as detailed below:

RSS-GEN	RSS 210	Part 15	Comments
5.3		15.15(b)	There are no controls accessible to the user that varies the output power above specified limits.
5.2		15.19	The label is shown in the label exhibit.
7.1.5		15.21	Information to the user is shown in the instruction manual exhibit.
		15.27	No special accessories are required for compliance.
		15.31	The EUT was tested in accordance with the measurement standards in this section.
		15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.
		15.35	The EUT emissions were measured using the measurement detector and bandwidth specified in this section, unless noted in specific rule section under which the equipment operates.
7.1.4		15.203	EUT employs a unique reverse polarity SMA antenna connector.
	2.6	15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209.
7.2.2		15.207	EUT meets the AC Line conducted emissions requirements of 15.207.
	Annex 8	15.247	The unit complies with the requirements of 15.247
4.6.1			Occupied Bandwidth measurements were made.

**Test Results****Bandwidth****LIMIT**

*The 20dB bandwidth is used to determine channel frequency separation limits and required number of hopping frequencies.*

**MEASUREMENTS / RESULTS**

<b>20dB Bandwidth</b>		
<b>Frequency (MHz)</b>	<b>Mode</b>	<b>20dB Bandwidth (KHz)</b>
917.4	PR-ASK modulation	52.00
922.4	PR-ASK modulation	57.75
927.2	PR-ASK modulation	53.50
<b>Tested by:</b> Tuyen Truong <b>Date:</b> 1/19/2015 <b>Company:</b> Trimble Navigation <b>EUT:</b> M6E-NANO <b>Temp/Humidity/Pressure:</b> 21.6°C, 26% and 1015mBar		
<b>RBW = 3KHz      VBW = 10KHz</b> <b>Analyzer:</b> Brown <b>Attenuator:</b> PE7019-20		

Rev. 1/18/2015

<b>Spectrum Analyzers / Receivers / Preselectors</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Brown	9kHz-26.5GHz	E4407B	Agilent	SG44210511	1510	I	5/12/2015	5/12/2014
<b>Radiated Emissions Sites</b>	<b>FCC Code</b>	<b>IC Code</b>	<b>VCCI Code</b>	<b>Range</b>		<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
1DCC-OATS-3M-I	719150	2762A-8	A-0015	30-1000MHz		II	5/17/2015	5/17/2013
<b>Preamps / Couplers Attenuators / Filters</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
HF 20dB 50W Attenuator	0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	7/14/2015	7/14/2014
<b>Meteorological Meters</b>		<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#1830		35519-044	Control Company	130320003	1830	II	6/13/2015	6/13/2013

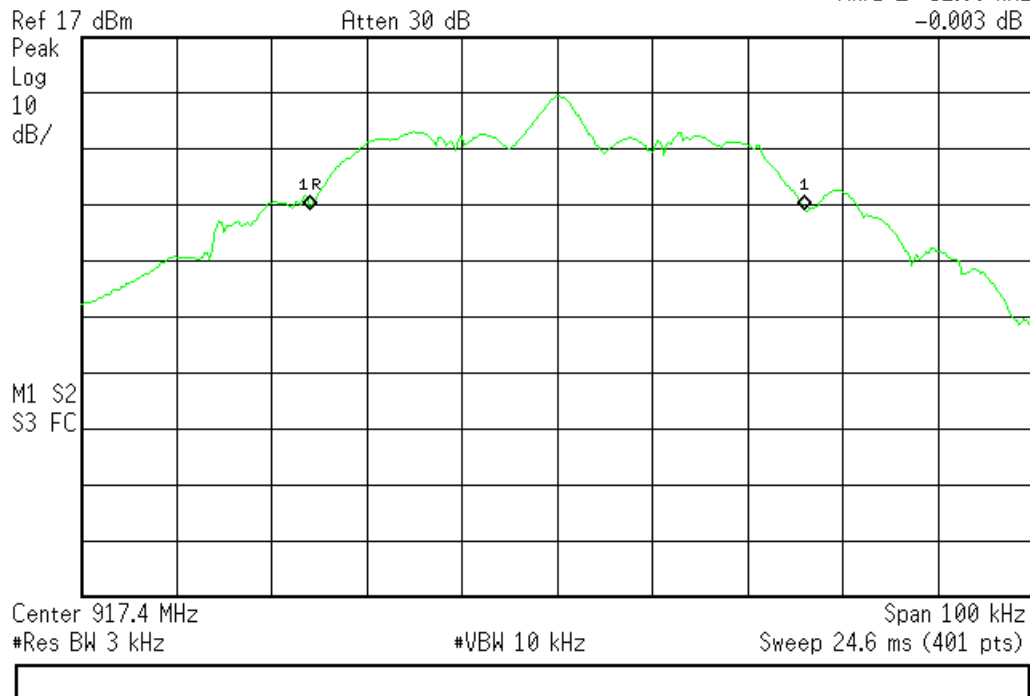
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



## Plot(s)

Agilent 09:49:58 Jan 19, 2015

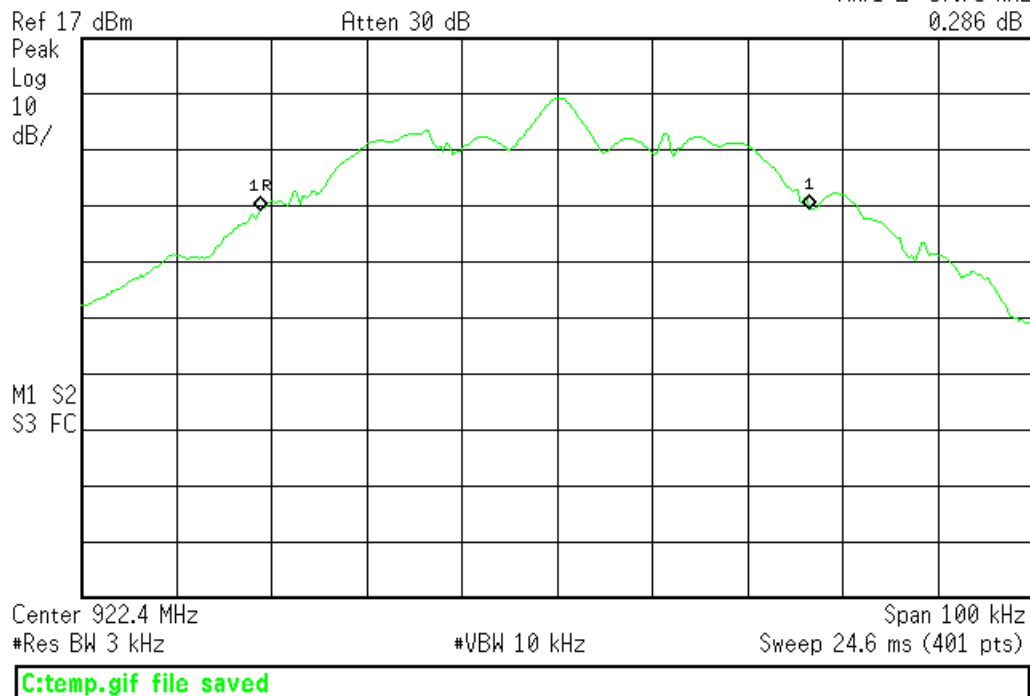
R T

Mkr1  $\Delta$  52.00 kHz  
-0.003 dB

## Low Channel

Agilent 09:54:01 Jan 19, 2015

R T

Mkr1  $\Delta$  57.75 kHz  
0.286 dB

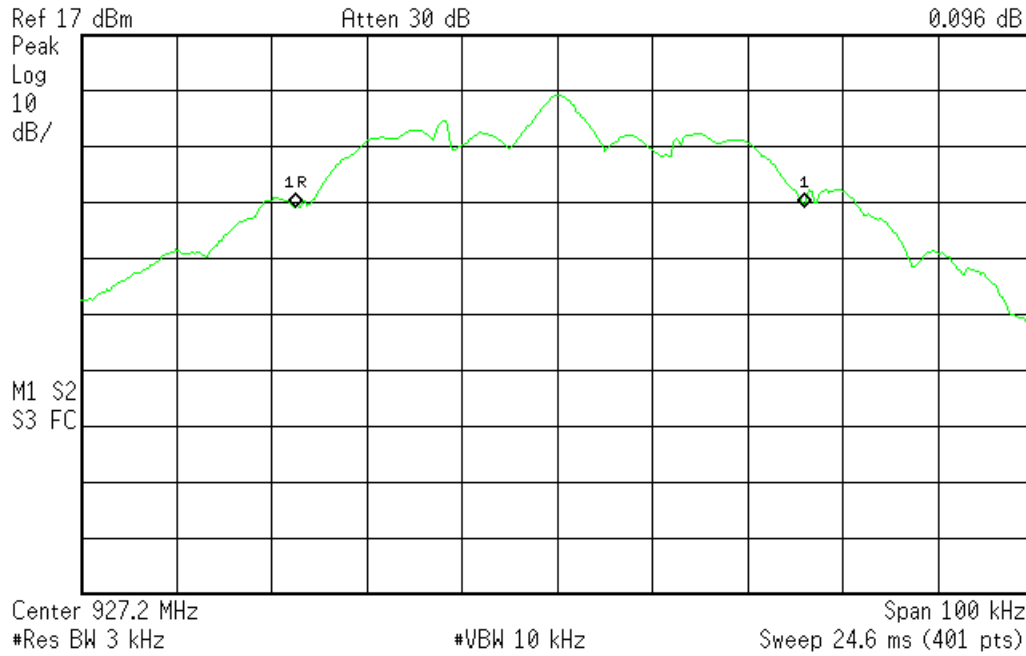
## Mid Channel



Agilent 09:55:36 Jan 19, 2015

R T

Mkr1  $\Delta$  53.50 kHz  
0.096 dB



High Channel



## Channel Frequency Separation

### LIMIT

“Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.”  
[15.247(a)(1)]

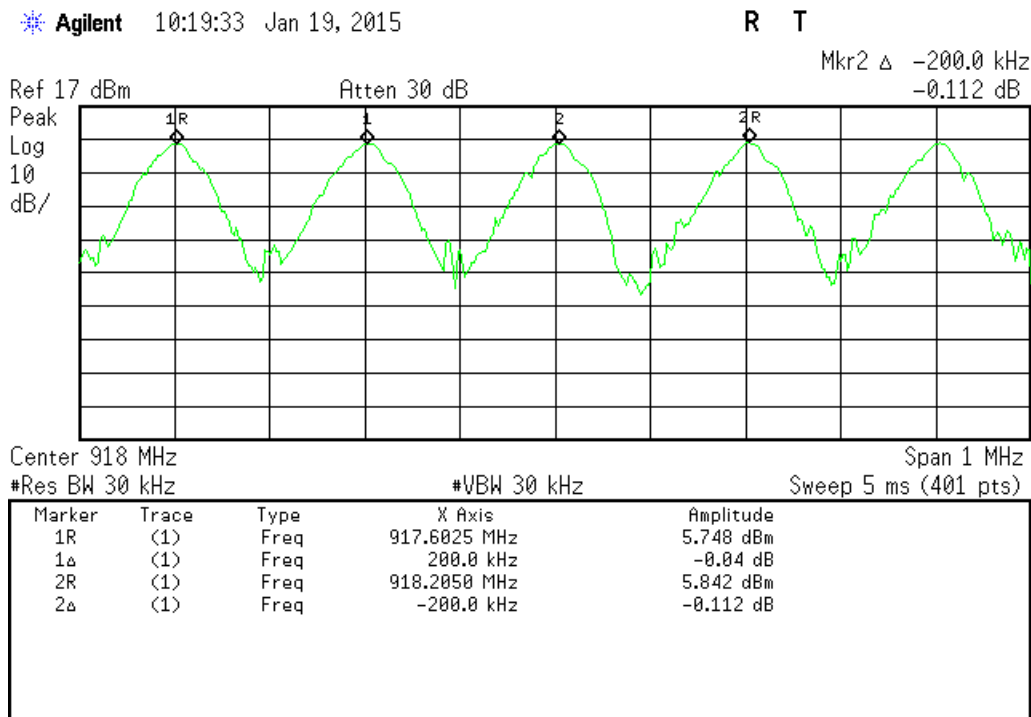
Limit = 20dB bandwidth = 57.75 kHz. (Worst case observed – See 20dB BW section)

Engineer	Tuyen Truong
Date	January 19, 2015
Site	3M Indoor
Temp/Humidity/Pressure	21.6°C, 26% and 1015mBar

## MEASUREMENTS / RESULTS

Channel Frequency Separation = 200 kHz

### Plot(s)

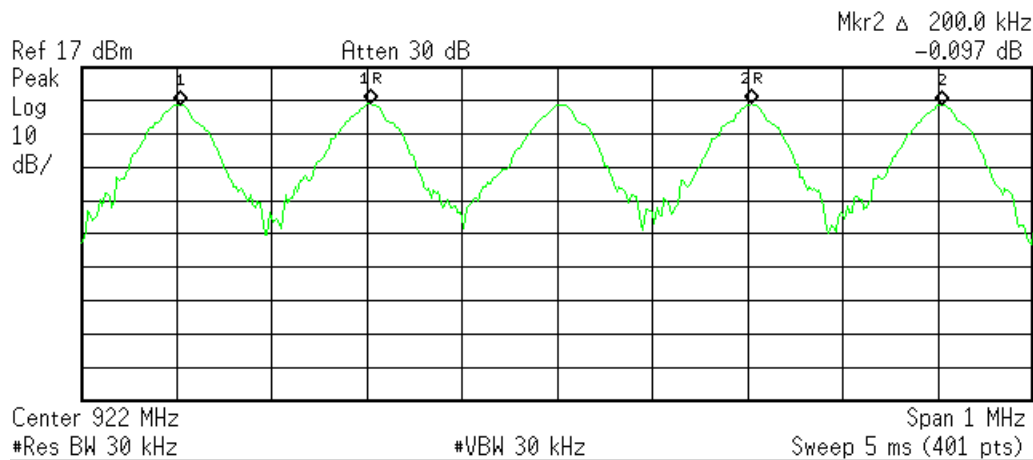


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Channel Separation - Low Channel & Adjacent Channels

✱ Agilent 10:21:50 Jan 19, 2015

R T



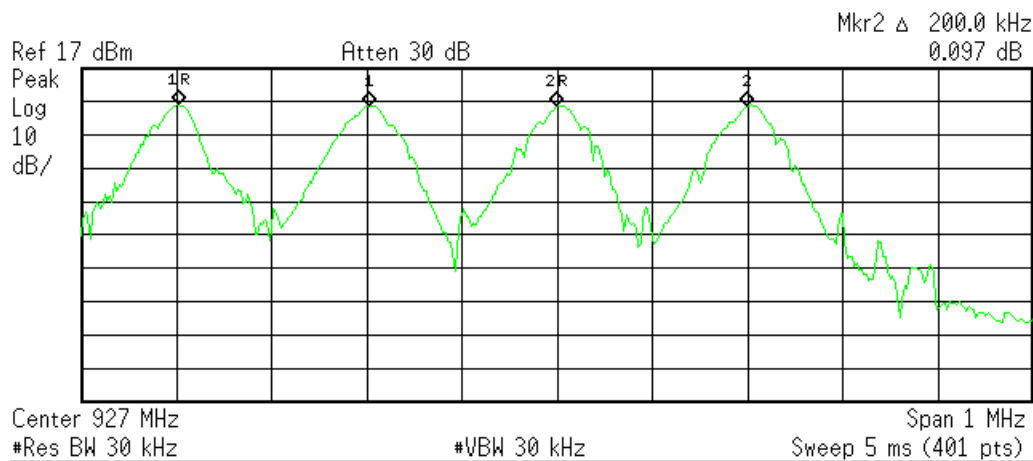
Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Freq	921.8050 MHz	5.833 dBm
1Δ	(1)	Freq	-200.0 kHz	-0.223 dB
2R	(1)	Freq	922.2050 MHz	5.781 dBm
2Δ	(1)	Freq	200.0 kHz	-0.097 dB

C:\temp.gif file saved

Channel Separation - Mid Channel &amp; Adjacent Channels

✱ Agilent 10:17:25 Jan 19, 2015

R T



Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Freq	926.6025 MHz	5.805 dBm
1Δ	(1)	Freq	200.0 kHz	-0.067 dB
2R	(1)	Freq	927.0000 MHz	5.388 dBm
2Δ	(1)	Freq	200.0 kHz	0.097 dB

C:\temp.gif file saved

Channel Separation - High Channel &amp; Adjacent Channels



Rev. 1/18/2015

Spectrum Analyzers / Receivers / Preselectors		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Brown		9kHz-26.5GHz	E4407B	Agilent	SG44210511	1510	I	5/12/2015	5/12/2014
Radiated Emissions Sites		FCC Code	IC Code	VCCI Code	Range		Cat	Calibration Due	Calibrated on
1DCC-OATS-3M-I		719150	2762A-8	A-0015	30-1000MHz		II	5/17/2015	5/17/2013
Preamps / Couplers Attenuators / Filters		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
HF 20dB 50W Attenuator		0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	7/14/2015	7/14/2014
Meteorological Meters			MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)			BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#1830			35519-044	Control Company	130320003	1830	II	6/13/2015	6/13/2013

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

## Number of Hopping Frequencies

### LIMIT

“...if the 20dB bandwidth of the hopping channel is less than 250kHz, the system shall use at least 50 hopping frequencies...”

[15.247(a)(1)(i)]

Engineer	Tuyen Truong
Date	January 19, 2015
Site	3M Indoor
Temp/Humidity/Pressure	21.6°C, 26% and 1015mBar

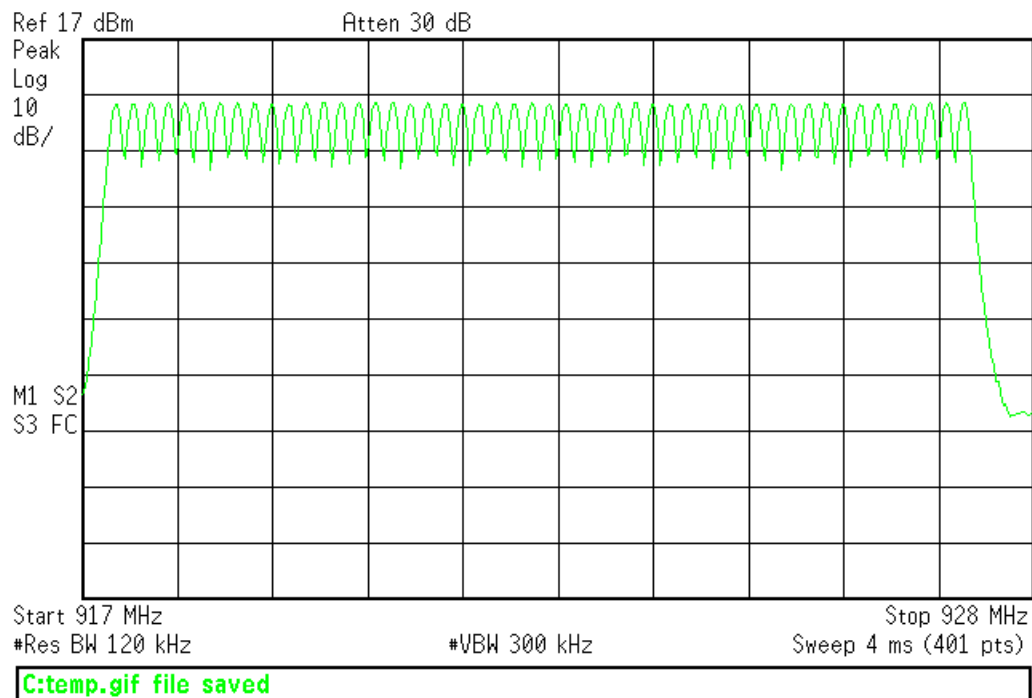
## MEASUREMENTS / RESULTS

Number of hopping frequencies = 50

### Plot(s)

Agilent 10:27:26 Jan 19, 2015

R T



Number of Hopping Frequencies - 50 Channels

## Time of Occupancy

### LIMIT

“...if the 20dB bandwidth of the hopping channel is less than 250kHz...the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period”  
[15.247(a)(1)(i)]

Engineer	Tuyen Truong
Date	January 19, 2015
Site	3M Indoor
Temp/Humidity/Pressure	21.6°C, 26% and 1015mBar

## MEASUREMENTS / RESULTS

Time of Occupancy							
Frequency (MHz)	Mode	Channel Dwell Time (ms)	Repetition Rate in 20sec	Total Occupied Time in 20sec (ms)	Limit (ms)	Margin (ms)	Pass/Fail
917.4	PR-ASK modulation	23.25	17	395.25	400	4.75	Pass
922.4	PR-ASK modulation	23	17	391	400	9	Pass
927.2	PR-ASK modulation	23.25	17	395.25	400	4.75	Pass
Tested by: Tuyen Truong				RBW = 120KHz VBW = 300KHz			
Date: 1/19/2015				Analyzer: Brown			
Company: Trimble Navigation				Attenuator: PE7019-20			
EUT: M6E-NANO							

Rev. 1/18/2015

Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Brown	9kHz-26.5GHz	E4407B	Agilent	SG44210511	1510	I	5/12/2015	5/12/2014
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range		Cat	Calibration Due	Calibrated on
1DCC-OATS-3M-I	719150	2762A-8	A-0015	30-1000MHz		II	5/17/2015	5/17/2013
Preamps / Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
HF 20dB 50W Attenuator	0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	7/14/2015	7/14/2014
Meteorological Meters		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#1830		35519-044	Control Company	130320003	1830	II	6/13/2015	6/13/2013

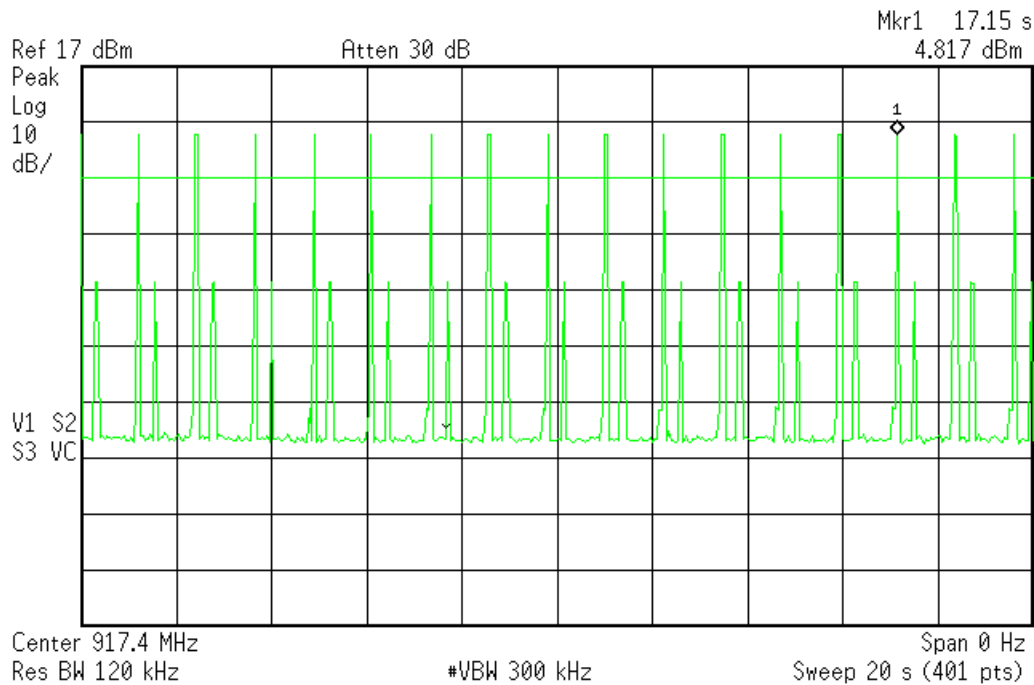
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



## Plot(s)

Agilent 11:20:30 Jan 19, 2015

R T

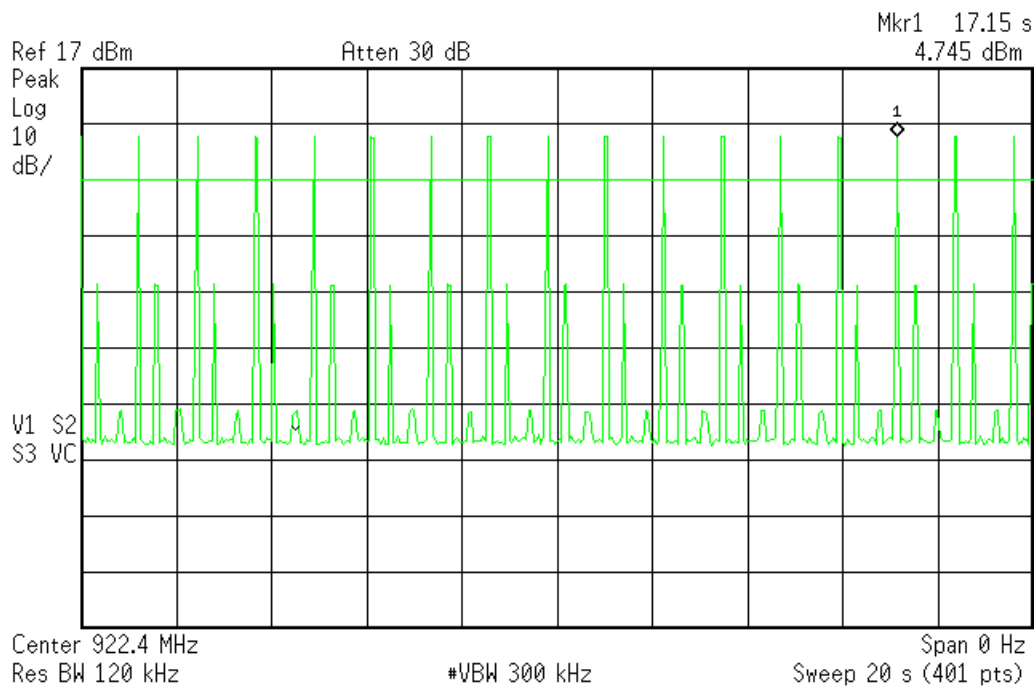


C:\temp.gif file saved

Time of Occupancy - Low Channel

Agilent 11:17:45 Jan 19, 2015

R T



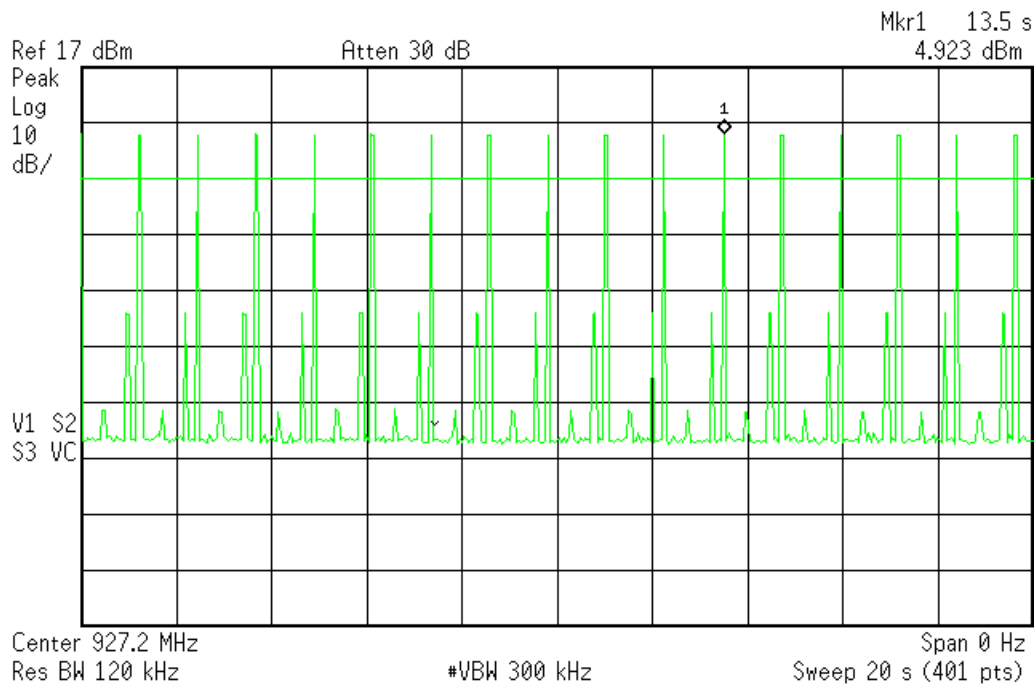
C:\temp.gif file saved

Time of Occupancy - Mid Channel



Agilent 11:22:41 Jan 19, 2015

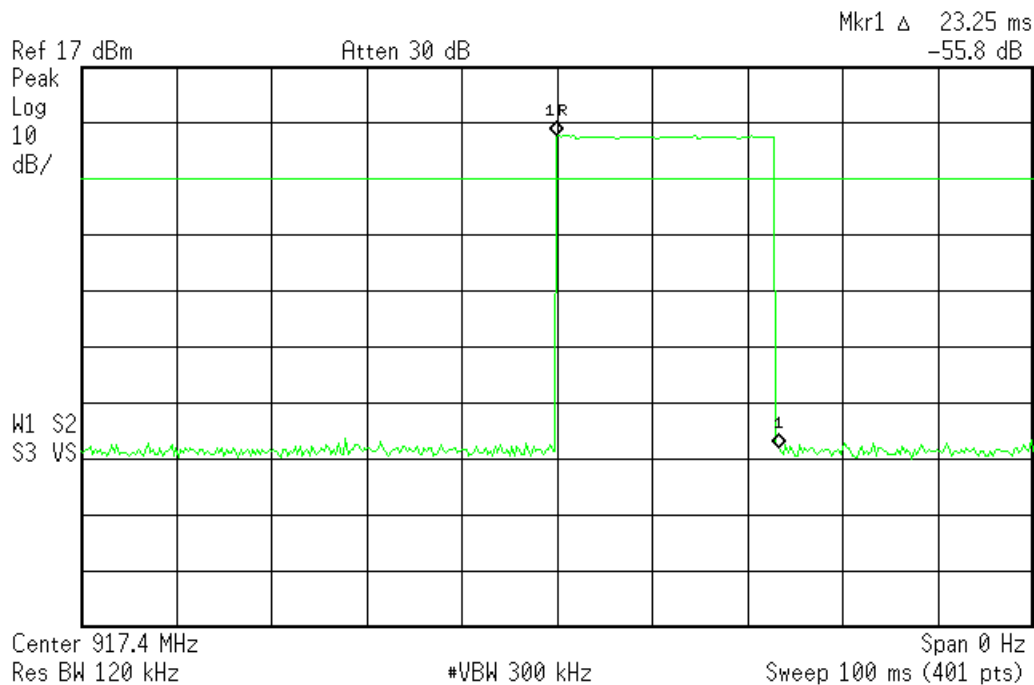
R T



Time of Occupancy - High Channel

Agilent 11:25:56 Jan 19, 2015

R T



Channel Dwell - Low Channel

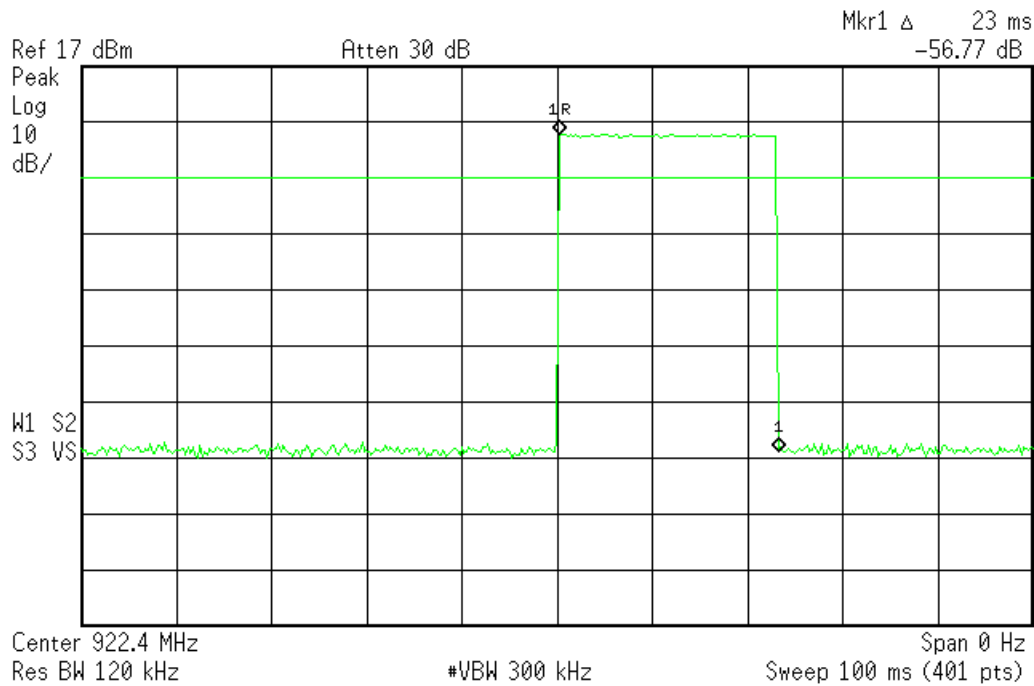


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Agilent 11:28:19 Jan 19, 2015

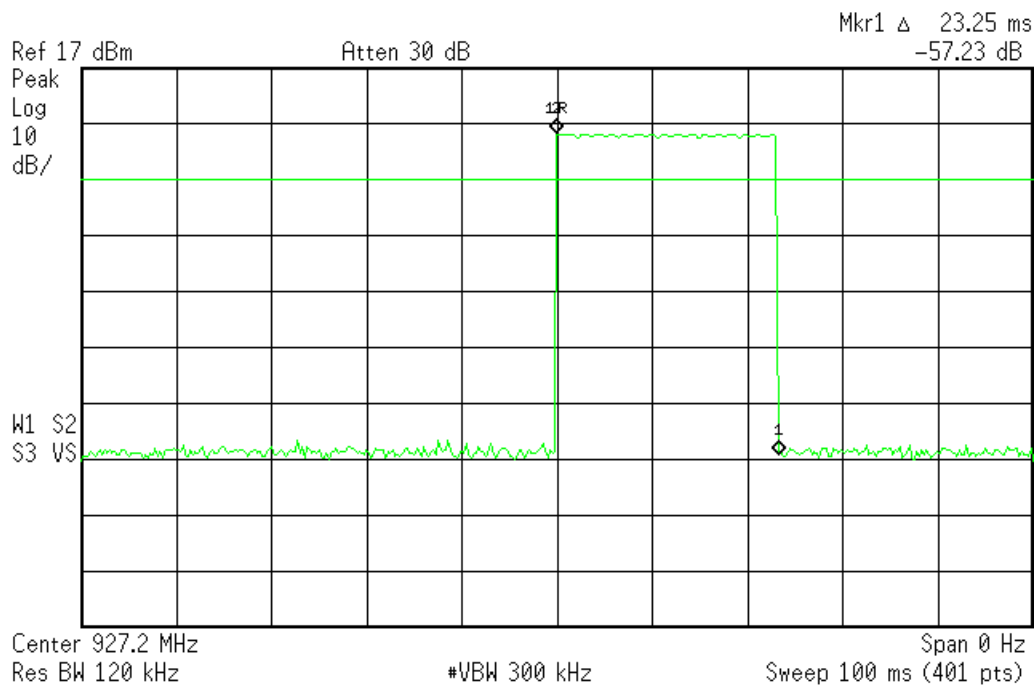
R T



Channel Dwell - Middle Channel

Agilent 11:24:31 Jan 19, 2015

R T



Channel Dwell - High Channel







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## Output Power

### LIMIT

*"The maximum peak conducted output power of the intentional radiator shall not exceed...For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels"*

[15.247(b)(2)]

Limit = 30dBm

Engineer	Tuyen Truong
Date	January 19, 2015
Site	3M Indoor
Temp/Humidity/Pressure	21.6°C, 26% and 1015mBar

## MEASUREMENTS / RESULTS

Maximum Conducted Peak Output Power							
Tested by: Tuyen Truong				WO: P0016			
Date: 1/19/2015		Analyzer: Brown		RBW = 100KHz			
Company: Trimble Navigation		Attenuator: PE7019-20 #791		VBW = 100KHz			
EUT: M6E-NANO		Operating Voltage: 5Vdc					
TX Mode: CW		Antenna: FG9026 8.15dBi					
Channel	Measured power	Attenuator		Adjusted power	Adjusted Limit for		
(MHz)	(dBm)	factor		measurement	Laird 8.15dBi	Margin	Result
		(dB)	Cable Loss	(dBm)	Antenna	(dB)	
917.4	5.08	19.48	2.46	27.02	27.85	-0.83	PASS
922.4	5.11	19.46	2.52	27.09	27.85	-0.77	PASS
927.2	5.10	19.47	2.43	27.00	27.85	-0.86	PASS

Maximum Conducted Peak Output Power							
Tested by: Tuyen Truong				WO: P0016			
Date: 1/19/2015		Analyzer: Brown		RBW = 100KHz			
Company: Trimble Navigation		Attenuator: PE7019-20 #791		VBW = 100KHz			
EUT: M6E-NANO		Operating Voltage: 5Vdc					
TX Mode: CW		Antenna: MT-263020 8dBi					
Channel (MHz)	Measured power (dBm)	Attenuator factor (dB)	Cable Loss	Adjusted power measurement (dBm)	Adjusted Limit for MTI 8dBi Antenna (dBm)	Margin (dB)	Result
917.4	5.08	19.48	2.46	27.02	28	-0.98	PASS
922.4	5.11	19.46	2.52	27.09	28	-0.91	PASS
927.2	5.10	19.47	2.43	27.00	28	-1.01	PASS

Note: Cable factor (cable loss) provided by client, (Verified using the HP83752A Agilent Sweeper – Asset #87.)



BUREAU  
VERITAS

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Rev. 3/8/2015

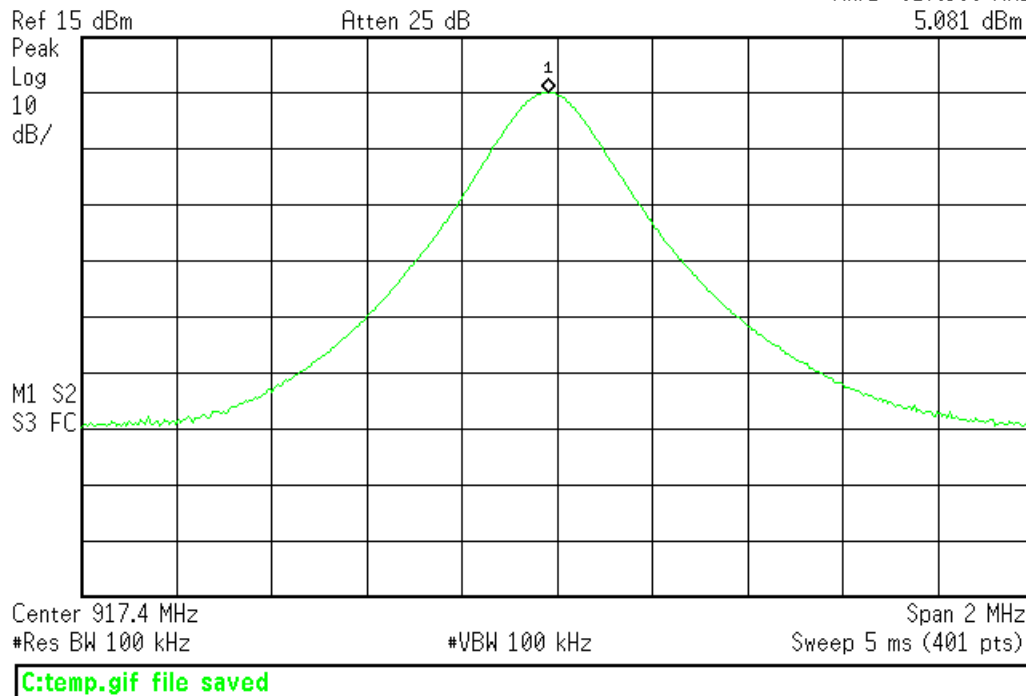
<b>Spectrum Analyzers / Receivers / Preselectors</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Brown	9kHz-26.5GHz	E4407B	Agilent	SG44210511	1510	I	5/12/2015	5/12/2014
<b>Radiated Emissions Sites</b>	<b>FCC Code</b>	<b>IC Code</b>	<b>VCCI Code</b>	<b>Range</b>		<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
1DCC-OATS-3M-I	719150	2762A-8	A-0015	30-1000MHz		II	5/17/2015	5/17/2013
<b>Preamps / Couplers Attenuators / Filters</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
HF 20dB 50W Attenuator	0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	7/14/2015	7/14/2014
<b>Meteorological Meters</b>		<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#1830		35519-044	Control Company	130320003	1830	II	6/13/2015	6/13/2013
<b>Signal Generators</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
RFI-High Sweeper 1	0.01-20.0GHz	HP83752A	Agilent	3610A01133	87	I	10/20/2015	10/20/2014

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

## Plot(s)

Agilent 13:33:07 Jan 19, 2015

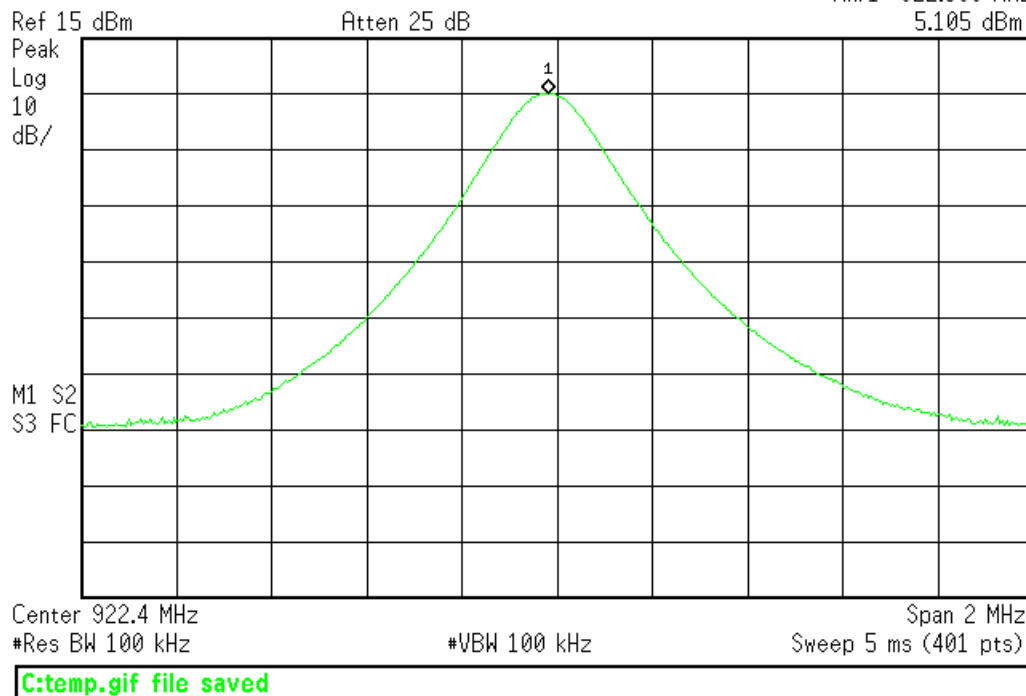
R T

Mkr1 917.380 MHz  
5.081 dBm

Output Power - Low Channel

Agilent 13:34:24 Jan 19, 2015

R T

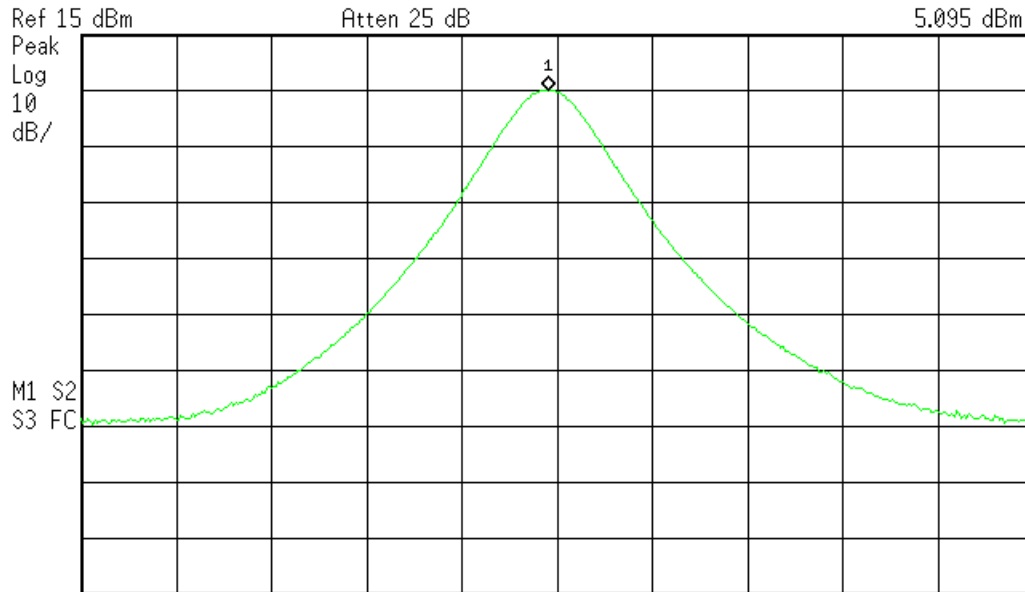
Mkr1 922.380 MHz  
5.105 dBm

Output Power - Mid Channel

Agilent 13:36:11 Jan 19, 2015

R T

Mkr1 927.180 MHz  
5.095 dBm



Center 927.2 MHz Span 2 MHz  
#Res BW 100 kHz #VBW 100 kHz Sweep 5 ms (401 pts)

C:\temp.gif file saved

Output Power - High Channel

## Conducted Spurious Emissions

### LIMITS

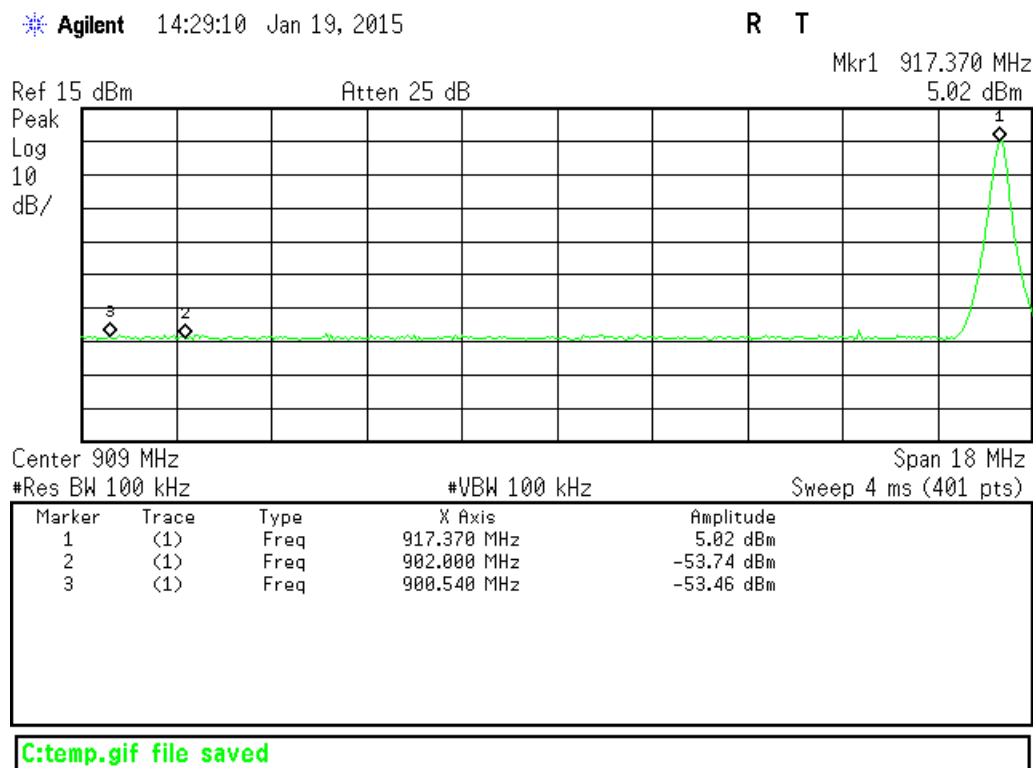
*"In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power"*

[15.247(d)]

Engineer	Tuyen Truong
Date	January 19, 2015
Site	3M Indoor
Temp/Humidity/Pressure	21.6°C, 26% and 1015mBar

### MEASUREMENTS / RESULTS

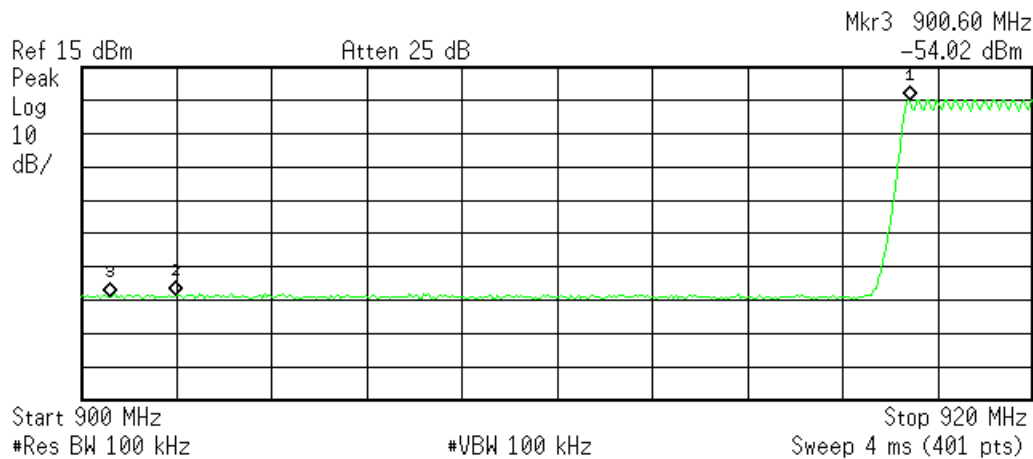
#### Conducted Band Edge Plot(s)



Conducted Spurious EMI - Lower Band Edge

✱ Agilent 14:31:41 Jan 19, 2015

R T

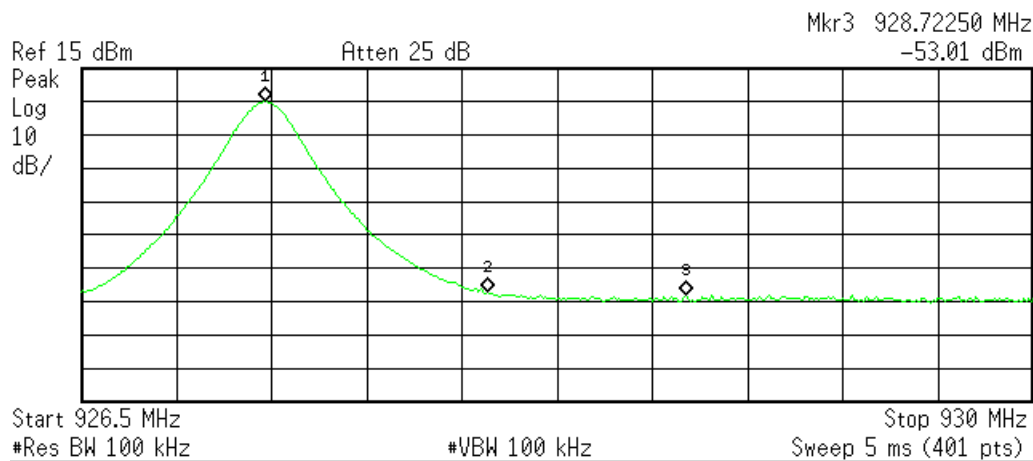


C:\temp.gif file saved

Conducted Spurious EMI - Lower Band Edge (Hopping Enable)

✱ Agilent 14:34:13 Jan 19, 2015

R T



C:\temp.gif file saved

Conducted Spurious EMI - Upper Band Edge



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\* Agilent 14:36:11 Jan 19, 2015

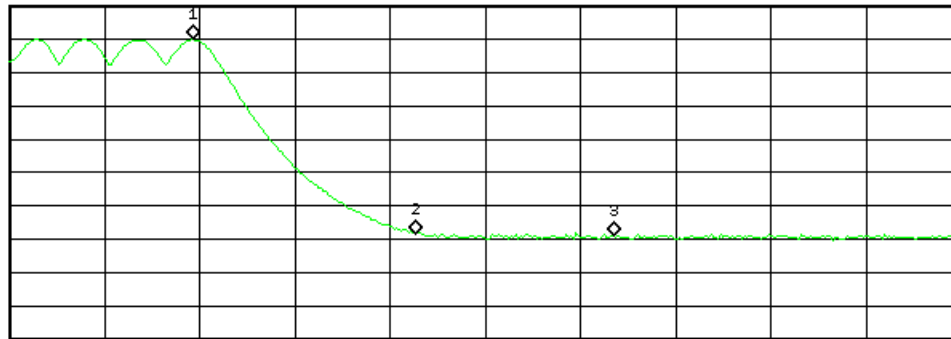
R T

Mkr3 928.72250 MHz

-54.1 dBm

Ref 15 dBm

Atten 25 dB

Peak  
Log  
10  
dB/

Start 926.5 MHz

Stop 930 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 5 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	927.17375 MHz	4.785 dBm
2	(1)	Freq	928.00000 MHz	-53.21 dBm
3	(1)	Freq	928.72250 MHz	-54.1 dBm

C:\temp.gif file saved

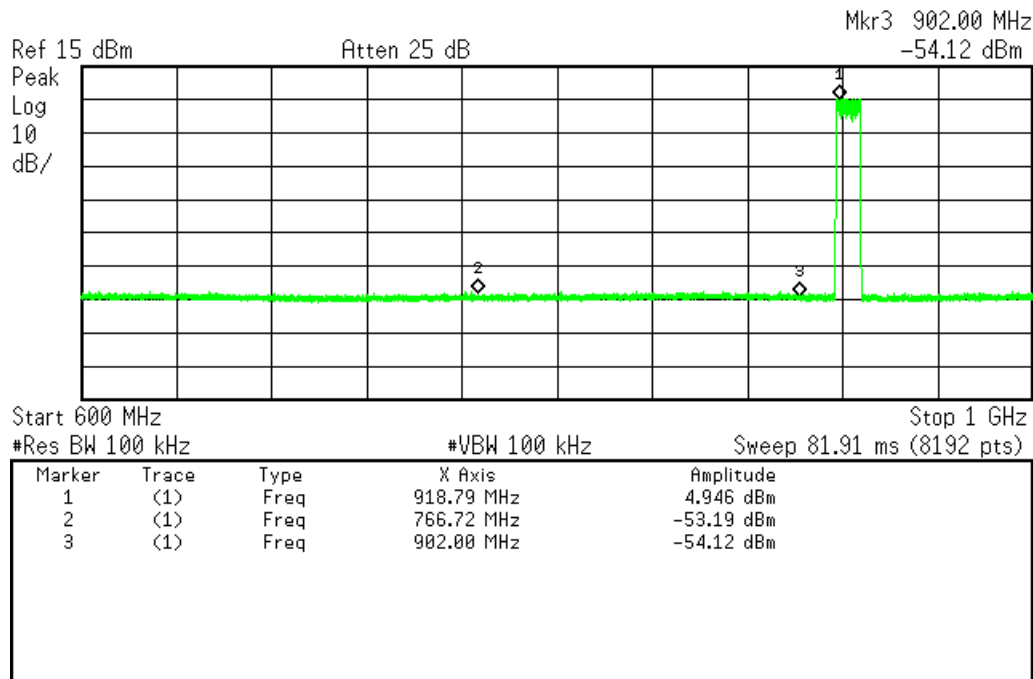
Conducted Spurious EMI - Upper Band Edge (Hopping Enable)



**Conducted Spurious Emission  
Plot(s)**

Agilent 14:44:09 Jan 19, 2015

R T

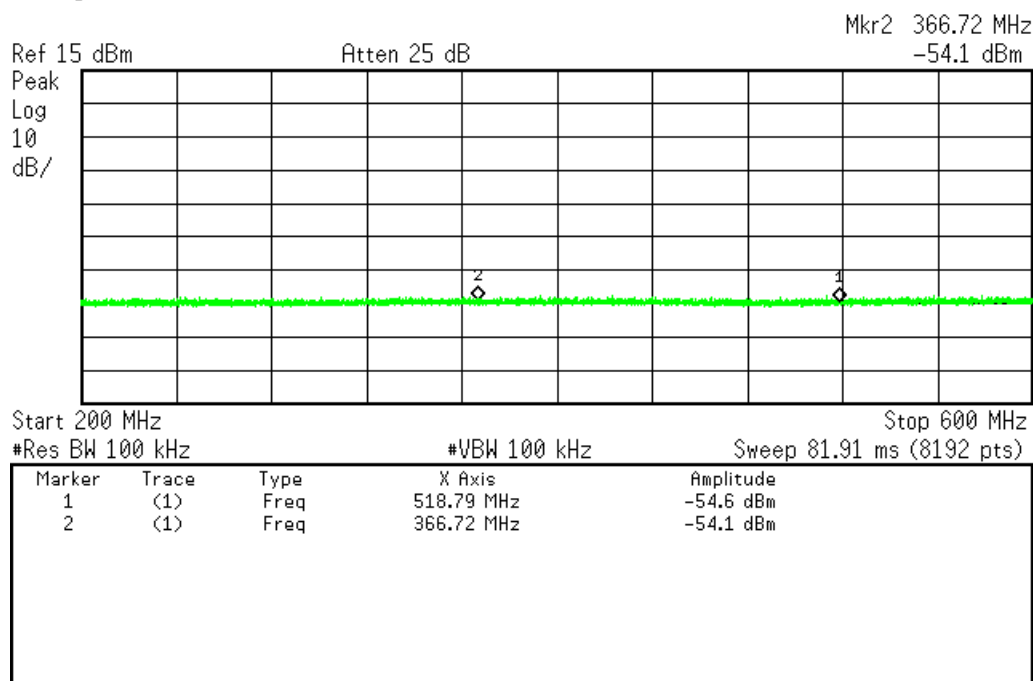


C:\temp.gif file saved

Conducted Spurious EMI - 1

Agilent 14:46:16 Jan 19, 2015

R T



C:\temp.gif file saved

Conducted Spurious EMI - 2



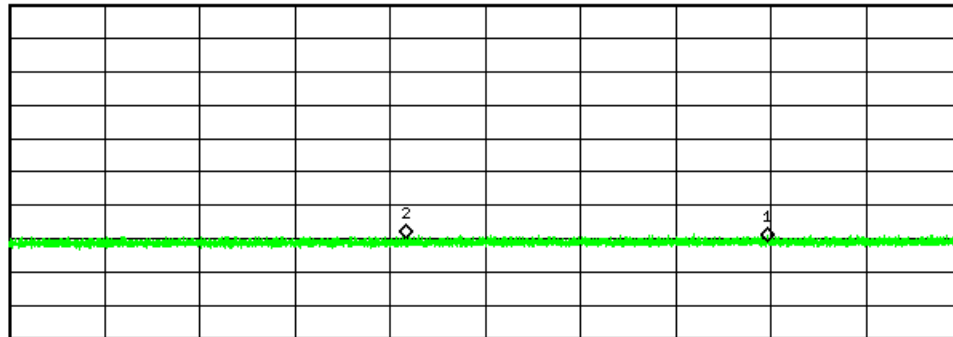
✱ Agilent 14:47:02 Jan 19, 2015

R T

Mkr2 100.856 MHz  
-54.99 dBm

Ref 15 dBm

Atten 25 dB

Peak  
Log  
10  
dB/

Start 30 MHz

Stop 200 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 81.91 ms (8192 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	165.485 MHz	-55.86 dBm
2	(1)	Freq	100.856 MHz	-54.99 dBm

C:\temp.gif file saved

## Conducted Spurious EMI – 3

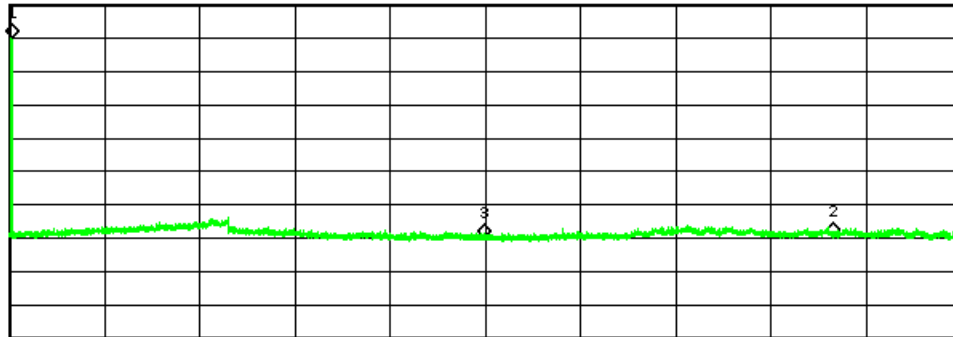
✱ Agilent 14:50:11 Jan 19, 2015

R T

Mkr2 8.7795 GHz  
-54.28 dBm

Ref 15 dBm

Atten 25 dB

Peak  
Log  
10  
dB/

Start 900 MHz

Stop 10 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 1.172 s (8192 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	925.6 MHz	4.981 dBm
2	(1)	Freq	8.7795 GHz	-54.28 dBm
3	(1)	Freq	5.4494 GHz	-55.87 dBm

C:\temp.gif file saved

## Conducted Spurious EMI – 4



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For Conducted Spurious Emissions at the Antenna Port, the spectrum analyzer was set to the following:

Span: 400MHz or less  
Resolution Bandwidth: 100 KHz  
Video Bandwidth: 300 KHz  
Points per sweep: 8192

The frequency range 30MHz-10GHz was tested at EUT antenna port and no emissions were found within 10dB of the limit, which was set at 30dB below the power of the transmit frequency. The low, mid, and high channels and hopping function enabled were tested. (See Conducted Spurious Emission - Plot(s))

## Radiated Spurious Emissions

### LIMITS

“...radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) ”  
[15.247(d)]

### MEASUREMENTS / RESULTS

EUT tested with MTI Wireless Edge antenna

**Radiated Emissions Table**

Date: 09-Mar-15			Company: Trimble Navigation			Work Order: P0016						
Engineer: Tuyen Truong			EUT Desc: M6E-NANO			EUT Operating Voltage/Frequency: 5Vdc						
Temp: 22°C			Humidity: 3%			Pressure: 1010mBar						
Frequency Range: 30 - 1000MHz						Measurement Distance: 3 m						
Notes: EUT tested with MTI Wireless Edge 8dBi Antenna						EUT Max Freq: 917.4-927.2MHz						
EUT was tested while it was hopping through all channels.												
EUT was also checked while it individually transmitted on Low, Mid and High Channels.												
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	---			FCC Class 15.209		
							Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
v	55.52	55.2	25.4	7.7	0.6	38.1	---	---	---	40.0	-1.9	Pass
h	57.42	39.6	25.4	7.7	0.7	22.6	---	---	---	40.0	-17.4	Pass
v	57.47	56.2	25.4	7.7	0.7	39.2	---	---	---	40.0	-0.8	Pass
v	59.52	50.2	25.4	7.8	0.7	33.3	---	---	---	40.0	-6.7	Pass
v	152.7	34.8	25.1	12.9	1.0	23.6	---	---	---	43.5	-19.9	Pass
v	339.8	24.7	25.3	14.7	1.4	15.5	---	---	---	46.0	-30.5	Pass
h	340.8	24.7	25.3	14.7	1.4	15.5	---	---	---	46.0	-30.5	Pass
v	864.8	34.7	25.7	22.4	2.2	33.6	---	---	---	46.0	-12.4	Pass
h	909.9	28.4	25.4	22.9	2.2	28.1	---	---	---	46.0	-17.9	Pass
v	911.3	35.0	25.3	22.9	2.2	34.8	---	---	---	46.0	-11.2	Pass
v	977.2	33.5	24.4	23.4	2.3	34.8	---	---	---	54.0	-19.2	Pass
Table Result: Pass						by	-0.8 dB		Worst Freq:		57.47 MHz	
Test Site: EMI Chamber 2			Cable 1: Asset #1506			Cable 2: Asset #1507			Cable 3: ---			
Analyzer: Rental SA#2			Preamp: Blue-Blk			Antenna: Red-White			Preselector: ---			

Rev.3/8/2015

<b>Spectrum Analyzers / Receivers/Preselectors</b> SA #2 (1860)	<b>Range</b> 9kHz-26.5 GHz	<b>MN</b> E7405A	<b>Mfr</b> Agilent	<b>SN</b> MY45104916	<b>Asset</b> 1860	<b>Cat</b> I	<b>Calibration Due</b> 6/4/2015	<b>Calibrated on</b>
<b>Radiated Emissions Sites</b> EMI Chamber 2	<b>FCC Code</b> 719150	<b>IC Code</b> 2762A-7	<b>VCCI Code</b> A-0015	<b>Range</b> 30-1000MHz		<b>Cat</b> II	<b>Calibration Due</b> 4/9/2015	<b>Calibrated on</b> 3/9/2014
<b>Preamps/Couplers Attenuators / Filters</b> Blue-Black	<b>Range</b> 0.009-2000MHz	<b>MN</b> ZFL-1000-LN	<b>Mfr</b> CS	<b>SN</b> N/A	<b>Asset</b> 800	<b>Cat</b> II	<b>Calibration Due</b> 12/26/2015	<b>Calibrated on</b> 12/26/2014
<b>Antennas</b> Red-White Bilog	<b>Range</b> 30-2000MHz	<b>MN</b> JB1	<b>Mfr</b> Sunol	<b>SN</b> A091604-1	<b>Asset</b> 1105	<b>Cat</b> I	<b>Calibration Due</b> 7/24/2015	<b>Calibrated on</b> 7/24/2013
<b>Cables</b> Asset #1506 Asset #1507	<b>Range</b> 9kHz - 18GHz 9kHz - 18GHz		<b>Mfr</b> Florida RF Florida RF			<b>Cat</b> II II	<b>Calibration Due</b> 3/8/2016 2/15/2016	<b>Calibrated on</b> 3/8/2015 2/15/2015
<b>Meteorological Meters</b> Weather Clock (Pressure Only) TH A#1833		<b>MN</b> BA928 35519-044	<b>Mfr</b> Oregon Scientific Control Company	<b>SN</b> C3166-1 130318278	<b>Asset</b> 831 1833	<b>Cat</b> I II	<b>Calibration Due</b> 3/19/2016 6/13/2015	<b>Calibrated on</b> 3/19/2014 6/13/2013

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



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Radiated Emissions Table															
Date: 09-Mar-15				Company: Trimble Navigation				Work Order: P0016							
Engineer: Tuyen Truong				EUT Desc: M6E-NANO				EUT Operating Voltage/Frequency: 5Vdc							
Temp: 22°C				Humidity: 3%				Pressure: 1010mBar							
Frequency Range: 1-10GHz								Measurement Distance: 3 m (1-6GHz) and 1m (6-10GHz)							
Notes: EUT tested with MTI Wireless Antenna 1288 HPF in place EUT was tested while it was hoping through all channels. EUT was also checked while it individually transmitted on Low, Mid and High Channels.								EUT Max Freq: 917.4-927.2MHz							
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC15.209 High Frequency - Peak			FCC 15.209 High Frequency - Average			
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	
v	1834.8	33.1	26.3	20.6	30.7	3.2	46.4	39.6	74.0	-27.6	Pass	54.0	-14.4	Pass	
v	1844.0	34.49	30.4	20.6	30.8	3.2	47.9	43.8	74.0	-26.1	Pass	54.0	-10.2	Pass	
v	1854.4	36.21	32.5	20.6	30.9	3.2	49.7	46.0	74.0	-24.3	Pass	54.0	-8.0	Pass	
v	2065.0	31.51	21.6	21.1	31.9	4.1	46.4	36.5	74.0	-27.6	Pass	54.0	-17.5	Pass	
v	2705.0	33.2	22.6	21.9	32.9	4.6	48.8	38.2	74.0	-25.2	Pass	54.0	-15.8	Pass	
Table Result: Pass by -8.0 dB Worst Freq: 1854.4 MHz															
Test Site: EMI Chamber 2				Cable 1: Asset #1506				Cable 2: Asset #1507				Cable 3: ---			
Analyzer: Rental SA#2				Preamp: Asset #1517				Antenna: Blue Horn				Preselector: ---			

Rev.3/3/2015

Spectrum Analyzers / Receivers / Preselectors		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
SA #2 (1860)		9kHz-26.5 GHz	E7405A	Agilent	MY45104916	1860	I	6/4/2015	
Radiated Emissions Sites		FCC Code	IC Code	VCCI Code	Range		Cat	Calibration Due	Calibrated on
EMI Chamber 2		719150	2762A-7	A-0015	30-1000MHz		II	4/9/2015	3/9/2014
Preamps / Couplers / Attenuators / Filters		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
1517 HF Preamp		1-20GHz	CS	CS	N/A	1517	II	9/9/2015	9/9/2014
High Pass Filter		0.03-9 GHz	VHP-16	Mini-Circuits	NA	1288	II	1/13/2016	1/13/2015
Antennas		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Blue Horn		1-18GHz	3117	ETS	157647	1861	I	2/8/2017	2/8/2015
Cables		Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #1506		9kHz - 18GHz		Florida RF			II	3/8/2016	3/8/2015
Asset #1507		9kHz - 18GHz		Florida RF			II	2/15/2016	2/15/2015
Meteorological Meters			MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)			BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#1833			35519-044	Control Company	130318278	1833	II	6/13/2015	6/13/2013

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



## EUT tested with LAIRD Technology antenna

## Radiated Emissions Table

Date: 09-Mar-15			Company: Trimble Navigation			Work Order: P0016						
Engineer: Tuyen Truong			EUT Desc: M6E-NANO			EUT Operating Voltage/Frequency: 5Vdc						
Temp: 22°C			Humidity: 3%			Pressure: 1010mBar						
Frequency Range: 30 - 1000MHz						Measurement Distance: 3 m						
Notes: EUT tested with LAIRD Technology Antenna						EUT Max Freq: 917.4-927.2MHz						
EUT was tested while it was hoping through all channels.												
EUT was also checked while it individually transmitted on Low, Mid and High Channels.												
Antenna Polarization (H/V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)	---			FCC 15.209		
							Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
v	45.62	39.4	25.3	10.8	0.6	25.5	---	---	---	40.0	-14.5	Pass
v	53.58	51.7	25.4	8.0	0.6	34.9	---	---	---	40.0	-5.1	Pass
v	55.45	55.9	25.4	7.8	0.6	38.9	---	---	---	40.0	-1.1	Pass
v	55.52	53.4	25.4	7.7	0.6	36.3	---	---	---	40.0	-3.7	Pass
v	59.53	44.1	25.4	7.8	0.7	27.2	---	---	---	40.0	-12.8	Pass
h	208.5	43.7	25.2	11.3	1.1	30.9	---	---	---	43.5	-12.6	Pass
v	210.4	42.8	25.2	11.2	1.1	29.9	---	---	---	43.5	-13.6	Pass
v	212.6	42.1	25.1	11.3	1.1	29.4	---	---	---	43.5	-14.1	Pass
h	266.7	37.0	25.4	13.3	1.3	26.2	---	---	---	46.0	-19.8	Pass
h	713.9	25.5	25.1	20.7	2.1	23.2	---	---	---	46.0	-22.8	Pass
v	864.0	32.7	25.7	22.4	2.2	31.6	---	---	---	46.0	-14.4	Pass
v	972.8	28.6	24.4	23.4	2.3	29.9	---	---	---	54.0	-24.1	Pass
Table Result: Pass						by	-1.1 dB			Worst Freq: 55.45 MHz		
Test Site: EMI Chamber 2			Cable 1: Asset #1506			Cable 2: Asset #1507			Cable 3: ---			
Analyzer: Rental SA#2			Preamp: Blue-Blk			Antenna: Red-White			Preselector: ---			

Rev.3/8/2015

<b>Spectrum Analyzers / Receivers/Preselectors</b> SA #2 (1860)	<b>Range</b> 9kHz-26.5 GHz	<b>MN</b> E7405A	<b>Mfr</b> Agilent	<b>SN</b> MY45104916	<b>Asset</b> 1860	<b>Cat</b> I	<b>Calibration Due</b> 6/4/2015	<b>Calibrated on</b>
<b>Radiated Emissions Sites</b> EMI Chamber 2	<b>FCC Code</b> 719150	<b>IC Code</b> 2762A-7	<b>VCCI Code</b> A-0015	<b>Range</b> 30-1000MHz		<b>Cat</b> II	<b>Calibration Due</b> 4/9/2015	<b>Calibrated on</b> 3/9/2014
<b>Preamps/Couplers Attenuators / Filters</b> Blue-Black	<b>Range</b> 0.009-2000MHz	<b>MN</b> ZFL-1000-LN	<b>Mfr</b> CS	<b>SN</b> N/A	<b>Asset</b> 800	<b>Cat</b> II	<b>Calibration Due</b> 12/26/2015	<b>Calibrated on</b> 12/26/2014
<b>Antennas</b> Red-White Bilog	<b>Range</b> 30-2000MHz	<b>MN</b> JB1	<b>Mfr</b> Sunol	<b>SN</b> A091604-1	<b>Asset</b> 1105	<b>Cat</b> I	<b>Calibration Due</b> 7/24/2015	<b>Calibrated on</b> 7/24/2013
<b>Cables</b> Asset #1506 Asset #1507	<b>Range</b> 9kHz - 18GHz 9kHz - 18GHz		<b>Mfr</b> Florida RF Florida RF			<b>Cat</b> II II	<b>Calibration Due</b> 3/8/2016 2/15/2016	<b>Calibrated on</b> 3/8/2015 2/15/2015
<b>Meteorological Meters</b> Weather Clock (Pressure Only) TH A#1833		<b>MN</b> BA928 35519-044	<b>Mfr</b> Oregon Scientific Control Company	<b>SN</b> C3166-1 130318278	<b>Asset</b> 831 1833	<b>Cat</b> I II	<b>Calibration Due</b> 3/19/2016 6/13/2015	<b>Calibrated on</b> 3/19/2014 6/13/2013

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

## Radiated Emissions Table

Date: 09-Mar-15			Company: Trimble Navigation					Work Order: P0016									
Engineer: Tuyen Truong			EUT Desc: M6E-NANO					EUT Operating Voltage/Frequency: 5Vdc									
Temp: 22°C			Humidity: 3%					Pressure: 1010mBar									
Frequency Range: 1-10GHz								Measurement Distance: 3 m (1-6GHz) and 1m (6-10GHz)									
Notes: EUT tested with LAIRD Technology Antenna 1288 HPF in place EUT was tested while it was hoping through all channels. EUT was also checked while it individually transmitted on Low, Mid and High Channels.								EUT Max Freq: 917.4-927.2MHz									
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC15.209 High Frequency - Peak			FCC 15.209 High Frequency - Average					
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)			
v	1834.8	33.03	22.4	20.6	30.7	3.2	46.3	35.7	74.0	-27.7	Pass	54.0	-18.3	Pass			
v	1844.0	33.44	25.4	20.6	30.8	3.2	46.8	38.8	74.0	-27.2	Pass	54.0	-15.2	Pass			
v	1854.4	33.05	25.6	20.6	30.9	3.2	46.6	39.1	74.0	-27.4	Pass	54.0	-14.9	Pass			
v	2065.9	33.99	34.0	21.1	31.9	4.1	48.9	48.9	74.0	-25.1	Pass	54.0	-5.1	Pass			
v	2752.2	32.81	23.6	21.9	33.0	4.5	48.4	39.2	74.0	-25.6	Pass	54.0	-14.8	Pass			
Table Result:				Pass					by		-5.1 dB				Worst Freq: 2065.9 MHz		
Test Site: EMI Chamber 2				Cable 1: Asset #1506					Cable 2: Asset #1507					Cable 3: ---			
Analyzer: Rental SA#2				Preamp: Asset #1517					Antenna: Blue Horn					Preselector: ---			

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<b>Spectrum Analyzers / Receivers/Preselectors</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
SA #2 (1860)	9kHz-26.5 GHz	E7405A	Agilent	MY45104916	1860	I	6/4/2015	
<b>Radiated Emissions Sites</b>	<b>FCC Code</b>	<b>IC Code</b>	<b>VCCI Code</b>	<b>Range</b>		<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz		II	4/9/2015	3/9/2014
<b>Preamps/Couplers Attenuators / Filters</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
1517 HF Preamp	1-20GHz	CS	CS	N/A	1517	II	9/9/2015	9/9/2014
High Pass Filter	0.03-9 GHz	VHP-16	Mini-Circuits	NA	1288	II	1/13/2016	1/13/2015
<b>Antennas</b>	<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Blue Horn	1-18Ghz	3117	ETS	157647	1861	I	2/8/2017	2/8/2015
<b>Cables</b>	<b>Range</b>		<b>Mfr</b>			<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Asset #1506	9kHz - 18GHz		Florida RF			II	3/8/2016	3/8/2015
Asset #1507	9kHz - 18GHz		Florida RF			II	2/15/2016	2/15/2015
<b>Meteorological Meters</b>		<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#1833		35519-044	Control Company	130318278	1833	II	6/13/2015	6/13/2013

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



## AC Line Conducted Emissions LIMITS

Frequency of emission (MHz)	Quasi-peak limit (dBμV)	Average limit (dBμV)
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.  
[47 CFR 15.207(a)]

## MEASUREMENTS / RESULTS

AC side of AC/DC Power Supply - Conducted Emissions Data Table														
Date: 22-Jan-15 Engineer: Tuyen Truong Temp: 23.0 °C							Company: Trimble Navigation EUT Desc: M6E-NANO Humidity: 2%				Work Order: P0016 Pressure: 1015mBar			
Notes: EUT tx on low, mid, high and hopping through all channels during testing.														
Frequency Range: 0.15-30MHz										EUT Input Voltage/Frequency: 5Vdc				
Frequency (MHz)	Quasi-Peak Readings		Average Readings		LISN Factors		Cable Factor (dB)	ATTN Factor (dB)	FCC 15.207			FCC 15.207		
	QP1 (dBμV)	QP2 (dBμV)	AVG1 (dBμV)	AVG2 (dBμV)	L1 (dB)	L2 (dB)			QP Limit (dBμV)	Margin (dB)	Result (Pass/Fail)	AVG Limit (dBμV)	Margin (dB)	Result (Pass/Fail)
0.25	34.2	34.2	2.9	2.2	0.0	-0.1	0.0	-19.8	61.7	-7.6	Pass	51.7	-28.9	Pass
1.98	14.5	6.3	1.5	1.7	0.0	0.0	-0.1	-19.8	56.0	-21.6	Pass	46.0	-24.4	Pass
5.94	11.4	6.7	4.0	4.6	0.0	0.0	-0.1	-19.8	60.0	-28.7	Pass	50.0	-25.5	Pass
13.84	18.1	16.1	11.7	12.1	-0.1	-0.1	-0.2	-19.8	60.0	-21.8	Pass	50.0	-17.8	Pass
11.86	13.8	12.6	8.4	7.4	-0.1	-0.1	-0.2	-19.8	60.0	-26.1	Pass	50.0	-21.6	Pass
16.67	15.0	17.7	7.4	6.9	-0.1	-0.1	-0.3	-19.8	60.0	-22.2	Pass	50.0	-22.5	Pass
19.77	20.5	21.4	17.5	18.9	-0.1	-0.1	-0.3	-19.8	60.0	-18.4	Pass	50.0	-10.9	Pass
23.72	20.7	21.3	15.6	16.7	-0.1	-0.1	-0.3	-19.8	60.0	-18.6	Pass	50.0	-13.1	Pass
29.66	18.4	20.1	13.1	15.0	-0.1	-0.2	-0.3	-19.8	60.0	-19.6	Pass	50.0	-14.8	Pass
Result: Pass					Worst Margin: -7.6 dB					Frequency: 0.252 MHz				
Measurement Device: LISN ASSET 1730(Line 1) LISN ASSET 1731(Line 2)							Cable: CEMI-11			Spectrum Analyzer: Gold				
							Attenuator: 20dB Attenuator-02			Site: CEMI 1				

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Spectrum Analyzers / Receivers / Preselectors		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold		100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	3/28/2015	3/28/2014
LISNs/Measurement Probes		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
LISN Asset 1730		150kHz-30MHz	LI-150A	Com-Power	201090	1730	I	2/26/2015	2/26/2014
LISN Asset 1731		150kHz-30MHz	LI-150A	Com-Power	201091	1731	I	3/3/2015	3/3/2014
Conducted Test Sites (Mains / Telco)		FCC Code		VCCI Code			Cat	Calibration Due	Calibrated on
CEMI 1		719150		A-0015			III	NA	N/A
Cables		Range		Mfr			Cat	Calibration Due	Calibrated on
CEMI-11		9kHz - 2GHz		C-S			II	5/3/2015	5/3/2014
Attenuators		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
20dB Attenuator-02		9kHz-2GHz	PE7000-20	Pasternack	N/A		II	7/26/2015	7/26/2014
Meteorological Meters			MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)			BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#1828			35519-044	Control Company	130318292	1828	II	6/13/2015	6/13/2013

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.







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## Occupied Bandwidth

### REQUIREMENT

When an occupied bandwidth is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured. [RSS-GEN 4.6.1]

### MEASUREMENTS / RESULTS

99% Occupied Bandwidth		
Frequency (MHz)	Mode	99% Occupied Bandwidth (KHz)
917.4	PR-ASK Modulation	111.6242
922.4	PR-ASK Modulation	112.1874
927.2	PR-ASK Modulation	111.3972
<b>Tested by:</b> Tuyen Truong <b>Date:</b> 1/19/2015 <b>Company:</b> Trimble Navigation <b>EUT:</b> M6E-NANO <b>Temp/Humidity/Pressure:</b> 21.6°C, 26% and 1015mBar		
<b>RBW = 30kHz</b> <b>VBW = 100kHz</b> <b>Analyzer:</b> Brown <b>Attenuator:</b> PE7019-20		

Rev. 1/18/2015

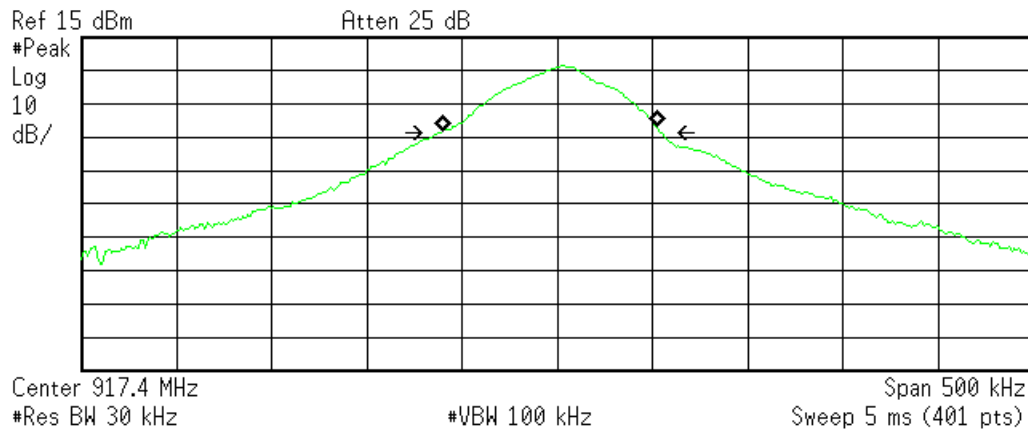
Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Brown	9kHz-26.5GHz	E4407B	Agilent	SG44210511	1510	I	5/12/2015	5/12/2014
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range		Cat	Calibration Due	Calibrated on
1DCC-OATS-3M-I	719150	2762A-8	A-0015	30-1000MHz		II	5/17/2015	5/17/2013
Preamps / Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
HF 20dB 50W Attenuator	0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	7/14/2015	7/14/2014
Meteorological Meters		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#1830		35519-044	Control Company	130320003	1830	II	6/13/2015	6/13/2013

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

## Plot(s)

Agilent 13:55:54 Jan 19, 2015

R T



Occupied Bandwidth  
111.6242 kHz

Occ BW % Pwr 99.00 %  
x dB -20.00 dB

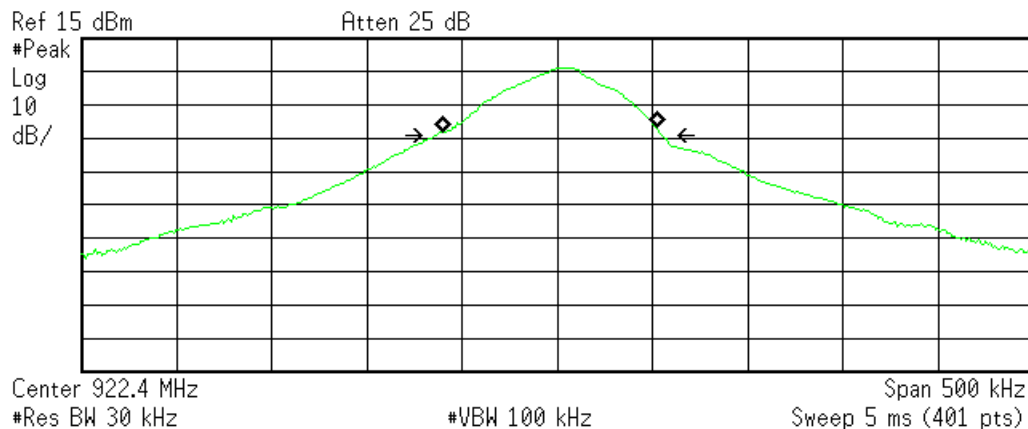
Transmit Freq Error -3.621 kHz  
x dB Bandwidth 116.793 kHz

C:\temp.gif file saved

99% Occupied Bandwidth - Low Channel

Agilent 13:58:03 Jan 19, 2015

R T



Occupied Bandwidth  
112.1874 kHz

Occ BW % Pwr 99.00 %  
x dB -20.00 dB

Transmit Freq Error -4.157 kHz  
x dB Bandwidth 117.969 kHz

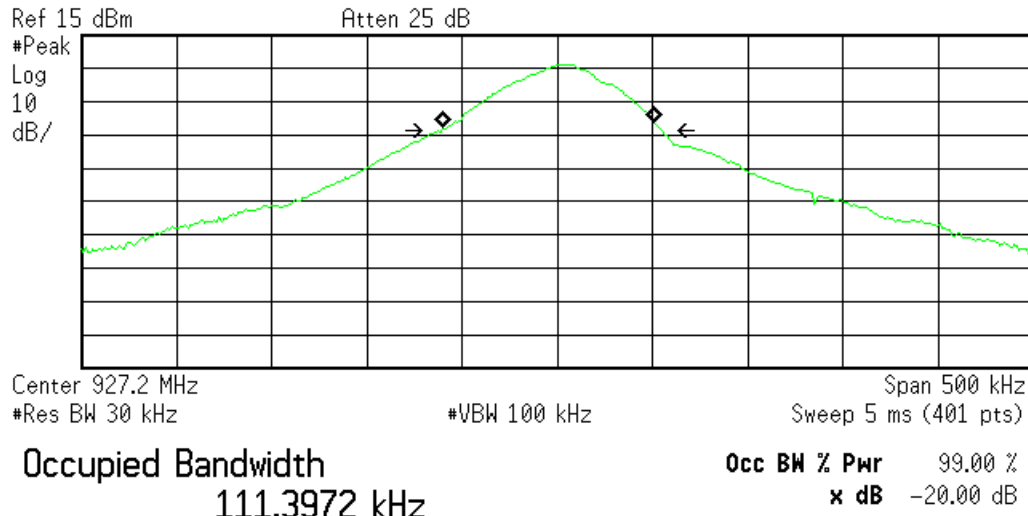
C:\temp.gif file saved

99% Occupied Bandwidth - Mid Channel



\* Agilent 13:54:36 Jan 19, 2015

R T



Transmit Freq Error -4.076 kHz  
x dB Bandwidth 117.811 kHz

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99% Occupied Bandwidth - High Channel

## Measurement Uncertainty

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty
Radiated Emissions (30-1000MHz)		
NIST	5.6dB	N/A
CISPR	4.6dB	5.2dB (Ucisp)
Radiated Emissions (1-26.5GHz)	4.6dB	N/A
Radiated Emissions (above 26.5GHz)	4.9dB	N/A
Magnetic Radiated Emissions	5.6dB	N/A
Conducted Emissions		
NIST	3.9dB	N/A
CISPR	3.6dB	3.6dB (Ucisp)
Telco Conducted Emissions (Current)	2.9dB	N/A
Telco Conducted Emissions (Voltage)	4.4dB	N/A
Electrostatic Discharge	11.5%	N/A
Radiated RF Immunity (Uniform Field)	1.6dB	N/A
Electrical Fast Transients	23.1%	N/A
Surge	23.1%	N/A
Conducted RF Immunity	3dB	N/A
Magnetic Immunity	12.8%	N/A
Dips and Interrupts	2.3V	N/A
Harmonics	3.5%	N/A
Flicker	3.5%	N/A
Radio frequency (@ 2.4GHz)	$3.23 \times 10^{-8}$	$1 \times 10^{-7}$
RF power, conducted	0.40dB	0.75dB
Maximum frequency deviation:		
• Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency	3.4% 0.3dB	5% 3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	2.39dB	3dB
Conducted emission of receivers	1.3dB	3dB
Radiated emission of transmitter, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of transmitter, valid up to 80GHz	3.3dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of receiver, valid up to 80GHz	3.3dB	6dB
Humidity	2.37%	5%
Temperature	0.7°C	1.0°C
Time	4.1%	10%
RF Power Density, Conducted	0.4dB	3dB
DC and low frequency voltages	1.3%	3%
Voltage (AC, <10kHz)	1.3%	2%
Voltage (DC)	0.62%	1%
The above reflects a 95% confidence level		



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## Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("Client"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "Conditions"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("Test Report") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.

2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.

3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.

4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.

5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "BUREAU VERITAS," "BUREAU VERITAS CONSUMER PRODUCTS SERVICES," "BVCPS," "MTL," "ACTS," "MTL-ACTS" and CURTIS-STRAUS (collectively, the "Marks") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.

6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.

7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.

8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.

9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.

10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.

11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only where such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.

12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.

13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.

14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.



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15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B) NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.\$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

The complete list of the Approved Subcontractors Curtis-Straus may use to delegate the performance of work can be provided upon request.  
Rev.160009121(2)\_#684340 v14CS

