TEST REPORT

FCC ID: ZC8S321UHF

Applicant : Hemisphere GNSS Inc.

Address : 8515 E Anderson Dr, Scottsdale, AZ 85255, USA

Equipment under Test (EUT):

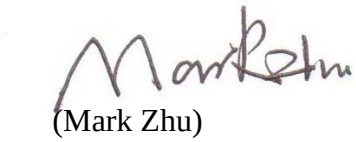
Name	:	GNSS Survey Receiver
Model	:	S321 UHF , BRx6 UHF

Standards: FCC PART 90: 2015, ANSI C63.10:2013

Report No : T1851402 16
Date of Test : September 22- November 30, 2015
Date of Issue : December 01, 2015

Test Result : PASS

In the configuration tested, the EUT complied with the standards specified above
Authorized Signature



(Mark Zhu)
Manager

TABLE OF CONTENT

TEST REPORT VERIFICATION

Applicant	:	Hemisphere GNSS Inc.
Manufacturer	:	Hemisphere GNSS Inc.
EUT Description	:	GNSS Survey Receiver

(A) Model No.	: S321 UHF , BRx6 UHF
(B) Trademark	: N/A
(C) Ratings Supply	: DC 10.8V from internal battery or 9-18VDC
(D)Test Voltage	: DC 10.8V from internal battery

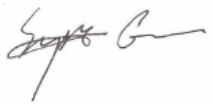
Measurement Standard Used:

FCC Rules and Regulations Part 90 15, RSS-119 ANSI C63.10:2013

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....…..:	Eric Huang Test Engineer	
Approved by (name + signature)…....:	Simple Guan Project Manager	
Date of issue…… ……..:	November 16, 2015	

1 General Information

1.1 Description of Device (EUT)

Trade Name	:	N/A
EUT	:	GNSS Survey Receiver
Model No.		S321 UHF , BRx6 UHF
DIFF	:	Only differ in model name
Radio Technology	:	UHF
Antenna Type	:	Integrated Antenna, Maximum Gain is 2.15dBi.
Operation frequency	:	406.1-470MHz
Modulation	:	GMSK, 4FSK, 8FSK, 16FSK
Channel Spacing	:	12.5KHz, 25KHz
Power Supply	:	DC 10.8V from internal battery or 9-18VDC
Applicant	:	Hemisphere GNSS Inc.
Address	:	8515 E Anderson Dr, Scottsdale, AZ 85255, USA
Manufacturer	:	Hemisphere GNSS Inc.
Address	:	8515 E Anderson Dr, Scottsdale, AZ 85255, USA

1.2 Description of Test Facility

Shenzhen Alpha Product Testing Co., Ltd
Building B, East Area of Nanchang Second, Industrial Zone, Gushu 2nd Road,
Bao'an, Shenzhen, China

August 11, 2014 File on Federal Communication Commission
Registration Number: 203110

July 18, 2014 Certificated by IC
Registration Number: 12135A

2 EMC Equipment List

Equipment	Manufacture	Model No.	Serial No.	Cal. Due day	Cal Interval
3m Semi-Anechoic	ETS-LINDGREN	N/A	SEL0017	2016.01.19	1Year
Spectrum analyzer	Agilent	E4407B	MY46185649	2016.01.19	1Year
Receiver	R&S	ESCI	1166.5950K03-1011	2016.01.19	1Year
Receiver	R&S	ESCI	101202	2016.01.18	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-438	2017.01.21	2Year
Horn Antenna	EMCO	3115	640201028-06	2017.01.21	2Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2017.01.21	2Year
Cable	Resenberger	N/A	No.1	2016.01.19	1Year
Cable	SCHWARZBECK	N/A	No.2	2016.01.19	1Year
Cable	SCHWARZBECK	N/A	No.3	2016.01.19	1Year
Pre-amplifier	Schwarzbeck	BBV9743	9743-019	2016.01.19	1Year
Pre-amplifier	R&S	AFS33-18002650-30-8P-44	SEL0080	2016.01.19	1Year
Base station	Agilent	E5515C	GB44300243	2016.01.19	1 Year
Temperature controller	Terchy	MHQ	120	2016.01.19	1Year

Power divider	Anritsu	K240C	020346	2016.01.19	1 Year
Signal Generator	HP	83732B	VS3449051	2016.01.19	1 Year
Power Meter	Anritsu	ML2487A	6K00001491	2016.01.19	1Year
Power sensor	Anritsu	ML2491A	32516	2016.01.19	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2016.01.19	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2016.01.19	1 Year
Digital phosphor Oscilloscope	Tecktronix Inc	DPO4054	C012267	2016.01.19	1 Year
Signal Generator	HP	E4438C	MY45031273	2016.01.19	1 Year
Analyzer, RF Communication Test set	HP	8920A	3438A05227	2016.01.19	1 Year
Attenuator	Bird Electronic Corp.	50-AFFB-30	120540086	2016.01.19	1 Year

3 Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The test procedure used was ANSI Standard ANSI C63.10:2013 using a 50 u H LISN. Both Lines were observed. The bandwidth of the receiver was 10kHz with an appropriate sweep speed. The ambient temperature of the EUT was 25℃ with a humidity of 58%.

RADIATION INTERFERENCE: The test procedure used was ANSI Standard ANSI C63.10:2013 using a ANRITSU spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a micro volt at the output of the antenna. The resolution bandwidth was 100kHz and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3MHz above 1 GHz. The ambient temperature of the EUT was 25℃ with a humidity of 58%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer and cable loss. The antenna correction factors and cable loss are stated in terms of dB. The gain of the Pre-selector was accounted for in the Spectrum Analyzer Meter Reading.
Example:
Freq (MHz) METER READING + ACF + CABLE = FS
33.20 dBuV + 10.36 dB + 0.9 dB= 44.46 dBuV/m @ 3m
ANSI STANDARD ANSI C63.10:2013 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes. The situation was similar for the conducted measurement except that the table did not rotate. The EUT was setup as described in ANSI Standard ANSI C63.10:2013 10.1.7 with the EUT 40 cm from the vertical ground wall.

4 Summary of Measurement

4.1 Summary of test result

Test Item	Standards Paragraph	Result
Transmitter Power(Conducted)	FCC Part90.205	Compliance
99% Occupied Bandwidth	FCC Part90.210	Compliance
Spectrum Emission Mask	FCC Part90.210	Compliance
Spurious Emissions(conducted)	FCC Part90.210	Compliance
Spurious Emissions(Radiated)	FCC Part90.210	Compliance
Transient Frequency Behavior	FCC Part90.214	Compliance
Frequency Stability	FCC Part90.213	Compliance

Note: The EUT has been tested as an independent unit. And Continual Transmitting in maximum power.

4.2 Test connection

EUT

4.3 Assistant equipment used for test

Description	:	Notebook
Manufacturer	:	ACER
Model No.	:	ZQT
Remark: FCC DOC approved		

4.4 Test mode

Dutycycle :100% Keeping TX		
Mode	Channel	Frequency (MHz)
UHF	Low	406.1
	Middle	438
	High	470
Note: According exploratory test, EUT will have maximum output power in those data rate. so those data rate were used for all test. Note2: The UHF is designed to be capable of transmit voice on public safety frequency in the 450-570MHz band on nationwide public safety, also can transmit data with a power of 1W, with data rate of 4800bits per second per 6.25KHz of channel bandwidth.		

4.5 Test Conditions

Temperature range	21-25℃
Humidity range	40-75%
Pressure range	86-106kPa

4.6 Measurement Uncertainty (95% confidence levels, k=2)

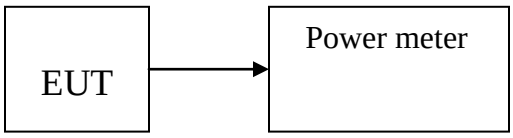
Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.42dB	
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB	Polarize: V
	2.57dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.54dB	Polarize: V
	4.1dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	2.08dB	Polarize: H
	2.56dB	Polarize: V
Uncertainty for radio frequency	1×10-9	
Uncertainty for conducted RF Power	0.65dB	
Uncertainty for temperature	0.2℃	
Uncertainty for humidity	1%	
Uncertainty for DC and low frequency voltages	0.06%	

5 Transmitter Power(Conducted)

5.1 Test limit

Please refer section FCC Part 90.205&RSS-119 5.4.

5.2 Test Setup



5.3 Test Results

PASS

Detailed information please see the following page.

EUT: GNSS Survey Receiver M/N: S321 UHF				
Test date: 2015-11-30 Test site: RF site Tested by: Eric Huang				
Mode	Frequency (MHz)	PK Output power(dBm)	Limit (dBm)	Judgment
4FSK 12.5KHz channel spacing	406.1	30.68	33	Pass
	438	30.26	33	Pass
	470	30.02	33	Pass
Conclusion: PASS				

EUT: GNSS Survey Receiver M/N: S321 UHF				
Test date: 2015-11-30 Test site: RF site Tested by: Eric Huang				
Mode	Frequency (MHz)	PK Output power(dBm)	Limit (dBm)	Judgment
8FSK 12.5KHz channel spacing	406.1	30.42	33	Pass
	438	30.15	33	Pass
	470	29.28	33	Pass
Conclusion: PASS				

EUT: GNSS Survey Receiver M/N: S321 UHF				
Test date: 2015-11-30 Test site: RF site Tested by: Eric Huang				
Mode	Frequency (MHz)	PK Output power(dBm)	Limit (dBm)	Judgment
16FSK 12.5KHz channel spacing	406.1	30.03	33	Pass
	438	29.79	33	Pass
	470	29.42	33	Pass
Conclusion: PASS				

EUT: GNSS Survey Receiver M/N: S321 UHF				
Test date: 2015-11-30 Test site: RF site Tested by: Eric Huang				
Mode	Frequency (MHz)	PK Output power(dBm)	Limit (dBm)	Judgment
4FSK 25.0KHz channel spacing	406.1	30.57	33	Pass
	438	30.19	33	Pass
	470	30.06	33	Pass
Conclusion: PASS				

EUT: GNSS Survey Receiver M/N: S321 UHF				
Test date: 2015-11-30 Test site: RF site Tested by: Eric Huang				
Mode	Frequency (MHz)	PK Output power(dBm)	Limit (dBm)	Judgment
8FSK 25.0KHz channel spacing	406.1	30.35	33	Pass
	438	30.06	33	Pass
	470	29.46	33	Pass
Conclusion: PASS				

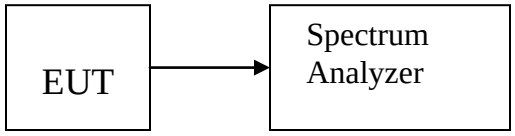
EUT: GNSS Survey Receiver M/N: S321 UHF				
Test date: 2015-11-30 Test site: RF site Tested by: Eric Huang				
Mode	Frequency (MHz)	PK Output power(dBm)	Limit (dBm)	Judgment
16FSK 25.0KHz channel spacing	406.1	29.86	33	Pass
	438	29.75	33	Pass
	470	29.38	33	Pass
Conclusion: PASS				

6 99% Occupied Bandwidth

6.1 Test limit

Please refer section FCC Part 90.210 & RS-119 5.5.

6.2 Test Setup



6.3 Test Results

PASS.

Detailed information please see the following page.

Channel	Frequency (MHz)	26dB Bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Result
4FSK 12.5KHz Channel Spacing:				
Low	406.1	/	7.5722	PASS
Mid	438	/	7.5466	PASS
High	470	/	7.5661	PASS

Channel	Frequency (MHz)	26dB Bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Result
8FSK 12.5KHz Channel Spacing:				
Low	406.1	/	7.5775	PASS
Mid	438	/	7.5446	PASS
High	470	/	7.5161	PASS

Channel	Frequency (MHz)	26dB Bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Result
16FSK 12.5KHz Channel Spacing:				
Low	406.1	/	7.5711	PASS
Mid	438	/	7.6466	PASS
High	470	/	7.5655	PASS

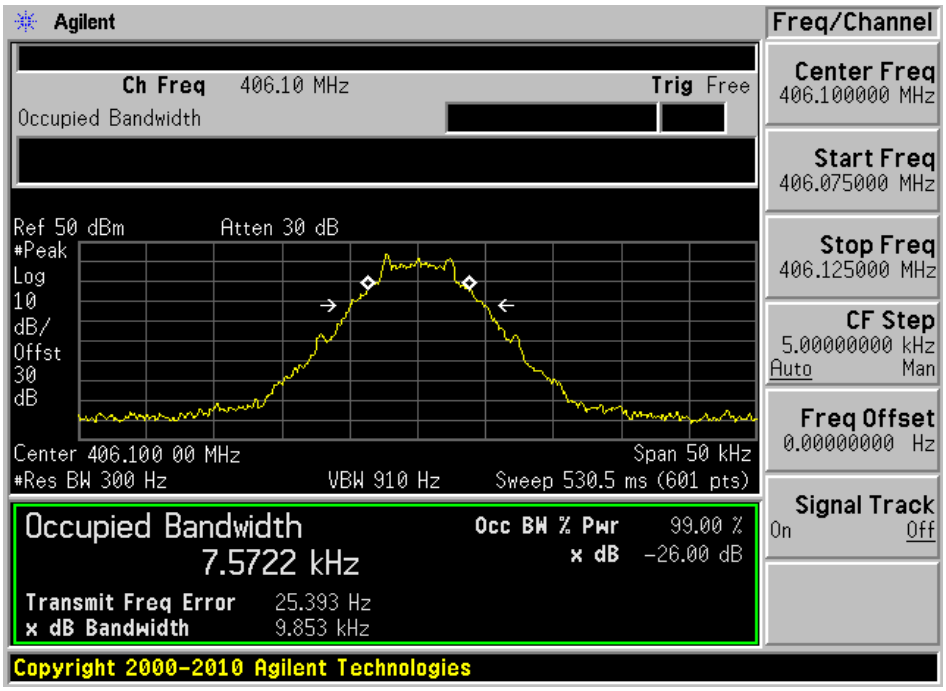
Channel	Frequency (MHz)	26dB Bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Result
4FSK 25KHz Channel Spacing:				
Low	406.1	/	15.0577	PASS
Mid	438	/	15.1170	PASS
High	470	/	15.1556	PASS

Channel	Frequency (MHz)	26dB Bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Result
8FSK 25KHz Channel Spacing:				
Low	406.1	/	15.0577	PASS
Mid	438	/	15.1770	PASS
High	470	/	15.1657	PASS

Channel	Frequency (MHz)	26dB Bandwidth (KHz)	99% Occupied Bandwidth (KHz)	Result
16FSK 25KHz Channel Spacing:				
Low	406.1	/	15.0577	PASS
Mid	438	/	15.1577	PASS
High	470	/	15.1656	PASS

12.5KHz channel Spacing

4FSK :
CH Low :



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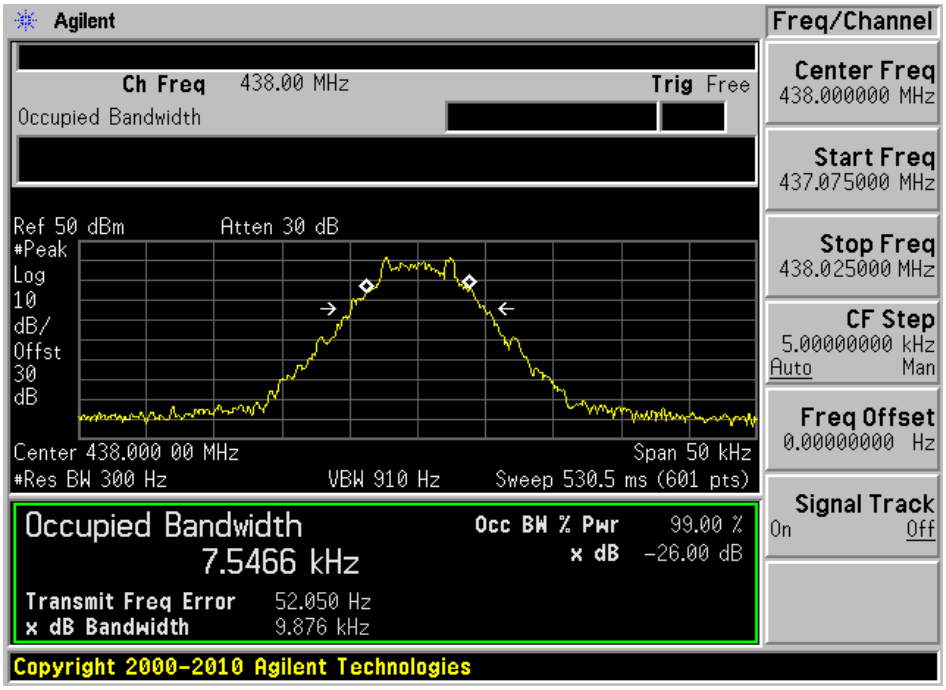

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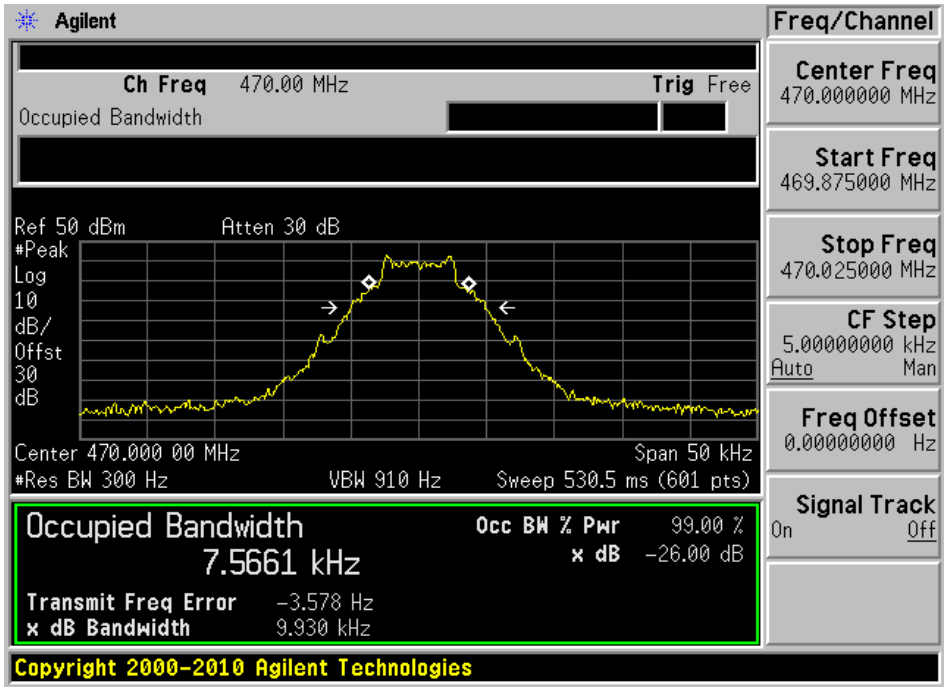
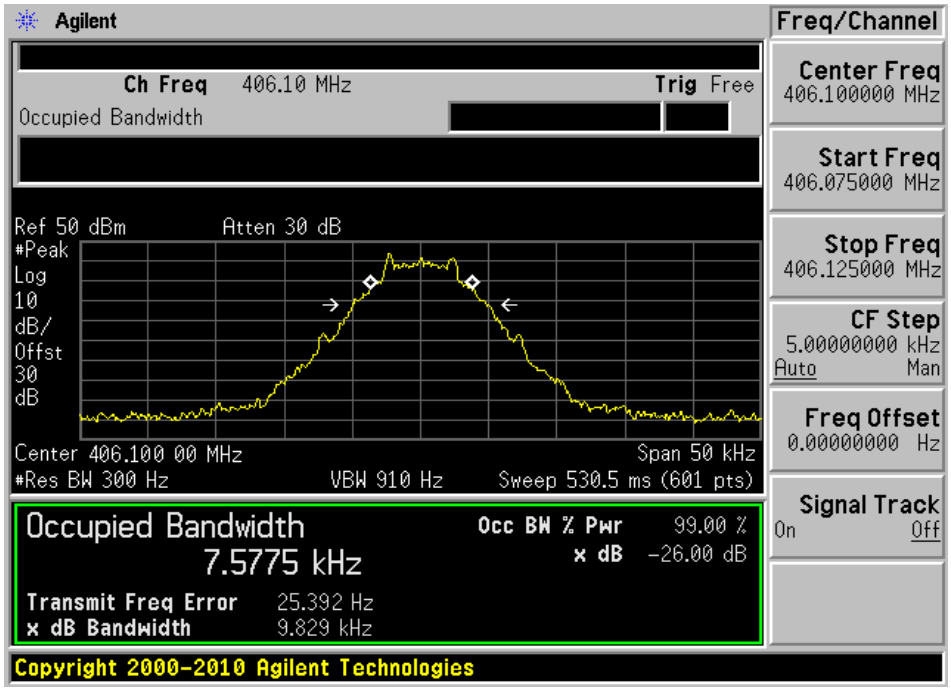


8FSK :
CH Low :



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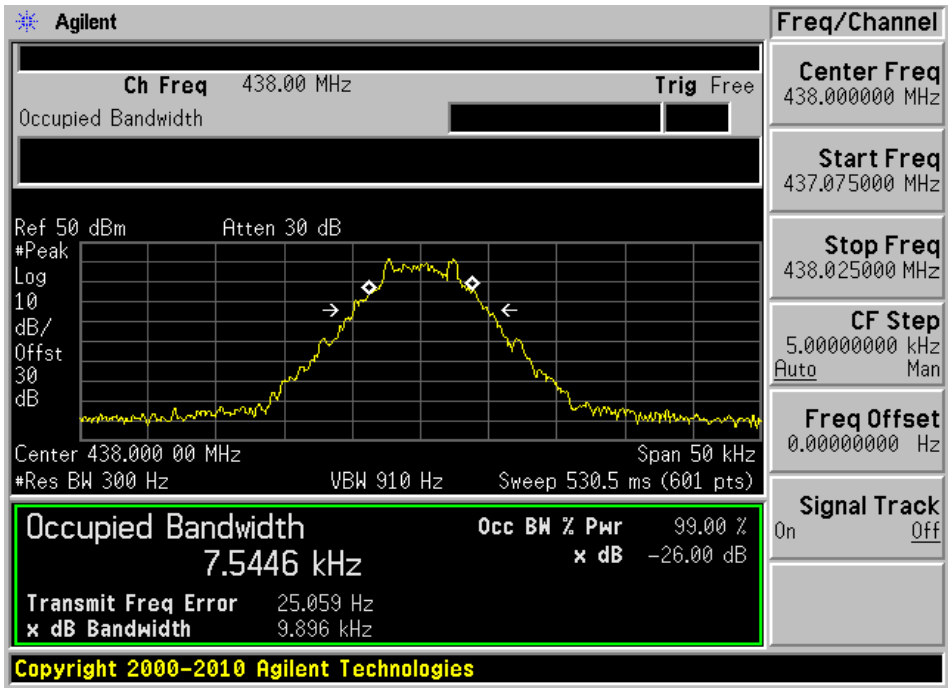
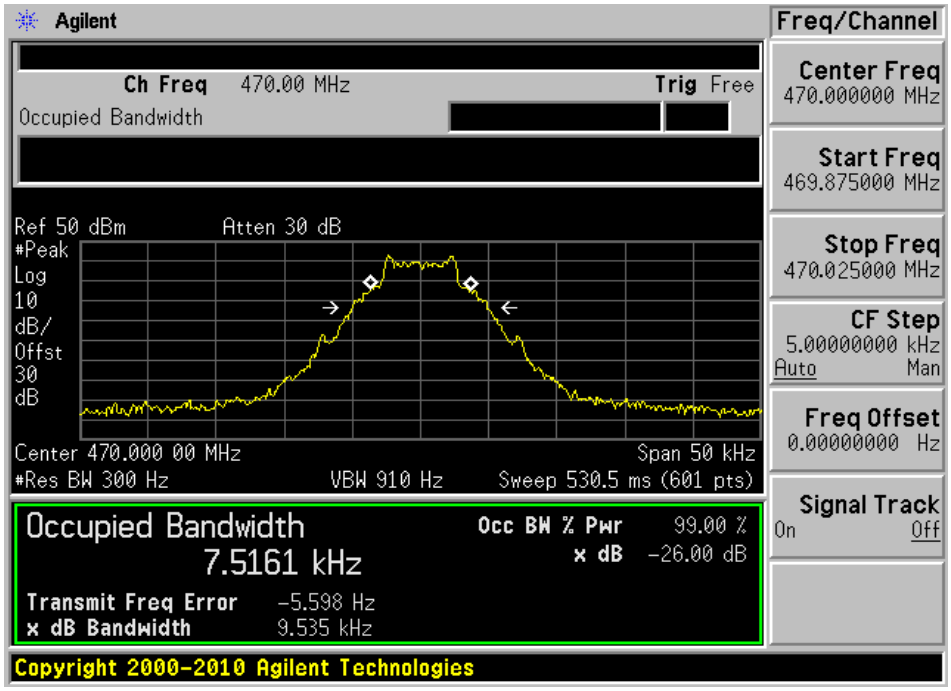
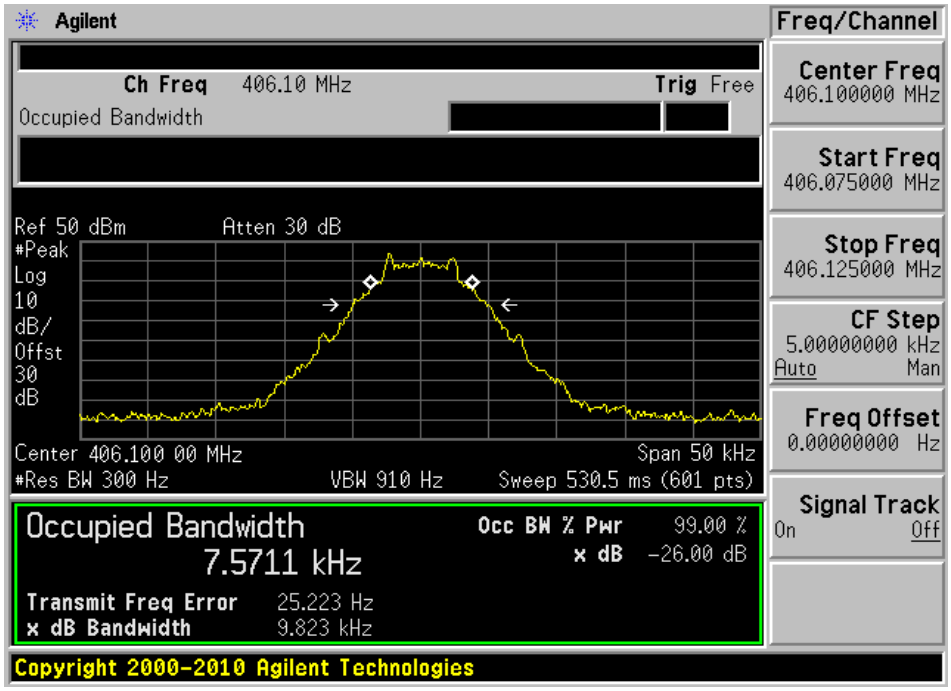

Agilent
Freq/Channel
Ch Freq 438.00 MHz
Trig Free
Occupied Bandwidth
Ref 50 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
30
dB
Center 438.000 00 MHz
Span 50 kHz
#Res BW 300 Hz
VBW 910 Hz
Sweep 530.5 ms (601 pts)
Occupied Bandwidth
7.5446 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 25.059 Hz
x dB Bandwidth 9.896 kHz
Center Freq
438.000000 MHz
Start Freq
437.075000 MHz
Stop Freq
438.025000 MHz
CF Step
5.00000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies

CH Hig:


Agilent
Freq/Channel
Ch Freq 470.00 MHz
Trig Free
Occupied Bandwidth
Ref 50 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
30
dB
Center 470.000 00 MHz
Span 50 kHz
#Res BW 300 Hz
VBW 910 Hz
Sweep 530.5 ms (601 pts)
Occupied Bandwidth
7.5161 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -5.598 Hz
x dB Bandwidth 9.535 kHz
Center Freq
470.000000 MHz
Start Freq
469.875000 MHz
Stop Freq
470.025000 MHz
CF Step
5.00000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies

16FSK :
CH Low :



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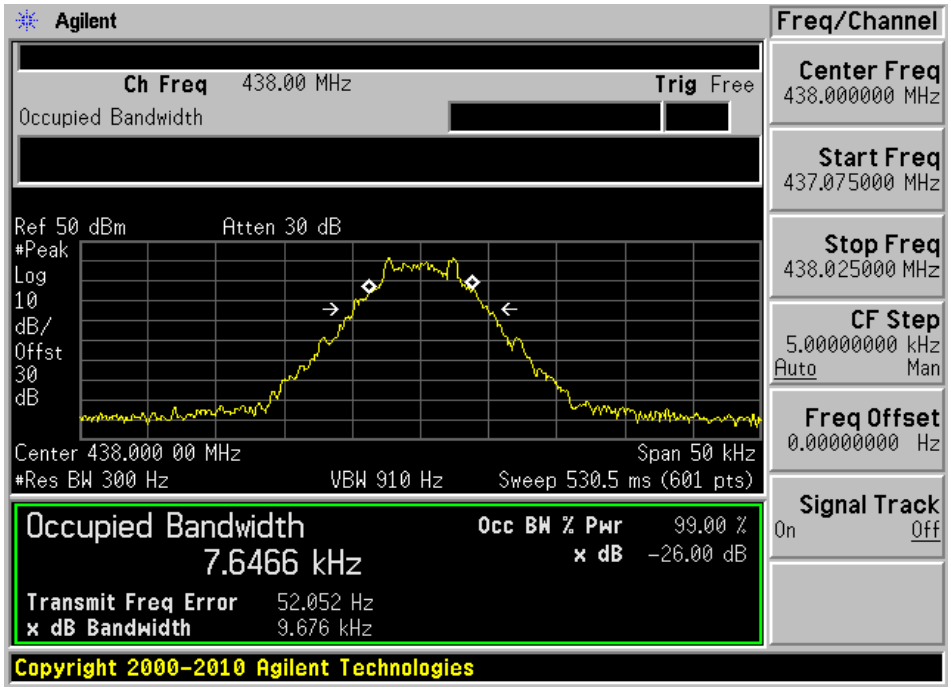

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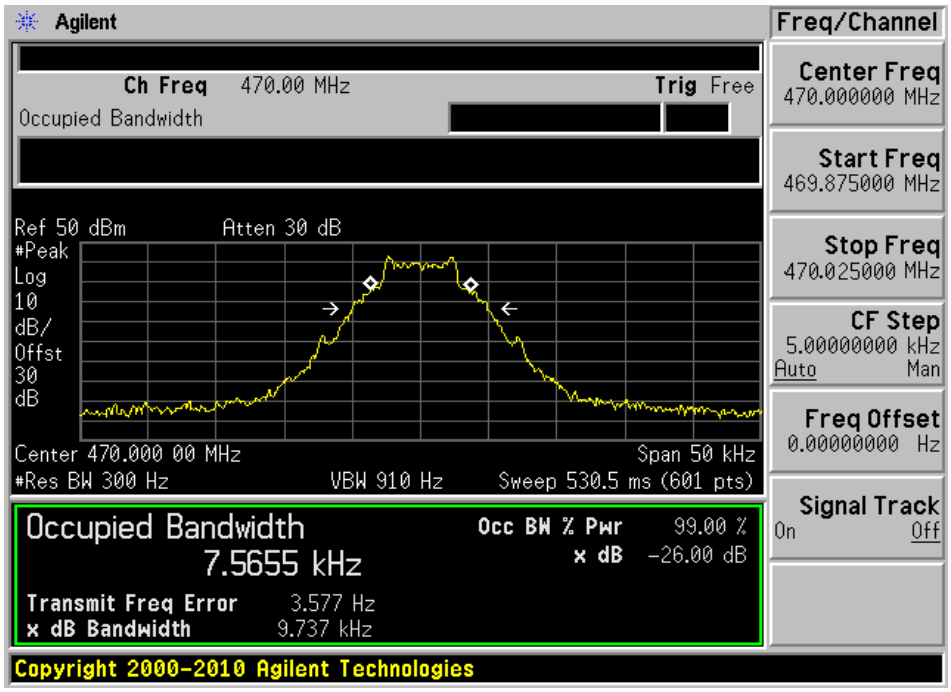
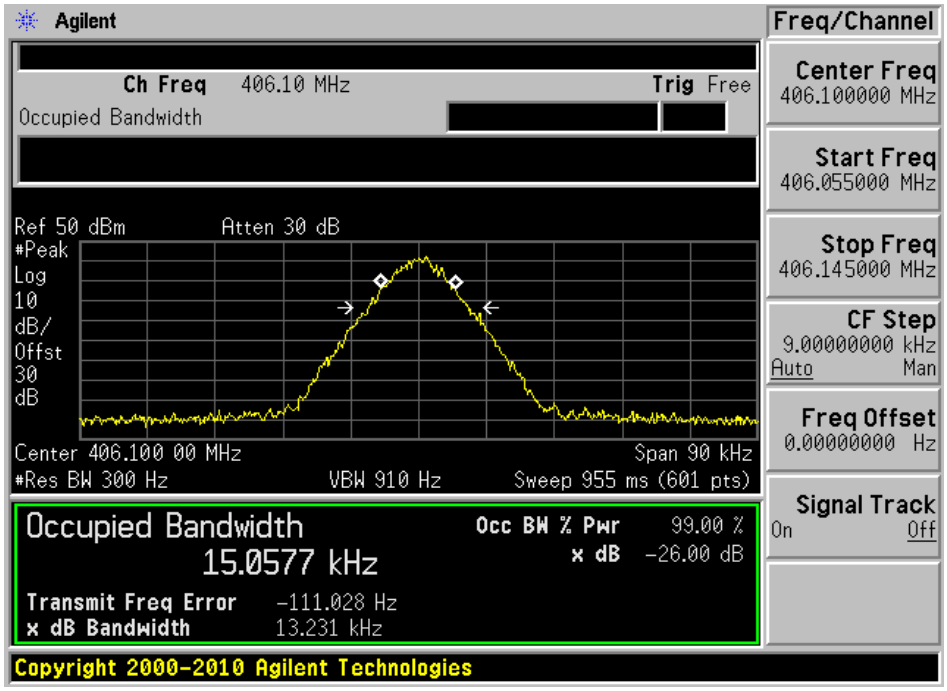


25KHz channel Spacing
4FSK :
CH Low :



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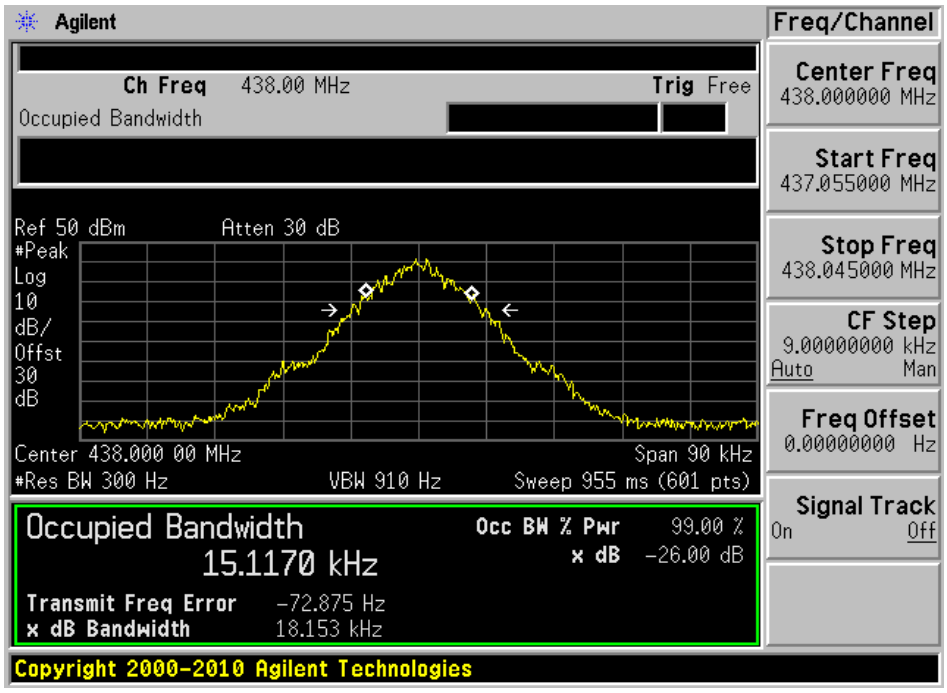
Agilent
Freq/Channel
Ch Freq 438.00 MHz
Trig Free
Occupied Bandwidth
Ref 50 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
30
dB
Center 438.000 00 MHz
Span 90 kHz
#Res BW 300 Hz
VBW 910 Hz
Sweep 955 ms (601 pts)
Occupied Bandwidth
15.1170 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -72.875 Hz
x dB Bandwidth 18.153 kHz
Center Freq
438.000000 MHz
Start Freq
437.055000 MHz
Stop Freq
438.045000 MHz
CF Step
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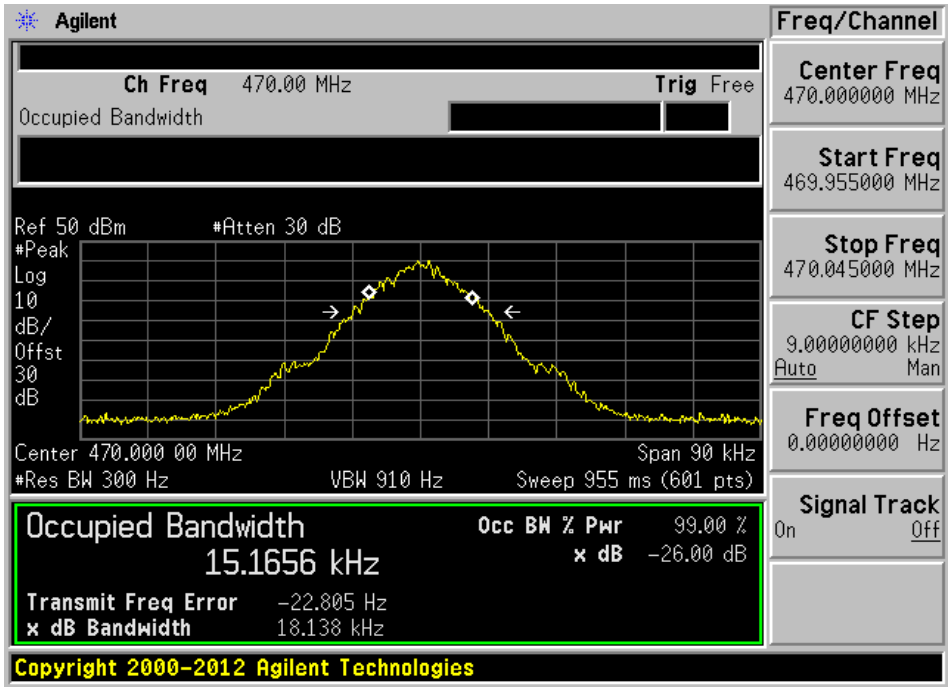
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies

CH Hig:


Agilent
Freq/Channel
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Trig Free
Occupied Bandwidth
Ref 50 dBm
#Atten 30 dB
#Peak
Log
10
dB/
Offst
30
dB
Center 470.000 00 MHz
Span 90 kHz
#Res BW 300 Hz
VBW 910 Hz
Sweep 955 ms (601 pts)
Occupied Bandwidth
15.1656 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -22.805 Hz
x dB Bandwidth 18.138 kHz
Center Freq
470.000000 MHz
Start Freq
469.955000 MHz
Stop Freq
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CF Step
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Auto Man
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Signal Track
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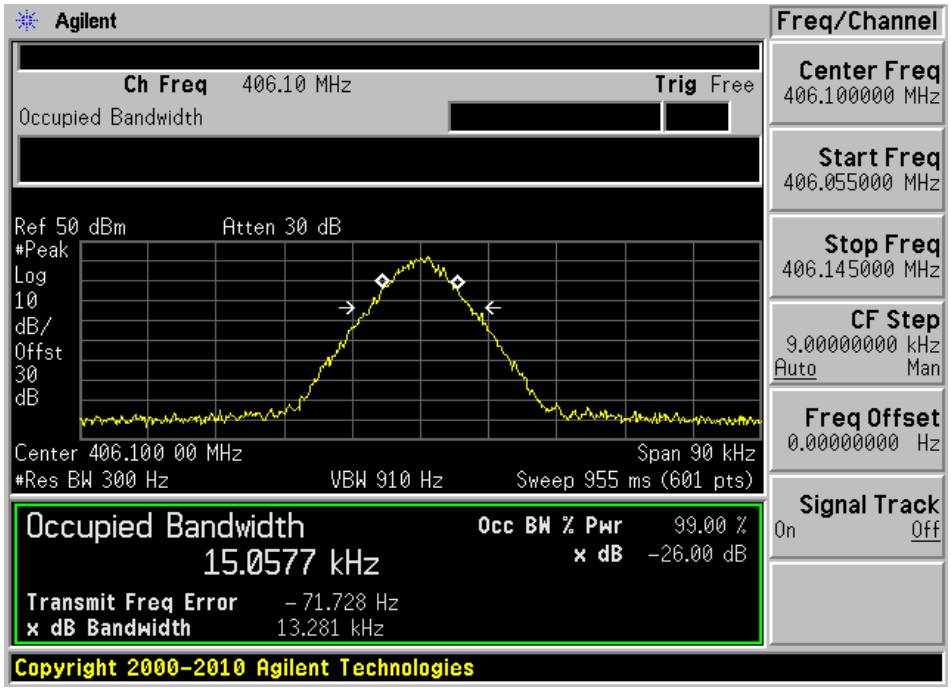
Copyright 2000-2012 Agilent Technologies

8FSK :
CH Low :



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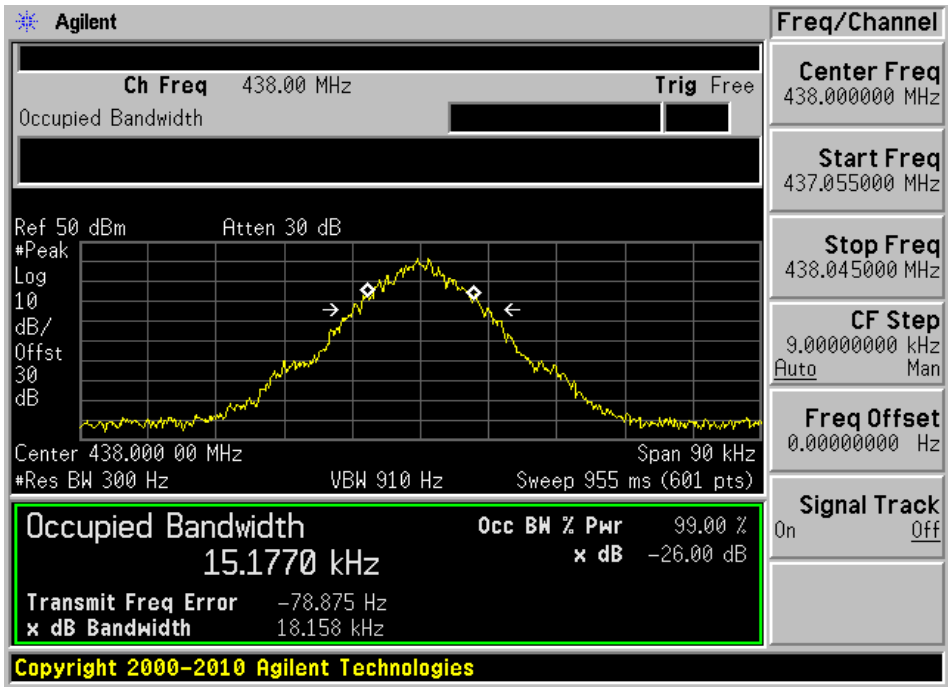

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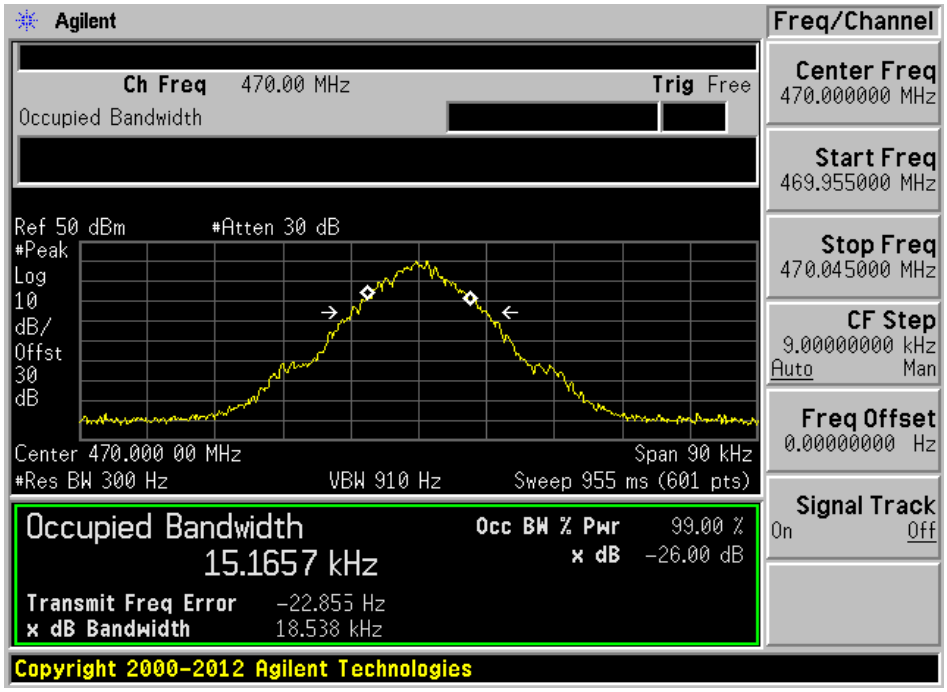
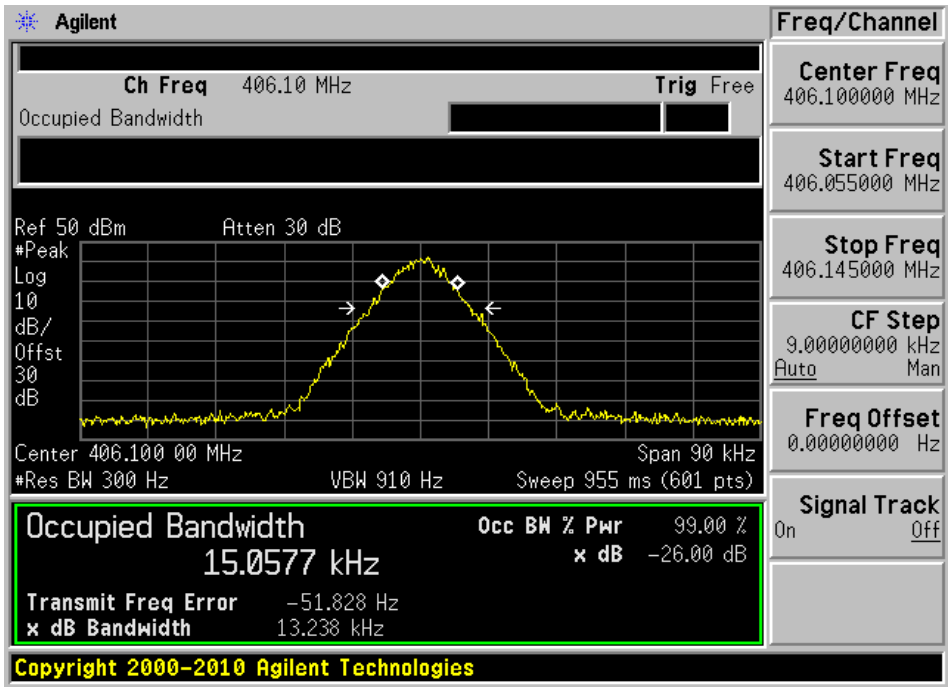


16FSK :
CH Low :



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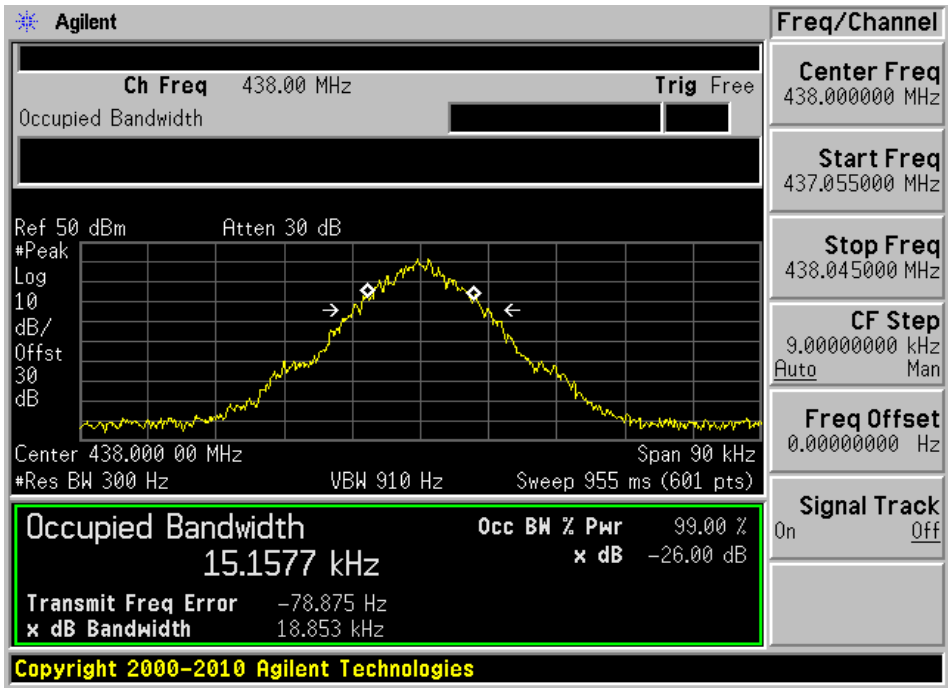
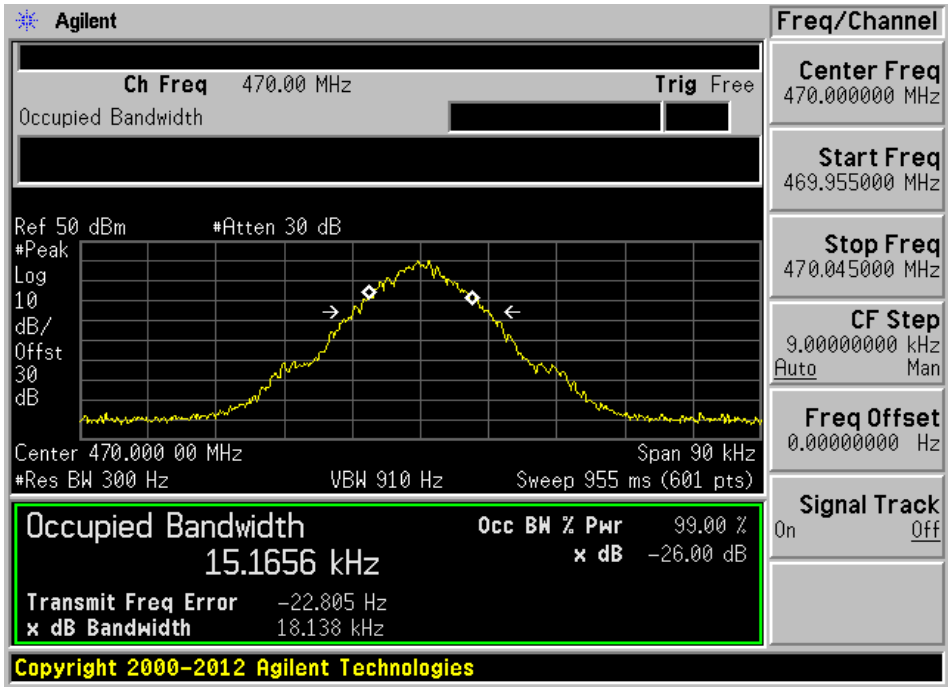

Agilent
Freq/Channel
Ch Freq 438.00 MHz
Trig Free
Occupied Bandwidth
Ref 50 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
30
dB
Center 438.000 00 MHz
Span 90 kHz
#Res BW 300 Hz
VBW 910 Hz
Sweep 955 ms (601 pts)
Occupied Bandwidth
15.1577 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -78.875 Hz
x dB Bandwidth 18.853 kHz
Center Freq
438.000000 MHz
Start Freq
437.055000 MHz
Stop Freq
438.045000 MHz
CF Step
9.00000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Copyright 2000-2010 Agilent Technologies

CH Hig:


Agilent
Freq/Channel
Ch Freq 470.00 MHz
Trig Free
Occupied Bandwidth
Ref 50 dBm
#Atten 30 dB
#Peak
Log
10
dB/
Offst
30
dB
Center 470.000 00 MHz
Span 90 kHz
#Res BW 300 Hz
VBW 910 Hz
Sweep 955 ms (601 pts)
Occupied Bandwidth
15.1656 kHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error -22.805 Hz
x dB Bandwidth 18.138 kHz
Center Freq
470.000000 MHz
Start Freq
469.955000 MHz
Stop Freq
470.045000 MHz
CF Step
9.00000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
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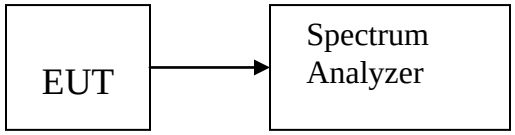
7 Spectrum Emission Mask

7.1 Test limit

FCC Part90.210& RSS-119 5.5

7.2 Test Setup



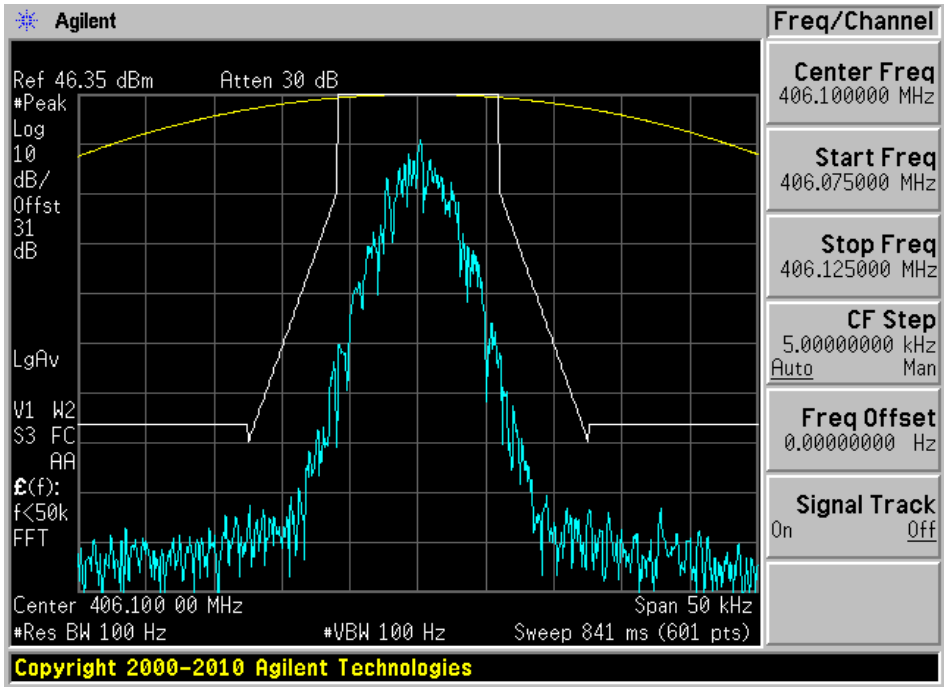
7.3 Test Results

PASS.

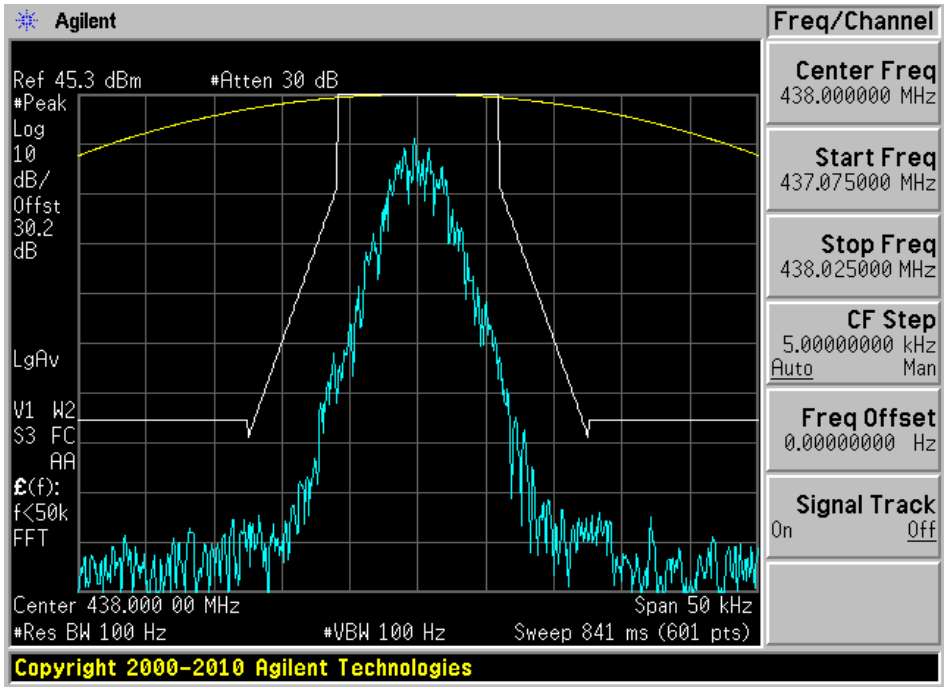
All modulation types have been tested, and only worst data of 4FSK data listed.

Detailed information please see the following page.

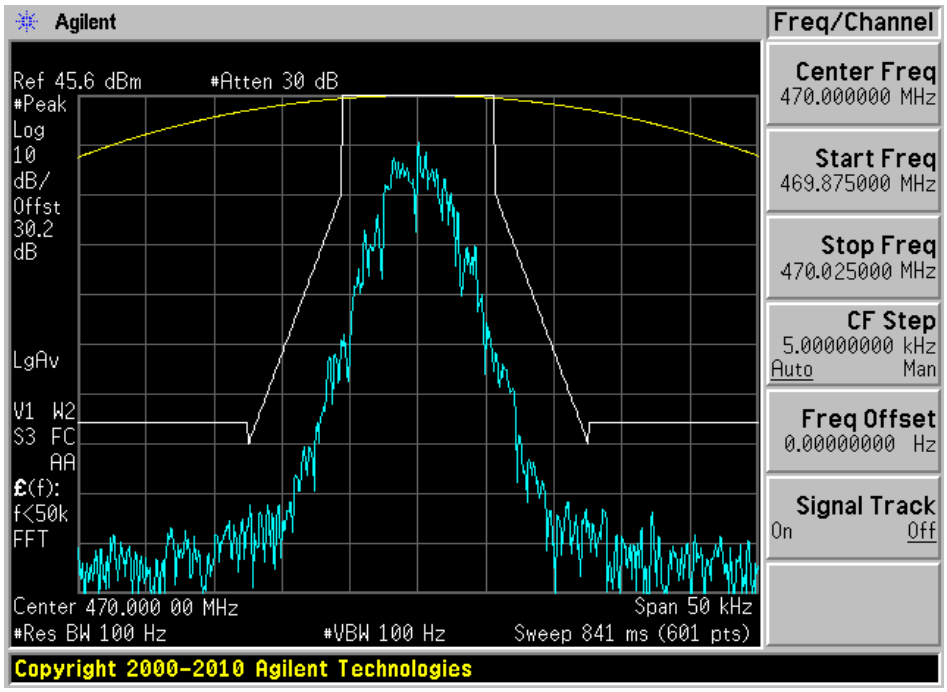
12.5KHz Channel Spacing
4FSK:
CH Low :



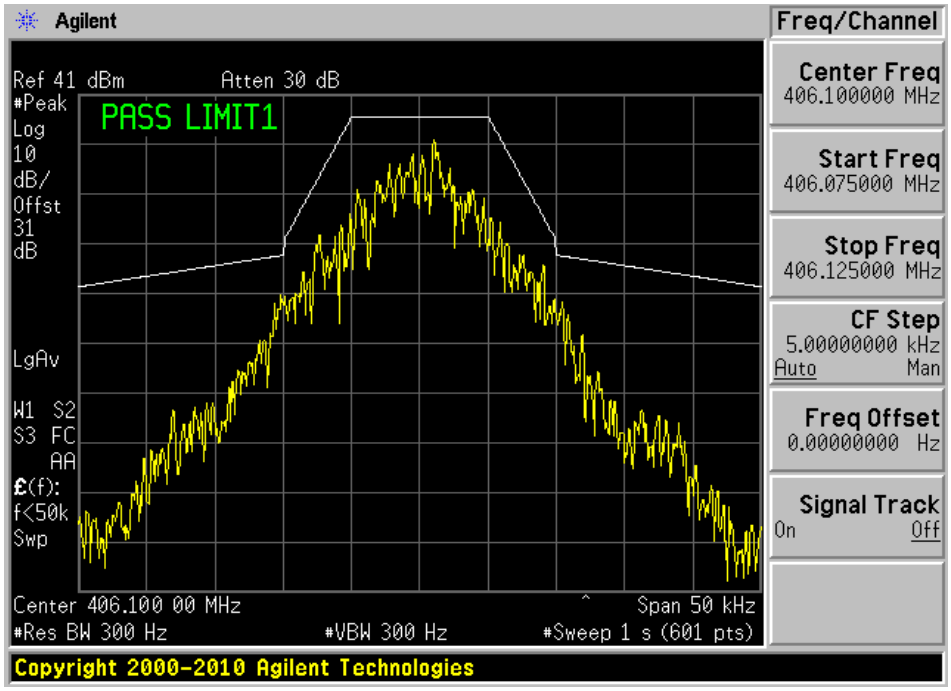
CH Mid :



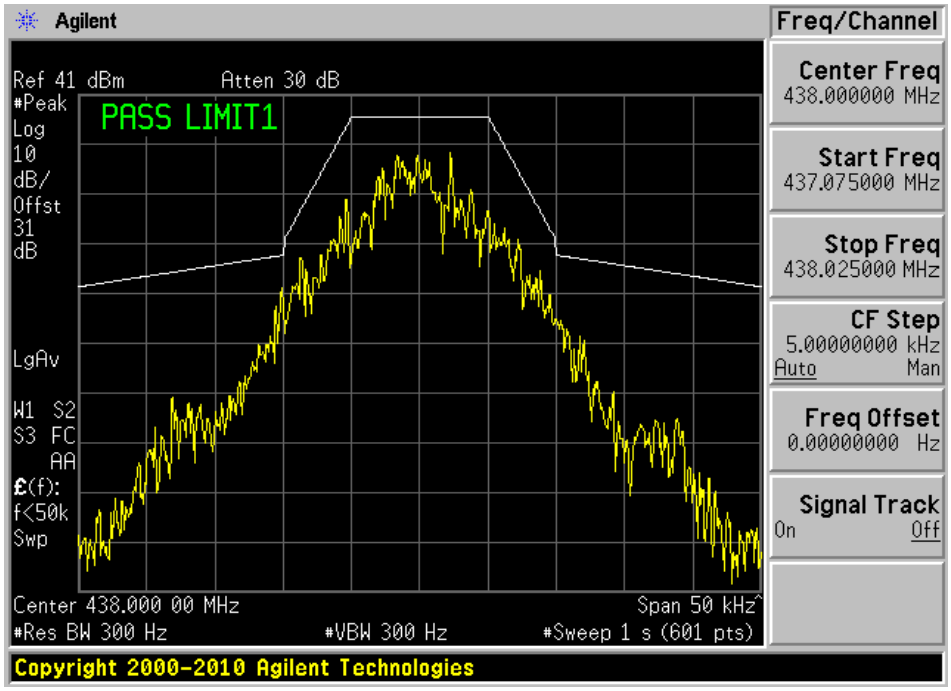
CH High :



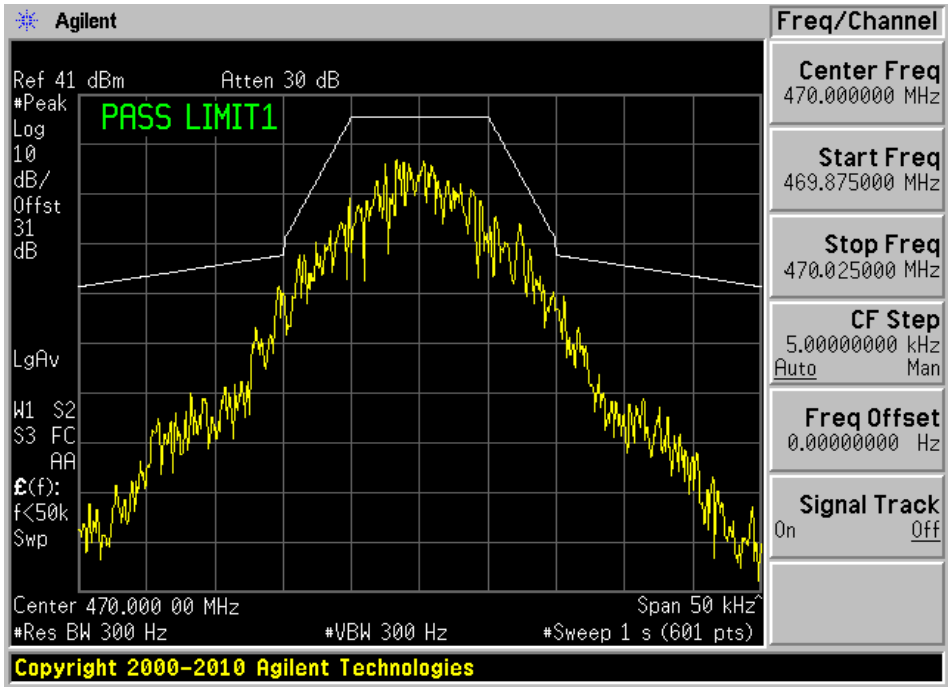
25KHz Channel Spacing
4FSK:
CH Low :



CH Mid :


Agilent
Freq/Channel
Ref 41 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
31
dB
PASS LIMIT1
LgAv
W1 S2
S3 FC
AA
£(f):
f<50k
Swp
Center Freq
438.000000 MHz
Start Freq
437.075000 MHz
Stop Freq
438.025000 MHz
CF Step
5.00000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 438.000 00 MHz
Span 50 kHz
#Res BW 300 Hz
#VBW 300 Hz
#Sweep 1 s (601 pts)
Copyright 2000-2010 Agilent Technologies

CH Hig:

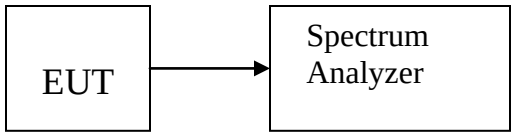

Agilent
Freq/Channel
Ref 41 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
31
dB
PASS LIMIT1
LgAv
W1 S2
S3 FC
AA
£(f):
f<50k
Swp
Center Freq
470.000000 MHz
Start Freq
469.875000 MHz
Stop Freq
470.025000 MHz
CF Step
5.00000000 kHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 470.000 00 MHz
Span 50 kHz
#Res BW 300 Hz
#VBW 300 Hz
#Sweep 1 s (601 pts)
Copyright 2000-2010 Agilent Technologies

8 Spurious Emissions(conducted)

8.1 Test limit

FCC Part90.210& RSS-119 5.8.

8.2 Test Setup



8.3 Test Result

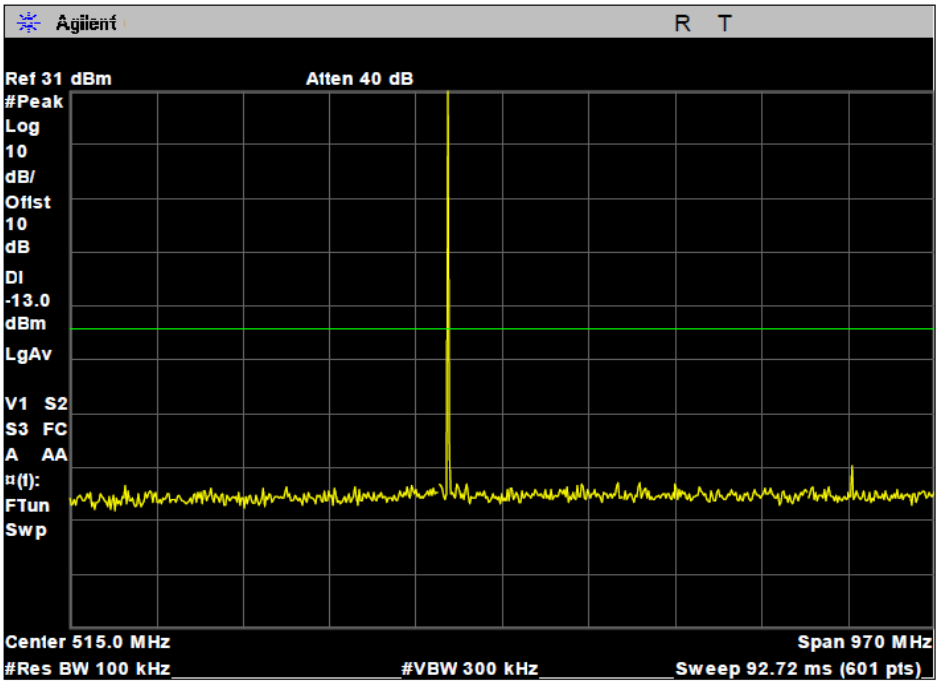
PASS.

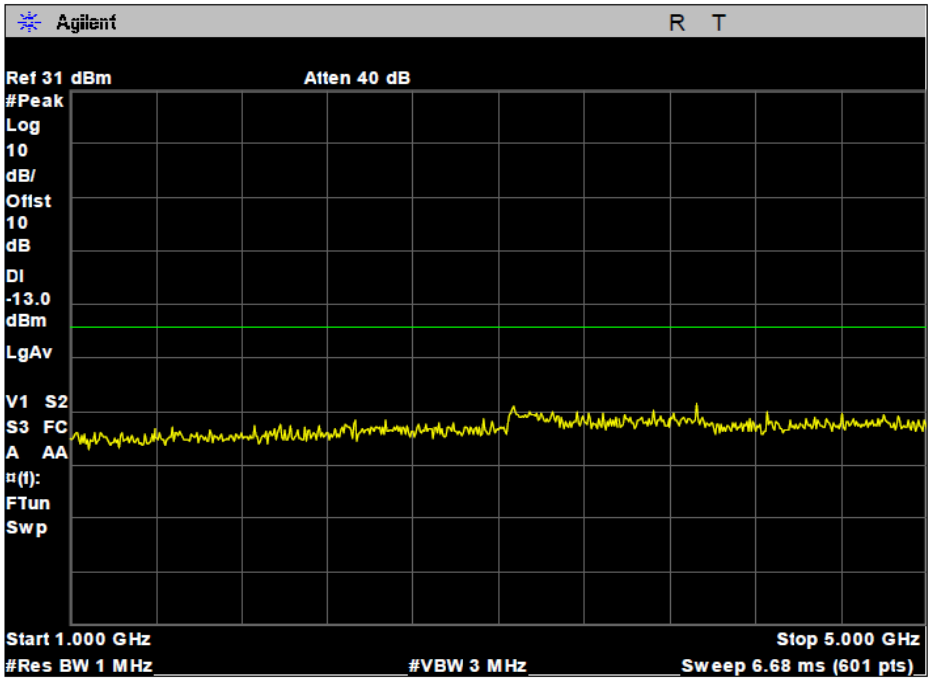
All modulation types have been tested, and only worst data of 4FSK data listed.

Detailed information please see the following page.

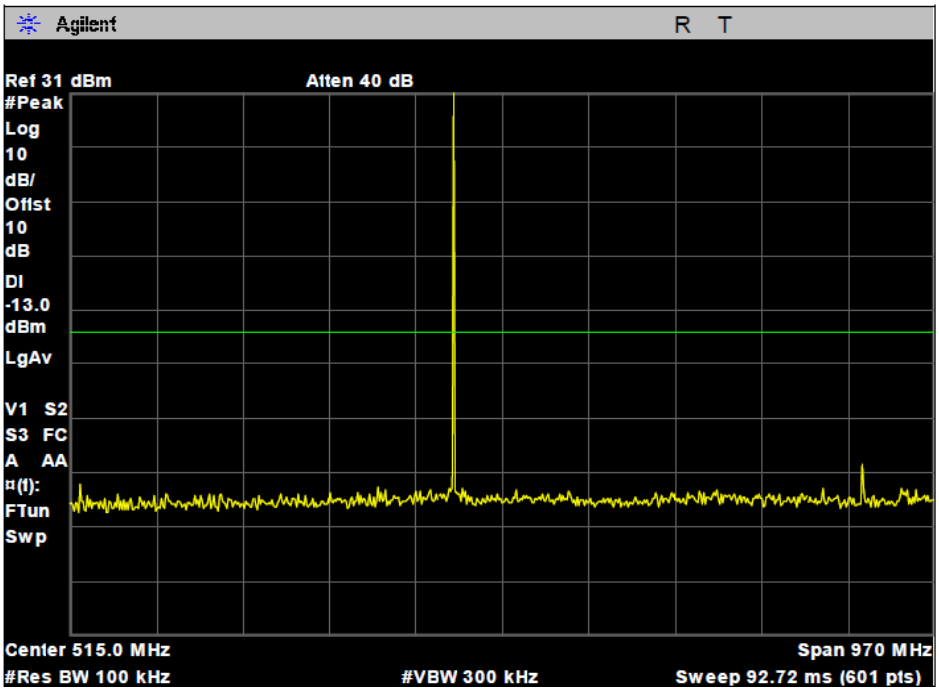
12.5KHz Channel Spacing:

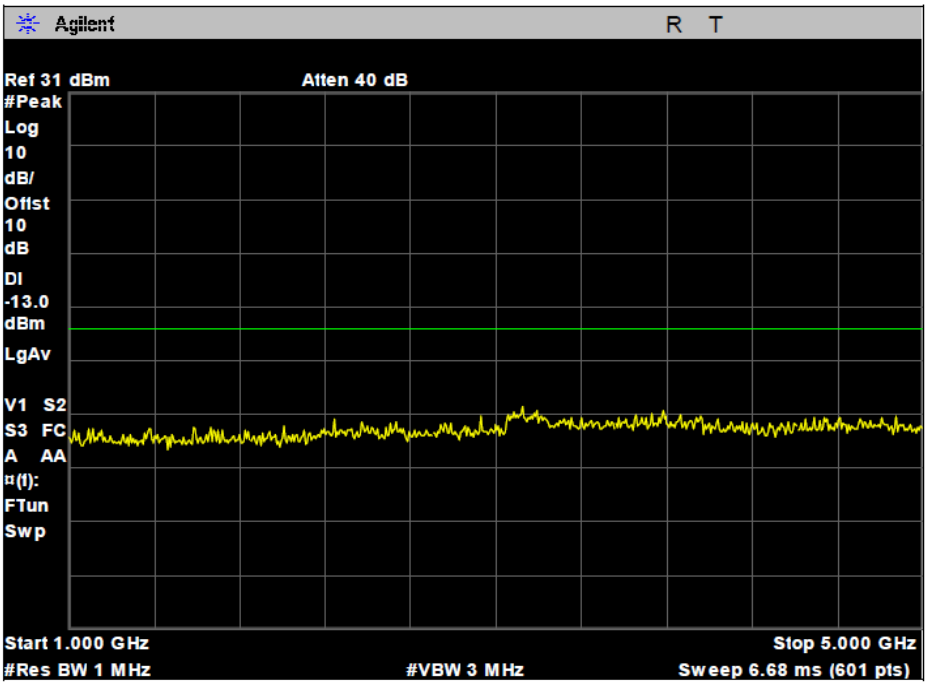
Ch Low



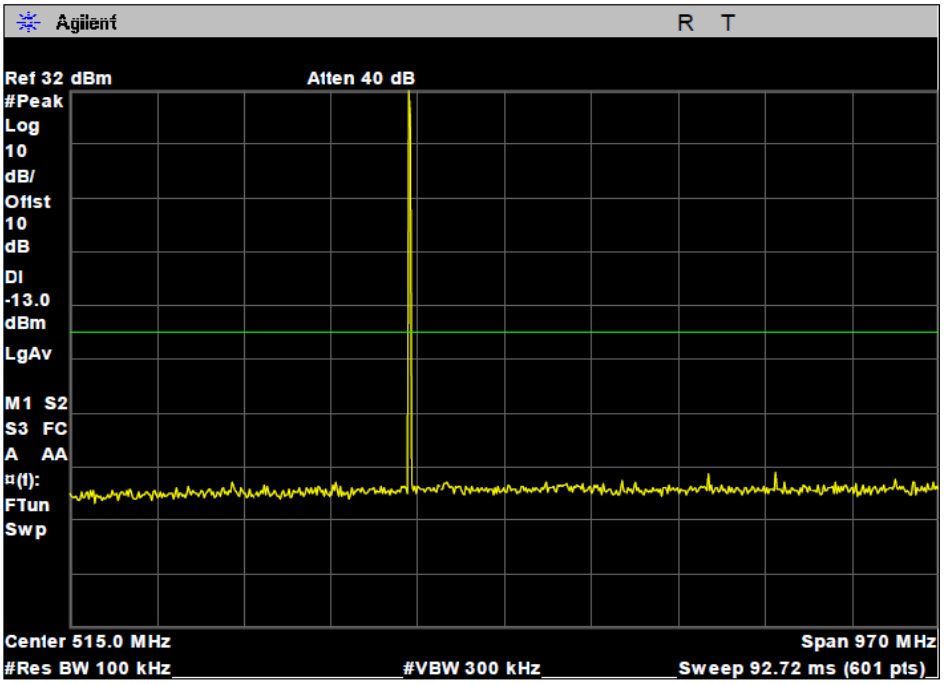


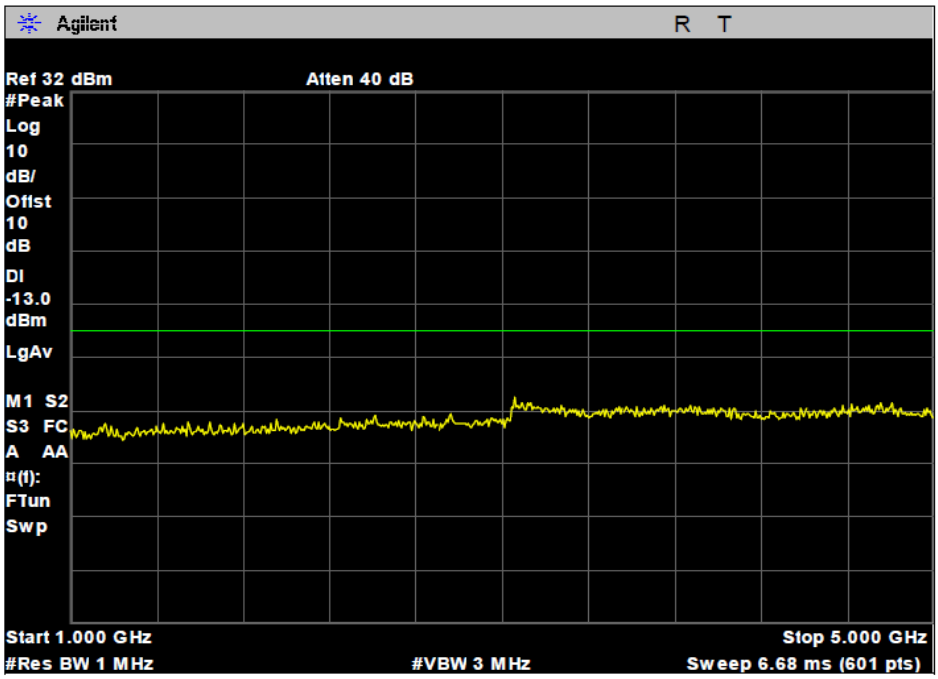
Ch Mid:


Agilent
R T
Ref 31 dBm
Atten 40 dB
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
LgAv
V1 S2
S3 FC
A AA
¤(l):
FTun
Swp
Center 515.0 MHz
Span 970 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 92.72 ms (601 pts)


Agilent
R T
Ref 31 dBm
Atten 40 dB
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
LgAv
V1 S2
S3 FC
A AA
¤(l):
FTun
Swp
Start 1.000 GHz
Stop 5.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 6.68 ms (601 pts)

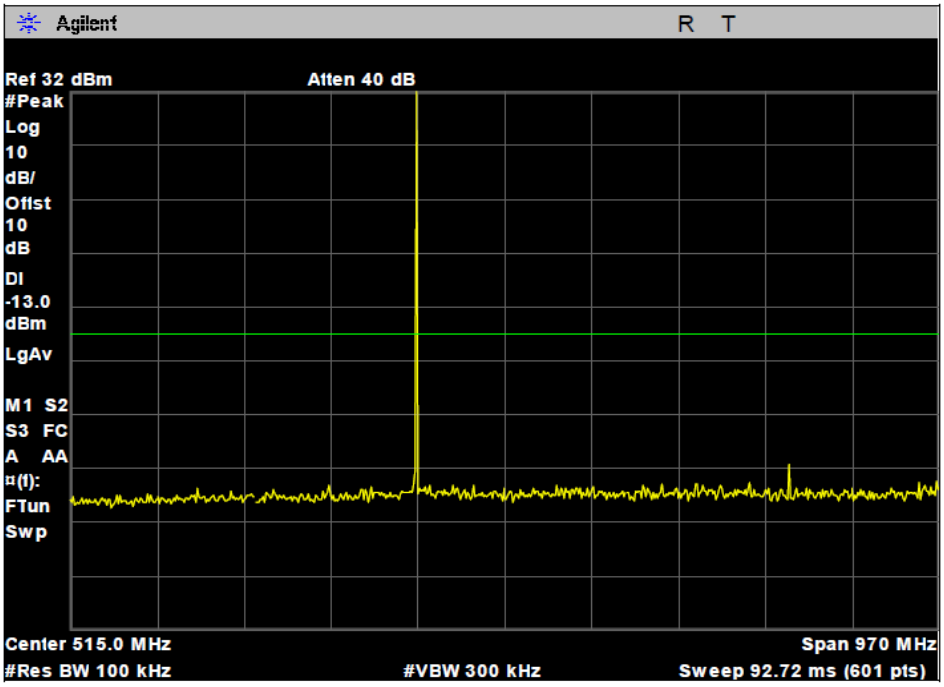
CH Hig:

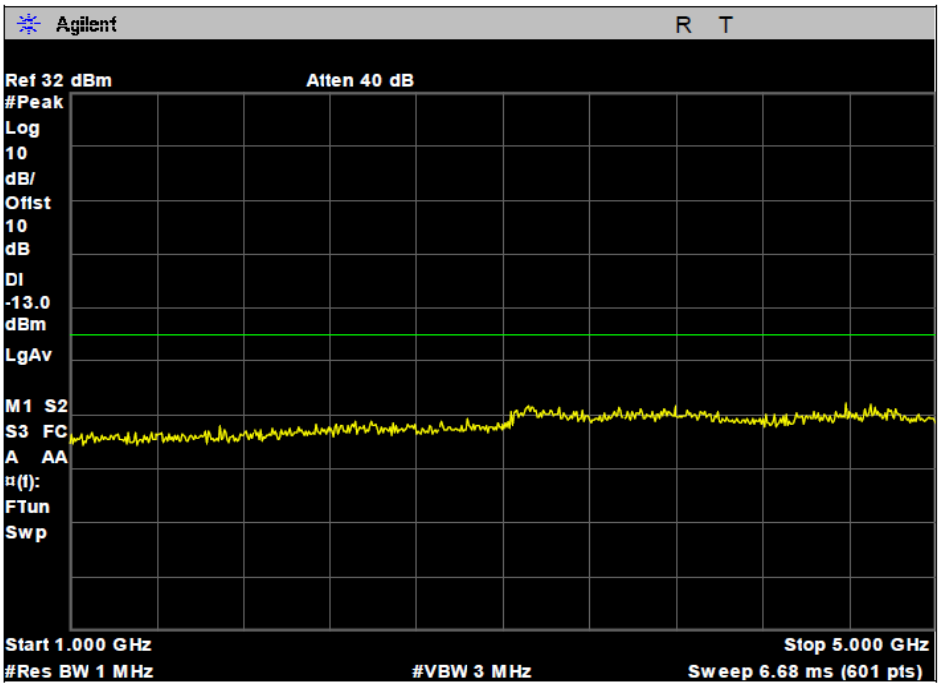

Agilent
R T
Ref 32 dBm
Atten 40 dB
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
A AA
¤(f):
FTun
Swp
Center 515.0 MHz
Span 970 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 92.72 ms (601 pts)


Agilent
R T
Ref 32 dBm
Atten 40 dB
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
A AA
¤(f):
FTun
Swp
Start 1.000 GHz
Stop 5.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 6.68 ms (601 pts)

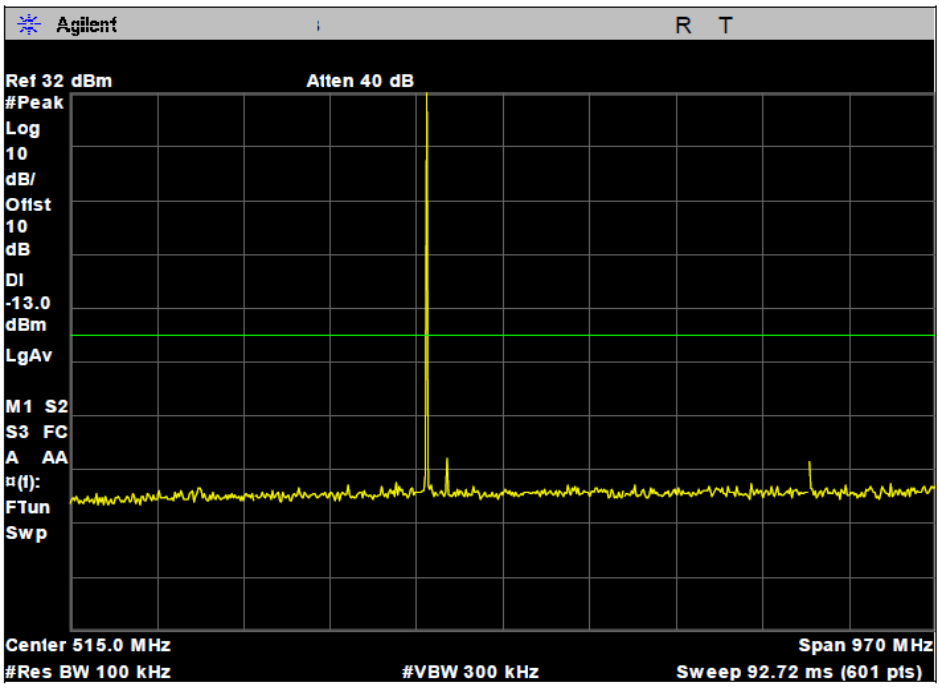
25KHz Channel Spacing:

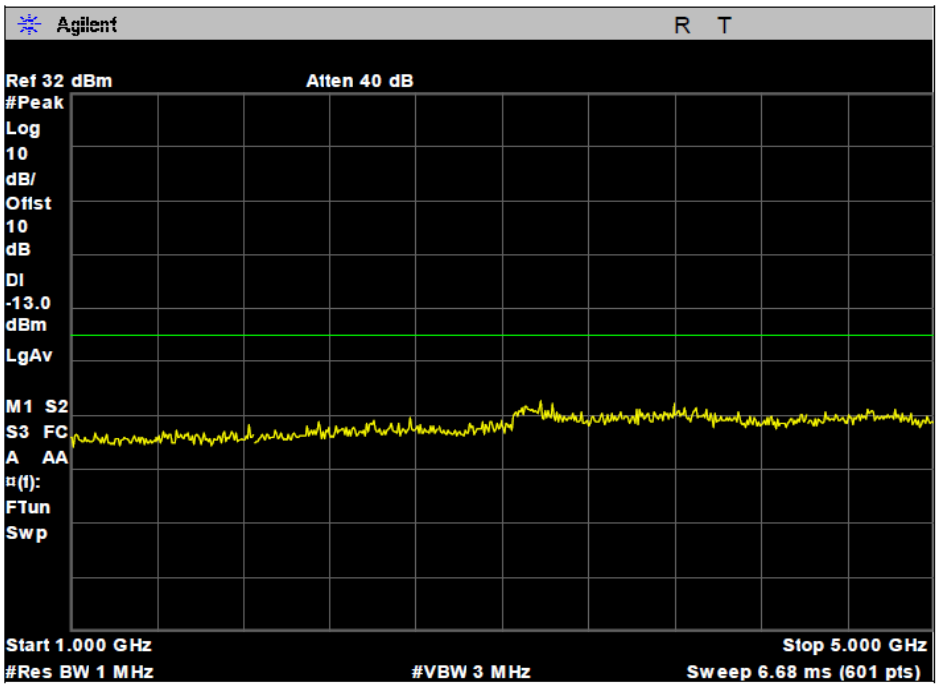
Ch Low



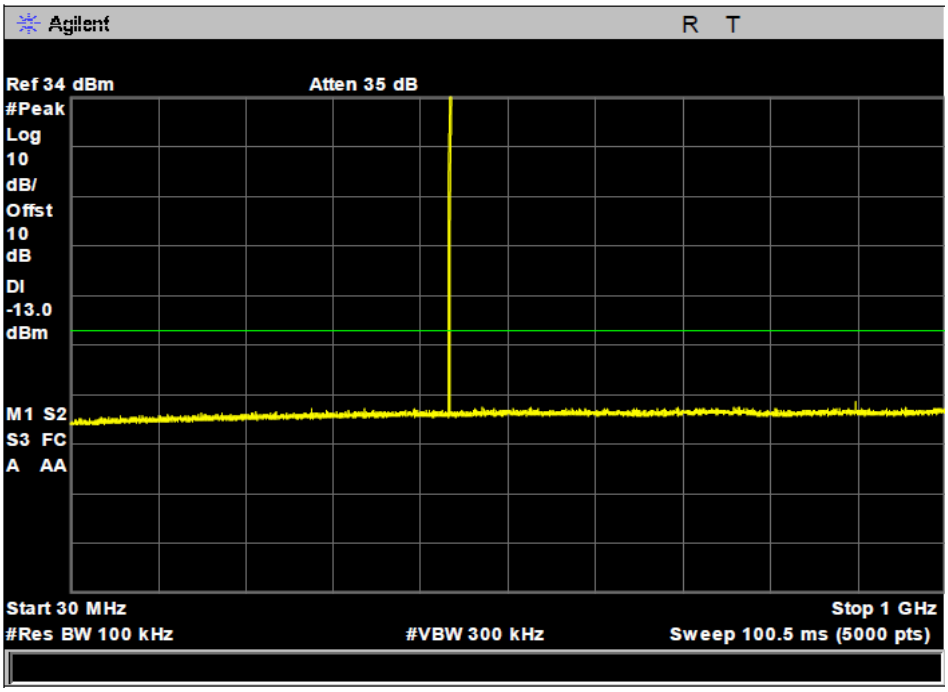


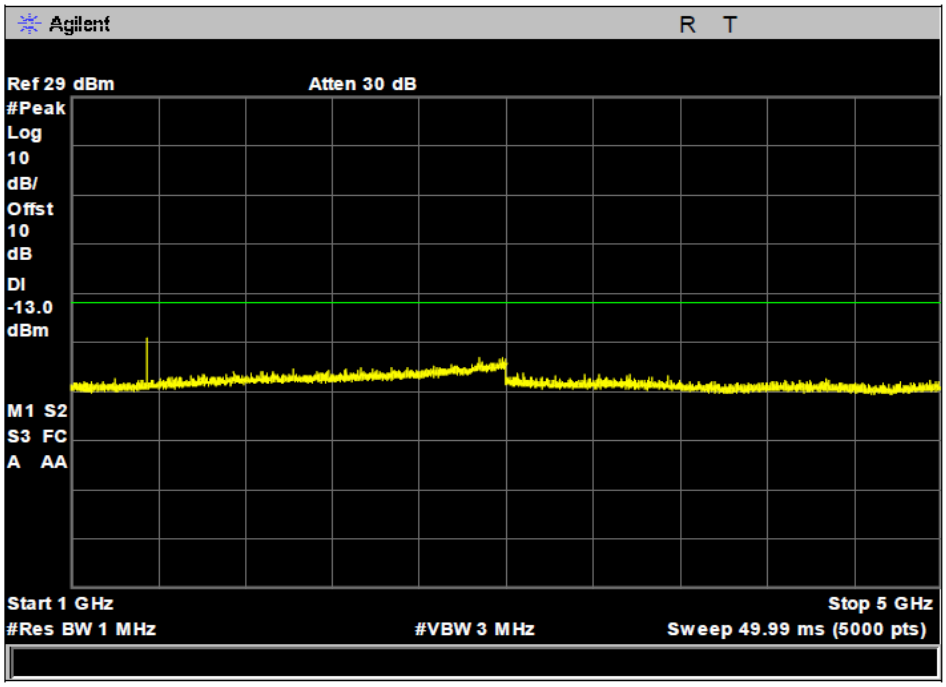
Ch Mid:


Agilent
R T
Ref 32 dBm
Atten 40 dB
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
A AA
¤(f):
FTun
Swp
Center 515.0 MHz
Span 970 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 92.72 ms (601 pts)


Agilent
R T
Ref 32 dBm
Atten 40 dB
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
A AA
¤(f):
FTun
Swp
Start 1.000 GHz
Stop 5.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 6.68 ms (601 pts)

CH Hig:


Agilent
R T
Ref 34 dBm
Atten 35 dB
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
M1 S2
S3 FC
A AA
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1 GHz
Sweep 100.5 ms (5000 pts)


Agilent
R T
Ref 29 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
M1 S2
S3 FC
A AA
Start 1 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 5 GHz
Sweep 49.99 ms (5000 pts)

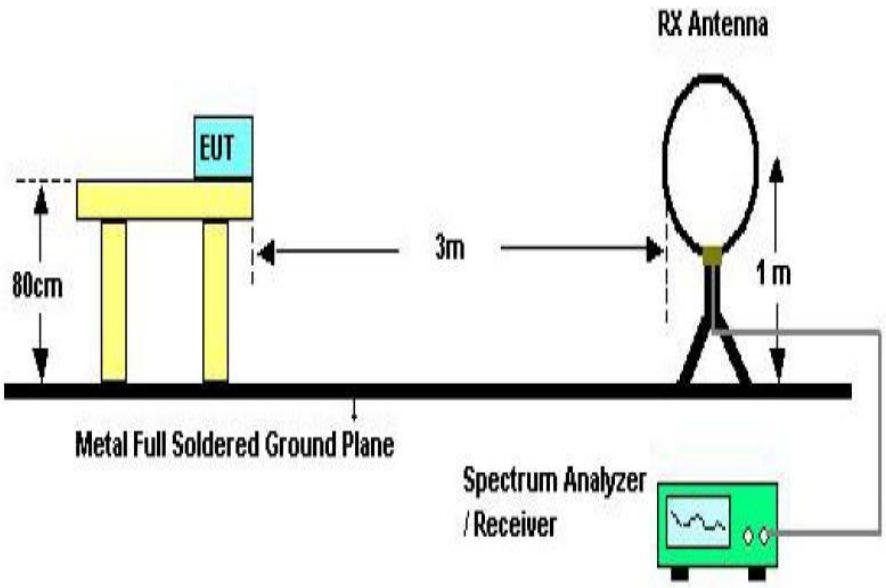
9 Radiation Emission Spurious Emissions(Radiated)

9.1 Radiation Emission Limits(15.209)

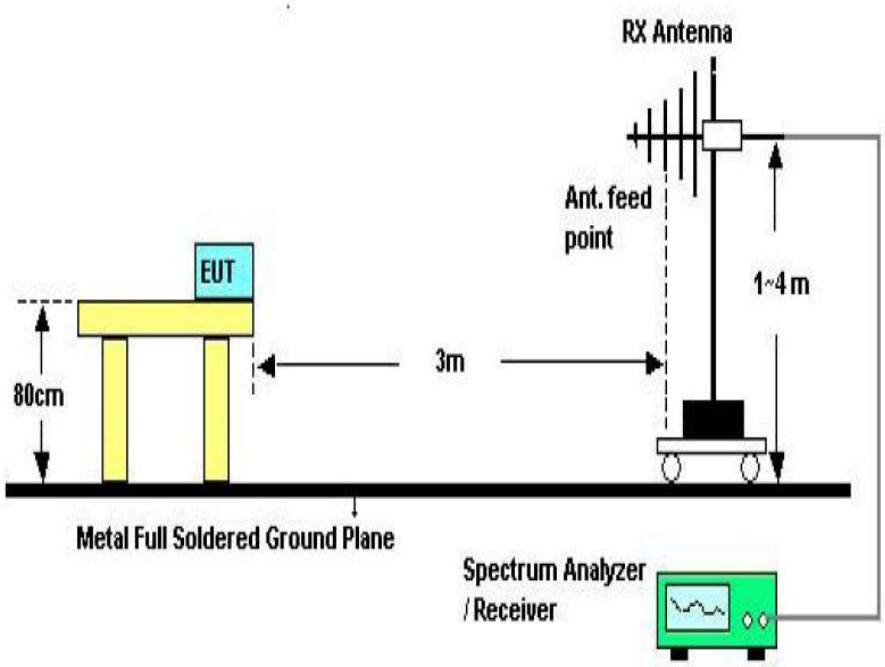
For equipment using 25 kHz channel spacing, on any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.
For equipment using 12.5 kHz channel spacing, on any frequency removed from the center of The authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least 50 + 10 log(P) dB or 70 dB, whichever is the lesser attenuation.

9.1.1 Test Setup

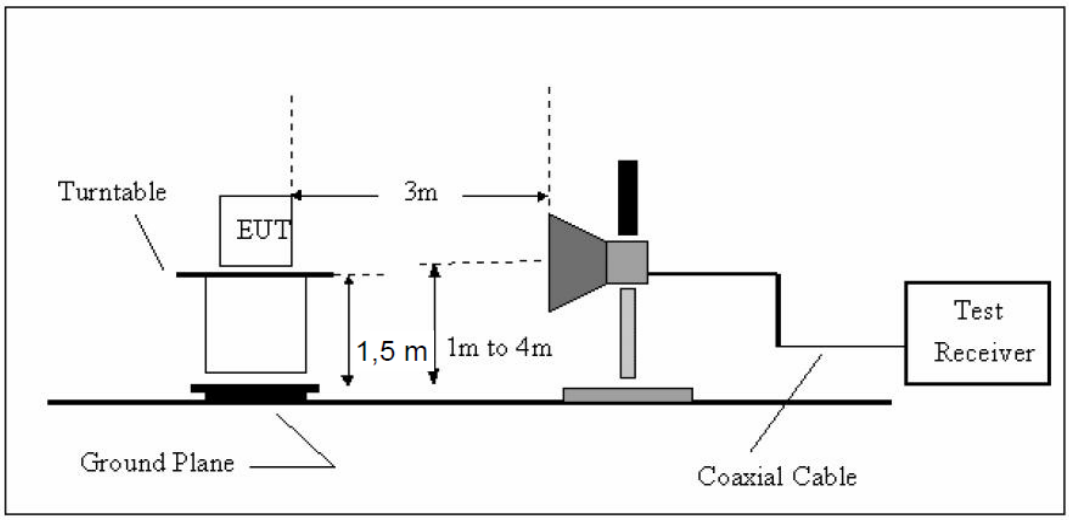
See the next page



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

9.1.2 Test Procedure

a) The measuring distance of 3m shall be used for measurements at frequency up

to 1GHz and above 1GHz, The EUT was placed on a rotating 0.8 m high above ground for below 1GHz and 1.5m high for above1GHz testing, The table was rotated 360 degrees to determine the position of the highest radiation

b) The Test antenna shall vary between 1m and 4m,Both Horizontal and Vertical antenna are set of make measurement.
c) The initial step in collecting conducted emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significant Peaks are then marked. and then Qusia Peak Detector mode premeasured
d) If Peak value comply with QP limit Below 1GHz.The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.
e) For the actual test configuration, please see the test setup photo.

9.1.3 Test Equipment Setting For emission test Result

9KHz~150KHz	RBW 200Hz	VBW1KHz
150KHz~30MHz	RBW 9KHz	VBW 30KHz
30MHZ~1GHz	RBW 120KHz	VBW 300KHz
Above 1GHz	RBW 1MHz	VBW 3MHz

9.1.4 Test Condition

Continual Transmitting in maximum power.

9.1.5 Test Result

We have scanned the 9KHz from 25GHz to the EUT.
Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

EUT: GNSS Survey Receiver	M/N: S321 UHF				
Power: DC 10.8V from battery					
Ambient Temperature: 23℃	Relative Humidity: 60%				
Test result					
Test Mode： Low Channel, Channel Spacing 12.5KHz					
Frequency (MHz)	Antenna polarization	Result (dBm)	Limit (dBm)	Margin (dB)	Conclusion
532.43	H	-54.13	-13	41.13	PASS
812.2	H	-54.01	-13	41.01	PASS
1218.3	H	-39.13	-13	26.13	PASS
532.43	V	-55.24	-13	42.24	PASS
812.2	V	-53.06	-13	40.06	PASS
1218.3	V	-40.24	-13	27.24	PASS
Test Mode：Mid channel, Channel Spacing 12.5KHz					
532.43	H	-54.7	-13	41.7	PASS
876	H	-54.27	-13	41.27	PASS
1314	H	-42.85	-13	29.85	PASS
532.43	V	-53.8	-13	40.8	PASS
876	V	-51.69	-13	38.69	PASS
1314	V	-43.94	-13	30.94	PASS
Test Mode：High Channel, Channel Spacing 12.5KHz					
532.43	H	-51.26	-13	38.26	PASS
940	H	-49.29	-13	36.29	PASS
1410	H	-40.36	-13	27.36	PASS
532.43	V	-51.39	-13	38.39	PASS
940	V	-49.09	-13	36.09	PASS
1410	V	-39.03	-13	26.03	PASS
Note: All the emissions detected are belonging to narrowband emissions.					

EUT: GNSS Survey Receiver M/N: S321 UHF					
Power: DC 10.8V from battery					
Ambient Temperature: 23℃		Relative Humidity: 60%			
Test result					
Test Mode： Low Channel, Channel Spacing 25KHz					
Frequency (MHz)	Antenna polarization	Result (dBm)	Limit (dBm)	Margin (dB)	Conclusion
532.43	H	-52.19	-13	39.19	PASS
876	H	-51.26	-13	38.26	PASS
1314	H	-37.43	-13	24.43	PASS
532.43	V	-53.77	-13	40.77	PASS
876	V	-51.19	-13	38.19	PASS
1314	V	-38.3	-13	25.3	PASS
Test Mode：Mid channel, Channel Spacing 25KHz					
532.43	H	-53.35	-13	40.35	PASS
813.57	H	-52.92	-13	39.92	PASS
2457	H	-41.5	-13	28.5	PASS
532.43	V	-52.45	-13	39.45	PASS
813.57	V	-50.34	-13	37.34	PASS
2457	V	-42.59	-13	29.59	PASS

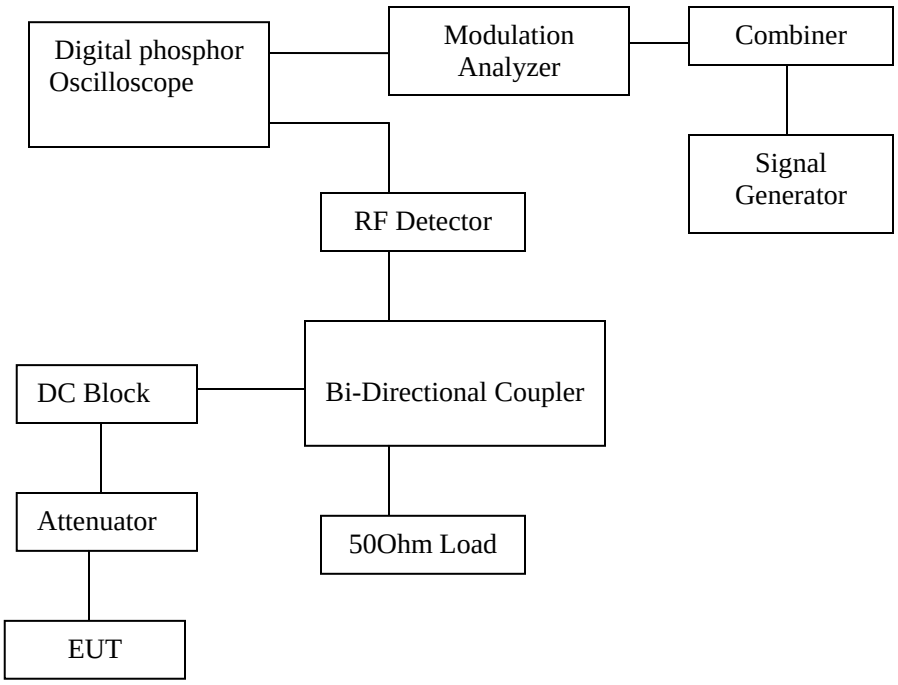
Test Mode：High Channel, Channel Spacing 25KHz					
532.43	H	-50.23	-13	37.23	PASS
940	H	-48.26	-13	35.26	PASS
1410	H	-36.69	-13	23.69	PASS
532.43	V	-50.36	-13	37.36	PASS
940	V	-48.06	-13	35.06	PASS
1410	V	-37.86	-13	24.86	PASS

10 Transient Frequency Behavior

10.1 Test limit

FCC Part90.214& RSS-119 5.9.

10.2 Test Setup



10.3 Test Result

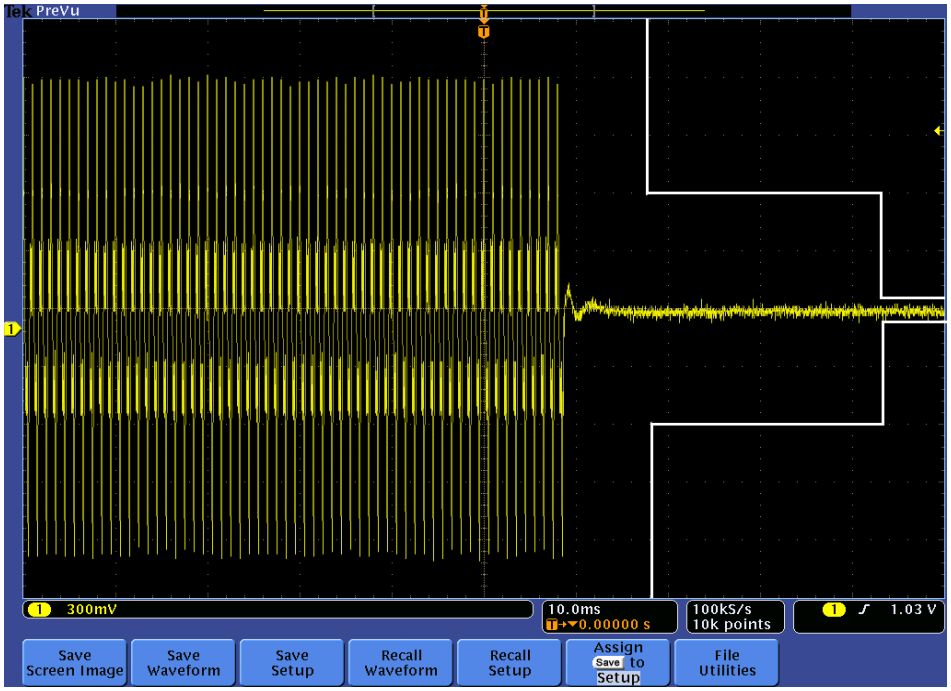
PASS.

All modulation types have been tested, and only worst data of 4FSK data listed.

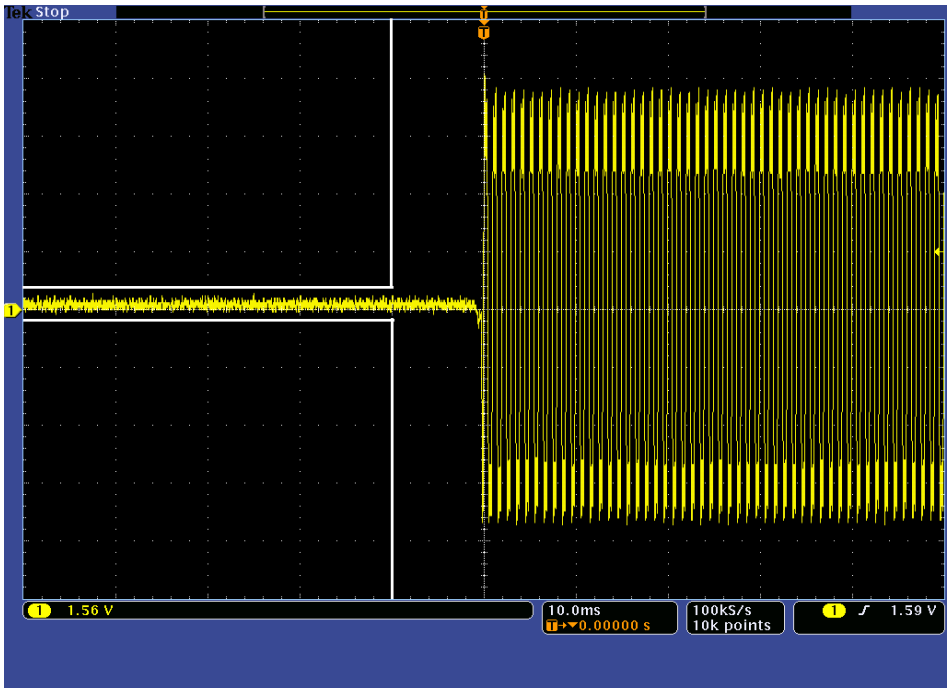
Detailed information please see the following page.

12.5KHz Channel Spacing
CH Low

Power On

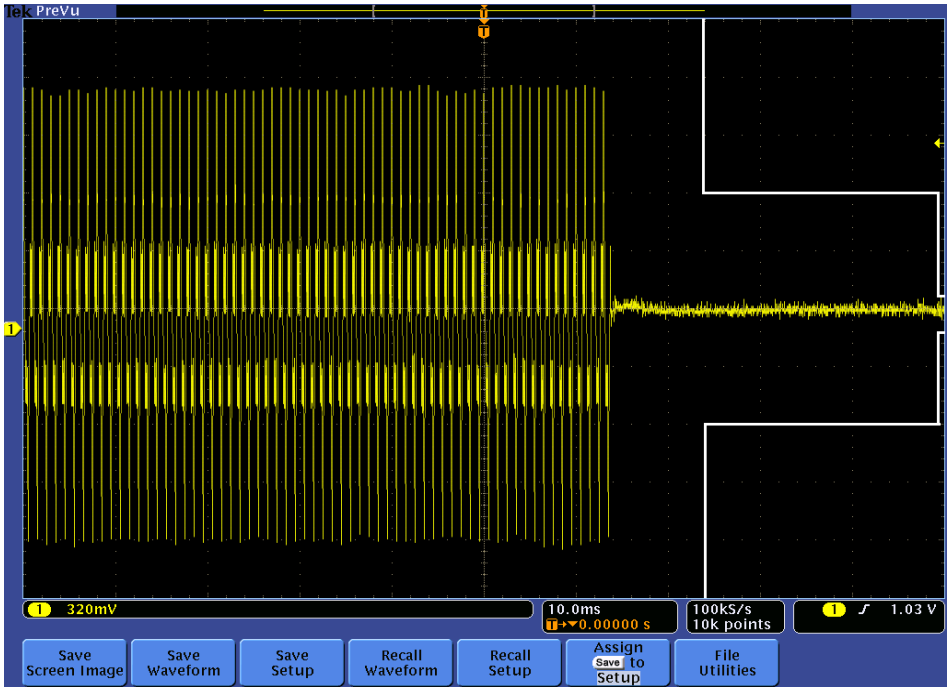


Power Off

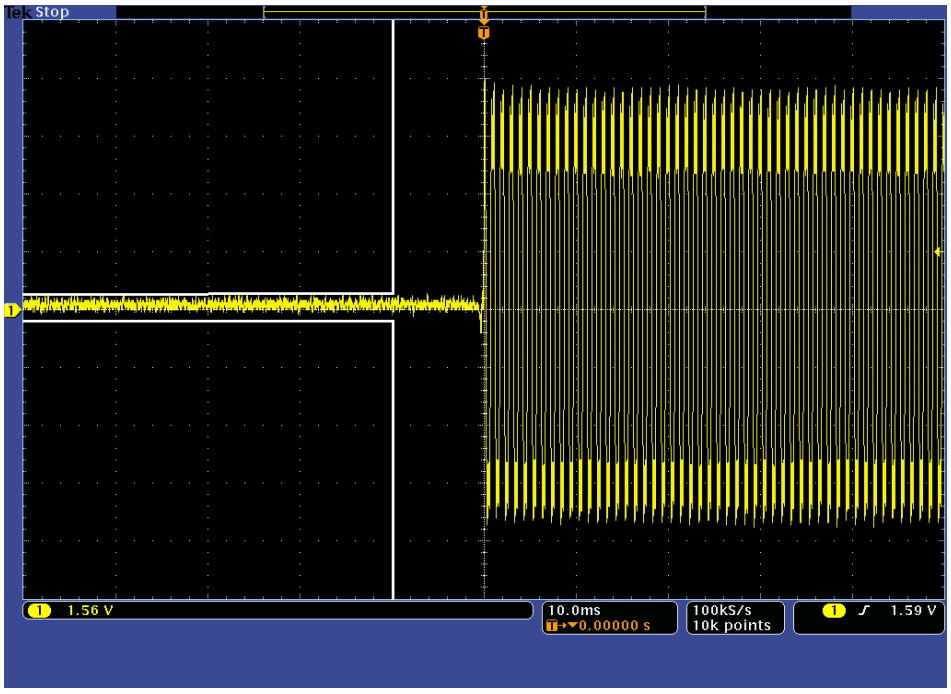


CH Mid

Power On

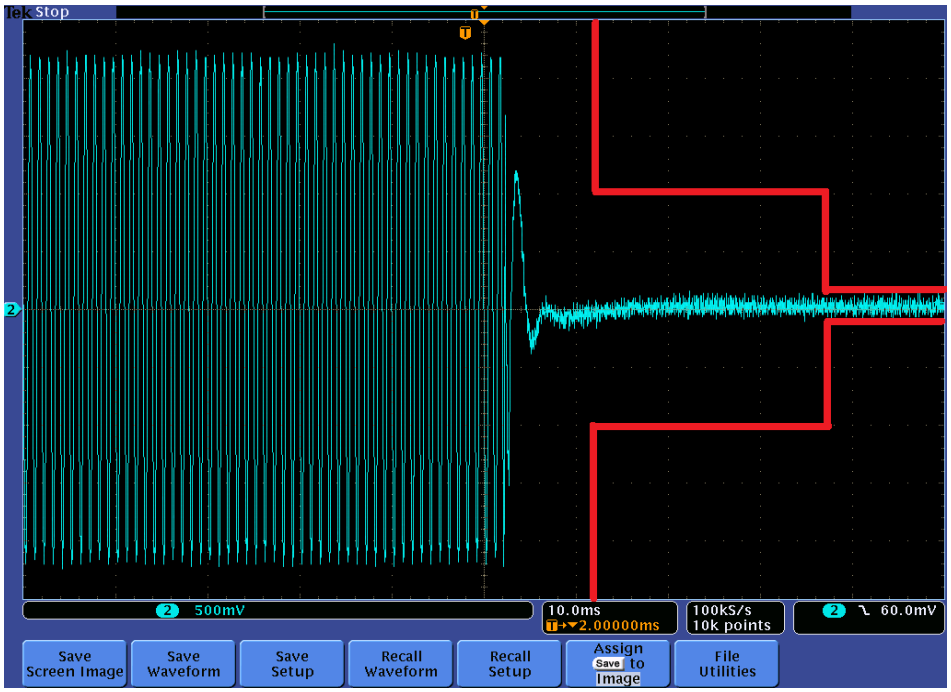


Power Off

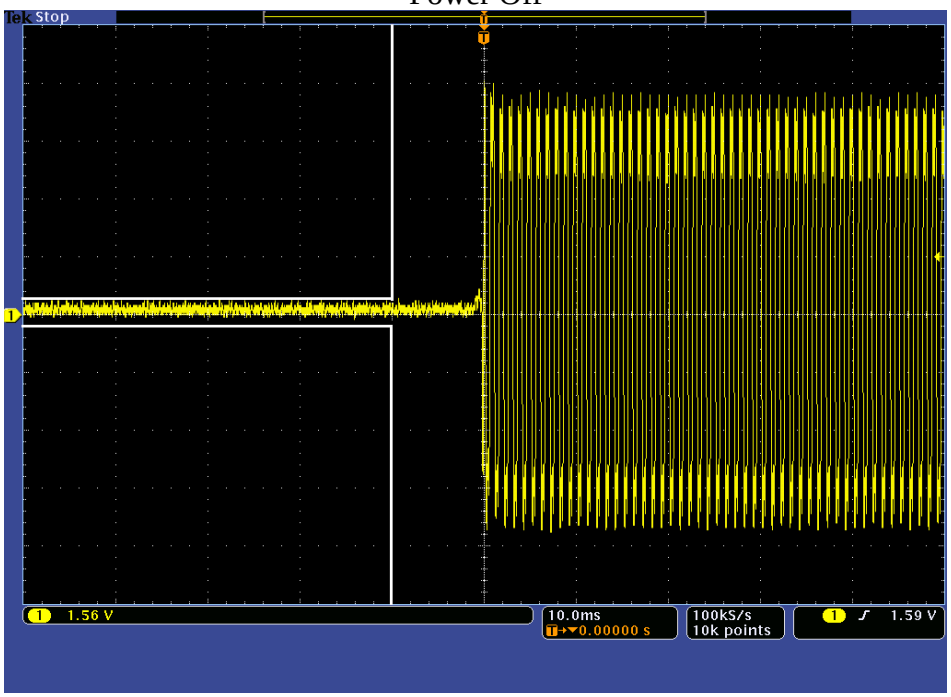


CH High

Power On

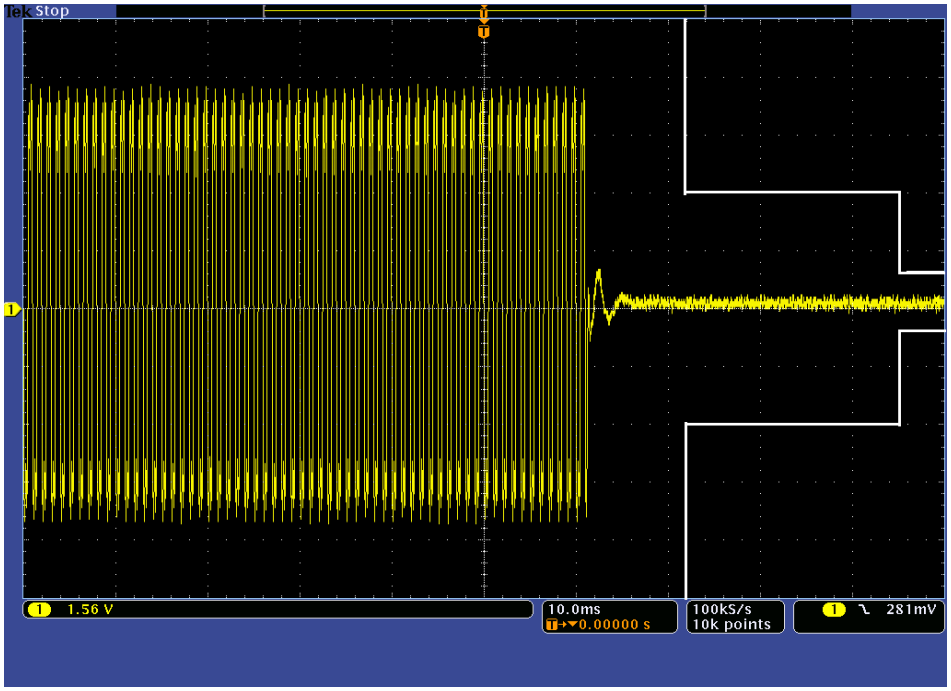


Power Off

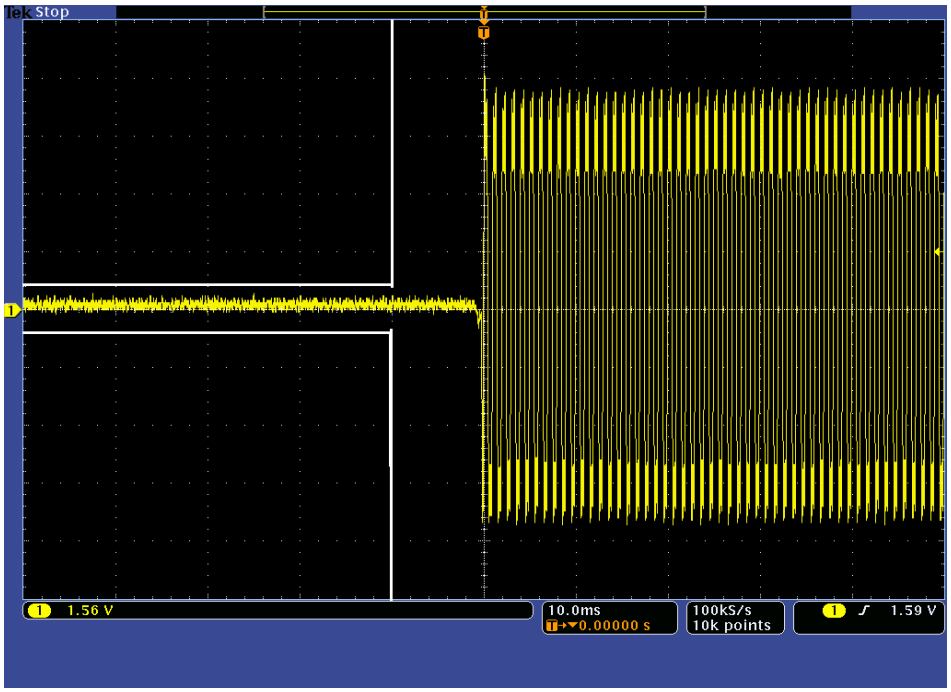


25KHz Channel Spacing
CH Low

Power On

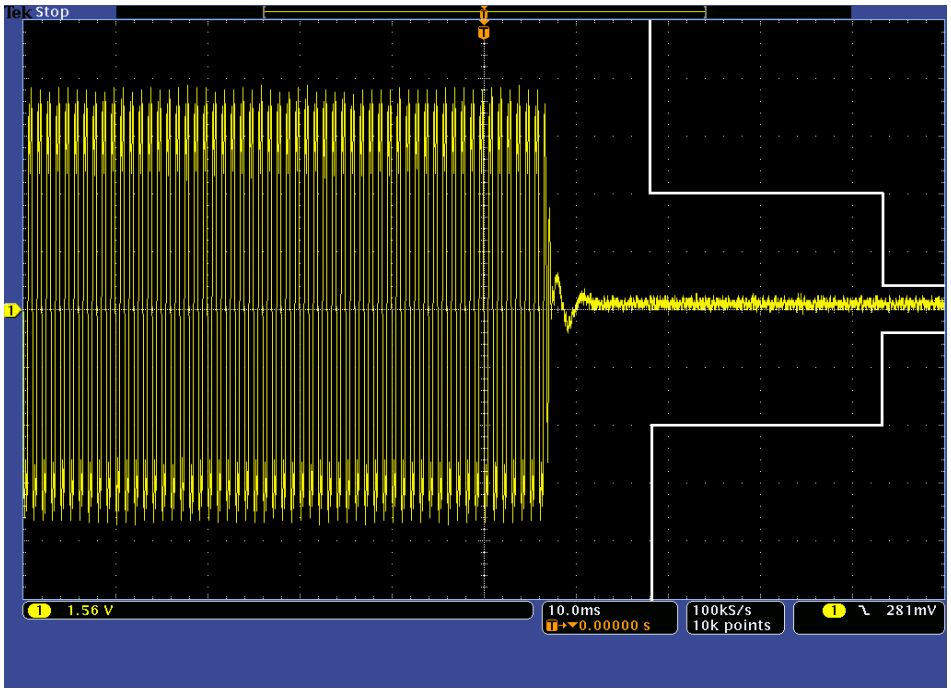


Power Off

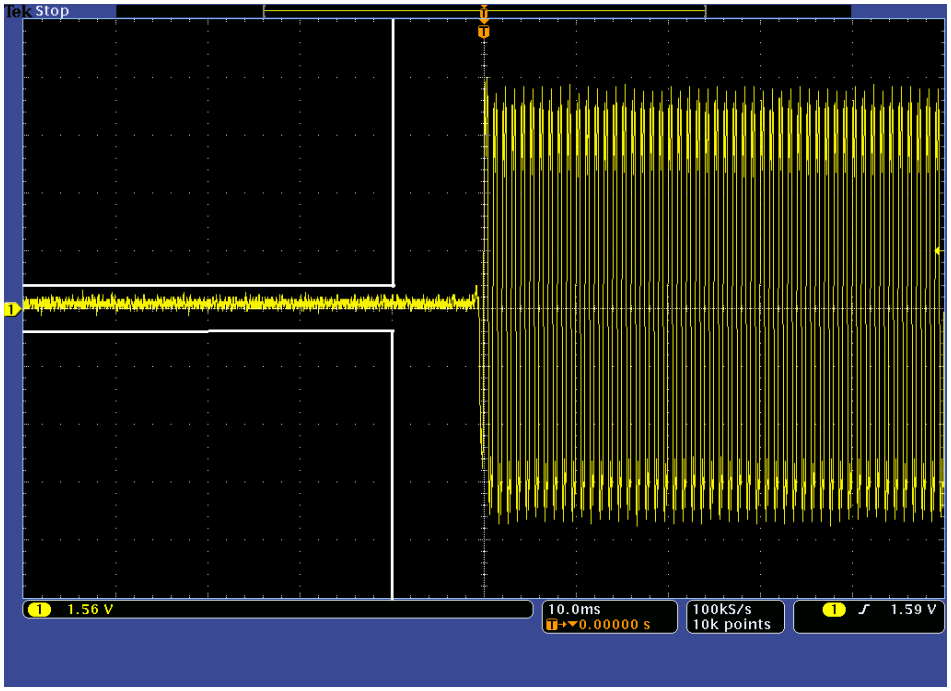


CH Mid

Power On

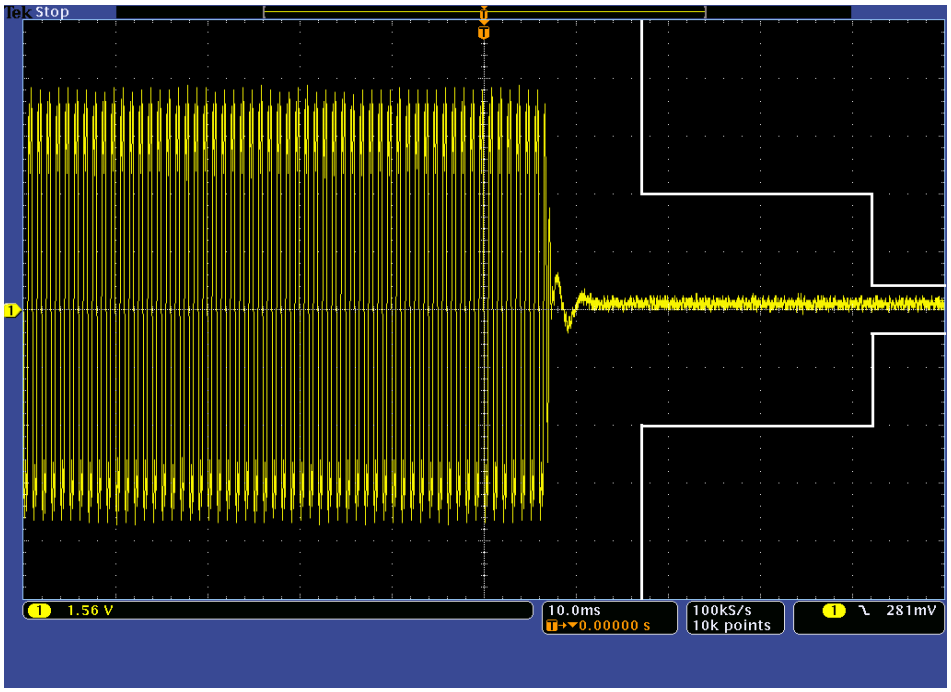


Power Off

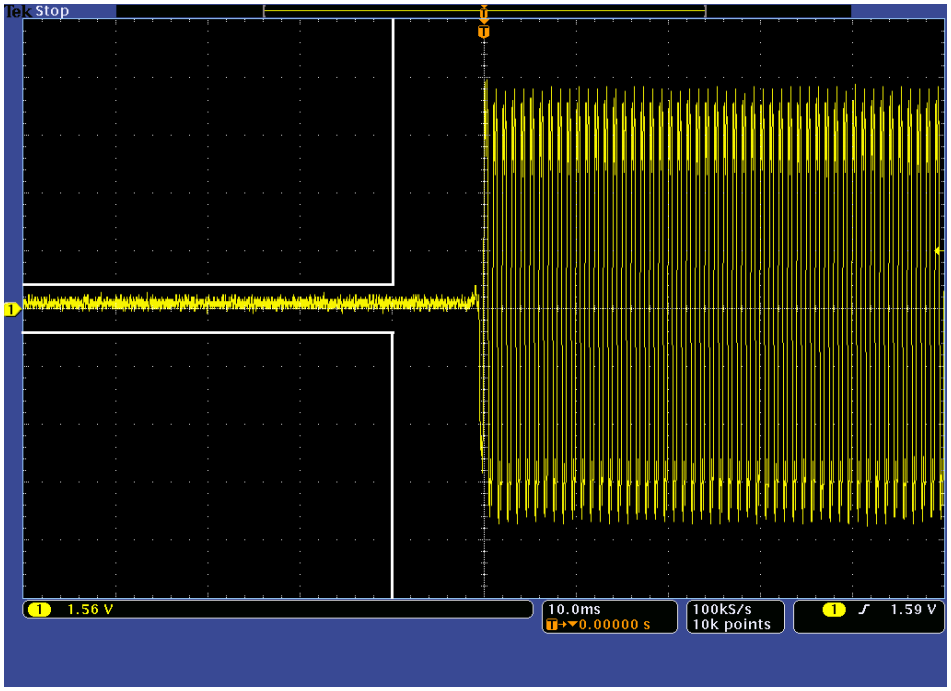


CH High

Power On



Power Off

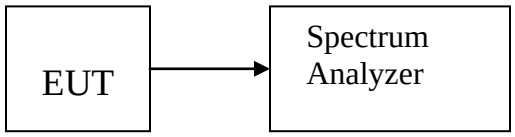


11 Behavior Frequency Stability

11.1 Standard Requirement

FCC Part90.213& RSS-119 5.3

11.2 Test Setup



11.3 Test Result

PASS.

All modulation types have been tested, and only worst data of 4FSK data listed.

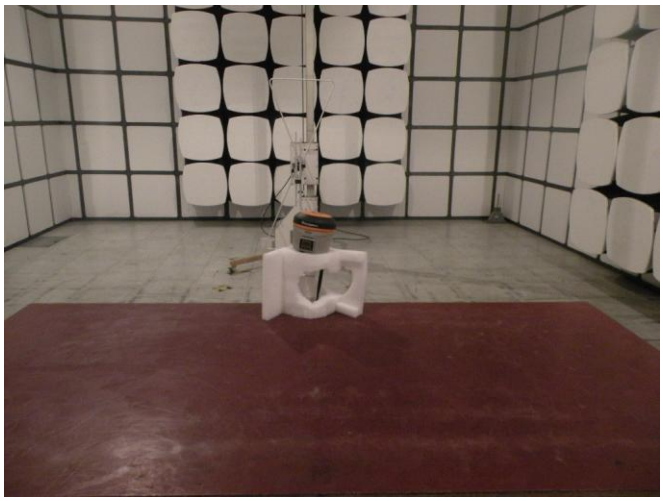
Detailed information please see the following page.

EUT: GNSS Survey Receiver M/N:S321 UHF			
Ambient Temperature:23℃		Relative Humidity: 60%	
Conclusion: PASS			
Mode	Voltage (V)	Frequency error (Hz)	frequency error (ppm)
Middle Channel 12.5KHz Channel Spacing	10.8V	-25	-0.0571
	10.0V	-25	-0.0571
	9.5V	-25	-0.0571
	9.0V	-25	-0.0571
Limit	1.5ppm		
Middle Channel 25KHz Channel Spacing	10.8V	-25	-0.0571
	10.0V	-25	-0.0571
	9.5V	-25	-0.0571
	9.0V	-25	-0.0571
Limit	2.5ppm		

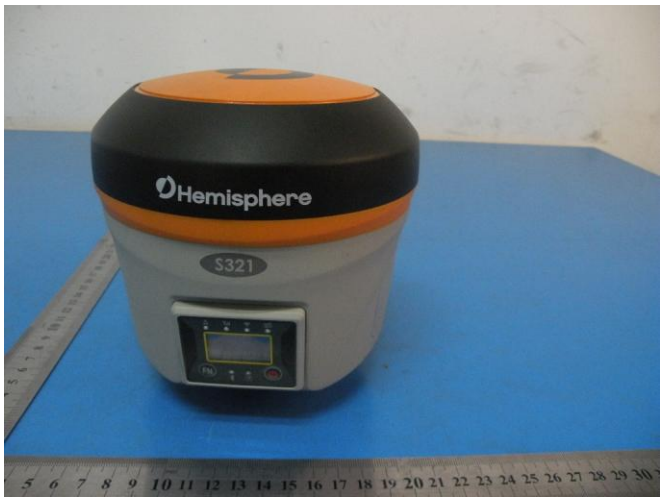
Mode	Temperature (℃)	Frequency error (Hz)	frequency error (ppm)
Middle Channel 12.5KHz Channel Spacing	-30	-63	-0.1438
	-20	-57	-0.1301
	-10	-55	-0.1256
	0	-49	-0.1119
	10	-38	-0.0868
	20	-62	-0.1416
	30	-29	-0.0662
	40	-35	-0.0799
	50	-57	-0.1301
Limit	1.5ppm		
Middle Channel 25KHz Channel Spacing	-30	-58	-0.1324
	-20	-54	-0.1233
	-10	-51	-0.1164
	0	-32	-0.0731
	10	-46	-0.1050
	20	-57	-0.1301
	30	-32	-0.0731
	40	-45	-0.1027
	50	-29	-0.0662
Limit	2.5ppm		

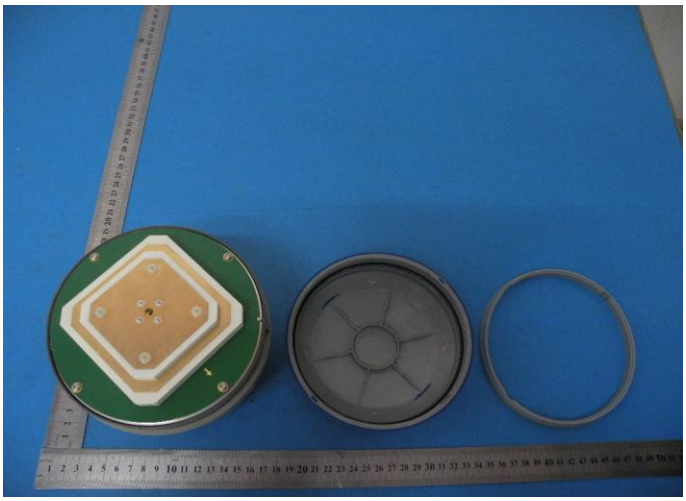
12 Test setup photo

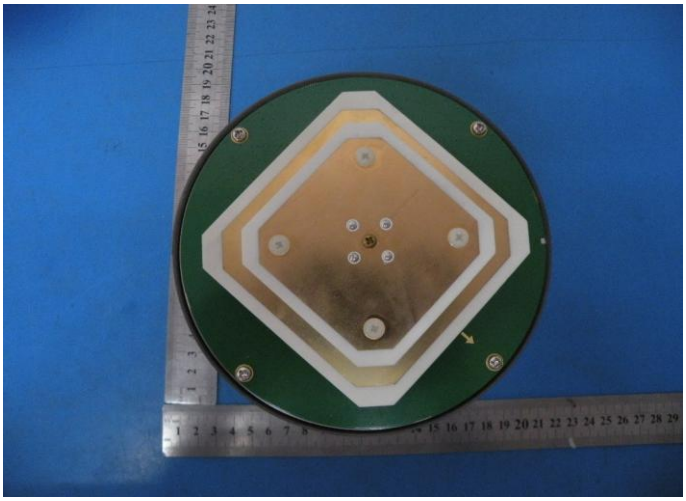
Photographs-Radiated Emission Test Setup in Chamber

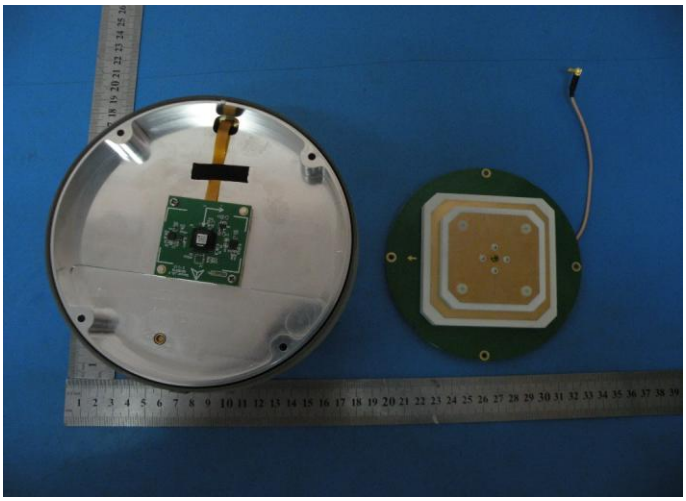


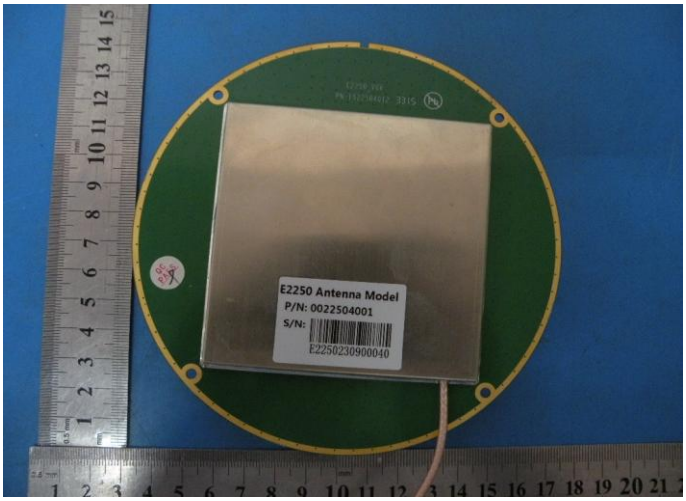
13 Photos of EUT

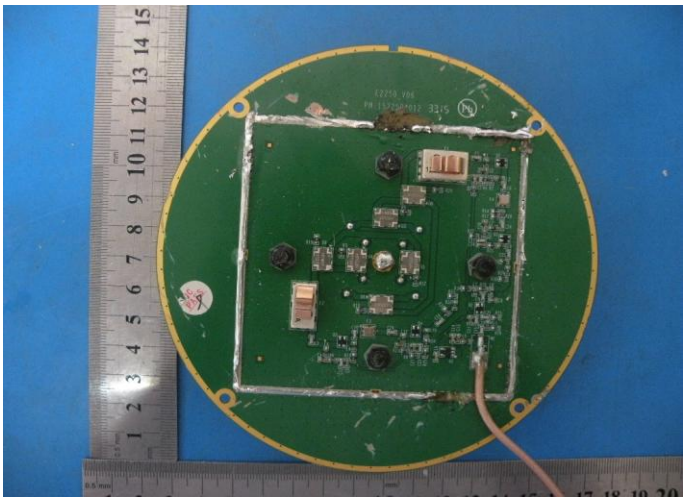

Hemisphere
S321

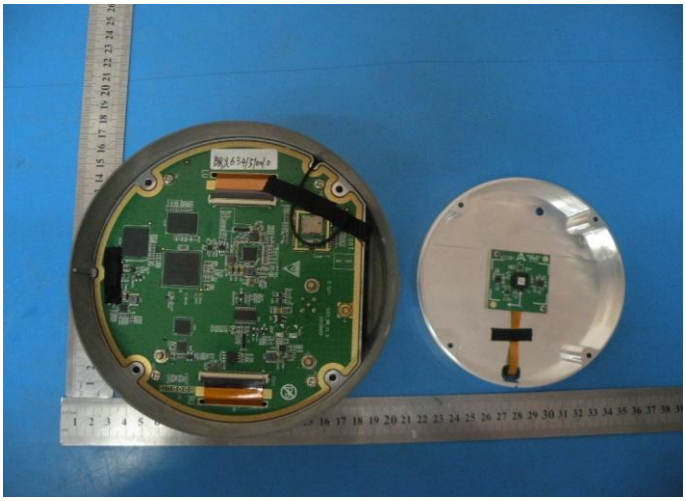


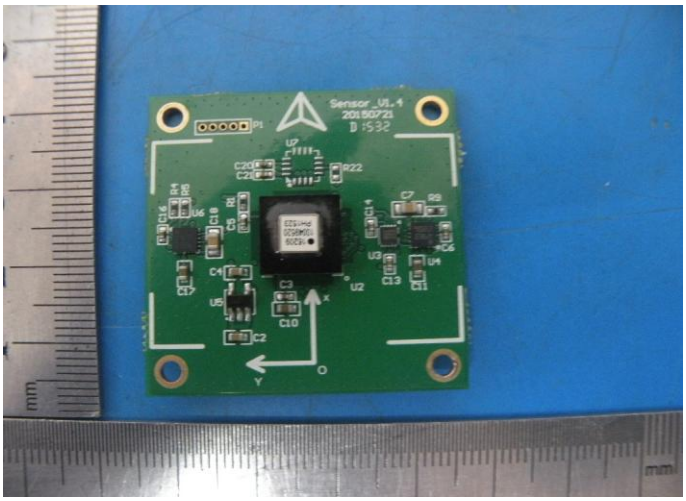


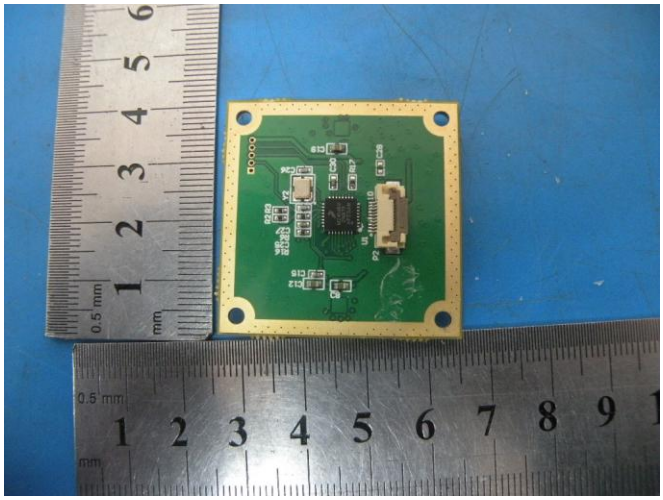


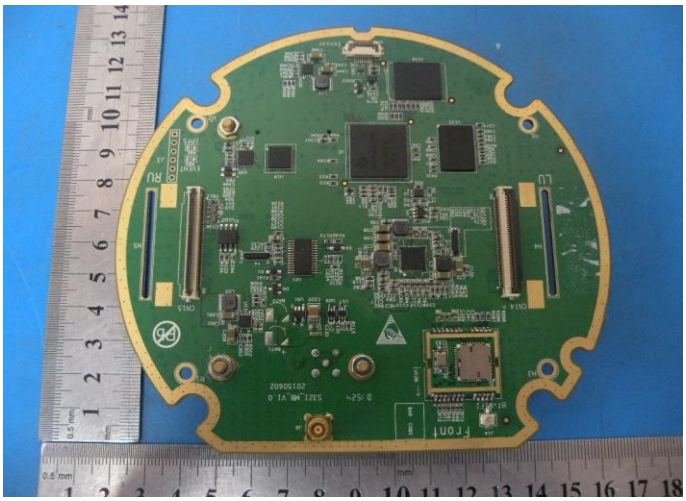

E2250 Antenna Model
P/N: 0022504001
S/N:
E2250230900040

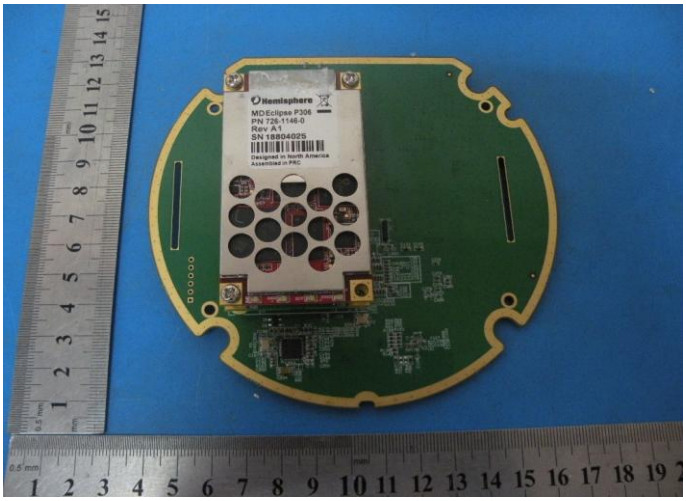


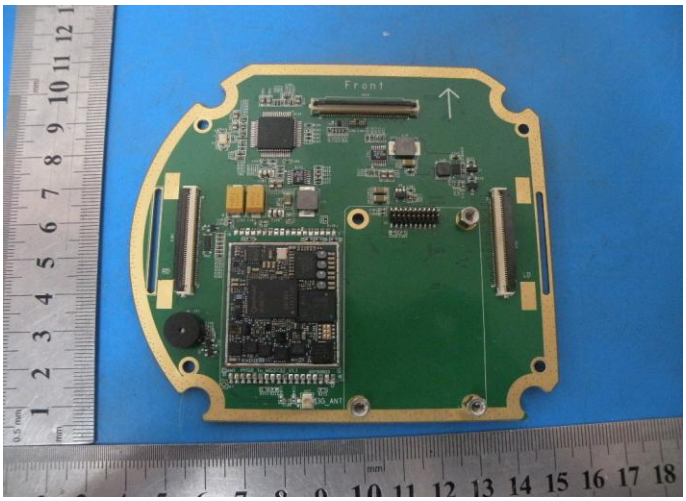


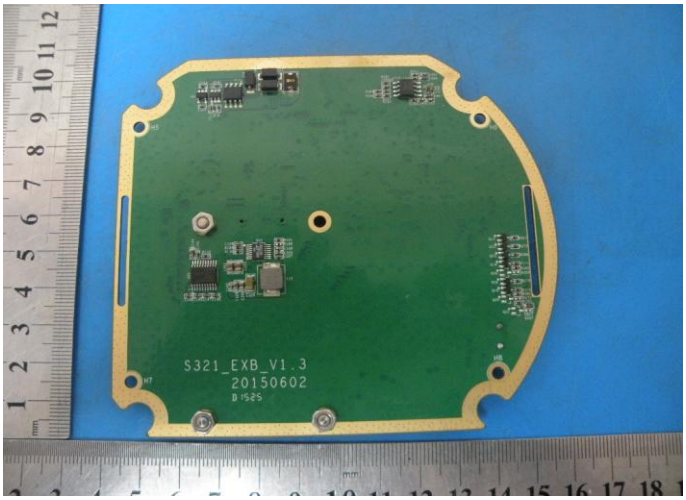

Sensor_V1.4
20150721
mm

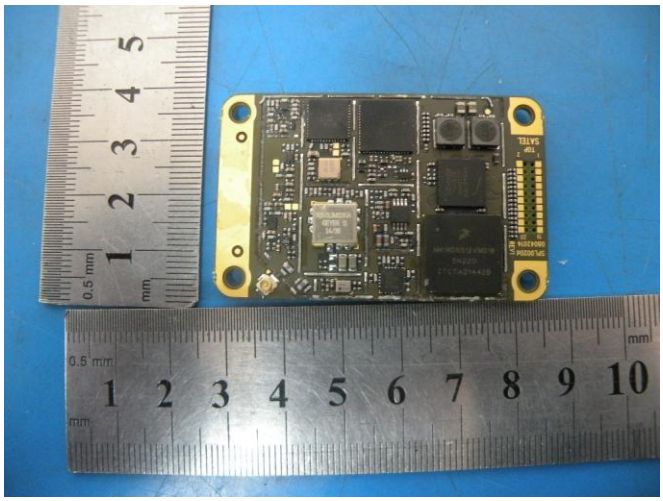

0.5 mm
1 2 3 4 5 6 7 8 9

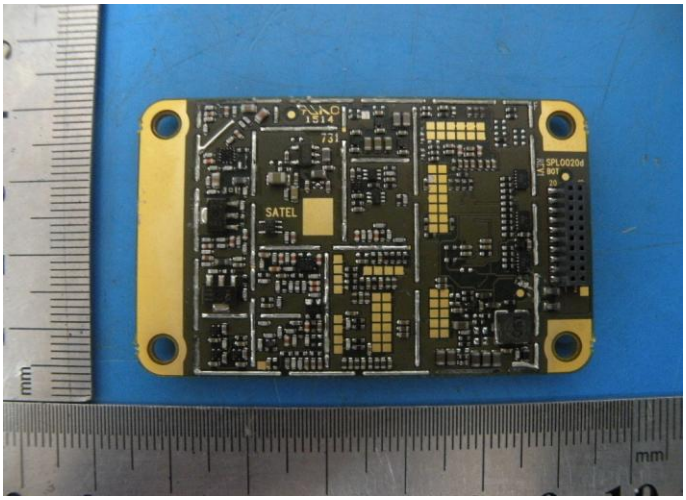


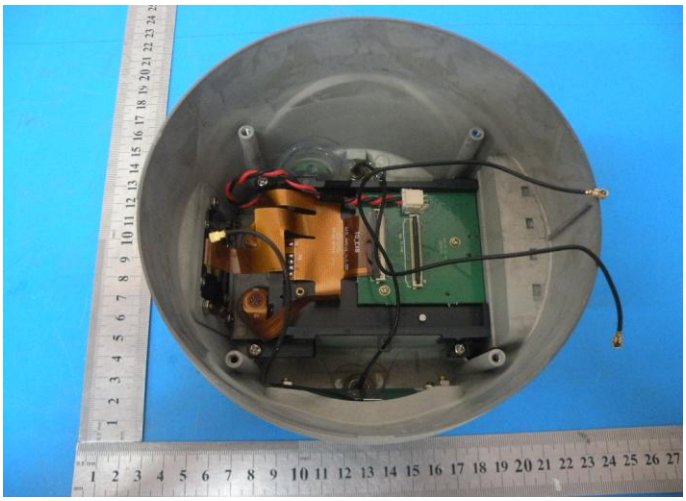

Hemisphere
MD Eclipse P306
PN 726-1148-0
Rev A1
SN:18804025
Designed in North America
Assembled in PRC

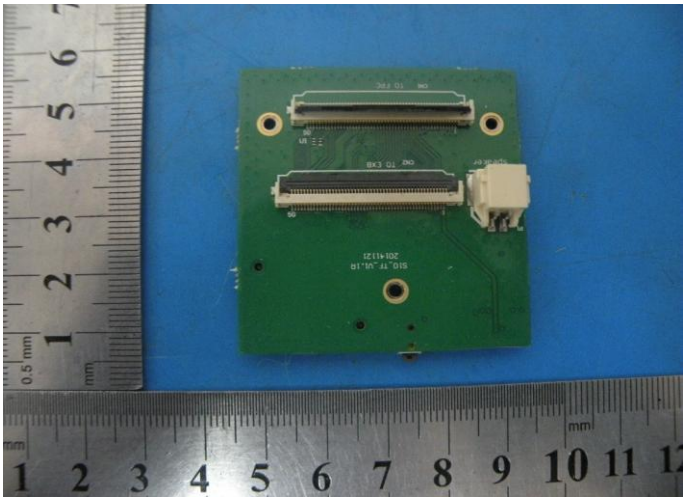

Front

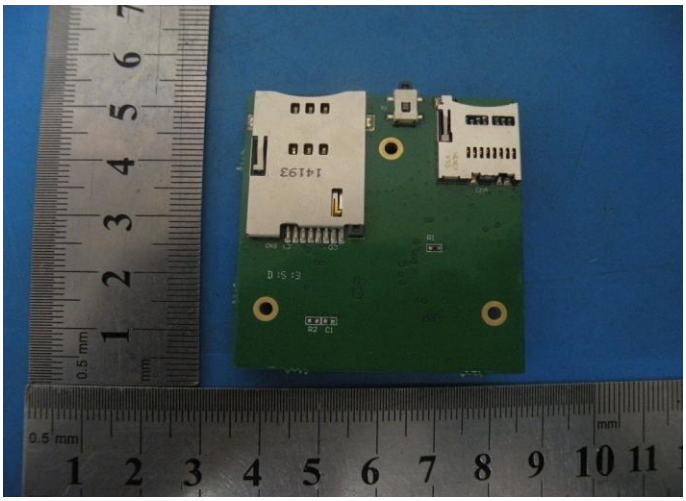

S321_EXB_V1.3
20150602

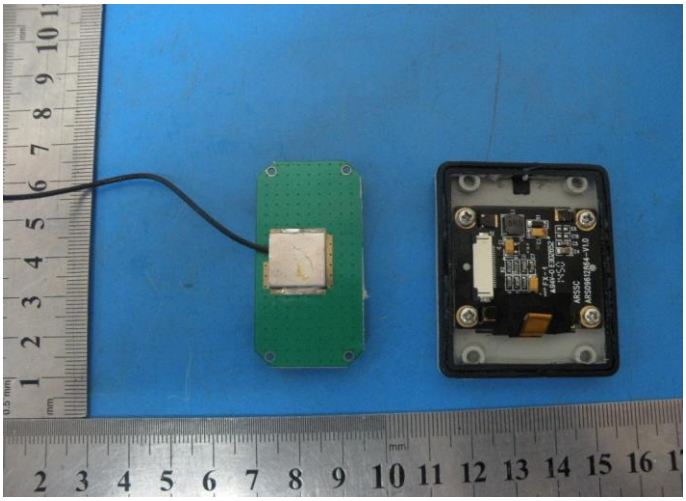



SATEL









---------END OF THE REPORT-------