



FCC TEST REPORT

Report No: STS2008346W02

Issued for

STAR SYSTEMS INTERNATIONAL LIMITED

UNIT 7B, 8/F VANTA INDUSTRIAL CENTRE, 21-33 TAI LIN PAI ROAD, KWAI CHUNG, HK

Product Name:	INTEGRATED READER
Brand Name:	TARVOS
Model Name:	HRD27009
Series Model:	N/A
FCC ID:	2AA7KTARVOSHRD27000
IC:	20068-TARVOS27000
Test Standard:	FCC Part 90.353 RSS-137 Issue 2, February 2009

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TEST RESULT CERTIFICATION

Applicant's Name : STAR SYSTEMS INTERNATIONAL LIMITED
 Address : UNIT 7B, 8/F VANTA INDUSTRIAL CENTRE, 21-33 TAI LIN PAI ROAD, KWAI CHUNG, HK
Manufacturer's Name : STAR SYSTEMS INTERNATIONAL LIMITED
 Address : UNIT 7B, 8/F VANTA INDUSTRIAL CENTRE, 21-33 TAI LIN PAI ROAD, KWAI CHUNG, HK

Product Description

Product Name : INTEGRATED READER
 Brand Name : TARVOS
 Model Name..... : HRD27009

Series Model : N/A


Test Standards : FCC Part 90.353
 RSS-137 Issue 2, February 2009

Test Procedure : TIA TIA-603-D


This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC/IC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test :
 Date of receipt of test item : 26 May 2020
 Date of performance of tests... : 26 May 2020 ~ 16 July 2020
 01 Sept. 2020 ~ 16 Sept. 2020
 Date of Issue : 16 Sept. 2020
 Test Result : Pass

Testing Engineer : 

 (Chris chen)

Technical Manager : 

 (Sean she)



Authorized Signatory : 

 (Vita Li)



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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	16 July 2020	STS2005237W02	ALL	Initial Issue
00	16 Sept. 2020	STS2008346W02	ALL	Updated antenna and Radiated test data.





1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part 90 RSS-137			
Standard	Item	Result	Remarks
Part 90.205 RSS-137 6.4	ERP Power	PASS	--
Part 90.209 RSS-137 6.1	Occupied Bandwidth	PASS	--
Part 90.210 RSS-137 6.5	Spurious Emissions at Antenna terminals	PASS	--
Part 90.210 RSS-137 6.5	Radiated Spurious emissions	PASS	--
Part 90.213 RSS-137 6.3	Frequency Stability	PASS	--
RSS-137 6.6	Receiver Spurious emissions	PASS	--

NOTE:

- (1) 'N/A' denotes test is not applicable in this Test Report.
- (2) All tests are according to TIA-603-D.



1.1 TEST FACILITY

SHENZHEN STS TEST SERVICES CO., LTD

Add. : A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	RF output power, conducted	$\pm 0.68\text{dB}$
2	Unwanted Emissions, conducted	$\pm 2.988\text{dB}$
3	All emissions, radiated 30-1GHz	$\pm 5.6\text{dB}$
4	All emissions, radiated 1G-6GHz	$\pm 5.5\text{dB}$
5	All emissions, radiated >6G	$\pm 5.8\text{dB}$
6	Conducted Emission (9KHz-150KHz)	$\pm 3.37\text{dB}$
7	Conducted Emission (150KHz-30MHz)	$\pm 3.83\text{dB}$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	INTEGRATED READER
Brand Name:	TARVOS
Model Name:	HRD27009
Series Model:	N/A
Model Difference description:	N/A
Modulation type:	Dense reader mode for EPCglobal Gen2,RAIN,or ISO-18000-63 Single reader mode for EPCglobal Gen2,RAIN,or ISO-18000-63 Low data rate ISO-18000-62(40kbps) High data rate ISO-18000-62 (80kbps) Unmodulated ISO-10374 TDM Title 21
Adapter:	Input: AC 100-240V, 800mA, 50/60 Hz Output: DC 24V, 1.25A
Temperature Range:	-30°C-50°C
Test frequency list:	See Note 2
Software version number:	R5
Hardware version number:	1.5.2.23029
RFID Protocols	Frequency
Dense reader mode ISO-18000-63	911.25MHz -920.25MHz
Single reader mode ISO-18000-63	911.75MHz -919.25MHz
Low data rate ISO-18000-62(40kbps)	911.75MHz -919.75MHz
High data rate ISO-18000-62 (80kbps)	912.25MHz -918.75MHz
Unmodulated ISO-10374	902.75MHz and 903.25MHz, 910.75MHz -920.75MHz
TDM	913.75MHz and 916.25MHz
Title 21	913.75MHz – 917.75MHz

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



2.

Operation Frequency of channel					
Dense reader mode for EPCglobal Gen2,RAIN,or ISO-18000-63					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
04	911.25	11	914.75	18	918.25
05	911.75	12	915.25	19	918.75
06	912.25	13	915.75	20	919.25
07	912.75	14	916.25	21	919.75
08	913.25	15	916.75	22	920.25
09	913.75	16	917.25		
10	914.25	17	917.75		
Single reader mode for EPCglobal Gen2,RAIN,or ISO-18000-63					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
05	911.75	11	914.75	17	917.75
06	912.25	12	915.25	18	918.25
07	912.75	13	915.75	19	918.75
08	913.25	14	916.25	20	919.25
09	913.75	15	916.75		
10	914.25	16	917.25		
Low data rate ISO-18000-62(40kbps)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
05	911.75	11	914.75	17	917.75
06	912.25	12	915.25	18	918.25
07	912.75	13	915.75	19	918.75
08	913.25	14	916.25	20	919.25
09	913.75	15	916.75	21	919.75
10	914.25	16	917.25		
High data rate ISO-18000-62 (80kbps)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
06	912.25	11	914.75	16	917.25
07	912.75	12	915.25	17	917.75
08	913.25	13	915.75	18	918.25
09	913.75	14	916.25	19	918.75
10	914.25	15	916.75		
Unmodulated ISO-10374					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	902.75	09	913.75	17	917.75
02	903.25	10	914.25	18	918.25
03	910.75	11	914.75	19	918.75
04	911.25	12	915.25	20	919.25
05	911.75	13	915.75	21	919.75
06	912.25	14	916.25	22	920.25
07	912.75	15	916.75	23	920.75
08	913.25	16	917.25		
TDM					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
09	913.75	11	914.75	13	915.75
10	914.25	12	915.25	14	916.25



Title 21					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
09	913.75	12	915.25	15	916.75
10	914.25	13	915.75	16	917.25
11	914.75	14	916.25	17	917.75

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Antenna Cable loss (dB)	Antenna combination (dBi)
1	TARVOS	HRD27009	Avior	N/A	15	4	11
2	TARVOS	HRD27009	Cheetah II	N/A	12	4	8
3	TARVOS	HRD27009	Bobcat	N/A	8	4	4
4	TARVOS	HRD27009	Kuma	N/A	10	4	6

Note: All antennas have been tested for conducted emission and radiated spurious emission, but the report only shows the worst data of the Avior antenna.



2.2 EUT OPERATION MODE

The EUT has been tested under typical operating condition and The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

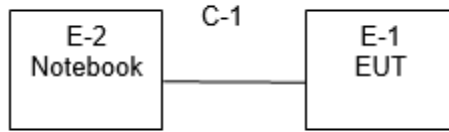
2.3 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test Mode	Modulation Type	Frenquency
Mode1	Dense reader mode for EPCglobal Gen2,RAIN,or ISO-18000-63	Low channel(911.25MHz)
		High channel(920.25MHz)
Mode2	Single reader mode for EPCglobal Gen2,RAIN,or ISO-18000-63	Low channel(911.75MHz)
		High channel(919.25MHz)
Mode3	Low data rate ISO-18000-62(40kbps)	Low channel(911.75MHz)
		High channel(919.75MHz)
Mode4	High data rate ISO-18000-62 (80kbps)	Low channel(912.25MHz)
		High channel(918.75MHz)
Mode5	Unmodulated ISO-10374	Low channel(902.75MHz)
		High channel(903.25MHz)
		Low channel(910.75MHz)
		High channel(920.75MHz)
Mode6	TDM	Low channel(913.75MHz)
		High channel(916.25MHz)
Mode7	Title 21	Low channel(913.75MHz)
		High channel(917.75MHz)



2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
E-2	Notebook	DELL	VOSTRO.3800	N/A	N/A
C-1	USB Cable	N/A	N/A	100cm	N/A

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.



2.6 TEST EQUIPMENT

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Signal Analyzer	Agilent	N9020A	MY51110105	2020.03.05	2021.03.04
Signal Generator	Agilent	N5182A	MY46240556	2019.10.09	2020.10.08
Bilog Antenna	TESEQ	CBL6111D	34678	2017.11.02	2020.11.01
Horn Antenna	SCHWARZBECK	BBHA 9120D(1201)	9120D-1343	2018.10.19	2021.10.18
Pre-Amplifier (0.1M-3GHz)	EM	EM330	060665	2019.10.09	2020.10.08
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-4 5	SK2018080901	2019.10.12	2020.10.11
Pre-Amplifier (18G-40G)	SKET	LNPA_1840-50	SK2018101801	2019.10.22	2020.10.21
Attenuator	HP	8494B	DC-18G	2020.04.30	2021.04.29
Programmable power supply	Agilent	E3642A	MY40002025	2019.10.11	2020.10.10
AC Power Source	APC	KDF-11010G	F214050035	N.C.R	N.C.R
Audio analyzer	R&S	UPL	100689	2020.03.05	2021.03.04



3. MAXIMUM TRANSMITTER POWER

3.1 LIMITS

LMS systems operating pursuant to subpart M of this part in the 902-927.25 MHz band will be authorized a maximum of 30 watts ERP. LMS equipment operating in the 927.25-928 MHz band will be authorized a maximum of 300 watts ERP. ERP must be measured as peak envelope power. Antenna heights will be as specified in FCC Part §90.353(h).

3.2 TEST PROCEDURE

1. Set analyzer center frequency to channel center frequency.
2. Set the RBW to: 1MHz \geq RBW 3. Set the VBW \geq 3 x RBW.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

3.3 TEST CONDITIONS

The EUT is transmitting through a antenna cable with a stated loss of 3dB. All Firmware setting is 33dBm.

3.4 TEST RESULT

Dense reader mode ISO-18000-63								
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP Limit (dBm)	Verdict
Low	911.25	33.499	4.000	15.000	44.499	42.349	44.77	Pass
High	920.25	33.695	4.000	15.000	44.695	42.545		
Single reader mode ISO-18000-63								
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP Limit (dBm)	Verdict
Low	911.75	33.360	4.000	15.000	44.360	42.210	44.77	Pass
High	919.25	33.483	4.000	15.000	44.483	42.333		
Low data rate ISO-18000-62(40kbps)								
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP Limit (dBm)	Verdict
Low	911.75	33.452	4.000	15.000	44.452	42.302	44.77	Pass
High	919.75	33.528	4.000	15.000	44.528	42.378		
High data rate ISO-18000-62 (80kbps)								
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP Limit (dBm)	Verdict
Low	912.25	33.471	4.000	15.000	44.471	42.321	44.77	Pass
High	918.75	33.534	4.000	15.000	44.534	42.384		



Unmodulated ISO-10374								
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP Limit (dBm)	Verdict
Low	902.75	33.167	4.000	15.000	44.167	42.017	44.77	Pass
High	903.75	33.117	4.000	15.000	44.117	41.967		
Low	910.75	33.255	4.000	15.000	44.255	42.105		
High	920.75	33.362	4.000	15.000	44.362	42.212		
TDM								
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP Limit (dBm)	Verdict
Low	913.75	33.315	4.000	15.000	44.315	42.165	44.77	Pass
High	916.25	33.268	4.000	15.000	44.268	42.118		
Title 21								
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)	ERP (dBm)	ERP Limit (dBm)	Verdict
Low	913.75	33.254	4.000	15.000	44.254	42.104	44.77	Pass
High	917.75	33.298	4.000	15.000	44.298	42.148		

Note:

1. The EUT is transmitting through a long enough antenna cable with a stated loss of 4dB into the antenna with type N connector 15dBi gain.
2. $EIRP = \text{conducted power} + \text{antenna gain} - \text{cable loss}$; $ERP = EIRP - 2.15$
3. Worst case modulation used by the device.

KDB 594280. Professional installation or authorized service personnel is required to configure radio parameters of the transmitter using the software for adjusting total EIRP (30W) power at local installation to ensure compliance with FCC Rules.



4. OCCUPIED BANDWIDTH

4.1 LIMIT

The maximum authorized bandwidth shall be 12 MHz for non-multilateration LMS operations in the band 909.75-921.75 MHz and 2 MHz in the band 902.00-904.00 MHz. The maximum authorized bandwidth for multilateration LMS operations shall be 5.75 MHz in the 904.00-909.75 MHz band; 2 MHz in the 919.75-921.75 MHz band; 5.75 MHz in the 921.75-927.25 MHz band and its associated 927.25-927.50 MHz narrowband forward link; and 8.00 MHz if the 919.75-921.75 MHz and 921.75-927.25 MHz bands and their associated 927.25-927.50 MHz and 927.50-927.75 MHz narrowband forward links are aggregated.

4.2 MEASUREMENT PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	For 26 dB Bandwidth :100KHz For 99% Bandwidth :1% to 5% of the occupied bandwidth
VBW	For 26dB Bandwidth : $\geq 3 \times$ RBW For 99% Bandwidth : approximately $3 \times$ RBW
Trace	Max hold
Sweep	Auto

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB and 99% relative to the maximum level measured in the fundamental emission.

4.3 TEST RESULT

Dense reader mode ISO-18000-63			
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)	99% Bandwidth(KHz)
Low	911.25	347.90	102.35
High	920.25	357.10	116.24
Single reader mode ISO-18000-63			
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)	99% Bandwidth(KHz)
Low	911.75	439.30	273.21
High	919.25	438.40	270.94
Low data rate ISO-18000-62(40kbps)			
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)	99% Bandwidth(KHz)
Low	911.75	457.50	238.79
High	919.75	445.60	235.50
High data rate ISO-18000-62 (80kbps)			
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)	99% Bandwidth(KHz)
Low	912.25	646.80	481.99
High	918.75	634.70	479.51



Unmodulated ISO-10374			
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)	99% Bandwidth(KHz)
Low	902.75	289.10	23.04
High	903.25	289.40	23.09
Low	910.75	289.50	23.09
High	920.75	289.40	23.07
TDM			
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)	99% Bandwidth(KHz)
Low	913.75	620.30	153.03
High	916.25	615.20	151.06
Title 21			
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)	99% Bandwidth(KHz)
Low	913.75	1031.00	897.96
High	917.75	1031.00	890.58

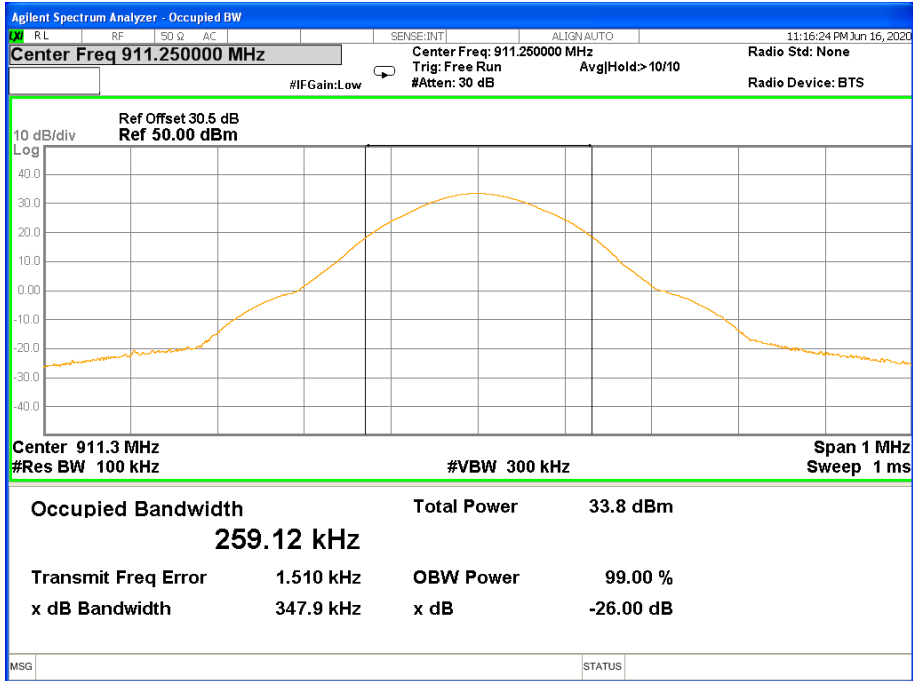
Note: Unmodulated ISO-10374 mode emission type is unmodulation type, which cannot meet the 1%-5% OBW test requirements.



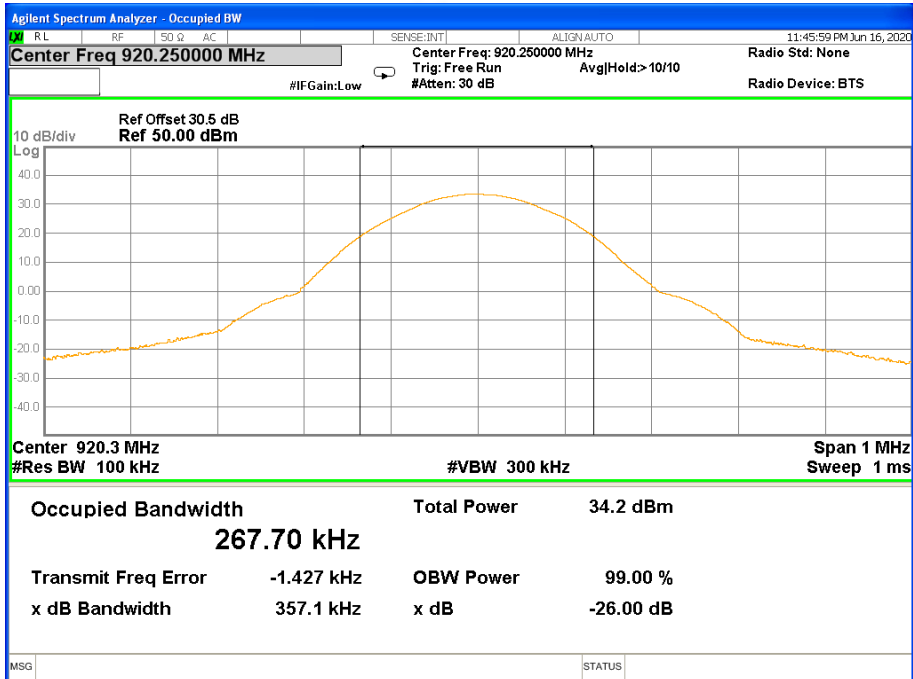
26 dB Bandwidth

Dense reader mode ISO-18000-63

Low channel(911.25MHz)

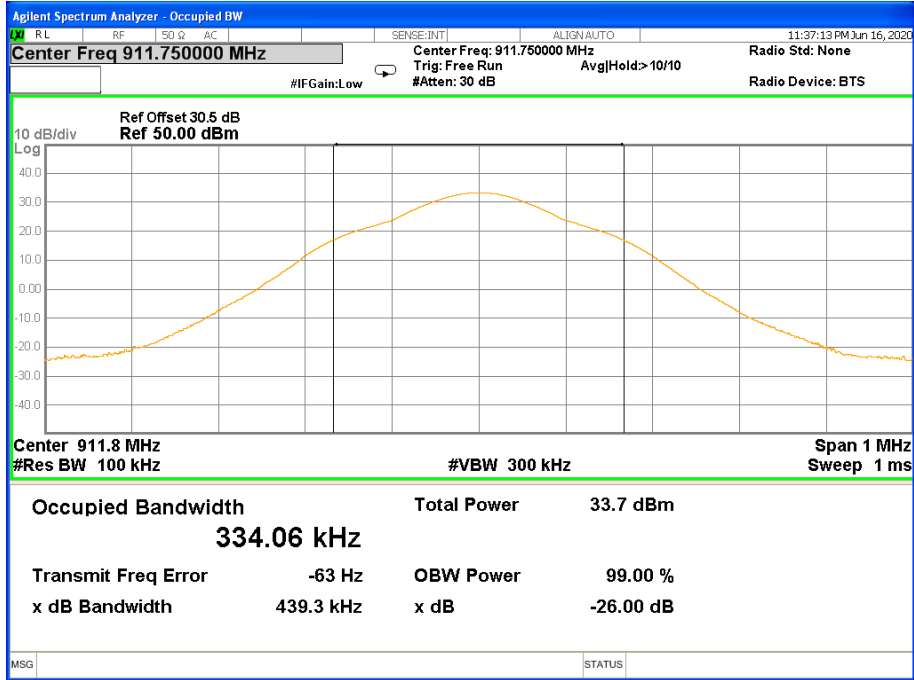


High channel(920.25MHz)

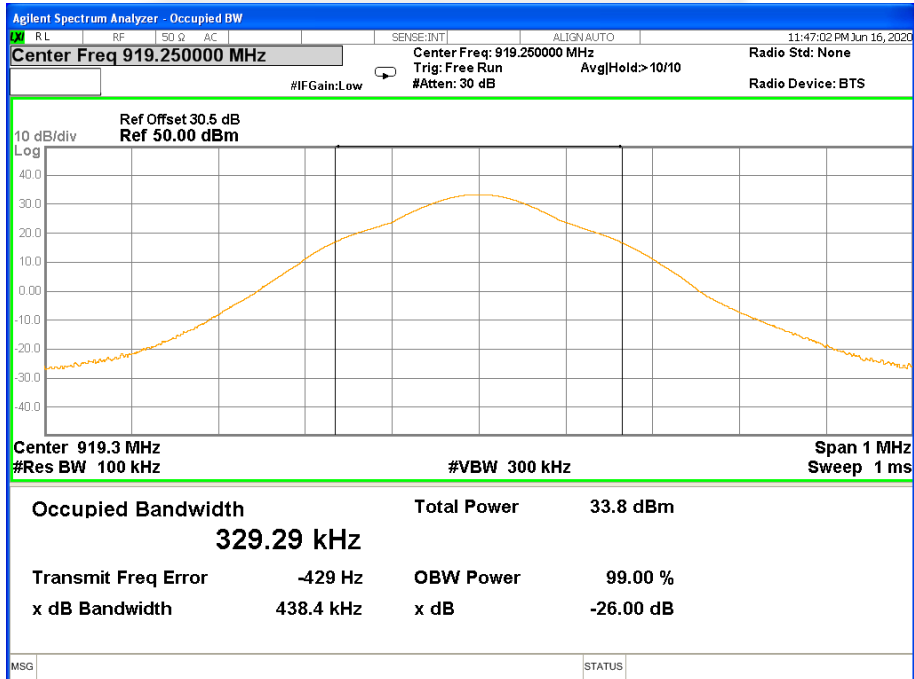




Single reader mode ISO-18000-63
Low channel(911.75MHz)

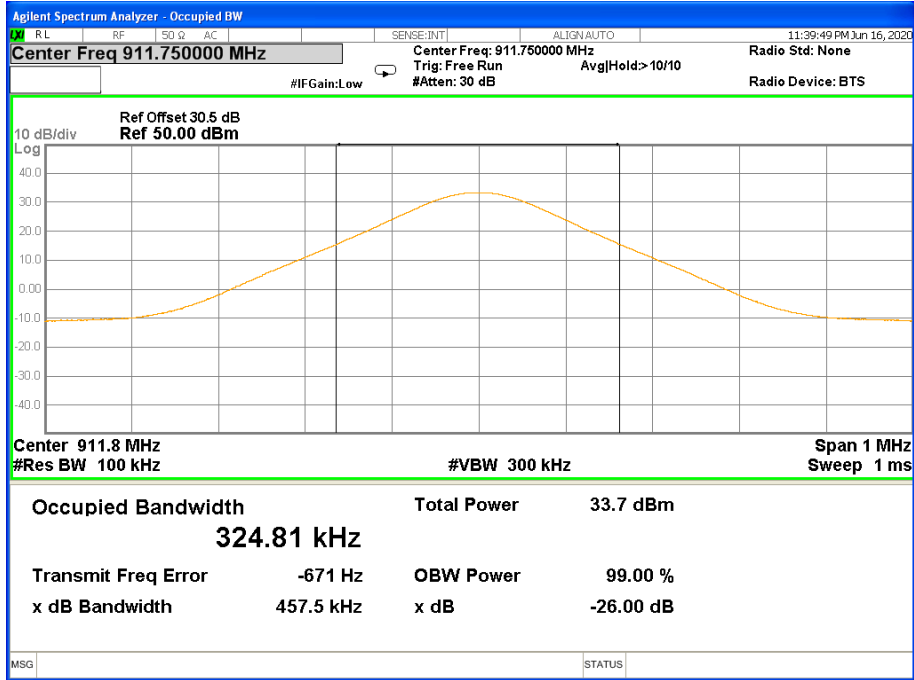


High channel(919.25MHz)

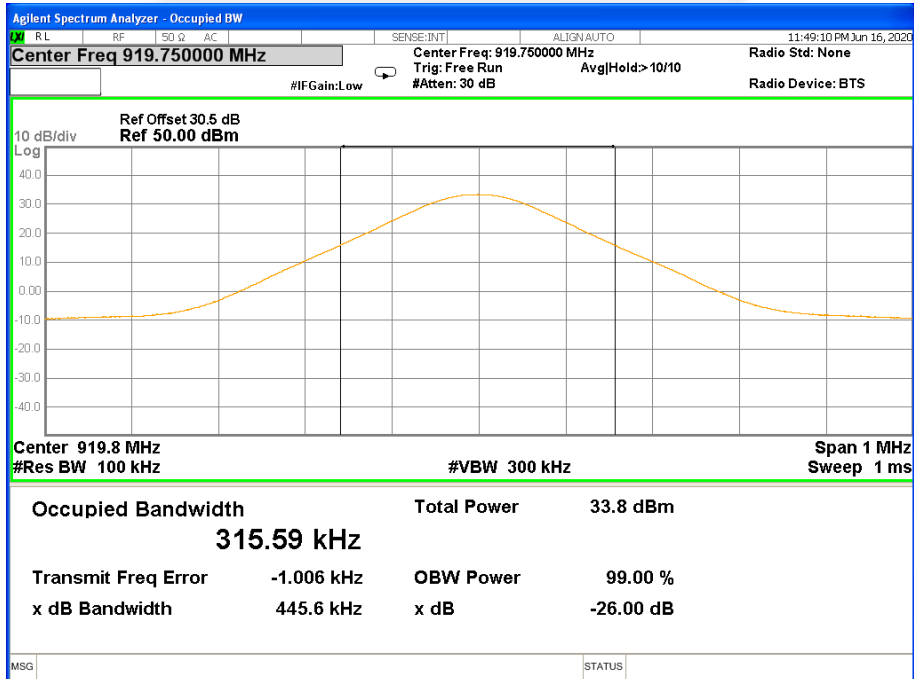




Low data rate ISO-18000-62(40kbps)
Low channel(911.75MHz)



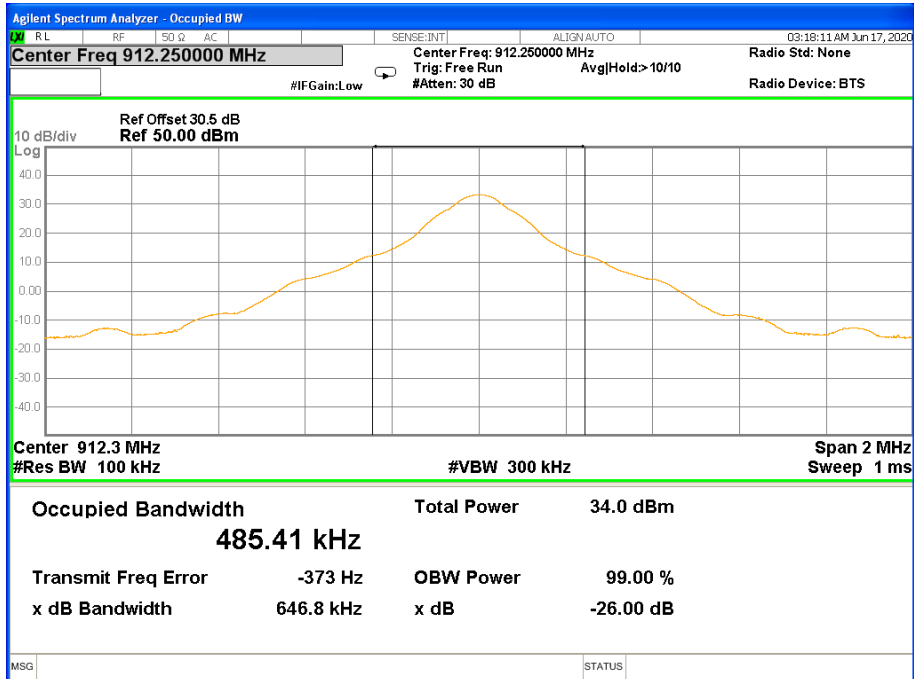
High channel(919.75MHz)



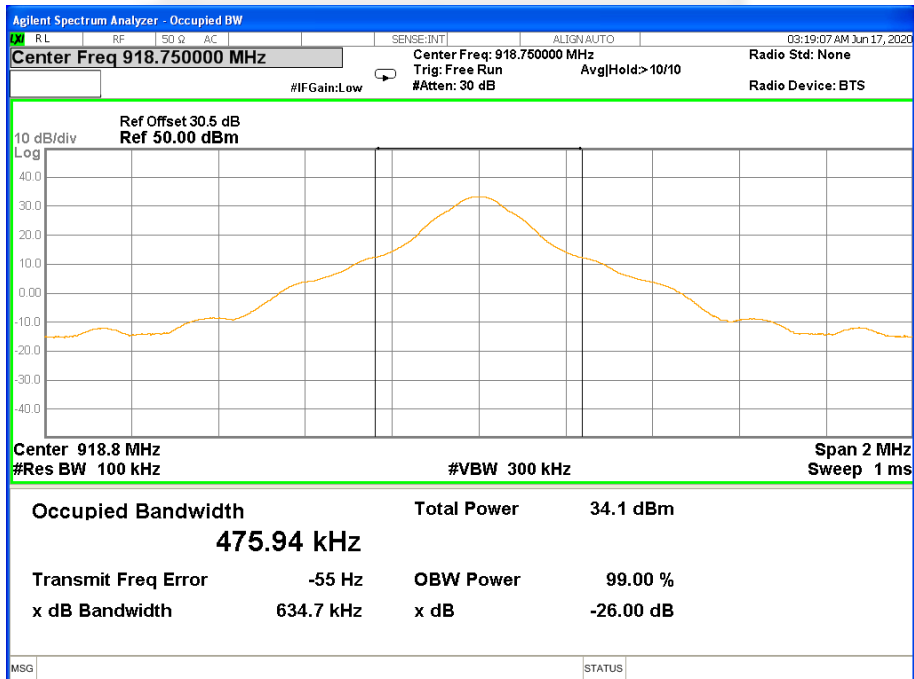


High data rate ISO-18000-62(80kbps)

Low channel(912.25MHz)

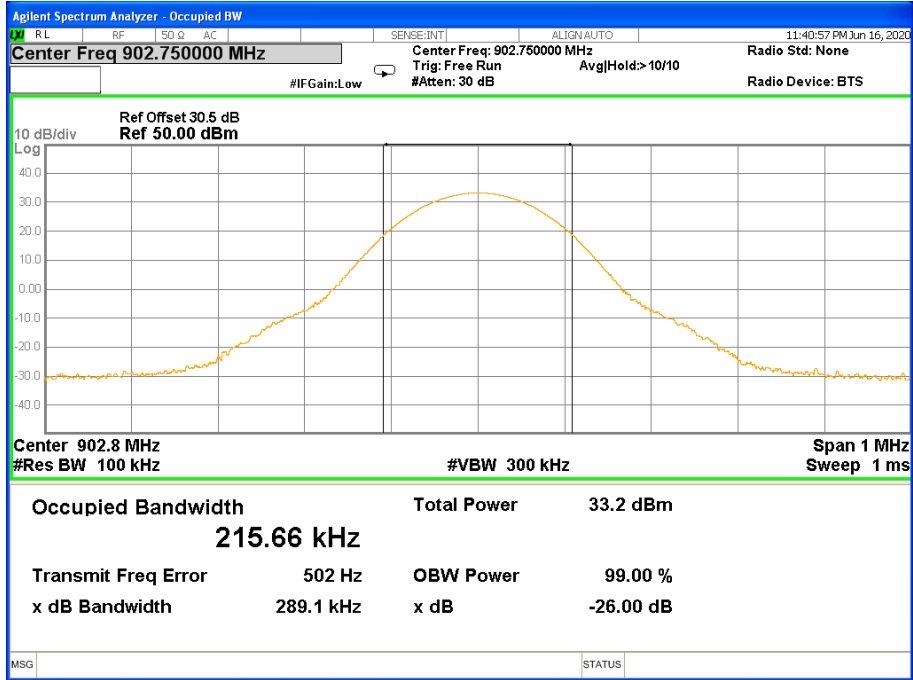


High channel(918.75MHz)

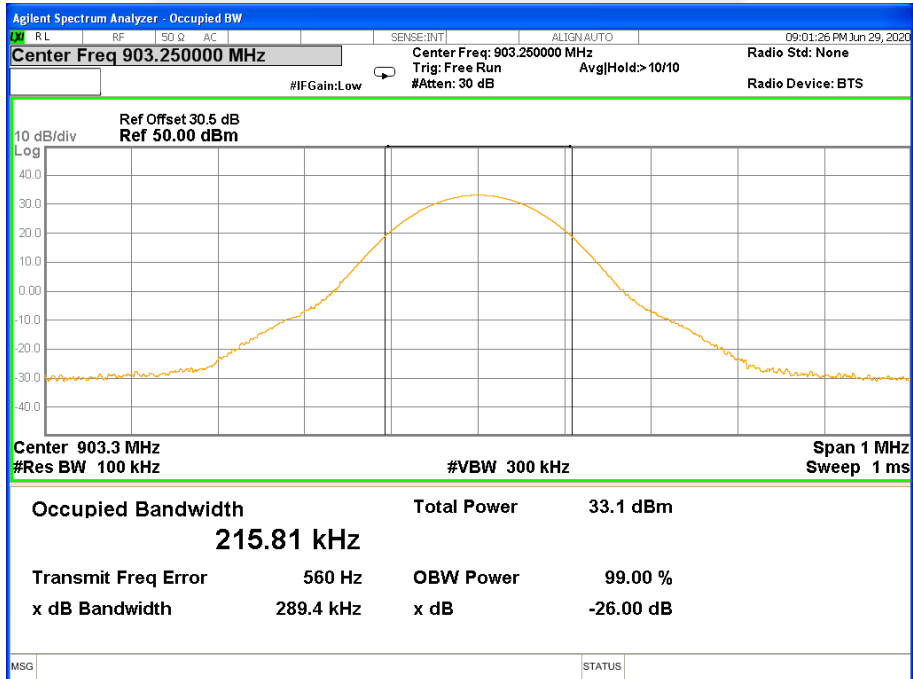




Unmodulated ISO-10374
Low channel(902.75MHz)

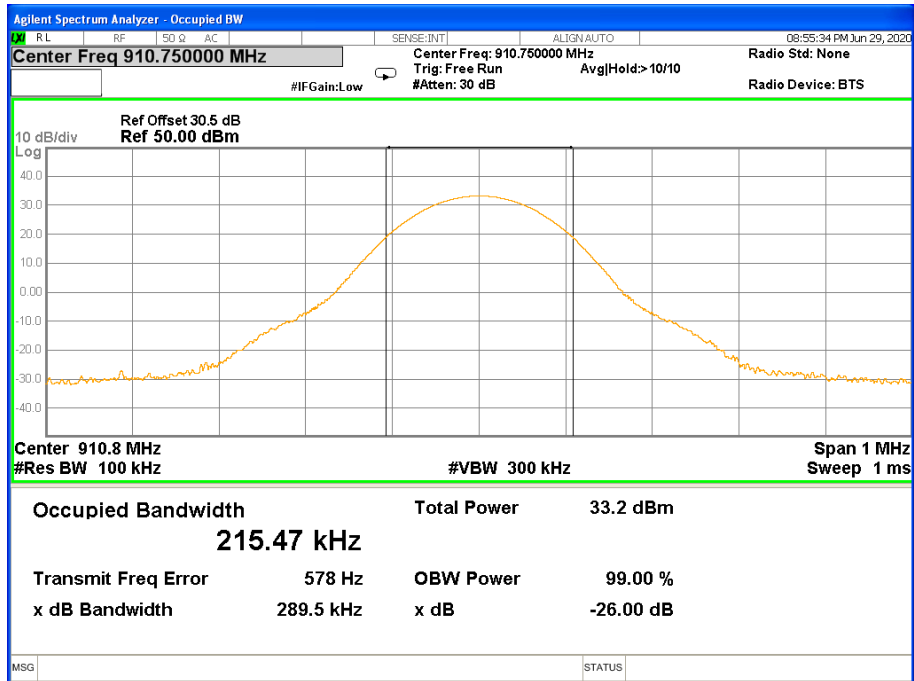


High channel(903.25MHz)

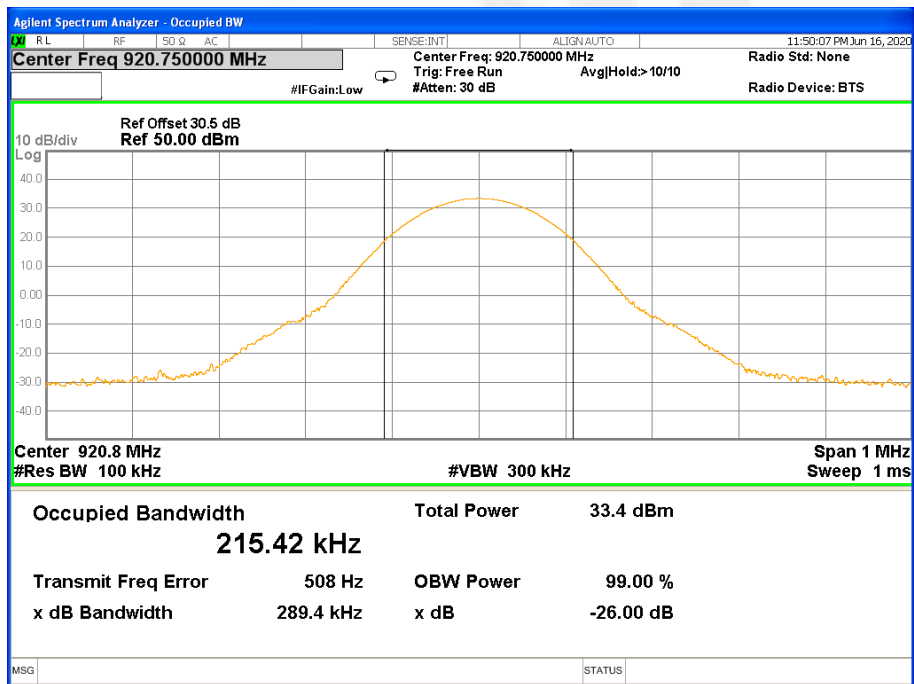




Low channel(910.75MHz)

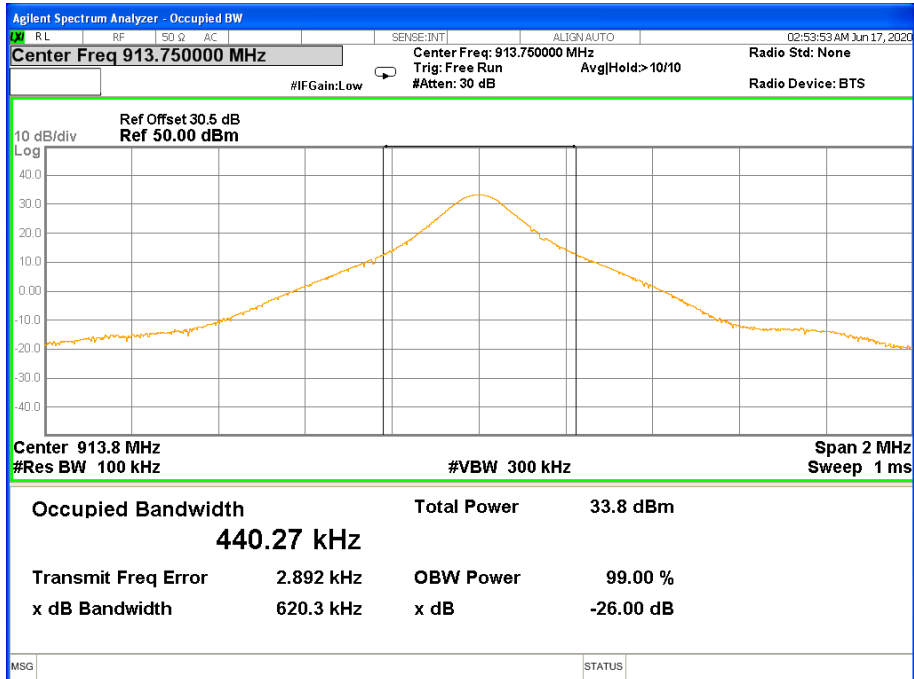


High channel(920.75MHz)

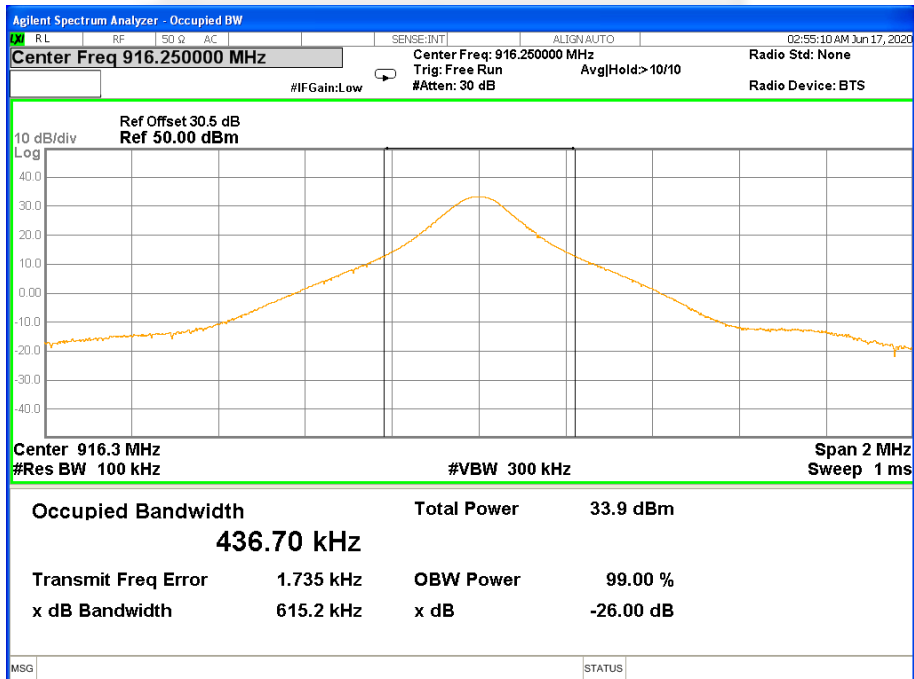




TDM
Low channel(913.75MHz)

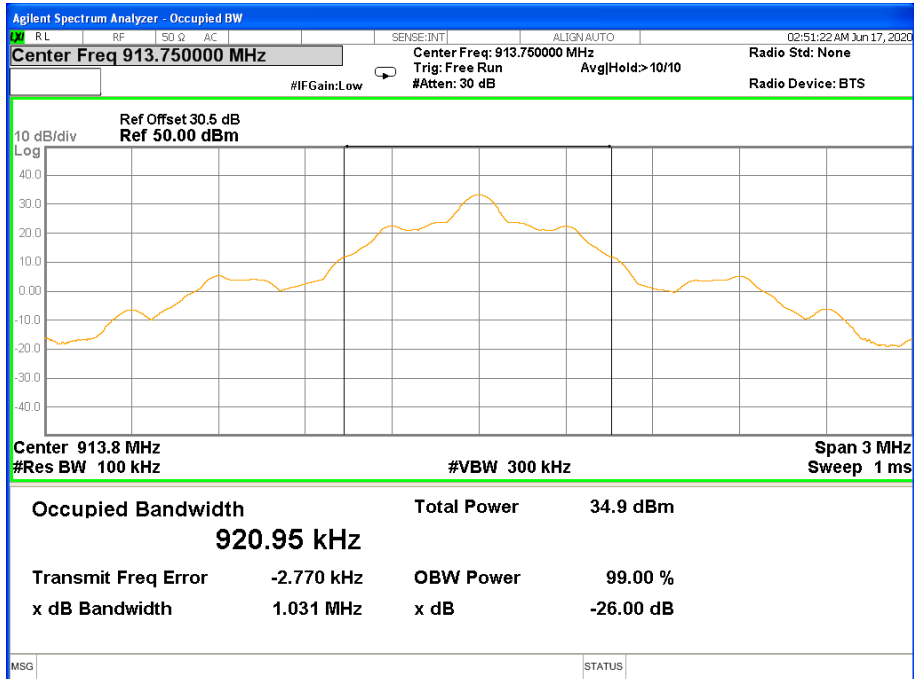


High channel(916.25MHz)

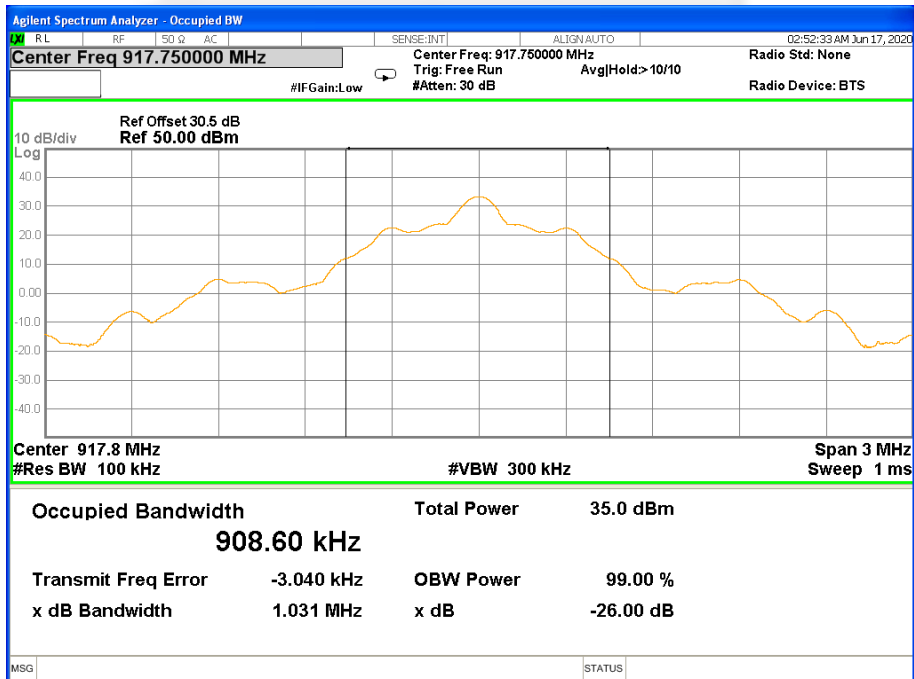




Title 21
Low channel(913.75MHz)



High channel(917.75MHz)

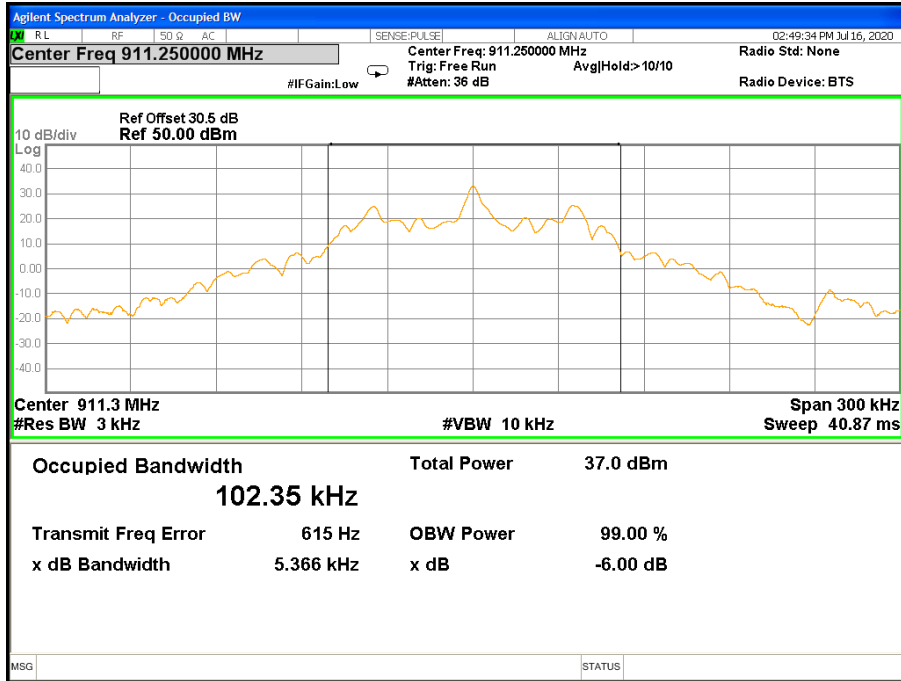




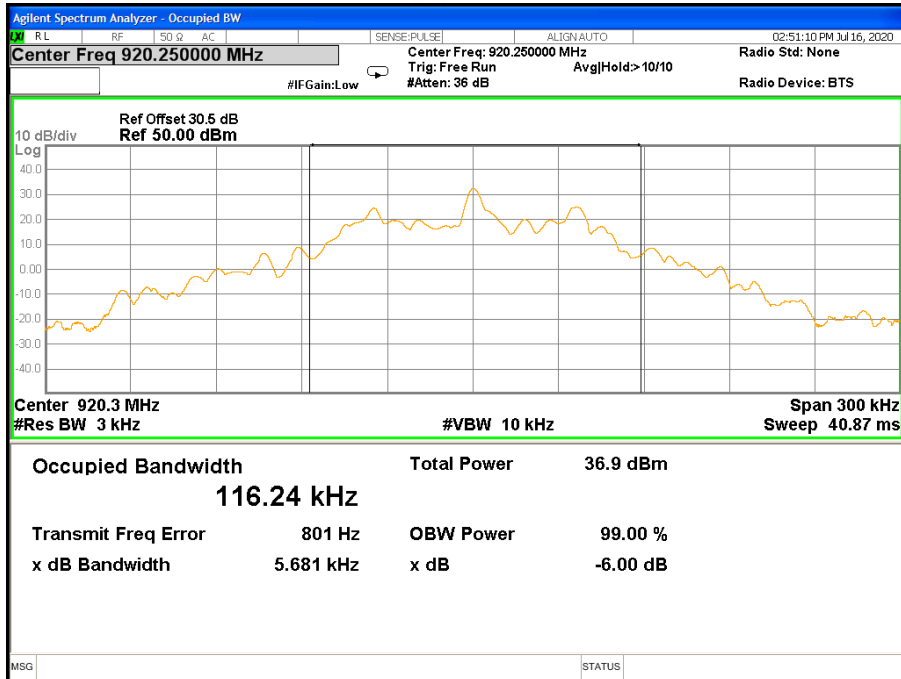
99% Bandwidth

Dense reader mode ISO-18000-63

Low channel(911.25MHz)

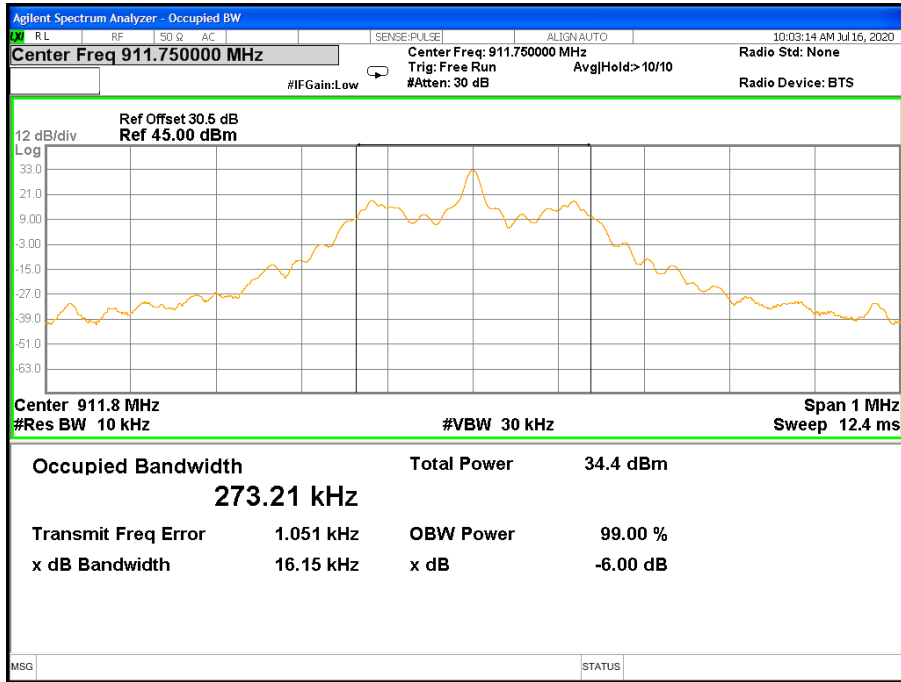


High channel(920.25MHz)

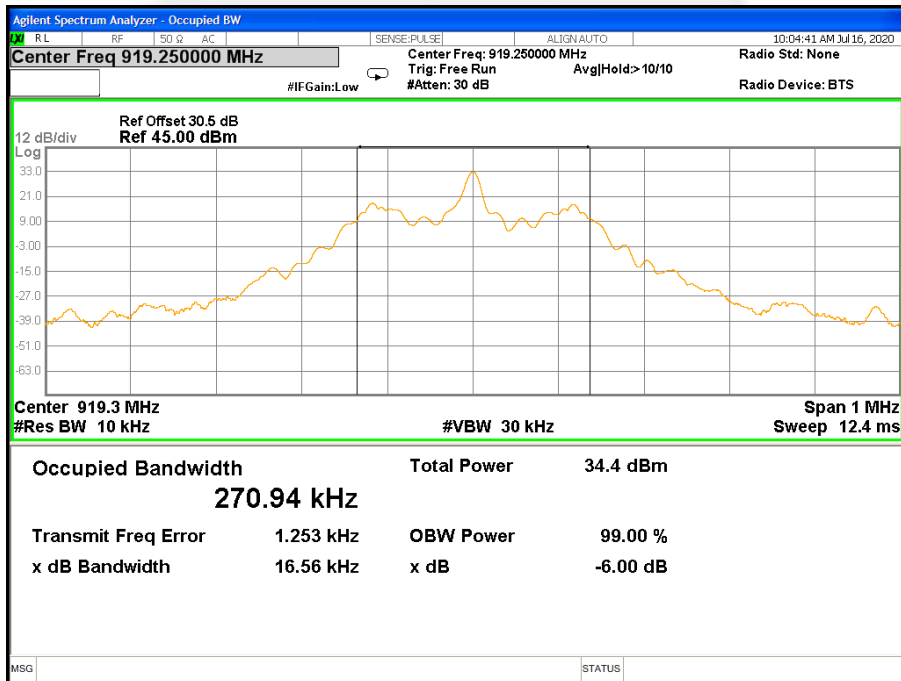




Single reader mode ISO-18000-63
Low channel(911.75MHz)



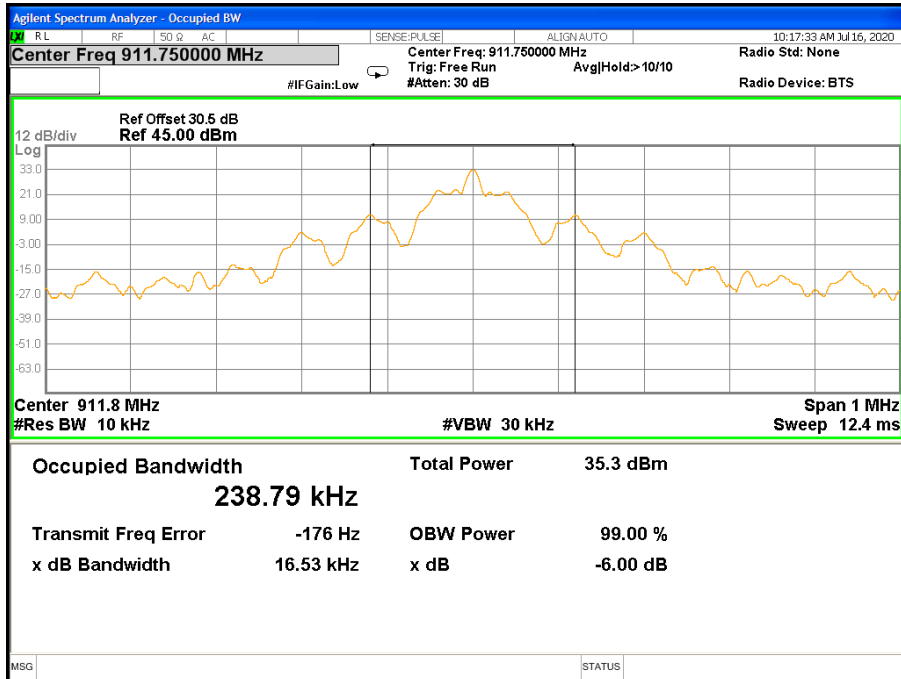
High channel(919.25MHz)



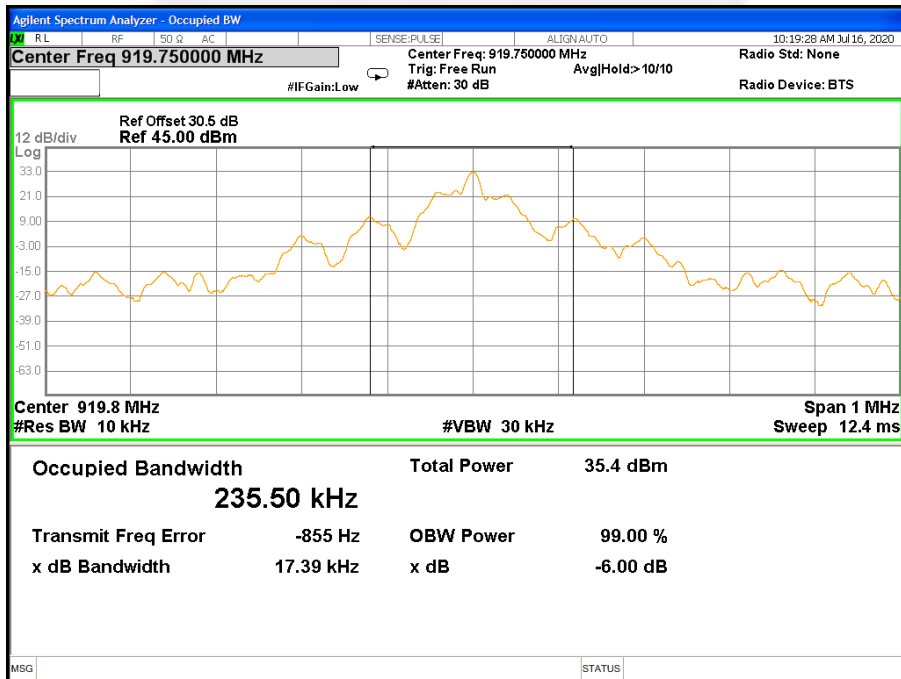


Low data rate ISO-18000-62(40kbps)

Low channel(911.75MHz)

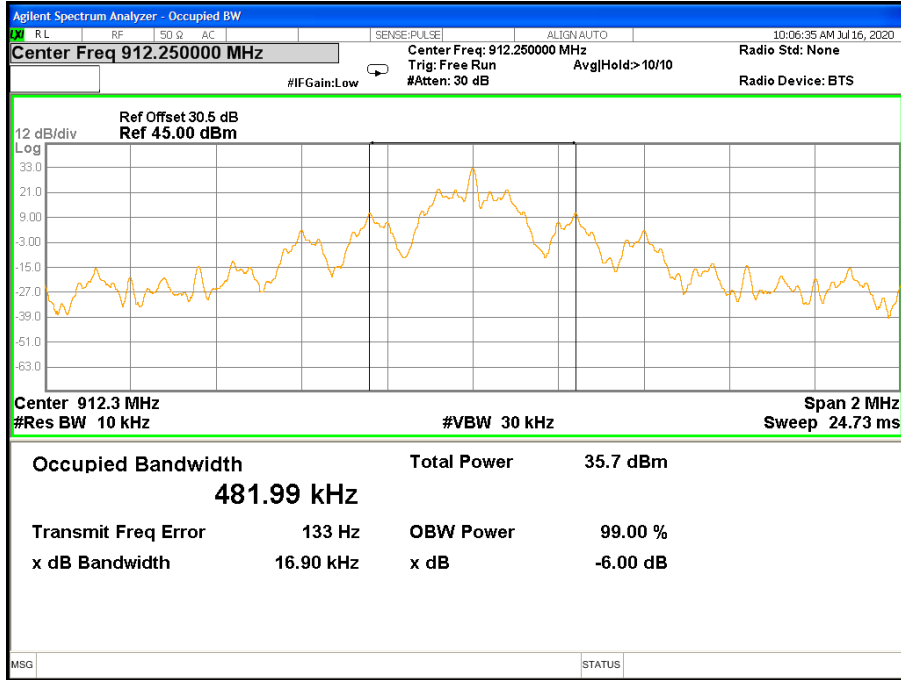


High channel(919.75MHz)

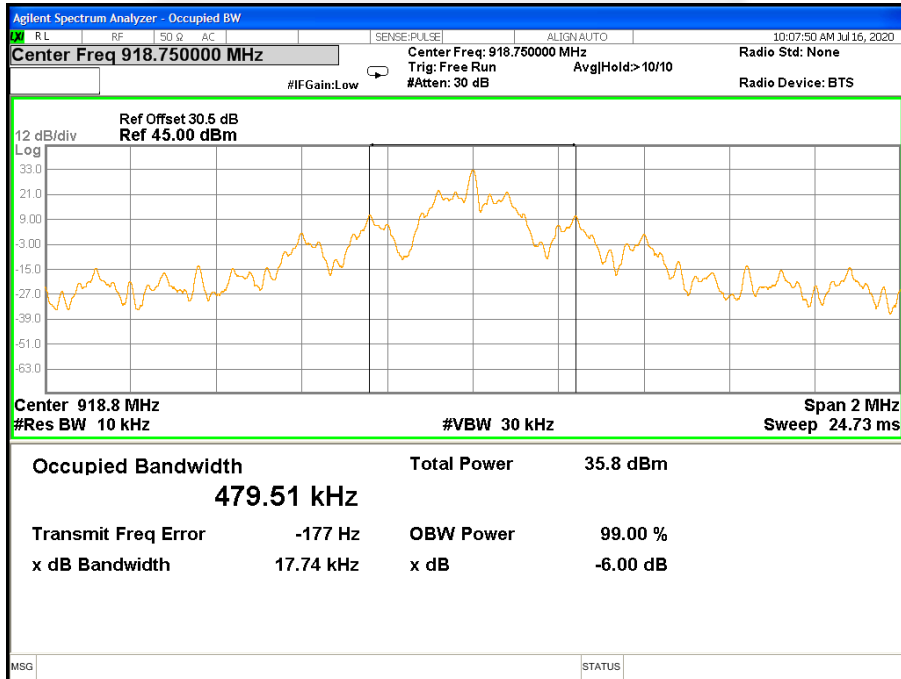




High data rate ISO-18000-62(80kbps)
Low channel(912.25MHz)

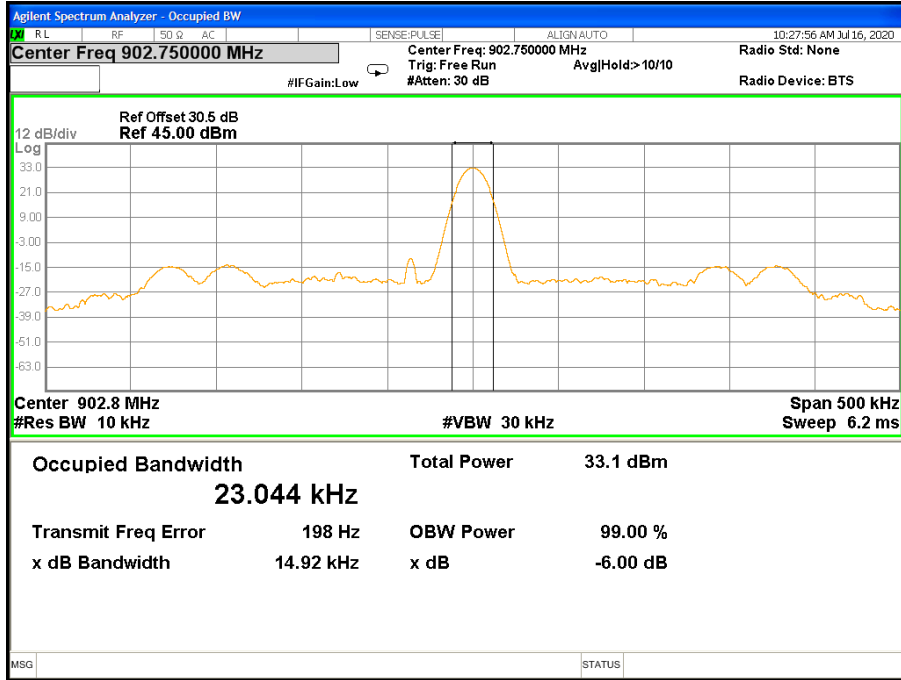


High channel(918.75MHz)

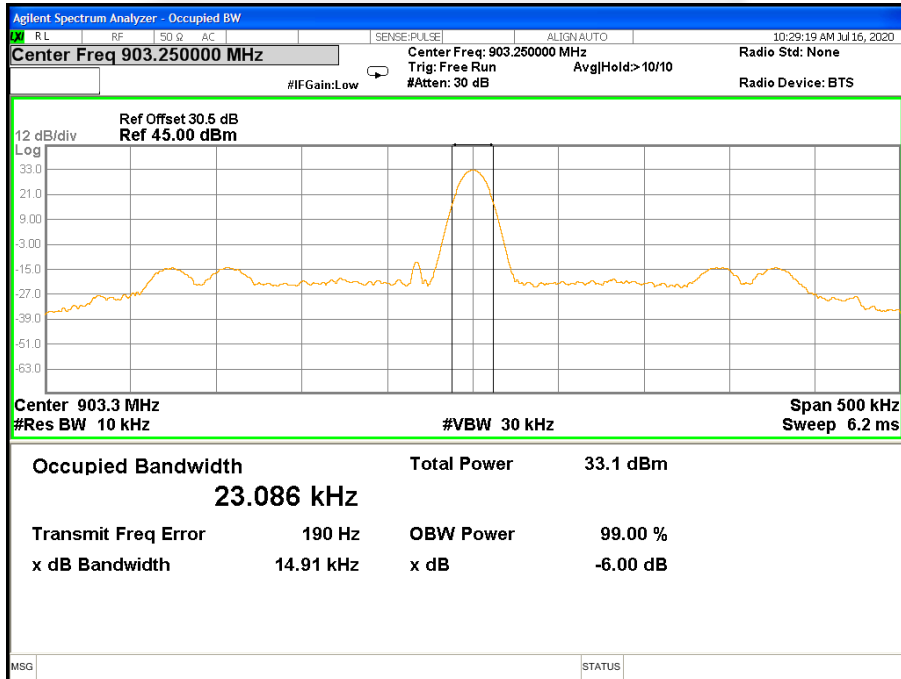




Unmodulated ISO-10374
Low channel(902.75MHz)

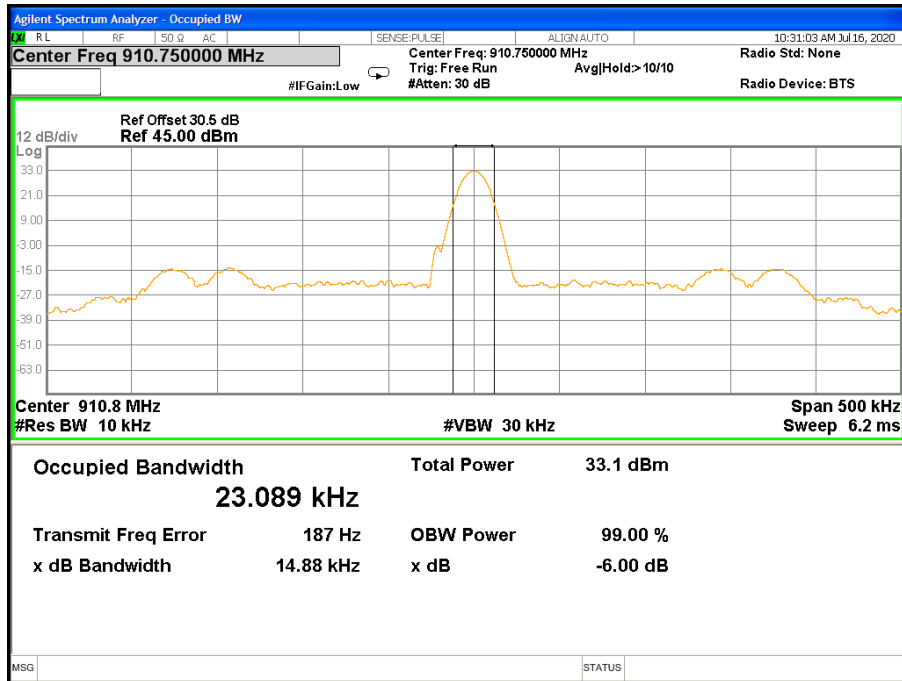


High channel(903.25MHz)

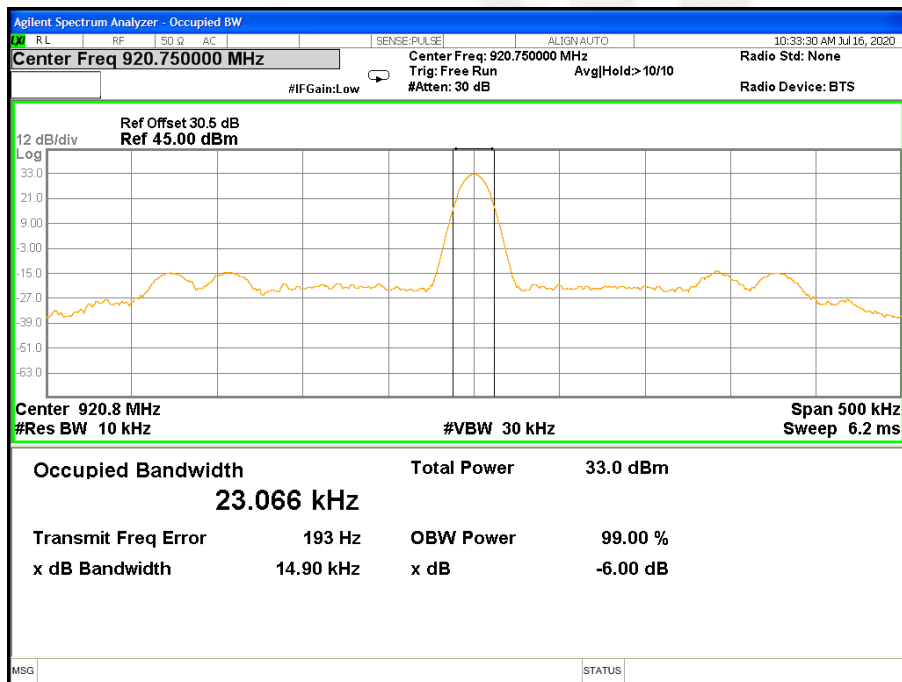




Low channel(910.75MHz)

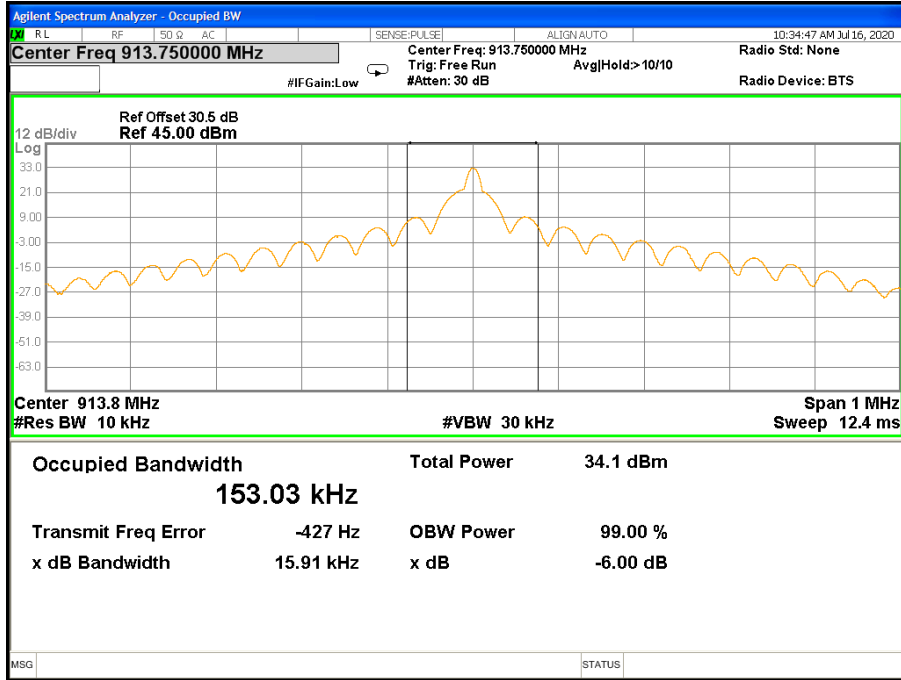


High channel(920.75MHz)

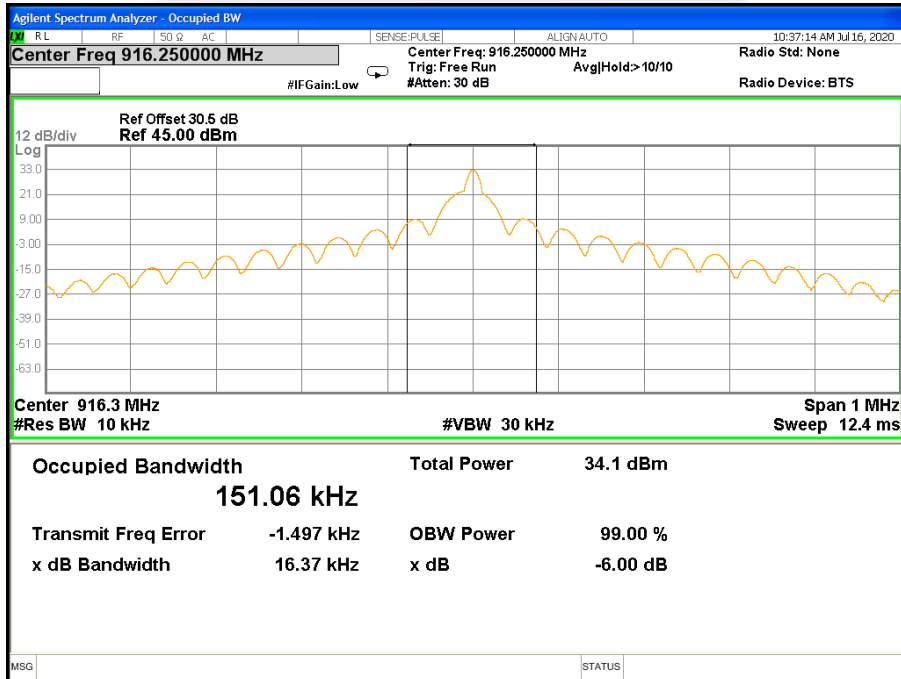




TDM
Low channel(913.75MHz)

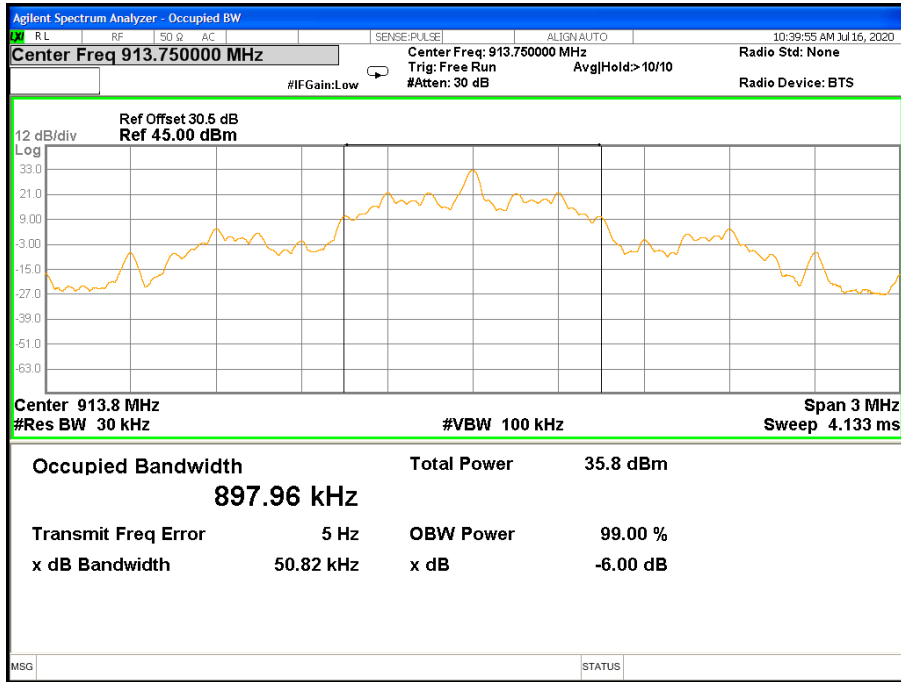


High channel(916.25MHz)

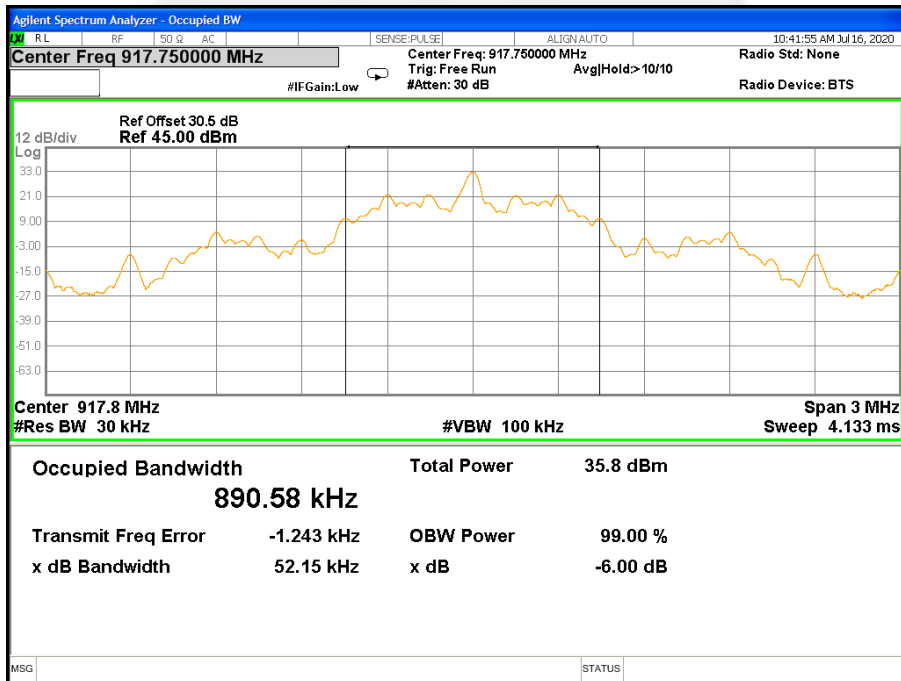




Title 21
Low channel(913.75MHz)



High channel(917.75MHz)



5. FREQUENCY STABILITY

5.1 LIMIT

However, the device meets the following condition:

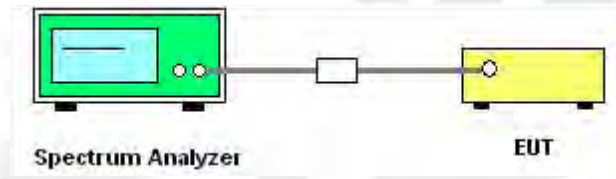
Fixed non-multilateration transmitters with an authorized bandwidth that is more than 40 kHz from the band edge, intermittently operated hand-held readers, and mobile transponders are not subject to frequency tolerance restrictions.

Frequency tolerances measurements are taken for information purpose. Frequency must be maintained from -30°C to +50°C. The EUT is monitored at each 10 °C increment. At each temperature, the device is checked after a stabilization period required for the device to reach the temperature.

5.2 TEST PROCEDURE

1. Set analyzer center frequency to channel center frequency.
2. Set the RBW to: 30KHz= RBW
3. Set the VBW $\geq 3 \times$ RBW.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

5.3 TEST SETUP BLOCK DIAGRAM



5.4 MEASUREMENT RESULT

The worst case results are presented, with the frequency shown. The device was checked at each 10 °C increment of temperature.

Dense reader mode ISO-18000-63					
Channel	Test Condition	Nominal Frequency (MHz)	Measured Frequency (MHz)	Result (ppm)	Limit (ppm)
911.25MHz	+22°C, Nominal	911.25	911.24998	-0.022	±2.5
	-30°C, Nominal	911.25	911.24996	-0.044	
	+50°C, Nominal	911.25	911.24999	-0.011	
920.25MHz	+22°C, Nominal	920.25	920.24998	-0.022	
	-30°C, Nominal	920.25	920.24995	-0.054	
	+50°C, Nominal	920.25	920.24999	-0.011	



Single reader mode ISO-18000-63					
Channel	Test Condition	Nominal Frequency (MHz)	Measured Frequency (MHz)	Result (ppm)	Limit (ppm)
911.75MHz	+22°C, Nominal	911.75	911.75000	0.000	±2.5
	-30°C, Nominal	911.75	911.74997	-0.033	
	+50°C, Nominal	911.75	911.75000	0.000	
919.25MHz	+22°C, Nominal	919.25	919.25000	0.000	
	-30°C, Nominal	919.25	919.24999	-0.011	
	+50°C, Nominal	919.25	919.25003	0.033	

Low data rate ISO-18000-62 (40kbps)					
Channel	Test Condition	Nominal Frequency (MHz)	Measured Frequency (MHz)	Result (ppm)	Limit (ppm)
911.75MHz	+22°C, Nominal	911.75	911.74998	-0.022	±2.5
	-30°C, Nominal	911.75	911.74997	-0.033	
	+50°C, Nominal	911.75	911.74998	-0.022	
919.75MHz	+22°C, Nominal	919.75	919.74998	-0.022	
	-30°C, Nominal	919.75	919.74996	-0.043	
	+50°C, Nominal	919.75	919.74996	-0.043	

High data rate ISO-18000-62 (80kbps)					
Channel	Test Condition	Nominal Frequency (MHz)	Measured Frequency (MHz)	Result (ppm)	Limit (ppm)
912.75MHz	+22°C, Nominal	912.25	912.24998	-0.022	±2.5
	-30°C, Nominal	912.25	912.24993	-0.077	
	+50°C, Nominal	912.25	912.24996	-0.044	
918.75MHz	+22°C, Nominal	918.75	918.74998	-0.022	
	-30°C, Nominal	918.75	918.74996	-0.044	
	+50°C, Nominal	918.75	918.74998	-0.022	



Unmodulated ISO-10374					
Channel	Test Condition	Nominal Frequency (MHz)	Measured Frequency (MHz)	Result (ppm)	Limit (ppm)
902.75MHz	+22°C, Nominal	902.75	902.74996	-0.0443	±2.5
	-30°C, Nominal	902.75	902.74995	-0.0554	
	+50°C, Nominal	902.75	902.74997	-0.0332	
903.25MHz	+22°C, Nominal	903.25	903.24996	-0.0443	
	-30°C, Nominal	903.25	903.24994	-0.0664	
	+50°C, Nominal	903.25	903.24999	-0.0111	
910.75MHz	+22°C, Nominal	910.75	910.74996	-0.0439	
	-30°C, Nominal	910.75	910.74994	-0.0659	
	+50°C, Nominal	910.75	910.74999	-0.0110	
920.75MHz	+22°C, Nominal	920.75	920.74998	-0.0217	
	-30°C, Nominal	920.75	920.74994	-0.0652	
	+50°C, Nominal	920.75	920.74999	-0.0109	

TDM					
Channel	Test Condition	Nominal Frequency (MHz)	Measured Frequency (MHz)	Result (ppm)	Limit (ppm)
913.75MHz	+22°C, Nominal	913.75	913.75000	0.000	±2.5
	-30°C, Nominal	913.75	913.74997	-0.033	
	+50°C, Nominal	913.75	913.75001	0.011	
916.25MHz	+22°C, Nominal	916.25	916.24996	-0.044	
	-30°C, Nominal	916.25	916.24994	-0.065	
	+50°C, Nominal	916.25	916.24995	-0.055	

Title 21					
Channel	Test Condition	Nominal Frequency (MHz)	Measured Frequency (MHz)	Result (ppm)	Limit (ppm)
913.75MHz	+22°C, Nominal	913.75	913.74996	-0.044	±2.5
	-30°C, Nominal	913.75	913.74994	-0.066	
	+50°C, Nominal	913.75	913.74995	-0.055	
917.75MHz	+22°C, Nominal	917.75	917.74996	-0.044	
	-30°C, Nominal	917.75	917.74993	-0.076	
	+50°C, Nominal	917.75	917.74994	-0.065	



6. FIELD STRENGTH OF SPURIOUS EMISSIONS

6.1 LIMIT

For all other transmitters authorized under subpart M that operate in the 902-928 MHz band, the peak power of any emission shall be attenuated below the power of the highest emission contained within the licensee's sub-band in accordance with the following schedule:

- (i) On any frequency within the authorized bandwidth: Zero dB.
- (ii) On any frequency outside the licensee's sub-band edges: $55 + 10 \log(P)$ dB, where (P) is the highest emission (watts) of the transmitter inside the licensee's sub-band.

6.2 TEST PROCEDURE

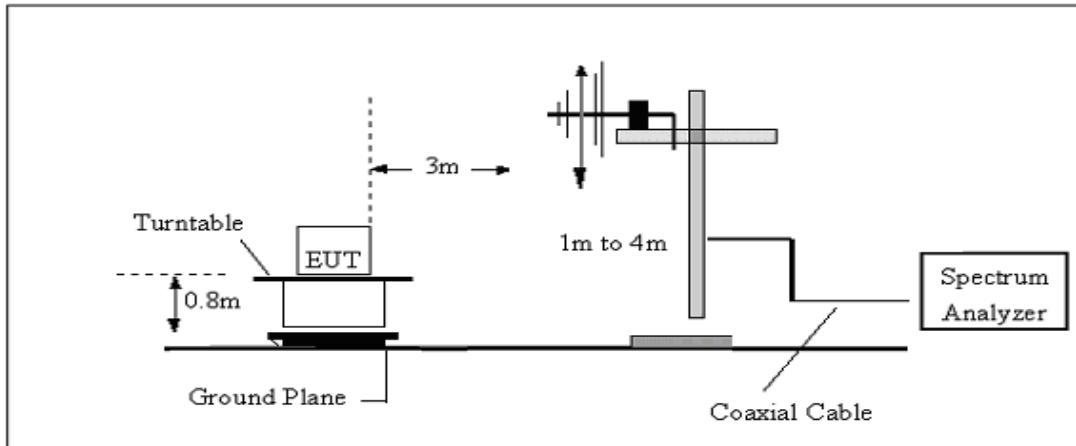
- a. The measuring distance at 3 m shall be used for measurements at frequency 30MHz up to 1GHz, and above 1GHz.
- b. The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber. The table was rotated 360 degree to determine the position of the highest radiation.
- c. The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarization of the antenna are set to make the measurement.
- d. 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 Quasi Peak detector mode will be re-measured.
- e. If the Peak Mode measured value is compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and no additional QP Mode measurement was performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

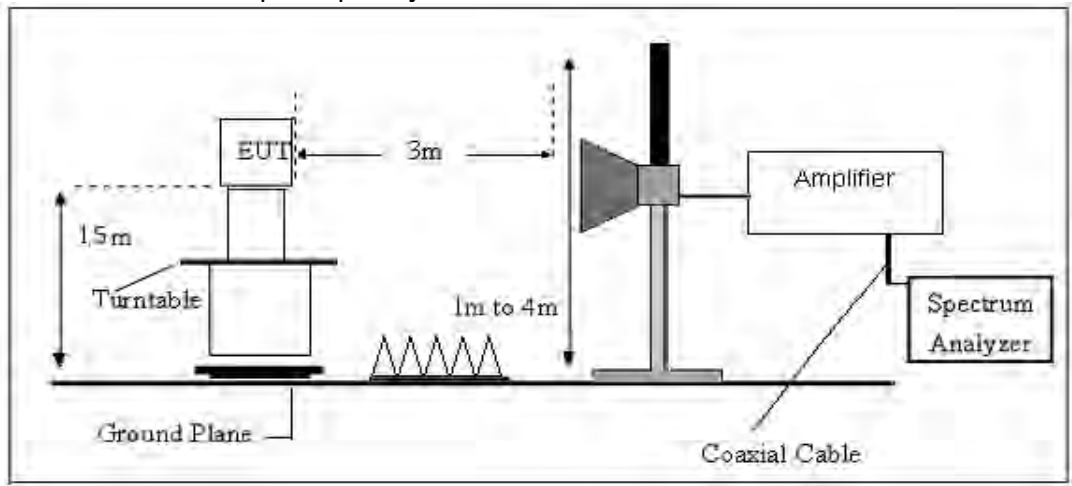
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

6.3 TEST SETUP

(A) Radiated Emission Test-Up Frequency 30MHz~1GHz



(B) Radiated Emission Test-Up Frequency Above 1GHz



6.4 EUT OPERATION CONDITIONS

Please refer to section 2.4 of this report.

6.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

Frequency (MHz)	FS (dBμV/m)	RA (dBμV/m)	AF (dB)	CL (dB)	AG (dB)	Factor (dB)
300	40	58.1	12.2	1.6	31.9	-18.1

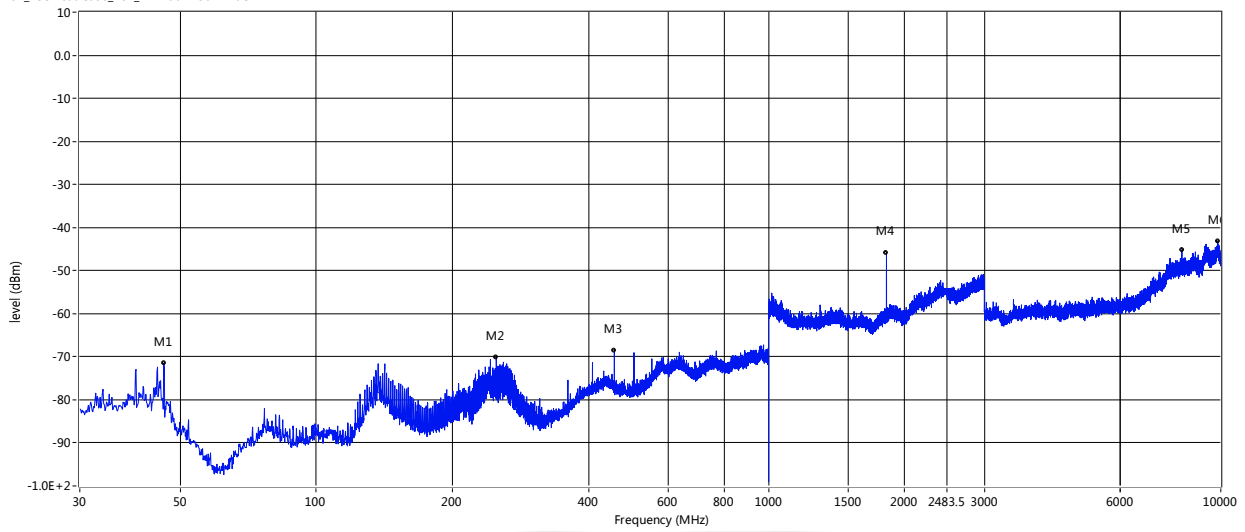
$$\text{Factor} = \text{AF} + \text{CL} - \text{AG}$$



6.6 TEST RESULT

Dense reader mode ISO-18000-63
Low channel
Horizontal

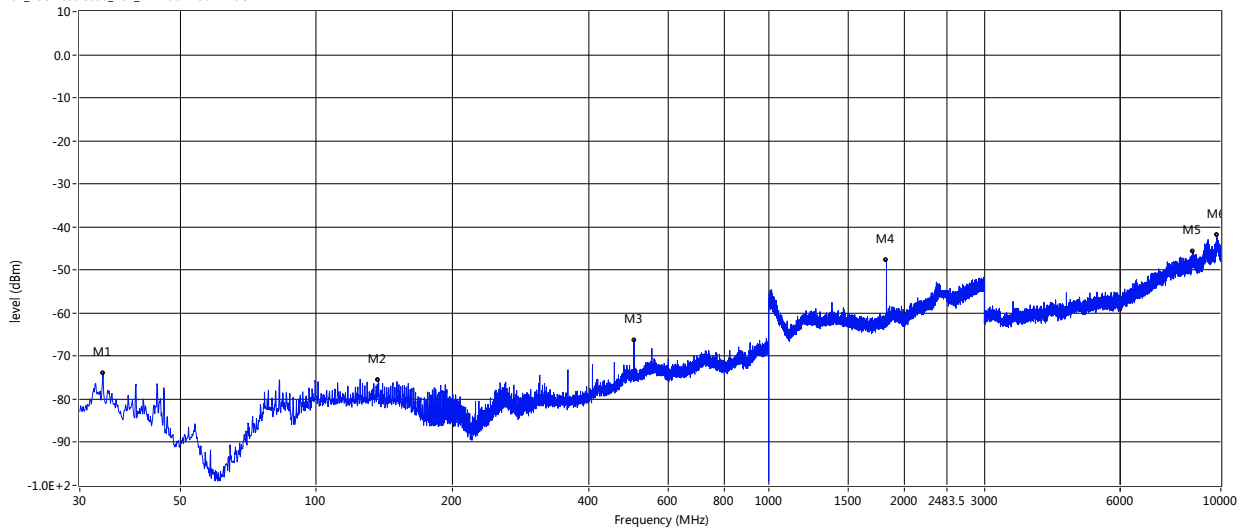
RSE_FCC Test Case_RSE_PART90 H 30M-10G



Frequency (MHz)	Result (dBm)	Limit (dBm)	Over Limit (dB)	ANT	Verdict
46.005	-71.54	-13.0	-58.54	Horizontal	Pass
249.947	-70.07	-13.0	-57.07	Horizontal	Pass
456.073	-68.67	-13.0	-55.67	Horizontal	Pass
1822.500	-45.90	-13.0	-32.90	Horizontal	Pass
8201.875	-45.18	-13.0	-32.18	Horizontal	Pass
9840.750	-43.16	-13.0	-30.16	Horizontal	Pass

Vertical

RSE_FCC Test Case_RSE_PART90 V 30M-10G

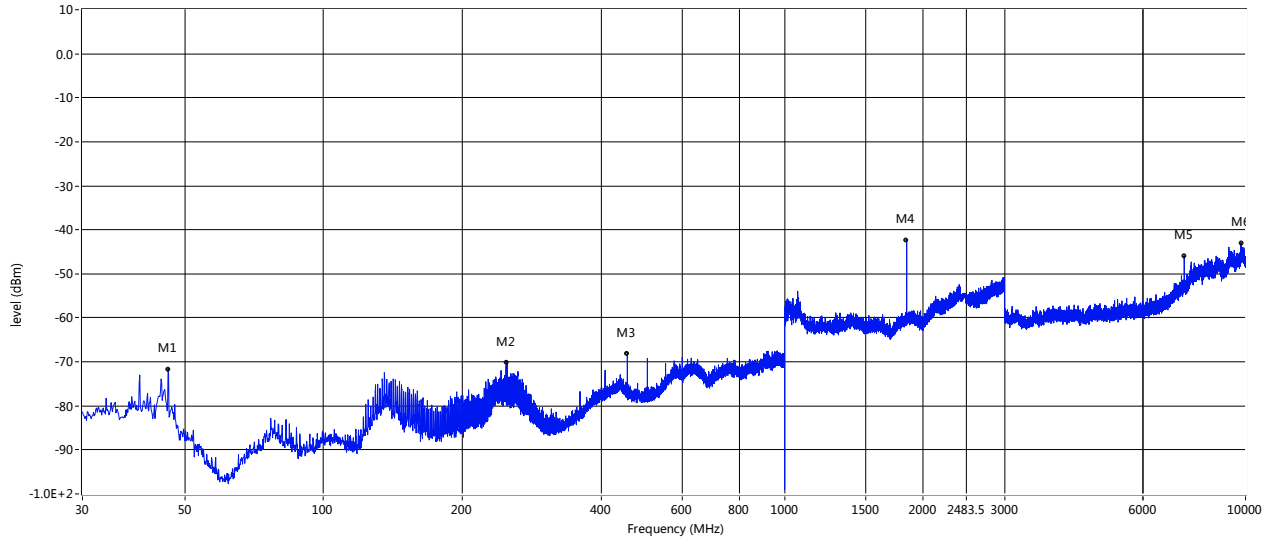


Frequency (MHz)	Result (dBm)	Limit (dBm)	Over Limit (dB)	ANT	Verdict
33.759	-73.96	-13.0	-60.96	Vertical	Pass
137.064	-75.50	-13.0	-62.50	Vertical	Pass
503.966	-66.36	-13.0	-53.36	Vertical	Pass
1822.500	-47.78	-13.0	-34.78	Vertical	Pass
8681.375	-45.66	-13.0	-32.66	Vertical	Pass
9797.875	-41.95	-13.0	-28.95	Vertical	Pass



High channel Horizontal

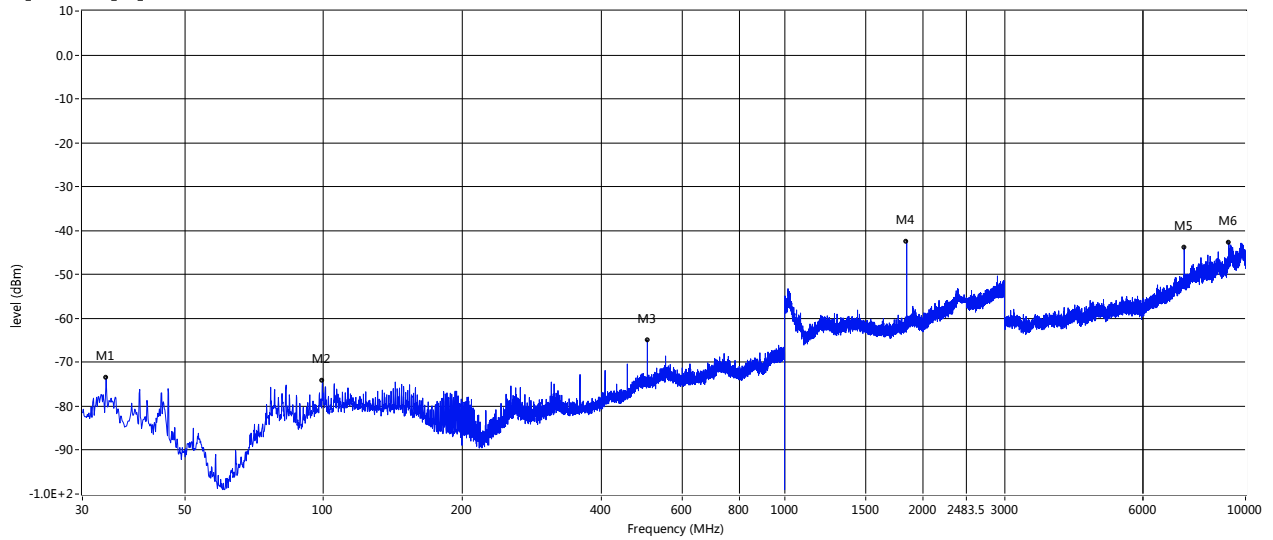
RSE_FCC Test Case_RSE_PART90 H 30M-10G



Frequency (MHz)	Result (dBm)	Limit (dBm)	Over Limit (dB)	ANT	Verdict
46.005	-71.67	-13.0	-58.67	Horizontal	Pass
249.947	-70.19	-13.0	-57.19	Horizontal	Pass
456.073	-68.11	-13.0	-55.11	Horizontal	Pass
1840.500	-42.52	-13.0	-29.52	Horizontal	Pass
7361.875	-45.99	-13.0	-32.99	Horizontal	Pass
9783.000	-43.15	-13.0	-30.15	Horizontal	Pass

Vertical

RSE_FCC Test Case_RSE_PART90 V 30M-10G

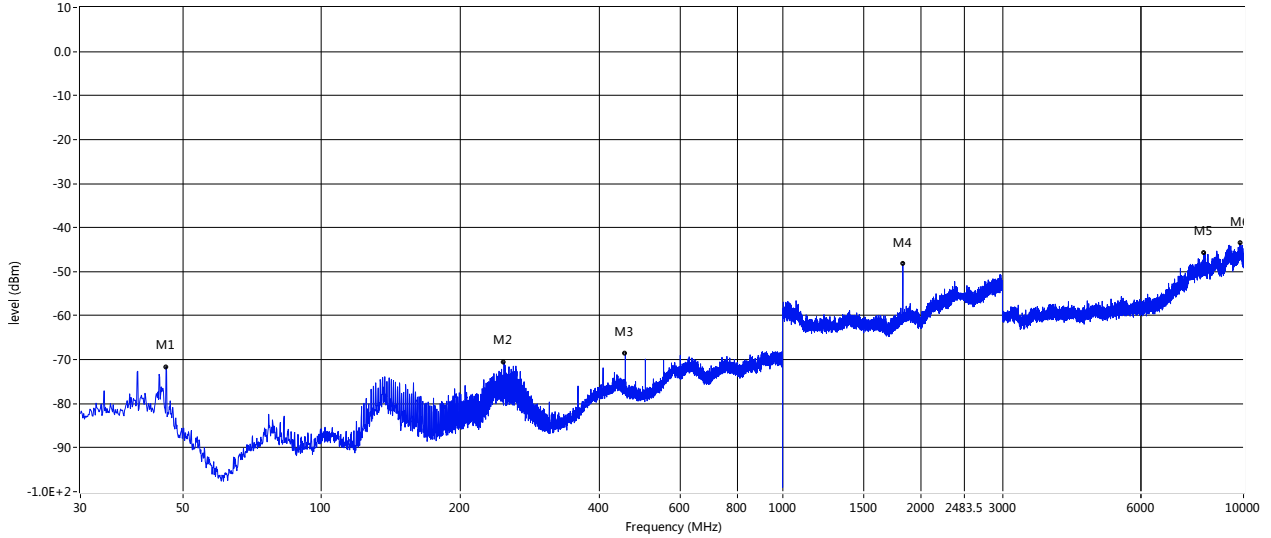


Frequency (MHz)	Result (dBm)	Limit (dBm)	Over Limit (dB)	ANT	Verdict
33.759	-73.58	-13.0	-60.58	Vertical	Pass
99.476	-74.26	-13.0	-61.26	Vertical	Pass
503.966	-64.95	-13.0	-51.95	Vertical	Pass
1840.500	-42.44	-13.0	-29.44	Vertical	Pass
7361.875	-43.86	-13.0	-30.86	Vertical	Pass
9202.875	-42.71	-13.0	-29.71	Vertical	Pass



Single reader mode ISO-18000-63
Low channel
Horizontal

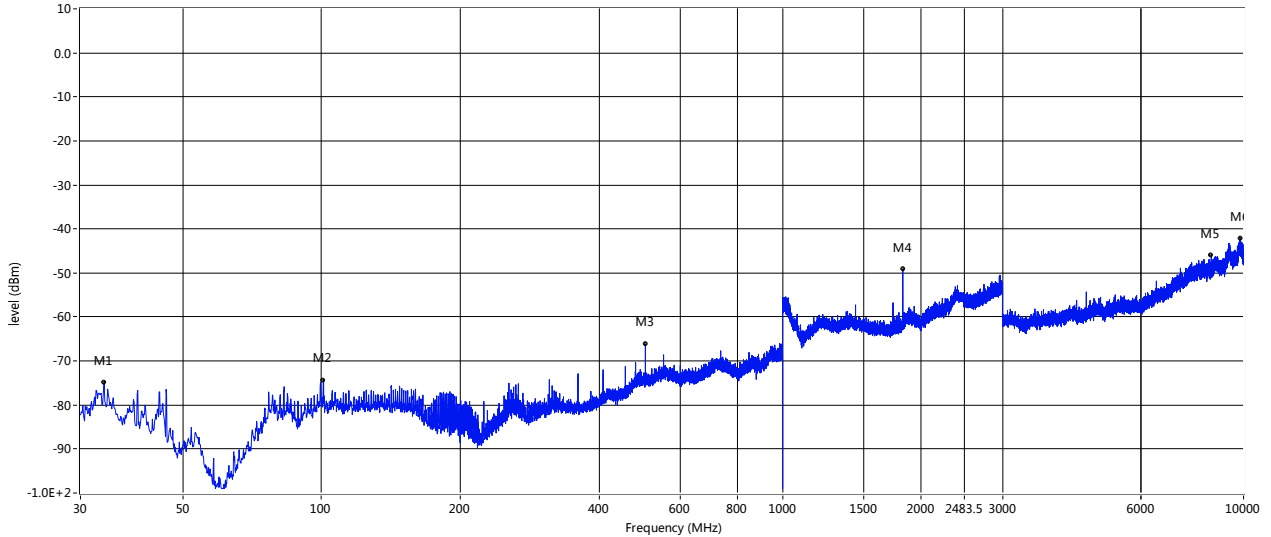
RSE_FCC Test Case_RSE_PART90 H 30M-10G



Frequency (MHz)	Result (dBm)	Limit (dBm)	Over Limit (dB)	ANT	Verdict
46.005	-71.66	-13.0	-58.66	Horizontal	Pass
248.856	-70.58	-13.0	-57.58	Horizontal	Pass
456.073	-68.68	-13.0	-55.68	Horizontal	Pass
1823.500	-48.31	-13.0	-35.31	Horizontal	Pass
8206.250	-45.85	-13.0	-32.85	Horizontal	Pass
9831.125	-43.61	-13.0	-30.61	Horizontal	Pass

Vertical

RSE_FCC Test Case_RSE_PART90 V 30M-10G



Frequency (MHz)	Result (dBm)	Limit (dBm)	Over Limit (dB)	ANT	Verdict
33.759	-74.89	-13.0	-61.89	Vertical	Pass
100.931	-74.37	-13.0	-61.37	Vertical	Pass
503.966	-66.16	-13.0	-53.16	Vertical	Pass
1823.250	-49.24	-13.0	-36.24	Vertical	Pass
8511.625	-46.00	-13.0	-33.00	Vertical	Pass
9839.000	-42.19	-13.0	-29.19	Vertical	Pass