RADIO TEST REPORT

Report No: STS1710201W03

Issued for

Star Systems International Limited

Unit 04, 12/F Vanta Industrial Centre, 21-33 Tai Lin Pai Road, Kwai Chung, HK

Product Name:	RFID READER
Brand Name:	TITAN
Model Name:	HRD22000
Series Model:	N/A
FCC ID:	2AA7KTITAN-22000
Test Standard:	FCC Part 90.353

Shenzhen STS Test Services Co., Ltd.
1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China
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TEST RESULT CERTIFICATION

Applicant's name	:	Star Systems International Limited
Address	:	Unit 04, 12/F Vanta Industrial Centre, 21-33 Tai Lin Pai Road, Kwai Chung, HK
Manufacture's Name	:	Star Systems International Limited
Address	:	Unit 04, 12/F Vanta Industrial Centre, 21-33 Tai Lin Pai Road, Kwai Chung, HK

Product description

Product Name	:	RFID READER
Brand Name	:	TITAN
Model Name	:	HRD22000
Series Model	:	N/A
Test Standards	:	FCC Part 90.353
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. And it is applicable only to the tested sample identified in the report.
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Date of Test	:	
Date (s) of performance of tests	:	10 Oct. 2017~20 Nov. 2017
Date of Issue	:	20 Nov. 2017
Test Result	:	**Pass**

Testing Engineer : Sean She
(Sean she)

Technical Manager : Hakim. hou
(Hakim.hou)

Authorized Signatory : Vita Li
(Vita Li)

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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	20 Nov. 2017	STS1710201W03	ALL	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part 90			
Standard Section	Test Item	Judgment	Remark
Part 90.205	Conducted Output Power	PASS	--
Part 90.210	Occupied Bandwidth	PASS	--
Part 90.210	Spurious Emissions at Antenna terminals	PASS	--
Part 90.210	Radiated Spurious emissions	PASS	--
Part 90.213	Frequency Stability	PASS	--

NOTE:

(1) ”N/A” denotes test is not applicable in this Test Report

(2) All tests are according to TIA TIA-603-D

1.1 TEST FACTORY

Shenzhen STS Test Services Co., Ltd.
Add. : 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China
CNAS Registration No.: L7649; FCC Registration No.: 625569
IC Registration No.: 12108A; A2LA Certificate No.: 4338.01;

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended 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	Conducted Emission (9KHz-150KHz)	±2.88dB
2	Conducted Emission (150KHz-30MHz)	±2.67dB
3	RF power,conducted	±0.71dB
4	Spurious emissions,conducted	±0.63dB
5	All emissions,radiated (9KHz-30MHz)	±3.02dB
6	All emissions,radiated (30MHz-200MHz)	±3.80dB
7	All emissions,radiated (200MHz-1000MHz)	±3.97dB
8	All emissions,radiated(>1G)	±3.03dB

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name	RFID READER
Trade Name	TITAN
Model Name	HRD22000
Series Model	N/A
Model Difference	N/A
Modulation	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	Power supply and ADP(rating): Input: AC 100V-240V, 50/60Hz, 800mA Output: DC 24V, 1.25A
Hardware version number	R5
Software version number	0.7.2.9319_rr
Connecting I/O Port(s)	Please refer to the User's Manual
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)	912.75MHz -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: This device only supports SISO mode, just one of the four RF ports will be actived during normal operating. Meanwhile, the four RF ports are identical in RF characterics.

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

2.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	TITAN	HRD22000	Avior Antenna	N/A	15dBi	ANT

2.2 DESCRIPTION OF SUPPORT UNITS

The EUT has been 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.

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
	PC	4CV428DQXR	500-320cx	N/A	N/A
	POE	Phihong	PSAC30U-240L6	N/A	N/A

Item	Shielded Type	Ferrite Core	Length	Note
	Ethernet cable	NO	7m	N/A
	Power cord	NO	3m	N/A

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
(3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.3 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESW	101535	2017.06.01	2018.05.31
Bilog Antenna	TESEQ	CBL6111D	34678	2017.03.24	2018.03.23
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1343	2017.03.06	2018.03.05
SHF-EHF Horn Antenna (15G-40GHz)	BBHA 9170	SCHWARZBECK	BBHA9170367	2017.05.02	2018.05.01
Temperature & Humitidy	HH660	Mieo	N/A	2017.10.15	2018.10.14
Temperature & Humitidy	HH660	Mieo	N/A	2017.10.15	2018.10.14
Pre-mplifier (0.1M-3GHz)	EM	EM330	60538	2017.03.12	2018.03.11
PreAmplifier (1G-26.5GHz)	Agilent	8449B	60538	2017.10.15	2018.10.14
Pre-mplifier (18G-40G)	MINI-CIRCUITS	AP-040G	1382501	2017.05.15	2018.05.14
Operational Manual Passive Loop (9K--30MHz)	ETS	6512	00165355	2017.03.06	2018.03.05
Low frequency cable	EM	R01	N/A	2017.03.12	2018.03.11
Low frequency cable	EM	R06	N/A	2017.03.12	2018.03.11
High frequency cable	SCHWARZBECK	R04	N/A	2017.03.12	2018.03.11
High frequency cable	SCHWARZBECK	R02	N/A	2017.03/12	2018.03.11
Semi-anechoic chamber	Changling	966	N/A	2017.10.15	2018.10.14
trun table	EM	SC100_1	60531	N/A	N/A
Antnna mast	EM	SC100	N/A	N/A	N/A
Max-full Antenna Corp	MF	MFA-440H	N/A	N/A	N/A

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2017.10.15	2018.10.14
LISN	R&S	ENV216	101242	2017.10.15	2018.10.14
conduction Cable	EM	C01	N/A	2017.03.12	2018.03.11
Temperature & Humitidy	Mieo	HH660	N/A	2017.10.15	2018.10.14

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
USB RF power sensor	DARE	RPR3006W	15I00041SNO03	2017.10.15	2018.10.14
Power Meter	R&S	NRP	100510	2017.10.15	2018.10.14
Spectrum Analyzer	Agilent	E4407B	MY50140340	2017.03.11	2018.03.10
Signal Analyzer	Agilent	N9020A	MY49100060	2017.03.11	2018.03.10

3. CONDUCTED OUTPUT POWER

3.1 APPLIED PROCEDURES / LIMIT

902-928 MHz. 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 §90.353(h).

3.2 TEST PROCEDURE

1. Set analyzer center frequency to channel center frequency.
2. Set the RBW to: 1MHz ≥ RBW
3. Set the VBW ≥ 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

4.4 TEST RESULTS

Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 24V From POE

Dense reader mode ISO-18000-63					
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)
Low	911.25	32.821	4	15	43.821
High	920.25	32.725	4	15	43.725
Single reader mode ISO-18000-63					
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)
Low	911.75	32.649	4	15	43.649
High	919.25	32.656	4	15	43.656
Low data rate ISO-18000-62(40kbps)					
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)
Low	911.75	32.451	4	15	43.451
High	919.75	32.474	4	15	43.474
High data rate ISO-18000-62 (80kbps)					
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)
Low	912.75	32.025	4	15	43.025
High	918.75	32.120	4	15	43.120
Unmodulated ISO-10374					
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)
Low	902.75	32.223	4	15	43.223
High	903.25	32.194	4	15	43.194
Low	910.75	32.131	4	15	43.131
High	920.75	32.111	4	15	43.111

TDM					
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)
Low	913.75	32.634	4	15	43.634
High	916.25	32.469	4	15	43.469
Title 21					
Channel	Frequency (MHz)	Conducted Power (dBm)	Cable loss (dB)	Antenna gain (dBi)	EIRP (dBm)
Low	913.75	32.205	4	15	43.205
High	917.75	32.206	4	15	43.206

Note:
1. The EUT is transmitting through a long enough antenna cable with a stated loss of 4dB into the antenna with typy N connector 15dBi gain.
2. EIRP=conducted power + antenna gain-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 APPLIED PROCEDURES / 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 TEST PROCEDURE

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to -26 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW≥3RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be≥6 dB.

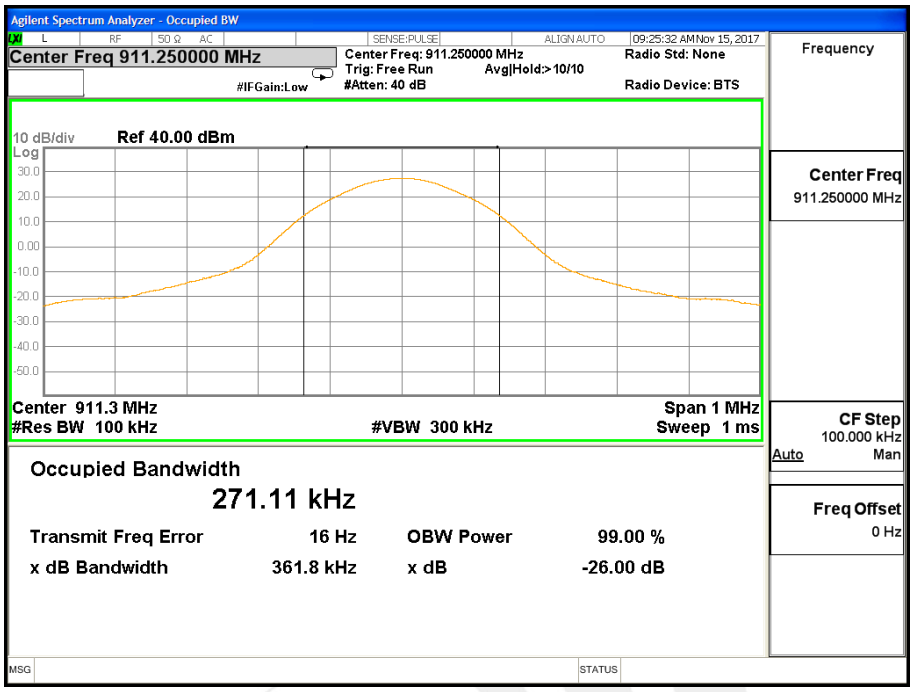
4.3 TEST RESULTS

Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 24V From POE

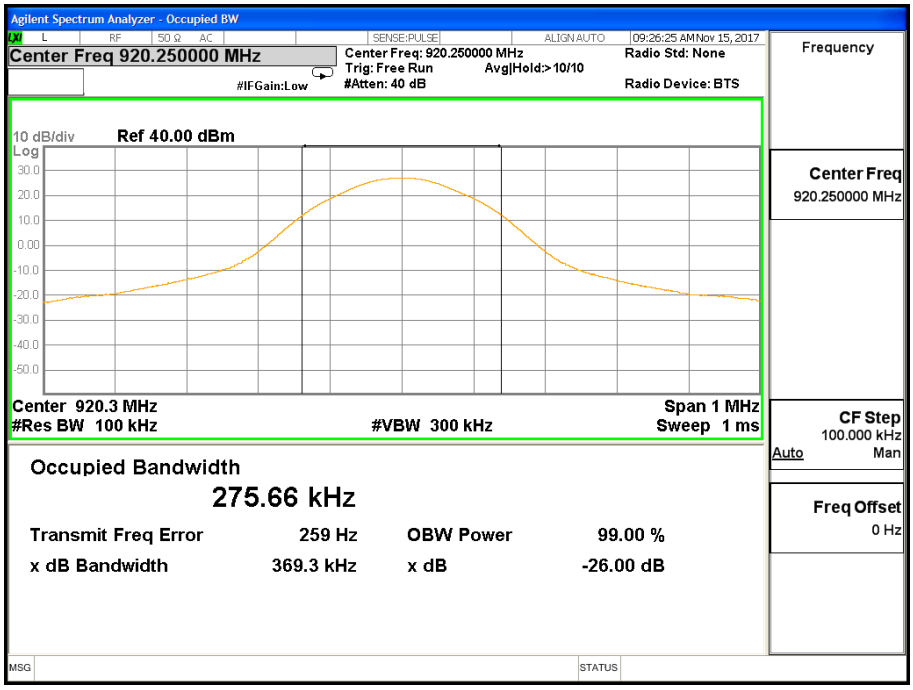
Dense reader mode ISO-18000-63		
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)
Low	911.25	361.8
High	920.25	369.3
Single reader mode ISO-18000-63		
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)
Low	911.75	647.9
High	919.25	663.8
Low data rate ISO-18000-62(40kbps)		
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)
Low	911.75	451.4
High	919.75	454.8
High data rate ISO-18000-62 (80kbps)		
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)
Low	912.75	652.4
High	918.75	650.9
Unmodulated ISO-10374		
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)
Low	902.75	284.3
High	903.25	284.2
Low	910.75	284.4
High	920.75	284.6
TDM		
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)
Low	913.75	611.1
High	916.25	615.3
Title 21		
Channel	Frequency (MHz)	-26 dB Bandwidth(KHz)
Low	913.75	1030
High	917.75	1034

Dense reader mode ISO-18000-63

Low channel(911.25MHz)

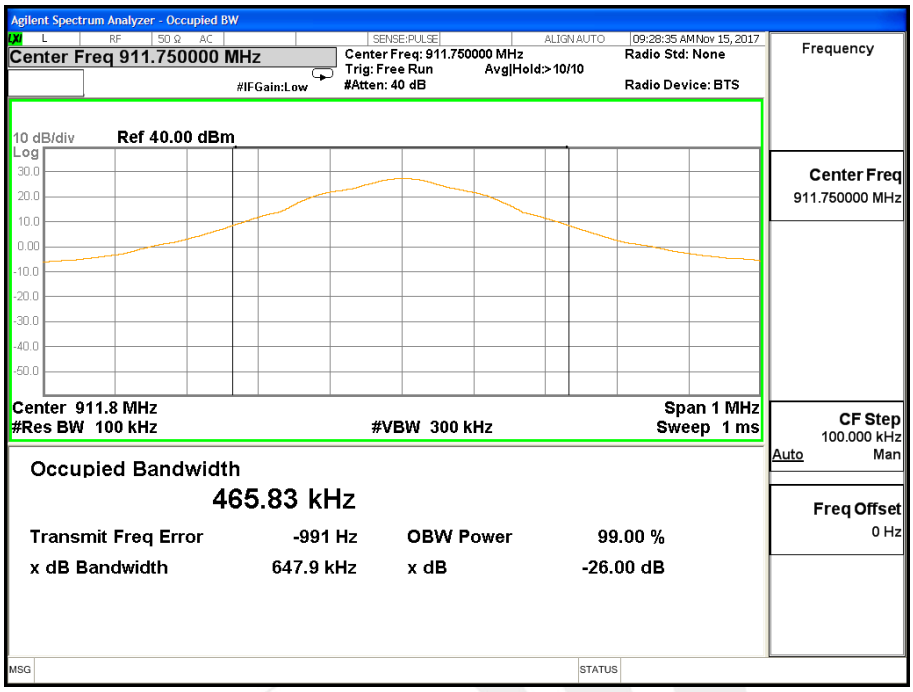


High channel(920.25MHz)

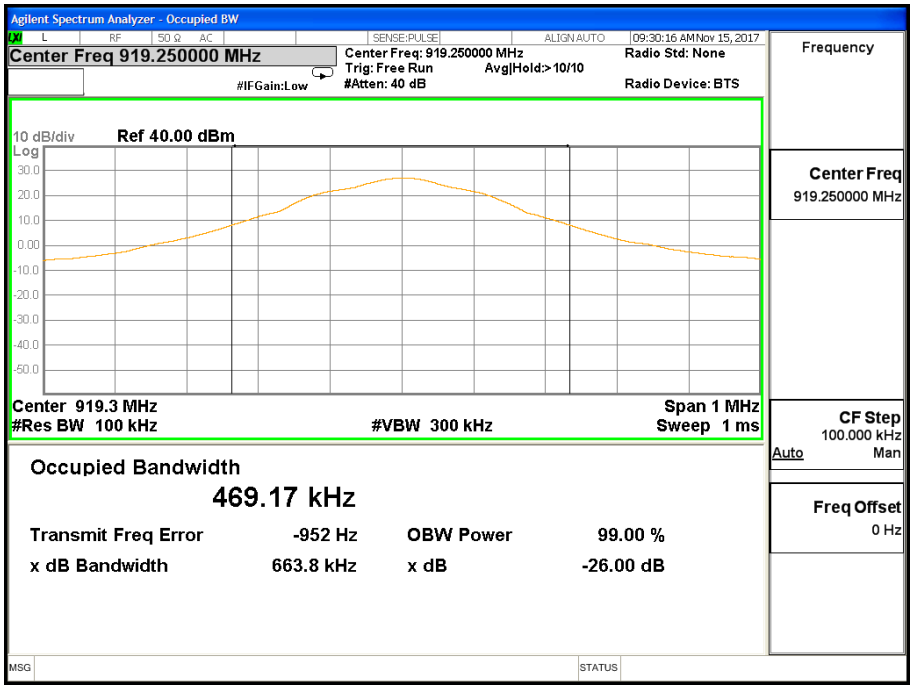


Single reader mode ISO-18000-63

Low channel(911.75MHz)

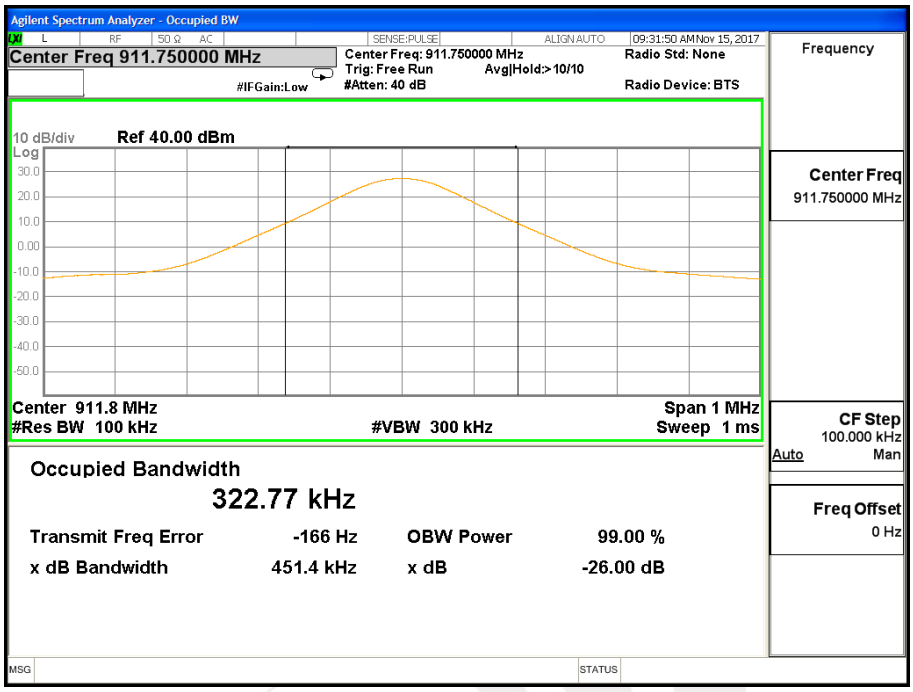


High channel(919.25MHz)

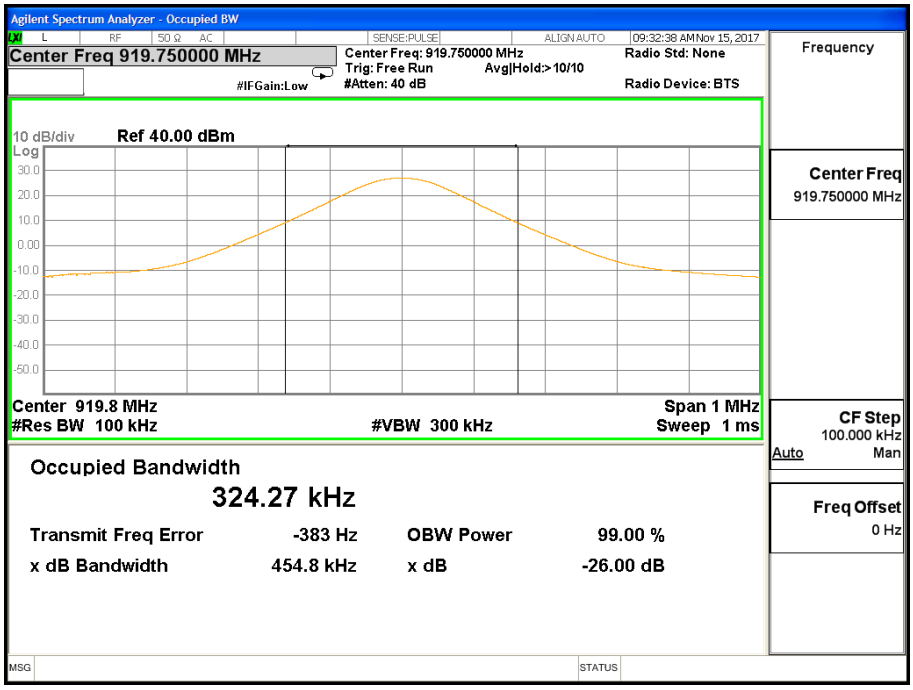


Low data rate ISO-18000-62(40kbps)

Low channel(911.75MHz)

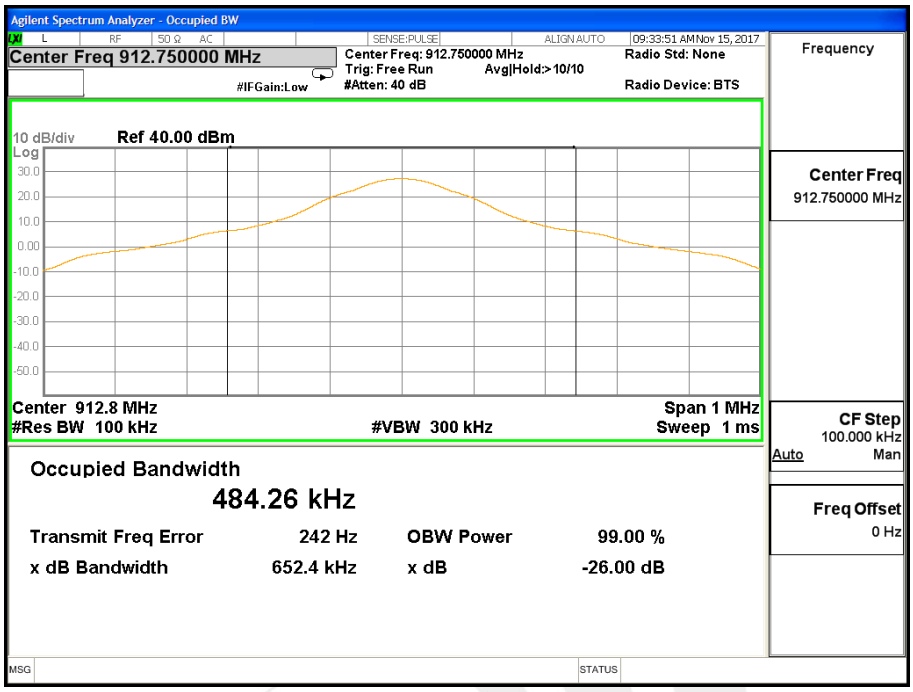


High channel(919.75MHz)

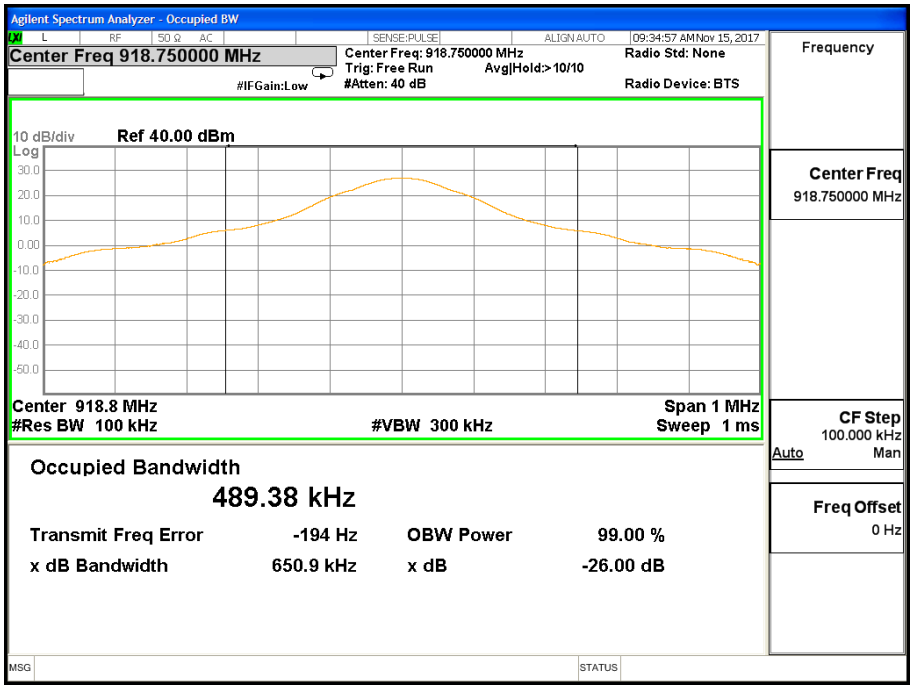


High data rate ISO-18000-62(80kbps)

Low channel(912.75MHz)

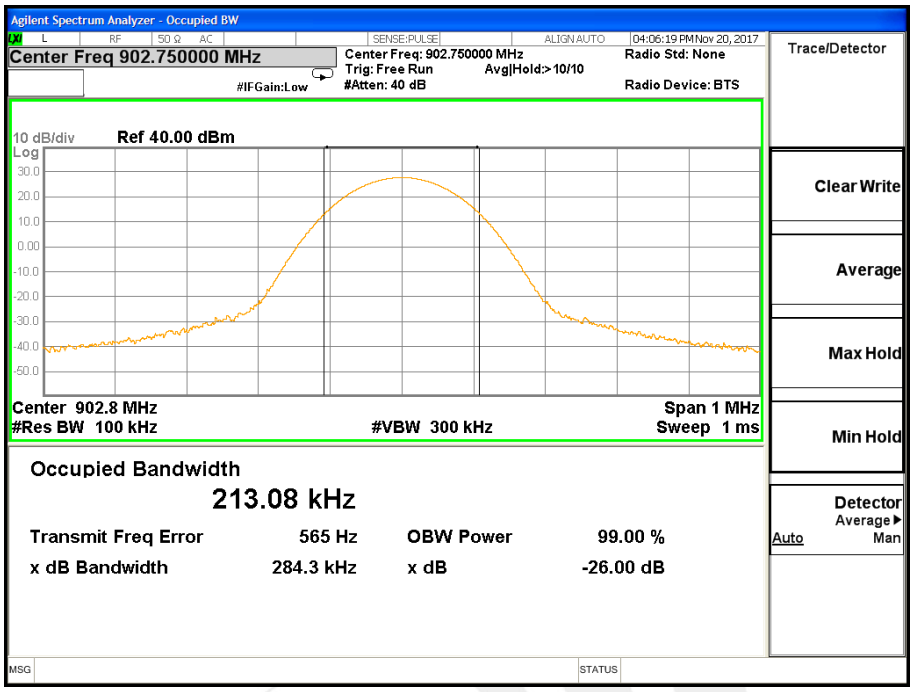


High channel(918.75MHz)

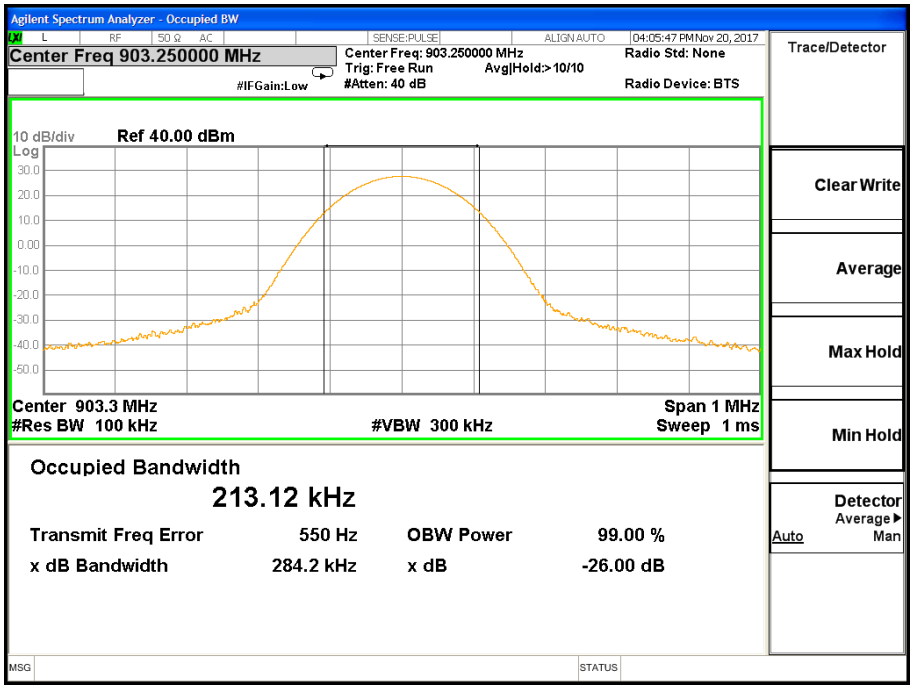


Unmodulated ISO-10374

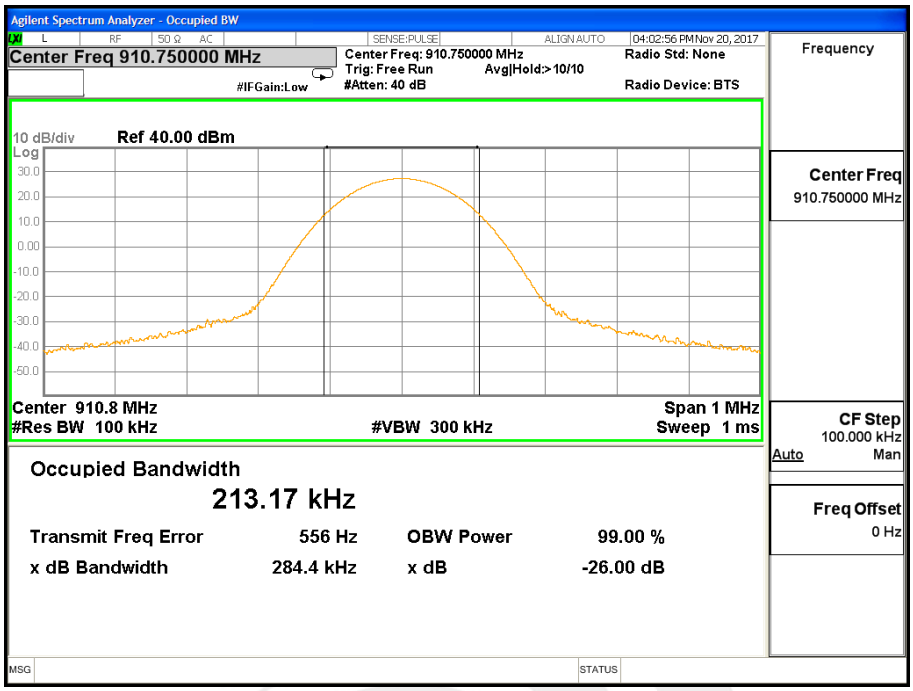
Low channel(902.75MHz)



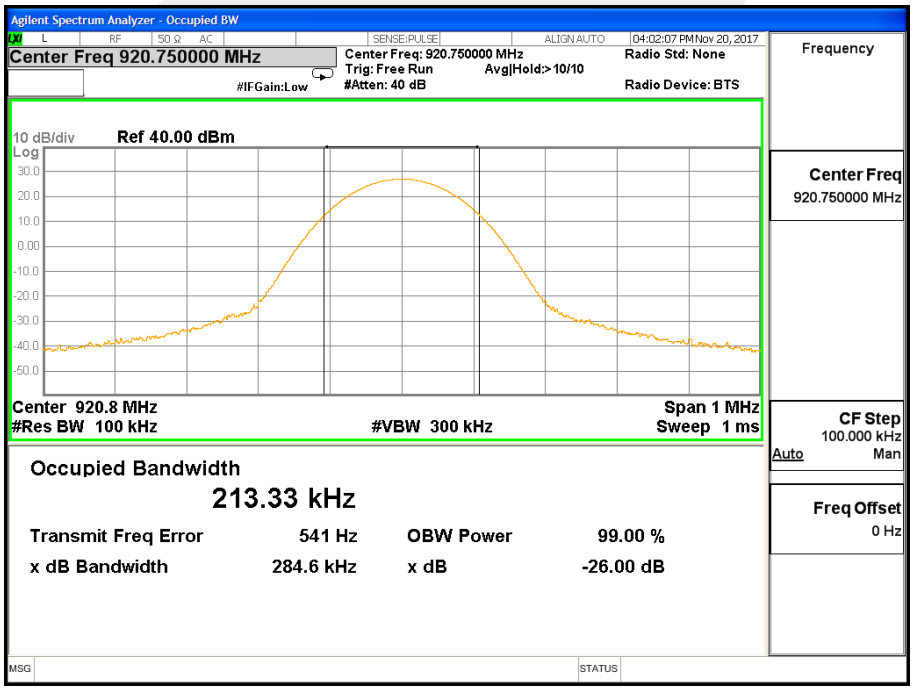
High channel(903.25MHz)



Low channel(910.75MHz)

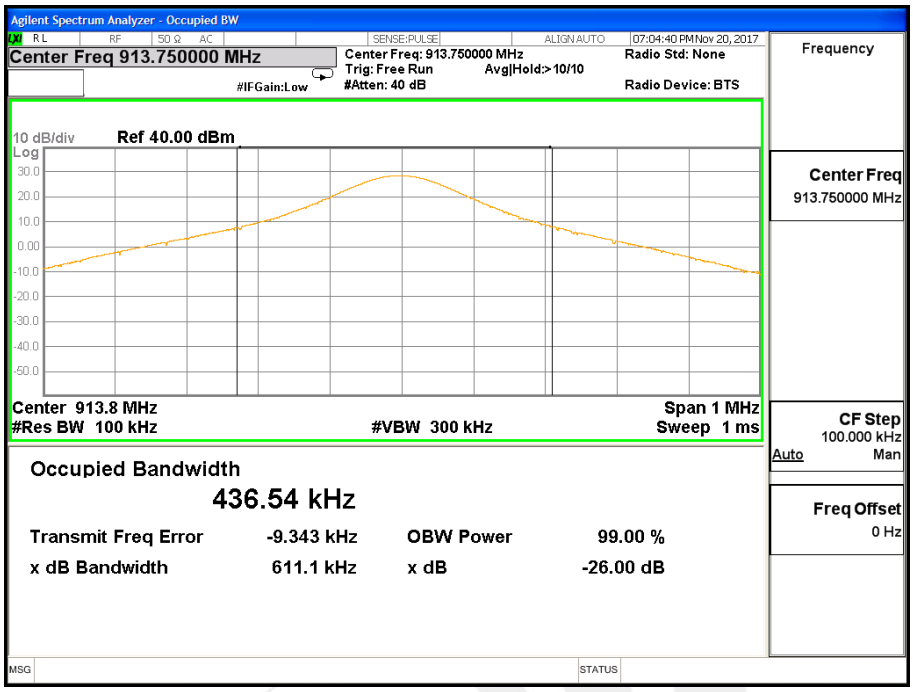


High channel(920.75MHz)

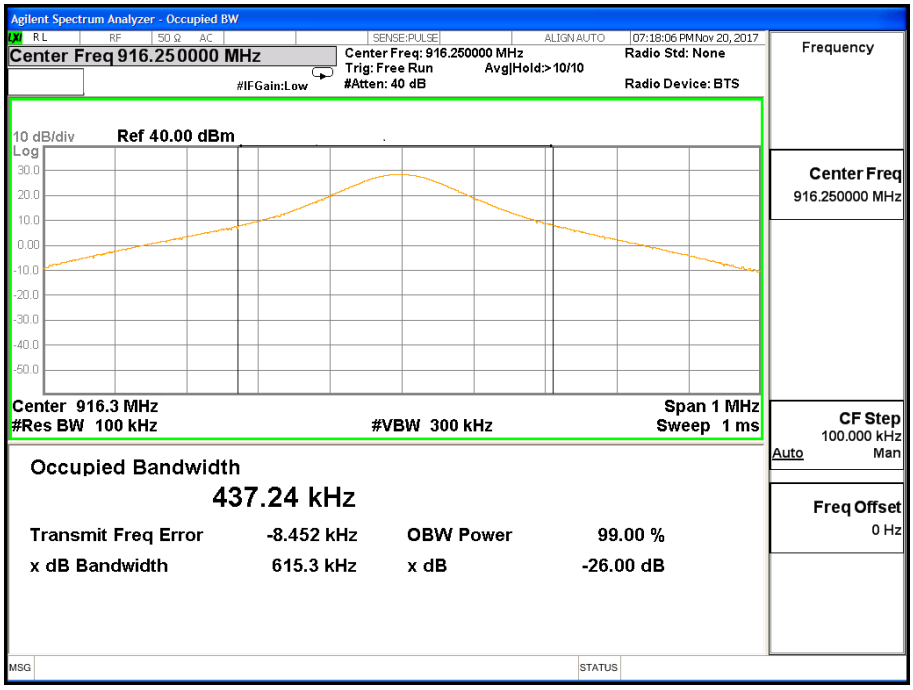


TDM

Low channel(913.75MHz)

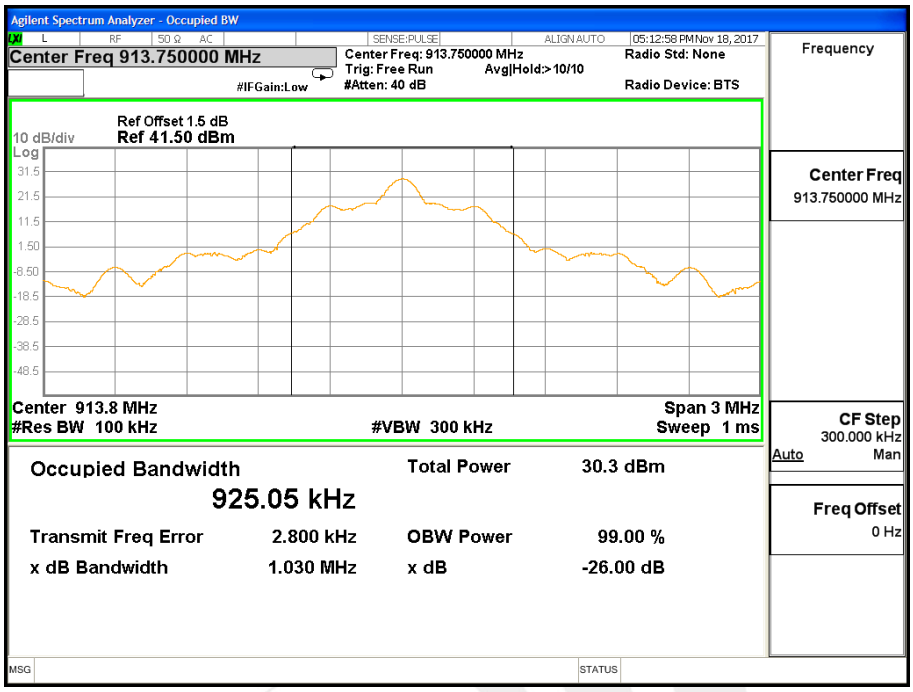


High channel(916.25MHz)

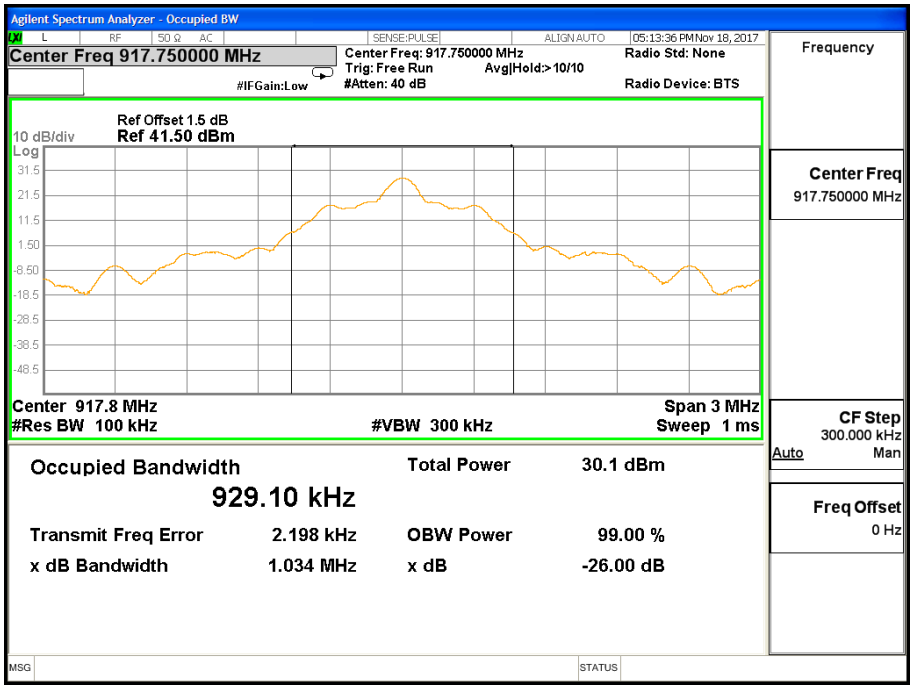


Title 21

Low channel(913.75MHz)



High channel(917.75MHz)



5. FREQUENCY STABILITY

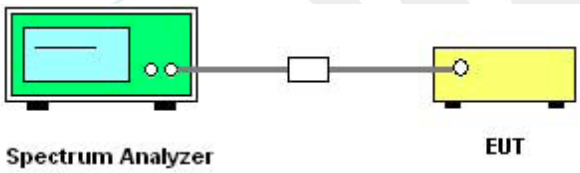
5.1 APPLIED PROCEDURES / LIMIT

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 degree 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 ≥ 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.

5.3 TEST SETUP



5.4 TEST RESULTS

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

Dense reader mode ISO-18000-63				
channel	Test Condition	Measured Frequency (MHz)	Frequency Drift (ppm)	Limit (ppm)
911.25MHz	+22°C, Nominal	911.2504	0.439	±2.5
	-30°C, Nominal	911.2509	0.988	
	+50°C, Nominal	911.2511	1.207	
920.25MHz	+22°C, Nominal	920.2506	0.652	
	-30°C, Nominal	920.2508	0.869	
	+50°C, Nominal	920.2511	1.195	

Single reader mode ISO-18000-63				
channel	Test Condition	Measured Frequency (MHz)	Frequency Drift (ppm)	Limit(ppm)
911.75MHz	+22°C, Nominal	911.7511	1.206	±2.5
	-30°C, Nominal	911.7515	1.645	
	+50°C, Nominal	911.7505	0.548	
919.25MHz	+22°C, Nominal	919.2512	1.305	
	-30°C, Nominal	919.2508	0.870	
	+50°C, Nominal	919.2507	0.761	

Low data rate ISO-18000-62 (40kbps)				
channel	Test Condition	Measured Frequency (MHz)	Frequency Drift (ppm)	Limit(ppm)
911.75MHz	+22°C, Nominal	911.7515	1.645	±2.5
	-30°C, Nominal	911.7518	1.974	
	+50°C, Nominal	911.7519	2.084	
919.75MHz	+22°C, Nominal	919.7514	1.522	
	-30°C, Nominal	919.7516	1.740	
	+50°C, Nominal	919.7511	1.196	

High data rate ISO-18000-62 (80kbps)				
channel	Test Condition	Measured Frequency (MHz)	Frequency Drift (ppm)	Limit(ppm)
912.75MHz	+22°C, Nominal	912.7503	0.329	±2.5
	-30°C, Nominal	912.7504	0.438	
	+50°C, Nominal	912.7513	1.424	
918.75MHz	+22°C, Nominal	918.7503	0.327	
	-30°C, Nominal	918.7508	0.871	
	+50°C, Nominal	918.7517	1.850	

Unmodulated ISO-10374				
channel	Test Condition	Measured Frequency (MHz)	Frequency Drift (ppm)	Limit(ppm)
902.75MHz	+22°C, Nominal	902.7508	0.886	±2.5
	-30°C, Nominal	902.7517	1.883	
	+50°C, Nominal	902.7516	1.772	
903.25MHz	+22°C, Nominal	903.2503	0.332	
	-30°C, Nominal	903.2511	1.218	
	+50°C, Nominal	903.2509	0.996	
910.75MHz	+22°C, Nominal	910.7505	0.549	
	-30°C, Nominal	910.7512	1.318	
	+50°C, Nominal	910.7510	1.098	
920.75MHz	+22°C, Nominal	920.7508	0.869	
	-30°C, Nominal	920.7511	1.195	
	+50°C, Nominal	920.7509	0.977	

TDM				
channel	Test Condition	Measured Frequency (MHz)	Frequency Drift (ppm)	Limit(ppm)
913.75MHz	+22°C, Nominal	913.7511	1.204	±2.5
	-30°C, Nominal	913.7509	0.985	
	+50°C, Nominal	913.7506	0.657	
916.25MHz	+22°C, Nominal	916.2512	1.305	
	-30°C, Nominal	916.2508	0.870	
	+50°C, Nominal	916.2505	0.544	

Title 21				
channel	Test Condition	Measured Frequency (MHz)	Frequency Drift (ppm)	Limit(ppm)
913.75MHz	+22°C, Nominal	913.7512	1.313	±2.5
	-30°C, Nominal	913.7509	0.985	
	+50°C, Nominal	913.7504	0.438	
917.75MHz	+22°C, Nominal	913.7512	1.313	
	-30°C, Nominal	913.7509	0.985	
	+50°C, Nominal	913.7504	0.438	

6. FIELD STRENGTH OF SPURIOUS EMISSIONS

6.1 APPLIED PROCEDURES / LIMIT

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.

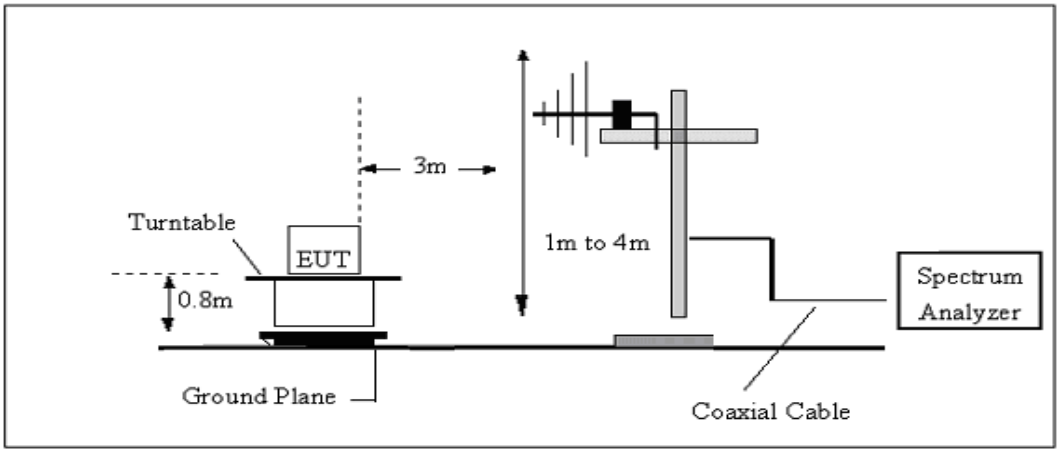
6.2 TEST PROCEDURE

a. The measuring distance of at 3 m shall be used for measurements at frequency30MHz up to 1GHz, and above 1GHz.
b. The EUT was placed on the top of a rotating table 0.8 meters (above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees 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 polarizations 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 then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

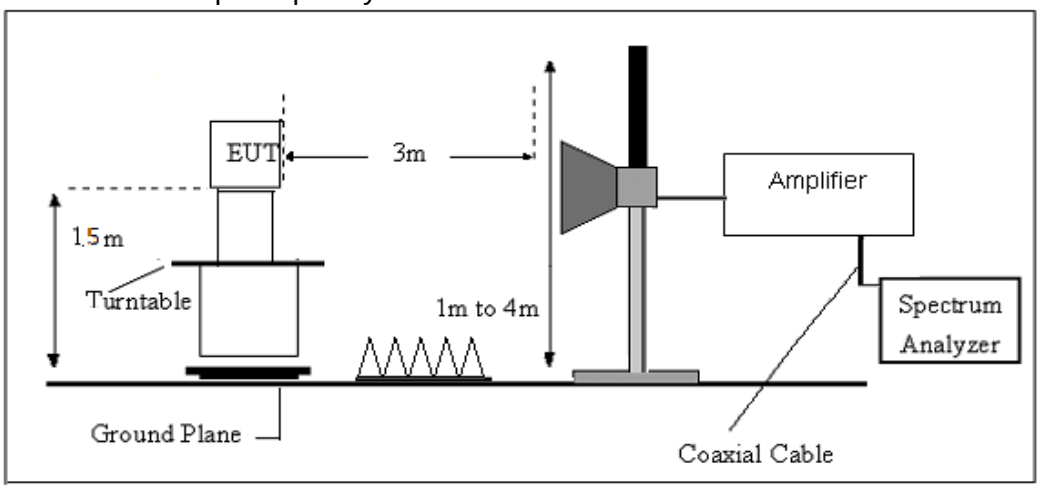
Note:
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

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

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

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

Factor=AF+CL-AG

6.6 TEST RESULTS

Below 1GHz

Dense reader mode ISO-18000-63 (911.25MHz)							
Frequency (MHz)	Polarity	Level (dBm)	Ant gain (dBi)	Cable Loss (dB)	Absolute level (dBm)	Limit (dBm)	Margin (dB)
40.25	H	-45.36	0	0.10	-45.46	-25.00	-20.46
40.38	V	-40.21	0	0.10	-40.31	-25.00	-15.31
258.39	H	-44.10	0	0.23	-44.33	-25.00	-19.33
257.58	V	-40.01	0	0.23	-40.24	-25.00	-15.24
621.24	H	-38.45	0	0.45	-38.90	-25.00	-13.90
620.23	V	-35.23	0	0.45	-35.68	-25.00	-10.68

Above 1GHz

Frequency	Polarity	Level (dBm)	Antenna Gain	Cable Loss	Emission Level	Limits	Margin
(MHz)		(dBm)	（dBi）	（dB）	(dBm)	(dBm)	(dB)
1822.50	H	-50.18	10.10	1.10	-41.18	-25.00	-16.18
1821.49	V	-45.17	10.10	1.10	-36.17	-25.00	-11.17
2733.75	H	-53.18	10.30	1.35	-44.23	-25.00	-19.23
2732.84	V	-48.18	10.30	1.35	-39.23	-25.00	-14.23
3458.20	H	-56.47	12.20	1.68	-45.95	-25.00	-20.95
3452.58	V	-50.47	12.20	1.68	-39.95	-25.00	-14.95
5847.25	H	-57.97	12.80	2.35	-47.52	-25.00	-22.52
5845.36	V	-52.94	12.80	2.35	-42.49	-25.00	-17.49

Below 1GHz

Dense reader mode ISO-18000-63 (920.25MHz)							
Frequency (MHz)	Polarity	Level (dBm)	Ant gain (dBi)	Cable Loss (dB)	Absolute level (dBm)	Limit (dBm)	Margin (dB)
40.25	H	-44.87	0	0.1	-44.97	-25.00	-19.97
40.78	V	-40.55	0	0.1	-40.65	-25.00	-15.65
258.39	H	-44.48	0	0.23	-44.71	-25.00	-19.71
258.10	V	-39.62	0	0.23	-39.85	-25.00	-14.85
621.24	H	-38.45	0	0.45	-38.90	-25.00	-13.90
620.33	V	-35.19	0	0.45	-35.64	-25.00	-10.64

Above 1GHz

Frequency	Polarity	Level (dBm)	Antenna Gain	Cable Loss	Emission Level	Limits	Margin
(MHz)		(dBm)	（dBi）	（dB）	(dBm)	(dBm)	(dB)
1840.50	H	-50.33	10.10	1.10	-41.33	-25.00	-16.33
1840.12	V	-45.23	10.10	1.10	-36.23	-25.00	-11.23
2760.75	H	-53.64	10.30	1.35	-44.69	-25.00	-19.69
2760.00	V	-47.85	10.30	1.35	-38.90	-25.00	-13.90
3458.20	H	-56.18	12.20	1.68	-45.66	-25.00	-20.66
3455.32	V	-49.71	12.20	1.68	-39.19	-25.00	-14.19
5847.25	H	-58.44	12.80	2.35	-47.99	-25.00	-22.99
5848.41	V	-52.80	12.80	2.35	-42.35	-25.00	-17.35

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Scan with all of model, the worst case is Dense reader mode ISO-18000-63
   Emission Level = Reading + Factor
   Margin = Limit - Emission Leve
3. The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.

7. SPURIOUS EMISSIONS AT ANTENNA TERMINALS

7.1 REQUIREMENT

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.

7.2 TEST PROCEDURE

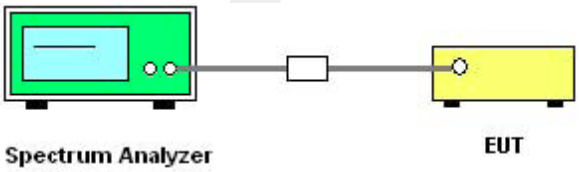
Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

.

For Band edge

Spectrum Parameter	Setting
Detector	Peak
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

7.3 TEST SETUP



The EUT which is powered by the adapter, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50 Ohm; the path loss as the factor is calibrated to correct the reading. Make the measurement with the spectrum analyzer's resolution bandwidth(RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

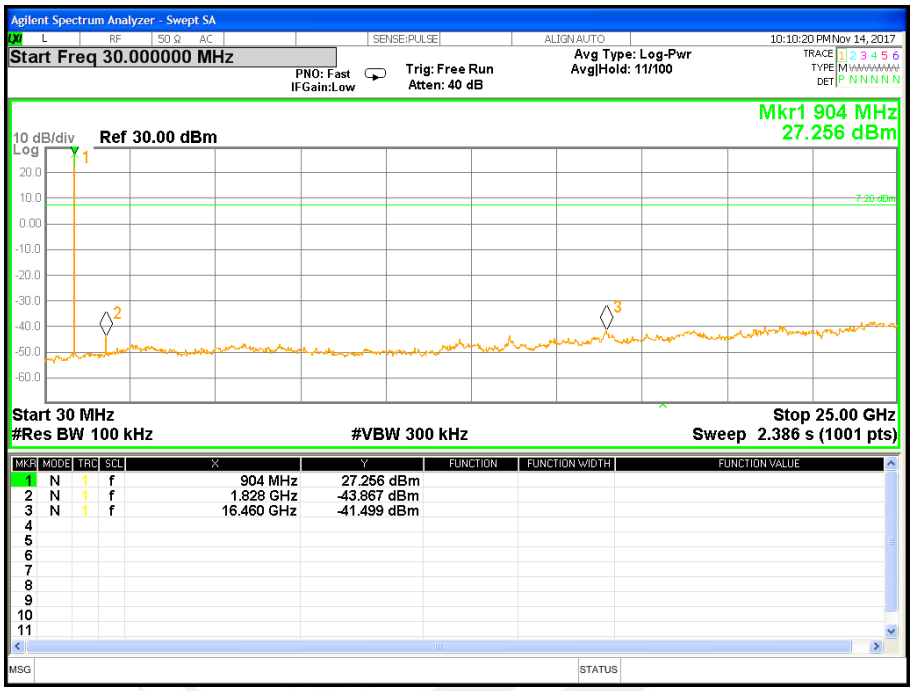
7.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

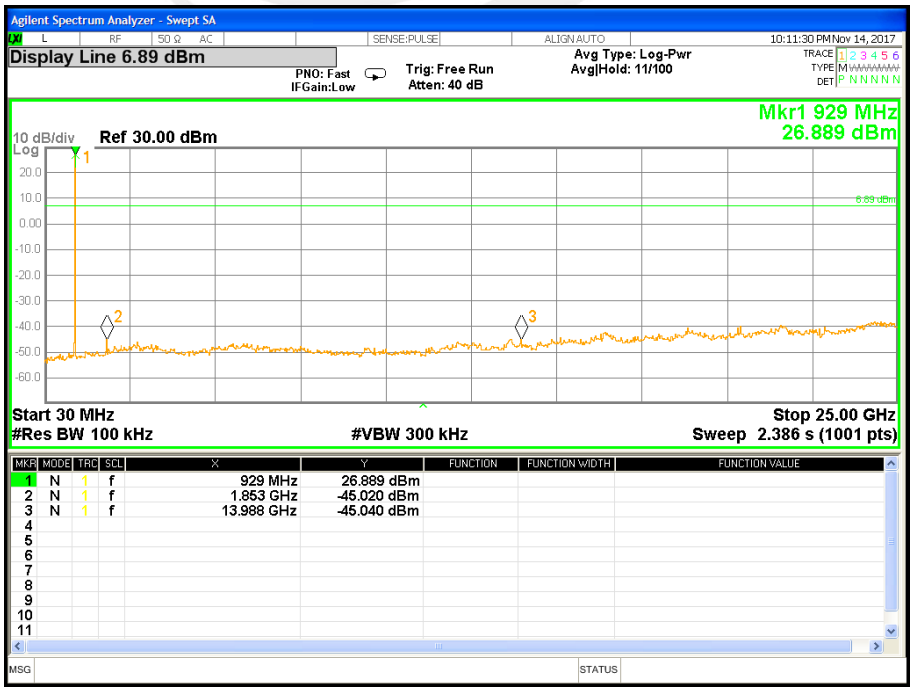
7.5 TEST RESULTS

Temperature：	25 ℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 24V From POE
Test Mode ：	Dense reader mode ISO-18000-63		

911.25MHz

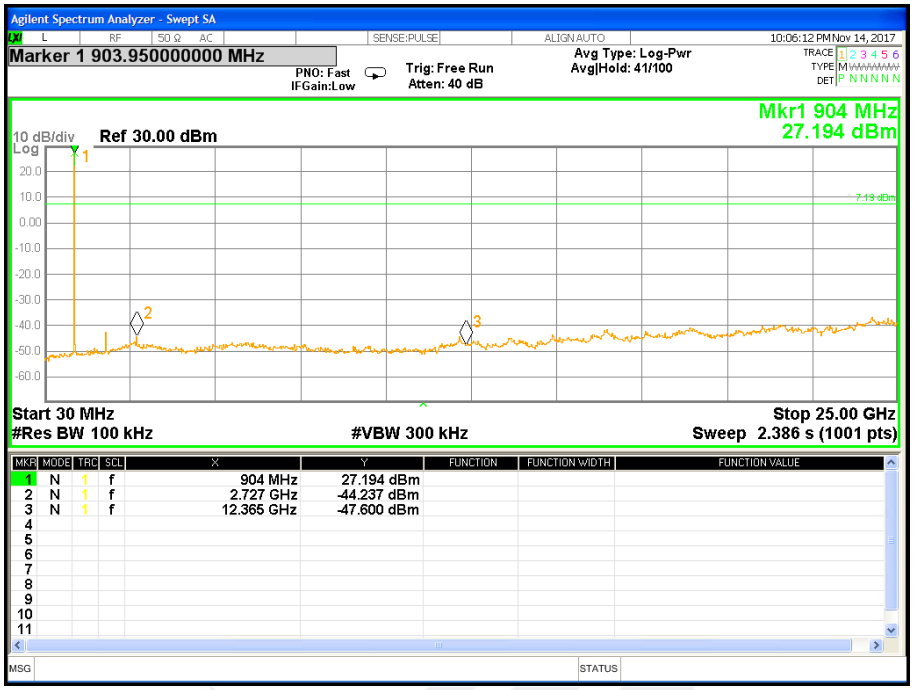


920.25

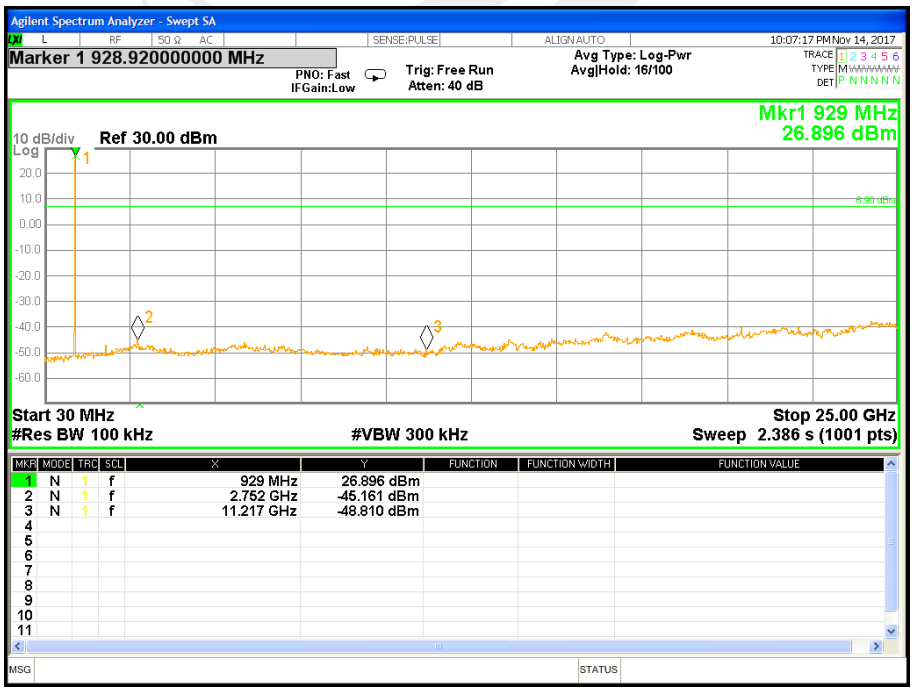


Temperature：	25 ℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 24V From POE
Test Mode ：	Single reader mode ISO-18000-63		

911.75MHz

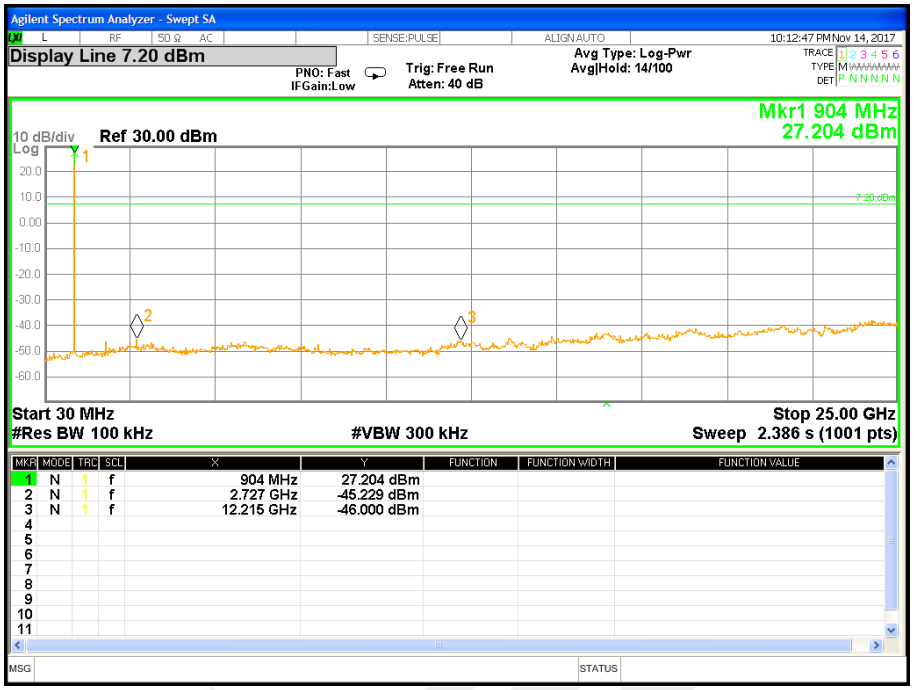


919.25MHz

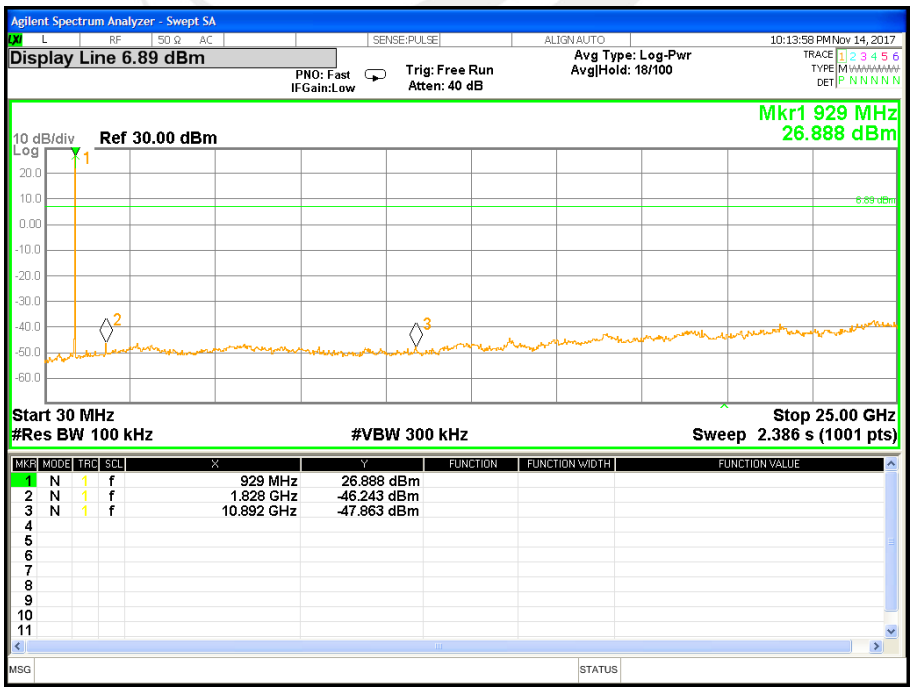


Temperature：	25 ℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 24V From POE
Test Mode ：	Low data rate ISO-18000-62(40kbps)		

911.75MHz

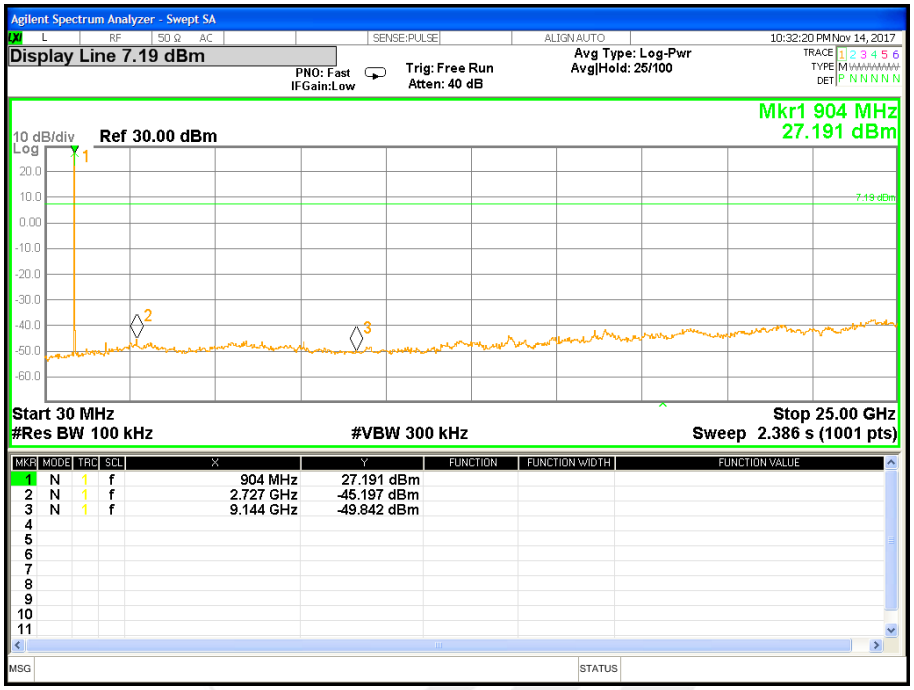


919.75MHz

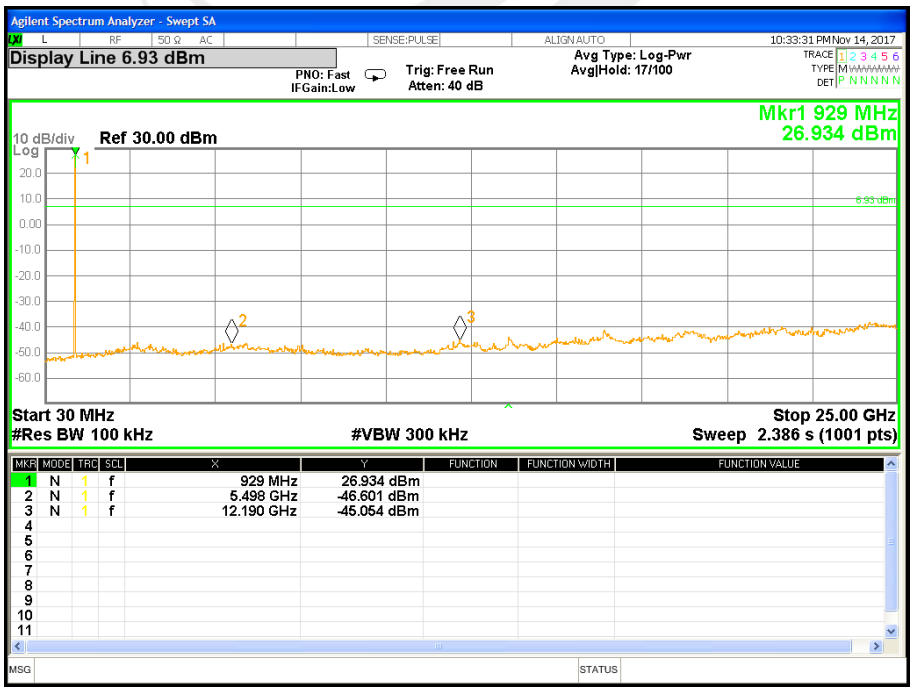


Temperature：	25 ℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 24V From POE
Test Mode ：	High data rate ISO-18000-62(80kbps)		

912.75MHz

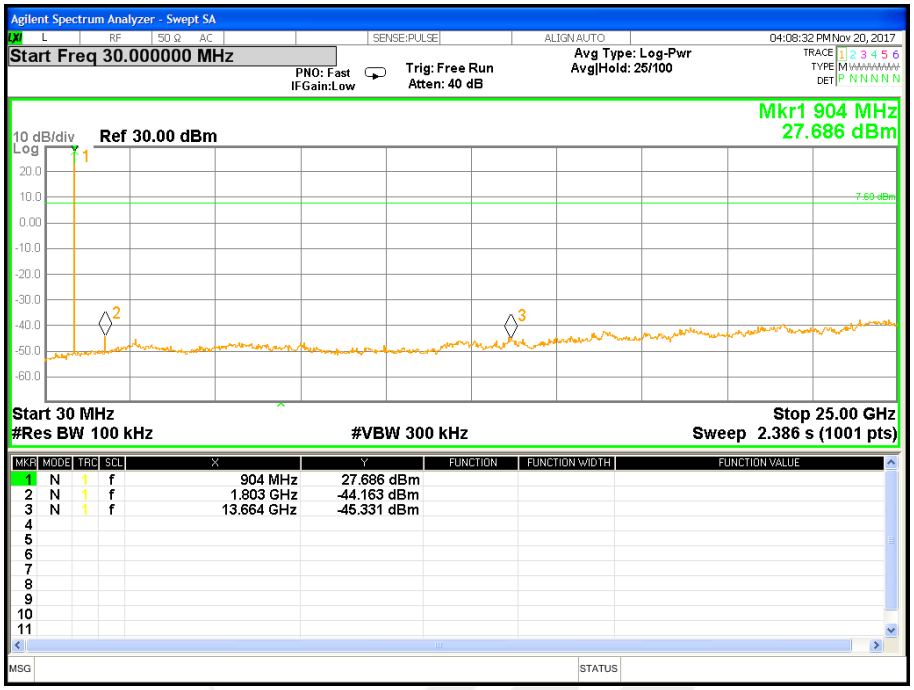


918.75MHz

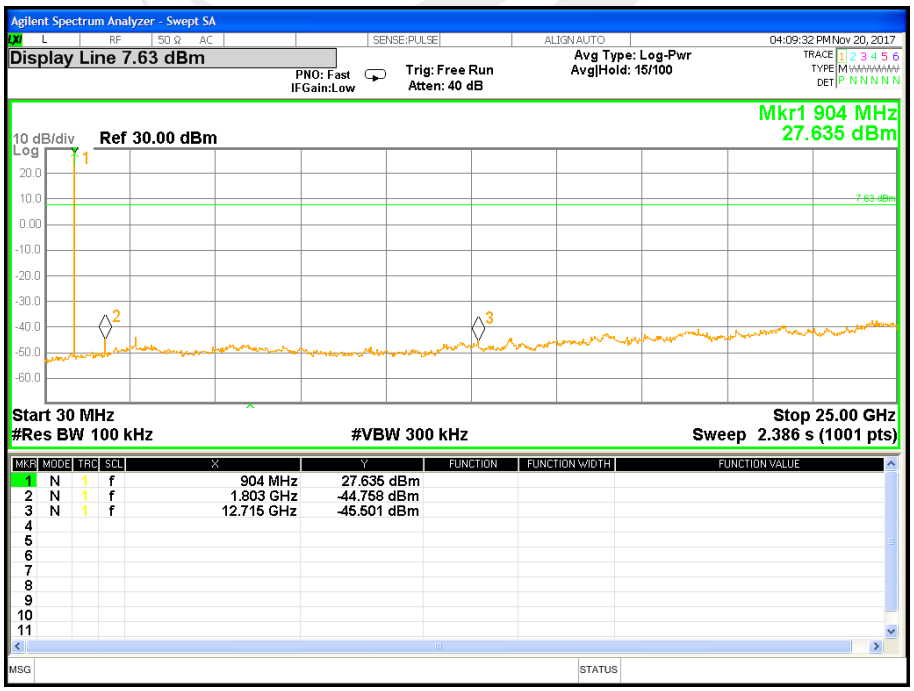


Temperature：	25 ℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 24V From POE
Test Mode ：	Unmodulated ISO-10374		

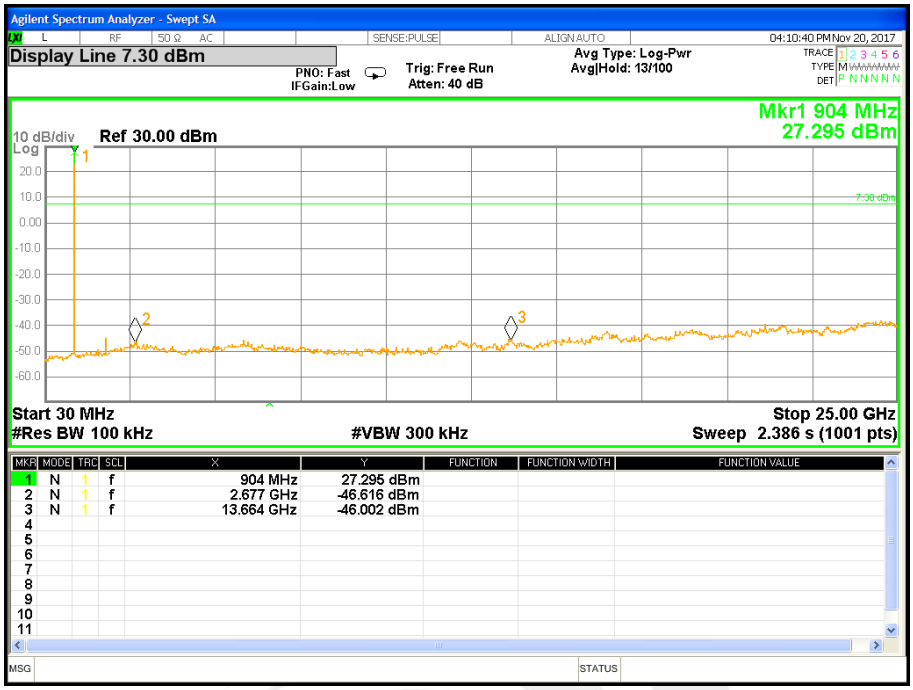
902.75MHz



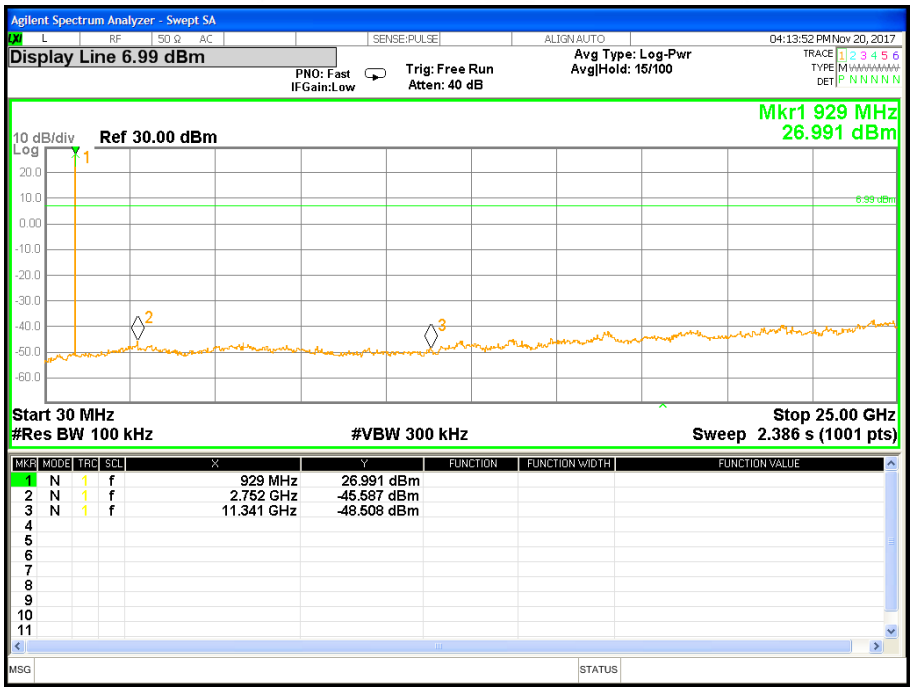
903.25MHz



910.75MHz

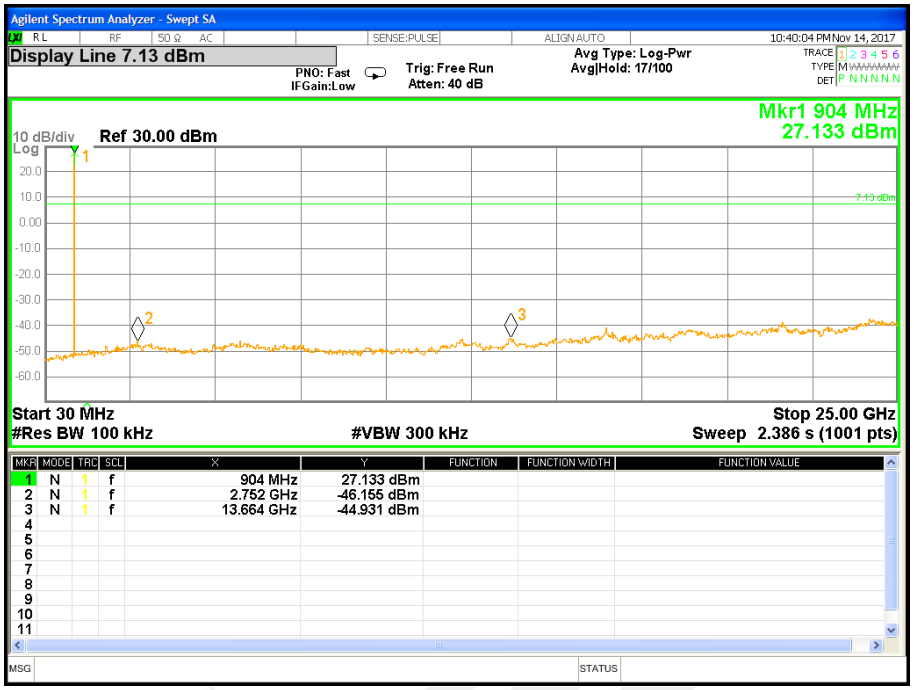


920.75MHz

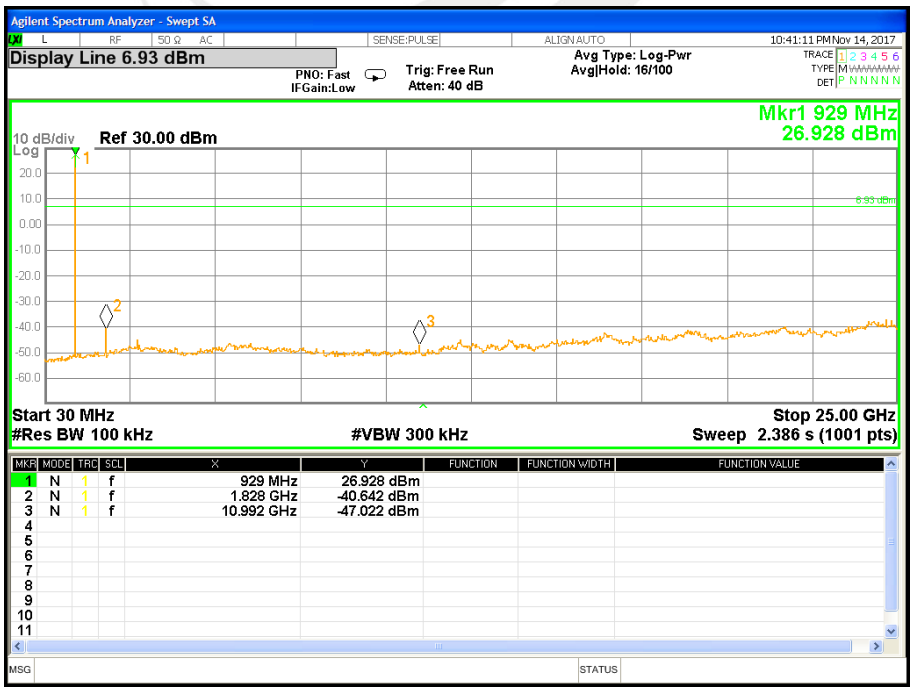


Temperature：	25 ℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 24V From POE
Test Mode ：	TDM		

913.75MHz

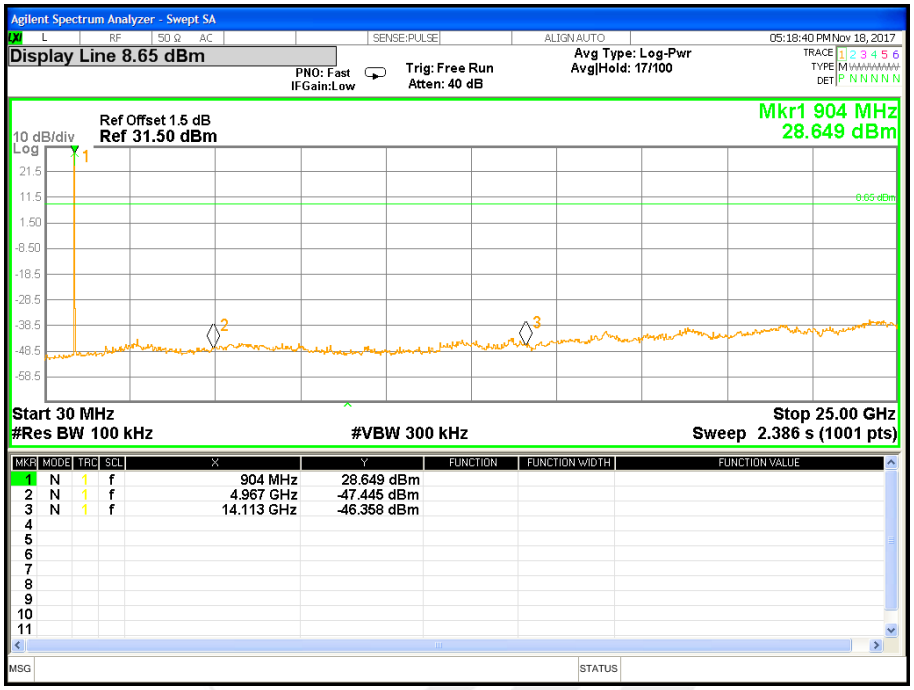


916.25MHz

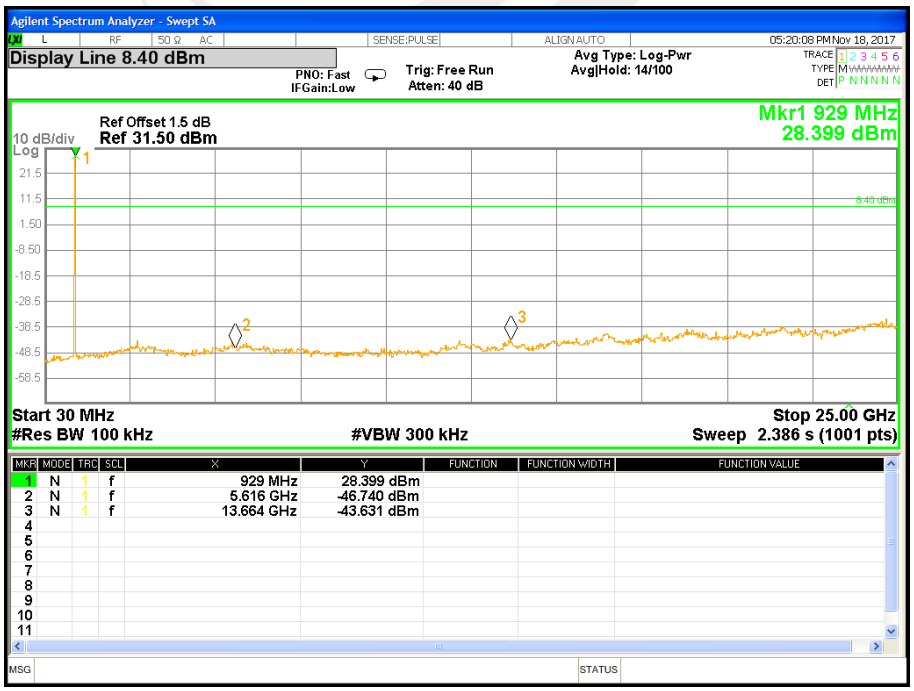


Temperature：	25 ℃	Relative Humidity：	50%
Pressure：	1012 hPa	Test Voltage ：	DC 24V From POE
Test Mode ：	Title 21		

913.75MHz

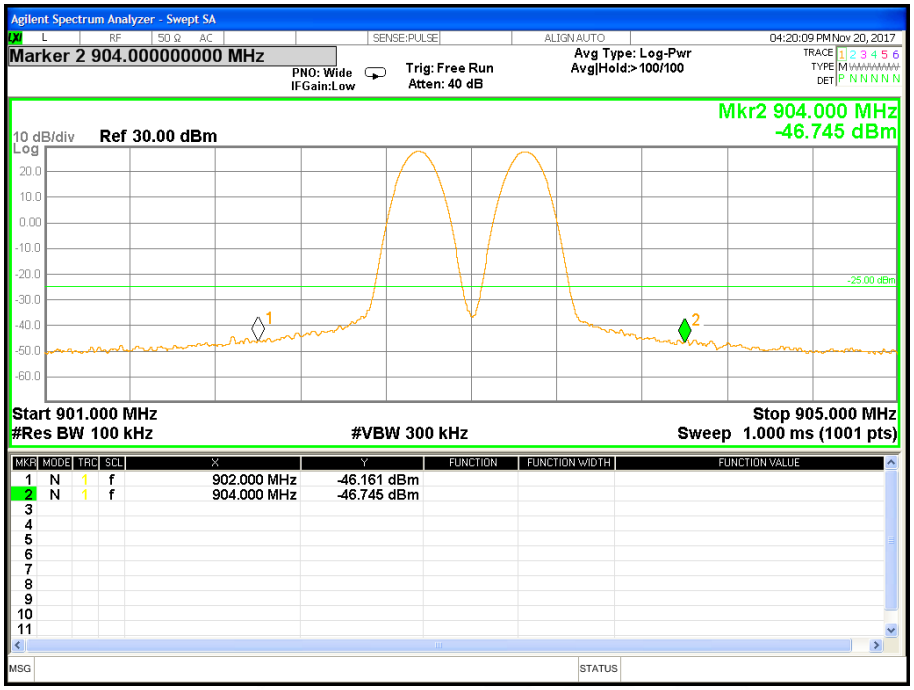


917.75MHz

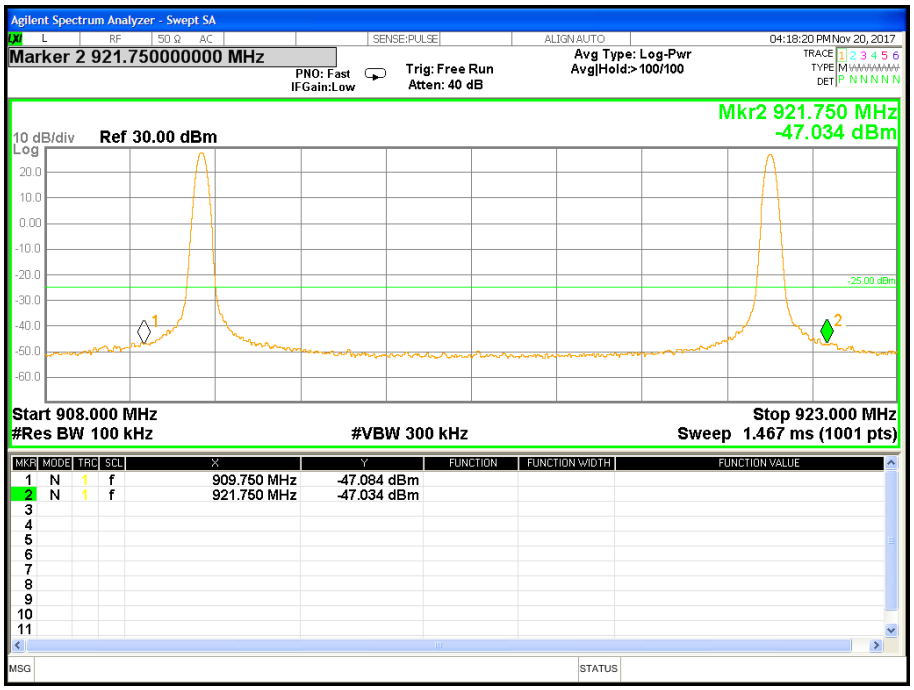


For band edge

Lower and Upper Band Edge-Low band- Unmodulated ISO-10374



Lower and Upper Band Edge-910.75~920.75- Unmodulated ISO-10374



8. RF EXPOSURE COMPLIANCE

8.1 LIMIT

The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed.
According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio-frequency (RF) radiation as specified in 1.1307 (b)

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)
Limits for Occupational / controlled Exposures			
300 - 1500	--	--	F/300
1500 – 100000	--	--	5.0
Limits for General population / Uncontrolled Exposure			
300 - 1500	--	--	F/1500
1500 – 100000	--	--	1.0

8.2 EUT ANTENNA

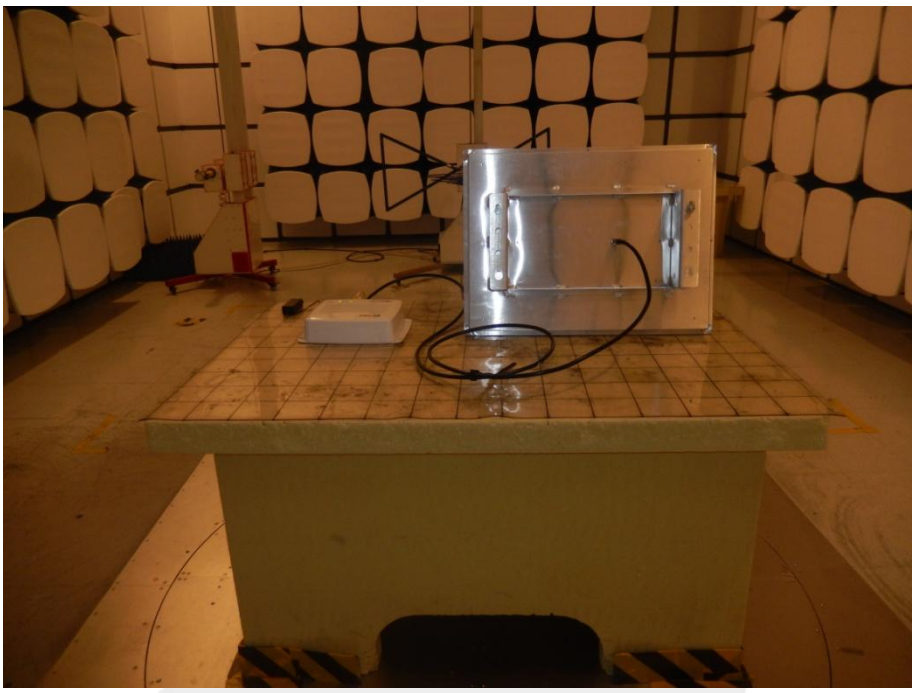
Protocol	MAX EIRP (mW)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Result
LMS	30000	0.239	0.6013	Pass

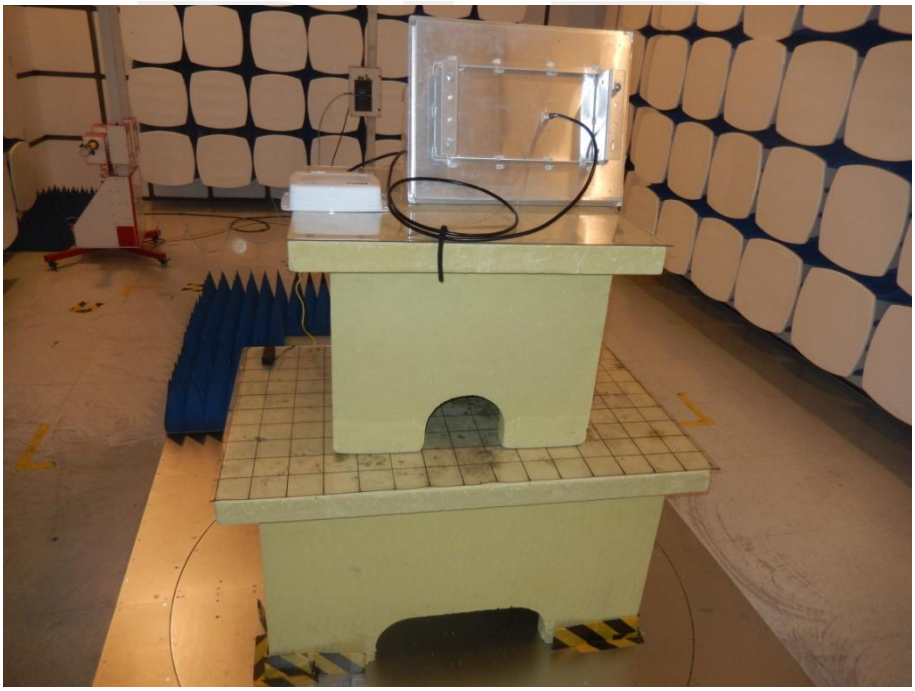
Friss Transmission Formula: Pd = (Pout) / ($4*pi*R^2$)

Where
Pd = power density in mW/cm^2
Pout = output power to antenna in mW
Pi = 3.1416
R = Distance between observation point and the center of radiator in cm, R=100cm

9. EUT TEST SETUP PHOTO

Radiated Measurement Photos





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