

# FCC Test Report

Product Name	Logistic Monitoring Gateway
Model No.	GWS-CSCG
FCC ID.	WL6GWS-CSCG

Applicant	ELITEGROUP COMPUTER SYSTEMS CO., LTD
Address	No.239, Sec. 2, Ti Ding Blvd., Taipei, Taiwan

Date of Receipt	Apr. 15, 2017
Issued Date	May 31, 2017
Report No.	1740404R-RFUSP24V00-A
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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# Test Report

Issued Date: May 31, 2017

Report No.: 1740404R-RFUSP24V00-A



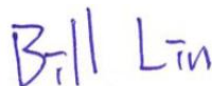
Product Name	Logistic Monitoring Gateway
Applicant	ELITEGROUP COMPUTER SYSTEMS CO., LTD
Address	No.239, Sec. 2, Ti Ding Blvd., Taipei, Taiwan
Manufacturer	Golden Elite Technology ( SHENZHEN ) CO., LTD.
Model No.	GWS-CSCG
FCC ID.	WL6GWS-CSCG
EUT Rated Voltage	DC 5V by USB
EUT Test Voltage	DC 5V by USB
Trade Name	ECS
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2016 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 DTS Meas Guidance v04
Test Result	Complied

Documented By :



( Senior Adm. Specialist / Genie Chang )

Tested By :



( Engineer / Bill Lin )

Approved By :



( Director / Vincent Lin )

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## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	Logistic Monitoring Gateway
Trade Name	ECS
Model No.	GWS-CSCG
FCC ID.	WL6GWS-CSCG
Frequency Range	2405-2480MHz
Channel Number	16
Type of Modulation	GFSK
Antenna Type	PIFA
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”

#### Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	ECS	IAHA20170411	PIFA	1.62dBi for 2.4 GHz

Note: The antenna of EUT is conforming to FCC 15.203.

Center Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01	2405	Channel 05	2425	Channel 09	2445	Channel 13	2465
Channel 02	2410	Channel 06	2430	Channel 10	2450	Channel 14	2470
Channel 03	2415	Channel 07	2435	Channel 11	2455	Channel 15	2475
Channel 04	2420	Channel 08	2440	Channel 12	2460	Channel 16	2480

Note:

1. The EUT is a Logistic Monitoring Gateway with a built-in 2.4GHz transceiver.
2. These tests were conducted on a sample for the purpose of demonstrating compliance of Bluetooth transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit
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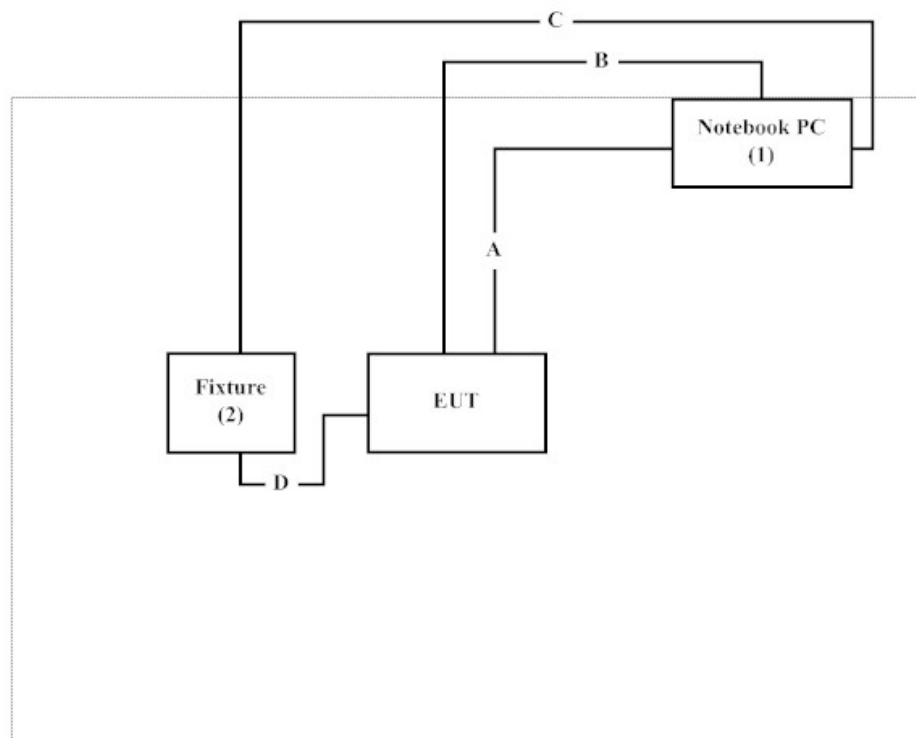
### 1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	P62G	229FJC2	N/A
2	Fixture	N/A	CI53A20_V2.0	N/A	N/A

Signal Cable Type		Signal cable Description
A	USB 2.0 Cable	Shielded, 0.75m
B	USB 2.0 Cable	Shielded, 1.0m
C	USB 2.0 Cable	Shielded, 1.8m
D	Signal Cable	Non-Shielded, 0.25m

### 1.4. Configuration of Tested System



### 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4.
- (2) Execute software “Tera Term (ver 4.90)” on the Notebook.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press “OK” to start the continuous Transmit.
- (5) Verify that the EUT works properly.

## 1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: [http://www.dekra.com.tw/index\\_en](http://www.dekra.com.tw/index_en)

Site Description: Accredited by TAF  
Accredited Number: 3023

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FCC Accreditation Number: TW1014

## 1.7. List of Test Equipment

### For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	EMI Test Receiver	R&S	ESR7	161601	2017.01.04	2018.01.05
X	LISN	R&S	ESH3-Z5	836679/017	2017.01.18	2018.01.17
X	LISN	R&S	ENV216	100097	2017.01.18	2018.01.17
X	Coaxial Cable	Quietek	RG400_BNC	RF001	2017.05.25	2018.05.24

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

### For Conducted measurements /ASR4

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSV30	103464	2017.01.07	2018.01.08
X	Power Meter	Anritsu	ML2496A	1548003	2016.12.15	2017.12.14
X	Power Sensor	Anritsu	MA2411B	1531024	2016.12.15	2017.12.14
X	Power Sensor	Anritsu	MA2411B	1531025	2016.12.15	2017.12.14
	Bluetooth Tester	R&S	CBT	101238	2017.01.01	2018.01.02

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek Conduction Test System V8.0.110

### For Radiated measurements /ACB1

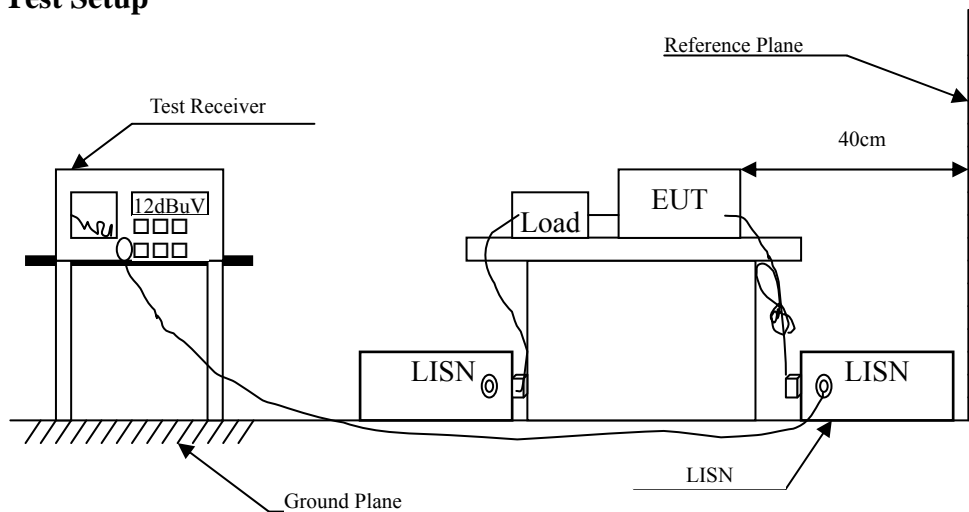
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	A.H.	SAS-562B	272	2016.07.21	2017.07.20
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2017.02.09	2018.02.08
X	Horn Antenna	ETS-Lindgren	3117	00203800	2016.10.13	2017.10.12
X	Horn Antenna	Com-Power	AH-840	101087	2017.05.03	2018.05.02
X	Pre-Amplifier	EMCI	EMC001330	980316	2017.05.14	2018.05.15
X	Pre-Amplifier	EMCI	EMC051835SE	980311	2017.05.15	2018.05.16
X	Pre-Amplifier	EMCI	EMC05820SE	980310	2017.05.15	2018.05.16
X	Pre-Amplifier	EMCI	EMC184045SE	980314	2017.05.17	2018.05.18
X	Filter	MICRO TRONICS	BRM50702	G251	2016.08.11	2017.08.10
	Filter	MICRO TRONICS	BRM50716	G188	2016.08.11	2017.08.10
X	EMI Test Receiver	R&S	ESR7	101602	2016.12.15	2017.12.14
X	Spectrum Analyzer	R&S	FSV40	101149	2017.01.24	2018.01.23
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2017.05.25	2018.05.24
X	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2016.08.11	2017.08.10

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

## 2. Conducted Emission

### 2.1. Test Setup



### 2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

### 2.3. Test Procedure

The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.4, 2014; tested to DTS test procedure of FCC KDB-558074 for compliance to FCC 47CFR Subpart C requirements.

### 2.4. Uncertainty

±2.35dB



## 2.5. Test Result of Conducted Emission

Product : Logistic Monitoring Gateway  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Date : 2017/05/24  
 Test Mode : Mode 1: Transmit (2402MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB $\mu$ V	dB $\mu$ V	dB	dB $\mu$ V
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.160	9.560	36.218	45.778	-19.936	65.714
0.240	9.562	24.586	34.148	-29.281	63.429
0.520	9.580	26.942	36.522	-19.478	56.000
3.800	9.598	18.766	28.364	-27.636	56.000
7.000	9.630	8.347	17.977	-42.023	60.000
10.000	9.650	18.918	28.568	-31.432	60.000
<b>Average</b>					
0.160	9.560	20.135	29.695	-26.019	55.714
0.240	9.562	13.463	23.025	-30.404	53.429
0.520	9.580	17.998	27.578	-18.422	46.000
3.800	9.598	8.530	18.128	-27.872	46.000
7.000	9.630	4.076	13.706	-36.294	50.000
10.000	9.650	12.875	22.525	-27.475	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Logistic Monitoring Gateway  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Date : 2017/05/24  
 Test Mode : Mode 1: Transmit (2402MHz)

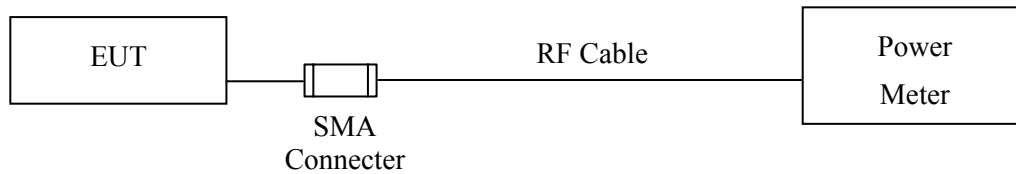
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dB $\mu$ V	dB $\mu$ V	dB	dB $\mu$ V
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.160	9.552	36.662	46.215	-19.499	65.714
0.290	9.563	19.686	29.249	-32.751	62.000
0.500	9.570	21.806	31.377	-24.623	56.000
2.300	9.583	11.053	20.636	-35.364	56.000
3.700	9.597	17.460	27.057	-28.943	56.000
9.900	9.649	12.111	21.760	-38.240	60.000
<b>Average</b>					
0.160	9.552	19.732	29.284	-26.430	55.714
0.290	9.563	10.082	19.645	-32.355	52.000
0.500	9.570	15.243	24.813	-21.187	46.000
2.300	9.583	6.399	15.982	-30.018	46.000
3.700	9.597	7.739	17.336	-28.664	46.000
9.900	9.649	7.503	17.152	-32.848	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

### 3. Peak Power Output

#### 3.1. Test Setup



#### 3.2. Limit

The maximum peak power shall be less 1Watt.

#### 3.3. Test Procedure

Tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using KDB 558074 section 9.1.3 PKPM1 Peak power meter method.

#### 3.4. Uncertainty

$\pm 0.86$  dB

### 3.5. Test Result of Peak Power Output

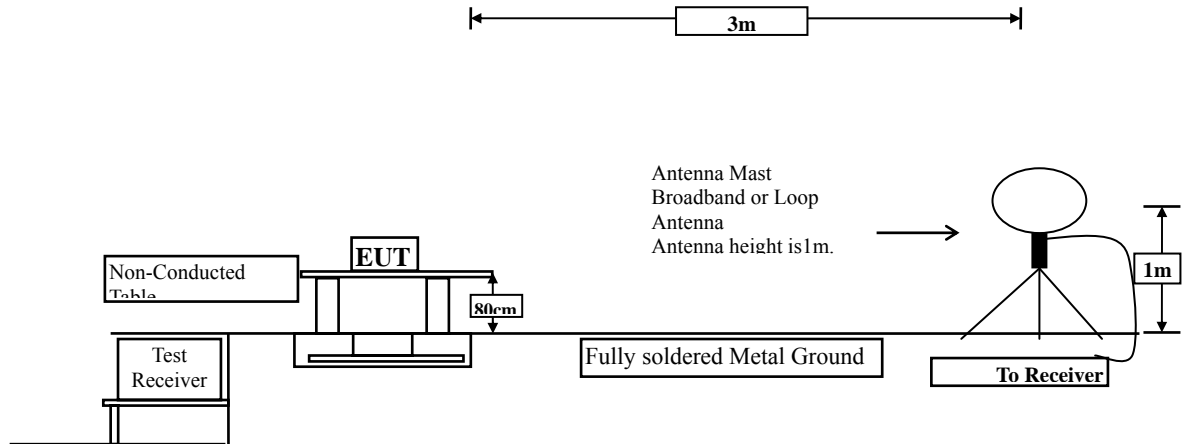
Product : Logistic Monitoring Gateway  
Test Item : Peak Power Output  
Test Mode : Mode 1: Transmit  
Test Date : 2017/05/25

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 01	2405.00	2.85	1 Watt= 30 dBm	Pass
Channel 08	2440.00	3.17	1 Watt= 30 dBm	Pass
Channel 16	2480.00	2.55	1 Watt= 30 dBm	Pass

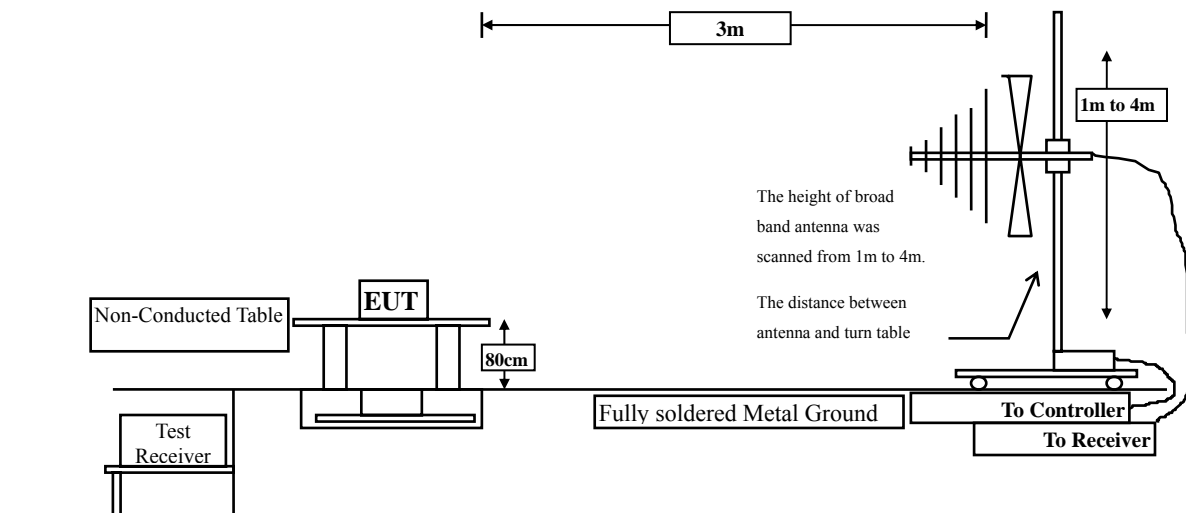
## 4. Radiated Emission

### 4.1. Test Setup

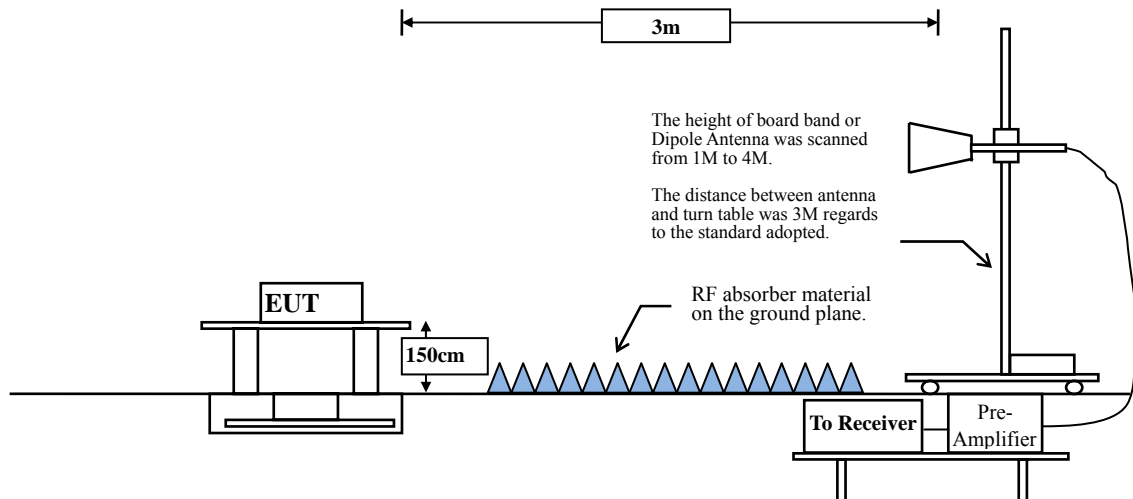
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



## 4.2. Limits

### ➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

- Remarks:
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
  2. In the Above Table, the tighter limit applies at the band edges.
  3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

### 4.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

### 4.4. Uncertainty

Horizontal polarization :

30-300MHz:  $\pm 4.08\text{dB}$  ; 300M-1GHz:  $\pm 3.86\text{dB}$  ; 1-18GHz:  $\pm 3.77\text{dB}$  ; 18-40GHz:  $\pm 3.98\text{dB}$

Vertical polarization :

30-300MHz:  $\pm 4.81\text{dB}$  ; 300M-1GHz:  $\pm 3.87\text{dB}$  ; 1-18GHz :  $\pm 3.83\text{dB}$  ; 18-40GHz:  $\pm 3.98\text{dB}$

#### 4.5. Test Result of Radiated Emission

Product : Logistic Monitoring Gateway  
 Test Item : Harmonic Radiated Emission Data  
 Test Date : 2017/05/25  
 Test Mode : Mode 1: Transmit (2405MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB $\mu$ V	dB $\mu$ V /m	dB	dB $\mu$ V /m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4810.000	-3.774	49.000	45.226	-28.774	74.000
7215.000	-0.776	47.240	46.464	-27.536	74.000
9620.000	1.106	46.180	47.287	-26.713	74.000
<b>Average Detector:</b>					
--					54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
4810.000	-3.774	47.690	43.916	-30.084	74.000
7215.000	-0.776	48.500	47.724	-26.276	74.000
9620.000	1.106	45.210	46.317	-27.683	74.000
<b>Average Detector:</b>					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product : Logistic Monitoring Gateway  
 Test Item : Harmonic Radiated Emission Data  
 Test Date : 2017/05/25  
 Test Mode : Mode 1: Transmit (2440MHz)

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV /m	Margin dB	Peak Limit dBμV /m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4880.000	-3.770	47.690	43.920	-30.080	74.000
7320.000	-0.715	49.040	48.325	-25.675	74.000
9760.000	1.381	45.900	47.281	-26.719	74.000
<b>Average Detector</b>					
--					54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
4880.000	-3.770	48.430	44.660	-29.340	74.000
7320.000	-0.715	46.910	46.195	-27.805	74.000
9760.000	1.381	45.510	46.891	-27.109	74.000
<b>Average Detector</b>					
--					54.000

## Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Logistic Monitoring Gateway  
 Test Item : Harmonic Radiated Emission Data  
 Test Date : 2017/05/25  
 Test Mode : Mode 1: Transmit (2480MHz)

Frequency MHz	Correct Factor dB	Reading Level dBμV	Measurement Level dBμV /m	Margin dB	Peak Limit dBμV /m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4960.000	-3.732	48.550	44.818	-29.182	74.000
7440.000	-0.646	47.650	47.003	-26.997	74.000
9920.000	1.687	43.060	44.747	-29.253	74.000
<b>Average Detector</b>					
--					54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
4960.000	-3.732	47.510	43.778	-30.222	74.000
7440.000	-0.646	44.530	43.883	-30.117	74.000
9920.000	1.687	43.730	45.417	-28.583	74.000
<b>Average Detector</b>					
--					54.000

## Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Logistic Monitoring Gateway  
 Test Item : General Radiated Emission Data  
 Test Date : 2017/05/24  
 Test Mode : Mode 1: Transmit (2440MHz)

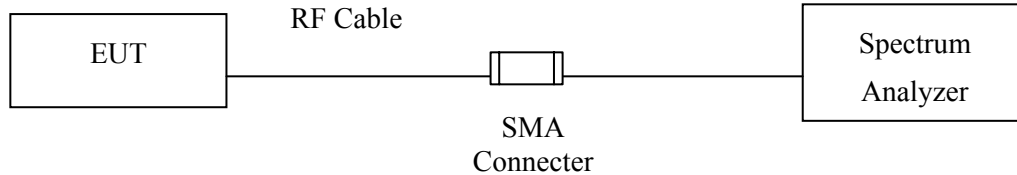
Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dB $\mu$ V	dB $\mu$ V /m	dB	dB $\mu$ V /m
<b>Horizontal</b>					
115.360	-13.599	40.919	27.320	-16.180	43.500
204.600	-13.458	44.725	31.267	-12.233	43.500
268.620	-11.117	49.833	38.715	-7.285	46.000
325.850	-9.511	40.756	31.245	-14.755	46.000
600.360	-3.330	32.872	29.541	-16.459	46.000
876.810	0.259	30.844	31.102	-14.898	46.000
<b>Vertical</b>					
79.470	-15.293	46.601	31.308	-8.692	40.000
127.970	-12.262	36.554	24.292	-19.208	43.500
202.660	-13.541	43.185	29.644	-13.856	43.500
268.620	-11.117	38.517	27.399	-18.601	46.000
755.560	-1.178	31.487	30.309	-15.691	46.000
917.550	0.728	30.771	31.499	-14.501	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

## 5. RF Antenna Conducted Test

### 5.1. Test Setup



### 5.2. Limits

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

### 5.3. Test Procedure

The EUT was tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

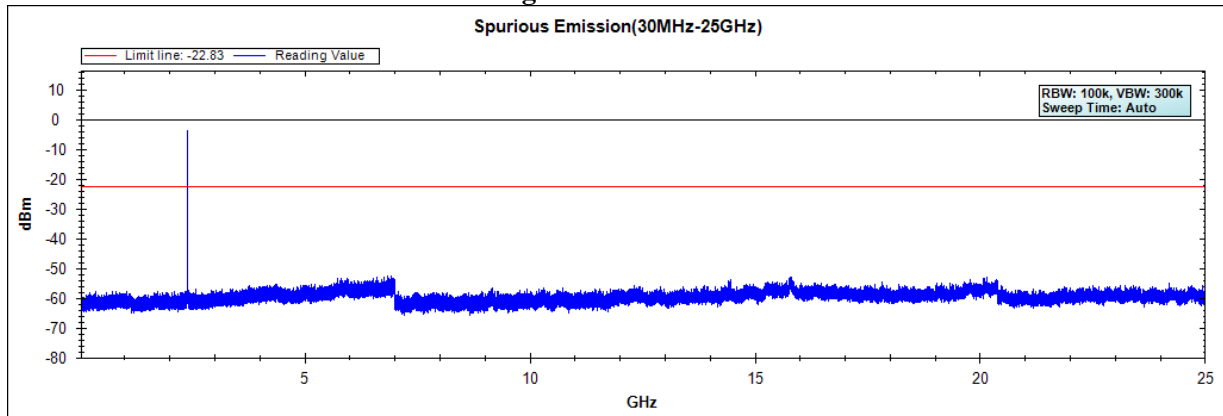
### 5.4. Uncertainty

±1.23dB

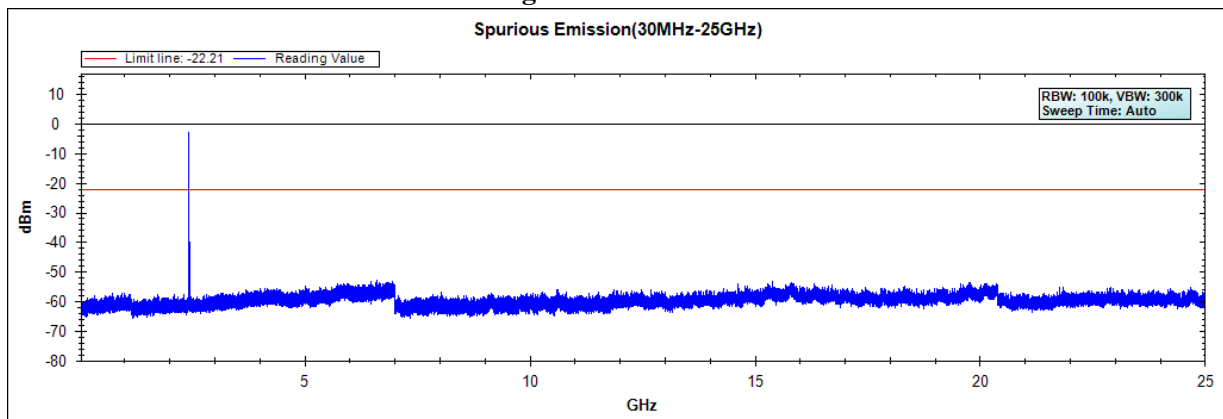
## 5.5. Test Result of RF Antenna Conducted Test

Product : Logistic Monitoring Gateway  
Test Item : RF Antenna Conducted Test  
Test Mode : Mode 1: Transmit  
Test Date : 2017/05/25

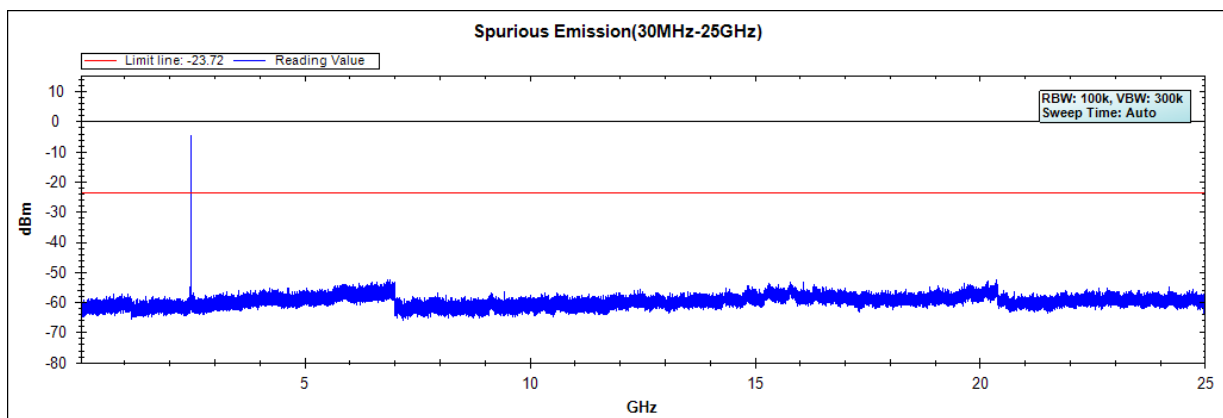
**Figure Channel 01:**



**Figure Channel 08:**



**Figure Channel 16:**

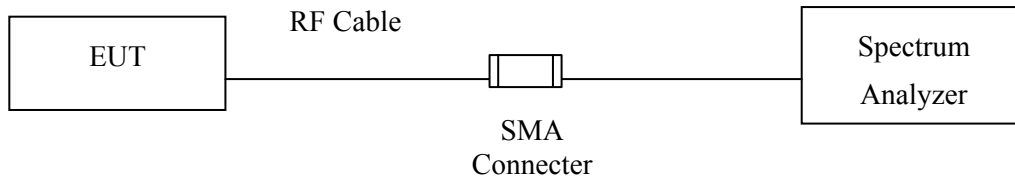


Note: The above test pattern is synthesized by multiple of the frequency range.

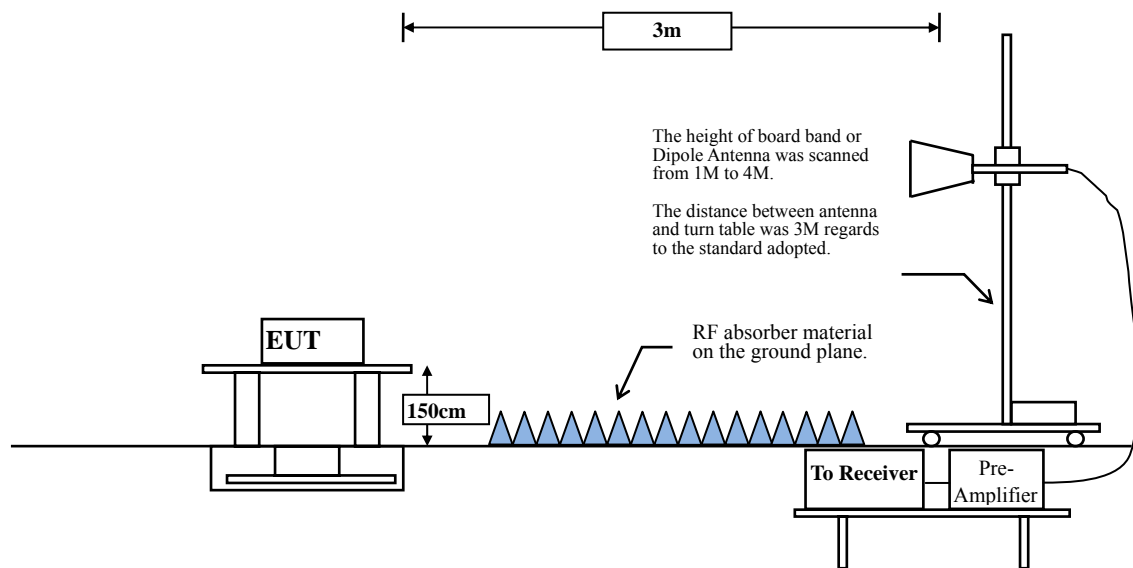
## 6. Band Edge

### 6.1. Test Setup

#### RF Conducted Measurement



#### RF Radiated Measurement:



## 6.2. Limit

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

## 6.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.

## 6.4. Uncertainty

Conducted:  $\pm 1.23\text{dB}$

Radiated:

Horizontal polarization : 1-18GHz:  $\pm 3.77\text{dB}$

Vertical polarization : 1-18GHz :  $\pm 3.83\text{dB}$

## 6.5. Test Result of Band Edge

Product : Logistic Monitoring Gateway  
 Test Item : Band Edge Data  
 Test Date : 2017/05/24  
 Test Mode : Mode 1: Transmit (2405MHz)

### RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dB $\mu$ V)	Emission Level (dB $\mu$ V /m)	Peak Limit (dB $\mu$ V /m)	Average Limit (dB $\mu$ V /m)	Result
01 (Peak)	2390.000	11.556	45.422	56.978	74.00	54.00	Pass
01 (Peak)	2400.000	11.579	50.568	62.147	--	--	--
01 (Peak)	2405.507	11.591	85.806	97.398	--	--	--
01 (Average)	2390.000	11.556	33.395	44.951	74.00	54.00	Pass
01 (Average)	2400.000	11.579	39.788	51.367	--	--	--
01 (Average)	2405.072	11.591	83.579	95.170	--	--	--

Figure Channel 2: Horizontal (Peak)

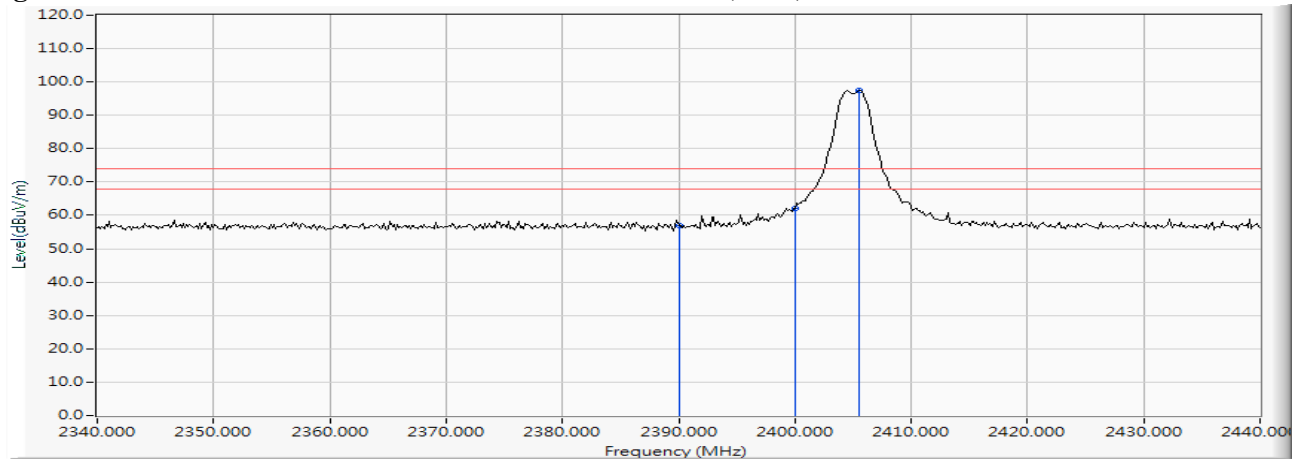
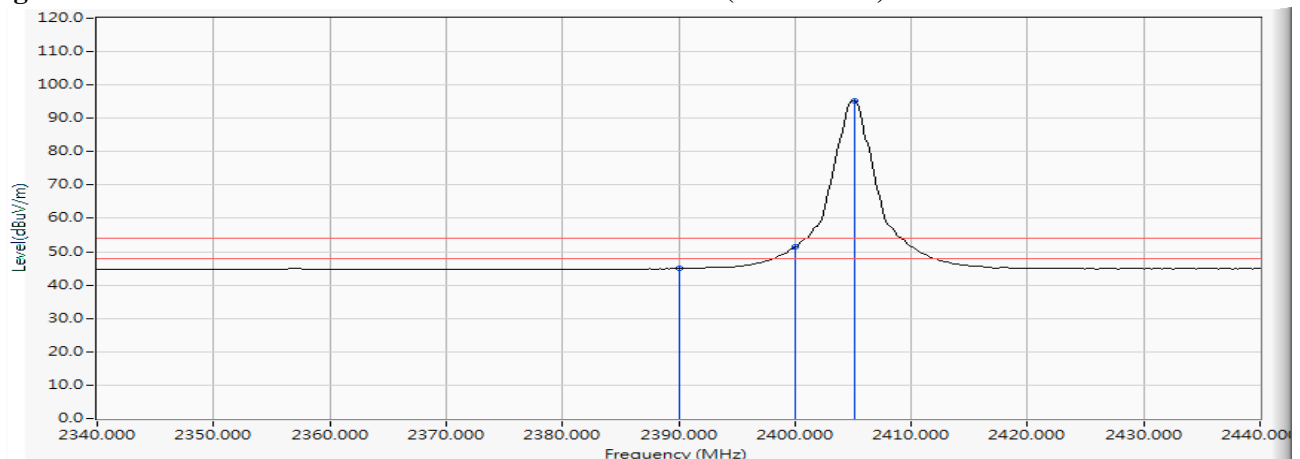


Figure Channel 2: Horizontal (AVERAGE)



Note:

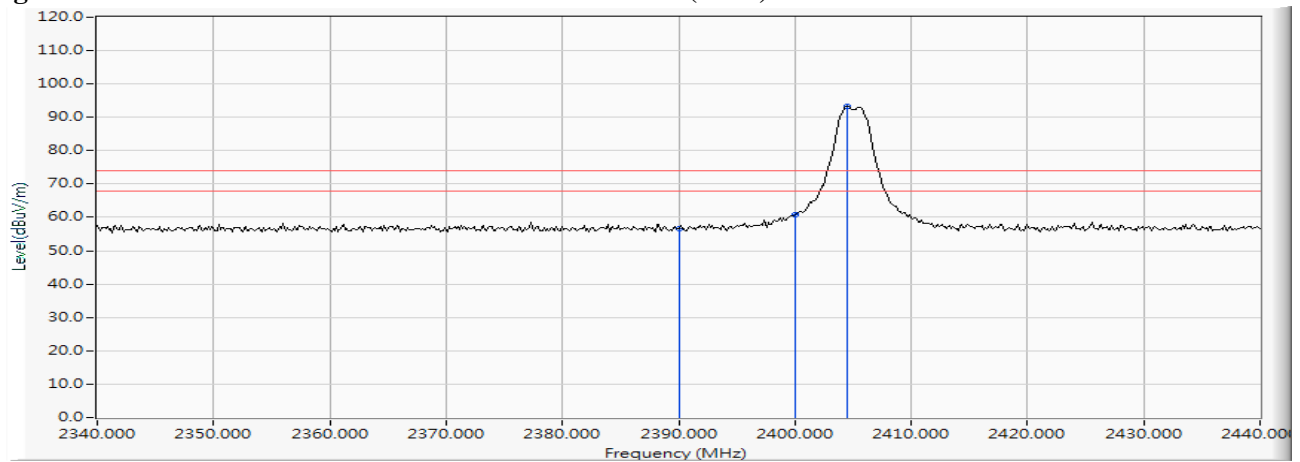
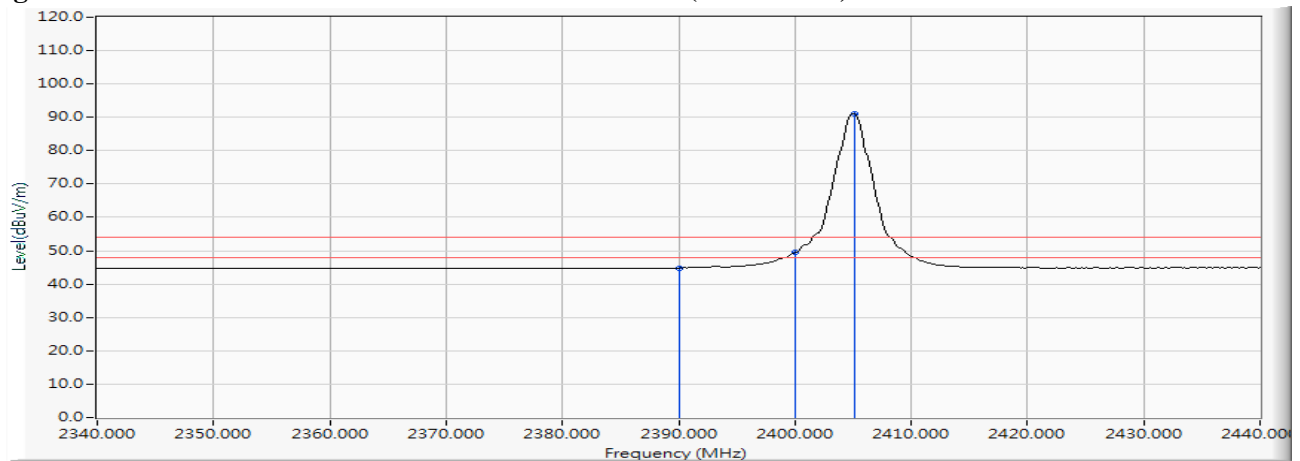
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.



Product : Logistic Monitoring Gateway  
 Test Item : Band Edge Data  
 Test Date : 2017/05/24  
 Test Mode : Mode 1: Transmit (2405MHz)

**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dB $\mu$ V)	Emission Level (dB $\mu$ V /m)	Peak Limit (dB $\mu$ V /m)	Average Limit (dB $\mu$ V /m)	Result
01 (Peak)	2390.000	11.556	45.064	56.620	74.00	54.00	Pass
01 (Peak)	2400.000	11.579	49.131	60.710	--	--	--
01 (Peak)	2404.493	11.590	81.705	93.295	--	--	Pass
01 (Average)	2390.000	11.556	33.316	44.872	74.00	54.00	Pass
01 (Average)	2400.000	11.579	37.973	49.552	--	--	Pass
01 (Average)	2405.072	11.591	79.337	90.928	--	--	--

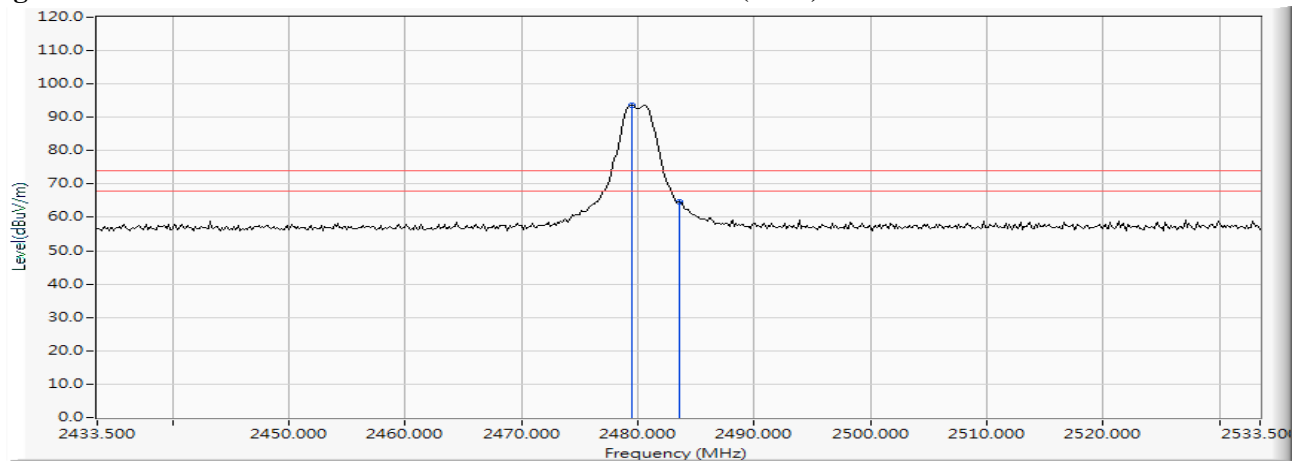
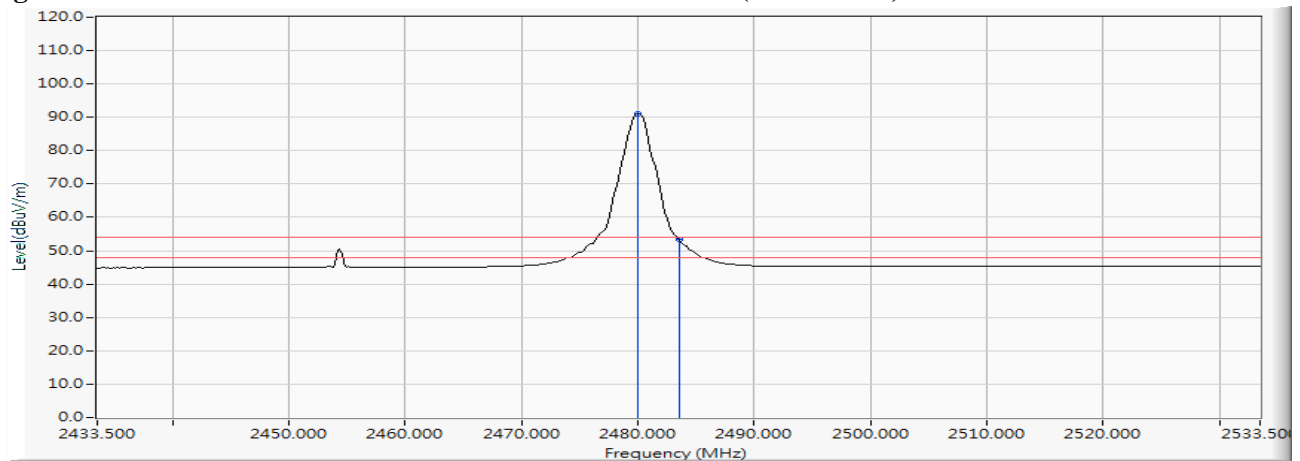
**Figure Channel 2: Vertical (Peak)****Figure Channel 2: Vertical (AVERAGE)****Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.

Product : Logistic Monitoring Gateway  
 Test Item : Band Edge Data  
 Test Date : 2017/05/24  
 Test Mode : Mode 1: Transmit (2480MHz)

**RF Radiated Measurement (Horizontal):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV /m)	Peak Limit (dBμV /m)	Average Limit (dBμV /m)	Result
16 (Peak)	2479.442	11.790	81.844	93.634	74.00	54.00	Pass
16 (Peak)	2483.500	11.800	52.737	64.537	--	--	--
16 (Average)	2480.022	11.791	79.356	91.147	74.00	54.00	Pass
16 (Average)	2483.500	11.800	41.687	53.487	--	--	--

**Figure Channel 38:**
**Horizontal (Peak)**

**Figure Channel 38:**
**Horizontal (AVERAGE)**


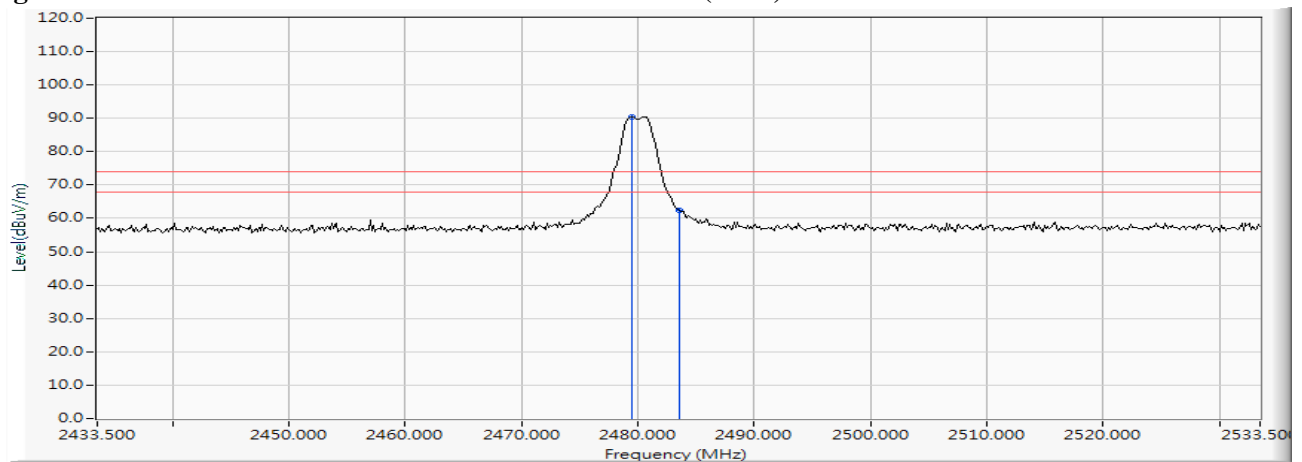
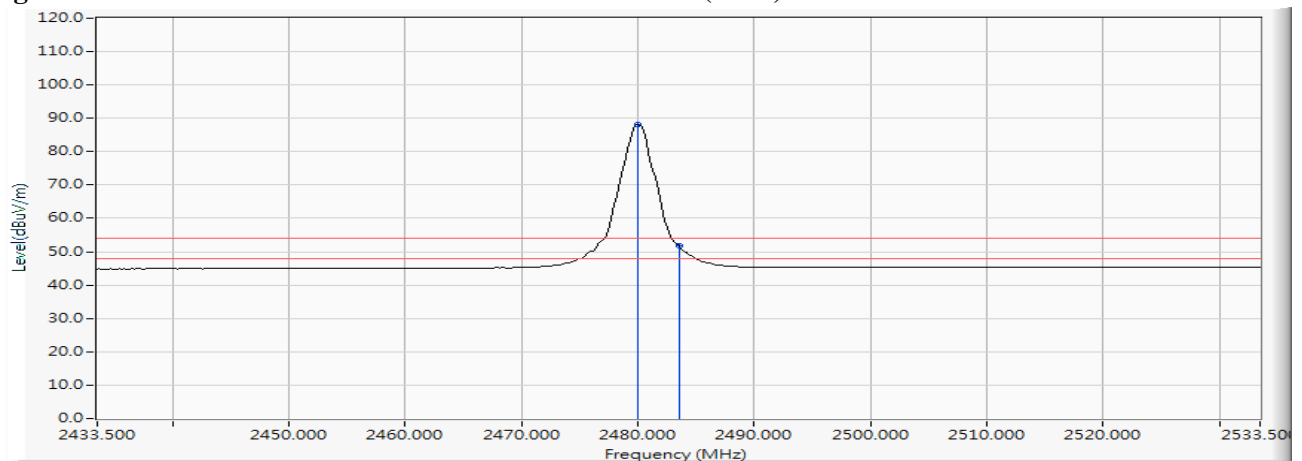
Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.

Product : Logistic Monitoring Gateway  
 Test Item : Band Edge Data  
 Test Date : 2017/05/24  
 Test Mode : Mode 1: Transmit (2480MHz)

**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dB $\mu$ V)	Emission Level (dB $\mu$ V /m)	Peak Limit (dB $\mu$ V /m)	Average Limit (dB $\mu$ V /m)	Result
16 (Peak)	2479.442	11.790	78.761	90.551	--	--	--
16 (Peak)	2483.500	11.800	50.540	62.340	74.00	54.00	Pass
16 (Average)	2480.022	11.791	76.301	88.092	--	--	--
16 (Average)	2483.500	11.800	39.894	51.694	74.00	54.00	Pass

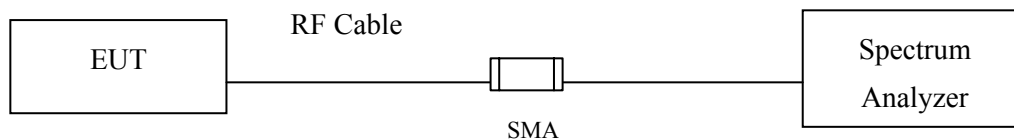
**Figure Channel 38:****Vertical (Peak)****Figure Channel 38:****Vertical (Peak)**

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.

## 7. 6dB Bandwidth

### 7.1. Test Setup



### 7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

### 7.3. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 1-5% of the emission bandwidth,  $VBW \geq 3 * RBW$

### 7.4. Uncertainty

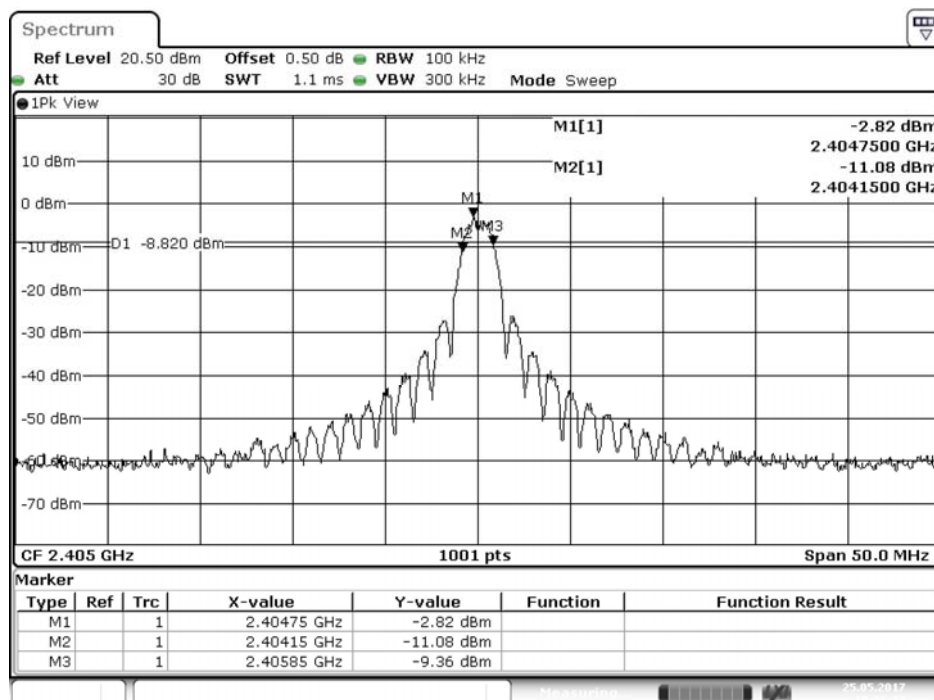
$\pm 279.2 \text{ Hz}$

## 7.5. Test Result of 6dB Bandwidth

Product : Logistic Monitoring Gateway  
 Test Item : 6dB Bandwidth Data  
 Test Mode : Mode 1: Transmit (2402MHz)  
 Test Date : 2017/05/25

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2405	1700	>500	Pass

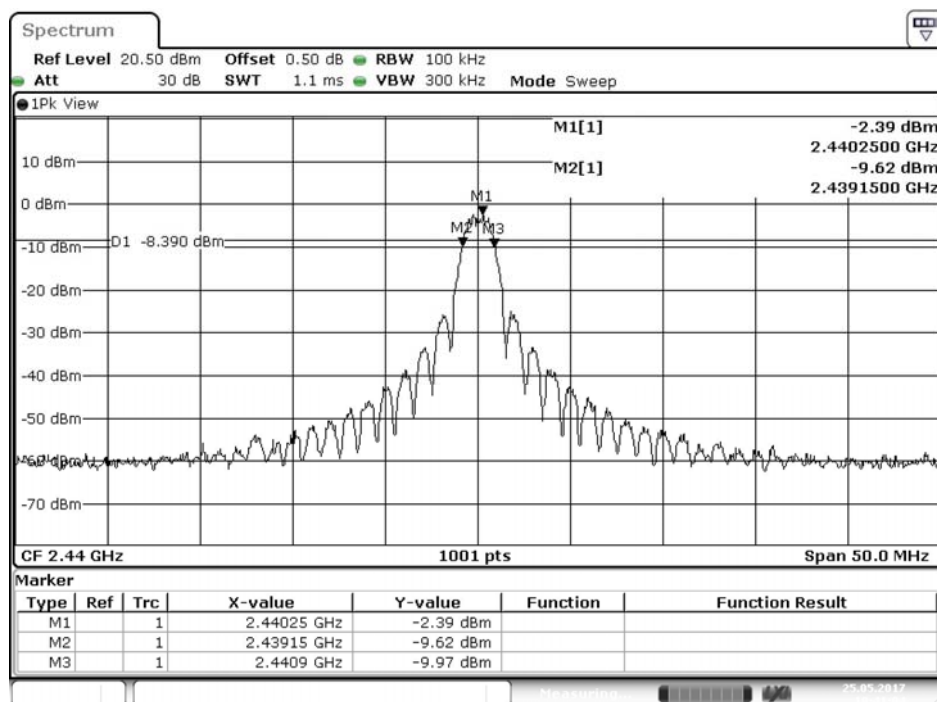
**Figure Channel 01:**



Product : Logistic Monitoring Gateway  
 Test Item : 6dB Bandwidth Data  
 Test Mode : Mode 1: Transmit (2440MHz)  
 Test Date : 2017/05/25

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
08	2440	1750	>500	Pass

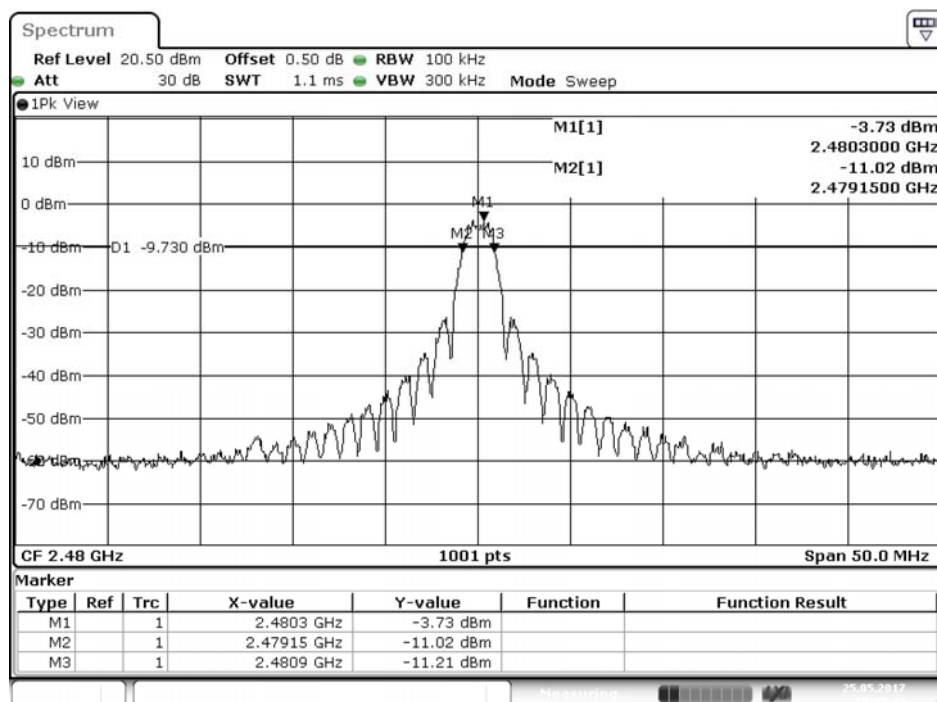
Figure Channel 02:



Product : Logistic Monitoring Gateway  
 Test Item : 6dB Bandwidth Data  
 Test Mode : Mode 1: Transmit (2480MHz)  
 Test Date : 2017/05/25

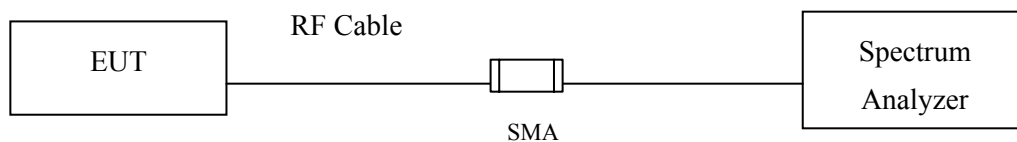
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
16	2480	1750	>500	Pass

Figure Channel 01:



## 8. Power Density

### 8.1. Test Setup



### 8.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

### 8.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013, the maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

### 8.4. Uncertainty

$\pm 1.23\text{dB}$

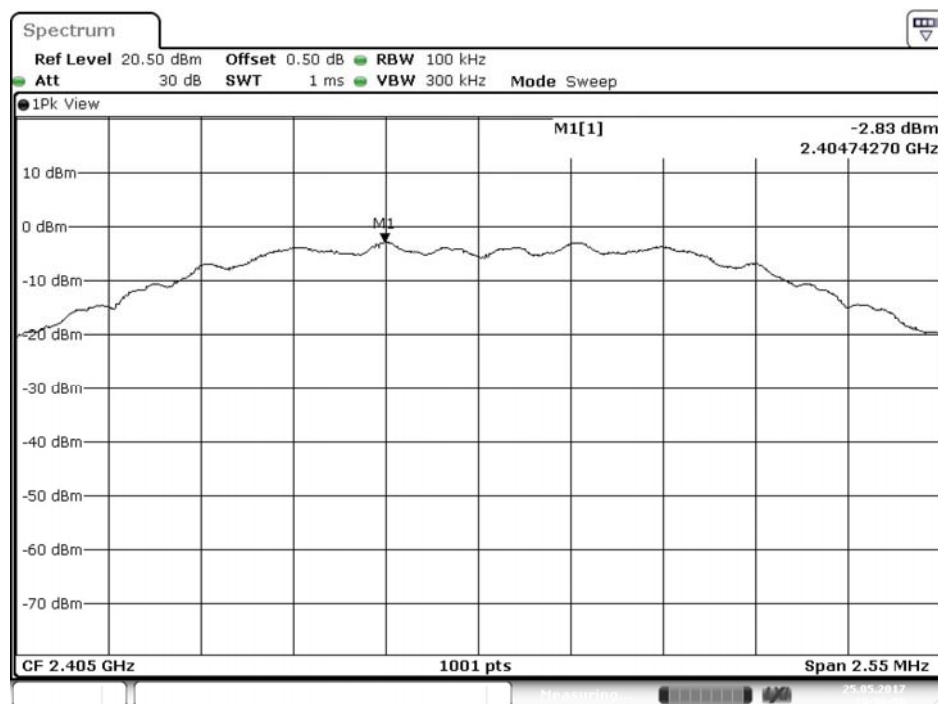


### 8.5. Test Result of Power Density

Product : Logistic Monitoring Gateway  
 Test Item : Power Density Data  
 Test Mode : Mode 1: Transmit (2405MHz)  
 Test Date : 2017/05/25

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2405	-2.83	$\leq 8$ dBm	Pass

**Figure Channel 01:**

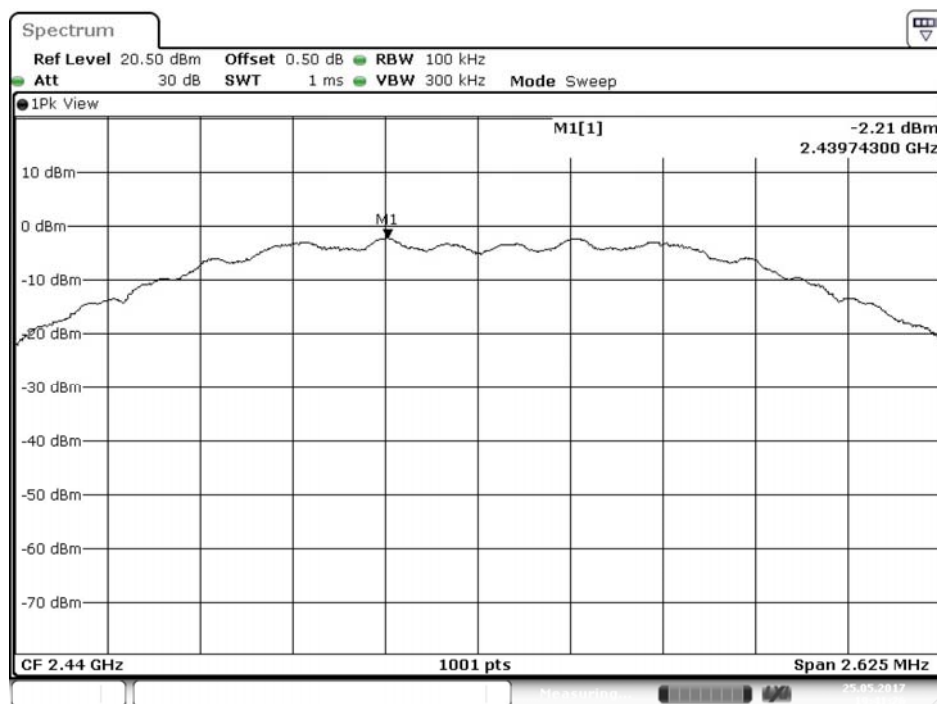


Date: 25.MAY.2017 19:36:49

Product : Logistic Monitoring Gateway  
 Test Item : Power Density Data  
 Test Mode : Mode 1: Transmit (2440MHz)  
 Test Date : 2017/05/25

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
08	2440	-2.21	$\leq 8\text{dBm}$	Pass

Figure Channel 02:

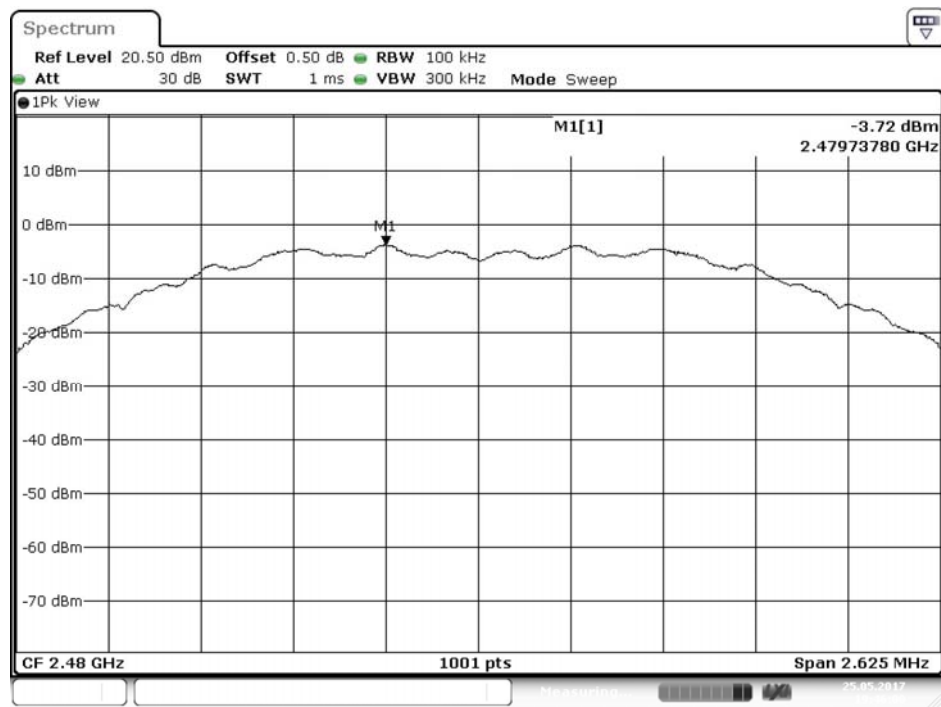


Date: 25.MAY.2017 19:41:26

Product : Logistic Monitoring Gateway  
 Test Item : Power Density Data  
 Test Mode : Mode 1: Transmit (2480MHz)  
 Test Date : 2017/05/25

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
16	2480	-3.72	$\leq 8$ dBm	Pass

Figure Channel 01:



## **9. EMI Reduction Method During Compliance Testing**

No modification was made during testing.

## Attachment 1: EUT Test Photographs

## Attachment 2: EUT Detailed Photographs