

## 9. DWELL TIME

### 9.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	PXA Signal Analyzer	Agilent	N9030A	MY53311015	Oct.15,17	1 Year
2.	RF Cable	Marvelous Microwave Inc	SFL402105FLEX	NO.1	Oct.15,17	1 Year

### 9.2. Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 9.3. Test Procedure

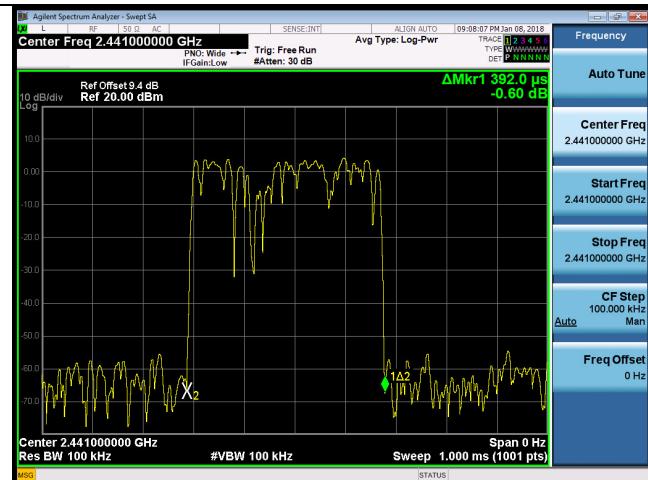
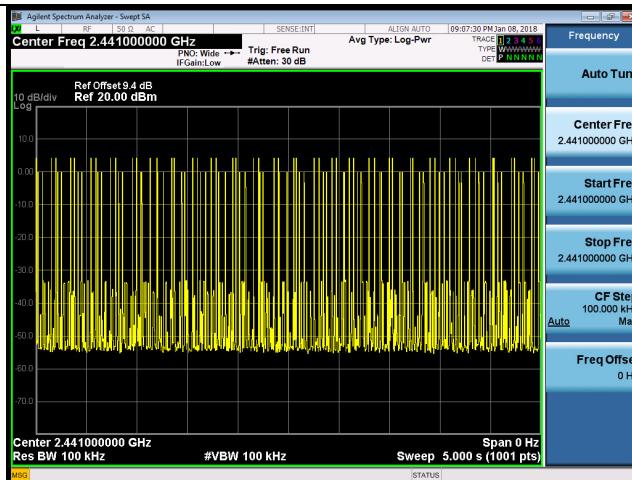
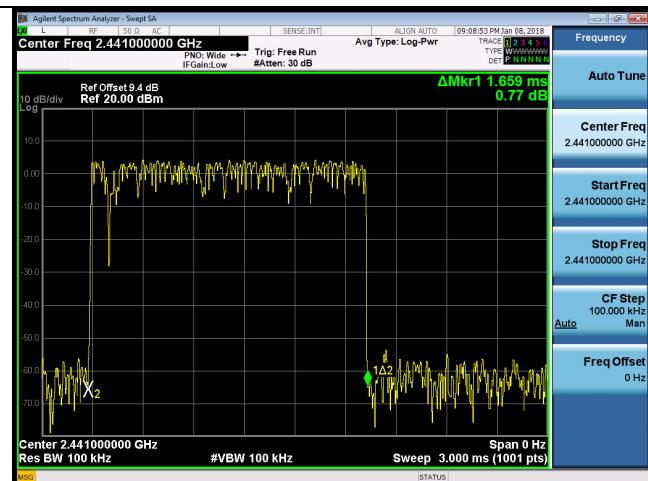
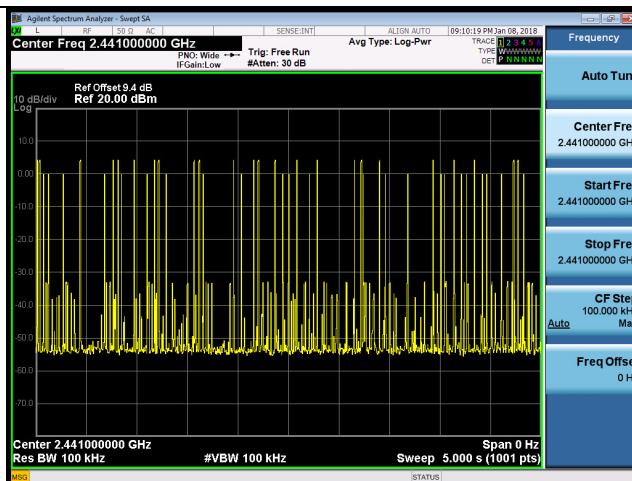
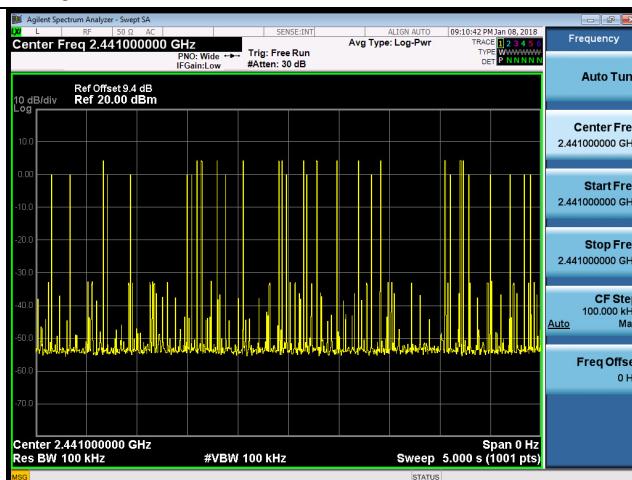
1. Connect the antenna of the EUT to Spectrum analyzer and let the EUT working at hopping mode.
2. Setting of SA is following as:  
RBW: 100kHz / VBW: 100kHz  
Sweep Mode: Single  
Detect mode: Positive peak  
Trace mode: Auto  
Span: 0Hz  
Sweep time: 5s and big enough to measure one hopping signal
3. Use below formula calculate the Dwell time  
Dwell time=Hopping number per second\*0.4\*channel number\*Pulse bandwidth per hopping.

### 9.4. Test Results

EUT: Gemini			
M/N:Gemini 4G			
Test date:2018-01-08	Pressure: 101.4±1.0kpa	Humidity: 51.4±3.0%	
Tested by: Kayle	Test site: RF Site	Temperature: 23.4±0.6°C	

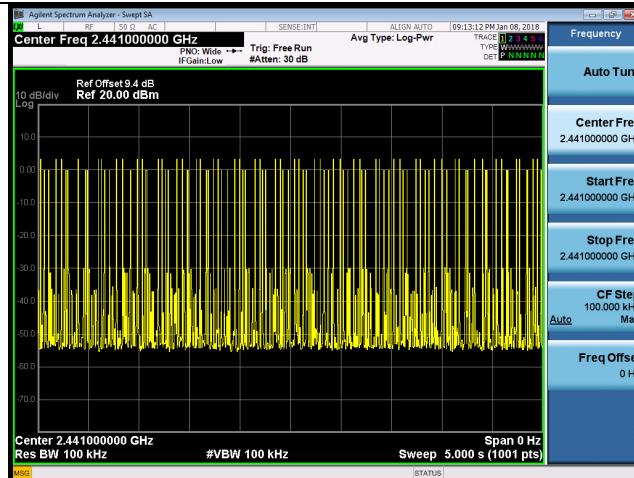
Mode	dwell time		Limit	Conclusion
GFSK	DH1	50 hops/5s*0.4*79channels* 0.392 ms =123.872ms	≤400ms	PASS
	DH3	24 hops/5s*0.4*79channels* 1.659 ms =251.637ms	≤400ms	PASS
	DH5	15 hops/5s*0.4*79channels* 2.905 ms =275.394ms	≤400ms	PASS
8-DPSK	3-DH1	50 hops/5s*0.4*79channels* 0.408 ms =128.928ms	≤400ms	PASS
	3-DH3	23 hops/5s*0.4*79channels* 1.662 ms =241.588ms	≤400ms	PASS
	3-DH5	17 hops/5s*0.4*79channels* 2.920 ms =313.725ms	≤400ms	PASS

Note: All the lower levels were signaled from receiver and should not be considered in here.

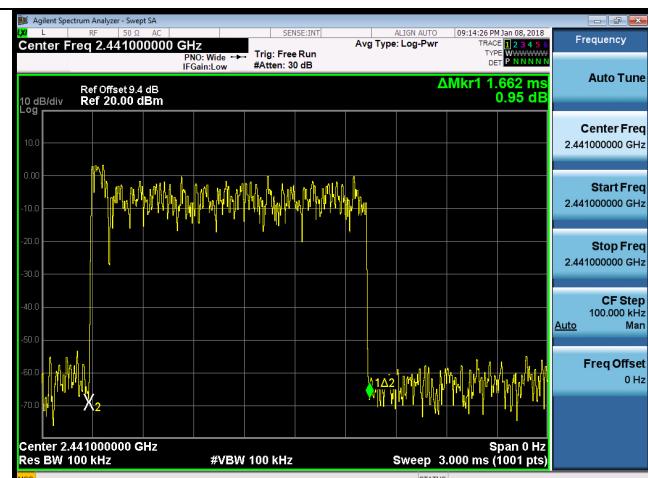
**GFSK**
**DH 1**

**DH 3**

**DH 5**


## 8-DPSK

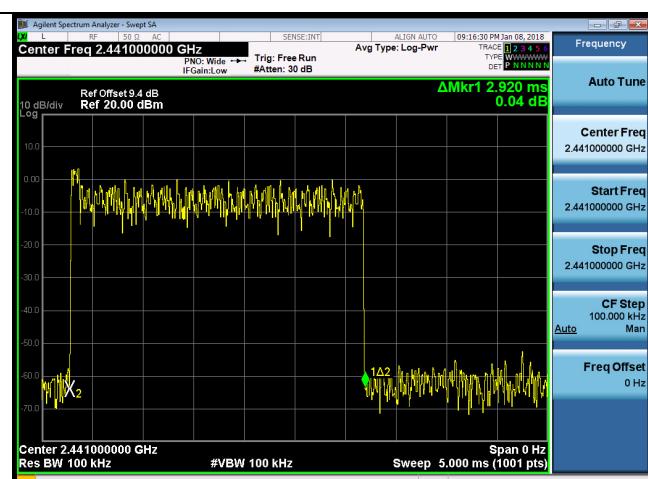
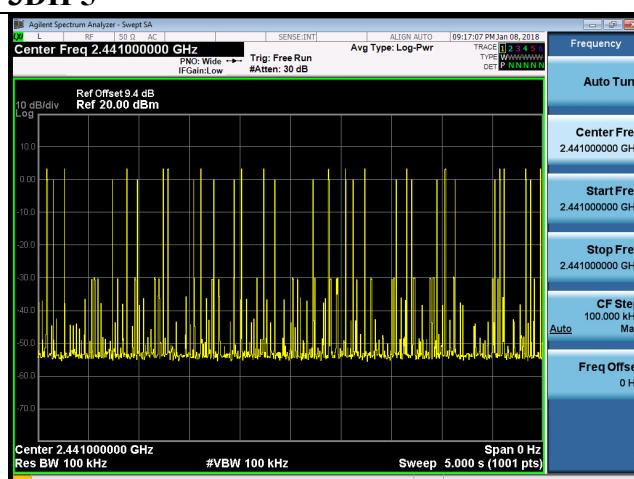
### 3DH 1



### 3DH 3



### 3DH 5



## 10. MAXIMUM PEAK OUTPUT POWER TEST

### 10.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY53311015	Oct.15,17	1 Year
2.	Power meter	Anritsu	ML2487A	6K00002472	Apr.22,17	1 Year
3.	Power sensor	Anritsu	MA2491A	0033005	Apr.22,17	1 Year
4.	Attenuator (20dB)	Agilent	8491B	MY39262165	Apr.22,17	1 Year
5.	RF Cable	Marvelous Microwave Inc	SFL402105FLEX	NO.1	Oct.15,17	1 Year

### 10.2. Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

### 10.3. Test Procedure

Connected the EUT's antenna port to Power Sensor, and use power meter to test peak output power directly.

### 10.4. Test Results

EUT: Gemini		
M/N:Gemini 4G		
Test date: 2018-01-23	Pressure: 102.1±1.0 kpa	Humidity: 51.1±3.0%
Tested by: Kayle	Test site: RF site	Temperature:22.8±0.6 °C

Test Mode	Frequency (MHz)	Peak output Power ( dBm )	Limit (dBm)
GFSK	2402	1.225	21
	2441	3.112	21
	2480	5.605	21
8-DPSK	2402	4.723	21
	2441	2.760	21
	2480	4.761	21
Conclusion: PASS			

## 11. BAND EDGE COMPLIANCE TEST

### 11.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum	Agilent	E4446A	US44300459	Apr.22,17	1 Year
2.	Amp	HP	8449B	3008A02495	Apr.22.17	1 Year
3.	Horn Antenna	ETC	MCTD 1209	DRH15F03006	May.15,17	1 Year
4.	HF Cable	Hubersuhner	Sucoflex104	274094/4	Apr.22,17	1 Year

### 11.2. Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

### 11.3. Test Procedure

For upper band emissions that are up to two bandwidths(2MHz) away (2483.5MHz to 2485.5MHz) from the band-edge use below produce:

1. Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set the analyzer RBW to 100KHz and with a video bandwidth 300KHz. Record the peak levels of the fundamental emission and the relevant band-edge emission, Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not a field strength measurement, it is only a relative measurement to determine the amount by which the emission drops at the band edge relative to the highest fundamental emission level.
2. Subtract the delta measured in step (1) from the maximum field strengths measured in clause 4 .The resultant field strengths are then used to determine band-edge compliance as required by Section 15.205

For emissions above two bandwidths away from the band-edge use below produce:

1. The EUT is placed on a insulating material (up to 12mm thick) worked at highest radiated power.
2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upperband-edges of the emission:
  - (a) PEAK: RBW=1MHz ,VBW=3MHz, PK detector, Sweep=AUTO
  - (b) This is pulse Modulation device a duty cycle factor was used to calculate average level based measured peak level.

### 11.4. Test Results

Pass (The testing data was attached in the next pages.)

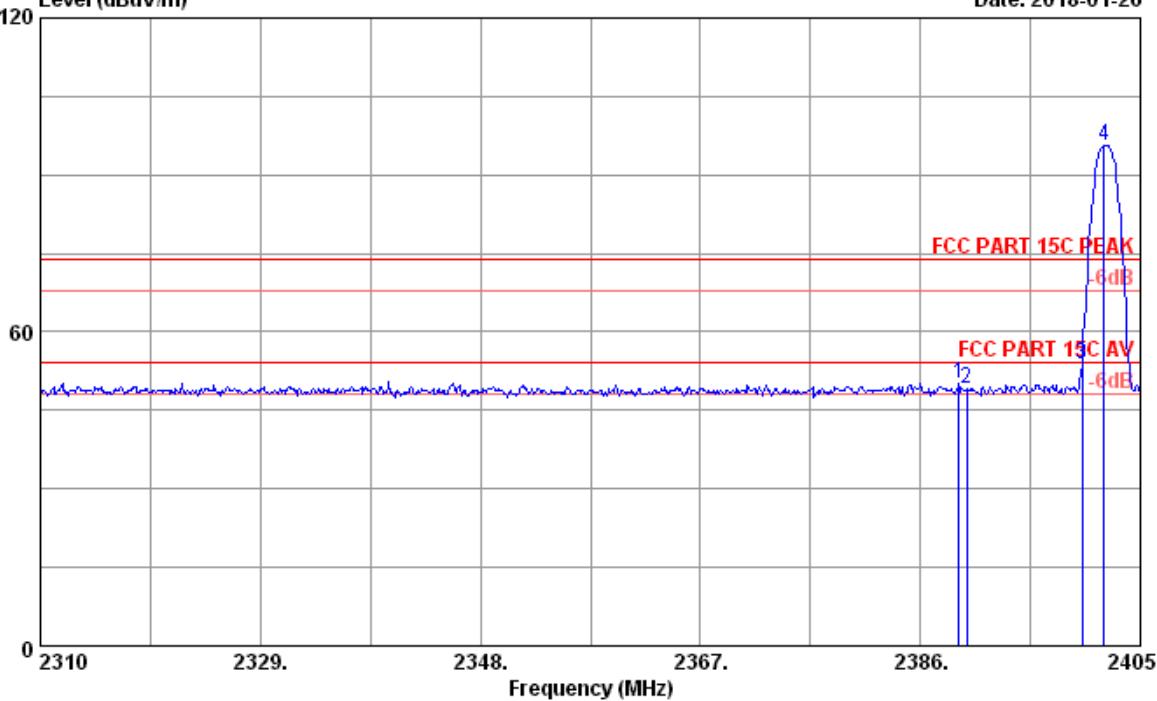
Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

Data: 3

File: F:\2017 Report\P\Planet\4G ACS17Q1941-BT3.0-FCC.EM6 (32)

Level (dBuV/m)

Date: 2018-01-26



Site no. : 3m Chamber Data no. : 3  
 Dis. / Ant. : 3m 2017 ANT 3006 HF Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : 23.1°C/52.5% Engineer : Kayle  
 EUT : Gemini M/N:Gemini 4G  
 Power rating : DC 5V From Adapter Input AC 120V/60Hz  
 Test Mode : BT3.0 GFSK 2402 Tx Mode

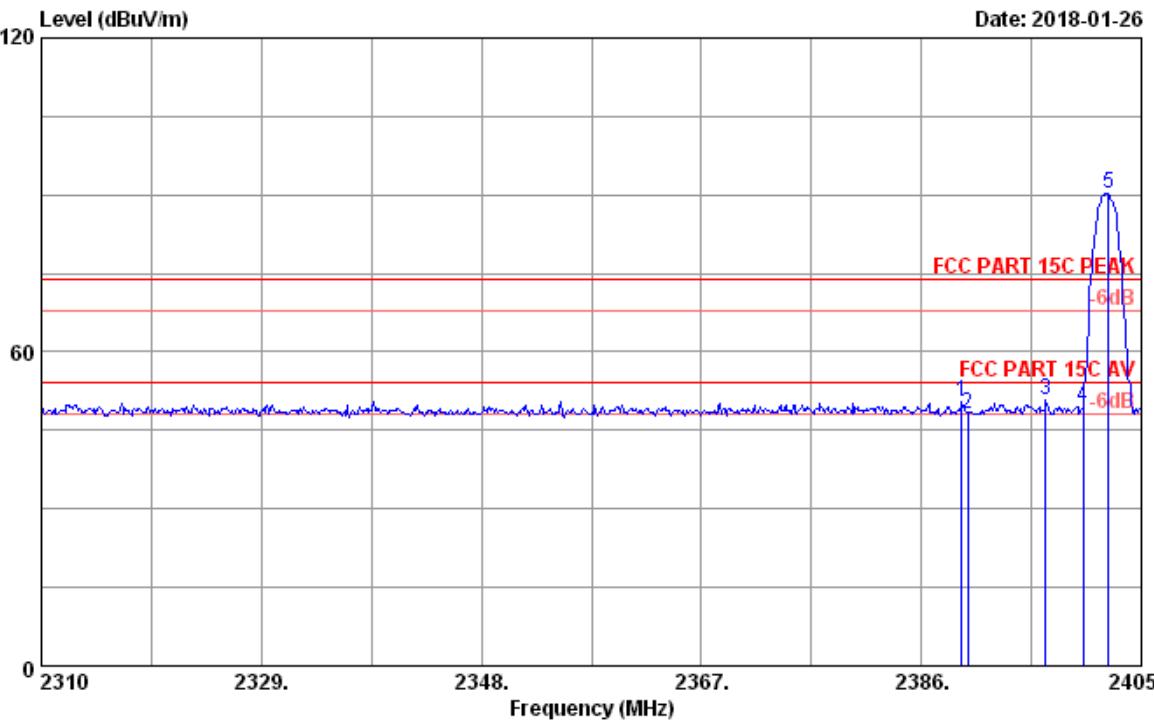
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission		
						Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
1	2389.33	27.96	10.26	47.54	35.58	50.18	74.00	23.82
2	2390.00	27.96	10.26	46.44	35.61	49.05	74.00	24.95
3	2400.00	27.96	10.30	51.02	35.61	53.67	74.00	20.33
4	2401.87	27.96	10.30	92.88	35.61	95.53	74.00	-21.53

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

Data: 4

File: F:\2017 Report\P\Planet\4G ACS17Q1941-BT3.0-FCC.EM6 (32)

Date: 2018-01-26



Site no. : 3m Chamber Data no. : 4  
 Dis. / Ant. : 3m 2017 ANT 3006 HF Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : 23.1°C/52.5% Engineer : Kayle  
 EUT : Gemini M/N:Gemini 4G  
 Power rating : DC 5V From Adapter Input AC 120V/60Hz  
 Test Mode : BT3.0 GFSK 2402 Tx Mode

No.	Freq. (MHz)	Ant.	Cable	Amp	Emission			Margin (dB)	Remark
		Factor (dB/m)	Loss (dB)	Reading (dBuV)	factor (dB)	Level (dBuV/m)	Limits (dBuV/m)		
1	2389.52	27.96	10.26	47.94	35.58	50.58	74.00	23.42	Peak
2	2390.00	27.96	10.26	45.60	35.61	48.21	74.00	25.79	Peak
3	2396.74	27.96	10.30	48.14	35.61	50.79	74.00	23.21	Peak
4	2400.00	27.96	10.30	46.66	35.61	49.31	74.00	24.69	Peak
5	2402.15	27.96	10.30	87.66	35.61	90.31	74.00	-16.31	Peak

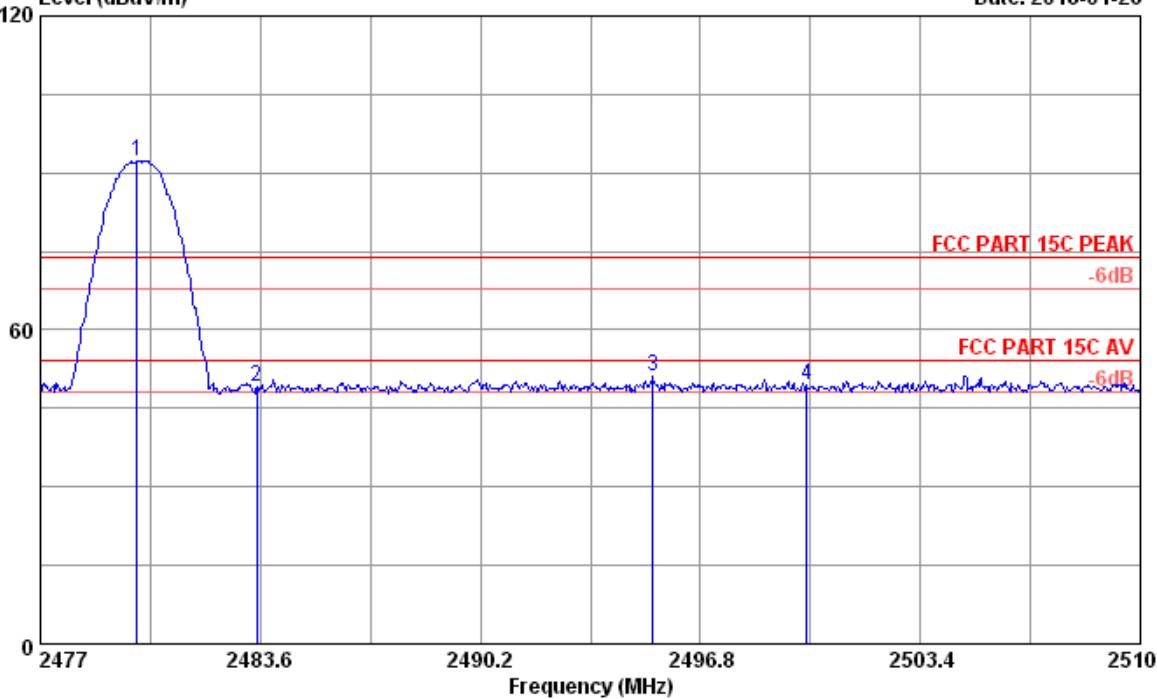
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

Data: 13

File: F:\2017 Report\P\Planet\4G ACS17Q1941-BT3.0-FCC.EM6 (32)

Level (dBuV/m)

Date: 2018-01-26



Site no. : 3m Chamber Data no. : 13  
 Dis. / Ant. : 3m 2017 ANT 3006 HF Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : 23.1°C/52.5% Engineer : Kayle  
 EUT : Gemini M/N:Gemini 4G  
 Power rating : DC 5V From Adapter Input AC 120V/60Hz  
 Test Mode : BT3.0 GFSK 2480 Tx Mode

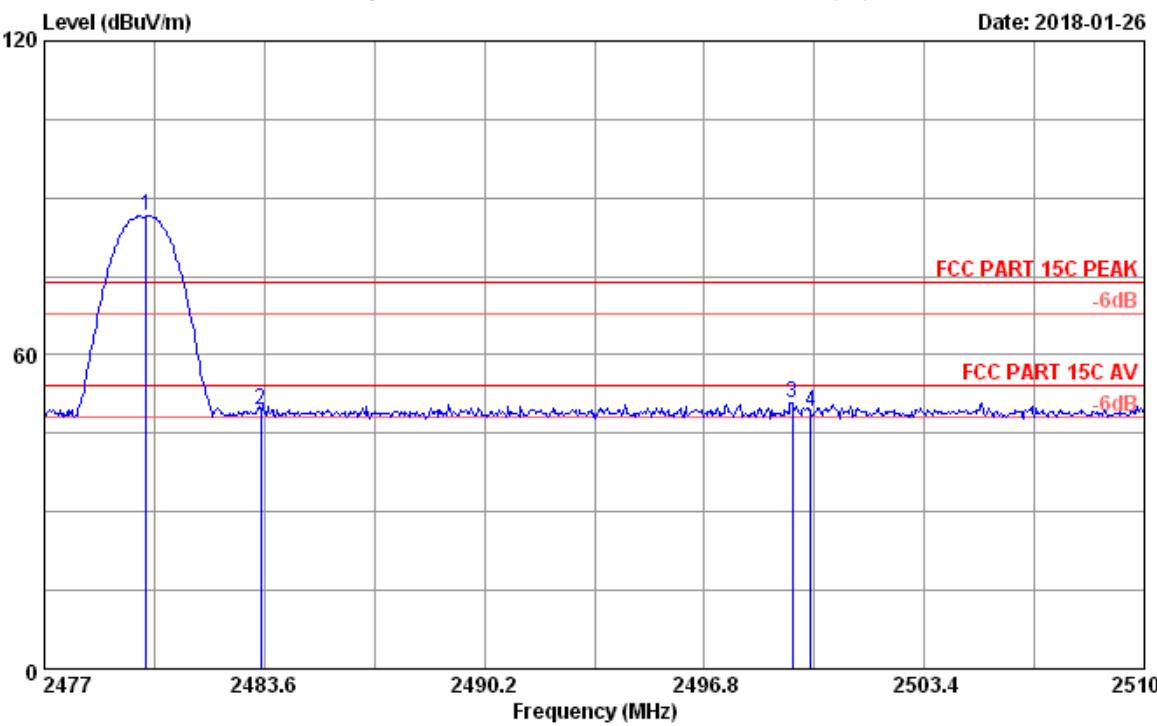
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission		
						Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
1	2479.90	28.08	10.45	89.47	35.71	92.29	74.00	-18.29
2	2483.50	28.08	10.48	46.21	35.71	49.06	74.00	24.94
3	2495.38	28.10	10.48	48.14	35.74	50.98	74.00	23.02
4	2500.00	28.10	10.48	46.75	35.74	49.59	74.00	24.41

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

Data: 14

File: F:\2017 Report\P\Planet\4G ACS17Q1941-BT3.0-FCC.EM6 (32)

Date: 2018-01-26



Site no. : 3m Chamber Data no. : 14  
 Dis. / Ant. : 3m 2017 ANT 3006 HF Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : 23.1°C/52.5% Engineer : Kayle  
 EUT : Gemini M/N:Gemini 4G  
 Power rating : DC 5V From Adapter Input AC 120V/60Hz  
 Test Mode : BT3.0 GFSK 2480 Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission		
						Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
1	2480.07	28.08	10.45	83.66	35.71	86.48	74.00	-12.48
2	2483.50	28.08	10.48	46.52	35.71	49.37	74.00	24.63
3	2499.44	28.10	10.48	47.91	35.74	50.75	74.00	23.25
4	2500.00	28.10	10.48	46.30	35.74	49.14	74.00	24.86

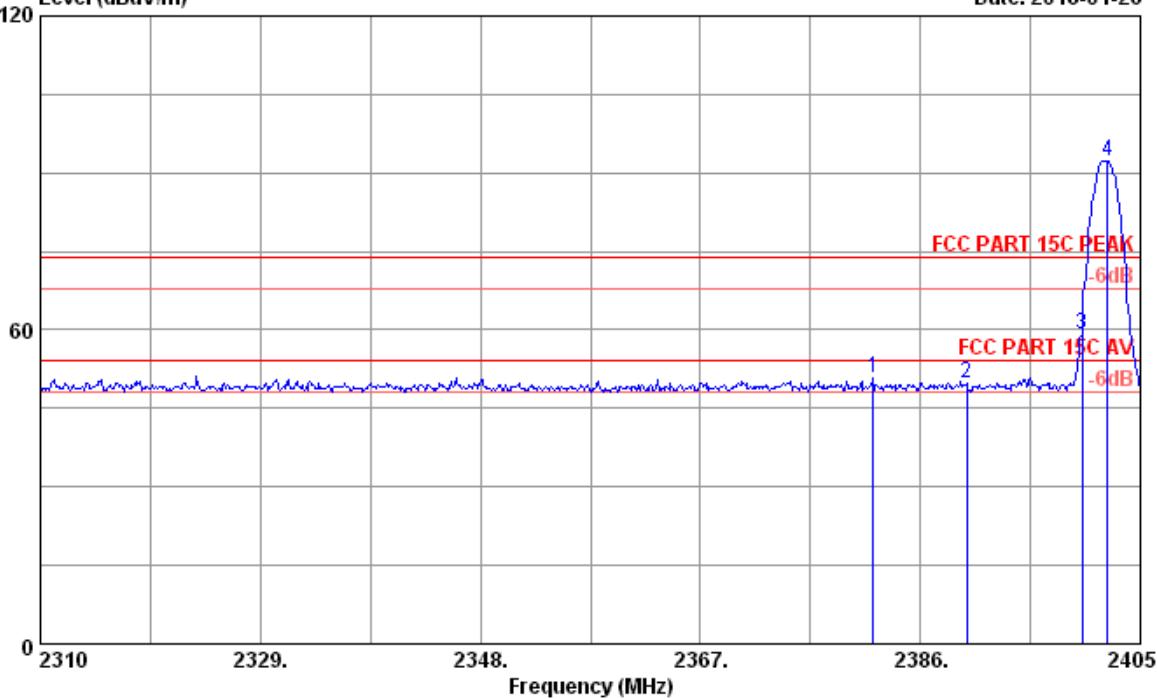
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.  
 2. The emission levels that are 20dB below the official limit are not reported.

Data: 19

File: F:\2017 Report\P\Planet\4G ACS17Q1941-BT3.0-FCC.EM6 (32)

Level (dBuV/m)

Date: 2018-01-26



Site no. : 3m Chamber Data no. : 19  
 Dis. / Ant. : 3m 2017 ANT 3006 HF Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : 23.1°C/52.5% Engineer : Kayle  
 EUT : Gemini M/N:Gemini 4G  
 Power rating : DC 5V From Adapter Input AC 120V/60Hz  
 Test Mode : BT3.0 8-DPSK 2402 Tx Mode

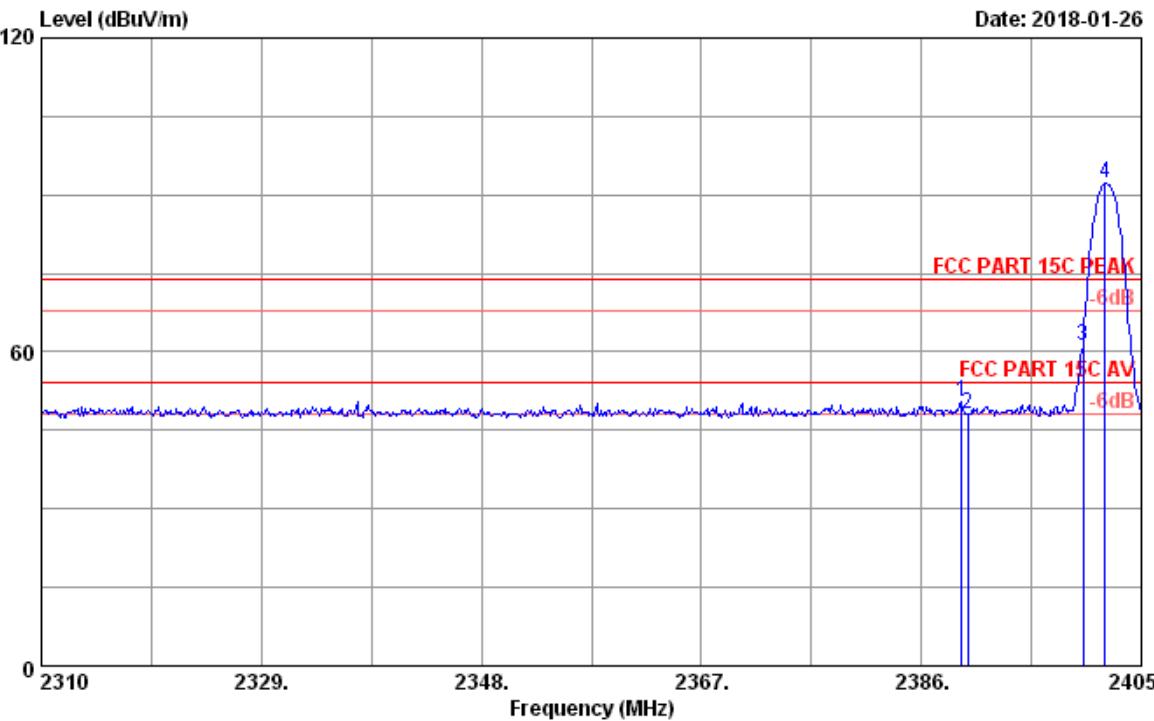
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission		
						Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
1	2381.92	27.93	10.26	48.08	35.58	50.69	74.00	23.31
2	2390.00	27.96	10.26	47.05	35.61	49.66	74.00	24.34
3	2400.00	27.96	10.30	56.53	35.61	59.18	74.00	14.82
4	2402.15	27.96	10.30	89.73	35.61	92.38	74.00	-18.38

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

Data: 20

File: F:\2017 Report\P\Planet\4G ACS17Q1941-BT3.0-FCC.EM6 (32)

Date: 2018-01-26



Site no. : 3m Chamber Data no. : 20  
 Dis. / Ant. : 3m 2017 ANT 3006 HF Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : 23.1°C/52.5% Engineer : Kayle  
 EUT : Gemini M/N:Gemini 4G  
 Power rating : DC 5V From Adapter Input AC 120V/60Hz  
 Test Mode : BT3.0 8-DPSK 2402 Tx Mode

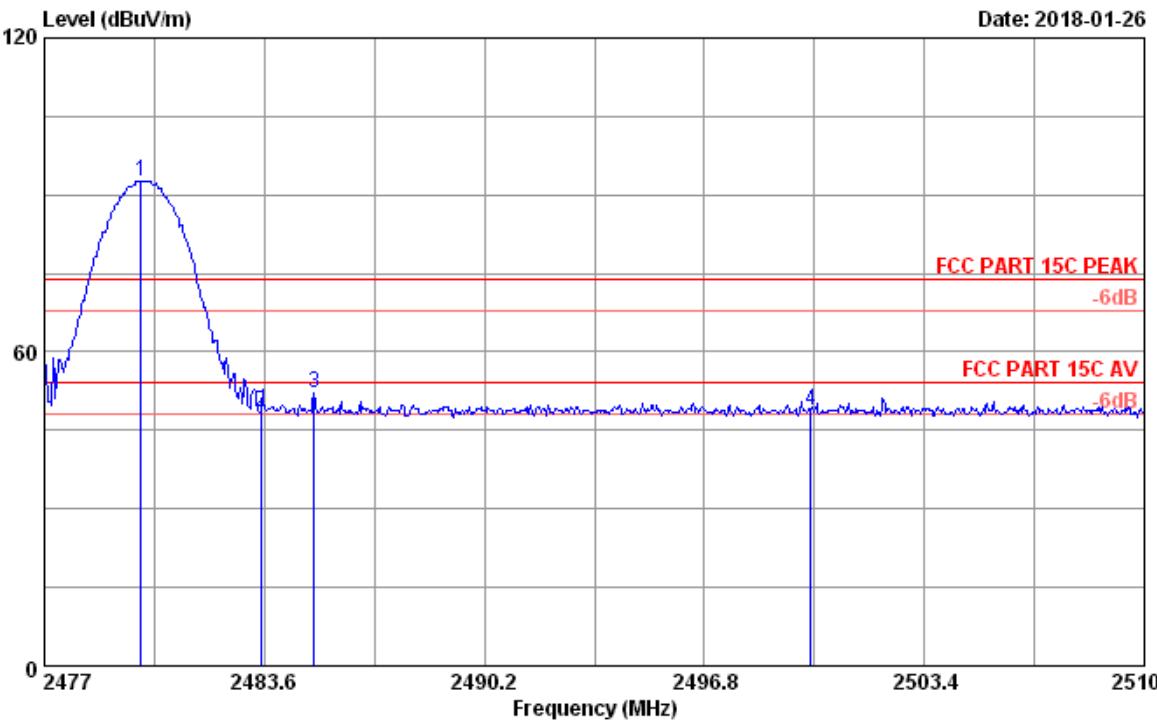
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission		
						Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
1	2389.52	27.96	10.26	47.94	35.58	50.58	74.00	23.42
2	2390.00	27.96	10.26	45.66	35.61	48.27	74.00	25.73
3	2400.00	27.96	10.30	58.43	35.61	61.08	74.00	12.92
4	2401.87	27.96	10.30	89.53	35.61	92.18	74.00	-18.18

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

Data: 31

File: F:\2017 Report\P\Planet\4G ACS17Q1941-BT3.0-FCC.EM6 (32)

Date: 2018-01-26



Site no. : 3m Chamber Data no. : 31  
 Dis. / Ant. : 3m 2017 ANT 3006 HF Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : 23.1°C/52.5% Engineer : Kayle  
 EUT : Gemini M/N:Gemini 4G  
 Power rating : DC 5V From Adapter Input AC 120V/60Hz  
 Test Mode : BT3.0 8-DPSK 2480 Tx Mode

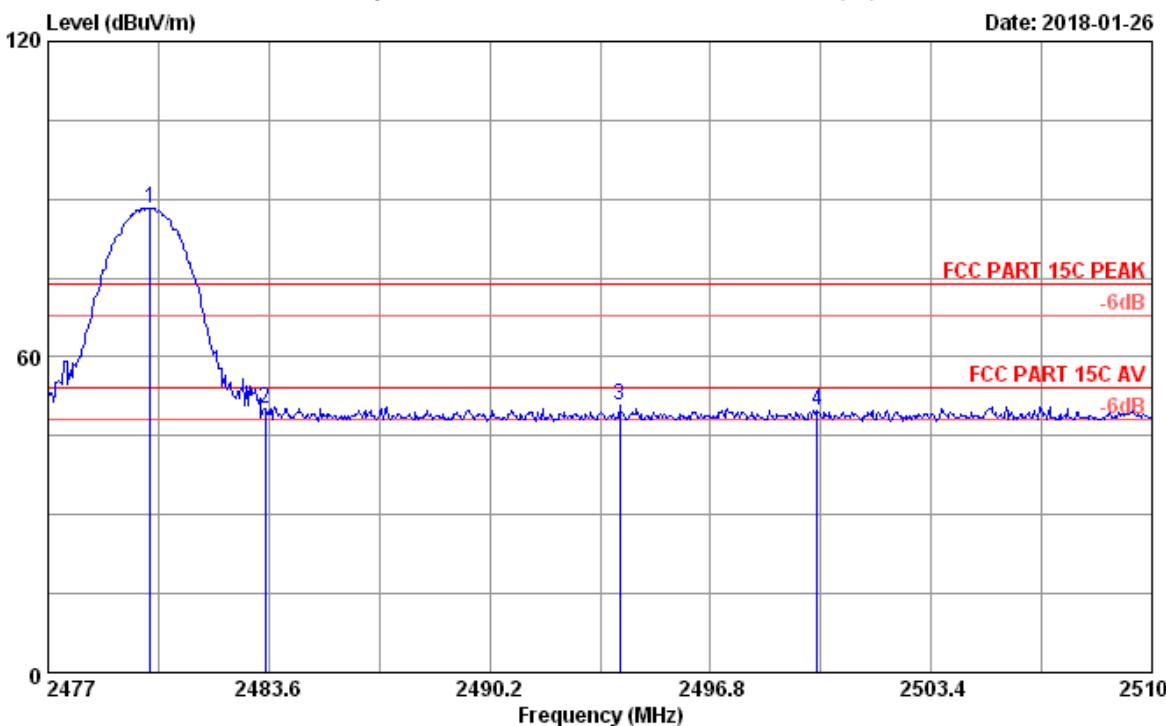
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission		
						Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)
1	2479.90	28.08	10.45	89.84	35.71	92.66	74.00	-18.66
2	2483.50	28.08	10.48	45.68	35.71	48.53	74.00	25.47
3	2485.09	28.08	10.48	49.30	35.71	52.15	74.00	21.85
4	2500.00	28.10	10.48	45.88	35.74	48.72	74.00	25.28

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading  
 -Amp factor.  
 2. The emission levels that are 20dB below the official  
 limit are not reported.

Data: 32

File: F:\2017 Report\P\Planet\4G ACS17Q1941-BT3.0-FCC.EM6 (32)

Date: 2018-01-26



Site no. : 3m Chamber Data no. : 32  
 Dis. / Ant. : 3m 2017 ANT 3006 HF Ant. pol. : VERTICAL  
 Limit : FCC PART 15C PEAK  
 Env. / Ins. : 23.1°C/52.5% Engineer : Kayle  
 EUT : Gemini M/N:Gemini 4G  
 Power rating : DC 5V From Adapter Input AC 120V/60Hz  
 Test Mode : BT3.0 8-DPSK 2480 Tx Mode

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
<hr/>									
1	2480.07	28.08	10.45	85.47	35.71	88.29	74.00	-14.29	Peak
2	2483.50	28.08	10.48	47.41	35.71	50.26	74.00	23.74	Peak
3	2494.09	28.10	10.48	47.87	35.74	50.71	74.00	23.29	Peak
4	2500.00	28.10	10.48	46.86	35.74	49.70	74.00	24.30	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.  
 2. The emission levels that are 20dB below the official limit are not reported.

## 12. ANTENNA REQUIREMENT

### 12.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### 12.2. Antenna Connected Construction

The antennas used for this product are PIFA antenna that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 0.42Bi

## 13. DEVIATION TO TEST SPECIFICATIONS

[NONE]