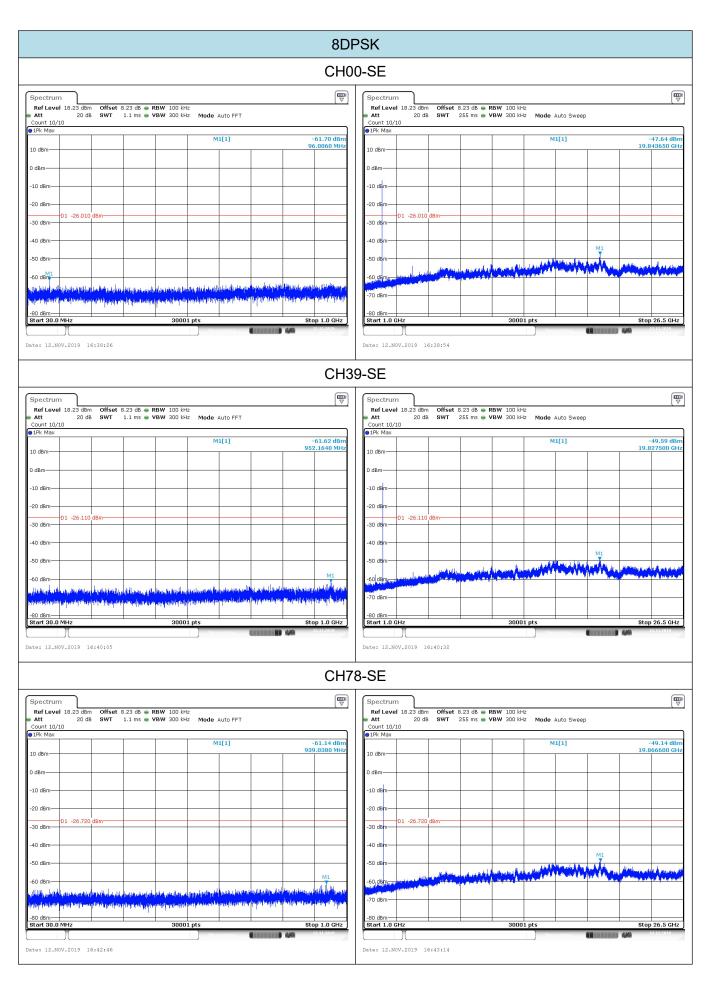


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## 3.10. Radiated Spurious Emissions

## <u>Limit</u>

## Radiated Emission Limits (9 kHz~1000 MHz)

Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)				
0.009~0.490	2400/F(KHz)	300				
0.490~1.705	24000/F(KHz)	30				
1.705~30.0	30	30				
30~88	100	3				
88~216	150	3				
216~960	200	3				
Above 960	500	3				

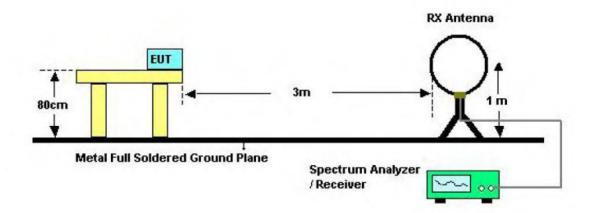
## Radiated Emission Limit (Above 1000MHz)

Frequency	Distance Meters(at 3m)							
(MHz)	Peak	Average						
Above 1000	74	54						

## Note:

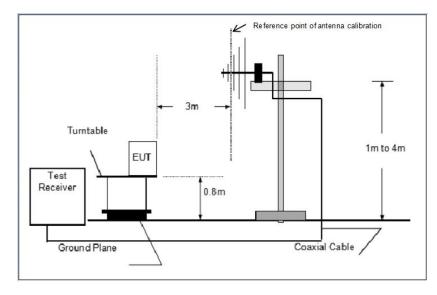
- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

## **Test Configuration**

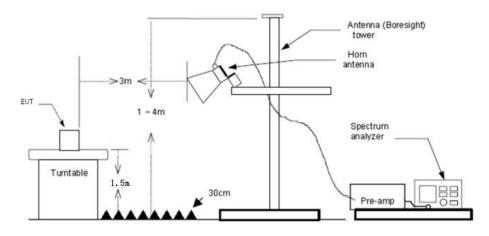


Below 30MHz Test Setup





Below 1000MHz Test Setup



Above 1GHz Test Setup

#### **Test Procedure**

- 1. The EUT was setup and tested according to ANSI C63.10:2013
- 2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
- 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- Use the following spectrum analyzer settings
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;

If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

(3) From 1 GHz to 10<sup>th</sup> harmonic:

RBW=1MHz, VBW=3MHz Peak detector for Peak value.

RBW=1MHz, VBW=10Hz RMS detector for Average value.



**Test Mode** 

Please refer to the clause 2.3.

#### **Test Result**

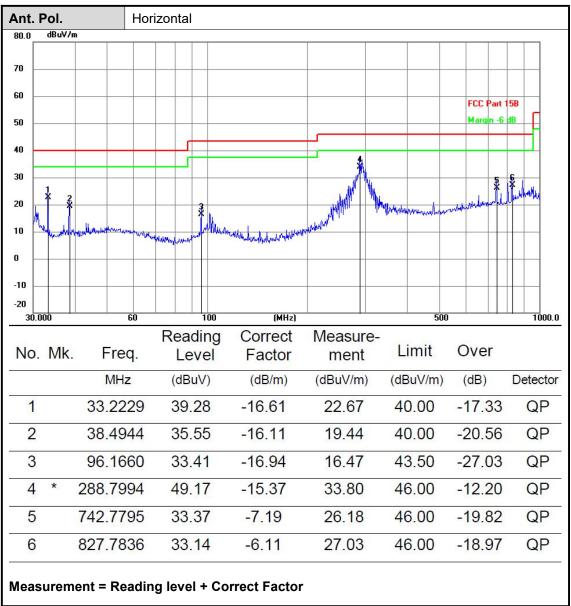
#### 9 KHz~30 MHz and 18GHz~25GHz

From 9 KHz~30 MHz and 18GHz~25GHz: Conclusion: PASS

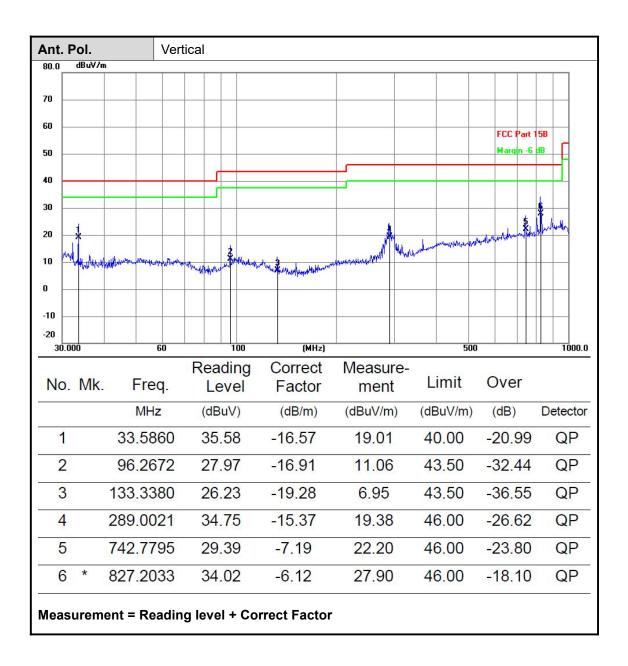
#### Note:

- Measurement = Reading level + Correct Factor
   Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor
- 2) The peak level is lower than average limit(54 dBuV/m), this data is the too weak instrument of signal is unable to test.
- 3) The emission levels of other frequencies are very lower than the limit and not show in test report.
- 4) The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
- 5) Pre-scan GFSK, π/4QPSK and 8DPSK modulation, and found the GFSK modulation 2402MHz which it is worse case for 30MHz-1GHz, so only show the test data for worse case.
- 6) Pre-scan GFSK, π/4QPSK and 8DPSK modulation, and found the GFSK modulation which it is worse case for above 1GHz, so only show the test data for worse case.





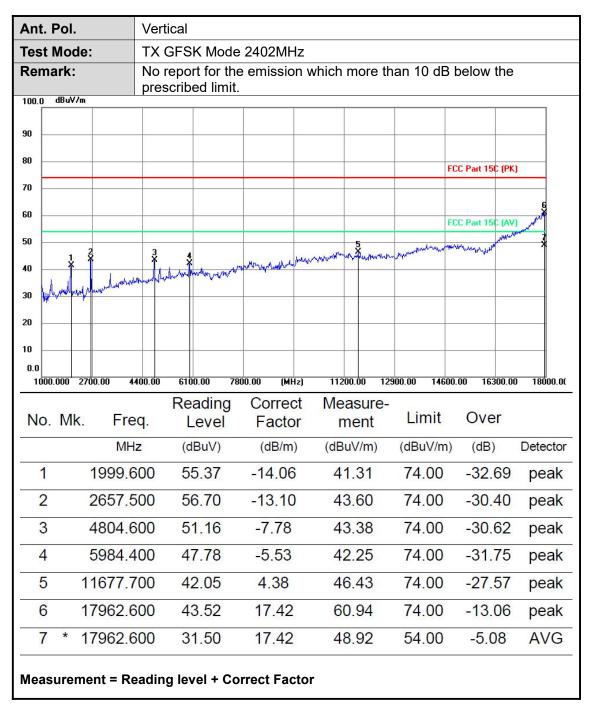




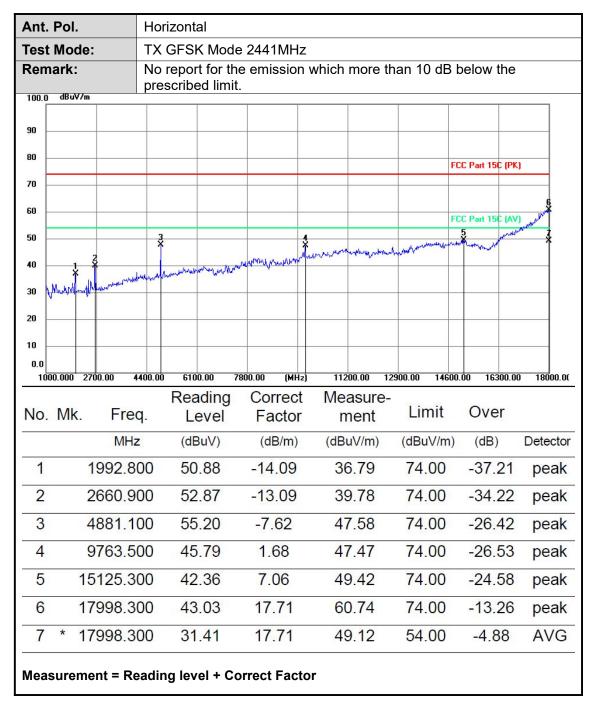


No report for the emission which more than 10 dB below the prescribed limit.   FCC Past 15C [PK]   FCC P	Ant. Pol.	Horizo	ntal											
prescribed limit.    100.0   dBuV/m	Test Mode:	TX GF	TX GFSK Mode 2402MHz											
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FCC Part 15C [PK]   FCC Part 15C [AV]   FCC	100.0 agav/m													
No. Mk. Freq. Reading Correct Measure- ment Limit Over    MHz   (dBuV)   (dB/m)   (dBuV/m)   (dBuV/	90													
Fire   Freq   Factor   Measure   Factor   Factor   Measure   Factor   F	80					F	CC Part 15C (PK	)						
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No. Mk. Freq. Reading Correct Measurement Limit Over    MHz	60					F	CC Part 15C (AV							
No. Mk. Freq. Reading Correct Measure- MHz (dBuV) (dB/m) (dBuV/m) (dBuV/m) (dB) Detector  1 1994.500 51.53 -14.08 37.45 74.00 -36.55 peak 2 2657.500 52.52 -13.10 39.42 74.00 -34.58 peak 3 4804.600 55.34 -7.78 47.56 74.00 -26.44 peak 4 9607.100 47.95 1.23 49.18 74.00 -24.82 peak 5 14071.300 42.81 6.66 49.47 74.00 -24.53 peak 6 17998.300 42.82 17.71 60.53 74.00 -13.47 peak	50	3 X		4	and the second second	New March	when the state of	<b>**</b>						
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No. Mk. Freq. Reading Correct Measure-   MHz	30 Hayra may be many													
No. Mk.         Freq.         Reading Level         Correct Factor         Measurement         Limit         Over           1         1994.500         510.00         510.00         610.00         6100.00         6100.00         6100.00         6100.00         6100.00         6100.00         6100.00         6100.00         6100.00         12900.00         14600.00         16300.00         18000.00         18000.00         18000.00         18000.00         18000.00         18000.00         10000.00         10000.00         18000.00	20													
No. Mk.         Freq.         Reading Correct Level Factor Measure- ment Limit Over           MHz         (dBuV)         (dB/m)         (dB/m)         (dBuV/m)														
No. Mk.         Freq.         Level         Factor         ment         Limit         Over           MHz         (dBuV)         (dB/m)         (dBuV/m)         (dBuV/m)         (dBuV/m)         (dB)         Detector           1         1994.500         51.53         -14.08         37.45         74.00         -36.55         peak           2         2657.500         52.52         -13.10         39.42         74.00         -34.58         peak           3         4804.600         55.34         -7.78         47.56         74.00         -26.44         peak           4         9607.100         47.95         1.23         49.18         74.00         -24.82         peak           5         14071.300         42.81         6.66         49.47         74.00         -24.53         peak           6         17998.300         42.82         17.71         60.53         74.00         -13.47         peak	200000	4400.00	6100.00 78	800.00 (MHz)	11200.00 12	900.00 14600	0.00 16300.00	) 18000.0C						
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3 4804.600 55.34 -7.78 47.56 74.00 -26.44 peak 4 9607.100 47.95 1.23 49.18 74.00 -24.82 peak 5 14071.300 42.81 6.66 49.47 74.00 -24.53 peak 6 17998.300 42.82 17.71 60.53 74.00 -13.47 peak	1 1994.	500	51.53	-14.08	37.45	74.00	-36.55	peak						
4 9607.100 47.95 1.23 49.18 74.00 -24.82 peak 5 14071.300 42.81 6.66 49.47 74.00 -24.53 peak 6 17998.300 42.82 17.71 60.53 74.00 -13.47 peak	2 2657.	500	52.52	-13.10	39.42	74.00	-34.58	peak						
5 14071.300 42.81 6.66 49.47 74.00 -24.53 peak 6 17998.300 42.82 17.71 60.53 74.00 -13.47 peak	3 4804.	600	55.34	-7.78	47.56	74.00	-26.44	peak						
6 17998.300 42.82 17.71 60.53 74.00 -13.47 peak	4 9607.	100	47.95	1.23	49.18	74.00	-24.82	peak						
00   1 €0.00 (4.0	5 14071.	071.300 42.81		6.66	49.47	74.00	-24.53	peak						
7 * 17998.300 32.07 17.71 49.78 54.00 -4.22 AVG	6 17998.	998.300 42.82		17.71	60.53	74.00	-13.47	peak						
	7 * 17998.	300	32.07	17.71	49.78	54.00	-4.22	AVG						
Measurement = Reading level + Correct Factor		) ' · · · · · · · · · · · · · · ·												

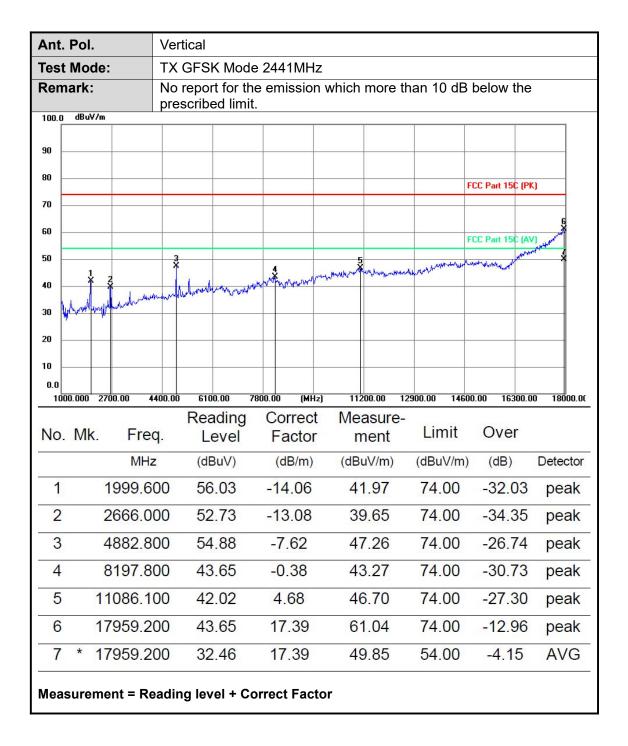








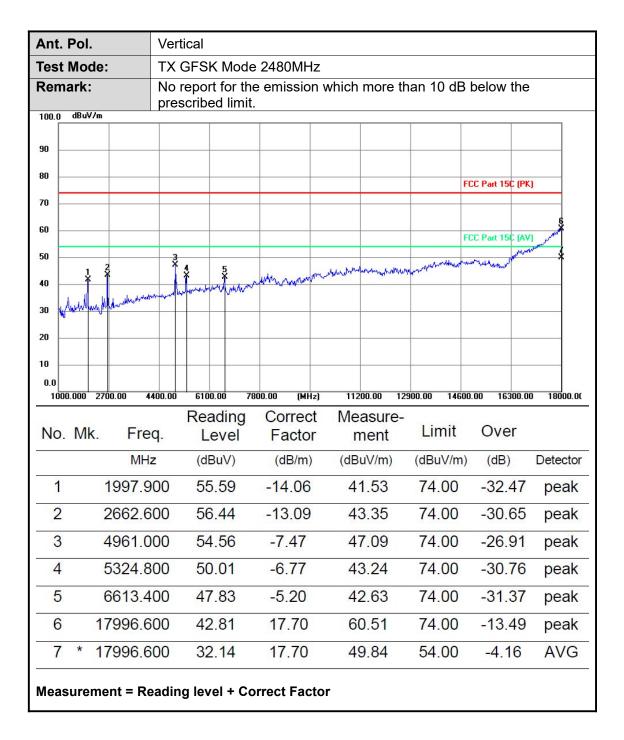






Ant	. P	ol.		H	Horiz	ontal												
Tes	est Mode: TX GFSK Mode 2480MHz																	
Ren					No report for the emission which more than 10 dB below the prescribed limit.													
100.0	) (	dBuV/	m															
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80														FCC	C Part 15	C (PK)	-	
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60														FCI	C Part 15	C (AV)	- 6	
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No	No. Mk. Fred		req		Readin Level	_	Facto		Measure- ment			Limit		Over				
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2	2 4961.000		0	56.85		<del>-7</del> .47		49.38		74.00		)	-24.62		2 peak			
3	3 8194.400		0	44.70		-0.38		44.32		74.00		)	-29.68		peak			
4	Ĺ	11006.200		0	41.74		4.69		46.43		74.00		)	-27.57		7 peak		
5	)		15076.000 43.73			7.13		50.86		74.00		)	-23.1		4 peak			
6	6		17976	5.20	200 42.90		1	17.53		60.43		7	74.00		-13.57		<sup>7</sup> peak	
7 * 17976.20				5.20	0	31.17	•	17.53	Y .	48	3.70	5	4.00	)	-5.3	0	AV	G
Mea	su	rem	ent =	Rea	ding	level +	Corre	ct Fac	tor									







## 3.11. Pseudorandom Frequency Hopping Sequence

#### LIMIT

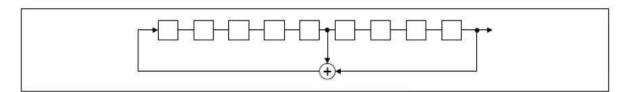
FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Al-ternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their cor-responding transmitters and shall shift frequencies in synchronization with the transmitted signals.

#### **TEST RESULTS**

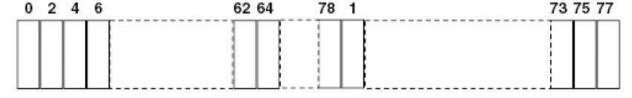
The pseudorandom frequency hopping sequence may be generated in a nice-stage shift register whose 5<sup>th</sup> and 9<sup>th</sup> stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the friststage. The sequence begins with the frist one of 9 consecutive ones, for example: the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence:29-1=511 bits
- Longest sequence of zeros:8(non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An explame of pseudorandom frequency hopping sequence as follows:



Each frequency used equally one the average by each transmitter.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shift frequencies in synchronization with the transmitted signals.



Reference to the document No.: Test Photos.

# **5.PHOTOGRAPHS OF EUT CONSTRUCTIONAL**

Reference to the document No.: External Photos and Internal Photos.