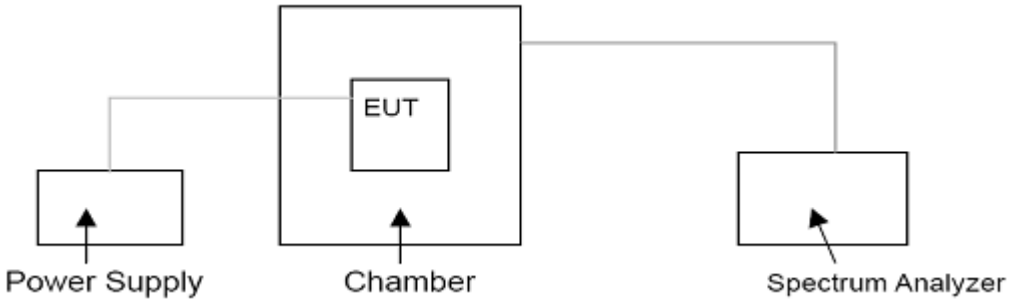
3.5 Frequency Stability

LIMITS

According to FCC 95.565

Each FRS transmitter type must be designed such that the carrier frequencies remain within ±2.5 parts-per-million of the channel center frequencies specified in §95.563 during normal operating conditions.

TEST CONFIGURATION



TEST PROCEDURE

The EUT was set in the climate chamber and connected to an external DC power supply. The RF output was directly connected to Spectrum Analyzer. The coupling loss of the additional cables was recorded and taken in account for all the measurements. After temperature stabilization (approx. 20 min for each stage), the frequency for the lower, the middle and the highest frequency range was recorded. For Frequency stability Vs. Voltage the EUT was connected to a DC power supply and the voltage was adjusted in the required ranges. The result was recorded.

TEST RESULTS

Reference Frequency:462.6375MHz, Limit:2.5 ppm， 12.5kHz			
Environment Temperature (°C)	Power Supplied (V_{DC})	Measurement Frequency (MHz)	Frequency Error (ppm)
Frequency Stability versus Input Temperature			
50	NV	462.637690	0.41
40	NV	462.637273	-0.49
30	NV	462.637789	0.62
20	NV	462.637033	-1.01
10	NV	462.637894	0.85
0	NV	462.637006	-1.07
-10	NV	462.637089	-0.89
-20	NV	462.637526	0.06
Frequency Stability versus Input Voltage			
20	LV	462.6370799	-0.91
20	HV	462.6371065	-0.85

Reference Frequency: 467.6375 MHz, Limit: ±2.5 ppm			
Environment Temperature (°C)	**Voltage Supplied (V_{DC})**	**Measurement Frequency (MHz)**	**Frequency Error (ppm)**
Frequency Stability Ver. Temperature			
50	3.7	467.638278	1.66
40	3.7	467.637154	-0.74
30	3.7	467.637185	-0.67
20	3.7	467.637105	-0.84
10	3.7	467.637145	-0.76
0	3.7	467.637171	-0.70
-10	3.7	467.637123	-0.81
-20	3.7	467.637128	-0.80
Frequency Stability Ver. Input Voltage			
20	3.4	467.637110	-0.83
20	4.2	467.637129	-0.79

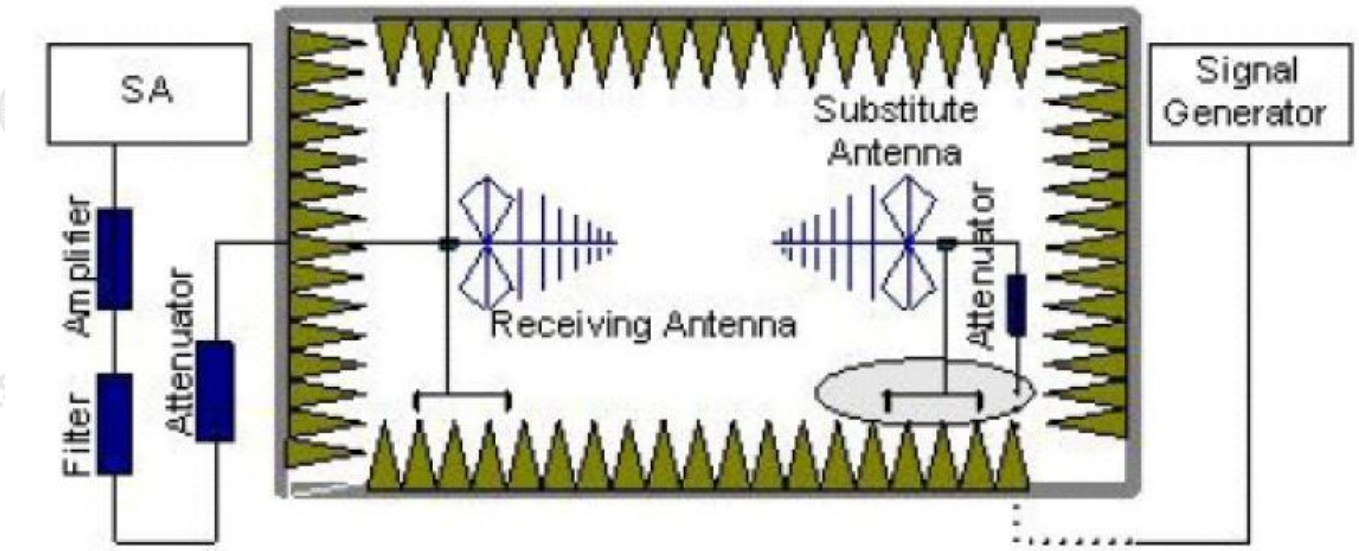
Note: The extreme voltage was declared by applicant.

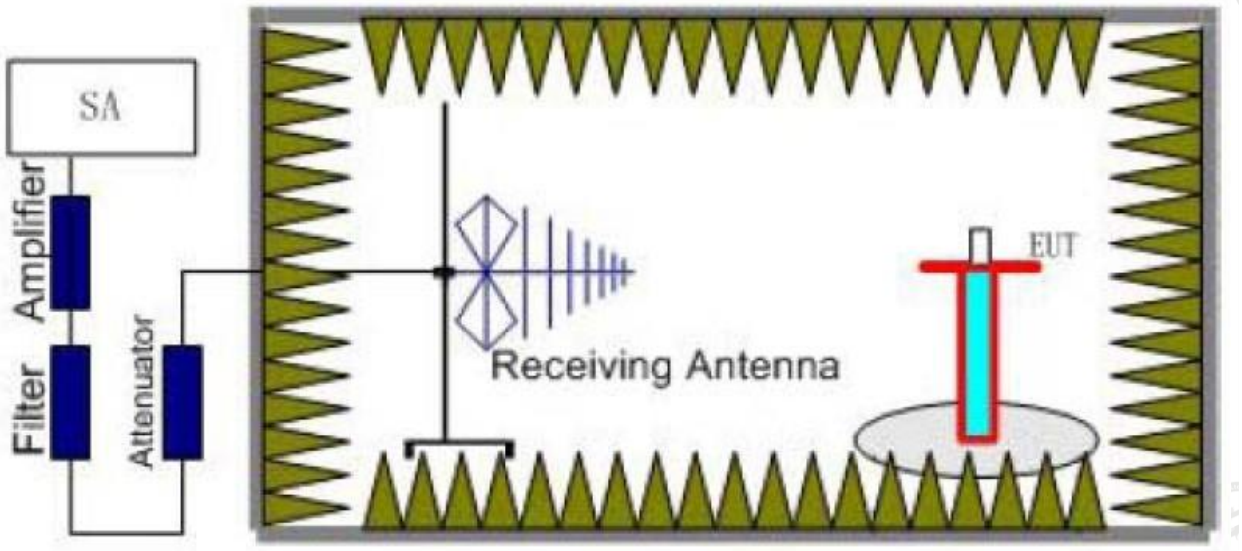
3.6 Transmitter Radiated Spurious Emission

Limit

The unwanted emission should be attenuated below TP by at least 43+10log(Transmit Power) dB and unwanted emissions falling within the restricted bands of RSS-Gen shall be attenuated to the limits provided in this section or to the general field strength limits shown in RSS-Gen, whichever are less stringent.

TEST CONFIGURATION





TEST PROCEDURE

a. EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.0m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all test transmit frequencies were measured with peak detector.
b. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
c. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum 100 kHz below 1GHz and 1MHz above 1GHz, Sweep from 30MHz to the 10th harmonic of the fundamental frequency; and recorded the level of the concerned spurious emission point as (P_r).
d. The EUT then replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
   The measurement results are obtained as described below:

$$\text{Power}_{(EIRP)} = P_{Mea} - P_{cl} + G_a$$

   Where;
   P_{Mea} is the recorded signal generator level
   P_{cl} is the cable loss connect between instruments
   G_a Substitution Antenna Gain
e. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
f. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.
g. Test site anechoic chamber refer to ANSI C63.

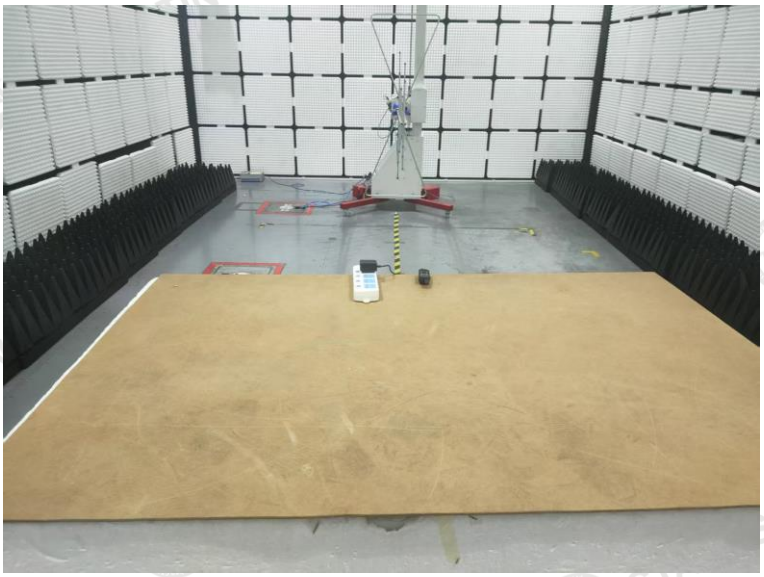
TEST RESULTS

30MHz - 5GHz:

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
462.6375MHz								
925.275	-52.48	53	1.0	H	9.27	-43.21	-13	-30.21
925.275	-55.2	44	1.2	V	11.55	-43.65	-13	-30.65
1387.91	-24.08	164	1.0	H	6.02	-18.06	-13	-5.06
1387.91	-34.27	165	1.4	V	5.83	-28.44	-13	-15.44
1850.55	-19.7	171	1.0	H	4.39	-15.31	-13	-2.31
1850.55	-27.44	178	1.5	V	3.59	-23.85	-13	-10.85
2313.19	-20.89	340	1.6	H	7.23	-13.66	-13	-0.66
2313.19	-23.01	71	1.0	V	6.69	-16.32	-13	-3.32
2775.83	-20.08	359	1.2	H	6.7	-13.38	-13	-0.38
2775.83	-23.48	214	1.1	V	6.31	-17.17	-13	-4.17
3238.46	-30.38	157	1.7	H	7	-23.38	-13	-10.38
3238.46	-39.57	168	1.1	V	6.26	-33.31	-13	-20.31
3701.1	-35.37	131	1.7	H	8.12	-27.25	-13	-14.25
3701.1	-37.64	91	1.4	V	7.61	-30.03	-13	-17.03
4163.74	-52.33	91	1.4	H	9.37	-42.96	-13	-29.96
4163.74	-50.86	89	1.7	V	8.56	-42.3	-13	-29.3
4626.38	-38.46	187	1.6	H	10.51	-27.95	-13	-14.95
4626.38	-40.2	255	1.9	V	10.1	-30.1	-13	-17.1
467.6375MHz								
935.275	-52.1	168	1.1	H	9.22	-42.88	-13	-29.88
935.275	-54.3	131	1.7	V	11.65	-42.65	-13	-29.65
1402.91	-23.52	89	1.7	H	5.85	-17.67	-13	-4.67
1402.91	-38.35	187	1.6	V	5.8	-32.55	-13	-19.55
1870.55	-22.63	187	1.6	H	4.15	-18.48	-13	-5.48
1870.55	-35.58	255	1.9	V	3.35	-32.23	-13	-19.23
2338.19	-21.27	346	1.9	H	7.28	-13.99	-13	-0.99
2338.19	-33.46	346	1.9	V	6.49	-26.97	-13	-13.97
2805.83	-20.82	230	1.3	H	6.78	-14.04	-13	-1.04
2805.83	-25.98	257	1.4	V	6.67	-19.31	-13	-6.31
3273.462	-31.46	257	1.4	H	6.72	-24.74	-13	-11.74
3273.462	-48.47	303	2.2	V	5.91	-42.56	-13	-29.56
3741.1	-39.17	331	1.5	H	8.76	-30.41	-13	-17.41
3741.1	-42.77	143	1.2	V	7.93	-34.84	-13	-21.84
4208.737	-51.66	143	1.2	H	9.37	-42.29	-13	-29.29
4208.737	-55.27	170	1.2	V	8.97	-46.3	-13	-33.3
4676.38	-46.11	181	1.6	H	10.76	-35.35	-13	-22.35
4676.38	-47.68	73	1.6	V	10.05	-37.63	-13	-24.63

Remark:
1.The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency; and worst spurious emissions recorded.
2.Absolute Level = Reading Level + Substituted Factor
Substituted Factor contains: SG Level - Cable loss+ Antenna Gain
Margin = Absolute Level - Limit

4 Test Setup Photos of the EUT



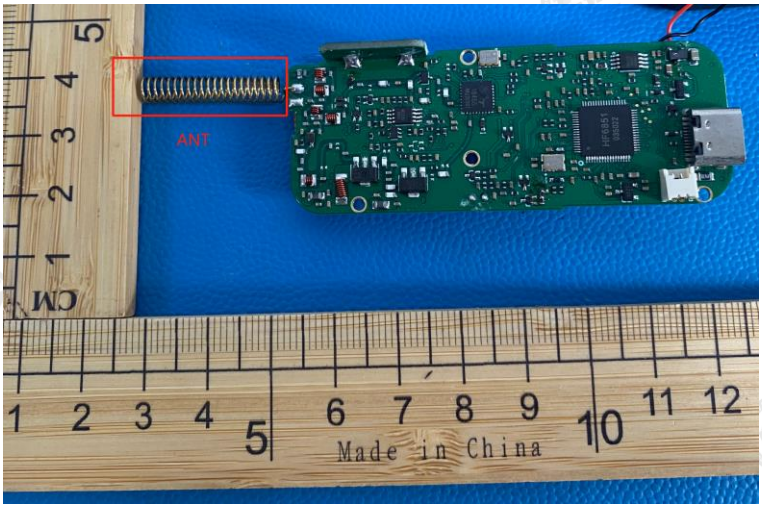
5 External and Internal Photos of the EUT

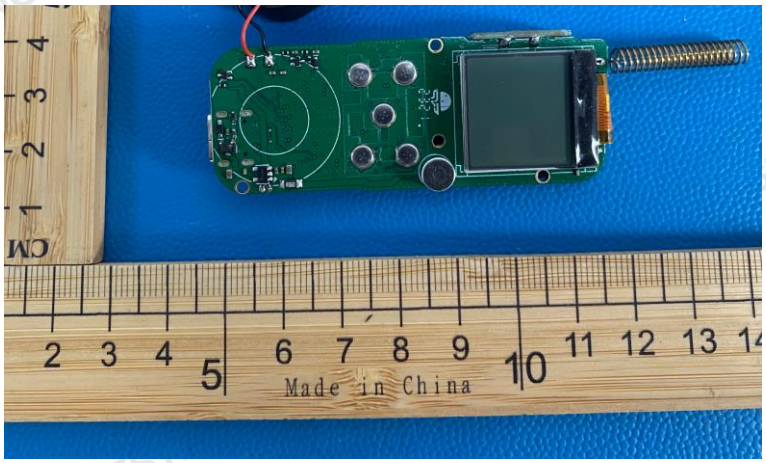
External Photos

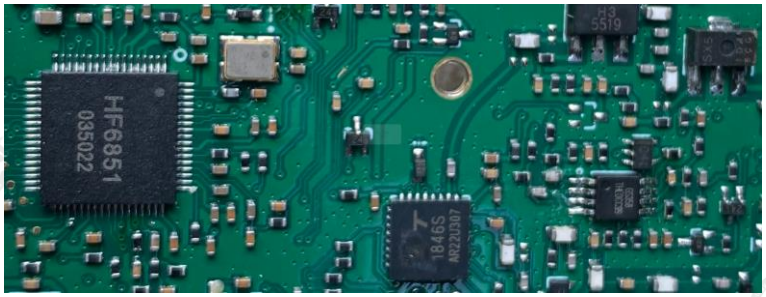

Made in China


Made in China

Internal Photos







********** End of Report **********