

## 10. RADIATED EMISSION

### 10.1. MEASUREMENT PROCEDURE

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

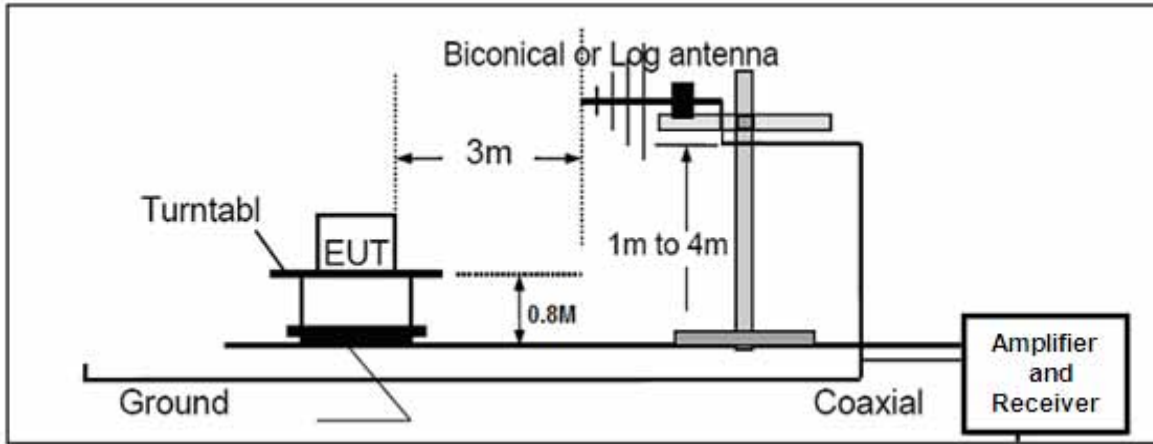
The following table is the setting of spectrum analyzer and receiver.

<b>Spectrum Parameter</b>	<b>Setting</b>
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/1MHz for Peak, 1MHz/10Hz for Average

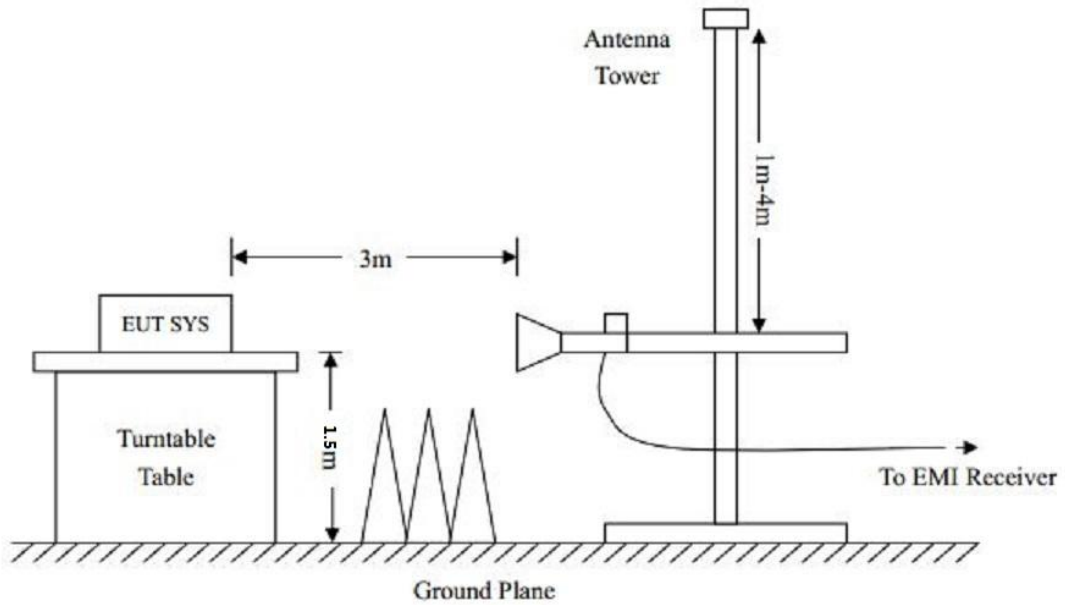
<b>Receiver Parameter</b>	<b>Setting</b>
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

## 10.2. TEST SETUP

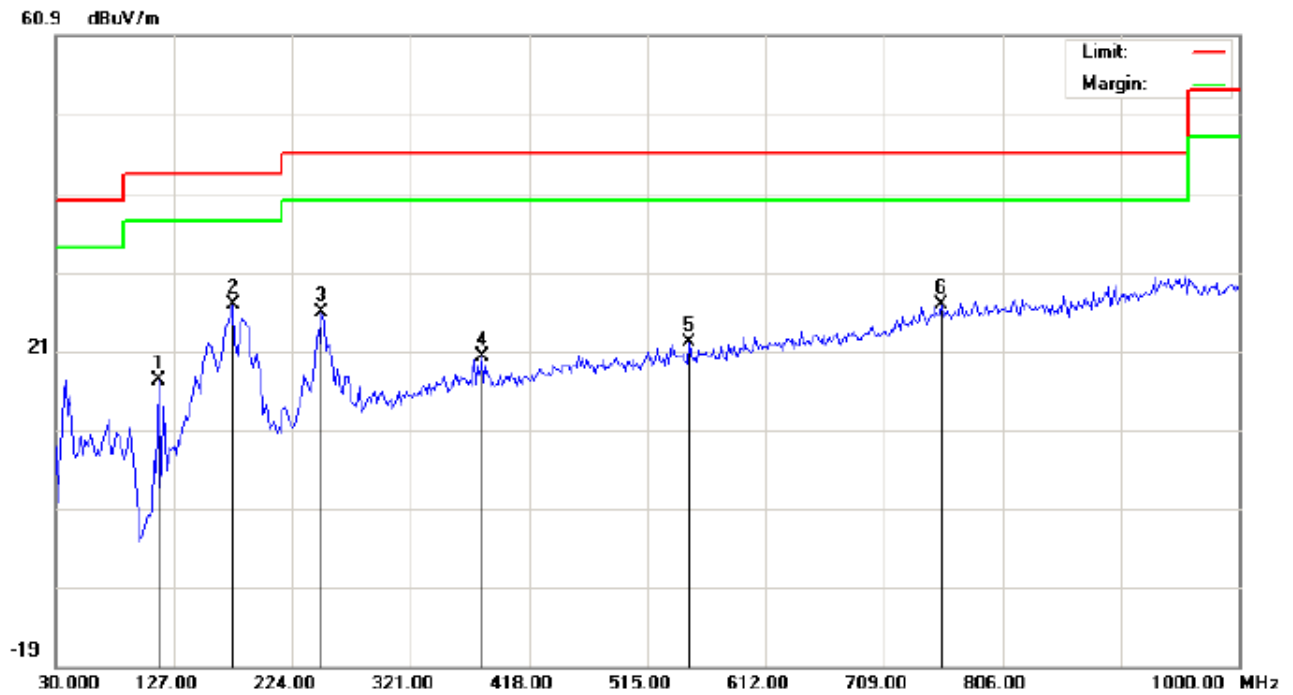
### RADIATED EMISSION TEST SETUP 30MHz-1000MHz



### RADIATED EMISSION TEST SETUP ABOVE 1000MHz







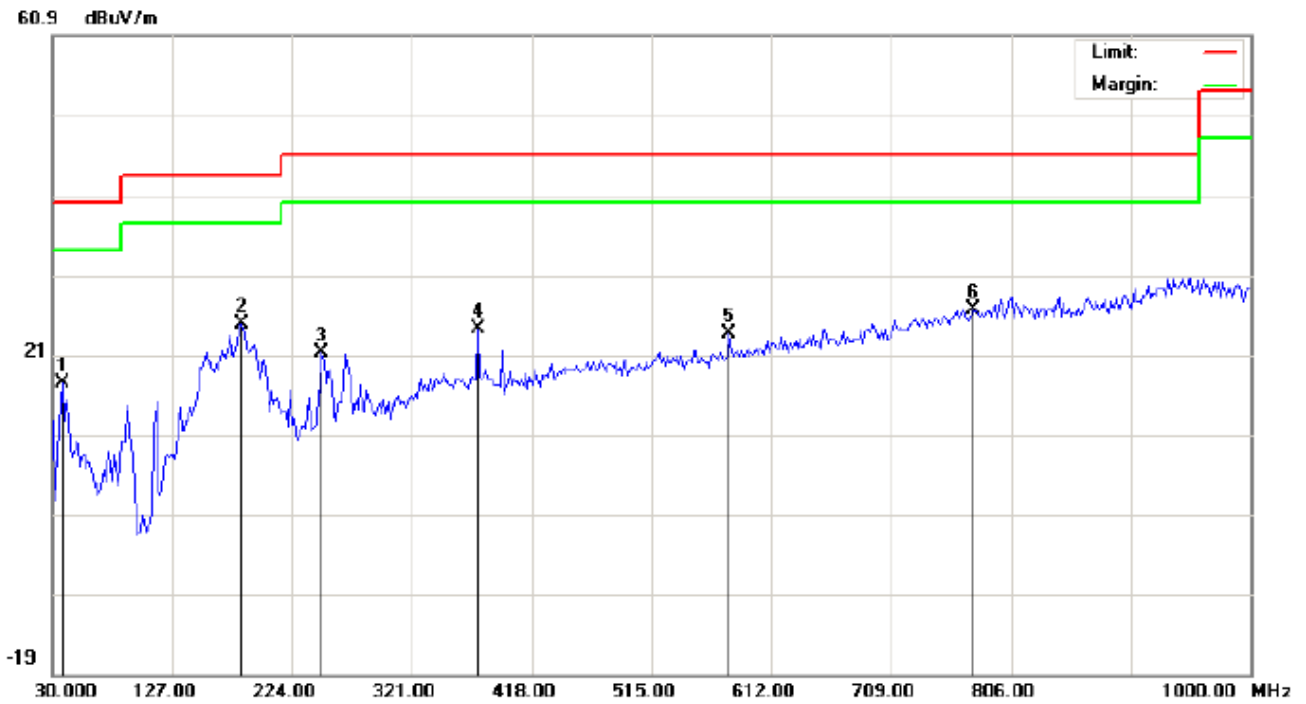
Site: site #1  
Limit: FCC Class B 3M Radiation  
EUT: Mobile Phone  
M/N: Bluesky Shine Plus S919  
Mode: Low channel TX  
Note:

Polarization: *Vertical*  
Power: AC 120V/60Hz  
Distance: 3m

Temperature: 24.6  
Humidity: 54.3 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		114.0667	13.22	3.91	17.13	43.50	-26.37	peak			
2	*	175.5000	12.45	14.35	26.80	43.50	-16.70	peak			
3		248.2500	11.98	13.73	25.71	46.00	-20.29	peak			
4		379.2000	1.21	18.93	20.14	46.00	-25.86	peak			
5		548.9500	-0.53	22.45	21.92	46.00	-24.08	peak			
6		755.8833	0.14	26.71	26.85	46.00	-19.15	peak			





Site: site #1  
Limit: FCC Class B 3M Radiation  
EUT: Mobile Phone  
M/N: Bluesky Shine Plus S919  
Mode: Middle channel TX  
Note:

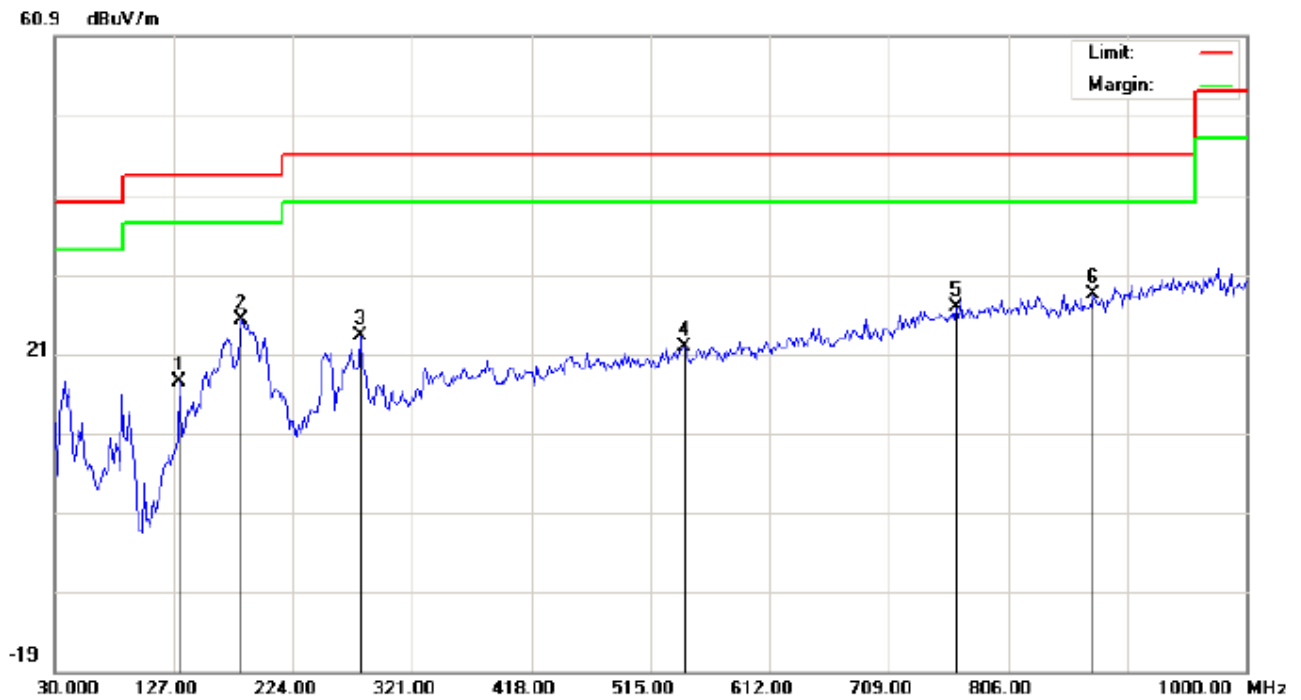
Polarization: *Vertical*  
Power: AC 120V/60Hz  
Distance: 3m

Temperature: 24.6  
Humidity: 54.3 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		38.0833	10.97	6.39	17.36	40.00	-22.64	peak			
2	*	183.5833	11.64	13.16	24.80	43.50	-18.70	peak			
3		248.2500	7.51	13.73	21.24	46.00	-24.76	peak			
4		374.3500	5.38	18.90	24.28	46.00	-21.72	peak			
5		578.0500	1.02	22.62	23.64	46.00	-22.36	peak			
6		775.2833	-0.30	26.98	26.68	46.00	-19.32	peak			







Site: site #1  
 Limit: FCC Class B 3M Radiation  
 EUT: Mobile Phone  
 M/N: Bluesky Shine Plus S919  
 Mode: High channel TX  
 Note:

Polarization: *Vertical*  
 Power: AC 120V/60Hz  
 Distance: 3m

Temperature: 24.6  
 Humidity: 54.3 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		131.8500	5.51	11.80	17.31	43.50	-26.19	peak			
2		181.9667	11.64	13.57	25.21	43.50	-18.29	peak			
3		278.9667	8.49	14.77	23.26	46.00	-22.74	peak			
4		542.4833	-0.47	22.28	21.81	46.00	-24.19	peak			
5		763.9667	-0.06	26.82	26.76	46.00	-19.24	peak			
6	*	875.5167	0.53	27.97	28.50	46.00	-17.50	peak			

**RESULT: PASS**

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

RADIATED EMISSION TEST- (ABOVE 1GHZ)

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	Type	
Low Channel (2402 MHz)							
4804.264	61.57	-3.62	57.95	74	-16.05	Pk	Vertical
4804.272	46.29	-3.62	42.67	54	-11.33	AV	Vertical
7206.138	62.33	-0.9	61.43	74	-12.57	pk	Vertical
7206.156	40.21	-0.9	39.31	54	-14.69	AV	Vertical
4803.959	63.58	-3.64	59.94	74	-14.06	Pk	Horizontal
4803.964	41.61	-3.64	37.97	54	-16.03	AV	Horizontal
Mid Channel (2441 MHz)							
4882.128	62.25	-3.65	58.6	74	-15.4	Pk	Vertical
4882.094	43.57	-3.65	39.92	54	-14.08	AV	Vertical
7323.228	66.94	-0.82	66.12	74	-7.88	Pk	Vertical
7323.220	43.32	-0.82	42.5	54	-11.5	AV	Vertical
4882.096	61.02	-3.68	57.34	74	-16.66	Pk	Horizontal
4882.171	44.16	-3.68	40.48	54	-13.52	AV	Horizontal
High Channel (2480 MHz)							
4960.260	67.22	-3.59	63.63	74	-10.37	pk	Vertical
4960.325	43.08	-3.59	39.49	54	-14.51	AV	Vertical
4960.190	64.65	-3.59	61.06	74	-12.94	pk	Horizontal
4960.157	48.89	-3.59	45.3	54	-8.7	AV	Horizontal

Note:

1) 30MHz~25GHz:(Scan with GFSK,  $\pi/4$ -DQPSK,8DPSK, the worst casw is GFSK Mode)

2) Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Meter Reading + Factor

Margin = Emission Leve - Limit

**RESULT: PASS**

## 11. BAND EDGE EMISSION

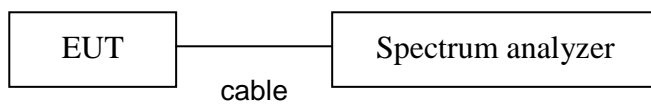
### 11.1. MEASUREMENT PROCEDURE

1. The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100kHz. The video bandwidth is set to 300kHz.
2. Transmitter set to the normal hopping mode at 2.4 and 2.4835 GHz.

### 11.2. TEST SET-UP

Radiated same as 10.2

Conducted set up



### 11.3. Radiated TEST RESULT

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	Type	
GFSK							
2399.9	61.28	-12.99	48.29	74	-25.71	peak	Vertical
2399.9	57.42	-12.99	44.43	54	-9.57	AVG	Vertical
2399.9	75.29	-12.99	62.3	74	-11.7	peak	Horizontal
2399.9	53.38	-12.99	40.39	54	-13.61	AVG	Horizontal
2483.6	72.14	-12.78	59.36	74	-14.64	peak	Vertical
2483.6	56.19	-12.78	43.41	54	-10.59	AVG	Vertical
2483.6	75.21	-12.78	62.43	74	-11.57	peak	Horizontal
2483.6	50.13	-12.78	37.35	54	-16.65	AVG	Horizontal
$\pi$ /4-DQPSK							
2399.9	74.19	-12.99	61.2	74	-12.8	peak	Vertical
2399.9	57.56	-12.99	44.57	54	-9.43	AVG	Vertical
2399.9	73.24	-12.99	60.25	74	-13.75	peak	Horizontal
2399.9	56.29	-12.99	43.3	54	-10.7	AVG	Horizontal
2483.6	74.56	-12.78	61.78	74	-12.22	peak	Vertical
2483.6	52.17	-12.78	39.39	54	-14.61	AVG	Vertical
2483.6	70.39	-12.78	57.61	74	-16.39	peak	Horizontal
2483.6	52.45	-12.78	39.67	54	-14.33	AVG	Horizontal
8DPSK							
2399.9	76.37	-12.99	63.38	74	-10.62	peak	Vertical
2399.9	52.14	-12.99	39.15	54	-14.85	AVG	Vertical
2399.9	72.26	-12.99	59.27	74	-14.73	peak	Horizontal
2399.9	57.54	-12.99	44.55	54	-9.45	AVG	Horizontal
2483.6	73.18	-12.78	60.4	74	-13.6	peak	Vertical
2483.6	54.35	-12.78	41.57	54	-12.43	AVG	Vertical
2483.6	77.61	-12.78	64.83	74	-9.17	peak	Horizontal
2483.6	52.98	-12.78	40.2	54	-13.8	AVG	Horizontal

### RESULT: PASS

**Note:** The other modes radiation emission have enough 20dB margin.

Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

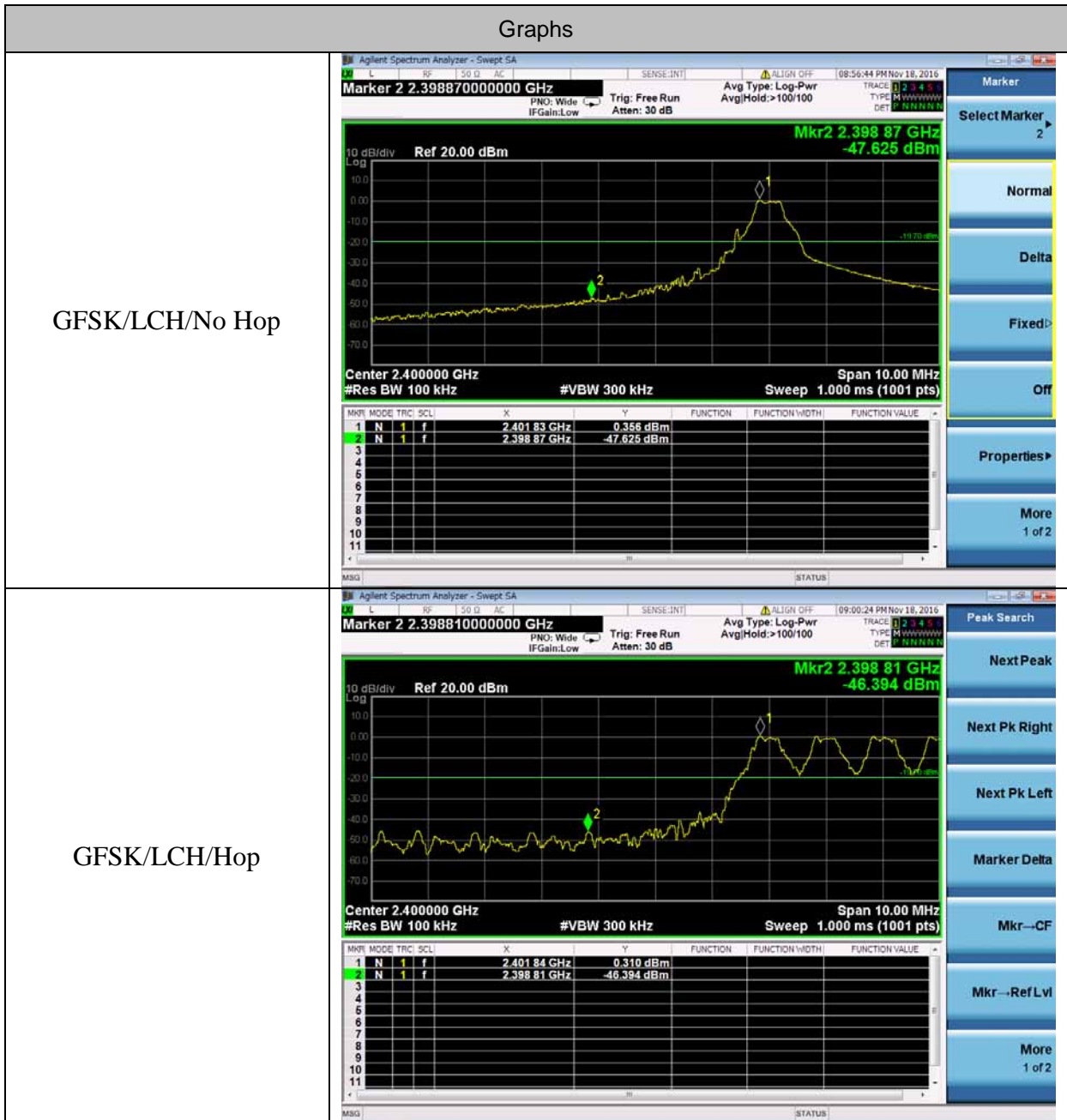
The "Factor" value can be calculated automatically by software of measurement system.

#### 11.4 Conducted TEST RESULT

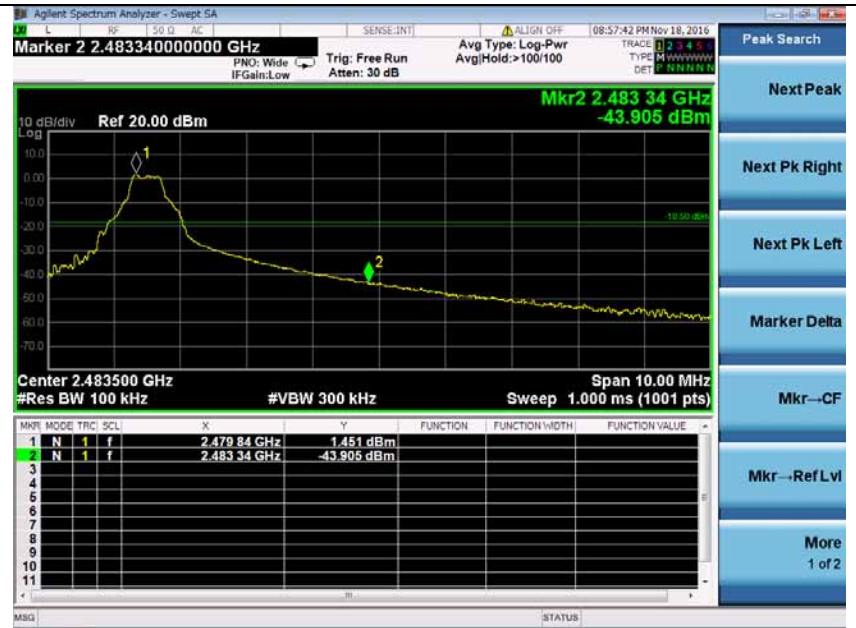
Mode	Channel	Carrier Frequency [MHz]	Frequency Hopping	Max Spurious Level [dBm]	Verdict
GFSK	LCH	2402	Off	-47.63	PASS
			On	-46.39	PASS
GFSK	HCH	2480	Off	-43.91	PASS
			On	-44.46	PASS
$\pi/4$ DQPSK	LCH	2402	Off	-52.01	PASS
$\pi/4$ DQPSK	HCH	2480	Off	-46.28	PASS
8DPSK	LCH	2402	Off	-49.54	PASS
8DPSK	HCH	2480	Off	-49.69	PASS

Note: All modes were tested, only the worst case record in the report.

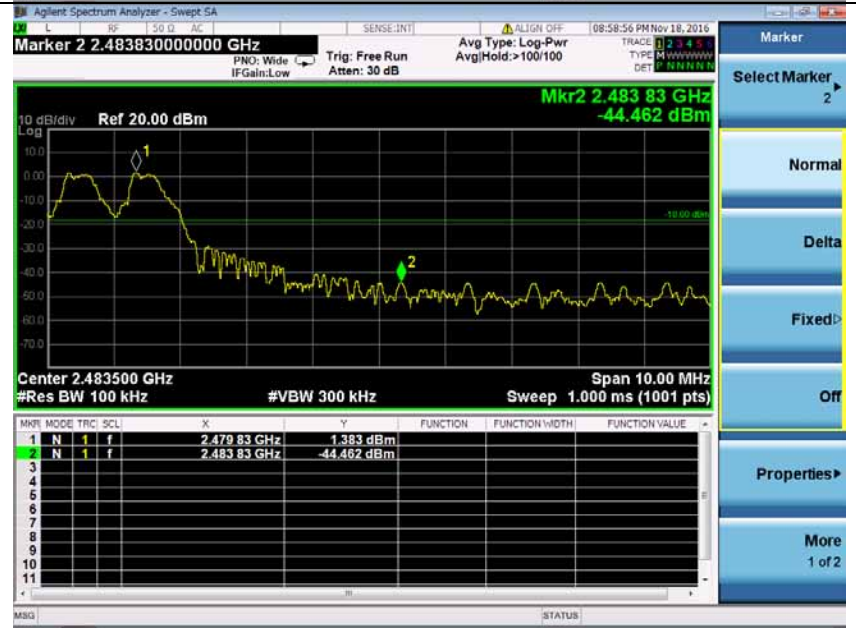
Test Graph



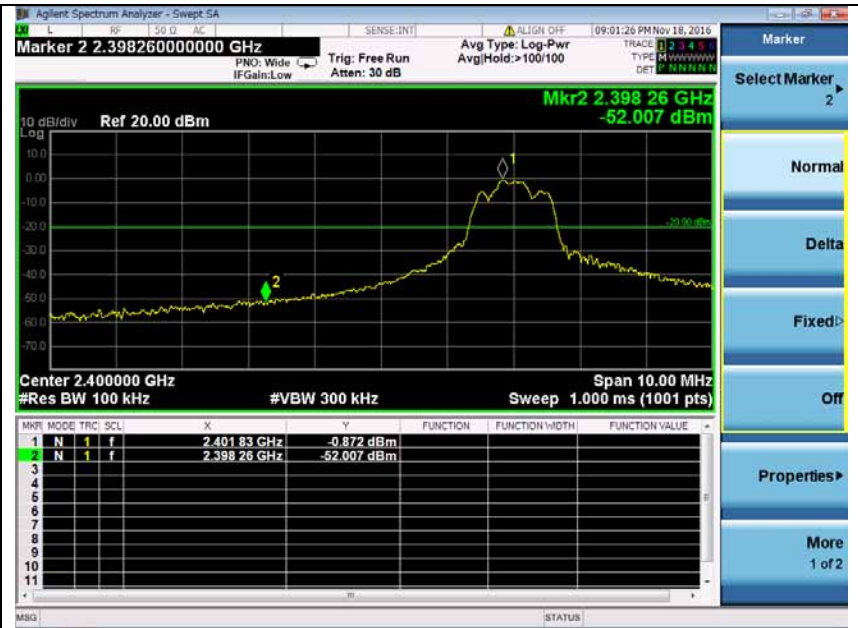
GFSK/HCH/No Hop



GFSK/HCH/Hop



$\pi$  /4DQPSK/LCH/No Hop



$\pi$  /4DQPSK/HCH/No Hop





8DPSK/LCH/No Hop



8DPSK/HCH/No Hop



## 12. NUMBER OF HOPPING FREQUENCY

### 12.1. MEASUREMENT PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer Start = 2.4GHz Stop = 2.4835GHz
4. Set the Spectrum Analyzer as RBW>=1%span, VBW>=RBW.

### 12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

### 12.3. MEASUREMENT EQUIPMENT USED

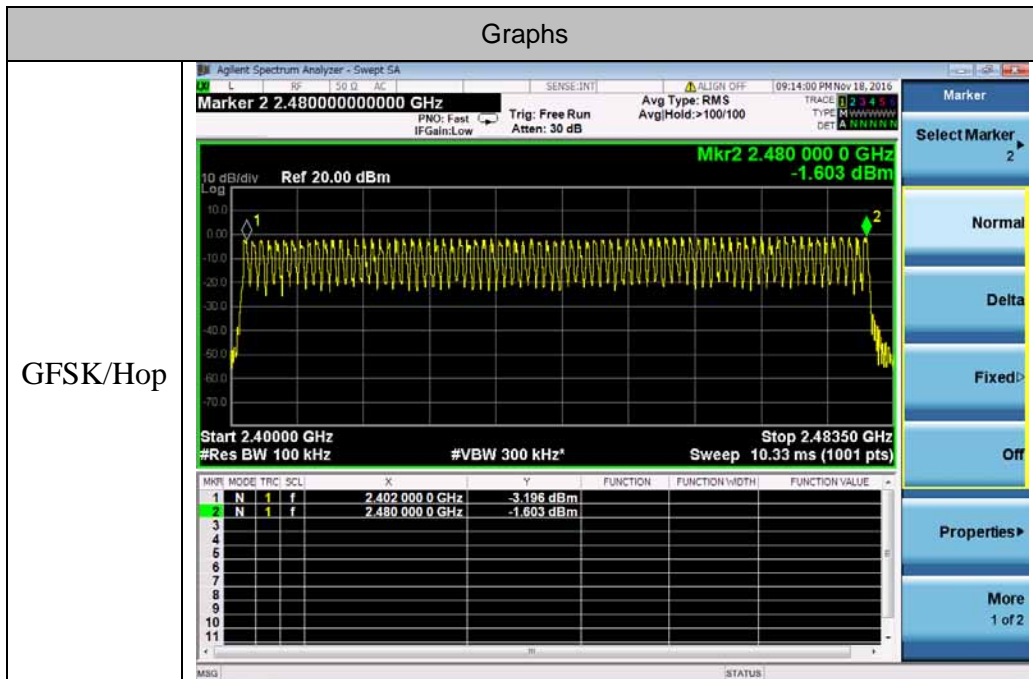
The same as described in section 6

### 12.4. LIMITS AND MEASUREMENT RESULT

Mode	Channel.	Number of Hopping Channel	Verdict
GFSK	Hop	79	PASS

Note: All modes were tested, only the worst case record in the report.

### Test Graph



### 13. TIME OF OCCUPANCY (DWELL TIME)

#### 13.1. MEASUREMENT PROCEDURE

1. Place the EUT on the table and set it in transmitting mode
2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer.
3. Set Span = zero span, centered on a hopping channel
4. Set the spectrum analyzer as RBW=1MHz, VBW>=RBW, Span = 0 Hz

#### 13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

#### 13.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

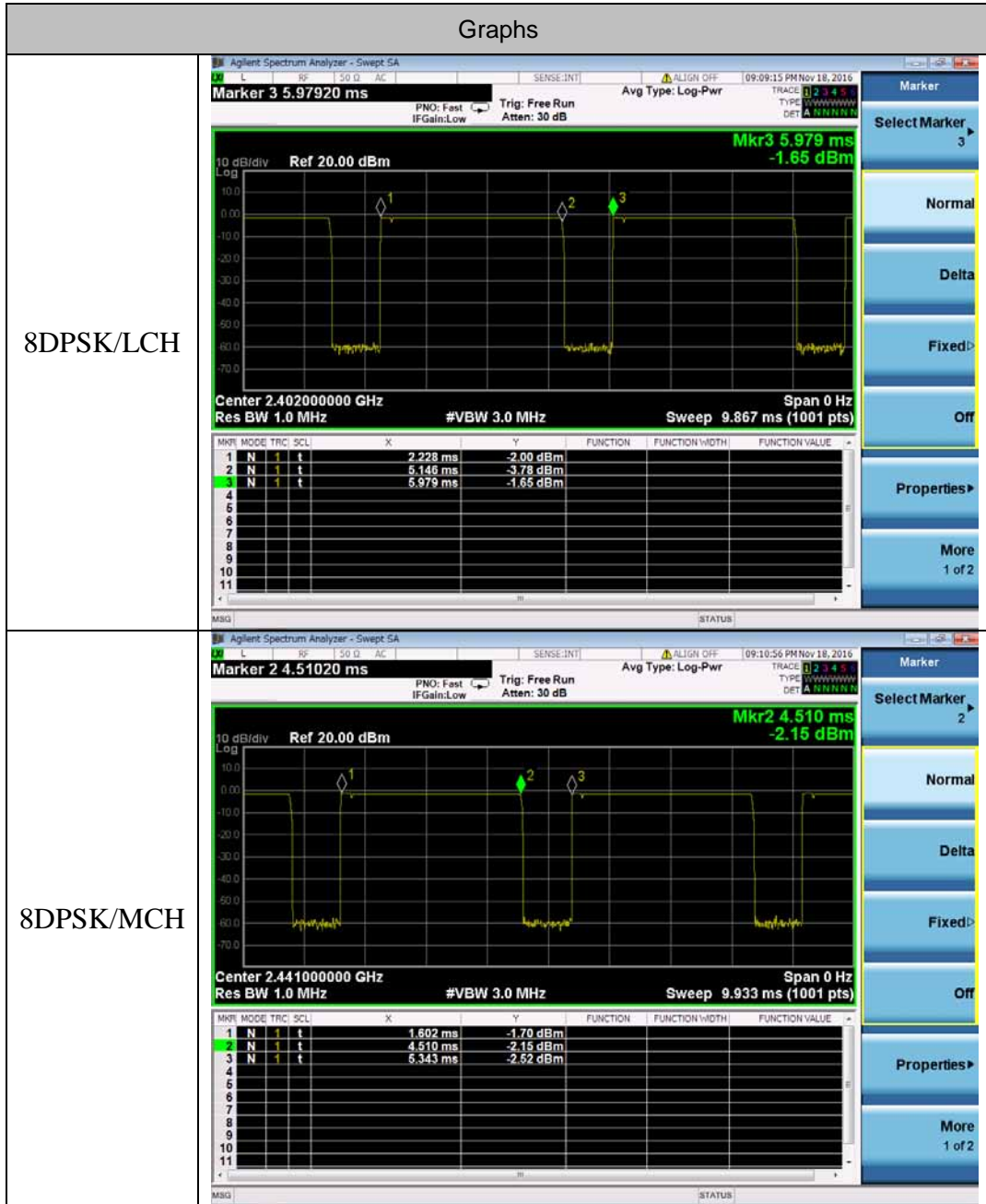
#### 13.4. LIMITS AND MEASUREMENT RESULT

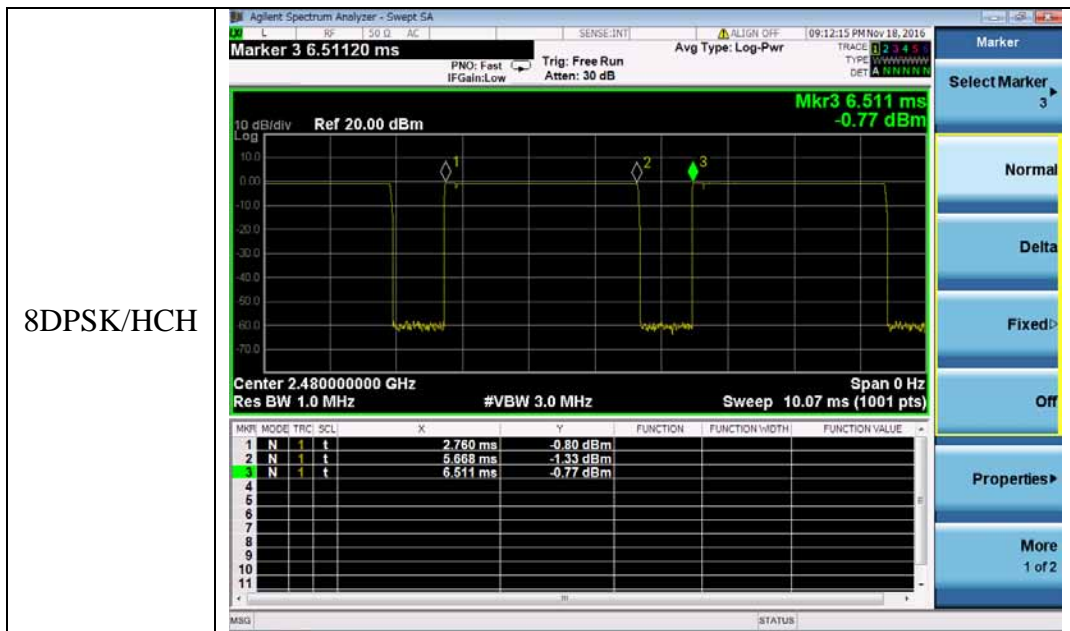
The Dwell Time=Burst Width\*Total Hops. The detailed calculations are showed as follows:

- The duration for dwell time calculation: $0.4[s]*\text{hopping number}=0.4[s]*79[\text{ch}]=31.6[s*\text{ch}]$ ;
- The burst width [ms/hop/ch], which is directly measured, refers to the duration on one channel hop.
- The hops per second for all channels: The selected EUT Conf uses a slot type of 5-Tx&1-Rx and a hopping rate of 1600 [ch\*hop/s] for all channels. So the final hopping rate for all channels is  $1600/6=266.67$  [ch\*hop/s]
- The hops per second on one channel:  $266.67$  [ch\*hops/s]/ $79$  [ch]= $3.38$  [hop/s];
- The total hops for all channels within the dwell time calculation duration: $3.38$  [hop/s]\* $31.6[s*\text{ch}]=106.67$  [hop\*ch];
- The dwell time for all channels hopping:  $106.67$  [hop\*ch]\*Burst Width [ms/hop/ch].

Mode	Channel.	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[ms]	Verdict	Limit (ms)
8DPSK	LCH	2.918	106.67	311.26	PASS	400
8DPSK	MCH	2.908	106.67	310.20	PASS	400
8DPSK	HCH	2.908	106.67	310.20	PASS	400

Test Graph





## 14. FREQUENCY SEPARATION

### 14.1. MEASUREMENT PROCEDURE

1. Place the EUT on the table and set it in transmitting mode
2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer
3. Set Span = wide enough to capture the peaks of two adjacent channels Resolution (or IF) Bandwidth (RBW)  $\geq$  1% of the span Video (or Average) Bandwidth (VBW)  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold

### 14.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 6.2

### 14.3. MEASUREMENT EQUIPMENT USED

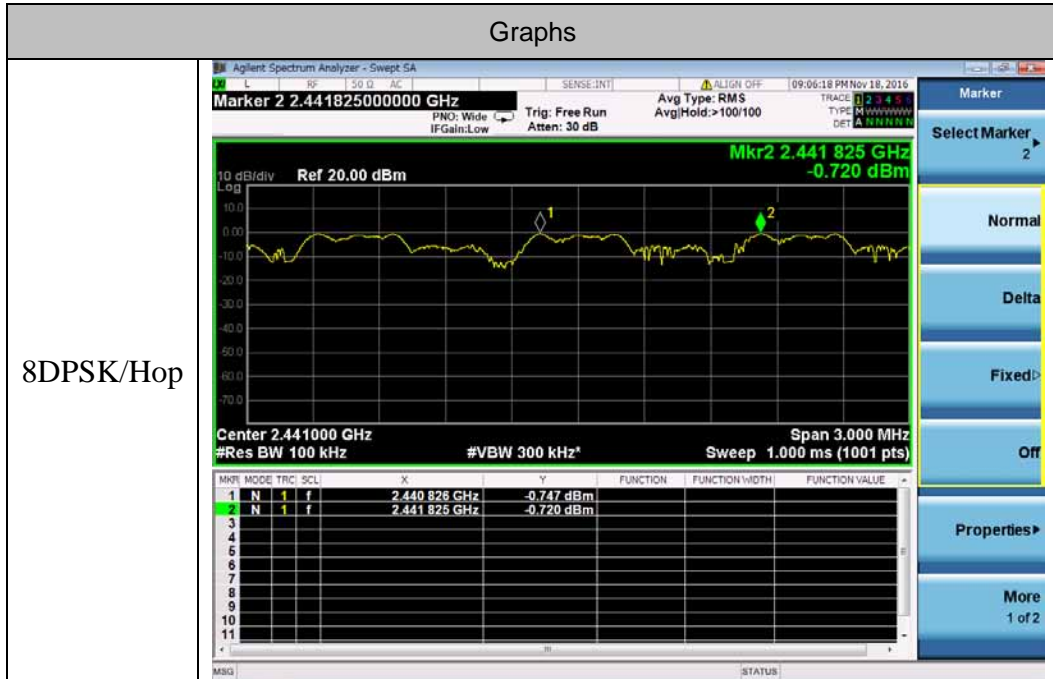
The same as described in section 6.3

### 14.4. LIMITS AND MEASUREMENT RESULT

Mode	Channel.	Carrier Frequency Separation [MHz]	Verdict
8DPSK	Hop	0.999	PASS

Note: All modes were tested, only the worst case record in the report.

### Test Graph



## 15. FCC LINE CONDUCTED EMISSION TEST

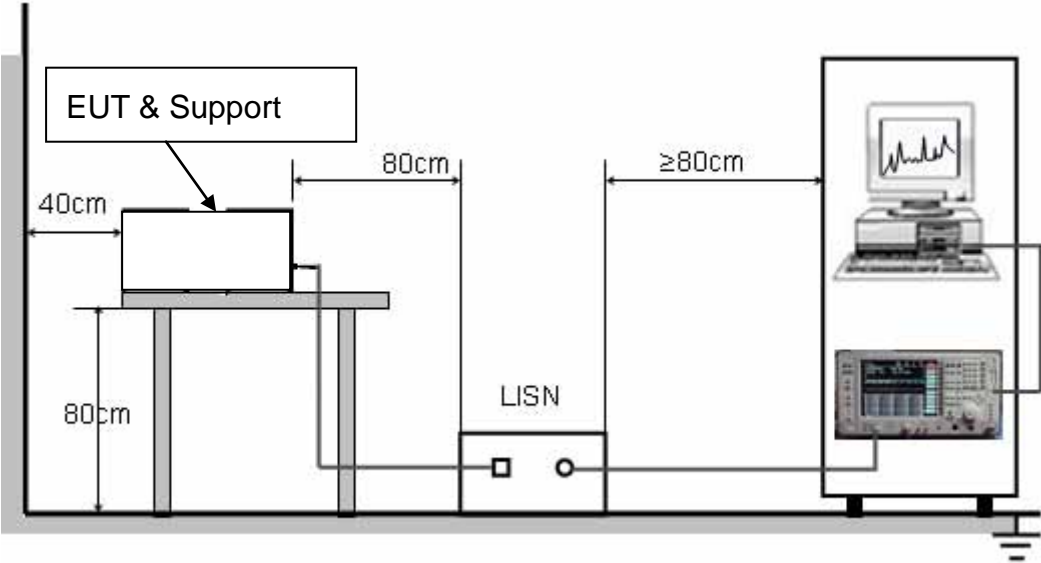
### 15.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.( dBuV)	Average( dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

15.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



### **15.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST**

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by adapter which received 120V/60Hz power by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

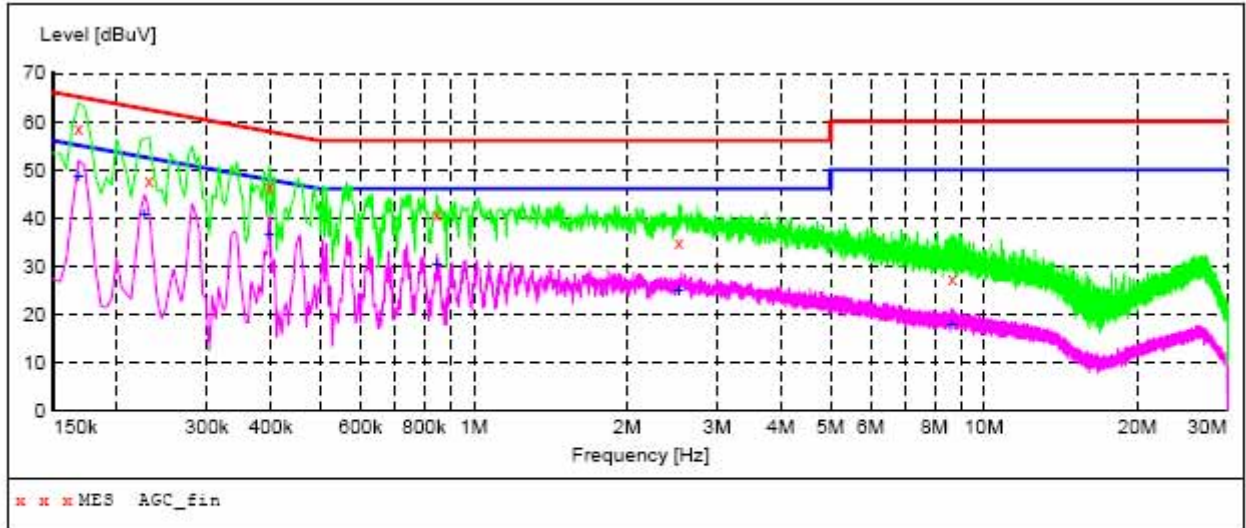
### **15.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST**

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.



**15.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST**

Line Conducted Emission Test Line 1-L



**MEASUREMENT RESULT: "AGC\_fin"**

2016/11/14 11:06

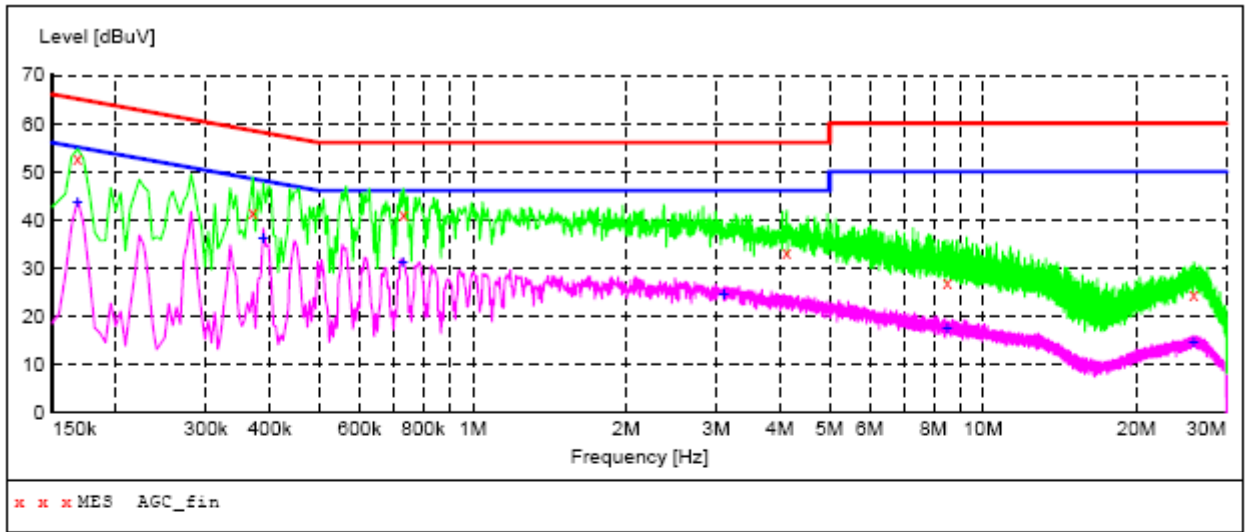
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBuV	dB	dBuV	dB				
0.168000	58.70	10.3	65	6.4	QP	L1	FLO	ON
0.231000	47.70	10.3	62	14.7	QP	L1	FLO	ON
0.397500	46.60	10.3	58	11.3	QP	L1	FLO	ON
0.847500	40.60	10.4	56	15.4	QP	L1	FLO	ON
2.521500	34.70	10.5	56	21.3	QP	L1	FLO	ON
8.673000	27.20	10.7	60	32.8	QP	L1	FLO	ON

**MEASUREMENT RESULT: "AGC\_fin2"**

2016/11/14 11:06

Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBuV	dB	dBuV	dB				
0.168000	48.40	10.3	55	6.7	AV	L1	FLO	ON
0.226500	40.80	10.3	53	11.8	AV	L1	FLO	ON
0.397500	36.60	10.3	48	11.3	AV	L1	FLO	ON
0.847500	30.30	10.4	46	15.7	AV	L1	FLO	ON
2.521500	25.00	10.5	46	21.0	AV	L1	FLO	ON
8.673000	17.90	10.7	50	32.1	AV	L1	FLO	ON

Line Conducted Emission Test Line 2-N



**MEASUREMENT RESULT: "AGC\_fin"**

2016/11/14 11:19

Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBuV	dB	dBuV	dB				
0.168000	52.60	10.3	65	12.5	QP	N	FLO	ON
0.370500	41.50	10.3	59	17.0	QP	N	FLO	ON
0.730500	41.00	10.3	56	15.0	QP	N	FLO	ON
4.123500	33.20	10.5	56	22.8	QP	N	FLO	ON
8.515500	26.90	10.7	60	33.1	QP	N	FLO	ON
25.872000	24.60	11.9	60	35.4	QP	N	FLO	ON

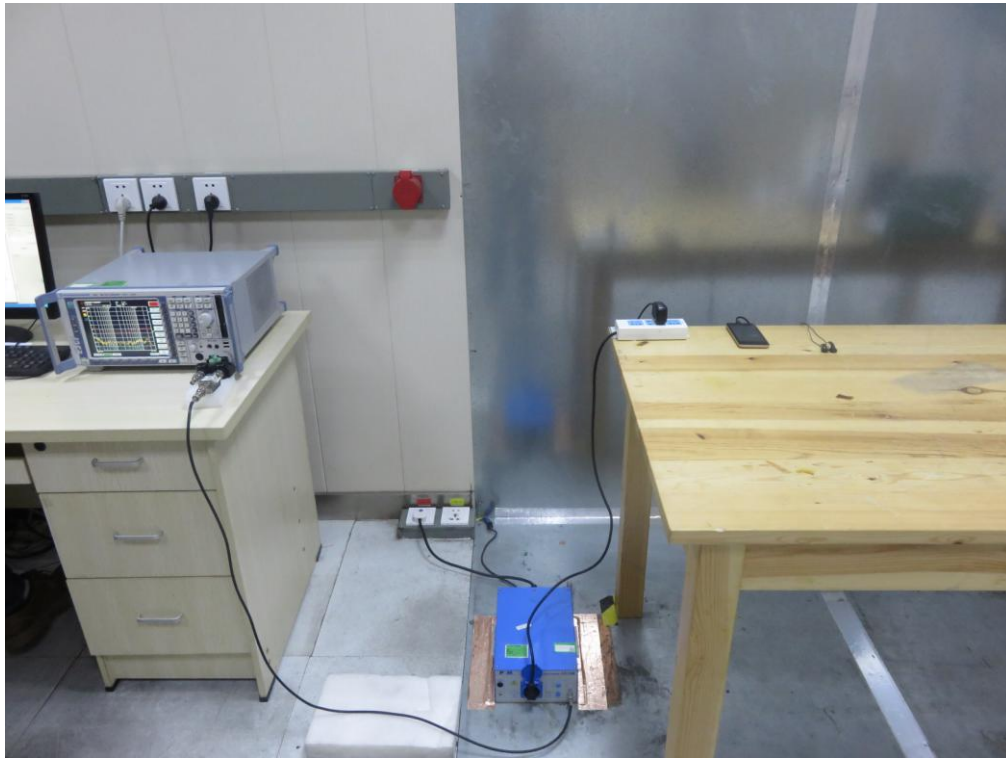
**MEASUREMENT RESULT: "AGC\_fin2"**

2016/11/14 11:19

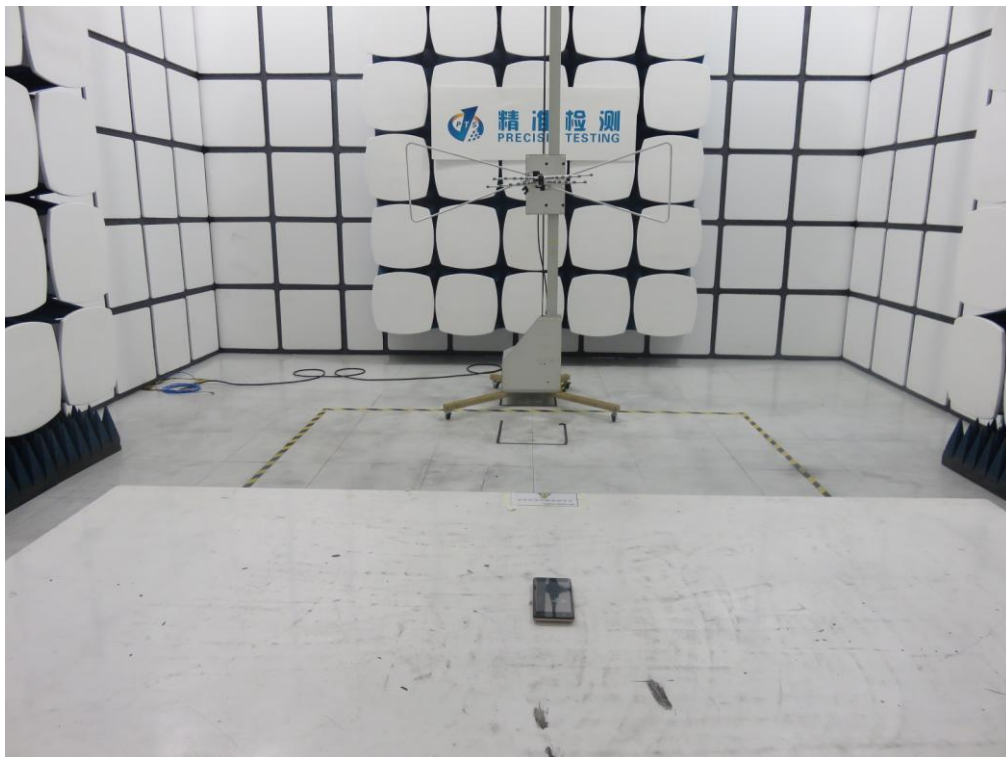
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBuV	dB	dBuV	dB				
0.168000	43.40	10.3	55	11.7	AV	N	FLO	ON
0.388500	36.10	10.3	48	12.0	AV	N	FLO	ON
0.730500	31.20	10.3	46	14.8	AV	N	FLO	ON
3.111000	24.30	10.5	46	21.7	AV	N	FLO	ON
8.515500	17.30	10.7	50	32.7	AV	N	FLO	ON
25.872000	14.70	11.9	50	35.3	AV	N	FLO	ON

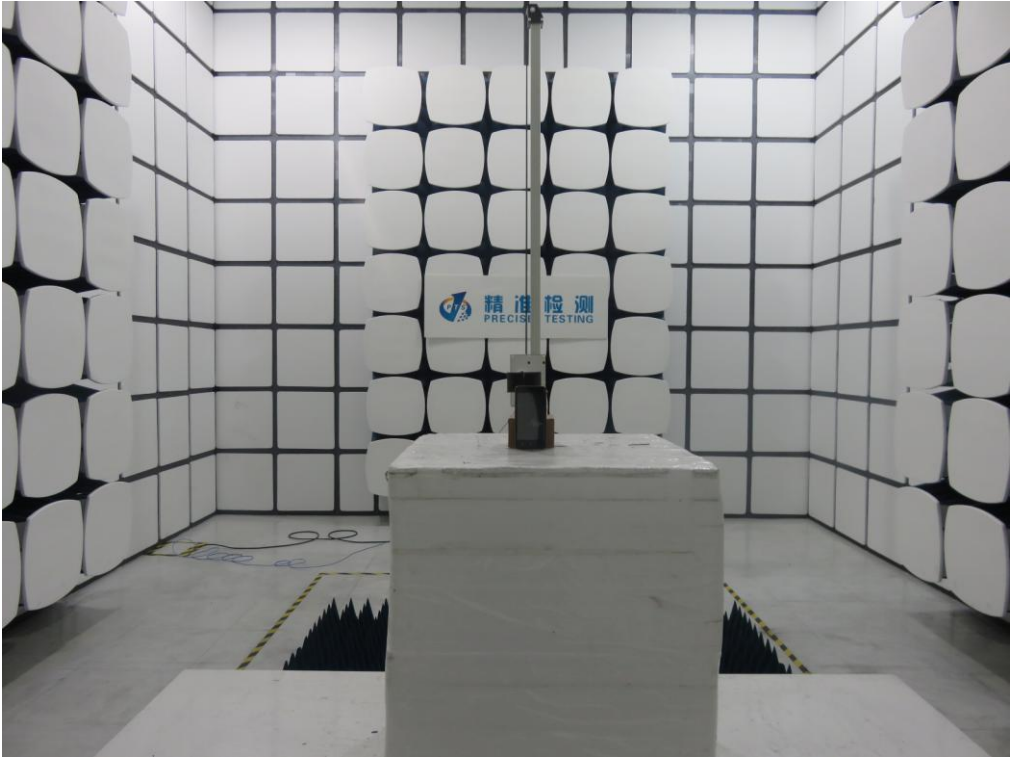
## APPENDIX A: PHOTOGRAPHS OF TEST SETUP

### FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP





## APPENDIX B: PHOTOGRAPHS OF EUT TOTAL VIEW OF EUT



THE LABEL OF ADAPTER



### THE LABEL OF BATTERY



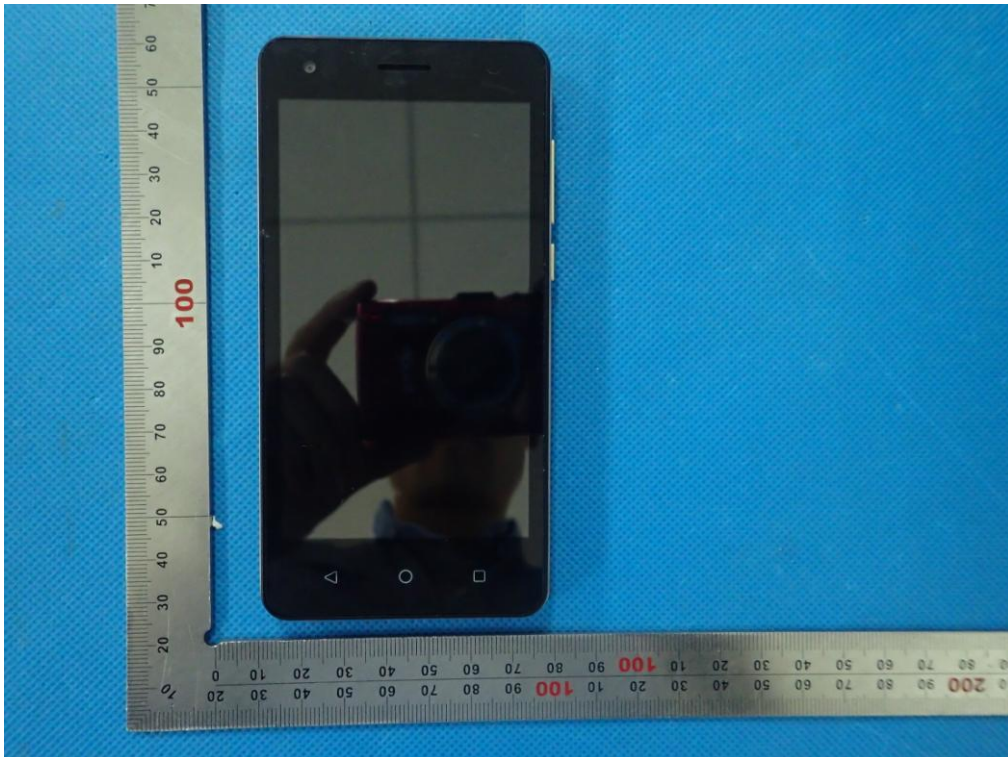
### TOP VIEW OF EUT



BOTTOM VIEW OF EUT



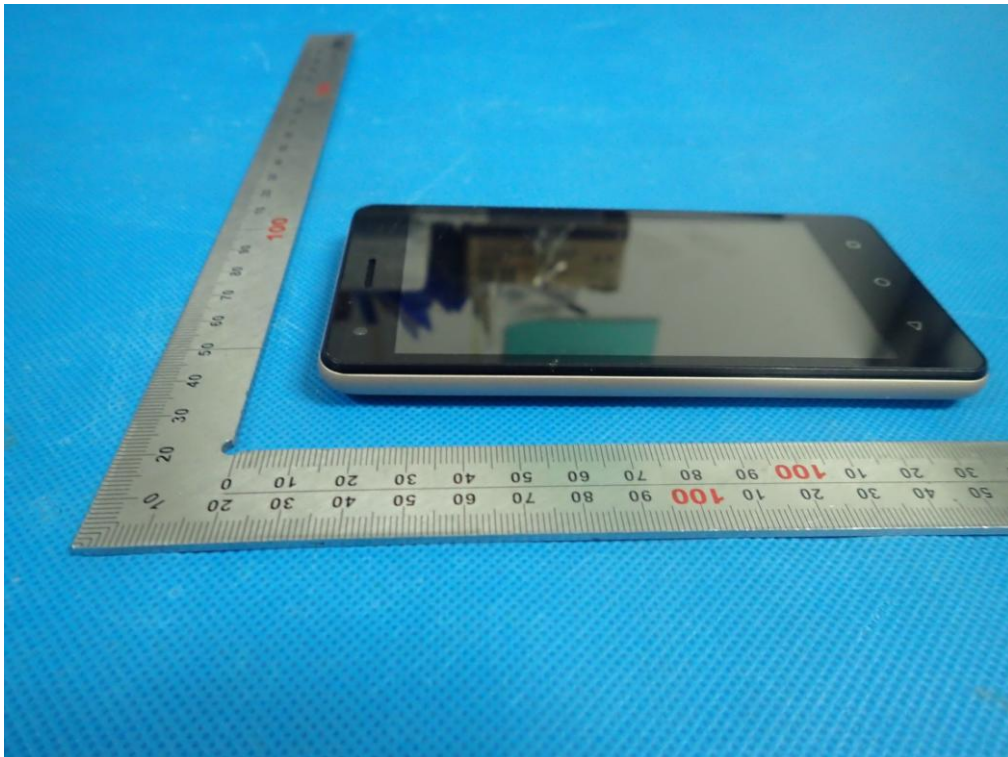
FRONT VIEW OF EUT



BACK VIEW OF EUT

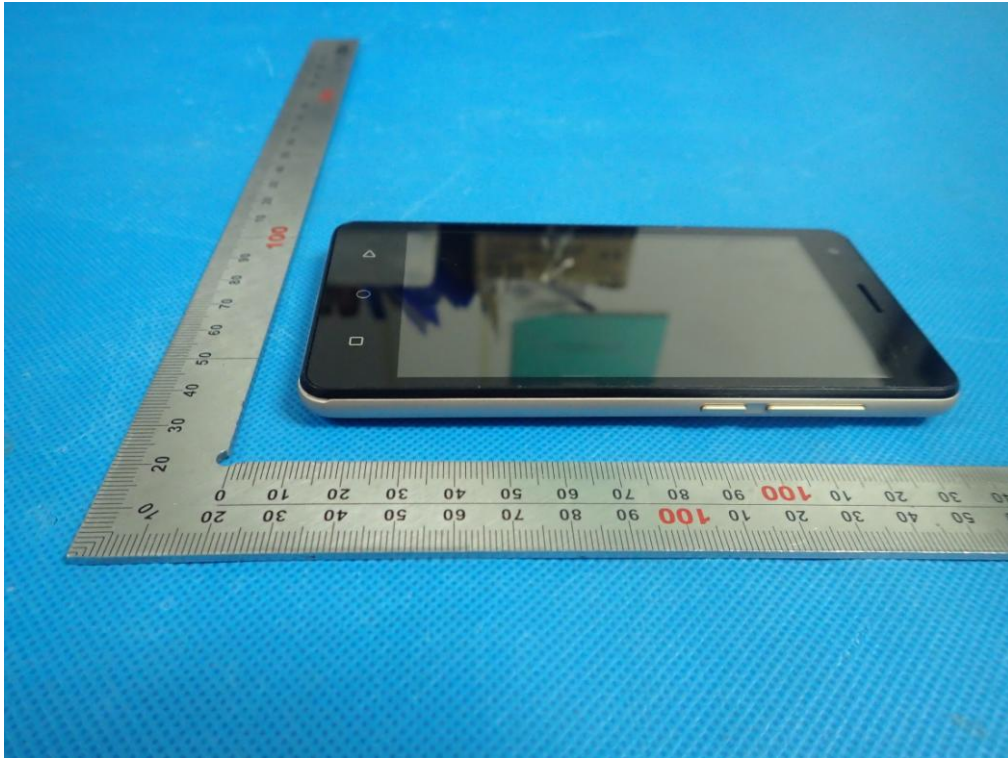


LEFT VIEW OF EUT





RIGHT VIEW OF EUT



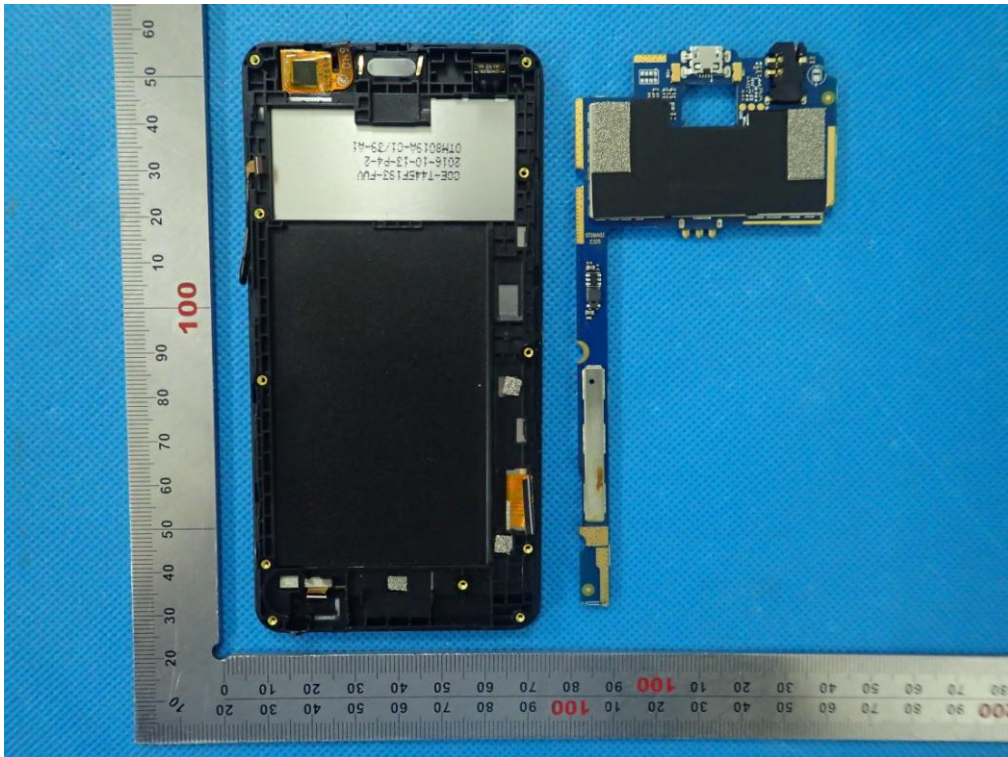
OPEN VIEW OF EUT-1



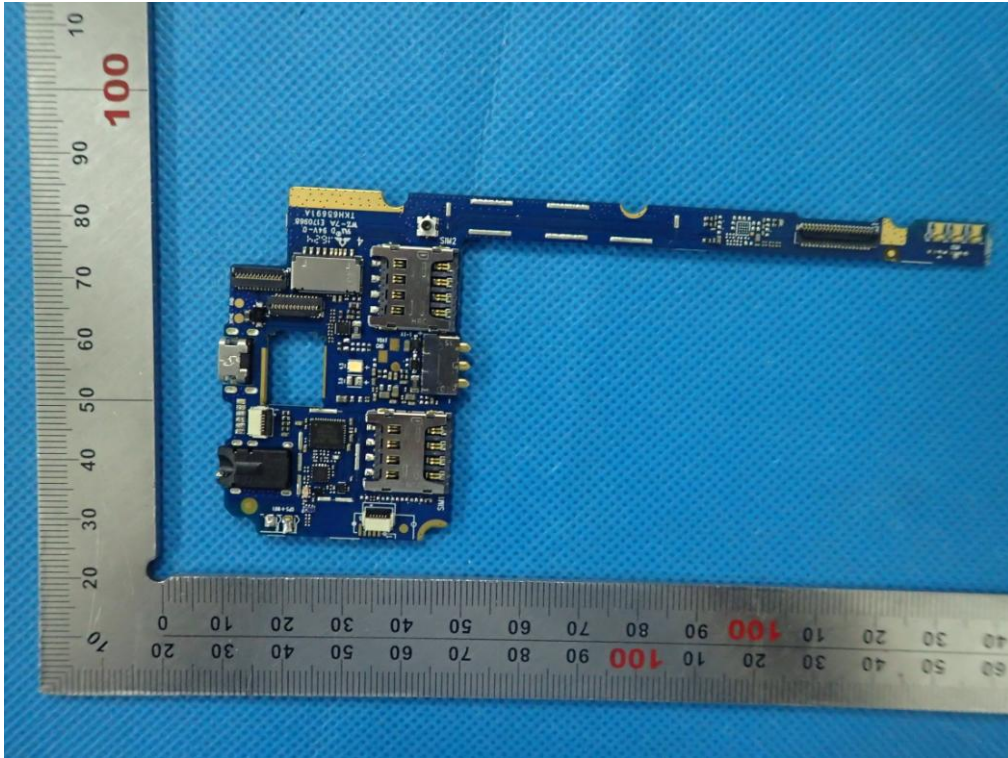
OPEN VIEW OF EUT-2



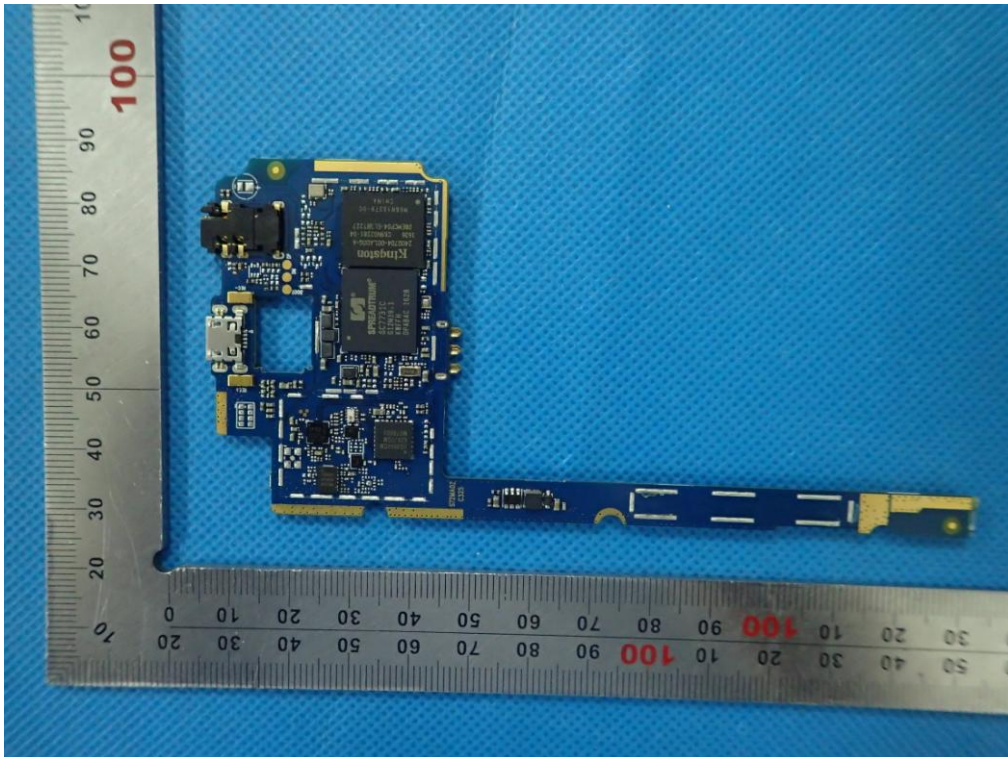
OPEN VIEW OF EUT-3



INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



-----END OF REPORT-----