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.

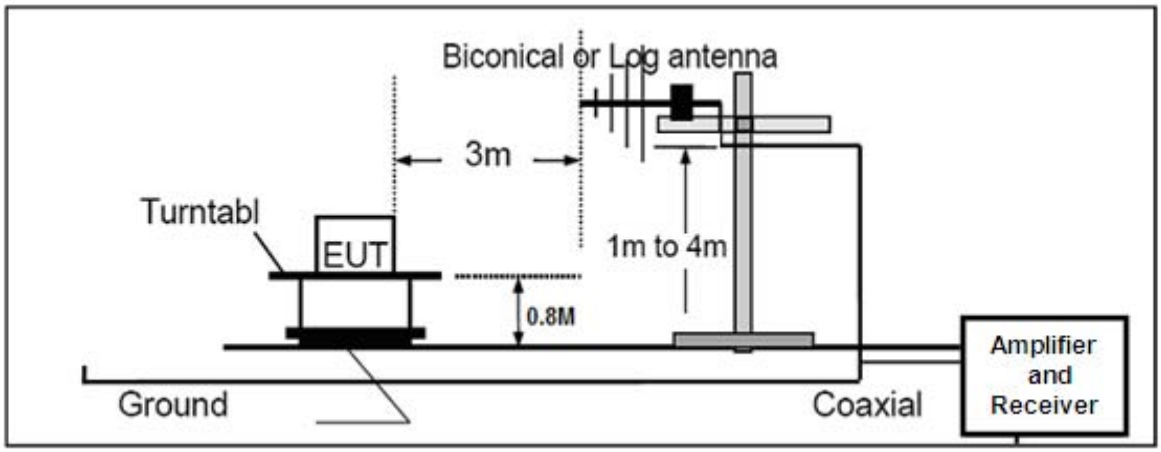
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
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

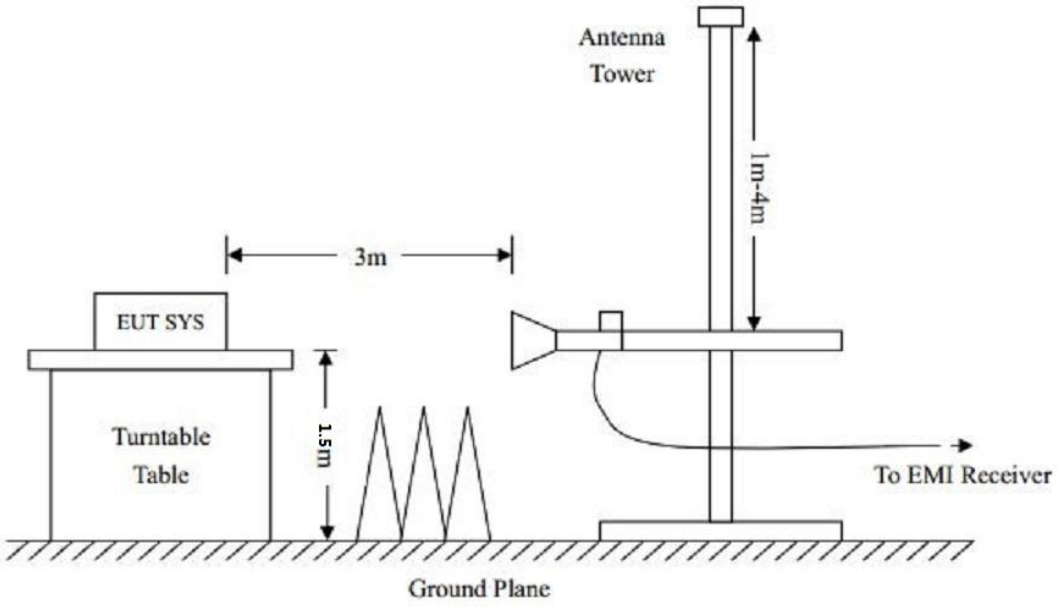
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

10.2. TEST SETUP

RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz

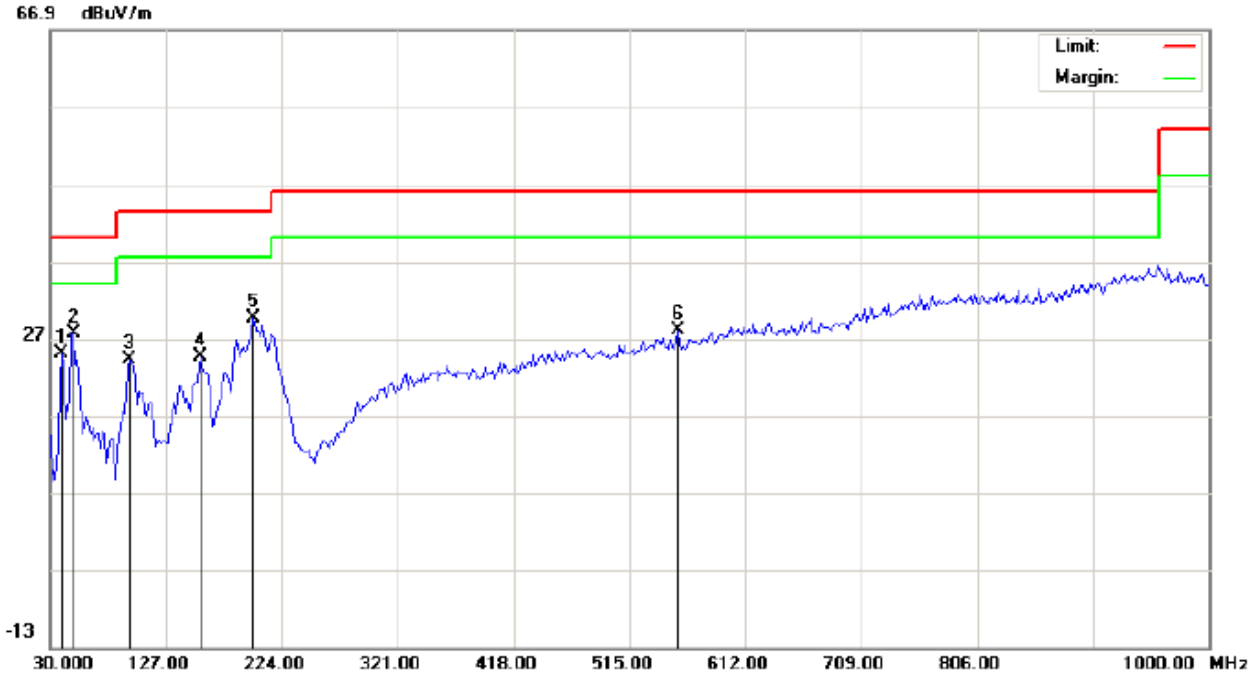


10.3. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

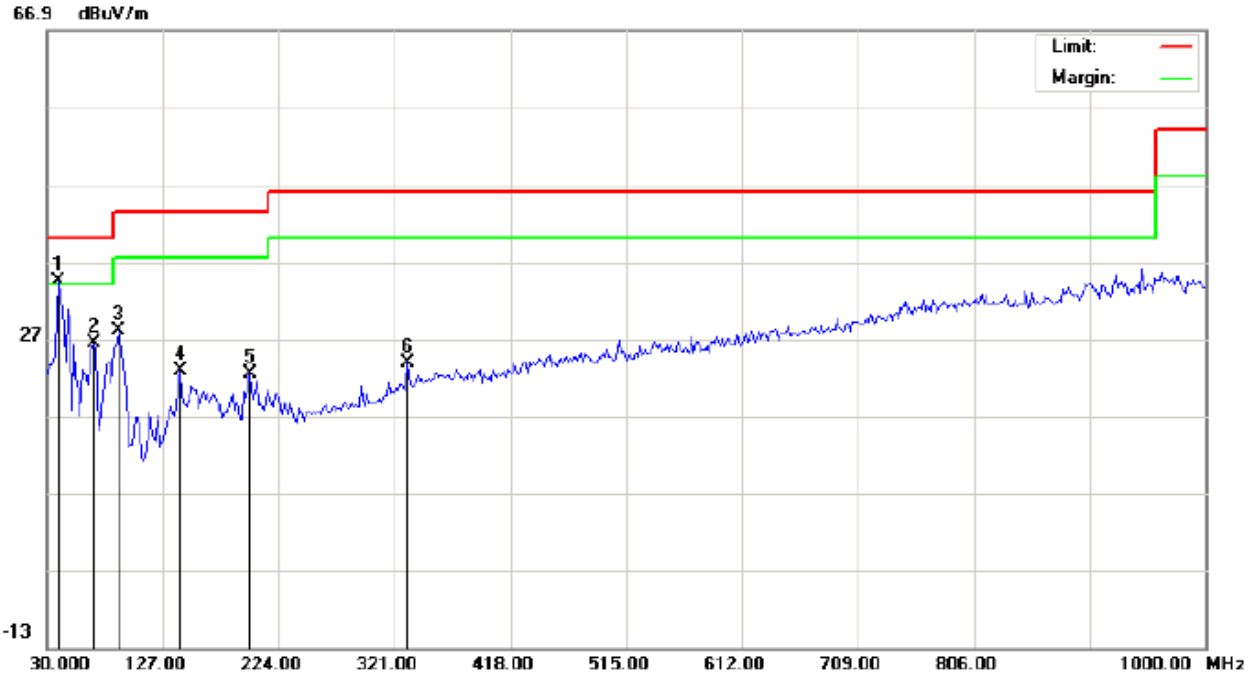


Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Smart Phone
M/N: A8
Mode: Low channel Tx
Note:

Polarization: *Horizontal*
Power: AC 120V/60Hz
Distance:

Temperature: 22.9
Humidity: 53.6 %

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		39.7000	13.54	11.51	25.05	40.00	-14.95	peak			
2	*	49.4000	16.35	11.28	27.63	40.00	-12.37	peak			
3		96.2833	17.48	6.77	24.25	43.50	-19.25	peak			
4		156.1000	13.31	11.28	24.59	43.50	-18.91	peak			
5		199.7500	17.60	11.99	29.59	43.50	-13.91	peak			
6		555.4167	5.47	22.62	28.09	46.00	-17.91	peak			

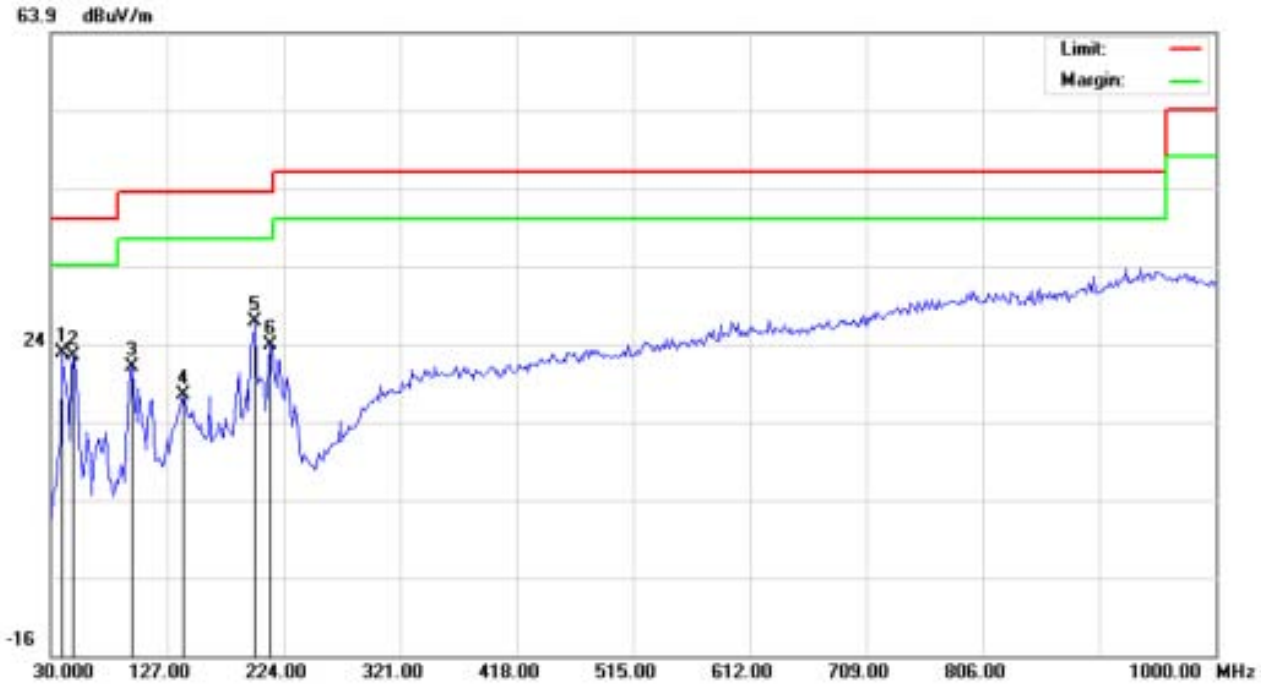


Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Smart Phone
M/N: A8
Mode: Low channel Tx
Note:

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

Temperature: 22.9
Humidity: 53.6 %

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	*	39.7000	25.90	8.51	34.41	40.00	-5.59	peak			
2		68.8000	21.71	4.73	26.44	40.00	-13.56	peak			
3		89.8167	22.66	5.31	27.97	43.50	-15.53	peak			
4		141.5500	7.61	15.21	22.82	43.50	-20.68	peak			
5		199.7500	13.32	9.06	22.38	43.50	-21.12	peak			
6		332.3167	6.25	17.56	23.81	46.00	-22.19	peak			



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Smart Phone
M/N: A8
Mode: Middle channel Tx
Note:

Polarization: *Horizontal*
Power: AC 120V/60Hz
Distance:

Temperature: 22.9
Humidity: 53.6 %

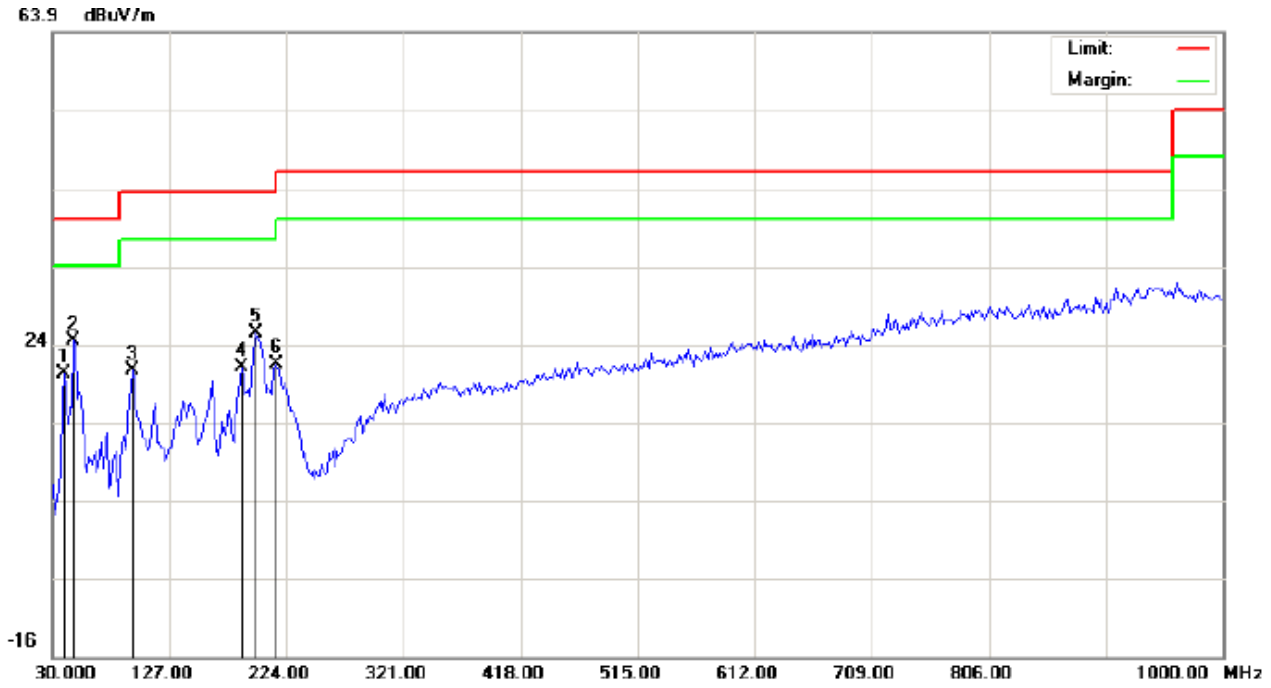
No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		39.7000	11.34	11.51	22.85	40.00	-17.15	peak			
2		49.3998	11.04	11.28	22.32	40.00	-17.68	peak			
3		97.9000	12.54	8.38	20.92	43.50	-22.58	peak			
4		139.9333	2.31	15.17	17.48	43.50	-26.02	peak			
5	*	199.7500	14.72	11.99	26.71	43.50	-16.79	peak			
6		212.6833	13.16	10.71	23.87	43.50	-19.63	peak			

Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Smart Phone
M/N: A8
Mode: Middle channel Tx
Note:

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

Temperature: 22.9
Humidity: 53.6 %

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	*	42.9333	21.27	11.71	32.98	40.00	-7.02	peak			
2		49.3998	20.88	11.28	32.16	40.00	-7.84	peak			
3		68.7999	18.21	9.09	27.30	40.00	-12.70	peak			
4		96.2832	16.94	6.77	23.71	43.50	-19.79	peak			
5		139.9333	4.13	15.17	19.30	43.50	-24.20	peak			
6		201.3667	8.58	11.86	20.44	43.50	-23.06	peak			

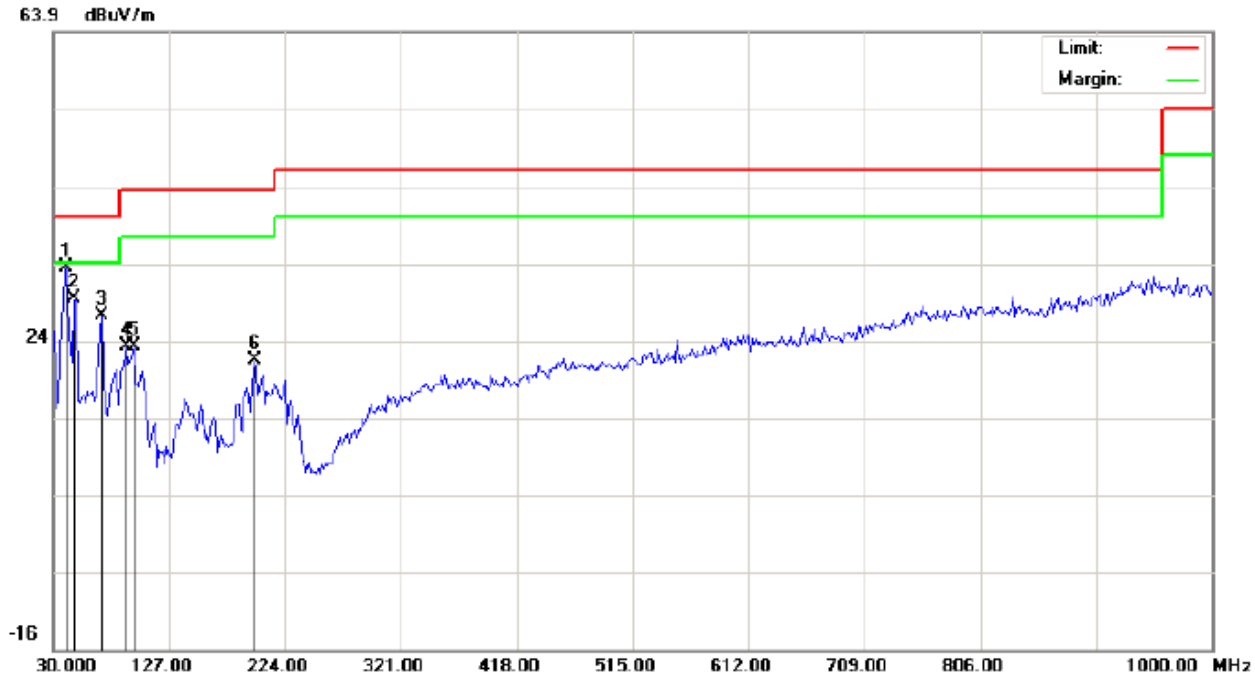


Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Smart Phone
M/N: A8
Mode: High channel Tx
Note:

Polarization: *Horizontal*
Power: AC 120V/60Hz
Distance:

Temperature: 22.9
Humidity: 53.6 %

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		39.7000	8.66	11.51	20.17	40.00	-19.83	peak			
2	*	47.7833	12.95	11.39	24.34	40.00	-15.66	peak			
3		96.2833	13.81	6.77	20.58	43.50	-22.92	peak			
4		186.8167	9.59	11.39	20.98	43.50	-22.52	peak			
5		198.1333	13.52	11.91	25.43	43.50	-18.07	peak			
6		215.9167	10.96	10.38	21.34	43.50	-22.16	peak			



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: Smart Phone
M/N: A8
Mode: High channel Tx
Note:

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

Temperature: 22.9
Humidity: 53.6 %

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	*	41.3167	21.55	11.81	33.36	40.00	-6.64	peak			
2		47.7833	17.91	11.39	29.30	40.00	-10.70	peak			
3		70.4167	17.29	9.85	27.14	40.00	-12.86	peak			
4		91.4333	21.21	1.93	23.14	43.50	-20.36	peak			
5		97.9000	14.75	8.38	23.13	43.50	-20.37	peak			
6		198.1333	9.39	11.91	21.30	43.50	-22.20	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)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
Low Channel (2402 MHz)							
4804.264	63.11	-3.62	59.49	74	-14.51	Pk	Vertical
4804.272	44.71	-3.62	41.09	54	-12.91	AV	Vertical
7206.138	61.99	-0.9	61.09	74	-12.91	pk	Vertical
7206.156	43.18	-0.9	42.28	54	-11.72	AV	Vertical
4803.959	61.21	-3.64	57.57	74	-16.43	Pk	Horizontal
4803.964	47.01	-3.64	43.37	54	-10.63	AV	Horizontal
Mid Channel (2441 MHz)							
4882.128	62.63	-3.65	58.98	74	-15.02	Pk	Vertical
4882.094	44.88	-3.65	41.23	54	-12.77	AV	Vertical
7323.228	61.96	-0.82	61.14	74	-12.86	Pk	Vertical
7323.220	43.4	-0.82	42.58	54	-11.42	AV	Vertical
4882.096	63.06	-3.68	59.38	74	-14.62	Pk	Horizontal
4882.171	44.58	-3.68	40.9	54	-13.1	AV	Horizontal
High Channel (2480 MHz)							
4960.260	61.88	-3.59	58.29	74	-15.71	pk	Vertical
4960.325	44.64	-3.59	41.05	54	-12.95	AV	Vertical
4960.190	61.04	-3.59	57.45	74	-16.55	pk	Horizontal
4960.157	43.7	-3.59	40.11	54	-13.89	AV	Horizontal

Note:

1) 30MHz~25GHz:(Scan with GFSK, π/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

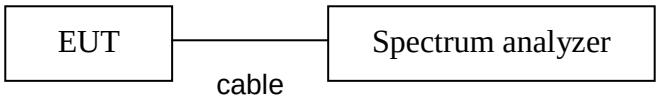
11.1. MEASUREMENT PROCEDURE

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)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
GFSK							
2399.9	60.97	-12.99	47.98	74	-26.02	peak	Vertical
2399.9	53.39	-12.99	40.4	54	-13.6	AVG	Vertical
2399.9	66.11	-12.99	53.12	74	-20.88	peak	Horizontal
2399.9	50.94	-12.99	37.95	54	-16.05	AVG	Horizontal
2483.6	62.16	-12.78	49.38	74	-24.62	peak	Vertical
2483.6	56.27	-12.78	43.49	54	-10.51	AVG	Vertical
2483.6	64.77	-12.78	51.99	74	-22.01	peak	Horizontal
2483.6	52.34	-12.78	39.56	54	-14.44	AVG	Horizontal
π/4-DQPSK							
2399.9	62.23	-12.99	49.24	74	-24.76	peak	Vertical
2399.9	53.38	-12.99	40.39	54	-13.61	AVG	Vertical
2399.9	66.4	-12.99	53.41	74	-20.59	peak	Horizontal
2399.9	49.49	-12.99	36.5	54	-17.5	AVG	Horizontal
2483.6	63.94	-12.78	51.16	74	-22.84	peak	Vertical
2483.6	53.73	-12.78	40.95	54	-13.05	AVG	Vertical
2483.6	63.76	-12.78	50.98	74	-23.02	peak	Horizontal
2483.6	51.39	-12.78	38.61	54	-15.39	AVG	Horizontal
8DPSK							
2399.9	62.17	-12.99	49.18	74	-24.82	peak	Vertical
2399.9	54.38	-12.99	41.39	54	-12.61	AVG	Vertical
2399.9	65.47	-12.99	52.48	74	-21.52	peak	Horizontal
2399.9	51.5	-12.99	38.51	54	-15.49	AVG	Horizontal
2483.6	60.2	-12.78	47.42	74	-26.58	peak	Vertical
2483.6	54.97	-12.78	42.19	54	-11.81	AVG	Vertical
2483.6	63.59	-12.78	50.81	74	-23.19	peak	Horizontal
2483.6	54.69	-12.78	41.91	54	-12.09	AVG	Horizontal

RESULT: PASS

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

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

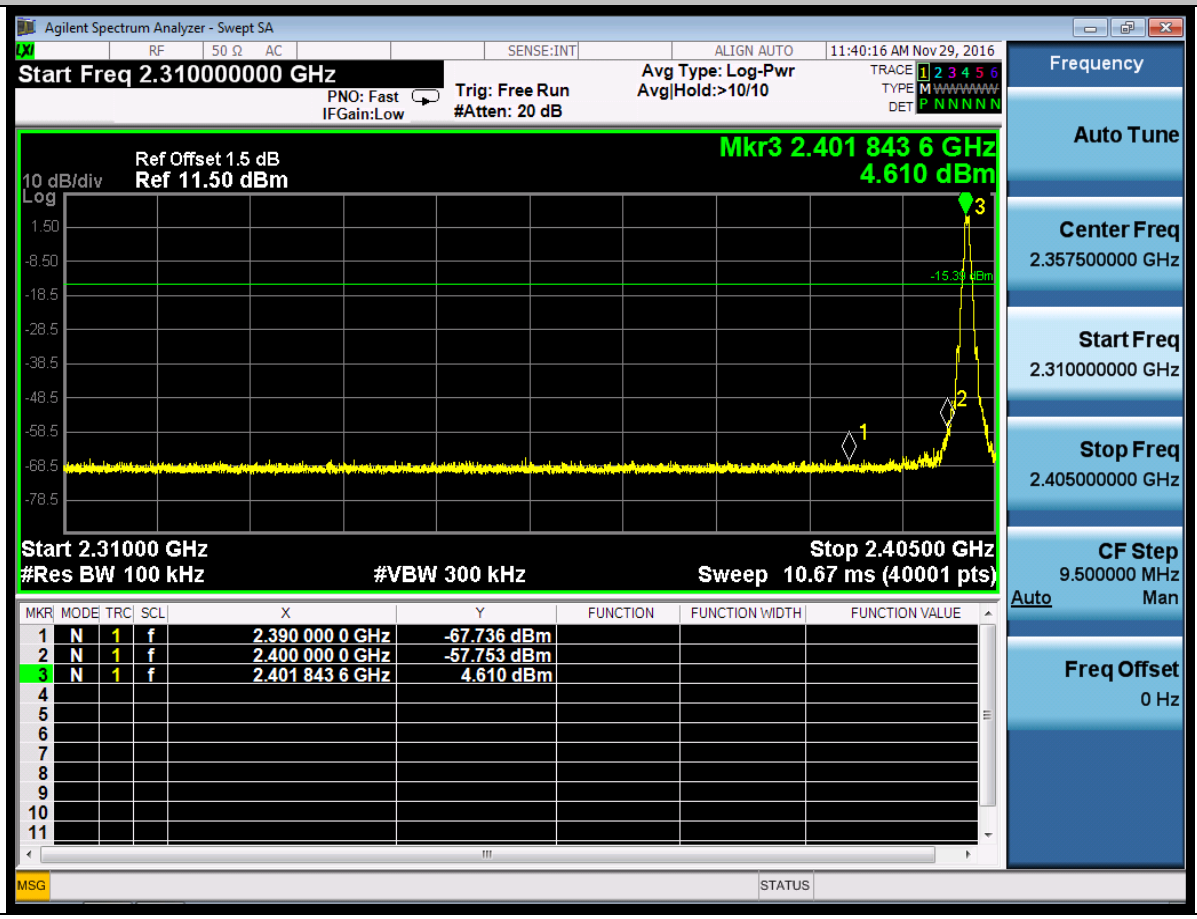
The “Factor” value can be calculated automatically by software of measurement system.

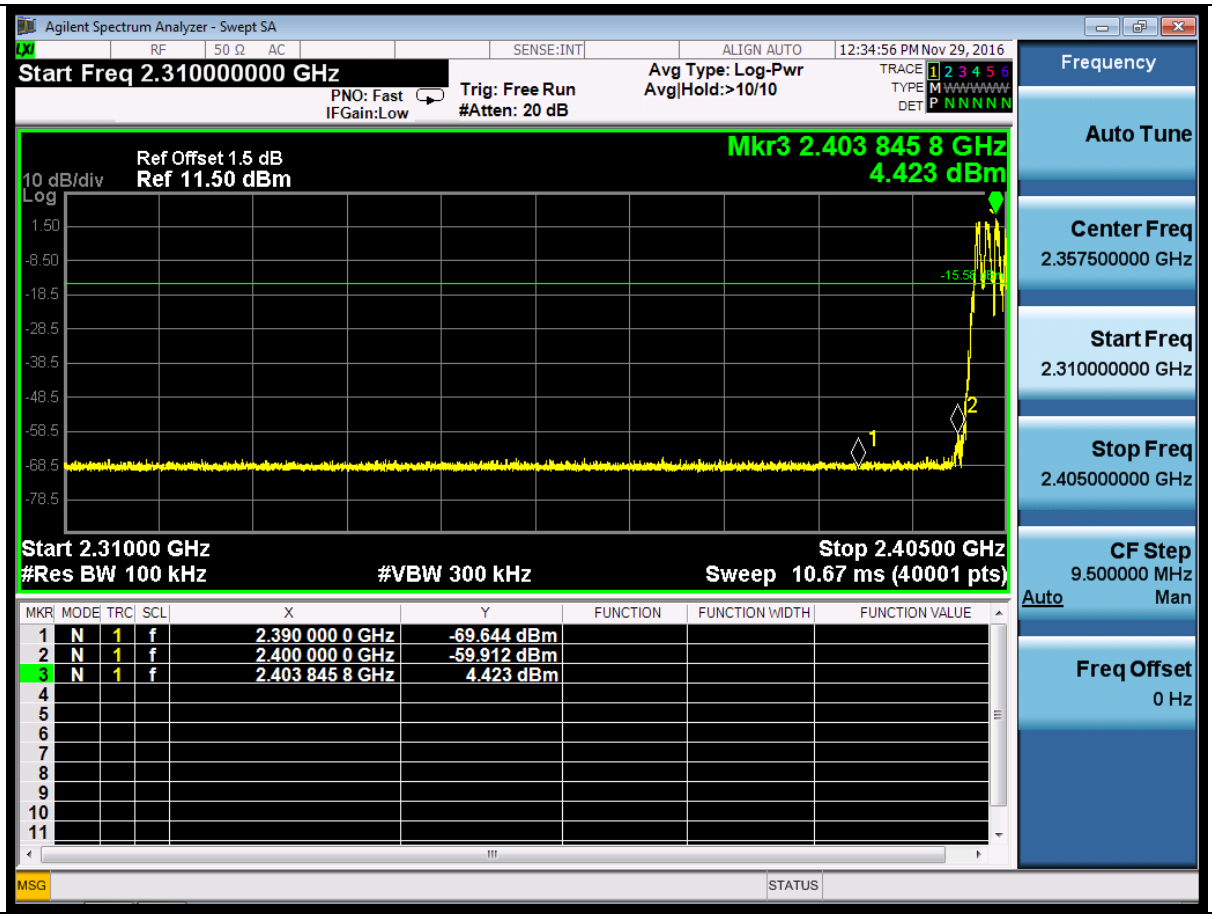
11.4 Conducted TEST RESULT

Mode	Channel	Carrier Frequency [MHz]	Frequency Hopping	Max Spurious Level [dBm]	Verdict
GFSK	LCH	2402	Off	-57.753	PASS
			On	-59.912	PASS
GFSK	HCH	2480	Off	-68.697	PASS
			On	-68.128	PASS
π/4DQPSK	LCH	2402	Off	-52.657	PASS
π/4DQPSK	HCH	2480	Off	-69.485	PASS
8DPSK	LCH	2402	Off	-54.080	PASS
8DPSK	HCH	2480	Off	-68.698	PASS

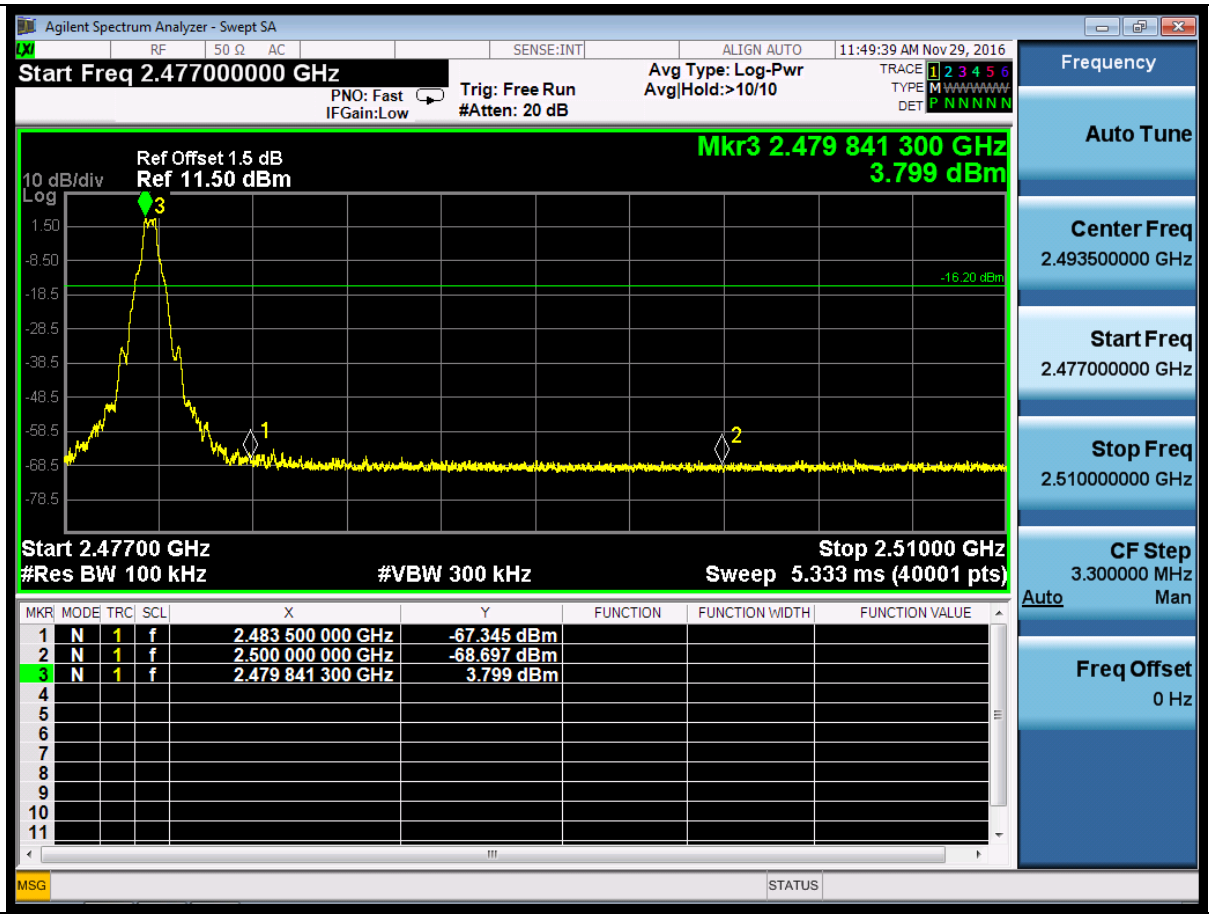
Note: All modes were tested, only the worst case record in the report.

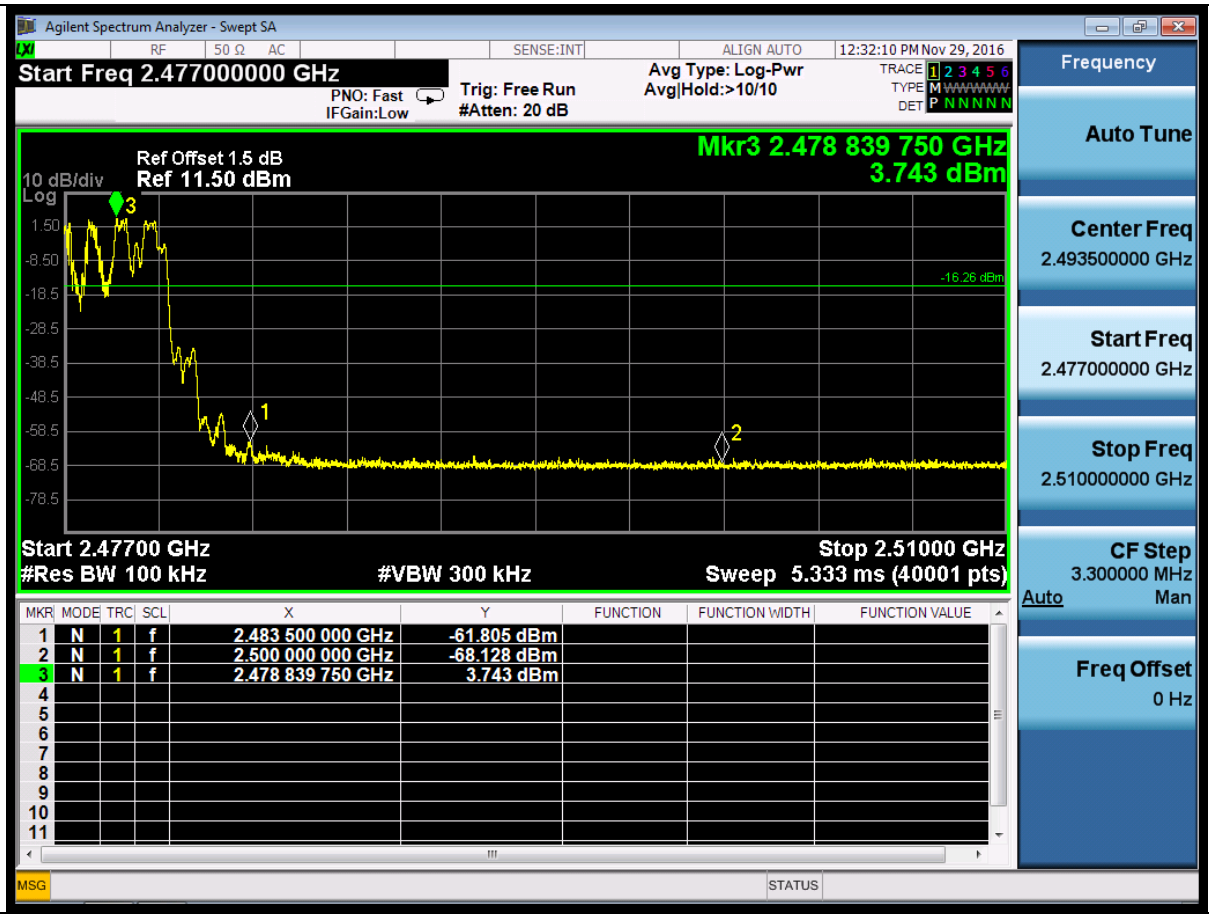
Test Graph

Graphs	
GFSK/LCH/No Hop	

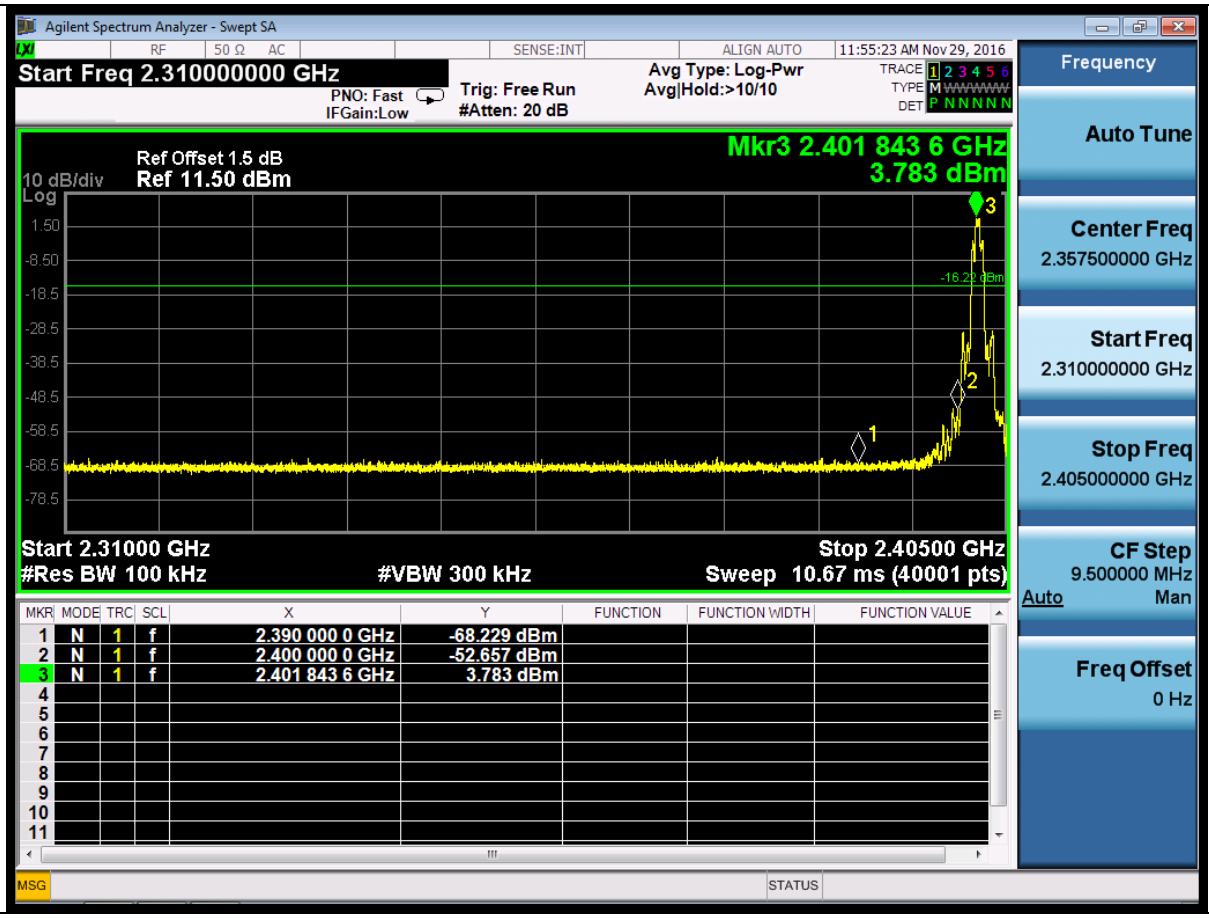
GFSK/LCH/Hop	

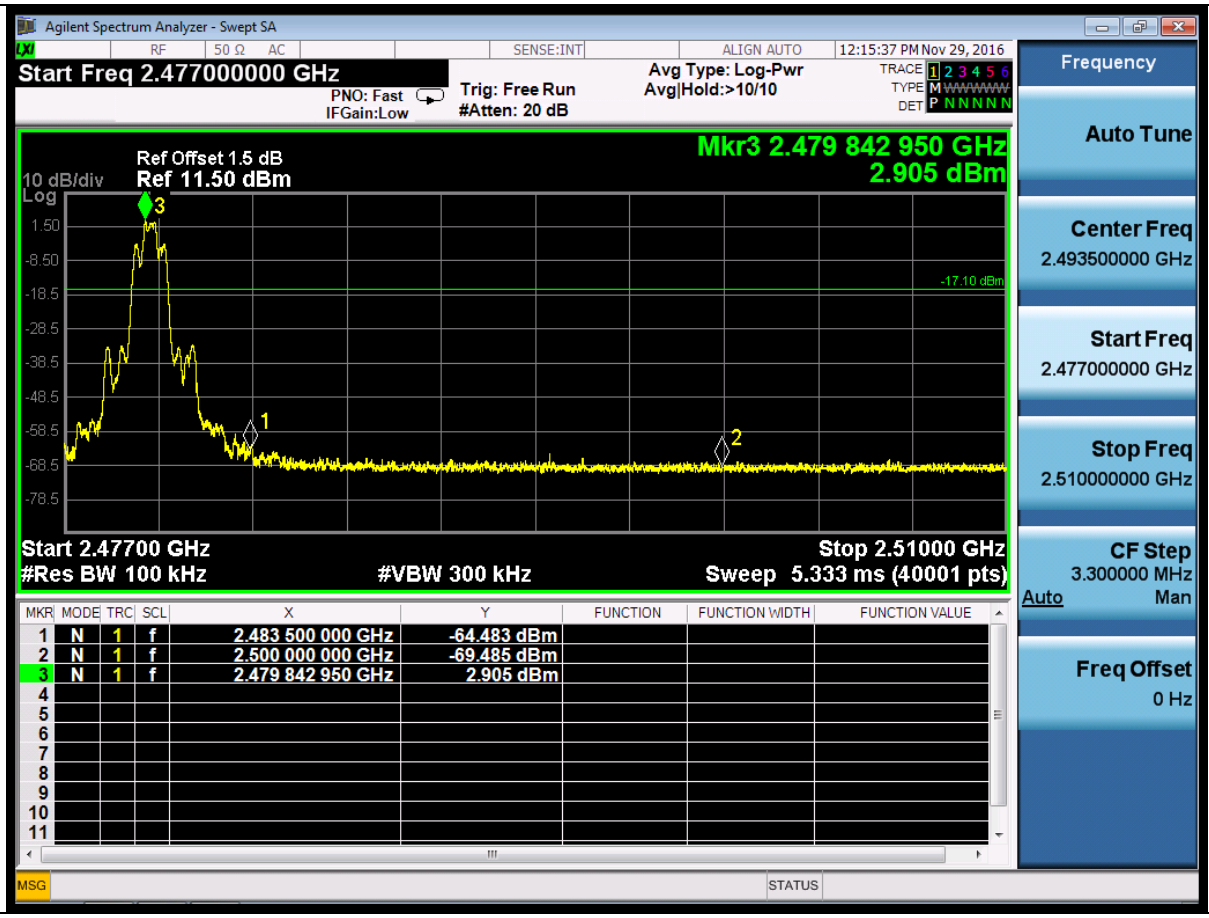
Agilent Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
12:34:56 PM Nov 29, 2016
Start Freq 2.310000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 1.5 dB
10 dB/div
Log
Ref 11.50 dBm
Mkr3 2.403 845 8 GHz
4.423 dBm
1.50
-8.50
-18.5
-28.5
-38.5
-48.5
-58.5
-68.5
-78.5
-15.5
Start 2.31000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.40500 GHz
Sweep 10.67 ms (40001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.390 000 0 GHz -69.644 dBm
2 N 1 f 2.400 000 0 GHz -59.912 dBm
3 N 1 f 2.403 845 8 GHz 4.423 dBm
4
5
6
7
8
9
10
11
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.357500000 GHz
Start Freq
2.310000000 GHz
Stop Freq
2.405000000 GHz
CF Step
9.500000 MHz
Auto
Man
Freq Offset
0 Hz

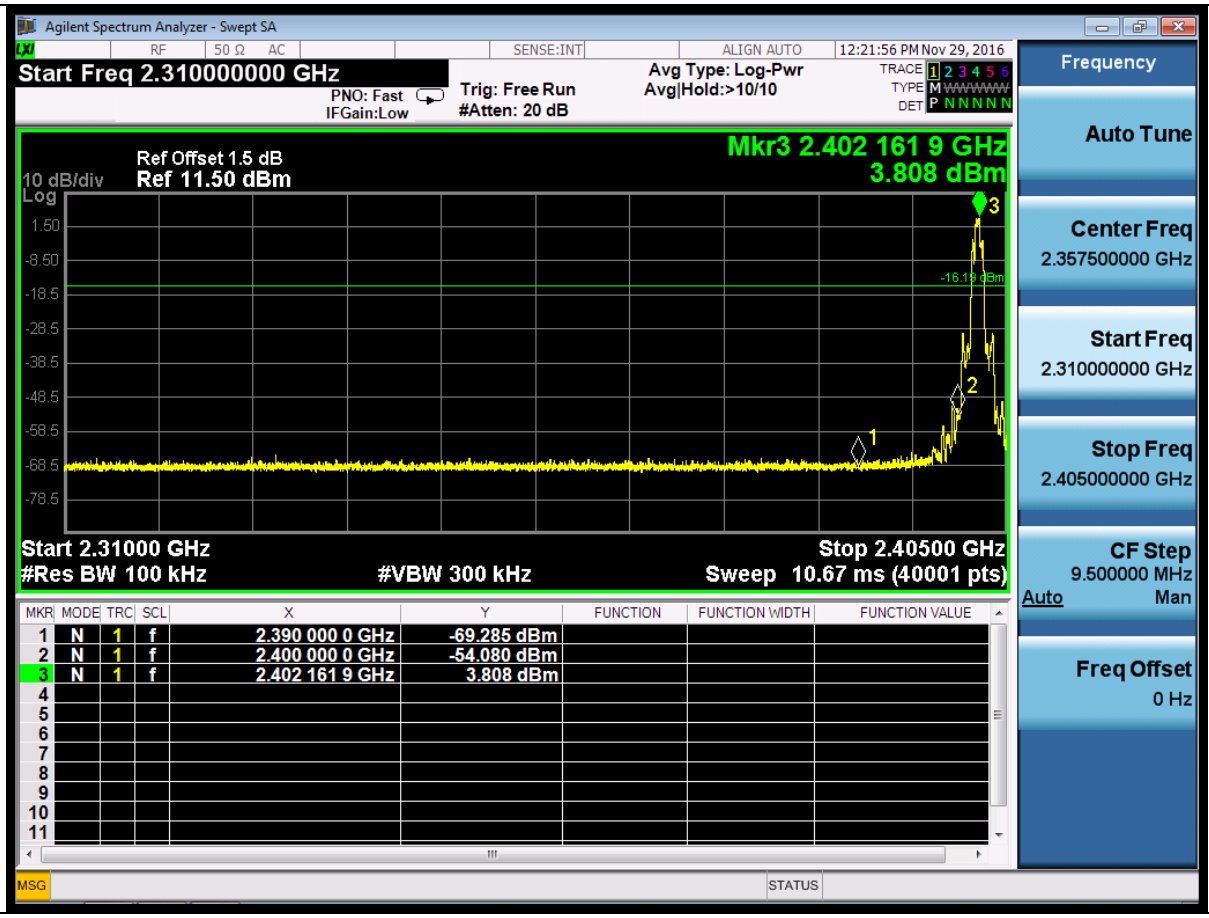
GFSK/HCH/No Hop	

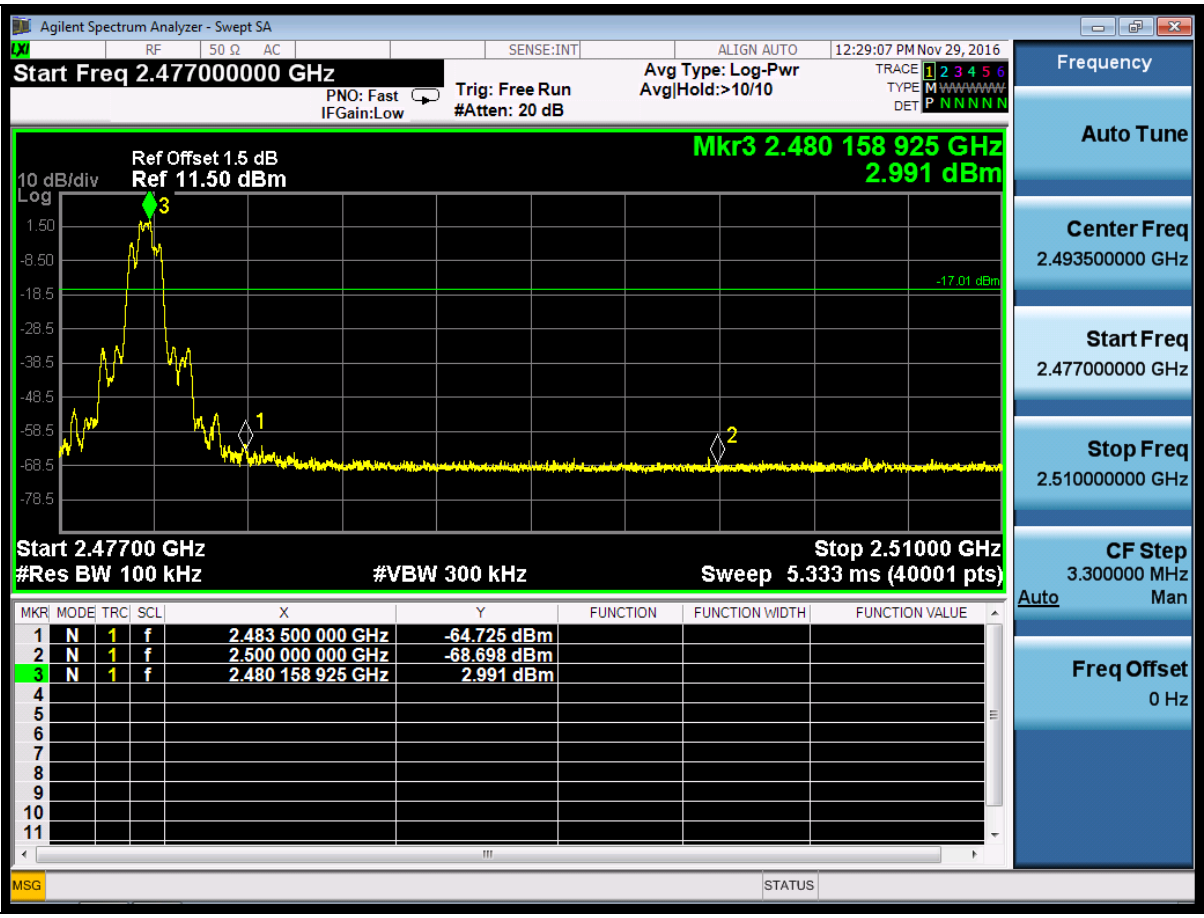
GFSK/HCH/Hop	

Agilent Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
12:32:10 PM Nov 29, 2016
Start Freq 2.477000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>10/10
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 1.5 dB
10 dB/div Ref 11.50 dBm
Log
Mkr3 2.478 839 750 GHz
3.743 dBm
1.50
-8.50
-18.5
-28.5
-38.5
-48.5
-58.5
-68.5
-78.5
-16.26 dBm
Start 2.47700 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.51000 GHz
Sweep 5.333 ms (40001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.483 500 000 GHz -61.805 dBm
2 N 1 f 2.500 000 000 GHz -68.128 dBm
3 N 1 f 2.478 839 750 GHz 3.743 dBm
4
5
6
7
8
9
10
11
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.493500000 GHz
Start Freq
2.477000000 GHz
Stop Freq
2.510000000 GHz
CF Step
3.300000 MHz
Auto
Man
Freq Offset
0 Hz

π /4DQPSK/LCH/No Hop	

π /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

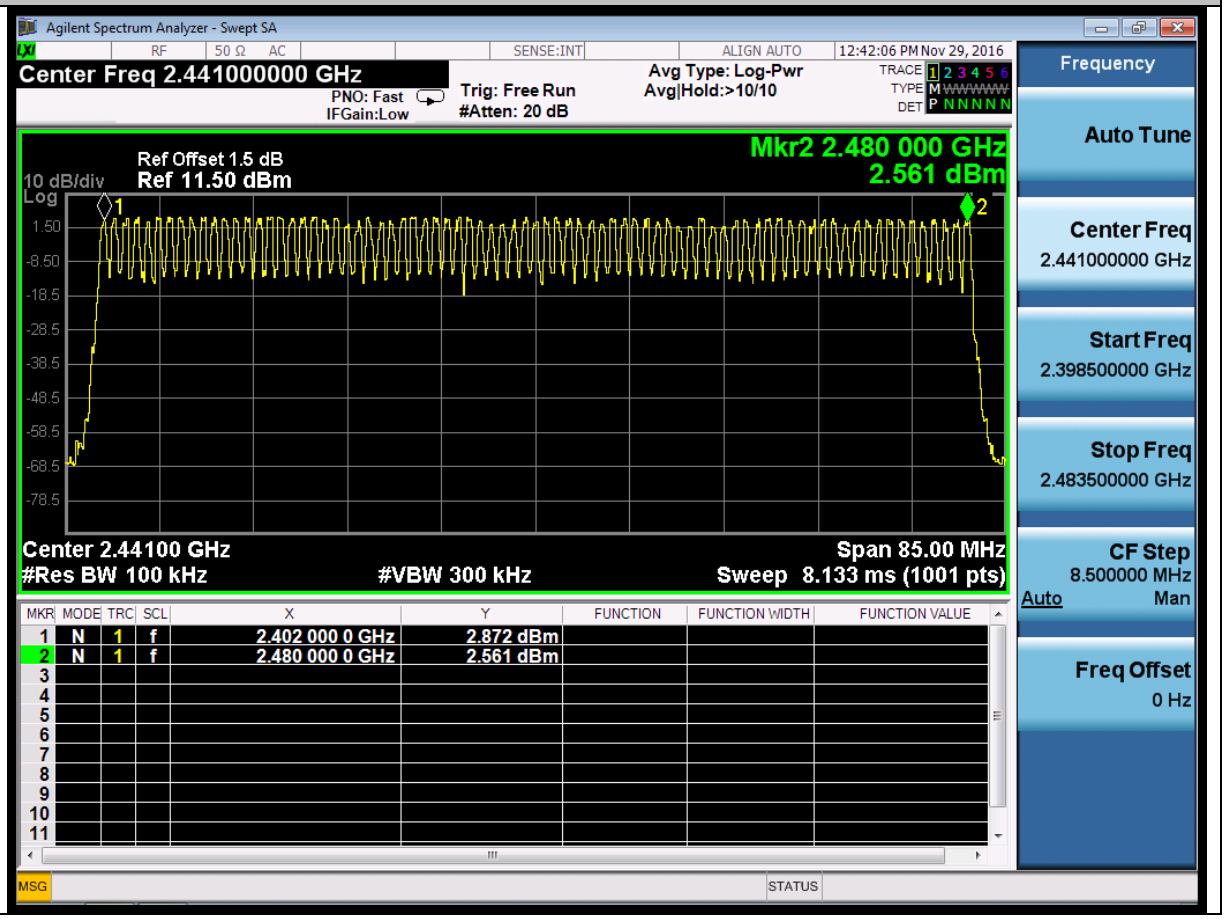
The same as described in section 6

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

Graphs	
GFSK/Hop	

13. TIME OF OCCUPANCY (DWELL TIME)

13.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
1. Span: Zero span, centered on a hopping channel.
2. RBW shall be≤channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
3. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
4. Detector function: Peak. Trace: Max hold.
5. Use the marker-delta function to determine the transmit time per hop.
6. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:
(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time)
7. The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements.

13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

13.3. MEASUREMENT EQUIPMENT USED

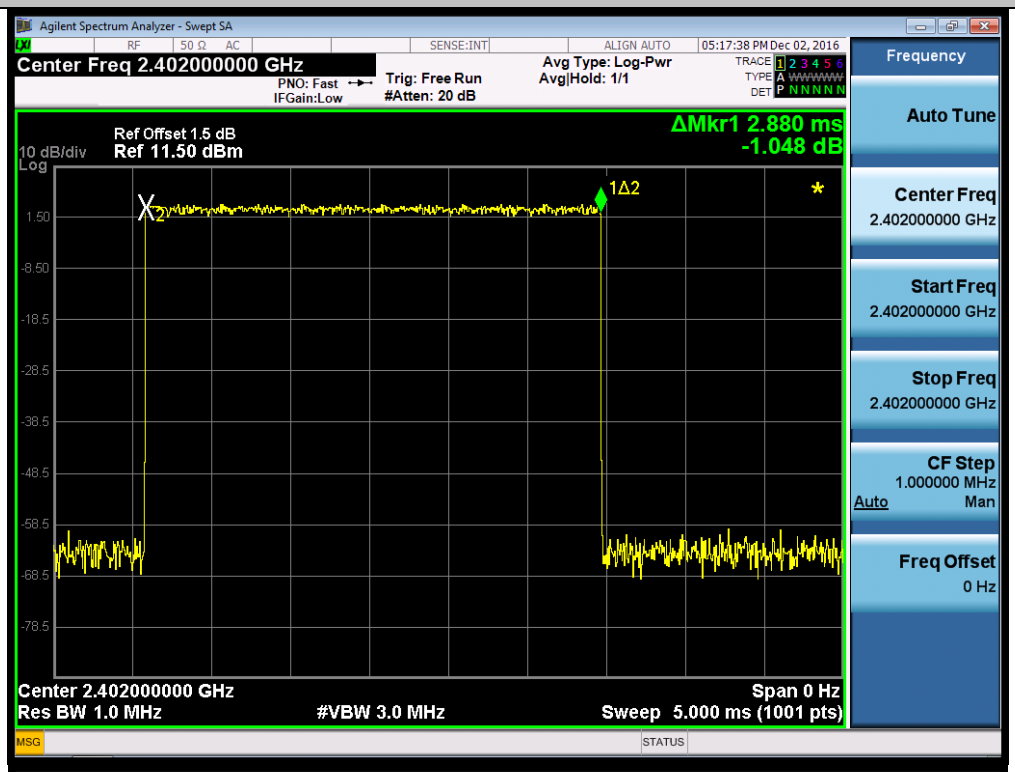
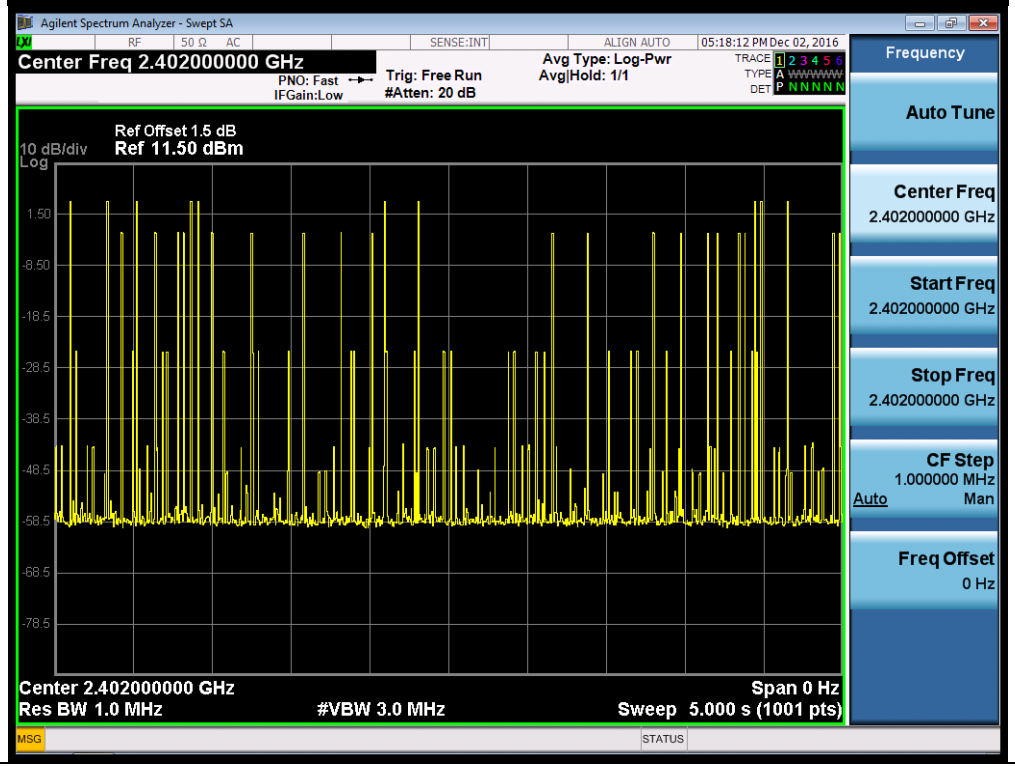
The same as described in section 6

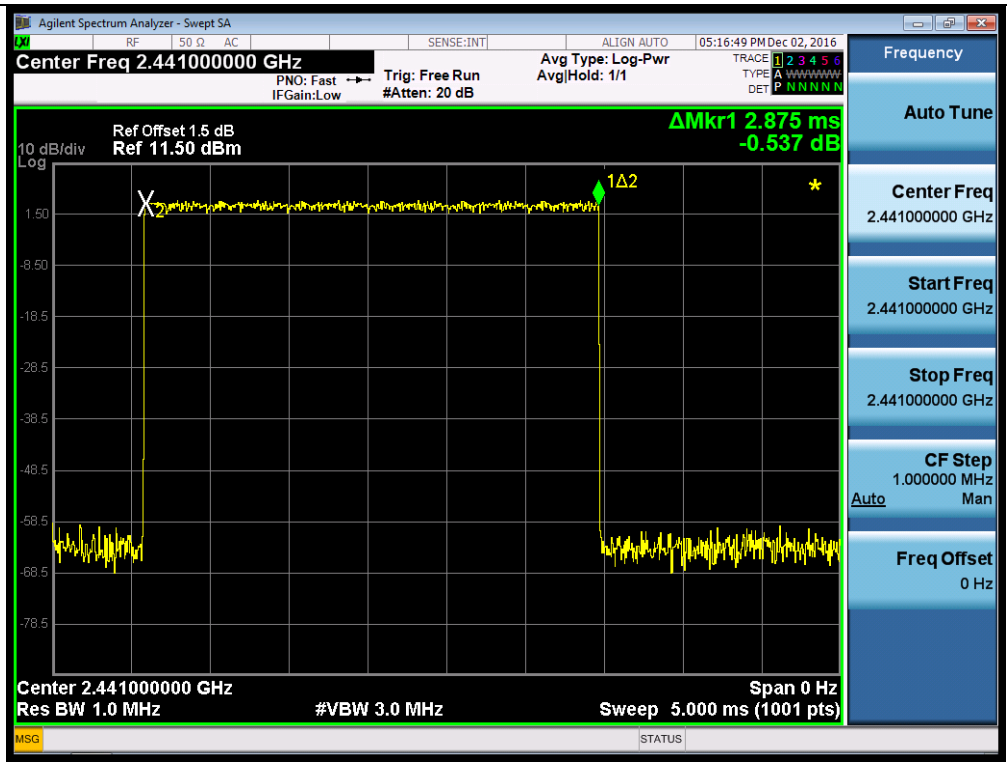
13.4. LIMITS AND MEASUREMENT RESULT

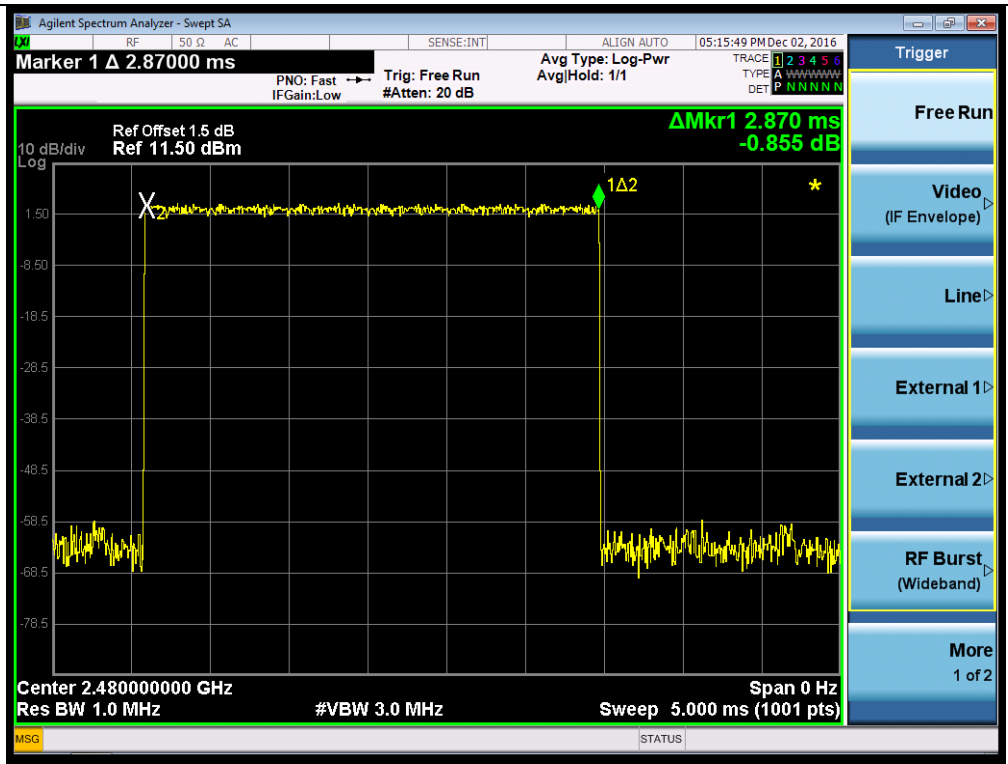
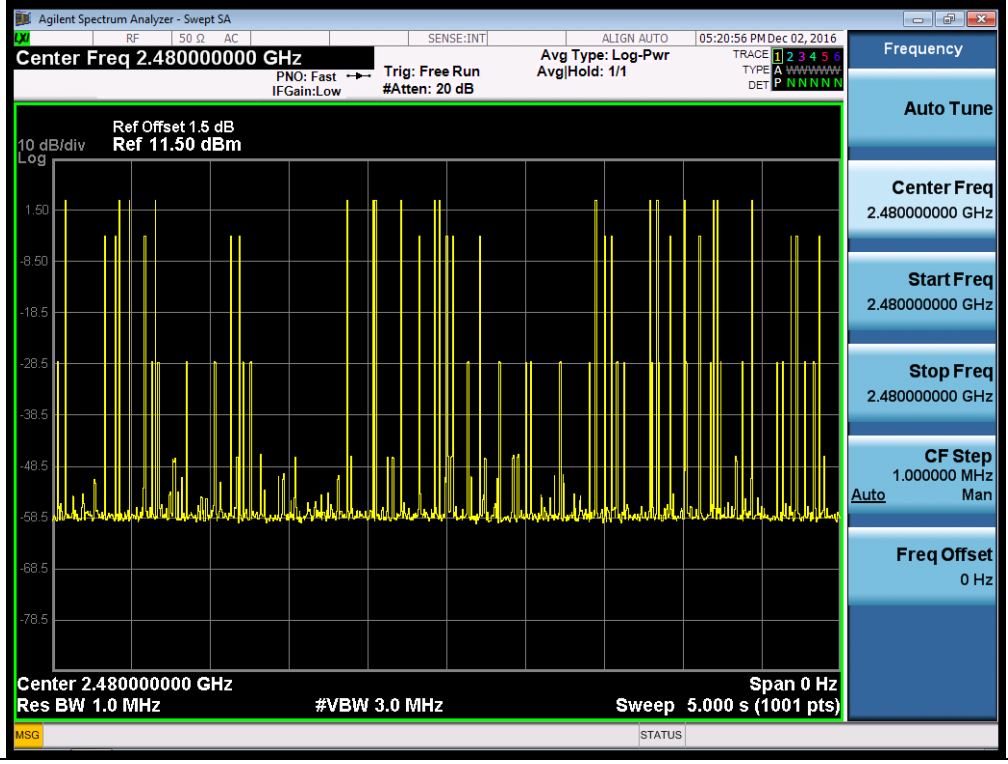
Channel.	Burst Width [ms/hop/ch]	Number of hops in the period specified in the requirements	Dwell Time[ms]	Verdict	Limit (ms)
LCH	2.880	10*6.32	182.016	PASS	400
MCH	2.875	15*6.32	272.550	PASS	400
HCH	2.870	16.6.32	290.214	PASS	400

Note: The 8-DPSK modulation is the worst case and recorded in the report.
(period specified in the requirements / analyzer sweep time)=(79*0.4)/5=6.32
(Number of hops in the period specified in the requirements)=6.32* number of hops on spectrum analyzer
Dwell Time= Burst Width*(Number of hops in the period specified in the requirements)

Test Graph

Graphs	
GFSK/LCH	 

GFSK/MCH		 Agilent Spectrum Analyzer - Swept SA Center Freq 2.441000000 GHz PNO: Fast IFGain:Low Trig: Free Run #Atten: 20 dB Avg Type: Log-Pwr Avg|Hold: 1/1 05:16:49 PM Dec 02, 2016 Frequency Auto Tune Ref Offset 1.5 dB 10 dB/div Ref 11.50 dBm ΔMkr1 2.875 ms -0.537 dB Center Freq 2.441000000 GHz Start Freq 2.441000000 GHz Stop Freq 2.441000000 GHz CF Step 1.000000 MHz Auto Man Freq Offset 0 Hz Center 2.441000000 GHz Res BW 1.0 MHz #VBW 3.0 MHz Span 0 Hz Sweep 5.000 ms (1001 pts) MSG STATUS Agilent Spectrum Analyzer - Swept SA Center Freq 2.441000000 GHz PNO: Fast IFGain:Low Trig: Free Run #Atten: 20 dB Avg Type: Log-Pwr Avg|Hold: 1/1 05:19:45 PM Dec 02, 2016 Frequency Auto Tune Ref Offset 1.5 dB 10 dB/div Ref 11.50 dBm Center Freq 2.441000000 GHz Start Freq 2.441000000 GHz Stop Freq 2.441000000 GHz CF Step 1.000000 MHz Auto Man Freq Offset 0 Hz Center 2.441000000 GHz Res BW 1.0 MHz #VBW 3.0 MHz Span 0 Hz Sweep 5.000 s (1001 pts) MSG STATUS

GFSK/HCH	 Agilent Spectrum Analyzer - Swept SA Marker 1 Δ 2.87000 ms PNO: Fast IFGain:Low Trig: Free Run #Atten: 20 dB Avg Type: Log-Pwr Avg|Hold: 1/1 05:15:49 PM Dec 02, 2016 Ref Offset 1.5 dB 10 dB/div Ref 11.50 dBm ΔMkr1 2.870 ms -0.855 dB Center 2.480000000 GHz Res BW 1.0 MHz #VBW 3.0 MHz Span 0 Hz Sweep 5.000 ms (1001 pts) Trigger Free Run Video (IF Envelope) Line External 1 External 2 RF Burst (Wideband) More 1 of 2 MSG STATUS  Agilent Spectrum Analyzer - Swept SA Center Freq 2.480000000 GHz PNO: Fast IFGain:Low Trig: Free Run #Atten: 20 dB Avg Type: Log-Pwr Avg|Hold: 1/1 05:20:56 PM Dec 02, 2016 Ref Offset 1.5 dB 10 dB/div Ref 11.50 dBm Center 2.480000000 GHz Res BW 1.0 MHz #VBW 3.0 MHz Span 0 Hz Sweep 5.000 s (1001 pts) Frequency Auto Tune Center Freq 2.480000000 GHz Start Freq 2.480000000 GHz Stop Freq 2.480000000 GHz CF Step 1.000000 MHz Auto Man Freq Offset 0 Hz MSG STATUS

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) ≥ 1% of the span Video (or Average) Bandwidth (VBW) ≥ 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

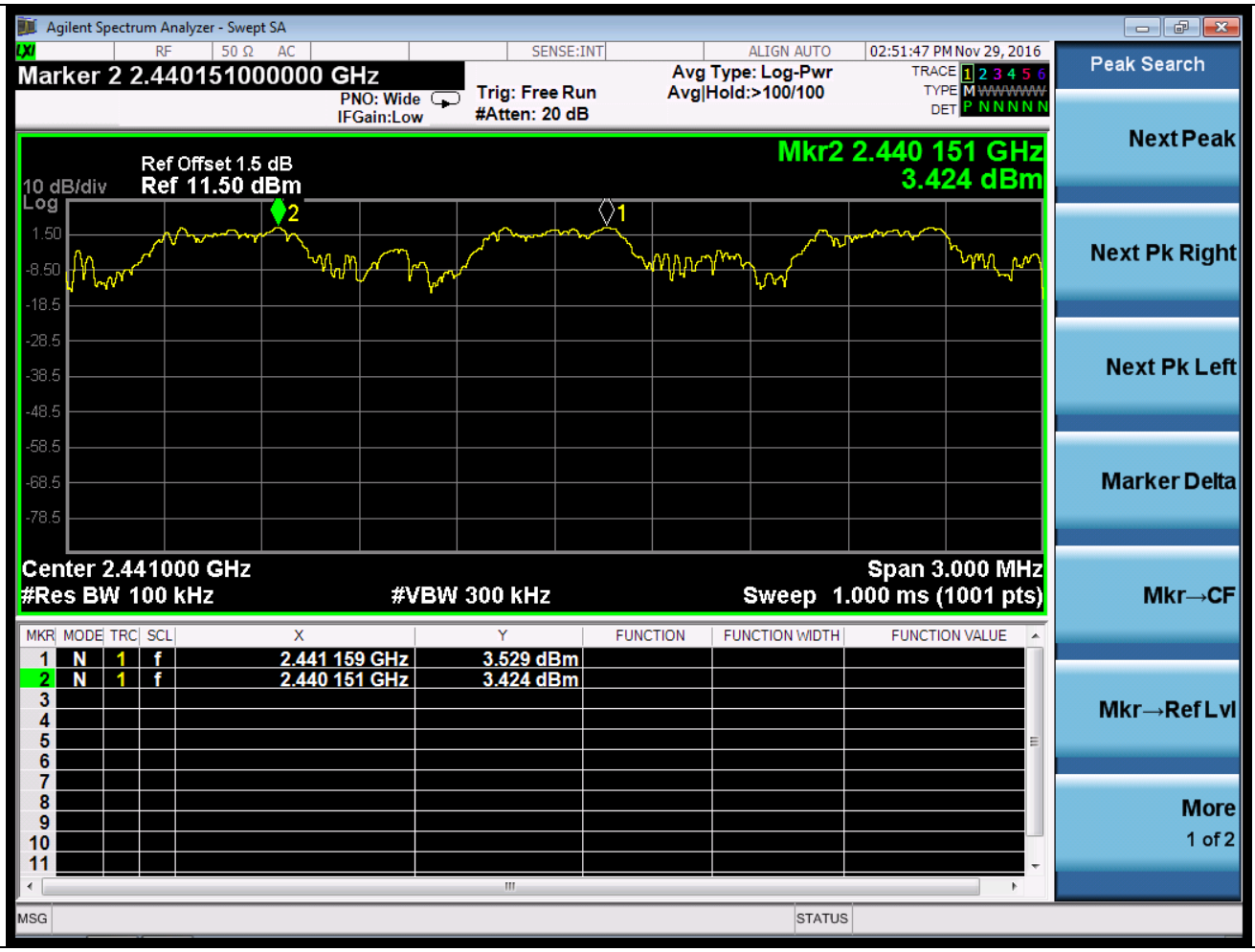
14.4. LIMITS AND MEASUREMENT RESULT

Mode	Channel.	Carrier Frequency Separation [MHz]	Verdict
8DPSK	Hop	1.008	PASS

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

Test Graph

Graphs

GFSK/Hop	

Agilent Spectrum Analyzer - Swept SA
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
02:51:47 PM Nov 29, 2016
Marker 2 2.440151000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Ref Offset 1.5 dB
10 dB/div
Log
Ref 11.50 dBm
Mkr2 2.440 151 GHz
3.424 dBm
1.50
-8.50
-18.5
-28.5
-38.5
-48.5
-58.5
-68.5
-78.5
Center 2.441000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 2.441 159 GHz 3.529 dBm
2 N 1 f 2.440 151 GHz 3.424 dBm
3
4
5
6
7
8
9
10
11
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
MSG
STATUS

15. FCC LINE CONDUCTED EMISSION TEST

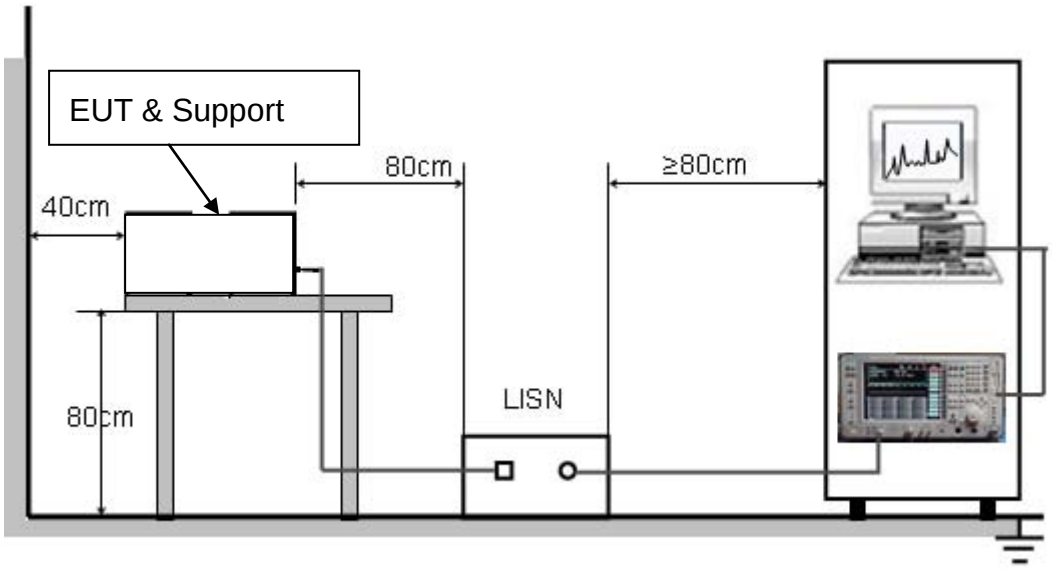
15.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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/60Hzpower 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.

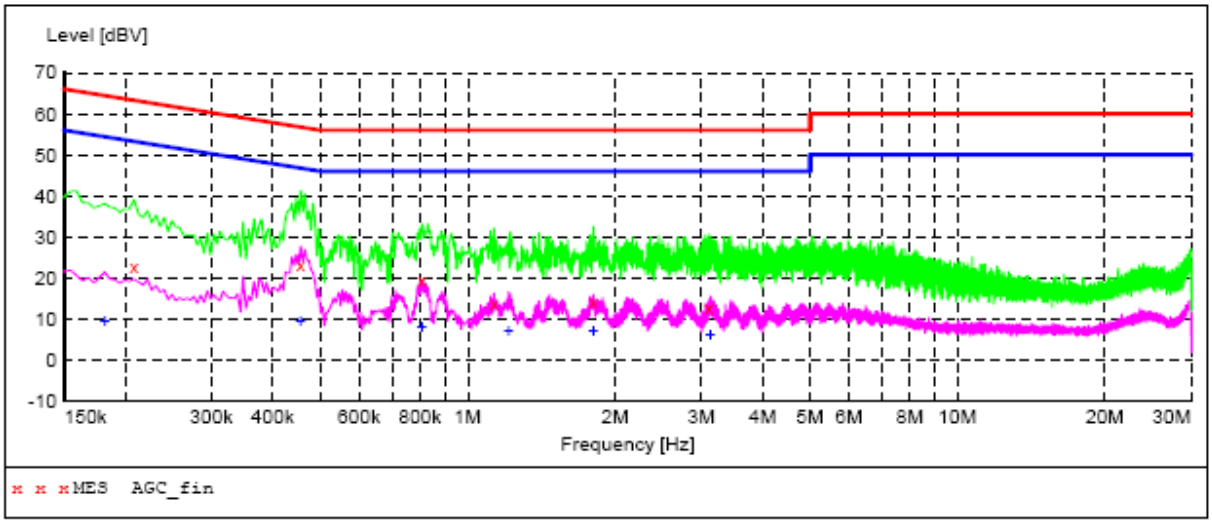
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

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"

2016/12/2 9:20

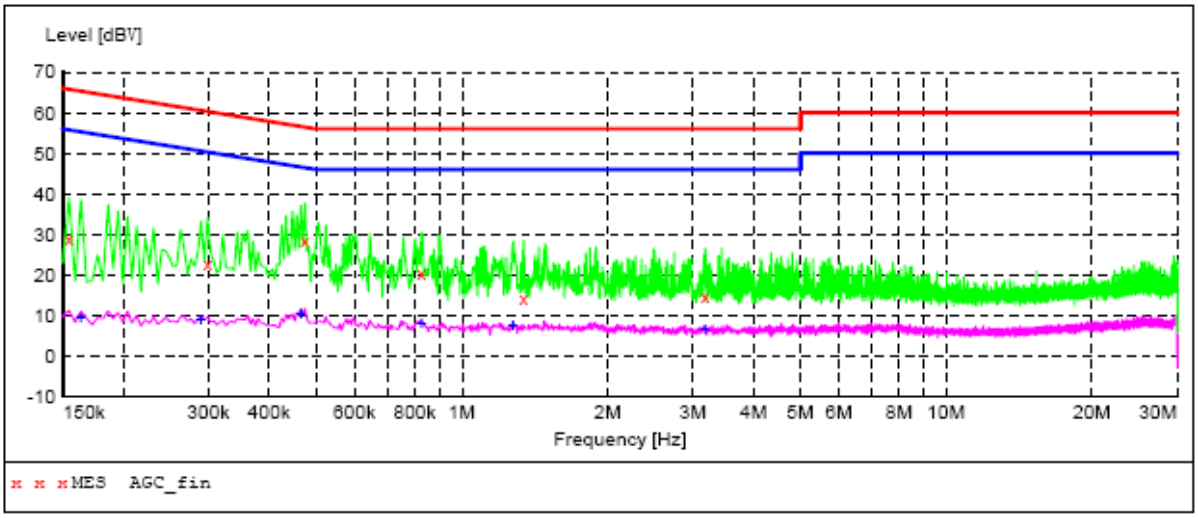
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBV	dB	dBV	dB				
0.208500	22.70	10.3	63	40.6	QP	L1	GND	ON
0.456000	23.10	10.3	57	33.7	QP	L1	GND	ON
0.807000	19.40	10.3	56	36.6	QP	L1	GND	ON
1.131000	13.80	10.4	56	42.2	QP	L1	GND	ON
1.806000	14.40	10.4	56	41.6	QP	L1	GND	ON
3.111000	12.60	10.5	56	43.4	QP	L1	GND	ON

MEASUREMENT RESULT: "AGC_fin2"

2016/12/2 9:20

Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBV	dB	dBV	dB				
0.181500	9.50	10.3	54	44.9	AV	L1	GND	ON
0.456000	9.40	10.3	47	37.4	AV	L1	GND	ON
0.807000	7.90	10.3	46	38.1	AV	L1	GND	ON
1.212000	7.20	10.4	46	38.8	AV	L1	GND	ON
1.806000	7.10	10.4	46	38.9	AV	L1	GND	ON
3.129000	6.30	10.5	46	39.7	AV	L1	GND	ON

Line Conducted Emission Test Line 2-N



MEASUREMENT RESULT: "AGC_fin"

2016/12/2 9:29

Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBV	dB	dBV	dB				
0.154500	29.10	10.3	66	36.7	QP	N	GND	ON
0.298500	22.70	10.3	60	37.6	QP	N	GND	ON
0.474000	28.30	10.3	56	28.1	QP	N	GND	ON
0.825000	20.40	10.3	56	35.6	QP	N	GND	ON
1.342500	14.40	10.4	56	41.6	QP	N	GND	ON
3.178500	14.60	10.5	56	41.4	QP	N	GND	ON

MEASUREMENT RESULT: "AGC_fin2"

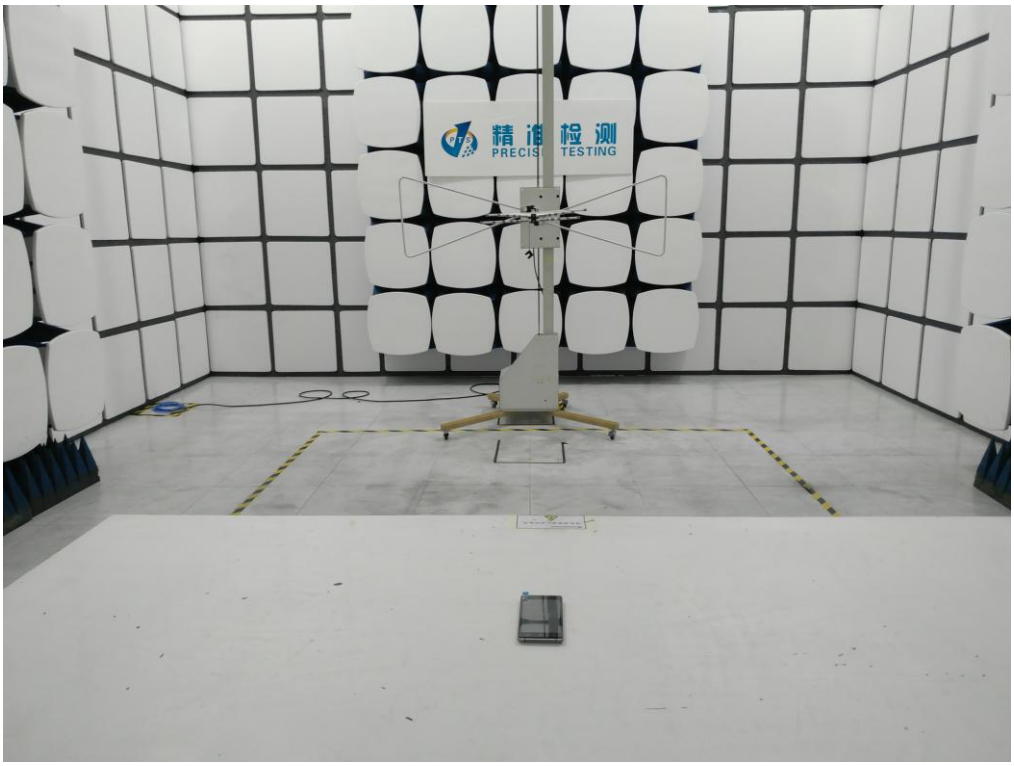
2016/12/2 9:29

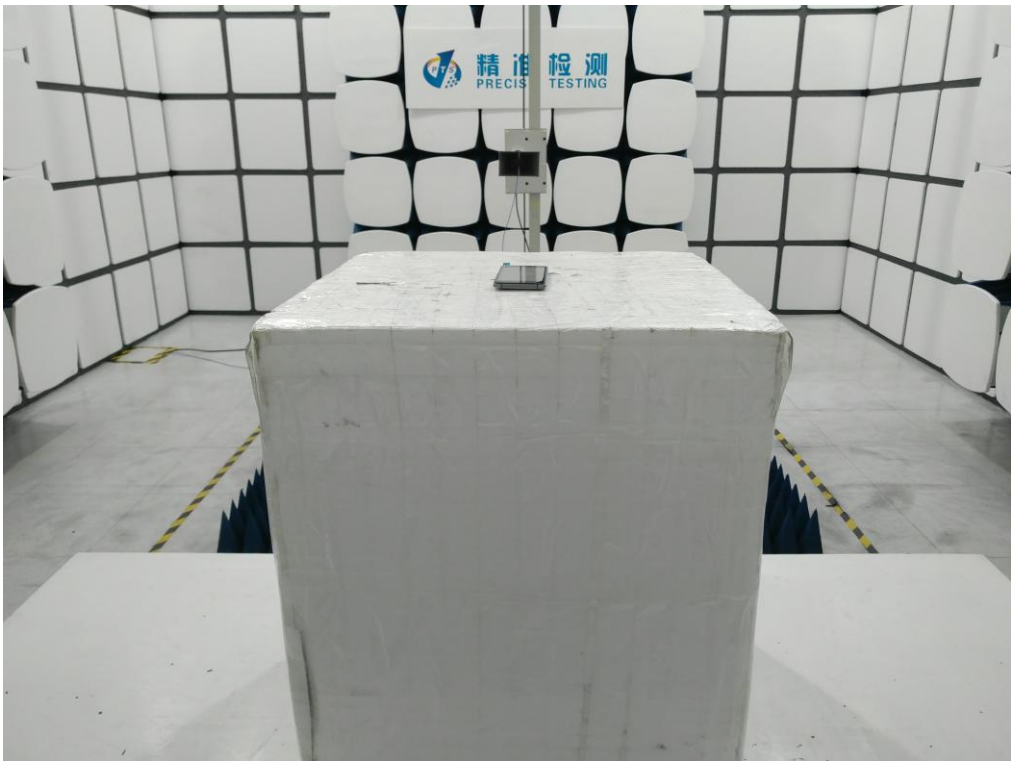
Frequency	Level	Transd	Limit	Margin	Detector	Line	PE	AUX STATE
MHz	dBV	dB	dBV	dB				
0.163500	9.50	10.3	55	45.8	AV	N	GND	ON
0.289500	8.90	10.3	51	41.6	AV	N	GND	ON
0.465000	10.60	10.3	47	36.0	AV	N	GND	ON
0.825000	8.20	10.3	46	37.8	AV	N	GND	ON
1.275000	7.60	10.4	46	38.4	AV	N	GND	ON
3.178500	6.70	10.5	46	39.3	AV	N	GND	ON

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC LINE CONDUCTED EMISSION TEST SETUP

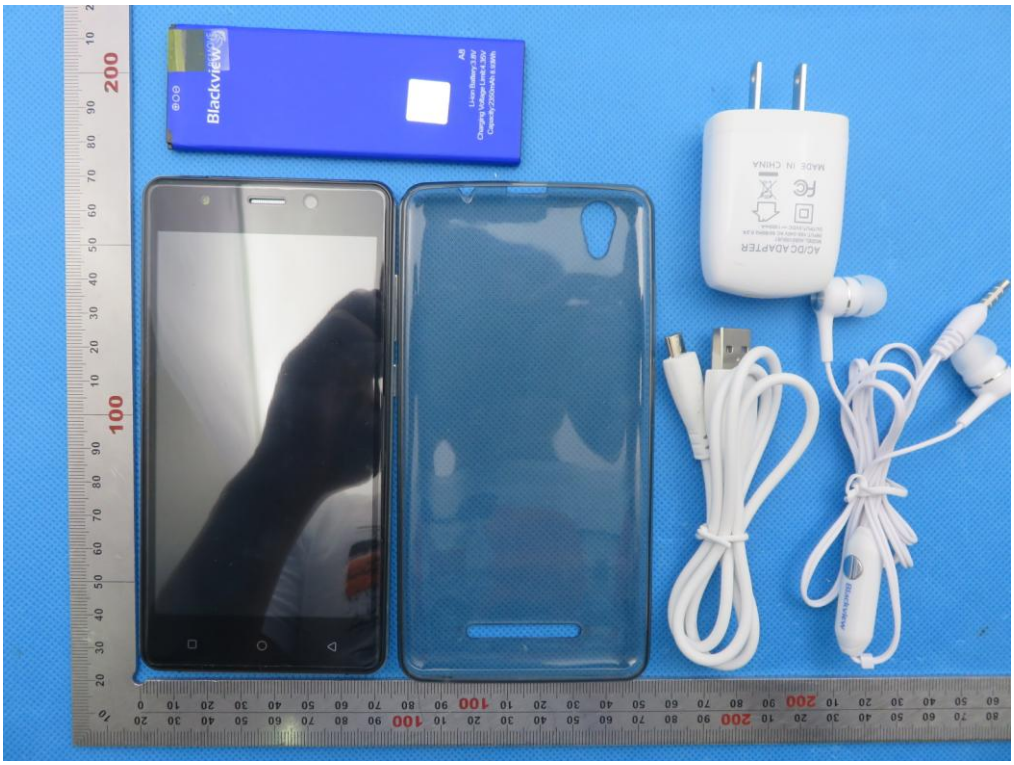
FCC RADIATED EMISSION TEST SETUP




精准检测
PRECISION TESTING

APPENDIX B: PHOTOGRAPHS OF EUT

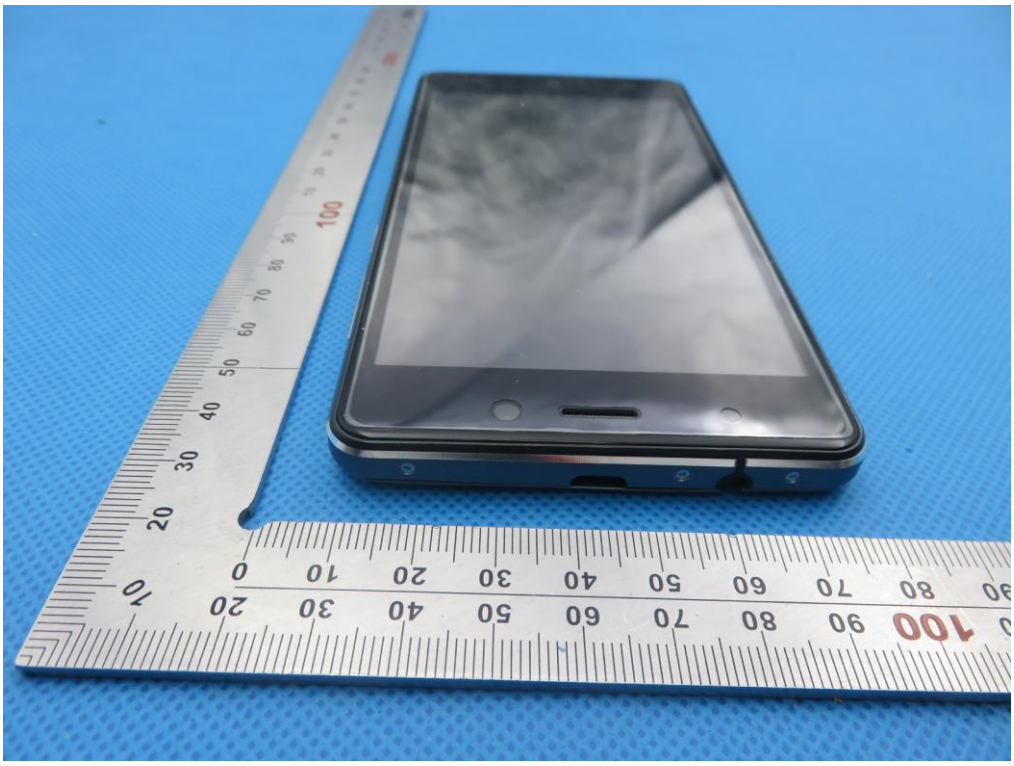
TOTAL VIEW OF EUT



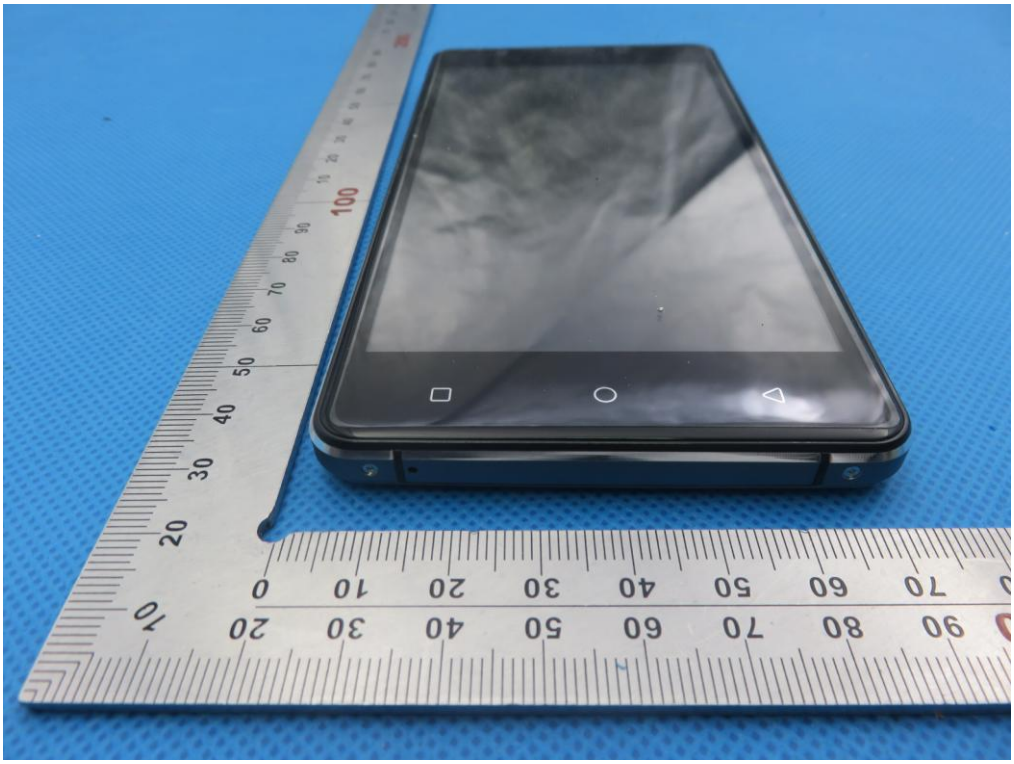
THE LABEL OF ADAPTER

THE LABEL OF BATTERY

TOP VIEW OF EUT



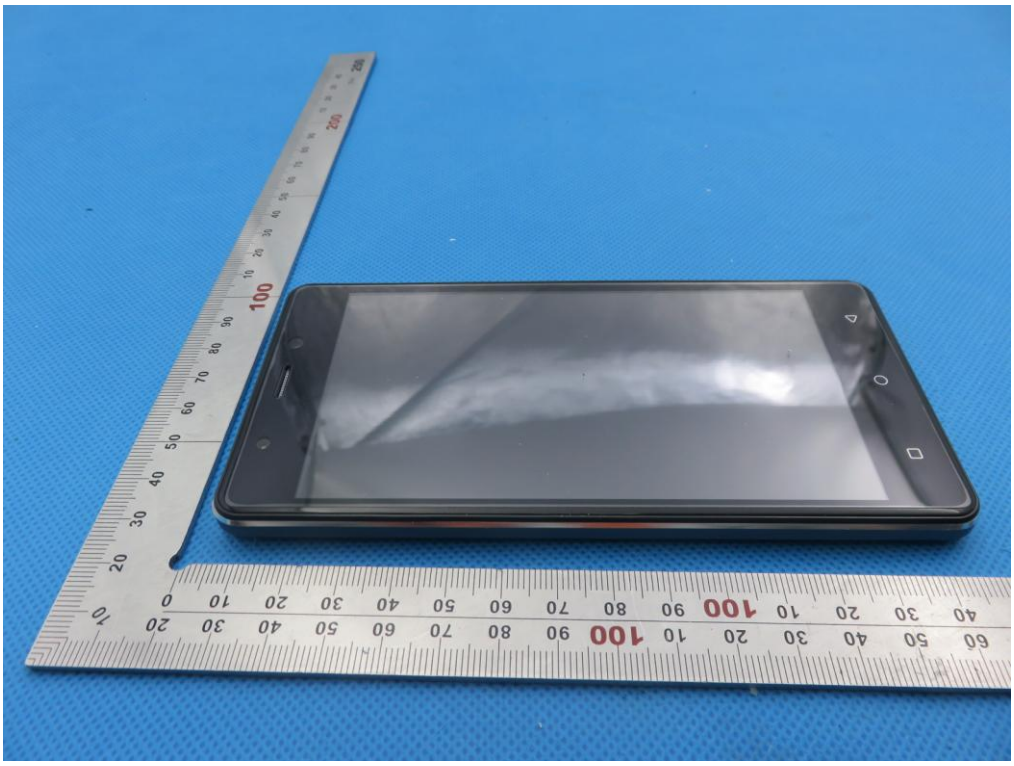
BOTTOM VIEW OF EUT



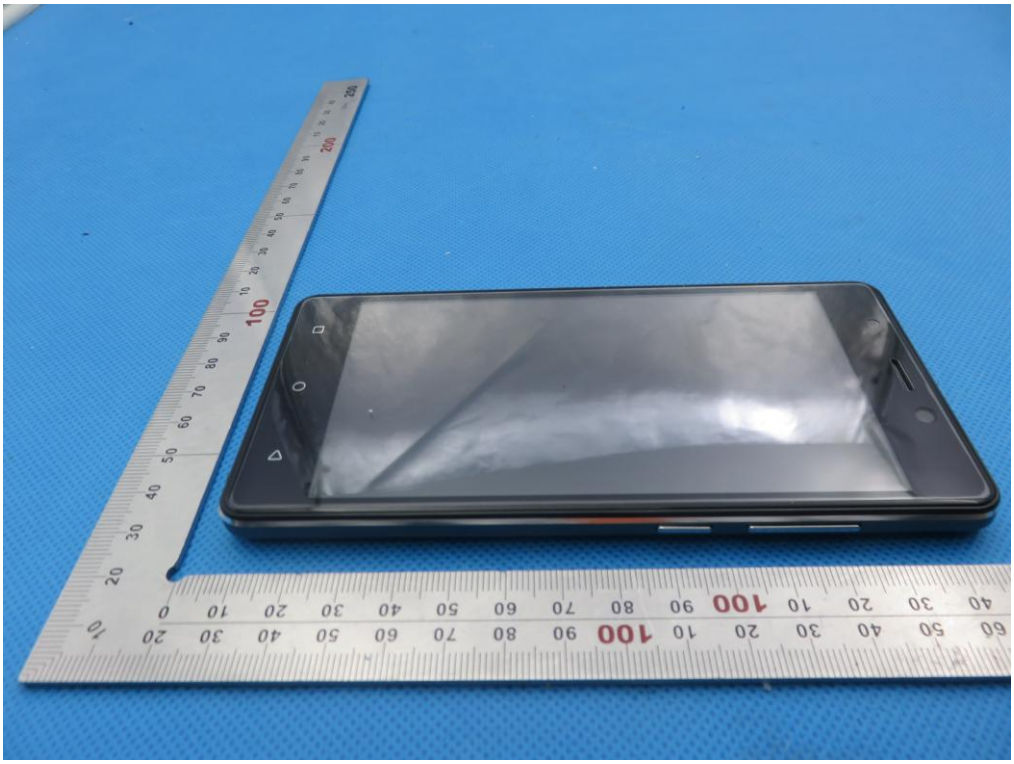
FRONT VIEW OF EUT

BACK VIEW OF EUT

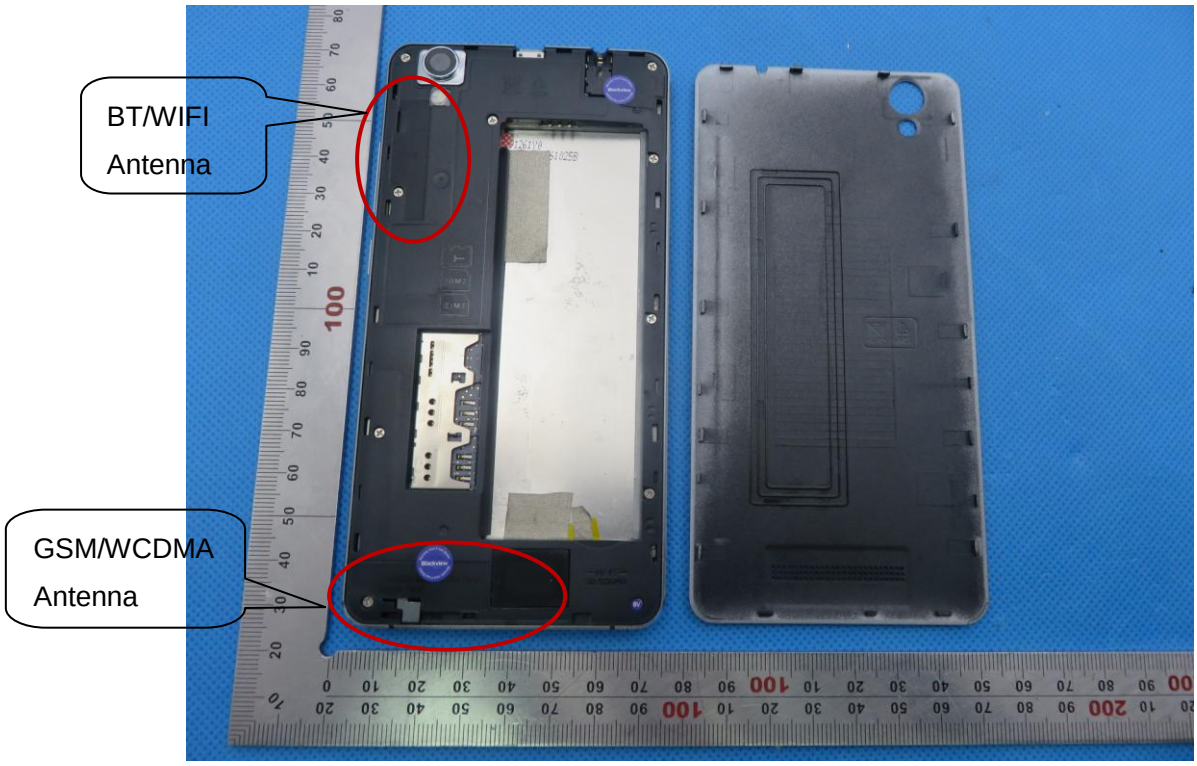
LEFT VIEW OF EUT



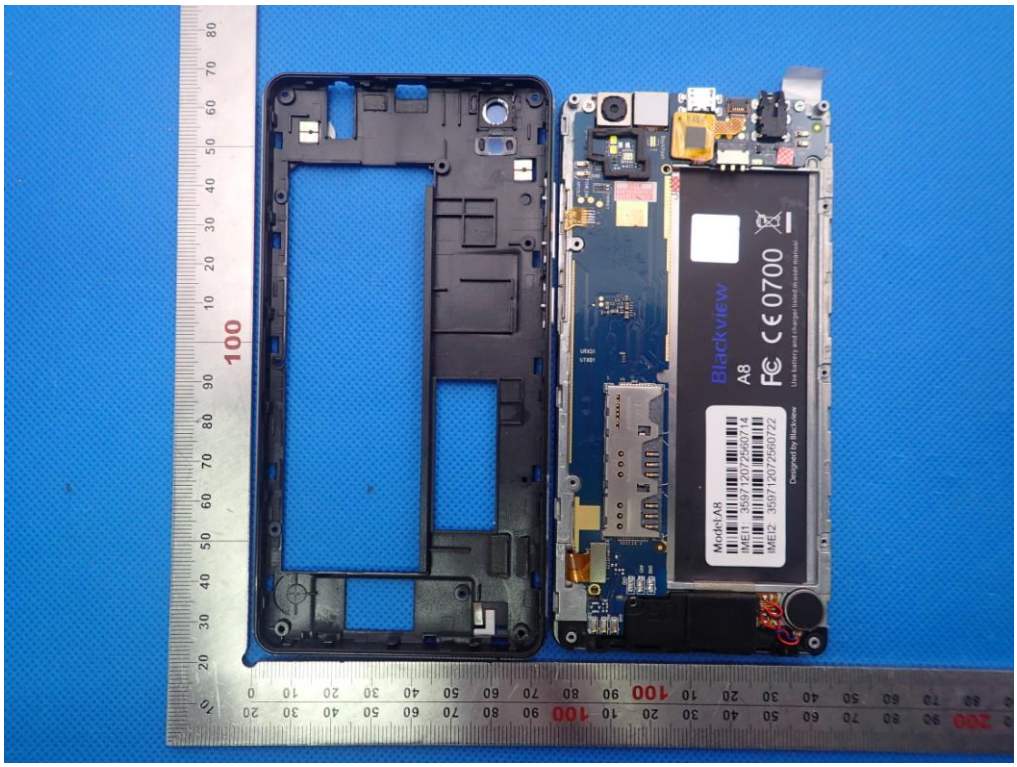
RIGHT VIEW OF EUT



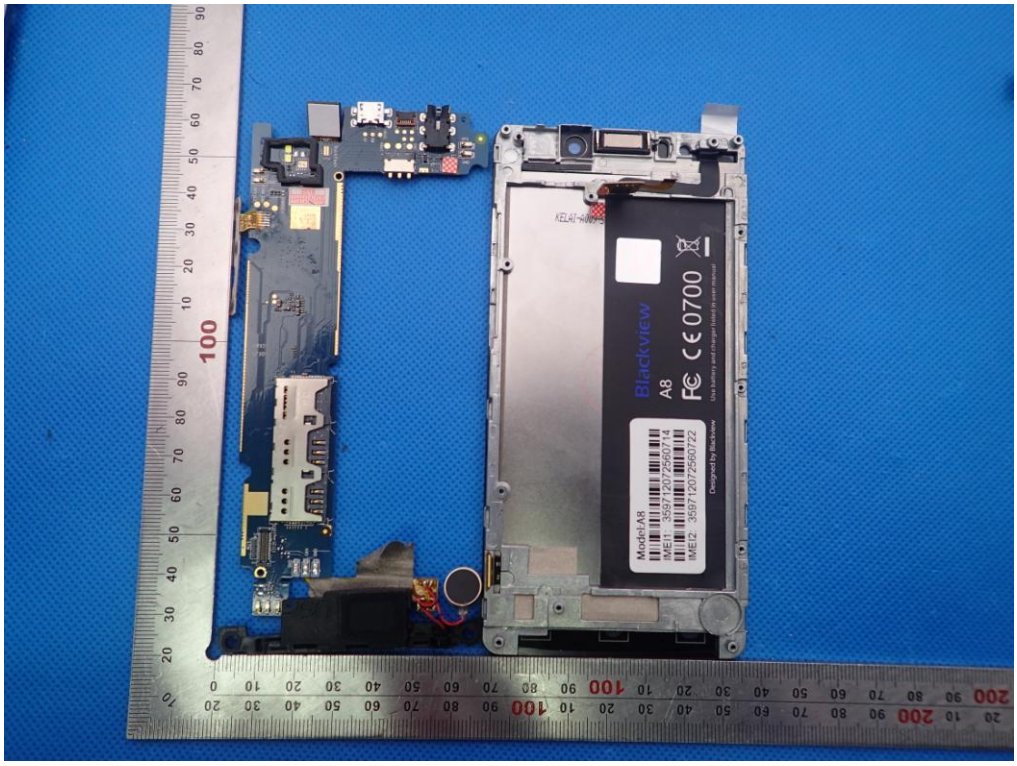
OPEN VIEW OF EUT-1



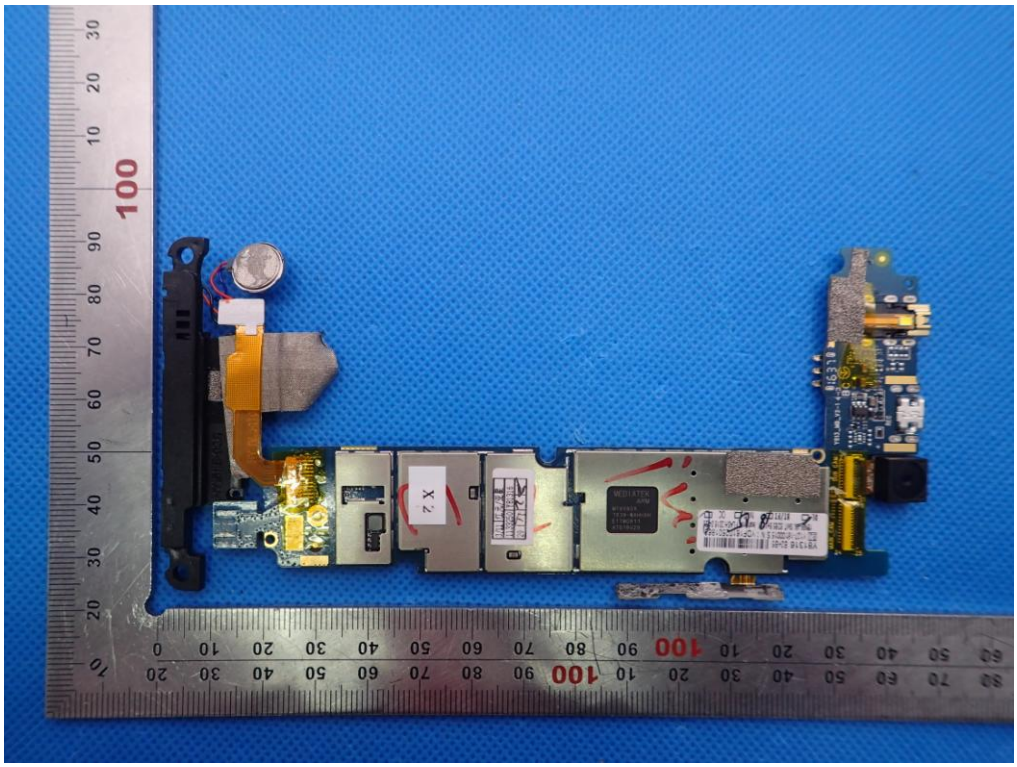
OPEN VIEW OF EUT-2



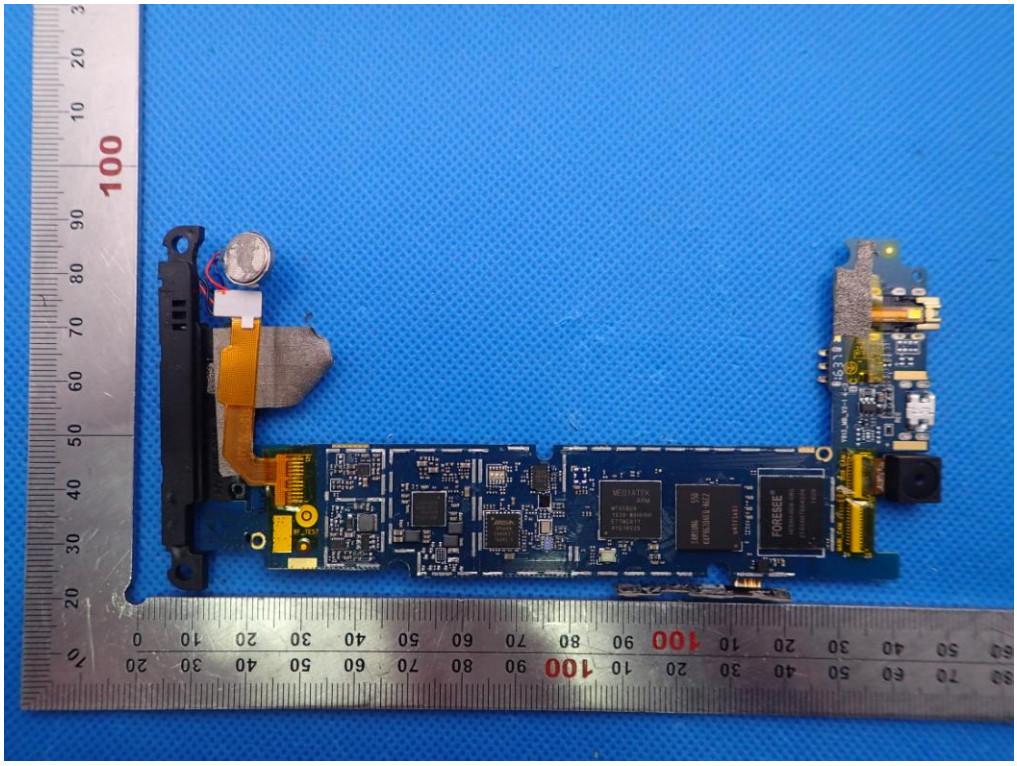
OPEN VIEW OF EUT-3



INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



----END OF REPORT----