

# **FCC RADIO TEST REPORT**

FCC ID: 2ADBRK968

Of

Product Name: smart mobile phone

Brand Name: KALIHO, K-CEL, K-TEN

Model No.: K968

Series Model: A600

Test Report Number: STS1410012F02

Issued for

Shenzhen Kaliho Technology Development Limited Rm1901, Block A, The Stars Plaza, Huaqiang North Rd., Futian District, Shenzhen, China

Issued by

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All Test Data Presented in this report is only applicable to presented Test sample.

# **TEST RESULT CERTIFICATION** Applicant's name.......... Shenzhen Kaliho Technology Development Limited Rm1901, Block A, The Stars Plaza, Huagiang North Rd., Futian District, Address ......Shenzhen,China Manufacture's Name...... Shenzhen Kaliho Technology Development Limited Floor 4, Flat F, XingHui Technology industrial park, Huaning West Rd., Address ..... Dalang Street, Longhua, Baoan district, Shenzhen **Product description** Product name ..... smart mobile phone Band name..... KALIHO, K-CEL, K-TEN Model and/or type reference K968 Ratings ...... DC 5V/0.5A Standards ...... FCC Part15.247 Test procedure...... ANSI C63.10-2009 This device described above has been tested by STS, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report. This report shall not be reproduced except in full, without the written approval of STS, this document may be altered or revised by STS, personal only, and shall be noted in the revision of the document. Date of Test Date (s) of performance of tests .. 08 Oct. 2014 ~16 Oct. 2014 Test Result.....Pass **Testing Engineer** (Tony Liu) Technical Manager Authorized Signatory: (Bovey Yang)

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# 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C					
Standard Section	Test Item	Judgment	Remark		
15.207	Conducted Emission	PASS			
15.247(a)(1)	Hopping Channel Separation	PASS			
15.247(b)(1)	Peak Output Power	PASS			
15.247(c)	Radiated Spurious Emission	PASS			
15.247(d)	Conducted Spurious Emission	PASS			
15.247(a)(iii)	Number of Hopping Frequency	PASS			
15.247(a)(iii)	Dwell Time	PASS			
15.247(a)(1)	Bandwidth	PASS			
15.205	Band Edge Emission	PASS			
15.203	Antenna Requirement	PASS			

# NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

## 1.1 TEST FACILITY

Shenzhen STS Test Services Co., Ltd.

Add.: 1/F, Building 2, Zhuoke Science Park, Chongqing Road, Fuyong, Baoan District,

Shenzhen, China.

FCC Registration No.: 842334

#### 1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $\mathbf{y} \pm \mathbf{U}$ , where expended uncertainty  $\mathbf{U}$  is based on a standard uncertainty multiplied by a coverage factor of  $\mathbf{k=2}$ , providing a level of confidence of approximately 95 %  $^{\circ}$ 

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

# 2. GENERAL INFORMATION

# 2.1 GENERAL DESCRIPTION OF EUT

Equipment	smart mobile phone
Trade Name	KALIHO, K-CEL, K-TEN
Model Name	K968
Serial Model	A600
Model Difference	Only difference in model name
Channel List	Please refer to the Note 2.
Bluetooth	Frequency:2402 – 2480 MHz Modulation: GFSK(1Mbps), π/4-DQPSK(2Mbps), 8-DPSK(3Mbps)
Adapter	Input:AC 100-240V,50/60Hz,0.2A
Adapter	Output:DC 5V,500mA
	Rated Voltage: 3.7V
Battery	Charge Limit: 4.2V
	capacity :1000mAh
Hardware version number	
Software versioning number	
Connecting I/O Port(s)	Please refer to the User's Manual

## Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

		Chann	el List		
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	PIFA Antenna	NA	0	BT Antenna

The EUT antenna is integral Antenna. no antenna other than that furnished by the responsible party shall be used with the device.

#### 2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	CH00
Mode 2	CH39
Mode 3	CH78

For Conducted Emission			
Final Test Mode	Description		
Mode4	Charging		

For Radiated Emission			
Final Test Mode	Description		
Mode 1	CH00		
Mode 2	CH39		
Mode 3	CH78		

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

#### 2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

Test software Version	Test program: N/A			
Frequency	2402 MHz	2441 MHz	2480 MHz	
Parameters(1Mbps)	DEF	DEF	DEF	

# 2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED Radiated Spurious Emission Test E-1 **EUT Conducted Emission Test** AC Plug E-1 E-2 EUT Adapter C-1

## 2.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	smart mobile phone	KALIHO, K-CEL, K-TEN	K968	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
C-1	No	No	1.5M	

#### Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in <code>"Length\_"</code> column.
- (3) "YES" is means "shielded" "with core"; "NO" is means "unshielded" "without core".

# 2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of	Manufacturer	Type No.	Serial No.	Last	Calibrated	Calibration
	Equipment				calibration	until	period
1	Spectrum Analyzer	Agilent	E4407B	MY4510804 0	2014.07.06	2015.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2014.06.08	2015.06.07	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2014.07.06	2015.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	620026441 6	2014.06.06	2015.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2014.06.06	2015.06.06	1 year
6	Horn Antenna	EM	EM-AH-101 80	2011071402	2014.07.06	2015.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2014.07.06	2015.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2013.12.22	2014.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2014.06.08	2015.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2014.07.06	2015.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619. 05	2014.07.06	2015.07.05	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufactu rer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2014.06.06	2015.06.05	1 year
2	LISN	R&S	ENV216	101313	2014.08.24	2015.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2014.08.24	2015.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2014.06.06	2015.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2014.06.06	2015.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2014.06.08	2015.06.07	1 year

## 3. EMC EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz) operating frequency band. In case the emission fall within the restricted band specified on Part 15.247&207(a) limit in the table below has to be followed.

FREQUENCY (MHz)	Class B	Standard	
	Quasi-peak	Average	Standard
0.15 -0.5	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	56.00	46.00	CISPR
5.0 -30.0	60.00	50.00	CISPR

0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

#### Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

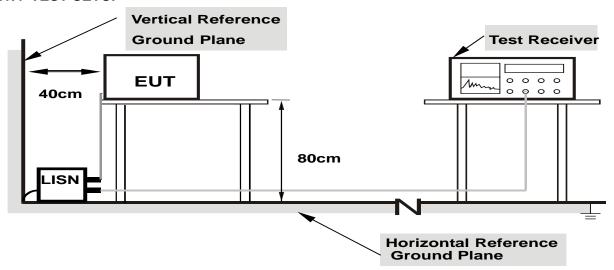
#### 3.1.2 TEST PROCEDURE

- a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item -EUT Test Photos.

#### 3.1.3 DEVIATION FROM TEST STANDARD

No deviation

#### 3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

#### 3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

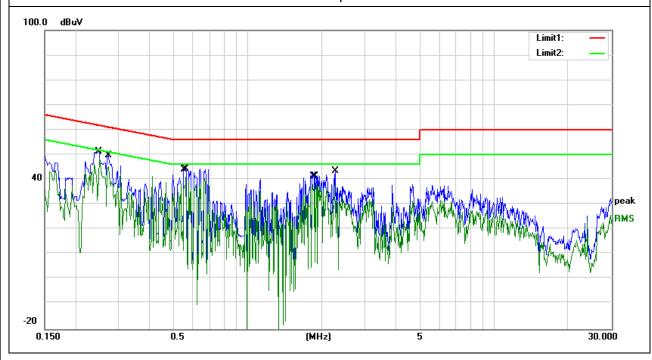
# 3.1.6 TEST RESULTS

EUT:	smart mobile phone	Model Name. :	K968
Temperature:	<b>23</b> ℃	Relative Humidity:	50%
Pressure :	1010hPa	Phase:	L
Test Voltage :	DC 5V from Adapter AC 120V/60Hz	Test Mode:	Link Mode

Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
0.1654	28.25	17.21	19.71	45.46	36.92	65.03	55.03	-19.57	-18.11	Pass
0.2354	21.14	10.32	19.62	31.46	29.94	59.74	49.74	-28.28	-19.8	Pass
0.8124	16.33	11.54	19.84	27.87	31.38	57.01	47.01	-29.14	-15.63	Pass
1.4523	19.24	11.23	19.88	39.12	31.11	56	46	-16.88	-14.89	Pass
2.4943	13.56	4.54	19.99	33.55	24.53	56	46	-22.45	-21.47	Pass
6.1476	19.76	6.65	20.41	40.17	27.06	60	50	-19.83	-22.94	Pass

# Remark:

1. Factor = Antenna Factor + Cable Loss - Pre-amplifier.

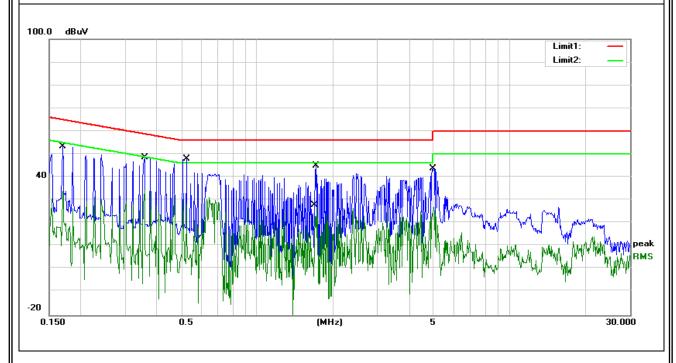


EUT:	smart mobile phone	Model Name. :	K968
Temperature:	<b>23</b> ℃	Relative Humidity:	50%
Pressure:	1010hPa	Phase :	N
LIEST VOITAGE .	DC 5V from Adapter AC 120V/60Hz	Test Mode:	Link Mode

Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
0.1743	23.25	13.21	19.69	42.94	32.9	65.07	55.08	-22.13	-22.18	Pass
0.5654	18.22	11.43	19.85	38.07	31.28	64.09	54.09	-26.02	-22.81	Pass
0.8123	21.13	12.12	19.83	40.96	31.95	59.95	49.95	-18.99	-18	Pass
1.3345	21.32	14.15	19.87	41.19	34.02	56.83	46.83	-15.64	-12.81	Pass
1.3923	21.54	15.22	19.88	41.42	35.1	56	46	-14.58	-10.9	Pass
6.1865	22.43	8.23	20.42	42.85	28.65	60	50	-17.15	-21.35	Pass

# Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



#### 3.2 RADIATED EMISSION MEASUREMENT

# 3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on Part 15247&205(a), then the Part 15 247&209(a) limit in the table below has to be followed.

Frequencies	Field Strength	Measurement Distance
(MHz)	(micorvolts/meter)	(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

#### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

EDEOLIENCY (MU-)	Class B (dBuV/m) (at 3M)			
FREQUENCY (MHz)	PEAK	AVERAGE		
Above 1000	74	54		

#### Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

## FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 <sup>th</sup> harmonic of the highest frequency or 40 GHz, whichever is lower

Spectrum Parameter	Setting		
Attenuation	Auto		
Start Frequency	1000 MHz		
Stop Frequency	10th carrier harmonic		
RB / VB (emission in restricted	1 MHz / 1 MHz for Dook 1 MHz / 10Hz for Average		
band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average		

Receiver Parameter	Setting
Attenuation	Auto
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

#### 3.2.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

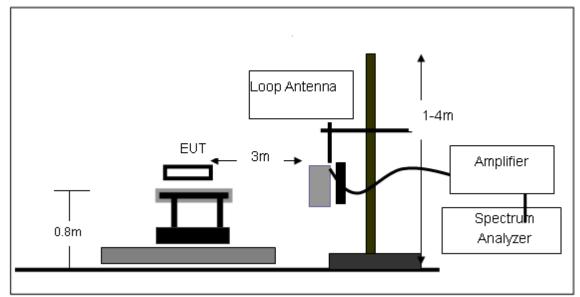
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

#### 3.2.3 DEVIATION FROM TEST STANDARD

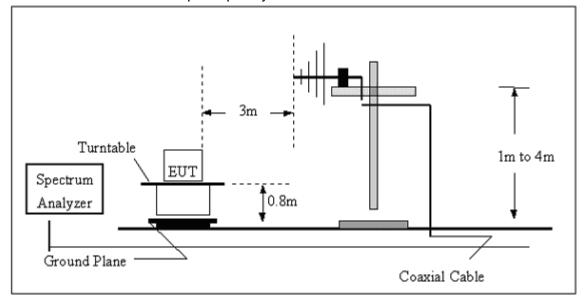
No deviation

# 3.2.4 TEST SETUP

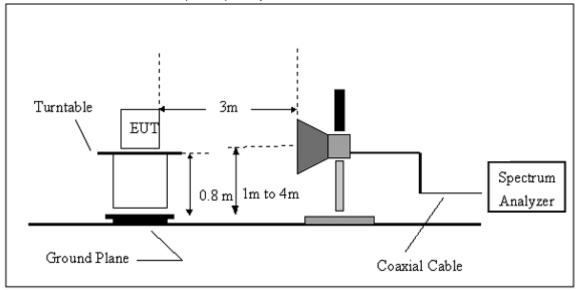
# (A) Radiated Emission Test-Up Frequency Below 30MHz



# (B) Radiated Emission Test-Up Frequency 30MHz~1GHz



# (C) Radiated Emission Test-Up Frequency Above 1GHz



## 3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

# 3.2.6 TEST RESULTS (BELOW 30 MHZ)

EUT:	smart mobile phone	Model Name. :	K968
Temperature:	<b>23</b> ℃	Relative Humidity:	50%
Pressure:	1010 hPa	Polarization :	
Test Voltage:	AC 120V		
Test Mode :	TX Mode		

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
				PASS
				PASS

#### NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =40 log (specific distance/test distance)(dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

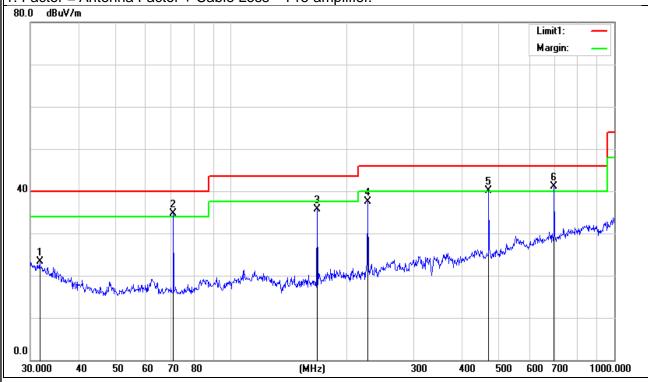
# 3.2.7 TEST RESULTS (BETWEEN 30M - 1000 MHZ)

EUT:	smart mobile phone	Model Name.:	K968
Temperature:	23 ℃	Relative Humidity:	50%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage:	AC 120V		
Test Mode:	TX Mode		

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
31.7312	5.13	18.05	23.18	40	-16.62	100	20	QP
70.8314	27.54	6.62	34.16	40	-5.84	200	85	QP
167.8245	24.12	11.06	35.18	43.5	-8.32	100	133	QP
227.6913	26.23	11.12	37.35	46	-8.65	100	155	QP
470.5222	19.14	20.21	39.35	46	-6.65	100	95	QP
696.8513	17.23	24.03	41.26	46	-4.74	100	169	QP

## Remark:

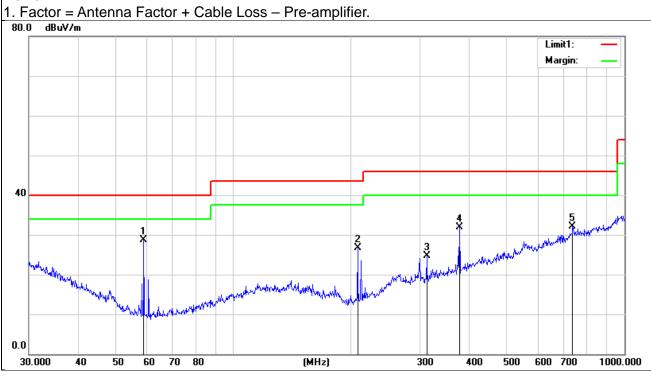
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT:	smart mobile phone	Model Name.:	K968
Temperature:	23 °C	Relative Humidity:	50%
Pressure :	1010 hPa	Polarization:	Vertical
Test Voltage:	AC 120V		
Test Mode :	TX Mode		

Frequency (MHz) 35.23 46.34 64.24 400.22 666.22 870.17	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
35.23	11.34	14.66	26	40	-14	100	19	QP
46.34	16.35	10.38	26.73	40	-13.27	200	84	QP
64.24	15.76	8.63	13.76	43.5	-29.74	100	133	QP
400.22	9.23	18.14	27.37	46	-18.63	100	155	QP
666.22	7.23	21.55	28.78	46	-17.22	100	96	QP
870.17	8.14	23.63	31.77	46	-14.23	100	169	QP

# Remark:



# 3.2.8 TEST RESU LTS (ABOVE 1000 MHZ)

Radiated Spurious Emission (Transmitting)

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

Factor = Antenna Factor + Cable Loss - Pre-amplifier.

Emission Level = Meter Reading + Factor

Margin = Limit - Emission Level

# 3.2.8 TEST RESULTS (ABOVE 1000 MHZ

Frequency	Meter Reading	Factor	Emission Level	Emission Level Limits		Detector	Comment				
(MHz)	(dBµV)	(dB)	(dBµV/m)	/m) (dBµV/m)		Type	Common				
	Low Channel (2402 MHz)										
4804.264	66.12	-3.62	62.5	74	-11.5	Pk	Vertical				
4804.272	47.12	-3.62	43.5	54	-10.5	AV	Vertical				
7206.138	63.78	-0.9	62.88	74	-11.12	pk	Vertical				
7206.156	42.45	-0.9	41.55	54	-12.45	AV	Vertical				
4803.959	63.92	-3.64	60.28	74	-13.72	Pk	Horizontal				
4803.964	45.32	-3.64	41.68	54	-12.32	AV	Horizontal				
		1	Mid Channel (2441	I MHz)							
4882.128	66.12	-3.65	62.47	74	-11.53	Pk	Vertical				
4882.094	51.14	-3.65	47.49	54	-6.51	AV	Vertical				
7323.228	62.21	-0.82	61.39	74	-12.61	Pk	Vertical				
7323.220	45.21	-0.82	44.39	54	-9.61	AV	Vertical				
4882.096	62.24	-3.68	58.56	74	-15.44	Pk	Horizontal				
4882.171	46.12	-3.68	42.44	54	-11.56	AV	Horizontal				
	High Channel (2480 MHz)										
4960.260	62.22	-3.59	58.63	74	-15.37	pk	Vertical				
4960.325	45.41	-3.59	41.82	54	-12.18	AV	Vertical				
4960.190	64.23	-3.59	60.64	74	-13.36	pk	Horizontal				
4960.157	46.52	-3.59	42.93	54	-11.07	AV	Horizontal				

# Radiated band edge

Frequency	Meter	Factor	Emission	Limits	Margin	Detector			
Frequency	Reading	Facioi	Level	Liiiilis	iviargiri	Detector	Comment		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type			
GFSK									
2399.9	69.12	-12.99	56.13	74	-17.87	peak	Vertical		
2399.9	55.34	-12.99	42.35	54	-11.65	AVG	Vertical		
2399.9	70.25	-12.99	57.26	74	-16.74	peak	Horizontal		
2399.9	54.21	-12.99	41.22	54	-12.78	AVG	Horizontal		
2483.6	71.24	-12.78	58.46	74	-15.54	peak	Vertical		
2483.6	54.13	-12.78	41.35	54	-12.65	AVG	Vertical		
2483.6	71.43	-12.78	58.52	74	-15.48	peak	Horizontal		
2483.6	54.32	-12.78	41.54	54	-12.46	AVG	Horizontal		
			π/4-D	QPSK					
2399.9	71.34	-12.99	58.35	74	-15.65	peak	Vertical		
2399.9	54.13	-12.99	41.14	54	-12.86	AVG	Vertical		
2399.9	70.24	-12.99	57.25	74	-16.75	peak	Horizontal		
2399.9	55.13	-12.99	42.14	54	-11.86	AVG	Horizontal		
2483.6	71.54	-12.78	58.76	74	-15.24	peak	Vertical		
2483.6	56.24	-12.78	43.46	54	-10.54	AVG	Vertical		
2483.6	71.24	-12.78	58.46	74	-15.54	peak	Horizontal		
2483.6	54.46	-12.78	41.68	54	-12.32	AVG	Horizontal		
			8DF	PSK					
2399.9	71.21	-12.99	58.22	74	-15.78	peak	Vertical		
2399.9	55.56	-12.99	42.57	54	-11.43	AVG	Vertical		
2399.9	70.13	-12.99	57.14	74	-16.86	peak	Horizontal		
2399.9	56.21	-12.99	43.22	54	-10.78	AVG	Horizontal		
2483.6	71.35	-12.78	58.57	74	-15.43	peak	Vertical		
2483.6	55.13	-12.78	42.35	54	-11.65	AVG	Vertical		
2483.6	71.32	-12.78	58.54	74	-15.46	peak	Horizontal		
2483.6	54.23	-12.78	41.45	54	-12.55	AVG	Horizontal		

NOTE: The result(PK) less than AV limite, No need shown AV result.

# Hopping

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Type	
			GF	SK			
2390	69.13	-12.99	56.14	74	-17.86	peak	Vertical
2390	55.24	-12.99	42.25	54	-11.75	AVG	Vertical
2390	68.56	-12.99	55.57	74	-18.43	peak	Horizontal
2390	54.23	-12.99	41.24	54	-12.76	AVG	Horizontal
2483.5	67.45	-12.78	54.67	74	-19.33	peak	Vertical
2483.5	55.22	-12.78	42.44	54	-11.56	AVG	Vertical
2483.5	68.24	-12.78	55.46	74	-18.54	peak	Horizontal
2483.5	55.54	-12.78	42.76	54	-11.24	AVG	Horizontal
			π/4-D	QPSK			
2390	69.18	-12.99	56.19	74	-17.81	peak	Vertical
2390	56.14	-12.99	43.15	54	-10.85	AVG	Vertical
2390	68.13	-12.99	55.14	74	-18.86	peak	Horizontal
2390	54.24	-12.99	41.25	54	-12.75	AVG	Horizontal
2483.5	68.34	-12.78	55.56	74	-18.44	peak	Vertical
2483.5	54.21	-12.78	41.43	54	-12.57	AVG	Vertical
2483.5	69.22	-12.78	56.44	74	-17.56	peak	Horizontal
2483.5	55.21	-12.78	42.43	54	-11.57	AVG	Horizontal
			8DF	PSK			
2390	69.23	-12.99	56.24	74	-17.76	peak	Vertical
2390	55.23	-12.99	42.24	54	-11.76	AVG	Vertical
2390	68.24	-12.99	55.25	74	-18.75	peak	Horizontal
2390	55.32	-12.99	42.33	54	-11.67	AVG	Horizontal
2483.5	69.23	-12.78	56.45	74	-17.55	peak	Vertical
2483.5	55.21	-12.78	42.43	54	-11.57	AVG	Vertical
2483.5	68.23	-12.78	55.45	74	-18.55	peak	Horizontal
2483.5	55.14	-12.78	42.36	54	-11.64	AVG	Horizontal

#### 4. CONDUCTED SPURIOUS EMISSIONS

#### 4.1 REQUIREMENT

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

#### 4.1.2 TEST PROCEDURE

Spectrum Parameter	Setting	
Detector	Peak	
Start Frequency	30 MHz	
Stop Frequency	10th carrier harmonic	
RB / VB (emission in restricted band)	ted band) 100 KHz/300 KHz	
Trace-Mode:	Max hold	

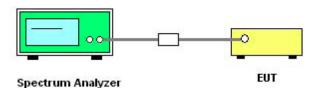
#### For Band edge

Spectrum Parameter	Setting	
Attenuation Auto		
Start/Stop Frequency	Lower Band Edge: 2310 – 2404 MHz	
	Upper Band Edge: 2478 – 2500 MHz	
RB / VB (emission in restricted band)	sion in restricted band) 100 KHz/300 KHz	
Trace-Mode:	Max hold	

#### 4.1.2 DEVIATION FROM STANDARD

No deviation.

#### 4.1.3 TEST SETUP



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading. Make the measurement with the spectrum analyzer's resolution bandwidth(RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

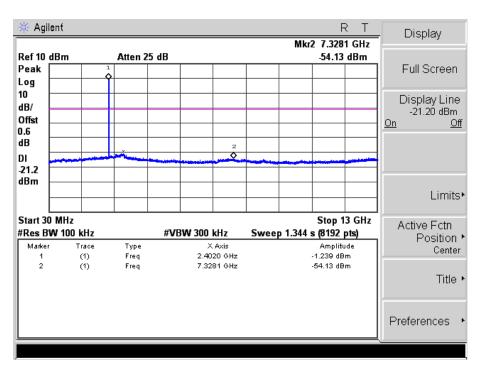
#### **4.1.4 EUT OPERATION CONDITIONS**

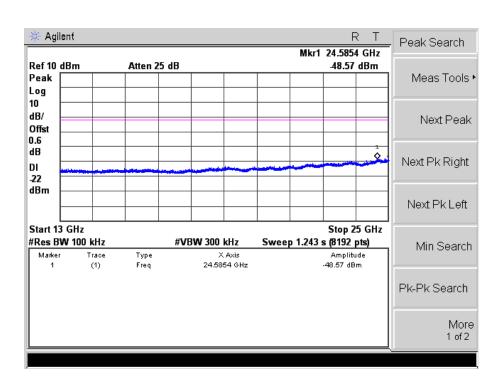
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

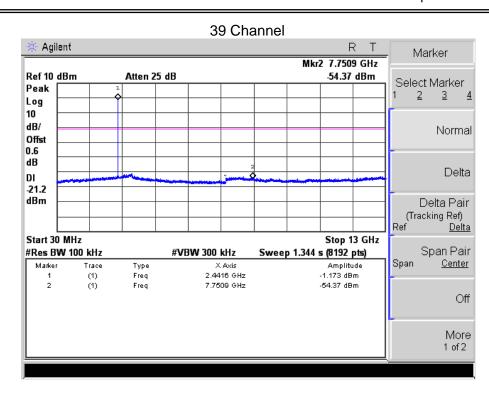
#### 4.1.5 TEST RESULTS

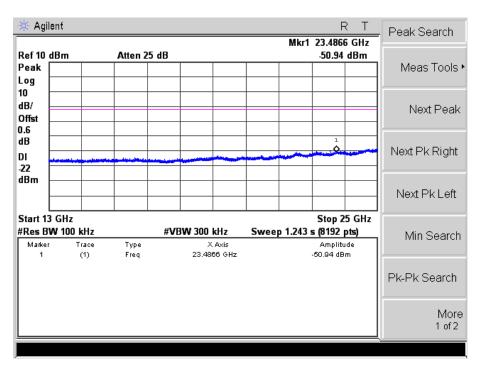
EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 °C	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	GFSK(1Mbps)-00/39/78 CH		

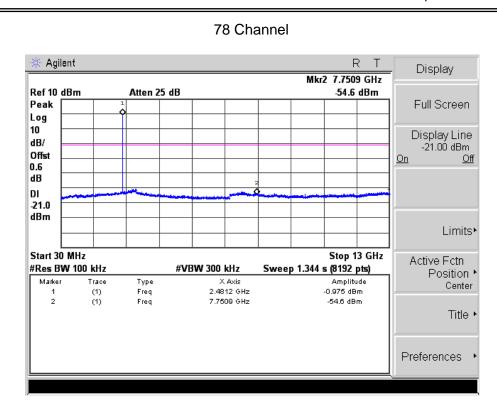
## 0 Channel

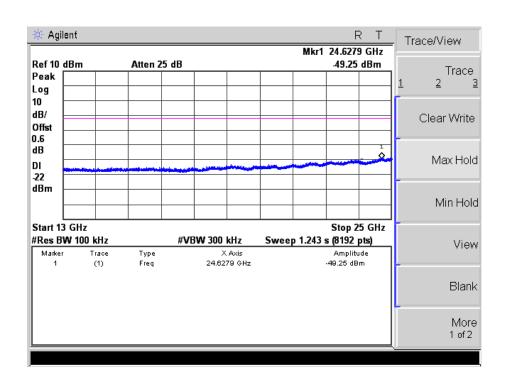






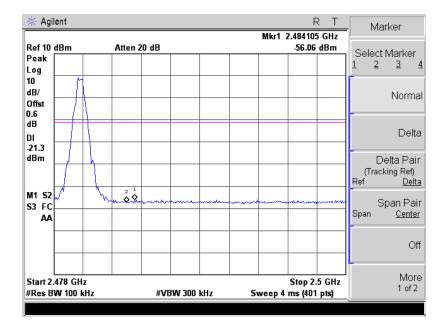




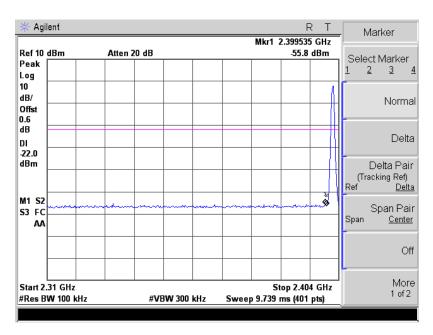


# For Band edge

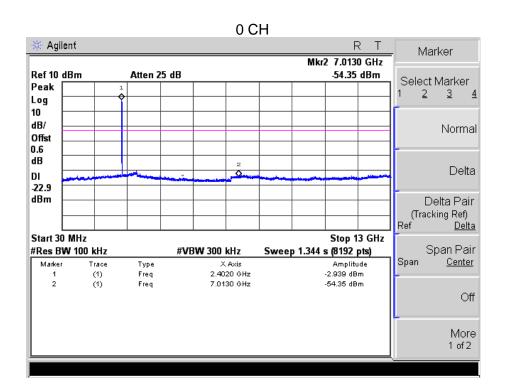
# 0 Channel

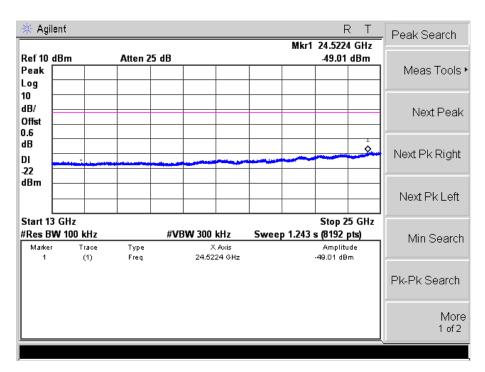


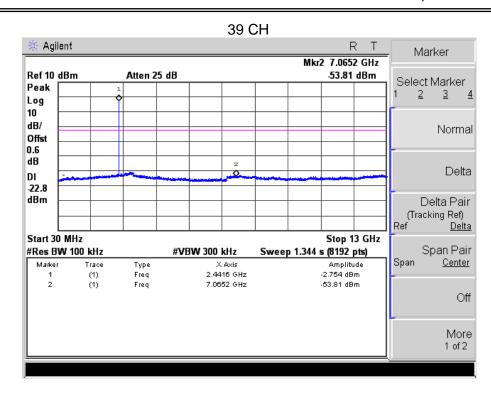
79 CH

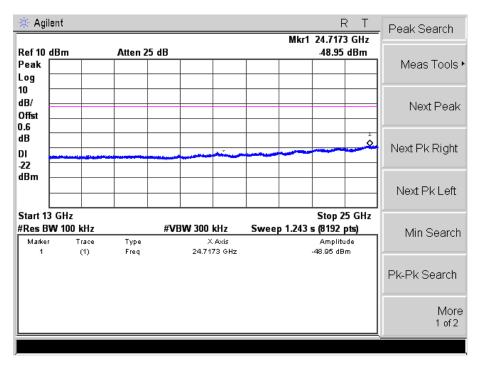


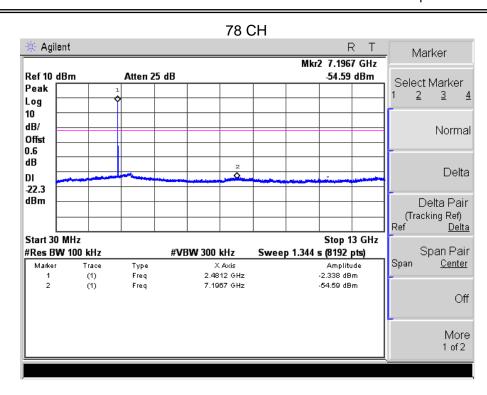
EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 °C	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	π/4-DQPSK(2Mbps) –00/39/78 CH		

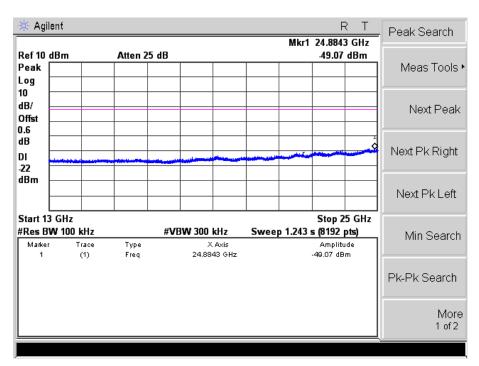




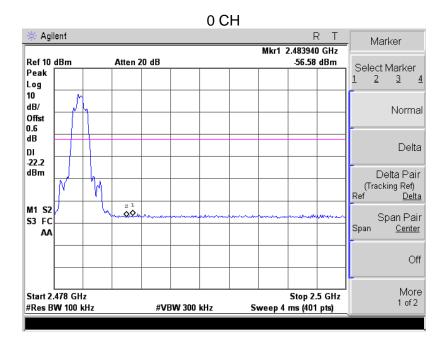




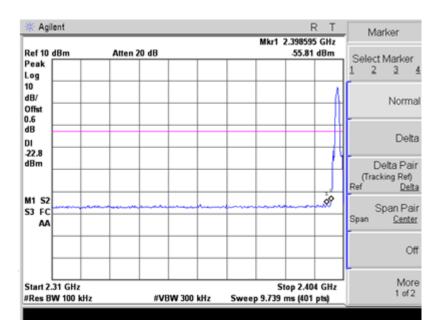




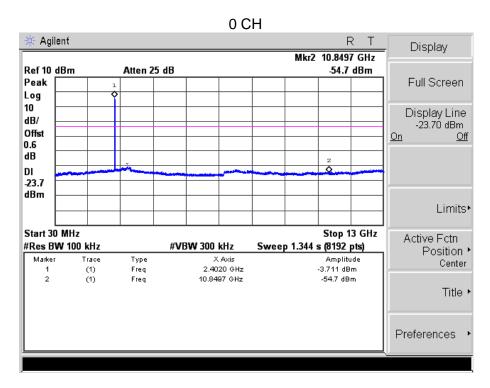
# Band edge

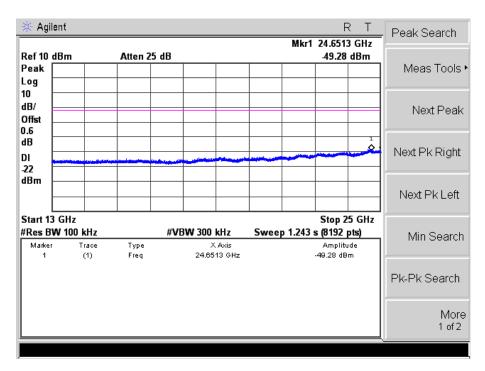


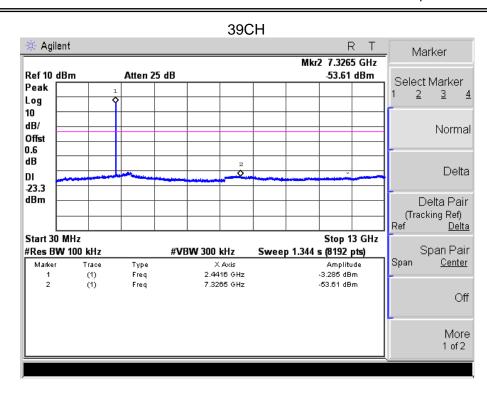
#### 78 CH

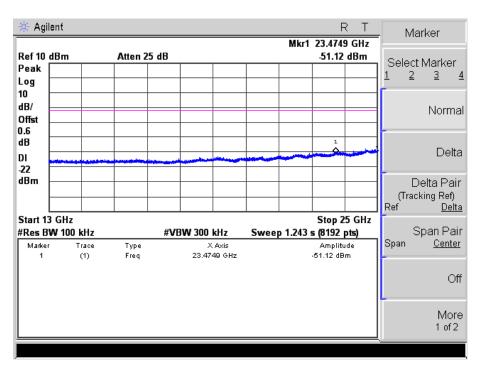


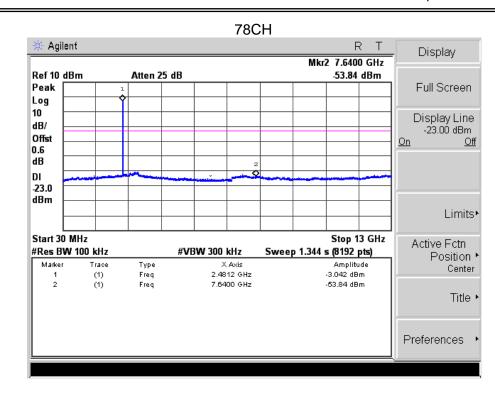
			_
EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 °C	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	8-DPSK(3Mbps) -00/39/78 CH		

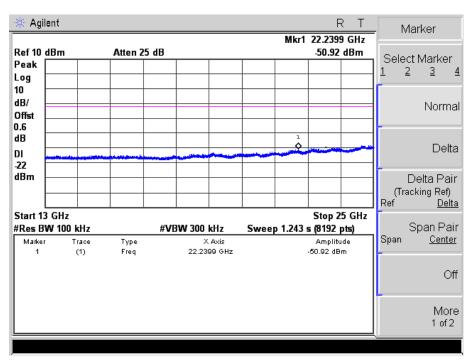






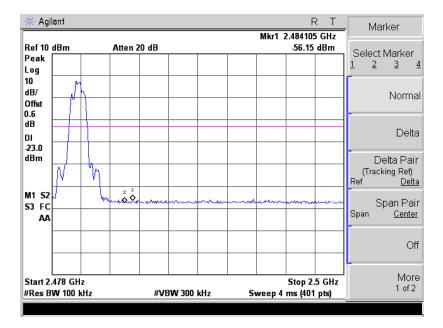




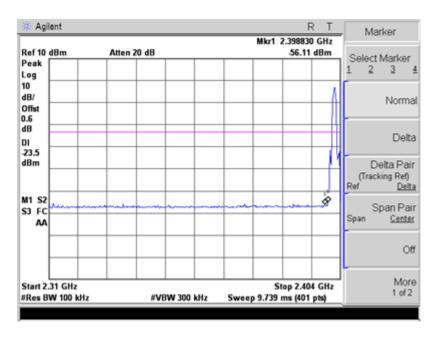


# For Band edge

# 0 CH



# 78 CH



# 5. NUMBER OF HOPPING CHANNEL

## **5.1 APPLIED PROCEDURES / LIMIT**

FCC Part15 (15.247), Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RB	100 KHz
VB	300 KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

## **5.1.1 TEST PROCEDURE**

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting: RBW= 100K, VBW=300K, Sweep time = Auto.

### **5.1.2 DEVIATION FROM STANDARD**

No deviation.

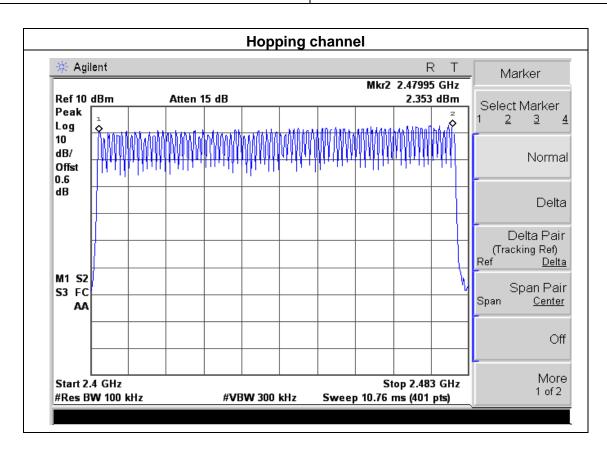
## 5.1.3 TEST SETUP

EUT	SPECTRUM
	ANALYZER

### **5.1.4 EUT OPERATION CONDITIONS**

EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 ℃	Relative Humidity:	60%
Pressure :	1015 hPa	Test Voltage :	DC 3.7V
Test Mode :	Hopping Mode		





### 6. AVERAGE TIME OF OCCUPANCY

#### **6.1 APPLIED PROCEDURES / LIMIT**

FCC Part15 (15.247) , Subpart C				
Section Test Item Limit Frequency Range (MHz) Result				
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

#### **6.1.1 TEST PROCEDURE**

- a. The transmitter output (antenna port) was connected to the spectrum analyzer
- b. Set RBW of spectrum analyzer to 1MHz and VBW to 3MHz.
- c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
- d. Sweep Time is more than once pulse time.
- e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- f. Measure the maximum time duration of one single pulse.
- g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
- h. Measure the maximum time duration of one single pulse.
- i. DH5 Packet permit maximum 1600/79/6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times  $3.37 \times 31.6 = 106.6$  within 31.6 seconds.
- j. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times  $5.06 \times 31.6 = 160$  within 31.6 seconds.
- k. DH1 Packet permit maximum 1600 / 79 / 2 = 10.12 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times  $10.12 \times 31.6 = 320$  within 31.6 seconds.

### **6.1.2 DEVIATION FROM STANDARD**

No deviation.

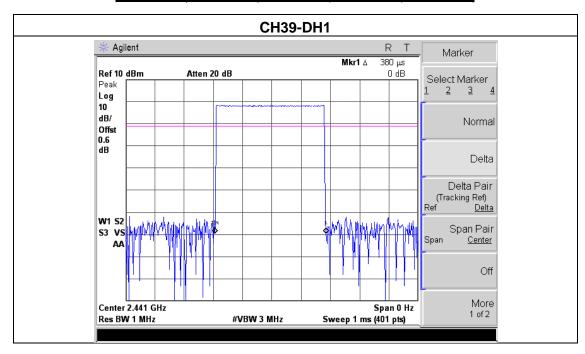
#### 6.1.3 TEST SETUP

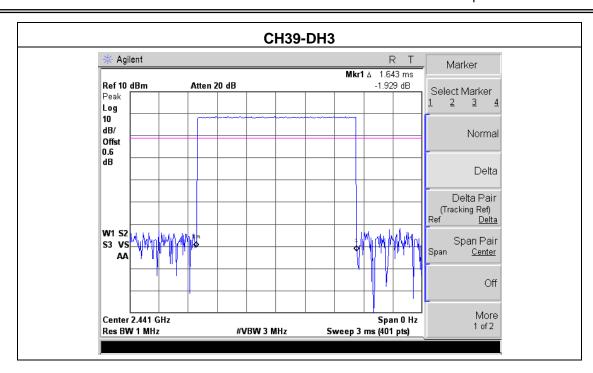


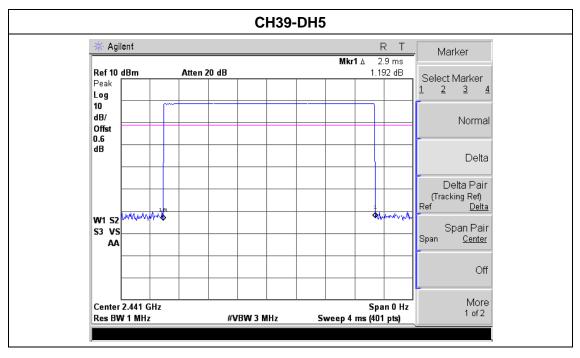
### **6.1.4 EUT OPERATION CONDITIONS**

EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 °C	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	GFSK(1Mbps)-DH1/DH3/DH5		

Data Packet	Frequen cy	Pulse Duration (ms)	Dwell Time (s)	Limits (s)
DH1	2441 MHz	0.380	0.12	0.4
DH3	2441 MHz	1.643	0.26	0.4
DH5	2441 MHz	2.900	0.31	0.4

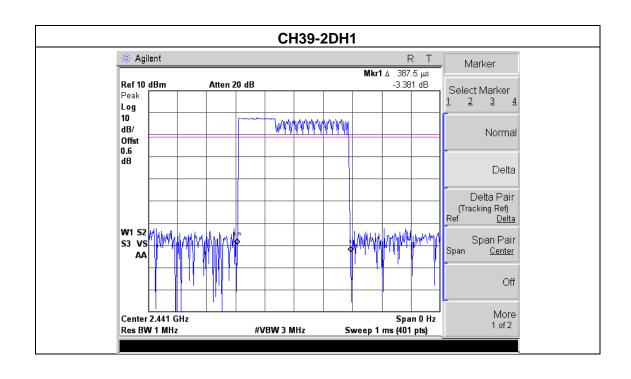


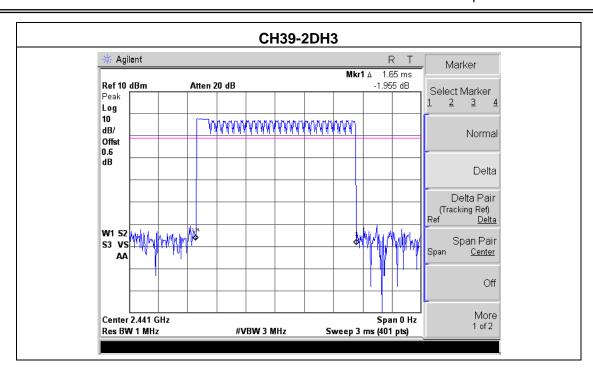


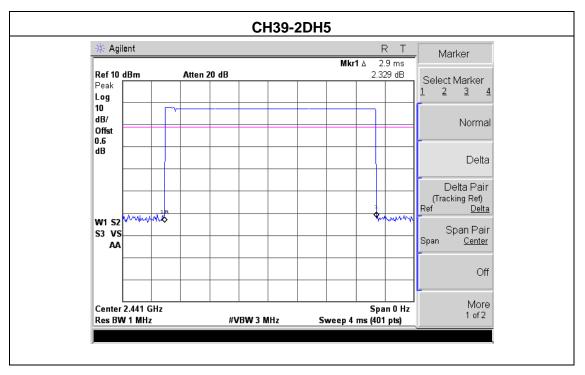


EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 °C	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	π/4-DQPSK(2Mbps) –2DH1/2DH3/2DH5		

Data Packet	Frequen cy	Pulse Duration (ms)	Dwell Time (s)	Limits (s)
2DH1	2441 MHz	0.388	0.12	0.4
2DH3	2441 MHz	1.650	0.26	0.4
2DH5	2441 MHz	2.900	0.31	0.4

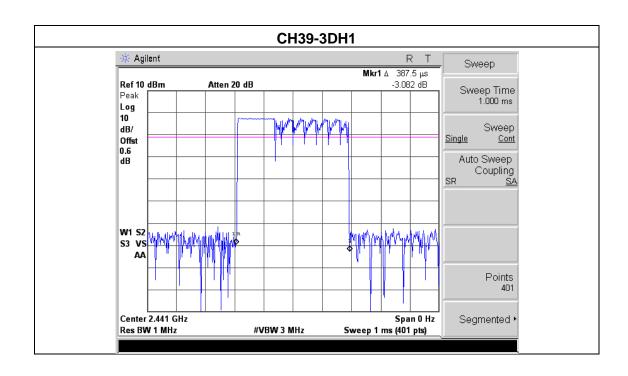


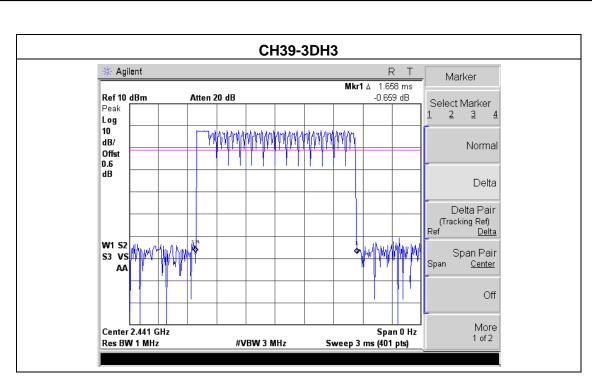


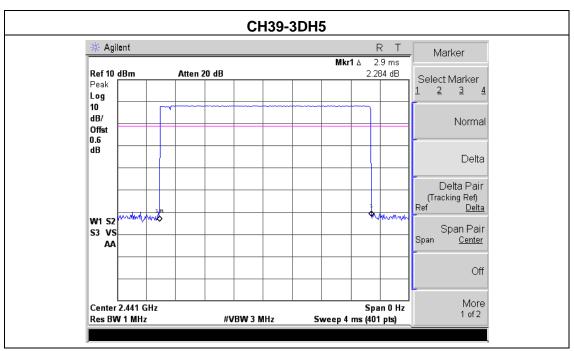


EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 °C	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	8DPSK(2Mbps) -3DH1/3DH3/3DH5		

Data Packet	Frequen cy	Pulse Duration (ms)	Dwell Time (s)	Limits (s)
3DH1	2441 MHz	0.388	0.12	0.4
3DH3	2441 MHz	1.658	0.27	0.4
3DH5	2441 MHz	2.900	0.31	0.4







### 7. HOPPING CHANNEL SEPARATION MEASUREMEN

### 7.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting	
Attenuation	Auto	
Span Frequency	> Measurement Bandwidth or Channel Separation	
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)	
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)	
Detector	Peak	
Trace	Max Hold	
Sweep Time	Auto	

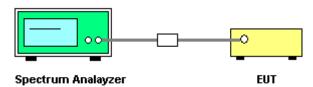
### 7.1.1 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
- c. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.

## 7.1.2 DEVIATION FROM STANDARD

No deviation.

### 7.1.3 TEST SETUP



### 7.1.4 EUT OPERATION CONDITIONS

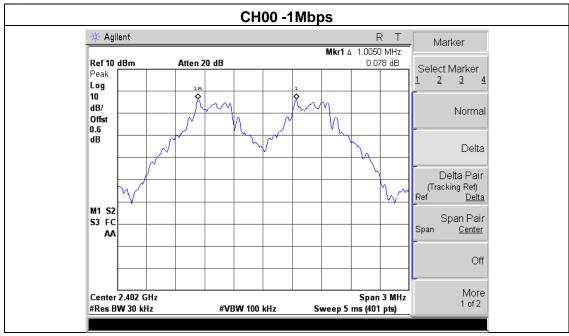
The EUT was programmed to be in continuously transmitting mode.

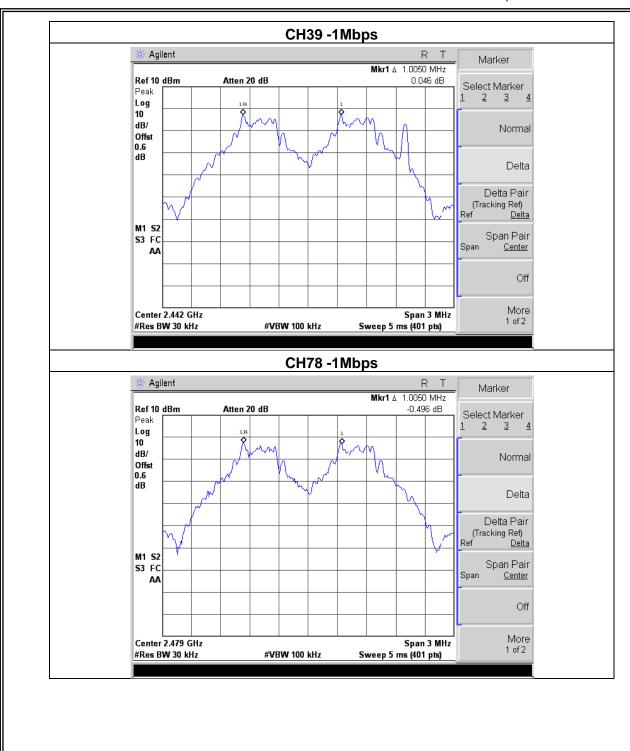
EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 °C	Relative Humidity:	50%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00 / CH39 /CH78 (GFSK(1Mbps) Mode)		

Frequency	Ch. Separation (MHz)	Result
2402 MHz	1.005	Complies
2441 MHz	1.005	Complies
2480 MHz	1.005	Complies

# For GFSK:

# Ch. Separation Limits: >20dB bandwidth



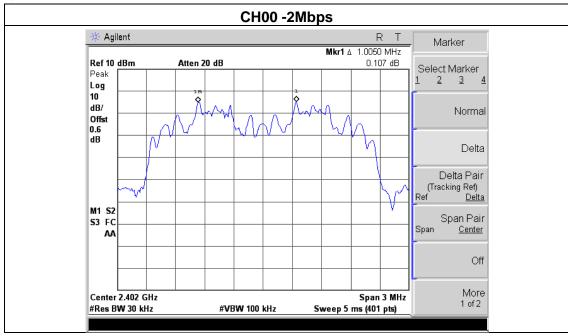


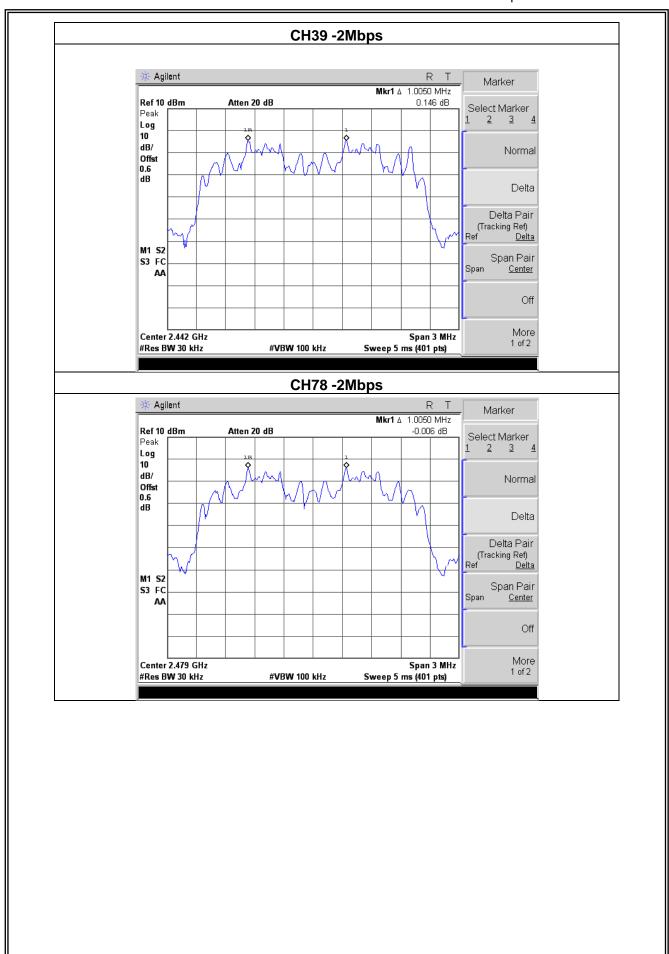
EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 °C	Relative Humidity:	50%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00 / CH39 /CH78 (π/4-DQPSK(2Mbps) Mode)		

Frequency	Ch. Separation (MHz)	Result
2402 MHz	1.005	Complies
2441 MHz	1.005	Complies
2480 MHz	1.005	Complies

For  $\pi/4$ -DQPSK(2Mbps):

# Ch. Separation Limits: > two-thirds 20dB bandwidth



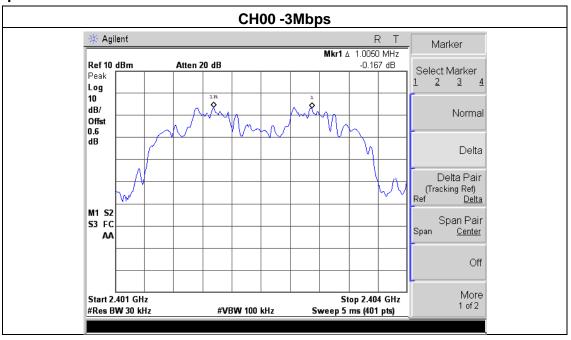


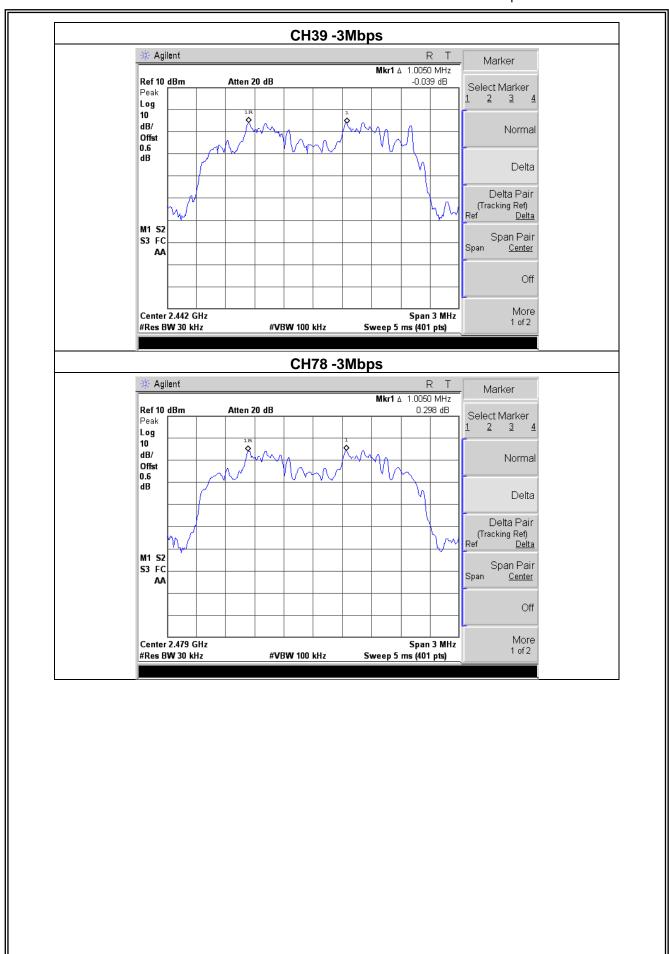
EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 °C	Relative Humidity:	50%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00 / CH39 /CH78 (8-DPSK(3Mbps)Mode)		

Frequency	Ch. Separation (MHz)	Result
2402 MHz	1.005	Complies
2441 MHz	1.005	Complies
2480 MHz	1.005	Complies

# For 8-DPSK(3Mbps):

# Ch. Separation Limits: > two-thirds 20dB bandwidth





## 8. BANDWIDTH TEST

## **8.1 APPLIED PROCEDURES / LIMIT**

FCC Part15 (15.247) , Subpart C				
Section Test Item Limit Frequency Range (MHz) Result			Result	
15.247 (a)(1)	Bandwidth	(20dB bandwidth)	2400-2483.5	PASS

Spectrum Parameter	Setting	
Attenuation	Auto	
Span Frequency	> Measurement Bandwidth or Channel Separation	
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)	
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)	
Detector	Peak	
Trace	Max Hold	
Sweep Time	Auto	

# **8.1.1 TEST PROCEDURE**

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting: RBW= 30KHz, VBW=100KHz, Sweep time = Auto.

### **8.1.2 DEVIATION FROM STANDARD**

No deviation.

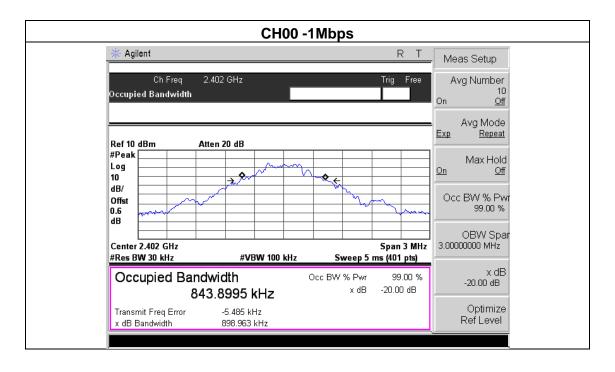
### 8.1.3 TEST SETUP

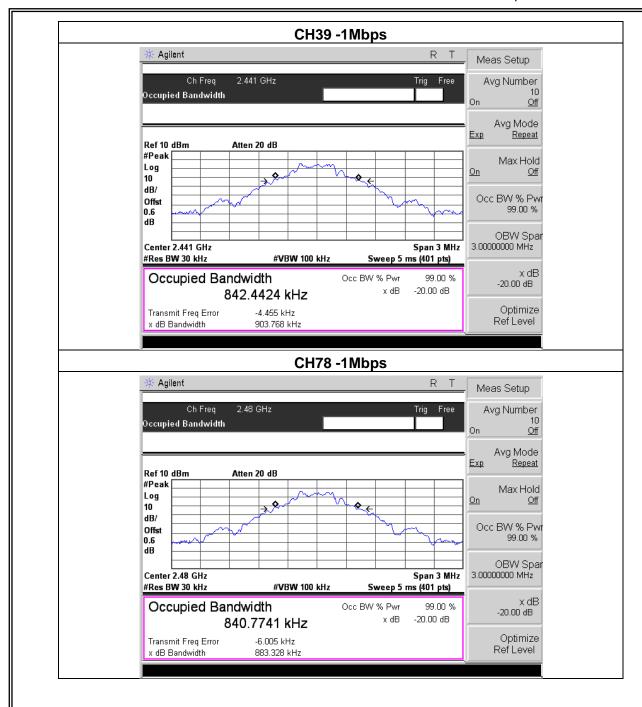


## **8.1.4 EUT OPERATION CONDITIONS**

EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 ℃	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	GFSK(1Mbps)CH00 / CH39 /C78		

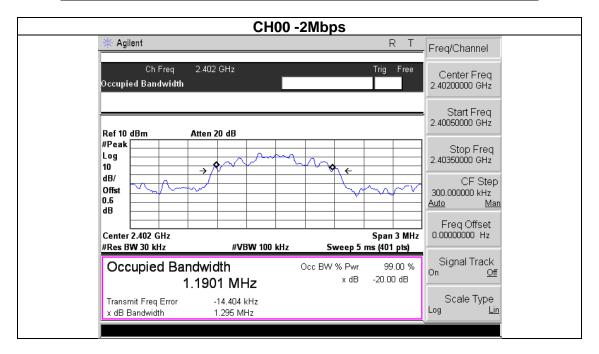
Frequency	20dB Bandwidth (kHz)	Result
2402 MHz	898.963	PASS
2441 MHz	903.768	PASS
2480 MHz	883.328	PASS

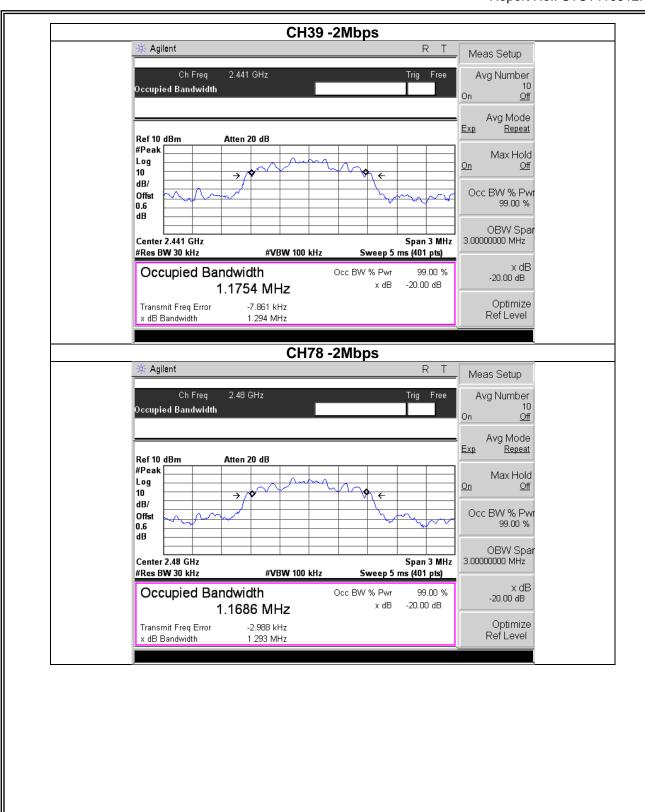




EUT:	smart mobile phone	Model Name:	K968
Temperature:	25 °C	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage:	DC 3.7V
Test Mode:	π/4-DQPSK(2Mbps)CH00 / CH39 /C78		

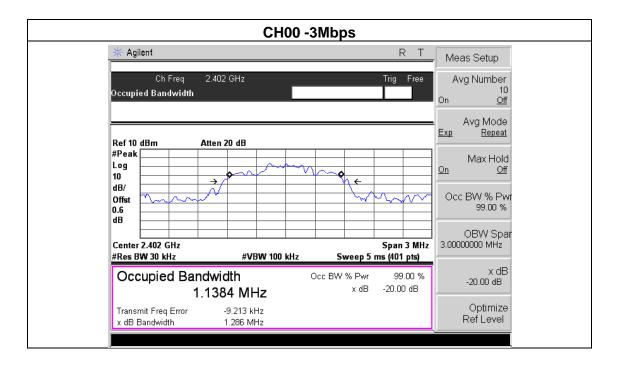
Frequency	20dB Bandwidth(kHz)	Result
2402 MHz	1.295	PASS
2441 MHz	1.294	PASS
2480 MHz	1.293	PASS

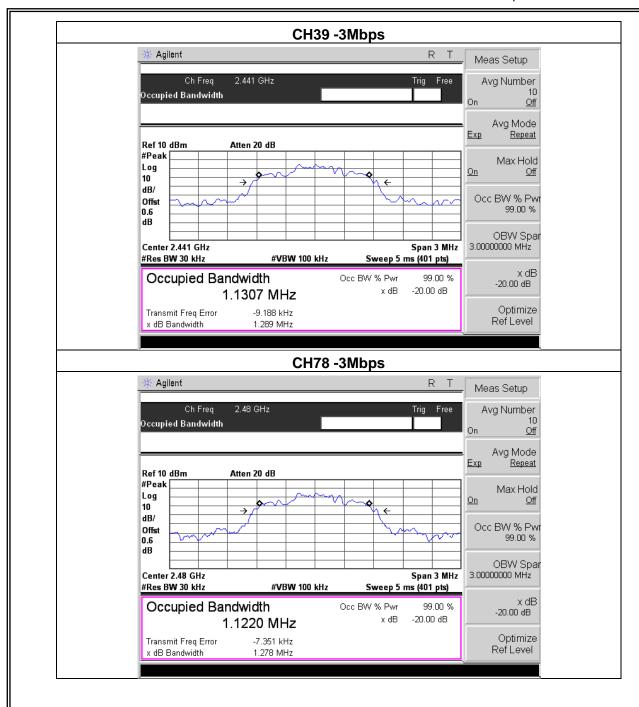




EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 °C	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	8-DPSK(3Mbps)CH00 / CH39 /	/C78	

Frequency	20dB Bandwidth (kHz)	Result
2402 MHz	1.286	PASS
2441 MHz	1.289	PASS
2480 MHz	1.278	PASS





## 9. PEAK OUTPUT POWER TEST

## 9.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15 247	Peak	1 W or 0.125W		
15.247 Output (b)(i) Power		Or if channel separation > 2/3 bandwidthprovided the systems operatewith an output power no greater than125 mW(20.96dBm)	2400-2483.5	PASS

### 9.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : GFSK(1Mbps):RBW= 1MHz, VBW= 3MHz, Sweep time = Auto.
- C. Spectrum Setting:  $\pi/4$ -DQPSK(2Mbps):RBW= 3MHz, VBW= 3MHz, Sweep time = Auto.
- d. Spectrum Setting: 8-DPSK(3Mbps):RBW= 3MHz, VBW= 3MHz, Sweep time = Auto.

#### 9.1.2 DEVIATION FROM STANDARD

No deviation.

### 9.1.3 TEST SETUP

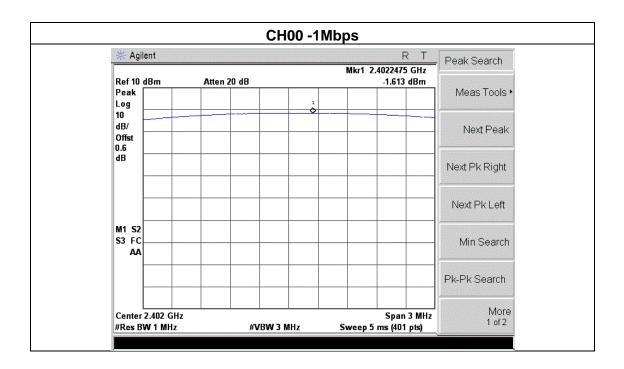


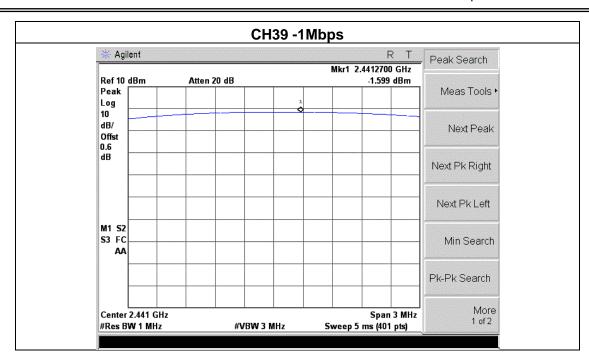
## 9.1.4 EUT OPERATION CONDITIONS

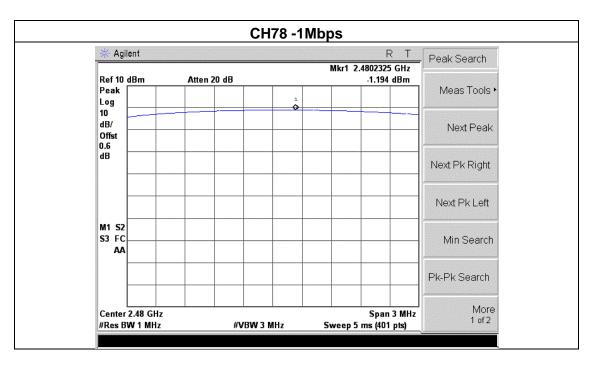
EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 °C	Relative Humidity:	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00/ CH39 /CH78 GFSK(1Mbps)		

Test Channel	Frequency	Peak Output Power	LIMIT
	(MHz)	(dBm)	(dBm)
CH00	2402	-1.613	30
CH39	2441	-1.599	30
CH78	2480	-1.194	30

Note: the channel separation > bandwidth



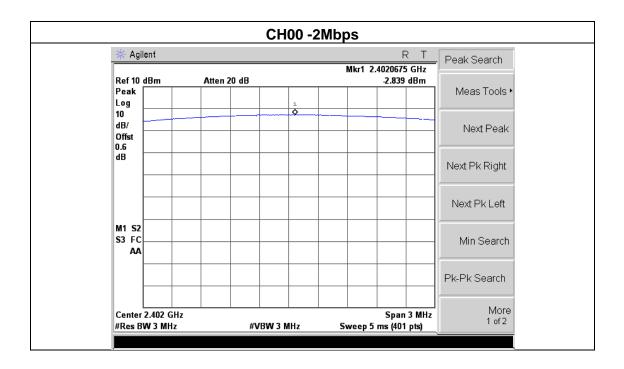


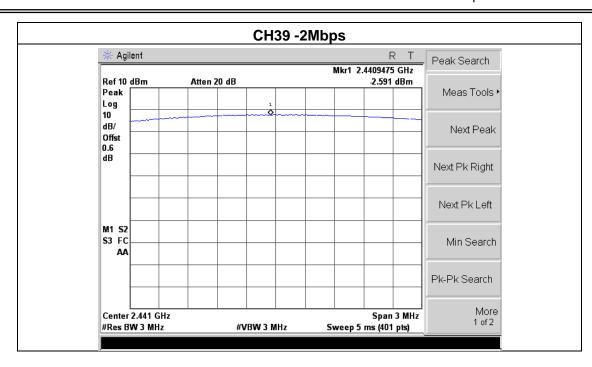


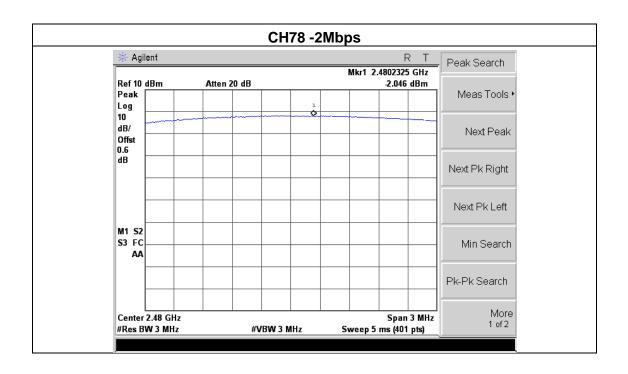
EUT:	smart mobile phone	Model Name :	K968
Temperature:	25 °C	Relative Humidity:	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00/ CH39 /CH78 π/4-DQPSK(2Mbps)		

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)
CH00	2402	-2.839	20.96
CH39	2441	-2.591	20.96
CH78	2480	-2.046	20.96

Note: the channel separation >2/3 bandwidth



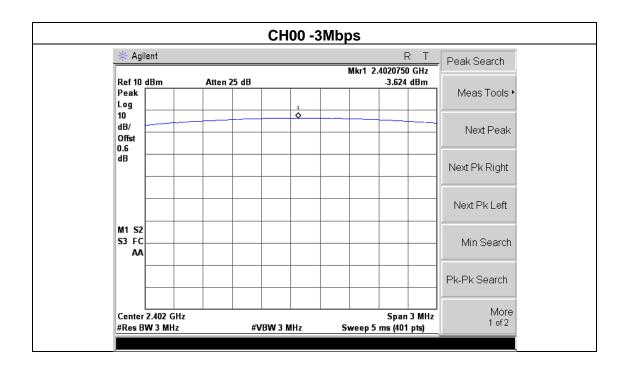


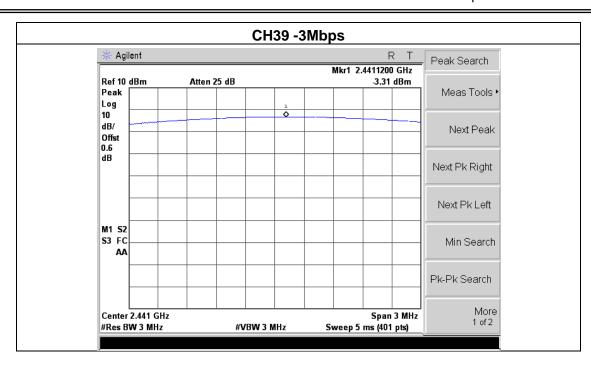


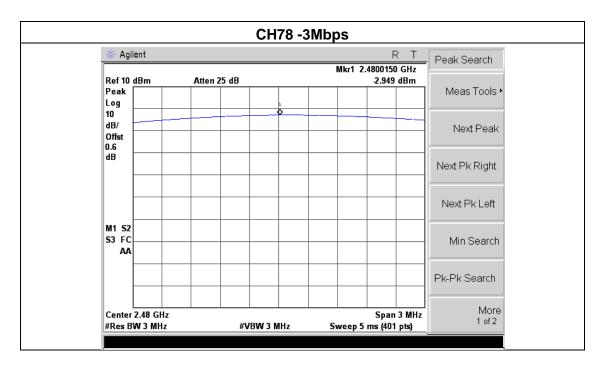
EUT:	smart mobile phone	Model Name:	K968
Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage:	DC 3.7V
Test Mode:	CH00/ CH39 /CH78 8-DPSK(3Mbps)		

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)
CH00	2402	-3.624	20.96
CH39	2441	-3.31	20.96
CH78	2480	2.949	20.96

Note: the channel separation >2/3 bandwidth







40. ANTENNA DEGUIDENENT
10. ANTENNA REQUIREMENT
10.1 STANDARD REQUIREMENT
15.203 requirement: For intentional device, according to 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.
10.2 EUT ANTENNA
The EUT antenna is integral Antenna. It comply with the standard requirement.

# **TEST SETUP**

# **Radiated Measurement Photos**

