Microtest
微测检测

Test Report

FCC ID. : 2AMKU-DK66

Date of issue: Jun. 16, 2017

Report Number:	MTi170710E072
Sample Description:	Rugged Smartphone
Model(s):	DK66, DK66plus, DK6x series (X is arabic number), WF68
Applicant:	Shenzhen Gomtel Science & Technology Co., Ltd.
Address:	5th Floor, Sector B, Fuhua Technology Building No.9116 Beihuan Road, Nanshan, Shenzhen, China.
Date of Test:	May. 26, 2017 to Jun. 16, 2017

Shenzhen Microtest Co., Ltd.
http://www.mtitest.com

TEST RESULT CERTIFICATION

Applicant's name ..... :	**Shenzhen Gomtel Science & Technology Co., Ltd.**
Address ..... :	5th Floor, Sector B, Fuhua Technology Building No.9116 Beihuan Road, Nanshan, Shenzhen, China.
Manufacture's Name ..... :	**Shenzhen Gomtel Science & Technology Co., Ltd.**
Address ..... :	5th Floor, Sector B, Fuhua Technology Building No.9116 Beihuan Road, Nanshan, Shenzhen, China.
Product description	
Product name ..... :	Rugged Smartphone
Model and/or type reference :	DK66
Serial Model ..... :	DK66plus, DK6x series (X is arabic number), WF68
Standards ..... :	FCC Part27
Test procedure	ANSI C63.4-2014

Tested by: Ace Chai

Ace Chai Jun. 16, 2017

Reviewed by: Smith Chen

Smith Chen Jun. 16, 2017

Approved by: Tom Xue

Tom Xue Jun. 16, 2017

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

Description of Test Item	Standard	Results
Conducted Output power&EIRP	FCC PART 2: 2.1046 FCC PART 27.50(c)	PASS
Occupied bandwidth	No Limit	PASS
Frequency stability	FCC PART 2: 2.1055 FCC PART 27.53(g)	PASS
Conducted spurious emission (Antenna terminal)	FCC PART 2: 2.1051 FCC PART 27.50(g)	PASS
Radiated spurious emissions	FCC PART 2: 2.1051 FCC PART 27.50(g)	PASS
Band edge compliance	FCC PART 2: 2.1051 FCC PART 27.50(g)	PASS

NOTE:

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

1.1 TEST FACILITY

Shenzhen Toby Technology Co., Ltd.
Add.: 10/F.,A Block,Jiada R&D Bldg.,No.5 Songpingshan, Road, Science&Technology Park, Shenzhen, 518057
FCC Registration No.:811562

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

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	Rugged Smartphone
Trade Name	**DuraMobi**
Model Name	DK66
Serial Model	DK66plus, DK6x series (X is arabic number), WF68
Model Difference	N/A
Product Description	The EUT is a Rugged Smartphone Operation Frequency: LTE B17(TX: 704-716MHz/RX: 734-746MHz) Modulation Type: QPSK,16QAM Antenna Designation: Please see Note 3. Output Power(Conducted): 23.58dBm Antenna Gain (dBi) -1.12dbi Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.
Channel List	Please refer to the Note 2.
Adapter	Model: UT-133E-5200Z Input: AC100-240~ 50/60Hz 0.3A Max Output: DC 5V 2A
Battery	DC 3.8V by rechargeable Li-polymer battery
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. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
A	N/A	N/A	Integrated antenna	/	-1.12	LTE Antenna

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	LTE B17 QPSK
Mode 2	LTE B17 16QAM
Mode 3	Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 3	Link Mode

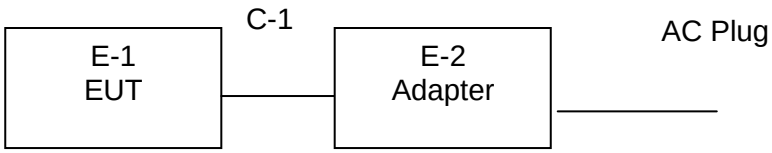
For Radiated Emission	
Final Test Mode	Description
Mode 3	LTE B17

Note:

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

(2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.4 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	Brand	Model/Type No.	Series No.	Note
E-1	Rugged Smartphone	DuraMobi	DK66	N/A	EUT
E-2	Adapter	N/A	UT-133E- 5200ZY	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	1.0m	
C-2	NO	NO	0.8m	

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『Length』column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

For RF conducted test:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
Signal Analyzer	Agilent	N9010A	MY48030494	2017/11/4
4 Ch. Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW54063513	2017/11/4
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080019	2017/11/4
vector Signal Generator	Agilent	E4438C	US44271917	2017/11/4
vector Signal Generator	Agilent	E4438C	MY49070163	2017/11/4
Dc Power Supply	GW	GPR-6030D	/	2017/11/4
Temperature & Humitidy Chamber	GIANT FORCE	GTH-056P	GF-94454-1	2017/11/4
Wideband Radio Communication Tester	ROHDE&SCHWARZ	CMW500	120909	2017/11/4

For Radiated test:

Equipment	Manufacturer	Model	Serial No.	Calibration Due
Broadband TRILOG Antenna	Schwarabeck	VULB9163	9163-872	2017/11/14
Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-1145	2017/11/14
Amplifier	HP	8447D	3113A06150	2017/11/4
Amplifier	Agilent	8449B	3008A02400	2018/7/4
Test Receiver	Schwarabeck	ESPI7	100314	2017/11/4
Spectrum analyzer	Agilent	E4407B	MY41441082	2017/11/4
Signal Generator	R&S	SMT 06	832080/007	2017/11/4

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

3. CONDUCTED OUTPUT POWER&EIRP

3.1 APPLIED PROCEDURES / LIMIT

Section	Test Item	Limit	Result
27.50(c))	Conducted Output power	33dBm(ERP) for LTE B17	PASS

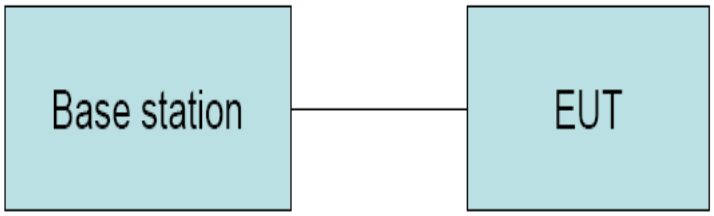
3.1.1 TEST PROCEDURE

(1) The EUT's RF output port was connected to base station.
(2) A call is set up by the SS according to the generic call set up procedure
(3) Set EUT at maximum power level through base station by power level command
(4) Measure the maximum output power of EUT at each frequency band and mode by base station.

3.1.2 DEVIATION FROM STANDARD

No deviation.

3.1.3 TEST SETUP



3.1.4 EUT OPERATION 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.

3.1.5 TEST RESULTS

EUT：	Rugged Smartphone	Model Name ：	DK66
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5Vfrom adapter
Test Mode ：	LTE B17		

Conducted Output Power						
BW(MHz)	RB Size	RB offset	Mode	Channel		
				Lowest(dBm)	Middle(dBm)	Highest(dBm)
5	1	0	QPSK	23.58	23.49	23.57
	1	0	16QAM	23.57	23.55	23.55
10	1	0	QPSK	23.48	23.53	23.49
	1	0	16QAM	23.47	23.49	23.54
Limit	33dBm					
Note: all modes of RB configurations have been tested, and only worst configuration data listed.						

Conducted Output Power and EIRP						
BW(MHz)	RB Size	RB offset	Mode	Channel		
				Lowest(dBm)	Middle(dBm)	Highest(dBm)
5	1	0	QPSK	22.46	22.37	22.45
	1	0	16QAM	22.45	22.43	22.43
10	1	0	QPSK	22.36	22.41	22.37
	1	0	16QAM	22.35	22.37	22.42
Limit	33dBm					
Note1: all modes of RB configurations have been tested, and only worst configuration data listed. Note2: EIRP=Conducted Output Power + Gain, where Gain=-1.12dBi						

4. OCCUPY BANDWIDTH

4.1 APPLIED PROCEDURES / LIMIT

Section	Test Item	Limit	Result
2.1049	Occupied bandwidth	/	PASS

4.1.1 TEST PROCEDURE

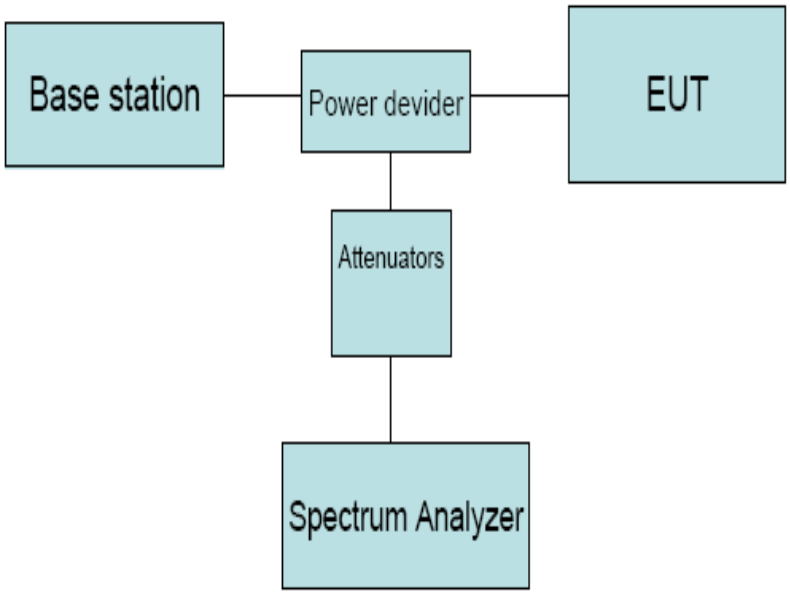
1. The EUT' RF output port was connected to Spectrum Analyzer and Base Station via power divider.

2. Spectrum analyzer's occupied bandwidth measure function was used to measure 99% bandwidth and -26dBc bandwidth

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

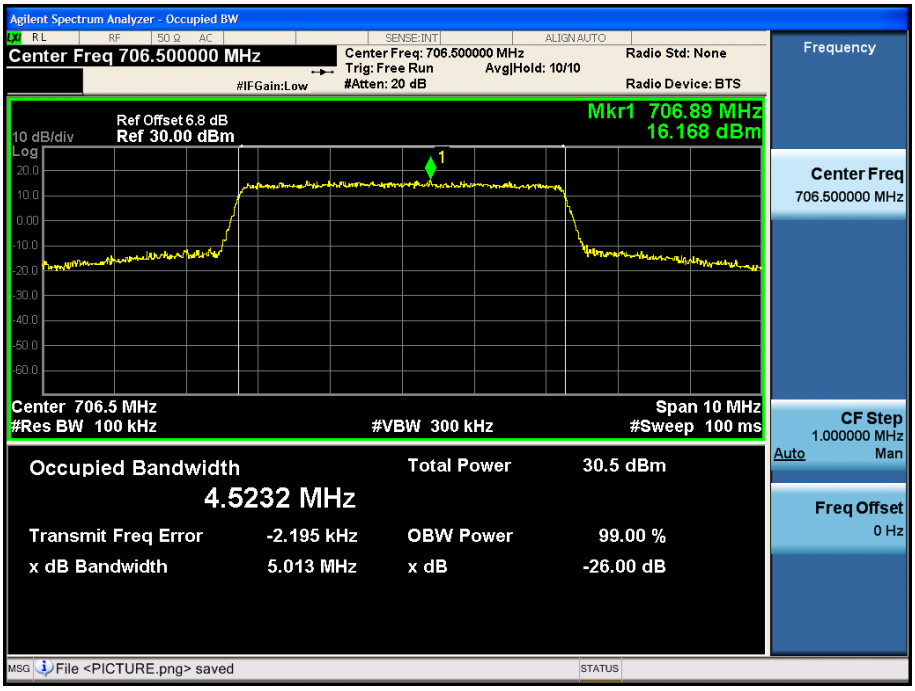
The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

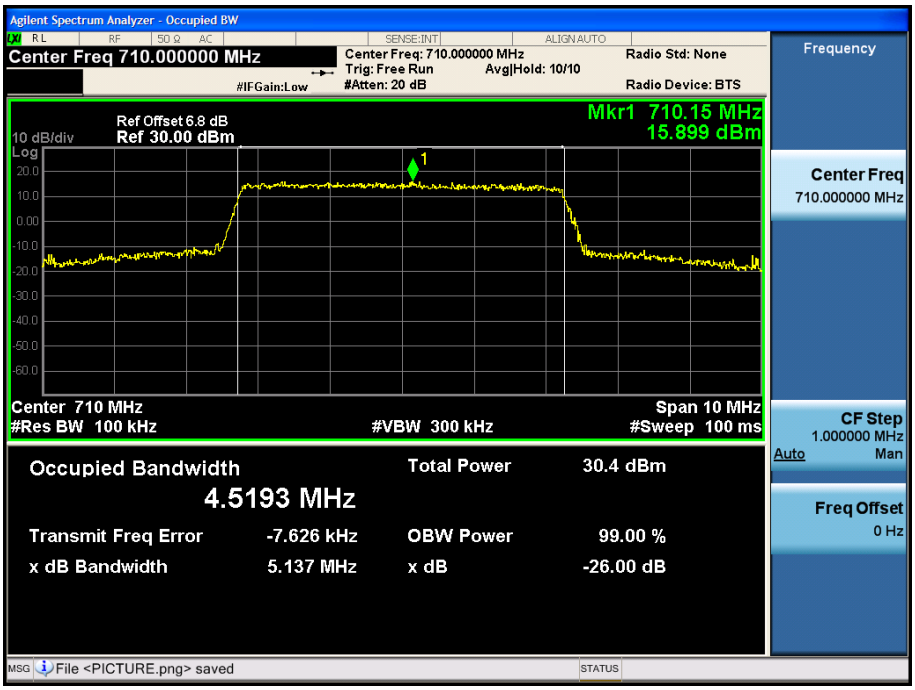
EUT：	Rugged Smartphone	Model Name ：	DK66
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC 5Vfrom adapter
Test Mode ：	LTE B17		

99% Bandwidth						
BW(MHz)	RB Size	RB offset	Mode	Channel		
				Lowest(MHz)	Middle(MHz)	Highest(MHz)
5	1	0	QPSK	4.52	4.51	4.51
	1	0	16QAM	4.52	4.52	4.52
10	1	0	QPSK	9.00	9.00	9.00
	1	0	16QAM	9.01	9.00	9.01
Limit	N/A					
Note: all modes of RB configurations have been tested, and only worst configuration data listed. Note2: All modes have been tested, and only worst data of 16QAM mode data shown.						

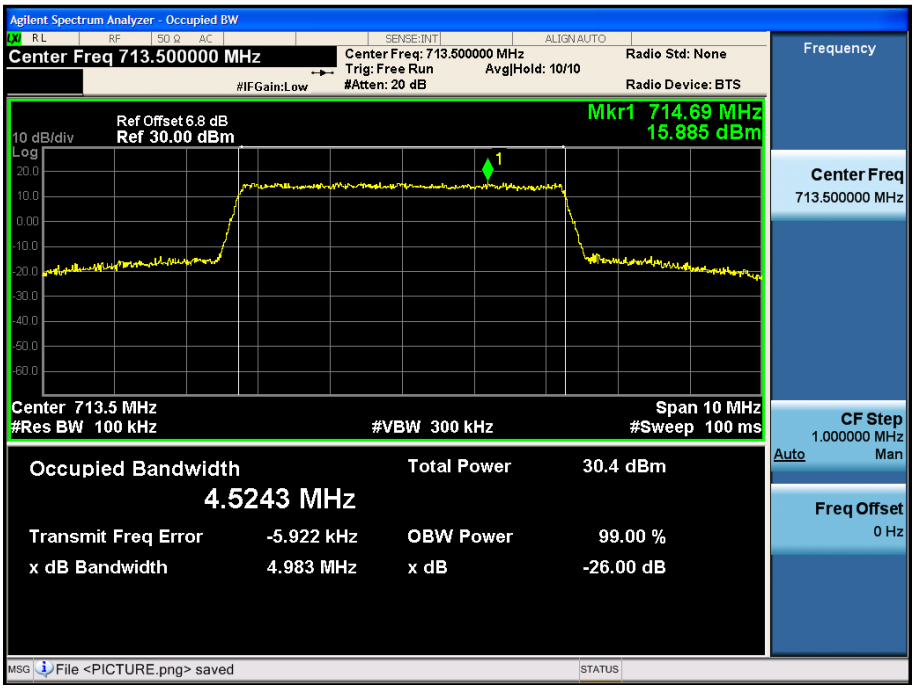
LTE B17 Lowest 5MHz



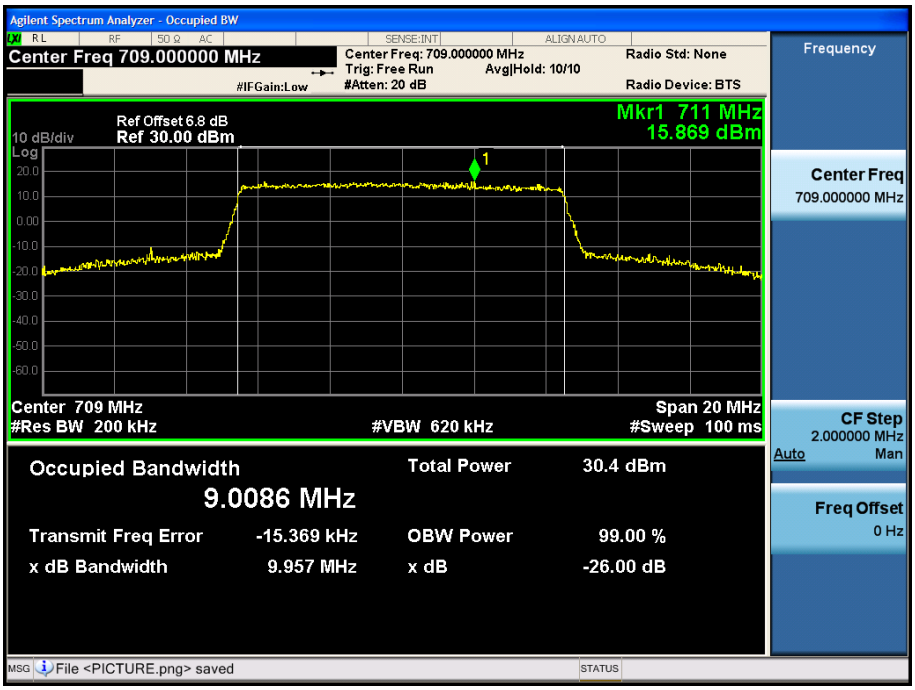
LTE B17 Middle 5MHz



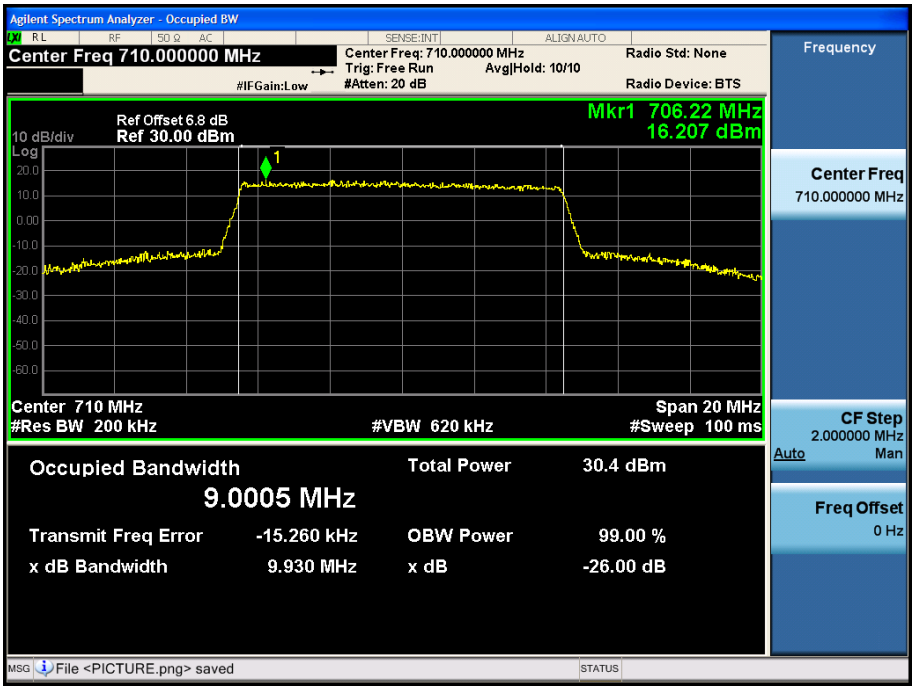
LTE B17 Hightest 5MHz



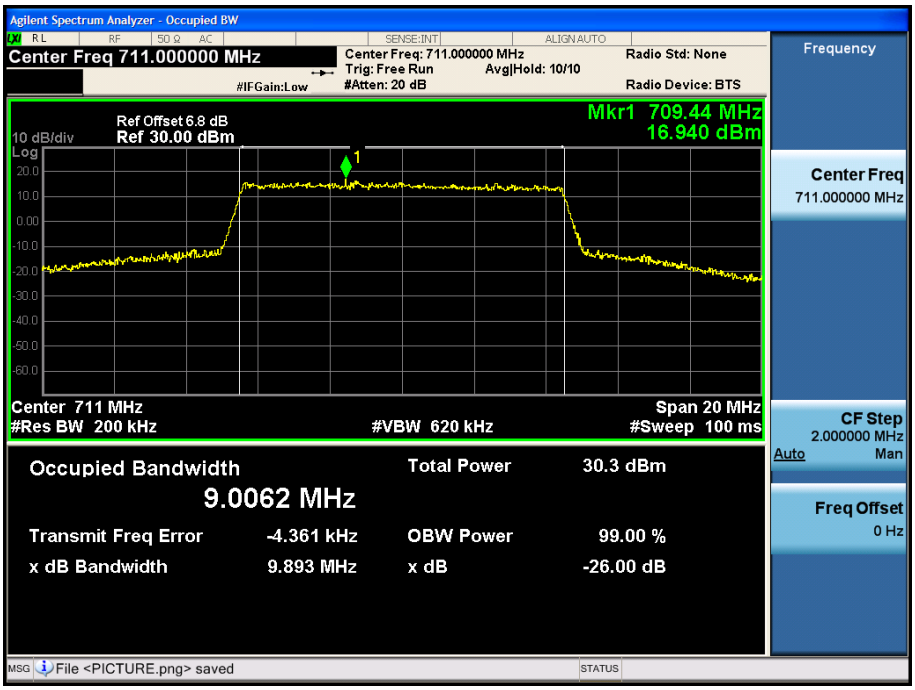
LTE B17 Lowest 10MHz



LTE B17 Middle 10MHz



LTE B17 Hightest 10MHz



5. FREQUENCY STABLITY

5.1 APPLIED PROCEDURES / LIMIT

Section	Test Item	Limit	Result
27.53(g)	Frequency stability	± 2.5 ppm	PASS

5.1.1 TEST PROCEDURE

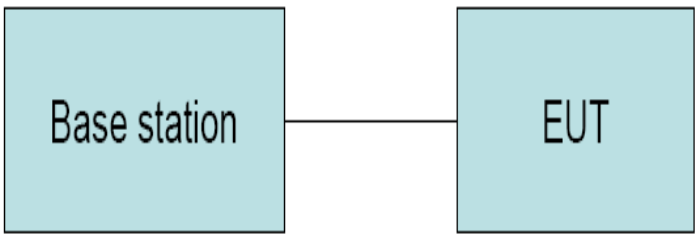
Test Procedures for Temperature Variation:
1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to -10°C and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 45°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. If the EUT can not be turned on at -10°C, the testing lowest temperature will be raised in 10°C step until the EUT can be turned on.

Test Procedures for Voltage Variation
1. The EUT was placed in a temperature chamber at 25±5° C and connected with the base station.
2. The power supply voltage to the EUT was varied from DC 5V to 3.5V
3. The variation in frequency was measured for the worst case.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

EUT：	Rugged Smartphone	Model Name ：	DK66
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC 5Vfrom adapter
Test Mode ：	LTE B17		

Test Conditions		(QPSK) / Middle Channel(1420MHz)		Limit
Temperature (°C)	Voltage (Volt)	BW 10MHz		Note
		Deviation (Hz)	Deviation (ppm)	Result
50°C	Normal Voltage	12	0.0085	PASS
30°C	Normal Voltage	16	0.0113	
20°C	Normal Voltage	13	0.0092	
10°C	Normal Voltage	-9	-0.0063	
0°C	Normal Voltage	-15	-0.0106	
-10°C	Normal Voltage	16	0.0113	
-20°C	Normal Voltage	11	0.0077	
-30°C	Normal Voltage	16	0.0113	
25°C	Maximum Voltage	-12	-0.0085	
25°C	Normal Voltage	-16	-0.0113	
25°C	Minimum Voltage	-13	-0.0092	

6. CONDUCTED SPURIOUS EMISSIONS

6.1 APPLIED PROCEDURES / LIMIT

Section	Test Item	Limit	Result
27.53(g)	Conducted spurious emissions	−13dBm	PASS

6.1.1 TEST PROCEDURE

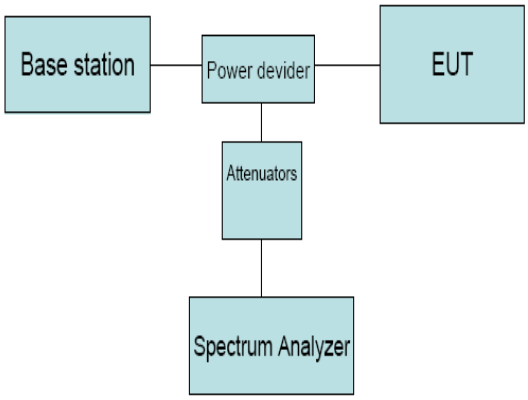
1. The EUT was connected to spectrum analyzer and base station via power divider.

2. The low, middle and high channels of each band and mode's spurious emissions for 30MHz to 10th Harmonic were measured by Spectrum analyzer.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



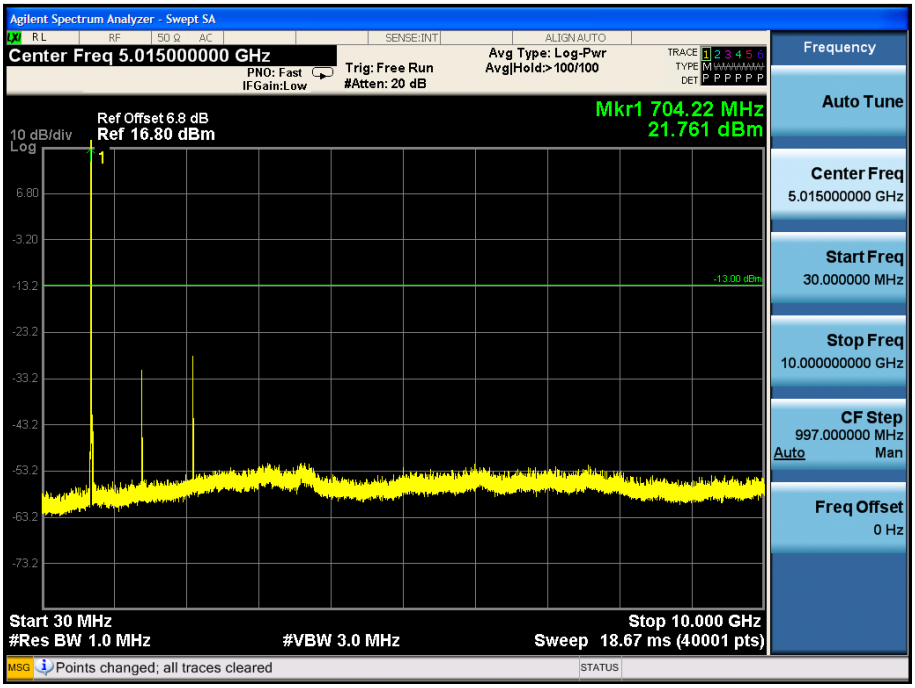
6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

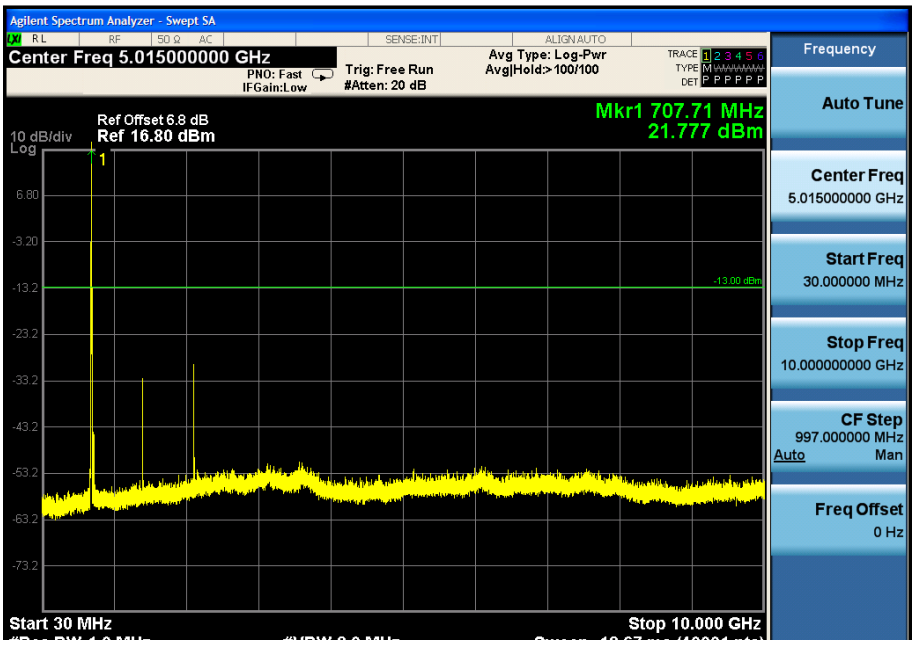
6.1.5 TEST RESULTS

NOTE: ALL MODE HAS BEEN TESTED, ONLY WORST DATA SHOWN IN THIS REPORT.

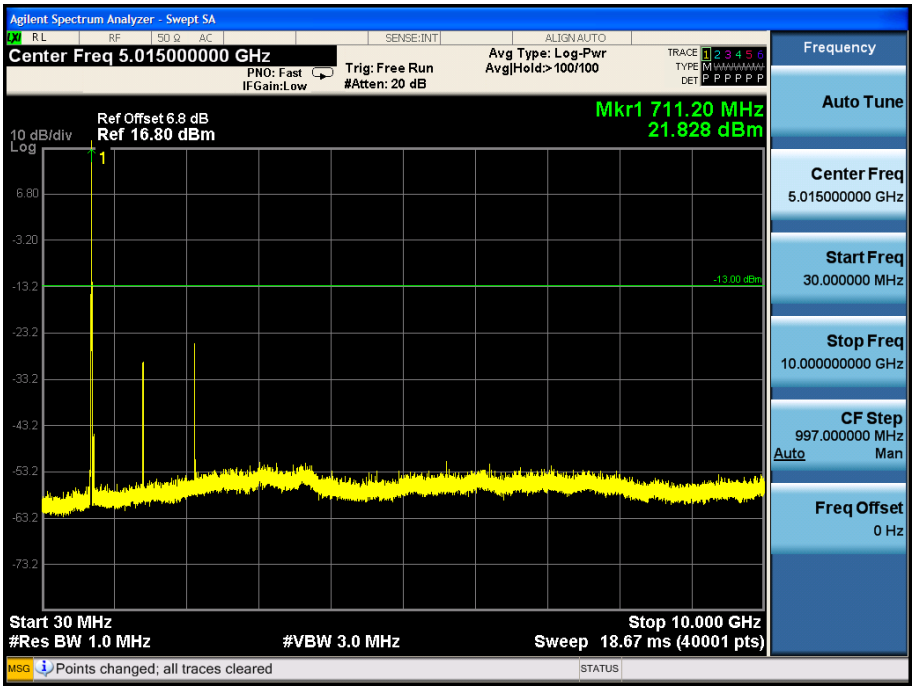
Lowest 5MHz QPSK



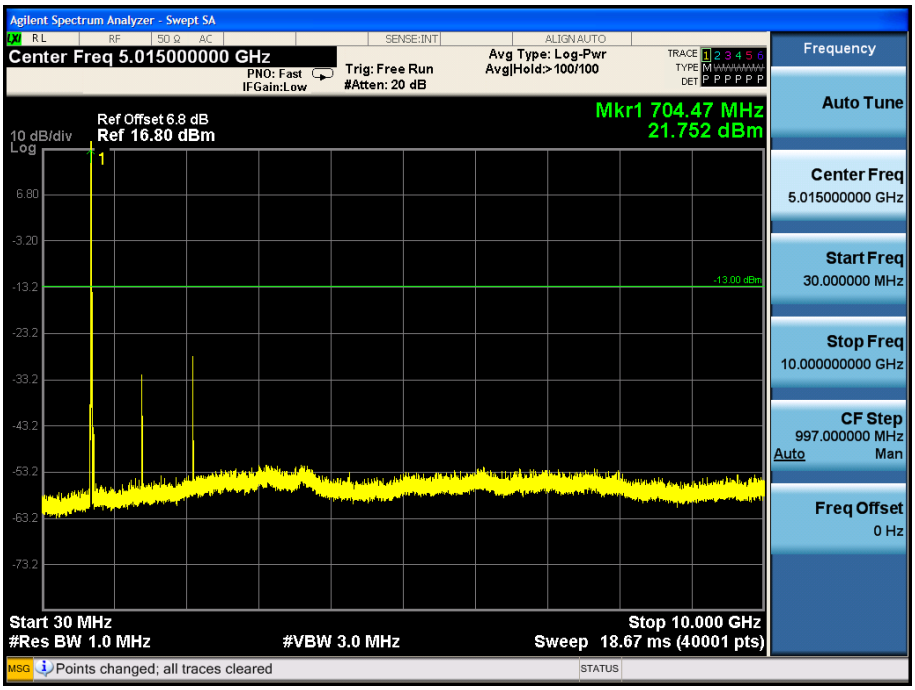
Middle 5MHz QPSK



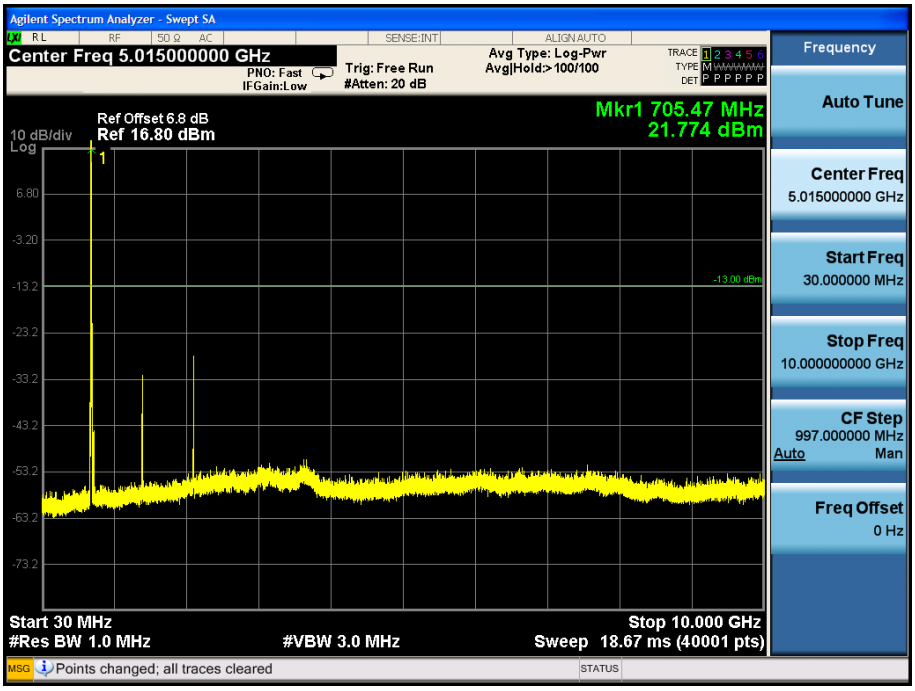
Highest 5MHz QPSK



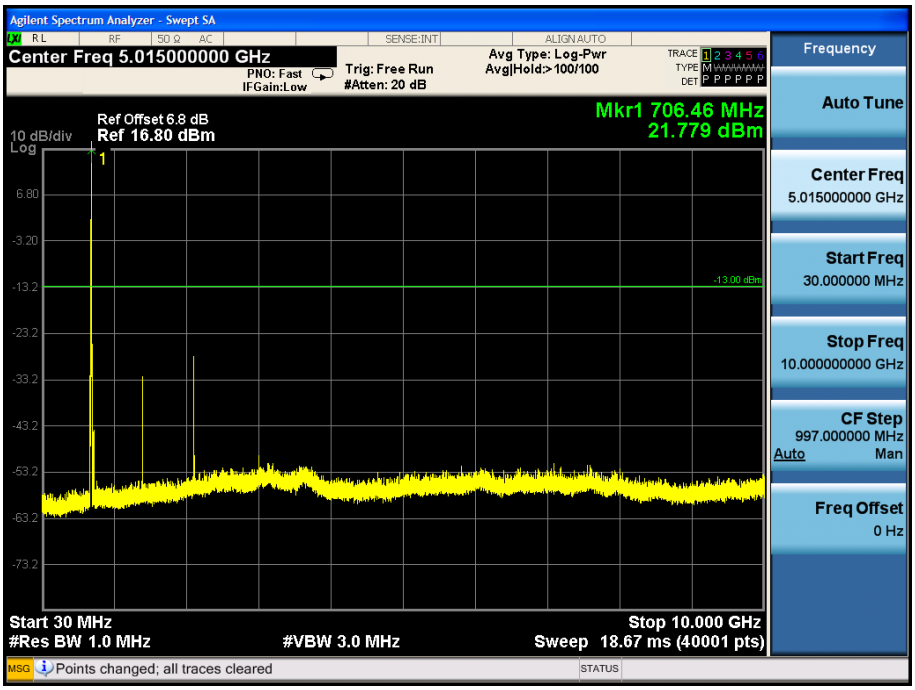
Lowest 10 MHz QPSK



Middle 10 MHz QPSK



Highest 10 MHz QPSK



7. RADIATED SPURIOUS EMISSIONS

7.1 APPLIED PROCEDURES / LIMIT

Section	Test Item	Limit	Result
27.53(g)	Radiated Spurious emissions	-13dBm	PASS

7.1.1 TEST PROCEDURE

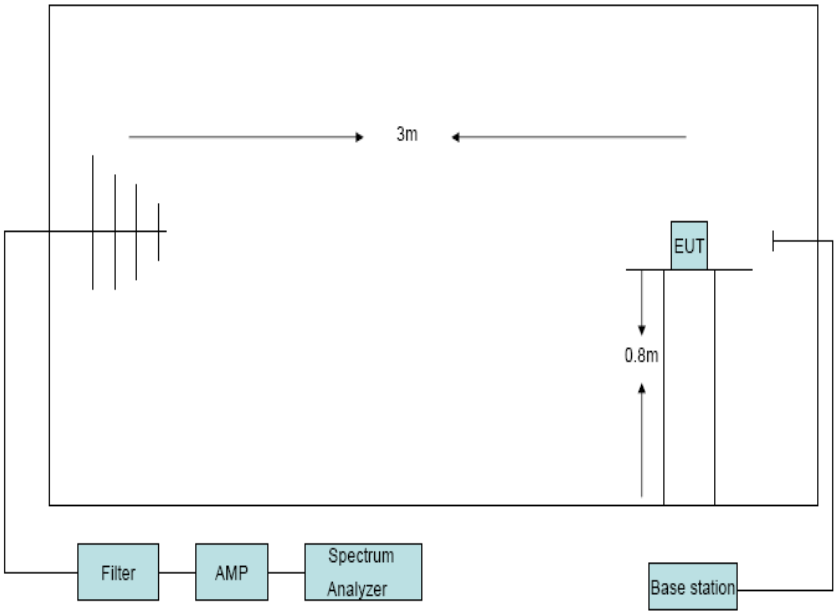
1. The EUT was placed on an non-conductive rotating platform with 0.8 meter height in an anechoic chamber. The radiated spurious emissions from 30MHz to 10th harmonious of fundamental frequency were measured at 3m with a test antenna and a spectrum analyzer with RBW= 1MHz,VBW= 1MHz ,peak detector settings.
2. During the measurement, the EUT was enforced in maximum power and linked with a base station. All the spurious emissions (record as LVL) at 3m were measured by rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
3. Final spurious emissions levels were measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (for frequency below 1GHz) or Horn antenna (for frequency above 1GHz) at same location with same polarize of receiver antenna and then a known power of each measure frequency from S.G. was applied into the dipole antenna or Horn antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain –Substitution antenna Loss(only for Dipole antenna) - Analyzer reading. Then final

   spurious emissions were calculated with the correction factor, EIRP= LVL + Correction factor and ERP = EIRP – 2.15

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 TEST RESULTS

NOTE: ALL MODE HAS BEEN TESTED, ONLY WORST DATA SHOWN IN THIS REPORT.

Test result for Lowest Channel QPSK 5MHz						
Frequency (MHz)	Antenna polarization	LVL (dBm)	Correction factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)
2532.9	H	-53.28	4.25	-49.03	-13.00	36.03
1413	H	-41.69	2.76	-38.93	-13.00	25.93
2532.9	V	-53.63	4.25	-49.38	-13.00	36.38
1413	V	-41.73	2.76	-38.97	-13.00	25.97
/	/	/	/	/	/	/

Test result for Highest Channel QPSK 5MHz						
Frequency (MHz)	Antenna polarization	LVL (dBm)	Correction factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)
2532.9	H	-55.27	4.25	-51.02	-13.00	38.02
1427	H	-41.67	2.78	-38.89	-13.00	25.89
2532.9	V	-53.53	4.25	-49.28	-13.00	36.28
1427	V	-40.39	2.78	-37.61	-13.00	24.61
/	/	/	/	/	/	/

Test result for Lowest Channel 16QAM 5MHz						
Frequency (MHz)	Antenna polarization	LVL (dBm)	Correction factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)
2532.9	H	-55.26	4.25	-51.01	-13.00	38.01
1413	H	-41.14	2.76	-38.38	-13.00	25.38
2532.9	V	-53.09	4.25	-48.84	-13.00	35.84
1413	V	-40.23	2.76	-37.47	-13.00	24.47
/	/	/	/	/	/	/

Test result for Highest Channel 16QAM 5MHz						
Frequency (MHz)	Antenna polarization	LVL (dBm)	Correction factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)
2532.9	H	-56.12	4.25	-51.87	-13.00	38.87
1427	H	-41.05	2.78	-38.27	-13.00	25.27
2532.9	V	-53.66	4.25	-49.41	-13.00	36.41
1427	V	-41.11	2.78	-38.33	-13.00	25.33
/	/	/	/	/	/	/

Note: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

8. BAND EDGE

8.1 APPLIED PROCEDURES / LIMIT

Section	Test Item	Limit	Result
27.53(g)	Band edge	−13dBm	PASS

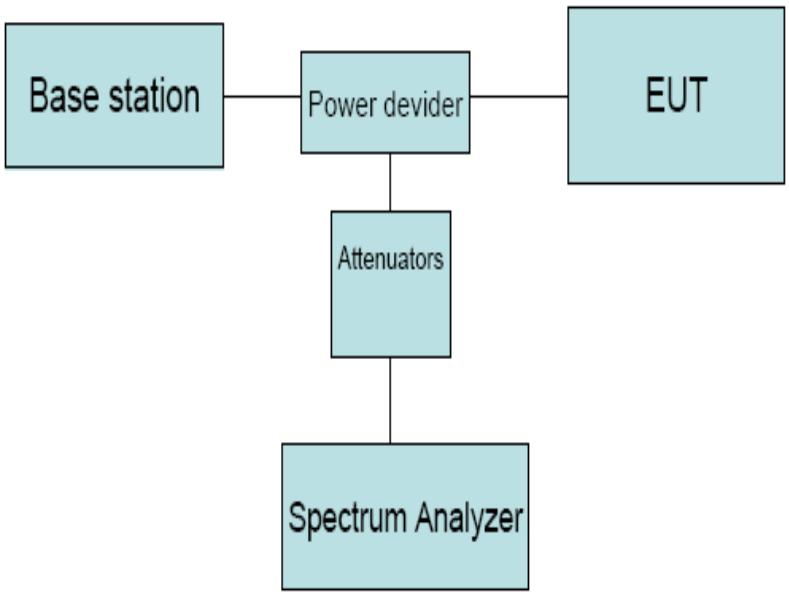
8.1.1 TEST PROCEDURE

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The band edges of low and high channels for the highest RF powers were measured.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



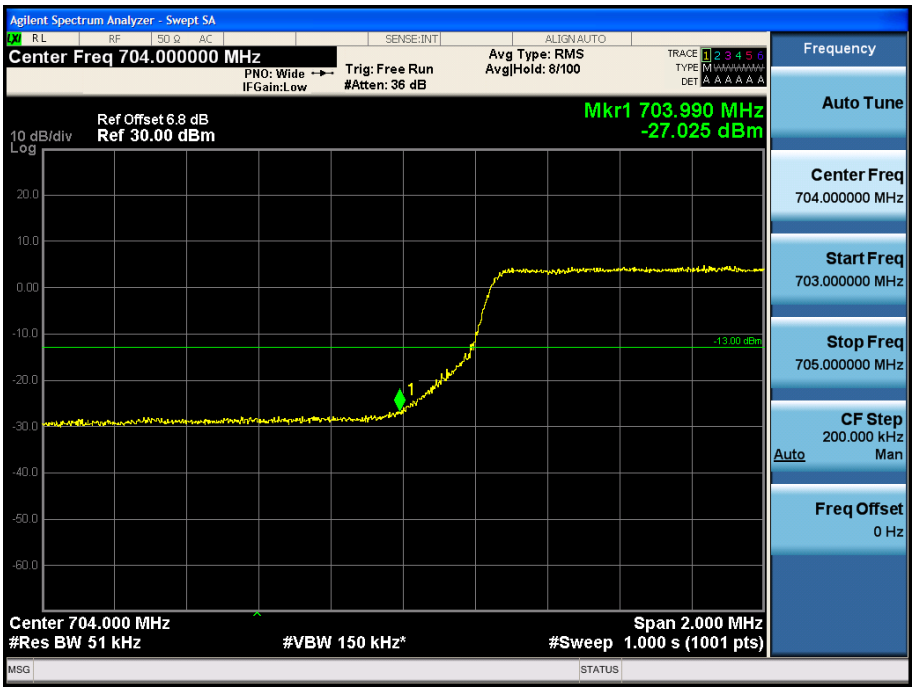
8.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

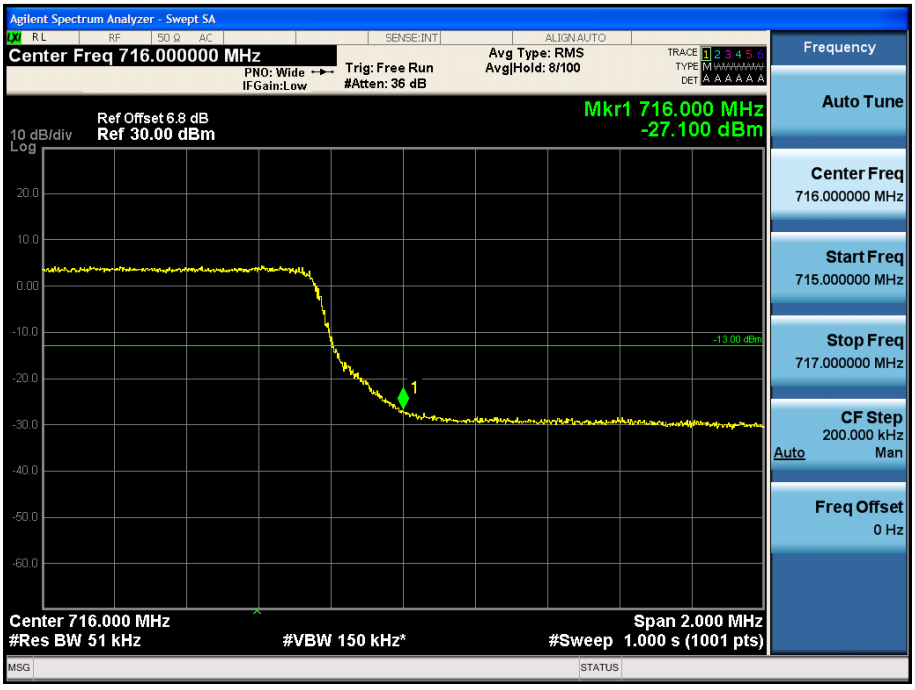
8.1.5 TEST RESULTS

NOTE: ALL MODE HAS BEEN TESTED, ONLY WORST DATA SHOWN IN THIS REPORT.

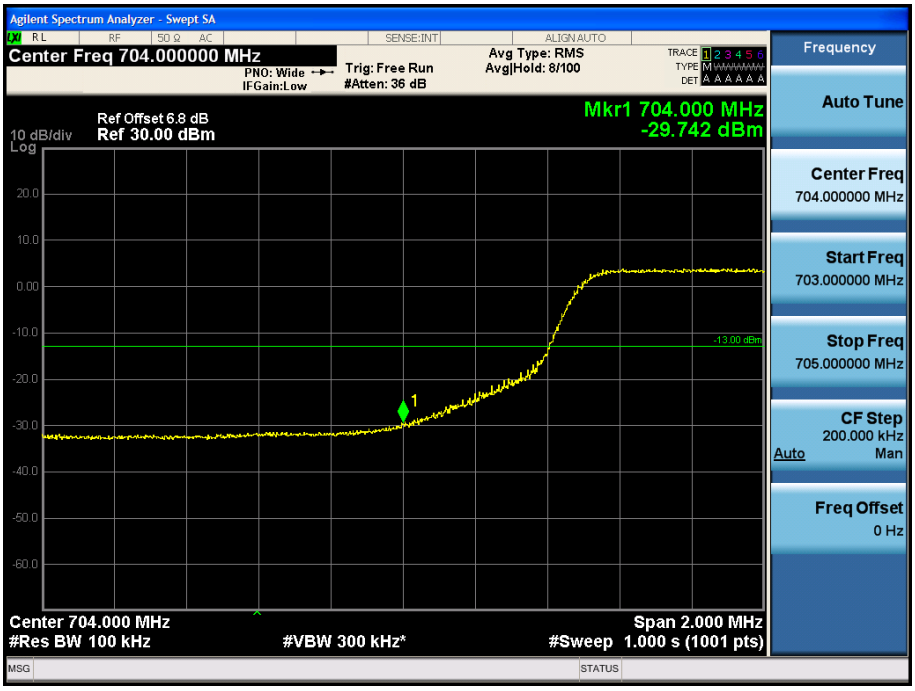
Lowest Channel 5MHz QPSK



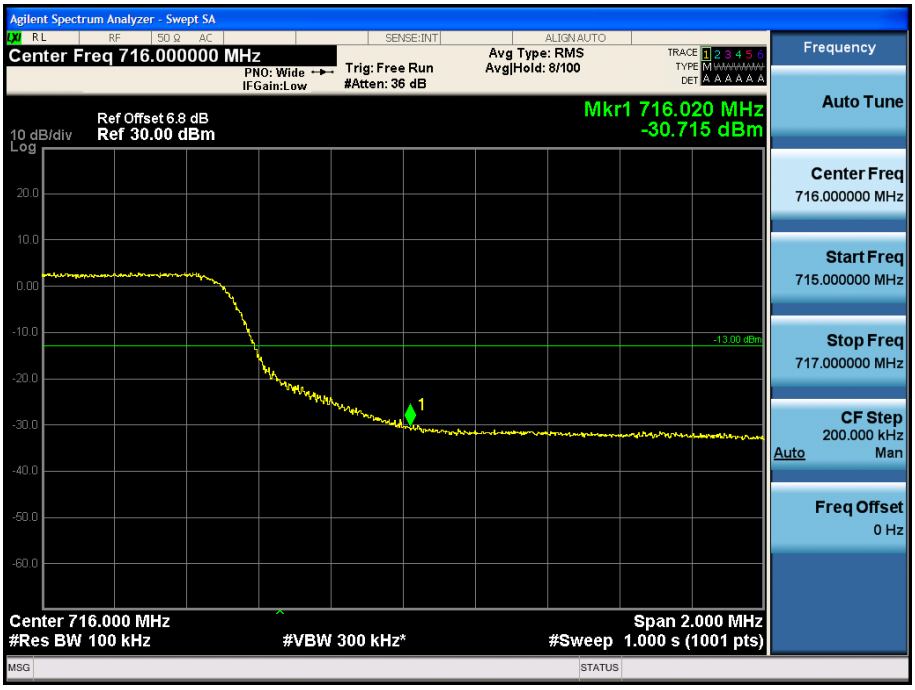
Highest Channel 5MHz QPSK



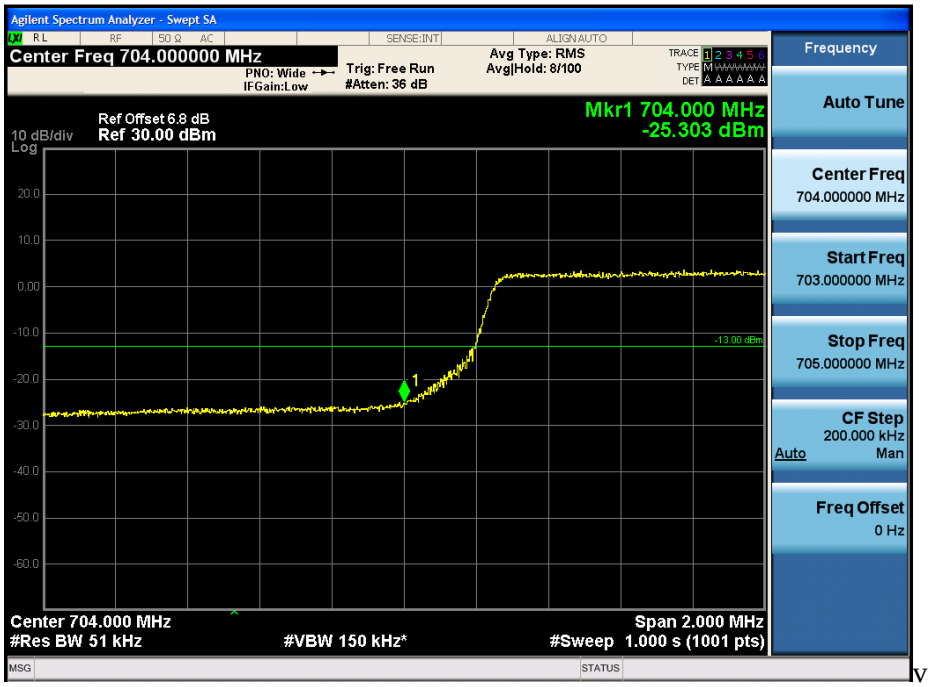
Lowest Channel 10MHz QPSK



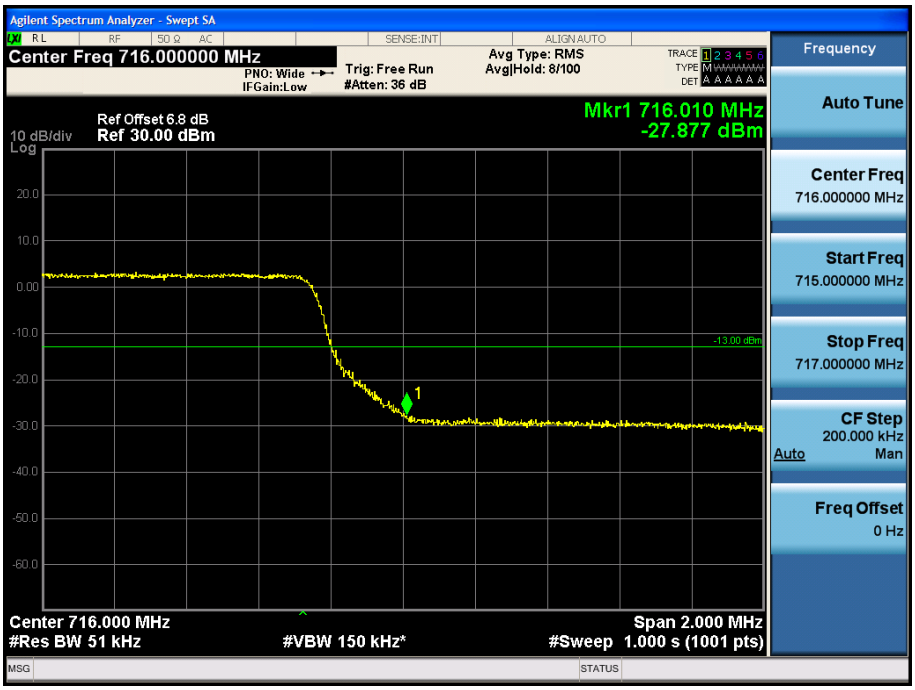
Highest Channel 10MHz QPSK



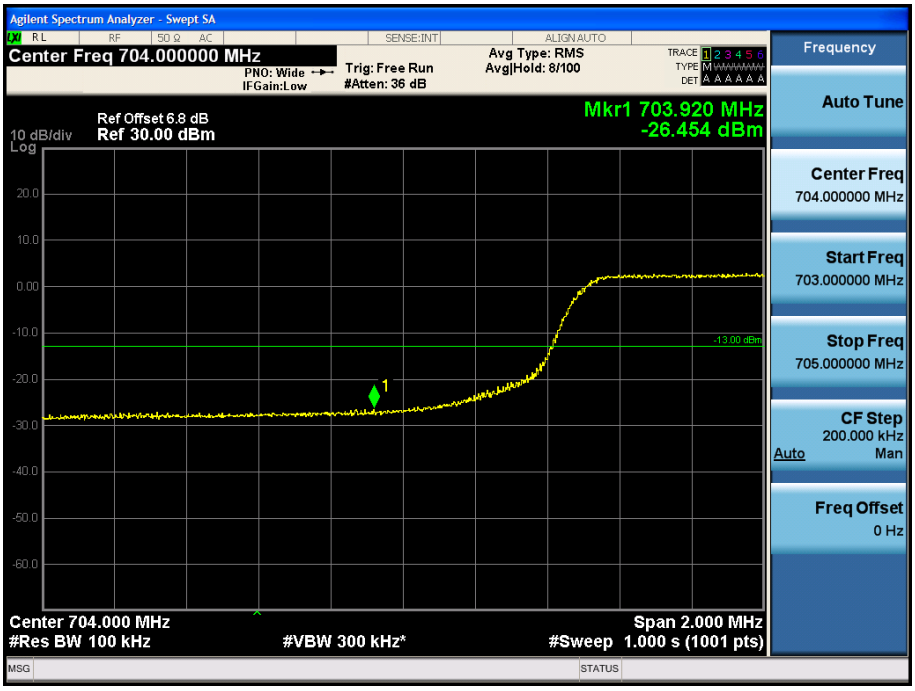
Lowest Channel 5MHz 16QAM



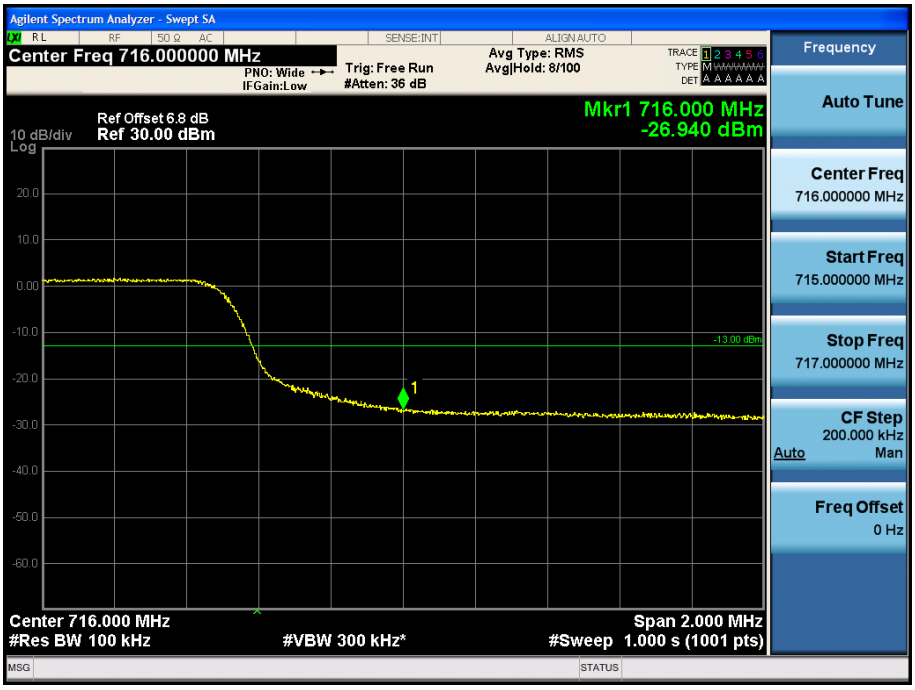
Highest Channel 5MHz 16QAM



Lowest Channel 10MHz 16QAM



Highest Channel 10MHz 16QAM



END OF REPORT