Microtest
微测检测

# Test Report

FCC ID :2AMKU-DK66

Date of issue: Jun. 16, 2017

| | |
|---|---|
| Report Number: | MTi170621E133 |
| Sample Description: | Rugged Smartphone |
| Model(s): | DK66 |
| 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.
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# 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 Part15.247 |
| Test procedure ..... | ANSI C63.10-2013 |

Tested by: Ace Chai

Ace Chai Jun. 15, 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:

| FCC Part15 (15.247) , Subpart C | | | |
|---|---|---|---|
| Standard Section | Test Item | Judgment | Remark |
| 15.207 | Conducted Emission | PASS | |
| 15.247 (a)(2) | 6dB Bandwidth | PASS | |
| 15.247 (b) | Peak Output Power | PASS | |
| 15.247 (c) | Radiated Spurious Emission | PASS | |
| 15.247 (d) | Power Spectral Density | 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 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<br>Operation Frequency: BLE 2402-2480MHz<br>Modulation Type: GFSK<br>Bit Rate of Transmitter 1Mbps<br>Number Of Channel 40<br>Antenna Designation: Please see Note 3.<br>Output Power(Conducted): BLE: -2.48 dBm (Max.)<br>Antenna Gain (dBi) -0.76dbi<br>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- 5200ZY<br>AC Power Input: 100-240V~50/60Hz 0.3A MAX<br>Output :5V DC, 2000mA |
| Battery | Model:EU955164PV 3.8V 4600mAh |
| 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.

| Channel List for BLE | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 01 | 2402 | -- | --- | 20 | 2440 | 38 | 2476 |
| 02 | 2404 | -- | --- | -- | --- | 39 | 2478 |
| 03 | 2406 | 19 | 2438 | -- | --- | 40 | 2480 |

3.

Table for Filed Antenna

| Ant. | Brand | Model Name | Antenna Type | Connector | Gain (dBi) | NOTE |
|---|---|---|---|---|---|---|
| A | N/A | N/A | integrated antenna | - | -0.76dBi | BT 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 | BLE CH1/ CH20/ CH40 |
| Mode 2 | Link Mode |

| **For Conducted Emission** | |
|---|---|
| Final Test Mode | Description |
| Mode 2 | Link Mode |

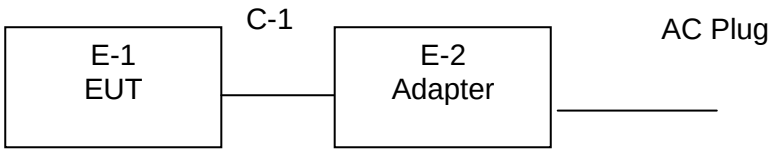
| **For Radiated Emission** | |
|---|---|
| Final Test Mode | Description |
| Mode 1 | BLE CH1/ CH20/ CH40 |

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 | DragonKing | 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 | 2017/11/4 |
| 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. EMC EMISSION TEST

## 3.1 CONDUCTED EMISSION MEASUREMENT

### 3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

| FREQUENCY (MHz) | Class A (dBuV) | | Class B (dBuV) | | Standard |
|---|---|---|---|---|---|
| | Quasi-peak | Average | Quasi-peak | Average | |
| 0.15 -0.5 | 79.00 | 66.00 | 66 - 56 * | 56 - 46 * | CISPR |
| 0.50 -5.0 | 73.00 | 60.00 | 56.00 | 46.00 | CISPR |
| 5.0 -30.0 | 73.00 | 60.00 | 60.00 | 50.00 | CISPR |

| | | | | | |
|---|---|---|---|---|---|
| 0.15 -0.5 | 79.00 | 66.00 | 66 - 56 * | 56 - 46 * | FCC |
| 0.50 -5.0 | 73.00 | 60.00 | 56.00 | 46.00 | FCC |
| 5.0 -30.0 | 73.00 | 60.00 | 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 |

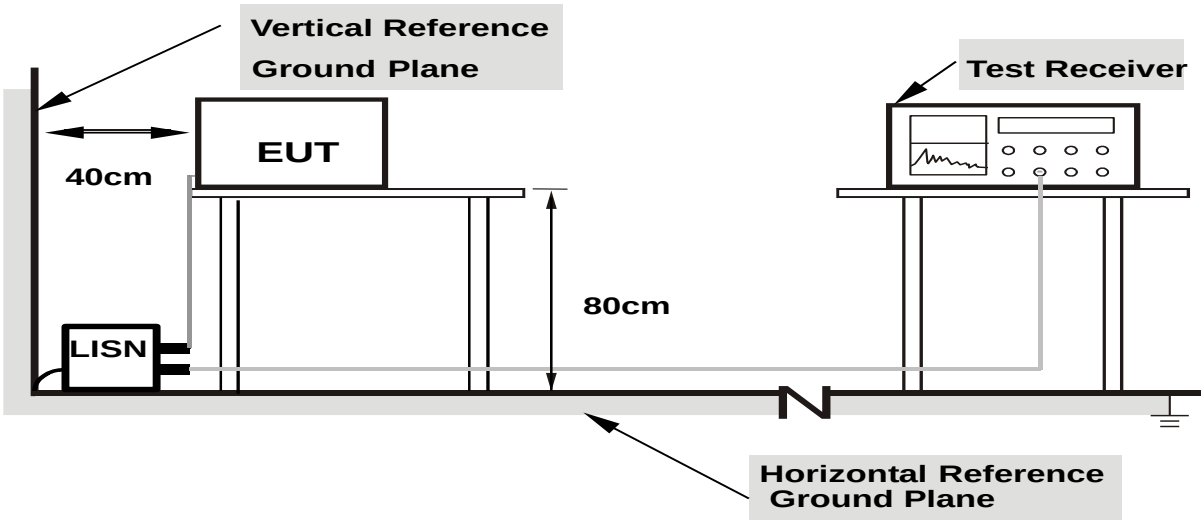
### 3.1.2 TEST PROCEDURE

a. The EUT was placed 0.8 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



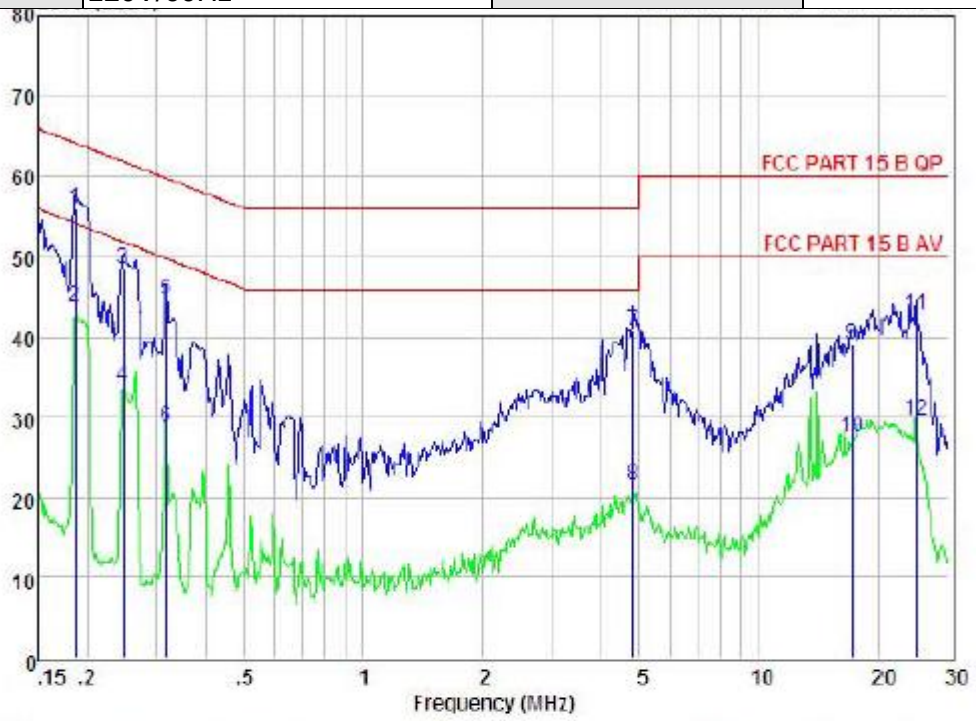

**Note: 1.Support units were connected to second LISN.**
**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

### 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： | Rugged Smartphone | Model Name. ： | DK66 |
|---|---|---|---|
| Temperature： | 26 ℃ | Relative Humidity： | 54% |
| Pressure： | 1010hPa | Phase： | L |
| Test Voltage ： | DC 5Vfrom adapter AC 120V/60Hz | Test Mode： | Mode 5 |

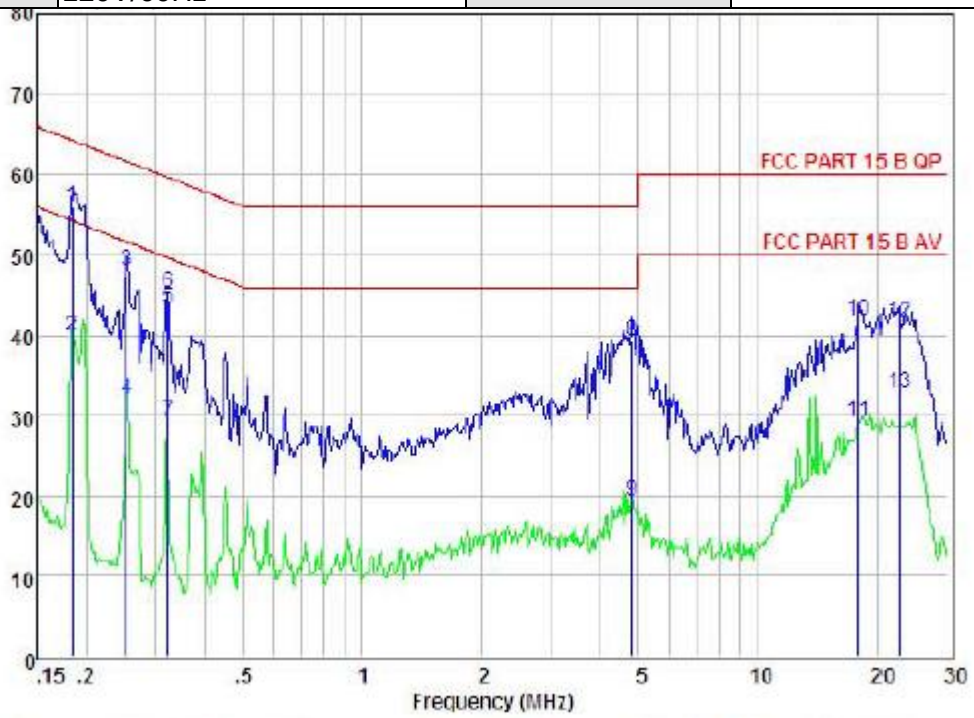



Condition : FCC PART 15 B QP POL: LINE Temp: 23.1℃ Hum: 48 %
EUT :
Model No :
Test Mode :
Power :
Test Engineer :
Remark :

| Item | Freq | Read Level | LISN Factor | Preamp Factor | Cable Loss | Level | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dBuV | dBuV | dBuV | |
| 1 | 0.186 | 46.28 | 0.03 | -9.52 | 0.10 | 55.93 | 64.20 | -8.27 | QP |
| 2 | 0.186 | 34.15 | 0.03 | -9.52 | 0.10 | 43.80 | 54.20 | -10.40 | Average |
| 3 | 0.247 | 38.81 | 0.03 | -9.52 | 0.10 | 48.46 | 61.86 | -13.40 | QP |
| 4 | 0.247 | 24.15 | 0.03 | -9.52 | 0.10 | 33.80 | 51.86 | -18.06 | Average |
| 5 | 0.317 | 34.93 | 0.03 | -9.56 | 0.10 | 44.62 | 59.80 | -15.18 | QP |
| 6 | 0.317 | 19.12 | 0.03 | -9.56 | 0.10 | 28.81 | 49.80 | -20.99 | Average |
| 7 | 4.822 | 30.63 | 0.10 | -9.91 | 0.12 | 40.76 | 56.00 | -15.24 | QP |
| 8 | 4.822 | 11.27 | 0.10 | -9.91 | 0.12 | 21.40 | 46.00 | -24.60 | Average |
| 9 | 17.291 | 28.64 | 0.28 | -9.82 | 0.30 | 39.04 | 60.00 | -20.96 | QP |
| 10 | 17.291 | 17.14 | 0.28 | -9.82 | 0.30 | 27.54 | 50.00 | -22.46 | Average |
| 11 | 24.790 | 31.95 | 0.46 | -9.82 | 0.47 | 42.70 | 60.00 | -17.30 | QP |
| 12 | 24.790 | 18.94 | 0.46 | -9.82 | 0.47 | 29.69 | 50.00 | -20.31 | Average |

Remark: Level = Read Level + LISN Factor - Preamp Factor + Cable Loss

| EUT： | Rugged Smartphone | Model Name. ： | DK66 |
|---|---|---|---|
| Temperature： | 26 ℃ | Relative Humidity： | 54% |
| Pressure： | 1010hPa | Phase： | N |
| Test Voltage ： | DC 5Vfrom adapter AC 120V/60Hz | Test Mode： | Mode 5 |




Condition : FCC PART 15 B QP POL: NEUTRAL Temp: 23.1℃ Hum: 48 %
EUT :
Model No :
Test Mode :
Power :
Test Engineer :
Remark :

| Item | Freq | Read Level | LISN Factor | Preamp Factor | Cable Loss | Level | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dBuV | dBuV | dBuV | |
| 1 | 0.184 | 46.34 | 0.03 | -9.52 | 0.10 | 55.99 | 64.28 | -8.29 | QP |
| 2 | 0.184 | 30.82 | 0.03 | -9.52 | 0.10 | 39.97 | 54.28 | -14.31 | Average |
| 3 | 0.253 | 38.34 | 0.03 | -9.56 | 0.10 | 46.03 | 61.64 | -13.61 | QP |
| 4 | 0.253 | 22.35 | 0.03 | -9.56 | 0.10 | 32.04 | 51.64 | -19.60 | Average |
| 5 | 0.322 | 33.60 | 0.03 | -9.56 | 0.10 | 43.29 | 59.66 | -16.37 | QP |
| 6 | 0.322 | 35.60 | 0.03 | -9.56 | 0.10 | 45.29 | 59.66 | -14.37 | QP |
| 7 | 0.322 | 19.53 | 0.03 | -9.56 | 0.10 | 29.22 | 49.66 | -20.44 | Average |
| 8 | 4.822 | 29.11 | 0.10 | -9.91 | 0.12 | 39.24 | 56.00 | -16.76 | QP |
| 9 | 4.822 | 9.26 | 0.10 | -9.91 | 0.12 | 19.39 | 46.00 | -26.61 | Average |
| 10 | 18.039 | 31.48 | 0.29 | -9.82 | 0.32 | 41.91 | 60.00 | -18.09 | QP |
| 11 | 18.039 | 18.77 | 0.29 | -9.82 | 0.32 | 29.20 | 50.00 | -20.80 | Average |
| 12 | 22.655 | 30.91 | 0.41 | -9.81 | 0.42 | 41.55 | 60.00 | -18.45 | QP |
| 13 | 22.655 | 22.14 | 0.41 | -9.81 | 0.42 | 32.78 | 50.00 | -17.22 | Average |

Remark: Level = Read Level + LISN Factor - Preamp Factor + Cable Loss

## 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 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB (emission in restricted 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:

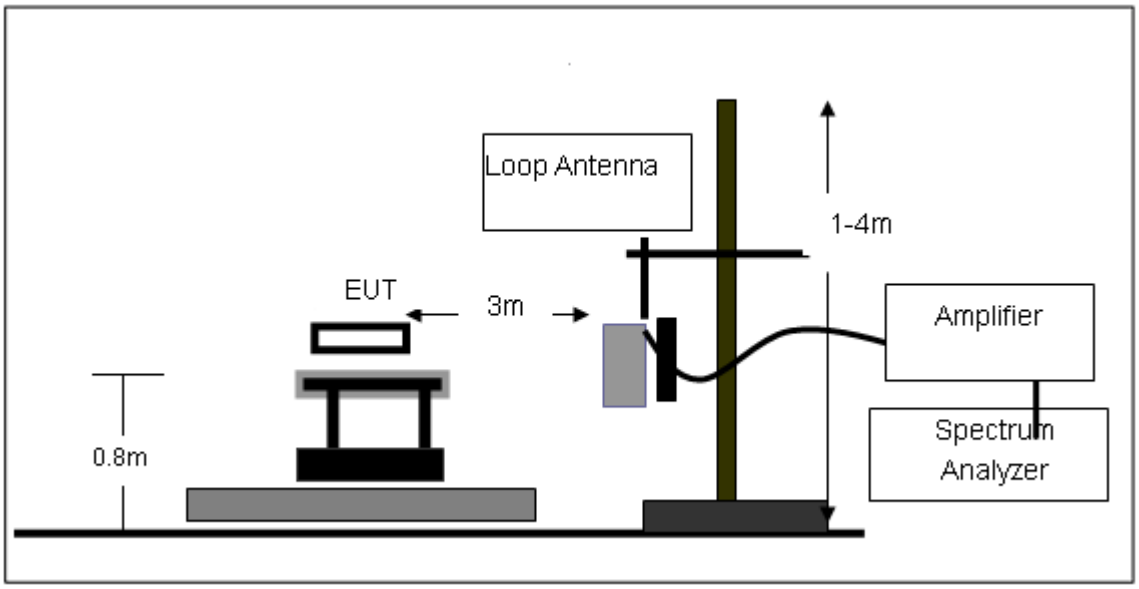
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

### 3.2.3 DEVIATION FROM TEST STANDARD

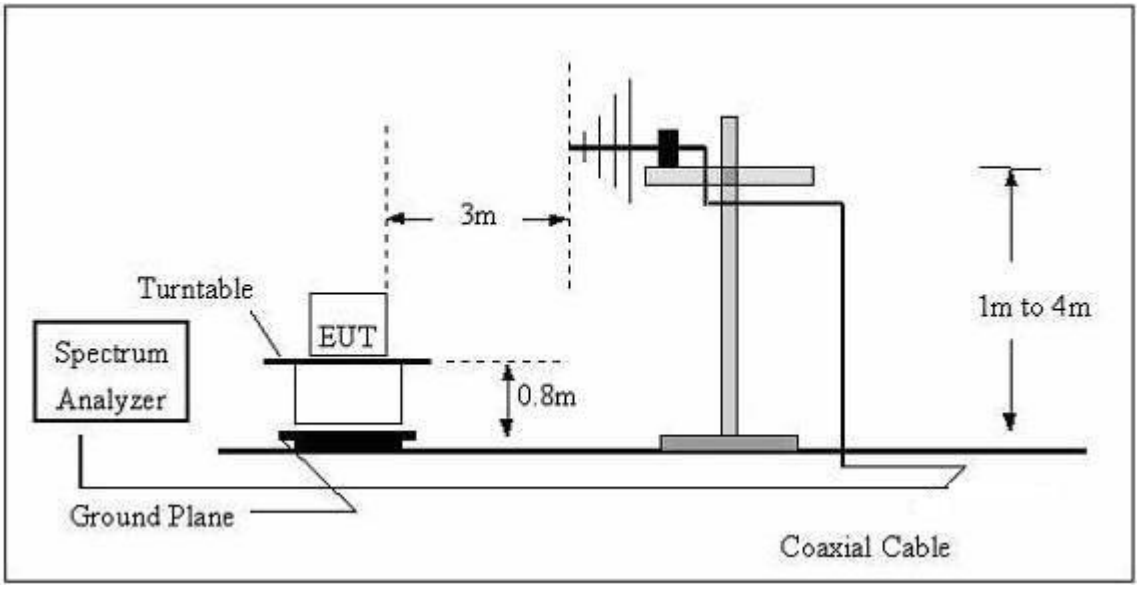
No deviation

### 3.2.4 TEST SETUP

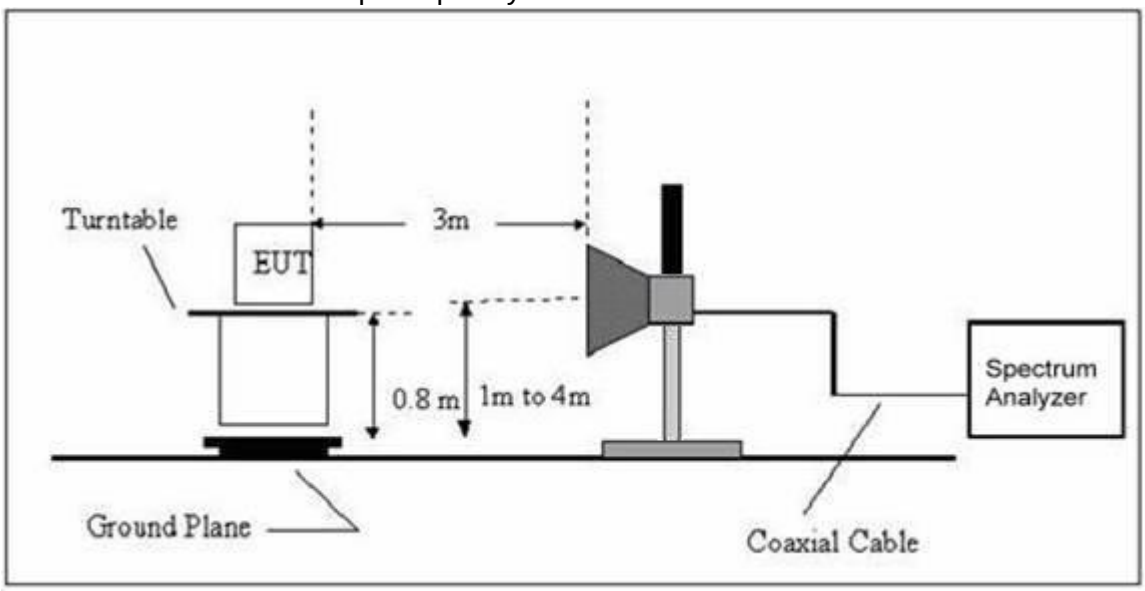
（A）Radiated Emission Test-Up Frequency Below 30MHz




（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 (BETWEEN 9KHZ – 30 MHZ)

| | | | |
|---|---|---|---|
| EUT： | Rugged Smartphone | Model Name. ： | DK66 |
| Temperature： | 20 ℃ | Relative Humidtity： | 48% |
| Pressure： | 1010 hPa | Test Voltage ： | DC 5Vfrom adapter AC 120V/60Hz |
| Test Mode ： | TX | Polarization : | -- |

| 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 30MHZ – 1GHZ)

| EUT： | Rugged Smartphone | Model Name ： | DK66 |
|---|---|---|---|
| Temperature： | 20 ℃ | Relative Humidity： | 48% |
| Pressure： | 1010 hPa | Test Voltage ： | DC 5Vfrom adapter |
| Test Mode ： | TX | | |

| Polar (H/V) | Frequency (MHz) | Meter Reading (dBuV) | Factor (dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|---|
| V | 119.4360 | 16.13 | 12.08 | 28.21 | 43.5 | 15.29 | QP |
| V | 128.1129 | 16.09 | 12.2 | 28.29 | 43.5 | 15.21 | QP |
| V | 170.7926 | 20.49 | 10.35 | 30.84 | 43.5 | 12.66 | QP |
| V | 341.9786 | 12.27 | 16.19 | 28.46 | 46 | 17.54 | QP |
| V | 468.8761 | 17.39 | 19.69 | 37.08 | 46 | 8.92 | QP |
| V | 935.5462 | 9.27 | 29.42 | 38.69 | 46 | 7.31 | QP |
| H | 170.7923 | 27.51 | 10.35 | 37.86 | 43.5 | 5.64 | QP |
| H | 341.9786 | 25.07 | 16.19 | 41.26 | 46 | 4.74 | QP |
| H | 468.8761 | 21.02 | 19.69 | 40.71 | 46 | 5.29 | QP |
| H | 726.8052 | 14.7 | 26 | 40.7 | 46 | 5.3 | QP |
| H | 813.1114 | 16.24 | 26.35 | 42.59 | 46 | 3.41 | QP |
| H | 854.0247 | 12.41 | 27.51 | 39.92 | 46 | 6.08 | QP |

**Remark:**

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level- Limit

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

Factor added by measurement software automatically

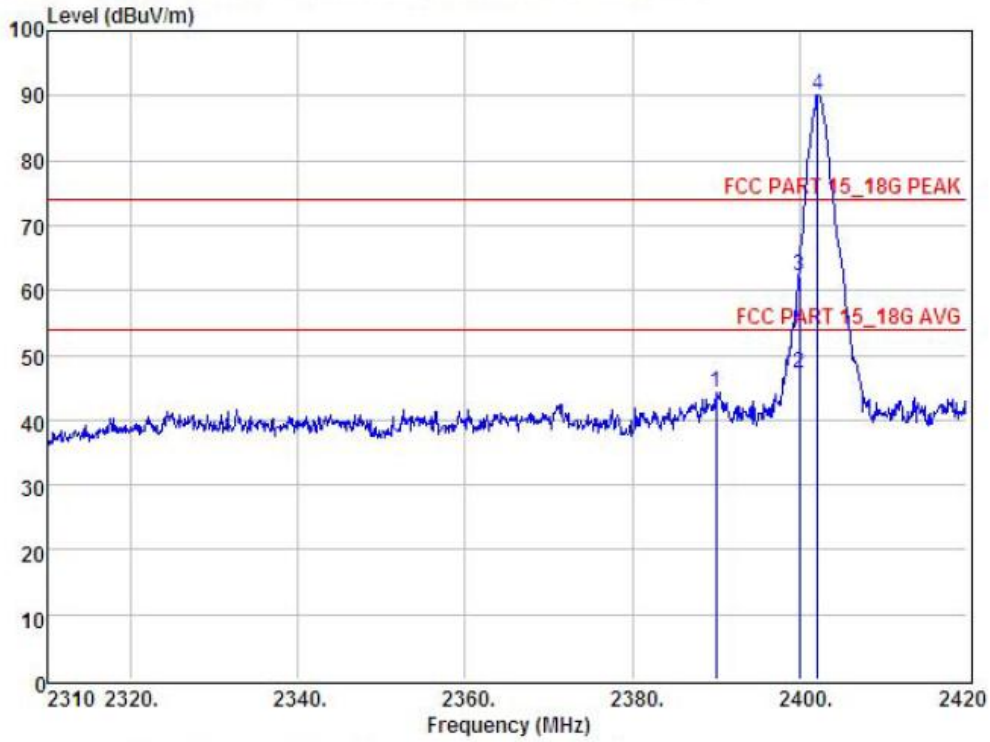
### 3.2.8 TEST RESULTS (1G-25GHZ)

**BLE**

Normal Voltage

| Polar (H/V) | Frequency (MHz) | Meter Reading (dBuV) | Factor (dB) | Emission Level (dBuV/m) | Limits (dBuV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|---|
| **Low Channel (2402 MHz)** | | | | | | | |
| Vertical | 2491.777 | 60.78 | -11.65 | 49.13 | 74 | 24.87 | Pk |
| Horizontal | 2498.247 | 57.68 | -12.73 | 44.95 | 74 | 29.05 | Pk |
| Vertical | 4804.184 | 57.78 | -3.6 | 54.18 | 74 | 19.82 | Pk |
| Horizontal | 4804.184 | 57.78 | -9.23 | 48.55 | 74 | 25.45 | Pk |
| Vertical | 1485.838 | 61.48 | -17.1 | 44.38 | 74 | 29.62 | Pk |
| Vertical | 1636.784 | 61.17 | -16.06 | 45.11 | 74 | 28.89 | Pk |
| Vertical | 2095.928 | 59.98 | -11.88 | 48.1 | 74 | 25.9 | Pk |
| Horizontal | 1074.301 | 61.71 | -19.69 | 42.02 | 74 | 31.98 | Pk |
| Horizontal | 1483.178 | 60.7 | -17.09 | 43.61 | 74 | 30.39 | Pk |
| Horizontal | 1895.832 | 57.72 | -14.25 | 43.47 | 74 | 30.53 | Pk |
| **Mid Channel (2440 MHz)** | | | | | | | |
| Vertical | 2474.777 | 57.4 | -11.65 | 45.75 | 74 | 28.25 | Pk |
| Horizontal | 2474.144 | 58.09 | -9.37 | 48.72 | 74 | 25.28 | Pk |
| Vertical | 4880.425 | 57.47 | -6.15 | 51.32 | 74 | 22.68 | Pk |
| Horizontal | 4880.979 | 57.47 | -6.83 | 50.64 | 74 | 23.36 | Pk |
| Vertical | 1433.535 | 64.46 | -17.12 | 47.34 | 74 | 26.66 | Pk |
| Vertical | 1636.784 | 61.79 | -16.06 | 45.73 | 74 | 28.27 | Pk |
| Vertical | 2284.166 | 55.53 | -12.83 | 42.7 | 74 | 31.3 | Pk |
| Horizontal | 1280.515 | 61.19 | -17.82 | 43.37 | 74 | 30.63 | Pk |
| Horizontal | 1636.784 | 60.02 | -16.06 | 43.96 | 74 | 30.04 | Pk |
| Horizontal | 1892.438 | 60.14 | -14.28 | 45.86 | 74 | 28.14 | Pk |
| **High Channel (2480 MHz MHz)** | | | | | | | |
| Vertical | 2453.883 | 58.06 | -12.91 | 45.15 | 74 | 28.85 | Pk |
| Horizontal | 2453.839 | 58.06 | -11.59 | 46.47 | 74 | 27.53 | Pk |
| Vertical | 4960.325 | 54.57 | -9.22 | 45.35 | 74 | 28.65 | Pk |
| Horizontal | 4960.683 | 54.57 | -3.64 | 50.93 | 74 | 23.07 | Pk |
| Vertical | 1187.688 | 59.09 | -18.27 | 40.82 | 74 | 33.18 | Pk |
| Vertical | 1636.784 | 57.9 | -16.06 | 41.84 | 74 | 32.16 | Pk |
| Vertical | 2084.693 | 55.49 | -11.99 | 43.5 | 74 | 30.5 | Pk |
| Horizontal | 1534.540 | 58.15 | -16.94 | 41.21 | 74 | 32.79 | Pk |
| Horizontal | 1786.985 | 57.86 | -15.04 | 42.82 | 74 | 31.18 | Pk |
| Horizontal | 1892.438 | 57.74 | -14.28 | 43.46 | 74 | 30.54 | Pk |

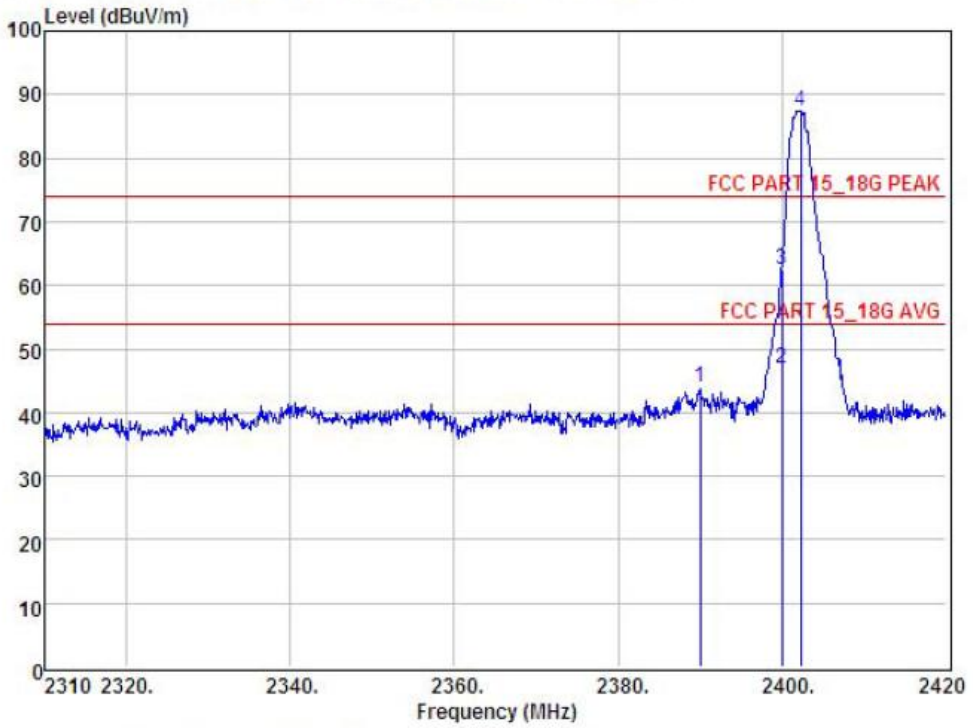
**BAND EDGE(Radiated)**




Condition : FCC PART 15_18G PEAK 3m POL: HORIZONTAL
EUT :
Model No :
Test Mode : GFSK 2402MHz
Power :
Test Engineer :
Remark :
Temp :
Hum :

| Item | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dBuV | dBuV | dBuV | |
| 1 | 2390.00 | 47.67 | 27.62 | 34.97 | 3.92 | 44.24 | 74.00 | -29.76 | Peak |
| 2 | 2400.00 | 50.49 | 27.62 | 34.97 | 3.94 | 47.08 | 54.00 | -6.92 | Average |
| 3 | 2400.00 | 65.49 | 27.62 | 34.97 | 3.94 | 62.08 | 74.00 | -11.92 | Peak |
| 4 | 2402.18 | 93.47 | 27.62 | 34.97 | 3.94 | 90.06 | 74.00 | 16.06 | Peak |

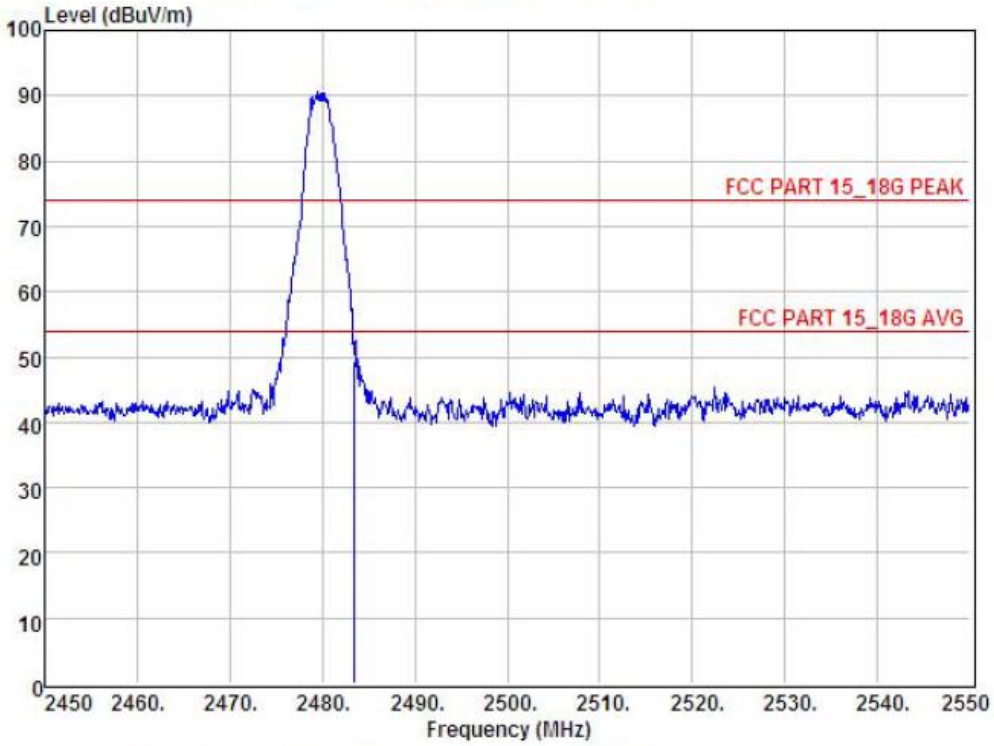
Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss




Condition : FCC PART 15_18G PEAK 3m POL: VERTICAL
EUT :
Model No :
Test Mode : GFSK 2402MHz
Power :
Test Engineer :
Remark :
Temp :
Hum :

| Item | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dBuV | dBuV | dBuV | |
| 1 | 2390.00 | 47.36 | 27.62 | 34.97 | 3.92 | 43.93 | 74.00 | -30.07 | Peak |
| 2 | 2400.00 | 50.26 | 27.62 | 34.97 | 3.94 | 46.85 | 54.00 | -7.15 | Average |
| 3 | 2400.00 | 65.93 | 27.62 | 34.97 | 3.94 | 62.52 | 74.00 | -11.48 | Peak |
| 4 | 2402.29 | 90.88 | 27.62 | 34.97 | 3.94 | 87.47 | 74.00 | 13.47 | Peak |

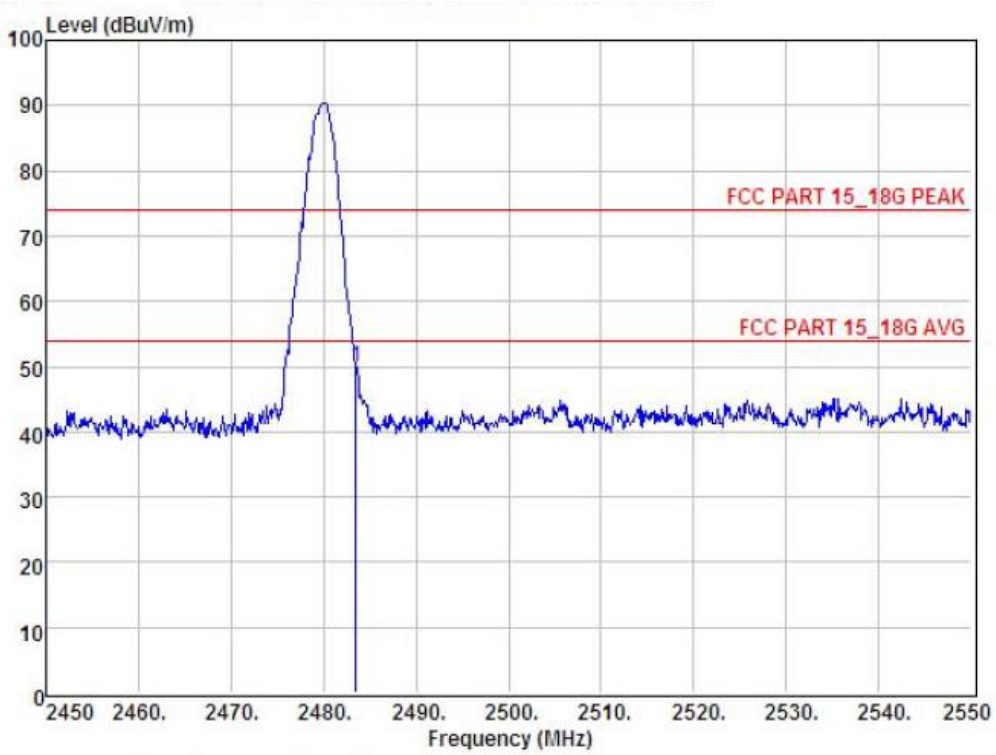
Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss




Condition : FCC PART 15_18G PEAK 3m POL: HORIZONTAL
EUT :
Model No :
Test Mode : GFSK 2480MHz
Power :
Test Engineer :
Remark :
Temp :
Hum :

| Item | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dBuV | dBuV | dBuV | |
| 1 | 2483.50 | 52.67 | 27.59 | 34.97 | 4.00 | 49.29 | 74.00 | -24.71 | Peak |

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss




Condition : FCC PART 15_18G PEAK 3m POL: VERTICAL
EUT :
Model No :
Test Mode : GFSK 2480MHz
Power :
Test Engineer :
Remark :
Temp :
Hum :

| Item | Freq | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Level | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB | dB | dBuV | dBuV | dBuV | |
| 1 | 2483.50 | 53.37 | 27.59 | 34.97 | 4.00 | 49.99 | 74.00 | -24.01 | Peak |

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

NOTE:The PK value is less than the AV value, AV value is not required.

# 4. POWER SPECTRAL DENSITY TEST

## 4.1 APPLIED PROCEDURES / LIMIT

| FCC Part15 (15.247) , Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247 | Power Spectral Density | 8 dBm (in any 3KHz) | 2400-2483.5 | PASS |

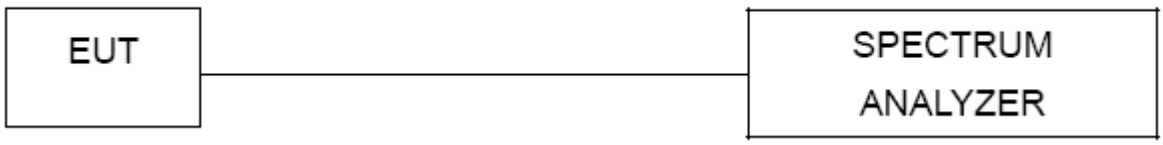
### 4.1.1 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW ≥ 3 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 4.1.2 DEVIATION FROM STANDARD

No deviation.

### 4.1.3 TEST SETUP




### 4.1.4 EUT OPERATION CONDITIONS

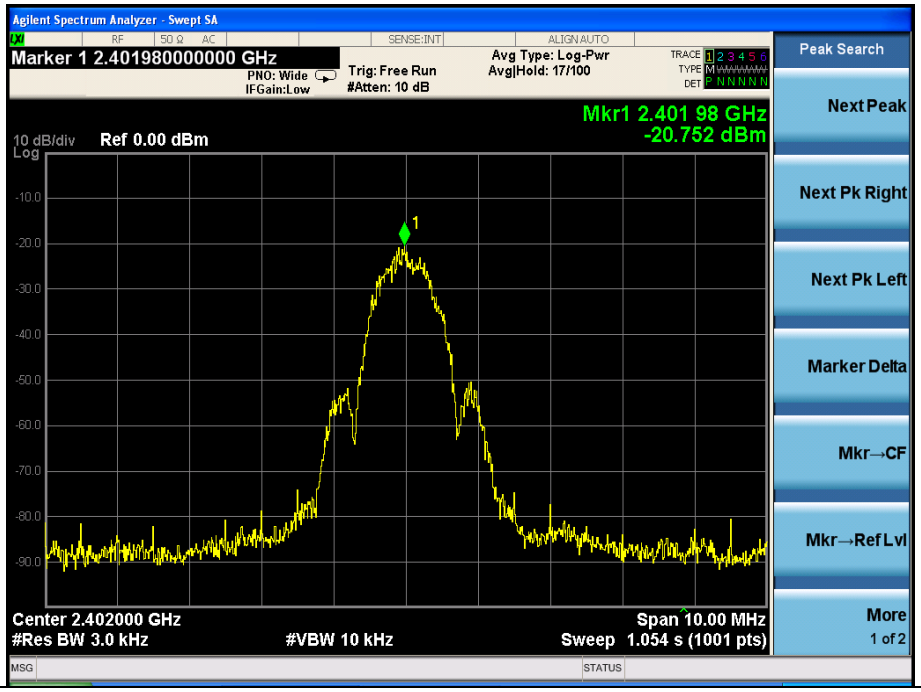
The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

### 4.1.5 TEST RESULTS

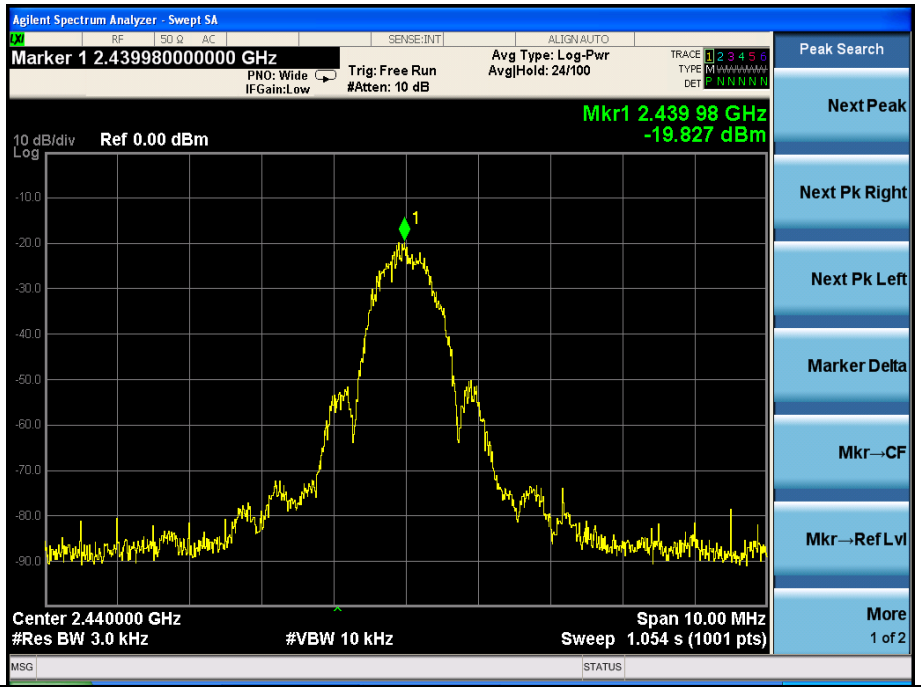
| EUT : | Rugged Smartphone | Model Name : | DK66 |
|---|---|---|---|
| Temperature : | 25 ℃ | Relative Humidity : | 60% |
| Pressure : | 1015 hPa | Test Voltage : | DC 5Vfrom adapter |
| Test Mode : | TX Mode /CH01, CH20, CH40 | | |

| Frequency | Power Density (dBm) | Limit (dBm) | Result |
|---|---|---|---|
| 2402 MHz | -20.752 | 8 | PASS |
| 2440 MHz | -20.712 | 8 | PASS |
| 2480 MHz | -19.827 | 8 | PASS |

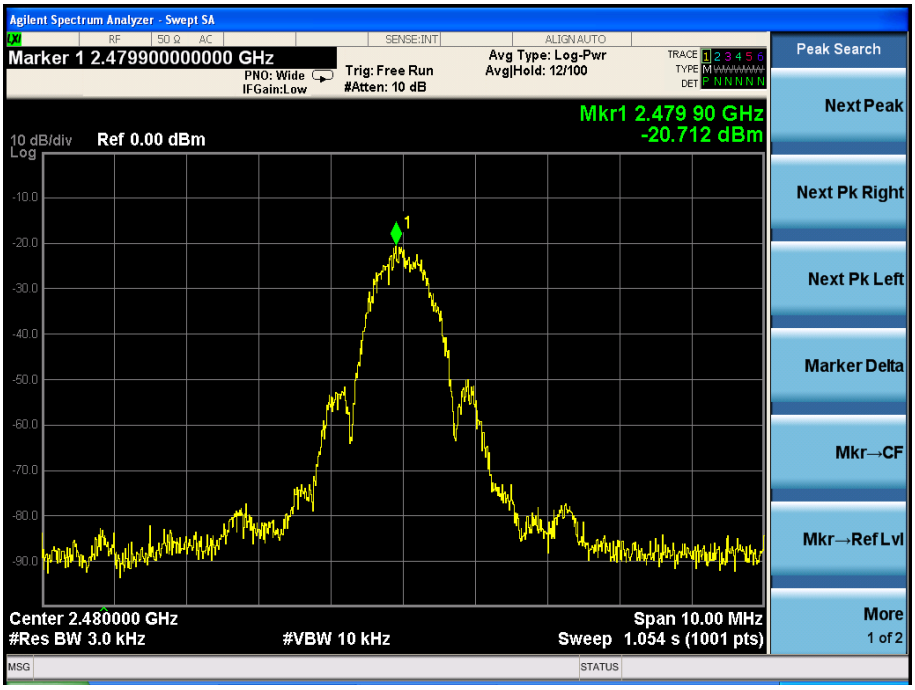
**TX CH01**



## TX CH20




## TX CH40



# 5. BANDWIDTH TEST

## 5.1 APPLIED PROCEDURES / LIMIT

| FCC Part15 (15.247) , Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247(a)(2) | Bandwidth | >= 500KHz (6dB bandwidth) | 2400-2483.5 | PASS |

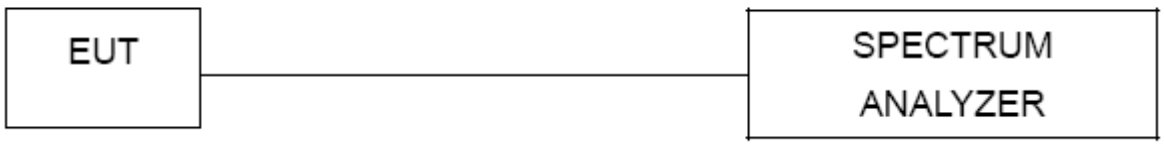
### 5.1.1 TEST PROCEDURE

1. Set RBW= 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### 5.1.2 DEVIATION FROM STANDARD

No deviation.

### 5.1.3 TEST SETUP




### 5.1.4 EUT OPERATION CONDITIONS

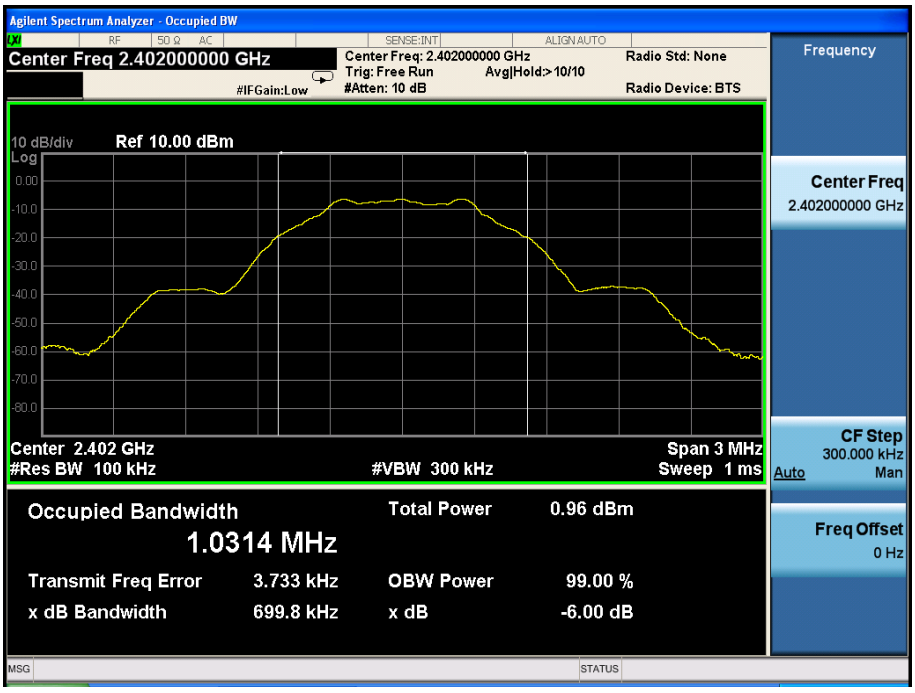
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

### 5.1.5 TEST RESULTS

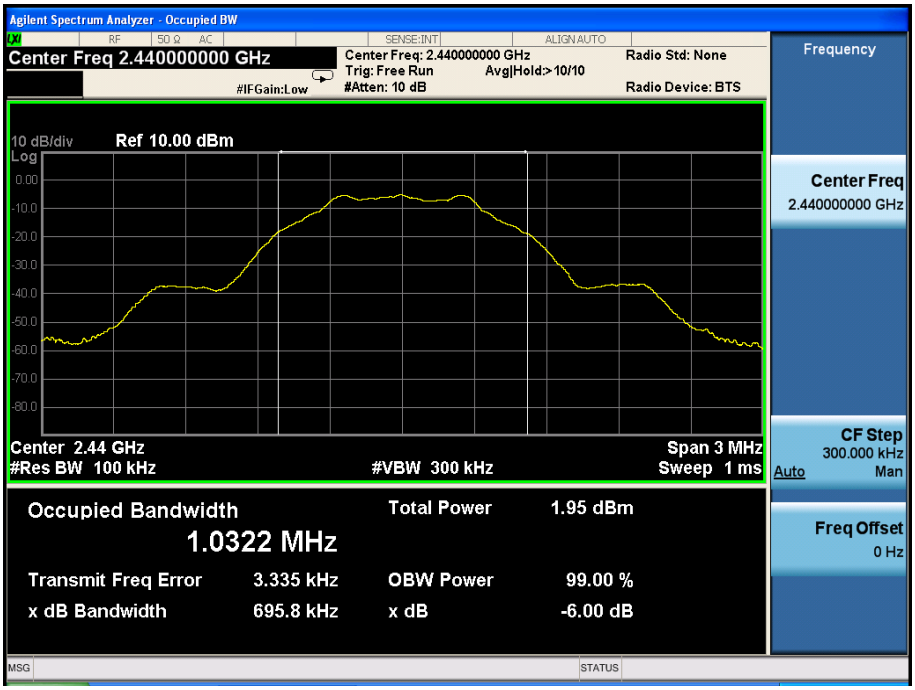
| EUT : | Rugged Smartphone | Model Name : | DK66 |
|---|---|---|---|
| Temperature : | 25 ℃ | Relative Humidity : | 60% |
| Pressure : | 1012 hPa | Test Voltage : | DC 5Vfrom adapter |
| Test Mode : | TX Mode /CH01, CH20, CH40 | | |

| Channel | Frequency (MHz) | 6dB bandwidth (MHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| Low | 2402 | 0.6998 | 500 | Pass |
| Middle | 2440 | 0.6958 | 500 | Pass |
| High | 2480 | 0.6952 | 500 | Pass |

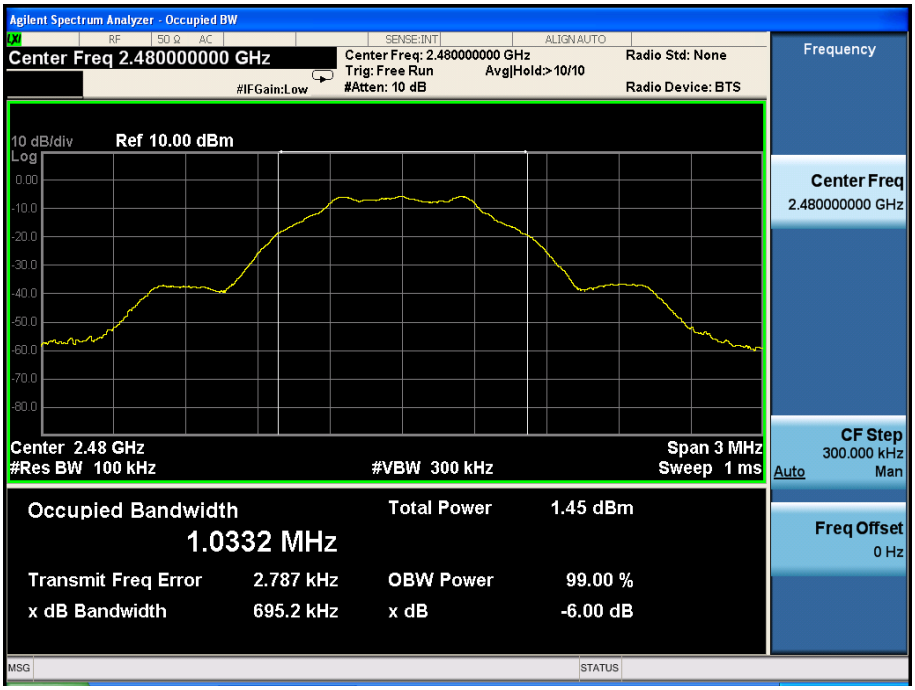
**TX CH 01**



## TX CH 20




## TX CH 40



# 6. PEAK OUTPUT POWER TEST

## 6.1 APPLIED PROCEDURES / LIMIT

| FCC Part15 (15.247) , Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247(b)(3) | Peak Output Power | 1 watt or 30dBm | 2400-2483.5 | PASS |

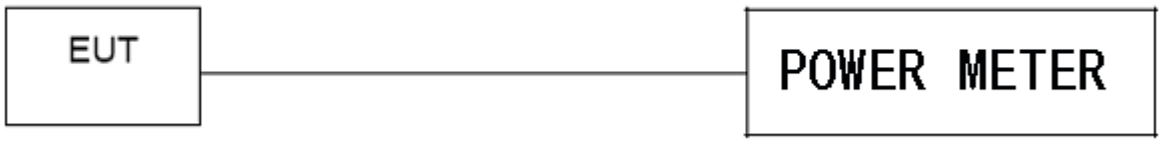
### 6.1.1 TEST PROCEDURE

a. The EUT was directly connected to the Power meter

### 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 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

### 6.1.5 TEST RESULTS

| | | | |
|---|---|---|---|
| EUT： | Rugged Smartphone | Model Name ： | DK66 |
| Temperature： | 25 ℃ | Relative Humidity： | 60% |
| Pressure： | 1012 hPa | Test Voltage ： | DC 5Vfrom adapter |
| Test Mode ： | TX Mode /CH01, CH20, CH40 | | |

| TX BLE Mode | | | |
|---|---|---|---|
| Test Channe | Frequency | Maximum Conducted Output Power(PK) | LIMIT |
| | (MHz) | (dBm) | dBm |
| CH01 | 2402 | -1.56 | 30 |
| CH06 | 2440 | -1.47 | 30 |
| CH40 | 2480 | -1.76 | 30 |

\\\\

# 7. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE&CONDUCTED EMISSION

## APPLICABLE STANDARD

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

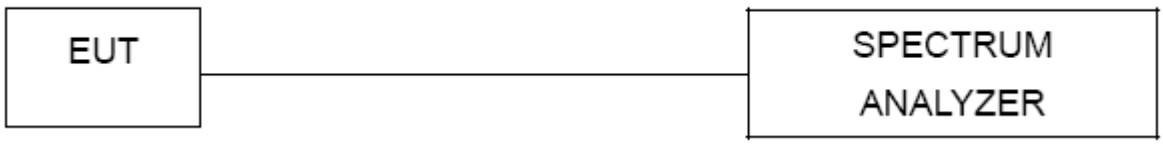
## TEST PROCEDURE

a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
e) Repeat above procedures until all measured frequencies were complete.

## 7.1 DEVIATION FROM STANDARD

No deviation.

## 7.2 TEST SETUP




## 7.3 EUT OPERATION CONDITIONS

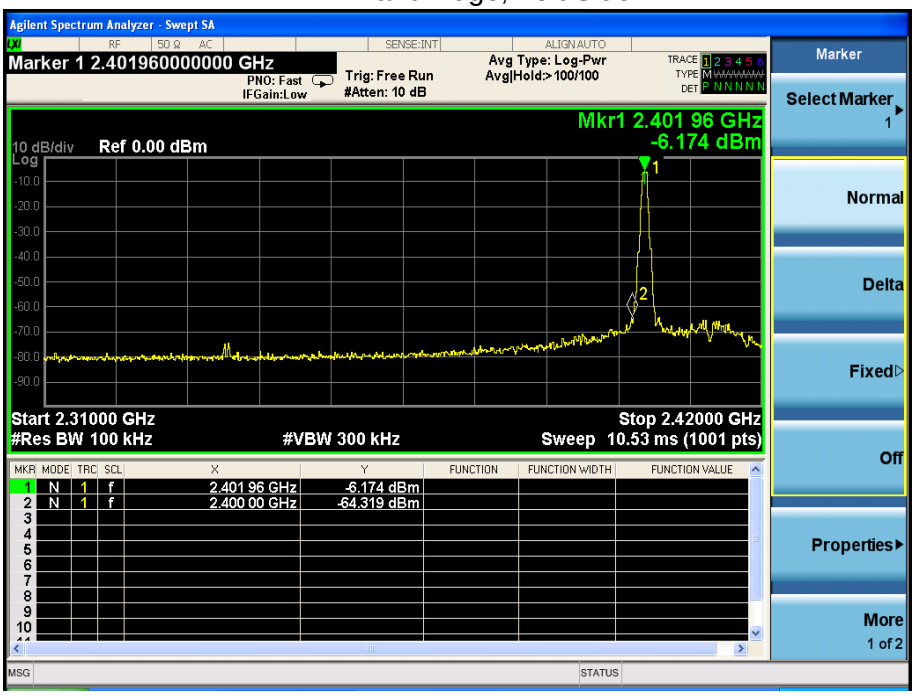
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

## 7.4 TEST RESULTS

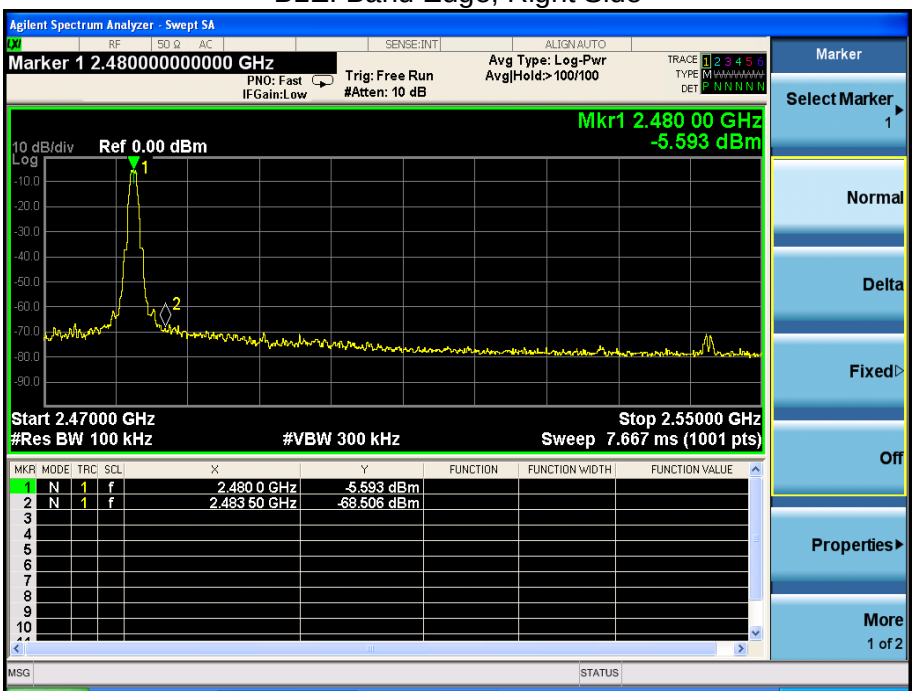
| | | | |
|---|---|---|---|
| EUT： | Rugged Smartphone | Model Name ： | DK66 |
| Temperature： | 25 ℃ | Relative Humidity： | 60% |
| Pressure： | 1012 hPa | Test Voltage ： | DC 5Vfrom adapter |

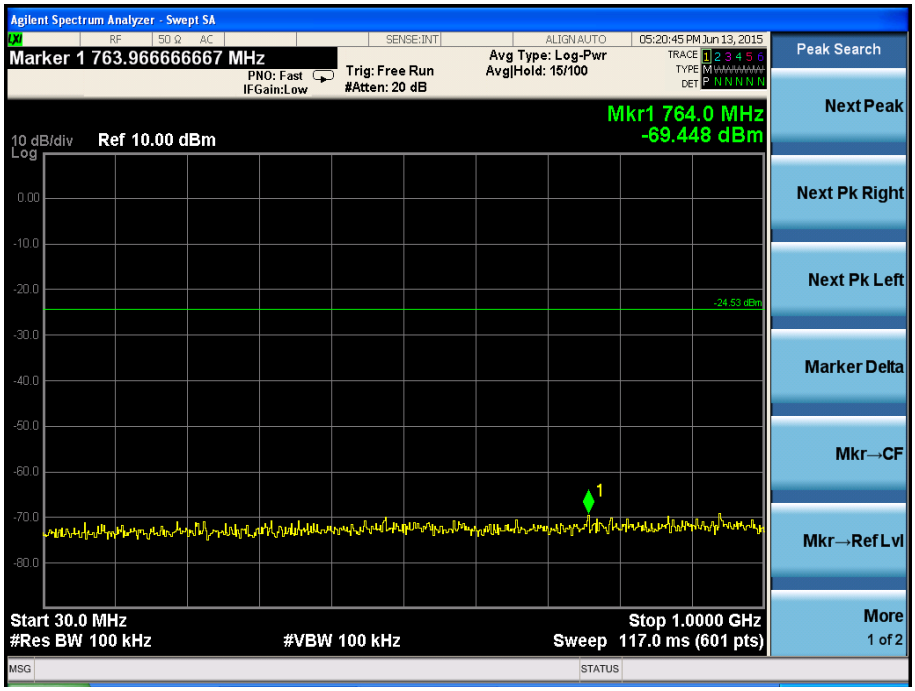
| Frequency Band | Delta Peak to band emission (dBc) | > Limit (dBc) | Result |
|---|---|---|---|
| BLE mode | | | |
| Left-band | 58.145 | 20 | Pass |
| Right-band | 62.193 | 20 | Pass |

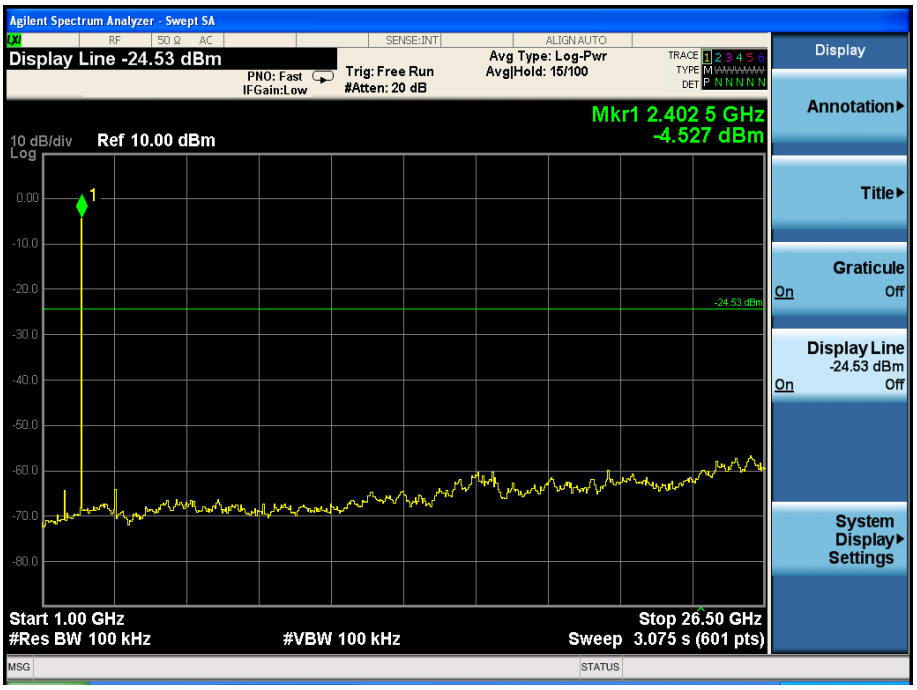
BLE: Band Edge, Left Side

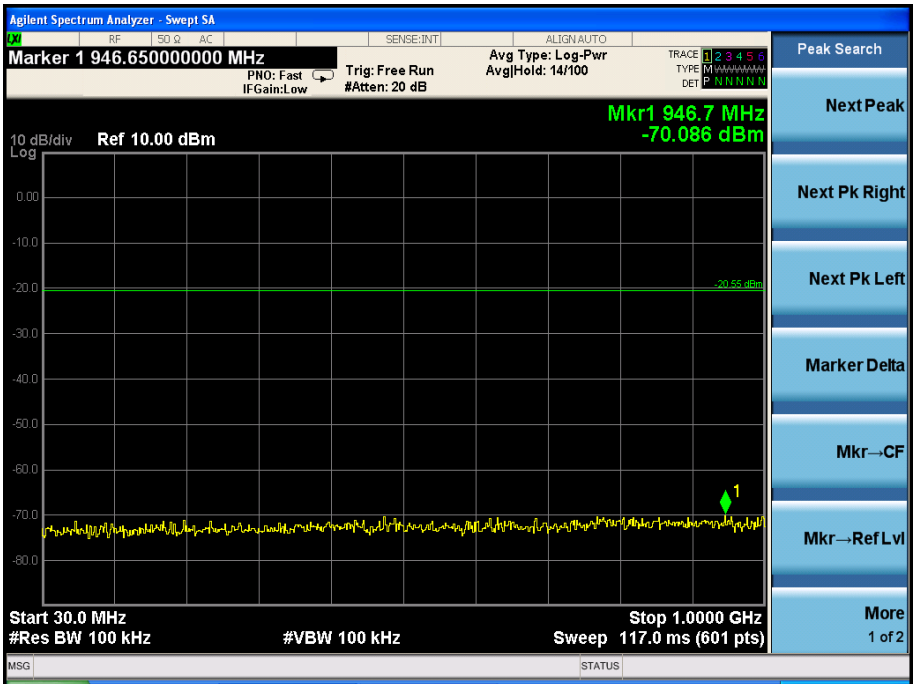


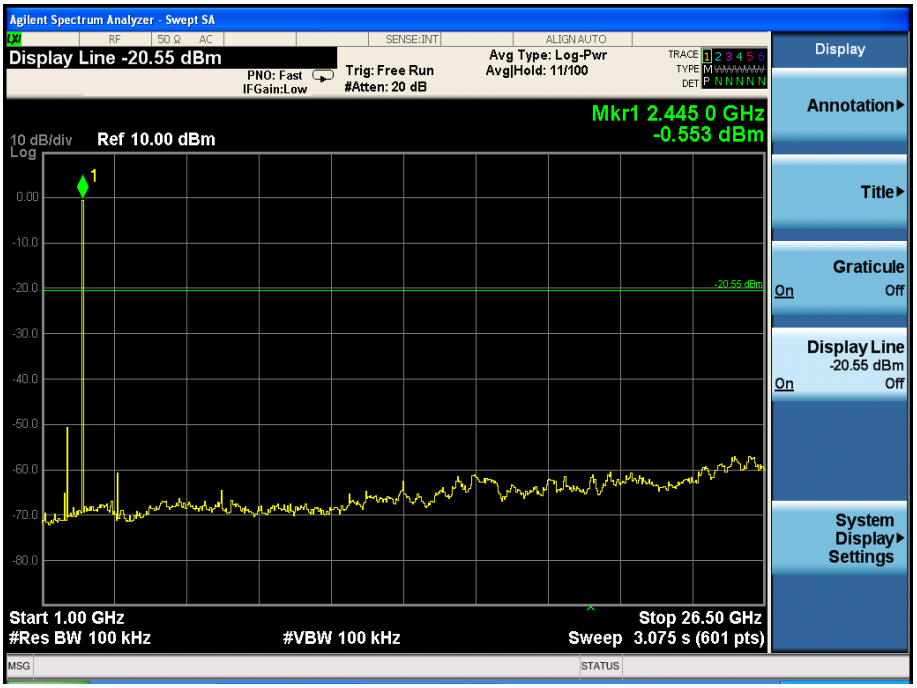

BLE: Band Edge, Right Side

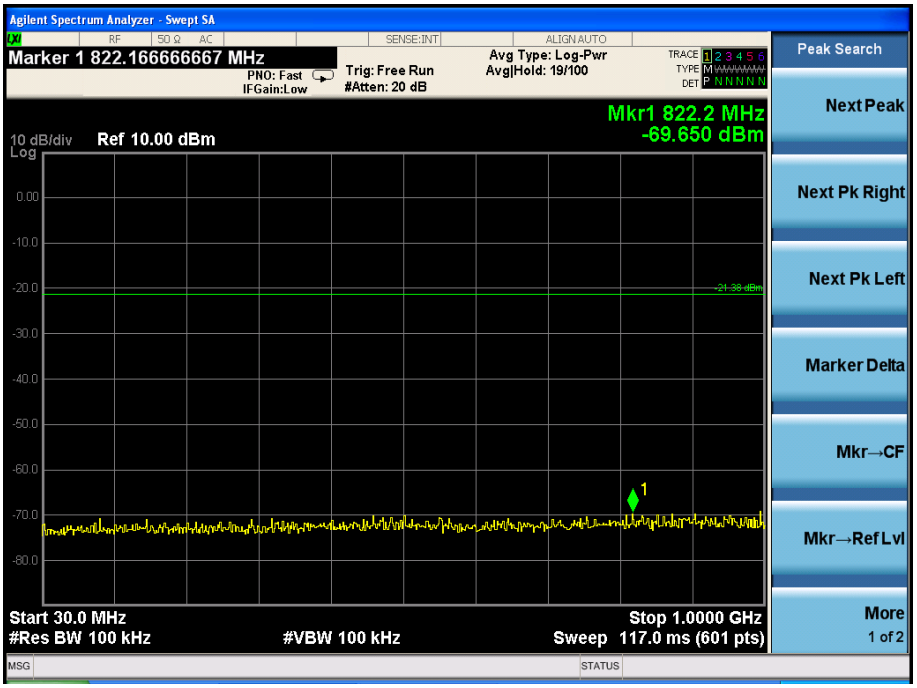


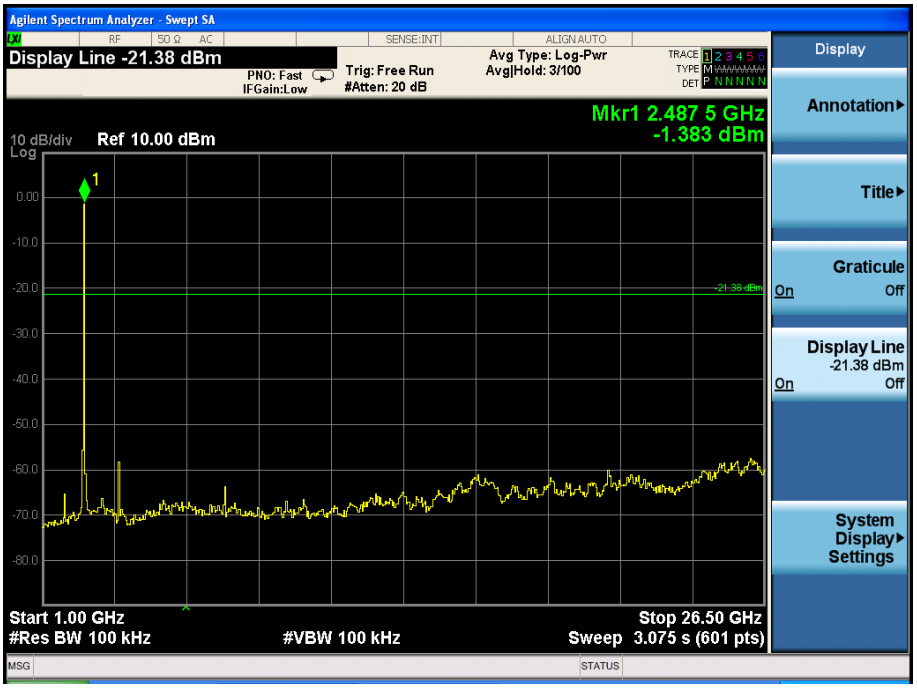

Agilent Spectrum Analyzer - Swept SA
Marker 1 763.966666667 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold: 15/100
05:20:45 PM Jun 13, 2015
Mkr1 764.0 MHz
-69.448 dBm
10 dB/div
Log
Ref 10.00 dBm
-24.53 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 1.0000 GHz
Sweep 117.0 ms (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Agilent Spectrum Analyzer - Swept SA
Display Line -24.53 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold: 15/100
Mkr1 2.402 5 GHz
-4.527 dBm
10 dB/div
Log
Ref 10.00 dBm
-24.53 dBm
Start 1.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 26.50 GHz
Sweep 3.075 s (601 pts)
Display
Annotation
Title
Graticule
On Off
Display Line
-24.53 dBm
On Off
System
Display
Settings


Agilent Spectrum Analyzer - Swept SA
Marker 1 946.650000000 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold: 14/100
Mkr1 946.7 MHz
-70.086 dBm
10 dB/div
Log
Ref 10.00 dBm
-20.55 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 1.0000 GHz
Sweep 117.0 ms (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Agilent Spectrum Analyzer - Swept SA
Display Line -20.55 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold: 11/100
Mkr1 2.445 0 GHz
-0.553 dBm
10 dB/div
Log
Ref 10.00 dBm
-20.55 dBm
Start 1.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 26.50 GHz
Sweep 3.075 s (601 pts)
Display
Annotation
Title
Graticule
On Off
Display Line
-20.55 dBm
On Off
System
Display
Settings


Agilent Spectrum Analyzer - Swept SA
Marker 1 822.166666667 MHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold: 19/100
Mkr1 822.2 MHz
-69.650 dBm
10 dB/div
Log
Ref 10.00 dBm
-21.38 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 1.0000 GHz
Sweep 117.0 ms (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2


Agilent Spectrum Analyzer - Swept SA
Display Line -21.38 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold: 3/100
Mkr1 2.487 5 GHz
-1.383 dBm
10 dB/div
Log
Ref 10.00 dBm
-21.38 dBm
Start 1.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 26.50 GHz
Sweep 3.075 s (601 pts)
Display
Annotation
Title
Graticule
On Off
Display Line
-21.38 dBm
On Off
System
Display
Settings

# 8. ANTENNA REQUIREMENT

## 8.1 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.

## 8.2 EUT ANTENNA

The EUT antenna is integrated antenna,-0.76dbi. It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used.

**END OF REPORT**