



# FCC TEST REPORT

**Test report  
On Behalf of  
Shenzhen Eternity Technology Co., Ltd  
For  
LTE smartphone  
Model No.: HEROSP001,UW5008KLTE**

**FCC ID: 2AVYL-HEROSP001**

**Prepared for :** **Shenzhen Eternity Technology Co., Ltd**  
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China

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**Date of Test:** **2020/3/2 ~ 2020/4/20**

**Date of Report:** **2020/4/21**

**Report Number:** **TZ200301201-E5**

The test report apply only to the specific sample(s) tested under stated test conditions  
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## TEST RESULT CERTIFICATION

**Applicant's name** ..... : **Shenzhen Eternity Technology Co., Ltd**  
**Address** ..... : Building A2, YingZhan Industrial Park, LongTian Street, PingShan,  
ShenZhen, China  
**Manufacture's Name** ..... : **Shenzhen Eternity Technology Co., Ltd**  
**Address** ..... : Building A2, YingZhan Industrial Park, LongTian Street, PingShan,  
ShenZhen, China

### Product description

**Trade Mark** ..... : N/A  
**Product name** ..... : LTE smartphone  
**Model and/or type reference** . : HEROSP001,UW5008KLTE

**Standards** ..... : FCC Rules and Regulations Part 22 & Part 24 & Part27 & Part90  
ANSI C63.26:2015

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**Date of Test** ..... :  
**Date (s) of performance of tests**..... : **2020/3/2 ~ 2020/4/20**  
**Date of Issue** ..... : **2020/4/21**  
**Test Result**..... : **Pass**

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(Anna Hu)

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**Revision History**

| Revision | Issue Date | Revisions     | Revised By |
|----------|------------|---------------|------------|
| 000      | 2020/4/21  | Initial Issue | Andy Zhang |
|          |            |               |            |
|          |            |               |            |



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## 1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Part 2:](#) FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[FCC Part 22 Subpart H:](#) PRIVATE LAND MOBILE RADIO SERVICES.

[FCC Part 24 Subpart E:](#) PUBLIC MOBILE SERVICES

[FCC Part 27:](#) Miscellaneous Wireless Communications Services.

[FCC Part 90:](#) PRIVATE LAND MOBILE RADIO SERVICES

[ANSI/TIA-603-E-2016:](#) Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

[ANSI C63.26-2015:](#) IEEE/ANSI Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

[FCCKDB971168D01](#) Power Meas License Digital Systems



## 2 SUMMARY

### 2.1 Product Description

|                              |                                                                                                                                                                                                                   |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT                          | : LTE smartphone                                                                                                                                                                                                  |
| Model Number                 | : HEROSP001,UW5008KLTE                                                                                                                                                                                            |
| Model Declaration            | : All the same except for the model name                                                                                                                                                                          |
| Test Model                   | : HEROSP001                                                                                                                                                                                                       |
| Power Supply                 | : DC 3.7V by battery                                                                                                                                                                                              |
| Hardware version             | : AL_A5L_MB_V10                                                                                                                                                                                                   |
| Software version             | : MOLY.LR12A.R3.MP.V88.3.T1                                                                                                                                                                                       |
| Sample ID                    | : TZ200301201-2#                                                                                                                                                                                                  |
| Bluetooth                    |                                                                                                                                                                                                                   |
| Bluetooth Version            | : V4.2+EDR                                                                                                                                                                                                        |
| Channel Number               | : 79 Channels for Bluetooth BR/EDR(DSS)<br>: 40 Channels for BLE (DTS)                                                                                                                                            |
| Modulation Technology        | : GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth BR/EDR (DSS)<br>: GFSK for BLE (DTS)                                                                                                                                 |
| Data Rates                   | : Bluetooth BR/EDR (DSS): 1/2/3Mbps<br>: BLE (DTS): 1Mbps                                                                                                                                                         |
| Antenna Type And Gain        | Internal Antenna /2.84 dBi(Max.)                                                                                                                                                                                  |
| WiFi                         |                                                                                                                                                                                                                   |
| WLAN                         | : Supported IEEE 802.11a/b/g/n                                                                                                                                                                                    |
| WLAN FCC Operation Frequency | IEEE 802.11b:2412-2462MHz<br>IEEE 802.11g:2412-2462MHz<br>: IEEE 802.11n HT20:2412-2462MHz / 5180-5240MHz<br>IEEE 802.11n HT40:2422-2452MHz / 5190-5230MHz<br>IEEE 802.11a: 5180-5240MHz                          |
| WLAN Channel Number          | 11 Channels for 2412-2462MHz(IEEE 802.11b/g/n HT20)<br>: 7 Channels for 2422-2452MHz(IEEE 802.11n HT40)<br>: 4 Channels for 5180-5240MHz (IEEE 802.11a/n HT20)<br>2 Channels for 5190-5230MHz (IEEE 802.11n HT40) |
| WLAN Modulation Technology   | IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)<br>: IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)<br>: IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)<br>IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)                        |
| Antenna Type And Gain        | Internal Antenna<br>: Wlan2.4G: 2.84 dBi(Max.)<br>Wlan5G: 0.87 dBi(Max.)                                                                                                                                          |
| GSM                          |                                                                                                                                                                                                                   |
| GSM FCC Operation Frequency  | : GSM850(UL: 824 – 849 MHz/DL: 869 – 894 MHz)<br>: GSM1900(UL: 1850 –1910 MHz/DL: 1930 – 1990 MHz)                                                                                                                |
| Channel Separation           | : 0.2MHz                                                                                                                                                                                                          |
| Modulation Technology        | : GMSK,8PSK                                                                                                                                                                                                       |
| Antenna Type And Gain        | Internal Antenna<br>: GSM850: 2.2 dBi<br>PCS1900: 0.57dBi                                                                                                                                                         |
| UTRA                         |                                                                                                                                                                                                                   |



|                              |                                                                                                                                                                                |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UTRA FCC Operation Frequency | : WCDMA BAND II (UL: 1850 – 1910 MHz/DL: 1930 – 1990 MHz)<br>: WCDMA BAND IV (UL: 1710 – 1755 MHz/DL: 2110 – 2155 MHz)<br>: WCDMA BAND V (UL: 824 – 849 MHz/DL: 869 – 894 MHz) |
| Channel Separation           | : 0.2MHz                                                                                                                                                                       |
| Modulation Technology        | : OFDM (16QAM, QPSK)                                                                                                                                                           |
| Antenna Type And Gain        | : Internal Antenna<br>: WCDMA BAND II: 0.57dBi<br>: WCDMA BAND IV: 1.26dBi<br>: WCDMA BAND V: 2.2dBi                                                                           |

#### CDMA

|                              |                                                                                                                                                |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| UTRA FCC Operation Frequency | : BC0 (UL: 824 – 849 MHz/DL: 869 – 894 MHz)<br>: BC1 (UL: 1850 – 1910 MHz/DL: 1930 – 1990 MHz)<br>: BC10 (UL: 816 – 824 MHz/DL: 861 – 869 MHz) |
| Channel Separation           | : BC0: 0.03MHz<br>: BC1: 0.05MHz<br>: BC10: 0.025MHz                                                                                           |
| Modulation Technology        | : OFDM (16QAM, QPSK)                                                                                                                           |
| Antenna Type And Gain        | : Internal Antenna<br>: BC0: 2.2dBi<br>: BC1: 0.57dBi<br>: BC10: 2.2dBi                                                                        |

#### E-UTRA

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E-UTRA FCC Operation Frequency | : <input checked="" type="checkbox"/> FDD Band 2 (UL: 1850 – 1910 MHz/DL: 1930 – 1990 MHz)<br>: <input checked="" type="checkbox"/> FDD Band 4 (UL: 1710 – 1755 MHz/DL: 2110 – 2155 MHz)<br>: <input checked="" type="checkbox"/> FDD Band 5 (UL: 824 – 849 MHz/DL: 869 – 894 MHz)<br>: <input checked="" type="checkbox"/> FDD Band 12 (UL: 699 – 716 MHz/DL: 729 – 746 MHz)<br>: <input checked="" type="checkbox"/> FDD Band 13 (UL: 777 – 787 MHz/DL: 746 – 756 MHz)<br>: <input checked="" type="checkbox"/> FDD Band 17 (UL: 704 – 716 MHz/DL: 746 – 756 MHz)<br>: <input checked="" type="checkbox"/> FDD Band 25 (UL: 1850 – 1915 MHz/DL: 1930 – 1995 MHz)<br>: <input checked="" type="checkbox"/> FDD Band 26 (UL: 824 – 849 MHz/DL: 869 – 894 MHz)<br>: <input checked="" type="checkbox"/> FDD Band 66 (UL: 1710 – 1780 MHz/DL: 2110 – 2180 MHz)<br>: <input checked="" type="checkbox"/> TDD Band 41 (UL: 2496 MHz - 2690 MHz/DL: 2496 - 2690 MHz)<br>: <input checked="" type="checkbox"/> FDD Band 71 (UL: 663 MHz - 698 MHz/DL: 617 - 652 MHz) |
| Channel Separation             | : 0.1 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Modulation Technology          | : OFDM (16QAM, QPSK)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Antenna Type And Gain          | : Internal Antenna<br>: FDD Band 2: 0.57 dBi,<br>: FDD Band 4: 1.26 dBi,<br>: FDD Band 5: 2.2 dBi,<br>: FDD Band 12: 0.7 dBi,<br>: FDD Band 13: -0.05 dBi,<br>: FDD Band 17: 0.7 dBi,<br>: FDD Band 25: 0.57 dBi,<br>: FDD Band 26: 2.2 dBi,<br>: FDD Band 66: 2.12 dBi,<br>: TDD Band 41: 2.34 dBi<br>: FDD Band 71: -0.12 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

Note: Antenna position refer to EUT Photos.



GSM/WCDMA/CDMA2000 Card Slot :

|              | Maximum ERP/EIRP<br>(dBm) | Max. Conducted Power<br>(dBm) | Max. Average<br>Burst Power (dBm) |
|--------------|---------------------------|-------------------------------|-----------------------------------|
| GSM 850      | 28.59                     | 33.24                         | 32.07                             |
| PCS 1900     | 26.05                     | 30.17                         | 29.91                             |
| BC0          | 20.87                     | 30.1                          | 24.2                              |
| BC1          | 20.85                     | 30.0                          | 23.9                              |
| BC10         | 21.04                     | 29.6                          | 24.3                              |
| UMTS BAND II | 20.95                     | 25.28                         | 22.57                             |
| UMTS BAND IV | 20.24                     | 25.33                         | 22.51                             |
| UMTS BAND V  | 20.08                     | 25.09                         | 22.38                             |



## 2.2 Host System Configuration List and Details

| Manufacturer | Description | Model | Serial Number | Certificate |
|--------------|-------------|-------|---------------|-------------|
|              |             |       |               |             |

## 2.3 Short description of the Equipment under Test (EUT)

### 2.3.1 General Description

EUT is subscriber equipment in the GSM/WCDMA/CDMA system. Frequency bands Shows in section 2.1.

## 2.4 Normal Accessory setting

Fully charged battery was used during the test.

## 2.5 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

☐ supplied by the lab ☒ supplied by the manufacturer

| Manufacturer                                  | Description | Model           | Serial Number | Certificate |
|-----------------------------------------------|-------------|-----------------|---------------|-------------|
| SHENZHEN<br>TIANYIN<br>ELECTRONICS CO<br>LTD. | Adapter     | TPA-46B050100UU | N/A           | N/A         |

## 2.6 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AVYL-HEROSP001** filing to comply with FCC Part 22 Rules, FCC Part 24 Rules and FCC Part 27 Rules.

## 2.7 Modifications

No modifications were implemented to meet testing criteria.



### 3 TEST ENVIRONMENT

#### 3.1 Test Facility

Designation Number: CN1229

Test Firm Registration Number: 616276

The 3m-Semi anechoic test site fulfills CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010

#### 3.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

|                       |              |
|-----------------------|--------------|
| Temperature:          | 15-35 ° C    |
|                       |              |
| Humidity:             | 30-60 %      |
|                       |              |
| Atmospheric pressure: | 950-1050mbar |

#### 3.3 Test Description

##### PCS 1900/UMTS BAND II/BC1:

| Test Item                              | FCC Rule No.         | Requirements                                                          | Judgement |
|----------------------------------------|----------------------|-----------------------------------------------------------------------|-----------|
| Effective (Isotropic) Radiated Power   | 2.1046,<br>24.232(c) | EIRP $\leq$ 2W(33dBm)                                                 | Pass      |
| Bandwidth                              | 2.1049<br>24.238(a)  | OBW: No limit.<br>EBW: No limit.                                      | Pass      |
| Band Edges                             | 2.1051,<br>24.238(a) | -13dBm                                                                | Pass      |
| Spurious Emission at Antenna Terminals | 2.1051,<br>24.238(a) | -13dBm                                                                | Pass      |
| Field Strength of Spurious Radiation   | 2.1053,<br>24.238(a) | -13dBm                                                                | Pass      |
| Frequency Stability                    | 2.1055,<br>24.235    | the fundamental emission stays within the authorized frequency block. | Pass      |
| Peak to average ratio                  | 24.232(d)            | <13dB                                                                 | Pass      |

##### GSM850/UMTS BAND V/CDMA2000 BC0:

| Test Item                              | FCC Rule No.            | Requirements                                                                      | Judgement |
|----------------------------------------|-------------------------|-----------------------------------------------------------------------------------|-----------|
| Effective (Isotropic) Radiated Power   | 2.1046,<br>22.913(a)    | ERP $\leq$ 7W(38.5dBm)                                                            | Pass      |
| Occupied Bandwidth                     | 2.1049                  | OBW: No limit.                                                                    | Pass      |
| Emission Bandwidth                     | 22.917(b)               | EBW: No limit.                                                                    | Pass      |
| Band Edges Compliance                  | 2.1051,<br>22.917(a)(b) | -13dBm                                                                            | Pass      |
| Spurious Emission at Antenna Terminals | 2.1051,<br>22.917       | -13dBm                                                                            | Pass      |
| Field Strength of Spurious Radiation   | 2.1053,<br>22.917       | -13dBm                                                                            | Pass      |
| Frequency Stability                    | 2.1055,<br>22.355       | the fundamental emissions stay within the authorized bands of operation. (2.5ppm) | Pass      |
| Peak to average ratio                  | 2.1046,<br>2.913(a)     | <13dB                                                                             | Pass      |

**CDMA2000 BC10**

| Test Item                              | FCC Rule No.     | Requirements                                                                      | Judgement |
|----------------------------------------|------------------|-----------------------------------------------------------------------------------|-----------|
| Effective (Isotropic) Radiated Power   | 2.1046, 90.635   | ERP $\leq$ 100W(50dBm)                                                            | Pass      |
| Occupied Bandwidth                     | 2.1049           | OBW: No limit.                                                                    | Pass      |
| Emission Bandwidth                     | --               | EBW: No limit.                                                                    | Pass      |
| Band Edges Compliance                  | 2.1051, 90.691   | -13dBm                                                                            | Pass      |
| Spurious Emission at Antenna Terminals | 2.1051, 90.691   | -13dBm                                                                            | Pass      |
| Field Strength of Spurious Radiation   | 2.1053, 90.691   | -13dBm                                                                            | Pass      |
| Frequency Stability                    | 2.1055, 90.213   | the fundamental emissions stay within the authorized bands of operation. (2.5ppm) | Pass      |
| Peak to average ratio                  | 2.1046, 2.913(a) | <13dB                                                                             | Pass      |

**UMTS BAND IV:**

| Test Item                              | FCC Rule No.     | Requirements                                                                      | Judgement |
|----------------------------------------|------------------|-----------------------------------------------------------------------------------|-----------|
| Effective (Isotropic) Radiated Power   | 2.1046, 27.50(d) | EIRP $\leq$ 2W(33dBm)                                                             | Pass      |
| Bandwidth                              | 2.1049           | OBW: No limit.<br>EBW: No limit.                                                  | Pass      |
| Band Edges                             | 2.1051, 27.53(h) | -13dBm                                                                            | Pass      |
| Spurious Emission at Antenna Terminals | 2.1051, 27.53(h) | -13dBm                                                                            | Pass      |
| Field Strength of Spurious Radiation   | 2.1053, 27.53(h) | -13dBm                                                                            | Pass      |
| Frequency Stability                    | 2.1055, 27.54    | the fundamental emissions stay within the authorized bands of operation. (2.5ppm) | Pass      |
| Peak to average ratio                  | 27.50(d)         | <13dB                                                                             | Pass      |



### 3.4 Equipments Used during the Test

| Item | Test Equipment                | Manufacturer    | Model No.    | Serial No.   | Calibration Date | Calibration Due Date |
|------|-------------------------------|-----------------|--------------|--------------|------------------|----------------------|
| 1    | MXA Signal Analyzer           | Keysight        | N9020A       | MY52091623   | 2020/1/2         | 2021/1/1             |
| 2    | Power Sensor                  | Agilent         | U2021XA      | MY5365004    | 2020/1/2         | 2021/1/1             |
| 3    | Power Meter                   | Agilent         | U2531A       | TW53323507   | 2020/1/2         | 2021/1/1             |
| 4    | Wideband Antenna              | schwarzbeck     | VULB 9163    | 958          | 2019/11/16       | 2022/11/15           |
| 5    | Horn Antenna                  | schwarzbeck     | 9120D-1141   | 1574         | 2019/11/16       | 2022/11/15           |
| 6    | EMI Test Receiver             | R&S             | ESCI         | 100849/003   | 2020/1/2         | 2021/1/1             |
| 7    | Controller                    | MF              | MF7802       | N/A          | N/A              | N/A                  |
| 8    | Amplifier                     | schwarzbeck     | BBV 9743     | 209          | 2020/1/2         | 2021/1/1             |
| 9    | Amplifier                     | Tonscend        | TSAMP-0518SE | --           | 2020/1/2         | 2021/1/1             |
| 10   | RF Cable(below 1GHz)          | HUBER+SUHNER    | RG214        | N/A          | 2020/1/2         | 2021/1/1             |
| 11   | RF Cable(above 1GHz)          | HUBER+SUHNER    | RG214        | N/A          | 2020/1/2         | 2021/1/1             |
| 12   | Artificial Mains              | ROHDE & SCHWARZ | ENV 216      | 101333-IP    | 2020/1/2         | 2021/1/1             |
| 12   | EMI Test Software             | ROHDE & SCHWARZ | ESK1         | V1.71        | N/A              | N/A                  |
| 14   | RE test software              | Tonscend        | JS32-RE      | V2.0.2.0     | N/A              | N/A                  |
| 15   | Test Software                 | Tonscend        | JS1120-2     | V2.5.77.0418 | N/A              | N/A                  |
| 16   | UNIVERSAL RADIO COMMUNICATION | R&S             | CMW500       | 101855       | 2020/1/2         | 2021/1/1             |



### 3.5 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to ETSI TR 100 028 " Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics" and is documented in the Shenzhen Tongzhou Testing Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Tongzhou Testing Co.,Ltd is reported:

| Test                                | Range      | Measurement Uncertainty | Notes |
|-------------------------------------|------------|-------------------------|-------|
| Radiated Emission                   | 30~1000MHz | 3.10 dB                 | (1)   |
| Radiated Emission                   | 1~18GHz    | 3.70 dB                 | (1)   |
| Radiated Emission                   | 18~40GHz   | 3.90 dB                 | (1)   |
| Conducted Disturbance               | 0.15~30MHz | 1.63 dB                 | (1)   |
| Conducted Power                     | 9KHz~18GHz | 0.61 dB                 | (1)   |
| Spurious RF Conducted Emission      | 9KHz~40GHz | 1.22 dB                 | (1)   |
| Band Edge Compliance of RF Emission | 9KHz~40GHz | 1.22 dB                 | (1)   |
| Occupied Bandwidth                  | 9KHz~40GHz | -                       | (1)   |

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=1.96$ .



## 4 DESCRIPTION OF TEST MODES

During the testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication Tester (CMU 200) to ensure max power transmission and proper modulation. Three channels (The top channel, the middle channel and the bottom channel) were chosen for testing on both GSM and PCS frequency band.

**\*\*\*Note:** GSM/GPRS 850, GSM/GPRS 1900, WCDMA/HSPA band II, WCDMA/HSPA band IV, WCDMA/HSPA band V mode have been tested during the test.

The worst condition was recorded in the test report if no other modes test data.

## 5 TEST CONDITIONS AND RESULTS

### 5.1 OUTPUT POWER

#### 5.1.1 CONDUCTED OUTPUT POWER

##### 5.1.1.1 MEASUREMENT METHOD

The transmitter output port was connected to base station.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Measure the maximum burst average power and average power for other modulation signal.

The EUT was setup for the max output power with pseudo random data modulation. Power was measured with Spectrum Analyzer. The measurements were performed on all modes (GSM/GPRS 850, GSM/GPRS 1900, WCDMA/HSPA band II, WCDMA/HSPA band IV, WCDMA/HSPA band V) at 3 typical channels (the Top Channel, the Middle Channel and the Bottom Channel) for each band.

##### 5.1.1.2 MEASUREMENT RESULT



| Mode              | Frequency (MHz) | Peak Power   | Avg.Burst Power | Duty cycle Factor(dB) | Frame Power (dBm) | Peak to Average Ratio |
|-------------------|-----------------|--------------|-----------------|-----------------------|-------------------|-----------------------|
| GSM850            | 824.2           | <b>33.24</b> | 31.74           | -9                    | 22.74             | 1.50                  |
|                   | 836.6           | 32.97        | <b>32.07</b>    | -9                    | 23.07             | 0.90                  |
|                   | 848.8           | 32.99        | 31.81           | -9                    | 22.81             | 1.18                  |
| GPRS850 (1 Slot)  | 824.2           | 32.76        | 31.56           | -9                    | 22.56             | 1.21                  |
|                   | 836.6           | 32.60        | 31.75           | -9                    | 22.75             | 0.84                  |
|                   | 848.8           | 32.67        | 31.81           | -9                    | 22.81             | 0.86                  |
| GPRS850 (2 Slot)  | 824.2           | 30.27        | 29.11           | -6                    | 23.11             | 1.16                  |
|                   | 836.6           | 30.36        | 29.34           | -6                    | <b>23.34</b>      | 1.02                  |
|                   | 848.8           | 30.46        | 29.28           | -6                    | 23.28             | 1.18                  |
| GPRS850 (3 Slot)  | 824.2           | 26.85        | 25.84           | -4.26                 | 21.58             | 1.00                  |
|                   | 836.6           | 27.29        | 25.75           | -4.26                 | 21.49             | 1.54                  |
|                   | 848.8           | 27.08        | 25.59           | -4.26                 | 21.33             | 1.49                  |
| GPRS850 (4 Slot)  | 824.2           | 26.02        | 24.71           | -3                    | 21.71             | 1.31                  |
|                   | 836.6           | 26.16        | 24.94           | -3                    | 21.94             | 1.22                  |
|                   | 848.8           | 26.10        | 25.05           | -3                    | 22.05             | 1.06                  |
| EGPRS850 (1 Slot) | 824.2           | 26.24        | 23.55           | -9                    | 14.55             | 2.69                  |
|                   | 836.6           | 26.58        | 23.84           | -9                    | 14.84             | 2.74                  |
|                   | 848.8           | <b>26.88</b> | <b>24.03</b>    | -9                    | 15.03             | <b>2.85</b>           |
| EGPRS850 (2 Slot) | 824.2           | 24.52        | 22.20           | -6                    | 16.20             | 2.32                  |
|                   | 836.6           | 24.51        | 22.03           | -6                    | 16.03             | 2.47                  |
|                   | 848.8           | 24.70        | 22.01           | -6                    | 16.01             | 2.69                  |
| EGPRS850 (3 Slot) | 824.2           | 22.14        | 19.38           | -4.26                 | 15.12             | 2.75                  |
|                   | 836.6           | 22.16        | 19.52           | -4.26                 | 15.26             | 2.65                  |
|                   | 848.8           | 22.83        | 20.15           | -4.26                 | 15.89             | 2.68                  |
| EGPRS850 (4 Slot) | 824.2           | 20.60        | 18.11           | -3                    | 15.11             | 2.49                  |
|                   | 836.6           | 21.15        | 18.37           | -3                    | 15.37             | 2.79                  |
|                   | 848.8           | 21.24        | 18.89           | -3                    | 15.89             | 2.35                  |



| Mode               | Frequency (MHz) | Peak Power   | Avg.Burst Power | Duty cycle Factor(dB) | Frame Power(dBm) | Peak to Average Ratio |
|--------------------|-----------------|--------------|-----------------|-----------------------|------------------|-----------------------|
| GSM1900            | 1850.2          | <b>30.17</b> | <b>29.91</b>    | -9                    | 20.91            | 0.26                  |
|                    | 1880            | 30.08        | 29.79           | -9                    | 20.79            | 0.28                  |
|                    | 1909.8          | 30.03        | 29.78           | -9                    | 20.78            | 0.25                  |
| GPRS1900 (1 Slot)  | 1850.2          | 29.58        | 29.45           | -9                    | 20.45            | 0.13                  |
|                    | 1880            | 29.50        | 29.21           | -9                    | 20.21            | 0.29                  |
|                    | 1909.8          | 29.72        | 29.59           | -9                    | 20.59            | 0.13                  |
| GPRS1900 (2 Slot)  | 1850.2          | 27.56        | 27.28           | -6                    | 21.28            | 0.29                  |
|                    | 1880            | 27.55        | 27.40           | -6                    | 21.40            | 0.15                  |
|                    | 1909.8          | 27.58        | 27.29           | -6                    | 21.29            | 0.29                  |
| GPRS1900 (3 Slot)  | 1850.2          | 26.92        | 26.66           | -4.26                 | 22.40            | 0.26                  |
|                    | 1880            | 26.59        | 26.40           | -4.26                 | 22.14            | 0.19                  |
|                    | 1909.8          | 26.90        | 26.77           | -4.26                 | 22.51            | 0.14                  |
| GPRS1900 (4 Slot)  | 1850.2          | 25.75        | 25.48           | -3                    | 22.48            | 0.27                  |
|                    | 1880            | 25.53        | 25.26           | -3                    | 22.26            | 0.27                  |
|                    | 1909.8          | 25.83        | 25.62           | -3                    | 22.62            | 0.21                  |
| EGPRS1900 (1 Slot) | 1850.2          | 27.10        | 23.60           | -9                    | 14.60            | 3.50                  |
|                    | 1880            | 27.28        | 23.85           | -9                    | 14.85            | 3.43                  |
|                    | 1909.8          | 27.23        | 23.59           | -9                    | 14.59            | 3.64                  |
| EGPRS1900 (2 Slot) | 1850.2          | 26.50        | 23.19           | -6                    | 17.19            | 3.30                  |
|                    | 1880            | 26.03        | 22.24           | -6                    | 16.24            | <b>3.80</b>           |
|                    | 1909.8          | 26.49        | 23.24           | -6                    | 17.24            | 3.25                  |
| EGPRS1900 (3 Slot) | 1850.2          | 24.82        | 21.08           | -4.26                 | 16.82            | 3.74                  |
|                    | 1880            | 24.62        | 20.99           | -4.26                 | 16.73            | 3.62                  |
|                    | 1909.8          | 24.84        | 21.23           | -4.26                 | 16.97            | 3.61                  |
| EGPRS1900 (4 Slot) | 1850.2          | 23.47        | 20.23           | -3                    | 17.23            | 3.24                  |
|                    | 1880            | 23.44        | 20.31           | -3                    | 17.31            | 3.14                  |
|                    | 1909.8          | 23.49        | 20.46           | -3                    | 17.46            | 3.03                  |

**BC0**

| Mode             | Frequency<br>(MHz) | Peak<br>Power | Avg.Burst<br>Power | Peak to<br>Average<br>Ratio |
|------------------|--------------------|---------------|--------------------|-----------------------------|
| 1xRTT            | 824.7              | <b>30.1</b>   | 23.9               | <b>6.2</b>                  |
|                  | 836.52             | 29.1          | <b>24.2</b>        | 4.9                         |
|                  | 848.31             | 28.6          | 23.8               | 4.8                         |
| 1XEV-DO<br>REV A | 824.7              | 29.7          | 23.7               | 6.0                         |
|                  | 836.52             | 28.9          | 23.9               | 5                           |
|                  | 848.31             | 28.3          | 22.8               | 5.5                         |

**BC1**

| Mode             | Frequency<br>(MHz) | Peak<br>Power | Avg.Burst<br>Power | Peak to<br>Average<br>Ratio |
|------------------|--------------------|---------------|--------------------|-----------------------------|
| 1xRTT            | 1851.25            | <b>30.0</b>   | 23.5               | <b>6.5</b>                  |
|                  | 1880               | 29.6          | 23.6               | 6                           |
|                  | 1908.75            | 28.8          | <b>23.9</b>        | 4.9                         |
| 1XEV-DO<br>REV A | 1851.25            | 28.9          | 23.5               | 5.4                         |
|                  | 1880               | 28.8          | 23.6               | 5.2                         |
|                  | 1908.75            | 27.8          | 23.4               | 4.4                         |

**BC10**

| Mode             | Frequency<br>(MHz) | Peak<br>Power | Avg.Burst<br>Power | Peak to<br>Average<br>Ratio |
|------------------|--------------------|---------------|--------------------|-----------------------------|
| 1xRTT            | 817.25             | 29.2          | <b>24.3</b>        | 4.9                         |
|                  | 820                | 29.4          | 24.3               | 5.1                         |
|                  | 822.75             | 27.8          | 23.7               | 4.1                         |
| 1XEV-DO<br>REV A | 817.25             | <b>29.6</b>   | 24.2               | 5.4                         |
|                  | 820                | 29.6          | 23.7               | <b>5.9</b>                  |
|                  | 822.75             | 28.1          | 23.4               | 4.7                         |

**UMTS BAND II**

| Mode            | Frequency (MHz) | Peak Power   | Avg.Burst Power | Peak to Average Ratio |
|-----------------|-----------------|--------------|-----------------|-----------------------|
| WCDMA1900 RMC   | 1852.4          | 24.80        | <b>22.57</b>    | 2.23                  |
|                 | 1880            | 24.54        | 22.01           | 2.54                  |
|                 | 1907.6          | 24.83        | 22.26           | 2.57                  |
| WCDMA1900 AMR   | 1852.4          | 24.46        | 22.31           | 2.15                  |
|                 | 1880            | 25.21        | 22.22           | 3.00                  |
|                 | 1907.6          | 24.58        | 21.98           | 2.60                  |
| HSDPA Subtest 1 | 1852.4          | 23.14        | 21.05           | 2.10                  |
|                 | 1880            | 23.41        | 21.01           | 2.41                  |
|                 | 1907.6          | 23.57        | 20.92           | 2.65                  |
| HSDPA Subtest 2 | 1852.4          | 22.57        | 20.31           | 2.27                  |
|                 | 1880            | 22.66        | 19.88           | 2.78                  |
|                 | 1907.6          | 22.81        | 20.79           | 2.02                  |
| HSDPA Subtest 3 | 1852.4          | 22.20        | 19.91           | 2.29                  |
|                 | 1880            | 22.12        | 19.99           | 2.13                  |
|                 | 1907.6          | 22.29        | 20.23           | 2.06                  |
| HSDPA Subtest 4 | 1852.4          | 22.83        | 20.10           | 2.73                  |
|                 | 1880            | 23.01        | 20.62           | 2.39                  |
|                 | 1907.6          | 23.20        | 20.78           | 2.42                  |
| HSUPA Subtest 1 | 1852.4          | 23.68        | 20.54           | <b>3.14</b>           |
|                 | 1880            | 22.62        | 20.43           | 2.18                  |
|                 | 1907.6          | 22.79        | 20.39           | 2.40                  |
| HSUPA Subtest 2 | 1852.4          | 24.36        | 21.45           | 2.91                  |
|                 | 1880            | 23.97        | 21.74           | 2.23                  |
|                 | 1907.6          | 23.77        | 21.33           | 2.44                  |
| HSUPA Subtest 3 | 1852.4          | 23.86        | 21.39           | 2.48                  |
|                 | 1880            | 23.85        | 21.29           | 2.56                  |
|                 | 1907.6          | 23.72        | 21.05           | 2.67                  |
| HSUPA Subtest 4 | 1852.4          | 23.82        | 21.01           | 2.81                  |
|                 | 1880            | <b>25.28</b> | 22.33           | 2.95                  |
|                 | 1907.6          | 24.97        | 22.03           | 2.94                  |
| HSUPA Subtest 5 | 1852.4          | 23.30        | 20.98           | 2.31                  |
|                 | 1880            | 24.69        | 21.67           | 3.02                  |
|                 | 1907.6          | 24.23        | 21.88           | 2.36                  |

**UMTS BAND IV**

| Mode            | Frequency (MHz) | Peak Power   | Avg.Burst Power | Peak to Average Ratio |
|-----------------|-----------------|--------------|-----------------|-----------------------|
| WCDMA1900 RMC   | 826.4           | 25.18        | <b>22.51</b>    | 2.67                  |
|                 | 836.4           | 25.15        | 22.20           | 2.95                  |
|                 | 846.6           | 24.11        | 22.06           | 2.05                  |
| WCDMA1900 AMR   | 1852.4          | 25.29        | 22.20           | 3.09                  |
|                 | 1880            | 24.02        | 21.85           | 2.18                  |
|                 | 1907.6          | 25.17        | 21.99           | 3.18                  |
| HSDPA Subtest 1 | 826.4           | 23.81        | 21.28           | 2.52                  |
|                 | 836.4           | 24.19        | 21.00           | <b>3.19</b>           |
|                 | 846.6           | 23.06        | 20.93           | 2.13                  |
| HSDPA Subtest 2 | 826.4           | 23.19        | 20.41           | 2.78                  |
|                 | 836.4           | 22.48        | 20.20           | 2.27                  |
|                 | 846.6           | 22.61        | 20.59           | 2.02                  |
| HSDPA Subtest 3 | 826.4           | 22.47        | 19.88           | 2.60                  |
|                 | 836.4           | 22.65        | 20.05           | 2.60                  |
|                 | 846.6           | 22.94        | 20.05           | 2.89                  |
| HSDPA Subtest 4 | 826.4           | 22.97        | 20.06           | 2.91                  |
|                 | 836.4           | 23.26        | 20.51           | 2.75                  |
|                 | 846.6           | 23.39        | 20.60           | 2.79                  |
| HSUPA Subtest 1 | 826.4           | 23.24        | 20.51           | 2.73                  |
|                 | 836.4           | 23.27        | 20.41           | 2.86                  |
|                 | 846.6           | 23.33        | 20.33           | 3.00                  |
| HSUPA Subtest 2 | 826.4           | 24.14        | 21.52           | 2.62                  |
|                 | 836.4           | 24.53        | 21.90           | 2.63                  |
|                 | 846.6           | 23.99        | 21.18           | 2.81                  |
| HSUPA Subtest 3 | 826.4           | 23.34        | 21.04           | 2.30                  |
|                 | 836.4           | 23.63        | 20.97           | 2.66                  |
|                 | 846.6           | 24.14        | 21.04           | 3.10                  |
| HSUPA Subtest 4 | 826.4           | 23.61        | 21.04           | 2.57                  |
|                 | 836.4           | <b>25.33</b> | 22.27           | 3.06                  |
|                 | 846.6           | 25.04        | 22.31           | 2.74                  |
| HSUPA Subtest 5 | 826.4           | 23.70        | 21.03           | 2.67                  |
|                 | 836.4           | 24.44        | 21.72           | 2.72                  |
|                 | 846.6           | 24.64        | 22.03           | 2.61                  |

**UMTS BAND V**

| Mode            | Frequency (MHz) | Peak Power   | Avg.Burst Power | Peak to Average Ratio |
|-----------------|-----------------|--------------|-----------------|-----------------------|
| WCDMA1900 RMC   | 826.4           | 24.77        | <b>22.38</b>    | 2.39                  |
|                 | 836.4           | 24.63        | 22.07           | 2.56                  |
|                 | 846.6           | 25.05        | 22.14           | 2.90                  |
| WCDMA1900 AMR   | 1852.4          | 24.67        | 22.04           | 2.63                  |
|                 | 1880            | 24.41        | 22.21           | 2.20                  |
|                 | 1907.6          | 24.21        | 21.91           | 2.30                  |
| HSDPA Subtest 1 | 826.4           | 23.89        | 21.20           | 2.70                  |
|                 | 836.4           | 24.07        | 21.08           | 2.99                  |
|                 | 846.6           | 23.92        | 20.94           | 2.98                  |
| HSDPA Subtest 2 | 826.4           | 22.98        | 20.35           | 2.63                  |
|                 | 836.4           | 22.32        | 19.83           | 2.49                  |
|                 | 846.6           | 23.74        | 20.63           | 3.11                  |
| HSDPA Subtest 3 | 826.4           | 21.99        | 19.94           | 2.04                  |
|                 | 836.4           | 23.24        | 20.06           | <b>3.18</b>           |
|                 | 846.6           | 22.63        | 20.05           | 2.59                  |
| HSDPA Subtest 4 | 826.4           | 22.31        | 20.18           | 2.13                  |
|                 | 836.4           | 23.06        | 20.35           | 2.71                  |
|                 | 846.6           | 22.93        | 20.73           | 2.21                  |
| HSUPA Subtest 1 | 826.4           | 22.80        | 20.71           | 2.09                  |
|                 | 836.4           | 23.27        | 20.30           | 2.98                  |
|                 | 846.6           | 23.58        | 20.48           | 3.10                  |
| HSUPA Subtest 2 | 826.4           | 23.52        | 21.29           | 2.23                  |
|                 | 836.4           | 24.50        | 21.70           | 2.79                  |
|                 | 846.6           | 24.49        | 21.41           | 3.09                  |
| HSUPA Subtest 3 | 826.4           | 23.60        | 21.30           | 2.30                  |
|                 | 836.4           | 23.36        | 21.07           | 2.29                  |
|                 | 846.6           | 23.75        | 21.02           | 2.73                  |
| HSUPA Subtest 4 | 826.4           | 23.28        | 21.17           | 2.12                  |
|                 | 836.4           | <b>25.09</b> | 22.06           | 3.03                  |
|                 | 846.6           | 24.84        | 22.22           | 2.62                  |
| HSUPA Subtest 5 | 826.4           | 23.20        | 21.14           | 2.05                  |
|                 | 836.4           | 24.50        | 21.73           | 2.77                  |
|                 | 846.6           | 23.90        | 21.70           | 2.20                  |

According to 3GPP 25.101 sub-clause 6.2.2 , the maximum output power is allowed to be reduced by following the table.

Table 6.1aA: UE maximum output power with HS-DPCCH and E-DCH

| UE Transmit Channel Configuration                                                                                                                                                              | CM(db)               | MPR(db)       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------|
| For all combinations of ,DPDCH,DPCCH<br>HS-DPDCH,E-DPDCH and E-DPCCH                                                                                                                           | $0 \leq CM \leq 3.5$ | $MAX(CM-1,0)$ |
| Note: CM=1 for $\beta_d/\beta_d=12/15$ , $\beta_{hs}/\beta_c=24/15$ .For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference. |                      |               |

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to average ratios (PAR) of the HSUPA signal. This prevents saturating the full range of the TX DAC inside of device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (a function of the combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH).

When E-DPDCH channels are present the beta gains on those channels are reduced firsts to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

The SW currently recalculates the cubic metric every time the beta gains on the E-DPDCH are reduced. The cubic metric will likely get lower each time this is done .However, there is no reported reduction of maximum output power in the HSUPA mode since the device also provides a compensate for the power back-off by increasing the gain of TX\_AGC in the transceiver (PA) device.

The end effect is that the DUT output power is identical to the case where there is no MPR in the device.



## 5.1.2 RADIATED OUTPUT POWER

### 5.1.2.1 MEASUREMENT METHOD

The measurements procedures specified in ANSI/TIA-603-E-2016 were applied.

1. Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signal operating below 1GHz are performed using dipole antennas. Measurements on signals operating above 1GHz are performed using broadband horn antennas. All measurements are performed as RMS average measurements while the EUT operating at its maximum duty cycle, at maximum power, and at the approximate frequencies.
2. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power ( $P_{in}$ ) is applied to the input of the dipole, and the power received ( $P_r$ ) at the chamber's probe antenna is recorded.
3. The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established as  $AR_{pl} = P_{in} + 2.15 - P_r$ . The  $AR_{pl}$  is the attenuation of "reference path loss", and including the gain of receive antenna, the cable loss and the air loss. The measurement results are obtained as described below:  $Power = P_{Mea} + AR_{pl}$
4. The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.
5. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.
6. The EUT is then put into continuously transmitting mode at its maximum power level.
7. Power mode measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c). The "reference path loss" from Step 1 is added to this result.
8. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power ( $P_{in}$ ).
9. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15 \text{ dBi}$ ...

### 5.1.2.2 PROVISIONS APPLICABLE

| Mode          | FCC Part Section(s) | Nominal Peak Power                 |
|---------------|---------------------|------------------------------------|
| GSM/GPRS 850  | 22.913(a)(2)        | $\leq 38.45 \text{ dBm}$ (7W). ERP |
| GSM/GPRS 1900 | 24.232(c)           | $\leq 33 \text{ dBm}$ (2W). EIRP   |
| BC0           | 22.913(a)(2)        | $\leq 38.45 \text{ dBm}$ (7W). ERP |
| BC1           | 24.232(c)           | $\leq 33 \text{ dBm}$ (2W). EIRP   |
| BC10          | 90.635              | $\leq 100 \text{ W}$ (50dBm) ERP   |
| UMTS BAND II  | 24.232(c)           | $\leq 33 \text{ dBm}$ (2W), EIRP   |
| UMTS BAND IV  | 27.50(d)            | $\leq 30 \text{ dBm}$ (1W), EIRP   |
| UMTS BAND V   | 22.913(a)(2)        | $\leq 38.45 \text{ dBm}$ (7W). ERP |



## 5.1.2.3 Measurement Result

| Radiated Power (ERP) for GPRS/EGPRS 850 |           |                     |                            |            |
|-----------------------------------------|-----------|---------------------|----------------------------|------------|
| Mode                                    | Frequency | Result              |                            | Conclusion |
|                                         |           | Max. Peak ERP (dBm) | Polarization Of Max. E.R.P |            |
| GSM                                     | 824.2     | <b>28.59</b>        | Horizontal                 | Pass       |
|                                         | 836.6     | 26.27               | Horizontal                 | Pass       |
|                                         | 848.8     | 24.85               | Horizontal                 | Pass       |
|                                         | 824.2     | 24.55               | Vertical                   | Pass       |
|                                         | 836.6     | 24.16               | Vertical                   | Pass       |
|                                         | 848.8     | 24.98               | Vertical                   | Pass       |
| GPRS                                    | 824.2     | 27.17               | Horizontal                 | Pass       |
|                                         | 836.6     | 26.21               | Horizontal                 | Pass       |
|                                         | 848.8     | <b>27.45</b>        | Horizontal                 | Pass       |
|                                         | 824.2     | 27.33               | Vertical                   | Pass       |
|                                         | 836.6     | 26.89               | Vertical                   | Pass       |
|                                         | 848.8     | 26.60               | Vertical                   | Pass       |
| EGPRS                                   | 824.2     | 20.26               | Horizontal                 | Pass       |
|                                         | 836.6     | 19.42               | Horizontal                 | Pass       |
|                                         | 848.8     | <b>20.50</b>        | Horizontal                 | Pass       |
|                                         | 824.2     | 17.73               | Vertical                   | Pass       |
|                                         | 836.6     | 18.95               | Vertical                   | Pass       |
|                                         | 848.8     | 18.58               | Vertical                   | Pass       |



| Radiated Power (E.I.R.P) for GPRS/EGPRS 1900 |           |                        |                                 |            |
|----------------------------------------------|-----------|------------------------|---------------------------------|------------|
| Mode                                         | Frequency | Result                 |                                 | Conclusion |
|                                              |           | Max. Peak ERP<br>(dBm) | Polarization<br>Of Max. E.I.R.P |            |
| GSM                                          | 1850.2    | <b>26.05</b>           | Horizontal                      | Pass       |
|                                              | 1880.0    | 24.41                  | Horizontal                      | Pass       |
|                                              | 1909.8    | 24.82                  | Horizontal                      | Pass       |
|                                              | 1850.2    | 20.61                  | Vertical                        | Pass       |
|                                              | 1880.0    | 21.89                  | Vertical                        | Pass       |
|                                              | 1909.8    | 21.32                  | Vertical                        | Pass       |
| GPRS                                         | 1850.2    | <b>25.50</b>           | Horizontal                      | Pass       |
|                                              | 1880.0    | 25.46                  | Horizontal                      | Pass       |
|                                              | 1909.8    | 25.35                  | Horizontal                      | Pass       |
|                                              | 1850.2    | 20.40                  | Vertical                        | Pass       |
|                                              | 1880.0    | 21.73                  | Vertical                        | Pass       |
|                                              | 1909.8    | 20.67                  | Vertical                        | Pass       |
| EGPRS                                        | 1850.2    | <b>19.54</b>           | Horizontal                      | Pass       |
|                                              | 1880.0    | 18.87                  | Horizontal                      | Pass       |
|                                              | 1909.8    | 18.45                  | Horizontal                      | Pass       |
|                                              | 1850.2    | 19.41                  | Vertical                        | Pass       |
|                                              | 1880.0    | 19.24                  | Vertical                        | Pass       |
|                                              | 1909.8    | 19.18                  | Vertical                        | Pass       |



| Radiated Power (ERP) for BC0 |           |                     |                            |            |
|------------------------------|-----------|---------------------|----------------------------|------------|
| Mode                         | Frequency | Result              |                            | Conclusion |
|                              |           | Max. Peak ERP (dBm) | Polarization Of Max. E.R.P |            |
| CDMA                         | 824.7     | 18.61               | Horizontal                 | Pass       |
|                              | 836.52    | <b>20.87</b>        | Horizontal                 | Pass       |
|                              | 848.31    | 18.12               | Horizontal                 | Pass       |
|                              | 824.7     | 18.16               | Vertical                   | Pass       |
|                              | 836.52    | 17.24               | Vertical                   | Pass       |
|                              | 848.31    | 17.17               | Vertical                   | Pass       |

| Radiated Power (E.I.R.P) for BC1 |           |                         |                              |            |
|----------------------------------|-----------|-------------------------|------------------------------|------------|
| Mode                             | Frequency | Result                  |                              | Conclusion |
|                                  |           | Max. Peak E.I.R.P (dBm) | Polarization Of Max. E.I.R.P |            |
| CDMA                             | 1851.25   | 19.06                   | Horizontal                   | Pass       |
|                                  | 1880      | <b>20.85</b>            | Horizontal                   | Pass       |
|                                  | 1908.75   | 18.57                   | Horizontal                   | Pass       |
|                                  | 1851.25   | 18.42                   | Vertical                     | Pass       |
|                                  | 1880      | 17.10                   | Vertical                     | Pass       |
|                                  | 1908.75   | 17.37                   | Vertical                     | Pass       |

| Radiated Power (ERP) for BC10 |           |                     |                            |            |
|-------------------------------|-----------|---------------------|----------------------------|------------|
| Mode                          | Frequency | Result              |                            | Conclusion |
|                               |           | Max. Peak ERP (dBm) | Polarization Of Max. E.R.P |            |
| CDMA                          | 817.25    | 19.04               | Horizontal                 | Pass       |
|                               | 820       | <b>21.04</b>        | Horizontal                 | Pass       |
|                               | 822.75    | 18.36               | Horizontal                 | Pass       |
|                               | 817.25    | 17.88               | Vertical                   | Pass       |
|                               | 820       | 17.15               | Vertical                   | Pass       |
|                               | 822.75    | 17.64               | Vertical                   | Pass       |



| Radiated Power (E.I.R.P) for UMTS band II |           |                            |                                 |            |
|-------------------------------------------|-----------|----------------------------|---------------------------------|------------|
| Mode                                      | Frequency | Result                     |                                 | Conclusion |
|                                           |           | Max. Peak E.I.R.P<br>(dBm) | Polarization<br>Of Max. E.I.R.P |            |
| UMTS                                      | 1852.4    | 19.01                      | Horizontal                      | Pass       |
|                                           | 1880      | <b>20.95</b>               | Horizontal                      | Pass       |
|                                           | 1907.6    | 18.40                      | Horizontal                      | Pass       |
|                                           | 1852.4    | 18.24                      | Vertical                        | Pass       |
|                                           | 1880      | 17.22                      | Vertical                        | Pass       |
|                                           | 1907.6    | 17.44                      | Vertical                        | Pass       |

| Radiated Power (E.I.R.P) for UMTS band IV |           |                            |                                 |            |
|-------------------------------------------|-----------|----------------------------|---------------------------------|------------|
| Mode                                      | Frequency | Result                     |                                 | Conclusion |
|                                           |           | Max. Peak E.I.R.P<br>(dBm) | Polarization<br>Of Max. E.I.R.P |            |
| UMTS                                      | 1712.4    | <b>20.24</b>               | Horizontal                      | Pass       |
|                                           | 1732.4    | 18.60                      | Horizontal                      | Pass       |
|                                           | 1752.6    | 20.00                      | Horizontal                      | Pass       |
|                                           | 1712.4    | 17.09                      | Vertical                        | Pass       |
|                                           | 1732.4    | 18.15                      | Vertical                        | Pass       |
|                                           | 1752.6    | 15.99                      | Vertical                        | Pass       |

| Radiated Power (ERP) for UMTS band V |           |                        |                               |            |
|--------------------------------------|-----------|------------------------|-------------------------------|------------|
| Mode                                 | Frequency | Result                 |                               | Conclusion |
|                                      |           | Max. Peak ERP<br>(dBm) | Polarization<br>Of Max. E.R.P |            |
| UMTS                                 | 826.4     | <b>20.08</b>           | Horizontal                    | Pass       |
|                                      | 836.4     | 18.65                  | Horizontal                    | Pass       |
|                                      | 846.6     | 19.70                  | Horizontal                    | Pass       |
|                                      | 826.4     | 16.99                  | Vertical                      | Pass       |
|                                      | 836.4     | 17.89                  | Vertical                      | Pass       |
|                                      | 846.6     | 16.17                  | Vertical                      | Pass       |

Note: Above is the worst mode data.

## 5.2 PEAK-TO-AVERAGE RATIO

### 5.2.1 MEASUREMENT METHOD

Use one of the procedures presented in 4.1 to measure the total peak power and record as PPk. Use one of the applicable procedures presented 4.2 to measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

$$\text{PAPR (dB)} = \text{PPk (dBm)} - \text{PAvg (dBm)}.$$

### 5.2.2 PROVISIONS APPLICABLE

This is the test for the Peak-to-Average Ratio from the EUT.

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

**5.2.3 MEASUREMENT RESULT**

| Modes                              | Max<br>Peak to Average<br>Ratio(dB) | Upper limit(dB) | Result |
|------------------------------------|-------------------------------------|-----------------|--------|
| GSM850                             | 2.85                                | 13              | Pass   |
| PCS1900                            | 3.80                                | 13              | Pass   |
| BC0                                | 6.2                                 | 13              | Pass   |
| BC1                                | 6.5                                 | 13              | Pass   |
| BC10                               | 5.9                                 | 13              | Pass   |
| UMTS BAND II                       | 3.14                                | 13              | Pass   |
| UMTS BAND IV                       | 3.19                                | 13              | Pass   |
| UMTS BAND V                        | 3.18                                | 13              | Pass   |
| Note: refer to section of 5.1.1.2. |                                     |                 |        |



### 5.3 OCCUPIED BANDWIDTH

#### 5.3.1 MEASUREMENT METHOD

1. The Occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper Frequency limits, the mean power radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.
2. RBW=1~5% of the expected OBW, VBW>=3 x RBW, Detector=Peak, Trace mode=max hold, Sweep=auto couple, and the trace was allowed to stabilize.

#### 5.3.2 PROVISIONS APPLICABLE

The emission bandwidth is defined as two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power

#### 5.3.3 MEASUREMENT RESULT

| Band      | Channel | Occupied Bandwidth (kHz) | 26dB Bandwidth (kHz) | Limit(kHz) | Verdict |
|-----------|---------|--------------------------|----------------------|------------|---------|
| GSM850    | 128     | 244.7                    | 312                  | ---        | PASS    |
| GSM850    | 190     | 246.7                    | 315                  | ---        | PASS    |
| GSM850    | 251     | 243.3                    | 316                  | ---        | PASS    |
| GPRS850   | 128     | 246.9                    | 311                  | ---        | PASS    |
| GPRS850   | 190     | 241.4                    | 309                  | ---        | PASS    |
| GPRS850   | 251     | 246.5                    | 314                  | ---        | PASS    |
| EGPRS850  | 128     | 248.2                    | 324                  | ---        | PASS    |
| EGPRS850  | 190     | 250.7                    | 313                  | ---        | PASS    |
| EGPRS850  | 251     | 248.8                    | 301                  | ---        | PASS    |
| GSM1900   | 512     | 245.2                    | 312                  | ---        | PASS    |
| GSM1900   | 661     | 245.6                    | 314                  | ---        | PASS    |
| GSM1900   | 810     | 245.4                    | 314                  | ---        | PASS    |
| GPRS1900  | 512     | 244.7                    | 311                  | ---        | PASS    |
| GPRS1900  | 661     | 246.3                    | 316                  | ---        | PASS    |
| GPRS1900  | 810     | 246.4                    | 311                  | ---        | PASS    |
| EGPRS1900 | 512     | 252.3                    | 317                  | ---        | PASS    |
| EGPRS1900 | 661     | 257.5                    | 328                  | ---        | PASS    |
| EGPRS1900 | 810     | 250.4                    | 320                  | ---        | PASS    |

| Band    | Channel | Occupied Bandwidth (kHz) | 26dB Bandwidth (kHz) | Limit(kHz) | Verdict |
|---------|---------|--------------------------|----------------------|------------|---------|
| Band II | 9262    | 4164.5                   | 4721                 | ---        | PASS    |
| Band II | 9400    | 4175.4                   | 4727                 | ---        | PASS    |
| Band II | 9538    | 4167.5                   | 4739                 | ---        | PASS    |
| Band IV | 1312    | 4207.5                   | 4786                 | ---        | PASS    |
| Band IV | 1413    | 4174.8                   | 4722                 | ---        | PASS    |
| Band IV | 1513    | 4199.8                   | 4792                 | ---        | PASS    |
| Band V  | 4132    | 4166.7                   | 4706                 | ---        | PASS    |
| Band V  | 4182    | 4173.2                   | 4748                 | ---        | PASS    |
| Band V  | 4233    | 4157.4                   | 4714                 | ---        | PASS    |

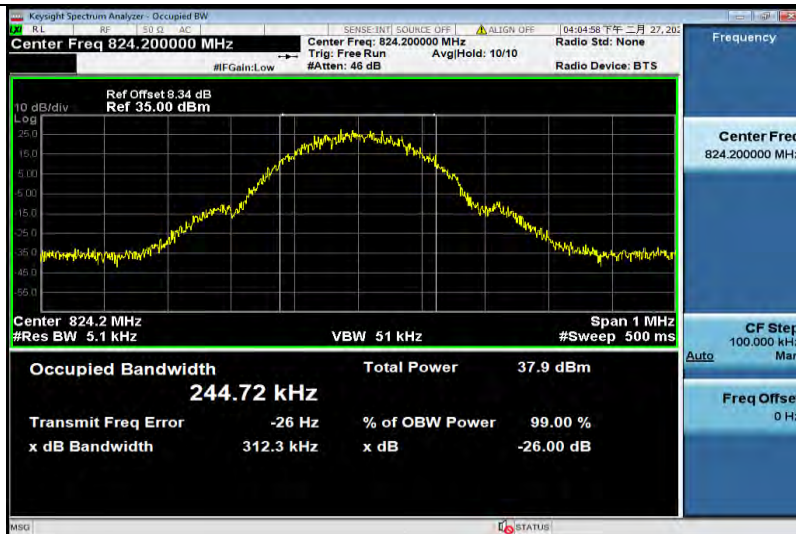


| Band | Channel | Occupied Bandwidth<br>(kHz) | 26dB Bandwidth<br>(kHz) | Limit(kHz) | Verdict |
|------|---------|-----------------------------|-------------------------|------------|---------|
| BC0  | 1013    | 1279.4                      | 1425                    | ---        | PASS    |
| BC0  | 384     | 1269.7                      | 1429                    | ---        | PASS    |
| BC0  | 777     | 1278.5                      | 1429                    | ---        | PASS    |
| BC1  | 25      | 1283.3                      | 1445                    | ---        | PASS    |
| BC1  | 600     | 1277.7                      | 1436                    | ---        | PASS    |
| BC1  | 1175    | 1282.6                      | 1436                    | ---        | PASS    |
| BC10 |         | 1288.6                      | 1472                    | ---        | PASS    |
| BC10 | 560     | 1292.3                      | 1467                    | ---        | PASS    |
| BC10 | 670     | 1290.0                      | 1464                    | ---        | PASS    |

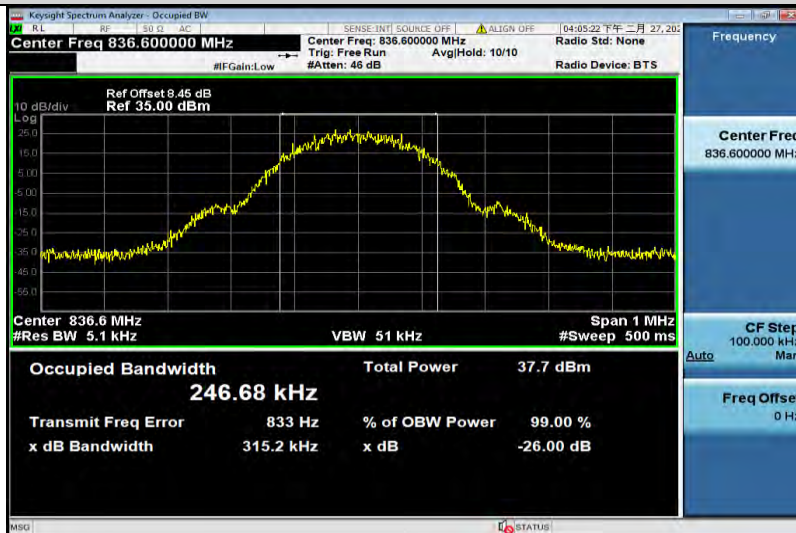


For GSM

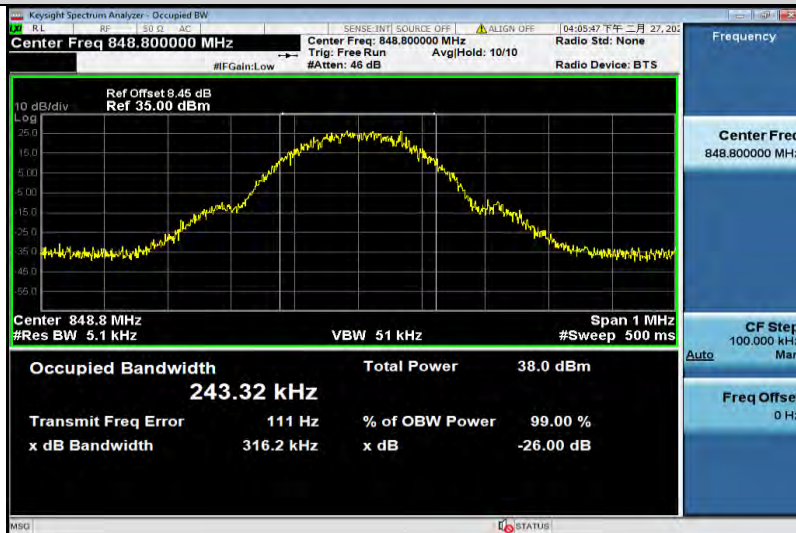
Test Band=GSM850/PCS1900



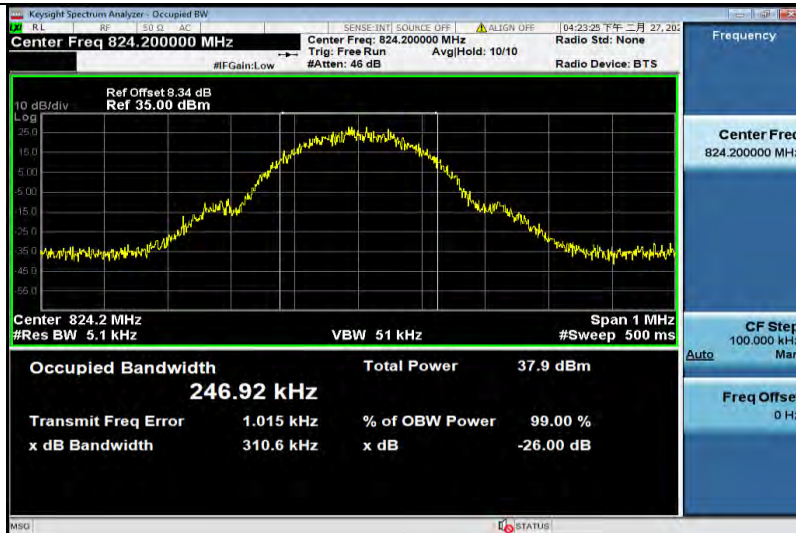
GSM850-128



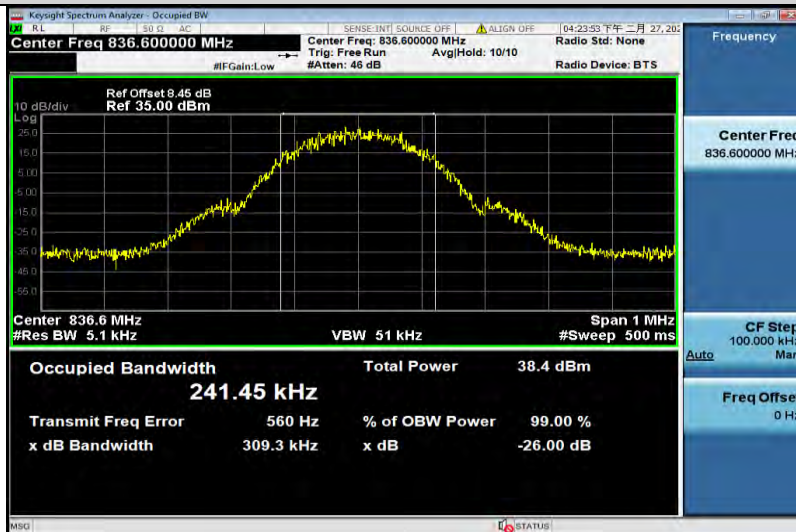
GSM850-190



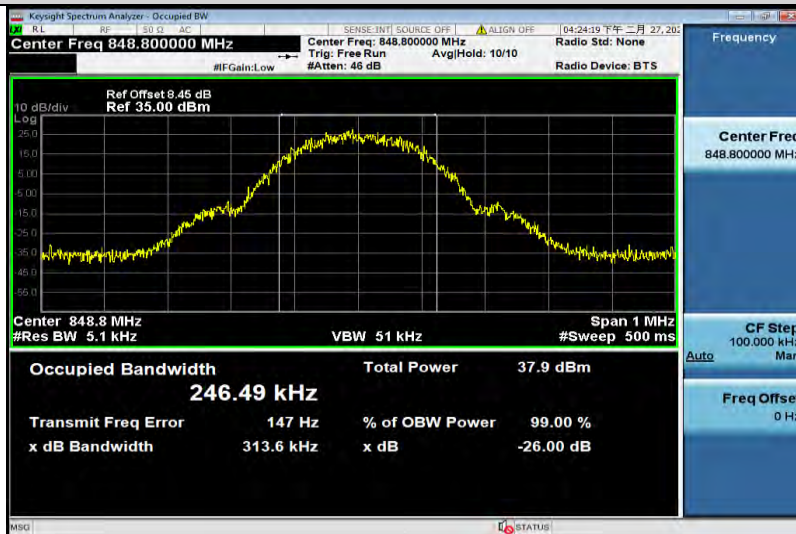
GSM850-251



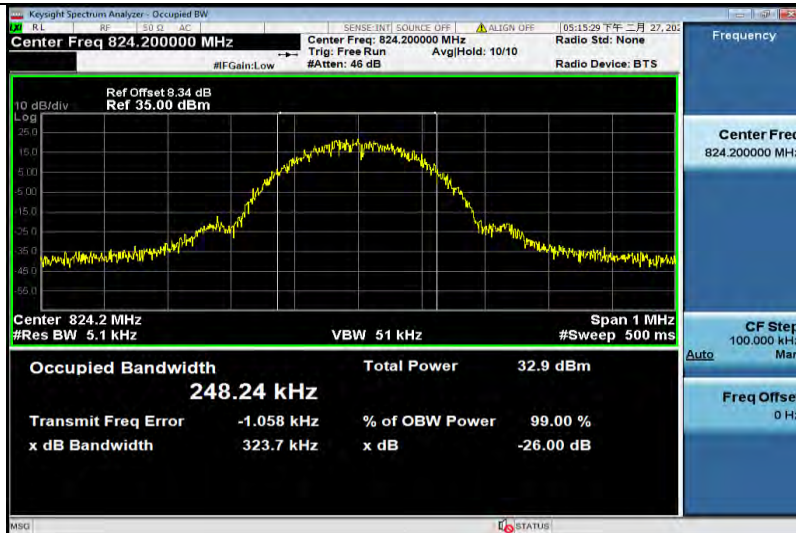
GPRS850-128



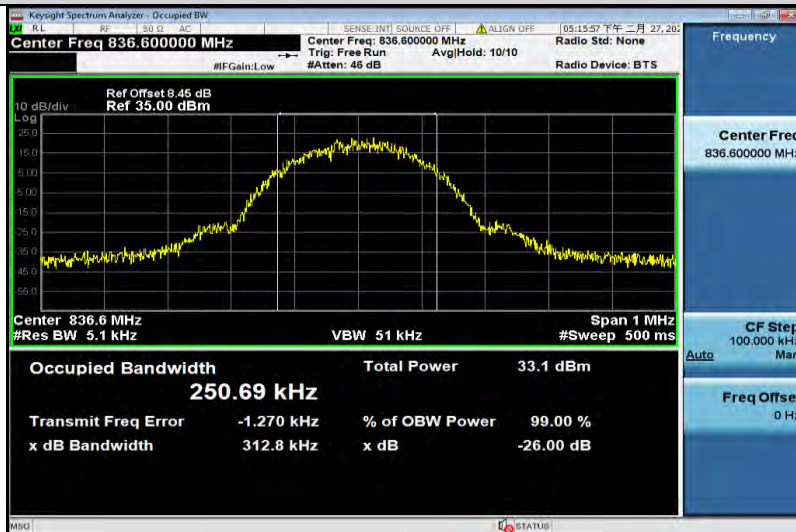
GPRS850-190



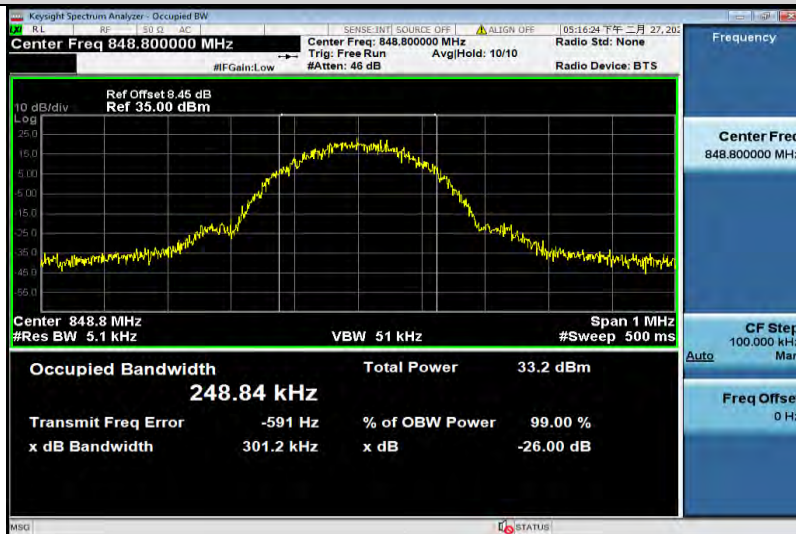
GPRS850-251



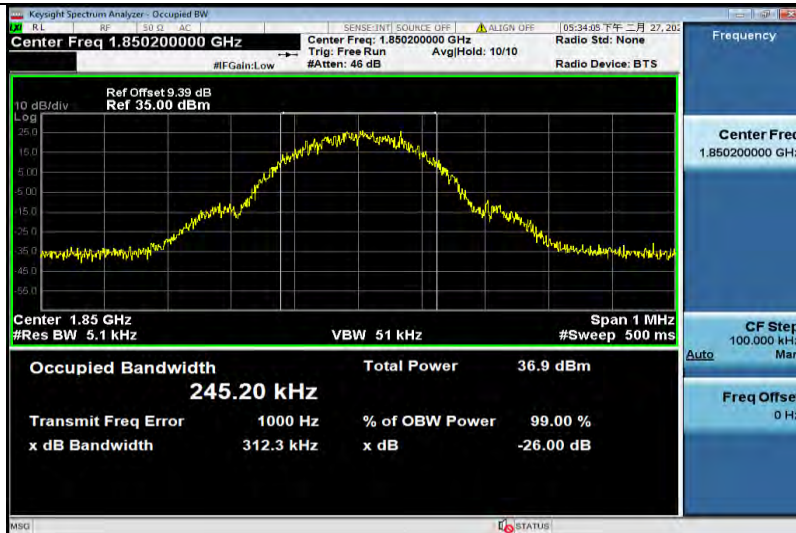
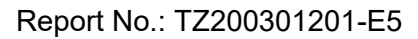
EGPRS850-128



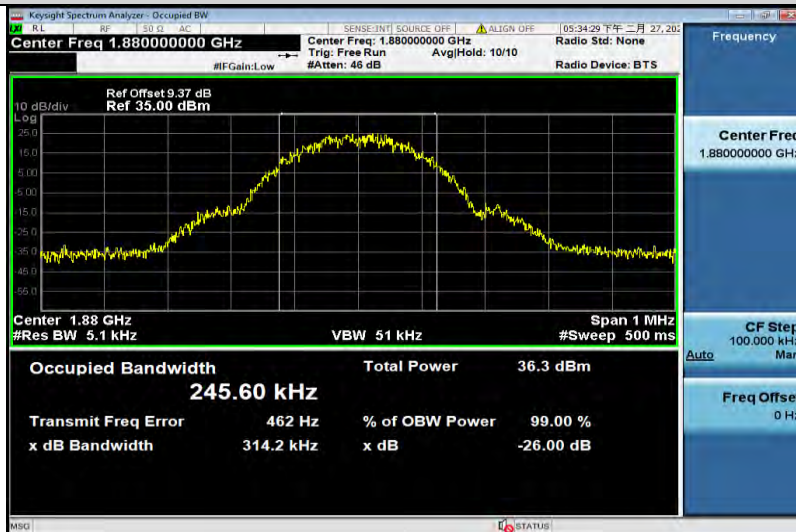
EGPRS850-190



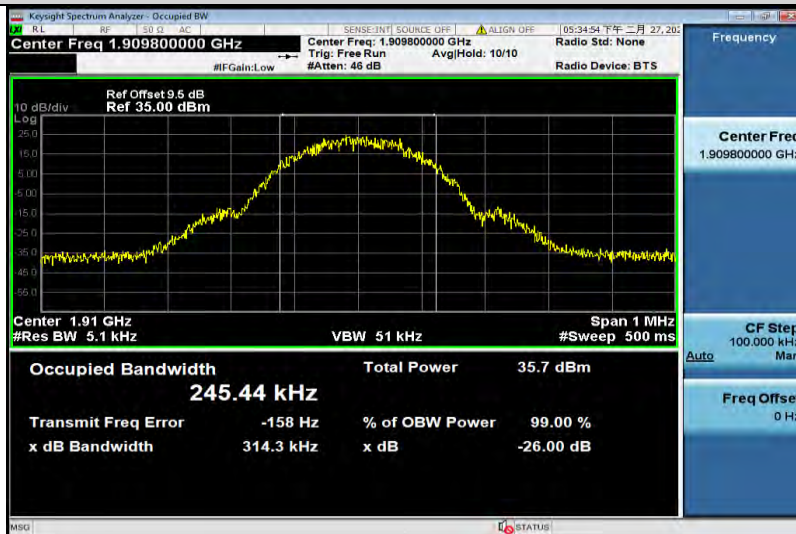
EGPRS850-251



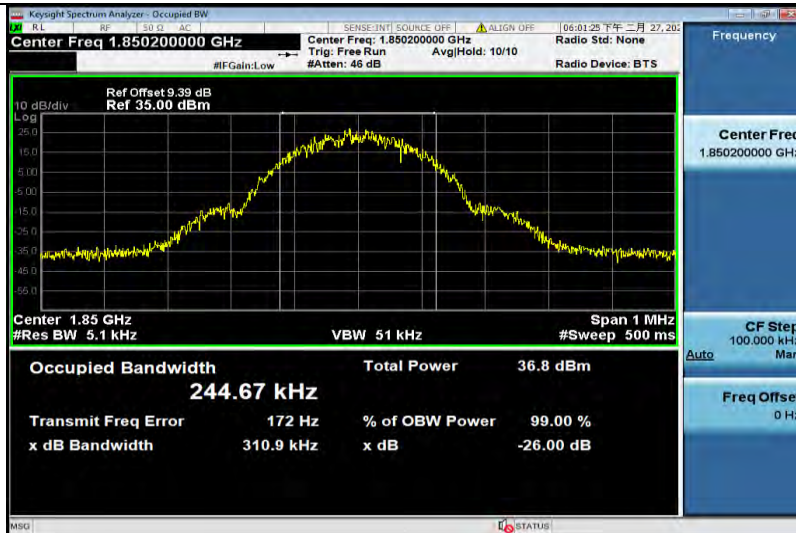
GSM1900-512



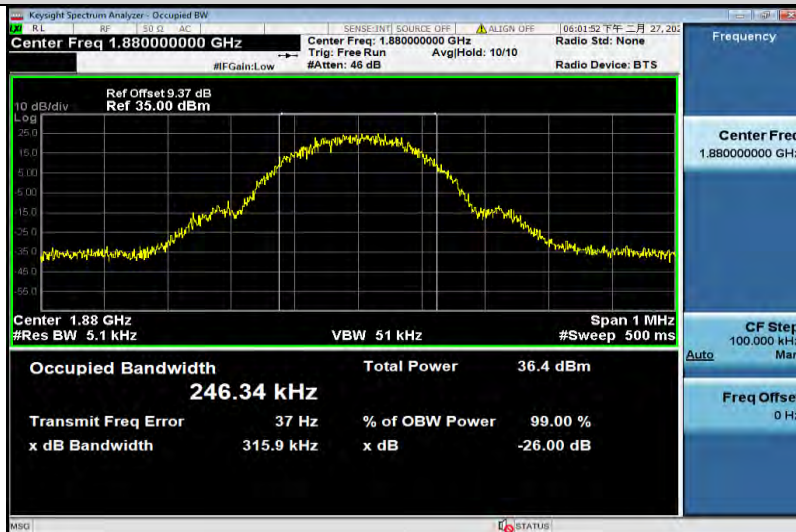
GSM1900-661



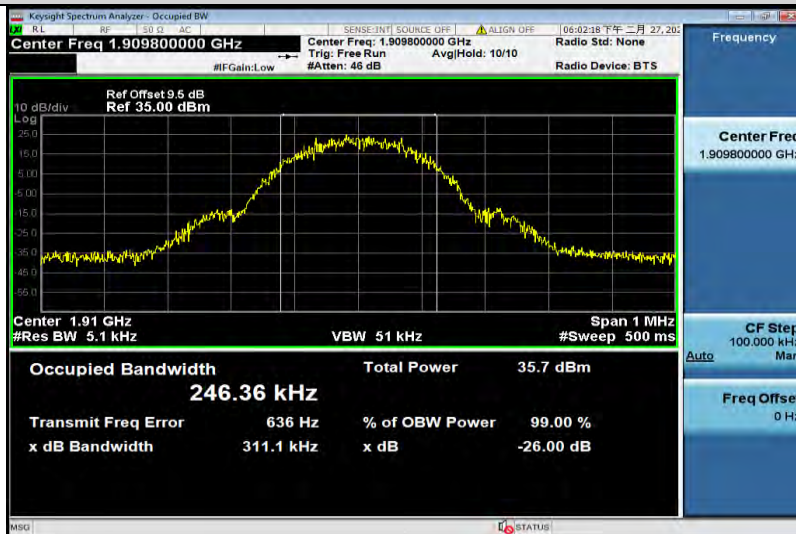
GSM1900-810



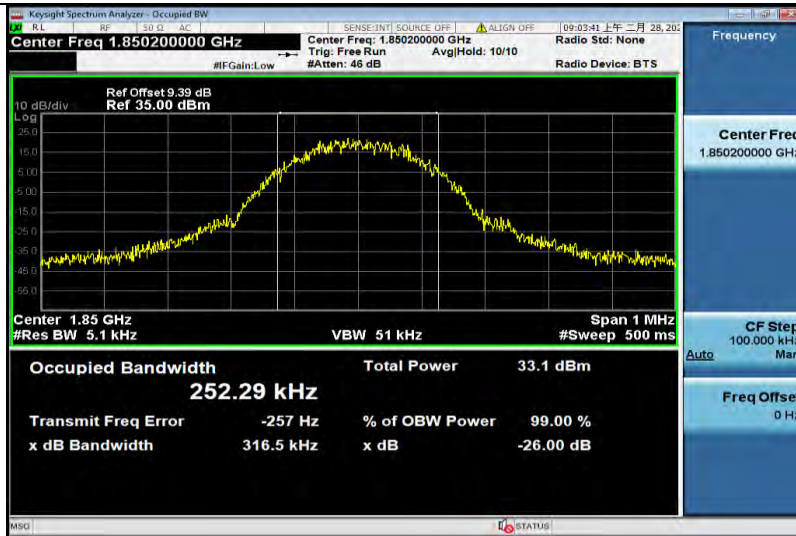
GPRS1900-512



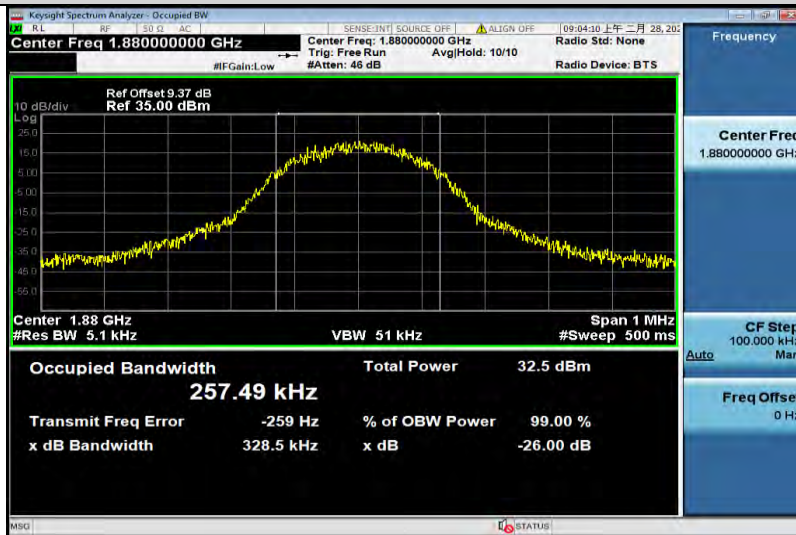
GPRS1900-661



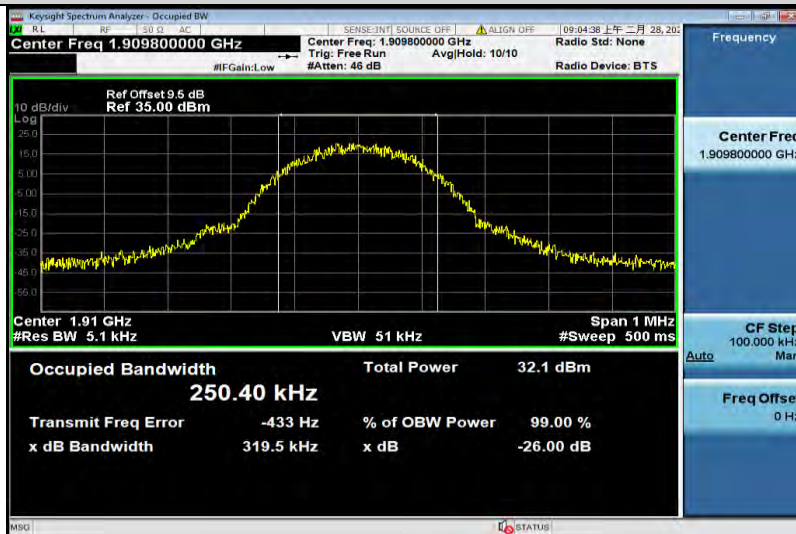
GPRS1900-810



EGPRS1900-512



EGPRS1900-661

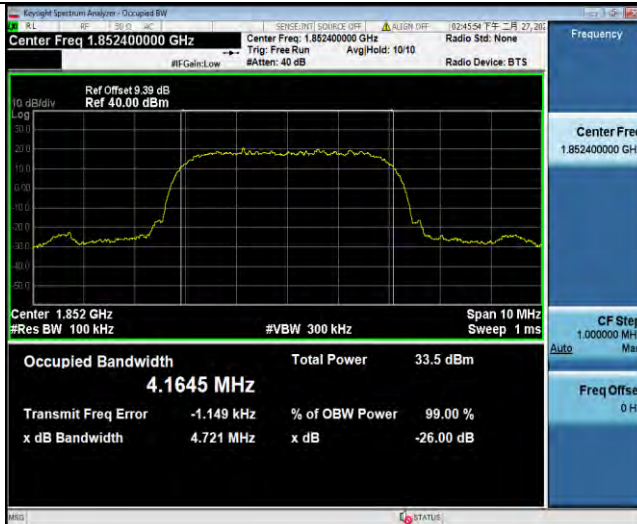


EGPRS1900-810



For WCDMA

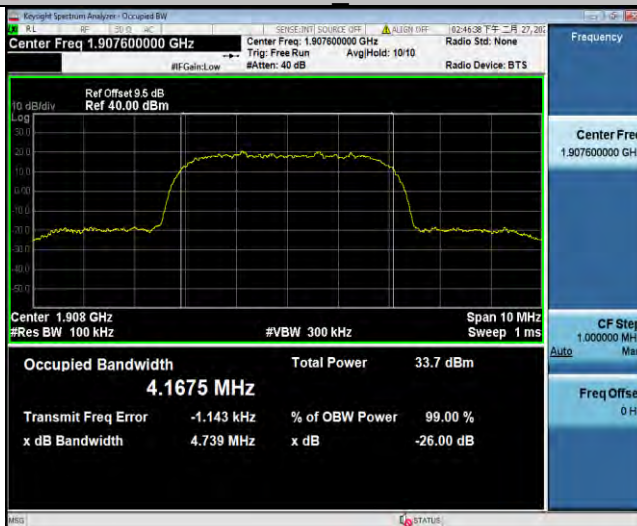
Test Band=WCDMA850/WCDMA1900



Band II 9262

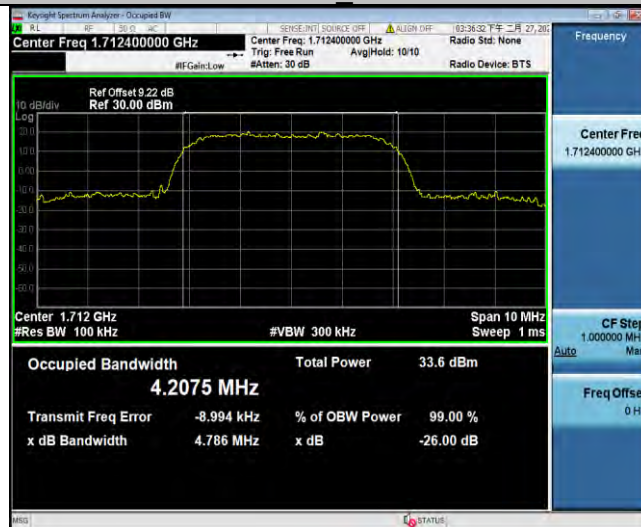


Band II 9400

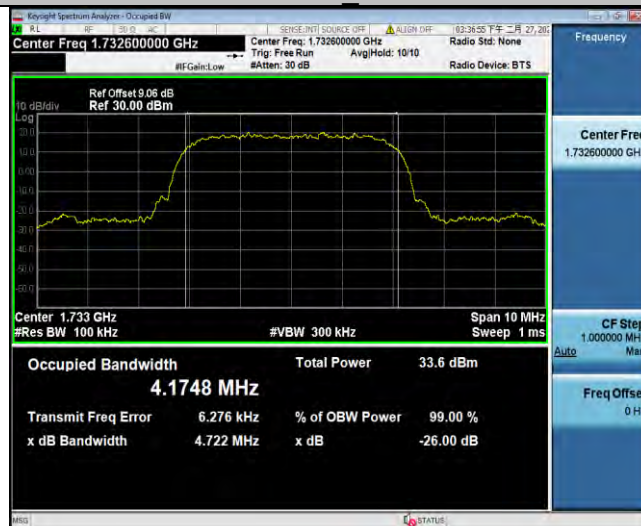




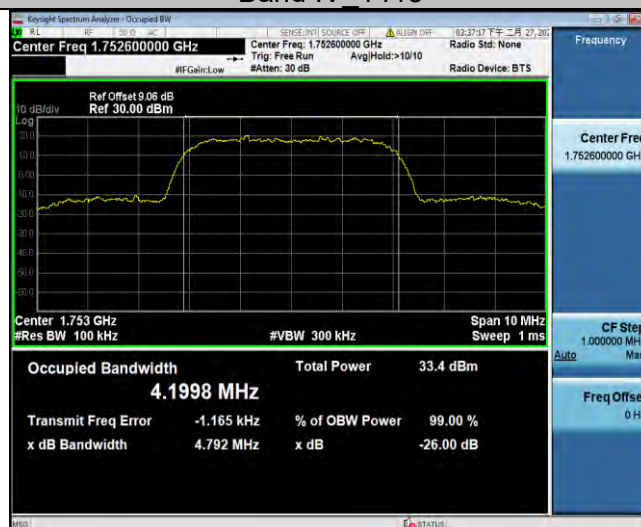
## Band II 9538



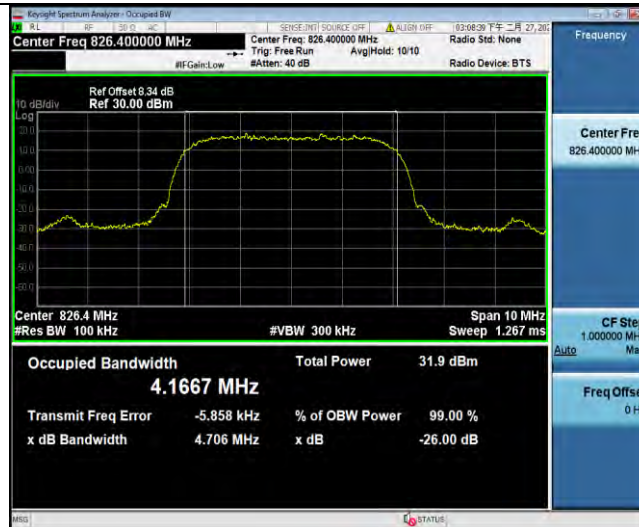
## Band IV 1312



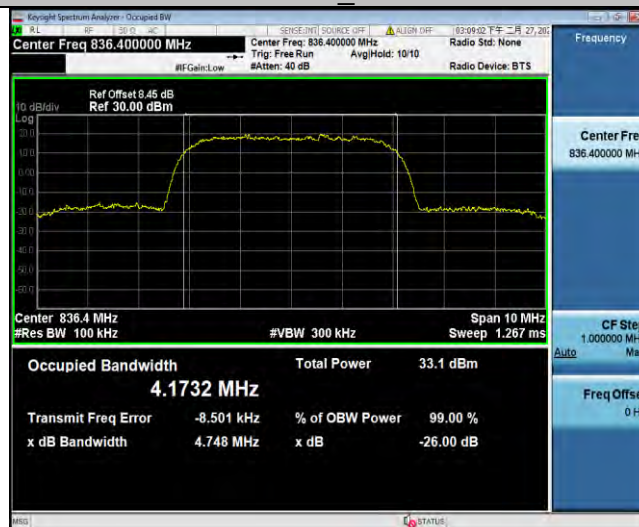
## Band IV 1413



## Band IV 1513



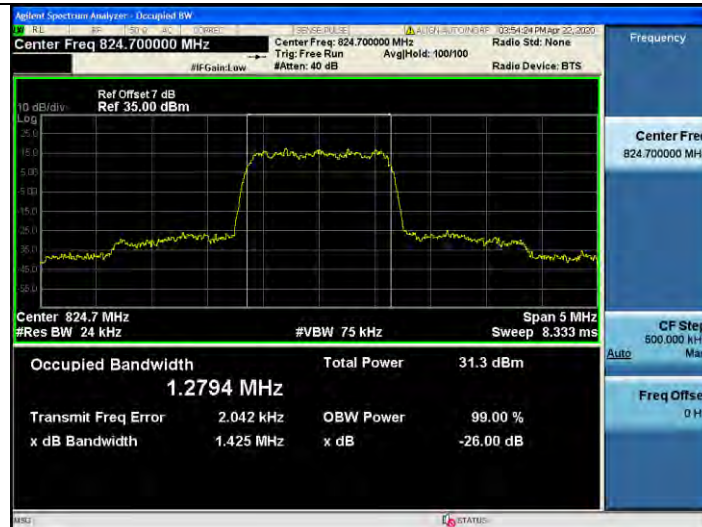
Band V 4132



Band V 4182



Band V 4233



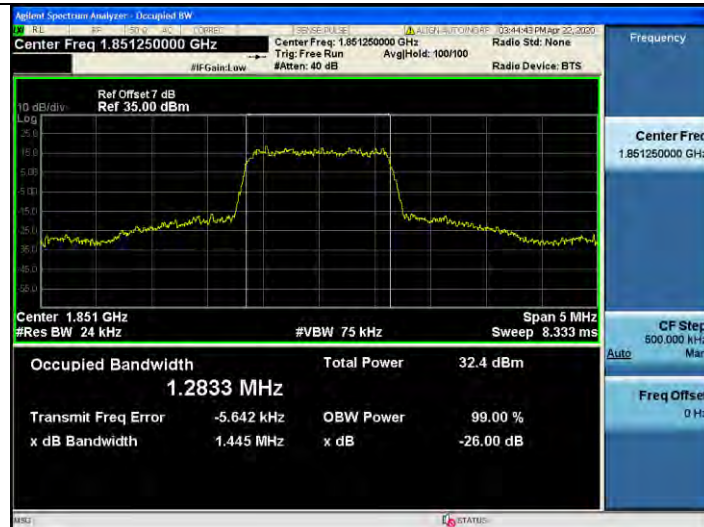
BC0 1013



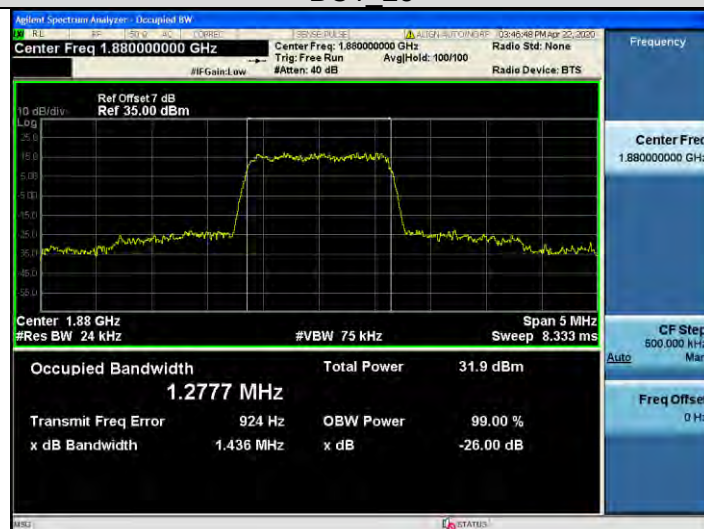
BC0 384



BC0 777



BC1\_25



BC1\_600



BC1\_1175



BC10\_450



BC10\_560



BC10\_670



## **5.4 BAND EDGE**

### **5.4.1 MEASUREMENT METHOD**

1. All out of band emissions are measured with an analyzer spectrum connected to the antenna terminal of the EUT while the EUT at its maximum duty cycle, at maximum power, and at the approximate frequencies. All data rates were investigated to determine the worst case configuration
2. The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.
3. Start and stop frequency were set such that the band edge would be placed in the center of the plot.
4. Span was set large enough so as to capture all out of band emissions near the band edge.
5. RBW>1% of the emission bandwidth, VBW  $\geq 3 \times$  RBW, Detector=RMS, Number of points  $\geq 2 \times$  Span/RBW, Trace mode=max hold, Sweep time=auto couple, and the trace was allowed to stabilize

### **5.4.2 PROVISIONS APPLICABLE**

As Specified in FCC rules of 22.917(a), 24.238(a) and KDB 971168 D1 V03R01.

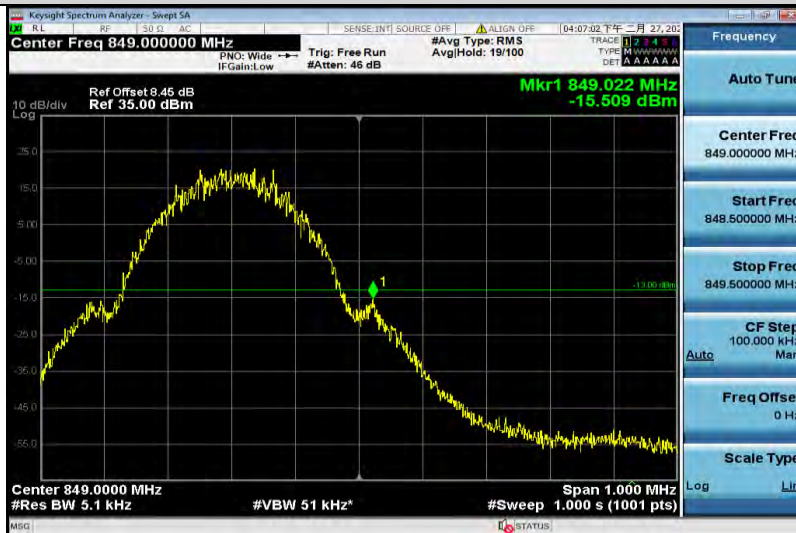
### **5.4.3 Test Results**

**For GSM**

**Test Band=GSM850/GSM1900**



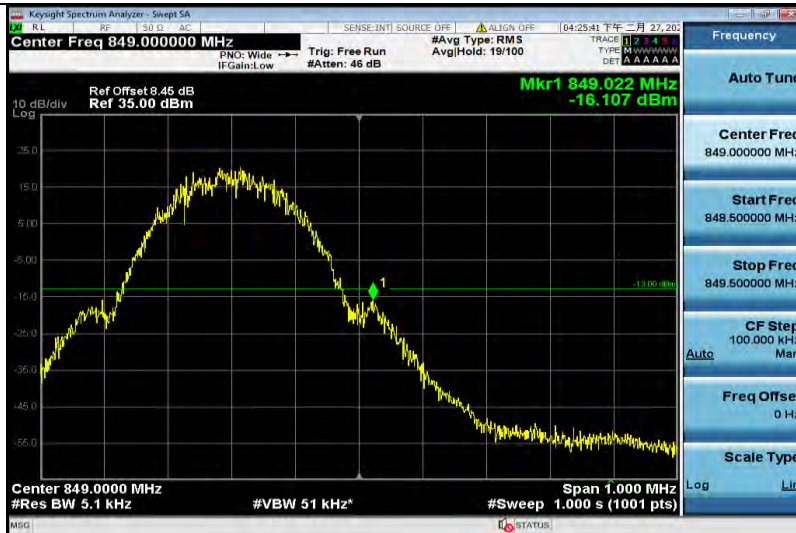
GSM850-128



GSM850-251



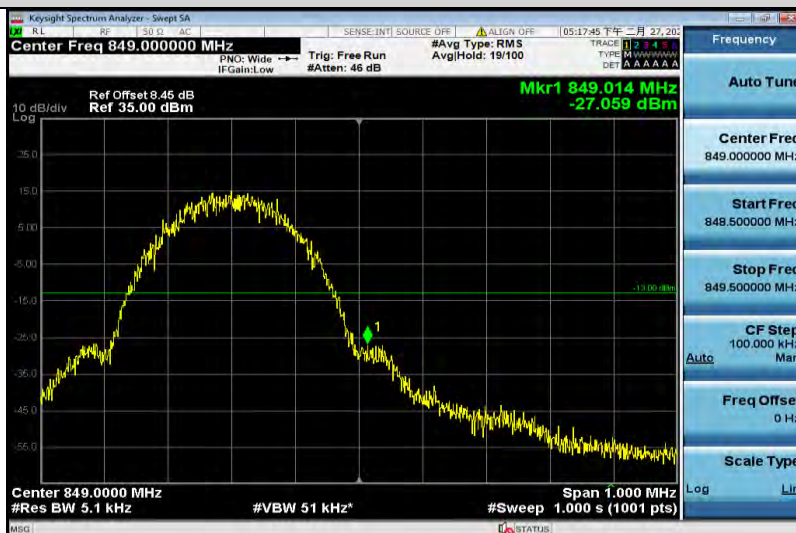
GPRS850-128



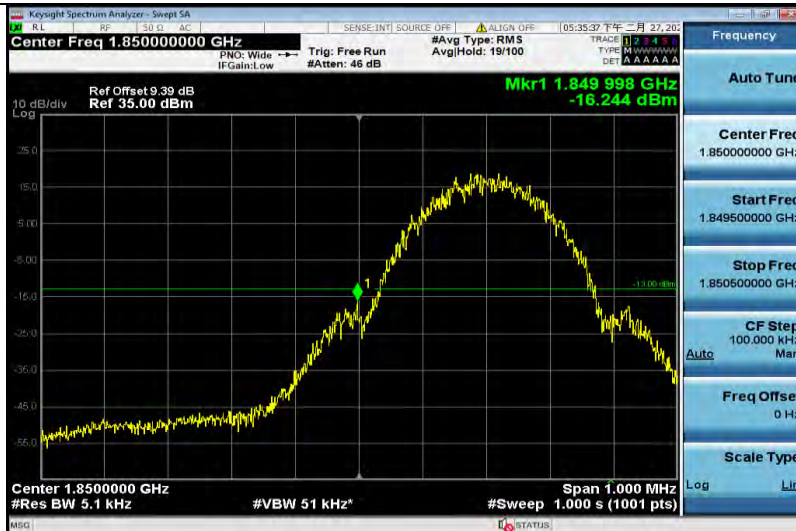
GPRS850-251



EGPRS850-128



EGPRS850-251



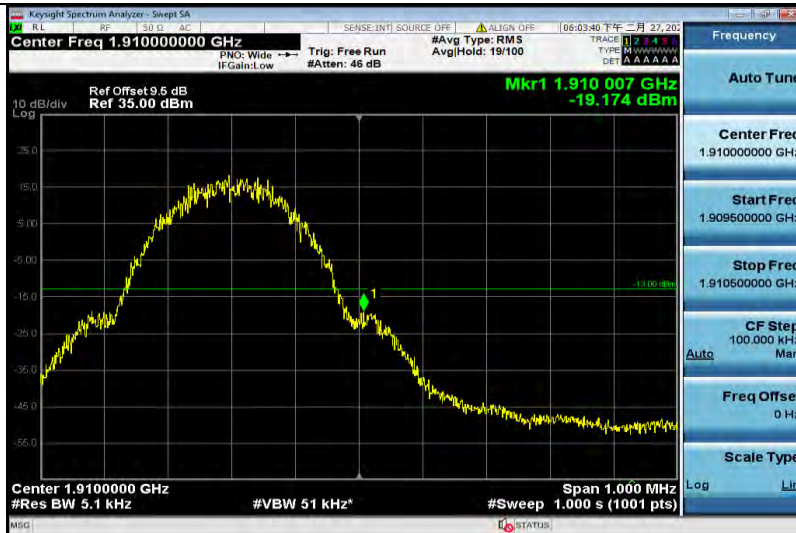
GSM1900-512



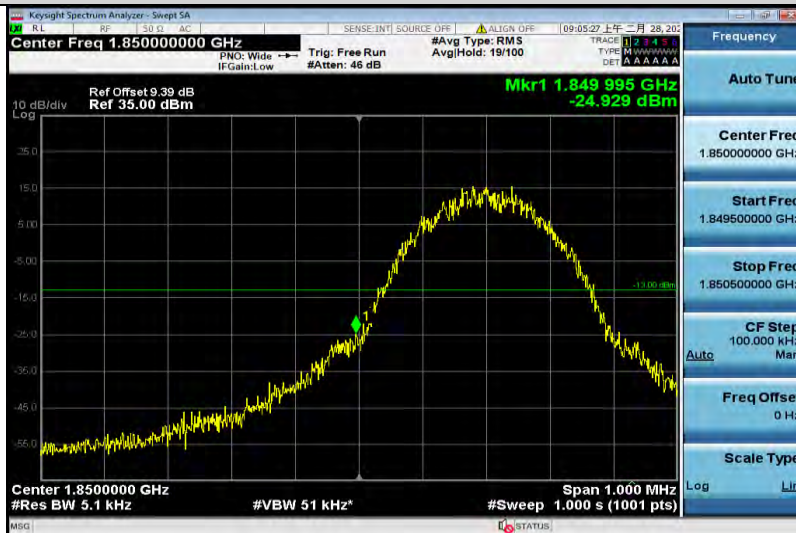
GSM1900-810



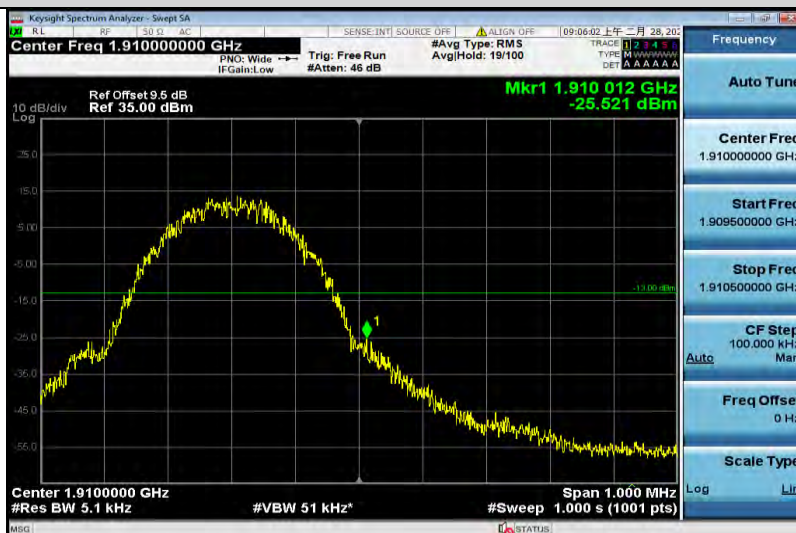
GPRS1900-512



GPRS1900-810



EGPRS1900-512



EGPRS1900-810



For WCDMA

Test Band=WCDMA850/WCDMA1900/WCDMA1700



Band II 9262



Band II 9538



Band IV 1312



Band IV\_1513



Band V\_4132



Band V\_4233



For CDMA

Test Band=BC0/ BC1/ BC10



BC0 1013



BC0 777



BC1\_25



BC1\_1175



BC10\_450



BC10\_670

## 5.5 SPURIOUS EMISSION

### 5.5.1 CONDUCTED SPURIOUS EMISSION

#### 5.5.1.1 MEASUREMENT METHOD

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. The level of the carrier and the various conducted spurious and harmonic frequency is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10<sup>th</sup> harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the approximate frequencies. All data rates were investigated to determine the worst case configuration.

2. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM850, data taken from 30 MHz to 9 GHz.

3. Determine EUT transmit frequencies: the following typical channels were chosen to conducted emissions testing.

| Typical Channels for testing of GSM 850 |                 |
|-----------------------------------------|-----------------|
| Channel                                 | Frequency (MHz) |
| 128                                     | 824.2           |
| 190                                     | 836.6           |
| 251                                     | 848.8           |

| Typical Channels for testing of PCS 1900 |                 |
|------------------------------------------|-----------------|
| Channel                                  | Frequency (MHz) |
| 512                                      | 1850.2          |
| 661                                      | 1880.0          |
| 810                                      | 1909.8          |

| Typical Channels for testing of BC0 |                 |
|-------------------------------------|-----------------|
| Channel                             | Frequency (MHz) |
| 1013                                | 824.7           |
| 384                                 | 836.52          |
| 777                                 | 848.31          |



| Typical Channels for testing of BC1 |                 |
|-------------------------------------|-----------------|
| Channel                             | Frequency (MHz) |
| 25                                  | 1851.25         |
| 600                                 | 1880.00         |
| 1175                                | 1908.75         |

| Typical Channels for testing of BC10 |                 |
|--------------------------------------|-----------------|
| Channel                              | Frequency (MHz) |
| 450                                  | 817.25          |
| 560                                  | 820.00          |
| 670                                  | 822.75          |

| Typical Channels for testing of UMTS band II |                 |
|----------------------------------------------|-----------------|
| Channel                                      | Frequency (MHz) |
| 9262                                         | 1852.4          |
| 9400                                         | 1880            |
| 9538                                         | 1907.6          |

| Typical Channels for testing of UMTS band IV |                 |
|----------------------------------------------|-----------------|
| Channel                                      | Frequency (MHz) |
| 1312                                         | 1712.4          |
| 1412                                         | 1732.4          |
| 1513                                         | 1752.6          |

| Typical Channels for testing of UMTS band V |                 |
|---------------------------------------------|-----------------|
| Channel                                     | Frequency (MHz) |
| 4132                                        | 846.4           |
| 4182                                        | 836.4           |
| 4233                                        | 846.6           |

#### 5.5.1.2 PROVISIONS APPLICABLE

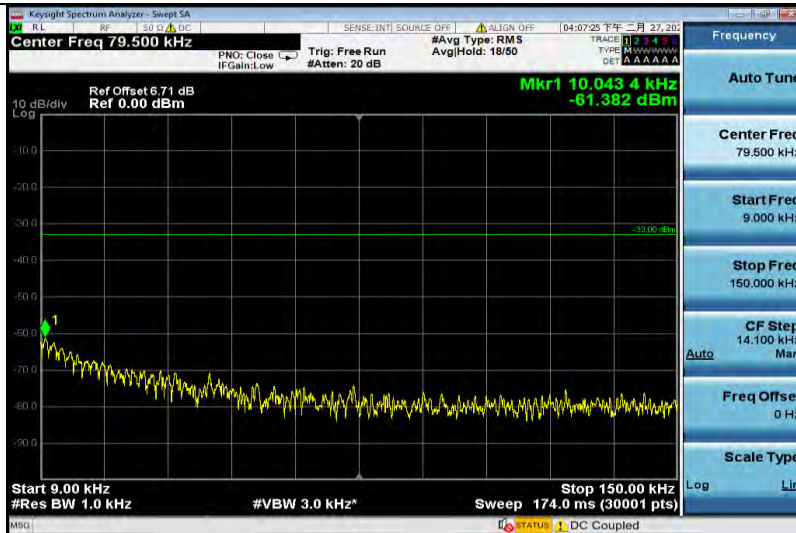
On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power ( $P$ , in Watts) by at least  $43+10\log(P)$  dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.



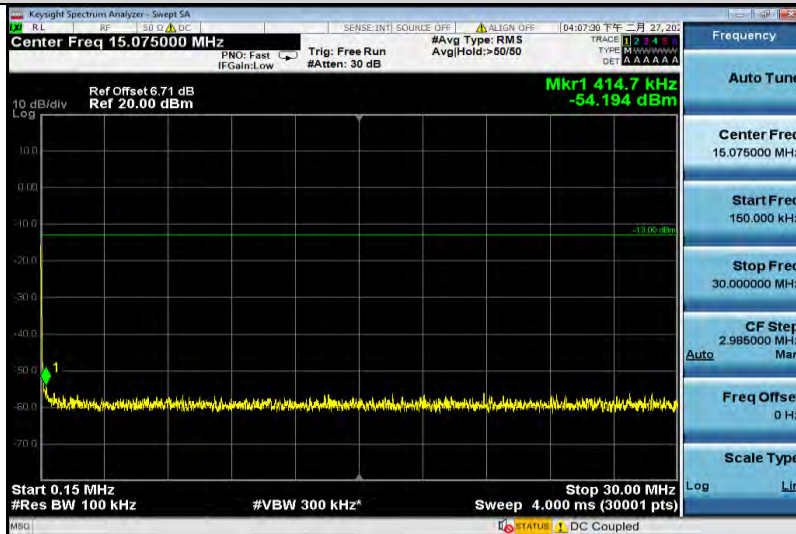
## 5.5.1.3 MEASUREMENT RESULT

## Test Results

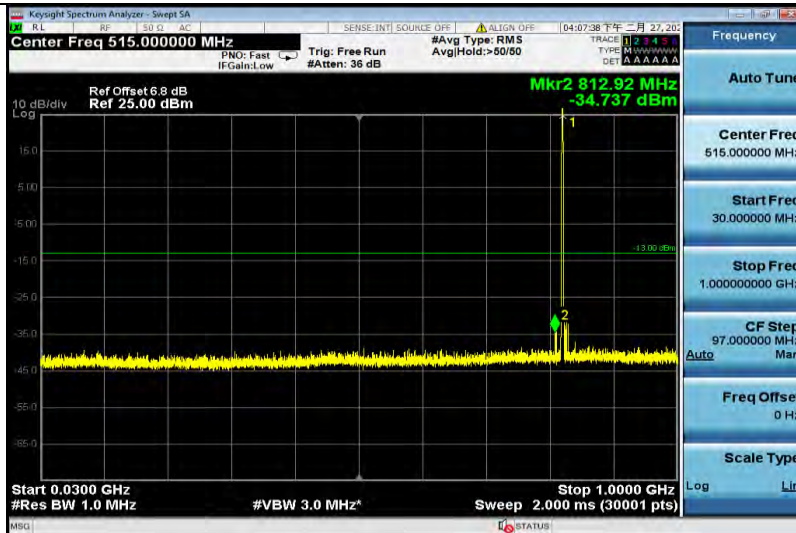
Test Band=GSM850/GSM1900 Test



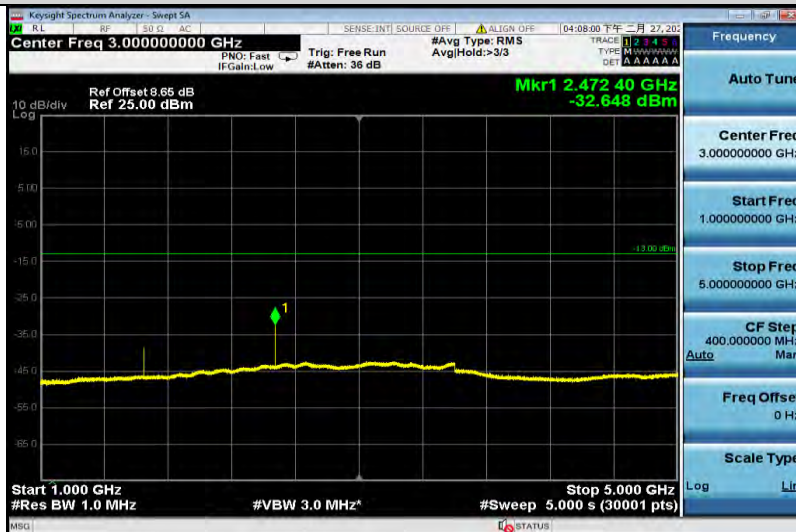
GSM850-128-0.009~0.15



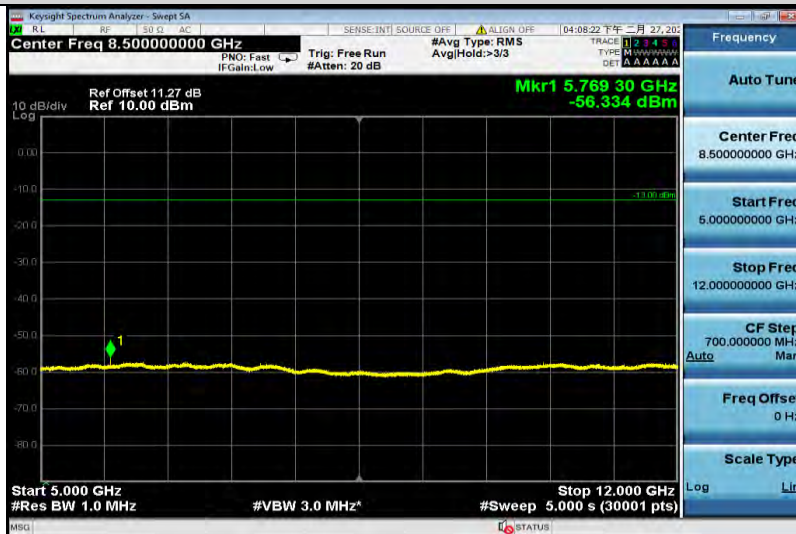
GSM850-128-0.15~30



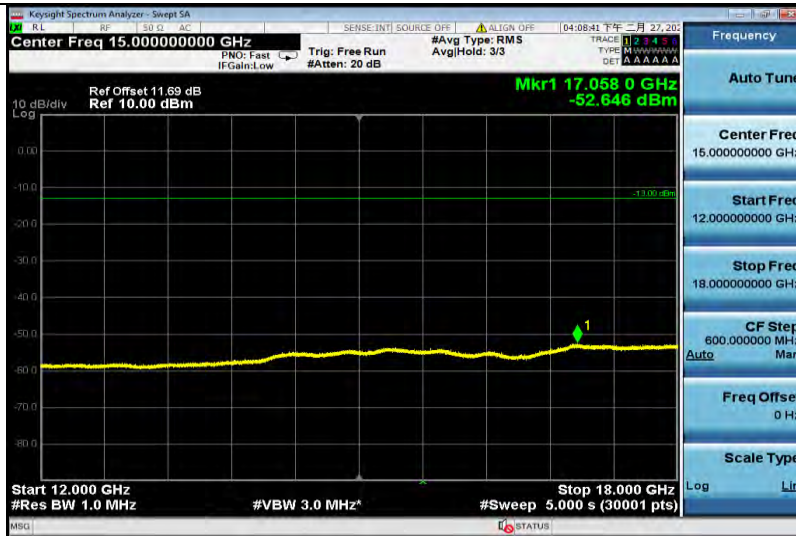
GSM850-128-30~1000



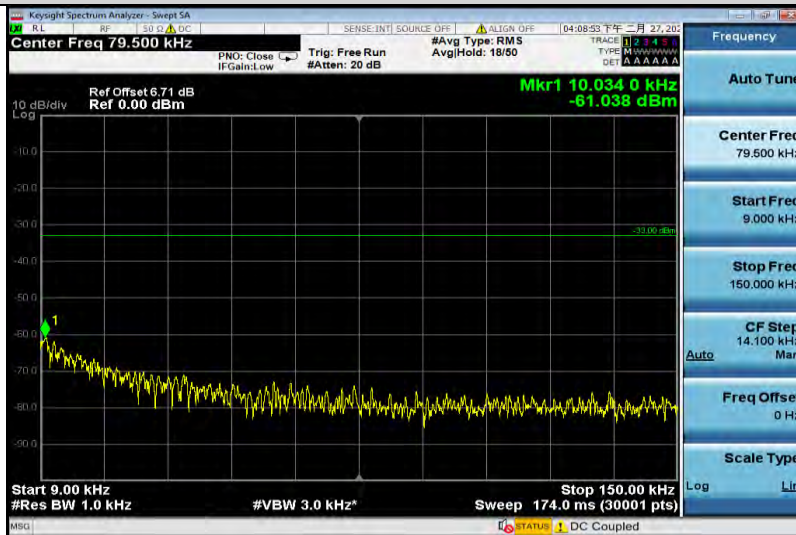
GSM850-128-1000~5000



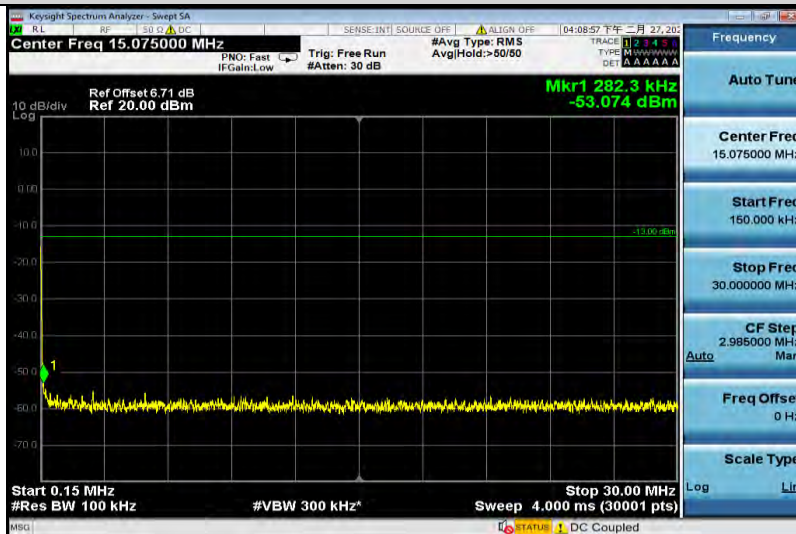
GSM850-128-5000~12000



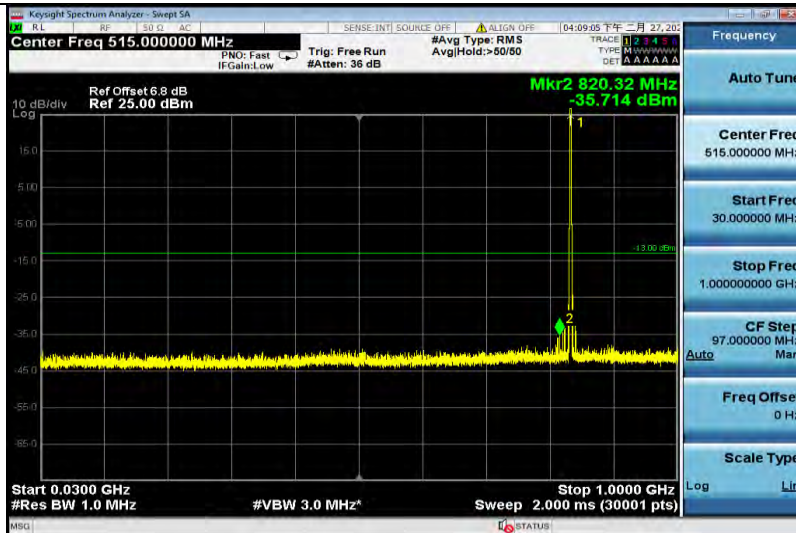
GSM850-128-12000~18000



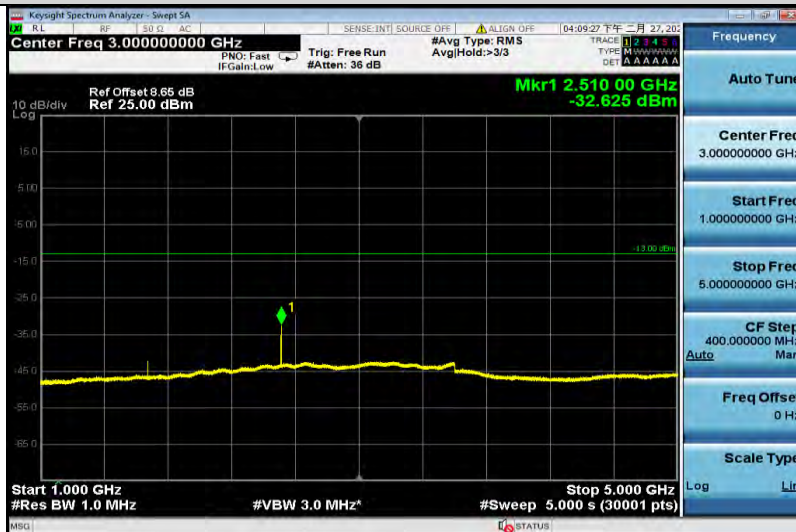
GSM850-190-0.009~0.15



GSM850-190-0.15~30



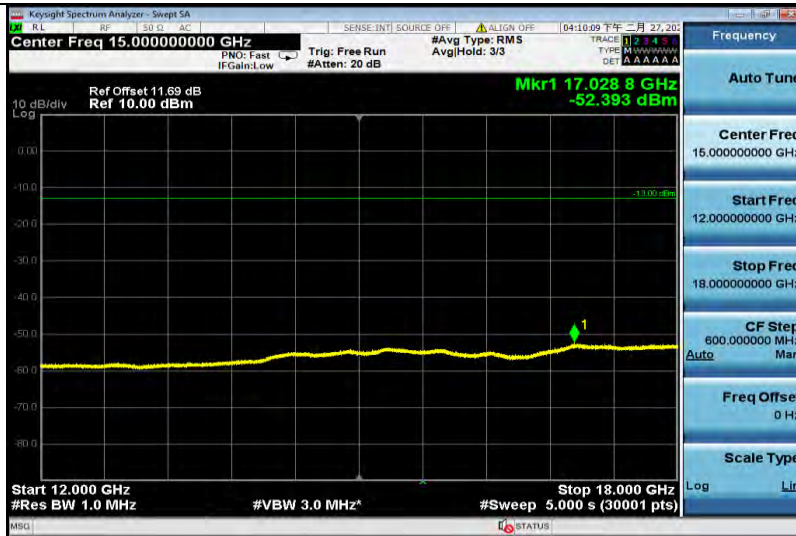
GSM850-190-30~1000



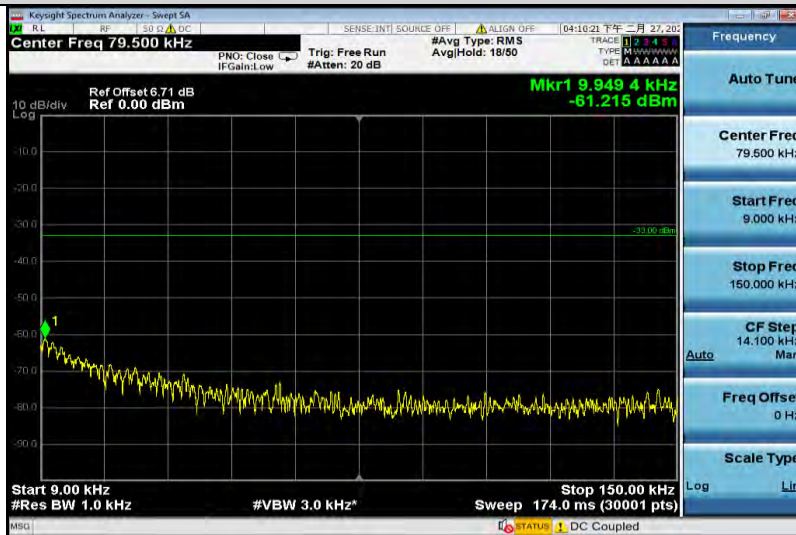
GSM850-190-1000~5000



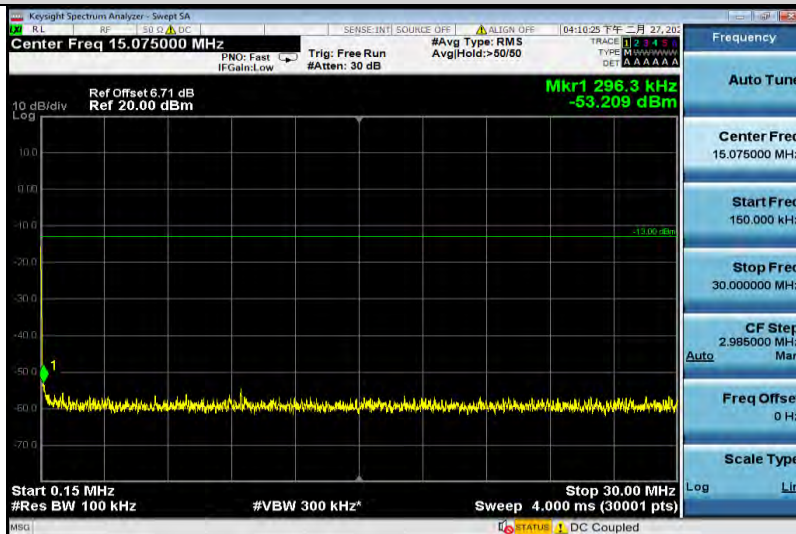
GSM850-190-5000~12000



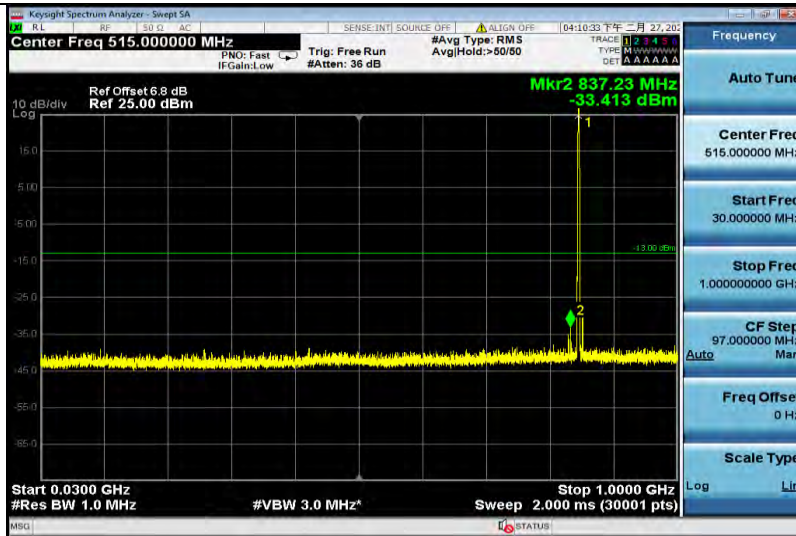
GSM850-190-12000~18000



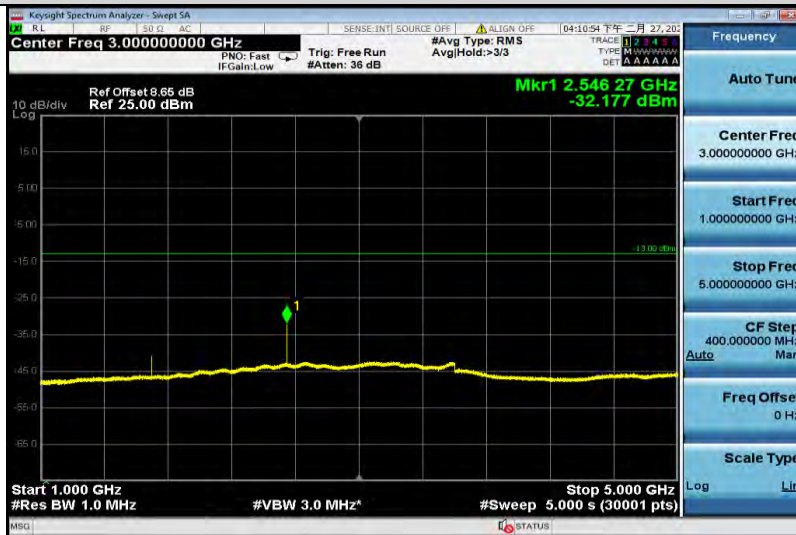
GSM850-251-0.009~0.15



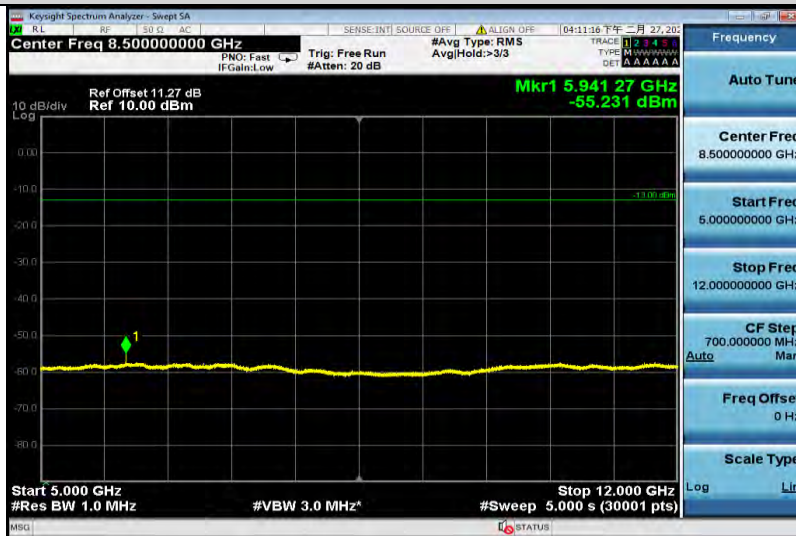
GSM850-251-0.15~30



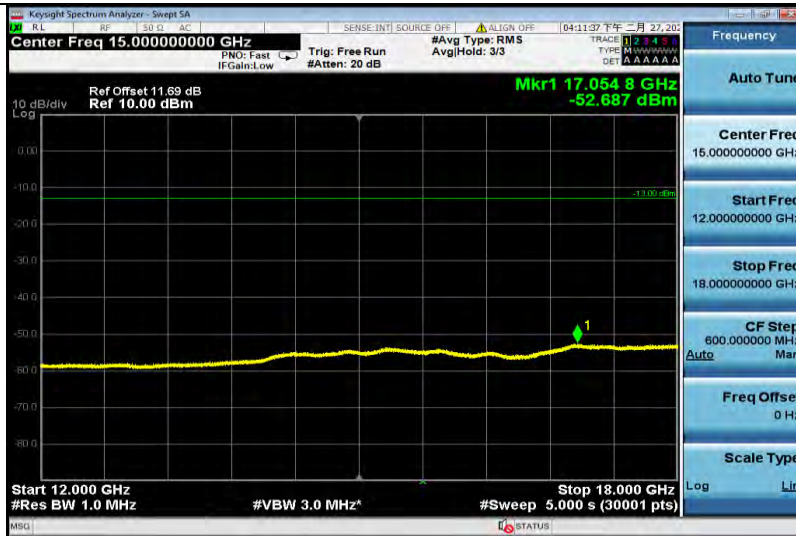
GSM850-251-30~1000



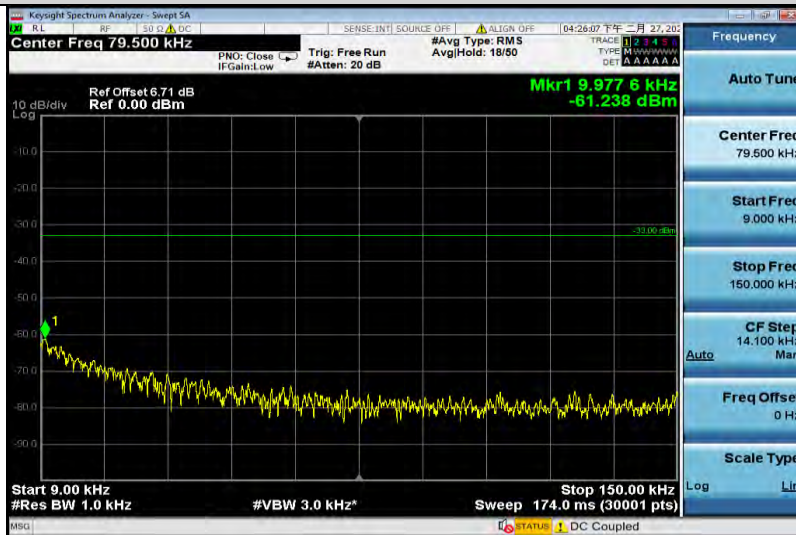
GSM850-251-1000~5000



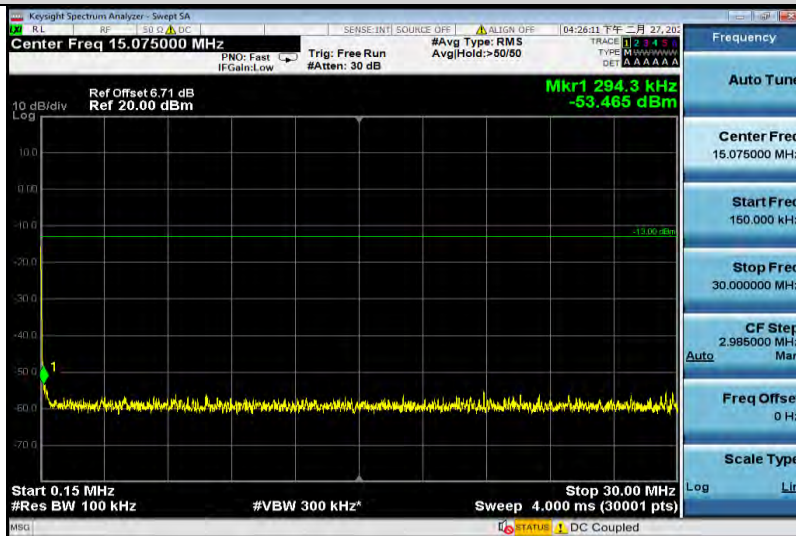
GSM850-251-5000~12000



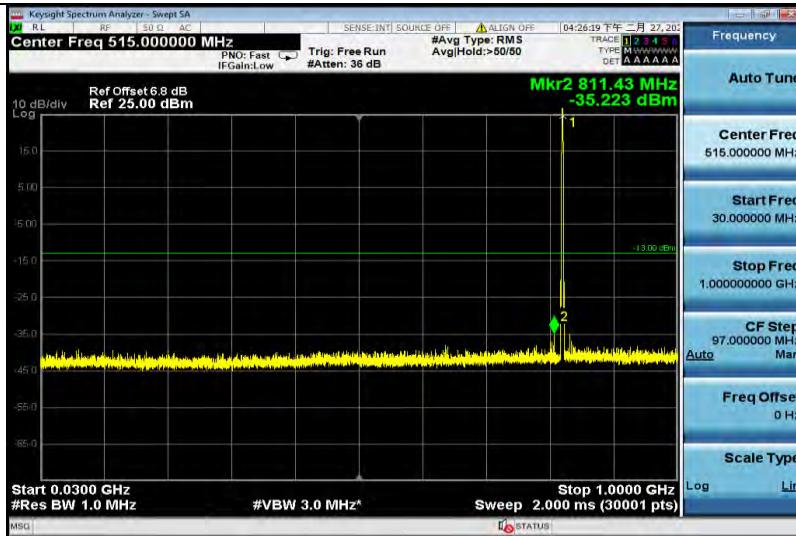
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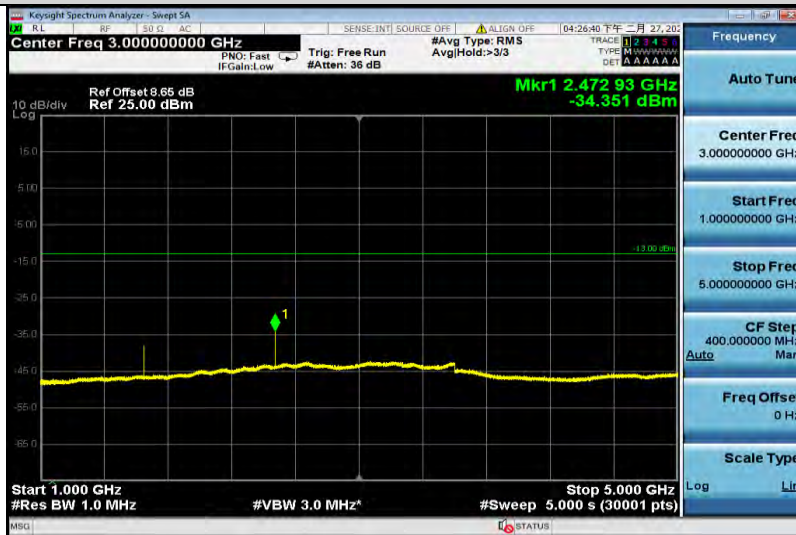
GPRS850-128-0.009~0.15



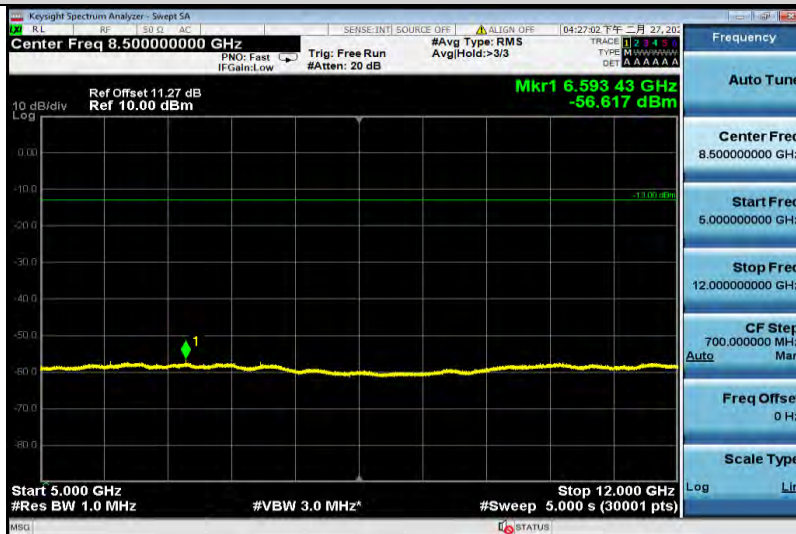
GPRS850-128-0.15~30



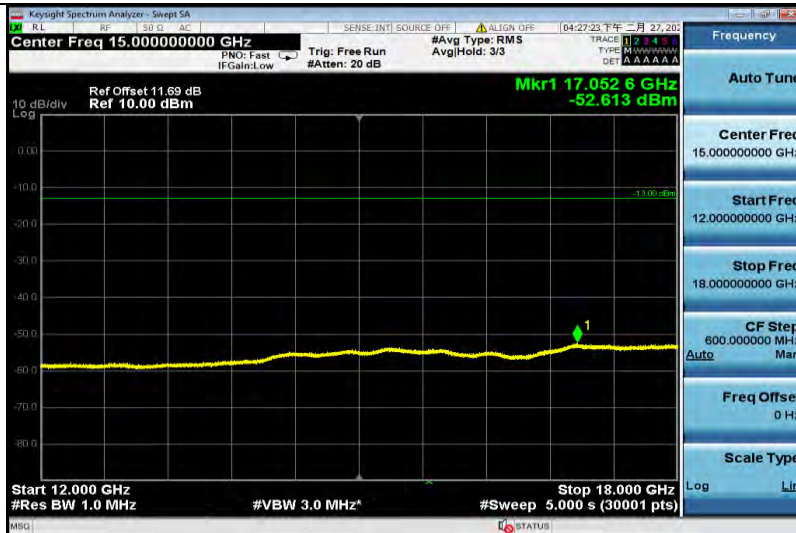
GPRS850-128-30~1000



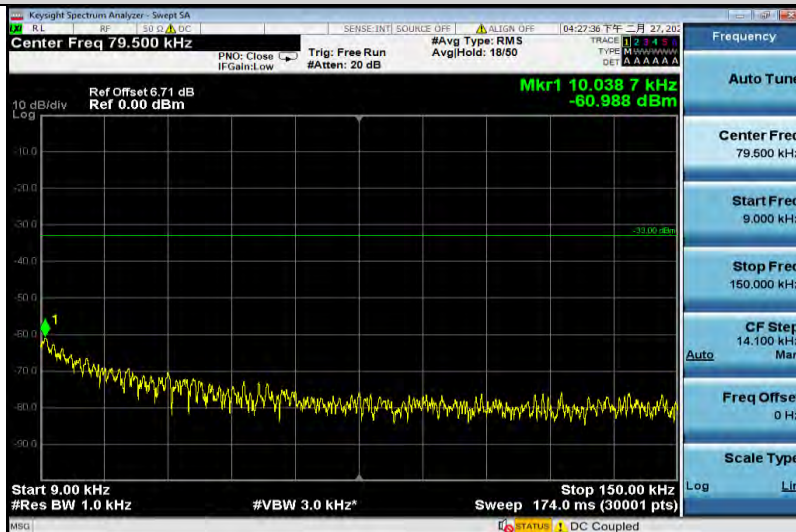
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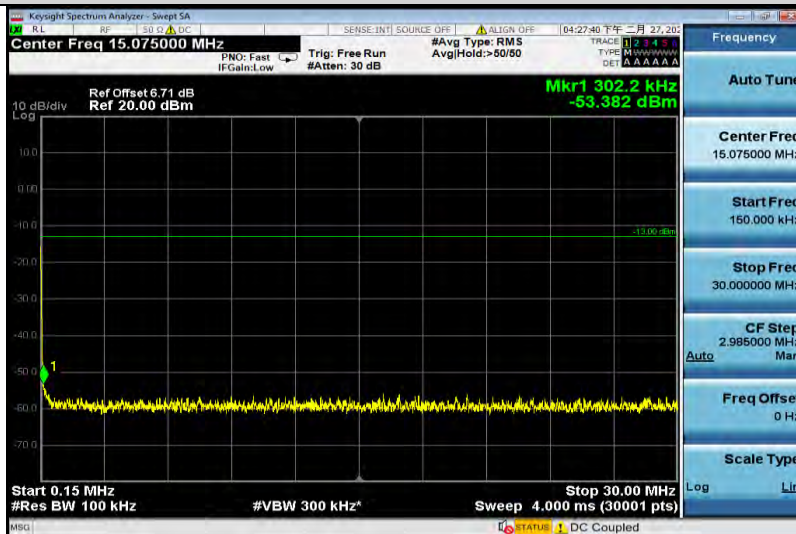
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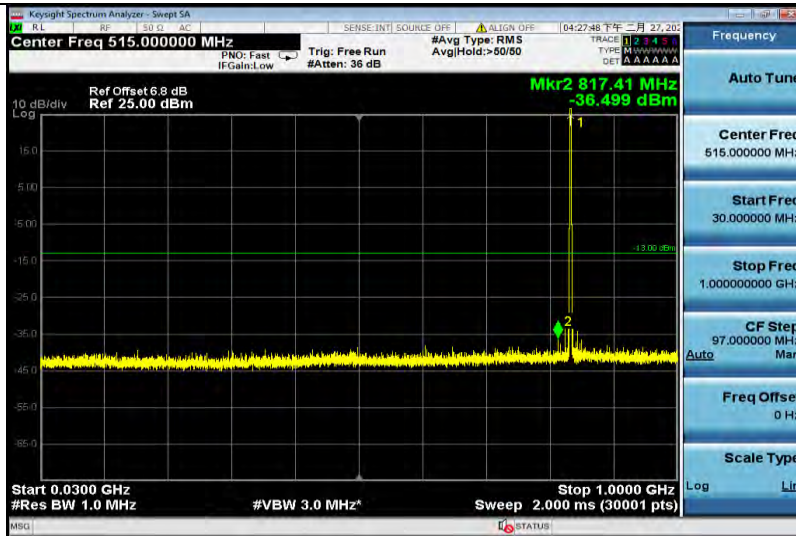
GPRS850-128-12000~18000



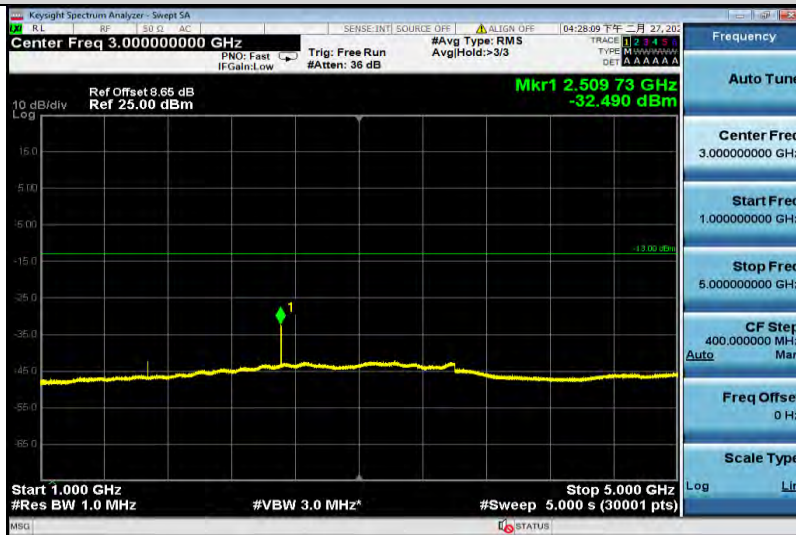
GPRS850-190-0.009~0.15



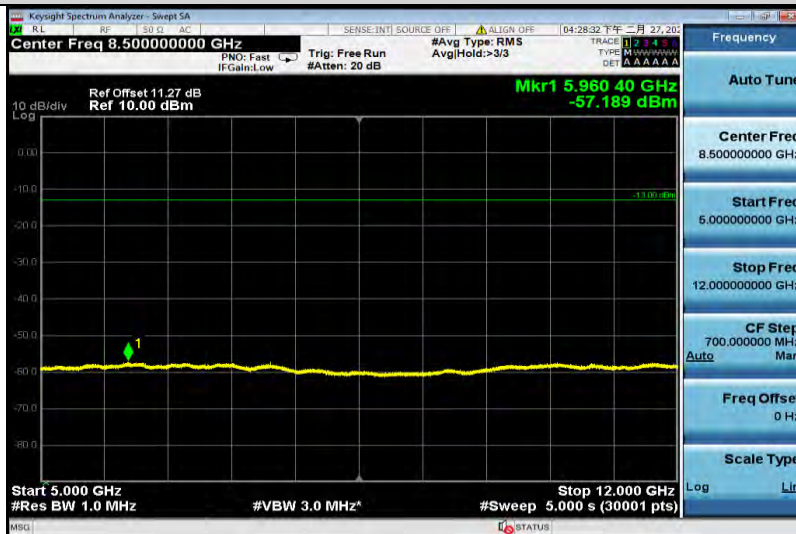
GPRS850-190-0.15~30



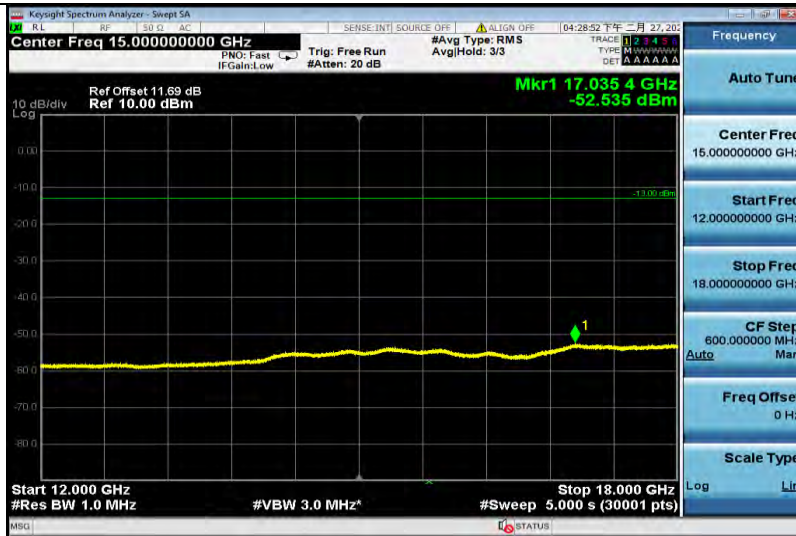
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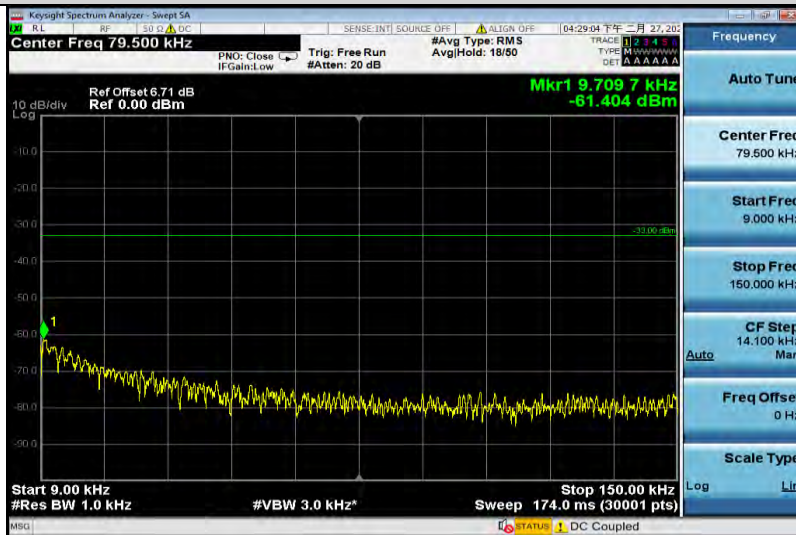
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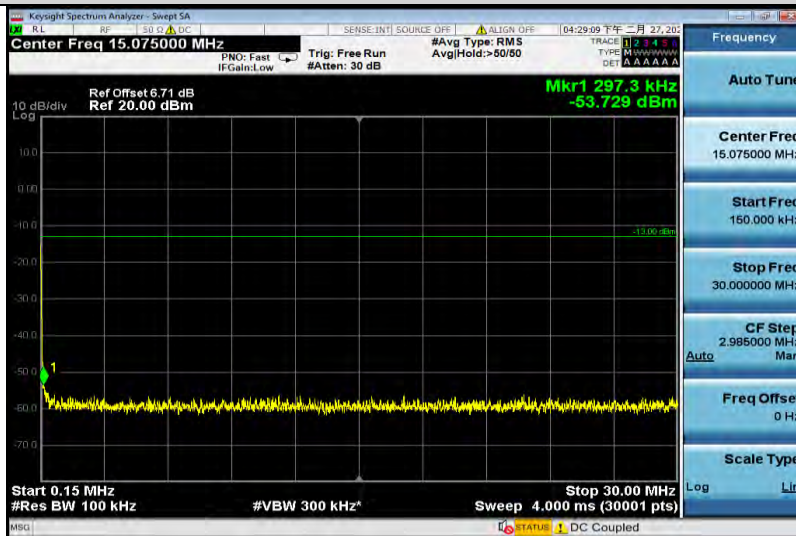
GPRS850-190-5000~12000



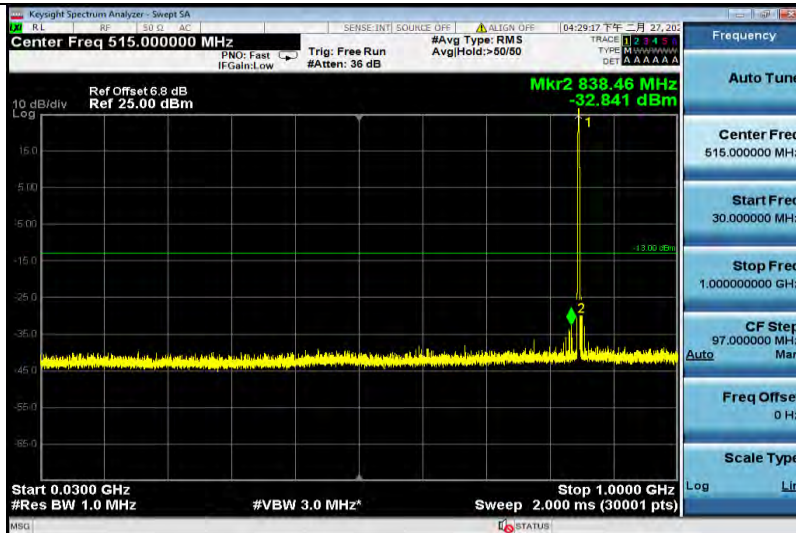
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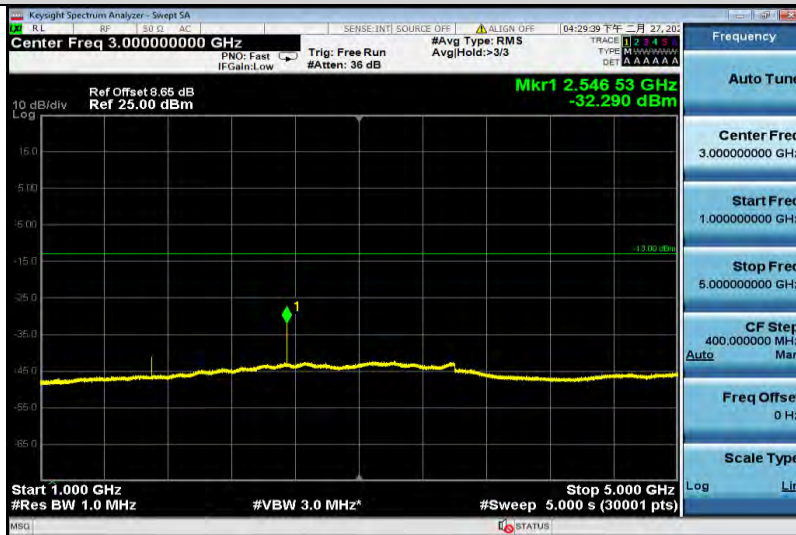
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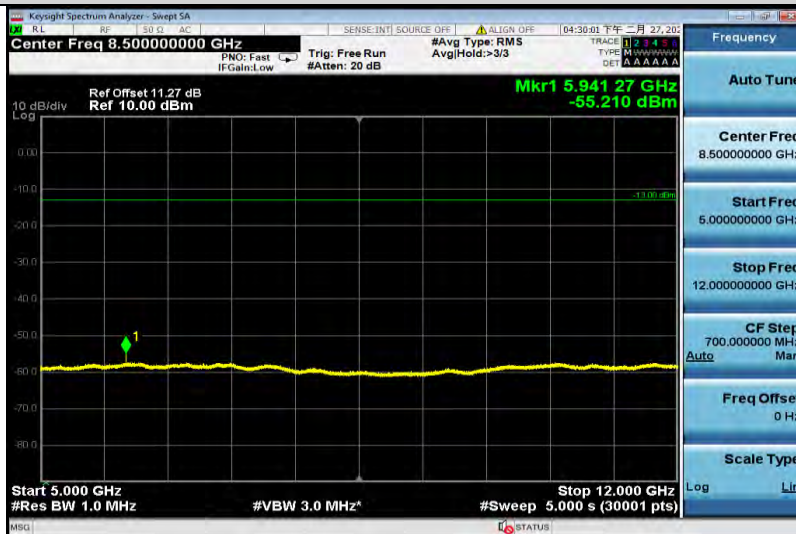
GPRS850-251-0.15~30



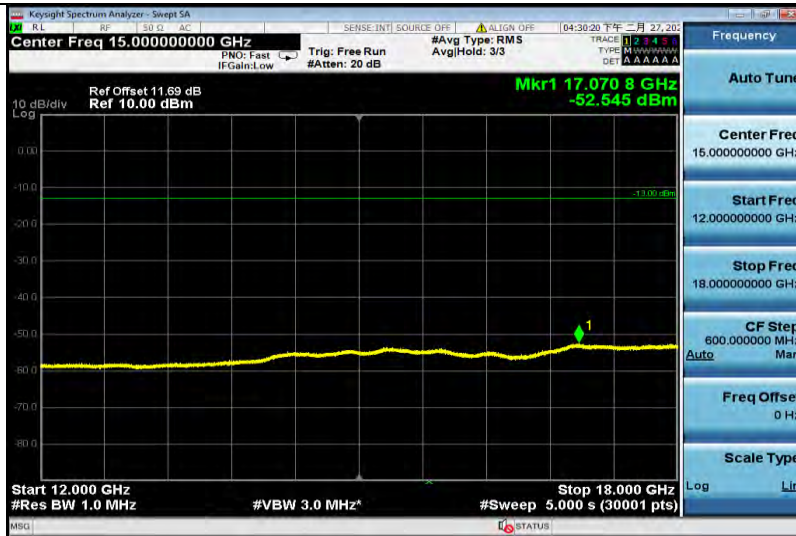
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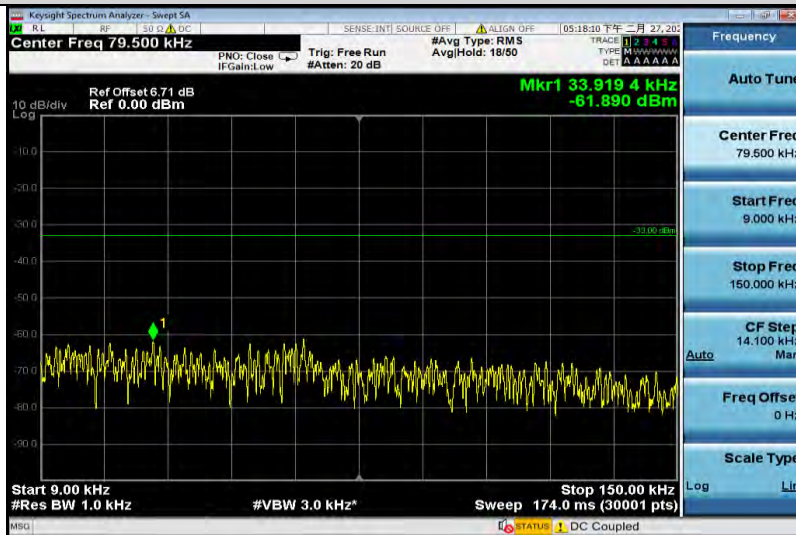
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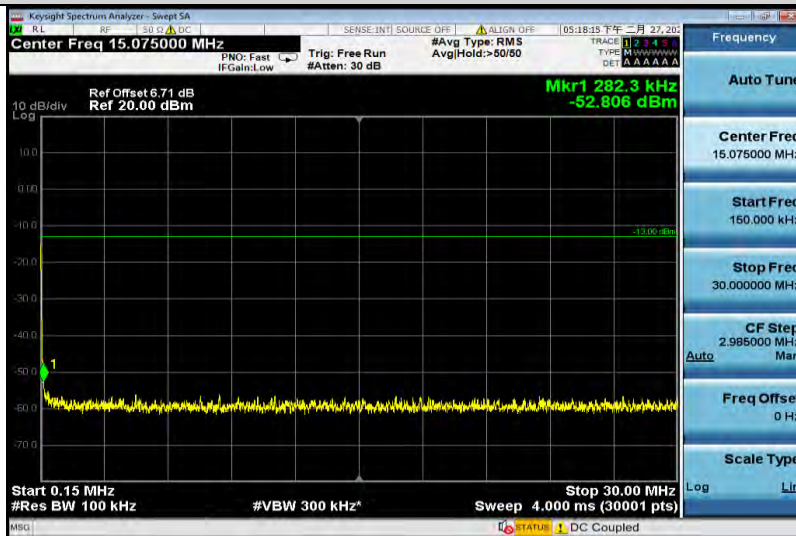
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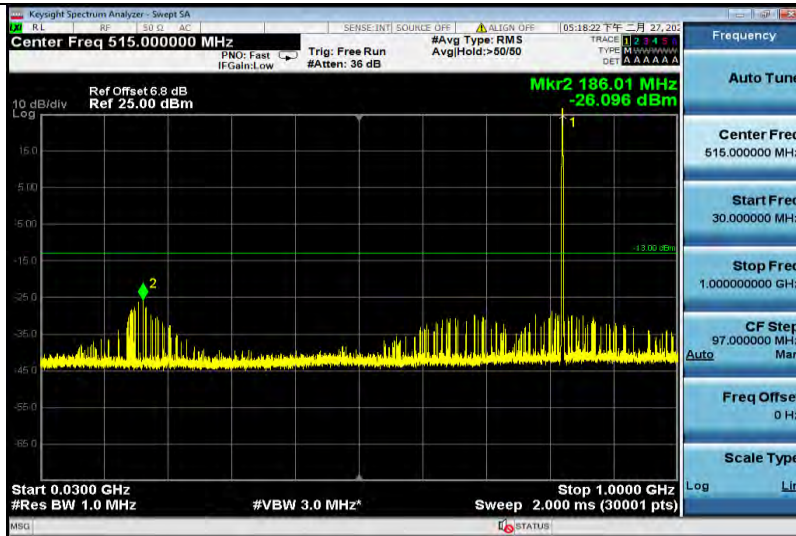
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EGPRS850-128-0.009~0.15



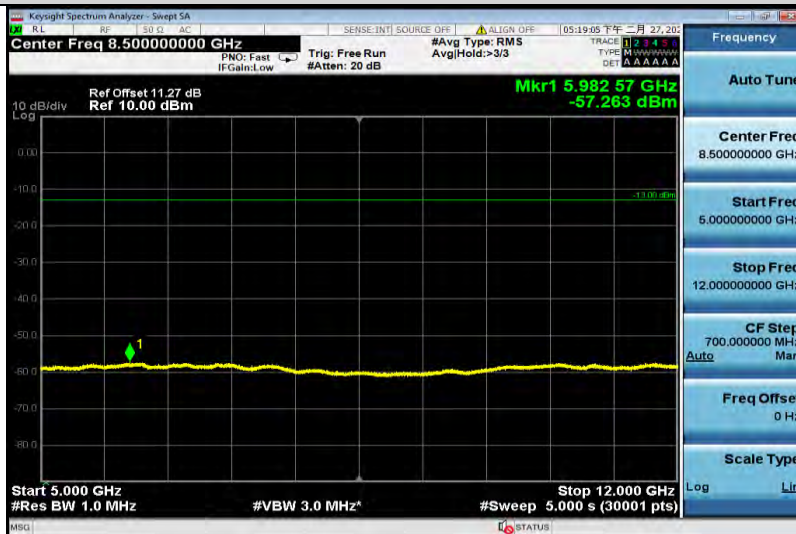
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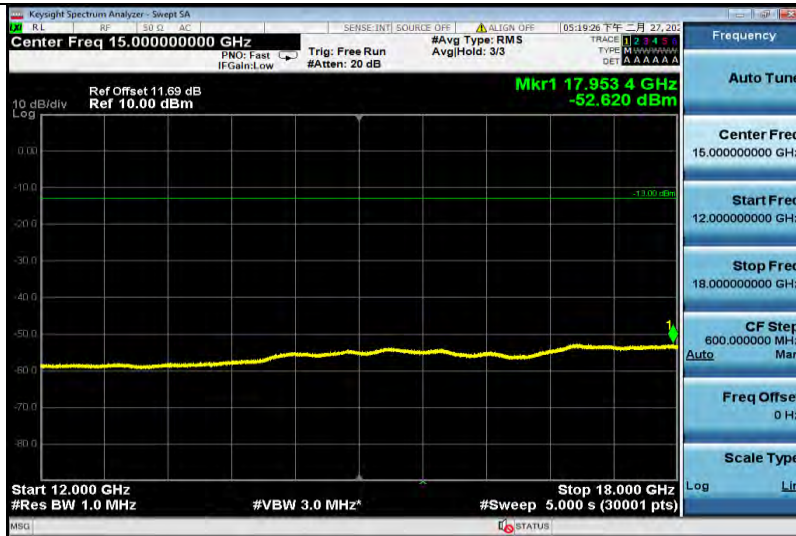
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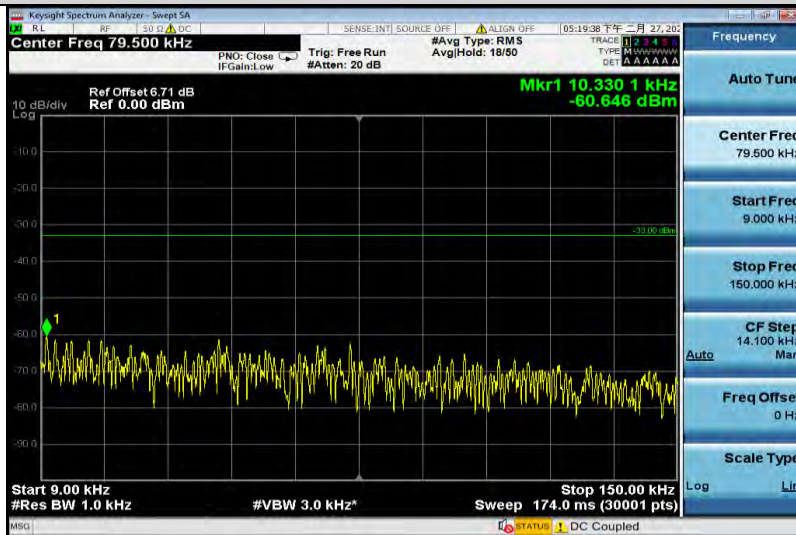
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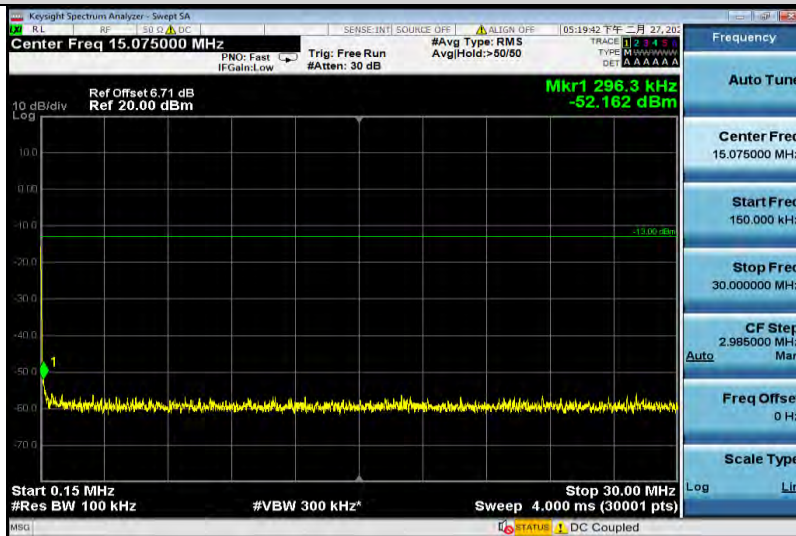
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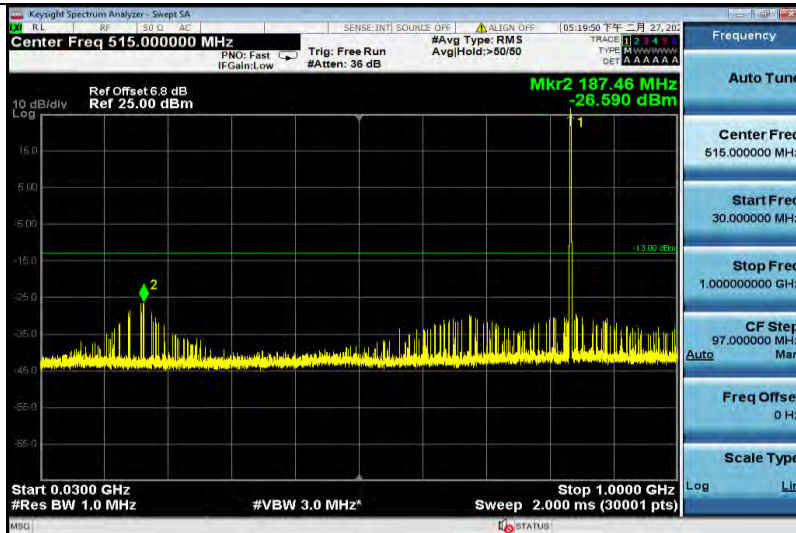
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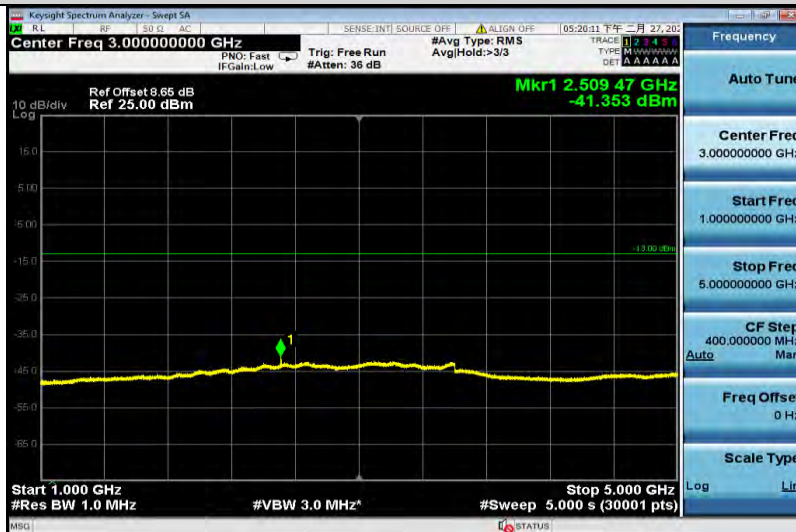
EGPRS850-190-0.009~0.15



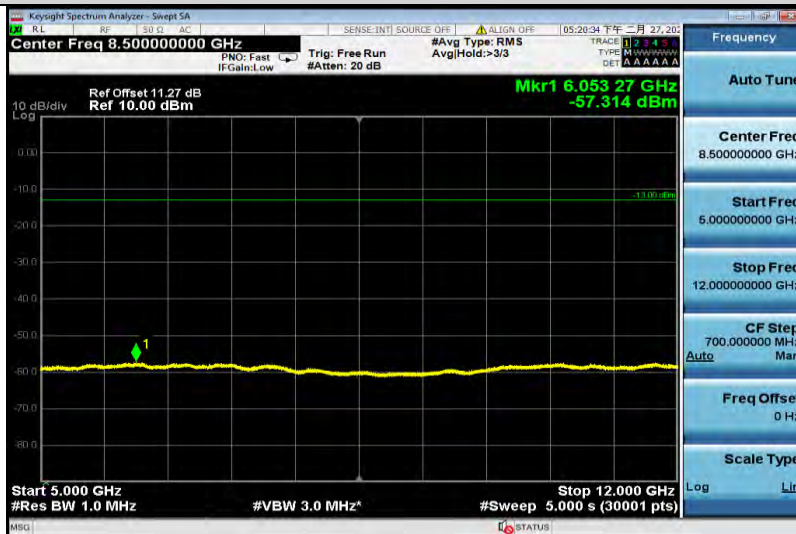
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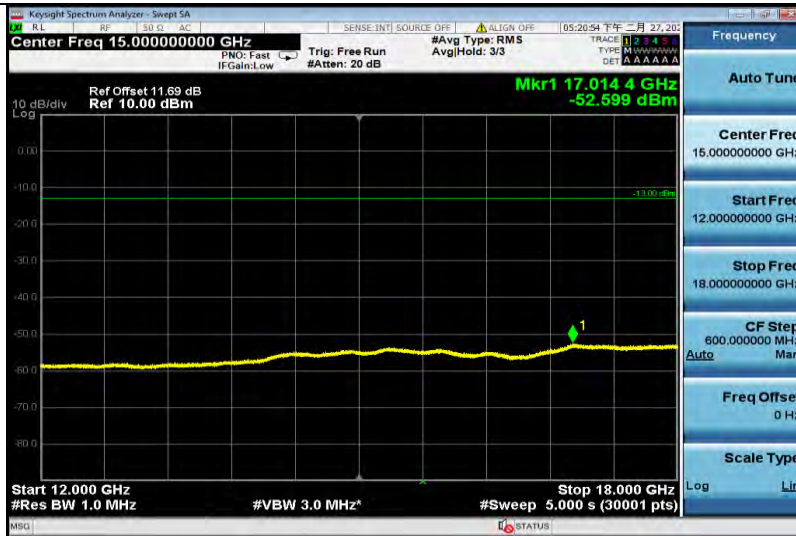
EGPRS850-190-30~1000



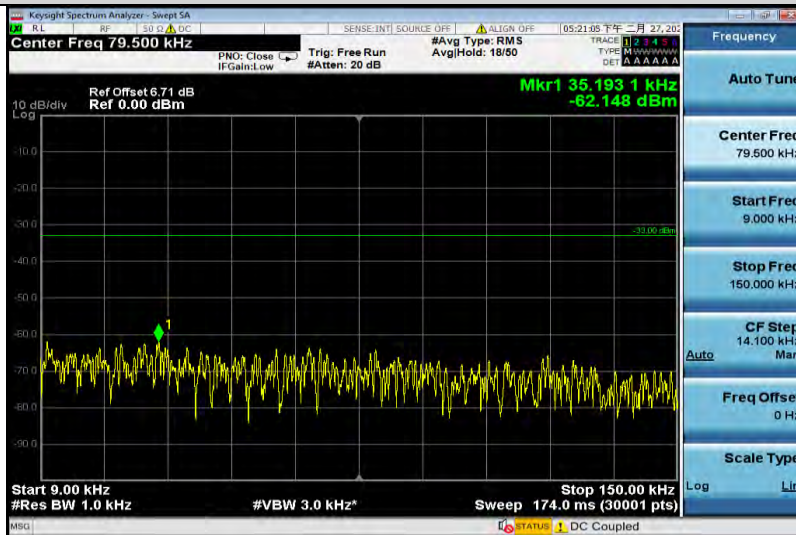
EGPRS850-190-1000~5000



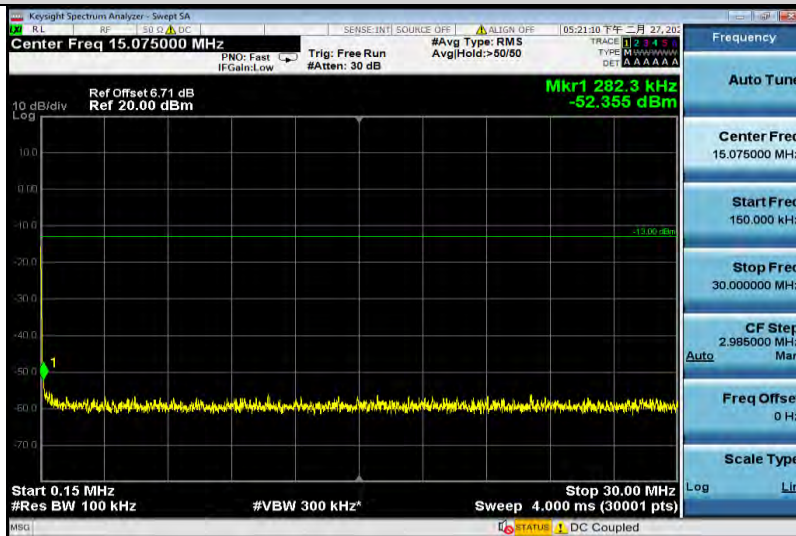
EGPRS850-190-5000~12000



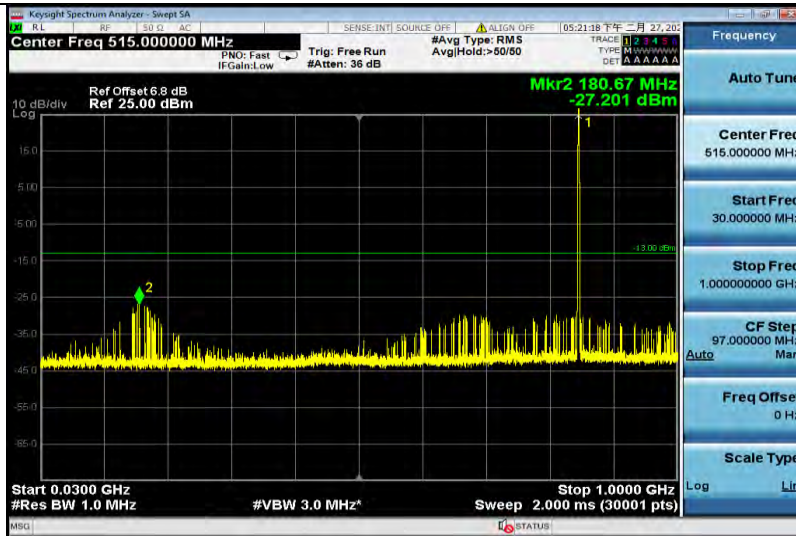
EGPRS850-190-12000~18000



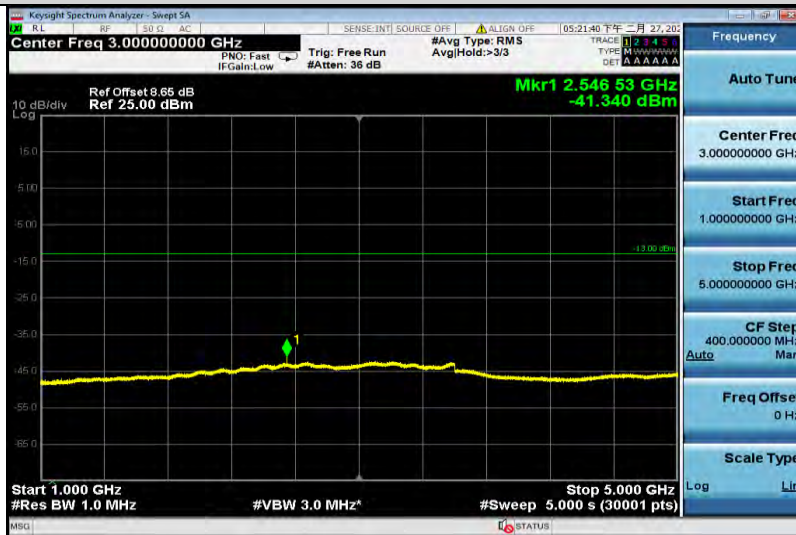
EGPRS850-251-0.009~0.15



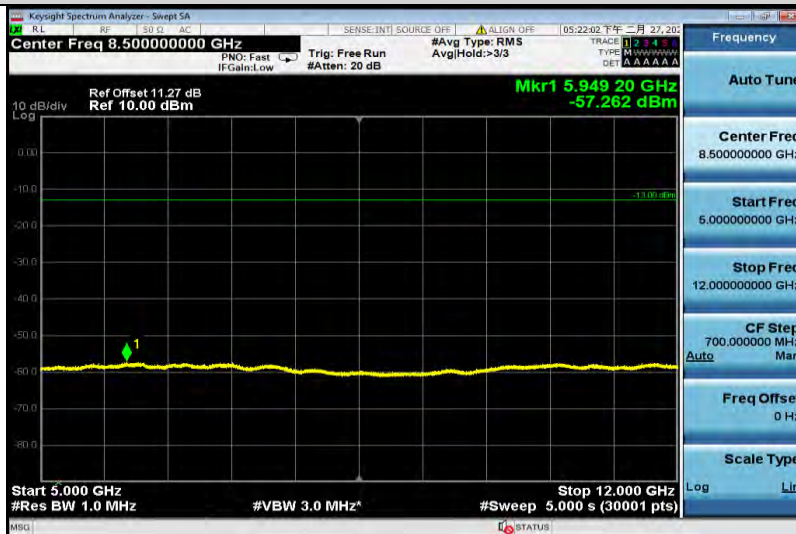
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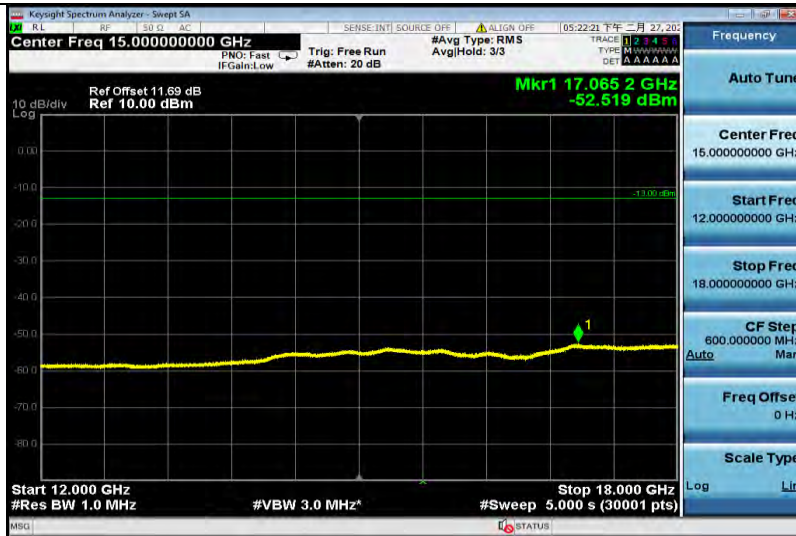
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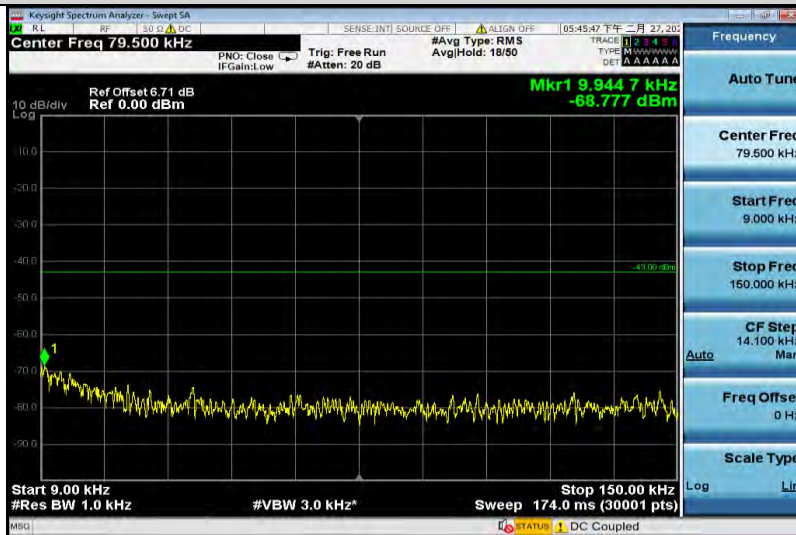
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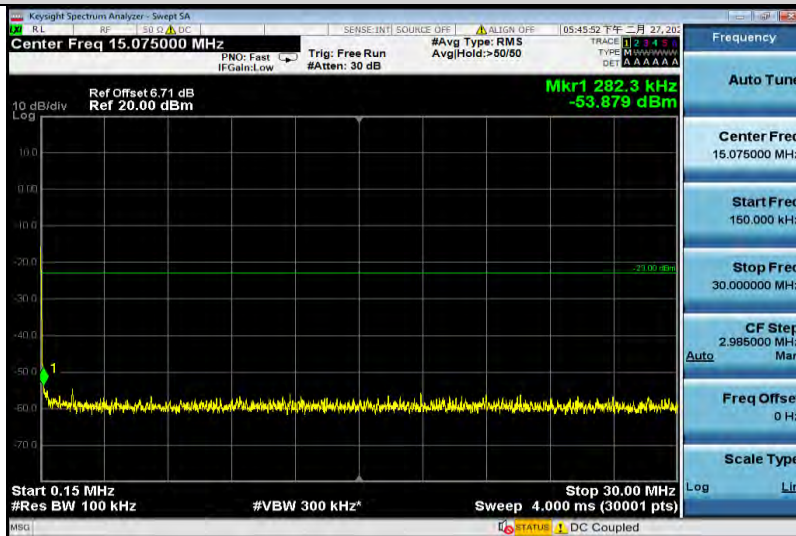
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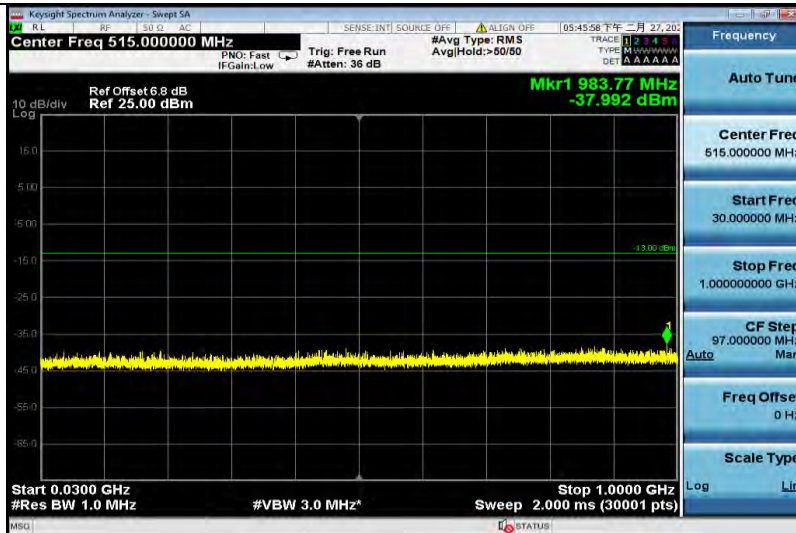
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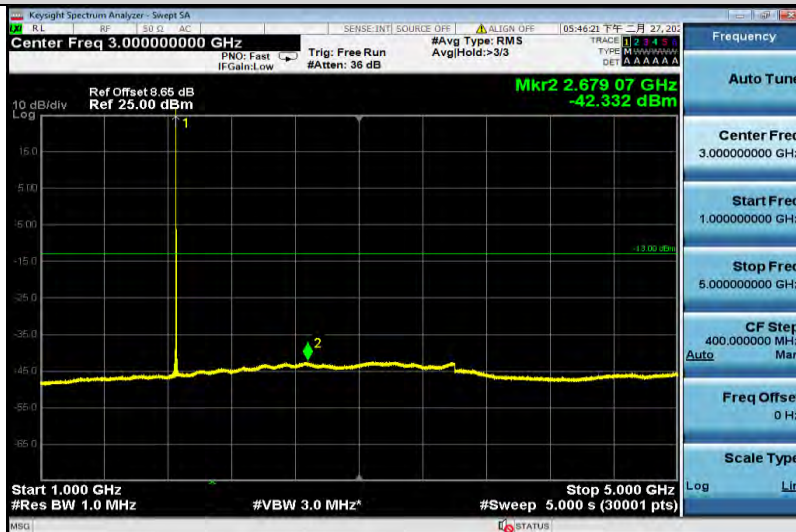
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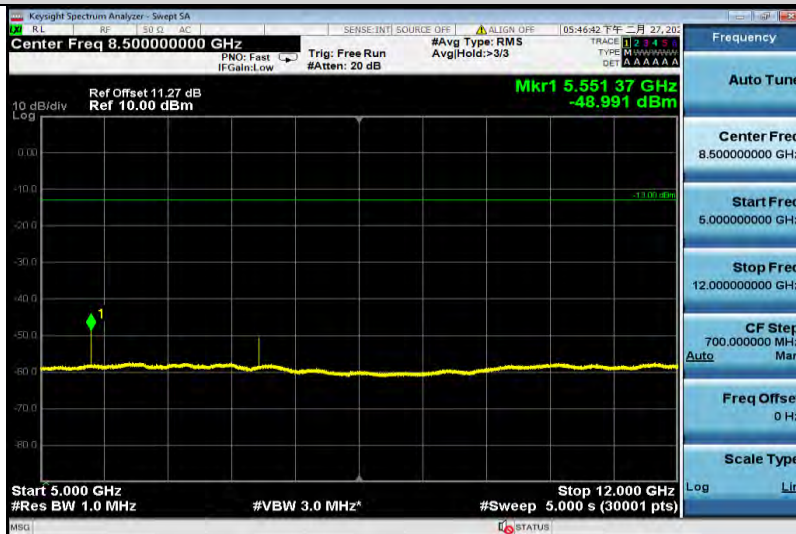
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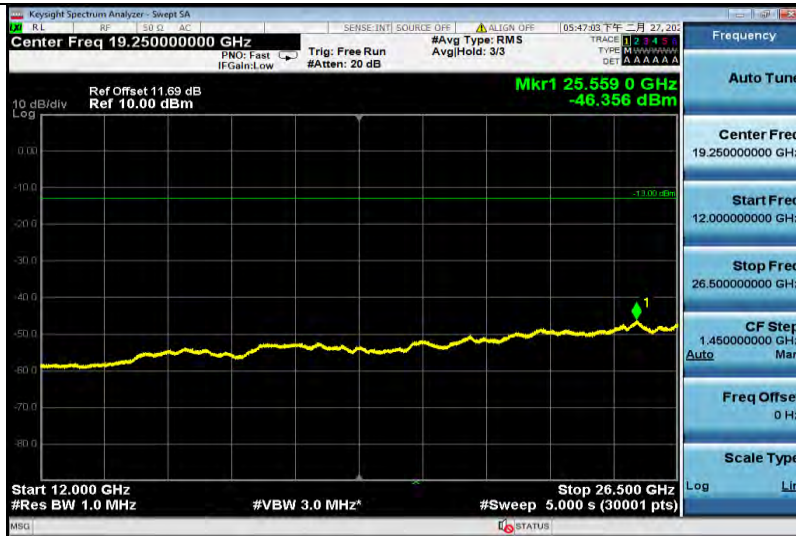
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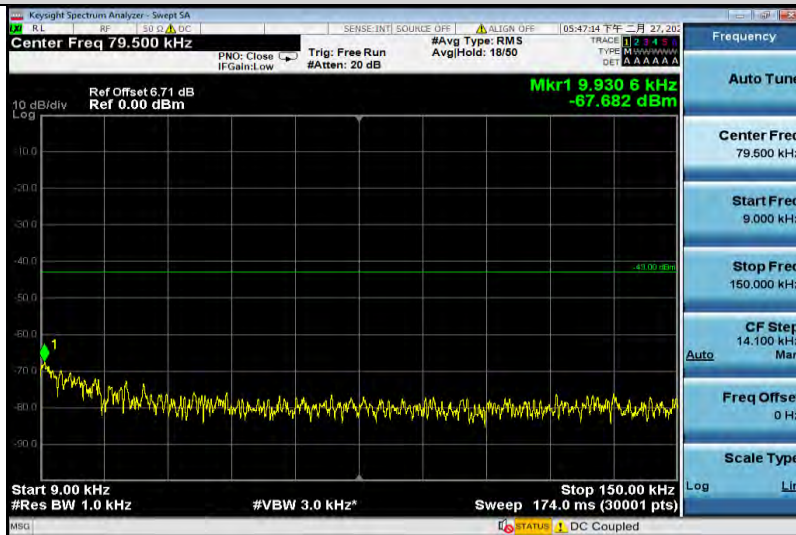
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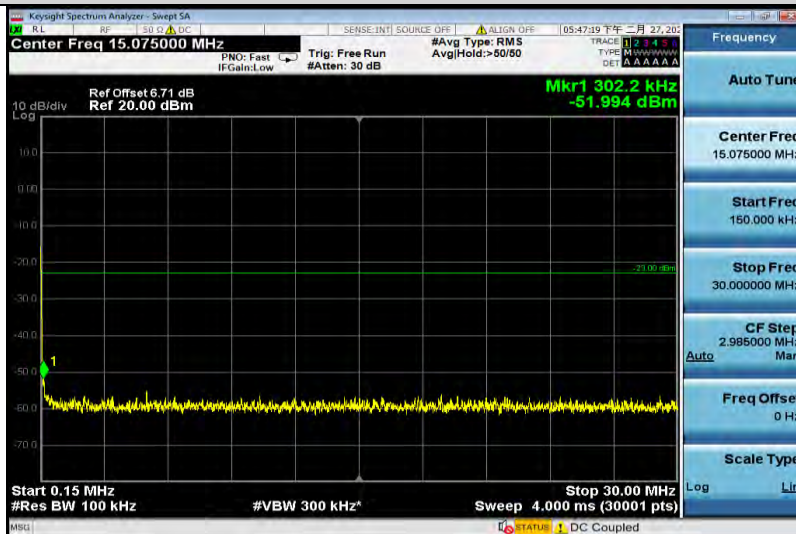
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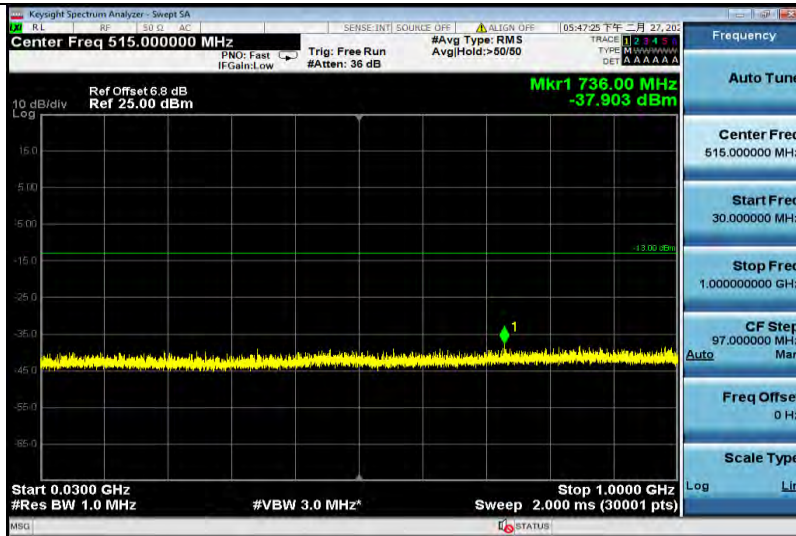
GSM1900-512-12000~26500



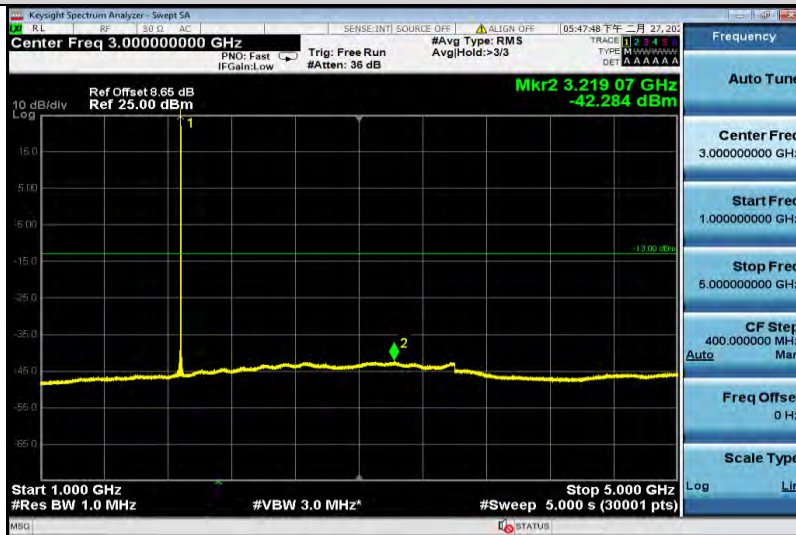
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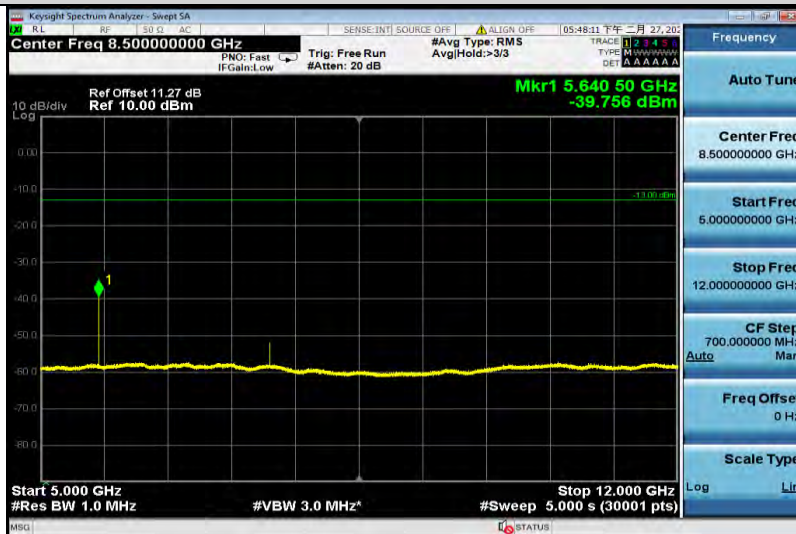
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GSM1900-661-30~1000



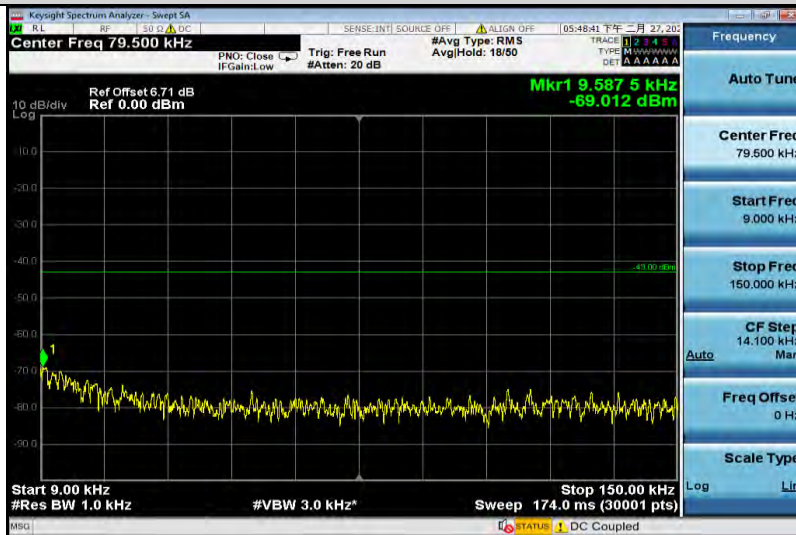
GSM1900-661-1000~5000



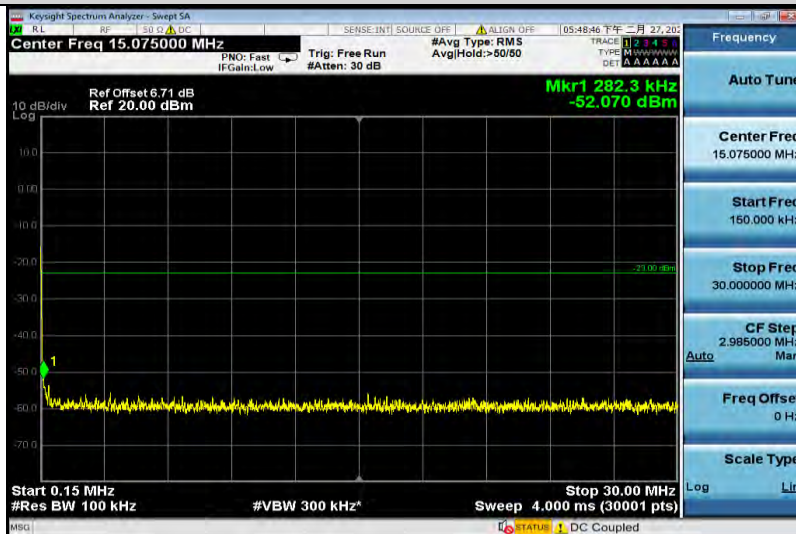
GSM1900-661-5000~12000



GSM1900-661-12000~26500



GSM1900-810-0.009~0.15



GSM1900-810-0.15~30