



Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

TEST REPORT FCC CFR Title 47 Part 2, Part 22 Subpart H, Part 24 Subpart E

Report Reference No..... : CTA22012500601

FCC ID..... : 2A3YA-N21

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Date of issue..... : Feb. 10, 2022

Testing Laboratory Name..... : Shenzhen CTA Testing Technology Co., Ltd.

Address..... : Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name..... : Naviter d.o.o.

Address..... : PLANINA 3 KRANJ Slovenia

Test specification..... :

Standard..... : FCC CFR Title 47 Part 2, Part 22 Subpart H, Part 24 Subpart E

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Test item description..... : GPS Navigator

Trade Mark..... : Naviter

Manufacturer..... : Naviter d.o.o.

Model/Type reference..... : N21

Listed Models : N23, N24, N31, N32, M71, M72

Modulation : GMSK for GSM/GPRS, 8PSK for EGPRS

Frequency..... : GSM850: UL: 824MHz~849MHz, DL: 869MHz~894MHz
PCS1900: UL: 1850MHz~1910, DL: 1930MHz~1990MHz

Rating..... : DC 3.70V From Battery and DC 5V From external circuit

Result..... : **PASS**

Shenzhen CTA Testing Technology Co., Ltd.

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TEST REPORT

Equipment under Test : GPS Navigator

Model /Type : N21

Series Model No. N23, N24, N31, N32, M71, M72

Applicant : Naviter d.o.o.

Address : PLANINA 3 KRANJ Slovenia

Manufacturer : Naviter d.o.o.

Address : PLANINA 3 KRANJ Slovenia

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. SUMMARY

1.1. Test Standards

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

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

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

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

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

[KDB 971168 D01 Power Meas License Digital Systems v03:](#) MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

1.2. Test Description

Test Item	Section in CFR 47	RSS Rule	Result	Test Engineer
Conducted Output Power	Part 2.1046 Part 22.913(a) Part 24.232(c)	RSS-132(5.4) RSS-133(6.4)	Pass	Kevin Liu
Peak-to-Average Ratio	Part 24.232	RSS-132(5.4) RSS-133(6.4)	Pass	Kevin Liu
99% Occupied Bandwidth & 26 dB Bandwidth	Part 2.1049 Part 22.917(b) Part 24.238(b)	RSS-GEN(6.6) RSS-133(6.5)	Pass	Kevin Liu
Band Edge	Part 2.1051 Part 22.917 Part 24.238	RSS-132(5.5) RSS-133(6.5)	Pass	Kevin Liu
Conducted Spurious Emissions	Part 2.1051 Part 22.917 Part 24.238	RSS-132(5.5) RSS-133(6.5)	Pass	Kevin Liu
Frequency stability vs temperature	Part 2.1055(a)(1)(b) Part 22.355 Part 24.235	RSS-GEN(6.11) RSS-132(5.3)	Pass	Kevin Liu
Frequency stability vs voltage	Part 2.1055(d)(1)(2) Part 22.355 Part 24.235	RSS-GEN(6.11) RSS-132(5.3)	Pass	Kevin Liu
ERP and EIRP	Part 22.913(a) Part 24.232(b)	RSS-132(5.4) RSS-133(6.4)	Pass	Kevin Liu
Radiated Spurious Emissions	Part 2.1053 Part 22.917 Part 24.238	RSS-132(5.5) RSS-133(6.5)	Pass	Kevin Liu
Receiver Spurious Emissions	/	RSS-GEN(7.1.3)	Pass	Kevin Liu

Note:

1. The measurement uncertainty is not included in the test result.
2. This is a single SIM card

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

1.3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 517856 Designation Number: CN1318

Shenzhen CTA Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: 6534.01

Shenzhen CTA Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

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

1.4. 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 TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen CTA Testing Technology 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 CTA Testing Technology Co., Ltd.:

Test	Measurement Uncertainty	Notes
Radiated Emission 30~1000MHz	4.06 dB	(1)
Radiated Emission 1~18GHz	5.14 dB	(1)
Radiated Emission 18-40GHz	5.38 dB	(1)
Conducted Output Power	0.48 dB	(1)
Peak-to-Average Ratio	3.16 dB	(1)
Occupy Bandwidth	2.80 dB	(1)
Out of band emission at antenna terminals	1.75 dB	(1)
Band Edge compliance	1.60 dB	(1)
Radiated Power Measurement	4.5dB (below 1GHz) 4.8dB (above 1GHz)	(1)
Frequency stability	1.38 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

1.5. Environmental conditions

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

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2. GENERAL INFORMATION

2.1. Client Information

Applicant:	Naviter d.o.o.
Address:	PLANINA 3 ZIP Code 4000 City KRANJ Country SLOVENIA
Manufacturer:	Naviter d.o.o.
Address:	PLANINA 3 ZIP Code 4000 City KRANJ Country SLOVENIA

2.2. 2.2.General Description of EUT

Test Sample Number:	1-1-1(Normal Sample),1-1-2(Engineering Sample)
Product Name:	GPS Navigator
Trademark:	Naviter
Model/Type reference:	N21
Listed Model(s):	N23, N24, N31, N32, M71, M72
Model Difference:	All models have the same circuit and RF module, except for the different appearance shape.
Power supply:	5V $\overline{=}$ 2A
Power supply(Battery):	DC 3.7V, 16000mAh, 59.2Wh
Hardware version:	V1.0
Software version:	V1.0.0
GSM	
Operation Band:	GSM850: UL: 824MHz~849MHz, DL: 869MHz~894MHz PCS1900: UL: 1850MHz~1910, DL: 1930MHz~1990MHz
Supported Type:	GSM/GPRS/EGPRS
Modulation Type:	GMSK for GSM/GPRS, 8PSK for EGPRS
Antenna Type:	FPC Antenna
Antenna Gain:	GSM850:0.5dBi PCS1900:1.0dBi

2.3. Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The CUM200 used to control the EUT staying in continuous transmitting and receiving mode for testing.

Test Frequency:

GSM 850		PCS 1900	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
128	824.20	512	1850.20
190	836.60	661	1880.00
251	848.80	810	1909.80

2.4. Measurement Instruments List

Test Equipment	Manufacturer	Model No.	Equipment No.	Calibration Date	Calibration Due Date
LISN	R&S	ENV216	CTA-308	2021/08/06	2022/08/05
LISN	R&S	ENV216	CTA-314	2021/08/06	2022/08/05
EMI Test Receiver	R&S	ESPI	CTA-307	2021/08/06	2022/08/05
EMI Test Receiver	R&S	ESCI	CTA-306	2021/08/06	2022/08/05
Spectrum Analyzer	Agilent	N9020A	CTA-301	2021/08/06	2022/08/05
Spectrum Analyzer	R&S	FSP	CTA-337	2021/08/06	2022/08/05
Vector Signal generator	Agilent	N5182A	CTA-305	2021/08/06	2022/08/05
Analog Signal Generator	R&S	SML03	CTA-304	2021/08/06	2022/08/05
Universal Radio Communication	CMW500	R&S	CTA-302	2021/08/06	2022/08/05
Temperature and humidity meter	Chigo	ZG-7020	CTA-326	2021/08/06	2022/08/05
Ultra-Broadband Antenna	Schwarzbeck	VULB9163	CTA-310	2021/08/07	2022/08/06
Horn Antenna	Schwarzbeck	BBHA 9120D	CTA-309	2021/08/07	2022/08/06
Loop Antenna	Zhinan	ZN30900C	CTA-311	2021/08/07	2022/08/06
Horn Antenna	Beijing Hangwei Dayang	OBH100400	CTA-336	2021/08/06	2022/08/05
Amplifier	Schwarzbeck	BBV 9745	CTA-312	2021/08/06	2022/08/05
Amplifier	Taiwan chengyi	EMC051845B	CTA-313	2021/08/06	2022/08/05
Directional coupler	NARDA	4226-10	CTA-303	2021/08/06	2022/08/05
High-Pass Filter	XingBo	XBLBQ-GTA18	CTA-402	2021/08/06	2022/08/05
High-Pass Filter	XingBo	XBLBQ-GTA27	CTA-403	2021/08/06	2022/08/05
Automated filter	Tonscend	JS0806-F	CTA-404	2021/08/06	2022/08/05

bank					
Power Sensor	Agilent	U2021XA	CTA-405	2021/08/06	2022/08/05
Amplifier	Schwarzbeck	BBV9719	CTA-406	2021/08/06	2022/08/05
Spectrum Analyzer	R&S	FSV40-N	CTA-407	2021/08/06	2022/08/05
Pre-Amplifier	Schwarzbeck	BBV-9721	CTA-408	2021/08/06	2022/08/05
Horn Antenna	Schwarzbeck	BBHA 9170	CTA-409	2021/08/06	2022/08/05

Note:

1)The Cal. Interval was one year.

2)The cable loss has calculated in test result which connection between each test instruments.

3. TEST ITEM AND RESULTS

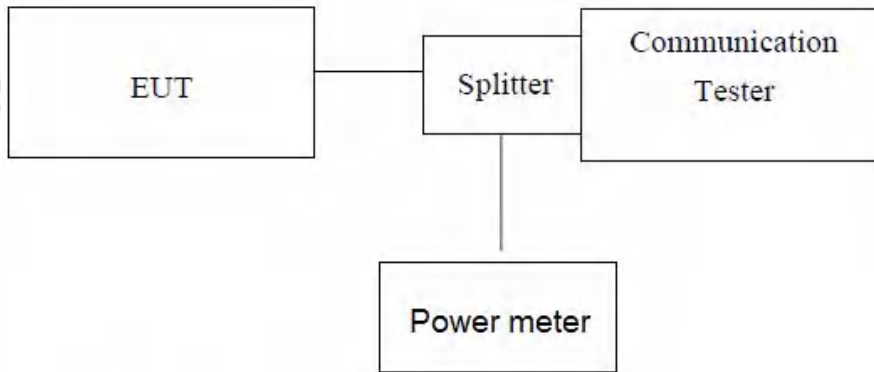
3.1. Conducted Output Power

LIMIT:

GSM850/WCDMA Band V: 7W

PCS1900/WCDMA Band II/WCDMA Band IV: 2W

TEST CONFIGURATION



Note: Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure the maximum PK burst power and maximum Avg. burst power.

TEST RESULTS

GSM850		Conducted Power (dBm)		
		CH128	CH190	CH251
		824.20MHz	836.60MHz	848.80MHz
GSM		31.42	31.40	31.35
GPRS (GMSK)	1TXslot	31.43	31.37	31.32
	2TXslots	30.86	30.84	30.84
	3TXslots	29.26	29.29	29.33
	4TXslots	28.19	28.22	28.27
EGPRS (8PSK)	1TXslot	25.97	27.74	25.93
	2TXslots	24.80	24.82	26.91
	3TXslots	22.62	22.44	22.56
	4TXslots	21.27	21.35	21.40

PCS1900		Conducted Power (dBm)		
		CH512	CH661	CH810
		1850.2MHz	1880.0MHz	1909.8MHz
GSM		26.71	27.70	28.12
GPRS (GMSK)	1TXslot	26.73	27.67	28.09
	2TXslots	26.04	27.00	27.43
	3TXslots	24.25	25.16	25.69
	4TXslots	23.06	23.98	24.53
EGPRS (8PSK)	1TXslot	23.15	24.89	24.54
	2TXslots	21.99	23.01	23.64
	3TXslots	20.11	20.94	21.63
	4TXslots	18.95	19.74	20.43

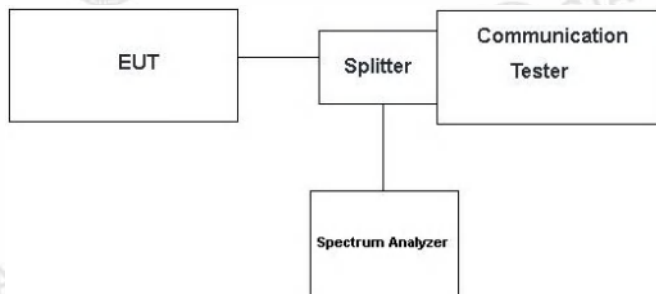
3.2. Peak-to-Average Ratio

LIMIT:

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13dB.

TEST CONFIGURATION

- For Peak-to-Average Ratio



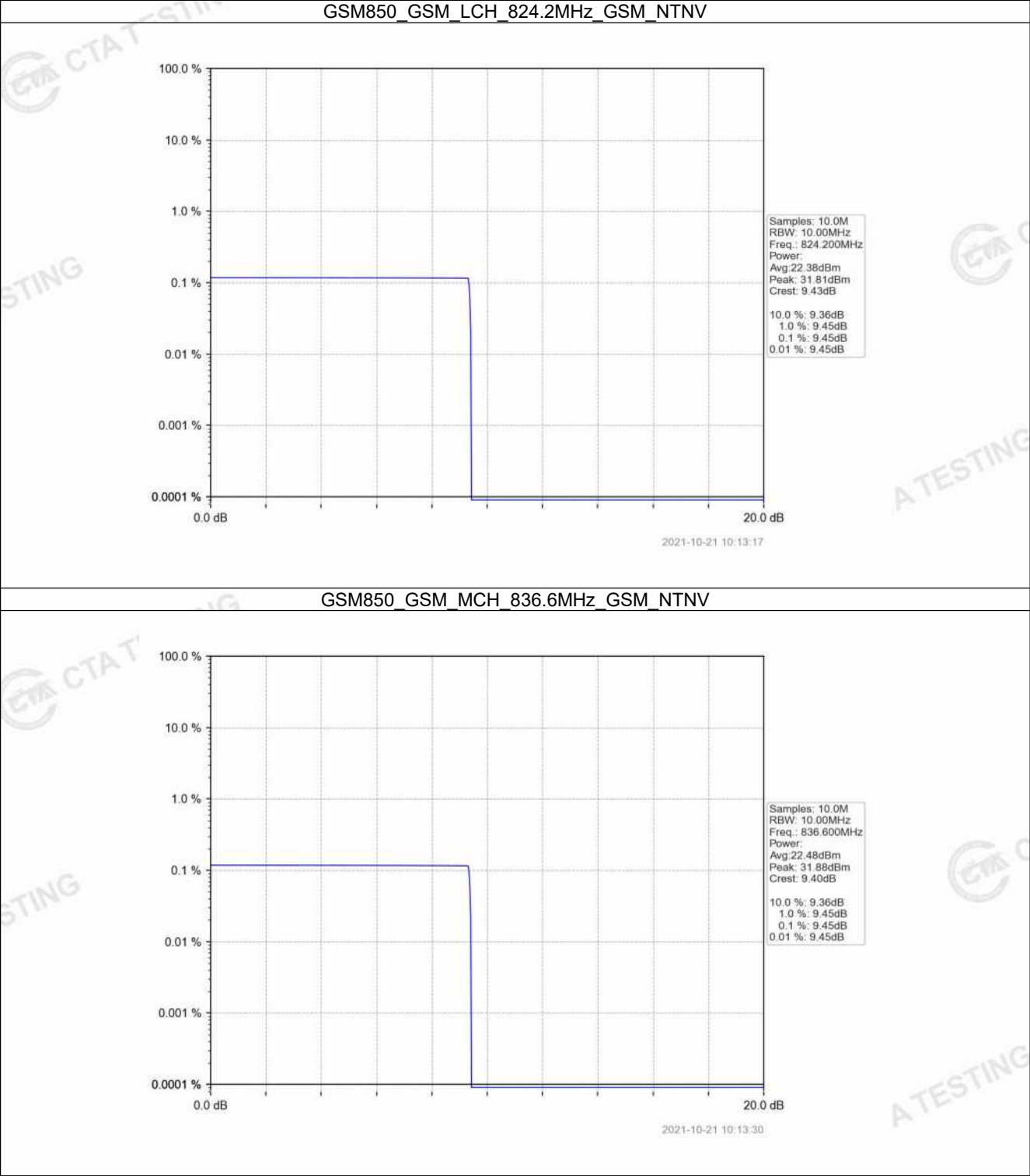
TEST PROCEDURE

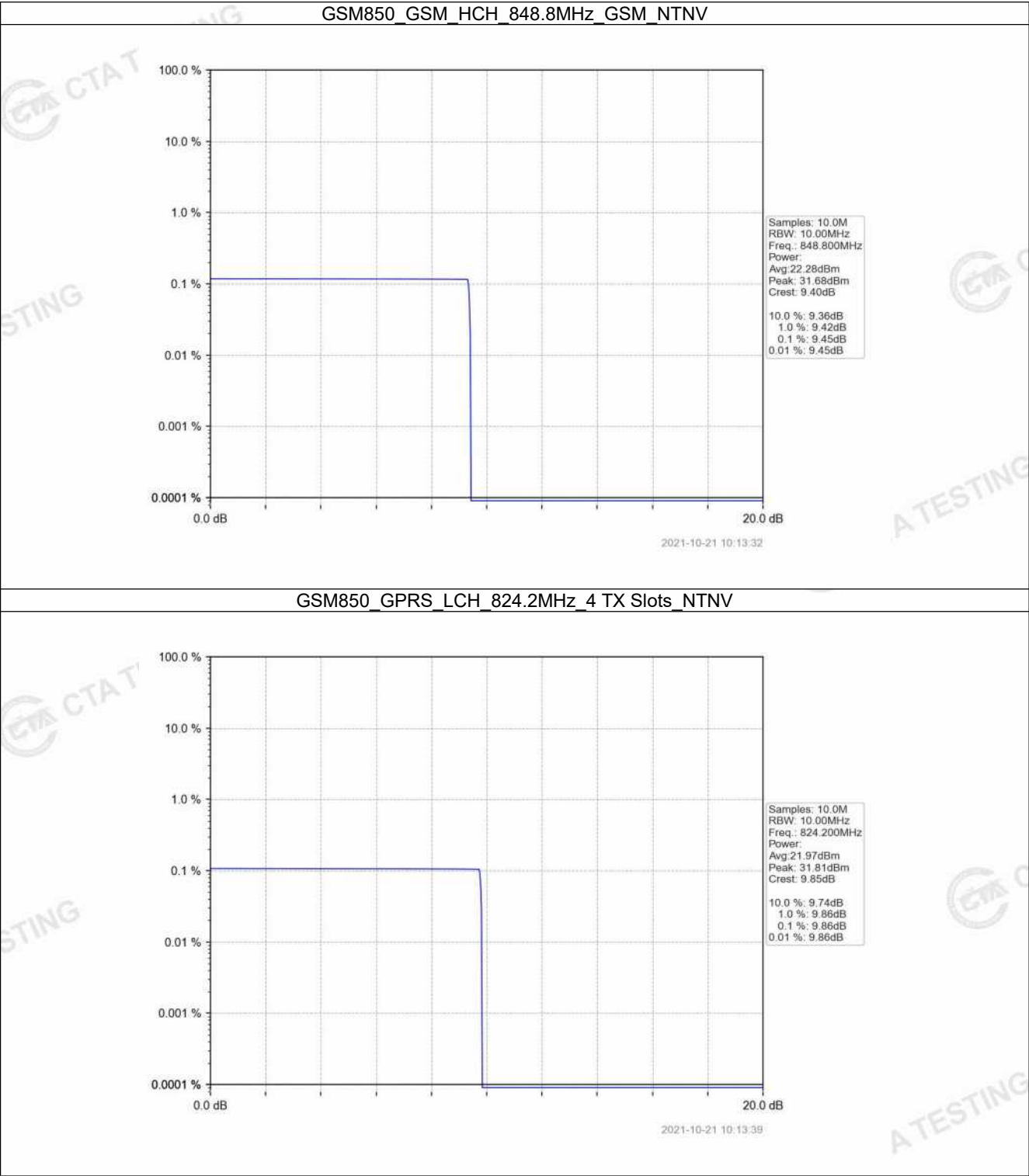
- For Peak-to-Average Ratio
 1. The testing follows FCC KDB 971168 v02r02 Section 5.7.1.
 2. The EUT was connected to spectrum and communication tester via a splitter
 3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
 4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
 5. ATT:40dB ,Offset:7.06dB for GSM850,ATT:40dB ,Offset:7.30dB for PCS1900
 6. Record the deviation as Peak to Average Ratio.

TEST RESULTS

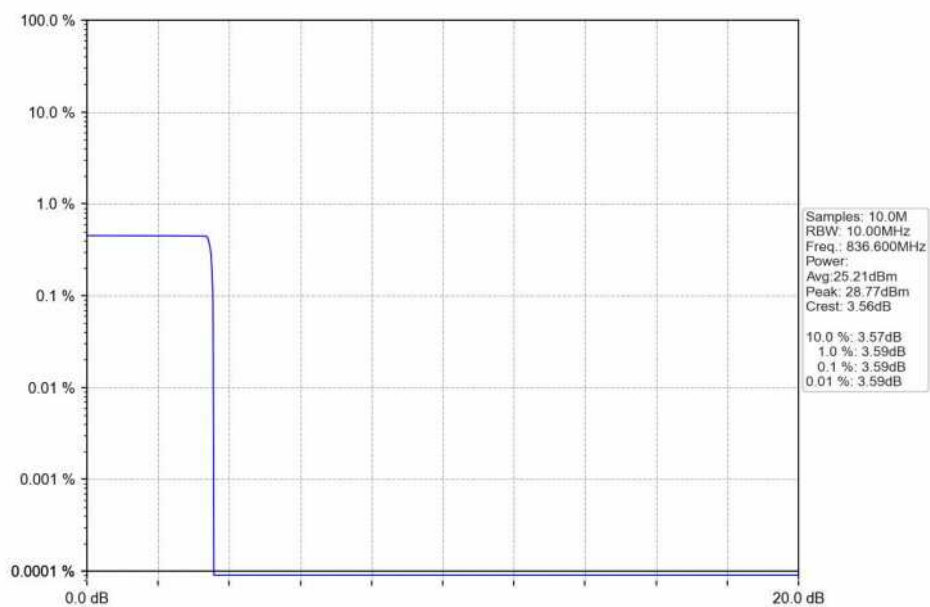
EUT Mode	Channel	Frequency (MHz)	Peak-to-Average Ratio(dB)	Limit (dB)	Result
GSM 850	128	824.20	9.45	13	PASS
	190	836.60	9.45	13	
	251	848.80	9.45	13	
GSM 850 GPRS	128	824.20	9.86	13	
	190	836.60	3.59	13	
	251	848.80	3.59	13	
GSM 850 EGPRS	128	824.20	12.84	13	
	190	836.60	7.22	13	
	251	848.80	7.22	13	
PCS 1900	512	1850.20	9.48	13	
	661	1880.00	9.48	13	
	810	1909.80	9.59	13	
PCS 1900 GPRS	512	1850.20	9.71	13	
	661	1880.00	3.77	13	
	810	1909.80	3.65	13	
PCS 1900 EGPRS	512	1850.20	12.55	13	
	661	1880.00	7.51	13	
	810	1909.80	7.36	13	

Test Graph



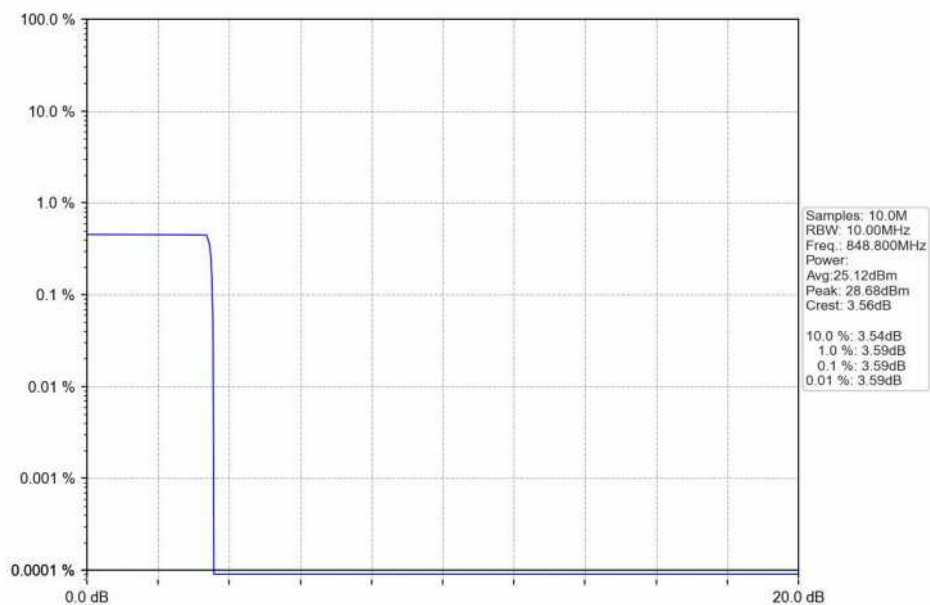


GSM850_GPRS_MCH_836.6MHz_4 TX Slots_NTNV



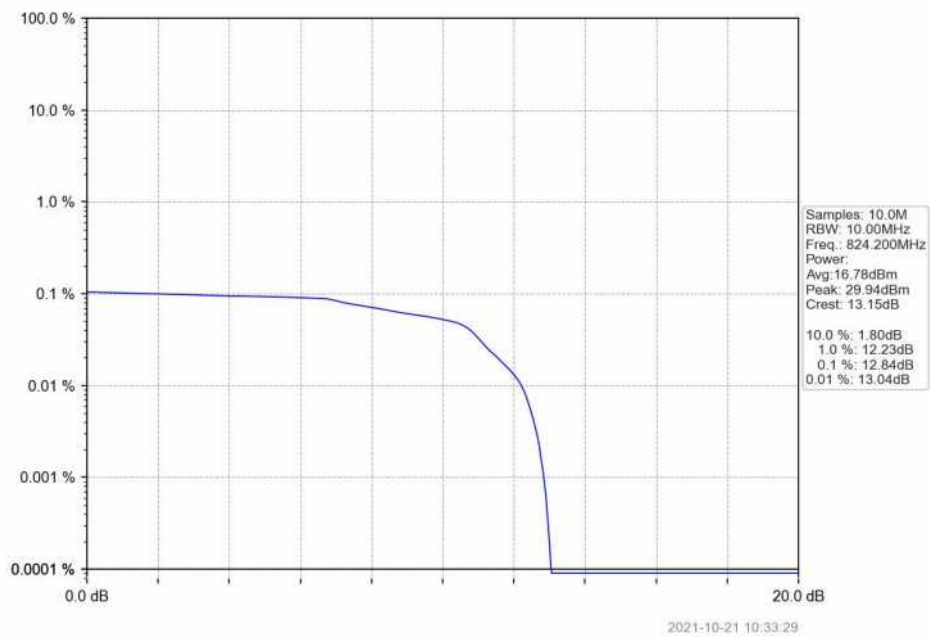
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GSM850_GPRS_HCH_848.8MHz_4 TX Slots_NTNV

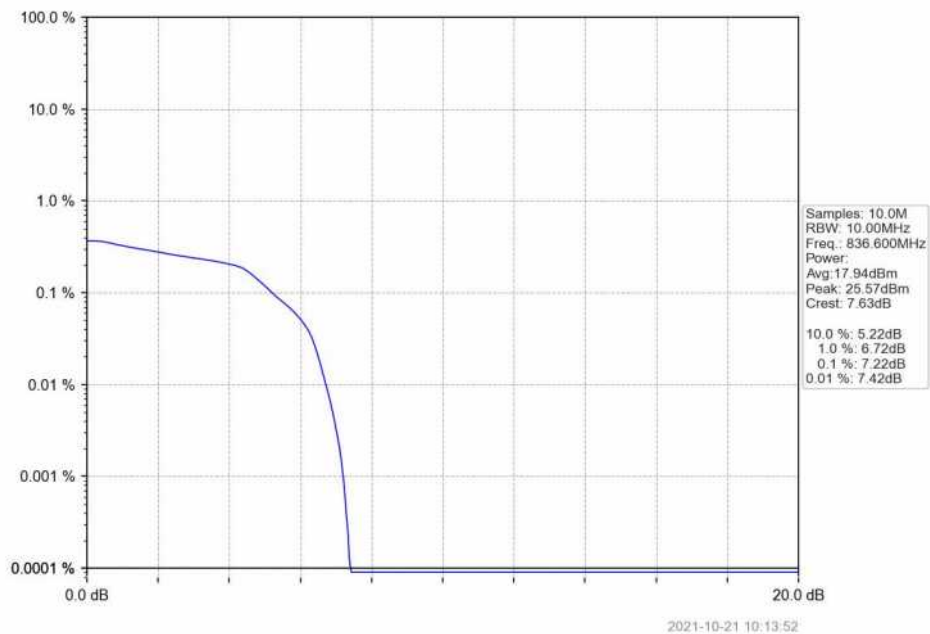


2021-10-21 10:13:42

GSM850_EGPRS_LCH_824.2MHz_4 TX Slots_NTNV



GSM850_EGPRS_MCH_836.6MHz_4 TX Slots_NTNV

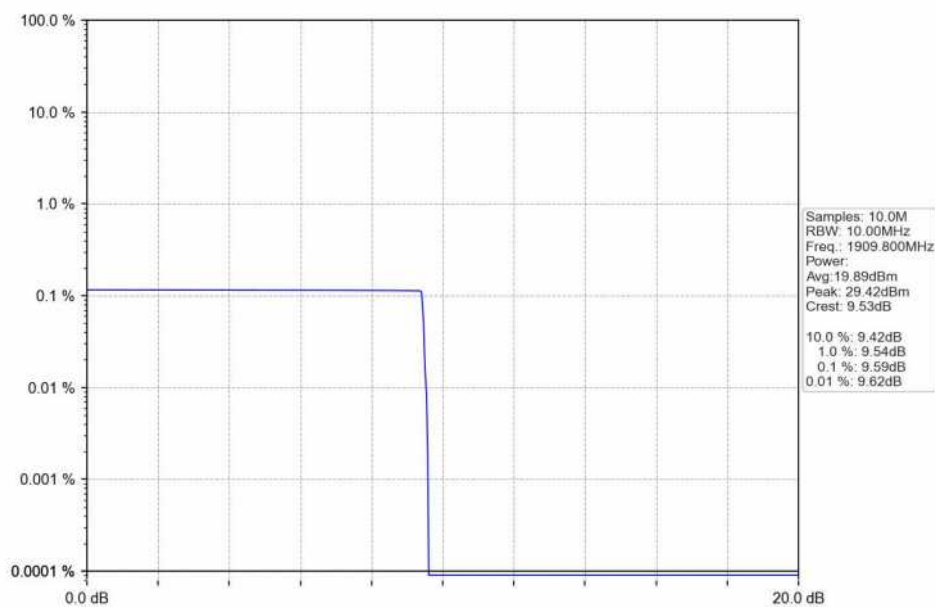




PCS 1900

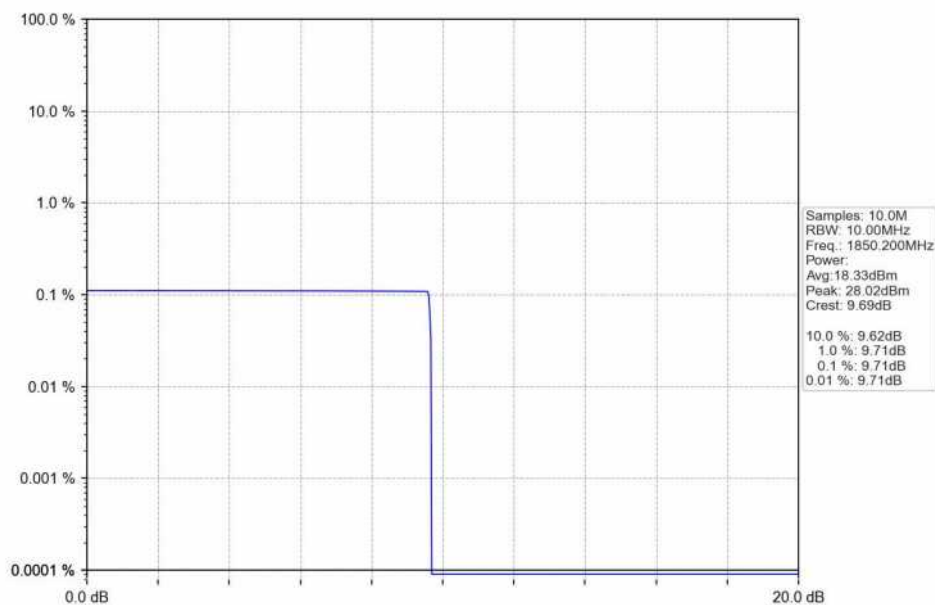


PCS1900_GSM_HCH_1909.8MHz_GSM_NTNV



2021-10-21 10:14:57

PCS1900_GPRS_LCH_1850.2MHz_4 TX Slots_NTNV



2021-10-21 10:15:04

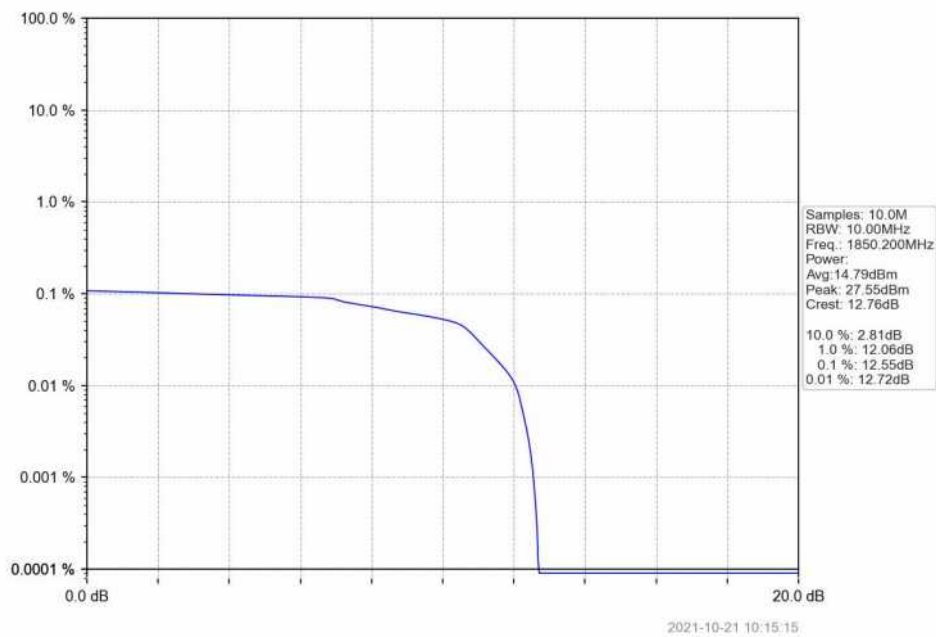
PCS1900_GPRS_MCH_1880MHz_4 TX Slots_NTNV



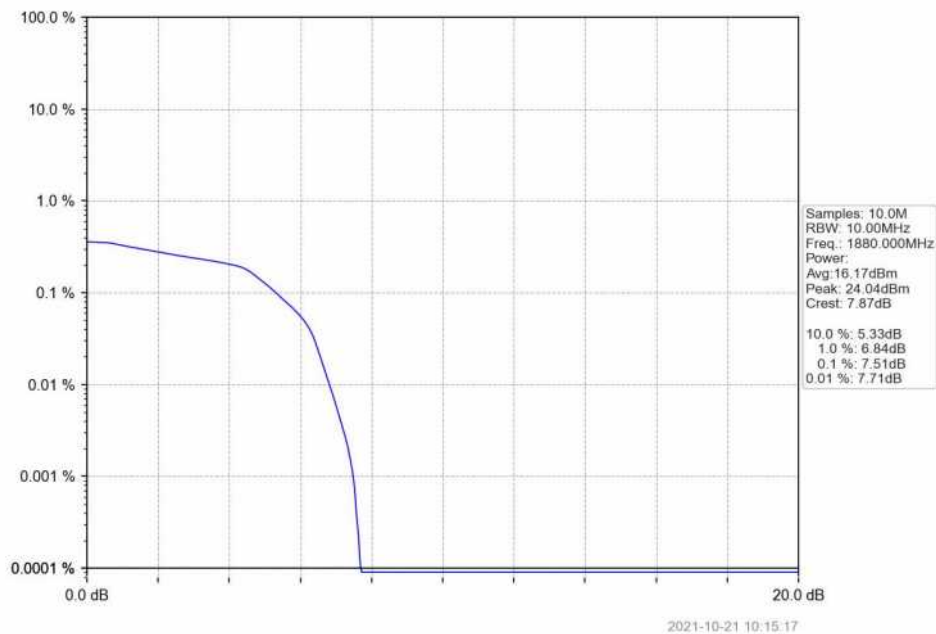
PCS1900_GPRS_HCH_1909.8MHz_4 TX Slots_NTNV



PCS1900_EGPRS_LCH_1850.2MHz_4 TX Slots_NTNV



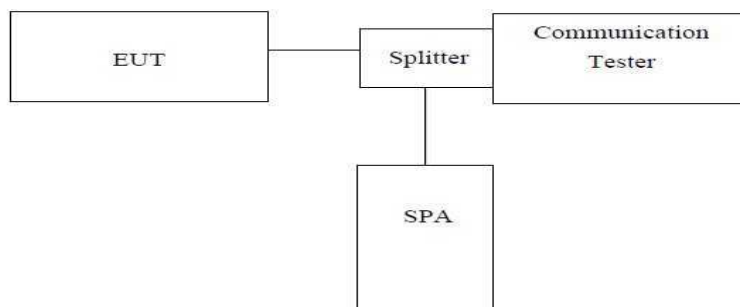
PCS1900_EGPRS_MCH_1880MHz_4 TX Slots_NTNV





3.3. Occupy Bandwidth

TEST CONFIGURATION



Note: Measurement setup for testing on Antenna connector

TEST PROCEDURE

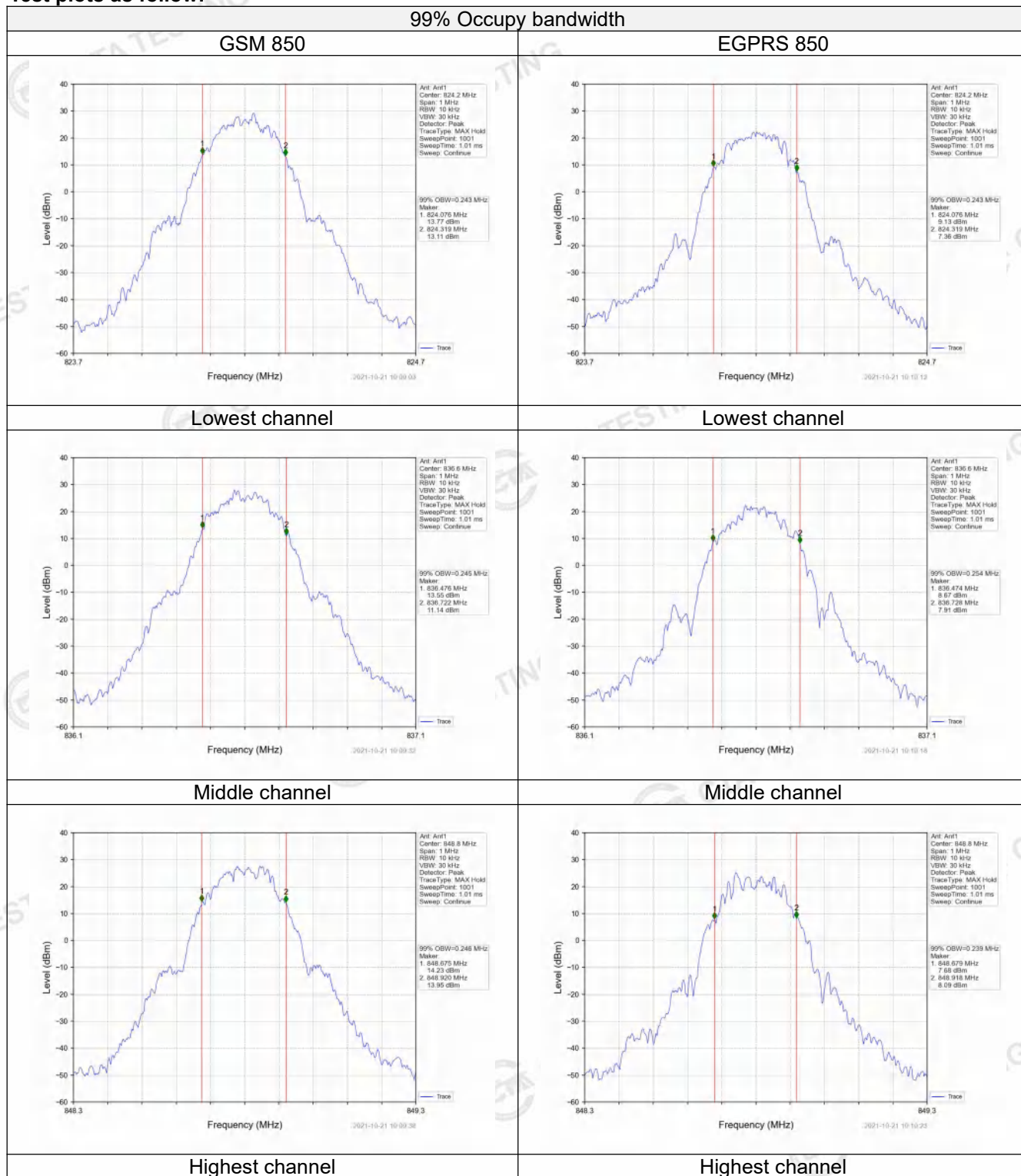
1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer
2. RBW was set to about 1% of emission BW, VBW $\geq$ 3 times RBW.
3. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.
4. ATT:40dB ,Offset:7.06dB for GSM850,ATT:40dB ,Offset:7.30dB for PCS1900

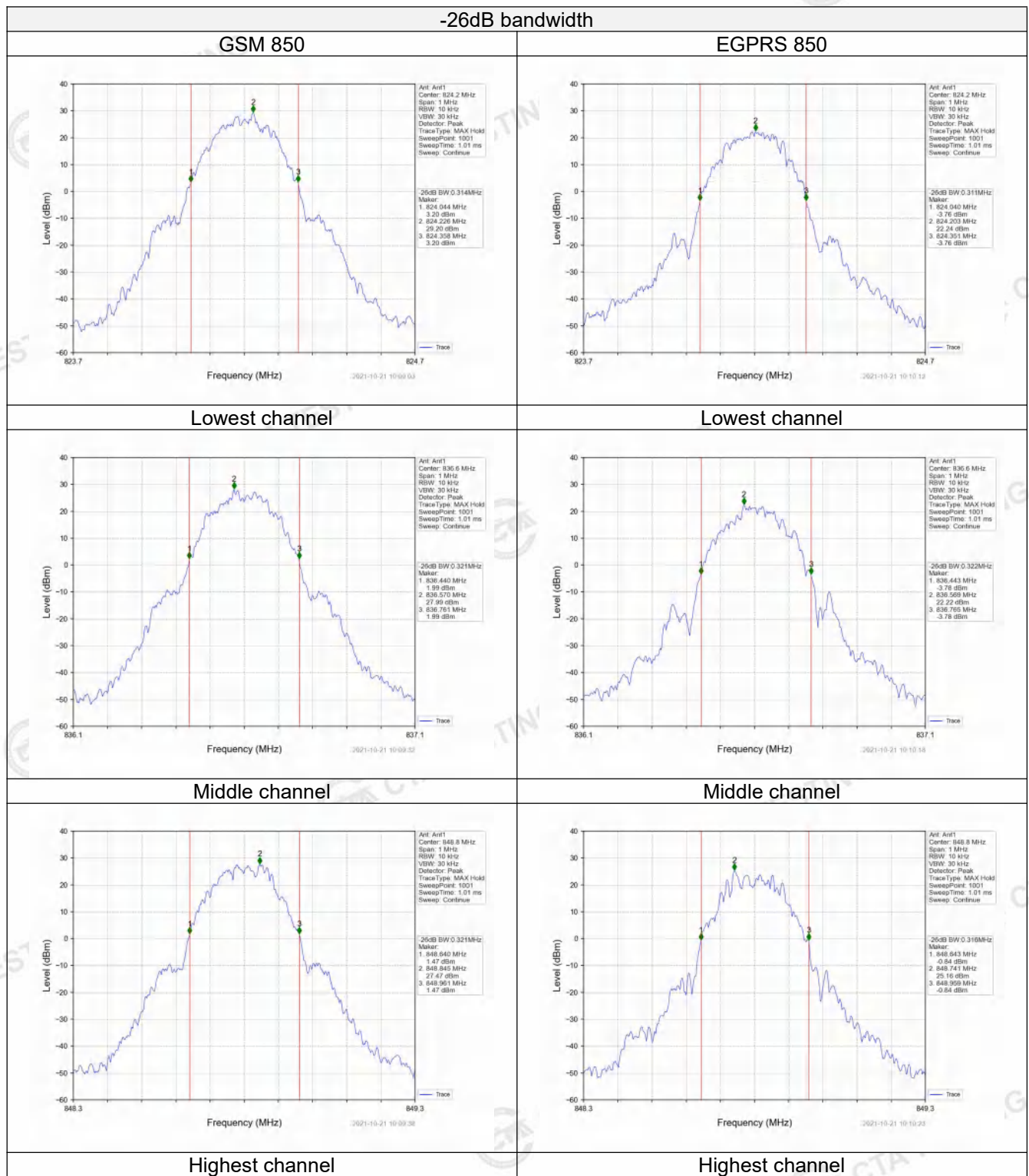
TEST RESULTS

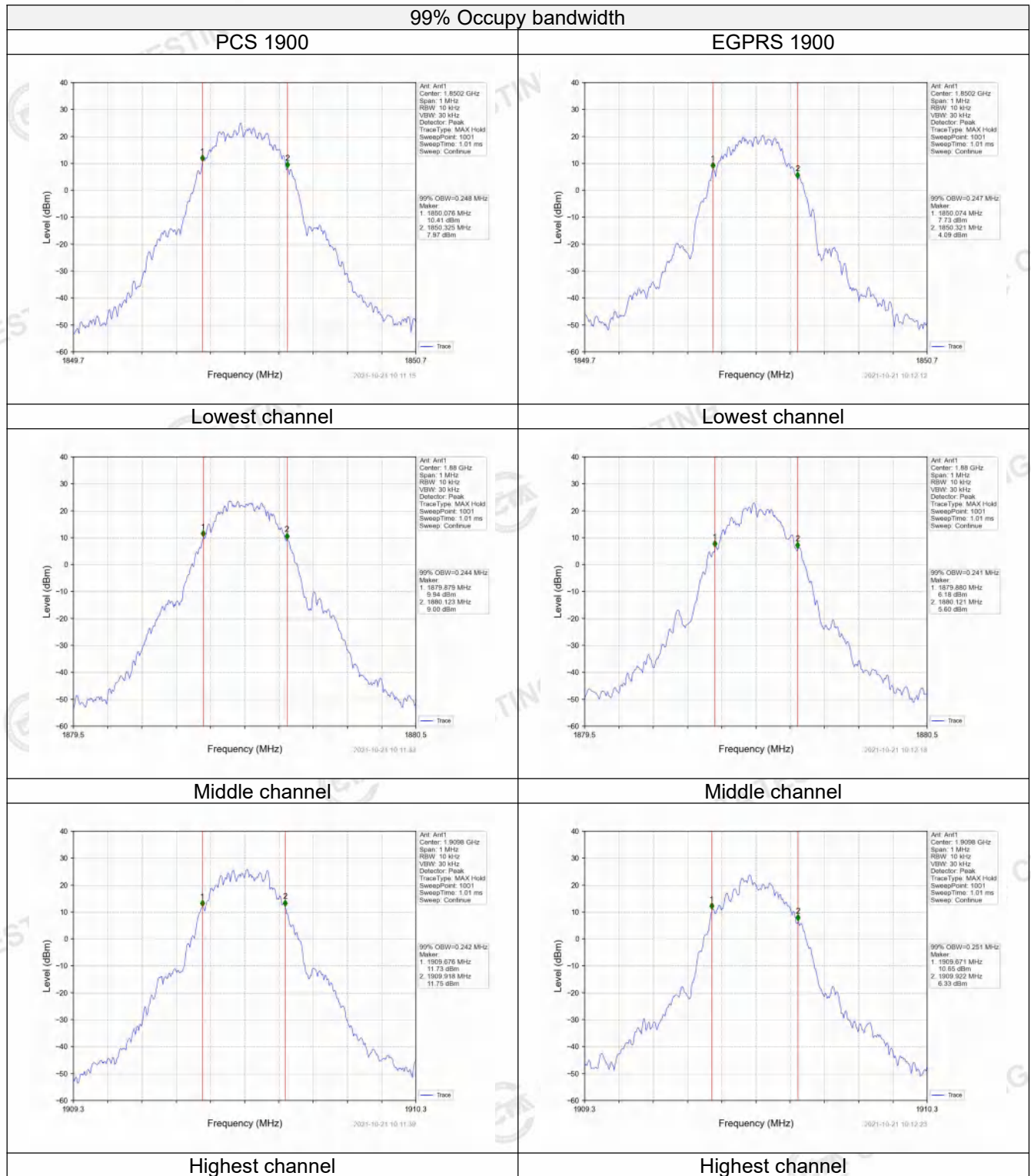
EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (MHz)	-26dB bandwidth (MHz)
GSM 850	128	824.20	0.243	0.314
	190	836.60	0.245	0.321
	251	848.80	0.246	0.321
EGPRS850 (8PSK,1Slot)	128	824.20	0.243	0.311
	190	836.60	0.254	0.322
	251	848.80	0.239	0.316
PCS1900	512	1850.20	0.248	0.309
	661	1880.00	0.244	0.318
	810	1909.80	0.242	0.314
EGPRS1900 (8PSK,1Slot)	512	1850.20	0.247	0.317
	661	1880.00	0.241	0.305
	810	1909.80	0.251	0.306

Note: GSM&GPRS use the same modulation technical (GMSK), and with the same channels, so the 99% OBW and the -26dB of GPRS not performed.

Test plots as follow:

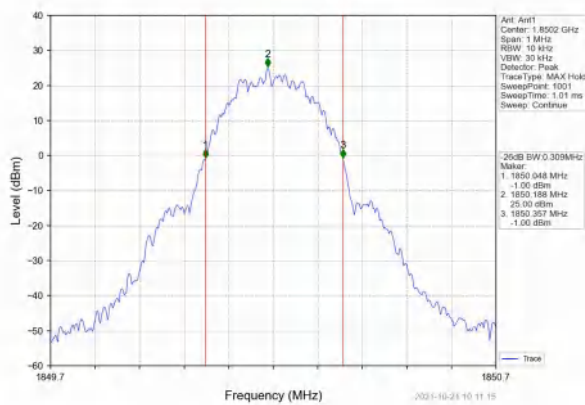




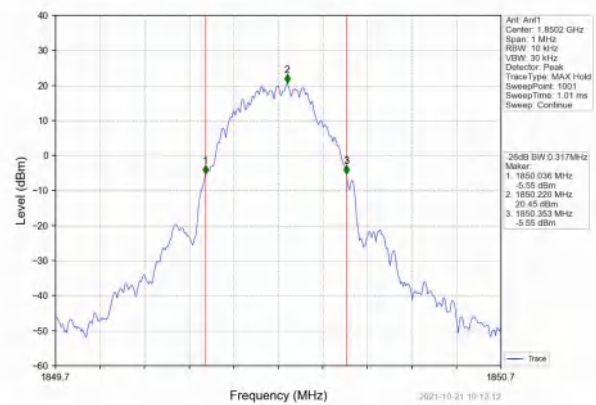


-26dB Occupy bandwidth

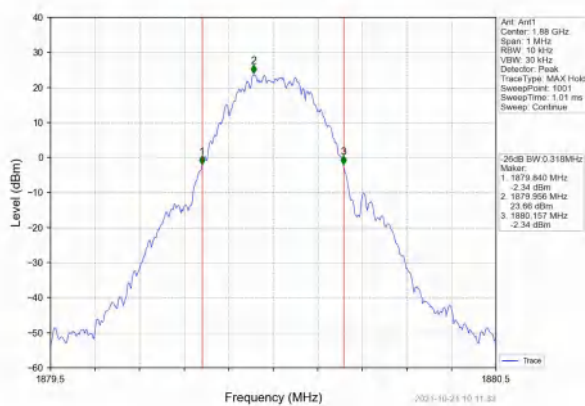
PCS 1900



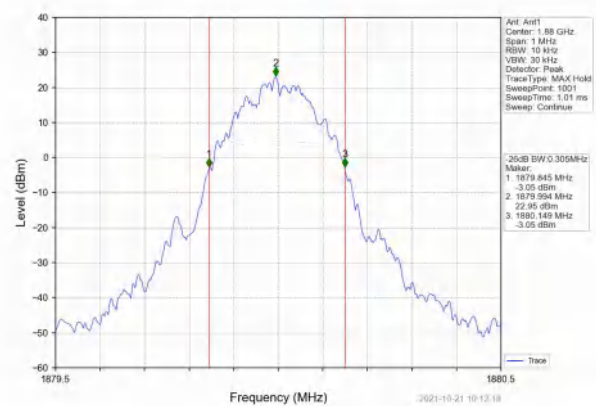
EGPRS 1900



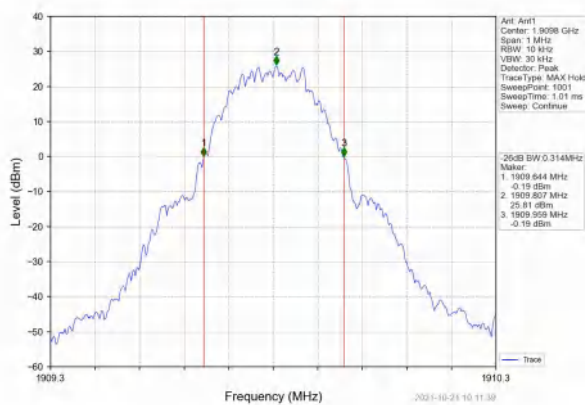
Lowest channel



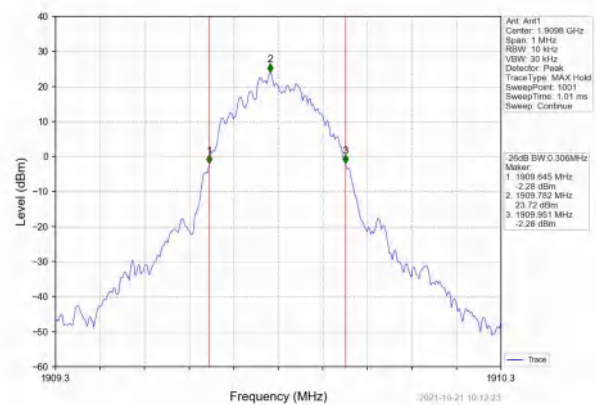
Lowest channel



Middle channel



Middle channel



Highest channel

Highest channel

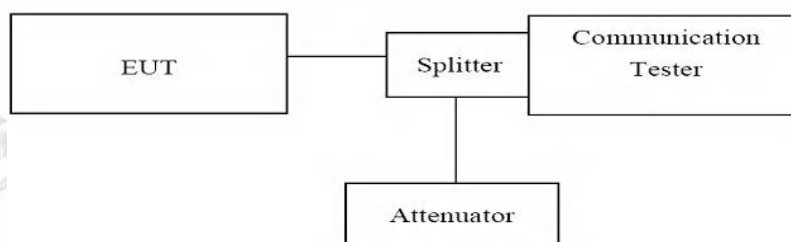
3.4. Out of band emission at antenna terminals

LIMIT

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

TEST CONFIGURATION



TEST PROCEDURE

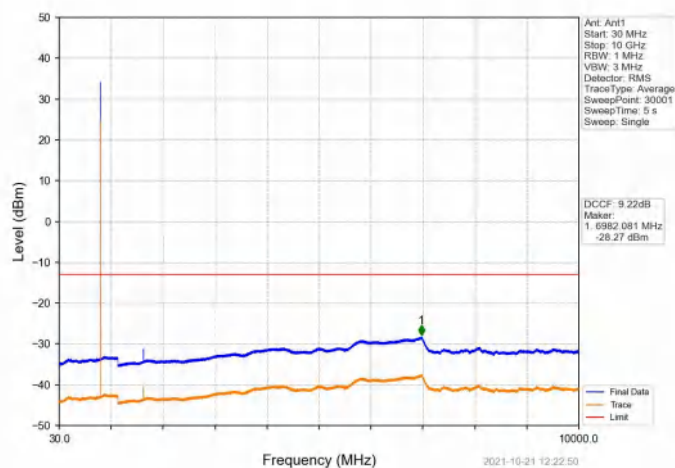
1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1MHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.
3. For the out of band: Set the RBW = 1MHz VBW ≥ 3 times RBW, Start=30MHz, Stop= 10th harmonic. ATT:40dB ,Offset:7.06dB for GSM850, ATT:40dB ,Offset:7.30dB for PCS1900

TEST RESULTS

Remark: We test all modulation type and record worst case at Voice mode (GSM850/PCS1900) .

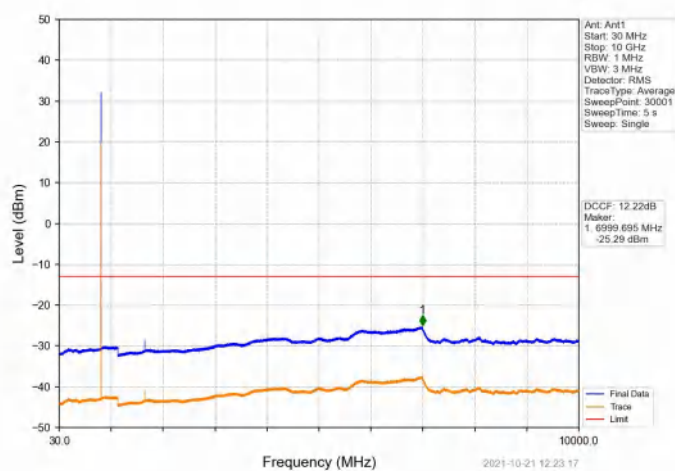
GSM 850

Lowest channel



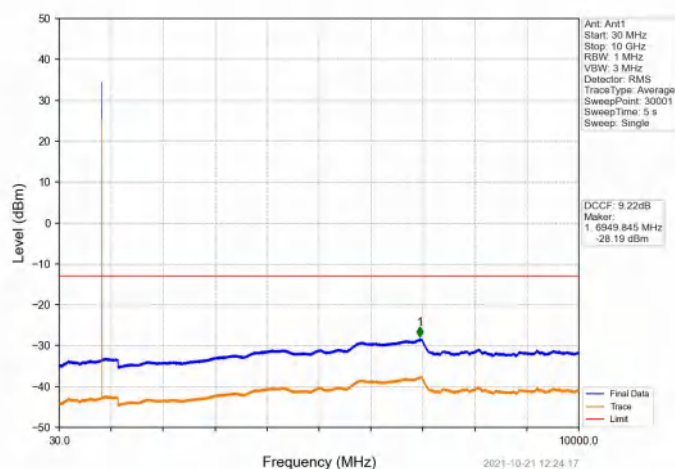
30MHz~10GHz

Middle channel



30MHz~10GHz

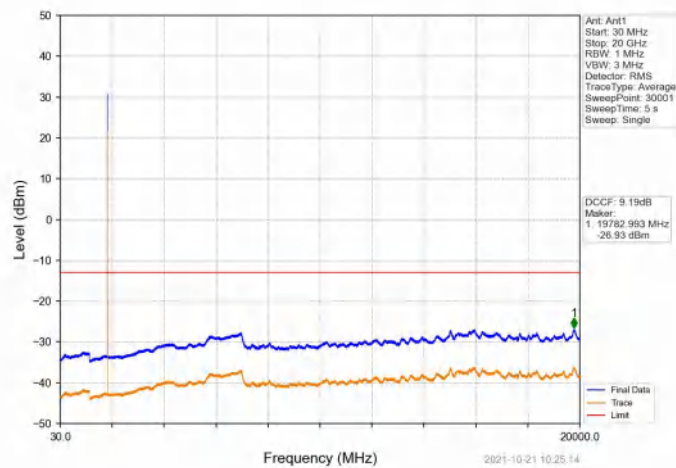
Highest channel



30MHz~10GHz

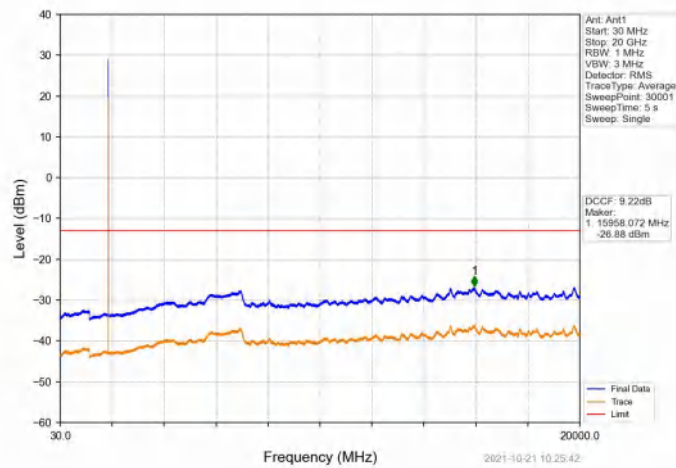
PCS 1900

Lowest channel



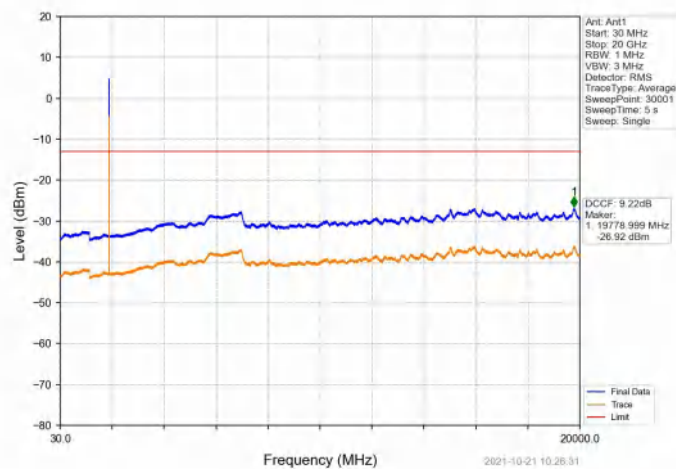
30MHz~20GHz

Middle channel



30MHz~20GHz

Highest channel



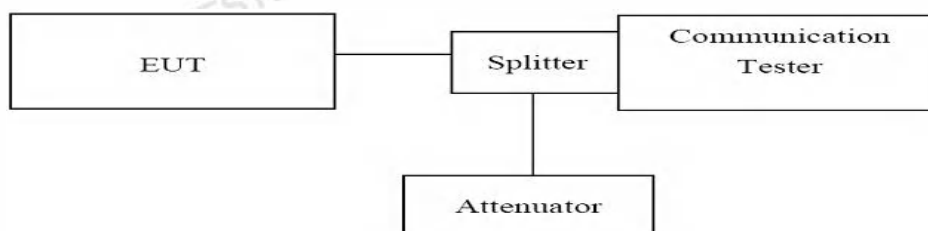
30MHz~20GHz

3.5. Band Edge compliance

LIMIT

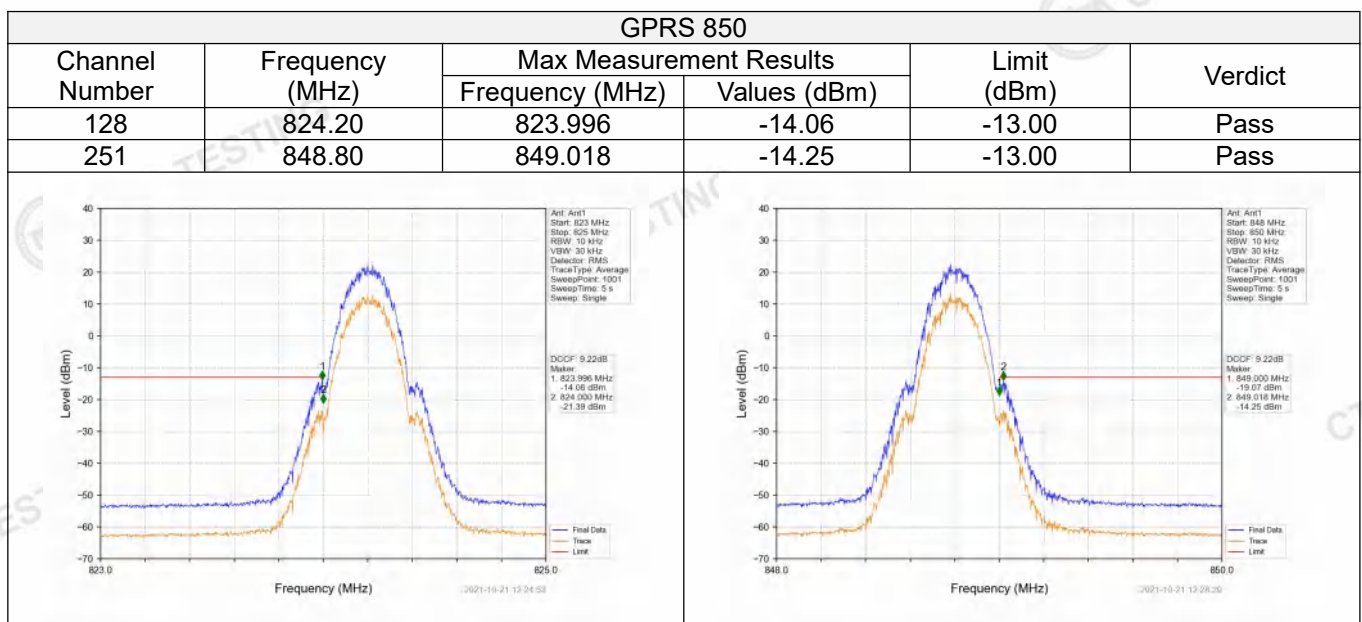
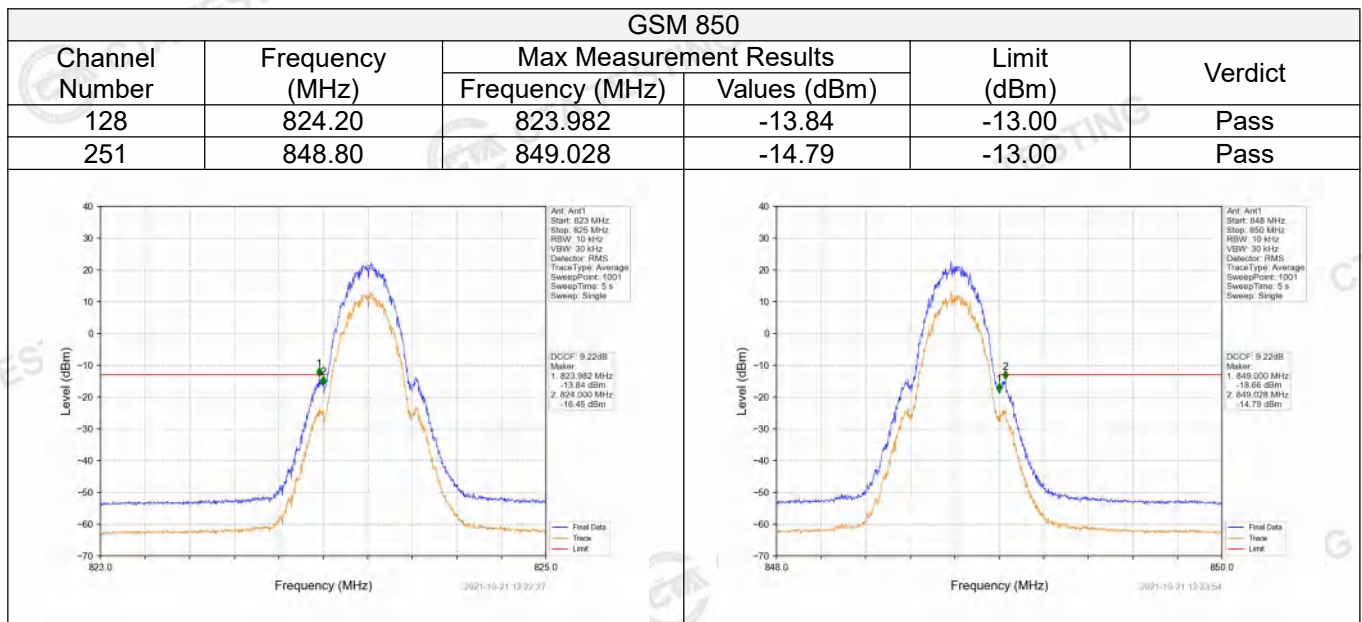
Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

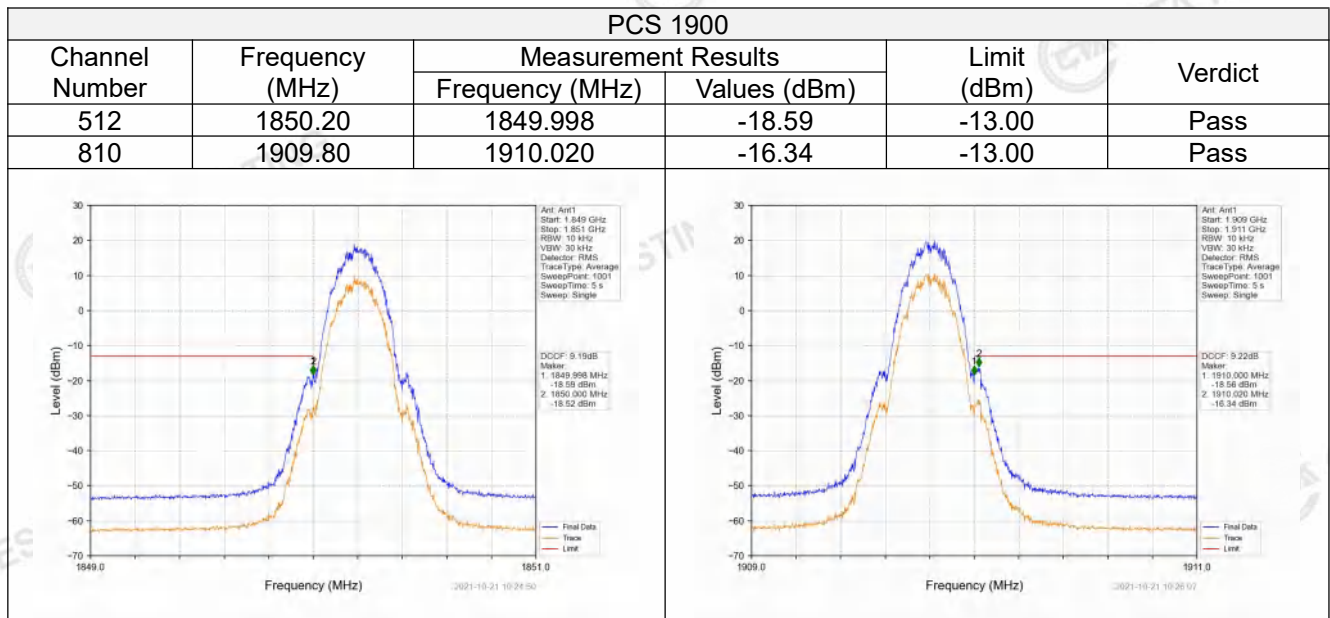
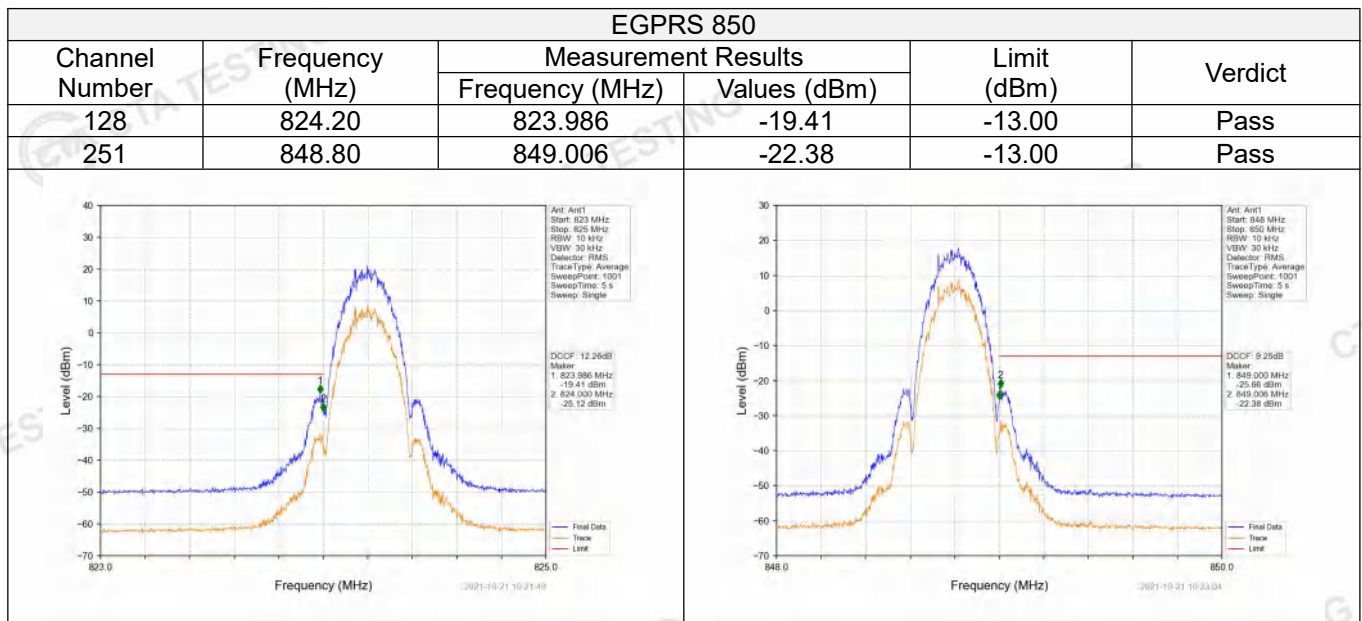
TEST CONFIGURATION

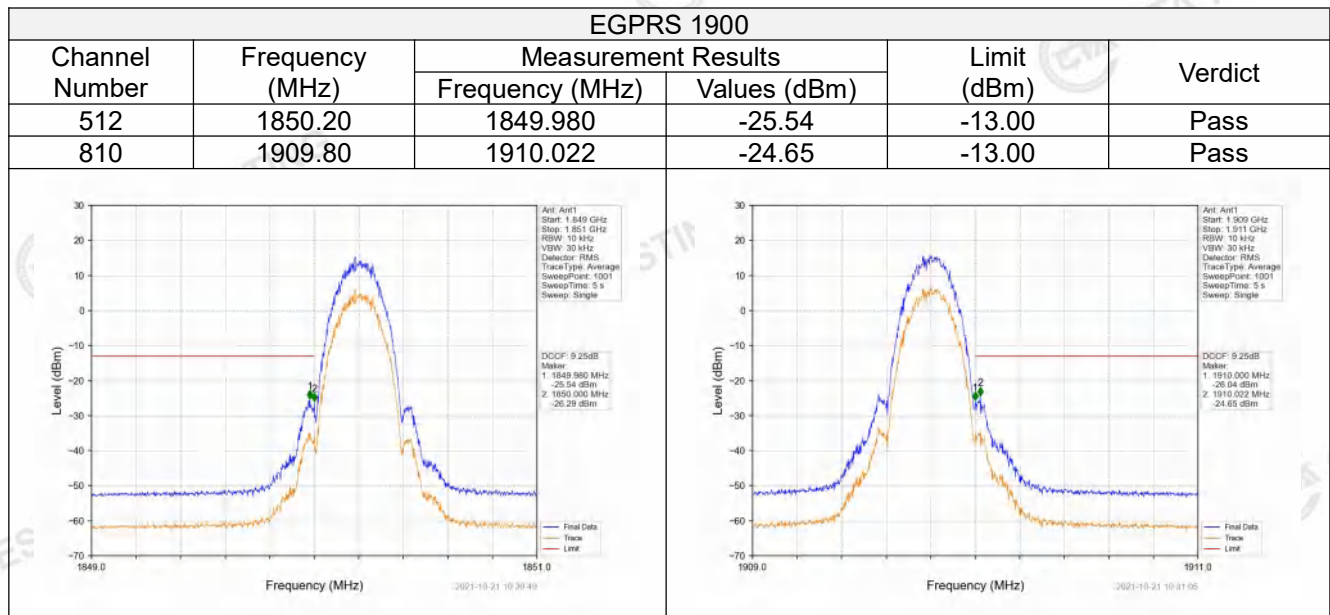
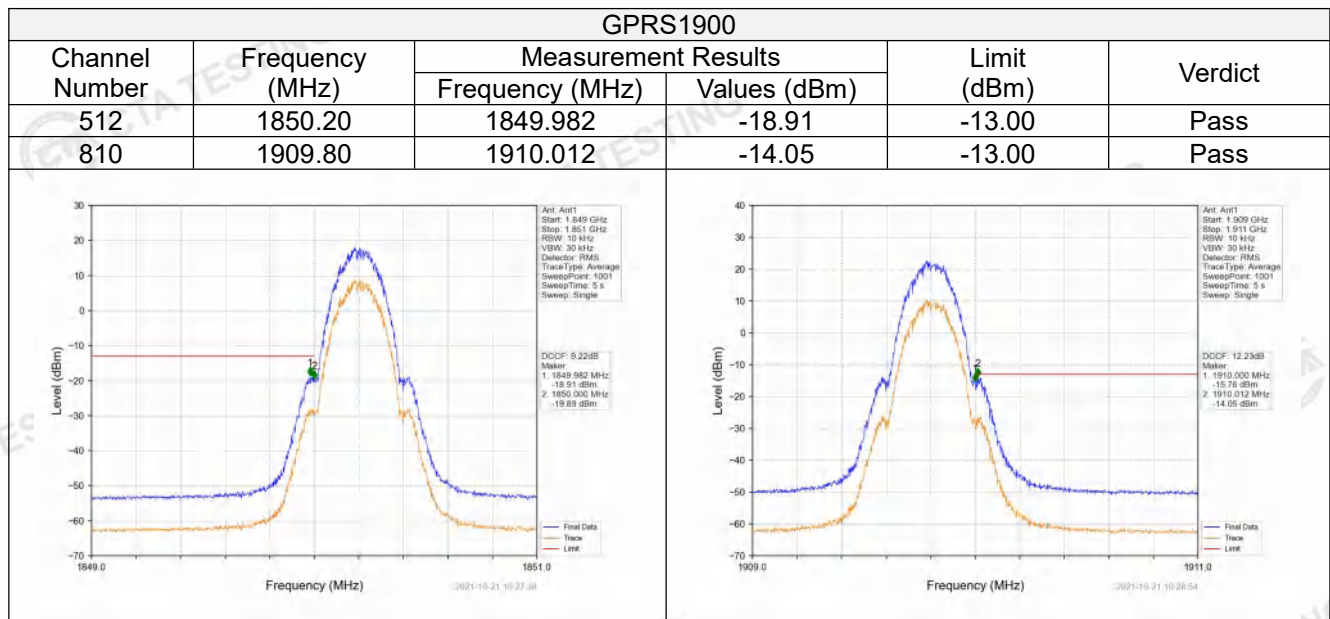


TEST PROCEDURE

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. Set the RBW=10KHz, VBW = 30KHz, Sweep time= Auto for 2G system measurement.
3. ATT:40dB ,Offset:7.06dB for GSM850,ATT:40dB ,Offset:7.30dB for PCS1900

TEST RESULTS





3.6. Radiated Power Measurement

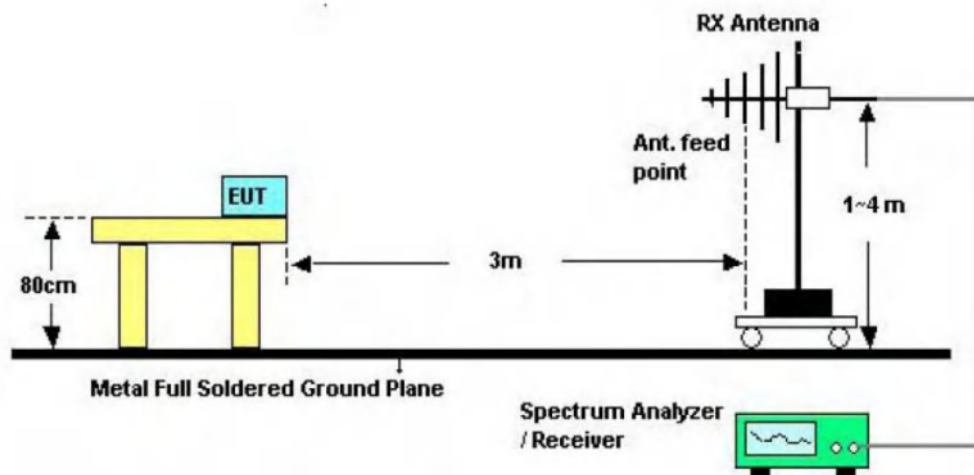
LIMIT

GSM850/WCDMA Band V: 7W ERP

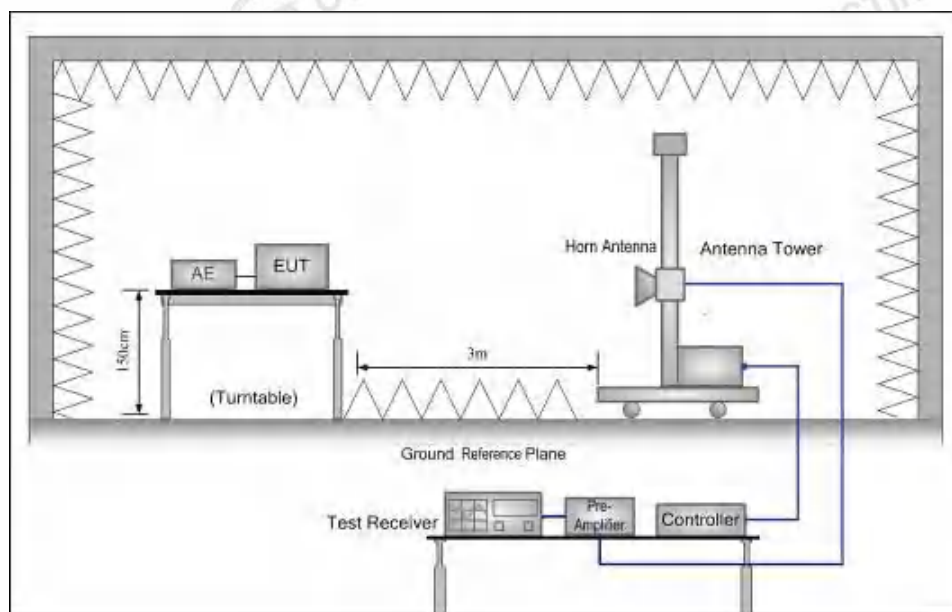
PCS1900/WCDMA Band II/WCDMA Band IV: 2W ERP

TEST CONFIGURATION

For the actual test configuration, please refer to the related Item – EUT Test Photos.



Below 1GHz



Above 1GHz

TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl), the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:
7. $\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} + \text{Ga}$
8. We used N5182A microwave signal generator which signal level can up to 33dBm, so we not used power Amplifier for substitution test; The measurement results are amend as described below:
9. $\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$
10. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
11. ERP can be calculated from EIRP by subtracting the gain of the dipole, $\text{ERP} = \text{EIRP} - 2.15\text{dBi}$.

TEST RESULTS

Remark:

1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "Z axis" position was the worst, and test data recorded in this report.

Measurement Data (worst case) :

Mode	Channel	Antenna Pol.	Pcl	SG Level	Ca Antenna Gain	Correction	ERP(dBm)	ERP(W)	Limit (dBm)	Result
GSM850 (GSM)	128	V	0.51	13.75	19.50	2.15	30.59	1.145	38.45	Pass
		H	0.51	14.09	19.19	2.15	30.62	1.153		
	190	V	0.51	13.58	19.66	2.15	30.58	1.142		
		H	0.51	13.84	19.33	2.15	30.51	1.124		
	251	V	0.52	14.03	19.23	2.15	30.59	1.145		
		H	0.52	13.97	19.26	2.15	30.56	1.137		
GSM850 (GPRS)	128	V	0.51	12.61	20.69	2.15	30.64	1.158	38.45	Pass
		H	0.51	12.29	20.91	2.15	30.54	1.132		
	190	V	0.51	13.80	19.52	2.15	30.66	1.164		
		H	0.51	12.26	21.01	2.15	30.61	1.150		
	251	V	0.52	13.16	20.15	2.15	30.64	1.150		
		H	0.52	12.85	20.48	2.15	30.66	1.164		
GSM850 (EGPRS)	128	V	0.51	11.98	21.32	2.15	30.64	1.158	38.45	Pass
		H	0.51	12.05	21.15	2.15	30.54	1.132		
	190	V	0.51	13.08	20.12	2.15	30.54	1.132		
		H	0.51	12.15	21.02	2.15	30.51	1.124		
	251	V	0.52	12.12	21.19	2.15	30.64	1.158		
		H	0.52	12.26	21.01	2.15	30.60	1.148		

Mode	Channel	Antenna Pol.	Pcl	SG Level	Ca Antenna Gain	Correction	ERP(dBm)	ERP(W)	Limit (dBm)	Result
PCS1900 (GSM)	128	V	0.51	12.62	20.59	2.15	30.55	1.135	33.00	Pass
		H	0.51	13.31	19.90	2.15	30.55	1.135		
	190	V	0.51	12.73	20.47	2.15	30.54	1.132		
		H	0.51	13.11	20.10	2.15	30.55	1.135		
	251	V	0.52	12.88	20.33	2.15	30.54	1.132		
		H	0.52	12.56	20.76	2.15	30.65	1.161		
PCS1900 (GPRS)	128	V	0.51	13.16	20.10	2.15	30.60	1.148	33.00	Pass
		H	0.51	12.58	20.61	2.15	30.53	1.129		
	190	V	0.51	13.44	19.92	2.15	30.70	1.174		
		H	0.51	13.48	19.84	2.15	30.66	1.164		
	251	V	0.52	13.28	19.94	2.15	30.55	1.135		
		H	0.52	12.99	20.19	2.15	30.51	1.124		
PCS1900 (EGPRS)	128	V	0.51	12.57	20.71	2.15	30.62	1.153	33.00	Pass
		H	0.51	13.09	20.10	2.15	30.53	1.129		
	190	V	0.51	13.30	20.03	2.15	30.67	1.166		
		H	0.51	12.62	20.68	2.15	30.64	1.158		
	251	V	0.52	13.31	20.04	2.15	30.68	1.169		
		H	0.52	12.73	20.51	2.15	30.57	1.140		

Note: ERP(dBm)= Ca Antenna Gain + SG Level – Pcl - Correction

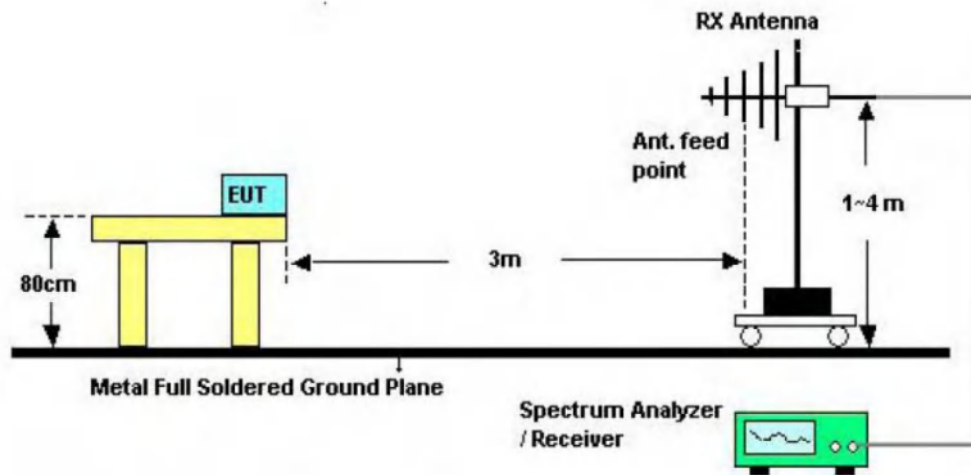
3.7. Radiated Spurious Emission

LIMIT

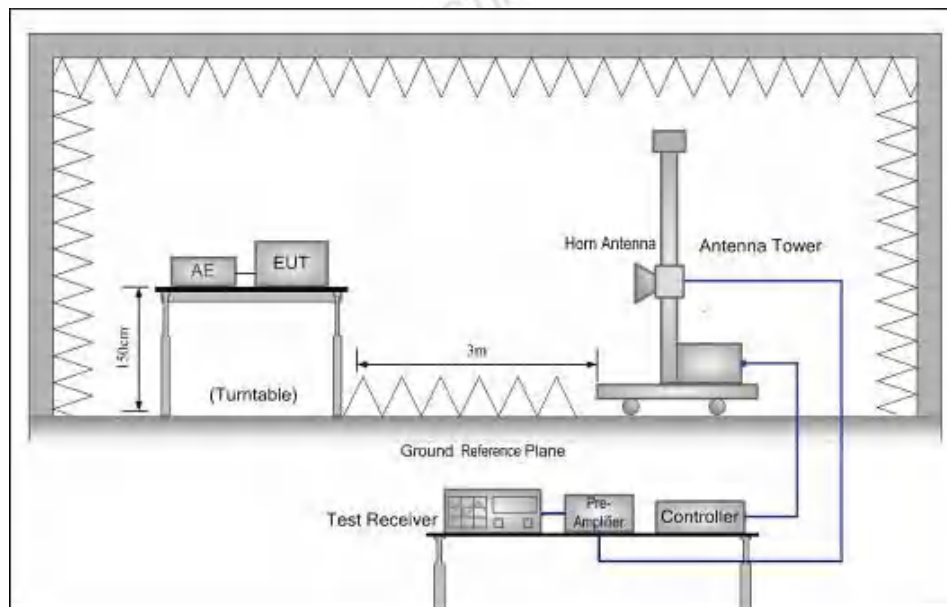
-13dBm

TEST CONFIGURATION

For the actual test configuration, please refer to the related Item – EUT Test Photos.



Below 1GHz



Above 1GHz

TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAG) should be recorded after test.
6. The measurement results are obtained as described below:
7. $\text{Power(EIRP)} = \text{PMea} - \text{PAG} - \text{Pcl} + \text{Ga}$
8. We used SMF100A microwave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:
9. $\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$
10. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
11. ERP can be calculated from EIRP by subtracting the gain of the dipole, $\text{ERP} = \text{EIRP} - 2.15\text{dBi}$.
12. Test frequency range should extend to 10th harmonic of highest fundamental frequency.

TEST RESULTS

Remark:

1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "Z axis" position was the worst, and test data recorded in this report.
2. We test all modulation type and record worst case at Voice mode (GSM850/PCS1900) .

Measurement Data (worst case):

GSM850					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
128	1648.40	Vertical	-49.30	-13.00	Pass
	2472.60	Vertical	-47.60		
	1648.40	Horizontal	-54.42		
	2472.60	Horizontal	-42.15		
190	1673.20	Vertical	-49.93		
	2509.80	Vertical	-42.35		
	1673.20	Horizontal	-53.31		
	2509.80	Horizontal	-40.17		
251	1697.60	Vertical	-47.73		
	2546.40	Vertical	-42.09		
	1697.60	Horizontal	-52.76		
	2546.40	Horizontal	-35.77		

Remark :

The emission levels of below 1 GHz are very lower than the limit above 10dB and not show in test report.

PCS1900							
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result		
		Polarization	Level (dBm)				
512	3700.40	Vertical	-49.34	-13.00	Pass		
	5550.60	Vertical	-47.63				
	3700.40	Horizontal	-54.81				
	5550.60	Horizontal	-42.21				
661	3760.00	Vertical	-49.63				
	5640.00	Vertical	-42.32				
	3760.00	Horizontal	-53.32				
	5640.00	Horizontal	-40.10				
810	3819.60	Vertical	-47.63				
	5729.40	Vertical	-42.20				
	3819.60	Horizontal	-52.68				
	5729.40	Horizontal	-45.44				

Remark :

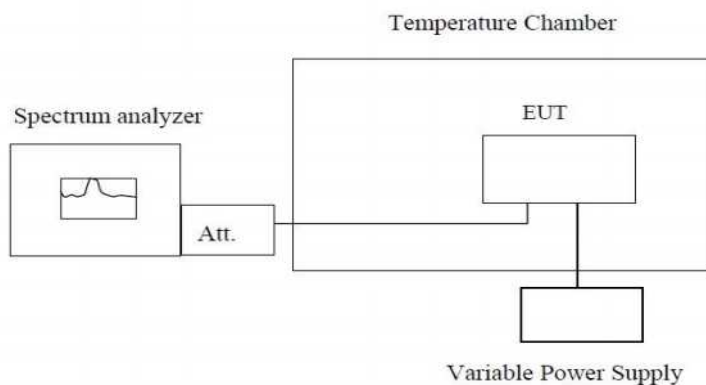
The emission levels of below 1 GHz are very lower than the limit above 10dB and not show in test report.

3.8. Frequency stability

LIMIT

Cellular Band: $\pm 2.5\text{ppm}$ PCS Band: Within the authorized frequency block

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to -30°C . After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10°C increased per stage until the highest temperature of $+50^{\circ}\text{C}$ reached.
7. Reduce the input voltage to specified extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.

TEST RESULTS

Remark: We test all modulation type and record worst case at Voice mode

1. Temperature measurement:

Test Band: GSM850 Middle channel=190 channel=836.6MHz (Frequency Error VS. Voltage)										
Test Mode	Test Temp.	Test Volt.	Freq. Error (Hz)			Freq. vs. rated (ppm)			Limit (ppm)	Verdict
			LCH	MCH	HCH	LCH	MCH	HCH		
GSM	NT	LV	0.58	-1.06	-2.10	0.0007	-0.0013	-0.0025	±2.50	PASS
		NV	2.00	-4.26	-7.30	0.0024	-0.0051	-0.0087	±2.50	PASS
		HV	-2.55	-4.49	-3.29	-0.0030	-0.0054	-0.0039	±2.50	PASS

Test Band: GSM850 Middle channel=190 channel=836.6MHz (Frequency Error VS. Temperature)										
Test Mode	Test Volt.	Test Temp.	Freq. Error (Hz)			Freq. vs. rated (ppm)			Limit (ppm)	Verdict
			LCH	MCH	HCH	LCH	MCH	HCH		
		-20.00	-3.87	-5.52	-1.91	-0.0046	-0.0066	-0.0023	±2.50	PASS
		-10.00	-2.49	-1.74	-3.62	-0.0030	-0.0021	-0.0043	±2.50	PASS
		0.00	-2.07	-1.52	-2.91	-0.0025	-0.0018	-0.0035	±2.50	PASS
		10.00	-2.13	-3.52	-1.06	-0.0025	-0.0042	-0.0013	±2.50	PASS
		20.00	-4.91	-3.71	-1.81	-0.0059	-0.0044	-0.0022	±2.50	PASS
		30.00	-2.65	-3.13	-1.20	-0.0032	-0.0037	-0.0014	±2.50	PASS
		40.00	-4.00	-0.48	-4.78	-0.0048	-0.0006	-0.0057	±2.50	PASS
		50.00	-4.23	-1.74	-1.23	-0.0051	-0.0021	-0.0015	±2.50	PASS

Test Band: PCS1900 (Frequency Error VS. Voltage)										
Test Mode	Test Temp.	Test Volt.	Freq. Error (Hz)			Freq. vs. rated (ppm)			Limit (ppm)	Verdict
			LCH	MCH	HCH	LCH	MCH	HCH		
PCS1900	NT	LV	3.10	-2.26	-3.39	0.0037	-0.0027	-0.0041	±2.50	PASS
		NV	-0.35	0.90	-3.13	-0.0004	0.0011	-0.0037	±2.50	PASS
		HV	-0.58	0.26	0.07	-0.0007	0.0003	0.0001	±2.50	PASS

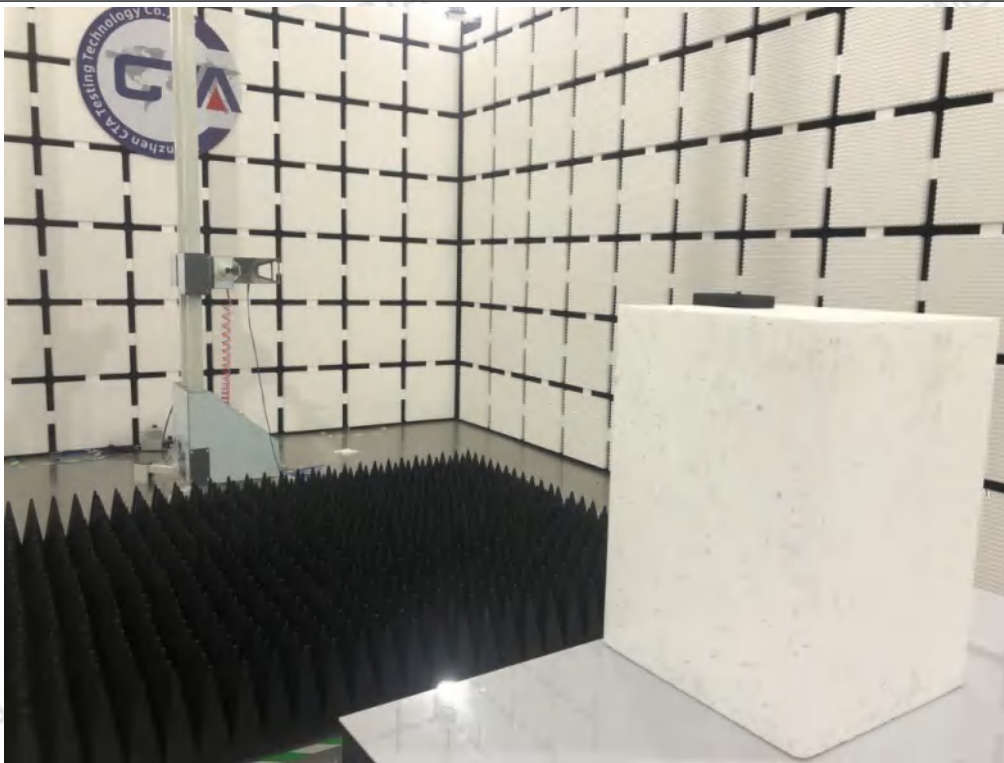
Test Band: PCS1900 (Frequency Error VS. Temperature)										
Test Mode	Test Volt.	Test Temp.	Freq. Error (Hz)			Freq. vs. rated (ppm)			Limit (ppm)	Verdict
			LCH	MCH	HCH	LCH	MCH	HCH		
		-20.00	2.07	-0.19	-2.65	0.0025	-0.0002	-0.0032	±2.50	PASS
		-10.00	2.00	-3.16	0.16	0.0024	-0.0038	0.0002	±2.50	PASS
		0.00	3.29	-0.10	-7.13	0.0039	-0.0001	-0.0085	±2.50	PASS
		10.00	-2.87	-3.07	0.55	-0.0034	-0.0037	0.0007	±2.50	PASS
		20.00	1.00	-1.26	2.03	0.0012	-0.0015	0.0024	±2.50	PASS
		30.00	0.78	0.42	-1.68	0.0009	0.0005	-0.0020	±2.50	PASS
		40.00	0.23	-2.87	-1.81	0.0003	-0.0034	-0.0022	±2.50	PASS
		50.00	0.81	-1.94	-0.48	0.0010	-0.0023	-0.0006	±2.50	PASS

4. EUT TEST PHOTOS

Radiated Measurement (Below 1GHz)



Radiated Measurement (Above 1GHz)



5. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

External Photographs

Photo 1

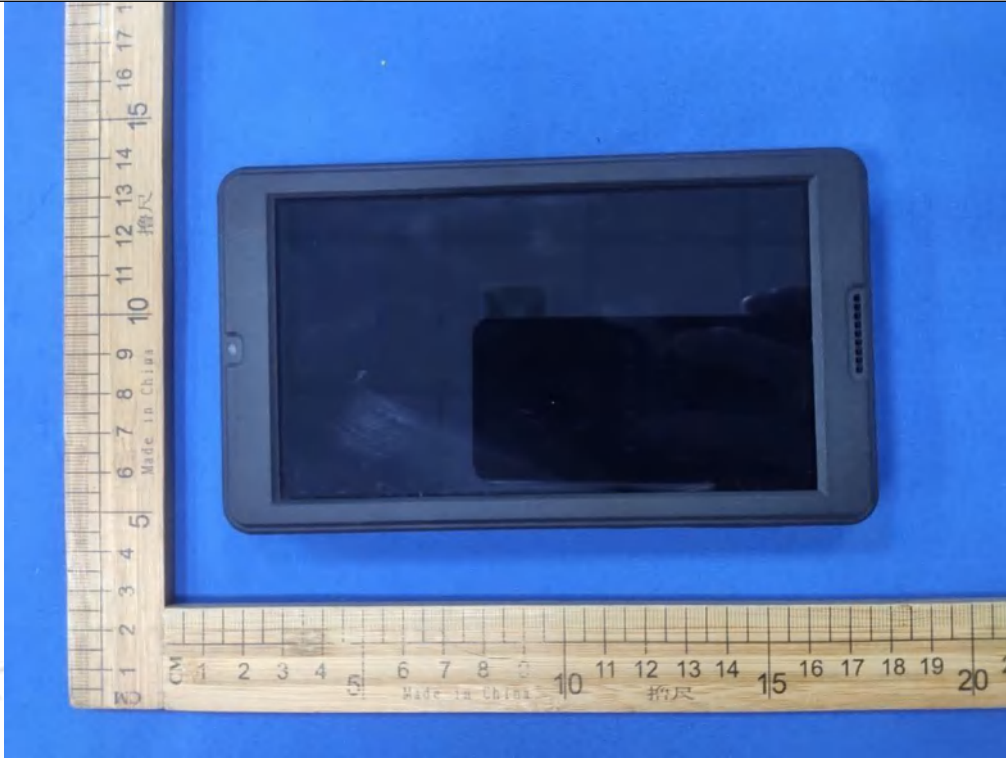


Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Internal Photographs

Photo 1

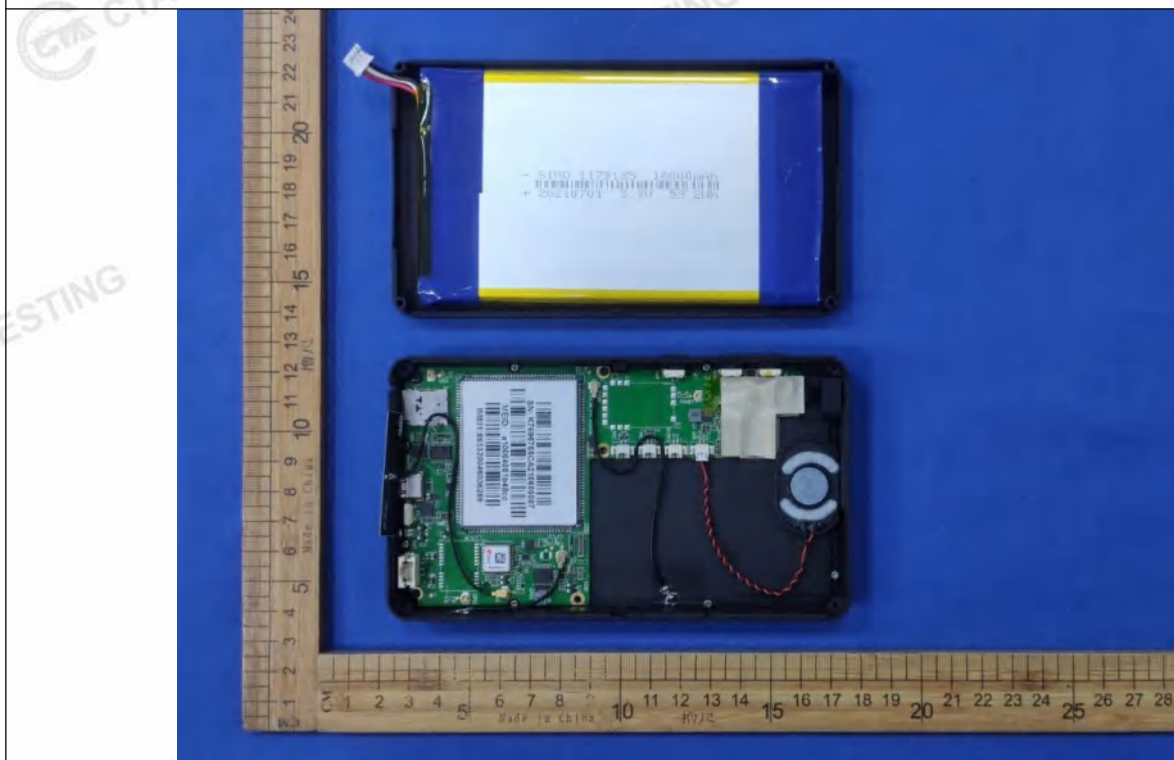


Photo 2



Photo 3



Photo 4

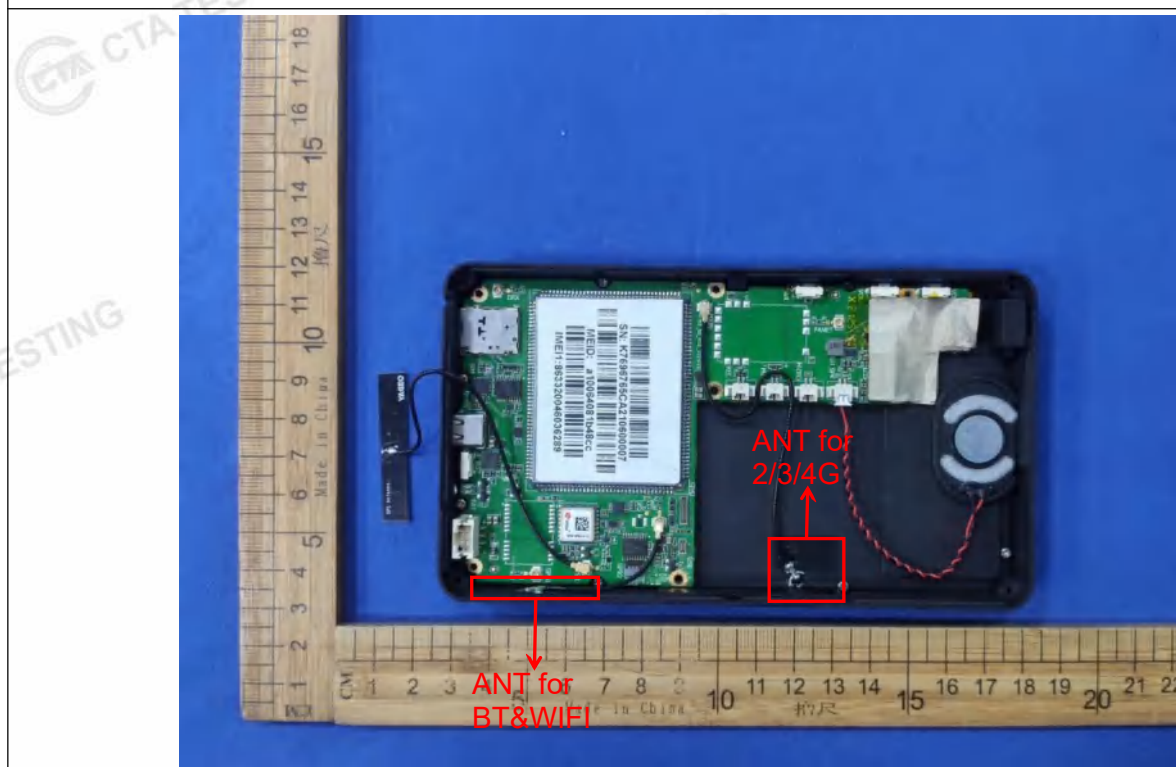


Photo 5



Photo 6

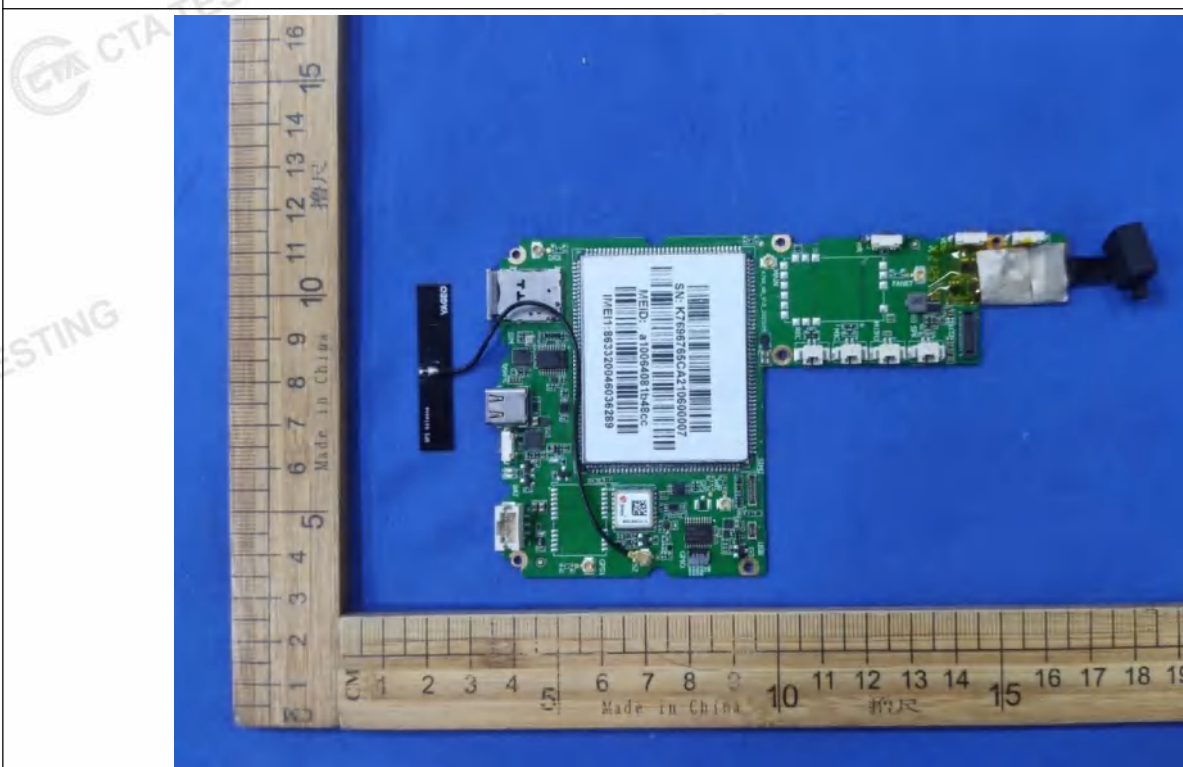


Photo 7

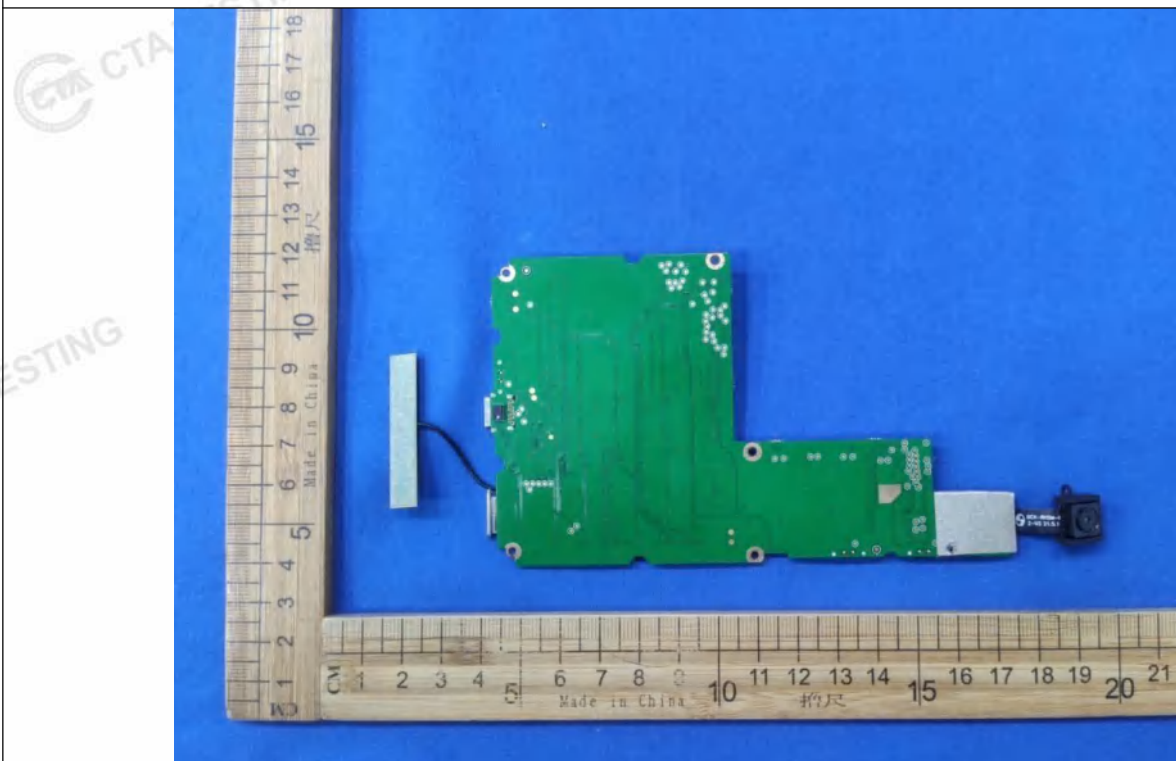


Photo 8

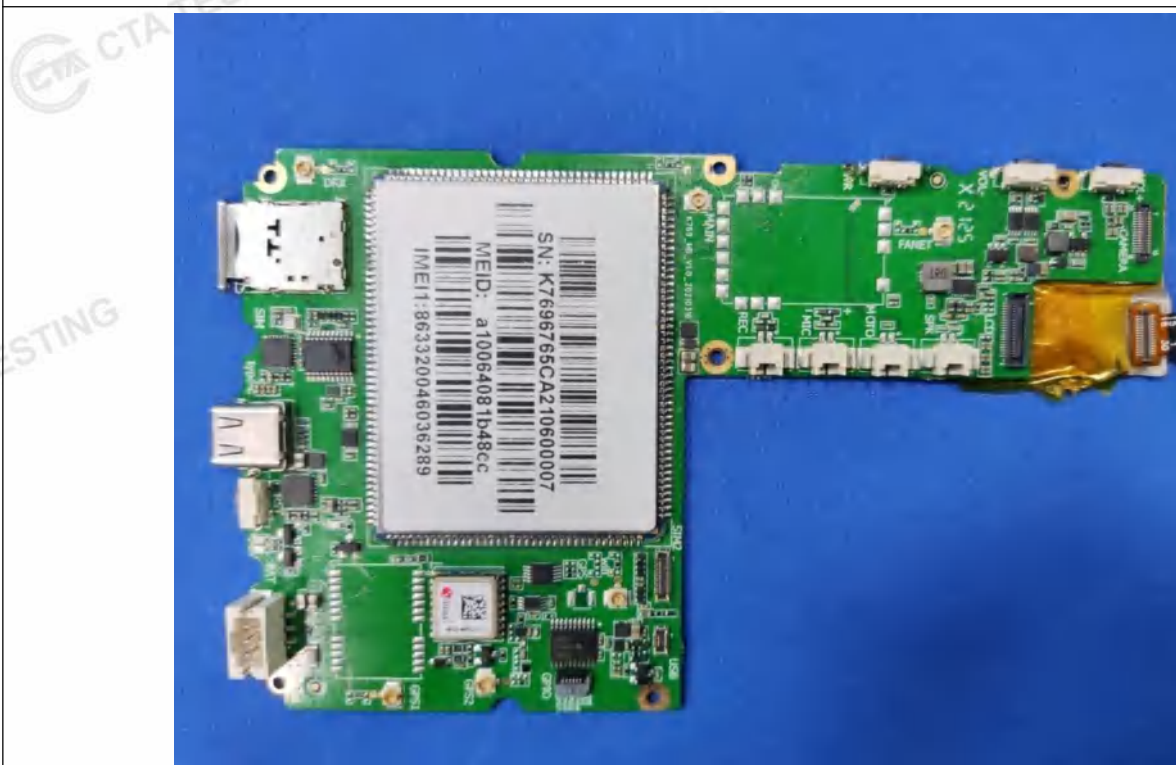


Photo 9



Photo 10

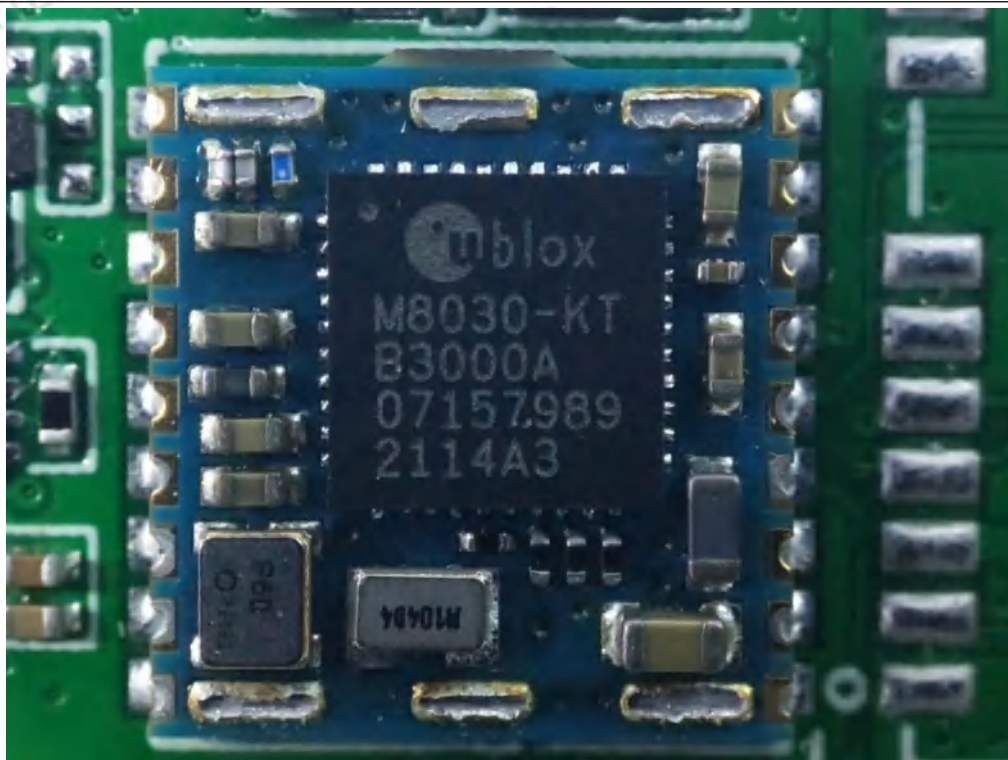


Photo 11

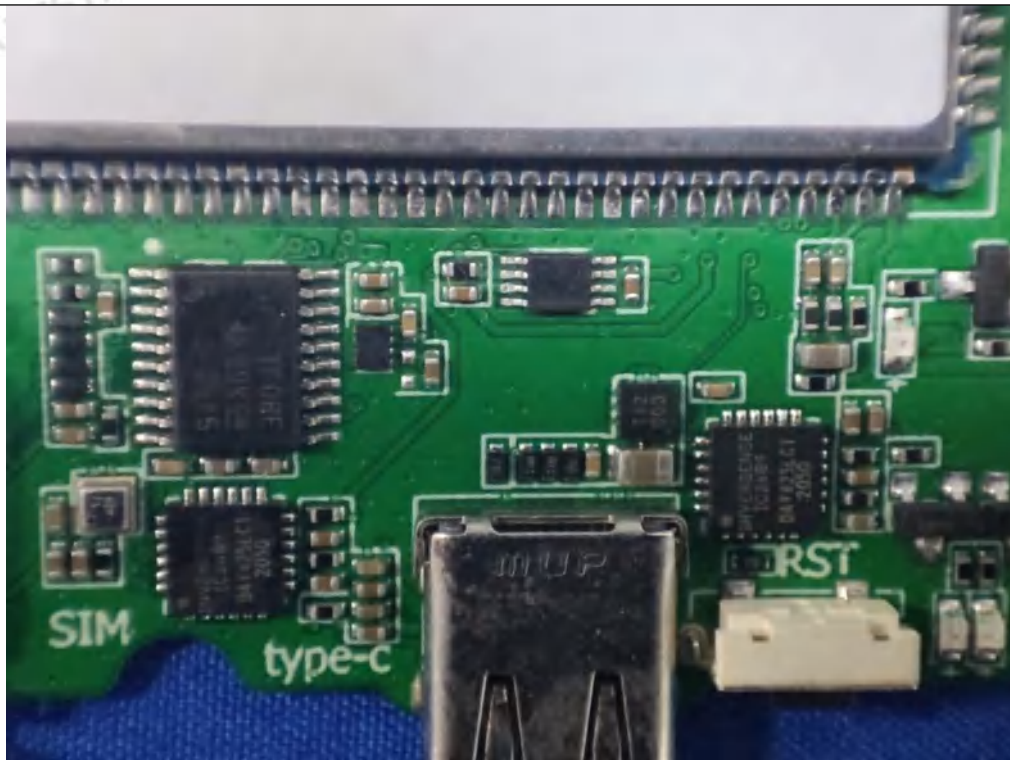


Photo 12

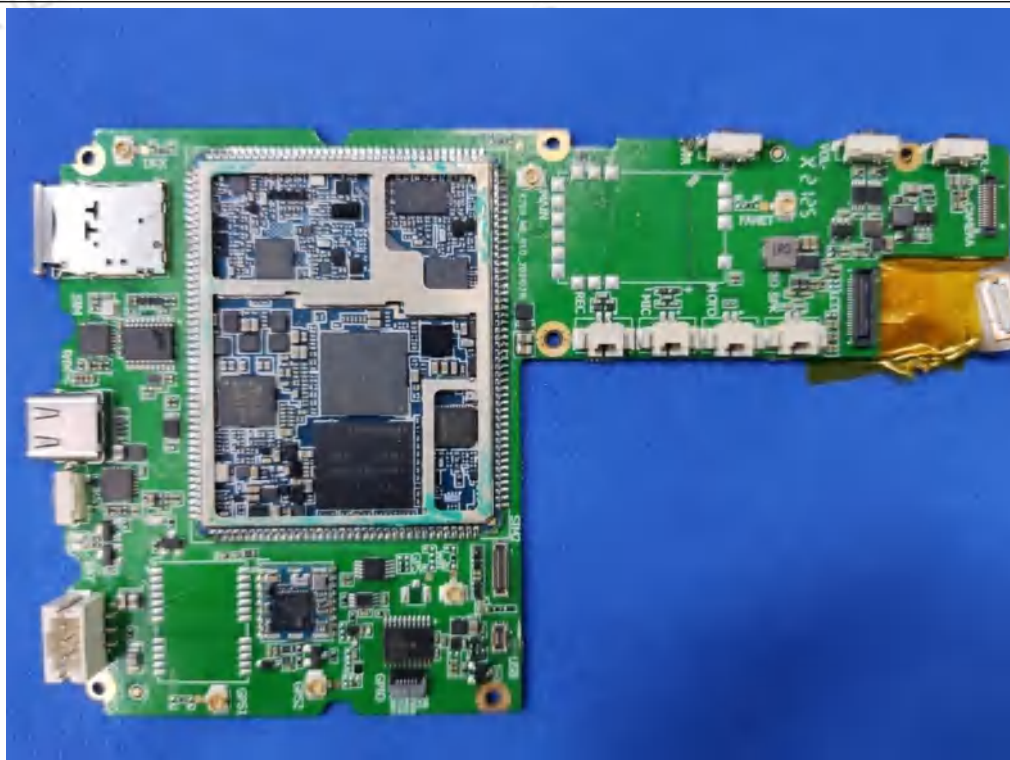


Photo 13

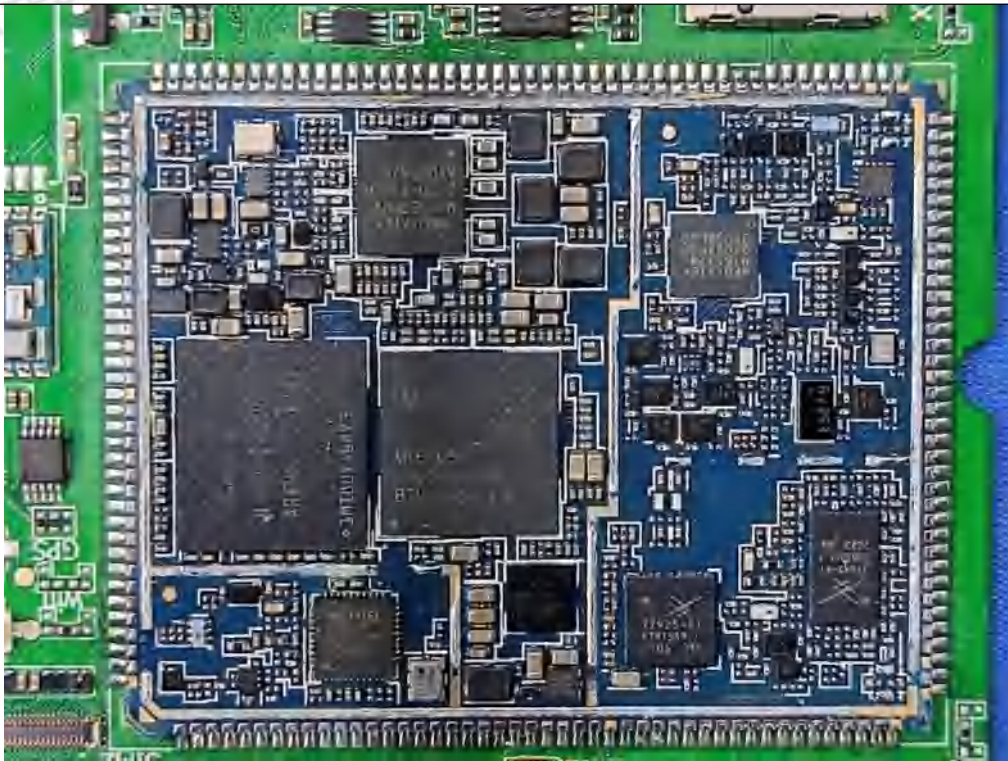


Photo 14

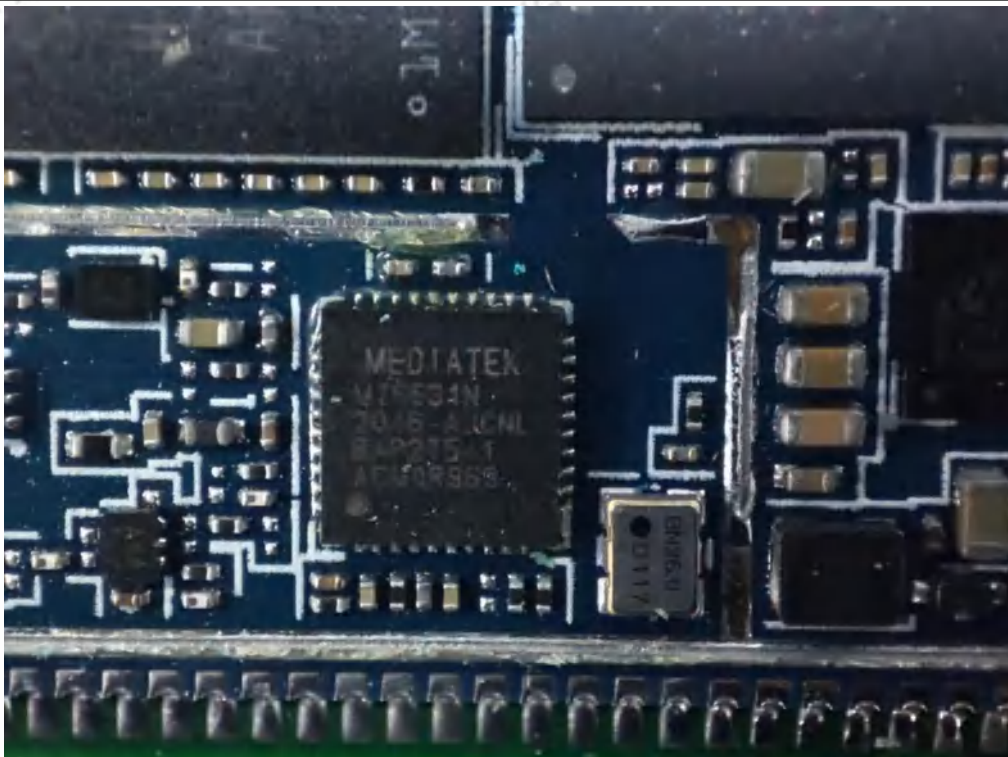


Photo 15

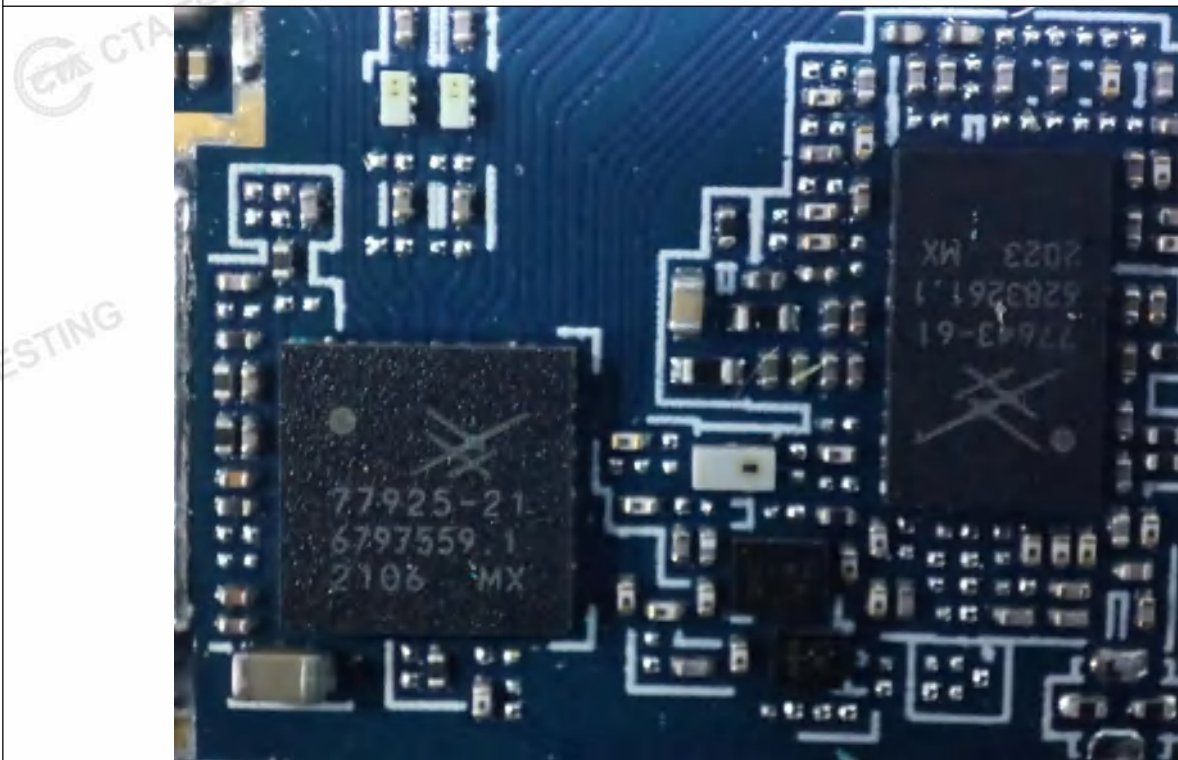


Photo 16

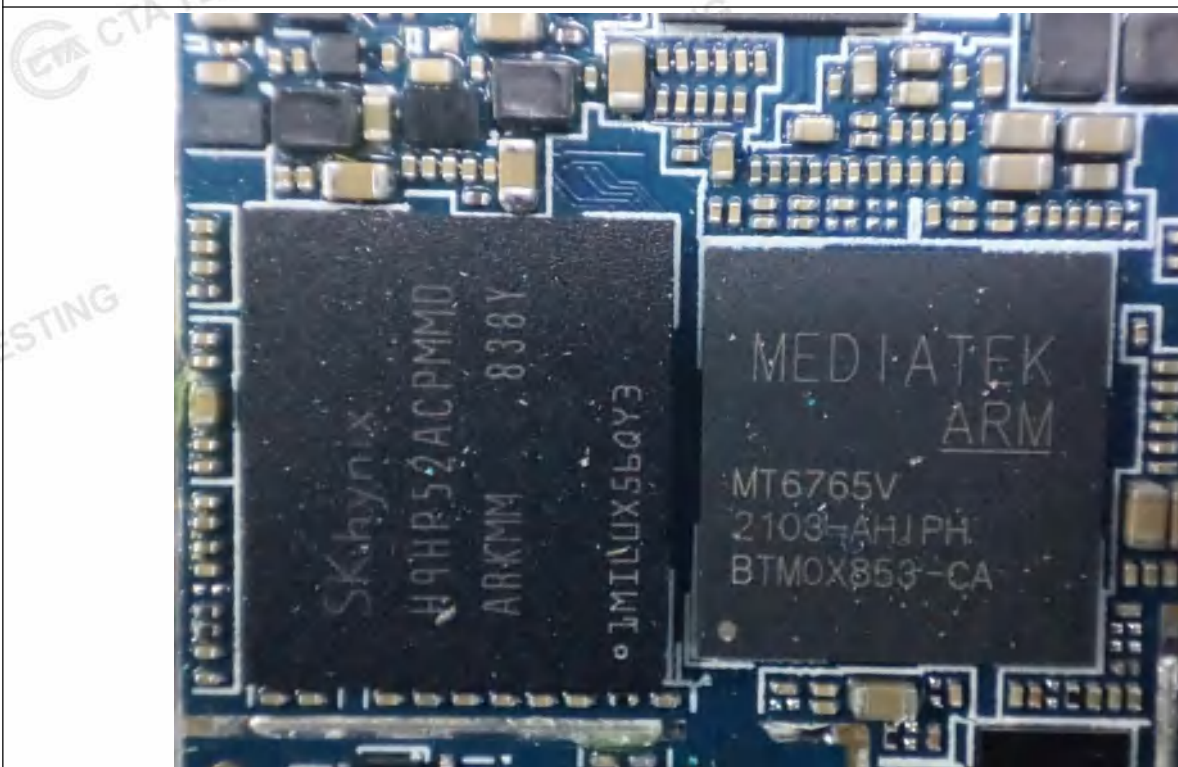


Photo 17

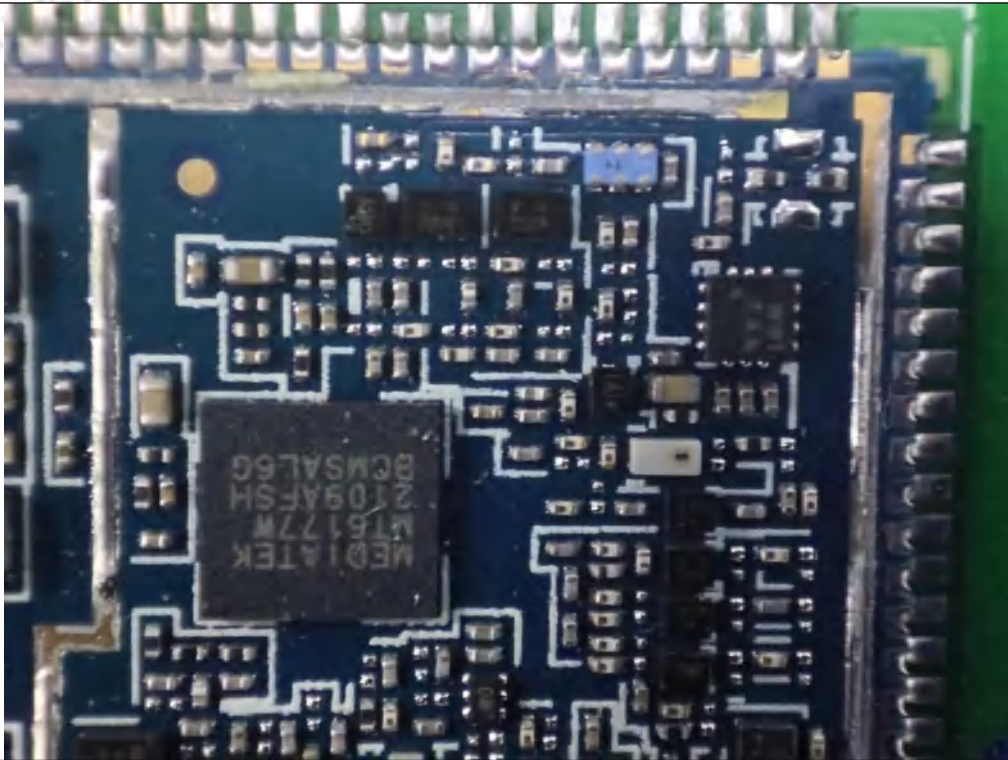


Photo 18



--THE END--