

FCC REPORT

(GSM & WCDMA)

Product Name : Mobile Phone
Trade mark : TECNO
Model No. : B1f
FCC ID : 2ADYY-B1F
Report Number : BLA-EMC-202006-A52-05
Date of sample receipt : June18, 2020
Date of Test : June19, 2020–June26, 2020
Date of Issue : July8, 2020
Test standard : FCC CFR Title 47 Part 2
FCC CFR Title 47 Part22 Subpart H
FCC CFR Title 47 Part24 Subpart E
Test result : PASS

Prepared for:

TECNO MOBILE LIMITED**ROOM 604 6/F SOUTH TOWER WORLD FINANCE CTR HARBOUR CITY 17
CANTON ROAD TST KL**

Prepared by:

BlueAsia of Technical Services(Shenzhen) Co.,Ltd.**IOT Test Centre of BlueAsia****No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen, China****TEL: +86-755-28682673****FAX: +86-755-28682673**

Compiled by:

hasan

Review by:

Sweet. Liang

Approved by:

Amir Li

Date: July 8, 2020



1. Version

Version No.	Date	Description
00	July 8, 2020	Original

BlueAsia

2. Contents

Page

1.	COVER PAGE	1
2.	VERSION	2
3.	CONTENTS	3
4.	TEST SUMMARY	4
5.	GENERAL INFORMATION	5
5.1	CLIENT INFORMATION	5
5.2	GENERAL DESCRIPTION OF E.U.T	5
5.3	TEST MODES	7
5.4	DESCRIPTION OF SUPPORT UNITS	7
5.5	MEASUREMENT UNCERTAINTY	7
5.6	LABORATORY FACILITY	7
5.7	LABORATORY LOCATION	7
5.8	TEST INSTRUMENTS LIST	7
6.	TEST RESULTS	10
6.1	CONDUCTED OUTPUT POWER	10
6.2	OCCUPY BANDWIDTH	13
6.3	PEAK-TO-AVERAGE POWER RATIO	21
6.4	MODULATION CHARACTERISTIC	26
6.5	OUT OF BAND EMISSION AT ANTENNA TERMINALS	26
6.6	ERP, EIRP MEASUREMENT	36
6.7	FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT	38
6.8	FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT	43
6.9	FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT	47
7	TEST SETUP PHOTO	49
8	EUT CONSTRUCTIONAL DETAILS	50

3. Test Summary

Test Item	Section in CFR 47	Result
RF Exposure (SAR)	Part 1.1307 Part 2.1093 RSS102 Issue5	Pass (Please refer to SAR Report)
RF Output Power	Part 2.1046 Part 22.913 (a)(2) Part 24.232 (c)	Pass
Peak-to-Average Power Ratio	Part 24.232 (d)	Pass
Modulation Characteristics	Part 2.1047	Pass
99% & -26 dB Occupied Bandwidth	Part 2.1049 Part 22.917(b) Part 24.238(b)	Pass
Spurious Emissions at Antenna Terminal	Part 2.1051 Part 22.917 (a) Part 24.238 (a)	Pass
Field Strength of Spurious Radiation	Part 2.1053 Part 22.917 (a) Part 24.238 (a)	Pass
Out of band emission, Band Edge	Part 22.917 (a) Part 24.238 (a)	Pass
Frequency stability vs. temperature	Part22.355 Part24.235 Part 2.1055(a)(1)(b)	Pass
Frequency stability vs. voltage	Part22.355 Part24.235 Part 2.1055(d)(2)	Pass

Pass: The EUT complies with the essential requirements in the standard.

4. General Information

5.1 Client Information

Applicant:	TECNO MOBILE LIMITED
Address:	ROOM 604 6/F SOUTH TOWER WORLD FINANCE CTR HARBOUR CITY 17 CANTON ROAD TST KL
Manufacturer	TECNO MOBILE LIMITED
Address:	ROOM 604 6/F SOUTH TOWER WORLD FINANCE CTR HARBOUR CITY 17 CANTON ROAD TST KL
Factory	SHENZHEN TECNO TECHNOLOGY CO.,LTD.
Address	101,Building 24,Waijing Industrial Park,FuminCommunity,FuchengStreet,LonghuaDistrict,ShenzhenCity ,P.R.China

5.2 General Description of E.U.T.

Product Name:	Mobile Phone
Model No.:	B1f
Operation Frequency range:	GSM 850: 824.20MHz-848.80MHz PCS1900: 1850.20MHz-1909.80MHz WCDMA Band V:826.4MHz-846.6MHz WCDMA Band II:1852.4 MHz -1907.6 MHz
Modulation type:	GSM/GPRS:GMSK,EGPRS: 8PSK,UMTS:QPSK,
Antenna type:	Internal Antenna
Antenna gain:	GSM850:-2dBi PCS1900:-2.5dBi WCDMA Band V:-2 dBi WCDMA Band II:-2.5dBi
Power supply:	Rechargeable Li-ion Battery DC3.8V, 2400mAh
AC adapter with two plugs :	Model: A8-501000 Input: AC100-240V 50/60Hz 0.2A Output: DC 5.0V, 1000mA
Remark:The Antenna Gain is supplied by the customer.BlueAsia is not responsible for this data	

Operation Frequency List:

GSM 850		PCS1900	
Channel:	Frequency (MHz)	Channel:	Frequency (MHz)
128	824.20	512	1850.20
129	824.40	513	1850.40
....			
189	836.40	660	1879.80
190	836.60	661	1880.00
191	836.80	662	1880.20
...	...	...	...
250	848.60	809	1909.60
251	848.80	810	1909.80
WCDMA Band V		WCDMA Band II	
Channel:	Frequency (MHz)	Channel:	Frequency (MHz)
4132	826.40	9262	1852.40
4133	826.60	9263	1852.60
....			
4182	836.40	9399	1879.80
4183	836.60	9400	1880.00
4184	836.80	9401	1880.20
...	...	...	...
4232	846.40	9537	1907.40
4233	846.60	9538	1907.60

Regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

GSM850			PCS1900		
Channel		Frequency(MHz)	Channel		Frequency(MHz)
Lowest channel	128	824.20	Lowest channel	512	1850.20
Middle channel	190	836.60	Middle channel	661	1880.00
Highest channel	251	848.80	Highest channel	810	1909.80
WCDMA Band V			WCDMA Band II		
Channel		Frequency(MHz)	Channel		Frequency(MHz)
Lowest channel	4132	826.40	Lowest channel	9262	1852.40
Middle channel	4183	836.60	Middle channel	9400	1880.00
Highest channel	4233	846.60	Highest channel	9538	1907.60

5.3 Test modes

Operating Environment:	
Temperature:	Normal: 15℃ ~ 35℃, Extreme: -10℃ ~ +55℃
Humidity:	20 % ~ 75 % RH
Atmospheric Pressure:	1008 mbar
Voltage:	Nominal: 3.8Vdc, Extreme: Low 3.5 Vdc, High 4.35 Vdc
Test mode:	
GSM mode	Keep the EUT communication with simulated station in GSM mode
GPRS mode	Keep the EUT communication with simulated station in GPRS mode
EGPRS mode	Keep the EUT communication with simulated station in EGPRS mode
RMC mode	Keep the EUT communication with simulated station in RMC mode
HSDPA	Keep the EUT communication with simulated station in HSDPA mode
HSUPA	Keep the EUT communication with simulated station in HSUPA mode
Remark: The EUT has been tested under continuous transmitting mode. Channel Low, Mid and High for each type band with rated data rate were chosen for full testing. The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for these modes with power adaptor, earphone and Data cable. Just the worst case position (H mode) shown in report.	

5.4 Description of Support Units

Test Equipment	Manufacturer	Model No.	Serial No.
Simulated Station	R&S	CMW500	1201.0002K50

5.5 Measurement Uncertainty

Parameters	Expanded Uncertainty
Radiated Emission (9kHz ~ 30MHz)	4.24 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	4.35 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	4.44 dB (k=2)
Radiated Emission (18GHz ~ 26.5GHz)	4.56 dB (k=2)
Radiated Emission (18GHz ~ 26.5GHz)	4.56 dB (k=2)

5.6 Laboratory Facility

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

- FCC — Designation No.: CN1252

BlueAsia of Technical Services(Shenzhen) Co.,Ltd.has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. DesignationCN1252.

- ISED — CAB identifier No.: CN0028

BlueAsia of Technical Services(Shenzhen) Co.,Ltd.has been registered by Certification and Engineering Bureau of ISED for radio equipment testing with CAB identifierCN0028.

- CNAS - Registration No.: CNAS L9788

BlueAsia of Technical Services(Shenzhen) Co.,Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L9788

5.7 Laboratory Location

BlueAsia of Technical Services(Shenzhen) Co., Ltd.
IOT Test Centre of BlueAsia
No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen,China
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673

5.8 Test Instruments list

Radiated Emission:

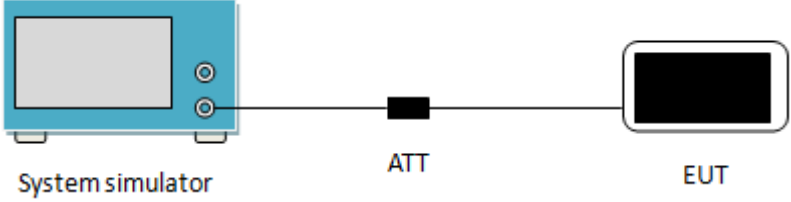
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m SAC	SKET	9m*6m*6m	966	7/4/2019	7/3/2020
2	Broadband Antenna	SCHWARZBECK	VULB9168	00836 P:00227	7/14/2018	7/13/2020
3	Horn Antenna	SCHWARZBECK	9120D	01892 P:00331	7/14/2018	7/13/2020
4	EMI Test Software	EZ	EZ	N/A	N/A	N/A
5	Pre-amplifier	SKET	LNPA-0118-45N/A	N/A	7/4/2019	7/3/2020
6	Spectrum analyzer	Rohde & Schwarz	FSP40	100817	7/4/2019	7/3/2020
7	EMI Test Receiver	Rohde & Schwarz	ESR7	101199	4/20/2020	4/19/2021
8	Controller	SKET	N/A	N/A	N/A	N/A
9	Vector Signal Generator	Agilent	E4438C	MY45092582	5/24/2020	05-23-2021
10	Signal Generator	Agilent	E8257D	MY44320250	5/24/2020	05-23-2021
11	Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
12	Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
13	Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	EMI Test Receiver	Rohde & Schwarz	ESPI3	101082	07/14/2019	07/13/2020
2	LISN	CHASE	MN2050D	1447	12/18/2019	12/17/2020
3	LISN	Rohde & Schwarz	ENV216	3560.6550.15	07/14/2019	07/13/2020
4	EMI Test Software	EZ	EZ	N/A	N/A	N/A
5	Temperature Humidity Chamber	Mingle	TH101B	N/A	07/14/2019	07/13/2020
6	Coaxial Cable	BlueAsia	BLA-XC-05	N/A	N/A	N/A

RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Spectrum Analyzer	Agilent	N9030A	MY50510123	5/24/2020	5/23/2021
2	Spectrum analyzer	Rohde & Schwarz	FSP40	100817	7/4/2019	7/3/2020
3	Vector Signal Generator	Agilent	E4438C	MY45092582	05/24/2020	05/23/2021
4	Signal Generator	Agilent	E8257D	MY44320250	05/24/2020	05/23/2021
5	Power Sensor	D.A.R.E	RPR3006W	17I00015SNO27	05/24/2020	05/23/2021
7	DC Power Supply	LODESTAR	LP305DE	N/A	07/14/2019	07/13/2020
8	Temperature Humidity Chamber	Mingle	TH101B	N/A	07/14/2019	07/13/2020

5. Test results

6.1 Conducted Output Power

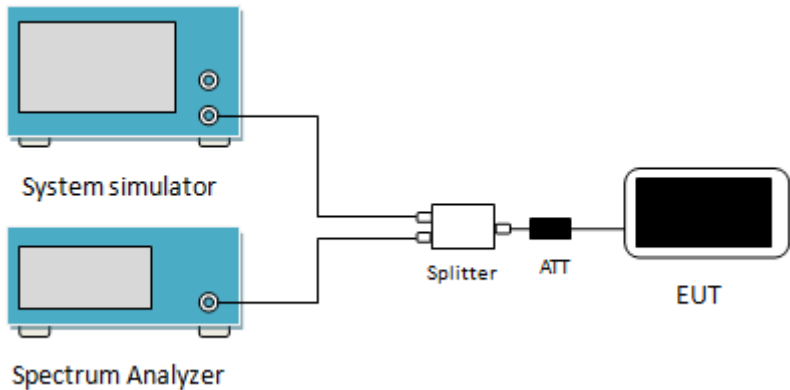
Test Requirement:	FCC part 22.913(a)(2), FCC part 24.232(c)
Test Method:	ANSI/TIA-603-D 2010
Limit:	GSM850: 7W, PCS1900: 2W WCDMA Band V: 7W, WCDMA Band II: 2W
Test setup:	 The diagram illustrates the test setup. On the left is a blue rectangular box labeled 'System simulator'. A line connects it to a small black square labeled 'ATT' (attenuator). Another line connects the 'ATT' to a black rectangular box labeled 'EUT' (Equipment Under Test).
Test Procedure:	The transmitter output was connected to a calibrated attenuator, the other end of which was connected to the simulated station. Transmitter output power was read off in dBm.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

EUT Mode	Burst Average power (dBm)			Limit(dBm)
	128	190	251	
	824.20MHz	836.60MHz	848.80MHz	
GSM 850	32.48	32.66	33.13	38.45
GPRS 850 (1 Uplink slot)	32.53	32.68	33.14	
GPRS 850 (2 Uplink slot)	31.56	31.73	32.17	
GPRS 850 (3 Uplink slot)	29.82	29.96	30.39	
GPRS 850 (4 Uplink slot)	29.04	29.15	29.60	
EGPRS 850 (1 Uplink slot)	25.90	25.73	25.82	
EGPRS 850 (2 Uplink slot)	24.67	24.37	24.76	
EGPRS 850 (3 Uplink slot)	22.37	22.36	22.13	
EGPRS 850 (4 Uplink slot)	20.36	20.51	20.75	
EUT Mode	Burst Average power (dBm)			Limit(dBm)
	512	661	810	
	1850.20MHz	1880.00MHz	1909.80MHz	
PCS 1900	28.40	28.35	28.12	33.00
GPRS 1900 (1 Uplink slot)	28.45	28.39	28.06	
GPRS 1900 (2 Uplink slot)	27.51	27.45	27.06	
GPRS 1900 (3 Uplink slot)	25.71	25.67	25.29	
GPRS 1900 (4 Uplink slot)	24.87	24.85	24.47	
EGPRS 1900 (1 Uplink slot)	25.83	26.06	25.57	
EGPRS 1900 (2 Uplink slot)	24.90	24.99	24.98	
EGPRS 1900 (3 Uplink slot)	22.97	22.70	22.09	
EGPRS 1900 (4 Uplink slot)	21.27	20.84	20.48	

EUT Mode		Burst Average power (dBm)			Limit(dBm)
		4132	4183	4233	
		826.40MHz	836.60MHz	846.60MHz	
UMTS 850 HSDPA	Subtest 1	22.11	22.30	22.11	38.45
	Subtest 2	21.71	21.60	21.69	
	Subtest 3	20.19	20.48	20.78	
	Subtest 4	20.51	20.90	20.53	
UMTS 850 HSUPA	Subtest 1	21.91	22.14	21.84	
	Subtest 2	22.05	22.19	21.87	
	Subtest 3	20.91	20.72	20.76	
	Subtest 4	22.07	22.27	22.08	
	Subtest 5	21.55	21.61	21.49	
UMTS 850 RMC	12.2kbps	23.03	23.18	23.03	
EUT Mode		Burst Average power (dBm)			Limit(dBm)
		9262	9400	9538	
		1852.40MHz	1880.00MHz	1907.60MHz	
UMTS 1900 HSDPA	Subtest 1	21.27	21.59	21.03	33.00
	Subtest 2	20.84	21.13	20.22	
	Subtest 3	19.47	19.76	19.07	
	Subtest 4	19.22	20.10	19.30	
UMTS 1900 HSUPA	Subtest 1	20.95	21.57	20.92	
	Subtest 2	21.21	21.46	21.08	
	Subtest 3	19.94	20.23	19.57	
	Subtest 4	21.38	21.73	21.12	
	Subtest 5	20.60	20.92	20.36	
UMTS 1900 RMC	12.2kbps	22.35	22.62	22.14	

6.2 Occupy Bandwidth

Test Requirement:	FCC part 22.917(b), FCC part 24.238(b)
Test Method:	ANSI/TIA-603-D 2010
Test setup:	 The diagram shows a test setup for measuring the occupied bandwidth of an Equipment Under Test (EUT). A System simulator and a Spectrum Analyzer are connected to a Splitter. The Splitter is connected to an ATT (Attenuator) and then to the EUT.
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= 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.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

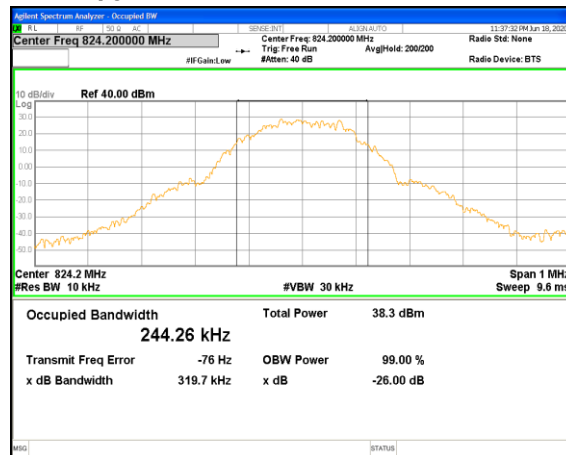
Measurement Data:

EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (kHz)	-26dB bandwidth (kHz)
GSM 850	128	824.2	244.256	319.706
	190	836.6	247.191	313.943
	251	848.8	248.091	317.852
EGPRS 850	128	824.2	254.245	290.052
	190	836.6	248.577	318.398
	251	848.8	245.772	294.526
PCS 1900	512	1850.2	245.562	317.778
	661	1880.0	242.201	320.529
	810	1909.8	245.728	317.110
EGPRS1900	128	1850.2	250.749	314.768
	190	1880.0	254.413	324.607
	251	1909.8	254.469	321.609
UMTS 850 12.2k RMC	4132	826.4	4161.742	4654.574
	4183	836.6	4163.815	4701.966
	4233	846.6	4147.763	4675.029
UMTS 1900 12.2k RMC	9262	1852.4	4171.151	4696.300
	9400	1880.0	4173.706	4690.215
	9538	1907.6	4168.943	4708.720

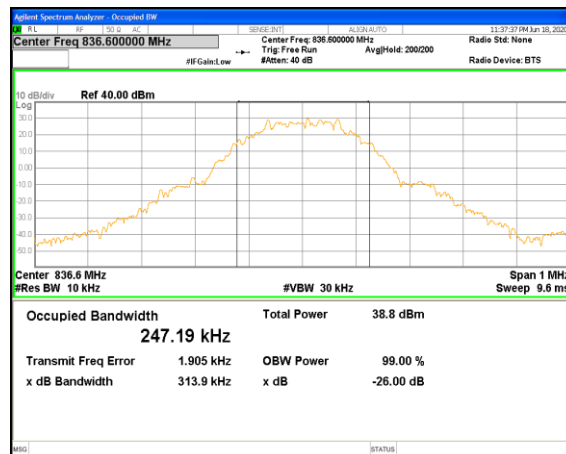
Note: GSM & GPRS use the same modulation technical (GMSK), and with the same channels, so the 99% OBW and the -26dB of GPRS not performed.

Test plot as follows:

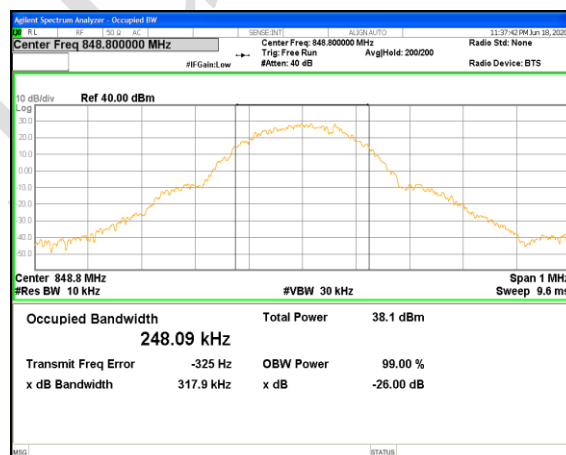
GSM 850
99% Occupy bandwidth&26dB Emission Bandwidth



Lowest channel



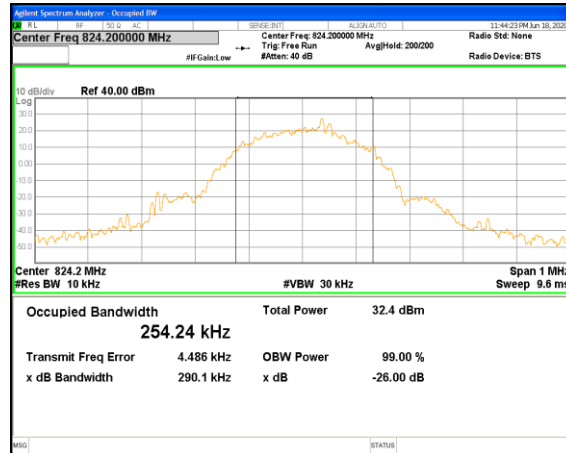
Middle channel



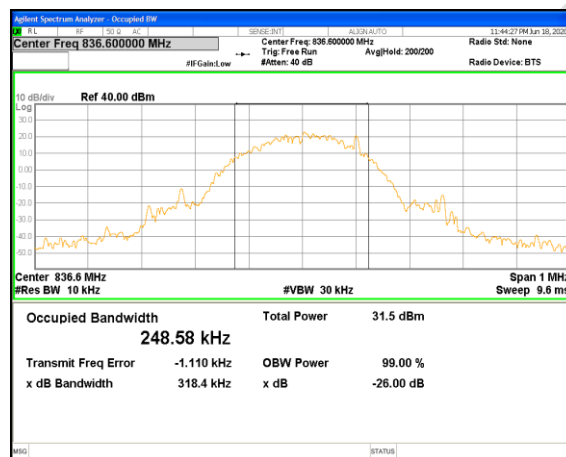
Highest channel

EGPRS 850

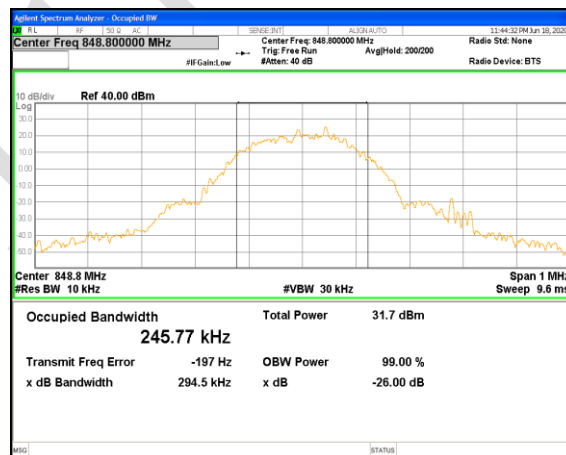
99% Occupancy bandwidth & 26dB Emission Bandwidth



Lowest channel



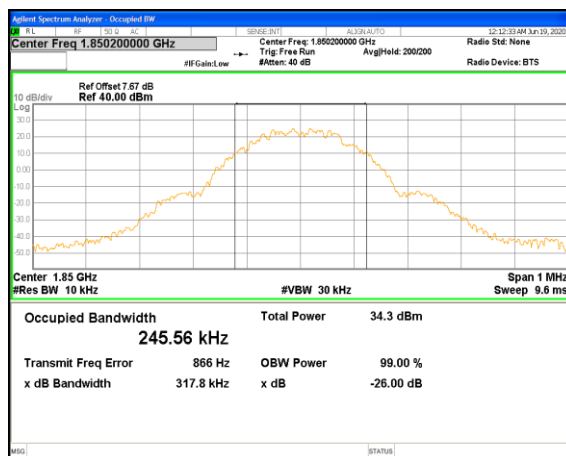
Middle channel



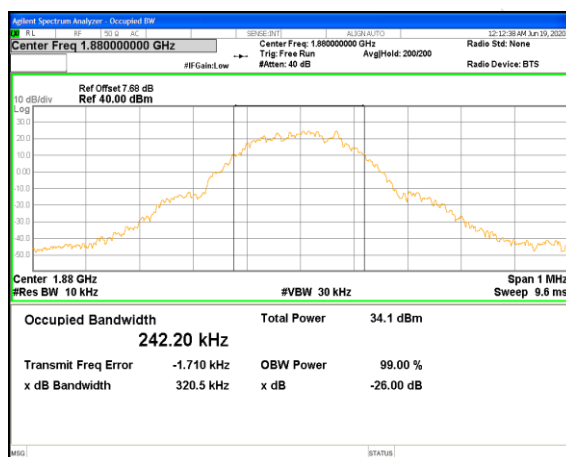
Highest channel

PCS 1900

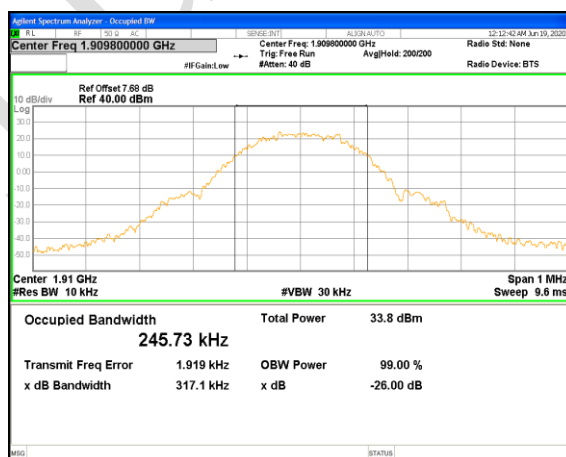
99% Occupy bandwidth&26dB Emission Bandwidth



Lowest channel



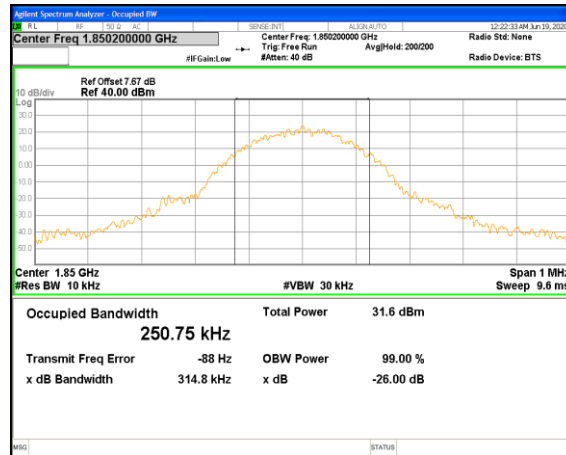
Middle channel



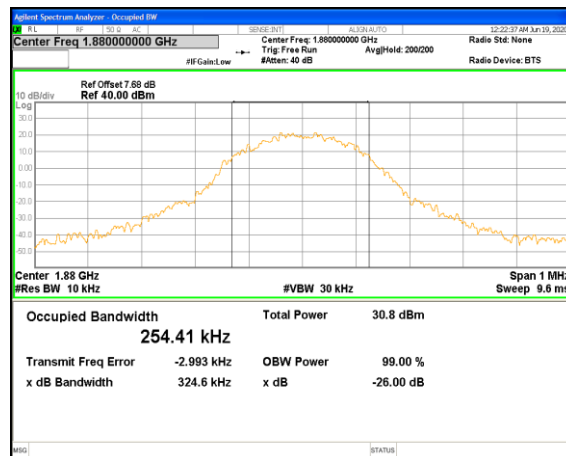
Highest channel

EGPRS 1900

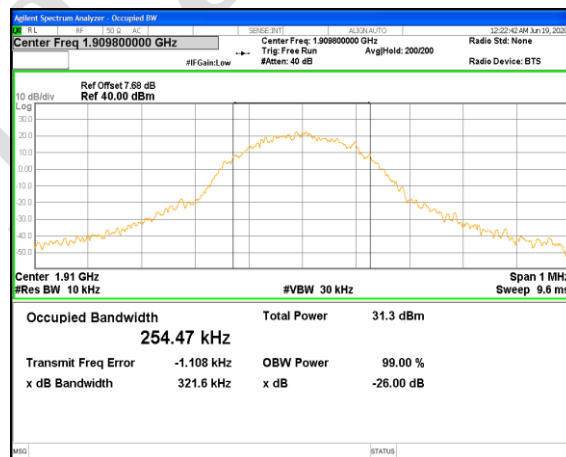
99% Occupy bandwidth&26dB Emission Bandwidth



Lowest channel



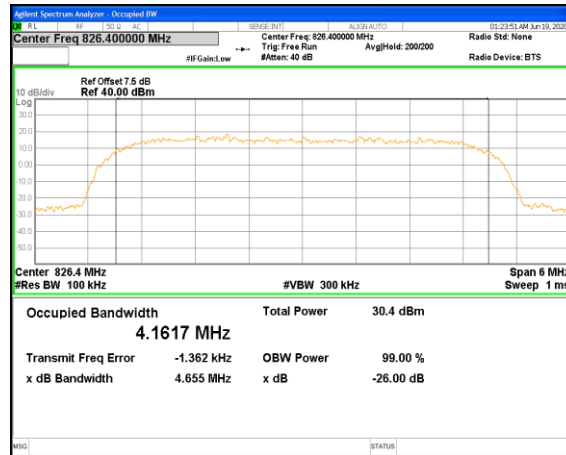
Middle channel



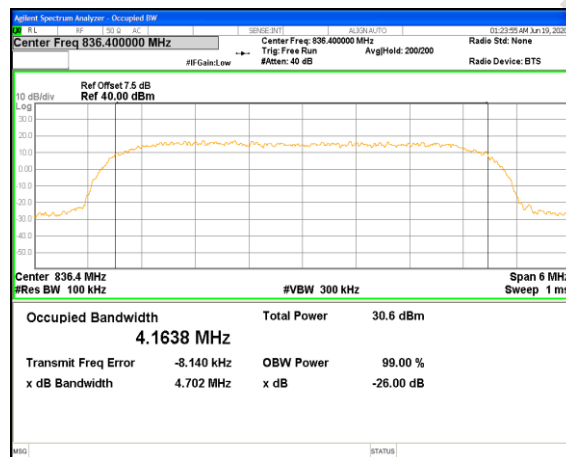
Highest channel

UMTS 850 12.2k RMC

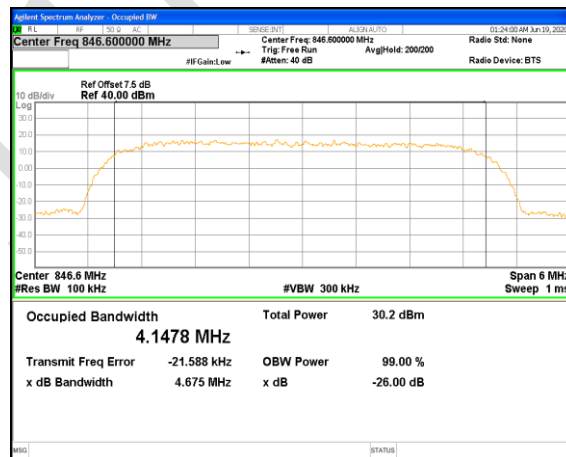
99% Occupy bandwidth&26dB Emission Bandwidth



Lowest channel



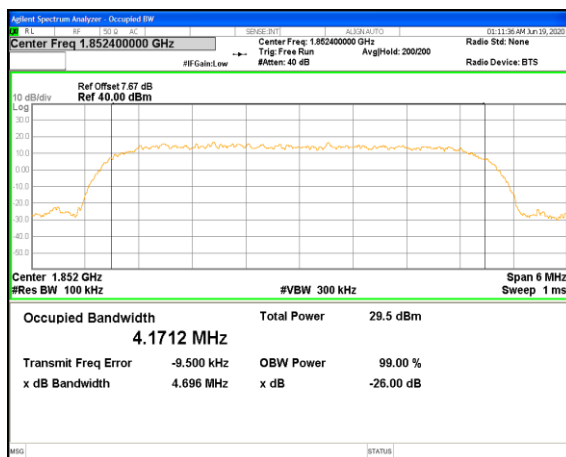
Middle channel



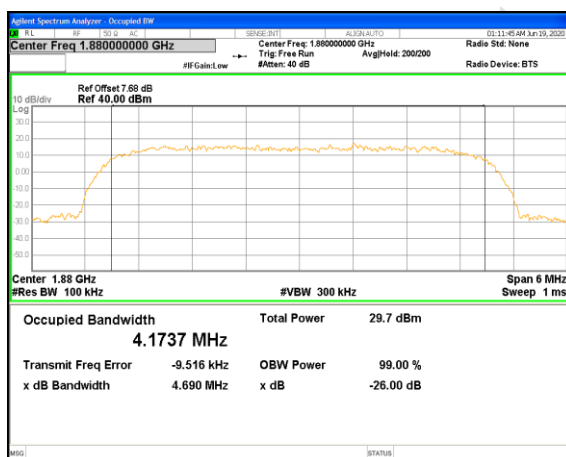
Highest channel

UMTS 1900 12.2k RMC

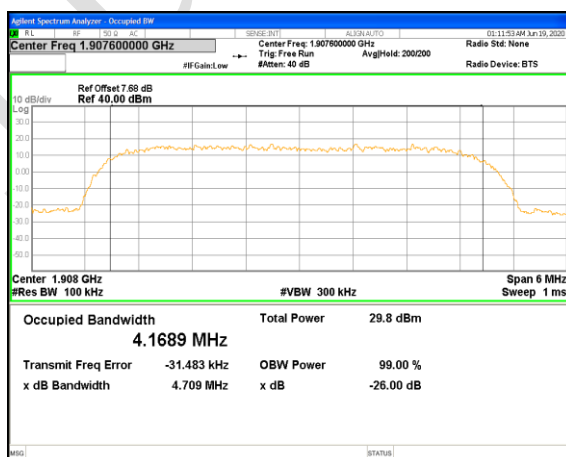
99% Occupancy bandwidth & 26dB Emission Bandwidth



Lowest channel



Middle channel



Highest channel

6.3 Peak-to-Average Power Ratio

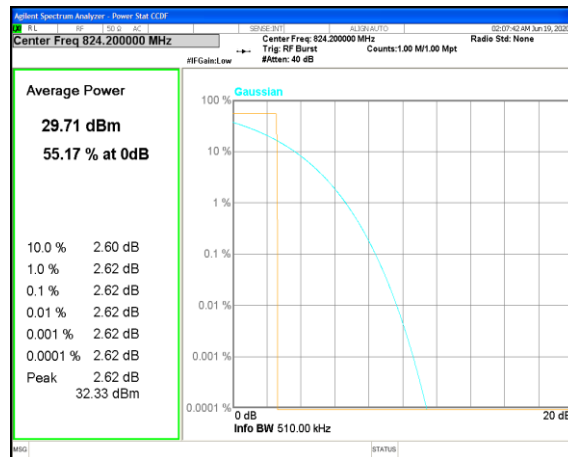
Test Requirement:	FCC part 24.232(d)
TestMethod	ANSI/TIA-603-D 2010
Limit:	The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.
Test setup:	
Test Procedure:	1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. 2 Set the CCDF option in spectrum analyzer, RBW $\geq$ OBW, 3 Set the EUT working in highest power level, measured and recorded the 0.1% as PAPR level. 4 Repeat step 1~3 at other frequency and modulations.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data:

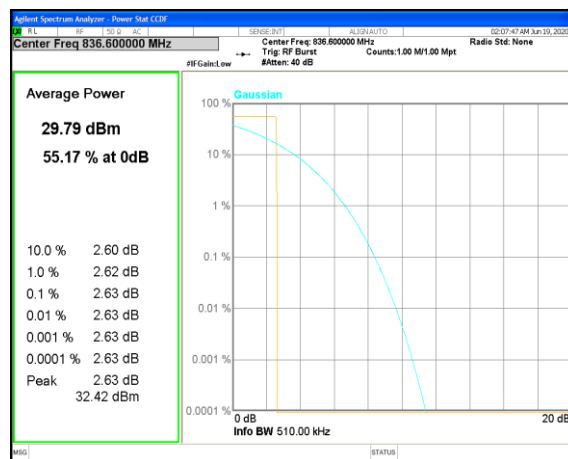
Modulation	Test channel	PAPR
GSM 850	128	2.62
	190	2.63
	251	2.64
PCS 1900	512	2.62
	661	2.62
	810	2.63
UMTS 850 RMC	4132	2.81
	4182	2.91
	4233	2.84
UMTS 1900 RMC	9262	2.68
	9400	2.73
	9538	2.54

Test plots as below:

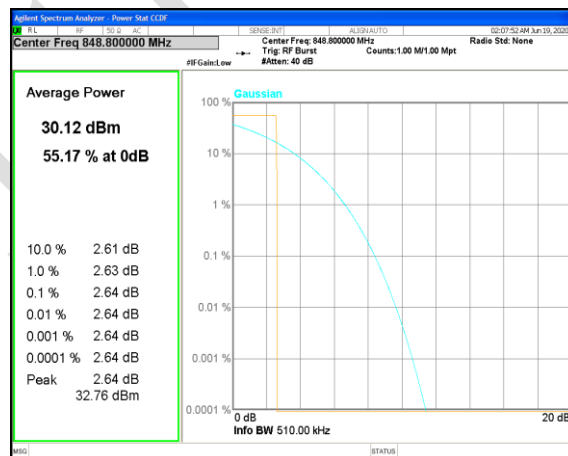
GSM 850



Lowest channel

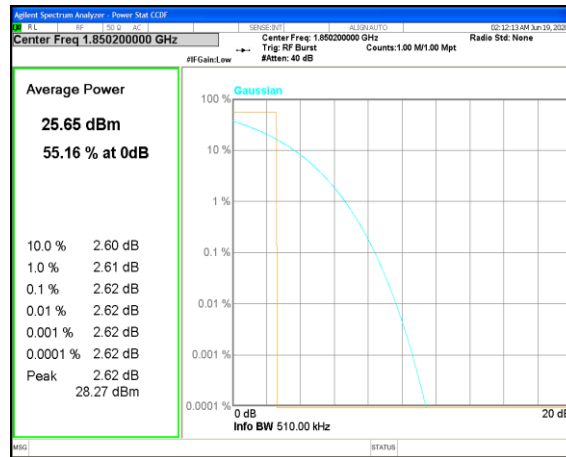


Middle channel

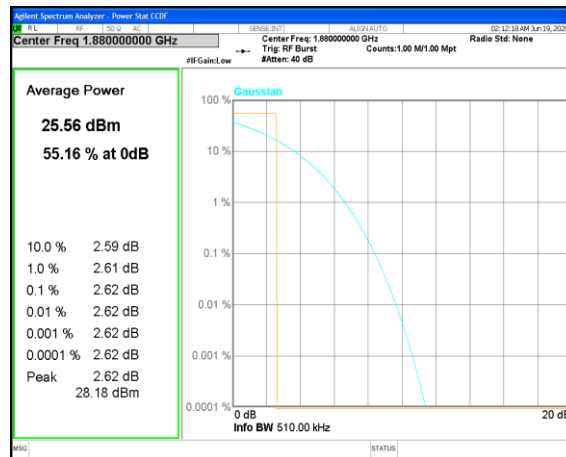


Highest channel

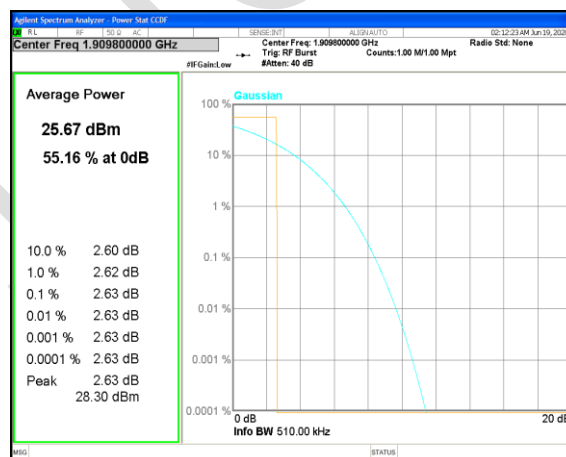
PCS 1900



Lowest channel

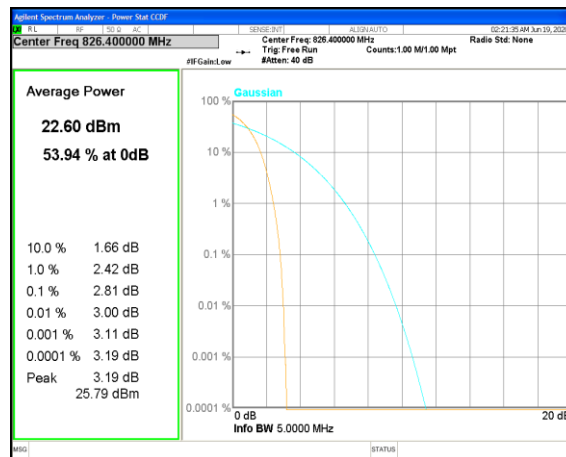


Middle channel

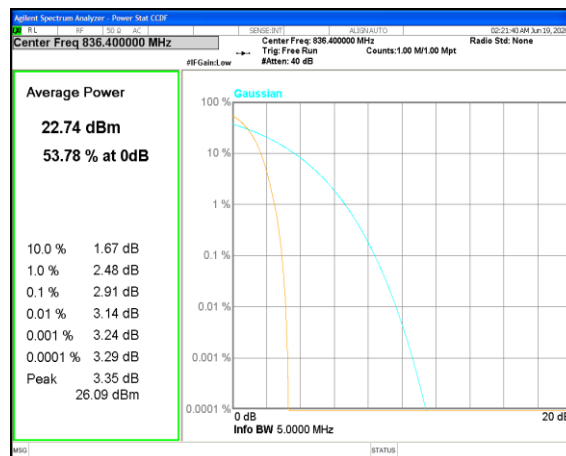


Highest channel

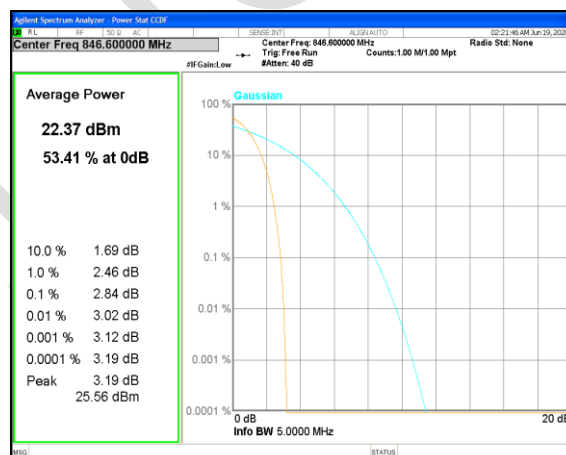
UMTS 850 12.2k RMC



Lowest channel

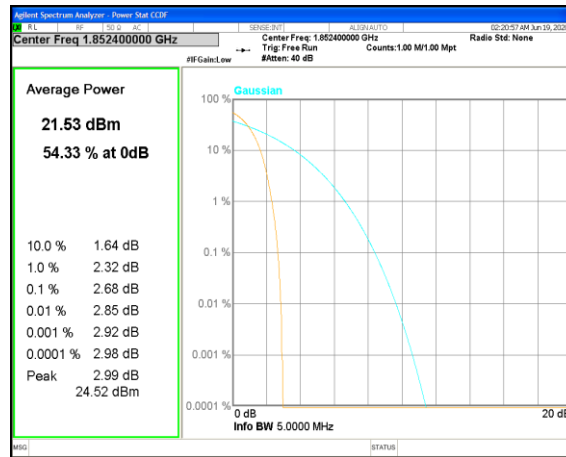


Middle channel

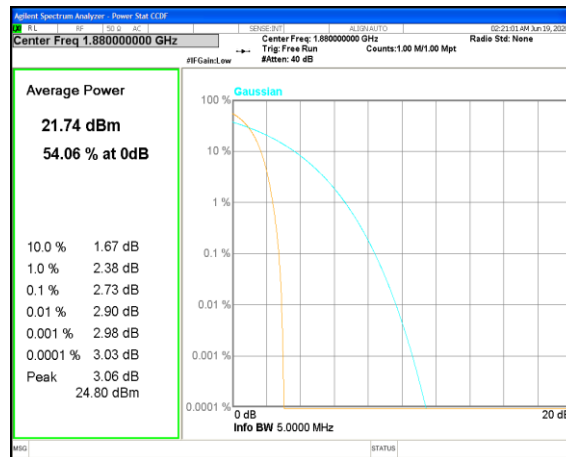


Highest channel

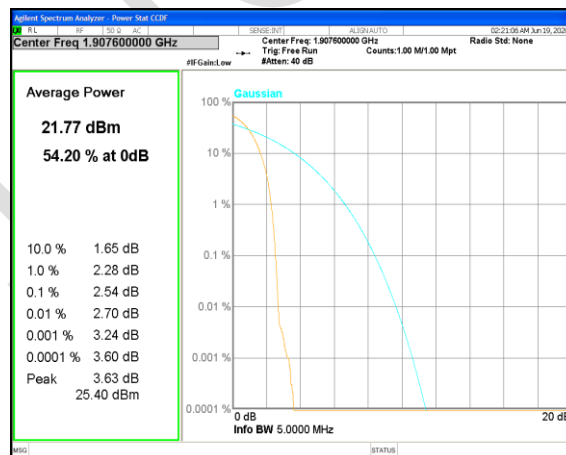
UMTS 1900 12.2k RMC



Lowest channel



Middle channel

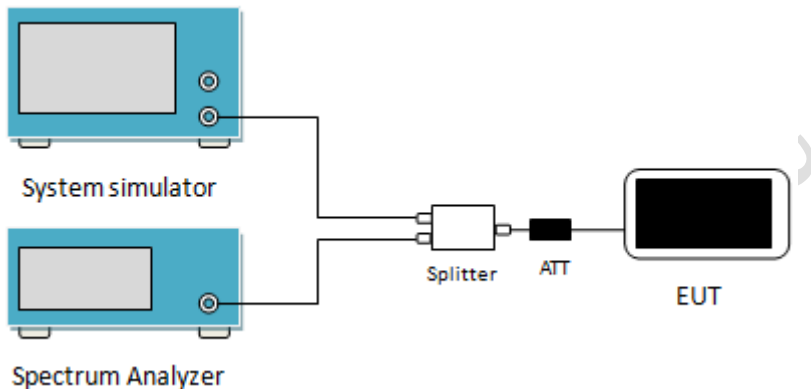


Highest channel

6.4 Modulation Characteristic

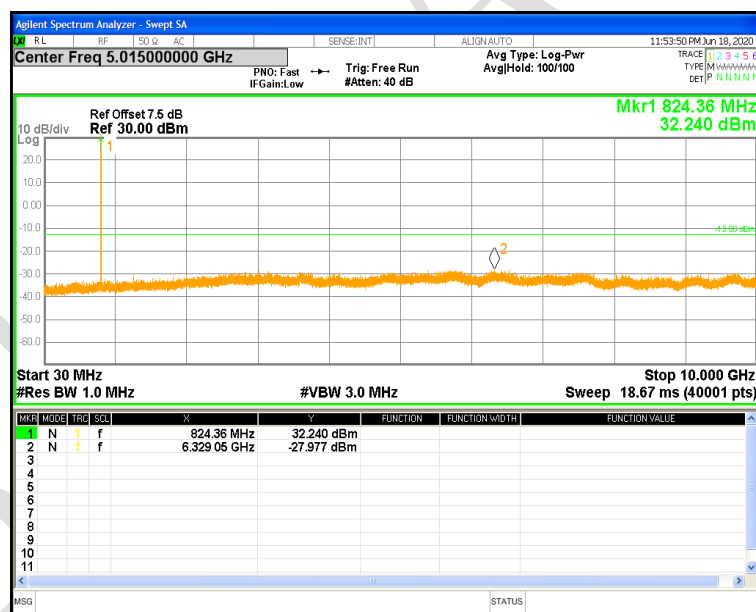
According to FCC § 2.1047(d), Part 22H & 24E there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

6.5 Out of band emission at antenna terminals

Test Requirement:	FCC part22.917(a), FCC part24.238(a)
Test Method:	ANSI/TIA-603-D 2010
Limit:	-13dBm
Test setup:	 The diagram illustrates the test setup for out-of-band emission measurement. A System simulator is connected to a Spectrum Analyzer through a Splitter and an Attenuator (ATT). The Spectrum Analyzer is also connected to the EUT (Equipment Under Test).
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 100 kHz when below 1GHz, 1MHz when above 1 GHz; 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=100 kHz, VBW=300 kHz when below 1 GHz, RBW =1 MHz, VBW=3 MHz when above 1 GHz, Start=30MHz, Stop= 10th harmonic. 4 Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

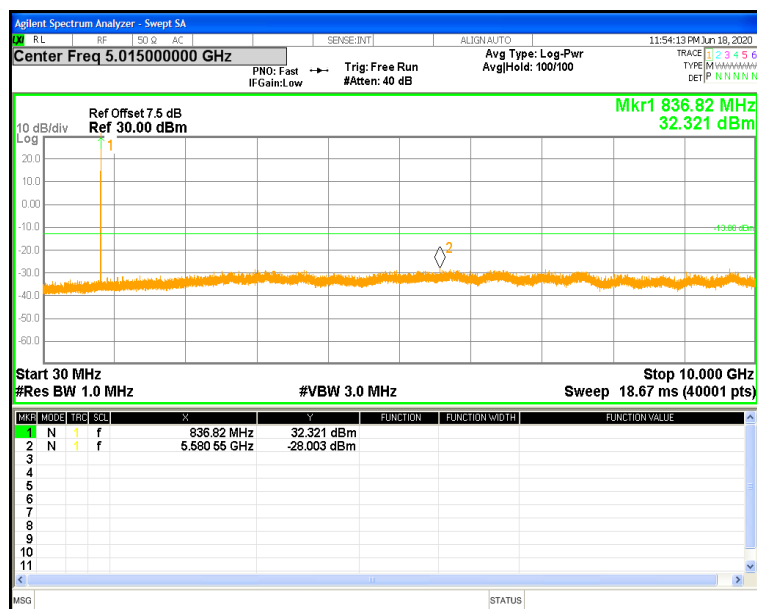
Test plots as follows:

Band	Channel	Frequency (MHz)	Spur Freq (MHz)	Spur Level (dBm)	Limit (dBm)	Verdict
GSM850	128	824.2	6329.05	-27.97	-13	PASS
GSM850	190	836.6	5580.55	-28.00	-13	PASS
GSM850	251	848.8	5771.47	-28.22	-13	PASS
PCS1900	512	1850.2	16428.37	-24.20	-13	PASS
PCS1900	661	1880	18753.87	-23.38	-13	PASS
PCS1900	810	1909.8	19046.43	-23.73	-13	PASS
Band5	4132	826.4	6545.15	-28.05	-13	PASS
Band5	4182	836.4	5684.98	-27.55	-13	PASS
Band5	4233	846.6	6471.37	-27.64	-13	PASS
Band2	9262	1852.4	16161.27	-24.31	-13	PASS
Band2	9400	1880	16005.50	-23.88	-13	PASS
Band2	9538	1907.6	18119.33	-24.56	-13	PASS

Spurious emission:
GSM 850
Lowest Channel


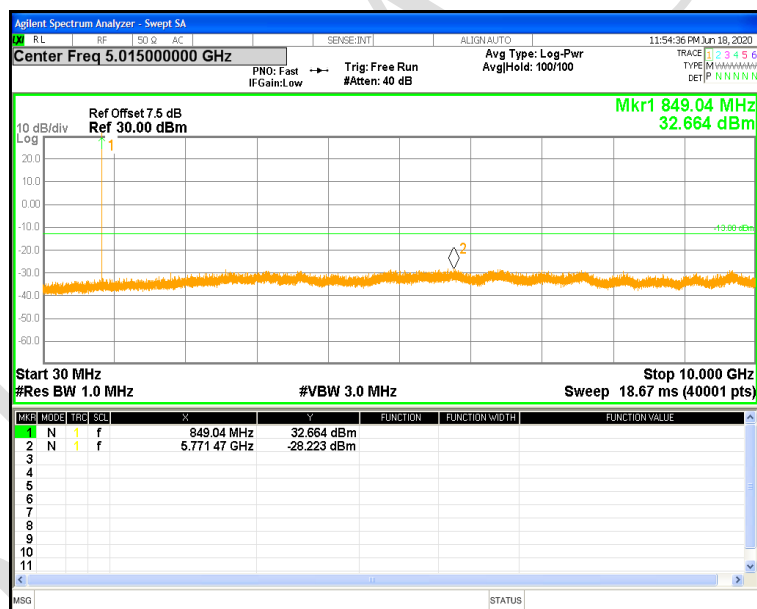
30MHz~10GHz

Middle channel



30MHz~10GHz

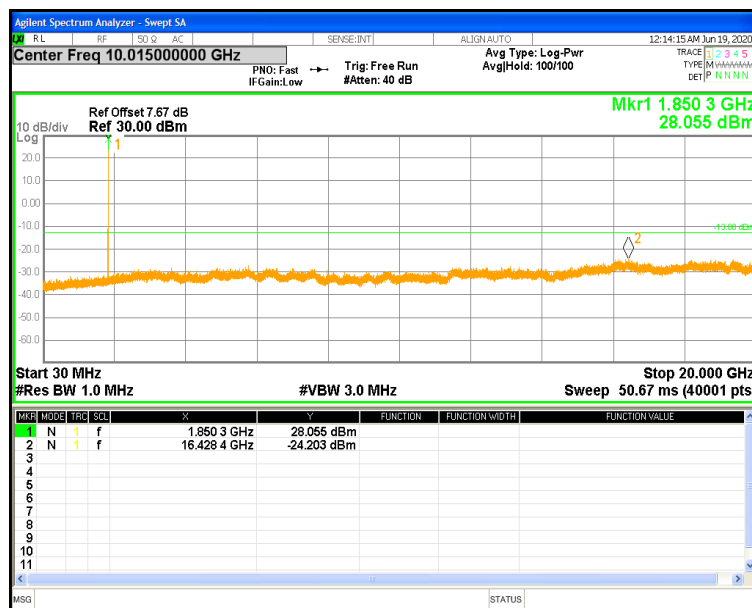
Highest Channel



30MHz~10GHz

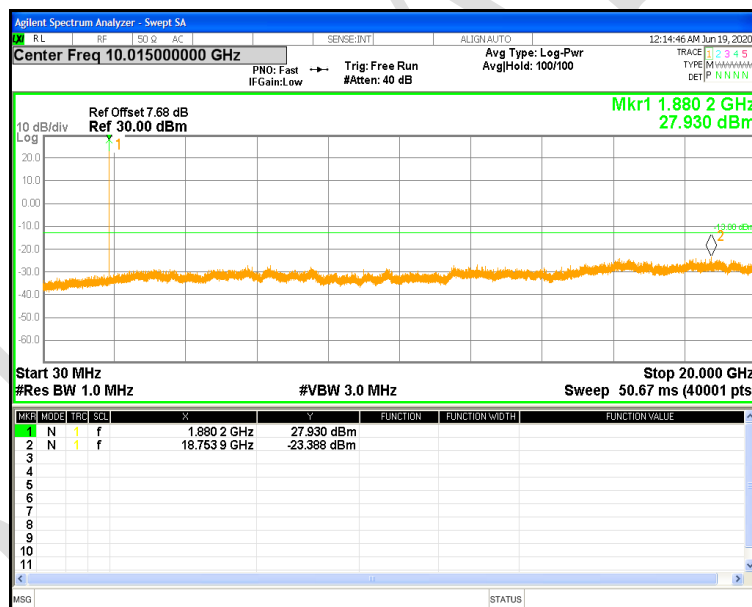
PCS 1900

Lowest Channel



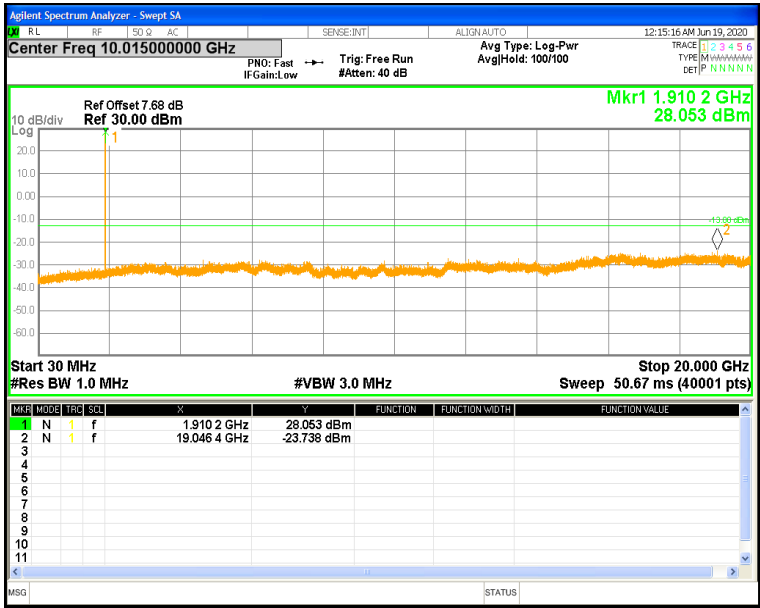
30MHz~20GHz

Middle Channel



30MHz~20GHz

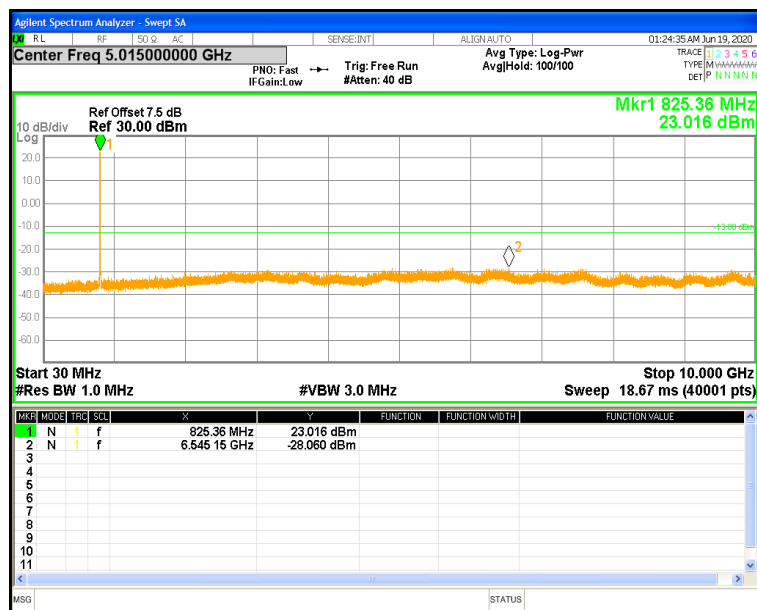
Highest Channel



30MHz~20GHz

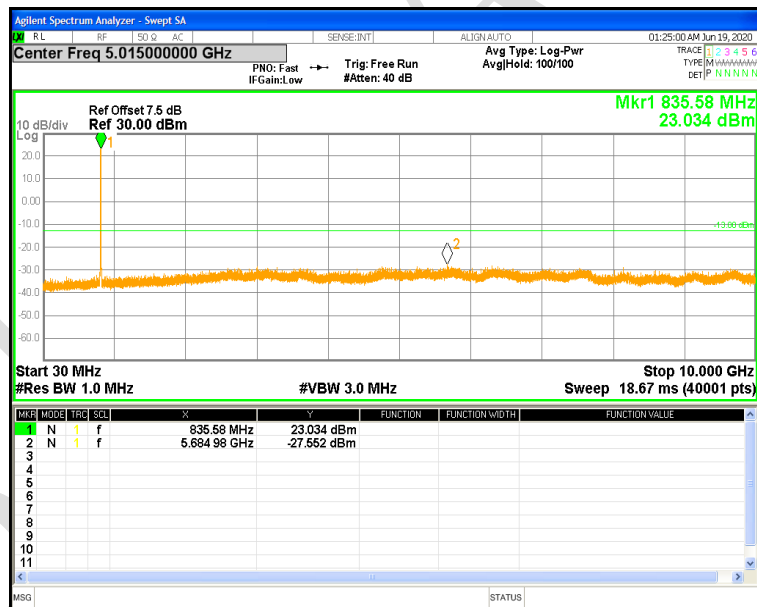
UMTS 850 12.2k RMC

Lowest Channel



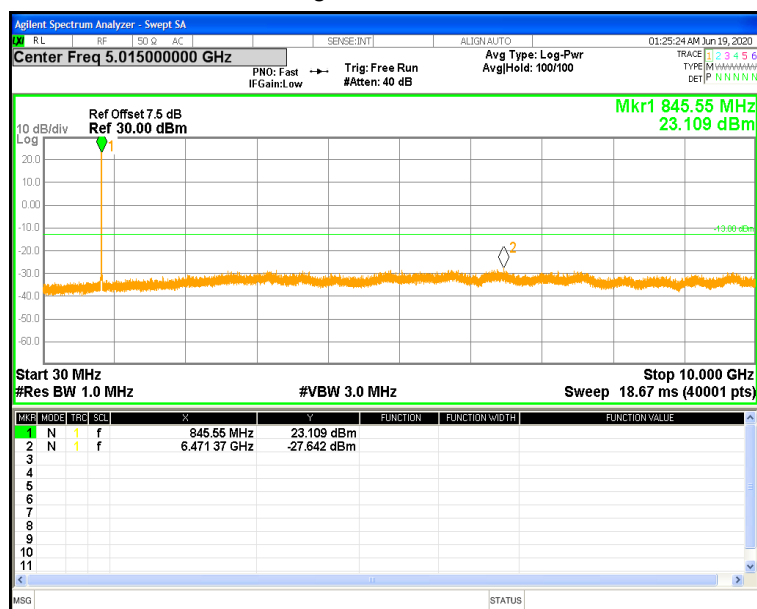
30MHz~10GHz

Middle Channel



30MHz~10GHz

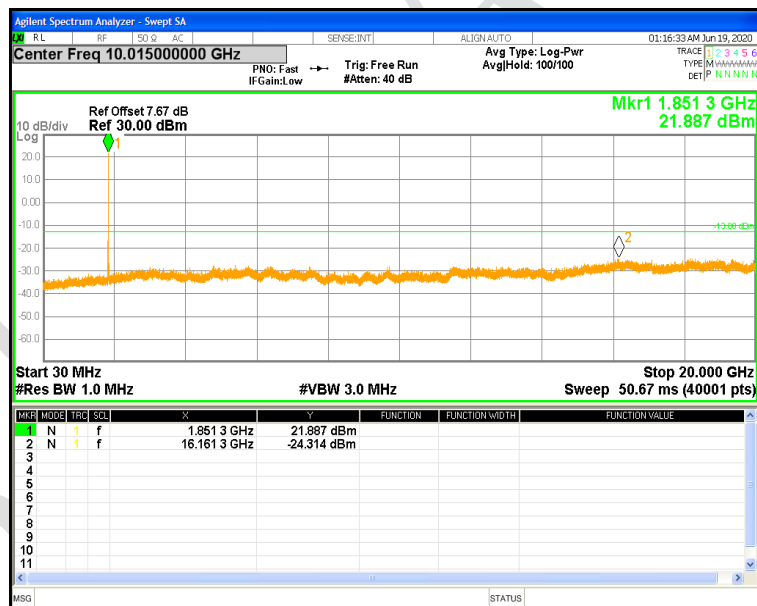
Highest Channel



30MHz~10GHz

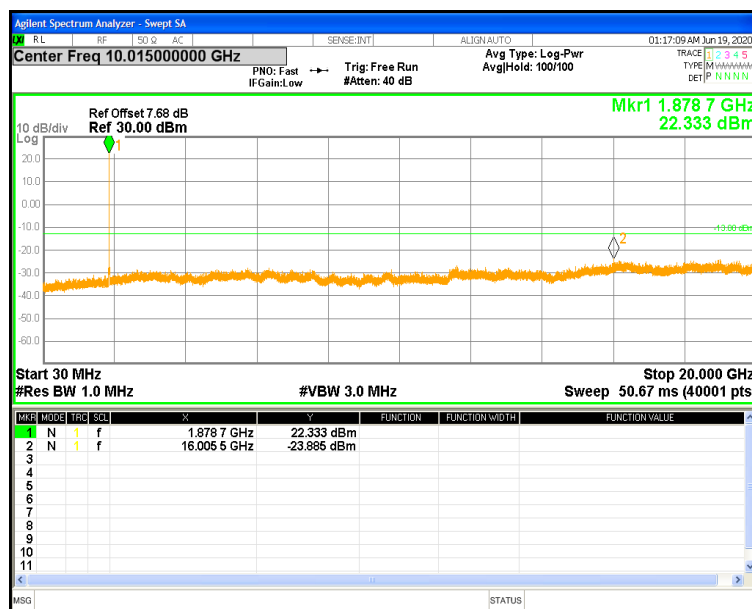
UMTS 1900 12.2k RMC

Lowest Channel



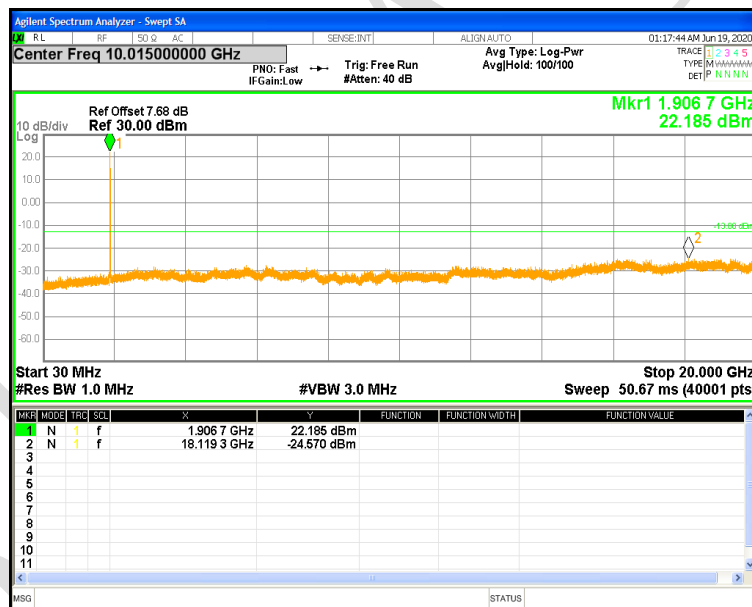
30MHz~20GHz

Middle Channel



30MHz~20GHz

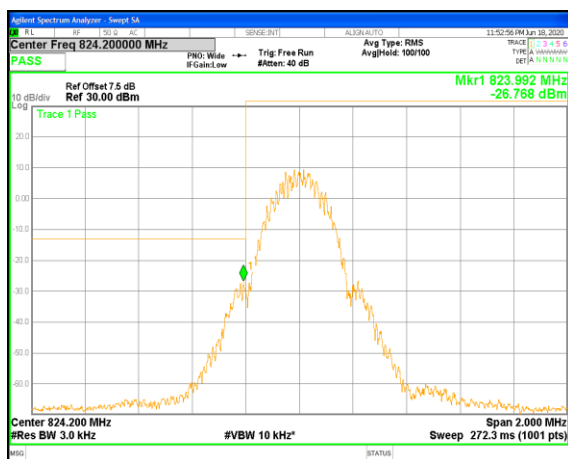
Highest Channel



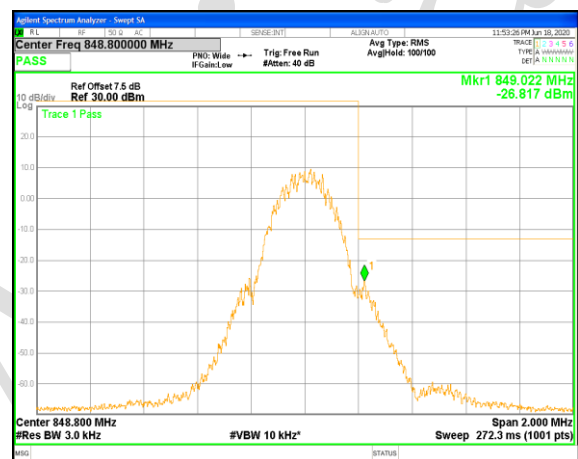
30MHz~20GHz

Band edge emission:

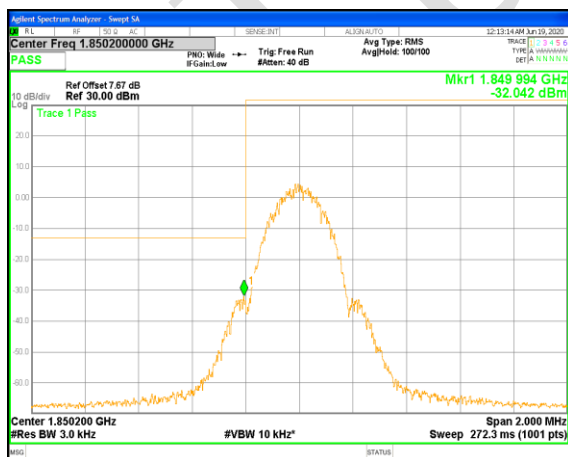
Band	Channel	Frequency (MHz)	Spur Freq (MHz)	Spur Level (dBm)	Limit (dBm)	Verdict
GSM850	128	824.2	823.99	-26.76	-13	PASS
GSM850	251	848.8	849.02	-26.81	-13	PASS
PCS1900	512	1850.2	1849.99	-32.04	-13	PASS
PCS1900	810	1909.8	1910.02	-30.82	-13	PASS
Band5	4132	826.4	824.00	-24.05	-13	PASS
Band5	4233	846.6	849.00	-25.36	-13	PASS
Band2	9262	1852.4	1850.00	-24.11	-13	PASS
Band2	9538	1907.6	1910.00	-25.04	-13	PASS

GSM850


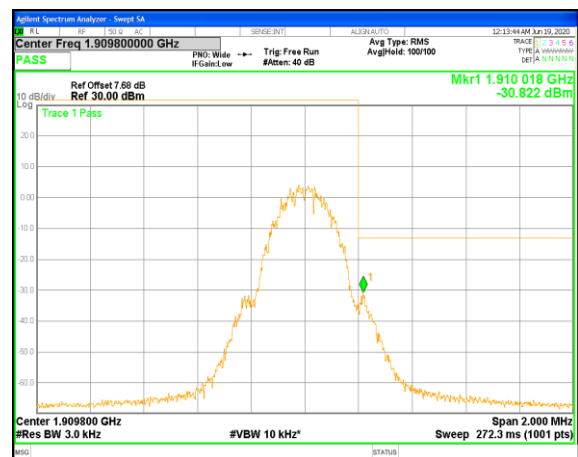
Lowest channel



Highest channel

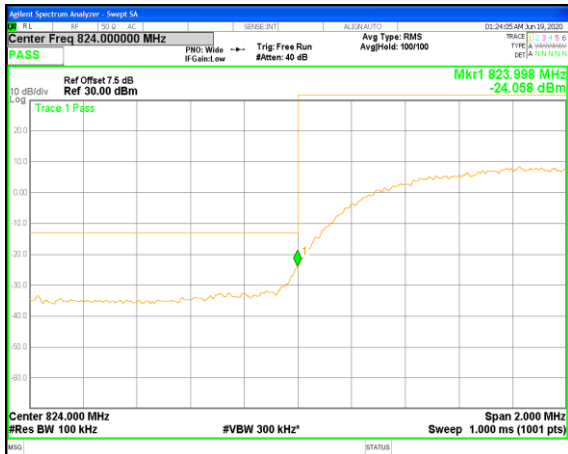
PCS1900


Lowest channel

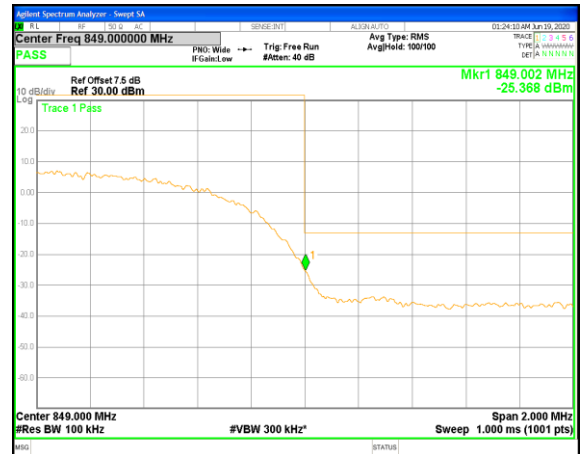


Highest channel

UMTS 850 RMC 12.2kbps

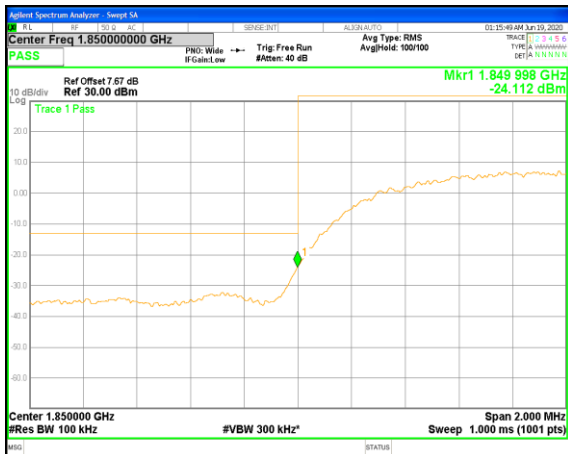


Lowest channel

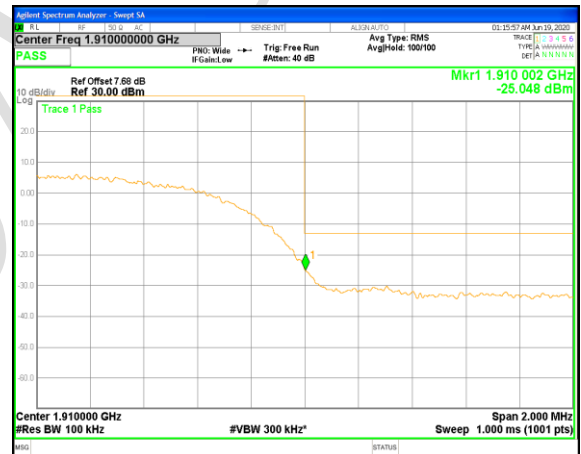


Highest channel

UMTS 1900 RMC 12.2kbps

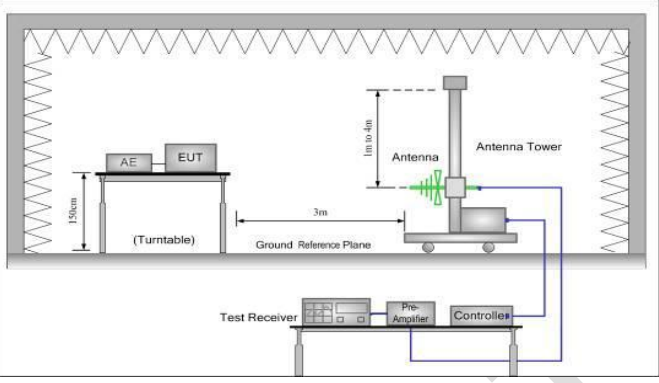
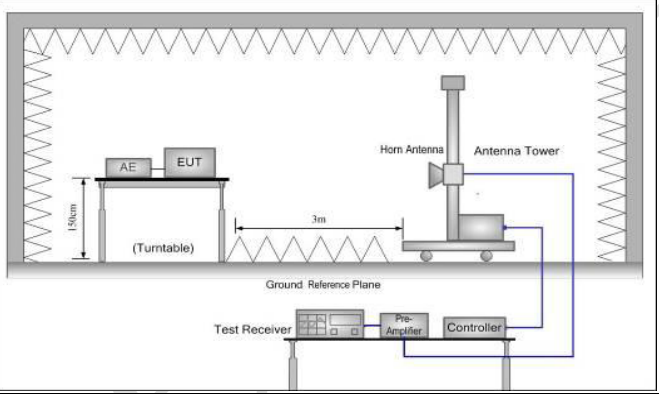


Lowest channel



Highest channel

6.6 ERP, EIRP Measurement

Test Requirement:	FCC part22.913(a)(2), FCC part24.232(c) and FCC part 27.50(d)
Test Method:	ANSI/TIA-603-D 2010
Limit:	GSM850 7W: ERP, PCS1900 2W: EIRP UMTS 850: 7W ERP, UMTS1900: 2W EIRP, UMTS1700: 1W EIRP
Test setup:	Below 1GHz  Above 1GHz 
Test Procedure:	- The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. - During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated. - ERP in frequency band 824.2 –848.80.8MHz were measured using a substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated asfollows: $ERP = S.G. \text{ output (dBm) + Antenna Gain (dBd) - Cable Loss (dB)}$ - EIRP in frequency band 1850.2 –1909.8MHz were measured using a substitution method. The EUT was replaced by or horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows: $EIRP = S.G. \text{ output (dBm) + Antenna Gain (dBi) - Cable Loss (dB)}$ - The worse case was relating to the conducted output power.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

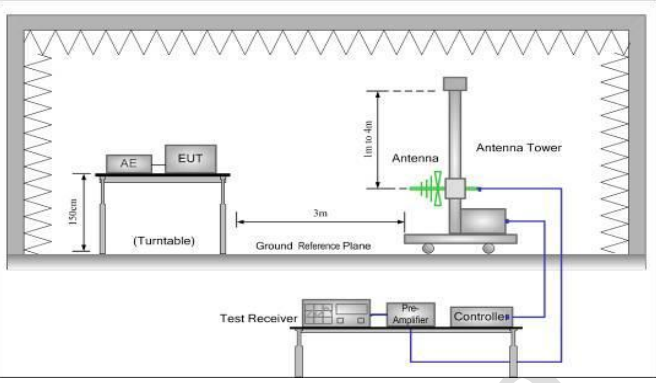
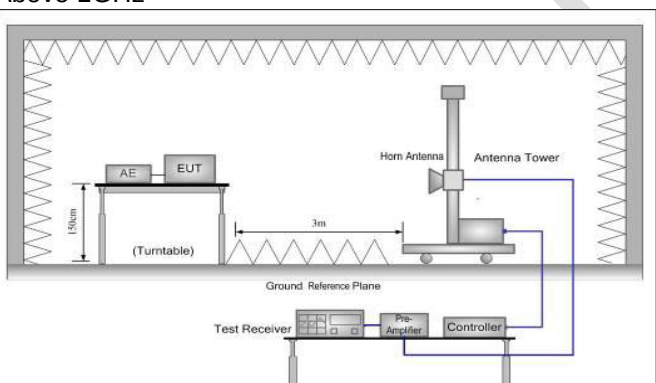
Measurement Data (worst case):

EUT mode	Channel	EUT Pol.	Antenna Pol.	ERP(dBm)	Limit (dBm)	Result
----------	---------	----------	--------------	----------	-------------	--------

GSM850	251	H	V	31.61	38.45	Pass
			H	27.72		
EGPRS850	125	H	V	23.48		
			H	22.16		
UMTS 850 12.2k RMC	4183	H	V	22.22		
			H	18.28		

EUT mode	Channel	EUT Pol.	Antenna Pol.	EIRP(dBm)	Limit (dBm)	Result
PCS1900	512	H	V	26.89	33	Pass
			H	28.16		
EGPRS1900	661	H	V	25.04		
			H	23.41		
UMTS 1900 12.2k RMC	9400	H	V	22.32		
			H	19.45		

6.7 Field strength of spurious radiation measurement

Test Requirement:	FCC part22.917(a), FCC part24.238(a) and FCC part 27.53(h)
Test Method:	ANSI/TIA-603-D 2010
Limit:	-13dBm
Test setup:	Below 1GHz  Above 1GHz 
Test Procedure:	1. The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. 2. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations. 3. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method. 4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency. $ERP / EIRP = S.G. \text{ output (dBm) } + \text{Antenna Gain(dB/dBi)} - \text{Cable Loss (dB)}$
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details.
Test results:	Passed

Measurement Data (worst case):

Test mode:	GSM850		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1648.40	Vertical	-30.55	-13.00	Pass
2472.60	V	-31.58		
3296.80	V	-33.95		
1648.40	Horizontal	-28.58	-13.00	Pass
2472.60	H	-35.13		
3296.80	H	-34.04		
Test mode:	GSM850		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-28.83	-13.00	Pass
2509.80	V	-31.09		
3346.40	V	-32.31		
1673.20	Horizontal	-24.51	-13.00	Pass
2509.80	H	-30.10		
3346.40	H	-32.77		
Test mode:	GSM850		Test channel:	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1697.60	Vertical	-30.72	-13.00	Pass
2546.40	V	-32.32		
3395.20	V	-30.26		
1697.60	Horizontal	-26.99	-13.00	Pass
2546.40	H	-29.55		
3395.20	H	-32.79		

Remark:

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

Test mode:	PCS1900		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3700.40	Vertical	-30.84	-13.00	Pass
5550.60	V	-37.35		
3700.40	Horizontal	-36.43	-13.00	Pass
5550.60	H	-35.29		
Test mode:	PCS1900		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-24.43	-13.00	Pass
5640.00	V	-33.18		
3760.00	Horizontal	-24.51	-13.00	Pass
5640.00	H	-37.15		
Test mode:	PCS1900		Test channel:	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3819.60	Vertical	-27.43	-13.00	Pass
5729.40	V	-35.41		
3819.60	Horizontal	-29.03	-13.00	Pass
5729.40	H	-33.43		

Remark:

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

Test mode:	WCDMA BAND V 12.2k RMC		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1652.80	Vertical	-45.38	-13.00	Pass
2479.20	V	-43.73		
1652.80	Horizontal	-51.36	-13.00	Pass
2479.20	H	-48.78		
Test mode:	WCDMA BAND V 12.2k RMC		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-54.53	-13.00	Pass
2509.80	V	-51.06		
1673.20	Horizontal	-51.15	-13.00	Pass
2509.80	H	-48.18		
Test mode:	WCDMA BAND V 12.2k RMC		Test channel:	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1693.20	Vertical	-53.69	-13.00	Pass
2539.80	V	-44.28		
1693.20	Horizontal	-51.07	-13.00	Pass
2539.80	H	-48.52		

Remark:

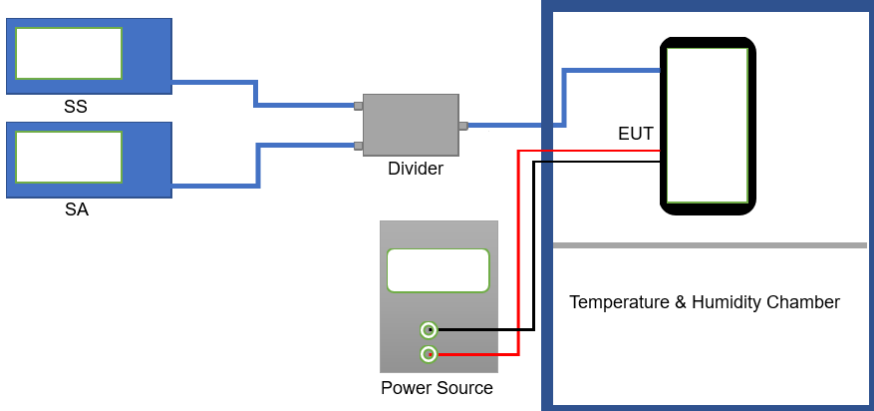
1. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	WCDMA Band II 12.2k RMC		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3704.80	Vertical	-49.42	-13.00	Pass
5557.20	V	-35.86		
3704.80	Horizontal	-50.98		
5557.20	H	-36.43		
Test mode:	WCDMA Band II 12.2k RMC		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-47.65	-13.00	Pass
5640.00	V	-32.69		
3760.00	Horizontal	-50.67		
5640.00	H	-34.70		
Test mode:	WCDMA Band II 12.2k RMC		Test channel:	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3815.20	Vertical	-46.98	-13.00	Pass
5722.80	V	-42.10		
3815.20	Horizontal	-49.87		
5722.80	H	-41.34		

Remark:

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

6.8 Frequency stability V.S. Temperature measurement

Test Requirement:	FCC Part22.355, FCC Part24.235, FCC Part2.1055(a)(1)(b)
Test Method:	ANSI/TIA-6-3-D 2010
Limit:	$\pm 2.5\text{ppm}$
Test setup:	 The diagram illustrates the test setup. A Signal Source (SS) and a Spectrum Analyzer (SA) are connected to a Divider. The Divider is connected to the EUT (Equipment Under Test) inside a Temperature & Humidity Chamber. A Power Source is also connected to the EUT.
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°C reached
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data (the worst channel):

Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	176	0.210375	±2.5	Pass
	-20	157	0.187664		
	-10	138	0.164953		
	0	127	0.151805		
	10	116	0.138656		
	20	144	0.172125		
	30	141	0.168539		
	40	130	0.155391		
	50	119	0.142242		
Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	181	0.096277	±2.5	Pass
	-20	158	0.084043		
	-10	144	0.076596		
	0	132	0.070213		
	10	128	0.068085		
	20	119	0.063298		
	30	110	0.058511		
	40	141	0.075000		
	50	149	0.079255		

Note: Only the worst case shown in the report.

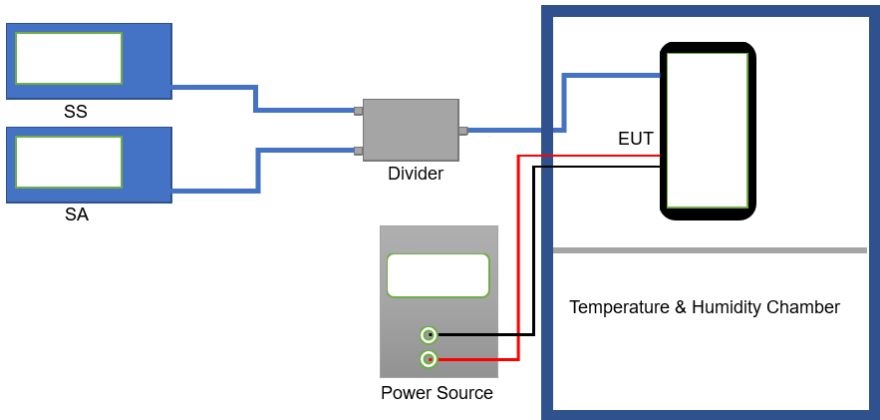
Reference Frequency: EGPRS850 Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	168	0.200813	±2.5	Pass
	-20	144	0.172125		
	-10	141	0.168539		
	0	136	0.016256		
	10	127	0.015181		
	20	143	0.017093		
	30	135	0.016137		
	40	127	0.015180		
	50	125	0.014941		
Reference Frequency: EGPRS1900 Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	148	0.078723	±2.5	Pass
	-20	162	0.086170		
	-10	151	0.080319		
	0	143	0.076064		
	10	125	0.066489		
	20	142	0.075532		
	30	130	0.069149		
	40	128	0.068085		
	50	141	0.075000		

Note: Only the worst case shown in the report.

Reference Frequency:WCDMA BAND V 12.2k RMC Middle channel=4183 channel=836.6MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	171	0.204399	±2.5	Pass
	-20	144	0.172125		
	-10	137	0.163758		
	0	124	0.148219		
	10	110	0.131485		
	20	162	0.193641		
	30	164	0.196032		
	40	140	0.167344		
	50	147	0.175711		
Reference Frequency: WCDMA BAND II 12.2k RMC Middle channel=9400 channel=1880MHz					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	192	0.102128	±2.5	Pass
	-20	154	0.081915		
	-10	145	0.077128		
	0	168	0.089362		
	10	147	0.078191		
	20	129	0.068617		
	30	150	0.079787		
	40	138	0.073404		
	50	154	0.081915		

Note: Only the worst case shown in the report.

6.9 Frequency stability V.S. Voltage measurement

Test Requirement:	FCC Part 22.355, FCC Part 24.235, FCC Part 2.1055(d)(2)
Test Method:	ANSI/TIA-603-D 2010
Limit:	$\pm 2.5\text{ppm}$
Test setup:	 The diagram illustrates the test setup. A Signal Source (SS) and a Spectrum Analyzer (SA) are connected to a Divider. The output of the Divider is connected to the EUT (Equipment Under Test) inside a Temperature & Humidity Chamber. A Power Source is also connected to the EUT.
Test procedure:	1. Set chamber temperature to 25°C. Use a variable DC power source to power the EUT and set the voltage to rated voltage. 2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. 3. Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

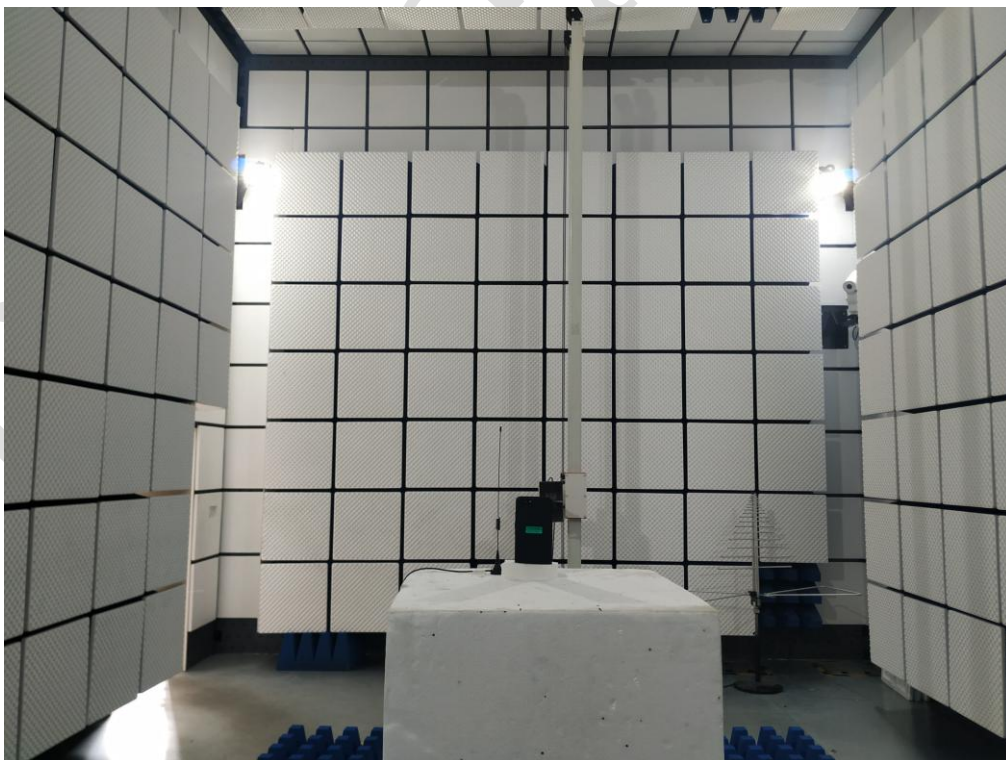
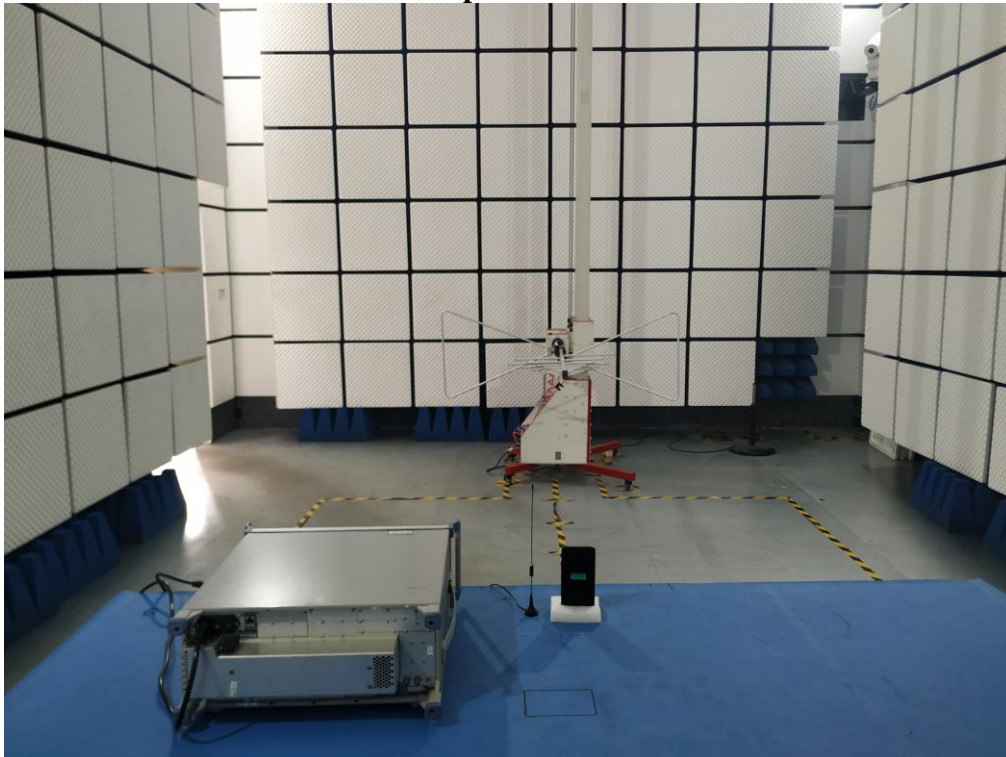
Measurement Data (the worst channel):

Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.35	87	0.103992	±2.5	Pass
	3.80	80	0.095625		
	3.55	70	0.083672		
Reference Frequency: EGPRS850 Middle channel=190 channel=836.6MHz					
25	4.35	100	0.119531	±2.5	Pass
	3.80	96	0.114791		
	3.55	81	0.096820		
Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.35	92	0.048936	±2.5	Pass
	3.80	76	0.040426		
	3.55	82	0.043617		
Reference Frequency: EGPRS1900 Middle channel=661 channel=1880MHz					
25	4.35	78	0.041489	±2.5	Pass
	3.80	80	0.042553		
	3.55	85	0.045213		
Reference Frequency: UMTS 850 12.2k RMC Middle channel=4183 channel=836.6MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.35	86	0.102797	±2.5	Pass
	3.80	92	0.109969		
	3.55	65	0.077695		
Reference Frequency: UMTS 1900 12.2k RMC Middle channel=9400 channel=1880MHz					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.35	80	0.042553	±2.5	Pass
	3.80	83	0.044149		
	3.55	71	0.037766		

Note: Only the worst case shown in the report.

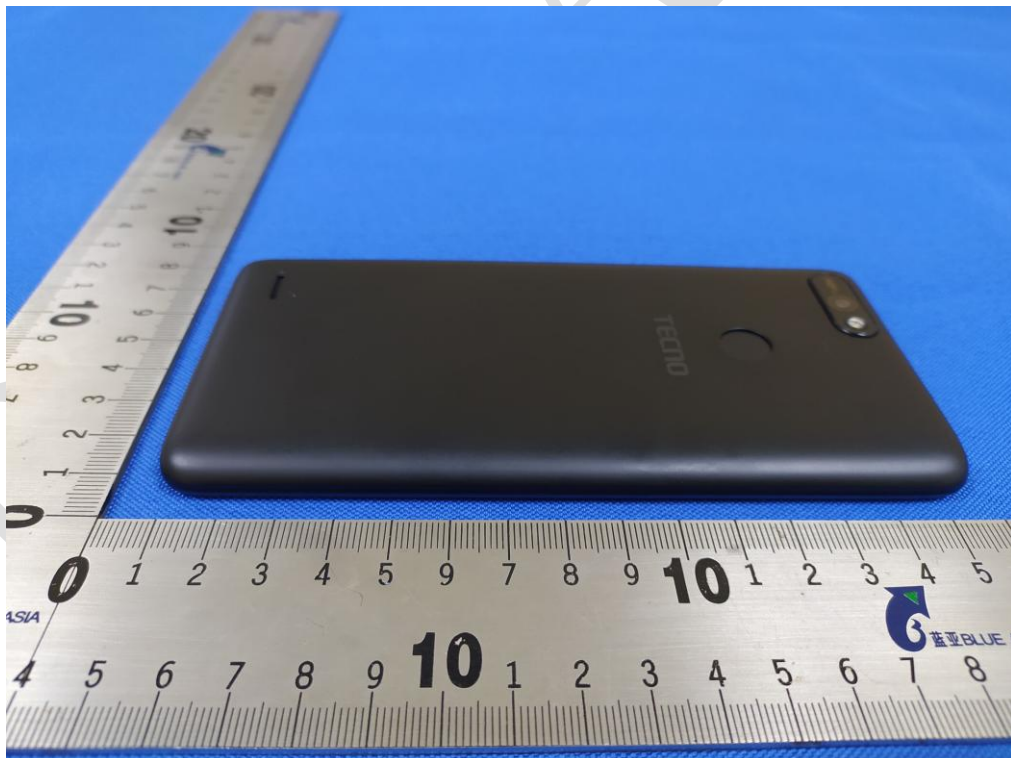
7 Test Setup Photo

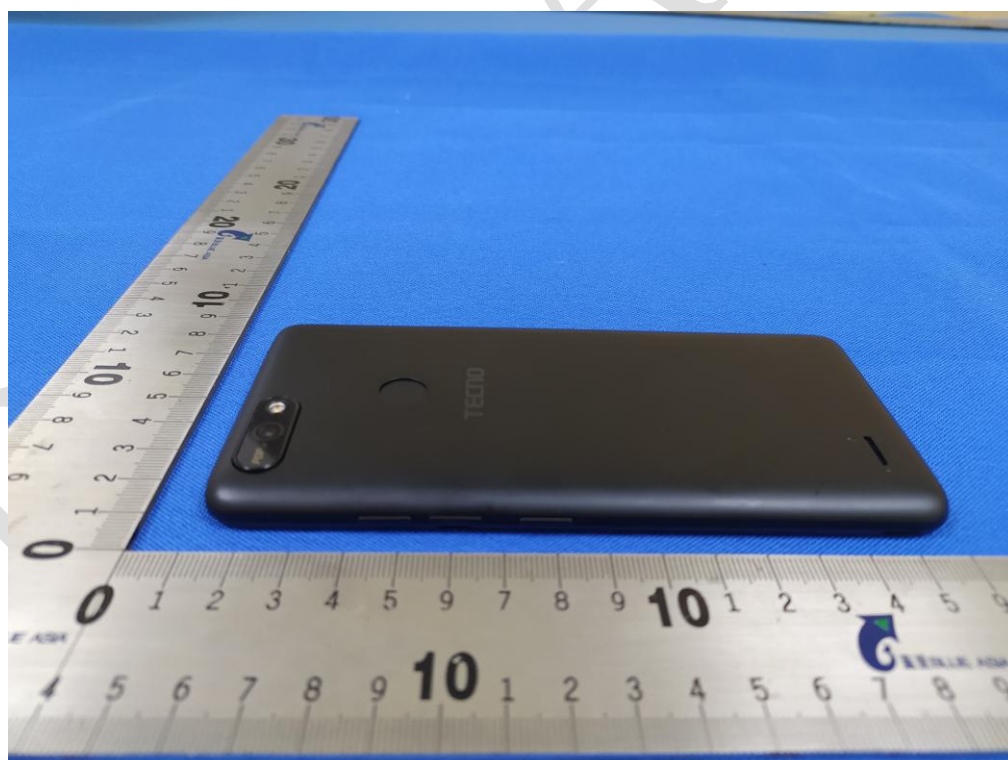
Radiated Spurious Emission



8 EUT Constructional Details

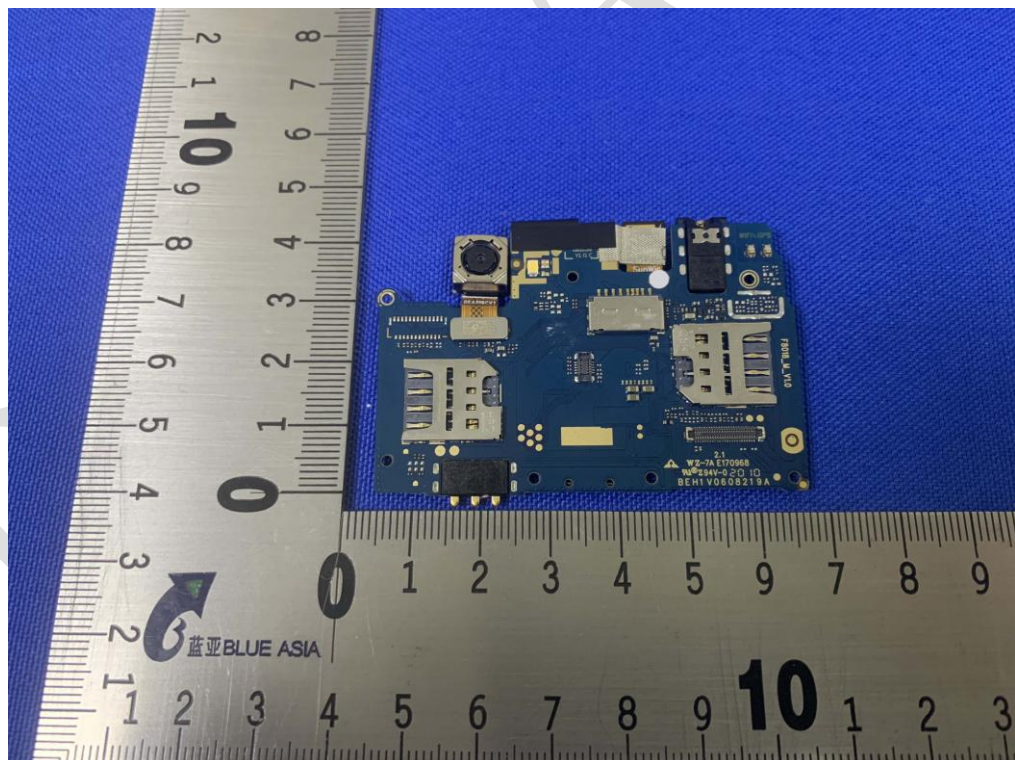


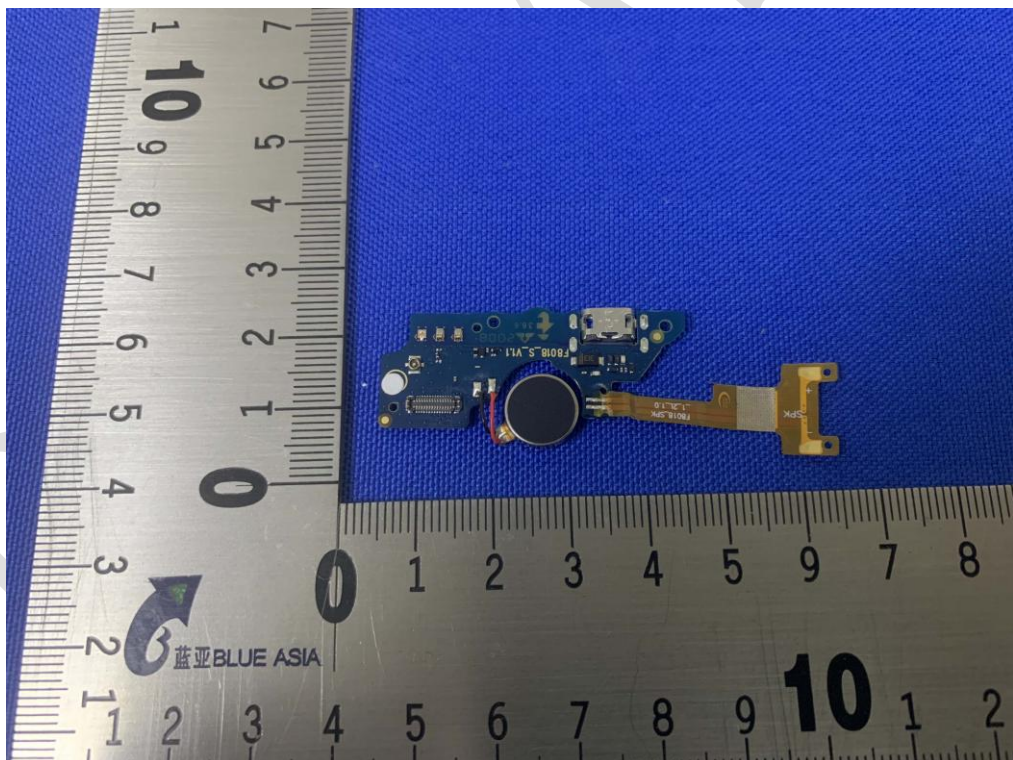
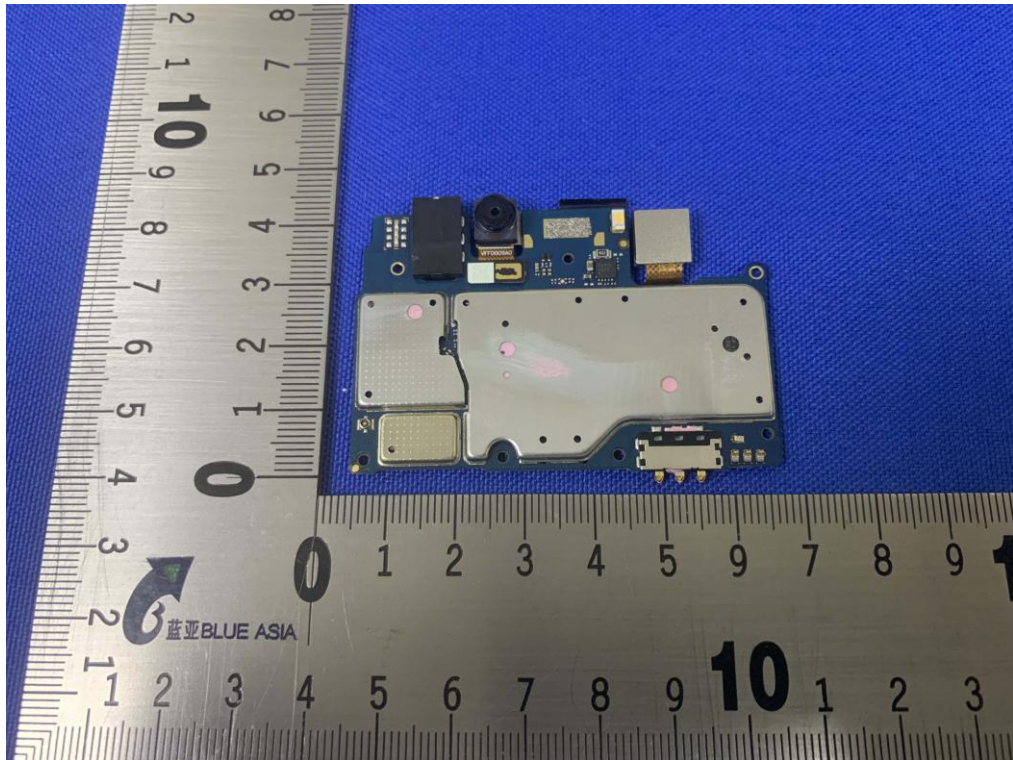


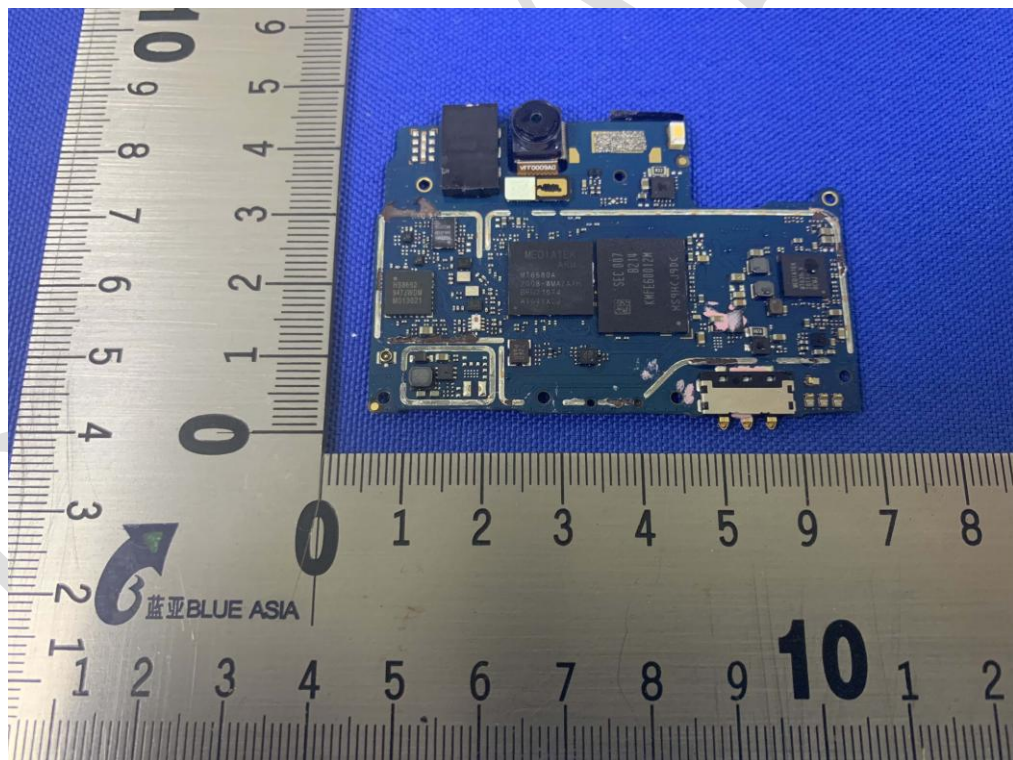
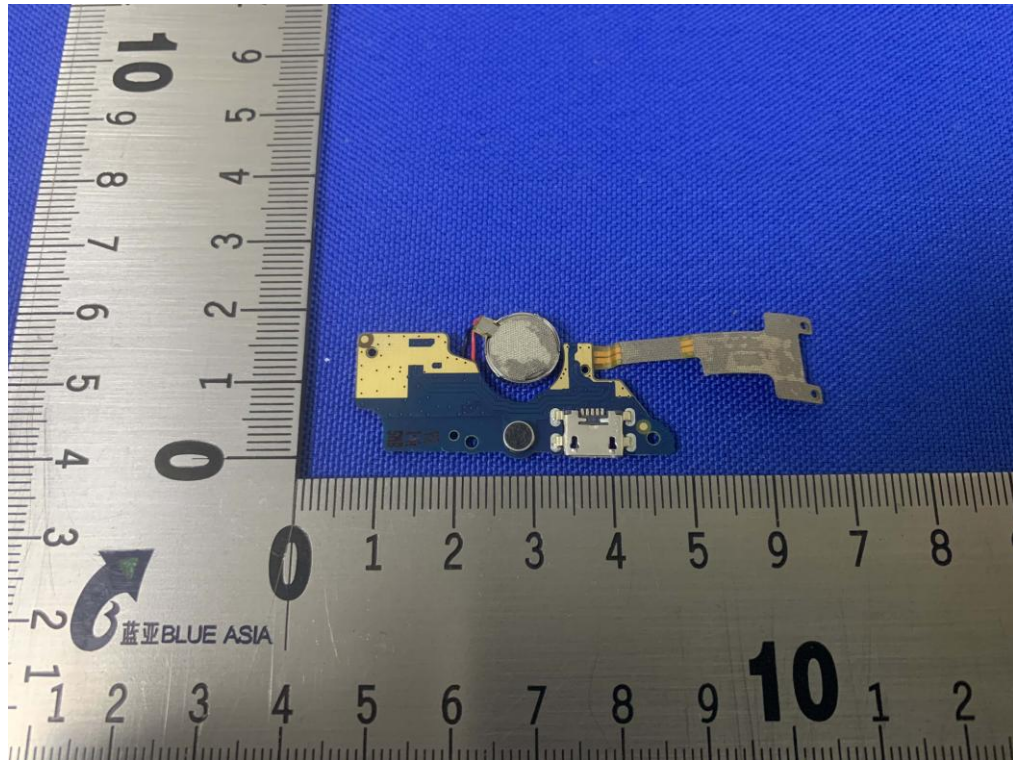


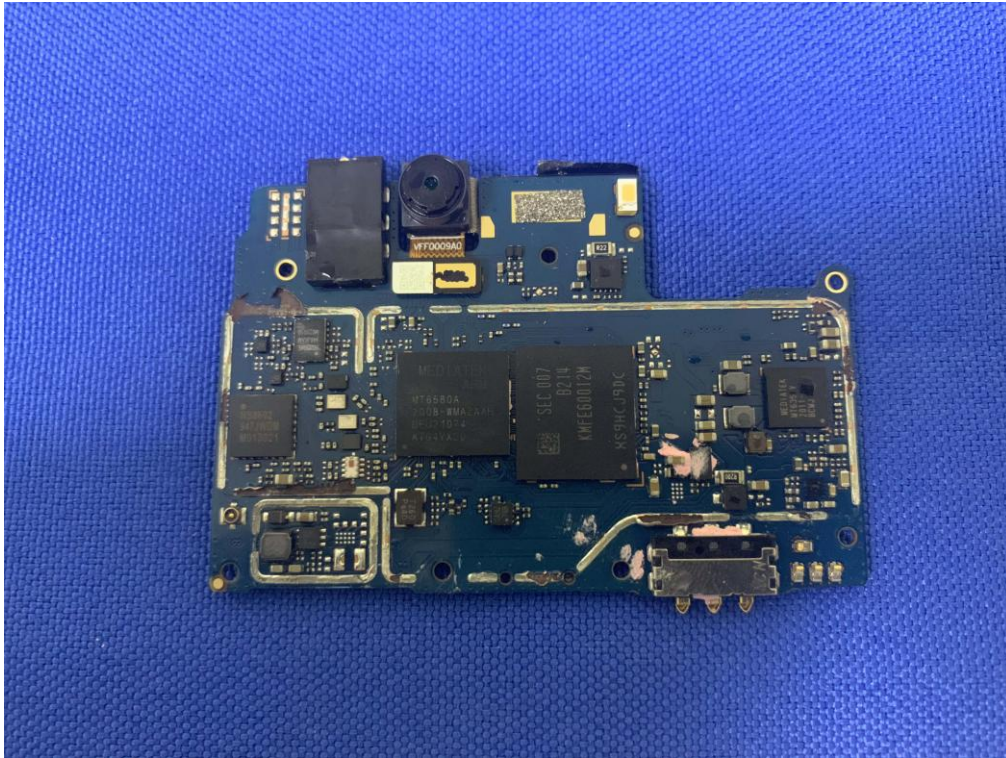












-----End of report-----

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of BlueAsia, this report can't be reproduced except in full.

BlueAsia