

TEST REPORT

FCC LTE B13 Test for SM-S721B/DS Certification

APPLICANT SAMSUNG Electronics Co., Ltd.

REPORT NO. HCT-RF-2407-FC055

DATE OF ISSUE July 24, 2024

> **Tested by** Jae Mun Do

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F-TP22-03(Rev.06)

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T E S T R E P O R T	REPORT NO. HCT-RF-2407-FC055 DATE OF ISSUE July 24, 2024 Additional Model SM-S721B
Applicant	SAMSUNG Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Product Name Model Name	Mobile Phone SM-S721B/DS
Date of Test	May 21, 2024 ~ July 23, 2024
FCC ID	A3LSMS721B
Location of Test	■ Permanent Testing Lab □ On Site Testing (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi- do, 17383 Republic of Korea)
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Test Standard Used	FCC Rule Part : § 27
Test Results	PASS





REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	July 24, 2024	Initial Release

Notice

Content

The measurements shown in this report were made in accordance with the procedures specified in CFR47 section § 2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated.

The test results have only been applied with the test methods required by the standard(s).

The laboratory is not accredited for the test results marked *.

Information provided by the applicant is marked **.

Test results provided by external providers are marked ***.

When confirmation of authenticity of this test report is required, please contact www.hct.co.kr

The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).



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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMS721B
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§27
EUT Type:	Mobile phone
Model(s):	SM-S721B/DS
Additional Model(s)	SM-S721B
	779.5 MHz –784.5 MHz (LTE – Band 13 (5 MHz))
Tx Frequency:	782 MHz (LTE – Band 13 (10 MHz))
Date(s) of Tests:	May 21, 2024 ~ July 23, 2024
	Radiated : R3CX40LGCGM
Serial number:	Conducted : R3CX503EC1Z



1.1. MAXIMUM OUTPUT POWER

	Τ.,			ERP	
Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	Max. Power (W)	Max. Power (dBm)
		4M50G7D	QPSK	0.111	20.44
LTE Dand 12 (E)	779.5 –784.5	4M53W7D	16QAM	0.073	18.62
LTE – Band13 (5)		4M51W7D	64QAM	0.059	17.70
		4M51W7D	256QAM	0.045	16.57
		9M02G7D	QPSK	0.109	20.36
LTE – Band13 (10)	782.0	9M01W7D	16QAM	0.071	18.50
		9M03W7D	64QAM	0.058	17.63
		9M00W7D	256QAM	0.045	16.52





2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS and LTE, Sub 6. It also supports IEEE 802.11 a/b/g/n/ac/ax (20/40/80/160 MHz), Bluetooth(ePA), BT LE(ePA), NFC, WPT, WIFI 6E.

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74**, **Seoicheon-ro 578beon-gil**, **Majang-myeon**, **Icheon-si**, **Gyeonggi-do**, **17383**, **Rep. of KOREA**.





3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

Test Description	Test Procedure Used
Occupied Bandwidth	- KDB 971168 D01 v03r01 – Section 4.3 - ANSI C63.26-2015 – Section 5.4.4
Band Edge	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Spurious and Harmonic Emissions at Antenna Terminal	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Conducted Output Power	- N/A (See SAR Report)
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Effective Radiated Power/ Effective Isotropic Radiated Power	- KDB 971168 D01 v03r01 – Section 5.2 & 5.8 - ANSI/TIA-603-E-2016 – Section 2.2.17
Radiated Spurious and Harmonic Emissions	- KDB 971168 D01 v03r01 – Section 6.2 - ANSI/TIA-603-E-2016 – Section 2.2.12



3.2 RADIATED POWER

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-E-2016 Clause 2.2.17.

Test Settings

- 1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
- 2. RBW = 1 -5% of the expected OBW, not to exceed 1 MHz
- 3. VBW \geq 3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points > 2 x span / RBW
- 6. Detector = RMS

7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".

8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.

- 9. Trace mode = trace averaging (RMS) over 100 sweeps
- 10. The trace was allowed to stabilize

Test Note

- 1. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission.
- 2. A half wave dipole is then substituted in place of the EUT. For emissions above 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The power is calculated by the following formula;

 P_{d} (dBm) = Pg (dBm) - cable loss (dB) + antenna gain (dB)

Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.

3. The maximum value is calculated by adding the forward power to the calibrated source plus its appropriate gain value.

These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration

- 4. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- 5. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.





3.3 RADIATED SPURIOUS EMISSIONS

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA-603-E-2016.

Test Settings

- 1. RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
- 2. VBW \geq 3 x RBW
- 3. Span = 1.5 times the OBW
- 4. No. of sweep points > 2 x span / RBW
- 5. Detector = Peak
- 6. Trace mode = Max Hold
- 7. The trace was allowed to stabilize
- 8. Test channel : Low/ Middle/ High
- 9. Frequency range : We are performed all frequency to 10th harmonics from 9 kHz.

Test Note

- Measurements value show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- 2. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.

The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the test data

3. For spurious emissions above 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The spurious emissions is calculated by the following formula;

Result (dBm) = Pg (dBm) - cable loss (dB) + antenna gain (dBi)

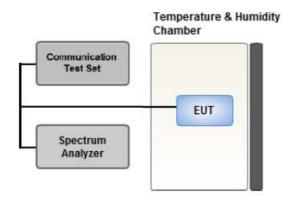
Where: P_{g} is the generator output power into the substitution antenna.

If the fundamental frequency is below 1 GHz, RF output power has been converted to EIRP.

EIRP (dBm) = ERP (dBm) + 2.15



3.4 OCCUPIED BANDWIDTH.



Test setup

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

The EUT makes a call to the communication simulator.

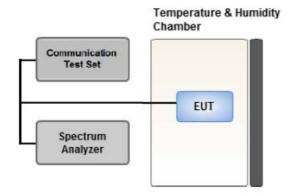
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

- 1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 1 5 % of the expected OBW
- 3. VBW \geq 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize
- 8. If necessary, steps 2 7 were repeated after changing the RBW such that it would be within
 - 1 5 % of the 99 % occupied bandwidth observed in Step 7



3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies 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 10th harmonic.

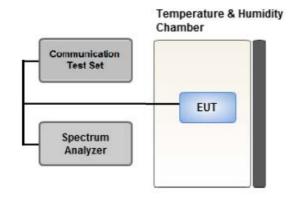
All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

- 1. RBW = 1 MHz
- 2. VBW \geq 3 MHz
- 3. Detector = RMS
- 4. Trace Mode = trace average
- 5. Sweep time = auto
- 6. Number of points in sweep \geq 2 x Span / RBW



3.6 BAND EDGE



Test setup

Test Overview

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 its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

- 1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
- 2. Span was set large enough so as to capture all out of band emissions near the band edge
- 3. RBW > 1 % of the emission bandwidth
- 4. VBW > 3 x RBW
- 5. Detector = RMS
- 6. Number of sweep points \geq 2 x Span/RBW
- 7. Trace mode = trace average
- 8. Sweep time = auto couple
- 9. The trace was allowed to stabilize



Test Notes

According to FCC 22.917, 24.238, 27.53 specified that 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.

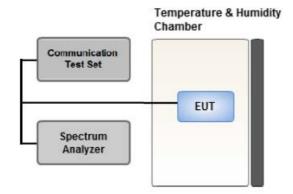
In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

All measurements were done at 2 channels(low and high operational frequency range.) The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

Where Margin < 1 dB the emission level is either corrected by 10 log(1 MHz/ RB) or the emission is integrated over a 1 MHz bandwidth to determine the final result. When using the integration method the integration window is either centered on the emission or, for emissions at the band edge, centered by an offset of 500 kHz from the block edge so that the integration window is the 1 MHz adjacent to the block edge.



3.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



Test setup

Test Overview

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015. The frequency stability of the transmitter is measured by:

1. Temperature:

The temperature is varied from -30 °C to +50 °C in 10 °C increments using an environmental chamber.

- 2. Primary Supply Voltage:
 - .- Unless otherwise specified, vary primary supply voltage from 85 % to 115 % of the nominal value for other than hand carried battery equipment.
 - .- For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

- 1. The carrier frequency of the transmitter is measured at room temperature (20 °C to provide a reference).
- 2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
- 3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.





3.8 WORST CASE(RADIATED TEST)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.
 Mode : Stand alone, Stand alone + External accessories (Earphone, AC adapter, etc)
 Worst case : Stand alone
- All simultaneous transmission scenarios of operation were investigated, and the test results showed no additional significant emissions relative to the least restrictive limit were observed.

Therefore, only the worst case(stand-alone) results were reported.

- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data
- Please refer to the table below.
- SM-S721B/DS & additional models were tested and the worst case results are reported. (Worst case : SM-S721B/DS)

[Worst case]							
Test Description	Modulation	RB size	RB offset	Axis			
	QPSK,	See Section 8.1		v			
Effective Radiated Power	16QAM,						
Effective Radiated Power	64QAM,	See See	ction 8.1	Y			
	256QAM						
Radiated Spurious and Harmonic Emissions	QPSK	See See	ction 8.2	Y			



3.9 WORST CASE(CONDUCTED TEST)

- All modes of operation were investigated and the worst case configuration results are reported.
- SM-S721B/DS & additional models were tested and the worst case results are reported.
- (Worst case : SM-S721B/DS)

[Worst case]						
Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset	
Occupied Bandwidth	QPSK, 16QAM, 64QAM, 256QAM	5, 10	Mid	Full RB	0	
	QPSK	5	Low High	1	0 24	
Band Edge		10	Low High	1	0 49	
		5, 10	Low, High	Full RB	0	
Spurious and Harmonic Emissions at Antenna Terminal	QPSK	5, 10	Low, Mid, High	1	0	



4	I IST	OF	TEST	FOU	IPMENT
· +.	LIJI	UΓ	IESI	EQU	

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
RF Switching System	FBSR-02B(1.2G HPF+LNA)	T&M SYSTEM	F1L1	12/11/2024	Annual
RF Switching System	FBSR-02B(3.3G HPF+LNA)	T&M SYSTEM	F1L2	12/11/2024	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	5001	04/17/2025	Annual
DC Power Supply	E3632A	Hewlett Packard	MY40004427	08/25/2024	Annual
Dipole Antenna	UHAP	Schwarzbeck	557	03/09/2025	Biennial
Dipole Antenna	UHAP	Schwarzbeck	558	03/09/2025	Biennial
Chamber	SU-642	ESPEC	93008124	02/19/2025	Annual
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	147	08/17/2025	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1298	09/11/2025	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/29/2024	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	03/28/2025	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	04/19/2025	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/17/2025	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	100931	08/17/2024	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/10/2024	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/07/2026	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	895	09/16/2024	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	1135	09/16/2024	Biennial
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262094331	11/17/2024	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6201026545	12/11/2024	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/17/2025	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

Note:

1. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

2. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).





5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.98 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.36 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.70 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.52 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.66 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (Above 40 GHz)	5.58 (Confidence level about 95 %, <i>k</i> =2)



6. SUMMARY OF TEST RESULTS

6.1 Test Condition: Conducted Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Occupied Bandwidth	§ 2.1049	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§ 2.1051, § 27.53(c)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
On all frequencies between 763-775 MHz and 793-805 MHz.	§ 27.53(c)(4)	< 65 + 10log10 (P[Watts])	PASS (See Note2)
Conducted Output Power	§ 2.1046	N/A	See Note1
Frequency stability / variation of ambient temperature	§2.1055, §27.54	Emission must remain in band	PASS

Note:

1. See SAR Report

2. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance.

6.2 Test Condition: Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Effective Radiated Power	§ 27.50(b)(10)	< 3 Watts max. ERP	PASS
Radiated Spurious and	§ 2.1053,	< 43 + 10log10 (P[Watts]) for	PASS
Harmonic Emissions	§ 27.53(c)	all out-of band emissions	PASS
Undesirable Emissions in	§ 2.1053,	<-70dBW/MHz EIRP (wideband)	DACC
the 1559 – 1610 MHz band	27.53(f)	<-80dBW EIRP (narrowband)	PASS



7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

Ch.	Ch./ Freq. Measured		Substitute	Ant. Gain			ERP	
channel	Freq.(MHz)	Level (dBm)	Level (dBm)	(dBd)	C.L	Pol.	W	dBm
128	824.20	-21.37	38.40	-10.61	0.95	Н	0.483	26.84

ERP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.

2) During the test, the turn table is rotated until the maximum signal is found.

3) Record the field strength meter's level.

- 4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
- 6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power.

7.2 EIRP Sample Calculation

Ch.	Ch./ Freq.		Substitute	Ant. Gain			EI	RP
channel	Freq.(MHz)	Level (dBm)	Level (dBm)	(dBi)	C.L	Pol.	w	dBm
20175	1,732.50	-15.75	18.45	9.90	1.76	Н	0.456	26.59

EIRP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.

2) During the test, the turn table is rotated until the maximum signal is found.

- 3) Record the field strength meter's level.
- 4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
- 6) The signal generator output level with Ant. Gain and cable loss are the rating of equivalent isotropic radiated power.



7.3. Emission Designator

GSM Emission Designator

Emission Designator = 249KGXW GSM BW = 249 kHz G = Phase Modulation X = Cases not otherwise covered W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 249KG7W GSM BW = 249 kHz G = Phase Modulation 7 = Quantized/Digital Info W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M17F9W WCDMA BW = 4.17 MHz F = Frequency Modulation 9 = Composite Digital Info W = Combination (Audio/Data)

QPSK Modulation

Emission Designator = 4M48G7D LTE BW = 4.48 MHz G = Phase Modulation 7 = Quantized/Digital Info D = Data transmission; telemetry; telecommand

<u>QAM Modulation</u> Emission Designator = 4M48W7D LTE BW = 4.48 MHz W = Amplitude/Angle Modulated 7 = Quantized/Digital Info D = Data transmission; telemetry; telecommand



8. TEST DATA

8.1 EFFECTIVE RADIATED POWER

Free	Med/		Measured	Substitute	Ant Cain			Limit	El	RP	I	RB
Freq (MHz)	Mod/ Bandwidth	h Modulation Level Level (dBm) (dBm)	Ant. Gain (dBd)	C.L	Pol	w	W	dBm	Size	Offset		
		QPSK	-30.78	31.55	-9.85	1.36	V		0.108	20.34		
770 5	16-QAM	-32.62	29.71	-9.85	1.36	V		0.071	18.50	1		
779.5		64-QAM	-33.50	28.83	-9.85	1.36	V		0.058	17.62		0
	256-QAM	-34.61	27.72	-9.85	1.36	V		0.045	16.51			
	QPSK	-31.11	31.38	-9.85	1.36	V		0.104	20.17			
702.0	LTE B13	16-QAM	-32.78	29.71	-9.85	1.36	V	< 2.00	0.071	18.50	1	0
782.0	(5 MHz)	64-QAM	-33.88	28.61	-9.85	1.36	V	< 3.00	0.055	17.40	- 1	0
		256-QAM	-34.91	27.58	-9.85	1.36	V		0.043	16.37		
		QPSK	-30.93	31.65	-9.85	1.36	V		0.111	20.44		
704 5		16-QAM	-32.75	29.83	-9.85	1.36	V		0.073	18.62	1	24
784.5		64-QAM	-33.67	28.91	-9.85	1.36	V			17.70	1	24
		256-QAM	-34.80	27.78	-9.85	1.36		0.045	16.57			

Freq	Mod/ Bandwidth	Modulation	Measured	Substitute	Ant Cain	t. Gain C.L dBd)	C.L Pol	Limit	ERP		l	RB	
(MHz)			Level (dBm)	Level (dBm)	(dBd)			w	W	dBm	Size	Offset	
	LTE B13 (10 MHz)	QPSK	-30.92	31.57	-9.85	1.36	V		0.109	20.36) 1	0	
702.0		16-QAM	-32.78	29.71	-9.85	1.36	V	- < 3.00 -	0.071	18.50			
782.0		64-QAM	-33.65	28.84	-9.85	1.36	V		0.058	17.63			
		256-QAM	-34.76	27.73	-9.85	1.36	V		0.045	16.52			



8.2 RADIATED SPURIOUS EMISSIONS

MODE:	LTE B13
MODULATION SIGNAL:	5 MHz QPSK
DISTANCE:	3 meters

Ch	Frea	Measured	Ant.	Substitut	C 1	Del	Result	Limit	RB	RB
Ch	(MHz)	Level (dBm)	Gain (dBd)	e Level (dBm)	C.L	Pol	(dBm)	(dBm)	Size	Offset
	1 559.0	-58.73	8.40	-66.06	1.94	V	-59.60	-40.00		
23205 (779.5)	2 338.5	-53.98	10.00	-59.50	2.45	V	-51.95	-13.00	1	0
(119.5)	3 118.0	-59.01	10.20	-61.38	2.81	V	-53.99	-13.00		
	1 564.0	-58.30	8.40	-65.70	1.96	V	-59.26	-40.00		
23230 (782.0)	2 346.0	-54.12	10.10	-59.94	2.47	Н	-52.31	-13.00	1	0
(102.0)	3 128.0	-61.74	10.20	-64.09	2.82	V	-56.71	-13.00		
	1 569.0	-58.37	8.40	-65.84	1.98	V	-59.42	-40.00		
23255 (784.5)	2 353.5	-53.79	10.20	-59.48	2.48	Н	-51.76	-13.00	1	24
(104.0)	3 138.0	-59.14	10.20	-60.81	2.84	V	-53.45	-13.00		



LTE B13

MODULATION SIGNAL:

DISTANCE:

MODE:

10 MHz QPSK

3 meters

Ch	Freq () Measured		Ant. Substitut Gain e Level		C.L	Pol Result		Limit	F	B
CII	(MHz)	(dBm)	(dBd)	e Level (dBm)	C.L	POI	(dBm)	(dBm)	Size	Offset
	1 564.0	-58.23	8.40	-65.63	1.96	V	-59.19	-40.00		
23230 (782.0)	2 346.0	-54.85	10.10	-60.67	2.47	Н	-53.04	-13.00	1	0
(182.0)	3 128.0	-59.98	10.20	-62.33	2.82	V	-54.95	-13.00		



1559 MHz ~ 1610 MHz BAND

OPERATING FREQUENCY:	779.5 MHz, 782.0 MHz, 784.5 MHz
MEASURED OUTPUT POWER:	5 MHz QPSK
DISTANCE:	3 meters
WIDEBAND EMISSION LIMIT:	-70 dBW/ MHz (= -40 dBm/ MHz)

Operating Frequency (MHz)	Measured Frequency (MHz)	EMISSION TYPE	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Margin (dB)
779.5	1 587.60		-55.40	8.40	-62.98	1.99	V	-56.57	16.57
782.0	1 599.50	Wide Band	-55.17	8.70	-63.04	1.96	V	-56.30	16.30
784.5	1 584.60		-55.01	8.40	-62.88	1.99	V	-56.47	16.47

Note:

Since the bandwidth of that Spurious emission is greater than 700 Hz, we applied -70 dBW/MHz according to § 27.53(f).

OPERATING FREQUENCY:	782.0 MHz
MEASURED OUTPUT POWER:	10 MHz QPSK
DISTANCE:	3 meters
WIDEBAND EMISSION LIMIT:	-70 dBW/ MHz (= -40 dBm/ MHz)

Operating	Measured	EMISSION	Measured Level (dBm)	Ant.	Substitute	<u> </u>	Pol	Result (dBm)	Margin (dB)
Frequency (MHz)	Frequency (MHz)	TYPE		Gain (dBi)	Level (dBm)	C.L			
782.0	1 597.70	Wide Band	-55.32	8.70	-63.19	1.96	V	-56.45	16.45

Note:

Since the bandwidth of that Spurious emission is greater than 700 Hz, we applied -70 dBW/MHz according to § 27.53(f).



8.3 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
			QPSK	25		4.5041
	E MIL-	782.0	16-QAM			4.5288
	5 MHz		64-QAM		0 9.0212	4.5072
10			256-QAM			4.5105
13			QPSK	50		9.0212
	10 MU-		16-QAM			9.0090
	10 MHz		64-QAM			9.0260
			256-QAM			9.0029

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 34 ~ 41.



8.4 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)			Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
		779.5	3.7049	27.976	-67.055	-39.079	
12	5	782.0	3.6955	27.976	-67.163	-39.187	12.00
13		784.5	3.1706	27.976	-67.110	-39.134	-13.00
	10	782.0	3.7074	27.976	-67.111	-39.135	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 42 ~ 45.

2. Conducted Spurious Emissions was Tested QPSK Modulation, Resource Block Size 1 and Resource Block Offset 0

3. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)

4. Factor (dB) = Cable Loss + Attenuator + Power Splitter

Frequency Range (GHz)	Factor [dB]
0.03 - 1	25.270
1 - 5	27.976
5 - 10	28.591
10 - 15	29.116
15 - 20	29.489
Above 20(26.5)	30.131

8.5 BAND EDGE

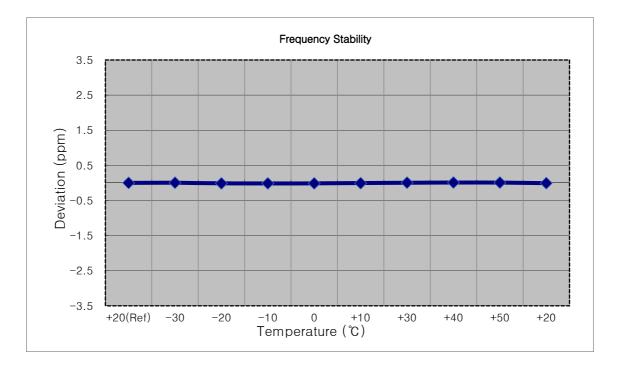
- Plots of the EUT's Band Edge are shown Page 46 ~ 57.



8.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

MODE:	LTE 13
OPERATING FREQUENCY:	779,500,000 Hz
CHANNEL:	23205 (5 MHz)
REFERENCE VOLTAGE:	3.880 VDC
DEVIATION LIMIT:	Emission must remain in band

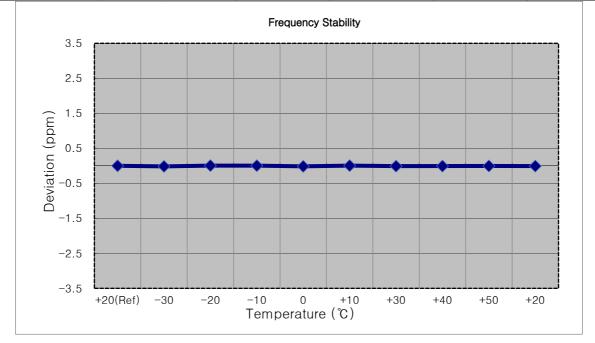
Voltage	Power	Temp.	Frequency	Frequency Error	Deviation		
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	ppm	
100 %		+20(Ref)	779 499 992	0.00	0.000 000	0.0000	
100 %		-30	779 499 996	4.00	0.000 001	0.0051	
100 %		-20	779 499 981	-11.20	-0.000 001	-0.0144	
100 %	_	-10	779 499 982	-10.10	-0.000 001	-0.0130	
100 %	3.880	0	779 499 982	-10.40	-0.000 001	-0.0133	
100 %		+10	779 499 985	-7.10	-0.000 001	-0.0091	
100 %		+30	779 499 998	5.20	0.000 001	0.0067	
100 %	_	+40	779 500 001	8.10	0.000 001	0.0104	
100 %		+50	779 499 999	6.80	0.000 001	0.0087	
Batt. Endpoint	3.300	+20	779 499 986	-6.00	-0.000 001	-0.0077	





MODE:	LTE 13
OPERATING FREQUENCY:	782,000,000 Hz
CHANNEL:	<u>23230 (5 MHz)</u>
REFERENCE VOLTAGE:	3.880 VDC
DEVIATION LIMIT:	Emission must remain in band

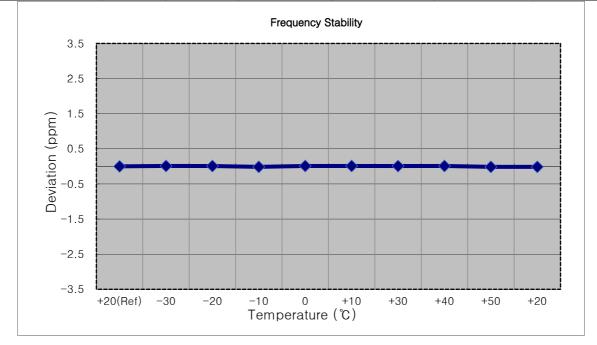
Voltage	Power	Temp.	Temp. Frequency Frequency Error Deviation			
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	ppm
100 %		+20(Ref)	782 000 009	0.00	0.000 000	0.0000
100 %		-30	781 999 996	-12.60	-0.000 002	-0.0161
100 %	_	-20	782 000 012	3.70	0.000 000	0.0047
100 %		-10	782 000 012	3.00	0.000 000	0.0038
100 %	3.880	0	781 999 996	-12.10	-0.000 002	-0.0155
100 %		+10	782 000 013	4.10	0.000 001	0.0052
100 %		+30	782 000 001	-7.30	-0.000 001	-0.0093
100 %	_	+40	782 000 002	-6.10	-0.000 001	-0.0078
100 %		+50	782 000 005	-3.50	0.000 000	-0.0045
Batt. Endpoint	3.300	+20	782 000 002	-6.20	-0.000 001	-0.0079





MODE:	LTE 13
OPERATING FREQUENCY:	784,500,000 Hz
CHANNEL:	<u>23255 (5 MHz)</u>
REFERENCE VOLTAGE:	3.880 VDC
DEVIATION LIMIT:	Emission must remain in band

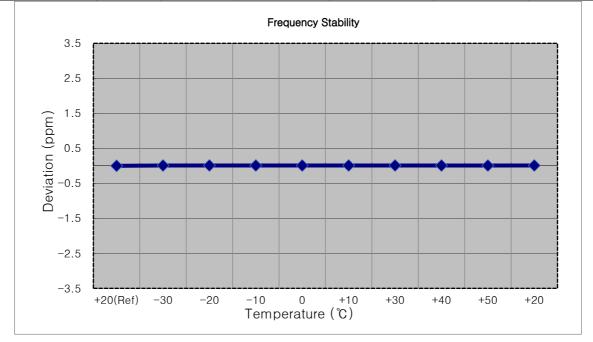
Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	ppm
100 %		+20(Ref)	784 499 989	0.00	0.000 000	0.0000
100 %		-30	784 499 998	8.80	0.000 001	0.0112
100 %	-	-20	784 499 997	7.50	0.000 001	0.0096
100 %		-10	784 499 978	-11.00	-0.000 001	-0.0140
100 %	3.880	0	784 499 998	8.90	0.000 001	0.0113
100 %		+10	784 499 998	8.50	0.000 001	0.0108
100 %	-	+30	784 499 996	7.10	0.000 001	0.0091
100 %	-	+40	784 499 998	8.60	0.000 001	0.0110
100 %		+50	784 499 978	-10.90	-0.000 001	-0.0139
Batt. Endpoint	3.300	+20	784 499 978	-10.90	-0.000 001	-0.0139





MODE:	LTE 13
OPERATING FREQUENCY:	782,000,000 Hz
CHANNEL:	23230 (10 MHz)
REFERENCE VOLTAGE:	3.880 VDC
DEVIATION LIMIT:	Emission must remain in band

Voltage	Power	Temp.	Frequency Frequency Error Deviation			
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	ppm
100 %		+20(Ref)	781 999 992	0.00	0.000 000	0.0000
100 %		-30	781 999 999	6.80	0.000 001	0.0087
100 %	-	-20	782 000 000	7.50	0.000 001	0.0096
100 %		-10	782 000 000	7.10	0.000 001	0.0091
100 %	3.880	0	781 999 999	6.20	0.000 001	0.0079
100 %		+10	781 999 999	6.80	0.000 001	0.0087
100 %		+30	782 000 000	7.50	0.000 001	0.0096
100 %	-	+40	781 999 999	6.30	0.000 001	0.0081
100 %		+50	781 999 998	6.00	0.000 001	0.0077
Batt. Endpoint	3.300	+20	782 000 000	7.30	0.000 001	0.0093







9. TEST PLOTS



Agilent Spectrum Analyzer - Occupied BV	V				
OX RL RF 50 Ω AC Center Freq 782.000000 PASS Deformute Def	#IFGain:Low	SENSE:INT Center Freq: 782.000000 M Trig: Free Run Av #Atten: 20 dB	ALIGN AUTO MHz gjHold: 700/700	08:34:34 PM Jun 24, 2024 Radio Std: None Radio Device: BTS	Frequency
Ref Offset 26.6 c 10 dB/div Ref 40.00 dB/div 30.0 20.0		and the second	m		Center Freq 782.000000 MHz
10.0 0.00 -10.0 -20.0 -30.0				Margan Margan	
-40.0 -50.0 Center 782 MHz				Span 10 MHz	CF Step 1.000000 MHz <u>Auto</u> Man
#Res BW 100 kHz Occupied Bandwid 4	th .5041 MH	#VBW 390 kHz Total Powe	er 30.9	Sweep 1 ms 9 dBm	Freq Offset 0 Hz
Transmit Freq Error x dB Bandwidth	19.714 kH 5.217 MH	z OBW Powe		0.00 % 00 dB	
MSG			STATU	s	

LTE B13_5 M_OBW_Mid_QPSK_FullRB



Je Agilent Spectrum Analyzer - Occupied BW	1			_		
	RL RF 50Ω AC SI nter Freq 782.000000 MHz Center F				08:33:30 PM Jun 24, 20 Radio Std: None Radio Device: BTS	Frequency
Ref Offset 26.6 dl 10 dB/div Ref 40.00 dBn Log						
20.0						Center Freq 782.000000 MHz
10.0	mm	minight	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m		
-10.0	{			North Contraction		
-20.0 -30.0				^~	W.M.M.	
-40.0						CF Step
Center 782 MHz #Res BW 100 kHz	1.000000 MHz Z <u>Auto</u> Man S					
Occupied Bandwidth 4.5288 MHz			Total Power 2		lBm	Freq Offset 0 Hz
Transmit Freq Error 14.169 k				99.0	00 %	
x dB Bandwidth 5.362 M		Hz x dB		-26.00) dB	
MSG				STATUS		

LTE B13_5 M_OBW_Mid_16QAM_FullRB



Agilent Spectrum Analyzer - Occupied BW	<u>11</u>							
Center Freq 782.000000 PASS	RF 50 Ω AC S nter Freq 782.000000 MHz Center f SS #IFGain:Low #IK							Frequency
Ref Offset 26.6 d 10 dB/div Ref 40.00 dBn Log								
30.0								Center Freq 782.000000 MHz
10.0	mmm	n.m.	mm	mmm	~			
-10.0	[J. Wy			
-20.0 -30.0						mm	m.	
-40.0								CF Step
Center 782 MHz #Res BW 100 kHz		#V	/BW 390	kHz			an 10 MHz eep 1 ms	1.000000 MHz
Occupied Bandwidth		Total Power		28.9	28.9 dBm		Freq Offset 0 Hz	
4.	5072 M	HZ						
Transmit Freq Error	16.550 kHz		OBW Power		99	99.00 %		
x dB Bandwidth	x dB Bandwidth 5.315 MHz		x dB		-26.	00 dB		
MSG					STATU	5		

LTE B13_5 M_OBW_Mid_64QAM_FullRB



📕 Agilent Spectrum Analyzer - Occupied BV	V							
RL RF 50 Ω AC Center Freq 782.000000 PASS Ref Offset 26.6 d	₩IFGain:Low	Tains Free Day	82.000000 MHz	ALIGN AUTO	08:48:21 P Radio Std: Radio Dev	energy a	Frequency	
10 dB/div Ref 40.00 dB Log 30.0 20.0	m						Center Fre 782.000000 MH	
10.0 10.0 20.0 30.0					Muntur	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
-40.0 -50.0 Center 782 MHz #Res BW 100 kHz		#VBW	390 kHz			n 10 MHz ep 1 ms	CF Step 1.000000 MHz Auto Man	
Occupied Bandwid	th .5105 MI		tal Power	27.9	dBm		Freq Offse 0 H	
Transmit Freq Error x dB Bandwidth	10.912 I 5.222 N	KHZ OE	W Power		0.00 % 00 dB			
MSG				STATUS	5			

LTE B13_5 M_OBW_Mid_256QAM_FullRB



Je Agilent Spectrum Analyzer - Occupied BW	12						
RL RF 50 Ω AC Center Freq 782.000000 PASS Ref Offset 26.6 d 10 dB/div Ref 40.00 dBr	HFGain:Low	Center Freq: 782 Trig: Free Run #Atten: 20 dB		ALIGN AUTO	08:41:56 PM Ju Radio Std: No Radio Device:	one	Frequency
		w. mm-waland	amenationet	Mangha .			Center Fred 782.000000 MHz
10.0 0.00 -10.0 -20.0 -30.0					mm	ht-show	
-40.0 -50.0 Center 782 MHz #Res BW 200 kHz		#VBW 82	0 kHz		Span 2 Sweep		CF Step 2.000000 MHz <u>Auto</u> Man
Occupied Bandwidt 9.	th 0212 M		Power	30.7	dBm	Freq Off	
Transmit Freq Error x dB Bandwidth	26.407 10.30 M		Power		.00 % 00 dB		
MSG				STATUS			

LTE B13_10 M_OBW_Mid_QPSK_FullRB



J Agilent Spectrum Analyzer - Occupied BV	V							
RL RF 50 Ω AC Center Freq 782.000000 PASS PASS	MHz #IFGain:Low		: 782.000000 N		1 AUTO	08:40:57 Radio Std Radio Dev		Frequency
Ref Offset 26.6 c 10 dB/div Ref 40.00 dB								
20.0								Center Freq 782.000000 MHz
10.0	Junanona	antoria mater	mound	monor				
-10.0	AN .							
-20.0 -30.0					and a start	unalazora	mmm	
-40.0								
-50.0								CF Step 2.000000 MHz
Center 782 MHz #Res BW 200 kHz		#VBW	/ 820 kHz				an 20 MHz eep 1 ms	<u>Auto</u> Man
Occupied Bandwid	th	т	otal Powe	r	29.7	dBm		Freq Offset 0 Hz
9.	.0090 M	Hz						0 H2
Transmit Freq Error	32.225	kHz C	BW Powe	r	99.	.00 %		
x dB Bandwidth	10.65 N	/Hz x	dB		-26.0	00 dB		
MSG					STATUS			

LTE B13_10 M_OBW_Mid_16QAM_FullRB



Agilent Spectrum Analyzer - Occupied BV	<u>r</u>							
RL RF 50 Ω AC Center Freq 782.000000 PASS PASS	₩IFGain:Low	Center F			ALIGN AUTO	Radio St	M Jun 24, 2024 d: None wice: BTS	Frequency
Ref Offset 26.6 c 10 dB/div Ref 40.00 dBi				_	, ,			
20.0								Center Freq 782.000000 MHz
10.0	mann	phones	want	non	-			
0.00 -10.0	/				- long			
-20.0 -30.0 - Amar Mar Market					'n	Wwwww	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
-40.0								
								CF Step 2.000000 MHz
Center 782 MHz #Res BW 200 kHz		#V	BW 8201	kHz			an 20 MHz reep 1 ms	<u>Auto</u> Man
Occupied Bandwid	th		Total P	ower	29.	7 dBm		Freq Offset 0 Hz
9.	0260 M	Hz						UHZ
Transmit Freq Error	12.302	kHz	OBW P	ower	9	9.00 %		
x dB Bandwidth	10.38 M	ИHz	x dB		-26	.00 dB		
MSG					STATU	IS		

LTE B13_10 M_OBW_Mid_64QAM_FullRB



Agilent Spectrum Analyzer - Occupied BW	<u>10</u>						
XI RF 50 g AC Center Freq 782.000000 PASS Ref Offset 26.6 d	#IFGain:Low	Center Freq: 782 Trig: Free Run #Atten: 20 dB		ALIGN AUTO	08:56:06 PM Radio Std: Radio Devid		Frequency
10 dB/div Ref 40.00 dBn Log 30.0 20.0							Center Free 782.000000 MHz
10.0 0.00 -10.0	an Mumm M	Age de transmission de la construcción de la constr	howletwork	h			
20.0 -30.0 mathematication of the second				- Warden	MMMM	limn	
-40.0 -50.0 Center 782 MHz					Spar	1 20 MHz	CF Step 2.000000 MHz Auto Man
#Res BW 200 kHz		#VBW 82	0 kHz			ep 1 ms	
Occupied Bandwidt 9.	th 0029 MI		l Power	27.7	dBm		Freq Offset 0 Hz
Transmit Freq Error	19.918		Power	99	.00 %		
x dB Bandwidth	10.23 N				00 dB		
MSG				STATUS			

LTE B13_10 M_OBW_Mid_256QAM_FullRB



	VF 50 Ω	AC		_	SENSE:	INT		ALIGN AUTO		M Jun 24, 2024	Frequency
enter Freq	5.01500	0000	GHZ PNO: Fast IFGain:Low		g: Free Ro ten: 20 d		#Avg Ty	pe: RMS	TYP	E 1 2 3 4 5 6 E A WWWW ET A A A A A A A	
dB/div R	ef 10.00 d	IBm						M	(r1 3.704 -67.0	4 9 GHz 55 dBm	Auto Tur
og											Center Fre 5.015000000 GH
0.0											Start Fro 30.000000 Mi
0.0 0.0 0.0				1			~~~			RMS	Stop Fre 10.00000000 GF
tart 30 MHz Res BW 1.0	MHz	X	#VE	W 3.0		FUNC		Sweep 17	.33 ms (2	.000 GHz 0001 pts)	CF Ste 997.000000 Mi <u>Auto</u> M
N 1 f 2 N 1 f 3 4 5 5 5 6 6 6 7 8 9 0 0 1 1 1		3.	704 9 GHz 777.8 MHz	-67.0 -3.6	55 dBm 80 dBm						Freq Offs 01
			ļ,					STATU			

LTE B13_5 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



RL	RF	50 Ω A		S	ENSE:INT		ALIGN AUTO		M Jun 24, 2024	
enter F	Freq 5.0	0150000	00 GHz PNO: Fast IFGain:Low			#Avg Typ	e: RMS	TYP	E 1 2 3 4 5 6 E A A A A A A A	Frequency
0 dB/div og r		0.00 dBr	n				Mk	r1 3.695 -67.10	5 5 GHz 63 dBm	Auto Tun
0.00 10.0 20.0										Center Fre 5.015000000 GF
30.0 40.0 50.0										Start Fre 30.000000 MF
50.0 70.0 30.0									RMS	Stop Fre 10.00000000 GF
tart 30 Res BW	1.0 MH		#V ×	BW 3.0 MH:	FUNC		weep 17	.33 ms (2	.000 GHz 0001 pts)	CF Ste 997.000000 Mi <u>Auto</u> Ma
1 N	1 f 1 f		3.695 5 GHz 780.2 MHz	-67.163 c -3.602 c	Bm			101101	E	Freq Offse 0 H
7										
8 9 0 1									-	

LTE B13_5 M_Conducted Spurious(30 M-10 G)_Mid_QPSK_1RB



RL RI	Analyzer - Swept SA F 50 Ω AC		SENSE:INT	ALIGN AUTO	08:37:19 PM Jun 24, 2024	
	5.015000000	PNO: Fast ↔		#Avg Type: RMS	TRACE 1 2 3 4 5 6 TYPE A WWWW DET A A A A A A	Frequency
	ef 10.00 dBm			M	tr1 3.170 6 GHz -67.110 dBm	Auto Tur
						Center Fro 5.015000000 G
).0 .0 .0						Start Fr 30.000000 M
).0).0).0					RMS	Stop Fr 10.000000000 G
art 30 MHz Res BW 1.0		#VB\	V 3.0 MHz	Sweep 17	Stop 10.000 GHz 33 ms (20001 pts)	CF Sto 997.000000 M <u>Auto</u> M
N 1 f 2 N 1 f 3 - - - 5 - - - 6 - - - 7 - - - 9 - - - 0 - - -		170 6 GHz 787.2 MHz	<u>-67.110 dBm</u> -3.259 dBm		F	Freq Offs 0
1 1		ļ	m	STATU	*	

LTE B13_5 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



Agilent Spectrum A	CALIFORNIA CONTRACTOR AND A CALIFORNIA		SENSE:INT		ALIGN AUTO	08:40:47 PM	up 24 2024	
	5.015000000	OGHZ PNO: Fast ↔ IFGain:Low			Type: RMS	TRACE TYPE	1 2 3 4 5 6 A 4 4 A A A A A A A A A A	Frequency
0 dB/div Re	ef 10.00 dBm				Mk	r1 3.707 -67.111	4 GHz dBm	Auto Tur
og 0.00 10.0 20.0								Center Fre 5.015000000 GH
i0.0 .0.0 .0.0								Start Fre 30.000000 Mi
50.0 70.0 30.0							RMS	Stop Fre 10.000000000 GF
tart 30 MHz Res BW 1.0		#VBV	V 3.0 MHz	FUNCTION	Sweep 17	Stop 10.0 .33 ms (200	001 pts)	CF Ste 997.000000 Mi <u>Auto</u> M
1 N 1 f 2 N 1 f 3 - - - 4 - - - 5 - - - 6 - - - 7 - - - 8 - - - 9 - - - 0 - - -	3	.707 4 GHz 778.2 MHz	-67.111 dBm -3.328 dBm					Freq Offs 01
1			m		STATUS	5	F	

LTE B13_10 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



		1							nt Spectrum Anal	
Frequency	PM Jun 24, 2024 CE 1 2 3 4 5 6 PE A 4 4 A A A A A	TRAC	ALIGN AUTO	#Avg Typ	SENSE:INT		PNO: Wide	50 Ω AC 5.000000 N	er Freq 77	ent
Auto Tur	00 MHz 89 dBm	1 776.0	Mkr		0 dB	#Atten: 20	IFGain:Low	set 26.6 dB 6.60 dBm		0 dB
Center Fre 776.000000 MH				\wedge						6.6
Start Fre 772.000000 Mi										.60 .40
Stop Fre 780.000000 Mi	-13.00 dBm									3.4 3.4
CF Ste 800.000 kł <u>Auto</u> Mi	RMS	5	7		1					3.4 - 3.4 -
Freq Offs 01										3.4
	.000 MHz (1001 pts)	Span 8 1.000 s (#Sweep			300 kHz	#VBW		r 776.000 BW 100 kl	
			STATUS							G

LTE B13_5 M_Band Edge_Low_QPSK_1RB



	08:31:30 PM Jun 24, 2024	ALIGN AUTO		SENSE:INT		AC AC	RF 50 Ω	RL
Frequency	TRACE 1 2 3 4 5 0 TYPE A WAYNAWY DET A A A A A A A	e:RMS	#Avg Ty	g: Free Run Iten: 20 dB	NO: Wide	4	eq 776.000	enter F
Auto Tu	1 775.936 MHz -32.244 dBm	Mkr				6 dB Bm	Ref Offset 26.6 Ref 26.60 d) dB/div
Center Fr 776.000000 M								6.6
Start Fr 772.000000 M	RMS		\int					40
Stop Fr 780.000000 M	-13.00 dBm							3.4
CF St 800.000 k <u>Auto</u> M				1	and the state of the			.4
Freq Offs 0								.4
	Span 8.000 MHz 1.000 s (1001 pts)	#Sweep		kHz	#VBW 300		6.000 MHz 100 kHz	
		STATUS						G

LTE B13_5 M_Band Edge_Low_QPSK_FullRB



RL RF SD GLAC Frequency enter Freq 769.000.000 MHz (FGainLow) Trig: Free Run (FGainLow) #Avg Type: RMS Trace Start Ref Offset 26.6 dB Mkr1 774.916 MHz -43.274 dBm Center Fre 769.00000 MH Og Jack Mark Start Fre 763.0000 MHz Ref Offset 26.6 dB Mkr1 774.916 MHz -43.274 dBm Start Fre 769.00000 MH Og Jack Mark Start Fre 763.0000 MHz Center Fre 763.0000 MHz Stop Fre 775.0000 MHz Ref Offset 26.8 dB Mkr1 774.916 MHz -43.274 dBm Og Jack Mark Stop Fre 763.0000 MHz Og Jack Mark Stop Fre 753.0000 MHz Center Fre 763.0000 MHz Stop 775.000 MHz Ref Offset 26.8 dB Stop 775.000 MHz Mark WBW 30 KHz #Sweep 1.000 s (1001 pts)			STATUS			00-R112	# 4 D 4 4		10 1112	G
enter Freq 769.000000 MHz PNO: Wide		op 775.000 MHz 000 s (1001 pts)	S			30 kHz	#VBW			
enter Freq 769.000000 MHz PNO: Wide										
enter Freq 769.000000 MHz PRO: Wide Trig: Free Run #Avg Type: RMS TRACE DE TAAAAAA Mkr1 7774.916 MHz -43.274 dBm Center Fre 769.00000 MH Center Fre 769.00000 MH Start Fre 763.00000 MH Start Fre 763.00000 MH Start Fre 763.00000 MH Start Fre 763.00000 MH Start Fre 765.00000 MH Start Fre 775.00000 MH Matta Matta Start Fre										00
enter Freq 769.000000 MHz PNO: Wide PNO: Wide PNO										0.0
enter Freq 769.000000 MHz Trig: Free Run #Avg Type: RMS Trace 12345 Frequency PNO: Wide mkr1 774.916 MHz Def AAAAAA Auto Tun Ref Offset 26.6 dB Mkr1 774.916 MHz -43.274 dBm Auto Tun 0 dB/div Ref -10.00 dBm -43.274 dBm Center Fre 0.0										0.0.
enter Freq 769.00000 MHz PNO: Wide Trig: Free Run #Atten: 20 dB Mkr1 774.916 MHz -43.274 dBm Center Fre 769.00000 MH Center Fre 769.00000 MH Center Fre 769.00000 MH Center Fre 763.00000 MH Start Fre 763.00000 MH Center Fre 763.00000 MH CF Ste	 A Constant of Constant Action 									5.0
enter Freq 769.00000 MHz PNO: Wide → IFGain:Low Ref Offset 26.6 dB 0 dB/div Ref -10.00 dBm 0 dB/div 0 dB/div				UNIT CONTRACTOR	hard your and hard	salogenters hants	nonatrinonation	and with the set	will mark the second	
enter Freq 769.00000 MHz PNO: Wide IFGain:Low Ref Offset 26.6 dB 0 dB/div Ref -10.00 dBm Center Frequency Center Frequency	775.000000 M			- Constant of the						0.0
enter Freq 769.00000 MHz PNO: Wide IFGain:Low Ref Offset 26.6 dB 0 dB/div Ref -10.00 dBm Center Frequency Mkr1 774.916 MHz -43.274 dBm Center Fre 769.00000 MH Center Fre 769.00000 MH										0.0
enter Freq 769.00000 MHz PNO: Wide → Trig: Free Run IFGein:Low #Atten: 20 dB Mkr1 774.916 MHz -43.274 dBm 00 00 00 00 00 00 00 00 00 0		RA								3.0
enter Freq 769.00000 MHz PNO: Wide IFGain:Low Ref Offset 26.6 dB 0 dB/div Ref -10.00 dBm PNO: Wide IFGain:Low Ref Offset 26.6 dB Center Frequency Auto Tur Center Frequency Center Frequency		-35.00 dBm								
enter Freq 769.000000 MHz PNO: Wide IFGain:Low Trig: Free Run #Atten: 20 dB Mkr1 774.916 MHz -43.274 dBm Center Free Center Free										0.0
enter Freq 769.000000 MHz PNO: Wide IFGein:Low Trig: Free Run #Atten: 20 dB Ref Offset 26.6 dB 0 dB/div Ref -10.00 dBm PG										0.0
enter Freq 769.000000 MHz PNO: Wide → Trig: Free Run IFGain:Low #Atten: 20 dB #Avg Type: RMS TRACE 12 34 5 TYPE A AAAAA Mkr1 774.916 MHZ Auto Tun	Center Fr									^{pg}
enter Freq 769.000000 MHz PNO: Wide +++ IFGain:Low Trig: Free Run #Avg Type: RMS TRACE 12 34 5 Type A A A A A Frequency	Auto Tu	774.916 MHz -43.274 dBm	Mkr					.6 dB dBm	Ref Offset 26 Ref -10.00	dB/div
enter Freq 769.000000 MHz #Avg Type: RMS TRACE 2 3 4 5 Frequency	Auto Tu	DET A A A A A A								
	Frequency	08:31:50 PM Jun 24, 2024					Hz		req 769.000	enter F

LTE B13_5 M_Extended Band Edge_Low_QPSK_FullRB



	88.000 MHz 100 kHz		#VBW	300 kHz		#Sweep	Span 8.00 1.000 s (10	0 MHz 01 pts)	
63.4									
53.4									Freq Offs 0 F
13.4		\sim		M	~			RMS	800.000 kł <u>Auto</u> Ma
33.4	٨	1		1					CF Ste
3.4								-13.00 dBm	Stop Fre 792.000000 Mi
3.40									784.000000 MH
6.60									Start Fre
16.6			Λ						Center Fre 788.000000 MH
0 dB/div	Ref Offset 26 Ref 26.60 c	.6 dB 1 Bm				Mki	1 788.008 -40.693	dBm	Auto Tur
enter F	req 788.000		PNO: Wide ++ IFGain:Low	Trig: Free Ru #Atten: 20 dB		Type: RMS	TRACE 1 TYPE A DET A	2 3 4 5 6 ***********************************	
the second s		AC		SENSE:II		ALIGN AUTO	08:37:05 PM Ju		Frequency

LTE B13_5 M_Band Edge_High_QPSK_1RB



					ctrum Analyzer - Swept SA	
Frequency	08:36:18 PM Jun 24, 2024 TRACE 1 2 3 4 5 6	#Avg Type: RMS	SENSE:INT	1Hz	RF 50 Ω AC req 788.000000 N	RL Center B
			Trig: Free Run #Atten: 20 dB	PNO: Wide		Jenter I
Auto Tun	1 788.016 MHz -32.904 dBm	Mkı			Ref Offset 26.6 dB Ref 26.60 dBm	0 dB/div
Center Fre 788.000000 MH						16.6
Start Fre 784.000000 MH					······································	6.60 3.40
Stop Fre 792.000000 M⊦	-13.00 dBm					13.4 23.4
CF Ste 800.000 kH Auto Ma	RMS		1			33.4
Freq Offs 0 I						3.4
	Span 8.000 MHz 1.000 s (1001 pts)	#Sween	300 kHz	#VBW	88.000 MHz 100 kHz	
		STATUS		# 0.2511		SG

LTE B13_5 M_Band Edge_High_QPSK_FullRB



Frequency	5:37 PM Jun 24, 2024		ALIGN AUTO		SENSE:INT		&F 50 Ω AC	Agilent Spectru R L
	TYPE A WWWW DET A A A A A A		Type: RMS	#Avg	Free Run n: 20 dB	PNO: Wide Irig: -	799.000000 N	enter Fre
Auto Tur	3.012 MHz 4.572 dBm	1 79: -54	Mk				ef Offset 26.6 dB ef -10.00 dBm	
Center Fre 799.000000 MH								0.0
Start Fre 793.000000 MF	-35.00 dBm							0.0
Stop Fre 805.000000 MH						Mitrad Rayment	walname and the second	0.0 1
CF Ste 1.200000 Mi <u>Auto</u> Mi	RMS Sundhiebernnetenentenentenente	atten attende		mangenering	enelihenton	Nan-dergenisadinestradinestradionis-unio		0.0
Freq Offs 0								0.0
	805.000 MHz s (1001 pts)	Stop 8	#Sweep		lz	#VBW 30 kH;		tart 793.00 Res BW 1
	(1000 p(0))		STATUS					G

LTE B13_5 M_Extended Band Edge_High_QPSK_FullRB



-	:40:33 PM Jun 24, 2024	08:4	LIGN AUTO		SE:INT	SEN		2 AC	RF 50	RL
Frequency	TRACE 1 2 3 4 5 6 TYPE A WANNA DET A A A A A A			#Avg Typ	Run	-	PNO: Wide		req 776.00	enter F
Auto Tui	73.216 MHz 44.127 dBm	r1 77 -4	Mki						Ref Offset 2 Ref 26.60) dB/div
Center Fre 776.000000 Mi										6.6
Start Fr 772.000000 M										40
Stop Fr 780.000000 M	-13.00 dBm									3.4
CF Ste 800.000 k Auto M	A	Lee	6	yun d	\sim				↓ ¹	3.4
Freq Offs 0					~	~		~		3.4
	oan 8.000 MHz 00 s (1001 pts)	Sp: 1.00	#Sweep			300 kHz	#VBW		6.000 MHz 100 kHz	enter 77
		s	STATUS							G

LTE B13_10 M_Band Edge_Low_QPSK_1RB



	ctrum Analyzer - Swept							
RL		AC		SENSE:INT	ALIGN		:39:49 PM Jun 24, 2024	Frequency
Center F	req 776.000	000 M	PNO: Wide	Trig: Free Run	#Avg Type: RM	5	TRACE 1 2 3 4 5 6 TYPE A WWWWW	
			IFGain:Low	#Atten: 20 dB			DETAAAAAA	
	Ref Offset 26.6	S AD				Mkr1 7	75.968 MHz	Auto Tune
10 dB/div	Ref 26.60 dl	Bm				-	34.565 dBm	
^{og}								
								Center Free
16.6								776.000000 MH
6.60							RMS	Start Fred
							~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	772.000000 MH
-3.40								772.000000 WH:
							-13.00 dBm)	
-13.4							-13.00 dbm	Stop Free
								780.000000 MH
-23.4								
				1	and the second s			CF Step
-33.4			All and a second second					800.000 kH
		- marine						Auto Mar
-43.4								
								Freq Offse
-53.4								0 Hi
63.4								
Contor 77	6.000 MHz						an 8.000 MHz	
#Res BW			#VBW	300 kHz	#Sw	veep 1.00	00 s (1001 pts)	
ISG			<i>"</i>	5 4 4 H H		STATUS	(reer pro)	
100						STATUS		

# LTE B13_10 M_Band Edge_Low_QPSK_FullRB



-100						0 H;
90.0						Freq Offse
80.0						<u>Auto</u> Ma
پلندي. 70.0	anna an	n an	Service and an address of the service of the servic			CF Ste 1.200000 MH
50.0				and the second s	<u> </u>	775.000000 MH
50.0				and the second s	non all worth of the state of the state of the	Stop Fre
40.0						763.000000 MH
30.0					-35.00 dBm	Start Fre
20.0						769.000000 MH
.og						Center Fre
0 dB/div	Ref Offset 26.6 Ref -10.00 df			M	r1 774.796 MHz -45.261 dBm	Auto Tun
	_	PNO: Wide	Trig: Free Run #Atten: 20 dB			Auto Tu
enter	Freq 769.0000	00 MHz	SENSE:INT	#Avg Type: RMS	08:40:08 PM Jun 24, 2024 TRACE 1 2 3 4 5 6	Frequency

# LTE B13_10 M_Extended Band Edge_Low_QPSK_FullRB



Ereguenev	M Jun 24, 2024		ALIGN AUTO		NSE:INT	SE		AC	RF 50 Ω	RL
Frequency	E 1 2 3 4 5 6 E A MMMM T A A A A A A	TYP	e: RMS	#Avg Ty		Trig: Free #Atten: 2	Z NO: Wide ↔ Gain:Low		q 788.000	enter Fi
Auto Tur	88 MHz 93 dBm	1 788.0 -45.6	Mkr					6 dB Bm	Ref Offset 26. Ref 26.60 d	) dB/div
Center Fre 788.000000 Mi										6.6
Start Fr 784.000000 M										40
Stop Fre 792.000000 M	-13.00 dBm									3.4
CF Sto 800.000 k Auto M					<b>↓</b> 1	5		m/	$\sim$	.4
Freq Offs 0	RMS	~								0.4
	.000 MHz 1001 pts)	Span 8 1.000 s (	#Sweep			300 kHz	#VBW		000 MHz 00 kHz	enter 78 Res BW
			STATUS							3

### LTE B13_10 M_Band Edge_High_QPSK_1RB



	100 pr.5/		STATUS				<i>"</i> 1.511			G
	.000 MHz 1001 pts)	Span 8	#Sweep		,	300 kHz	#VBW		8.000 MHz 100 kHz	enter 78 Res BW
										3.4
Freq Offs 0										3.4
										3.4
800.000 k Auto M	RMS	and and a stand of the stand of	*****	and the second	and the second second					
CF St					<b>♦</b> ¹	- and				3.4
792.000000 M										.4
Stop Fr	-13.00 dBm									3.4
										40
Start Fr 784.000000 M									6-4-4-6-2-2-2-4-9-4	
										.60
788.000000 M										5.6
Center Fr										^{og}
	24 MHz 46 dBm	-33.3	MK					6.6 dB <b>dBm</b>	Ref Offset 2 Ref 26.60	) dB/div
Auto Tu	AAAAA	DE				#Atten: 2	PNO: Wide			
Frequency	E 1 2 3 4 5 6 E A WWWW	TRAC	pe: RMS	#Avg T			IHz		req 788.00	enter F
	M Jun 24, 2024	08:43:11 P	ALIGN AUTO		INSE:INT	SE		2 AC	RF 50 9	RL

### LTE B13_10 M_Band Edge_High_QPSK_FullRB



	(1001 pts)		#Sweep			JU KHZ	#VBW		UKHZ	Res BW
	.000 MHz	Stop 805	#Oween			20 64-	#\/B\M		00 MHz	
										100
Freq Offs										0.0
										0.0
1.200000 MI Auto Mi										
CF Ste	RMS	Lakendranisku	-	winderstandigenergy						0.0
803.000000 Mil					in the contract of the contrac		Yelevila Beneriki sederika			0.0
Stop Fre 805.000000 MI							mana	frequences		0.0
									~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
793.000000 MI										0.0
Start Fre	-35.00 dBm									0.0
799.000000 MI										0.0
Center Fre										
	67 dBm	-47.6						dBm	Ref Offset 26. Ref -10.00) dB/div
Auto Tu	56 MHz		Mkr		0 dB	#Atten: 2	FGain:Low		D. 6 0 0 0 0 0	
riequency		TYP	e: RMS	#Avg Ty		Trig: Fre	PNO: Wide +++	3	eq 799.000	enter F
Frequency	PM Jun 24, 2024		ALIGN AUTO		NSE:INT	36		AC	RF 50 Ω	RL

LTE B13_10 M_Extended Band Edge_High_QPSK_FullRB



10. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2407-FC055-P