

# **TEST REPORT**

FCC LTE B5 Test for TM19FNNAHD4 Certification

APPLICANT LG Electronics Inc.

REPORT NO. HCT-RF-2411-FC008

DATE OF ISSUE December 6, 2024

> **Tested by** Jae Ryang Do

Technical Manager Jong Seok Lee



F-TP22-03(Rev.06)

1/112

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HCT CO.,LTD. 2-6, 73, 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea Tel. +82 31 645 6300 Fax. +82 31 645 6401

REPORT NO. HCT-RF-2411-FC008 DATE OF ISSUE December 06, 2024	
<b>LG Electronics Inc.</b> 128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Republic of Korea	
Telematics TM19FNNAHD4	
October 07, 2024 ~ December 05, 2024	
BEJTM19FNNAHD4	
■ Permanent Testing Lab □ On Site Testing (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)	
on: PCB Licensed Transmitter (PCB)	
FCC Rule Part: §22	
PASS	



## **REVISION HISTORY**

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

Revision No.	Date of Issue	Description
0	December 06, 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 \*\*\*.

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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:	LG Electronics Inc.			
Address:	128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Republic of Korea			
FCC ID:	BEJTM19FNNAHD4			
Application Type:	Certification			
FCC Classification:	PCB Licensed Transmitter (PCB)			
FCC Rule Part(s):	§ 22			
EUT Type:	Telematics			
Model(s):	TM19FNNAHD4			
	824.7 MHz – 848.3 MHz (LTE – Band 5 (1.4 MHz))			
Tx Frequency:	825.5 MHz – 847.5 MHz (LTE – Band 5 (3 MHz)) 826.5 MHz – 846.5 MHz (LTE – Band 5 (5 MHz))			
	829.0 MHz – 844.0 MHz (LTE – Band 5 (10 MHz))			
Date(s) of Tests:	October 07, 2024 ~ December 05, 2024			
Contal numbers	Radiated : Honda MY26 #03			
Serial number:	Conducted : Honda MY26 #01			
External Antenna Serial number:	8B505-3NAF-A000 : C03640005			
Antenna Information	Please refer to the Antenna Approval Specification document.			



## **1.1. MAXIMUM OUTPUT POWER**

Mada	Modo Ty Fraguancy Emi			<b>Conducted Output Power</b>		
Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	Max. Power (W)	Max. Power (dBm)	
		1M09G7D	QPSK	0.191	22.81	
	004 7 040 0	1M09W7D	16QAM	0.169	22.27	
LTE – Band5 (1.4)	824.7 – 848.3	1M09W7D	64QAM	0.128	21.08	
		1M09W7D	256QAM	0.067	18.27	
		2M71G7D	QPSK	0.191	22.81	
		2M70W7D	16QAM	0.166	22.19	
LTE – Band5 (3)	825.5 – 847.5	2M71W7D	64QAM	0.127	21.05	
		2M70W7D	256QAM	0.069	18.37	
		4M51G7D	QPSK	0.194	22.88	
		4M49W7D	16QAM	0.172	22.35	
LTE – Band5 (5)	826.5 – 846.5	4M50W7D	64QAM	0.131	21.16	
		4M50W7D	256QAM	0.069	18.37	
		8M96G7D	QPSK	0.191	22.82	
	000 0 044 0	8M96W7D	16QAM	0.177	22.47	
LTE – Band5 (10)	829.0 – 844.0	8M95W7D	64QAM	0.128	21.08	
		8M96W7D	256QAM	0.072	18.57	



## 2. INTRODUCTION

## **2.1. DESCRIPTION OF EUT**

The EUT was a Telematics with LTE, Sub 6.

## 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, Republic of Korea



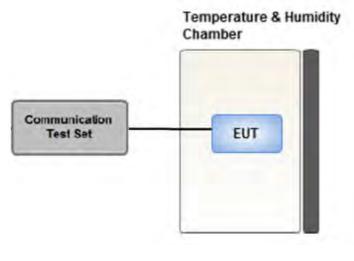
## **3. DESCRIPTION OF TESTS**

## **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	- KDB 971168 D01 v03r01 - Section 5.2.4 - ANSI C63.26-2015 - Section 5.2.1 & 5.2.4.2
Peak- to- Average Ratio	- KDB 971168 D01 v03r01 – Section 5.7 - ANSI C63.26-2015 – Section 5.2.3.4
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Radiated Power	- ANSI C63.26-2015 – Section 5.2.4.4 - KDB 971168 D01 v03r01 – Section 5.8
Radiated Spurious and Harmonic Emissions	- ANSI C63.26-2015 – Section 5.5.3 - KDB 971168 D01 v03r01 – Section 5.8



## **3.2 CONDUCTED OUTPUT POWER**



#### Test setup

## **Test Overview**

When an average power meter is used to perform RF output power measurements, the fundamental

condition that measurements be performed only over durations of active transmissions at maximum output power level applies.

Conducted Output Power was tested in accordance with KDB971168 D01 Power Meas License Digital Systems v03r01, Section 5.2.



## **3.3 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.

## **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.



#### **3.4 RADIATED SPURIOUS EMISSIONS**

#### **Test Overview**

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method.

#### **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 10<sup>th</sup> 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)

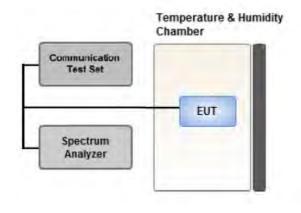
Where: Pg is the generator output power into the substitution antenna.

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

EIRP (dBm) = ERP (dBm) + 2.15



#### 3.5 PEAK- TO- AVERAGE RATIO



#### Test setup

#### ① CCDF Procedure for PAPR

#### **Test Settings**

- 1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
- 2. Set the number of counts to a value that stabilizes the measured CCDF curve;
- 3. Set the measurement interval as follows:
  - .- for continuous transmissions, set to 1 ms,
  - .- or burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
- 4. Record the maximum PAPR level associated with a probability of 0.1 %.

#### **②** Alternate Procedure for PAPR

Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as as P Pk.

Use one of the applicable procedures presented 5.2(ANSI C63.26-2015) to measure the total average power and record as P  $_{Avg}$ . Determine the P.A.R. from:

 $P.A.R_{(dB)} = P_{Pk(dBm)} - P_{Avg(dBm)} (P_{Avg} = Average Power + Duty cycle Factor)$ 



#### **Test Settings(Peak Power)**

The measurement instrument must have a RBW that is greater than or equal to the OBW of the

signal to be measured and a VBW  $\geq$  3 × RBW.

- 1. Set the RBW  $\geq$  OBW.
- 2. Set VBW  $\geq$  3 × RBW.
- 3. Set span  $\geq$  2 × OBW.
- 4. Sweep time  $\geq$  10 × (number of points in sweep) × (transmission symbol period).
- 5. Detector = peak.
- 6. Trace mode = max hold.
- 7. Allow trace to fully stabilize.
- 8. Use the peak marker function to determine the peak amplitude level.

#### Test Settings(Average Power)

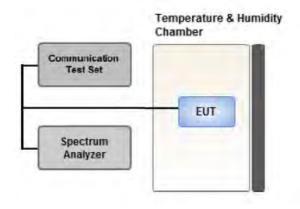
- 1. Set span to 2 × to 3 × the OBW.
- 2. Set RBW  $\geq$  OBW.
- 3. Set VBW  $\geq$  3 × RBW.
- 4. Set number of measurement points in sweep  $\geq 2 \times \text{span} / \text{RBW}$ .
- 5. Sweep time:
  - Set  $\geq$  [10 × (number of points in sweep) × (transmission period)] for single sweep

(automation-compatible) measurement. The transmission period is the (on + off) time.

- 6. Detector = power averaging (rms).
- 7. Set sweep trigger to "free run."
- 8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. (To accurately determine the average power over the on and off period of the transmitter, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.)
- 9. Use the peak marker function to determine the maximum amplitude level.
- 10. Add [10 log (1/duty cycle)] to the measured maximum power level to compute the average power during continuous transmission. For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is a constant 25 %.



## **3.6 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

#### **Test Settings**

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



## Communication Test Set EUT Spectrum Analyzer

#### 3.7 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



#### **Test Overview**

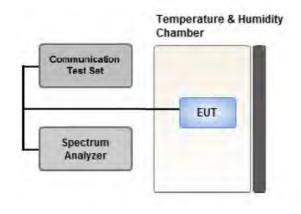
The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured 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.

#### **Test Settings**

- 1. RBW = 1 MHz
- 2. VBW  $\geq$  3 MHz
- 3. Detector = Peak
- 4. Trace Mode = Max Hold
- 5. Sweep time = auto
- 6. Number of points in sweep  $\geq 2 \times \text{Span} / \text{RBW}$



#### 3.8 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.

#### **Test Settings**

- 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 >  $3 \times RBW$
- 5. Detector = RMS
- 6. Number of sweep points  $\geq 2 \times \text{Span/RBW}$
- 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.



## Communication Test Set EUT Spectrum Analyzer

#### 3.9 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.

#### **Test Settings**

- 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.





## 3.10 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.
- 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.
- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth results are reported. (Worst case : 3 MHz(External Antenna), 10 MHz(Internal Antenna) )
- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data.

Test Description	Modulation	RB size	RB offset	Axis
	QPSK,			
	16QAM,	66.	Z	
Effective Radiated Power	64QAM,	See Section 8.2.1		
	256QAM			
Radiated Spurious and Harmonic Emissions	QPSK	See Sec	tion 8.3.1	Z

#### [External Antenna Worst case]

[Internal	Antenna	Worst	case ]	

Test Description	Modulation	RB size	RB offset	Axis
	QPSK,			
Effective Radiated Power	16QAM,	6 6	tion 0 0 0	x
	64QAM,	See Sec	See Section 8.2.2	
	256QAM			
Radiated Spurious and Harmonic Emissions	QPSK	See Sec	tion 8.3.2	Х



## 3.11 WORST CASE(CONDUCTED TEST)

- All modes of operation were investigated and the worst case configuration results are reported.

	[ Worst	case ]			
Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
	QPSK,				
Occupied Bandwidth	16QAM,	1.4, 3, 5, 10	Mid	Full RB	0
	64QAM,	1.4, 5, 5, 10	MIU	FUILKD	U
	256QAM				
	QPSK,				
Peak-To-Average Ratio	16QAM,	1.4, 3, 5, 10	Mid	Full RB	0
reak-10-Average Katio	64QAM,	1.4, 5, 5, 10	MIU	Full KD	0
	256QAM				
		1.4	Low	1	0
			High	1	5
		3	Low	1	0
			High	1	14
Deed Edge	000	_	Low	1	0
Band Edge	QPSK	5	High	1	24
		10	Low	1	0
		10	High	1	49
		140510	Low,		_
		1.4, 3, 5, 10	High	Full RB	0
Sourious and Harmonic Emissions at			Low,		
Spurious and Harmonic Emissions at Antenna Terminal	QPSK	1.4, 3, 5, 10	Mid,	1	0
			High		



## 4. LIST OF TEST EQUIPMENT

Equipment	Model	Manufacture	Serial No.	Due to Calibration	Calibration Interval
RF Switching System	Switch box(1.2 G HPF+LNA)	HCT CO., LTD.,	F1L1	11/11/2025	Annual
RF Switching System	Switch box(3.3 G HPF+LNA)	HCT CO., LTD.,	F1L2	11/11/2025	Annual
RF Switching System	Switch box(LNA)	HCT CO., LTD.,	F1L4	11/11/2025	Annual
RF Switching System	Switch box(6 G HPF+LNA)	HCT CO., LTD.,	F1L7	11/11/2025	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	5001	04/17/2025	Annual
DC Power Supply	E3632A	Agilent	MY40010147	08/06/2025	Annual
Dipole Antenna	UHAP	Schwarzbeck	01274	03/10/2026	Biennial
Dipole Antenna	UHAP	Schwarzbeck	01288	08/07/2026	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	09/20/2026	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	08/06/2025	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/05/2025	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/07/2026	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	895	08/28/2026	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	1135	08/19/2026	Biennial
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262094331	11/13/2025	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6201026545	12/11/2024	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	07/26/2025	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, § 22.917(a)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Conducted Output Power	§ 2.1046	N/A	PASS
Peak- to- Average Ratio	§ 22.913(d)	< 13 dB	PASS
Frequency stability / variation of ambient temperature	§ 2.1055, § 22.355	< 2.5 ppm	PASS

## 6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Effective Radiated Power	§ 22.913(a)(5)	< 7 Watts max. ERP	PASS
Radiated Spurious and Harmonic	§ 2.1053,	< 43 + 10log10 (P[Watts]) for	DACC
Emissions	§ 22.917(a)	all out-of band emissions	PASS



## 7. SAMPLE CALCULATION

#### 7.1 ERP Sample Calculation

Ch.	/ Freq.	Measured	Substitute	Ant. Gain	<u> </u>	Del	EF	RP
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.	/ Freq.	Measured	Substitute	Ant. Gain	C I	Pol.	EIRP		
channel	Freq.(MHz)	Level (dBm)	Level (dBm)	(dBi)	C.L	P01.	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

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## 8. TEST DATA

## 8.1 Conducted Output Power

	Modulation		RB	Max.	Average Power (	dBm)	Target	Target
Bandwidth	Modulation	RB SIZE	Offset	20407	20525	20643	- MPR	Power
				824.7 MHz	836.5 MHz	848.3 MHz	(dB)	
		1	0	22.73	22.61	22.71	0	23
		1	3	22.81	22.75	22.76	0	23
		1	5	22.72	22.72	22.65	0	23
	QPSK	3	0	22.67	22.68	22.71	1	22
		3	1	22.80	22.70	22.72	1	22
		3	3	22.70	22.68	22.67	1	22
		6	0	21.75	21.84	21.74	1	22
		1	0	22.07	22.26	21.91	1	22
		1	3	22.18	22.27	22.20	1	22
		1	5	22.08	22.02	22.04	1	22
	16QAM	3	0	21.91	21.86	21.95	2	21
	3         1         21.98           3         3         21.89	3	1	21.98	21.99	21.91	2	21
		21.89	21.90	21.91	2	21		
1 4 1 4 1		6	0	20.80	20.84	20.84	2	21
1.4 MHz		1	0	20.89	20.89	20.94	2	21
		1	3	21.04	21.08	20.98	2	21
		1	5	20.97	20.78	20.77	2	21
	64QAM	3	0	20.89	20.80	20.87	2	21
		3	1	20.91	20.81	20.86	2	21
		3	3	20.88	20.81	20.72	2	21
		6	0	19.87	19.79	19.74	3	20
		1	0	18.23	18.03	18.17	5	18
		1	3	18.18	18.27	18.06	5	18
		1	5	18.08	18.09	18.03	5	18
	256QAM	3	0	18.19	18.16	18.19	5	18
		3	1	18.22	18.19	18.21	5	18
		3	3	18.17	18.14	18.13	5	18
		6	0	18.04	18.02	18.05	5	18



<b>B</b>			RB	Max.	Average Power (	dBm)	Target	Target
Bandwidth	Modulation	RB SIZE	Offset	20415	20525	20635		Power
				825.5 MHz	836.5 MHz	847.5 MHz	- (ab)	
		1	0	22.81	22.80	22.75	0	23
		1	7	22.69	22.81	22.75	0	23
		1	14	22.69	22.79	22.68	0	23
	QPSK	8	0	21.97	21.86	21.78	1	22
		8	3	21.89	21.84	21.84	1	22
		8	7	21.86	21.81	21.82	1	22
		15	0	21.90	21.83	21.82	1	22
		1	0	22.19	22.06	22.18	1	22
		1	7	22.09	22.19	22.17	1	22
		1	14	22.02	22.04	21.91	1	22
	16QAM	8	0	20.92	20.95	20.92	2	21
		8	3         0         20.92         20.95         20.92           3         3         20.95         20.95         20.84	2	21			
		8	7	20.89	20.90	22.18       1         22.17       1         21.91       1         20.92       2         20.84       2         20.86       2         20.89       2         20.90       2         20.92       2         20.89       2         20.90       2         20.92       2         20.92       2	21	
2 141		15	0	20.95	20.92	20.89	MPR       T         5 $MPR$ P         5       0       0         5       0       0         5       0       0         5       0       0         5       0       0         5       0       0         5       0       0         6       0       0         6       0       0         7       1       1         2       1       1         2       1       1         2       1       1         2       1       1         2       2       1         4       1       1         2       2       1         5       2       2         6       2       2         6       3       3         6       3       3         6       5       1         7       5       5         6       5       1         7       5       5         6       5       1         7       5       5	21
3 MHz		1	0	21.05	20.99	20.90	2	21
		1	7	20.79	21.00	20.92	2	21
		1	14	20.93	21.05	20.82	2	21
	64QAM	8	0	19.88	19.89	19.85	3	20
		8	3	19.98	19.90	19.88	3	20
		8	7	19.95	19.81	19.84	3	20
		15	0	19.94	19.81	19.76	3	20
		1	0	18.25	18.36	18.25	5	18
		1	7	18.20	18.37	18.34	5	18
		1	14	18.26	18.19	18.20	5	18
	256QAM	8	0	18.21	18.17	18.14	5	18
		8	3	18.22	18.18	18.09	5	18
		8	7	18.17	18.20	18.12	5	18
		15	0	18.18	18.13	18.09	5	18



<b>D</b>	Madulation		RB	Max.	Average Power (	dBm)	Target	Target
Bandwidth	Modulation	RB Size	Offset	20425	20525	20625		Power
				826.5 MHz	836.5 MHz	846.5 MHz	– (ab)	
		1	0	22.79	22.88	22.86	0	23
		1	12	22.75	22.77	22.83	0	23
		1	24	22.75	22.74	22.73	0	23
	QPSK	12	0	21.91	21.88	21.85	1	22
		12	6	21.93	21.87	21.77	1	22
		12	11	21.84	21.89	21.80	1	22
		25	0	21.91	21.83	21.90	1	22
		1	0	22.35	22.20	22.15	1	22
		1	12	22.15	22.11	22.12	1	22
		1	24	22.06	22.11	22.08	1	22
	16QAM	12	0	20.94	20.97	20.93	2	21
		12	6	20.99	20.95	20.89	2	21
		12	11	20.93	20.90	20.94	2	21
		25	0	20.98	20.92	20625         MPR (dB)         T (dB)           846.5 MHz         0         1           22.86         0         1           22.83         0         1           22.73         0         1           21.85         1         1           21.85         1         1           21.80         1         1           21.80         1         1           22.12         1         1           22.15         1         1           22.08         1         1           20.93         2         1           20.89         2         1	21	
5 MHz		1	0	21.16	21.11	20.50	2	21
		1	12	20.94	20.88	21.00	2	21
		1	24	21.03	21.06	20.63	2	21
	64QAM	12	0	19.90	19.90	19.58	3	20
		12	6	19.87	19.91	19.85	3	20
		12	11	19.86	19.90	19.82	3	20
		25	0	19.88	19.84	19.71	3	20
		1	0	18.37	18.22	18.21	5	18
		1	12	18.18	18.24	18.19	5	18
		1	24	18.23	18.35	18.23	5	18
	256QAM	12	0	18.34	18.22	18.19	5	18
		12	6	18.26	18.15	18.18	5	18
		12	11	18.24	18.13	18.14	5	18
		25	0	18.31	18.13	18.11	2 2 2 3 3 3 3 3 3 3 3 3 5 5 5 5 5 5 5 5	18



5 1 1 1			RB	Max.	Average Power (	dBm)	Target	Target
Bandwidth	Modulation	RB SIZE	Offset	20450	20525	20600	MPR	Power
				829 MHz	836.5 MHz	844 MHz	(dB)	
		1	0	22.82	22.78	22.81	0	23
		1	24	22.56	22.72	22.52	0	23
		1	49	22.78	22.68	22.69	0	23
	QPSK	25	0	21.88	21.95	21.91	1	22
		25	12	21.95	21.88	21.82	1	22
		25	24	21.85	21.85	21.82	1	22
		50	0	21.94	21.91	21.91	1	22
		1	0	22.18	22.21	22.27	1	22
		1	24	22.07	22.47	22.17	1	22
		1	49	22.12	22.01	22.17	1	22
	16QAM	25	0	20.89	20.93	20.99	2	21
		25	12	20.94	20.90	20.88	2	21
		25	24	20.94 20.90 20.88 2	21			
10 MU		50	0	20.90	20.85	20.91	844 MHz         (dB)           22.81         0           22.52         0           22.69         0           21.91         1           21.82         1           21.82         1           21.82         1           21.91         1           22.17         1           22.17         1           20.99         2           20.88         2           20.82         2	21
10 MHz		1	0	21.02	20.92	21.08	2	21
		1	24	20.99	21.03	20.60	2	21
		1	49	20.97	20.83	20.86	2	21
	64QAM	25	0	19.90	19.88	19.82	3	20
		25	12	19.95	19.87	19.54	3	20
		25	24	19.85	19.94	19.73	3	20
		50	0	19.89	19.88	19.88	3	20
		1	0	18.33	18.25	18.19	5	18
		1	24	18.22	18.26	18.30	5	18
		1	49	18.57	18.22	18.25	5	18
	256QAM	25	0	18.27	18.21	18.25	.25 5	18
		25	12	18.37	18.29	18.29	5	18
		25	24	18.25	18.30	18.08	5	18
		50	0	18.32	18.19	18.28	5	18



#### **8.2 EFFECTIVE RADIATED POWER**

## 8.2.1 External Antenna

Frog	Mod/		Measured	Substitute				Limit	EF	RP	RB	
Freq (MHz)	Mod/ Bandwidth	Modulation	Level (dBm)	Level (dBm)	Ant. Gain(dBd)	C.L	Pol	w	W	dBm	Size	Offset
		QPSK	-30.87	31.45	-10.24	1.44	V		0.095	19.77		
0247		16-QAM	-31.57	30.75	-10.24	1.44	V		0.081	19.07	1	2
824.7	324.7	64-QAM	-32.59	29.73	-10.24	1.44	V		0.064	18.05		3
		256-QAM	-35.62	26.70	-10.24	1.44	V		0.032	15.02		
		QPSK -30.35 32.07 -10.18 1.45 V 0.111 20.44	20.44									
026 5	LTE B5	16-QAM	-31.00	31.42	-10.18	1.45	V	- 7.00	0.095	19.79	- 1	0
836.5	(1.4 MHz)	64-QAM	-32.02	30.40	-10.18	1.45	V	< 7.00	0.075	18.77		0
		256-QAM	-35.05	27.37	-10.18	1.45	V		0.037	15.74		
		QPSK	-31.88	30.81	-10.12	1.45	V		0.084	19.24		
040.2		16-QAM	-32.57	30.12	-10.12	1.45	V		0.072	18.55	1	0
848.3		64-QAM	-33.82	28.87	-10.12	1.45	V		0.054 1	17.30	1	0
		256-QAM	-36.60	26.09	-10.12	1.45	V		0.028	14.52	2	

Frog	Mod/		Measured	Substitute	Ant			Limit	EF	RP	R	В	
Freq (MHz)	Bandwidth	Modulation	Level (dBm)	Level (dBm)	Ant. Gain(dBd)	C.L	Pol	w	w	dBm	Size	Offset	
		QPSK	-30.60	31.76	-10.24	1.44	V		0.102	20.08			
825.5		16-QAM	-31.25	31.11	-10.24	1.44	V		0.088	19.43	1	14	
825.5		64-QAM	-32.43	29.93	-10.24	1.44	V		0.067	18.25	T	14	
		256-QAM	-35.42	26.94	-10.24	1.44	V		0.034	15.26			
		QPSK	-30.19	32.23	-10.18	1.45	V		0.115	20.60			
02C F	LTE B5	16-QAM	-30.82	31.60	-10.18	1.45	V	< 7.00	0.099	19.97	1	0	
836.5	(3 MHz)	64-QAM	-31.91	30.51	-10.18	1.45	V	< 7.00	0.077	18.88	1	0	
		256-QAM	-34.95	27.47	-10.18	1.45	V		0.038	15.84			
		QPSK	-31.53	31.19	-10.12	1.45	V		0.092	19.62	2		
047 5		16-QAM	-32.23	30.49	-10.12	1.45	V		0.078	18.92	1	0	
847.5	_	64-QAM	-33.66	29.06	-10.12	1.45	V		0.056		_	0	
		256-QAM	-36.34	26.38	-10.12	1.45	V		0.030	14.81			

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Frog	Mod/		Measured	Substitute				Limit	El	RP	R	B
Freq (MHz)	Mou/ Bandwidth	Modulation	Level (dBm)	Level (dBm)	Ant. Gain(dBd)	C.L	Pol	W	w	dBm	Size	Offset
		QPSK	-30.41	32.00	-10.23	1.44	V		0.108	20.33		
00C F		16-QAM	-31.10	31.31	-10.23	1.44	V		0.092	19.64	- 1	24
826.5		64-QAM	-32.21	30.20	-10.23	1.44	V		0.071	18.53	T	24
		256-QAM	-35.20	27.21	-10.23	1.44	V		0.036	15.54	.54	
		QPSK	-30.20	32.22	-10.18	1.45	V		0.115	20.59	- 1	
02C F	LTE B5	16-QAM	-30.78	31.64	-10.18	1.45	V	- 7 00	0.100	20.01		0
836.5	(5 MHz)	64-QAM	-31.93	30.49	-10.18	1.45	V	< 7.00	0.077	18.86		0
		256-QAM	-34.95	27.47	-10.18	1.45	V		0.038	15.84		
		QPSK	-31.21	31.55	-10.13	1.45	V		0.099	19.97		
046 5		16-QAM	-31.87	30.89	-10.13	1.45	V		0.085	19.31	1	0
846.5		64-QAM	-32.93	29.83	-10.13	1.45	V		0.067	18.25	1	0
		256-QAM	-35.97	26.79	-10.13	1.45	V		0.033	15.21		

From	Mod/		Measured	Substitute	Ant			Limit	El	RP	RB	
Freq (MHz)	Mod/ Bandwidth	Modulation	Level (dBm)	Level (dBm)	Ant. Gain(dBd)	C.L	Pol	w	w	dBm	Size	Offset
		QPSK	-30.29	32.07	-10.22	1.44	V		0.110	20.41	- 1	
020		16-QAM	-30.85	31.51	-10.22	1.44	V		0.097	19.85		40
829		64-QAM	-32.09	30.27	-10.22	1.44	V		0.073	18.61	49	
		256-QAM	-35.03	27.33	-10.22	1.44	V		0.037	15.67		
	]	QPSK	-30.34	32.08	-10.18	1.45	V		0.111	20.45		
026 F	LTE B5	16-QAM	-30.95	31.47	-10.18	1.45	V	~ 7 00	0.096	19.84	1	
836.5	(10 MHz)	64-QAM	-32.13	30.29	-10.18	1.45	V	< 7.00	0.073	18.66	1	0
		256-QAM	-35.18	27.24	-10.18	1.45	V		0.036	15.61		
		QPSK	-30.53	32.11	-10.14	1.45	V		0.113	20.52		
044.0		16-QAM	-31.07	31.57	-10.14	1.45	V		0.100	19.98		
844.0		64-QAM	-32.29	30.35	-10.14	1.45	V		0.075	18.76	1	0
		256-QAM	-35.38	27.26	-10.14	1.45	V		0.037	15.67		

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## 8.2.2 Internal Antenna

Frog	Mod/		Measured	Substitute	Ant.			Limit	ERP		RB	
Freq (MHz)	Bandwidth	Modulation	Level (dBm)	Level (dBm)	Gain(dBd)	C.L	Pol	w	w	dBm	Size	Offset
824.7		QPSK	-28.46	33.86	-10.24	1.44	V		0.165	22.18		0
		16-QAM	-29.15	33.17	-10.24	1.44	V		0.141	21.49	1	
824.7		64-QAM	-30.17	32.15	-10.24	1.44	V		0.111	20.47	-	
		256-QAM	-33.22	29.10	-10.24	1.44	V		0.055	17.42		
		QPSK	-28.60	33.82	-10.18	1.45	V		0.166	22.19	- 1	0
00C E	LTE B5	16-QAM	-29.25	33.17	-10.18	1.45	V		0.143	21.54		
836.5	(1.4 MHz)	64-QAM	-30.25	32.17	-10.18	1.45	V	< 7.00	0.113	20.54		
		256-QAM	-33.15	29.27	-10.18	1.45	V		0.058	17.64		
		QPSK	-29.30	33.39	-10.12	1.45	V		0.152	21.82		
040.2		16-QAM	-29.94	32.75	-10.12	1.45	V	-	21.18	1		
848.3		64-QAM	-31.23	31.46	-10.12	1.45	V		0.097	19.89	1	0
		256-QAM	-33.97	28.72	-10.12	1.45	V		0.052	17.15		

Frog	Mod/		Measured	Substitute	Ant			Limit	El	RP	RB	
Freq (MHz)	Bandwidth	Modulation	Level (dBm)	Level (dBm)	Ant. Gain(dBd)	C.L	Pol	w	w	dBm	Size	Offset
		QPSK	-28.22	34.14	-10.24	1.44	V		0.176	22.46		0
025 F		16-QAM	-28.90	33.46	-10.24	1.44	V		0.151	21.78	1	
825.5		64-QAM	-30.06	32.30	-10.24	1.44	V		0.115	20.62	_	
		256-QAM	-33.06	29.30	-10.24	1.44	V		0.058	17.62		
	LTE B5	QPSK	-28.18	34.24	-10.18	1.45	V		0.182	22.61	- 1	0
026 E		16-QAM	-28.79	33.63	-10.18	1.45	V	-< 7.00	0.158	22.00		
836.5	(1.4 MHz)	64-QAM	-29.88	32.54	-10.18	1.45	V	< 1.00	0.123	20.91		0
		256-QAM	-32.89	29.53	-10.18	1.45	V	V 0.062	17.90			
		QPSK	-28.87	33.85	-10.12	1.45	V		0.169	22.28		
047 5		16-QAM	-29.55	33.17	-10.12	1.45	V	0.145	21.60	1	0	
847.5		64-QAM	-31.04	31.68	-10.12	1.45	V		20.11	1	0	
		256-QAM	-33.65	29.07	-10.12	1.45	V		0.056	17.50		

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Freq	Mod/		Measured	Substitute	Ant.			Limit	ERP		RB	
(MHz)	Bandwidth	Modulation Level Level C.L		C.L	Pol	w	w	dBm	Size	Offset		
826.5		QPSK	-28.17	34.24	-10.23	1.44	V		0.181	22.57		
		16-QAM	-28.80	33.61	-10.23	1.44	V		0.156	21.94	1	0
820.5		64-QAM	-29.98	32.43	-10.23	1.44	V		0.119	20.76		0
_		256-QAM	-32.94	29.47	-10.23	1.44	V		0.060	17.80		
	LTE B5	QPSK	-28.15	34.27	-10.18	1.45	V		0.184	22.64	- 1	0
836.5		16-QAM	-28.78	33.64	-10.18	1.45	V	_<7.00	0.159	22.01		
830.3	(5 MHz)	64-QAM	-29.91	32.51	-10.18	1.45	V	< 1.00	0.122	20.88		
		256-QAM	-32.94	29.48	-10.18	1.45	V	V 0.061	17.85			
		QPSK	-28.58	34.18	-10.13	1.45	V		0.182	22.60		
04C E		16-QAM	-29.26	33.50	-10.13	1.45	V		0.156	21.92	1	0
846.5		64-QAM	-30.54	32.22	-10.13	1.45	V		0.116	20.64	1	0
		256-QAM	-33.37	29.39	-10.13	1.45	V		0.060	17.81	-	

Freq	Mod/		Measured	Substitute	Ant			Limit	ERP		RB	
(MHz)	Bandwidth	Modulation	Level (dBm)	Level (dBm)	Ant. Gain(dBd)	C.L	Pol	w	w	dBm	Size	Offset
		QPSK	-28.20	34.16	-10.22	1.44	V		0.178	22.50		0
829		16-QAM	-28.82	33.54	-10.22	1.44	V		0.154	21.88	1	
		64-QAM	-30.04	32.32	-10.22	1.44	V		0.116	20.66	1	
		256-QAM	-33.03	29.33	-10.22	1.44	V		0.058	17.67		
	LTE B5	QPSK	-28.22	34.20	-10.18	1.45	V	0.158	0.181	22.57	- 1	0
02C E		16-QAM	-28.81	33.61	-10.18	1.45	V		0.158	21.98		
836.5	(10 MHz)	64-QAM	-30.01	32.41	-10.18	1.45	V	< 7.00	0.120	20.78	L	
		256-QAM	-33.04	29.38	-10.18	1.45	V		0.060	17.75		
		QPSK	-28.23	34.41	-10.14	1.45	V		0.191	22.82		
044		16-QAM	-28.74	33.90	-10.14	1.45	V		0.170	22.31	1	0
844		64-QAM	-30.01	32.63	-10.14	1.45	V		0.127	21.04	1	0
		256-QAM	-33.08	29.56	-10.14	1.45	V		0.063	17.97		

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#### **8.3 RADIATED SPURIOUS EMISSIONS**

## 8.3.1 External Antenna

MODE:	LTE B5
MODULATION SIGNAL:	3 MHz QPSK
DISTANCE:	3 meters

	Freq (MHz)	Measured	Ant. Gain	Substitute Level	C.L	Pol	Result	Limit	R	B
Ch		Level (dBm)	(dBi)	(dBm)	C.L	POI	(dBm)	(dBm)	Size	Offset
	1651.00	-34.14	9.58	-49.73	2.02	V	-42.17	-13.00		
20415 (825.5)	2476.50	-45.83	10.30	-57.12	2.57	Н	-49.39	-13.00	1	14
х <i>У</i>	3302.00	-47.74	12.16	-57.05	2.96	Н	-47.85	-13.00		
	1673.00	-28.41	9.72	-44.06	2.05	Н	-36.39	-13.00		
20525 (836.5)	2509.50	-45.73	10.59	-56.90	2.51	Н	-48.82	-13.00	1	0
()	3346.00	-47.33	12.37	-57.12	2.96	Н	-47.71	-13.00	-	
	1695.00	-29.19	9.85	-44.72	2.07	Н	-36.94	-13.00		
20635 (847.5)	2542.50	-45.45	10.66	-56.59	2.53	V	-48.46	-13.00	1	0
(- · · · /	3390.00	-47.89	12.51	-57.97	2.98	V	-48.44	-13.00		



## 8.3.2 Internal Antenna

MODE:	LTE B5
MODULATION SIGNAL:	10 MHz QPSK
DISTANCE:	3 meters

Ch	Freq	Measured Level	Ant. Gain	Substitute Level	C.L	Pol	Result	Limit	RB	
Ch	(MHz)	(dBm)	(dBi)	(dBm)	C.L	POI	(dBm)	(dBm)	Size	Offset
	1658.00	-43.98	9.63	-59.47	2.03	Н	-51.87	-13.00		
20450 (829.0)	2487.00	-46.86	10.38	-58.10	2.53	Н	-50.25	-13.00	1	0
, , , , , , , , , , , , , , , , , , ,	3316.00	-47.58	12.23	-57.02	2.99	Н	-47.78	-13.00		
	1673.00	-37.96	9.72	-53.61	2.05	V	-45.94	-13.00		
20525 (836.5)	2509.50	-46.81	10.59	-57.98	2.51	V	-49.90	-13.00	1	0
, , , , , , , , , , , , , , , , , , ,	3346.00	-47.39	12.37	-57.18	2.96	Н	-47.77	-13.00		
	1688.00	-37.51	9.82	-53.11	2.06	V	-45.35	-13.00		
20600 (844.0)	2532.00	-47.32	10.67	-58.60	2.54	Н	-50.47	-13.00	1	0
	3376.00	-48.84	12.51	-58.86	2.98	V	-49.33	-13.00		



## 8.4 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
			QPSK			5.20
			16-QAM			5.99
	1.4 MHz		64-QAM	6		6.59
			256-QAM			6.55
	3 MHz	-	QPSK	- 15		5.09
		- 836.5	16-QAM			5.92
			64-QAM			6.50
-			256-QAM			6.55
5			QPSK	-	0	4.99
			16-QAM			5.81
	5 MHz		64-QAM	25		6.46
			256-QAM			6.54
		-	QPSK			4.82
	10		16-QAM	50		5.69
	10 MHz		64-QAM	50		6.49
			256-QAM			6.49

## Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 44~ 59.



# **8.5 OCCUPIED BANDWIDTH**

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
			QPSK			1.0940
			16-QAM			1.0901
	1.4 MHz		64-QAM	6		1.0908
			256-QAM			1.0895
	3 MHz	000 5	QPSK	15		2.7072
			16-QAM			2.7008
			64-QAM			2.7077
-			256-QAM		_	2.7007
5		836.5	QPSK	- 25	0	4.5065
			16-QAM			4.4874
	5 MHz		64-QAM			4.4996
			256-QAM			4.5008
			QPSK			8.9612
			16-QAM	50		8.9562
	10 MHz		64-QAM			8.9505
			256-QAM			8.9636

# Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 60  $\sim$  75.



#### **8.6 CONDUCTED SPURIOUS EMISSIONS**

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
		824.7	3.7089	28.112	-56.968	-28.856	
	1.4	836.5	3.1661	28.112	-57.922	-29.810	
		848.3	6.2986	28.634	-58.017	-29.383	
	3	826.5	5.6880	28.634	-56.532	-27.898	
		836.5	3.1925	28.112	-57.431	-29.319	
DE		846.5	6.5933	28.634	-57.363	-28.729	12.00
B5	5	826.5	3.6915	28.112	-57.353	-29.241	-13.00
		836.5	3.7129	28.112	-57.034	-28.922	
		846.5	3.0255	28.112	-57.913	-29.801	
		829.0	2.6686	28.112	-57.698	-29.586	
	10	836.5	9.6231	28.634	-57.926	-29.292	
		844.0	3.6855	28.112	-57.506	-29.394	

# Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 76 ~ 87.

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	27.500
1 - 5	28.112
5 - 10	28.634
10 - 15	29.245
15 - 20	29.511
Above 20(26.5)	30.210

# 8.7 BAND EDGE

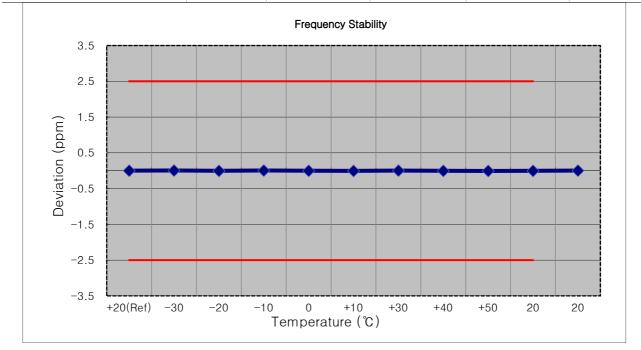
- Plots of the EUT's Band Edge are shown Page 88 ~ 111.



# 8.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

MODE:	LTE B5
OPERATING FREQUENCY:	836,500,000 Hz
CHANNEL:	20525 (1.4 MHz)
REFERENCE VOLTAGE:	13.200 VDC
DEVIATION LIMIT:	$\pm$ 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)         (%)           995         0.0         0.000 000           000         4.7         0.000 001           992         -3.2         0.000 000           000         4.2         0.000 001           993         -2.4         0.000 000           989         -6.0         -0.000 001           992         -3.1         0.000 000	- ppm	
100 %		+20(Ref)	836 499 995	0.0	0.000 000	0.000
100 %		-30	836 500 000	4.7	0.000 001	0.006
100 %		-20	836 499 992	-3.2	0.000 000	-0.004
100 %		-10	836 500 000	4.2	0.000 001	0.005
100 %	13.200	0	836 499 993	-2.4	0.000 000	-0.003
100 %		+10	836 499 989	-6.0	-0.000 001	-0.007
100 %		+30	836 499 998	2.3	0.000 000	0.003
100 %		+40	836 499 992	-3.1	0.000 000	-0.004
100 %		+50	836 499 989	-6.1	-0.000 001	-0.007
115 %	6	20	836 499 992	-3.3	0.000 000	-0.004
85 %	)	20	836 499 998	2.3	0.000 000	0.003



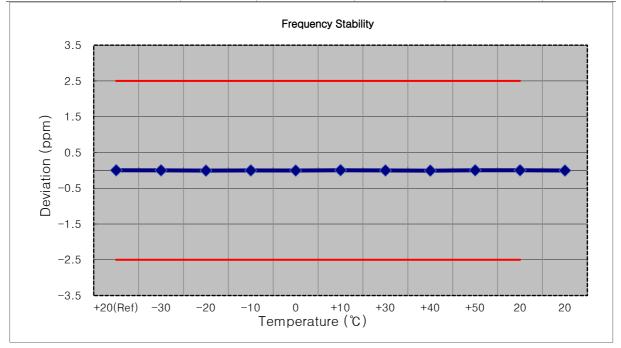
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MODE:	LTE B5
OPERATING FREQUENCY:	836,500,000 Hz
CHANNEL:	20525(3 MHz)
REFERENCE VOLTAGE:	13.200 VDC
DEVIATION LIMIT:	± 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	- ppm
100 %		+20(Ref)	836 500 005	0.0	0.000 000	0.000
100 %		-30	836 500 004	-1.5	0.000 000	-0.002
100 %		-20	836 500 000	-5.9	-0.000 001	-0.007
100 %		-10	836 500 004	-1.9	0.000 000	-0.002
100 %	13.200	0	836 500 000	-5.5	-0.000 001	-0.007
100 %		+10	836 500 008	2.2	0.000 000	0.003
100 %		+30	836 500 003	-2.8	0.000 000	-0.003
100 %		+40	836 499 998	-7.3	-0.000 001	-0.009
100 %		+50	836 500 007	1.4	0.000 000	0.002
115 %	6	20	836 500 007	1.1	0.000 000	0.001
85 %	)	20	836 500 001	-4.5	-0.000 001	-0.005

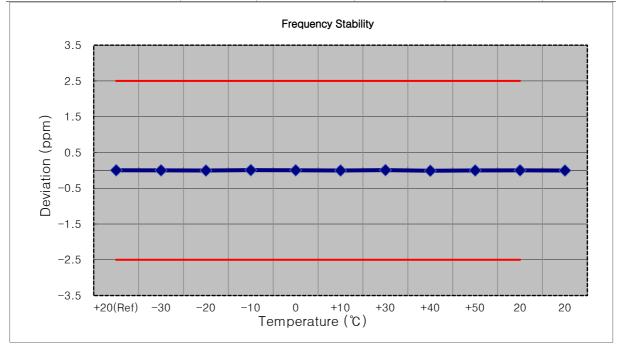


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MODE:	LTE B5
OPERATING FREQUENCY:	836,500,000 Hz
CHANNEL:	20525(5 MHz)
REFERENCE VOLTAGE:	13.200 VDC
DEVIATION LIMIT:	$\pm~$ 0.000 25 % or 2.5 ppm

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	- ppm
100 %		+20(Ref)	836 500 003	0.0	0.000 000	0.000
100 %		-30	836 500 002	-1.2	0.000 000	-0.001
100 %		-20	836 499 998	-5.0	-0.000 001	-0.006
100 %		-10	836 500 007	4.0	0.000 000	0.005
100 %	13.200	0	836 500 005	1.7	0.000 000	0.002
100 %		+10	836 499 999	-4.2	-0.000 001	-0.005
100 %		+30	836 500 008	5.1	0.000 001	0.006
100 %		+40	836 499 993	-9.9	-0.000 001	-0.012
100 %		+50	836 500 000	-2.5	0.000 000	-0.003
115 %	%	20	836 500 003	-0.1	0.000 000	0.000
85 %	, D	20	836 499 998	-5.3	-0.000 001	-0.006

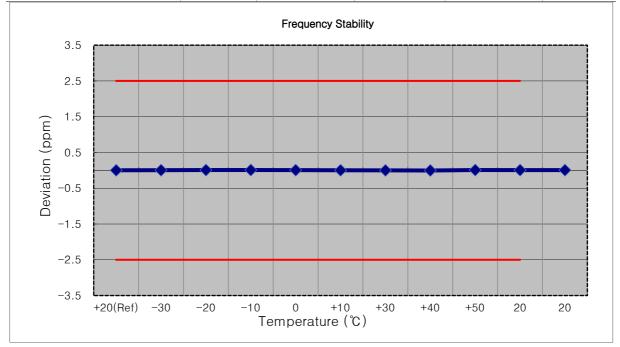


F-TP22-03 (Rev. 06)



MODE:	LTE B5
OPERATING FREQUENCY:	836,500,000 Hz
CHANNEL:	20525(10 MHz)
REFERENCE VOLTAGE:	13.200 VDC
DEVIATION LIMIT:	<u>± 0.000 25 % or 2.5 ppm</u>

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	- ppm
100 %		+20(Ref)	836 500 003	0.0	0.000 000	0.000
100 %		-30	836 500 005	2.1	0.000 000	0.003
100 %		-20	836 500 009	5.9	0.000 001	0.007
100 %		-10	836 500 010	6.5	0.000 001	0.008
100 %	13.200	0	836 500 009	5.3	0.000 001	0.006
100 %		+10	836 500 005	1.8	0.000 000	0.002
100 %		+30	836 500 002	-1.7	0.000 000	-0.002
100 %		+40	836 500 000	-3.4	0.000 000	-0.004
100 %		+50	836 500 009	6.2	0.000 001	0.007
115 %	6	20	836 500 009	5.5	0.000 001	0.007
85 %	D	20	836 500 007	3.8	0.000 000	0.005



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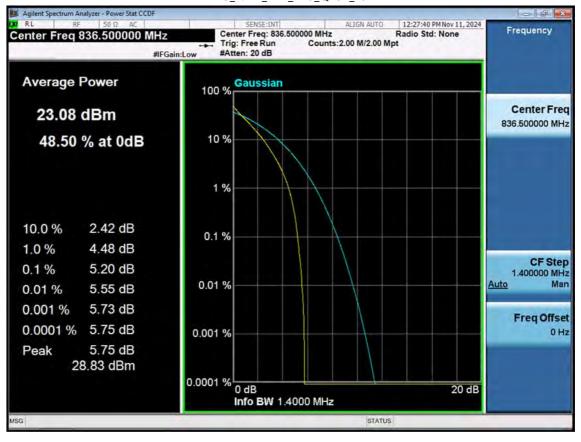
Report No. HCT-RF-2411-FC008

9. TEST PLOTS

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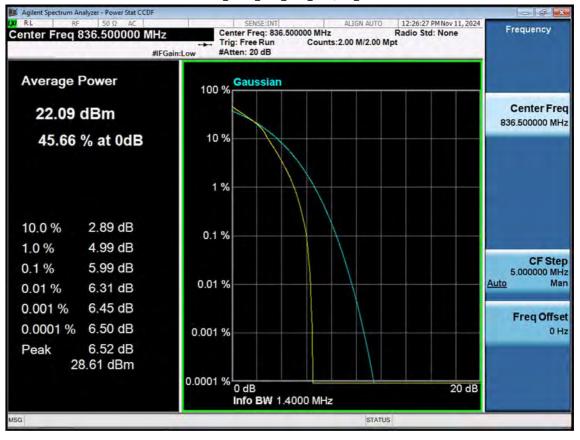






#### LTE B5\_1.4M\_PAR\_Mid\_QPSK\_FullRB





### LTE B5\_1.4M\_PAR\_Mid\_16QAM\_FullRB

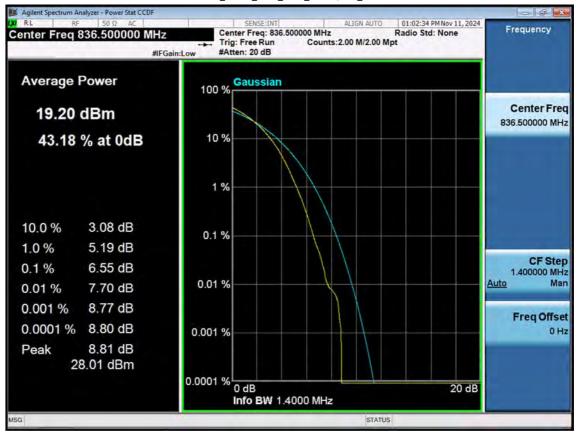




### LTE B5\_1.4M\_PAR\_Mid\_64QAM\_FullRB

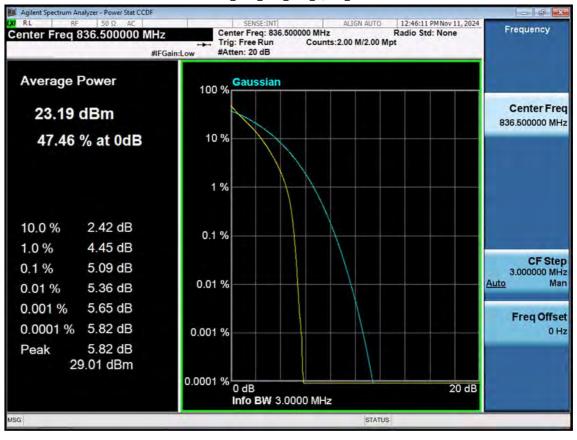






#### LTE B5\_1.4M\_PAR\_Mid\_256QAM\_FullRB

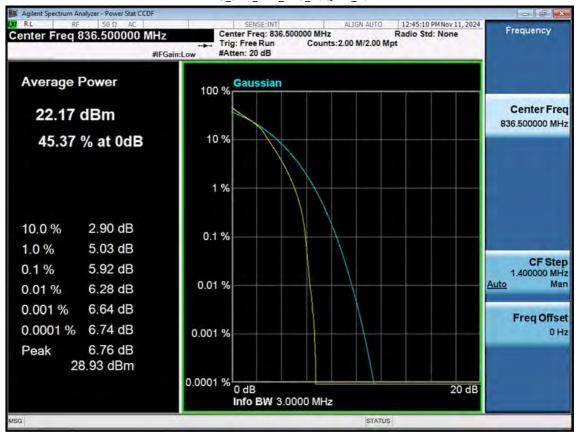




### LTE B5\_3 M\_PAR\_Mid\_QPSK\_FullRB



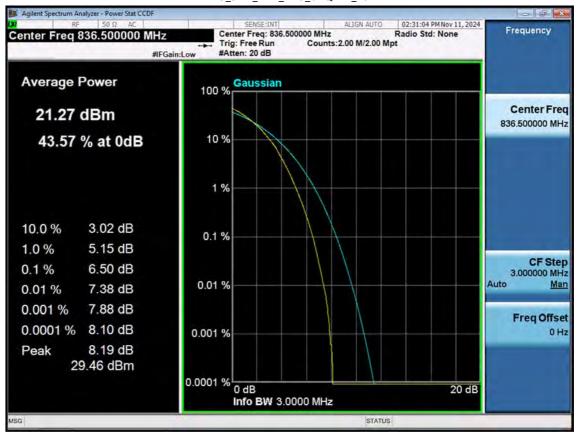




### LTE B5\_3 M\_PAR\_Mid\_16QAM\_FullRB

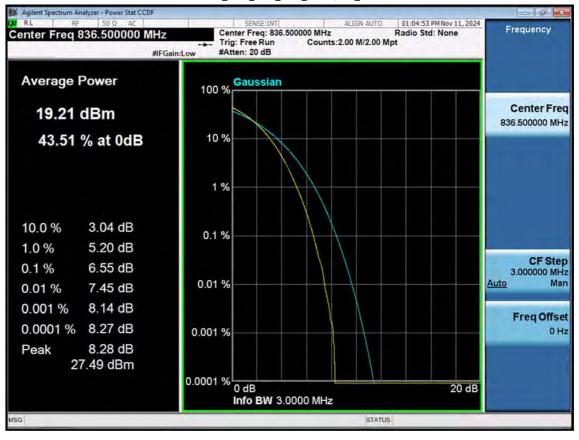






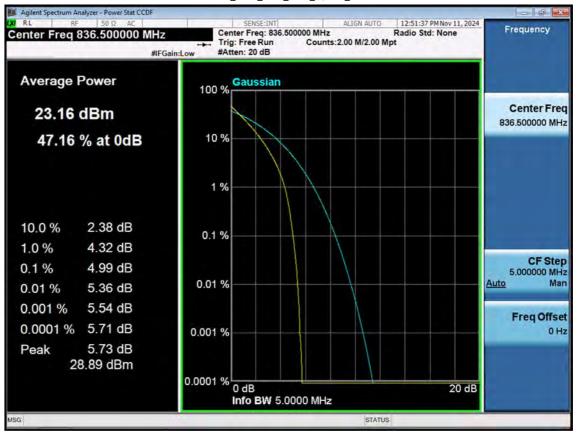
### LTE B5\_3 M\_PAR\_Mid\_64QAM\_FullRB





### LTE B5\_3 M\_PAR\_Mid\_256QAM\_FullRB

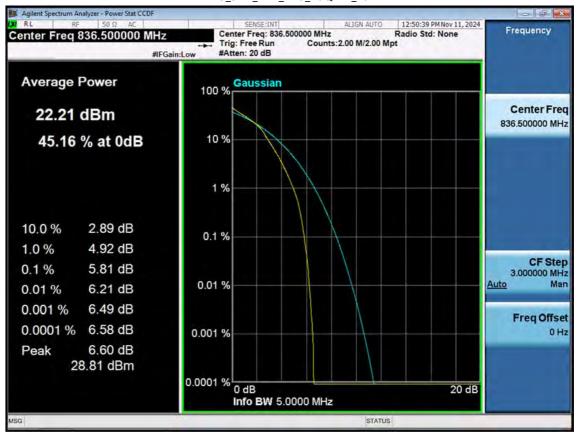




# LTE B5\_5 M\_PAR\_Mid\_QPSK\_FullRB



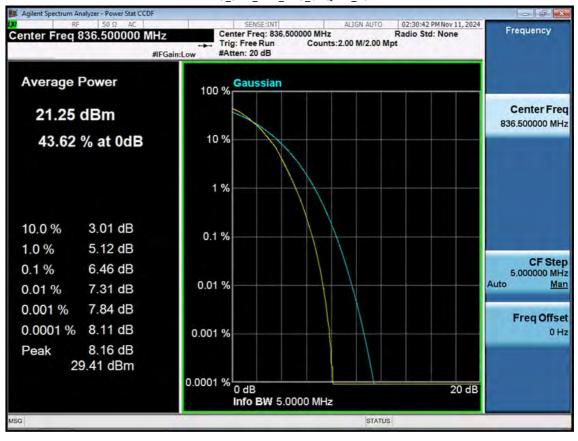




### LTE B5\_5 M\_PAR\_Mid\_16QAM\_FullRB







### LTE B5\_5 M\_PAR\_Mid\_64QAM\_FullRB

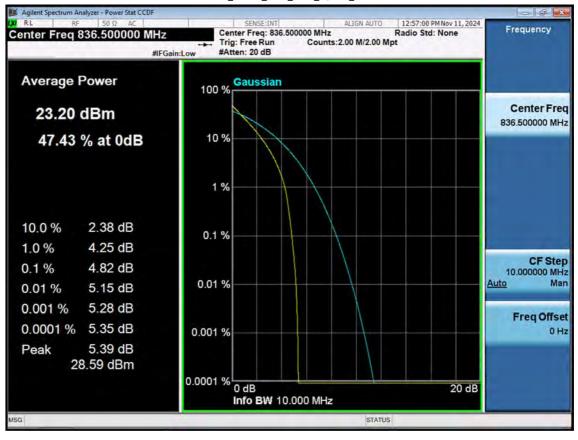




### LTE B5\_5 M\_PAR\_Mid\_256QAM\_FullRB

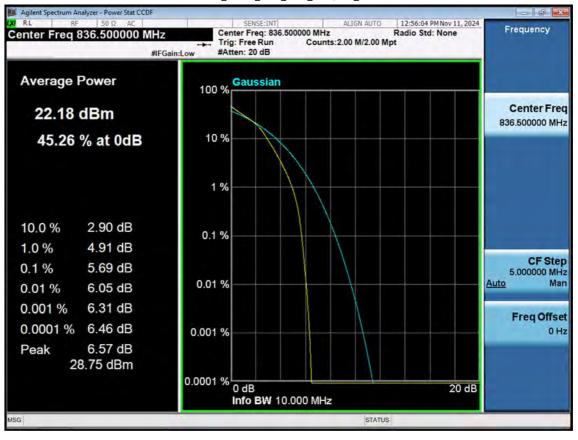






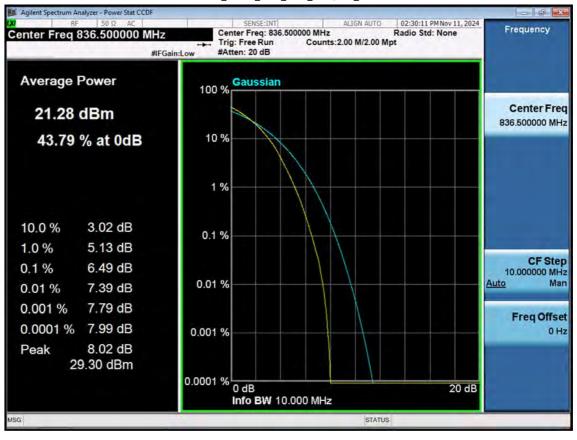
### LTE B5\_10 M\_PAR\_Mid\_QPSK\_FullRB





### LTE B5\_10 M\_PAR\_Mid\_16QAM\_FullRB

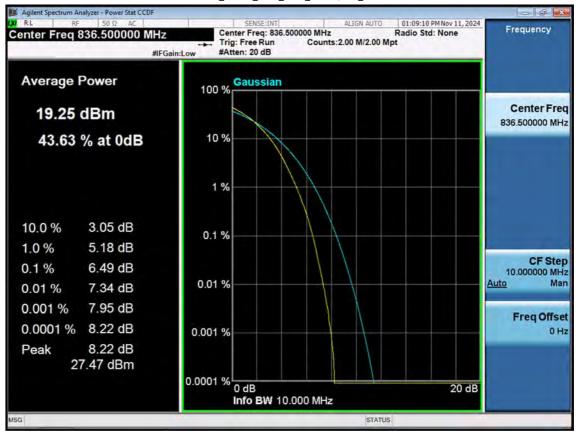




### LTE B5\_10 M\_PAR\_Mid\_64QAM\_FullRB







#### LTE B5\_10 M\_PAR\_Mid\_256QAM\_FullRB





Agilent Spectrum Analy	and a standard water water		1000							6
RL         RF         58 Ω         AC           Center Freq 836.500000 MHz         #IFGain:Low			SENSE:UTI         ALIGN AUTO           Center Freq: 836.500000 MHz         Trig: Free Run         Avg Hold: 700/700           #Atten: 20 dB         Avg         Avg			2 12:27:29 PMNov 11, 2024 Radio Std: None Radio Device: BTS		Frequency		
Ref Offset 27.5 dB 0 dB/div Ref 40.00 dBm										
20.0									Cente 836.5000	CONTRACTOR OF
10.0		f	www	~~~~	www.					
-10,0	/	/								
-20.0 -30.0 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	manamal					from	mm	munn		
-4070										F Step
Center 836.5 M Res BW 27 kHz			#VB	W 110 H	(Hz			n 2.8 MHz 3.667 ms	Auto	00 kHz Man
Occupied Bandwidth Total Power 31.8 dBm 1.0940 MHz						Freq	Offset 0 Hz			
		3.972 k			9	9.00 %				
x dB Bandw	idth	1.236 M	Hz	x dB		-26	.00 dB			
ISG						STAT	US			

# LTE B5\_1.4M\_OBW\_Mid\_QPSK\_FullRB





Agilent Spectrum Analyzer - Occ		1					0 0 8
Center Freq 836.50	e AC DOOO MHz #IFGain:Low	SENSE:INT Center Freq: 836.4 Trig: Free Run #Atten: 20 dB		ALIGN AUTO	Radio Std		Frequency
10 dB/div Ref 40.0							
30.0 20.0							Center Freq 836.500000 MHz
10.0	m		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				
-10.0							
300 0 00: 	mm			June	mas	manna	
-50.0							CF Step 280.000 kHz
Center 836.5 MHz Res BW 27 kHz		#VBW 11	0 kHz		Spa Sweep	n 2.8 MHz 3.667 ms	<u>Auto</u> Man
Occupied Banc	width 1.0901 M		Power	30.6	dBm		Freq Offset 0 Hz
Transmit Freq Er x dB Bandwidth	ror 574 1.236 M		Power		.00 % 00 dB		
MSG				STATUS			

# LTE B5\_1.4M\_OBW\_Mid\_16QAM\_FullRB





Agilent Spectrum Analyzer - Occupied		To post					o d X
RL         RF         50 Ω         Al           Center Freq         836.50000         PASS         Al         Al<			836.500000 MHz an Avg Hol	ALIGN AUTO	Radio Sto	PMNov 11, 2024 d: None vice: BTS	Frequency
Ref Offset 27.5 10 dB/div Ref 40.00 dl Log							
30.0 20.0							Center Freq 836.500000 MHz
10.0	/ mmm		hand and a second	1			
-10.0							
300 m m m m	~			Lan	m		
-50.0							CF Step 280.000 kHz
Center 836.5 MHz Res BW 27 kHz		#VBW	110 kHz			an 2.8 MHz 3.667 ms	<u>Auto</u> Man
Occupied Bandwi	dth 1.0908 MI		otal Power	30.0	6 dBm		Freq Offset 0 Hz
Transmit Freq Error x dB Bandwidth	385 1.237 M		BW Power dB		9.00 % 00 dB		
MSG				STATU	s		

# LTE B5\_1.4M\_OBW\_Mid\_64QAM\_FullRB



Agilent Spectrum Analyzer - Occupied					-		
RL         RF         50 Ω         A           Center Freq 836.50000         ASS         A		SENSE:INT Center Freq: 836. Trig: Free Run #Atten: 20 dB		ALIGN AUTO	Radio Std		Frequency
Ref Offset 27. 0 dB/div Ref 40.00 d							
30.0 20.0							Center Free 836.500000 MH
10.0	pmm	mmm	m m	1			
0.0	_/			$\backslash$			
800	with			Ima	man	umm	
00							CF Ste
center 836.5 MHz tes BW 27 kHz		#VBW 11	0 kHz			n 2.8 MHz 3.667 ms	280.000 kH <u>Auto</u> Ma
Occupied Bandwi			Power	27.	8 dBm		Freq Offse
Transmit Freq Error	1.0895 M		Power	00	9.00 %		
x dB Bandwidth	1.227 M				.00 dB		
SG				STATU	IS		

# LTE B5\_1.4M\_OBW\_Mid\_256QAM\_FullRB





Agilent Spectrum Analyzer - Occupied BV	(			- # ×
RL         RF         50 Ω         Ac           Center Freq         836.500000         PASS         PASS	Tr	SENSE:INT enter Freq: 836.500000 MHz rig: Free Run Avg Hol Atten: 20 dB	ALIGN AUTO 12:46:03 PMNov: Radio Std: None d: 700/700 Radio Device: B	Frequency
Ref Offset 27.5 c Ref 40.00 dB				
.og 30.0 20.0				Center Free 836.500000 MH
10.0	monum	men manual and a second	~	
10.0	/			
20.0 30.0			human	
00 500				CF Ste
Center 836.5 MHz #Res BW 62 kHz		#VBW 240 kHz	Span 6 Sweep 1.53	MHz Auto Mar
Occupied Bandwid	<sup>th</sup> 7072 MHz	Total Power	31.8 dBm	Freq Offse 0 H
Transmit Freq Error	3.846 kHz	OBW Power	99.00 %	
x dB Bandwidth	3.025 MHz	x dB	-26.00 dB	
SG			STATUS	

### LTE B5\_3 M\_OBW\_Mid\_QPSK\_FullRB





Agilent Spectrum Analyzer - Occupied BW								
RL         RF         50 Ω         AC           Center Freq 836.500000         PASS	MHZ #IFGain:Low	Center Fr			700/700	Radio Dev		Frequency
Ref Offset 27.5 d 10 dB/div Ref 40.00 dBr					_			
30.0 20.0								Center Fred 836.500000 MHz
10.0	A		m m	mmm	N.			
-10.0	/							
30.0						m	hammene	
50.0								CF Step 600.000 kHz
Center 836.5 MHz #Res BW 62 kHz		#VB	W 240 k	Hz			an 6 MHz 1.533 ms	<u>Auto</u> Mar
Occupied Bandwid 2.	<sup>th</sup> 7008 MI		Total Po	ower	31.1	l dBm		Freq Offset 0 Hz
Transmit Freq Error x dB Bandwidth	7.999   2.968 N		OBW Po	ower		0.00 %		
ISG					STATU	s		

# LTE B5\_3 M\_OBW\_Mid\_16QAM\_FullRB





	Analyzer - Occupied BW	-							, ic	
	836.500000 Ν	/IHZ #IFGain:Low	Center	SENSE:INT Freq: 836.500 ree Run : 20 dB		ALIGN AUTO	Radio St	PMNov 11, 2024 d: None vice: BTS	Freq	uency
	Ref Offset 27.5 dE Ref 40.00 dBm									
30.0 20.0										nter Fred
10.0		hum	h	ware ward	n					
-10.0	mmmm					h	h	munn		
40.0										
© Center 836.5 #Res BW 62			#\	/BW 2401	kHz			pan 6 MHz 1.533 ms		CF Step 0.000 kHz Mar
Occupie	d Bandwidth 2.7	n 7077 Mi	Hz	Total P	ower	30.	9 dBm		Fre	e <b>q Offset</b> 0 Hz
Transmit x dB Band	Freq Error dwidth	10.140 I 3.008 N		OBW P x dB	ower		9.00 % .00 dB			
ISG						STATL	IS			

### LTE B5\_3 M\_OBW\_Mid\_64QAM\_FullRB





Agilent Spectrum Analyzer - Occupied BW	1						
RL         RF         50 Ω         AC           Center Freq 836.500000 Γ         ASS         ASS         ASS         ASS	MHZ #IFGain:Low	SENSE:INT Center Freq: 836.5 Trig: Free Run #Atten: 20 dB	500000 MHz Avg Hold	ALIGN AUTO	Radio Dev		Frequency
Ref Offset 27.5 df 0 dB/div Ref 40.00 dBm							
30.0 20.0							Center Fre 836.500000 MH
10.0	mon	mmmmmm	mmmm	-			
0.00 10.0	/						
000 mm					y Y M	and the second second	
20						C MUL	CF Ste 600.000 kH
enter 836.5 MHz Res BW 62 kHz		#VBW 240	) kHz			oan 6 MHz 1.533 ms	<u>Auto</u> Ma
Occupied Bandwidt 2.	հ 7007 MH		Power	27.9	dBm		Freq Offse 0 H
Transmit Freq Error x dB Bandwidth	7.297 k 3.018 M		Power		0.00 % 00 dB		
SG				STATUS	6		

# LTE B5\_3 M\_OBW\_Mid\_256QAM\_FullRB





Agilent Spectrum Analyzer - Occupied B	N						-	- # ×
RL RF 50 Ω AC Center Freq 836.500000 PASS	MHz #IFGain:Low	Center Trig: F	Freq: 836.50 ree Run : 20 dB	0000 MHz Avg Hold	ALIGN AUTO	Radio Ste	PMNov 11, 2024 d: None vice: BTS	Frequency
Ref Offset 27.5 10 dB/div Ref 40.00 dB								
20.0								Center Free 836.500000 MH:
10.0	Jumm		-m-n-m	um run	m			
10.0	/							
20.0 30.0 40.0					ىرىز	WWWwwm	momm	
50.0								CF Step 1.000000 MH
Center 836.5 MHz Res BW 100 kHz		#\	VBW 390	kHz			an 10 MHz reep 1 ms	Auto Ma
Occupied Bandwid	th .5065 M	Hz	Total F	ower	31.	8 dBm		Freq Offse 0 H
Transmit Freq Error	21.380		OBW P	ower		9.00 %		
x dB Bandwidth	4.954 N	ИНz	x dB		-26	.00 dB		
ISG					STAT	JS		

### LTE B5\_5 M\_OBW\_Mid\_QPSK\_FullRB





Agilent Spectrum An	Contraction of the second second second								
Center Freq 8 PASS	50 Ω AC 36.500000 N	<b>1Hz</b> #IFGain:Low	Center		0000 MHz Avg Hold	ALIGN AUTO	12:50:31 Radio Sto Radio De		Frequency
	ef Offset 27.5 dB ef 40.00 dBm								
30.0 20.0									Center Free 836.500000 MH;
10.0		mm	mm		ymmeth	m l			
-10.0	{								
30.0 Whimmen M	Landra Andra A					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	and have	mmm	
50.0									CF Step 1.000000 MH
Center 836.5 M #Res BW 100			#V	BW 390	kHz		Spa Sw	an 10 MHz eep 1 ms	<u>Auto</u> Mar
Occupied	Bandwidth 4.4	1 1874 MI	Hz	Total F	ower	31.	0 dBm		Freq Offse 0 Ha
Transmit Fr x dB Bandv		15.488 I 4.933 N		OBW F x dB	ower		9.00 % .00 dB		
ISG						STATL	JS		

# LTE B5\_5 M\_OBW\_Mid\_16QAM\_FullRB





Agilent Spectrum Analyzer - Occupied B	W		State State	The New York Street of Long	
RL         RF         50 Ω         AC           Center Freq 836.500000         PASS	MHz #IFGain:Low	SENSE:INT Center Freq: 836.5000 Trig: Free Run #Atten: 20 dB	ALIGN AUTO 00 MHz Avg Hold: 700/700	Radio Device: BTS	Frequency
Ref Offset 27.5 10 dB/div Ref 40.00 dE					
30.0 20.0					Center Free 836.500000 MH
0.00	forman	hanne	manne		
10.0 20.0				mmmunn	-
4010					
200 Center 836.5 MHz Res BW 100 kHz		#VBW 390 ki	47	Span 10 MH Sweep 1 ms	
Occupied Bandwid	Ith .4996 MI	Total Po		.9 dBm	Freq Offse 0 H
Transmit Freq Error x dB Bandwidth	20.193 I 4.926 N	KHZ OBW Po		99.00 % 5.00 dB	
SG			STAT	US	

# LTE B5\_5 M\_OBW\_Mid\_64QAM\_FullRB





Agilent Spectrum Analyzer - Occupied	BW					- 6 ×
RL         RF         50 Ω         AC           Center Freq         836.50000         PASS                 AC		SENSE:INT Center Freq: 836. Trig: Free Run #Atten: 20 dB	500000 MHz Avg Hold	ALIGN AUTO	01:06:46 PMNov 11, 2024 Radio Std: None Radio Device: BTS	Frequency
Ref Offset 27.5 10 dB/div Ref 40.00 dl				_		
30.0 20.0						Center Free 836.500000 MH:
10.0	manne	man	when	2		
10,0						
20.0 30.0 40.0				h	mmultim	
50 0						CF Step 1.000000 MH
Center 836.5 MHz Res BW 100 kHz		#VBW 39	0 kHz		Span 10 MHz Sweep 1 ms	<u>Auto</u> Mar
Occupied Bandwi	<sup>dth</sup> 4.5008 MI		Power	27.9	dBm	Freq Offset 0 Ha
Transmit Freq Error x dB Bandwidth	12.513 4.947 M		Power		00 % 0 dB	
ISG				STATUS		

### LTE B5\_5 M\_OBW\_Mid\_256QAM\_FullRB





Agilent Spectrum Analy		-							
Center Freq 83	50 Ω AC 6.500000 N	/IHz #IFGain:Low	Center	SENSE:INT Freq: 836.50 ree Run : 20 dB		ALIGN AUTO	Radio St	PMNov 11, 2024 d: None vice: BTS	Frequency
	f Offset 27.5 dB f 40.00 dBm								
30.0 20.0									Center Fred 836.500000 MHz
10.0		montant	moun	m m m	Marchand	my			
-10.0						Ì			
20.0 mm	Nonnonord					1 has	munnall	Murran M	
-40 0									
Center 836.5 M	Hz						Sp	an 20 MHz	CF Step 2.000000 MHz Auto Mar
#Res BW 200 k	Hz		#\	/BW 820	kHz			eep 1 ms	1
Occupied I		) 9612 M	47	Total	Power	31.	.8 dBm		Freq Offset 0 Hz
Transmit Fre		14.536		OBW I	ower	9	9.00 %		
x dB Bandw	idth	9.804 N	ЛНz	x dB		-26	.00 dB		
ISG						STAT	US		

### LTE B5\_10 M\_OBW\_Mid\_QPSK\_FullRB





Agilent Spectrum Analyzer - Occupie							0 0 8
Center Freq 836.5000	51E		836.500000 MHz un Avg Ho	ALIGN AUTO	Radio Std		Frequency
Ref Offset 27 10 dB/div Ref 40.00 d							
30.0 20.0							Center Fred 836.500000 MHz
10.0	mon	mmhim	Amp and Amporton	ma			
-10.0				4			
-20.0 				- North	www.ww	manne	
-4010 -50.0							CF Step
Center 836.5 MHz #Res BW 200 kHz		#VBW	820 kHz			n 20 MHz eep 1 ms	2.000000 MHz Auto Man
Occupied Bandw			otal Power	30.	8 dBm		Freq Offset
	8.9562 M	HZ					
Transmit Freq Error	8.912	kHz O	BW Power	9	9.00 %		
x dB Bandwidth	9.803 N	1Hz x	dB	-26	.00 dB		
ISG				STATL	JS		

### LTE B5\_10 M\_OBW\_Mid\_16QAM\_FullRB





Agilent Spectrum Analyzer - Occupied B	N						
RL RF 50 Ω AC Center Freq 836.500000 PASS	MHz #IFGain:Low	Tales Free Days	36.500000 MHz	ALIGN AUTO	Radio Std: Radio Dev		Frequency
Ref Offset 27.5 10 dB/div Ref 40.00 dB							
20.0 20.0							Center Fred 836.500000 MHz
10.0	Jonamer	munhun	Monthlyne	and t			
10.0							
20.0 mp/1m/4-1/2004-04-04-04-04-04-04-04-04-04-04-04-04-				mur	ale management	windland	
-40.0							CF Step
Center 836.5 MHz #Res BW 200 kHz		#VBW	820 kHz			n 20 MHz ep 1 ms	2.000000 MHz Auto Man
Occupied Bandwid			tal Power	30.9	dBm		Freq Offset
8	.9505 MI	z					0112
<b>Transmit Freq Error</b>	11.833	KHZ OB	W Power	99	.00 %		
x dB Bandwidth	9.800 N	1Hz x d	В	-26.	00 dB		
ISG				STATUS	5		

### LTE B5\_10 M\_OBW\_Mid\_64QAM\_FullRB





Magilent Spectrum Analyzer	- Occupied BW						- 6 X
Center Freq 836.	50 Ω AC 500000 MHz #IFGain:Low	Center Trig: Fr		ALIGN AUTO Hz  Hold: 700/700	Radio Devi		Frequency
	ffset 27.5 dB 10.00 dBm						
30.0 20.0							Center Fred 836.500000 MHz
10.0	Jahr	mannon	mmannahan	mining			
-10.0							
30.0	monal			ha	mmand	munipher	
Center 836.5 MHz					Spar	1 20 MHz	CF Step 2.000000 MHz Auto Man
#Res BW 200 kHz		#V	/BW 820 kHz		Swe	ep 1 ms	Auto
Occupied Ba	andwidth 8.9636 I	MHz	Total Powe	r 27.	8 dBm		Freq Offset 0 Hz
Transmit Freq x dB Bandwid		2 kHz 9 MHz	OBW Power x dB		9.00 % .00 dB		
MSG				STATI	US		

## LTE B5\_10 M\_OBW\_Mid\_256QAM\_FullRB



Agilent Spectrum Analyzer - Sw RL RF 50 S		SENSE:INT	ALIGN AUTO	02:42:20 PM Dec 04, 2024	
enter Freq 5.0150			#Avg Type: RMS	TRACE 1 2 3 4 5 0 TYPE M	Frequency
dB/div Ref 10.00	dBm		M	(r1 3.708 9 GHz -56.968 dBm	Auto Tun
					Center Fre 5.015000000 GH
0.0 0.0 0.0		1			Start Fre 30.000000 MH
			den en bledet i var Beler en bledet en bledet i slæner i se ser en sen se ber en ser en bledet en bledet i var gener for segter er oppenser		<b>Stop Fre</b> 10.000000000 GF
tart 30 MHz Res BW 1.0 MHz		BW 3.0 MHz	Sweep 17	Stop 10.000 GHz 33 ms (20001 pts)	CF Ste 997.000000 Mi Auto Ma
N         1         f           1         N         1         f           2         N         1         f           3	X 3.708 9 GHz 824.6 MHz	-56.968 dBm 0.012 dBm			Freq Offs 0 H
7 8 9 9 0 1		m			
G			STATU	S	

### LTE B5\_1.4M\_Conducted Spurious(30 M-10 G)\_Low\_QPSK\_1RB



No. 4 - Hank C

	AC	SENSE:INT	ALIGN AUTO	02:43:16 PM Dec 04, 2024	Frequency
nter Freq 5.015000	0000 GHz PNO: Fast ↔ IFGain:Low	Trig: Free Run #Atten: 20 dB	#Avg Type: RMS	TRACE 2 3 4 5 0 TYPE M WWWW DET P P P P P P	
dB/div Ref 10.00 d	Bm		Mk	r1 3.166 1 GHz -57.922 dBm	Auto Tur
					Center Fre 5.015000000 GF
0 0 	1				Start Fre 30.000000 Mi
					Stop Fre 10.000000000 GF
art 30 MHz es BW 1.0 MHz	#VBW	3.0 MHz	Sweep 17	Stop 10.000 GHz .33 ms (20001 pts)	CF Ste 997.000000 Mi <u>Auto</u> M
N 1 f N 1 f	3.166 1 GHz 836.6 MHz	-57.922 dBm -0.073 dBm	Tokenok more		Freq Offs 01
		m			

#### LTE B5\_1.4M\_Conducted Spurious(30 M-10 G)\_Mid\_QPSK\_1RB



RL RF 50 Ω A	AC	SENSE:INT	ALIGN AUTO	02:43:44 PM Dec 04, 2024	12 Care 1 1 1
enter Freq 5.0150000	000 GHz PNO: Fast - IFGain:Low	Trig: Free Run #Atten: 20 dB	#Avg Type: RMS	TRACE 12345 TYPE MWWWWW DET PPPPPP	Frequency
dB/div Ref 10.00 dB	m		М	kr1 6.298 6 GHz -58.017 dBm	Auto Tun
2 .00 0.0					Center Fre 5.015000000 GH
0.0 0.0			1		Start Fre 30.000000 M⊦
0.0					Stop Fre
0.0					10.00000000 GF
tart 30 MHz Res BW 1.0 MHz		W 3.0 MHz		Stop 10.000 GHz 7.33 ms (20001 pts)	10.00000000 GF CF Ste 997.000000 MH <u>Auto</u> Ma
tart 30 MHz	#VB × 6.298 6 GHz 849.5 MHz		Sweep 1	7.33 ms (20001 pts)	CF Ste 997.000000 MH

#### LTE B5\_1.4M\_Conducted Spurious(30 M-10 G)\_High\_QPSK\_1RB



	19 PM Dec 04, 2024	07:44:11	ALIGN AUTO		SE:INT	CEN	1	AC AC	RF 50 Ω	pectrun	Agilent S
Frequency	RACE 2 3 4 5 0 TYPE M WWWW DET P P P P P P	TR		#Avg Typ	Run		Z NO: Fast +++ Gain:Low	0000 GH	5.01500	Fred	
Auto Tun	88 0 GHz 532 dBm	kr1 5.68 -56.	Mk					dBm	tef 10.00 (		dB/di
Center Fre 5.015000000 GH									2	$\diamond$	9 00 1.0 
Start Fre 30.000000 MH					1						.0 .0 .0
Stop Fre 10.00000000 GH							<b>مي الإيناوينات.</b>				.0 .0
CF Ste 997.000000 MH Auto Ma	10.000 GHz (20001 pts)	7.33 ms (	weep 17		FUNC	3.0 MHz	#VBW	X	0 MHz	W 1.0	art 30 Res B
Freq Offs 0 F	E				m	-56.532 dB 0.055 dB	0 GHz 6 MHz	5.688	f		
	-										
			STATUS							_	

# LTE B5\_3 M\_Conducted Spurious(30 M-10 G)\_Low\_QPSK\_1RB



Agilent Spectrum Analyzer - Swept S RL RF 50 Ω	AC	SENSE:INT	ALIGN AUTO	02:45:14 PM Dec 04, 2024	
enter Freq 5.015000	000 GHz PNO: Fast ↔ IFGain:Low	- Trig: Free Run #Atten: 20 dB	#Avg Type: RMS	TRACE 1 2 3 4 5 1 TYPE M WWWWW DET P P P P P P	Frequency
dB/div Ref 10.00 dE	3m		Mk	r1 3.192 5 GHz -57.431 dBm	Auto Tun
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2					Center Fre 5.015000000 GH
0.0	1				Start Fre 30.000000 MH
					Stop Fre 10.000000000 GH
tart 30 MHz Res BW 1.0 MHz		/ 3.0 MHz		Stop 10.000 GHz .33 ms (20001 pts)	CF Ste 997.000000 MH Auto Ma
N         1         f           1         N         1         f           2         N         1         f           3	× 3.192 5 GHz 835.6 MHz	-57.431 dBm -0.022 dBm	ICTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offse 0 H
G		m	STATUS	-	

### LTE B5\_3 M\_Conducted Spurious(30 M-10 G)\_Mid\_QPSK\_1RB



	PM Dec 04, 2024	02:45:42.0	ALIGN AUTO		SE:INT	CEN		AC AC	RF 50 G	Spectru	RL
Frequency	CE 1 2 3 4 5 0 PE M WWWWW ET P P P P P P	TRAC		#Avg Typ	Run		Z NO: Fast +++ Gain:Low	00000 GI	q 5.0150	r Fre	
Auto Tun	3 3 GHz 63 dBm	r1 6.593 -57.3	Mk					dBm	Ref 10.00		) dB/d
Center Fre 5.015000000 GH									<b>⊘</b> 2	<	
Start Fre 30.000000 MH				1_							0.0
Stop Fre 10.00000000 GH			anni i farrai farraiga		aguai (an this Mar						0.0 0.0
CF Ste 997.000000 MH Auto Ma	0.000 GHz 0001 pts)	.33 ms (2	weep 17 стіом міртні		ELIN	3.0 MHz	#VBW	X	.0 MHz	3W 1	tart 3 Res E
Freq Offse 0 H		- Sheri			m	-57.363 dE -0.099 dE	3 GHz 5 MHz	6.593		1	
						III					7 8 9 1
		1	STATUS	_	_					_	G

## LTE B5\_3 M\_Conducted Spurious(30 M-10 G)\_High\_QPSK\_1RB



	02:46:19 PM Dec 04, 2024 TRACE 1 2 3 4 5 0 TYPE MWWWWW DET P P P P P P
Auto Tune	r1 3.691 5 GHz -57.353 dBm
Center Fre 5.015000000 GH	
Start Fre 30.000000 MH	
Stop Fre 10.000000000 GH	
CF Ste 997.000000 MH Auto Ma	Stop 10.000 GHz 33 ms (20001 pts)
Freq Offse 0 H	FUNCTION VALUE
III STATUS	

## LTE B5\_5 M\_Conducted Spurious(30 M-10 G)\_Low\_QPSK\_1RB



Agilent Spectrum Analyzer - Swept SA					1	
RL RF 50 Ω AC enter Freq 5.015000000	GHz PNO: Fast	. Trig: Free Ru #Atten: 20 dE	#Avg Typ	ALIGN AUTO De: RMS	02:47:14 PM Dec 04 TRACE 1 2 TYPE MWW DET P P F	
dB/div Ref 10.00 dBm				Mk	r1 3.712 9 G -57.034 d	Hz Auto Tun Bm
						Center Fre 5.015000000 GH
0.0	1					Start Fre 30.000000 MH
						Stop Fre 10.00000000 GH
tart 30 MHz Res BW 1.0 MHz	#VBW	3.0 MHz		weep 17	Stop 10.000 33 ms (20001	pts) 997.000000 MH
1 N 1 f 3.	712 9 GHz 835.1 MHz	-57.034 dBm 0.001 dBm	Policificity Policificity		PORCHONVALO	Freq Offse
		ш		STATUS		•

## LTE B5\_5 M\_Conducted Spurious(30 M-10 G)\_Mid\_QPSK\_1RB



	PM Dec 04, 2024	02:47:42.0	ALIGN AUTO	-	ice aver	- cra		wept SA	trum Analyzer - S	Agilent Spec
Frequency	CE 1 2 3 4 5 0 PE M WWWWW ET P P P P P P	TRAC		#Avg Typ			CHZ PNO: Fast ↔		req 5.015	
Auto Tun	5 5 GHz 13 dBm	r1 3.025 -57.9	Mk					) dBm	Ref 10.0	dB/div
Center Fre 5.015000000 GH									<b>⊘</b> 2	0 0 0
Start Fre 30.000000 MH							1			0 0 0
Stop Fre 10.00000000 GH	and a state and the state									
CF Ste 997.000000 MH Auto Ma	0.000 GHz 20001 pts)	.33 ms (2			- Finder	3.0 MHz	#VBW		1.0 MHz	es BW
Freq Offs 0 F		FUNCTION	ICTION WIDTH		3m	-57.913 dE 0.053 dE	25 5 GHz 49.5 MHz		f	N 1
			STATUS		-	m				_

# LTE B5\_5 M\_Conducted Spurious(30 M-10 G)\_High\_QPSK\_1RB



	02:48:19 PM Dec 04, 2024	ALIGN AUTO	1	SE:INT	SEN	1	Ω AC	ctrum Analyzer - Sw RF 50	RL	
Frequency	TYPE M WWWWW DET P P P P P P	e: RMS	#Avg Ty		Trig: Free #Atten: 2	NO: Fast	P	req 5.0150	enter F	
Auto Tun	dB/div Ref 10.00 dBm -57.698 dBm									
Center Fre 5.015000000 GH								<u></u>	9 00 1.0 1.0	
Start Fre 30.000000 MH							1		).0 ).0 ).0	
Stop Fre 10.00000000 GH									).0 1.0	
CF Ste 997.000000 MH Auto Ma	Stop 10.000 GHz 33 ms (20001 pts)				3.0 MHz	#VBW		1.0 MHz		
Freq Offs 0 F	FUNCTION VALUE	NCTION WIDTH	CTION FU	3m	Y -57.698 dE -0.230 dE	6 GHz 1 MHz		f	2 N 1 3	
									6 7 8 9 1 1	
		STATUS			m				3	

# LTE B5\_10 M\_Conducted Spurious(30 M-10 G)\_Low\_QPSK\_1RB



	02:49:13 PM Dec 04, 2024	ALIGN AUTO	1	VSE:INT	SEN	1	Ω AC	trum Analyzer - Sw RF 50	RL
Frequency	TRACE 2 3 4 5 0 TYPE MWWWW DET PPPPP	e: RMS	#Avg Typ		Trig: Free #Atten: 20	IZ NO: Fast ↔ Gain:Low	P	req 5.0150	enter F
Auto Tun	Mkr1 9.623 1 GHz           dB/div         Ref 10.00 dBm           -57.926 dBm								
Center Fre 5.015000000 GH								<b></b>	9 00 1.0
Start Fre 30.000000 MH	1-								.0 .0
Stop Fre 10.00000000 GF									.0 .0 .0
CF Ste 997.000000 MH Auto Ma	Stop 10.000 GHz 33 ms (20001 pts)	weep 17.		FUNC	3.0 MHz	#VBW	×	1.0 MHz	art 30 M les BW
Freq Offs 0 F				3m	-57.926 dE -0.120 dE	1 GHz 6 MHz	9.623	f	N 1
	-				111				

#### LTE B5\_10 M\_Conducted Spurious(30 M-10 G)\_Mid\_QPSK\_1RB



	2:49:42 PM Dec 04, 2024	LIGN AUTO	1 7	SE:INT	SEA		AC AC	trum Analyzer - Swe	RL RL	
Frequency	TRACE 1 2 3 4 5 0 TYPE MWWWWW DET P P P P P P		#Avg Type	Run		Z NO: Fast +++ Gain:Low	00000 G	req 5.0150		
Auto Tun	0 dB/div Ref 10.00 dBm -57.506 dBm									
Center Fre 5.015000000 GH								<u></u>	g 00 .0 .0	
Start Fre 30.000000 Mi						1			.0	
Stop Fre 10.00000000 GF					THE COMPANY AND				.0	
CF Ste 997.000000 Mi Auto Mi	op 10.000 GHz ms (20001 pts)	St veep 17.33		FUNC	3.0 MHz	#VBW	×	1.0 MHz	art 30 M les BW	
Freq Offs 0 F	E			m	-57.506 dE -0.078 dE	5 GHz 0 MHz	3.685		N 1	
	-				m					
				_	101					

# LTE B5\_10 M\_Conducted Spurious(30 M-10 G)\_High\_QPSK\_1RB



×							alyzer - Swept SA	
Frequency	12:25:41 PM Nov 11, 2024 TRACE 1 2 3 4 5 TYPE A WWWWW DET A A A A A A	ALIGN AUTO	#A			Z NO: Wide		Center Fr
Auto Tune	824.000 MHz -38.501 dBm	Mkr			WALLELL 20	-Gain:Low	Dffset 27.5 dB 27.50 dBm	0 dB/div
Center Fred 824.000000 MH:				my				17.5
Start Free 822.000000 MH								7 50
Stop Free 826.000000 MH	-13.00 dBm		North Contraction of the second secon					12.5
CF Step 400.000 kH Auto Mar		-		1				42.5
Freq Offse 0 H:	harmon	and the second			Journa	- material and	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	52,5
	Span 4.000 MHz .000 s (1001 pts)	#Sweep			47 kHz	#VBW	MHz	Center 824
		STATUS			~ ~ ~ ~	1.11.11.1		ISG

# LTE B5\_1.4M\_Band Edge\_Low\_QPSK\_1RB



Agilent Spectrum Analyzer - Swept SA								- <b>.</b>
RL RF 50 Ω AC enter Freq 824.000000 M	Hz PNO: Wide	Trig: Free #Atten: 20		#Avg Type	ALIGN AUTO e: RMS	TRAC	MNov 11, 2024 E 2 3 4 5 E A WARMAN T A A A A A A	Frequency
Ref Offset 27.5 dB dB/div Ref 27.50 dBm	IFGain:Low	#Atten: 20			Mk	1 823.9	20 MHz 05 dBm	Auto Tune
5								Center Fred 824.000000 MHz
50			m	nimm	ntrintra			Start Free 822.000000 MH:
5							-13.00 dBm	Stop Free 826.000000 MH:
.5	LinkAnstalat	antarbala ported by				Leaven	r margan to produce and the	CF Step 400.000 kH: Auto Mar
5 5 5								Freq Offse 0 H
enter 824.000 MHz es BW 15 kHz	#\/B\A	47 kHz			#Sween	Span 4	.000 MHz 1001 pts)	
	#VDVV	TT NI12			status	7	roor prs)	

# LTE B5\_1.4M\_Band Edge\_Low\_QPSK\_FullRB



				trum Analyzer - Swept SA	
Frequency	12:25:16 PM Nov 11, 2024 TRACE 2 3 4 5 TYPE A WANNAW DET A A A A A A	ALIGN AUTO #Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	RF 50 Ω AC req 821.000000 MHz PNO: Wide → IFGain:Low	Center Fr
Auto Tune	1 822.964 MHz -38.635 dBm	Mki		Ref Offset 27.5 dB Ref 27.50 dBm	10 dB/div
Center Fre 821.000000 MH					17.5
Start Fre 819.000000 MH					7 50
Stop Fre 823.000000 MH	-13,00 dBm				12.5 <b></b> 22.5 <b></b>
CF Ste 400.000 kH Auto Ma	and the second s	and a stand of the stand of the stand			42.5
Freq Offse 0 H			and the second	we also and the second s	52.5
	Span 4.000 MHz			1.000 MHz	
	1.000 s (1001 pts)	#Sweep	300 kHz	100 KH2 #VBW	Res BW

#### LTE B5\_1.4M\_Extended Band Edge\_Low\_QPSK\_FullRB



					trum Analyzer - Swept SA	
Frequency	12:43:03 PM Nov 11, 2024 TRACE 1 2 3 4 5 TYPE A WWWWW DET A A A A A A	#Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	MHz PNO: Wide	RF 50 Ω AC req 849.000000 N	Center F
Auto Tune	1 849.000 MHz -38.169 dBm	Mkr	Witten 25 ab	IPGall.Low	Ref Offset 27.5 dB Ref 27.50 dBm	10 dB/div
Center Free 849.000000 MH			~			17.5
Start Free 847.000000 MH						7 50
Stop Free 851.000000 MH	-13.00 dBm					12.5
CF Step 400.000 kH Auto Mar			1	and and a start of the start of	marter	-32.5
Freq Offse 0 H	RMS	May an and the answer and			anan	-52.5
	Span 4.000 MHz 1.000 s (1001 pts)		47 kHz	#VBW 4	9.000 MHz 15 kHz	
		STATUS				ISG

# LTE B5\_1.4M\_Band Edge\_High\_QPSK\_1RB



			1		ctrum Analyzer - Swept SA				
Frequency	12:42:16 PM Nov 11, 2024 TRACE 2 3 4 5 TYPE A WWWW DET A A A A A A	ALIGN AUTO #Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB		RF 50 Ω A req 849.00000	Center F			
Auto Tun	1 849.084 MHz -39.451 dBm	Mkr		Ref Offset 27.5 dB div Ref 27.50 dBm					
Center Free 849.000000 MH						17:5			
Start Fre 847.000000 MH			m	minne		7 50			
Stop Fre 851.000000 MH	-13.00 dBm					12.5			
CF Ste 400.000 kH Auto Ma			1			32.5 42.5			
Freq Offs 0 H	RMS	and the second			the state of the s	52.5			
	Span 4.000 MHz 1.000 s (1001 pts)	#Sween	47 kHz		19.000 MHz	Center 84			
		STATUS				ISG			

# LTE B5\_1.4M\_Band Edge\_High\_QPSK\_FullRB



				trum Analyzer - Swept SA
Frequency	12:42:35 PM Nov 11, 2024 TRACE 2 3 4 5 TYPE A WANNAW DET A A A A A A	ALIGN AUTO #Avg Type: RMS	Trig: Free Run #Atten: 20 dB	RF 50 Ω AC req 852.000000 MHz PNO: Wide
Auto Tune	1 850.000 MHz -40.529 dBm	Mkr		Ref Offset 27.5 dB Ref 27.50 dBm
Center Fre 852.000000 MH				
Start Fre 850.000000 MH				
Stop Fre 854.000000 MH	-13,00 dBm			
CF Ste 400.000 kH Auto Ma				NULL PLANE VI.
Freq Offso 0 H	RMS	an tanan managan katang katang salang mang saga katang		
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	V 300 kHz	2.000 MHz 100 kHz #VBW
		STATUS		

### LTE B5\_1.4M\_Extended Band Edge\_High\_QPSK\_FullRB



					trum Analyzer - Swept SA	
Frequency	12:44:31 PM Nov 11, 2024 TRACE 2 3 4 5 TYPE A WWWWW DET A A A A A A	#Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	MHZ PNO: Wide	RF 50 Ω AC req 824.000000 M	Center F
Auto Tune	1 824.000 MHz -20.249 dBm	Mki		I GUINEON	Ref Offset 27.5 dB Ref 27.50 dBm	10 dB/div
Center Fred 824.000000 MHz						17.5
Start Free 822.000000 MH:						7.50
Stop Fred 826.000000 MH2	-13.00 dBm		1			-12.5
CF Step 400.000 kH Auto Mar	Λ	h				-32.5
Freq Offset 0 Hz	Parameter BNS				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	-52.5
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	91 kHz	#VBW 9	4.000 MHz 30 kHz	
		STATUS				ISG

# LTE B5\_3 M\_Band Edge\_Low\_QPSK\_1RB



						trum Analyzer - Swept SA	
Frequency	12:43:48 PM Nov 11, 2024 TRACE 2 3 4 5 TYPE A WAYNAW DET A A A A A A	#Avg Type: RMS			PNO: Wide	RF 50 Ω AC req 824.000000 M	Center Fi
Auto Tun	1 824.000 MHz -26.174 dBm	Mkr				Ref Offset 27.5 dB Ref 27.50 dBm	0 dB/div
Center Fre 824.000000 MH							175
Start Fre 822.000000 MH	RMS		$\int$				2.50
Stop Fre 826.000000 MH	-13.00 dBm		1				22.5
CF Ste 400.000 kł Auto Ma				- marked		and and a start a start the start and	2.5
Freq Offs 01							2.5
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep		91 kHz	#VBW	4.000 MHz 30 kHz	center 82 Res BW
		STATUS					SG

# LTE B5\_3 M\_Band Edge\_Low\_QPSK\_FullRB



				t SA	ctrum Analyzer - Swept SA			
Frequency	12:44:07 PMNov 11, 2024 TRACE 1 2 3 4 5 TYPE A WANNAW DET A A A A A A A	#Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	PNO: Wide	RF 50 Ω AC req 821.000000	Center F		
Auto Tune	1 822.824 MHz -32.873 dBm	Mk	WAllen, 20 ab	IFGain:Low Ref Offset 27.5 dB 0 dB/div Ref 27.50 dBm				
Center Free 821.000000 MH						17 5		
Start Fre 819.000000 MH						7 50		
Stop Fre 823.000000 MH	-13,00 dBm					22.5		
CF Ste 400.000 kH Auto Ma	THE RMS	and a second				32.5 42.5		
Freq Offso 0 H						52.5		
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	300 kHz	#VBW :	21.000 MHz 100 kHz			
		STATUS				ISG		

### LTE B5\_3 M\_Extended Band Edge\_Low\_QPSK\_FullRB



					trum Analyzer - Swept SA	
Frequency	12:48:33 PM Nov 11, 2024 TRACE 2 3 4 5 TYPE A WARWAY DET A A A A A A	ALIGN AUTO #Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	PNO: Wide	RF 50 Ω AC req 849.000000 N	Center F
Auto Tun	1 849.000 MHz -20.255 dBm	Mkr			Ref Offset 27.5 dB Ref 27.50 dBm	0 dB/div
Center Free 849.000000 MH			$\cap$			17.5
Start Free 847.000000 MH						7 50 2 50
Stop Fre 851.000000 MH	-13.00 dBm		1			12.5
CF Ste 400.000 kH <u>Auto</u> Ma					1	32.5 ———
Freq Offse 0 H	MAN THE MAN THE MAN THE MAN				water and and and a second	52.5
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	91 kHz	#VBW 9	9.000 MHz 30 kHz	
		STATUS				ISG

# LTE B5\_3 M\_Band Edge\_High\_QPSK\_1RB



				nalyzer - Swept SA	
Frequency	12:47:47 PM Nov 11, 2024 TRACE 2 4 5 TYPE A WWWWW DET A A A A A A	#Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	50 Ω AC 849.000000 MHz PNO: Wide IFGain:Low	Center Fi
Auto Tun	1 849.000 MHz -27.751 dBm	Mkr		Ref Offset 27.5 dB Ref 27.50 dBm	
Center Fre 849.000000 MH					.og
Start Fre 847.000000 MH				un marine and a second	2.50
Stop Fre 851.000000 MF	-13.00 dBm		1		2.5
CF Ste 400.000 kł Auto Ma	PMS	A service and the service of the ser			12.5
Freq Offs 01					2.5
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	91 kHz		enter 84 Res BW
		STATUS			sG

### LTE B5\_3 M\_Band Edge\_High\_QPSK\_FullRB



					um Analyzer - Swept SA	
Frequency	12:48:06 PMNov 11, 2024 TRACE 2 3 4 5 TYPE A WWWWW DET A A A A A A	#Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	MHz PNO: Wide	RF 50 Ω AC eq 852.000000 M	Center F
Auto Tune	Ref Offset 27.5 dB         Mkr1 850.264 MHz           0 dB/div         Ref 27.50 dBm         -33.723 dBm					
Center Free 852.000000 MH						17.5
Start Free 850.000000 MH						7 50
Stop Fre 854.000000 MH	-13.00 dBm					12.5
CF Ste 400.000 kH Auto Ma					1	32.5
Freq Offse 0 H:	RMS					52.5
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	300 kHz	#VBW :	.000 MHz 00 kHz	Center 85
		STATUS				ISG

### LTE B5\_3 M\_Extended Band Edge\_High\_QPSK\_FullRB

The report shall not be (partly) reproduced except in full without approval of the laboratory.



					Agilent Spectrum Analyzer - Swept SA
Frequency	12:50:02 PM Nov 11, 2024 TRACE 2 4 5 TYPE A WWWWY DET A A A A A A	ALIGN AUTO #Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB		Center Freq 824.000000
Auto Tune	1 824.000 MHz -23.229 dBm	Mkr		27.5 dB	Ref Offset 27.5 dB 10 dB/div Ref 27.50 dBm
Center Fred 824.000000 MHz			ſ		17.5
Start Free 822.000000 MH:					2.50
Stop Free 826.000000 MH:	-13.00 dBm		1		-12.5
CF Step 400.000 kH Auto Mar					-32.5
Freq Offse 0 Ha	FINS			and the second	52.5
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	160 kHz	#VBW	Center 824.000 MHz #Res BW 51 kHz
		STATUS			ASG

## LTE B5\_5 M\_Band Edge\_Low\_QPSK\_1RB



			1		Agilent Spec
Frequency	12:49:19 PM Nov 11, 2024 TRACE 1 2 3 4 5 TYPE A WWWWW DET A A A A A A	#Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	50 Ω AC 24.000000 MHz PNO: Wide → IFGain:Low	Center Fi
Auto Tun	1 824.000 MHz -31.298 dBm	Mkr		Ref Offset 27.5 dB Ref 27.50 dBm	
Center Fre 824.000000 MH					.og
Start Fre 822.000000 MH	RMS		$\int$		2.50
Stop Fre 826.000000 MH	-13.00 dBm				2.5
CF Ste 400.000 kH Auto Ma			1		12.5
Freq Offs 0 H					2.5
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	160 kHz		center 82
		STATUS			SG

# LTE B5\_5 M\_Band Edge\_Low\_QPSK\_FullRB



					rum Analyzer - Swept SA	
Frequency	12:49:37 PMNov 11, 2024 TRACE 2 3 4 5 TYPE A WARMANY DET A A A A A A	ALIGN AUTO #Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	MHZ PNO: Wide	eq 821.000000 M	Center F
Auto Tune	1 822.948 MHz -41.332 dBm	Mki			Ref Offset 27.5 dB Ref 27.50 dBm	0 dB/div
Center Free 821.000000 MH						17:5
Start Free 819.000000 MH:						7 50
Stop Free 823.000000 MH	-13.00 dBm					12.5 <b></b> 22.5 <b></b>
CF Stej 400.000 kH <u>Auto</u> Ma						42.5
Freq Offse 0 H						52.5
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	300 kHz	#VBW :	1.000 MHz 100 kHz	Center 82
		STATUS				ISG

# LTE B5\_5 M\_Extended Band Edge\_Low\_QPSK\_FullRB



	m Analyzer - Swept SA					
Center Free	q 849.000000	PNO: Wide	SENSE:INT	#Avg Type: RMS	12:54:00 PM Nov 11, 2024 TRACE 2 3 4 5 TYPE A WWWW DET A A A A A A	Frequency
R 10 dB/div R	Ref Offset 27.5 dB Ref 27.50 dBm	IFGain:Low	#Atten: 20 dB	Mk	r1 849.000 MHz -23.485 dBm	Auto Tune
175		(				Center Fred 849.000000 MH;
2.50						Start Free 847.000000 MH:
-12.5			1		-13,00 dBm	Stop Fred 851.000000 MH2
-32.5						CF Step 400.000 kHz Auto Mar
-52.5	and the second se				Part and the second sec	Freq Offset 0 Hz
Center 849.0 #Res BW 51		#VBW	160 kHz	#Sweep	Span 4.000 MHz 1.000 s (1001 pts)	
ISG				STATU	5	

# LTE B5\_5 M\_Band Edge\_High\_QPSK\_1RB



				trum Analyzer - Swept SA
Frequency	12:53:12 PMNov 11, 2024 TRACE 2 3 4 5 TYPE A WWWWY DET A A A A A A	ALIGN AUTO #Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	RF 50 Ω AC req 849.000000 MHz PNO: Wide ↔ IFGain:Low
Auto Tun	1 849.000 MHz -30.446 dBm	Mkr		Ref Offset 27.5 dB Ref 27.50 dBm
Center Fre 849.000000 MH				
Start Fre 847.000000 MH				
Stop Fre 851.000000 MH	-13.00 dBm			
CF Ste 400.000 kH Auto Ma	RMS		1	
Freq Offse 0 H				
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	160 kHz	9.000 MHz 51 kHz #VBW
		STATUS		

# LTE B5\_5 M\_Band Edge\_High\_QPSK\_FullRB



	12:53:32 PM Nov 11, 2024	ALIGN AUTO	SENSE:INT	50 Ω AC	Agilent Spectrum Analys	
Frequency	TRACE 1 2 3 4 5 TYPE A WWWW DET A A A A A A	#Avg Type: RMS	Trig: Free Run #Atten: 20 dB	352.000000 MHz PNO: Wide ↔ IFGain:Low	nter Freq 85	
Auto Tun	Ref Offset 27.5 dB Mkr1 850.124 MHz Ref 27.50 dBm -36.004 dBm					
Center Fre 852.000000 MH					5	
Start Fre 850.000000 MH					ο. α	
Stop Fre 854.000000 MF	-13.00 dBm				5	
CF Ste 400.000 kH Auto Ma					5	
Freq Offse 0 H:	RMS				5	
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	300 kHz		nter 852.000 M es BW 100 kH	
		STATUS				

## LTE B5\_5 M\_Extended Band Edge\_High\_QPSK\_FullRB



- # ×							trum Analyzer - Swept SA	
Frequency	12:55:28 PM Nov 11, 2024 TRACE 2 3 4 5 TYPE A WWWW DET A A A A A A	ERMS	#Avg Typ		Trig: Free #Atten: 20	PNO: Wide	RF 50 Ω AC req 824.000000 M	Center F
Auto Tune	824.000 MHz -32.751 dBm		Ref Offset 27.5 dB			10 dB/div		
Center Fred 824.000000 MH:			$\bigwedge$					17.5
Start Free 822.000000 MH:								2.50
Stop Free 826.000000 MH:	-13.00 dBm	1						-12.5
CF Step 400.000 kH Auto Mar	RMS			Í				32.5
Freq Offse 0 H:					/	an and a state of the	an a san an a	-52,5
	Span 4.000 MHz 000 s (1001 pts)	#Sween			300 kHz	#\/B\//	4.000 MHz	Center 82 #Res BW
	our provinces	STATUS			500-1112		TOO NI IZ	ISG

# LTE B5\_10 M\_Band Edge\_Low\_QPSK\_1RB



- <b>F</b>					trum Analyzer - Swept SA	
Frequency	12:54:45 PM Nov 11, 2024 TRACE 1 2 3 4 5 TYPE A WARWAY DET A A A A A A	ALIGN AUTO #Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	PNO: Wide	RF 50 Ω AC req 824.000000 M	Center F
Auto Tune	1 824.000 MHz -33.583 dBm	Mk			Ref Offset 27.5 dB Ref 27.50 dBm	10 dB/div
Center Fred 824.000000 MHz						17.5
Start Free 822.000000 MH	RMS					2.50
Stop Free 826.000000 MH	-13.00 dBm					-12.5
CF Stej 400.000 kH <u>Auto</u> Ma				and the second	مراجع المراجع	-32.5
Freq Offse 0 H						52.5
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	300 kHz	#VBW 3	4.000 MHz 100 kHz	Center 82 #Res BW
		STATUS				ISG

# LTE B5\_10 M\_Band Edge\_Low\_QPSK\_FullRB



				trum Analyzer - Swept SA	
Frequency	12:55:03 PM Nov 11, 2024 TRACE 2 3 4 5 TYPE A WARMAN DET A A A A A A	ALIGN AUTO #Avg Type: RMS	Trig: Free Run #Atten: 20 dB	RF 50 Ω AC req 821.000000 MHz PNO: Wide ↔ IFGain:Low	Center Fi
Auto Tune	1 822.988 MHz -41.157 dBm	Mki		Ref Offset 27.5 dB Ref 27.50 dBm	0 dB/div
Center Free 821.000000 MH					17.5
Start Free 819.000000 MH					7 50
Stop Free 823.000000 MH	-13.00 dBm				12.5
CF Ste 400.000 kH <u>Auto</u> Ma	T RM				32.5
Freq Offse 0 H			1990	and here a constrained of the second s	52,5
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	300 kHz	1.000 MHz 100 kHz #VBW	Center 82
		STATUS			ISG

#### LTE B5\_10 M\_Extended Band Edge\_Low\_QPSK\_FullRB



					rum Analyzer - Swept SA	Agilent Spec
Frequency	12:59:22 PM Nov 11, 2024 TRACE 1 2 3 4 5 TYPE A WARNAW DET A A A A A A	ALIGN AUTO #Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	PNO: Wide		
Auto Tun	1 849.000 MHz -32.760 dBm	Mk			Ref Offset 27.5 dB Ref 27.50 dBm	0 dB/div
Center Fre 849.000000 MH				$\cap$		175
Start Fre 847.000000 MH						150
Stop Fre 851.000000 M⊦	-13,00 dBm					22.5
CF Ste 400.000 kH Auto Ma						12.5
Freq Offso 0 H	RMS	washing to a start of the start				52.5
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	300 kHz	#VBW	0.000 MHz 100 kHz	Center 84
		STATUS				SG

# LTE B5\_10 M\_Band Edge\_High\_QPSK\_1RB



- # ×				Analyzer - Swept SA	
Frequency	12:58:36 PM Nov 11, 2024 TRACE 1 2 3 4 5 TYPE A WARKAY DET A A A A A A	#Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	RF 50 Ω AC 849.000000 MHz PNO: Wide ↔ IFGain:Low	Center Fr
Auto Tune	1 849.004 MHz -31.324 dBm	Mki		ef Offset 27.5 dB ef 27.50 dBm	10 dB/div
Center Free 849.000000 MH					17.5
Start Free 847.000000 MH					2.50
Stop Fre 851.000000 MH	-13.00 dBm				12.5
CF Ste 400.000 kH Auto Ma	RMS	**************************************	1		32.5
Freq Offse 0 H					52.5
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	300 kHz		Center 84 Res BW
		STATUS			ISG

# LTE B5\_10 M\_Band Edge\_High\_QPSK\_FullRB



					ctrum Analyzer - Swept SA	
Frequency	12:58:55 PM Nov 11, 2024 TRACE 1 2 3 4 5 TYPE A WARMAN DET A A A A A A	#Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB		RF 50 Ω AC req 852.000000	Center F
Auto Tun	1 850.084 MHz -34.977 dBm	Mkr		27.5 dB	Ref Offset 27.5 dB Ref 27.50 dBm	0 dB/div
Center Fre 852.000000 MH						17.5
Start Fre 850.000000 MH						7 50
Stop Fre 854.000000 M⊦	-13.00 dBm					22.5
CF Ste 400.000 kH Auto Ma	Ē					12.5
Freq Offs 0 H	RAIS					52.5
	Span 4.000 MHz 1.000 s (1001 pts)	#Sween	300 kHz		52.000 MHz 100 kHz	
		STATUS				ISG

#### LTE B5\_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-2411-FC008-P