

TEST REPORT

FCC LTE Test for SM-S731U
Certification

APPLICANT

SAMSUNG Electronics Co., Ltd.

REPORT NO.

HCT-RF-2507-FC023

DATE OF ISSUE

July 14, 2025

Tested by
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TEST REPORT

REPORT NO.

HCT-RF-2507-FC023

DATE OF ISSUE

July 14, 2025

Additional Model

SM-S731U1

Applicant**SAMSUNG Electronics Co., Ltd.**

129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Product Name

Mobile Phone

Model Name

SM-S731U

Date of Test

May 13, 2025 ~ July 10, 2025

FCC ID

A3LSMS731U

Location of Test

☒ Permanent Testing Lab ☐ On Site Testing

(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 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 14, 2025	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

Model(s):	SM-S731U
Additional Model(s)	SM-S731U1
Tx Frequency:	2502.5 – 2567.5 : 5 MHz 2505.0 – 2565.0 : 10 MHz 2507.5 – 2562.5 : 15 MHz 2510.0 – 2560.0 : 20 MHz
Serial number:	Radiated : R3CY40DEG4K Conducted : R3CY40XC8LM
Antenna Information	Please refer to the Antenna Specification document.

1.1. MAXIMUM OUTPUT POWER

Main 2 ANT

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	EIRP	
				Max. Power (W)	Max. Power (dBm)
LTE – Band 7 (5)	2502.5 – 2567.5	4M54G7D	QPSK	0.099	19.95
		4M51W7D	16QAM	0.085	19.27
		4M52W7D	64QAM	0.065	18.15
		4M56W7D	256QAM	0.032	15.09
LTE – Band 7 (10)	2505.0 – 2565.0	9M05G7D	QPSK	0.099	19.97
		9M03W7D	16QAM	0.084	19.24
		9M04W7D	64QAM	0.065	18.16
		9M04W7D	256QAM	0.032	15.09
LTE – Band 7 (15)	2507.5 – 2562.5	13M5G7D	QPSK	0.103	20.12
		13M5W7D	16QAM	0.087	19.38
		13M5W7D	64QAM	0.067	18.25
		13M5W7D	256QAM	0.034	15.32
LTE – Band 7 (20)	2510.0 – 2560.0	18M1G7D	QPSK	0.102	20.07
		18M0W7D	16QAM	0.085	19.31
		18M0W7D	64QAM	0.066	18.18
		18M0W7D	256QAM	0.034	15.26

Sub 2 ANT

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	EIRP	
				Max. Power (W)	Max. Power (dBm)
LTE – Band 7 (5)	2502.5 – 2567.5	4M53G7D	QPSK	0.155	21.91
		4M52W7D	16QAM	0.139	21.43
		4M53W7D	64QAM	0.106	20.27
		4M54W7D	256QAM	0.053	17.24
LTE – Band 7 (10)	2505.0 – 2565.0	9M04G7D	QPSK	0.156	21.92
		9M03W7D	16QAM	0.132	21.20
		9M05W7D	64QAM	0.104	20.15
		9M05W7D	256QAM	0.052	17.16
LTE – Band 7 (15)	2507.5 – 2562.5	13M5G7D	QPSK	0.167	22.23
		13M5W7D	16QAM	0.141	21.50
		13M5W7D	64QAM	0.109	20.39
		13M5W7D	256QAM	0.054	17.35
LTE – Band 7 (20)	2510.0 – 2560.0	18M1G7D	QPSK	0.166	22.21
		18M0W7D	16QAM	0.144	21.59
		18M0W7D	64QAM	0.109	20.39
		18M0W7D	256QAM	0.055	17.39

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

Please refer to the [2G3G] Test Report.

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	- N/A (See SAR Report)
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 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;

$$P_d \text{ (dBm)} = P_g \text{ (dBm)} - \text{cable loss (dB)} + \text{antenna gain (dB)}$$

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.

Test Settings

1. RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
2. VBW $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $> 2 \times$ 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

1. 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;

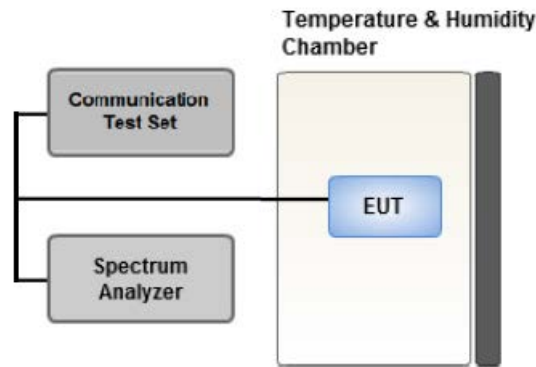
$$\text{Result}_{(\text{dBm})} = P_g_{(\text{dBm})} - \text{cable loss}_{(\text{dB})} + \text{antenna gain}_{(\text{dBi})}$$

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.

$$\text{EIRP}_{(\text{dBm})} = \text{ERP}_{(\text{dBm})} + 2.15$$

3.4 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 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:

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

Test Settings(Peak Power)

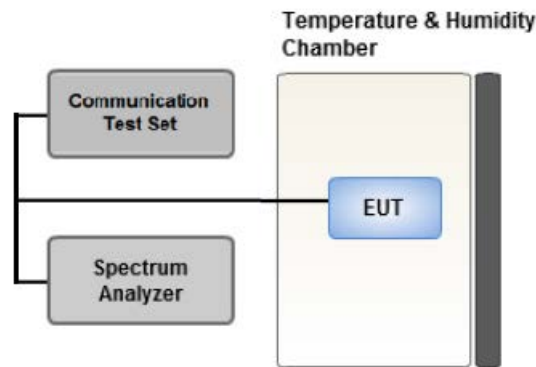
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW $\geq 3 \times$ RBW.

1. Set the RBW $\geq$ OBW.
2. Set VBW $\geq 3 \times$ RBW.
3. Set span $\geq 2 \times$ OBW.
4. Sweep time $\geq 10 \times$ (number of points in sweep) $\times$ (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 $2 \times$ to $3 \times$ the OBW.
2. Set RBW $\geq$ OBW.
3. Set VBW $\geq 3 \times$ RBW.
4. Set number of measurement points in sweep $\geq 2 \times$ span / RBW.
5. Sweep time:
Set $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$ 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 $[10 \log (1/\text{duty cycle})]$ to the measured maximum power level to compute the average power during continuous transmission. For example, add $[10 \log (1/0.25)] = 6 \text{ dB}$ if the duty cycle is a constant 25 %.

3.5 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.

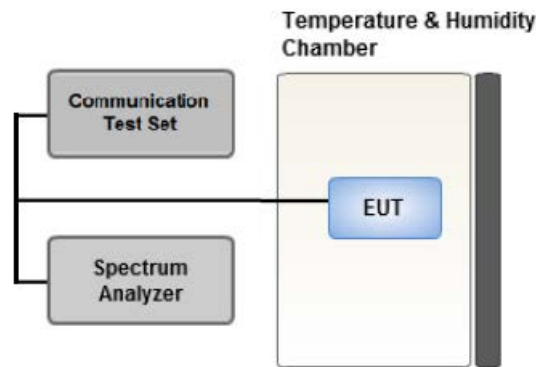
The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency.

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

3.6 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

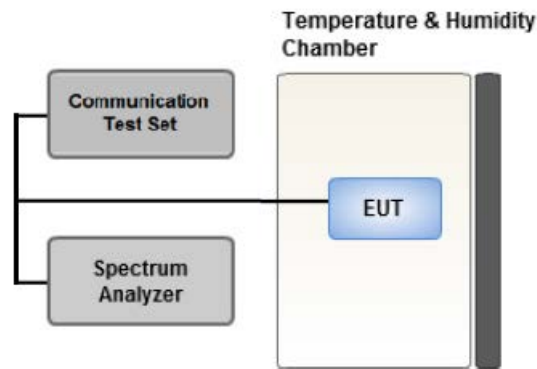
Test Overview

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.

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 x Span / RBW

3.7 CHANNEL 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 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

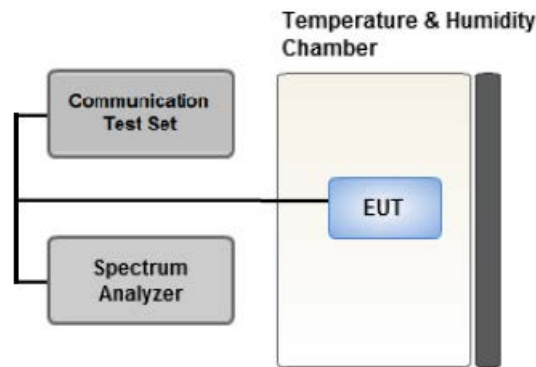
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. Within 1MHz of the channel edge the RBW should be 2% of EBW, then 1 MHz after that.
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points $\geq 2 \times \text{Span/RBW}$
7. Trace mode = trace average
8. Sweep Time > (Number of Points) (Symbol Period)
9. The trace was allowed to stabilize

Test Notes

1. The attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge,
2. $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge.
3. $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge.
4. The attenuation factor shall not be less than $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz.
5. $55 + 10 \log (P)$ dB at or below 2490.5 MHz.
6. X is the greater of 6MHz or the actual emission bandwidth
7. 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 $10 \log(1 \text{ MHz/ RB})$ 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.

3.8 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.

3.9 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-S731U & additional models were tested and the worst case results are reported.
(Worst case : SM-S731U)

[Main 2 ANT Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Isotropic Radiated Power	QPSK, 16QAM, 64QAM, 256QAM	See Section 8.1		Z
Radiated Spurious and Harmonic Emissions	QPSK	See Section 8.2		Y

[Sub 2 ANT Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Isotropic Radiated Power	QPSK, 16QAM, 64QAM, 256QAM	See Section 9.1		Y
Radiated Spurious and Harmonic Emissions	QPSK	See Section 9.2		Y

3.10 WORST CASE(CONDUCTED TEST)

- All modes of operation were investigated and the worst case configuration results are reported.
 - SM-S731U & additional models were tested and the worst case results are reported.
- (Worst case : SM-S731U)

[Worst case]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Occupied Bandwidth	QPSK, 16QAM, 64QAM, 256QAM	5, 10, 15, 20	Mid	Full RB	0
Peak-To-Average Ratio	QPSK, 16QAM, 64QAM, 256QAM	5, 10, 15, 20	Mid	Full RB	0
Band Edge	QPSK	5	Low	1	0
			High	1	24
		10	Low	1	0
			High	1	49
		15	Low	1	0
			High	1	74
		20	Low	1	0
			High	1	99
		5, 10, 15, 20	Low, High	Full RB	0
Spurious and Harmonic Emissions at Antenna Terminal	QPSK	5, 10, 15, 20	Low, Mid, High	1	0

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 Amplifier	CBL18265035	CERNEX	22966	11/07/2025	Annual
Power Amplifier	CBL26405040	CERNEX	25956	02/19/2026	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	5001	04/10/2026	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	02/11/2026	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	03/23/2027	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	04/14/2026	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/10/2026	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
Radio Communication Test Station	MT8000A	Anritsu Corp.	6272613402	08/28/2025	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	05/14/2026	Annual
Signal Analyzer(2 Hz ~ 50.0 GHz)	N9040B	KEYSIGHT	US55230216	12/09/2025	Annual
Signal & Spectrum Analyzer (2 Hz~67 GHz)	FSW67	REOHDE & SCHWARZ	101736	05/27/2026	Annual
Automation Software	FCC 2G/3G/4G Conducted	HCT CO., LTD	-	-	-
Automation Software	FCC NR Conducted	HCT CO., LTD	-	-	-
Automation Software	FCC LTE Radiated	HCT CO., LTD	-	-	-
Automation Software	FCC NR Radiated	HCT CO., LTD	-	-	-

Note:

- Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
- 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 ($\pm$ kHz)
Occupied Bandwidth	95 (Confidence level about 95 %, $k=2$)
Frequency stability	28 (Confidence level about 95 %, $k=2$)

Parameter	Expanded Uncertainty ($\pm$ dB)
Block Edge	0.70 (Confidence level about 95 %, $k=2$)
Conducted Spurious Emissions	1.18 (Confidence level about 95 %, $k=2$)
Peak- to- Average Ratio	0.68 (Confidence level about 95 %, $k=2$)
Radiated Power	4.74 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.36 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.68 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.75 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.82 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (Above 40 GHz)	5.58 (Confidence level about 95 %, $k=2$)

6. SUMMARY OF TEST RESULTS

-. The decision rule applies 'simple acceptance'

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(m)(4)	■ $< 40 + 10\log_{10} (P[\text{Watts}])$ at Channel edges ■ $< 43 + 10\log_{10} (P[\text{Watts}])$ between 5 and X MHz from Channel edges ■ $< 55 + 10\log_{10} (P[\text{Watts}])$ beyond X MHz beyond from Channel edges ■ $< 43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz	PASS
Conducted Output Power	§ 2.1046	N/A	<u>Note1</u>
Frequency stability / variation of ambient temperature	§ 2.1055, § 27.54	Emission must remain in band	PASS

Note:

1. Refer to the SAR report.

6.2 Test Condition: Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Equivalent Isotropic Radiated Power	§ 27.50(h)(2)	< 2 Watts max. EIRP	PASS
Radiated Spurious and Harmonic Emissions	§ 2.1053, § 27.53(m)(4)	$< 55 + 10\log_{10} (P[\text{Watts}])$	PASS

7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

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

$$\text{ERP} = \text{Substitute LEVEL(dBm)} + \text{Ant. Gain} - \text{CL(Cable Loss)}$$

- 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 Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol.	EIRP	
channel	Freq.(MHz)						W	dBm
20175	1,732.50	-15.75	18.45	9.90	1.76	H	0.456	26.59

$$\text{EIRP} = \text{Substitute LEVEL(dBm)} + \text{Ant. Gain} - \text{CL(Cable Loss)}$$

- 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

QAM Modulation

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

8. TEST DATA(Main 2 ANT)

8.1 EQUIVALENT ISOTROPIC RADIATED POWER

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured	Substitute	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP		RB	
			Level (dBm)	Level (dBm)				W	W	dBm	Size	Offset
2502.5	LTE B7/ 5 MHz	QPSK	-25.26	11.76	10.70	2.51	V	< 2.00	0.099	19.95	1	24
		16-QAM	-26.12	10.90	10.70	2.51	V		0.081	19.09		
		64-QAM	-27.21	9.81	10.70	2.51	V		0.063	18.00		
		256-QAM	-30.21	6.81	10.70	2.51	V		0.032	15.00		
2535.0		QPSK	-26.10	10.72	10.70	2.54	V		0.077	18.88	1	0
		16-QAM	-26.51	10.31	10.70	2.54	V		0.070	18.47		
		64-QAM	-27.61	9.21	10.70	2.54	V		0.055	17.37		
		256-QAM	-30.61	6.21	10.70	2.54	V		0.027	14.37		
2567.5		QPSK	-25.40	11.81	10.66	2.65	V		0.096	19.82	1	0
		16-QAM	-25.95	11.26	10.66	2.65	V		0.085	19.27		
		64-QAM	-27.07	10.14	10.66	2.65	V		0.065	18.15		
		256-QAM	-30.13	7.08	10.66	2.65	V		0.032	15.09		

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured	Substitute	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP		RB	
			Level (dBm)	Level (dBm)				W	W	dBm	Size	Offset
2505.0	LTE B7/ 10 MHz	QPSK	-25.37	11.65	10.70	2.51	V	< 2.00	0.096	19.84	1	49
		16-QAM	-26.08	10.94	10.70	2.51	V		0.082	19.13		
		64-QAM	-27.22	9.80	10.70	2.51	V		0.063	17.99		
		256-QAM	-30.19	6.83	10.70	2.51	V		0.032	15.02		
QPSK		-25.63	11.19	10.70	2.54	V	0.086		19.35	1	0	
16-QAM		-26.40	10.42	10.70	2.54	V	0.072		18.58			
64-QAM		-27.46	9.36	10.70	2.54	V	0.057		17.52			
256-QAM		-30.38	6.44	10.70	2.54	V	0.029		14.60			
2565.0		QPSK	-25.31	11.92	10.67	2.62	V		0.099	19.97	1	49
		16-QAM	-26.04	11.19	10.67	2.62	V		0.084	19.24		
		64-QAM	-27.12	10.11	10.67	2.62	V		0.065	18.16		
		256-QAM	-30.19	7.04	10.67	2.62	V		0.032	15.09		

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured	Substitute	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP		RB	
			Level (dBm)	Level (dBm)				W	W	dBm	Size	Offset
2507.5	LTE B7/ 15 MHz	QPSK	-25.22	11.85	10.70	2.51	V	< 2.00	0.101	20.04	1	74
		16-QAM	-26.01	11.06	10.70	2.51	V		0.084	19.25		
		64-QAM	-27.05	10.02	10.70	2.51	V		0.066	18.21		
		256-QAM	-29.99	7.08	10.70	2.51	V		0.034	15.27		
2535.0		QPSK	-25.48	11.34	10.70	2.54	V		0.089	19.50	1	0
		16-QAM	-26.15	10.67	10.70	2.54	V		0.076	18.83		
		64-QAM	-27.35	9.47	10.70	2.54	V		0.058	17.63		
		256-QAM	-30.33	6.49	10.70	2.54	V		0.029	14.65		
2562.5		QPSK	-25.16	12.07	10.67	2.62	V		0.103	20.12	1	38
		16-QAM	-25.90	11.33	10.67	2.62	V		0.087	19.38		
		64-QAM	-27.03	10.20	10.67	2.62	V		0.067	18.25		
		256-QAM	-29.96	7.27	10.67	2.62	V		0.034	15.32		

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured	Substitute	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP		RB	
			Level (dBm)	Level (dBm)				W	W	dBm	Size	Offset
2510.0	LTE B7/ 20 MHz	QPSK	-25.25	11.82	10.70	2.51	V	< 2.00	0.100	20.01	1	99
		16-QAM	-26.00	11.07	10.70	2.51	V		0.084	19.26		
		64-QAM	-27.08	9.99	10.70	2.51	V		0.066	18.18		
		256-QAM	-30.12	6.95	10.70	2.51	V		0.033	15.14		
2535.0		QPSK	-25.59	11.23	10.70	2.54	V		0.087	19.39	1	0
		16-QAM	-26.37	10.45	10.70	2.54	V		0.073	18.61		
		64-QAM	-27.56	9.26	10.70	2.54	V		0.055	17.42		
		256-QAM	-30.46	6.36	10.70	2.54	V		0.028	14.52		
2560.0		QPSK	-25.28	11.98	10.68	2.59	V		0.102	20.07	1	0
		16-QAM	-26.04	11.22	10.68	2.59	V		0.085	19.31		
		64-QAM	-27.23	10.03	10.68	2.59	V		0.065	18.12		
		256-QAM	-30.09	7.17	10.68	2.59	V		0.034	15.26		

8.2 RADIATED SPURIOUS EMISSIONS

■ MODE: LTE B7
 ■ MODULATION SIGNAL: 5 MHz QPSK
 ■ DISTANCE: 1 meters
 ■ LIMIT: -25 dBm

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	RB	
								Size	Offset
20775 (2502.5)	5 005.00	-42.69	12.55	-66.62	3.71	V	-57.78	1	24
	7 507.50	-36.41	10.98	-50.17	4.60	H	-43.79		
	10 010.00	-47.52	10.61	-58.01	5.47	H	-52.87		
21100 (2535.0)	5 070.00	-42.47	12.35	-64.34	3.80	H	-55.79	1	0
	7 605.00	-33.92	11.33	-48.29	4.64	H	-41.60		
	10 140.00	-46.84	10.71	-57.37	5.48	H	-52.14		
21425 (2567.5)	5 135.00	-44.33	12.15	-68.25	3.81	H	-59.91	1	0
	7 702.50	-35.50	11.55	-50.44	4.66	V	-43.55		
	10 270.00	-46.84	10.69	-55.04	5.57	V	-49.92		

■ MODE: LTE B7
 ■ MODULATION SIGNAL: 10 MHz QPSK
 ■ DISTANCE: 1 meters
 ■ LIMIT: -25 dBm

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	RB	
								Size	Offset
20800 (2505.0)	5 010.00	-41.87	12.55	-66.12	3.72	H	-57.29	1	49
	7 515.00	-32.18	10.98	-46.11	4.60	V	-39.73		
	10 020.00	-47.50	10.61	-58.32	5.47	H	-53.18		
21100 (2535.0)	5 070.00	-42.36	12.35	-64.23	3.80	H	-55.68	1	0
	7 605.00	-31.62	11.33	-45.99	4.64	H	-39.30		
	10 140.00	-45.91	10.71	-56.44	5.48	H	-51.21		
21400 (2565.0)	5 130.00	-41.83	12.15	-65.98	3.81	V	-57.64	1	49
	7 695.00	-30.40	11.51	-45.65	4.66	H	-38.80		
	10 260.00	-46.92	10.69	-55.22	5.56	V	-50.09		

■ MODE: LTE B7
 ■ MODULATION SIGNAL: 15 MHz QPSK
 ■ DISTANCE: 1 meters
 ■ LIMIT: -25 dBm

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	RB	
								Size	Offset
20825 (2507.5)	5 015.00	-40.16	12.55	-64.50	3.70	V	-55.65	1	74
	7 522.50	-29.04	10.98	-43.37	4.61	H	-37.00		
	10 030.00	-45.71	10.61	-56.30	5.47	V	-51.16		
21100 (2535.0)	5 070.00	-41.22	12.35	-63.09	3.80	V	-54.54	1	0
	7 605.00	-30.47	11.33	-44.84	4.64	V	-38.15		
	10 140.00	-46.22	10.71	-56.75	5.48	H	-51.52		
21375 (2562.5)	5 125.00	-40.48	12.15	-64.80	3.81	V	-56.46	1	38
	7 687.50	-31.24	11.47	-46.70	4.66	V	-39.89		
	10 250.00	-45.65	10.69	-53.72	5.54	H	-48.57		

■ MODE: LTE B7
 ■ MODULATION SIGNAL: 20 MHz QPSK
 ■ DISTANCE: 1 meters
 ■ LIMIT: -25 dBm

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	RB	
								Size	Offset
20850 (2510.0)	5 020.00	-41.70	12.55	-66.12	3.69	V	-57.26	1	99
	7 530.00	-32.39	10.98	-46.98	4.60	V	-40.60		
	10 040.00	-46.65	10.61	-56.83	5.49	V	-51.71		
21100 (2535.0)	5 070.00	-41.41	12.35	-63.28	3.80	V	-54.73	1	0
	7 605.00	-35.19	11.33	-49.56	4.64	V	-42.87		
	10 140.00	-47.03	10.71	-57.56	5.48	H	-52.33		
21350 (2560.0)	5 120.00	-41.19	12.15	-65.68	3.81	H	-57.34	1	0
	7 680.00	-33.63	11.47	-49.45	4.70	H	-42.68		
	10 240.00	-46.42	10.73	-54.00	5.54	V	-48.81		

8.3 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)	Limit (dB)
7	5 MHz	2535.0	QPSK	25	0	6.30	13.00
			16-QAM			6.79	
			64-QAM			6.50	
			256-QAM			6.56	
	10 MHz		QPSK	50		6.31	
			16-QAM			6.83	
			64-QAM			6.60	
			256-QAM			6.59	
	15 MHz		QPSK	75		6.26	
			16-QAM			6.76	
			64-QAM			6.55	
			256-QAM			6.58	
	20 MHz		QPSK	100		6.25	
			16-QAM			6.79	
			64-QAM			6.52	
			256-QAM			6.61	

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 70 ~ 85.
2. P.A.P.R is not required. These values are reported for information only.

8.4 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
7	5 MHz	2535.0	QPSK	25	0	4.5371
			16-QAM			4.5106
			64-QAM			4.5227
			256-QAM			4.5597
	10 MHz		QPSK	50		9.0506
			16-QAM			9.0342
			64-QAM			9.0413
			256-QAM			9.0375
	15 MHz		QPSK	75		13.529
			16-QAM			13.532
			64-QAM			13.504
			256-QAM			13.502
	20 MHz		QPSK	100		18.088
			16-QAM			17.999
			64-QAM			18.005
			256-QAM			17.979

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 86 ~ 101.

8.5 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
7	5	2502.5	9.1625	28.591	-57.656	-29.065	-25.00
		2535.0	9.9701	28.591	-58.134	-29.543	
		2567.5	10.0000	28.591	-57.765	-29.174	
	10	2505.0	8.8634	28.591	-57.238	-28.647	
		2535.0	8.5045	28.591	-56.407	-27.816	
		2565.0	3.8086	27.976	-57.797	-29.821	
	15	2507.5	8.2852	28.591	-58.539	-29.948	
		2535.0	7.6571	28.591	-57.843	-29.252	
		2562.5	5.7428	28.591	-56.949	-28.358	
	20	2510.0	4.3171	27.976	-57.741	-29.765	
		2535.0	8.8435	28.591	-57.368	-28.777	
		2560.0	5.7428	28.591	-57.456	-28.865	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 102 ~ 125.
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

8.6 CHANNEL EDGE

Band Width (Modulation)	Frequency (MHz)	RB Size / Offset	C.E ~ (C.E ± 1 MHz)		2 496 MHz ~ 2 499 MHz	(C.E + 1 MHz) ~ (C.E + 5 MHz)	2 490.5 MHz ~ 2 496 MHz	(C.E + 5 MHz) ~ (C.E + X MHz)	Below 2 490.5 MHz	Above (C.E + X MHz)
			Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
5 MHz (QPSK)	2502.5	25 / 0	-21.55	-21.79	-24.49	-27.26	-32.42	-33.09	-46.61	-34.28
10 MHz (QPSK)	2505.0	50 / 0	-23.93	-24.21	-22.82	-24.69	-28.67	-29.75	-42.36	-34.13
15 MHz (QPSK)	2507.5	75 / 0	-25.92	-25.20	-24.06	-23.86	-29.16	-26.80	-42.50	-37.90
20 MHz (QPSK)	2510.0	100 / 0	-27.71	-26.07	-26.76	-25.23	-31.04	-28.38	-43.02	-40.10
Limit(dBm)			-10.0		-10.0		-13.0		-25.0	

Band Width (Modulation)	Frequency (MHz)	RB Size / Offset	C.E ~ (C.E ± 1 MHz)		(C.E ± 1 MHz) ~ (C.E ± 5 MHz)	
			Lower	Upper	Lower	Upper
5 MHz (QPSK)	2535.0	25 / 0	-19.10	-19.15	-14.54	-14.97
	2567.5	25 / 0	-20.98	-20.82	-18.76	-19.03
10 MHz (QPSK)	2535.0	50 / 0	-20.29	-20.62	-15.76	-16.37
	2565.0	50 / 0	-23.08	-23.43	-20.19	-21.07
15 MHz (QPSK)	2535.0	75 / 0	-20.81	-21.41	-16.88	-17.70
	2562.5	75 / 0	-24.75	-25.59	-22.09	-23.61
20 MHz (QPSK)	2535.0	100 / 0	-20.47	-21.57	-17.61	-18.89
	2560.0	100 / 0	-25.62	-25.89	-23.64	-24.13
Limit(dBm)			-10.0		-10.0	

Band Width (Modulation)	Frequency (MHz)	Resource Block Size	(C.E ± 5 MHz) ~ (C.E ± X MHz)		Above (C.E ± X MHz)	
			Lower	Upper	Lower	Upper
5 MHz (QPSK)	2535.0	25 / 0	-27.90	-28.58	-29.45	-30.16
	2567.5	25 / 0	-31.64	-31.97	-32.14	-32.56
10 MHz (QPSK)	2535.0	50 / 0	-19.96	-20.45	-29.20	-29.81
	2565.0	50 / 0	-25.35	-26.13	-35.51	-35.38
15 MHz (QPSK)	2535.0	75 / 0	-19.82	-19.96	-33.07	-32.21
	2562.5	75 / 0	-25.94	-26.69	-39.20	-42.32
20 MHz (QPSK)	2535.0	100 / 0	-20.03	-20.40	-36.11	-34.91
	2560.0	100 / 0	-26.56	-26.41	-39.85	-46.70
Limit(dBm)			-13.0		-25.0	

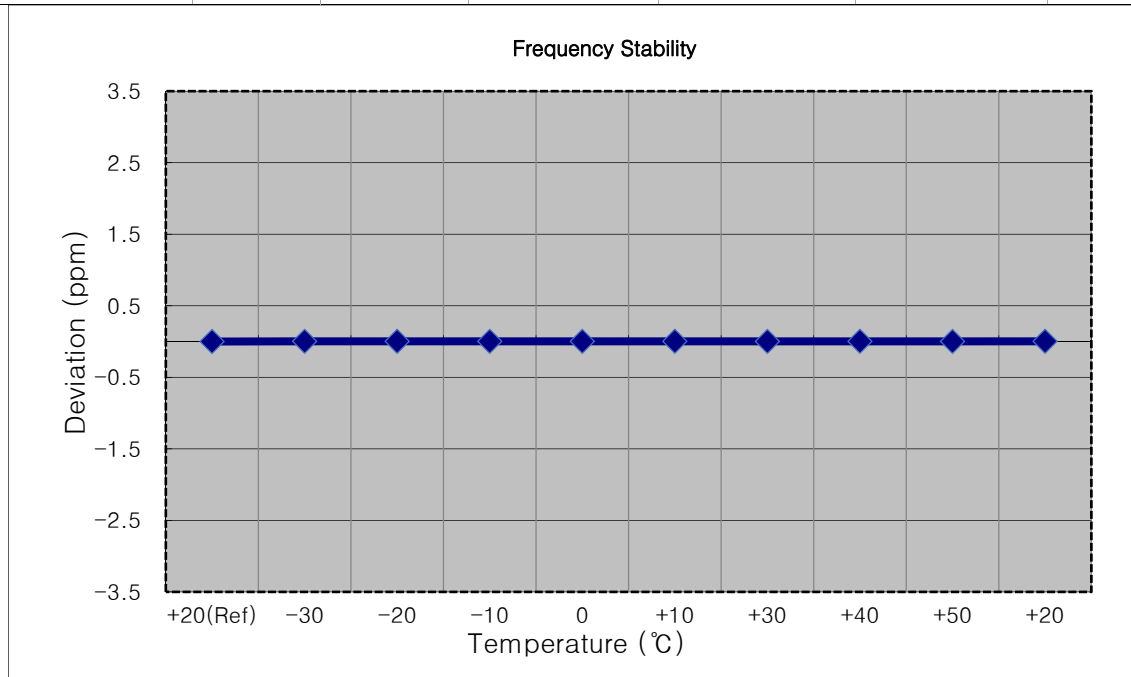
Note:

1. C.E = Channel Edge
2. X = X is the greater of 6 MHz or the actual emission bandwidth.
3. X = 6 MHz(5 MHz Bandwidth), 10 MHz(10 MHz Bandwidth), 15 MHz(15 MHz Bandwidth), 20 MHz(20 MHz Bandwidth)
4. Plots of the EUT's Channel Edge are shown Page 126 ~ 149.

8.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

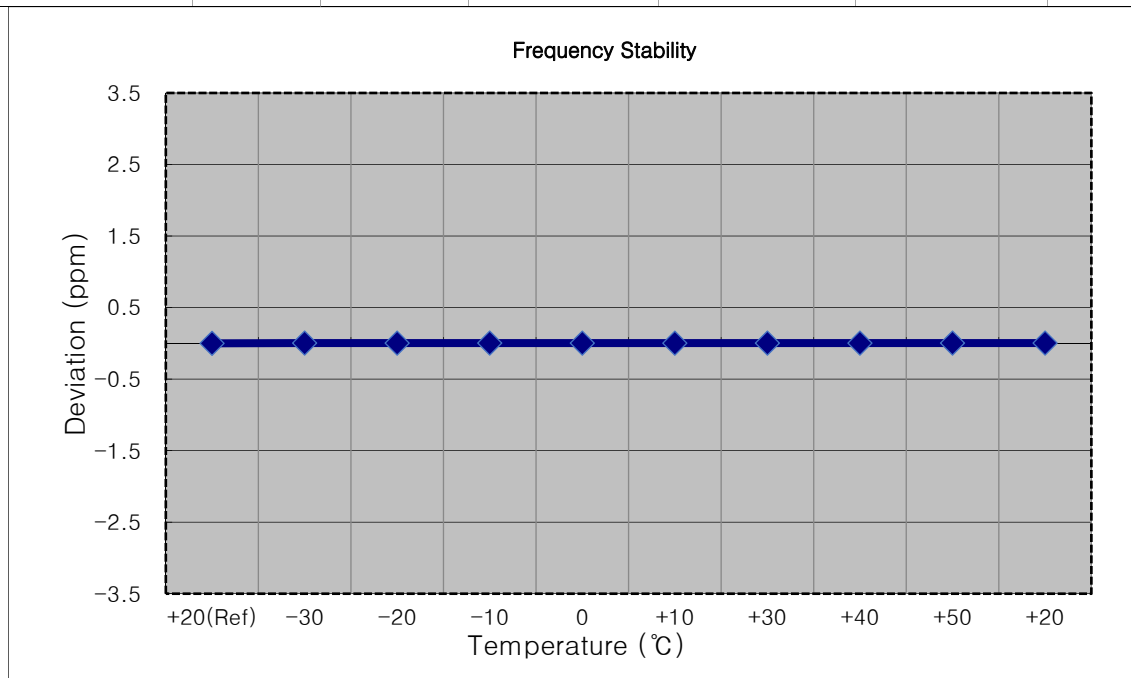
MODE:	<u>LTE 7</u>
OPERATING FREQUENCY:	<u>2,502,500,000 Hz</u>
CHANNEL:	<u>20775 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.880 VDC</u>
DEVIATION LIMIT:	<u>Emission must remain in band</u>

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2502 500 006	0.0	0.000 000	0.000
100 %		-30	2502 500 014	7.4	0.000 000	0.003
100 %		-20	2502 500 013	6.4	0.000 000	0.003
100 %		-10	2502 500 013	6.1	0.000 000	0.002
100 %		0	2502 500 012	5.5	0.000 000	0.002
100 %		+10	2502 500 014	7.5	0.000 000	0.003
100 %		+30	2502 500 011	4.9	0.000 000	0.002
100 %		+40	2502 500 014	7.2	0.000 000	0.003
100 %		+50	2502 500 011	4.7	0.000 000	0.002
Batt. Endpoint	3.300	+20	2502 500 014	7.6	0.000 000	0.003



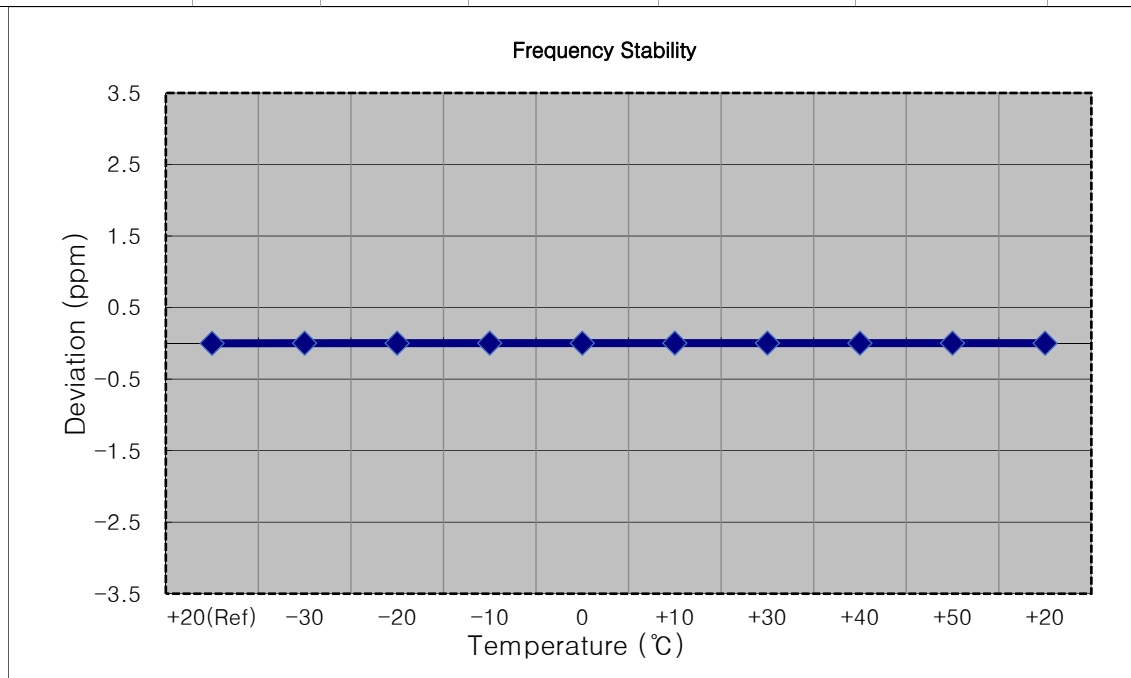
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,505,000,000 Hz
- ▣ CHANNEL: 20800 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2505 000 008	0.0	0.000 000	0.000
100 %		-30	2505 000 017	9.2	0.000 000	0.004
100 %		-20	2505 000 015	7.6	0.000 000	0.003
100 %		-10	2505 000 016	8.6	0.000 000	0.003
100 %		0	2505 000 016	7.8	0.000 000	0.003
100 %		+10	2505 000 014	6.2	0.000 000	0.002
100 %		+30	2505 000 016	8.0	0.000 000	0.003
100 %		+40	2505 000 015	7.5	0.000 000	0.003
100 %		+50	2505 000 016	8.5	0.000 000	0.003
Batt. Endpoint	3.300	+20	2505 000 018	9.9	0.000 000	0.004



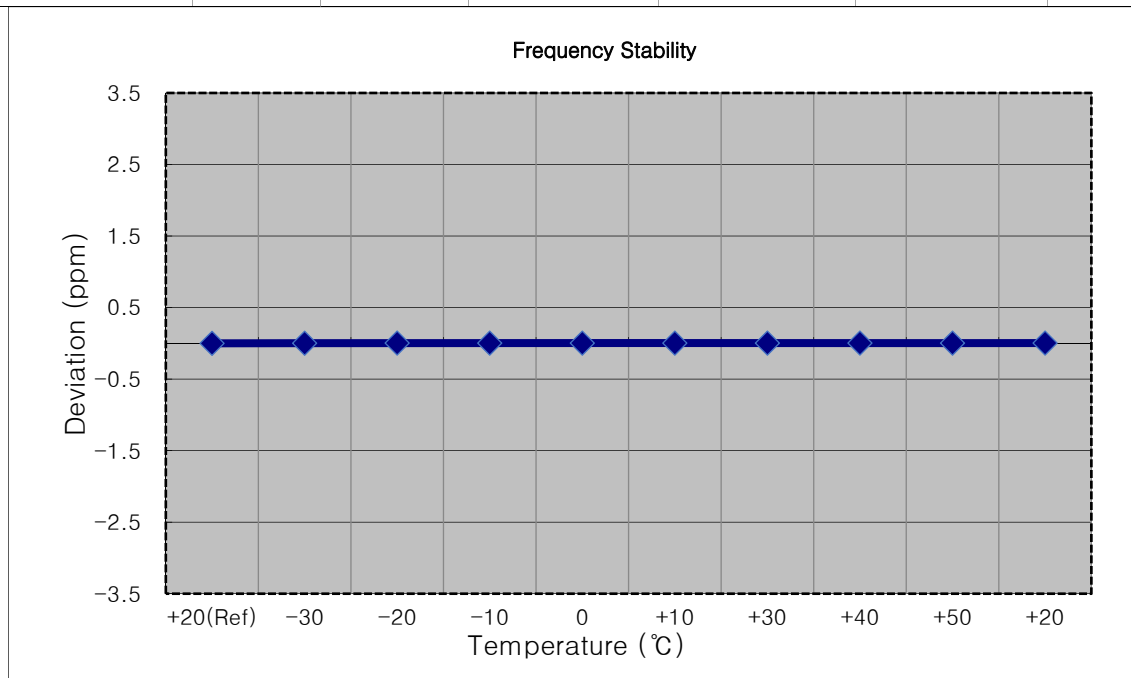
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,507,500,000 Hz
- ▣ CHANNEL: 20825 (15 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2507 500 005	0.0	0.000 000	0.000
100 %		-30	2507 500 010	4.8	0.000 000	0.002
100 %		-20	2507 500 010	5.2	0.000 000	0.002
100 %		-10	2507 500 012	6.9	0.000 000	0.003
100 %		0	2507 500 011	6.0	0.000 000	0.002
100 %		+10	2507 500 012	7.0	0.000 000	0.003
100 %		+30	2507 500 012	6.8	0.000 000	0.003
100 %		+40	2507 500 010	4.8	0.000 000	0.002
100 %		+50	2507 500 012	6.9	0.000 000	0.003
Batt. Endpoint	3.300	+20	2507 500 010	4.6	0.000 000	0.002



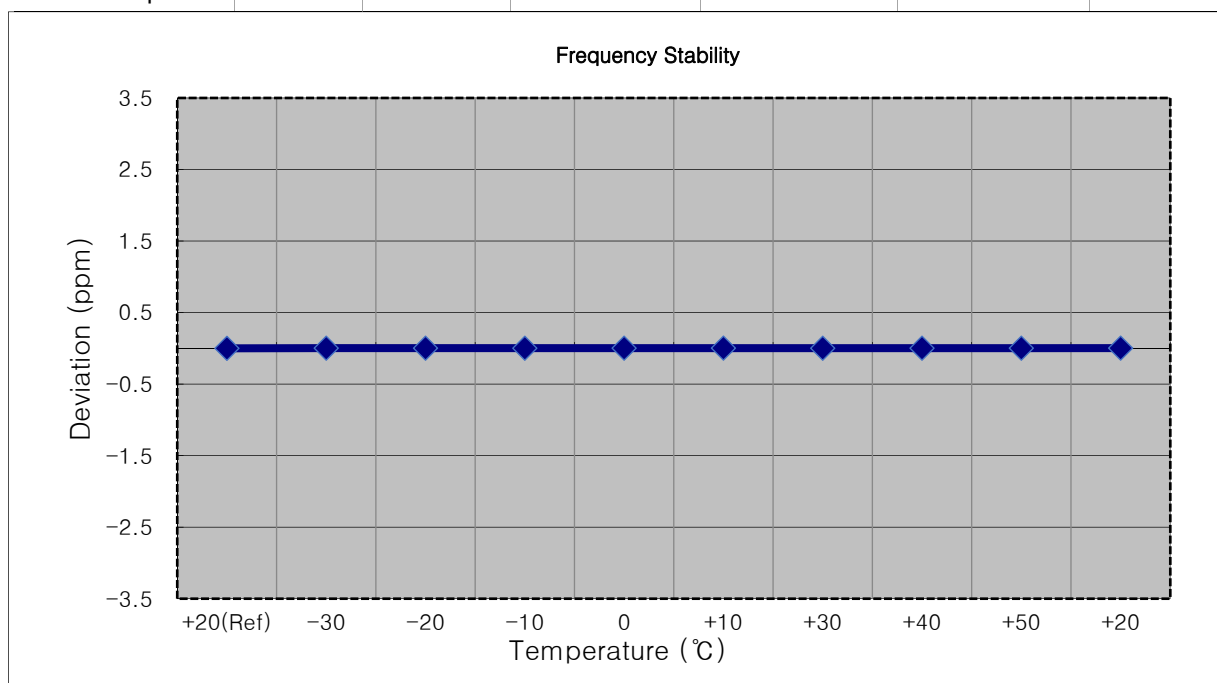
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,510,000,000 Hz
- ▣ CHANNEL: 20850 (20 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2510 000 009	0.0	0.000 000	0.000
100 %		-30	2510 000 013	4.4	0.000 000	0.002
100 %		-20	2510 000 018	9.3	0.000 000	0.004
100 %		-10	2510 000 017	7.7	0.000 000	0.003
100 %		0	2510 000 017	8.3	0.000 000	0.003
100 %		+10	2510 000 016	6.8	0.000 000	0.003
100 %		+30	2510 000 016	7.6	0.000 000	0.003
100 %		+40	2510 000 017	8.6	0.000 000	0.003
100 %		+50	2510 000 016	7.3	0.000 000	0.003
Batt. Endpoint	3.300	+20	2510 000 017	8.6	0.000 000	0.003



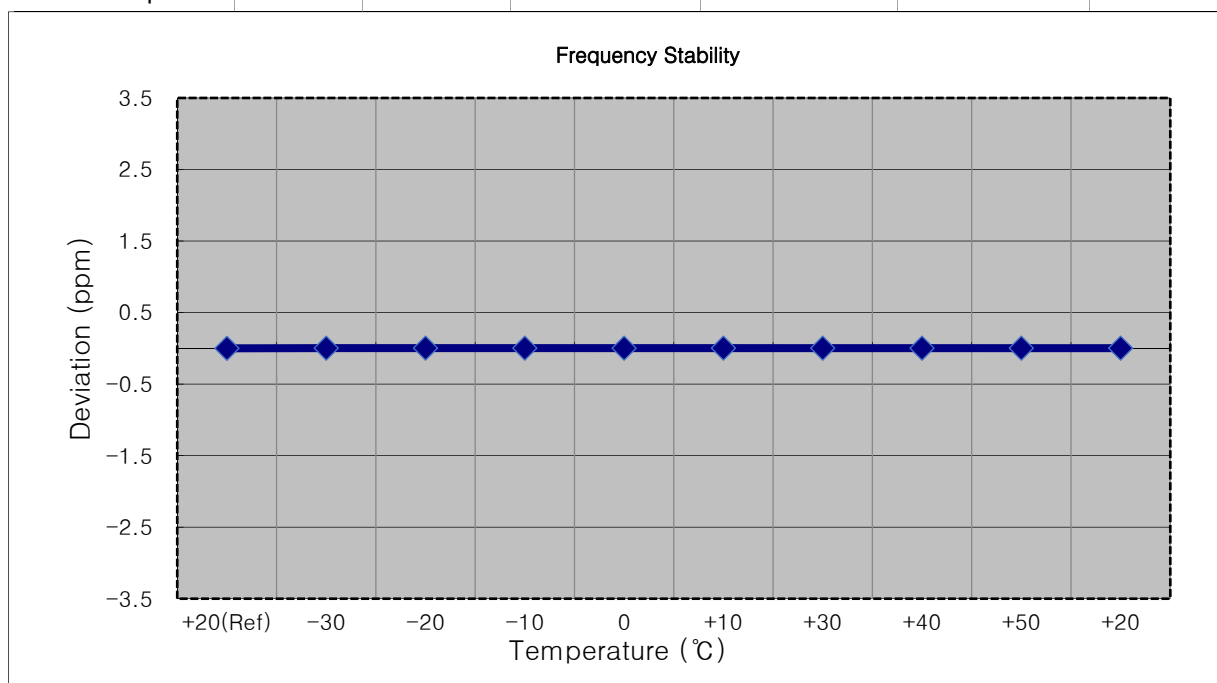
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,535,000,000 Hz
- ▣ CHANNEL: 21100 (5 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2535 000 006	0.0	0.000 000	0.000
100 %		-30	2535 000 012	6.1	0.000 000	0.002
100 %		-20	2535 000 012	5.4	0.000 000	0.002
100 %		-10	2535 000 011	4.6	0.000 000	0.002
100 %		0	2535 000 013	6.4	0.000 000	0.003
100 %		+10	2535 000 013	6.9	0.000 000	0.003
100 %		+30	2535 000 011	4.5	0.000 000	0.002
100 %		+40	2535 000 011	5.0	0.000 000	0.002
100 %		+50	2535 000 011	4.9	0.000 000	0.002
Batt. Endpoint	3.300	+20	2535 000 013	6.7	0.000 000	0.003



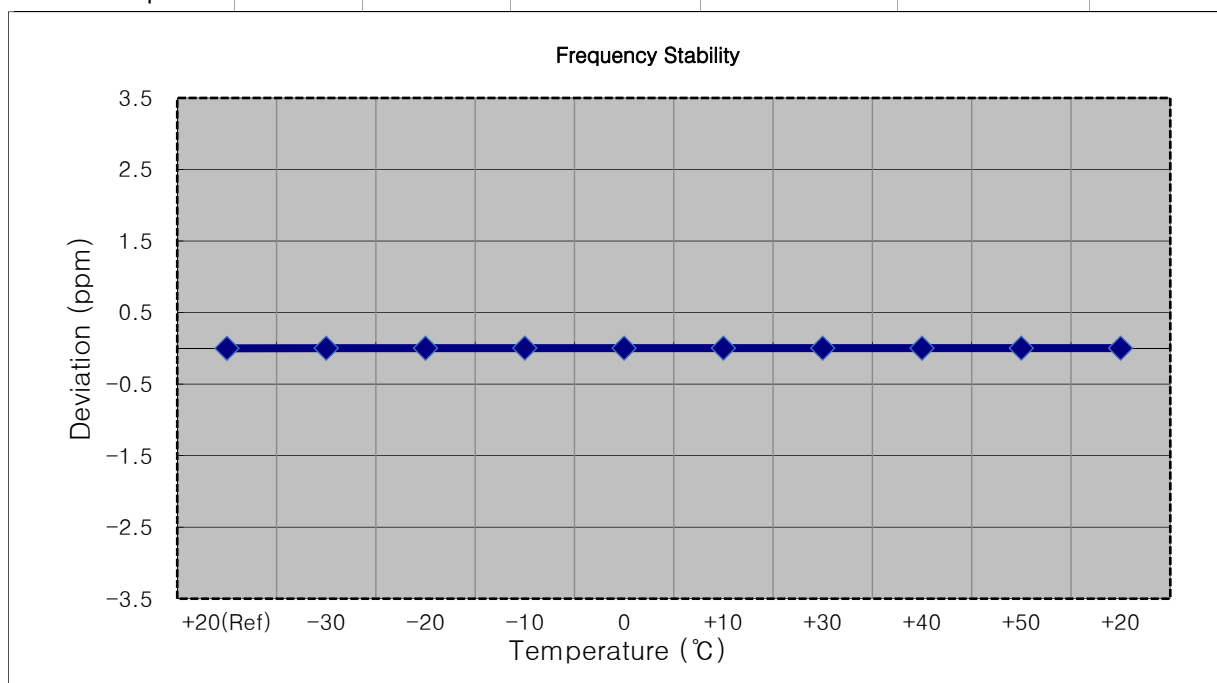
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,535,000,000 Hz
- ▣ CHANNEL: 21100 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2535 000 007	0.0	0.000 000	0.000
100 %		-30	2535 000 013	6.3	0.000 000	0.002
100 %		-20	2535 000 013	6.9	0.000 000	0.003
100 %		-10	2535 000 012	5.6	0.000 000	0.002
100 %		0	2535 000 013	6.2	0.000 000	0.002
100 %		+10	2535 000 013	6.6	0.000 000	0.003
100 %		+30	2535 000 012	5.2	0.000 000	0.002
100 %		+40	2535 000 013	6.0	0.000 000	0.002
100 %		+50	2535 000 012	5.0	0.000 000	0.002
Batt. Endpoint	3.300	+20	2535 000 011	4.7	0.000 000	0.002



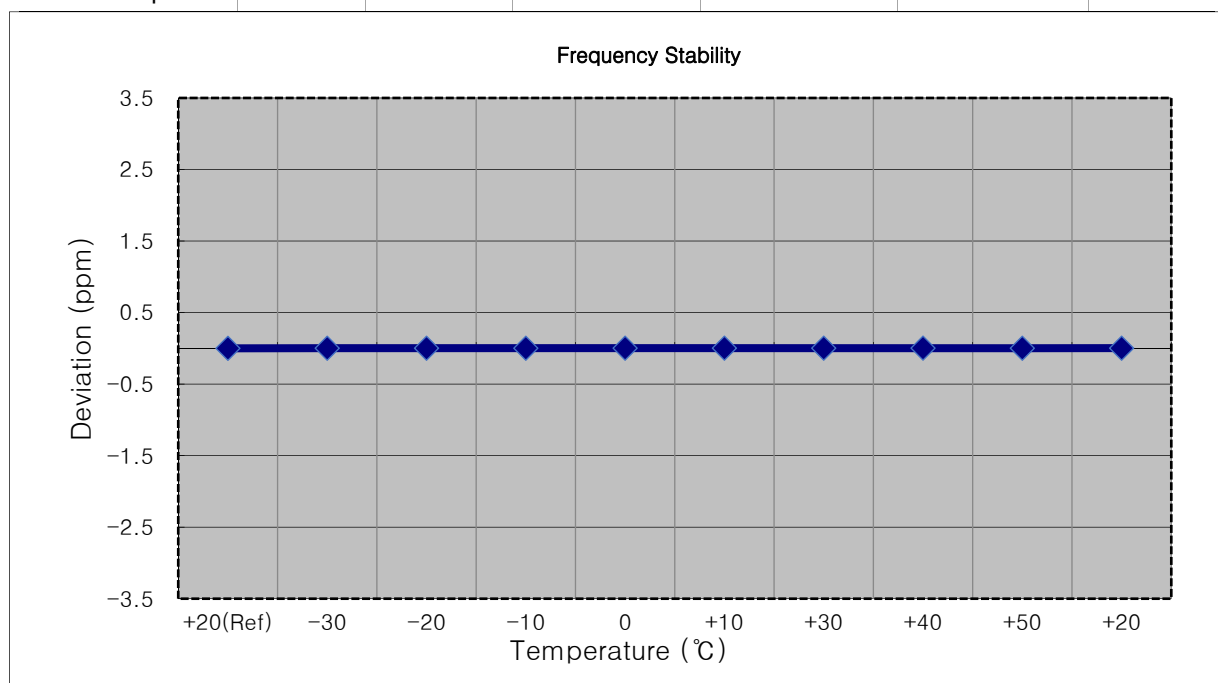
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,535,000,000 Hz
- ▣ CHANNEL: 21100 (15 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2535 000 007	0.0	0.000 000	0.000
100 %		-30	2535 000 012	4.3	0.000 000	0.002
100 %		-20	2535 000 011	3.8	0.000 000	0.001
100 %		-10	2535 000 015	7.2	0.000 000	0.003
100 %		0	2535 000 012	4.8	0.000 000	0.002
100 %		+10	2535 000 014	6.8	0.000 000	0.003
100 %		+30	2535 000 013	6.1	0.000 000	0.002
100 %		+40	2535 000 013	5.8	0.000 000	0.002
100 %		+50	2535 000 013	6.0	0.000 000	0.002
Batt. Endpoint	3.300	+20	2535 000 014	6.2	0.000 000	0.002



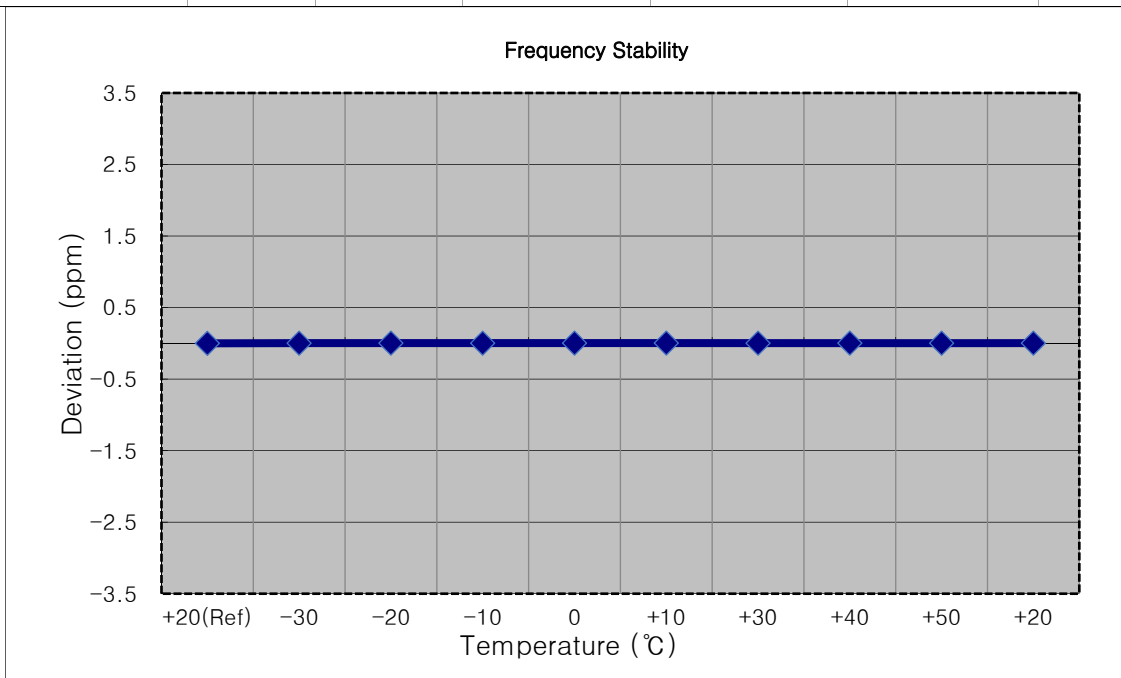
MODE:	<u>LTE 7</u>
OPERATING FREQUENCY:	<u>2,535,000,000 Hz</u>
CHANNEL:	<u>21100 (20 MHz)</u>
REFERENCE VOLTAGE:	<u>3.880 VDC</u>
DEVIATION LIMIT:	<u>Emission must remain in band</u>

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2535 000 008	0.0	0.000 000	0.000
100 %		-30	2535 000 012	4.5	0.000 000	0.002
100 %		-20	2535 000 012	4.5	0.000 000	0.002
100 %		-10	2535 000 012	4.5	0.000 000	0.002
100 %		0	2535 000 013	5.3	0.000 000	0.002
100 %		+10	2535 000 013	5.7	0.000 000	0.002
100 %		+30	2535 000 013	5.3	0.000 000	0.002
100 %		+40	2535 000 015	7.2	0.000 000	0.003
100 %		+50	2535 000 011	3.4	0.000 000	0.001
Batt. Endpoint	3.300	+20	2535 000 014	6.2	0.000 000	0.002



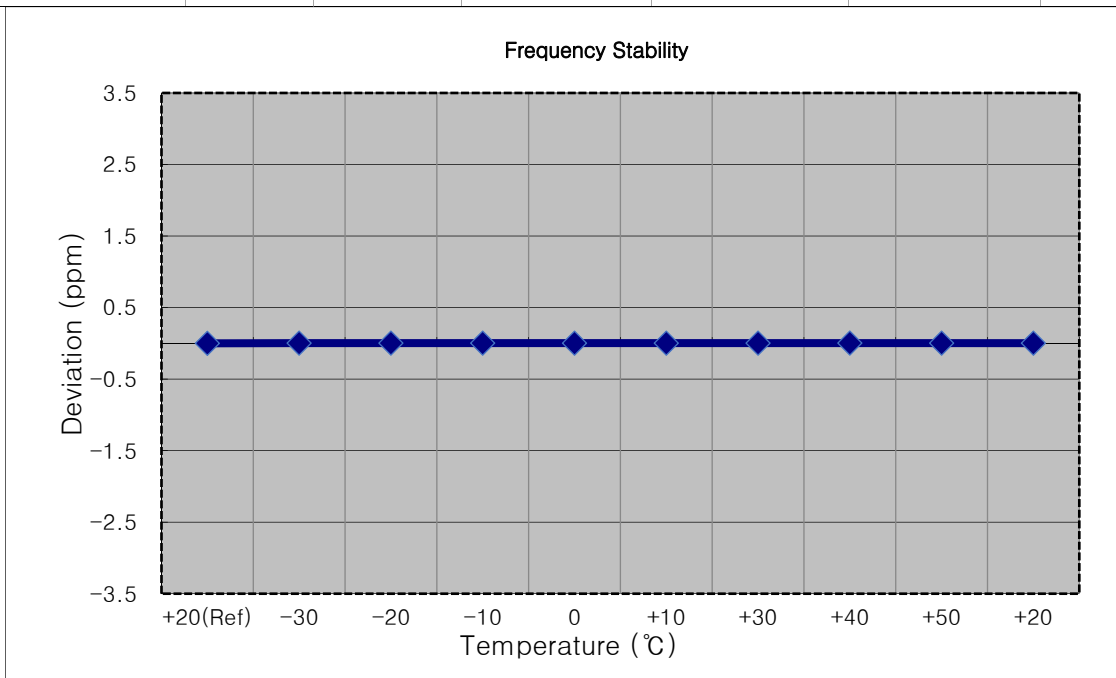
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,567,500,000 Hz
- ▣ CHANNEL: 21425 (5 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2567 500 008	0.0	0.000 000	0.000
100 %		-30	2567 500 014	6.2	0.000 000	0.002
100 %		-20	2567 500 016	7.9	0.000 000	0.003
100 %		-10	2567 500 014	6.6	0.000 000	0.003
100 %		0	2567 500 015	6.9	0.000 000	0.003
100 %		+10	2567 500 017	9.1	0.000 000	0.004
100 %		+30	2567 500 014	5.9	0.000 000	0.002
100 %		+40	2567 500 014	6.8	0.000 000	0.003
100 %		+50	2567 500 013	5.3	0.000 000	0.002
Batt. Endpoint	3.300	+20	2567 500 014	6.3	0.000 000	0.002



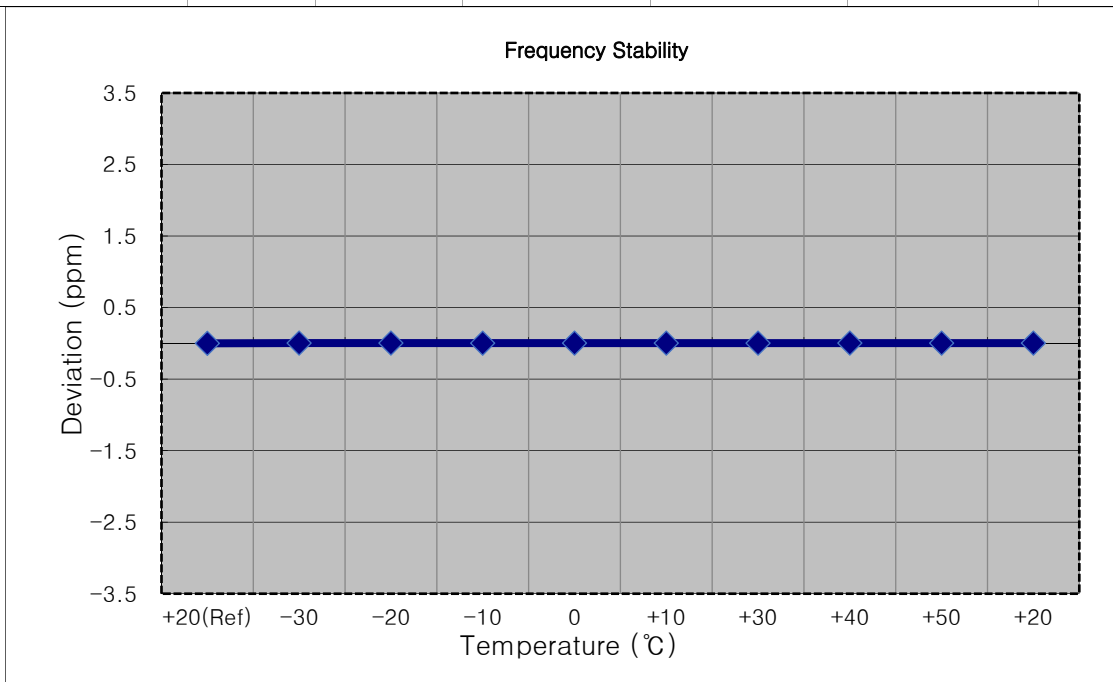
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,565,000,000 Hz
- ▣ CHANNEL: 21400 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2565 000 007	0.0	0.000 000	0.000
100 %		-30	2565 000 014	6.8	0.000 000	0.003
100 %		-20	2565 000 014	7.0	0.000 000	0.003
100 %		-10	2565 000 015	7.6	0.000 000	0.003
100 %		0	2565 000 013	5.6	0.000 000	0.002
100 %		+10	2565 000 013	5.9	0.000 000	0.002
100 %		+30	2565 000 015	7.7	0.000 000	0.003
100 %		+40	2565 000 016	8.7	0.000 000	0.003
100 %		+50	2565 000 014	6.9	0.000 000	0.003
Batt. Endpoint	3.300	+20	2565 000 013	5.5	0.000 000	0.002



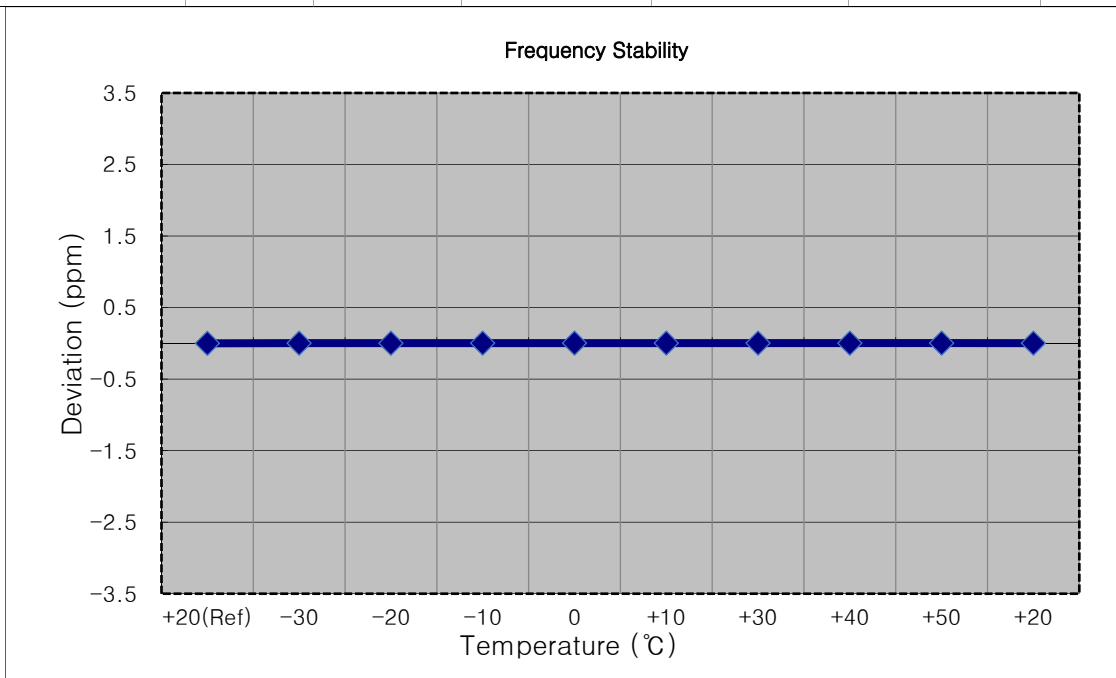
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,562,500,000 Hz
- ▣ CHANNEL: 21375 (15 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2562 500 005	0.0	0.000 000	0.000
100 %		-30	2562 500 013	8.7	0.000 000	0.003
100 %		-20	2562 500 014	9.2	0.000 000	0.004
100 %		-10	2562 500 011	6.3	0.000 000	0.002
100 %		0	2562 500 012	6.8	0.000 000	0.003
100 %		+10	2562 500 012	7.5	0.000 000	0.003
100 %		+30	2562 500 012	7.3	0.000 000	0.003
100 %		+40	2562 500 014	9.0	0.000 000	0.004
100 %		+50	2562 500 012	7.3	0.000 000	0.003
Batt. Endpoint	3.300	+20	2562 500 012	7.2	0.000 000	0.003



- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,560,000,000 Hz
- ▣ CHANNEL: 21350 (20 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2560 000 003	0.0	0.000 000	0.000
100 %		-30	2560 000 009	5.7	0.000 000	0.002
100 %		-20	2560 000 008	4.5	0.000 000	0.002
100 %		-10	2560 000 010	6.7	0.000 000	0.003
100 %		0	2560 000 010	6.7	0.000 000	0.003
100 %		+10	2560 000 012	8.3	0.000 000	0.003
100 %		+30	2560 000 011	7.2	0.000 000	0.003
100 %		+40	2560 000 009	5.9	0.000 000	0.002
100 %		+50	2560 000 011	7.7	0.000 000	0.003
Batt. Endpoint	3.300	+20	2560 000 009	5.4	0.000 000	0.002



9. TEST DATA(Sub 2 ANT)

9.1 EQUIVALENT ISOTROPIC RADIATED POWER

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured	Substitute	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP		RB	
			Level (dBm)	Level (dBm)				W	W	dBm	Size	Offset
2502.5	LTE B7/ 5 MHz	QPSK	-23.95	13.07	10.70	2.51	H	< 2.00	0.134	21.26	1	24
		16-QAM	-24.61	12.41	10.70	2.51	H		0.115	20.60		
		64-QAM	-25.82	11.20	10.70	2.51	H		0.087	19.39		
		256-QAM	-28.91	8.11	10.70	2.51	H		0.043	16.30		
2535.0		QPSK	-23.07	13.75	10.70	2.54	H		0.155	21.91	1	24
		16-QAM	-23.55	13.27	10.70	2.54	H		0.139	21.43		
		64-QAM	-24.71	12.11	10.70	2.54	H		0.106	20.27		
		256-QAM	-27.74	9.08	10.70	2.54	H		0.053	17.24		
2567.5		QPSK	-23.59	13.62	10.66	2.65	H		0.146	21.63	1	0
		16-QAM	-24.13	13.08	10.66	2.65	H		0.129	21.09		
		64-QAM	-25.28	11.93	10.66	2.65	H		0.099	19.94		
		256-QAM	-28.38	8.83	10.66	2.65	H		0.048	16.84		

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured	Substitute	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP		RB	
			Level (dBm)	Level (dBm)				W	W	dBm	Size	Offset
2505.0	LTE B7/ 10 MHz	QPSK	-23.93	13.09	10.70	2.51	H	< 2.00	0.134	21.28	1	49
		16-QAM	-24.52	12.50	10.70	2.51	H		0.117	20.69		
		64-QAM	-25.72	11.30	10.70	2.51	H		0.089	19.49		
		256-QAM	-28.79	8.23	10.70	2.51	H		0.044	16.42		
2535.0		QPSK	-23.06	13.76	10.70	2.54	H		0.156	21.92	1	49
		16-QAM	-23.78	13.04	10.70	2.54	H		0.132	21.20		
		64-QAM	-24.83	11.99	10.70	2.54	H		0.104	20.15		
		256-QAM	-27.82	9.00	10.70	2.54	H		0.052	17.16		
2565.0		QPSK	-23.53	13.70	10.67	2.62	H		0.149	21.75	1	0
		16-QAM	-24.24	12.99	10.67	2.62	H		0.127	21.04		
		64-QAM	-25.38	11.85	10.67	2.62	H		0.098	19.90		
		256-QAM	-28.35	8.88	10.67	2.62	H		0.049	16.93		

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured	Substitute	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP		RB	
			Level (dBm)	Level (dBm)				W	W	dBm	Size	Offset
2507.5	LTE B7/ 15 MHz	QPSK	-23.72	13.35	10.70	2.51	H	< 2.00	0.142	21.54	1	74
		16-QAM	-24.53	12.54	10.70	2.51	H		0.118	20.73		
		64-QAM	-25.69	11.38	10.70	2.51	H		0.090	19.57		
		256-QAM	-28.65	8.42	10.70	2.51	H		0.046	16.61		
2535.0		QPSK	-22.97	13.85	10.70	2.54	H		0.159	22.01	1	74
		16-QAM	-23.78	13.04	10.70	2.54	H		0.132	21.20		
		64-QAM	-24.74	12.08	10.70	2.54	H		0.106	20.24		
		256-QAM	-27.67	9.15	10.70	2.54	H		0.054	17.31		
2562.5		QPSK	-23.05	14.18	10.67	2.62	H		0.167	22.23	1	0
		16-QAM	-23.78	13.45	10.67	2.62	H		0.141	21.50		
		64-QAM	-24.89	12.34	10.67	2.62	H		0.109	20.39		
		256-QAM	-27.93	9.30	10.67	2.62	H		0.054	17.35		

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured	Substitute	Ant. Gain (dBi)	C.L	Pol	Limit	EIRP		RB	
			Level (dBm)	Level (dBm)				W	W	dBm	Size	Offset
2510.0	LTE B7/ 20 MHz	QPSK	-23.52	13.55	10.70	2.51	H	< 2.00	0.149	21.74	1	99
		16-QAM	-24.38	12.69	10.70	2.51	H		0.123	20.88		
		64-QAM	-25.49	11.58	10.70	2.51	H		0.095	19.77		
		256-QAM	-28.59	8.48	10.70	2.51	H		0.046	16.67		
2535.0		QPSK	-23.25	13.57	10.70	2.54	H		0.149	21.73	1	99
		16-QAM	-23.82	13.00	10.70	2.54	H		0.131	21.16		
		64-QAM	-25.00	11.82	10.70	2.54	H		0.100	19.98		
		256-QAM	-27.95	8.87	10.70	2.54	H		0.050	17.03		
2560.0		QPSK	-23.14	14.12	10.68	2.59	H		0.166	22.21	1	0
		16-QAM	-23.76	13.50	10.68	2.59	H		0.144	21.59		
		64-QAM	-24.96	12.30	10.68	2.59	H		0.109	20.39		
		256-QAM	-27.96	9.30	10.68	2.59	H		0.055	17.39		

9.2 RADIATED SPURIOUS EMISSIONS

■ MODE: LTE B7
 ■ MODULATION SIGNAL: 5 MHz QPSK
 ■ DISTANCE: 1 meters
 ■ LIMIT: -25 dBm

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	RB	
								Size	Offset
20775 (2502.5)	5,005.00	-32.47	12.55	-56.40	3.71	V	-47.56	1	24
	7,507.50	-44.92	10.98	-58.68	4.60	V	-52.30		
	10,010.00	-45.76	10.61	-56.25	5.47	V	-51.11		
21100 (2535.0)	5,070.00	-33.19	12.35	-55.06	3.80	H	-46.51	1	24
	7,605.00	-43.23	11.33	-57.60	4.64	V	-50.91		
	10,140.00	-45.51	10.71	-56.04	5.48	H	-50.81		
21425 (2567.5)	5,135.00	-33.03	12.15	-56.95	3.81	H	-48.61	1	0
	7,702.50	-39.26	11.55	-54.20	4.66	H	-47.31		
	10,270.00	-45.15	10.69	-53.35	5.57	V	-48.23		

■ MODE: LTE B7
 ■ MODULATION SIGNAL: 10 MHz QPSK
 ■ DISTANCE: 1 meters
 ■ LIMIT: -25 dBm

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	RB	
								Size	Offset
20800 (2505.0)	5,010.00	-32.73	12.55	-56.98	3.72	H	-48.15	1	49
	7,515.00	-43.15	10.98	-57.08	4.60	V	-50.70		
	10,020.00	-45.20	10.61	-56.02	5.47	V	-50.88		
21100 (2535.0)	5,070.00	-30.53	12.35	-52.40	3.80	H	-43.85	1	49
	7,605.00	-43.13	11.33	-57.50	4.64	H	-50.81		
	10,140.00	-45.76	10.71	-56.29	5.48	H	-51.06		
21400 (2565.0)	5,130.00	-34.61	12.15	-58.76	3.81	H	-50.42	1	0
	7,695.00	-42.40	11.51	-57.65	4.66	V	-50.80		
	10,260.00	-44.75	10.69	-53.05	5.56	V	-47.92		

■ MODE: LTE B7
 ■ MODULATION SIGNAL: 15 MHz QPSK
 ■ DISTANCE: 1 meters
 ■ LIMIT: -25 dBm

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	RB	
								Size	Offset
20825 (2507.5)	5,015.00	-33.02	12.55	-57.36	3.70	H	-48.51	1	74
	7,522.50	-43.44	10.98	-57.77	4.61	H	-51.40		
	10,030.00	-46.03	10.61	-56.62	5.47	V	-51.48		
21100 (2535.0)	5,070.00	-30.28	12.35	-52.15	3.80	V	-43.60	1	74
	7,605.00	-38.65	11.33	-53.02	4.64	H	-46.33		
	10,140.00	-45.72	10.71	-56.25	5.48	V	-51.02		
21375 (2562.5)	5,125.00	-30.99	12.15	-55.31	3.81	H	-46.97	1	0
	7,687.50	-39.98	11.47	-55.44	4.66	H	-48.63		
	10,250.00	-43.91	10.69	-51.98	5.54	V	-46.83		

■ MODE: LTE B7
 ■ MODULATION SIGNAL: 20 MHz QPSK
 ■ DISTANCE: 1 meters
 ■ LIMIT: -25 dBm

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	RB	
								Size	Offset
20850 (2510.0)	5,020.00	-35.26	12.55	-59.68	3.69	V	-50.82	1	99
	7,530.00	-40.49	10.98	-55.08	4.60	V	-48.70		
	10,040.00	-45.67	10.61	-55.85	5.49	V	-50.73		
21100 (2535.0)	5,070.00	-30.93	12.35	-52.80	3.80	H	-44.25	1	99
	7,605.00	-37.50	11.33	-51.87	4.64	H	-45.18		
	10,140.00	-45.82	10.71	-56.35	5.48	V	-51.12		
21350 (2560.0)	5,120.00	-30.67	12.15	-55.16	3.81	H	-46.82	1	0
	7,680.00	-40.49	11.47	-56.31	4.70	V	-49.54		
	10,240.00	-45.67	10.73	-53.25	5.54	V	-48.06		

9.3 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)	Limit (dB)
7	5 MHz	2535.0	QPSK	25	0	6.21	13.00
			16-QAM			6.76	
			64-QAM			6.64	
			256-QAM			6.64	
	10 MHz		QPSK	50		6.35	
			16-QAM			6.78	
			64-QAM			6.70	
			256-QAM			6.69	
	15 MHz		QPSK	75		6.23	
			16-QAM			6.72	
			64-QAM			6.62	
			256-QAM			6.64	
	20 MHz		QPSK	100		6.18	
			16-QAM			6.72	
			64-QAM			6.58	
			256-QAM			6.68	

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 151 ~ 166.
2. P.A.P.R is not required. These values are reported for information only.

9.4 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
7	5 MHz	2535.0	QPSK	25	0	4.5305
			16-QAM			4.5159
			64-QAM			4.5258
			256-QAM			4.5412
	10 MHz		QPSK	50		9.0400
			16-QAM			9.0277
			64-QAM			9.0538
			256-QAM			9.0493
	15 MHz		QPSK	75		13.508
			16-QAM			13.529
			64-QAM			13.536
			256-QAM			13.539
	20 MHz		QPSK	100		18.088
			16-QAM			17.988
			64-QAM			17.980
			256-QAM			18.039

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 167 ~ 182.

9.5 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
7	5	2502.5	3.6990	27.976	-56.763	-28.787	-25.00
		2535.0	3.0409	27.976	-58.163	-30.187	
		2567.5	3.7488	27.976	-57.354	-29.378	
	10	2505.0	3.6591	27.976	-58.155	-30.179	
		2535.0	3.2005	27.976	-58.443	-30.467	
		2565.0	5.3241	28.591	-57.803	-29.212	
	15	2507.5	3.6790	27.976	-56.734	-28.758	
		2535.0	2.7718	27.976	-57.994	-30.018	
		2562.5	3.2703	27.976	-57.298	-29.322	
	20	2510.0	6.8794	28.591	-57.198	-28.607	
		2535.0	6.9392	28.591	-57.847	-29.256	
		2560.0	3.2802	27.976	-58.454	-30.478	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 183 ~ 206.
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

9.6 CHANNEL EDGE

Band Width (Modulation)	Frequency (MHz)	RB Size / Offset	C.E ~ (C.E ± 1 MHz)		2 496 MHz ~ 2 499 MHz	(C.E + 1 MHz) ~ (C.E + 5 MHz)	2 490.5 MHz ~ 2 496 MHz	(C.E + 5 MHz) ~ (C.E + X MHz)	Below 2 490.5 MHz	Above (C.E + X MHz)
			Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
5 MHz (QPSK)	2502.5	25 / 0	-22.93	-23.19	-24.11	-28.13	-33.77	-34.17	-42.17	-35.12
10 MHz (QPSK)	2505.0	50 / 0	-25.25	-25.65	-24.77	-26.49	-30.73	-31.64	-41.27	-35.49
15 MHz (QPSK)	2507.5	75 / 0	-27.80	-26.42	-26.84	-24.92	-32.41	-27.64	-41.51	-38.67
20 MHz (QPSK)	2510.0	100 / 0	-29.77	-27.14	-29.52	-26.32	-34.36	-29.76	-41.66	-40.09
Limit(dBm)			-10.0		-10.0		-13.0		-25.0	

Band Width (Modulation)	Frequency (MHz)	RB Size / Offset	C.E ~ (C.E ± 1 MHz)		(C.E ± 1 MHz) ~ (C.E ± 5 MHz)	
			Lower	Upper	Lower	Upper
5 MHz (QPSK)	2535.0	25 / 0	-21.52	-21.29	-17.79	-17.79
	2567.5	25 / 0	-23.31	-22.30	-23.18	-21.85
10 MHz (QPSK)	2535.0	50 / 0	-23.03	-22.85	-19.36	-18.98
	2565.0	50 / 0	-25.35	-24.40	-23.85	-22.27
15 MHz (QPSK)	2535.0	75 / 0	-24.02	-23.70	-20.64	-20.17
	2562.5	75 / 0	-26.94	-26.72	-25.14	-25.09
20 MHz (QPSK)	2535.0	100 / 0	-24.10	-24.05	-21.60	-21.55
	2560.0	100 / 0	-27.94	-28.69	-26.56	-28.01
Limit(dBm)			-10.0		-10.0	

Band Width (Modulation)	Frequency (MHz)	Resource Block Size	(C.E ± 5 MHz) ~ (C.E ± X MHz)		Above (C.E ± X MHz)	
			Lower	Upper	Lower	Upper
5 MHz (QPSK)	2535.0	25 / 0	-32.46	-32.65	-32.99	-33.42
	2567.5	25 / 0	-34.51	-34.84	-34.19	-34.83
10 MHz (QPSK)	2535.0	50 / 0	-24.00	-23.05	-34.24	-34.18
	2565.0	50 / 0	-29.20	-27.65	-36.78	-37.83
15 MHz (QPSK)	2535.0	75 / 0	-23.75	-22.38	-36.85	-36.01
	2562.5	75 / 0	-29.14	-28.63	-39.22	-40.68
20 MHz (QPSK)	2535.0	100 / 0	-24.27	-22.91	-38.43	-37.81
	2560.0	100 / 0	-29.60	-30.47	-38.90	-41.72
Limit(dBm)			-13.0		-25.0	

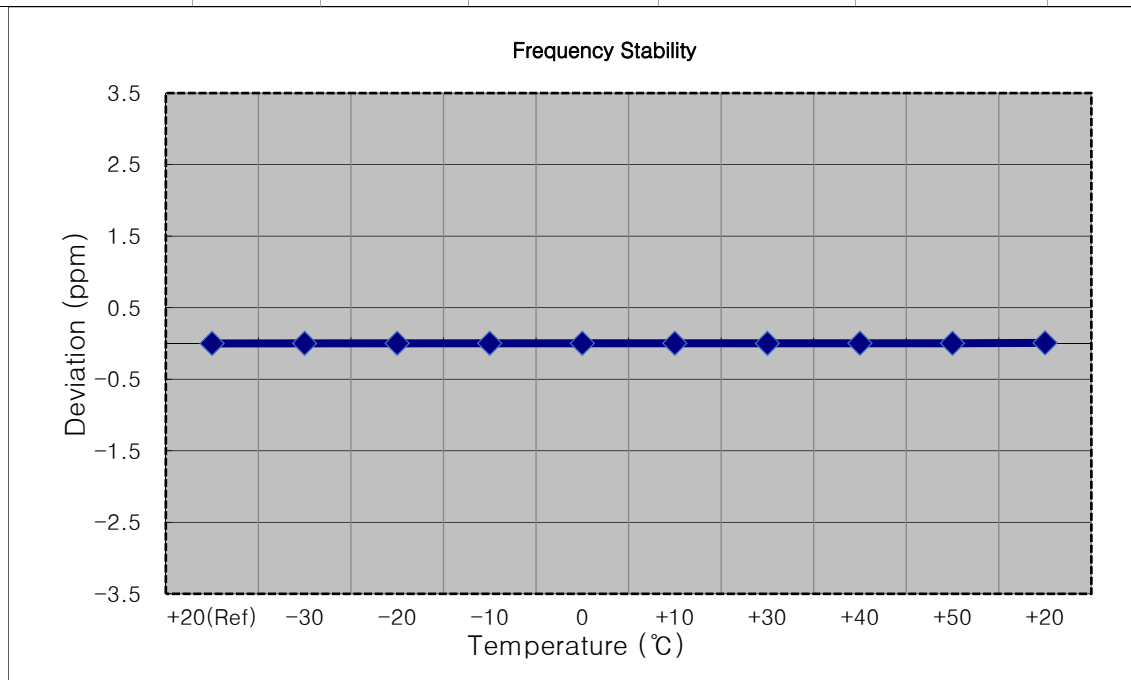
Note:

1. C.E = Channel Edge
2. X = X is the greater of 6 MHz or the actual emission bandwidth.
3. X = 6 MHz(5 MHz Bandwidth), 10 MHz(10 MHz Bandwidth), 15 MHz(15 MHz Bandwidth), 20 MHz(20 MHz Bandwidth)
4. Plots of the EUT's Channel Edge are shown Page 207 ~ 230.

9.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

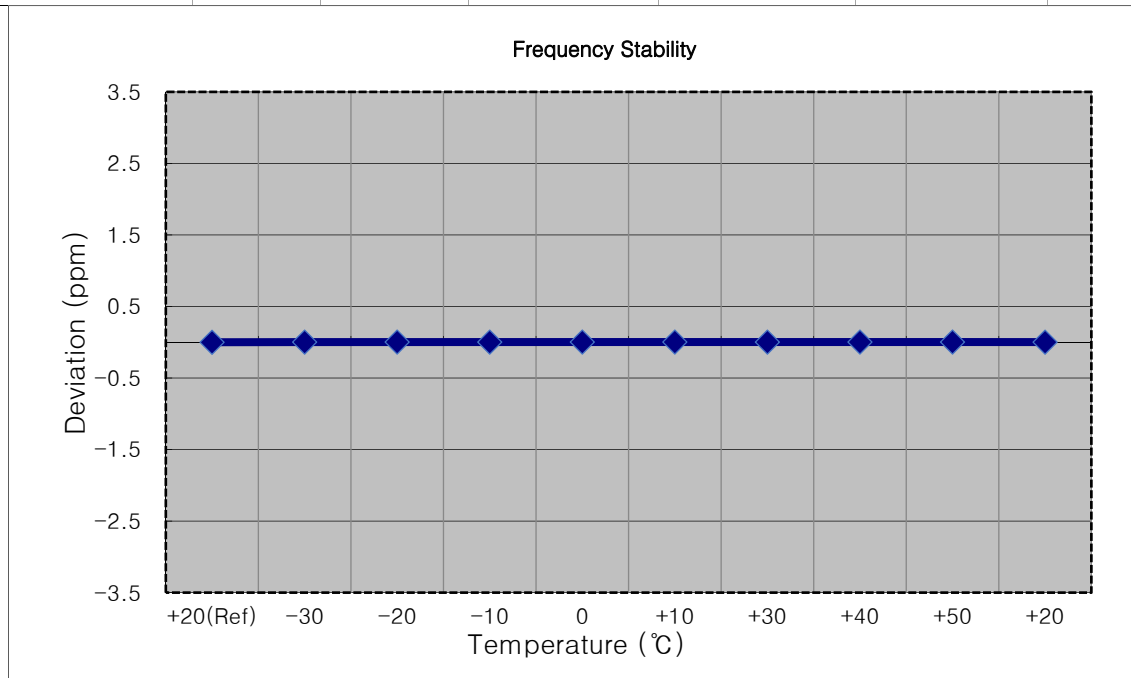
MODE:	<u>LTE 7</u>
OPERATING FREQUENCY:	<u>2,502,500,000 Hz</u>
CHANNEL:	<u>20775 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.880 VDC</u>
DEVIATION LIMIT:	<u>Emission must remain in band</u>

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	2502 500 006	0.0	0.000 000	0.000
100 %		-30	2502 500 010	3.8	0.000 000	0.002
100 %		-20	2502 500 012	5.8	0.000 000	0.002
100 %		-10	2502 500 012	5.8	0.000 000	0.002
100 %		0	2502 500 011	5.6	0.000 000	0.002
100 %		+10	2502 500 011	5.1	0.000 000	0.002
100 %		+30	2502 500 010	4.0	0.000 000	0.002
100 %		+40	2502 500 013	7.2	0.000 000	0.003
100 %		+50	2502 500 012	5.9	0.000 000	0.002
Batt. Endpoint	3.300	+20	2502 500 026	20.0	0.000 001	0.008



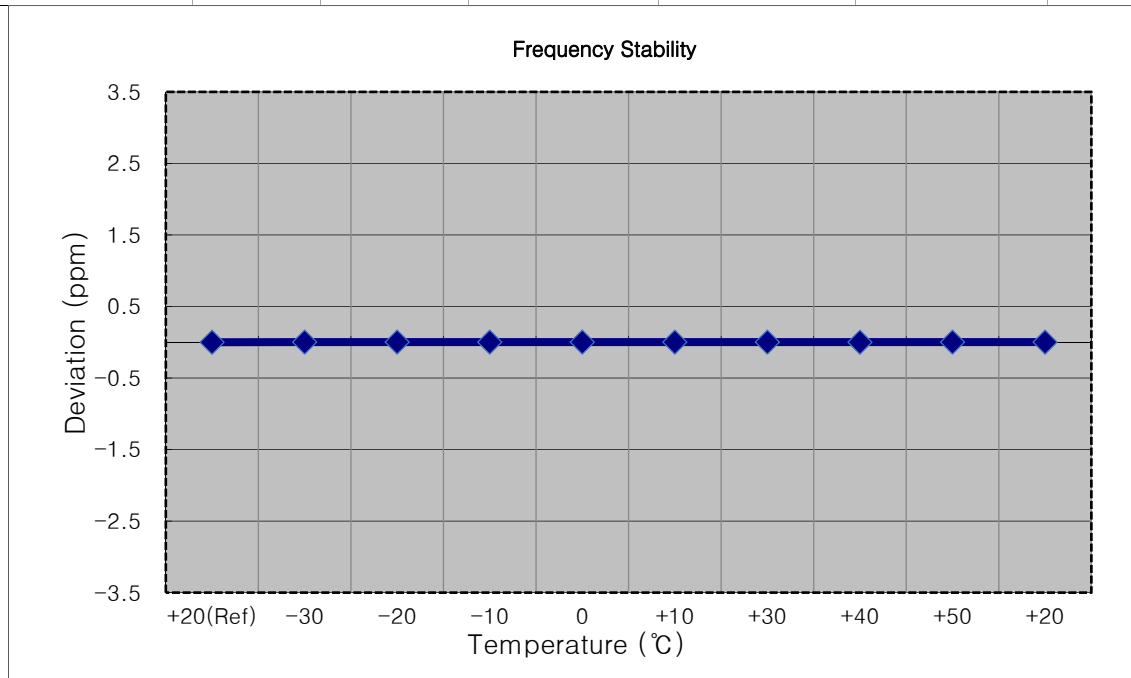
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,505,000,000 Hz
- ▣ CHANNEL: 20800 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2505 000 007	0.0	0.000 000	0.000
100 %		-30	2505 000 012	4.9	0.000 000	0.002
100 %		-20	2505 000 014	6.9	0.000 000	0.003
100 %		-10	2505 000 013	5.6	0.000 000	0.002
100 %		0	2505 000 014	6.9	0.000 000	0.003
100 %		+10	2505 000 014	6.7	0.000 000	0.003
100 %		+30	2505 000 014	6.5	0.000 000	0.003
100 %		+40	2505 000 014	7.3	0.000 000	0.003
100 %		+50	2505 000 014	7.1	0.000 000	0.003
Batt. Endpoint	3.300	+20	2505 000 011	3.9	0.000 000	0.002



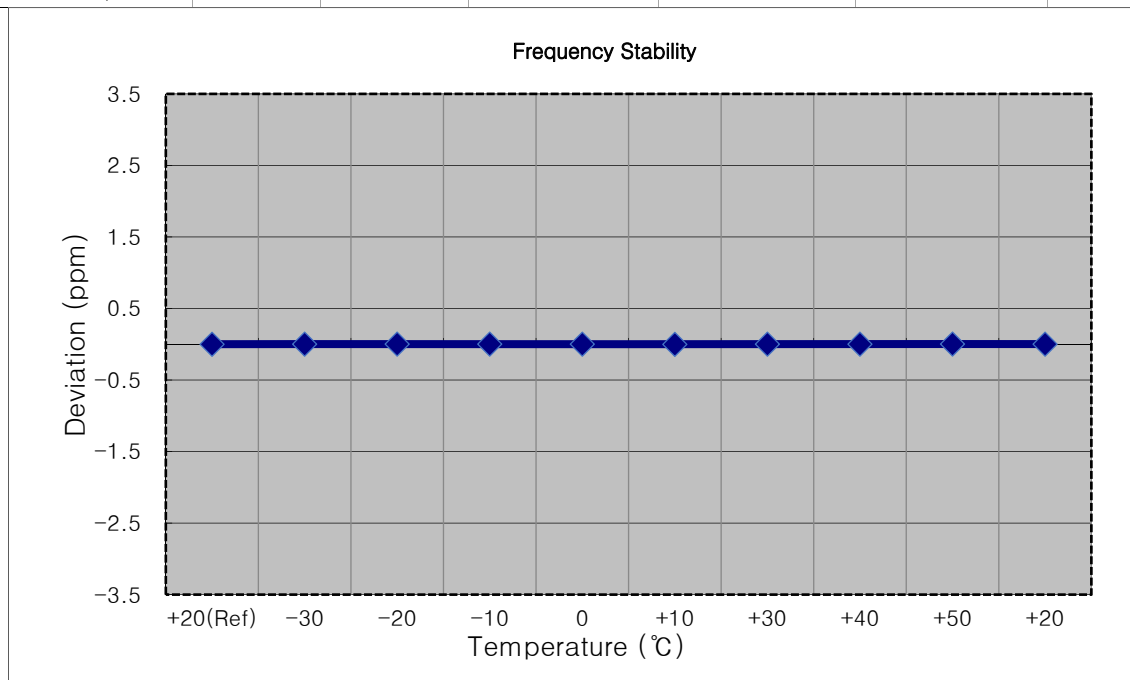
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,507,500,000 Hz
- ▣ CHANNEL: 20825 (15 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2507 500 003	0.0	0.000 000	0.000
100 %		-30	2507 500 009	5.6	0.000 000	0.002
100 %		-20	2507 500 010	6.7	0.000 000	0.003
100 %		-10	2507 500 008	5.1	0.000 000	0.002
100 %		0	2507 500 009	5.3	0.000 000	0.002
100 %		+10	2507 500 008	4.9	0.000 000	0.002
100 %		+30	2507 500 008	4.8	0.000 000	0.002
100 %		+40	2507 500 006	2.8	0.000 000	0.001
100 %		+50	2507 500 008	5.1	0.000 000	0.002
Batt. Endpoint	3.300	+20	2507 500 008	4.4	0.000 000	0.002



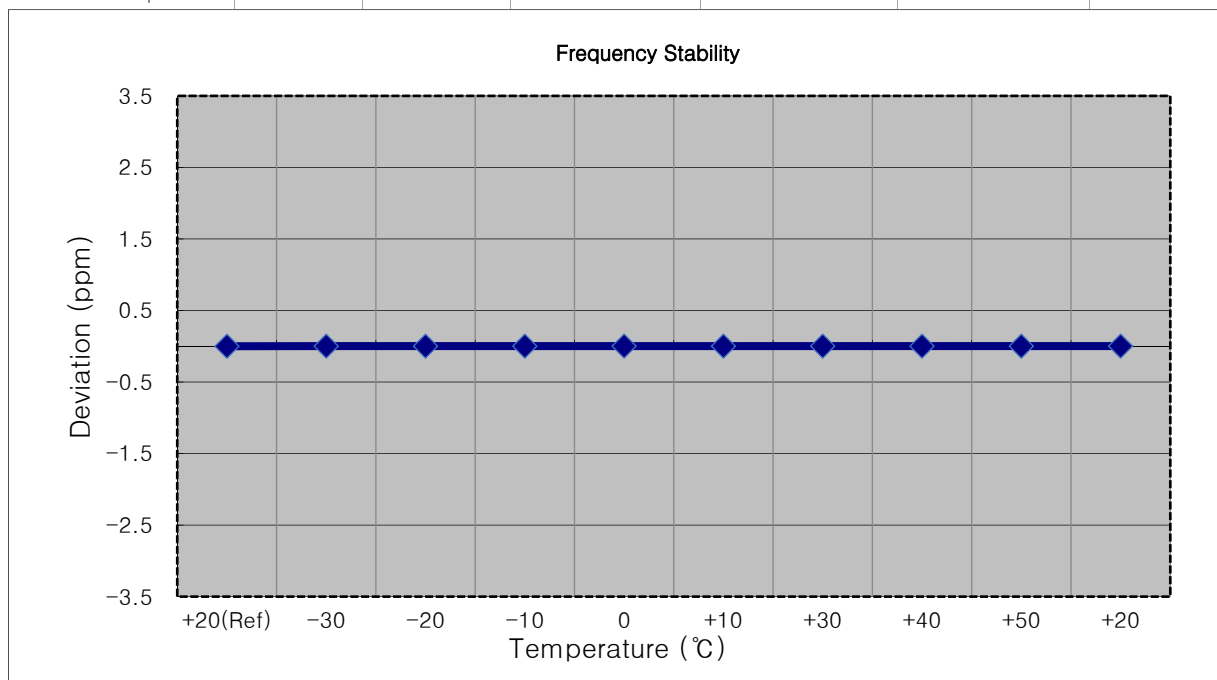
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,510,000,000 Hz
- ▣ CHANNEL: 20850 (20 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2510 000 006	0.0	0.000 000	0.000
100 %		-30	2510 000 010	4.1	0.000 000	0.002
100 %		-20	2510 000 012	6.0	0.000 000	0.002
100 %		-10	2510 000 011	5.5	0.000 000	0.002
100 %		0	2510 000 010	4.1	0.000 000	0.002
100 %		+10	2510 000 002	-4.0	0.000 000	-0.002
100 %		+30	2510 000 009	3.1	0.000 000	0.001
100 %		+40	2510 000 010	4.4	0.000 000	0.002
100 %		+50	2510 000 013	6.7	0.000 000	0.003
Batt. Endpoint	3.300	+20	2510 000 010	4.1	0.000 000	0.002



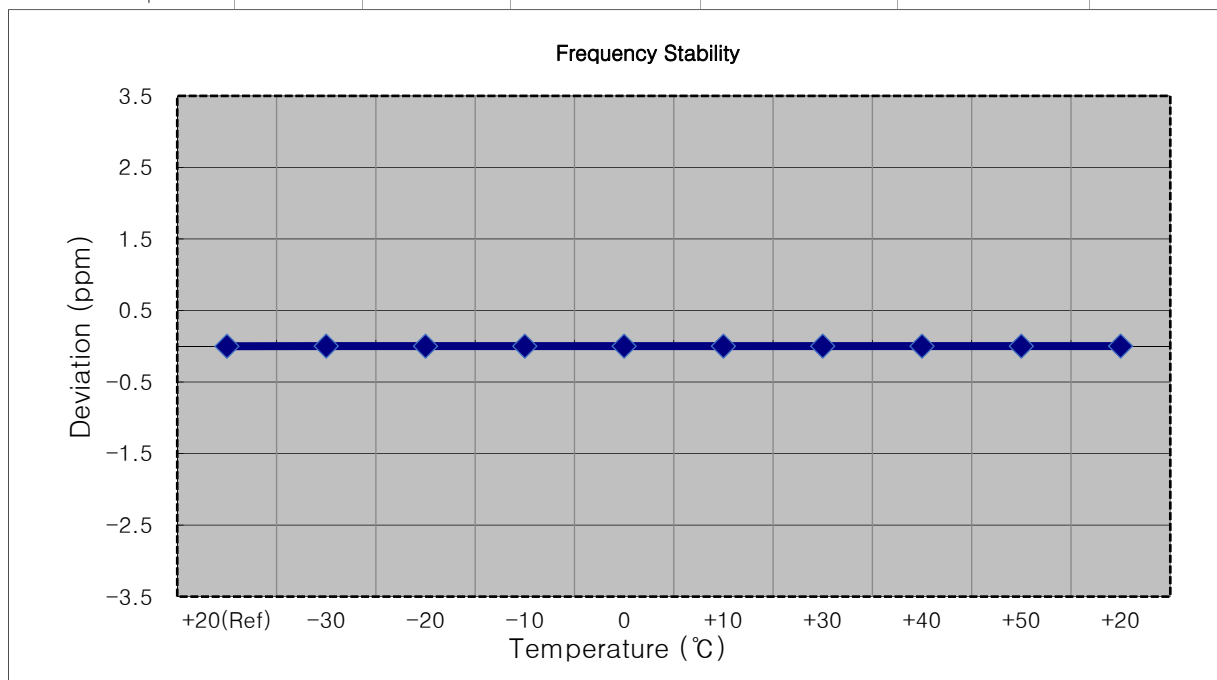
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,535,000,000 Hz
- ▣ CHANNEL: 21100 (5 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2535 000 004	0.0	0.000 000	0.000
100 %		-30	2535 000 009	4.6	0.000 000	0.002
100 %		-20	2535 000 008	3.2	0.000 000	0.001
100 %		-10	2535 000 009	4.1	0.000 000	0.002
100 %		0	2535 000 010	5.4	0.000 000	0.002
100 %		+10	2535 000 009	4.7	0.000 000	0.002
100 %		+30	2535 000 010	5.2	0.000 000	0.002
100 %		+40	2535 000 008	3.6	0.000 000	0.001
100 %		+50	2535 000 009	4.3	0.000 000	0.002
Batt. Endpoint	3.300	+20	2535 000 010	5.1	0.000 000	0.002



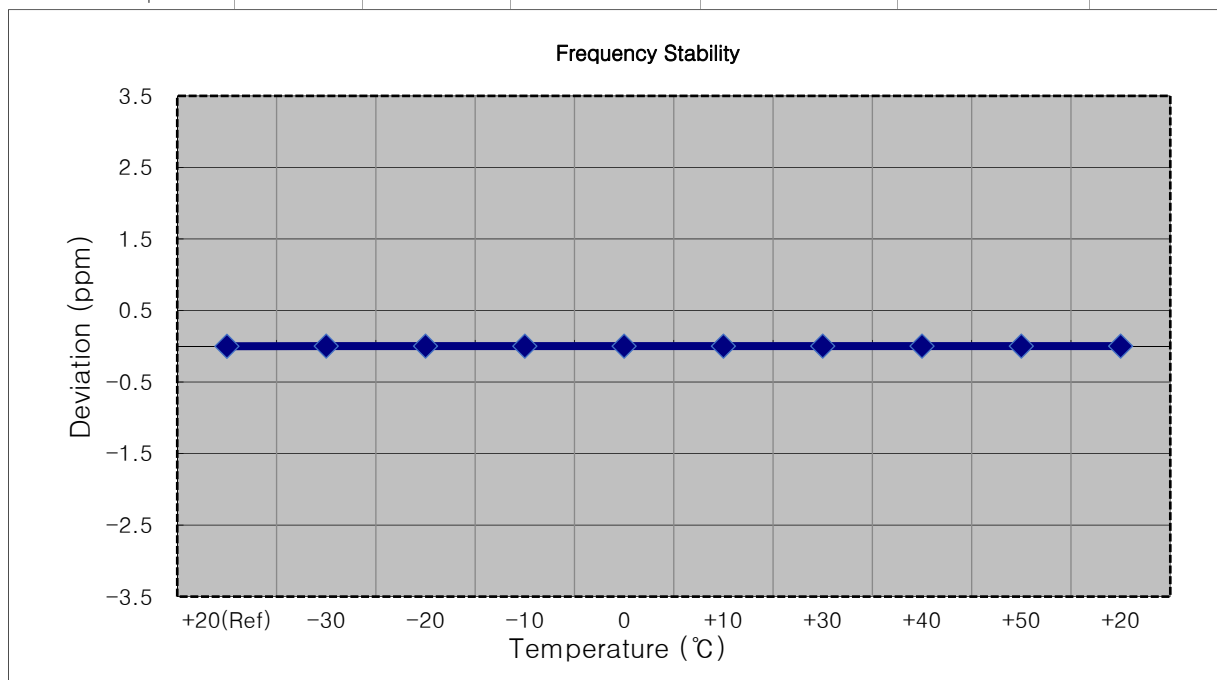
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,535,000,000 Hz
- ▣ CHANNEL: 21100 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2535 000 005	0.0	0.000 000	0.000
100 %		-30	2535 000 012	6.1	0.000 000	0.002
100 %		-20	2535 000 009	4.0	0.000 000	0.002
100 %		-10	2535 000 009	4.0	0.000 000	0.002
100 %		0	2535 000 009	3.3	0.000 000	0.001
100 %		+10	2535 000 010	4.2	0.000 000	0.002
100 %		+30	2535 000 010	4.8	0.000 000	0.002
100 %		+40	2535 000 010	4.3	0.000 000	0.002
100 %		+50	2535 000 010	4.7	0.000 000	0.002
Batt. Endpoint	3.300	+20	2535 000 010	5.0	0.000 000	0.002



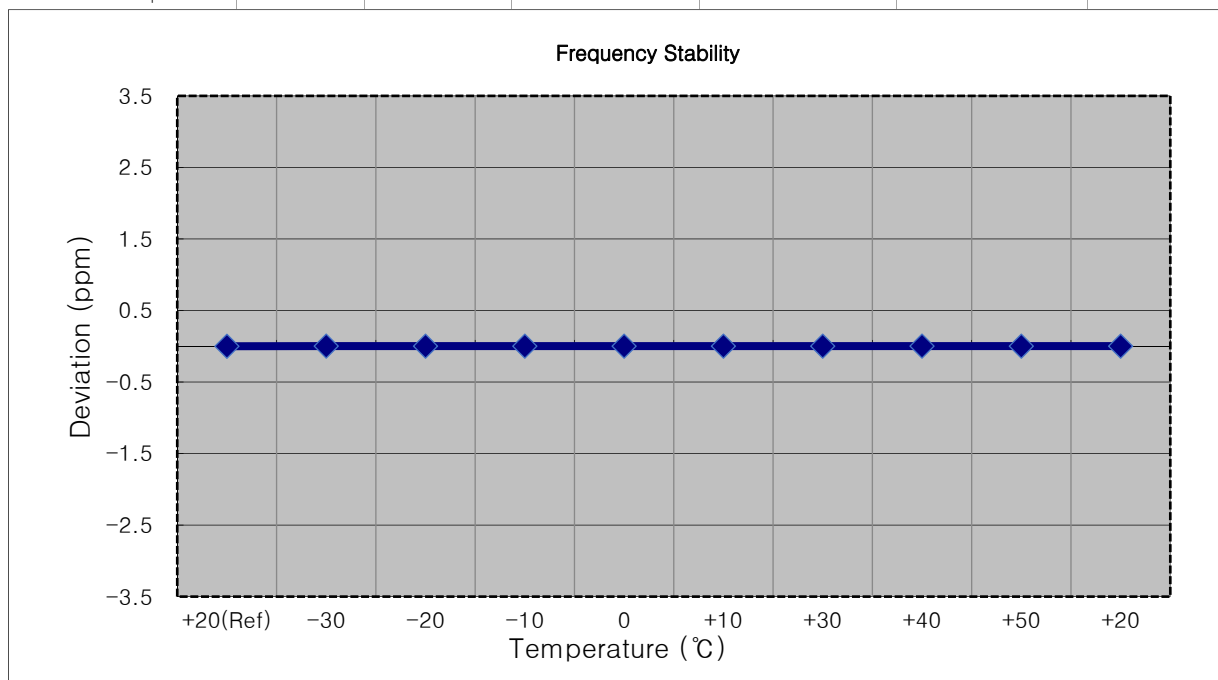
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,535,000,000 Hz
- ▣ CHANNEL: 21100 (15 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2535 000 003	0.0	0.000 000	0.000
100 %		-30	2535 000 009	5.3	0.000 000	0.002
100 %		-20	2535 000 009	5.2	0.000 000	0.002
100 %		-10	2535 000 008	4.6	0.000 000	0.002
100 %		0	2535 000 008	4.5	0.000 000	0.002
100 %		+10	2535 000 008	4.6	0.000 000	0.002
100 %		+30	2535 000 009	5.2	0.000 000	0.002
100 %		+40	2535 000 009	5.1	0.000 000	0.002
100 %		+50	2535 000 008	4.9	0.000 000	0.002
Batt. Endpoint	3.300	+20	2535 000 009	5.5	0.000 000	0.002



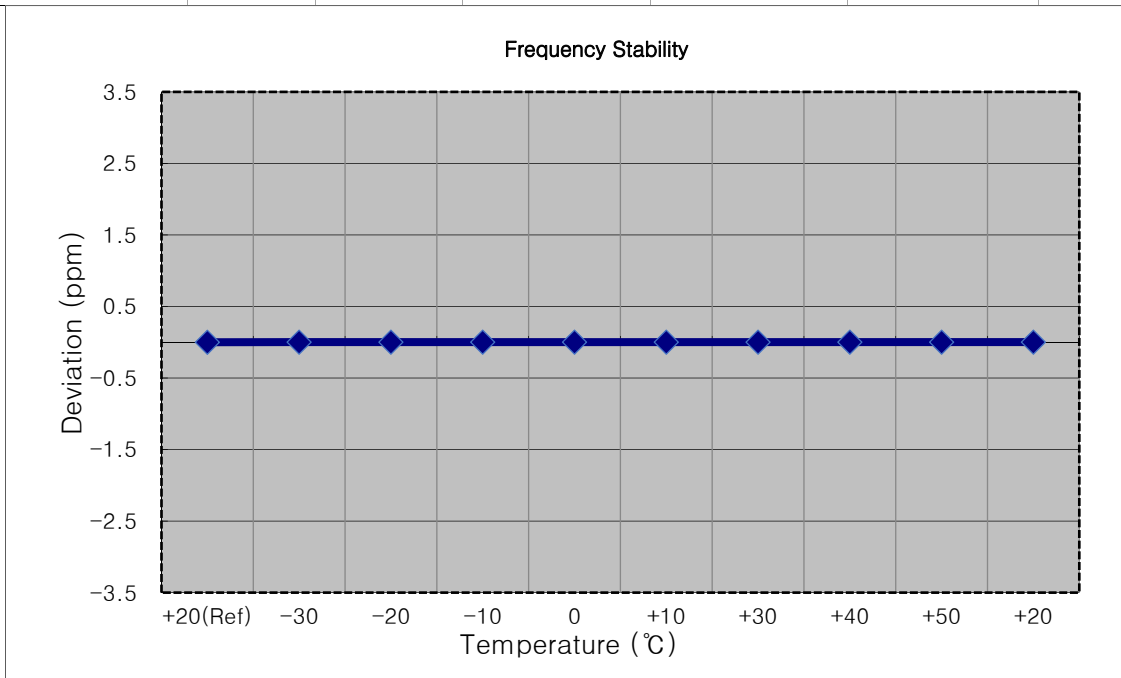
MODE: LTE 7
 OPERATING FREQUENCY: 2,535,000,000 Hz
 CHANNEL: 21100 (20 MHz)
 REFERENCE VOLTAGE: 3.880 VDC
 DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100 %	3.880	+20(Ref)	2535 000 005	0.0	0.000 000	0.000
100 %		-30	2535 000 011	6.4	0.000 000	0.003
100 %		-20	2535 000 009	4.6	0.000 000	0.002
100 %		-10	2535 000 009	4.3	0.000 000	0.002
100 %		0	2535 000 009	4.5	0.000 000	0.002
100 %		+10	2535 000 009	4.1	0.000 000	0.002
100 %		+30	2535 000 009	4.3	0.000 000	0.002
100 %		+40	2535 000 010	5.1	0.000 000	0.002
100 %		+50	2535 000 009	3.9	0.000 000	0.002
Batt. Endpoint	3.300	+20	2535 000 009	4.4	0.000 000	0.002



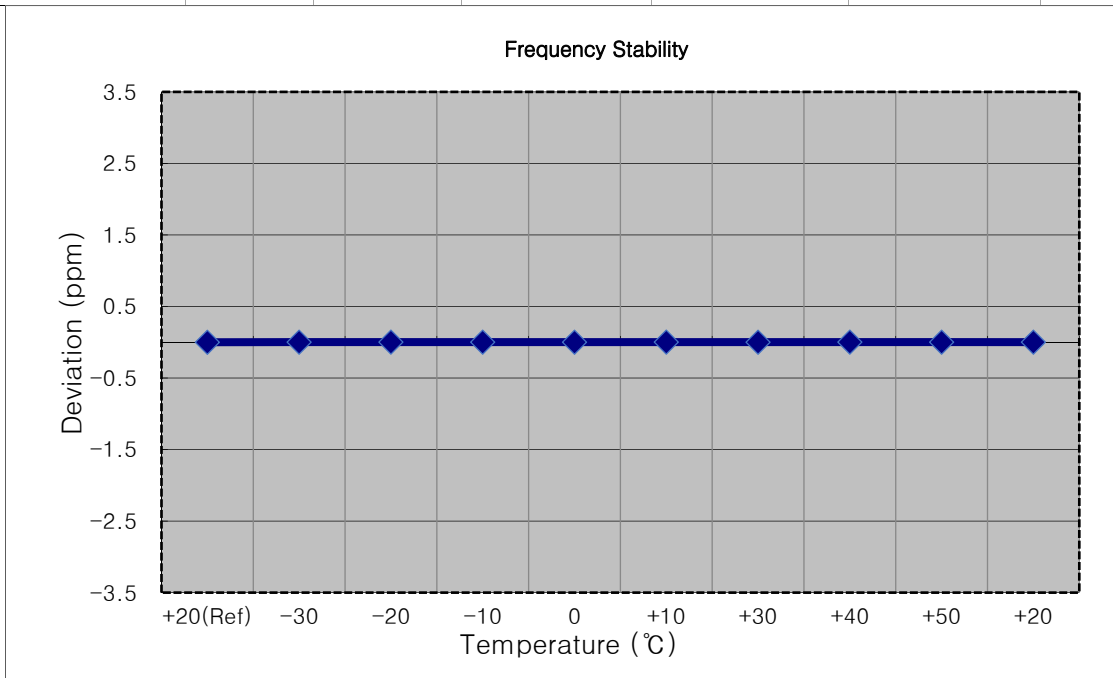
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,567,500,000 Hz
- ▣ CHANNEL: 21425 (5 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2567 500 004	0.0	0.000 000	0.000
100 %		-30	2567 500 008	4.0	0.000 000	0.002
100 %		-20	2567 500 007	2.9	0.000 000	0.001
100 %		-10	2567 500 008	4.2	0.000 000	0.002
100 %		0	2567 500 009	4.7	0.000 000	0.002
100 %		+10	2567 500 008	4.0	0.000 000	0.002
100 %		+30	2567 500 008	3.8	0.000 000	0.001
100 %		+40	2567 500 008	4.2	0.000 000	0.002
100 %		+50	2567 500 008	4.6	0.000 000	0.002
Batt. Endpoint	3.300	+20	2567 500 008	4.5	0.000 000	0.002



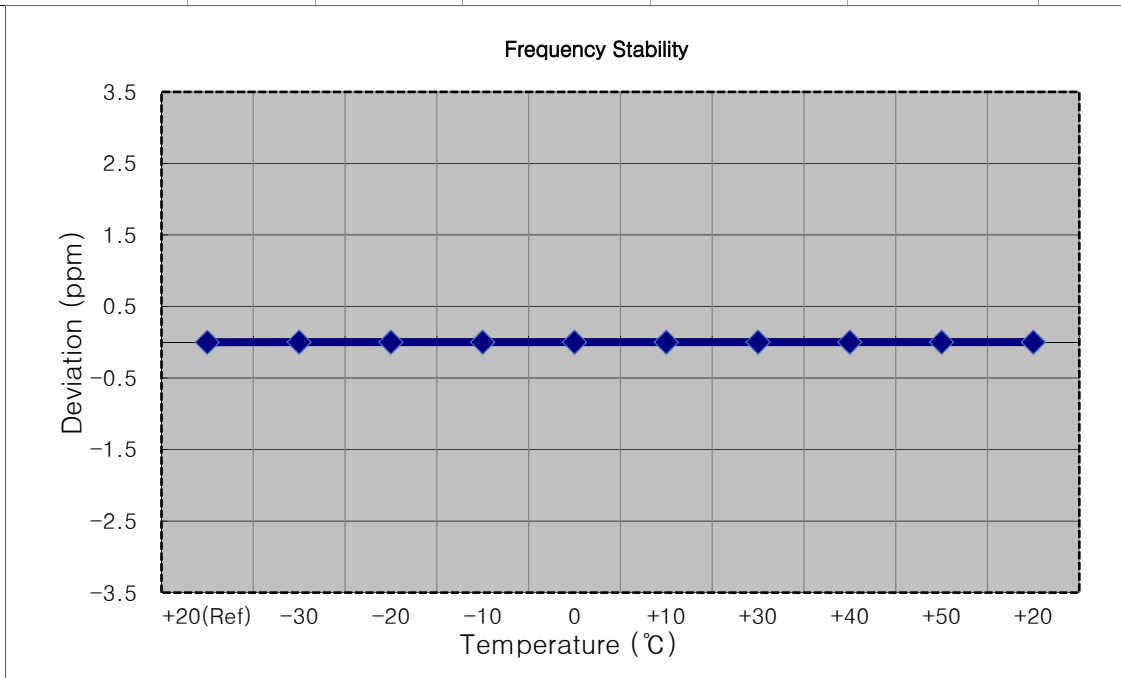
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,565,000,000 Hz
- ▣ CHANNEL: 21400 (10 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2565 000 004	0.0	0.000 000	0.000
100 %		-30	2565 000 008	4.1	0.000 000	0.002
100 %		-20	2565 000 009	4.9	0.000 000	0.002
100 %		-10	2565 000 008	4.0	0.000 000	0.002
100 %		0	2565 000 007	2.6	0.000 000	0.001
100 %		+10	2565 000 009	4.8	0.000 000	0.002
100 %		+30	2565 000 007	2.6	0.000 000	0.001
100 %		+40	2565 000 009	5.0	0.000 000	0.002
100 %		+50	2565 000 009	4.4	0.000 000	0.002
Batt. Endpoint	3.300	+20	2565 000 008	3.8	0.000 000	0.001



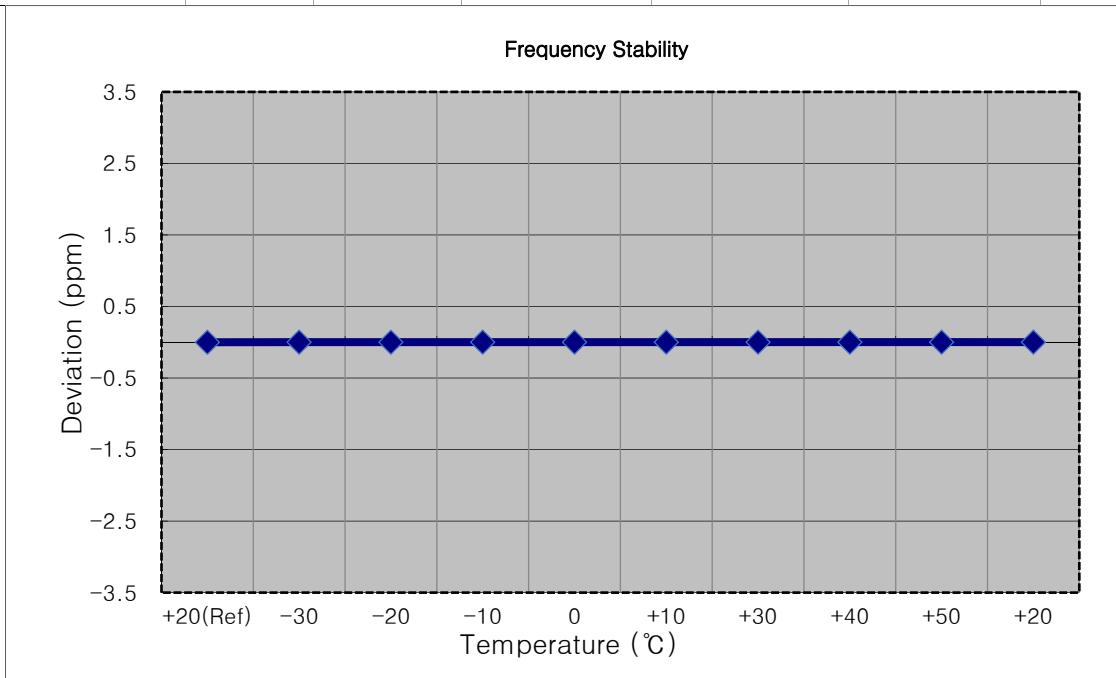
- ▣ MODE: LTE 7
- ▣ OPERATING FREQUENCY: 2,562,500,000 Hz
- ▣ CHANNEL: 21375 (15 MHz)
- ▣ REFERENCE VOLTAGE: 3.880 VDC
- ▣ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2562 500 005	0.0	0.000 000	0.000
100 %		-30	2562 500 010	4.8	0.000 000	0.002
100 %		-20	2562 500 009	4.5	0.000 000	0.002
100 %		-10	2562 500 009	3.9	0.000 000	0.002
100 %		0	2562 500 009	4.5	0.000 000	0.002
100 %		+10	2562 500 008	2.8	0.000 000	0.001
100 %		+30	2562 500 010	5.0	0.000 000	0.002
100 %		+40	2562 500 008	3.3	0.000 000	0.001
100 %		+50	2562 500 010	4.7	0.000 000	0.002
Batt. Endpoint	3.300	+20	2562 500 009	4.3	0.000 000	0.002



■ MODE: LTE 7
 ■ OPERATING FREQUENCY: 2,560,000,000 Hz
 ■ CHANNEL: 21350 (20 MHz)
 ■ REFERENCE VOLTAGE: 3.880 VDC
 ■ DEVIATION LIMIT: Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	(Hz)	(%)	
100 %	3.880	+20(Ref)	2560 000 002	0.0	0.000 000	0.000
100 %		-30	2560 000 005	3.0	0.000 000	0.001
100 %		-20	2560 000 005	2.7	0.000 000	0.001
100 %		-10	2560 000 006	3.3	0.000 000	0.001
100 %		0	2560 000 006	3.5	0.000 000	0.001
100 %		+10	2560 000 006	4.0	0.000 000	0.002
100 %		+30	2560 000 005	3.2	0.000 000	0.001
100 %		+40	2560 000 006	3.7	0.000 000	0.001
100 %		+50	2560 000 006	4.0	0.000 000	0.002
Batt. Endpoint	3.300	+20	2560 000 006	4.1	0.000 000	0.002



10. TEST PLOTS(Main 2 ANT)

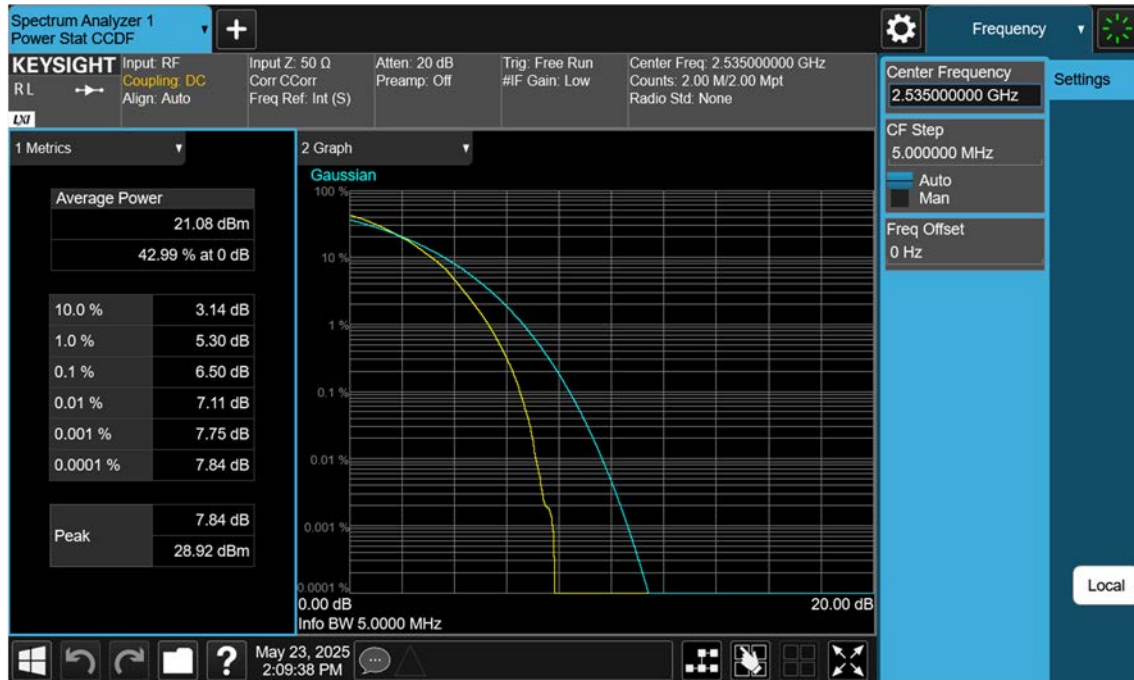
LTE B7_5 M_PAR_Mid_QPSK_FullRB



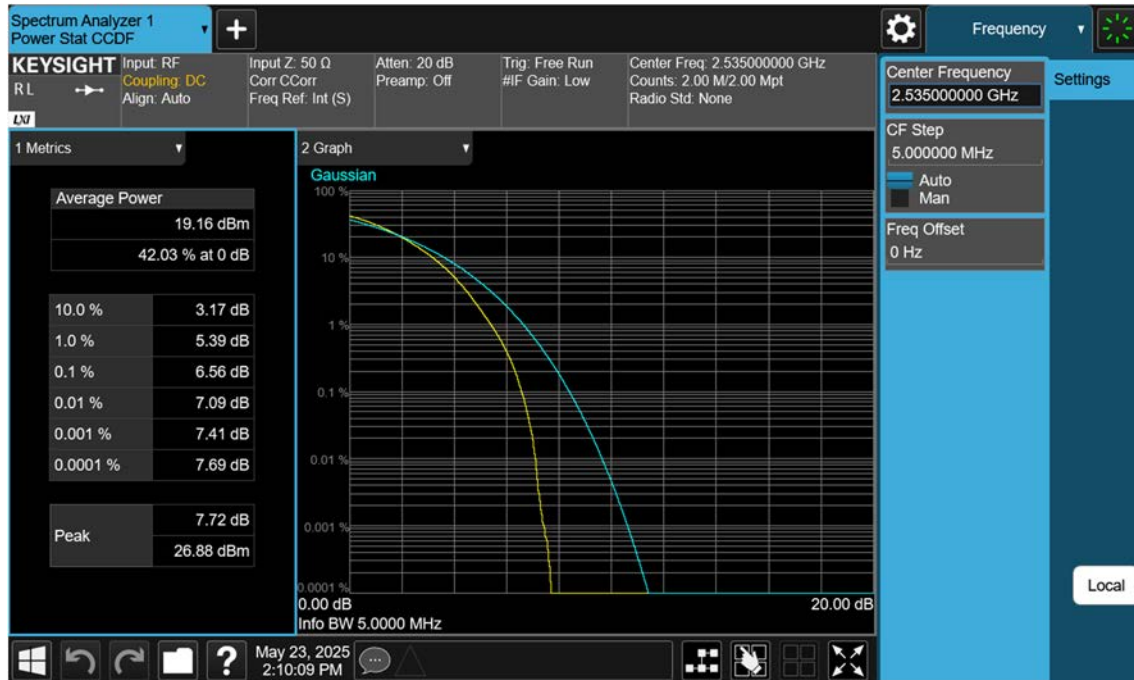
LTE B7_5 M_PAR_Mid_16QAM_FullRB



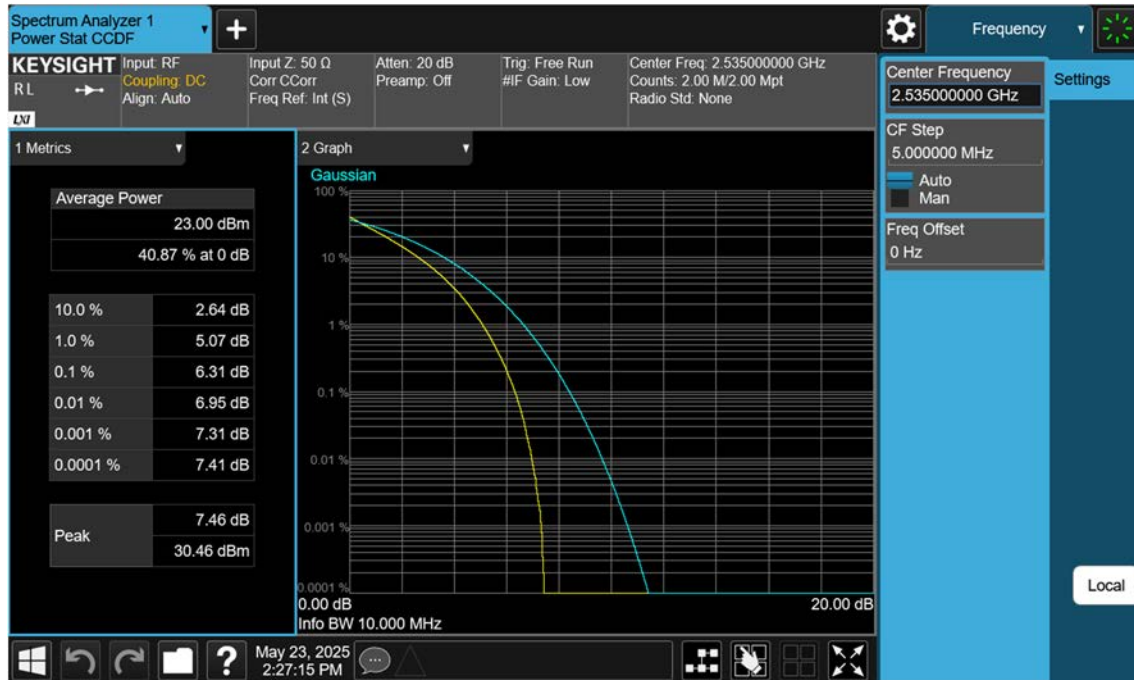
LTE B7_5 M_PAR_Mid_64QAM_FullRB



LTE B7_5 M_PAR_Mid_256QAM_FullRB



LTE B7_10 M_PAR_Mid_QPSK_FullRB



LTE B7_10 M_PAR_Mid_16QAM_FullRB



LTE B7_10 M_PAR_Mid_64QAM_FullRB



LTE B7_10 M_PAR_Mid_256QAM_FullRB



LTE B7_15 M_PAR_Mid_QPSK_FullRB



LTE B7_15 M_PAR_Mid_16QAM_FullRB



LTE B7_15 M_PAR_Mid_64QAM_FullRB



LTE B7_15 M_PAR_Mid_256QAM_FullRB



LTE B7_20 M_PAR_Mid_QPSK_FullRB



LTE B7_20 M_PAR_Mid_16QAM_FullRB



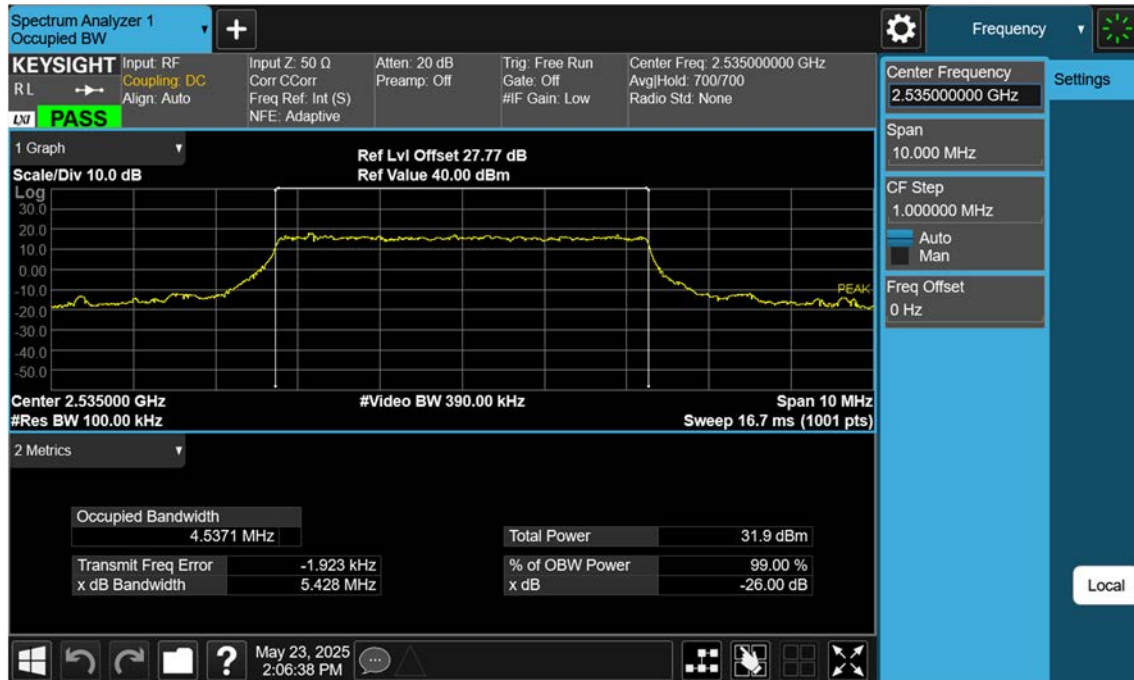
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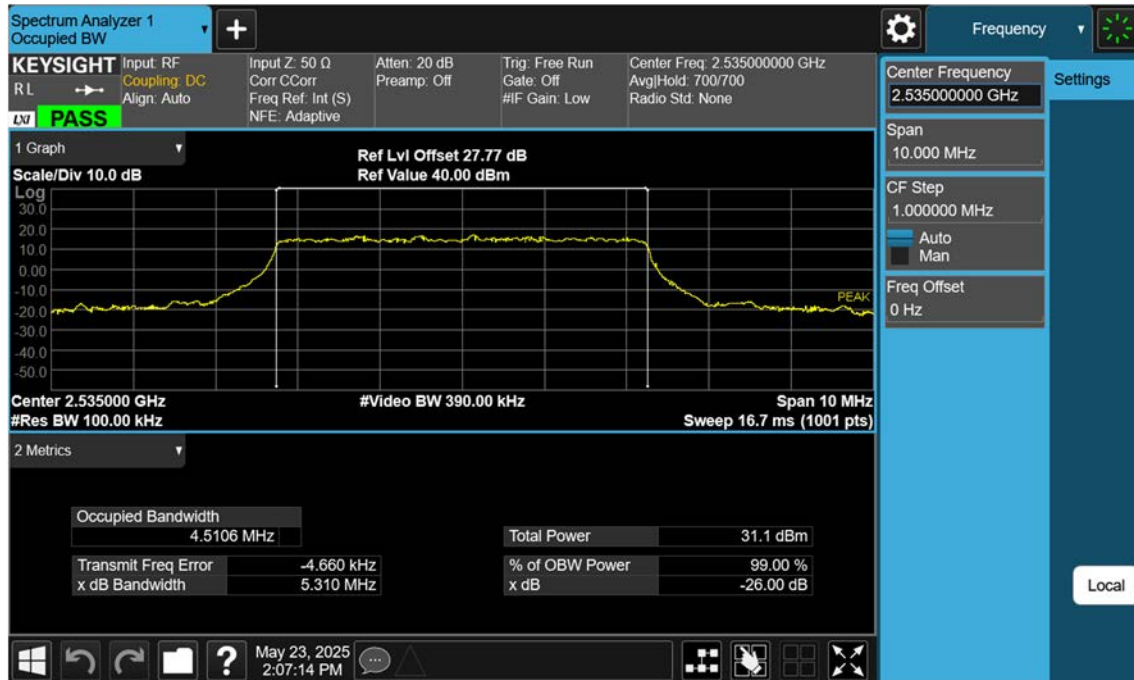
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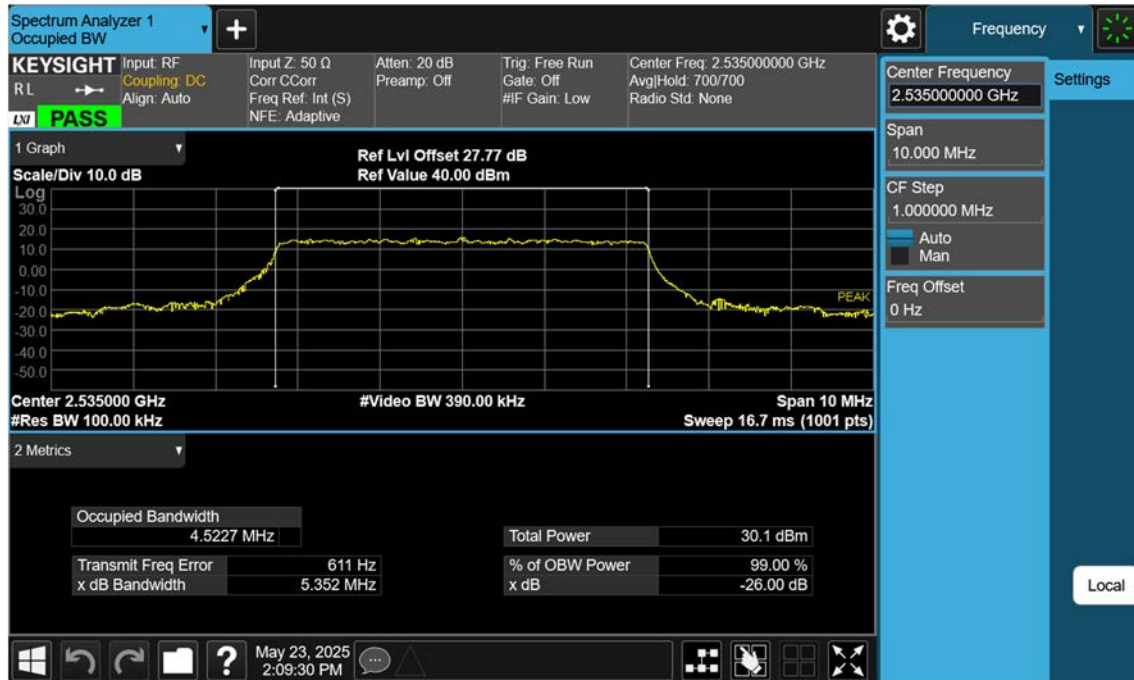
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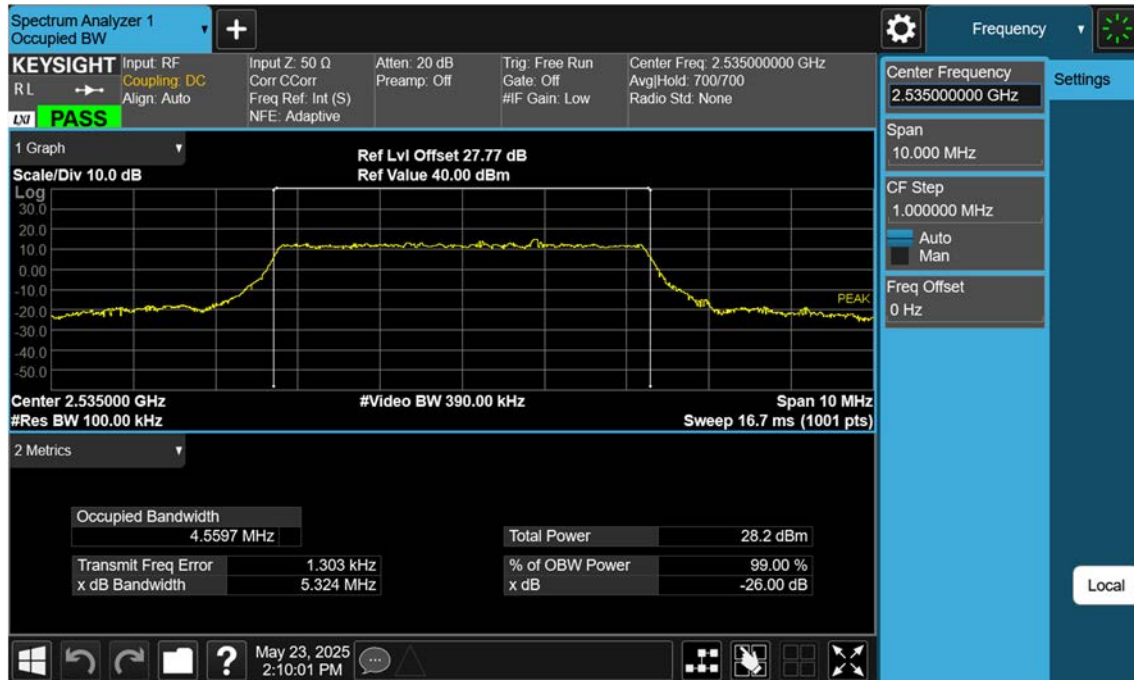
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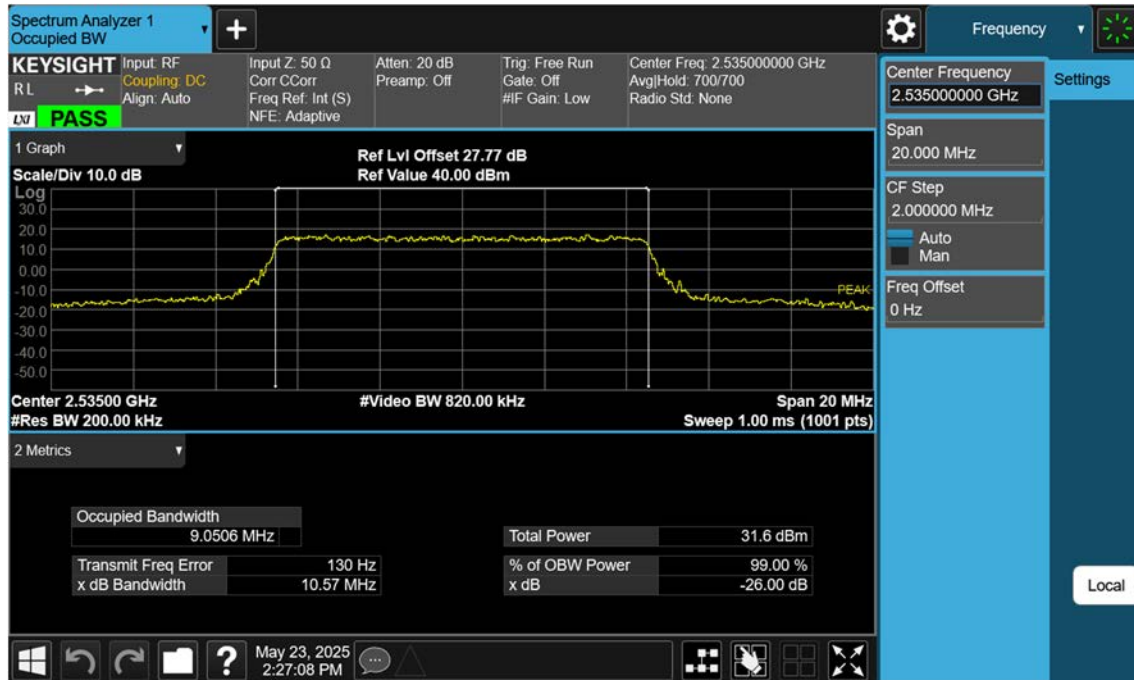
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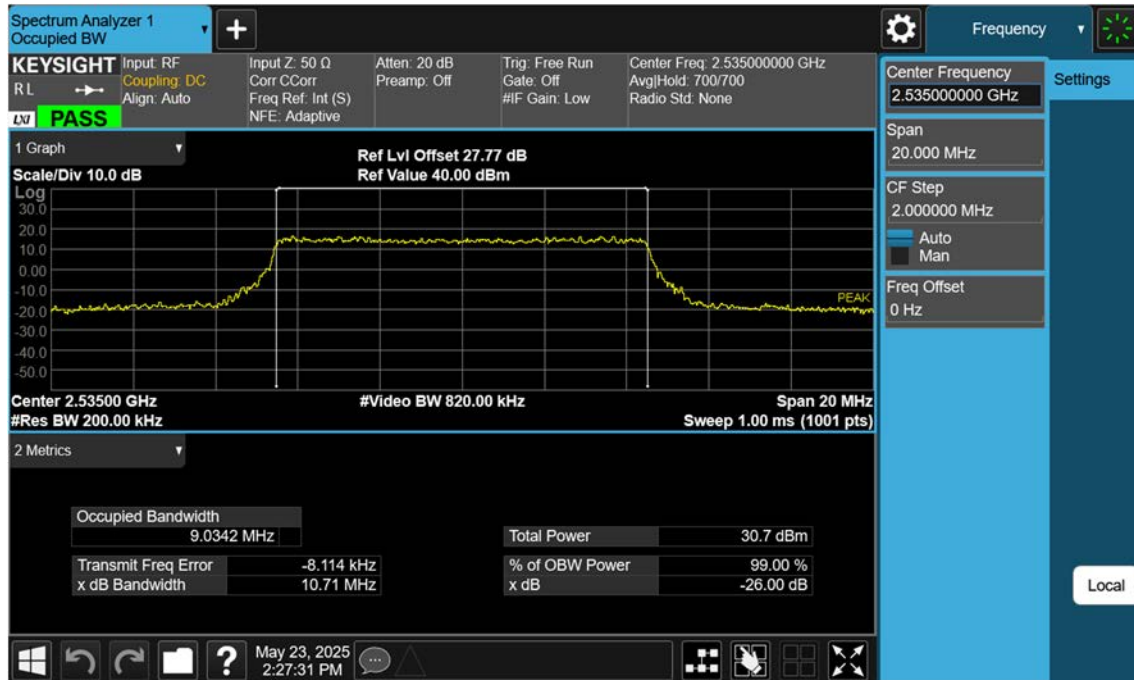
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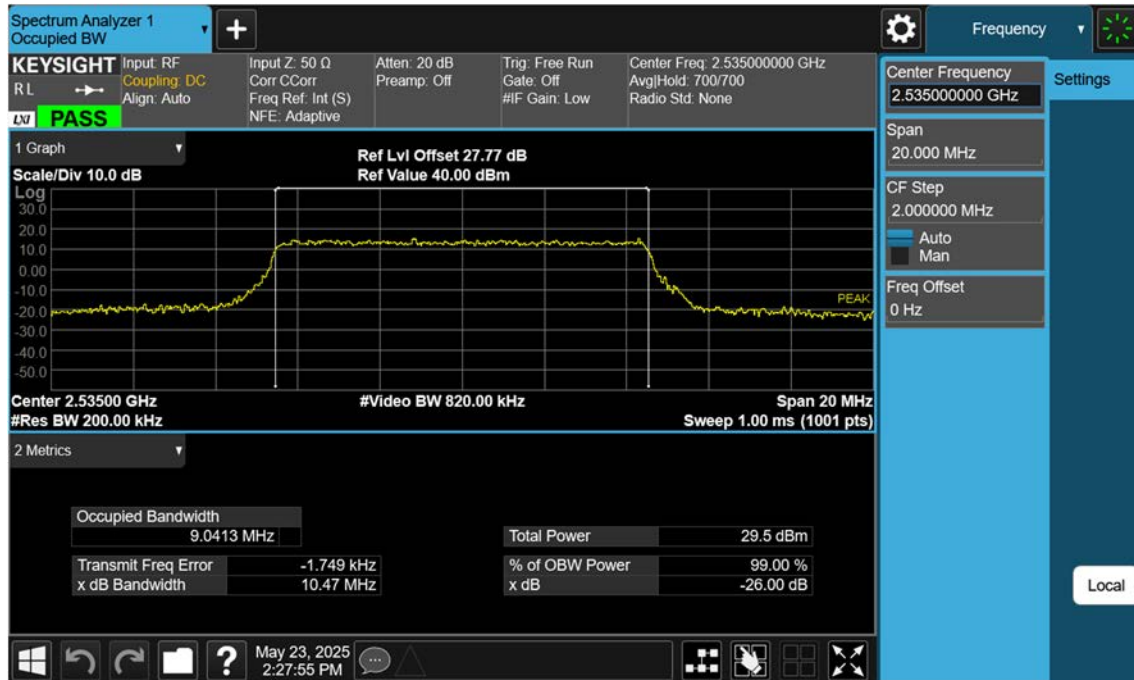
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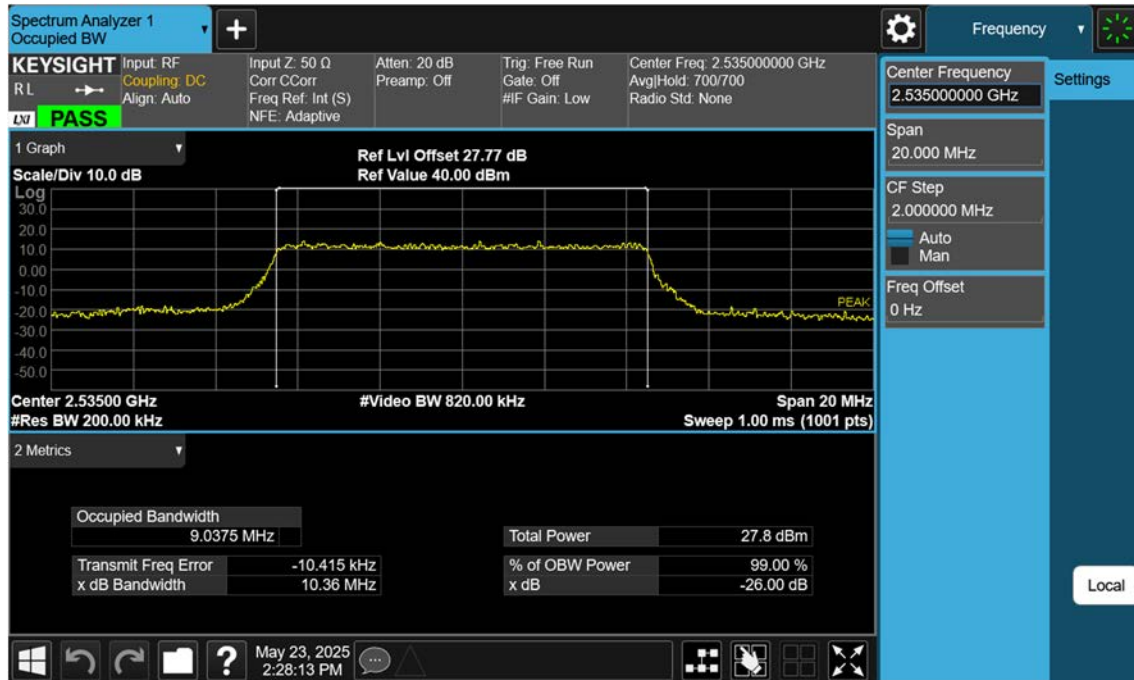
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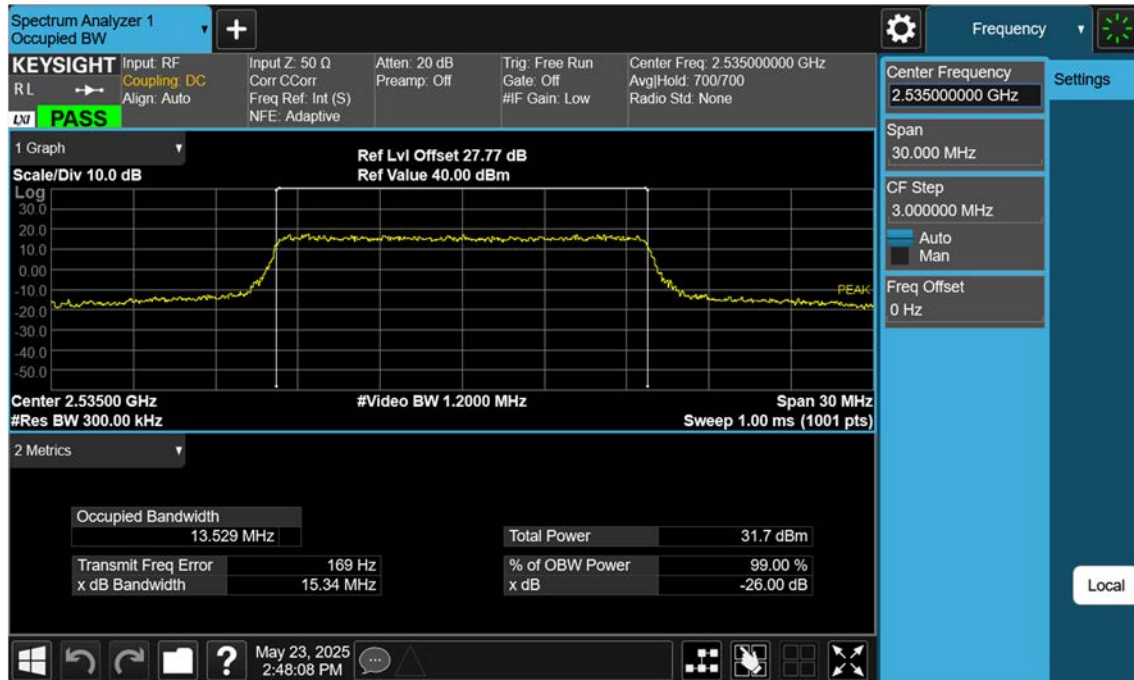
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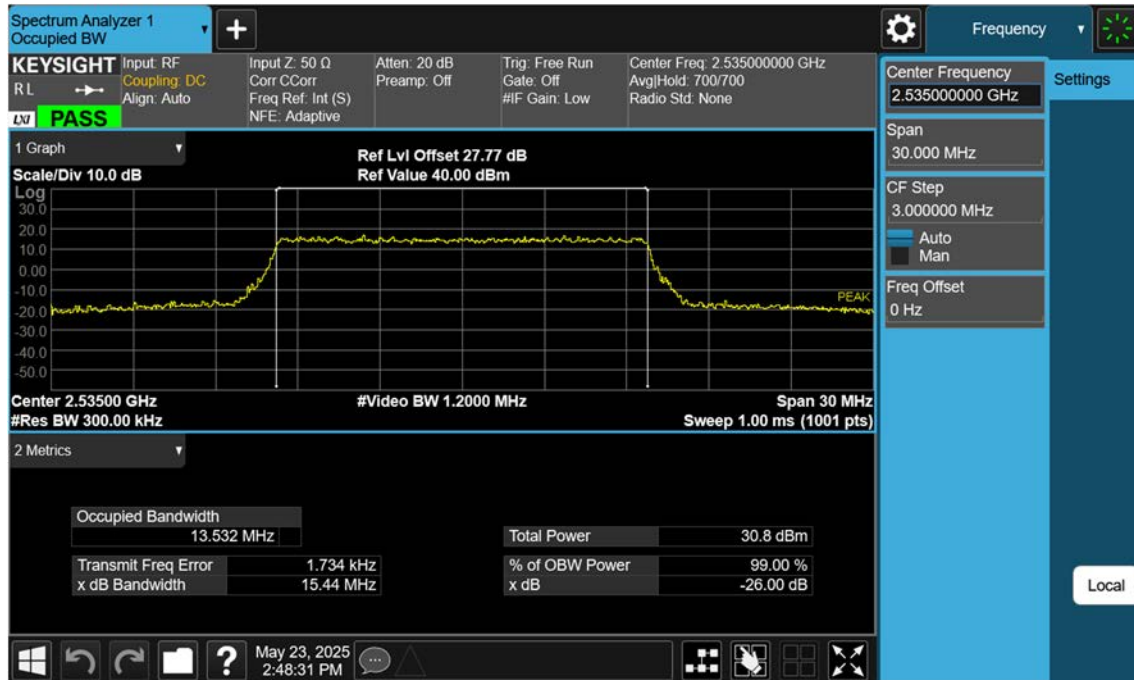
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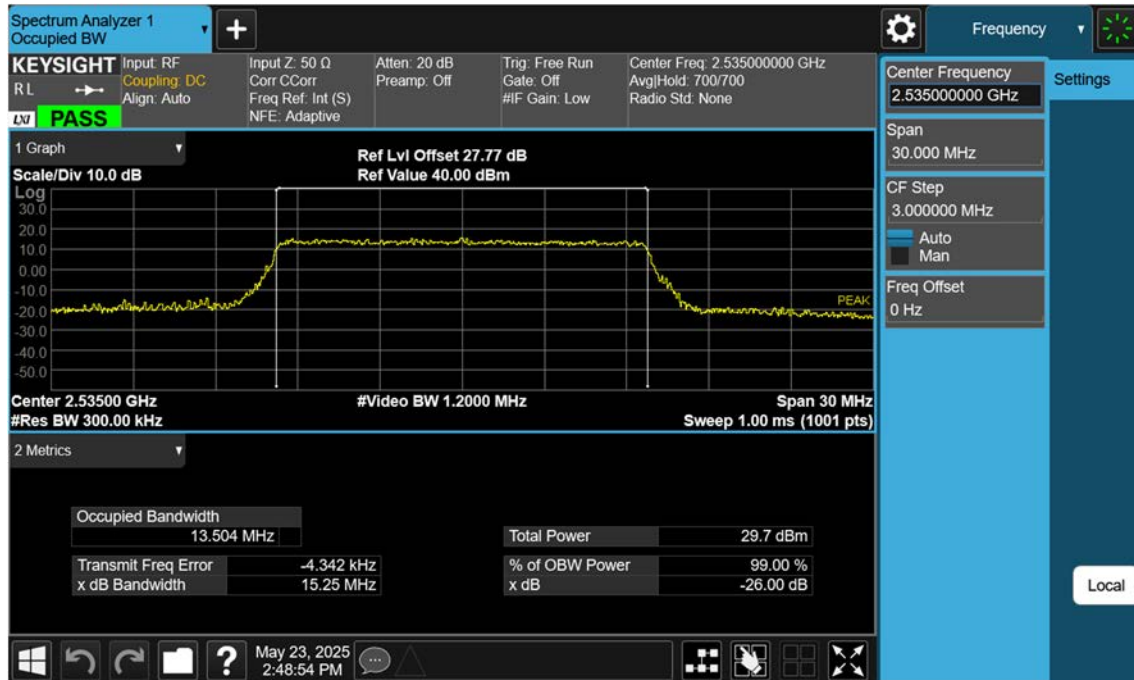
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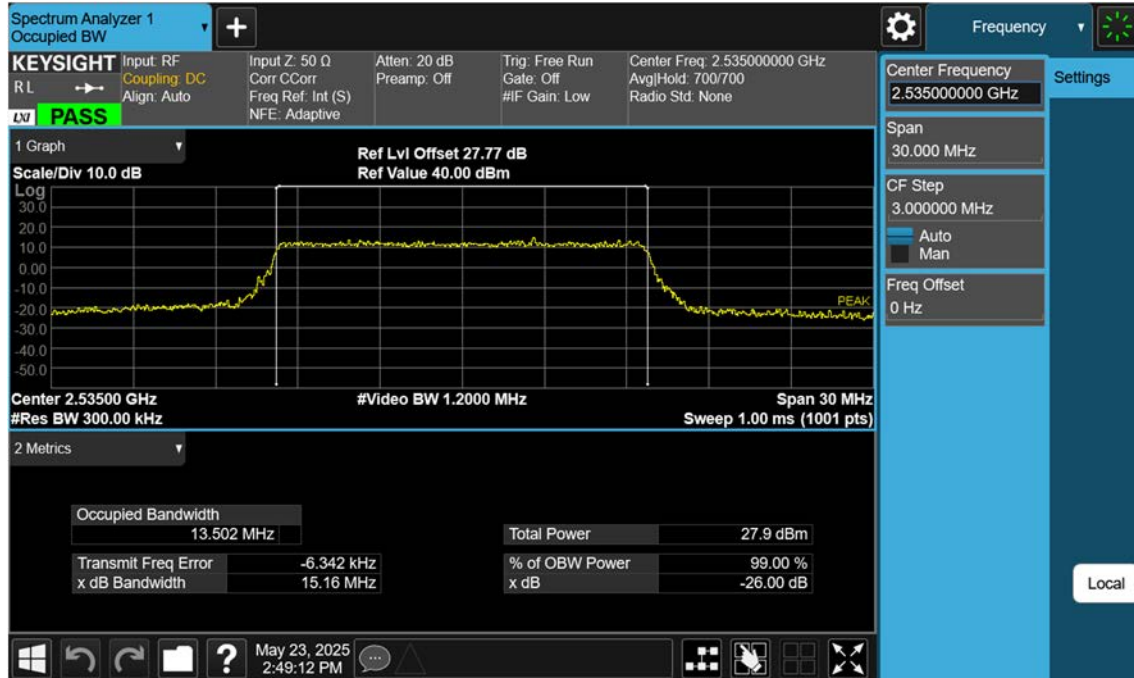
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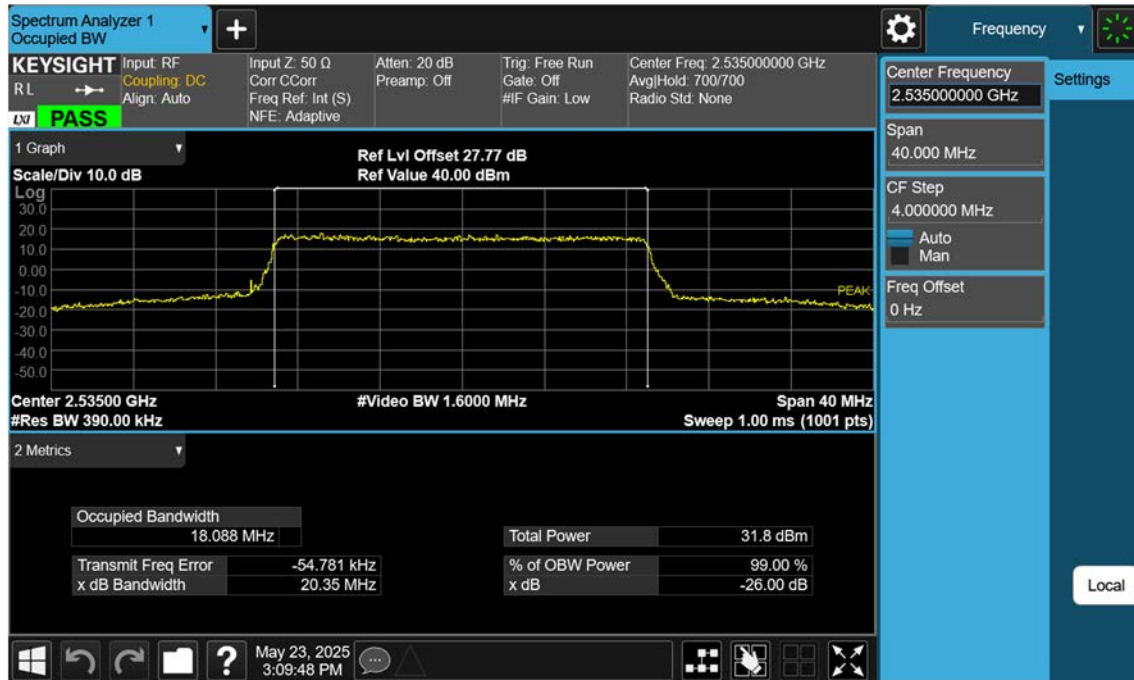
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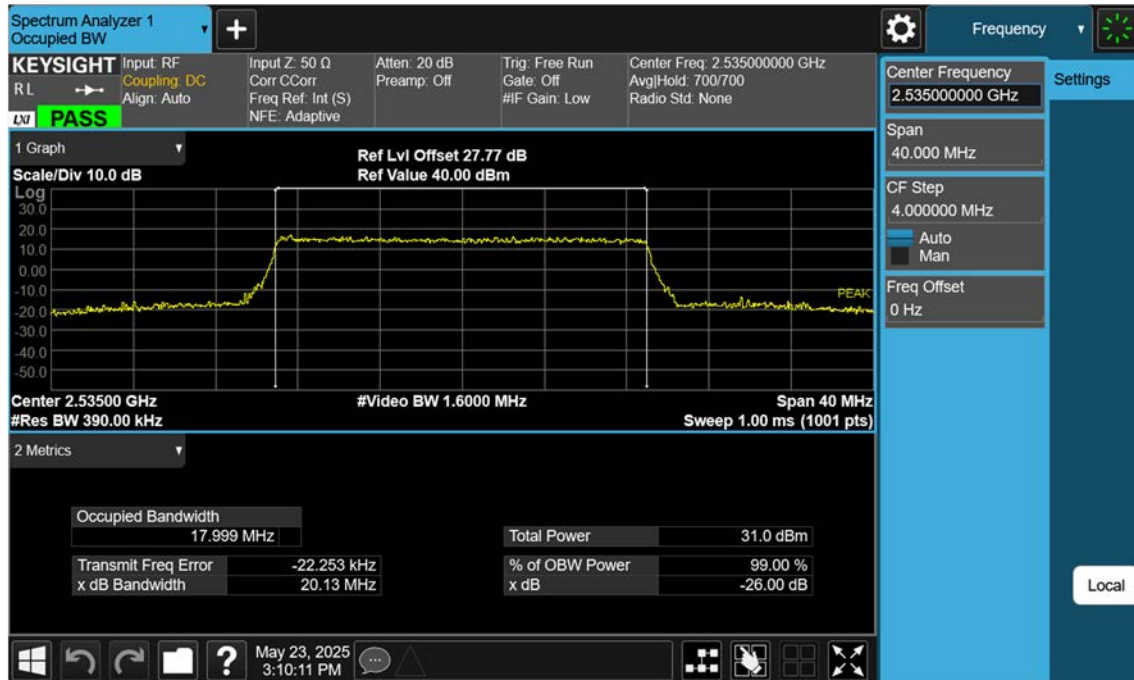
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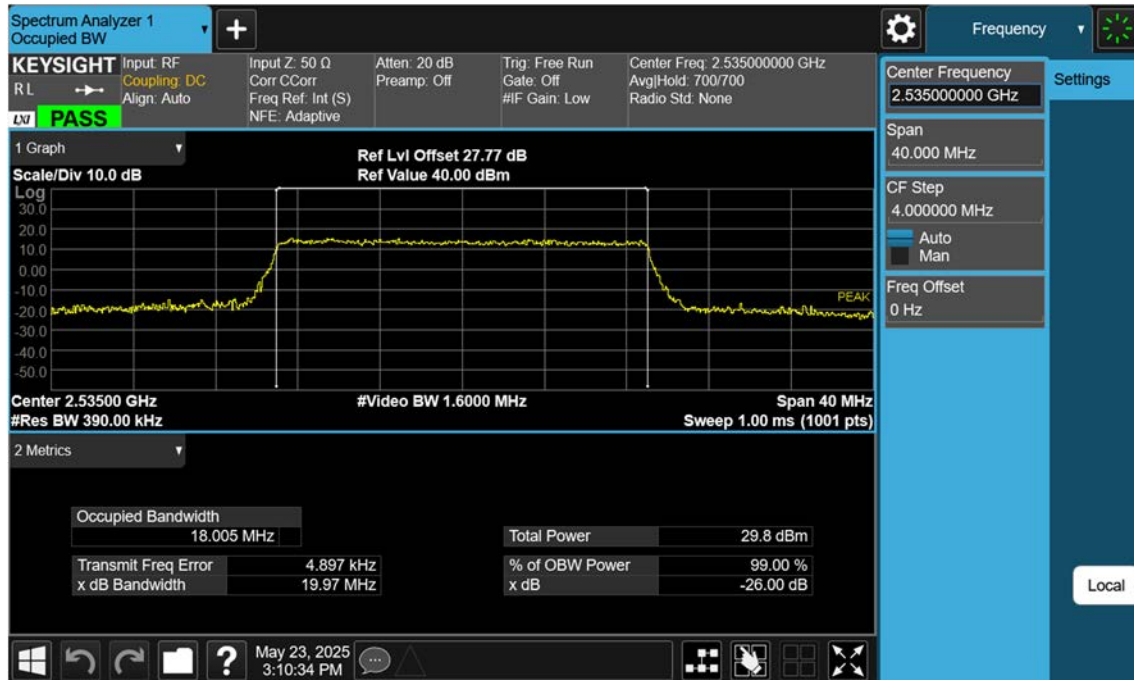
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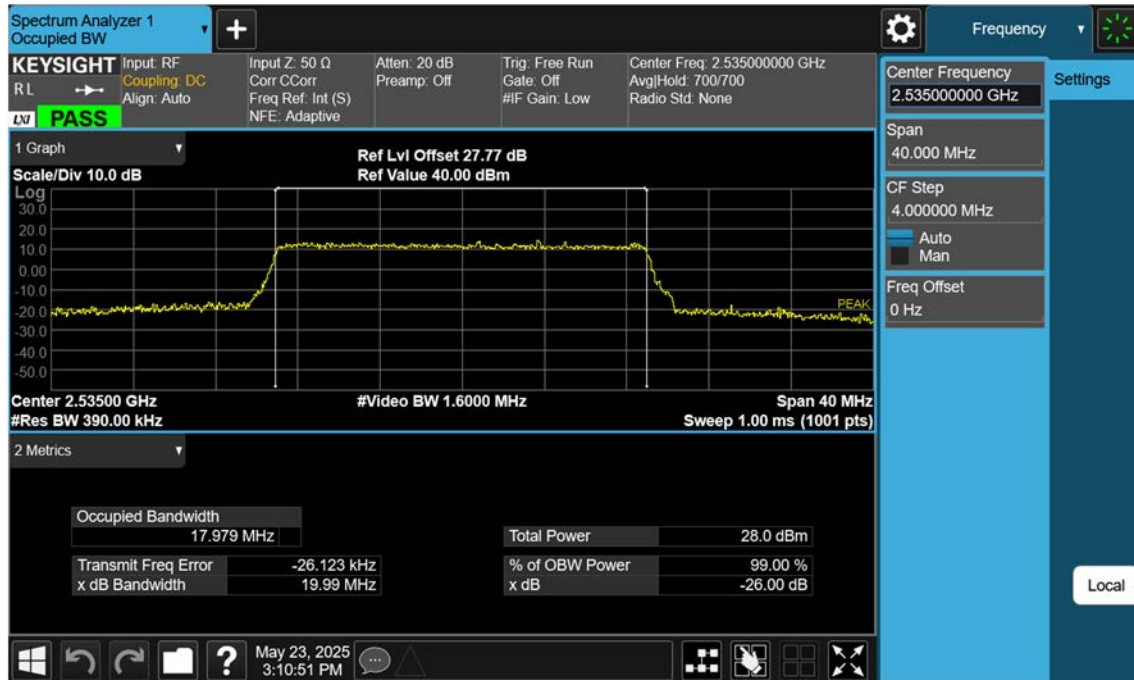
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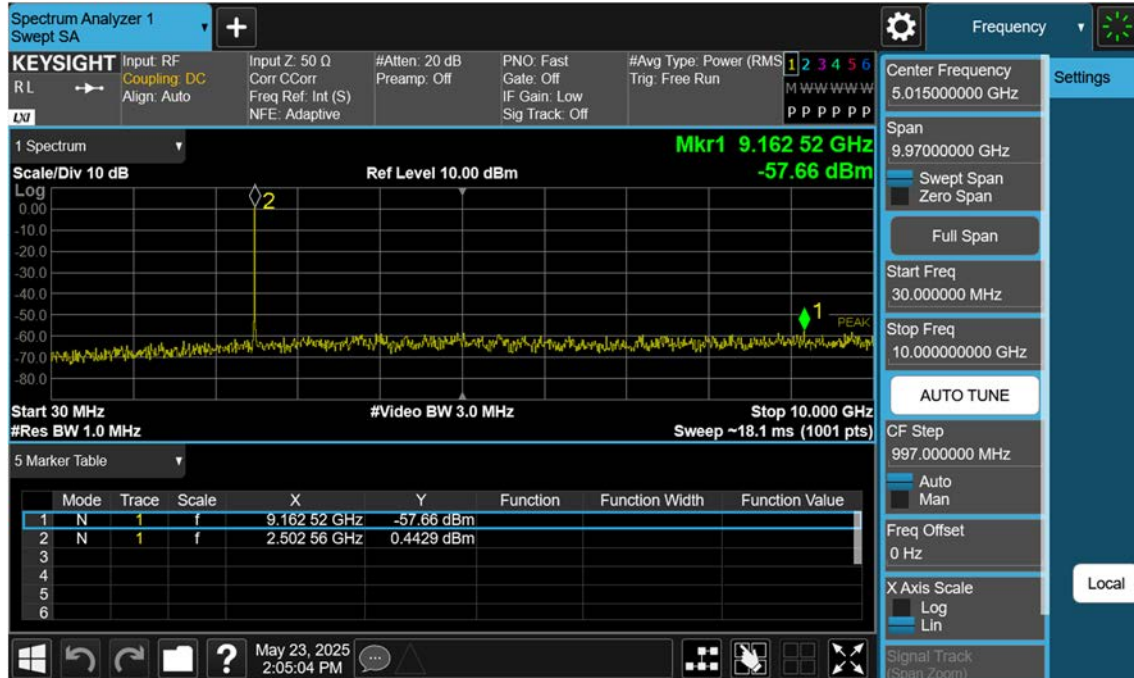
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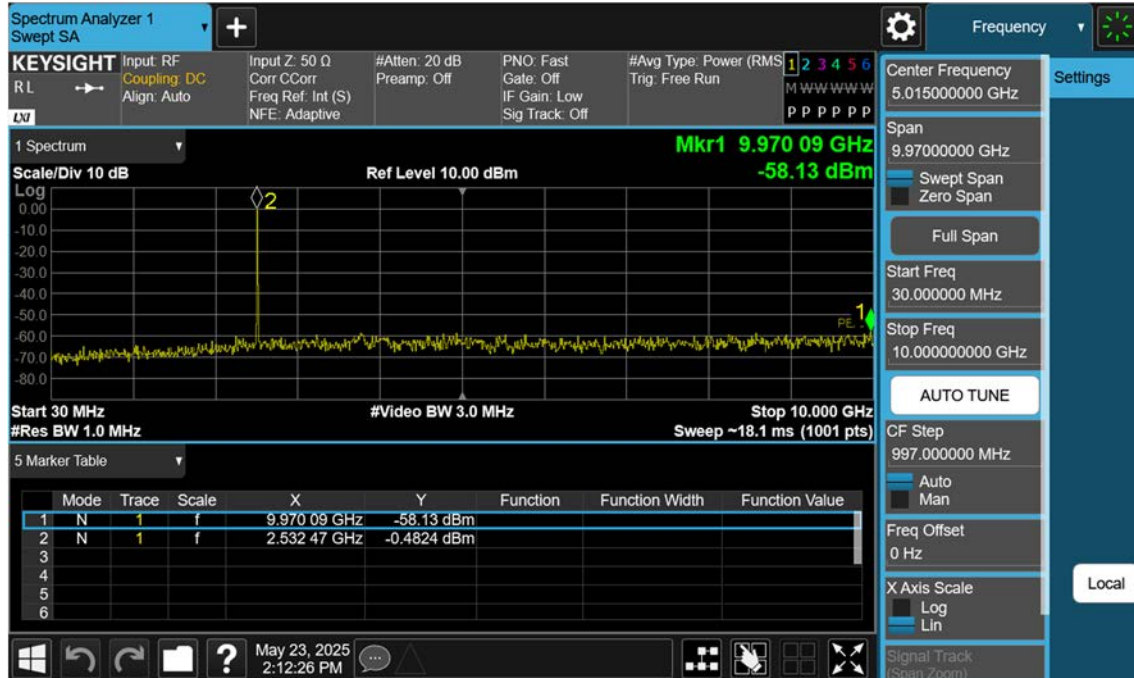
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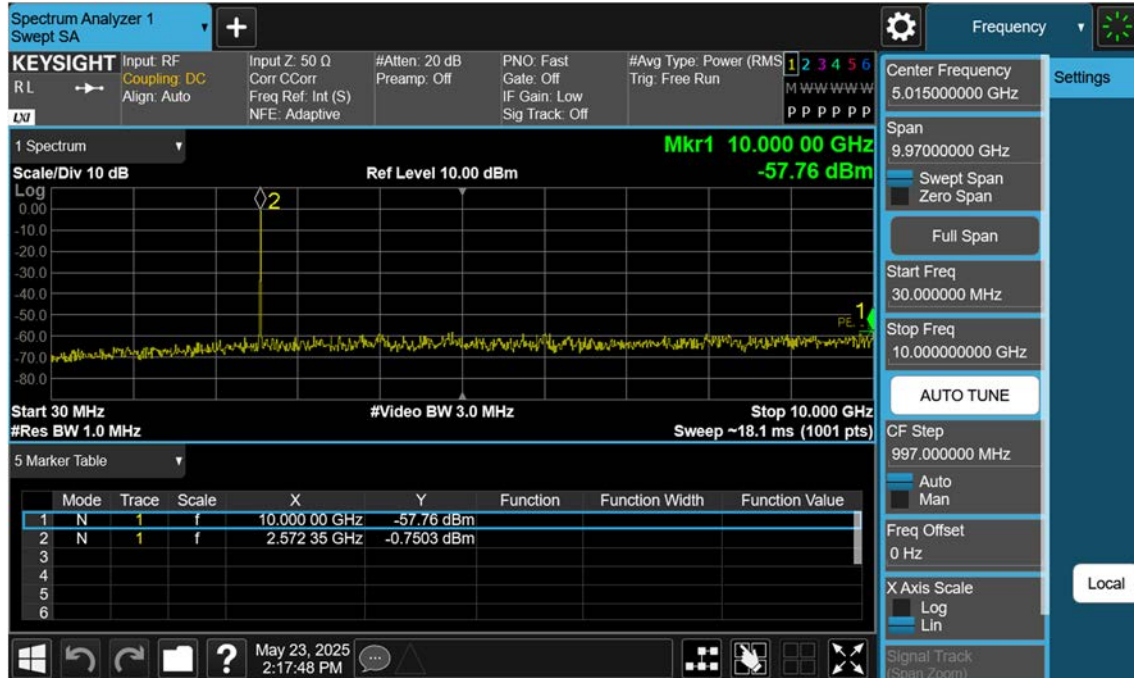
LTE B7_5 M_Conducted Spurious(30 M-10 G)_Low_QPSK_1RB



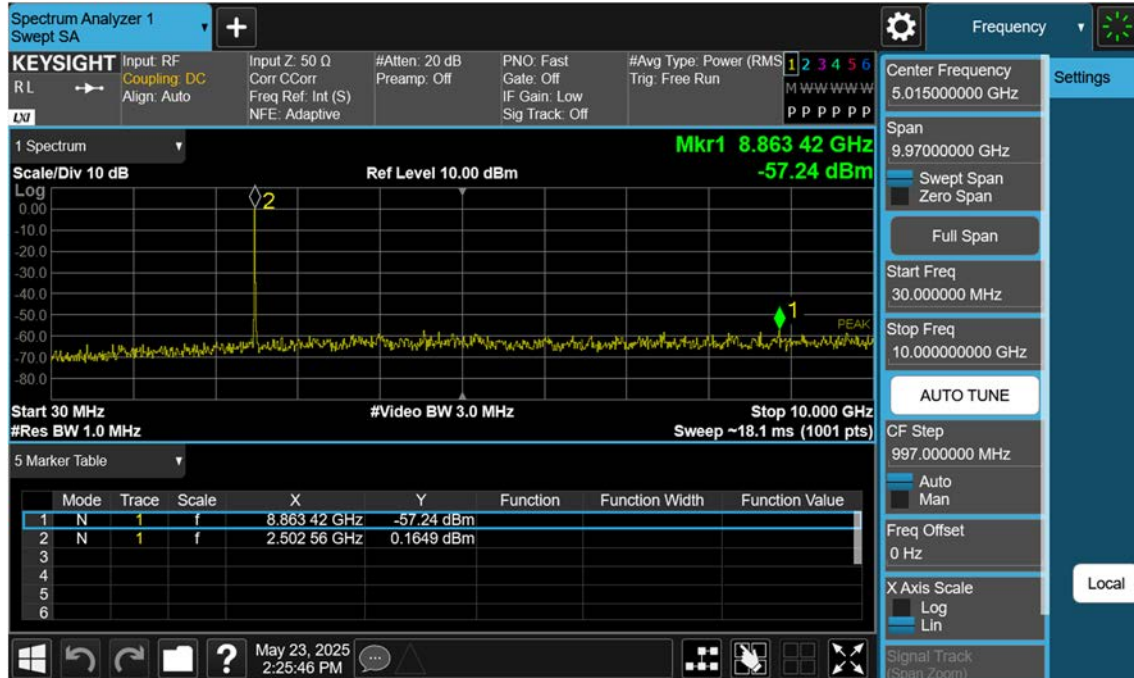
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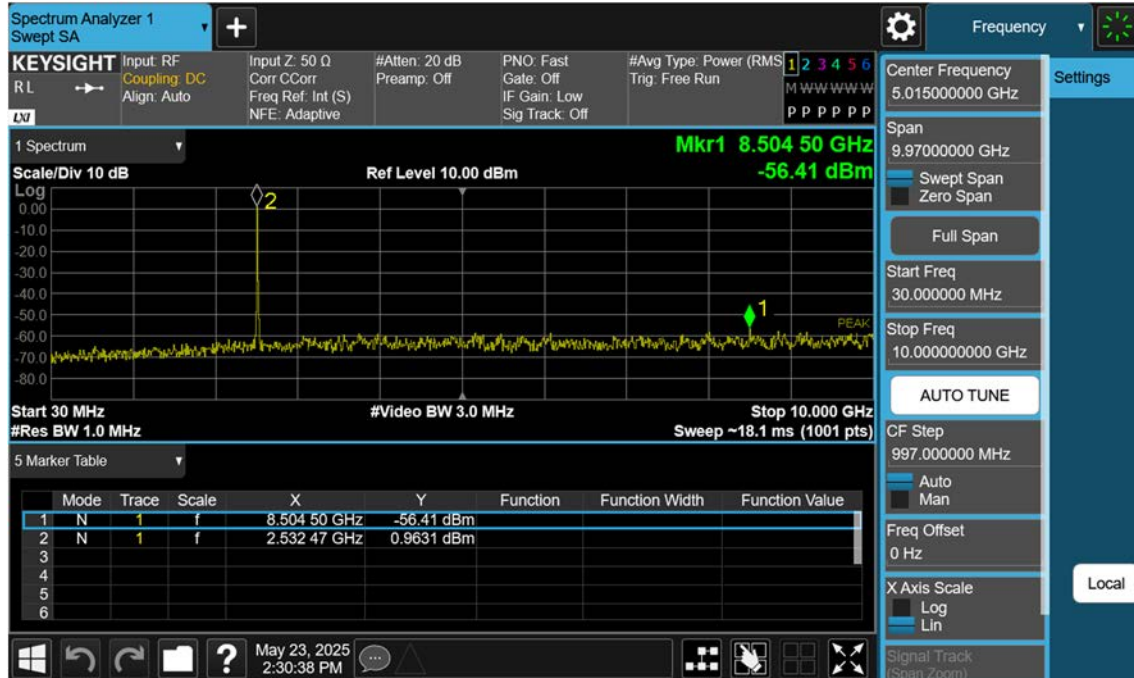
LTE B7_5 M_Conducted Spurious(30 M-10 G)_High_QPSK_1RB



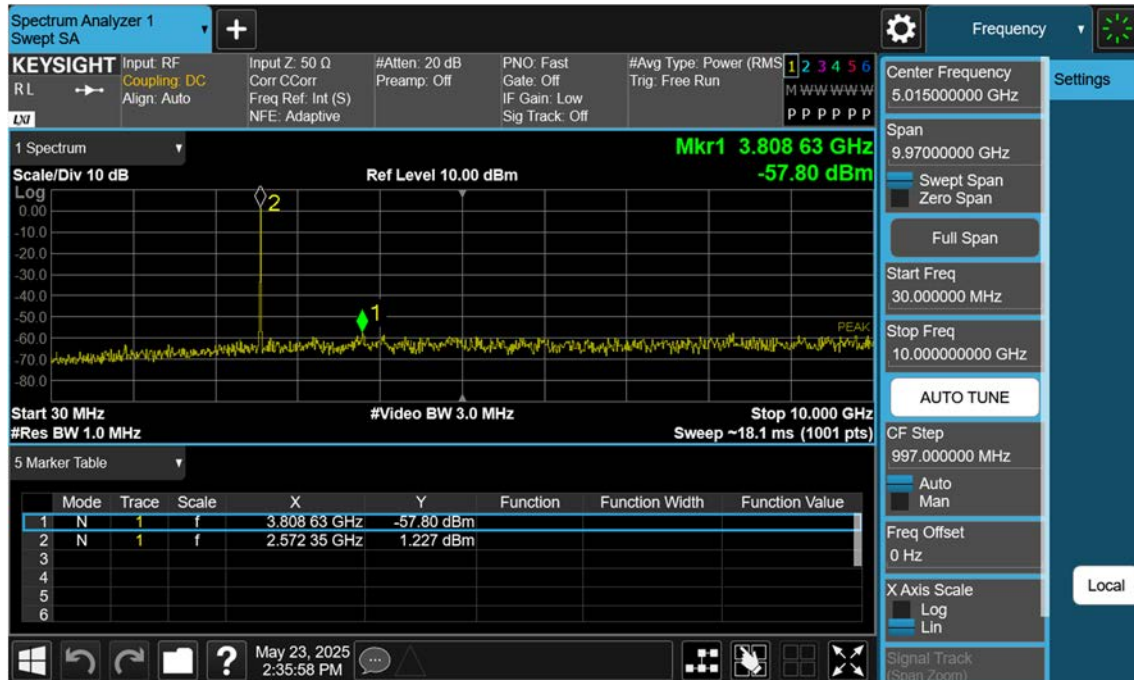
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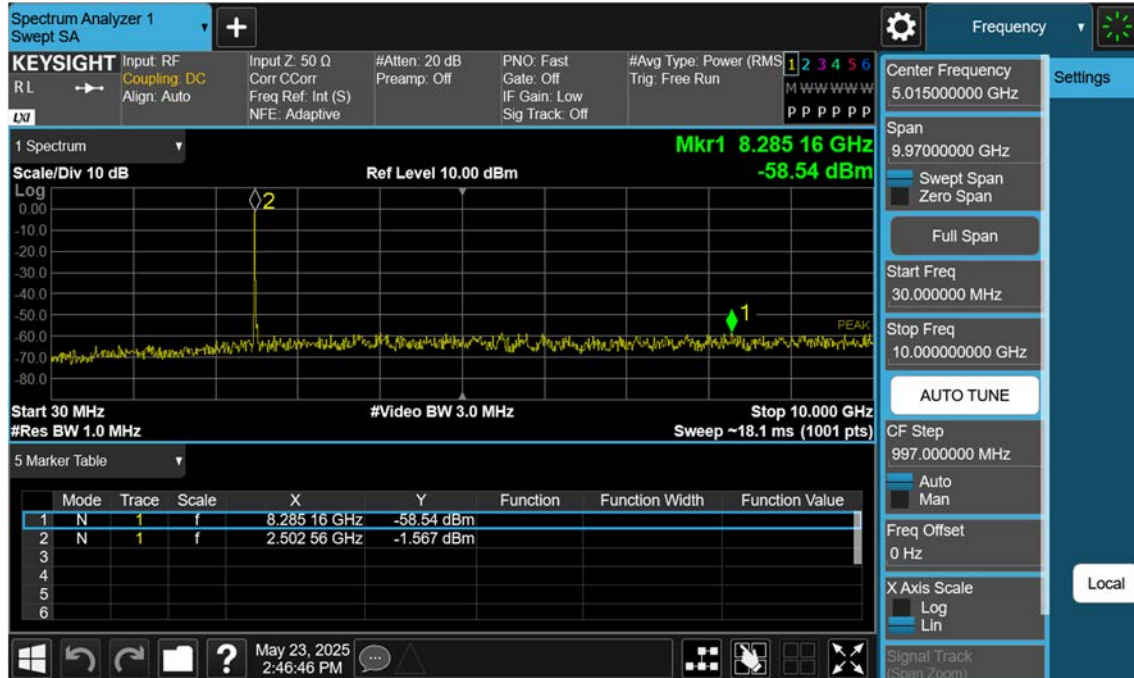
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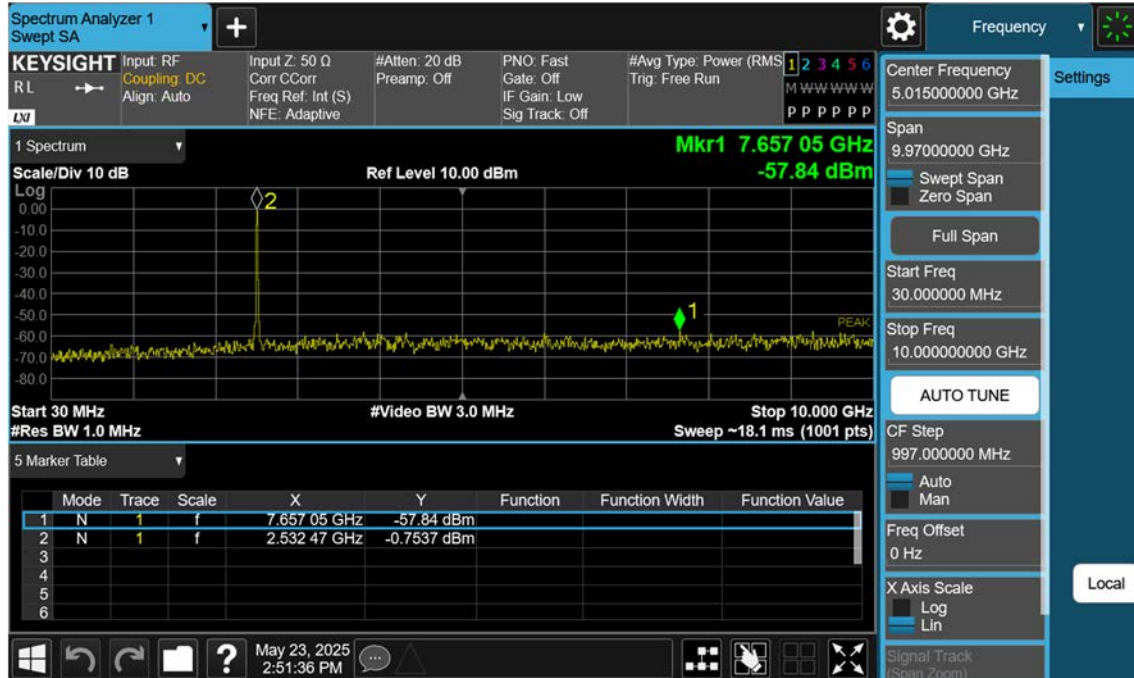
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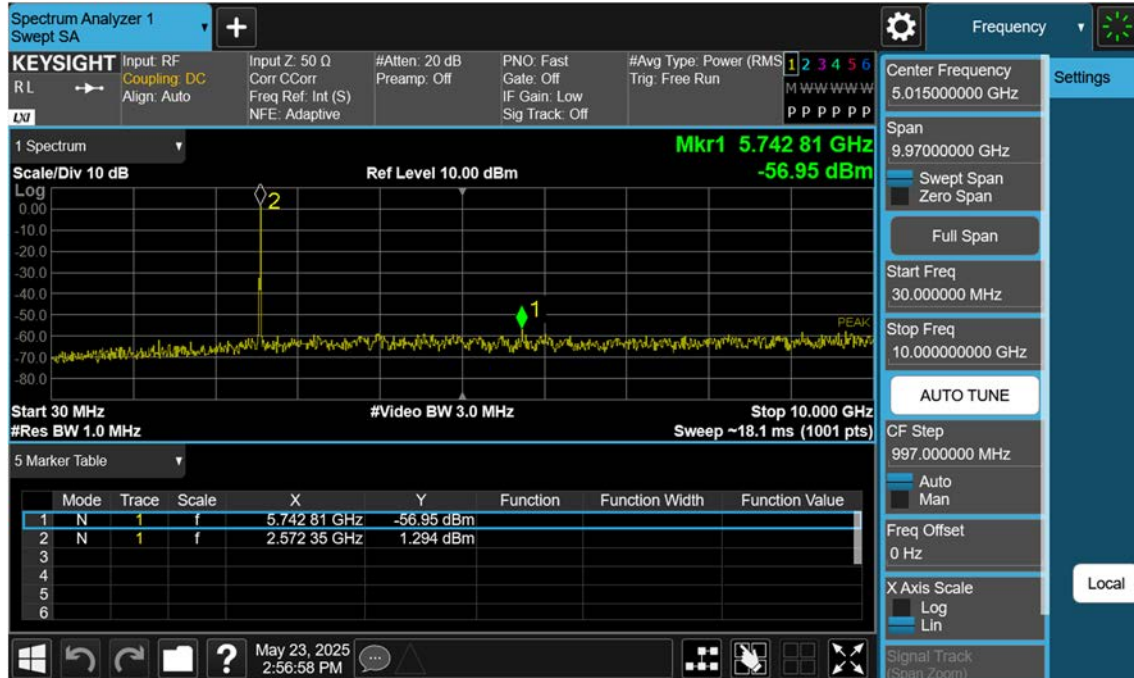
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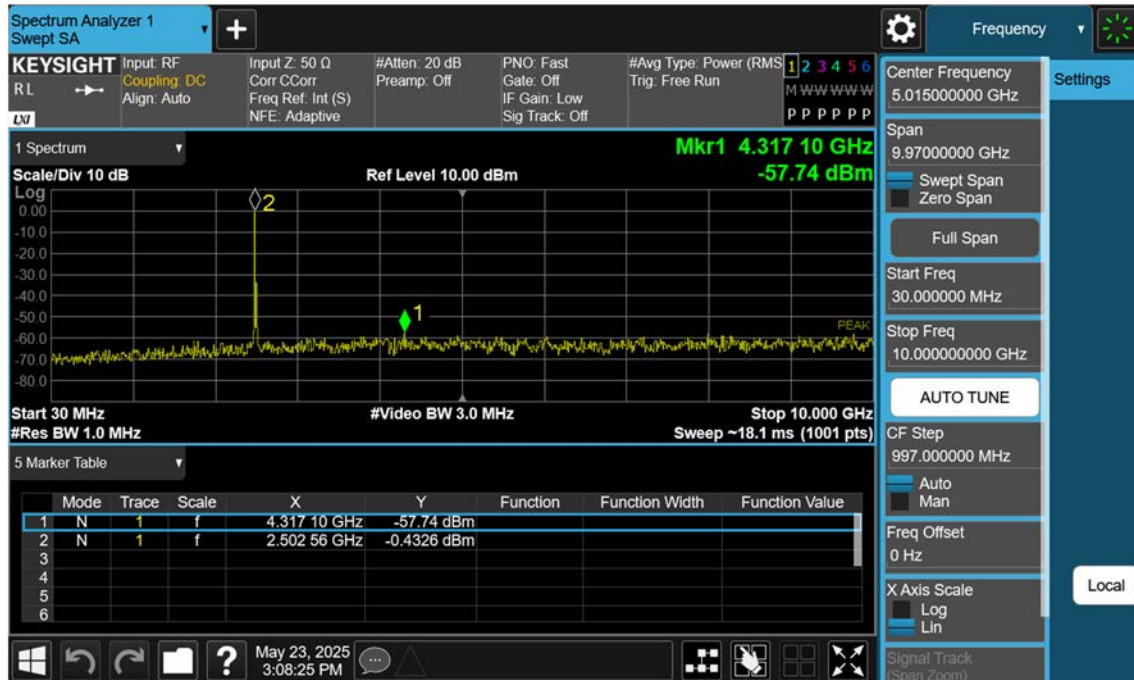
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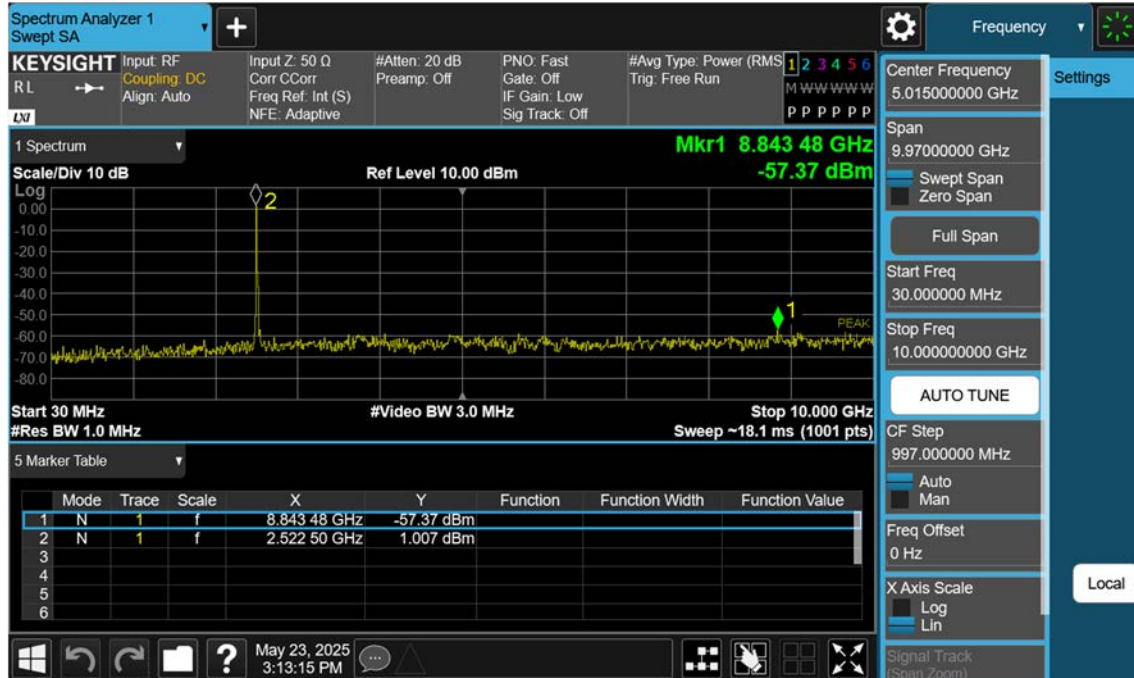
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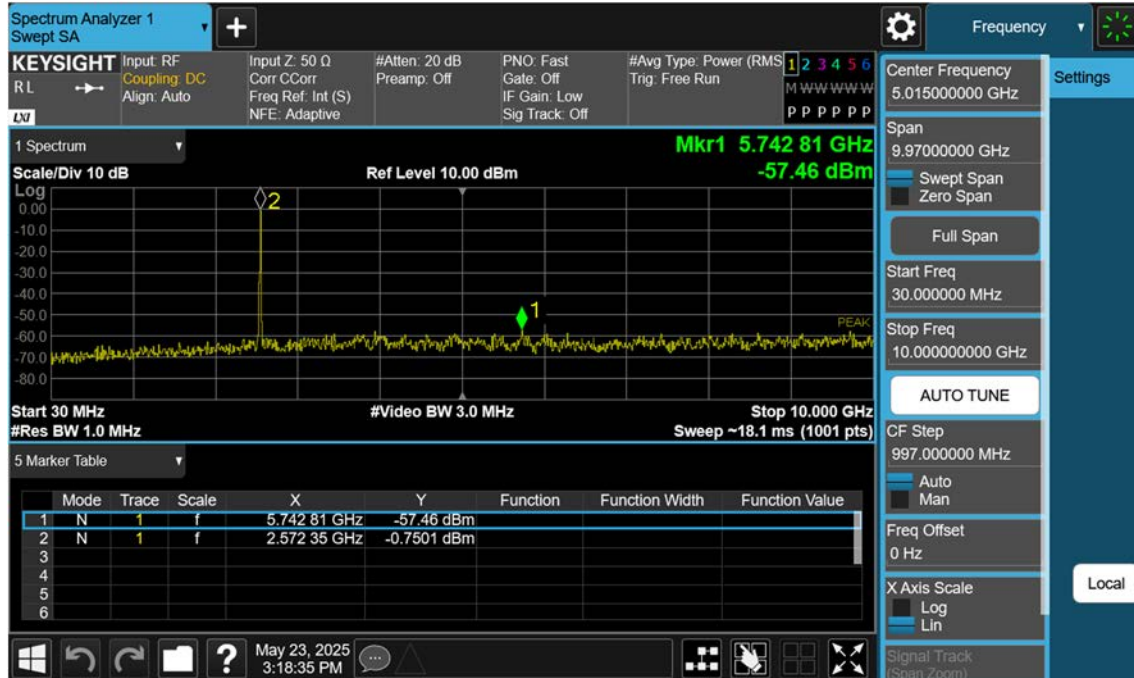
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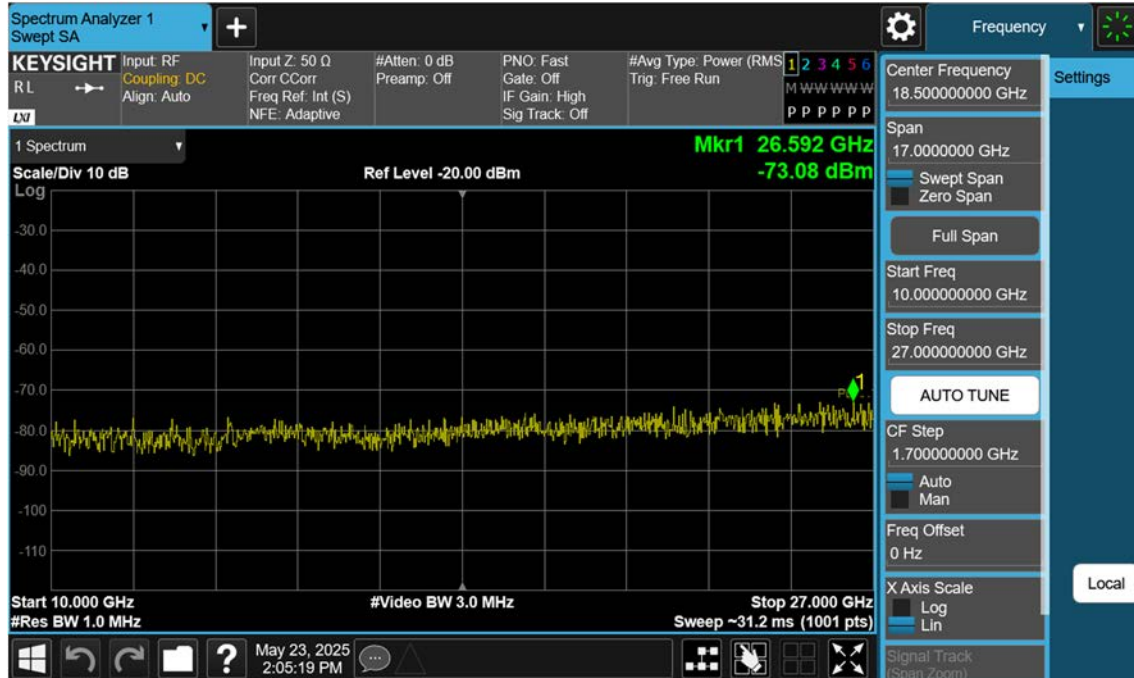
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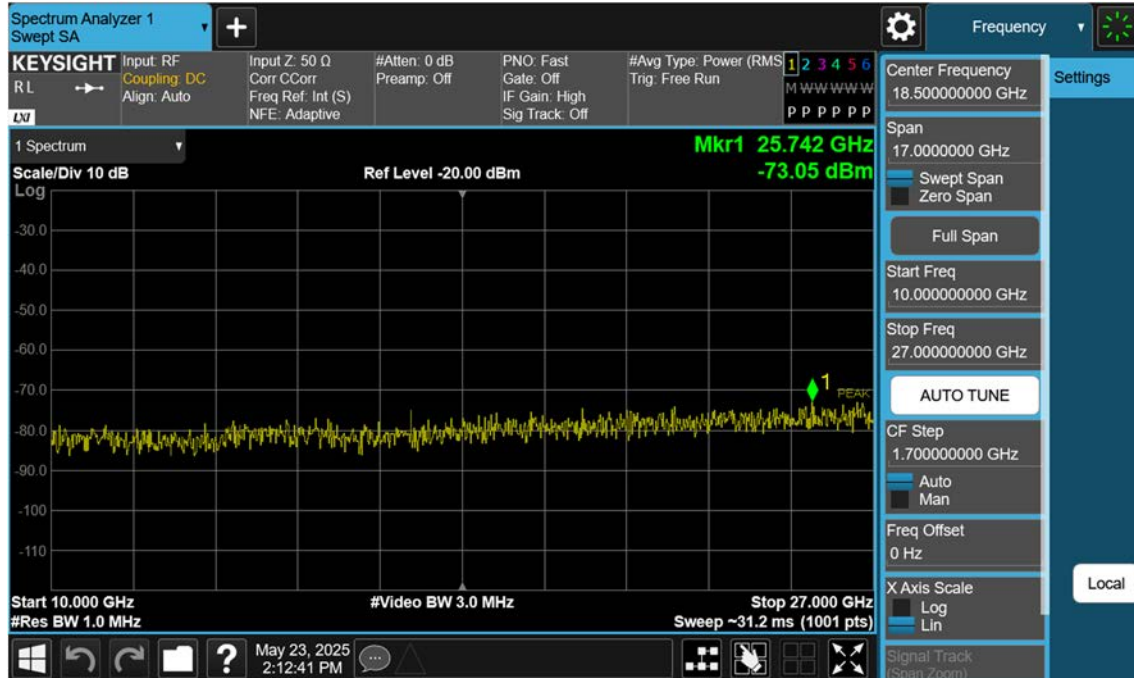
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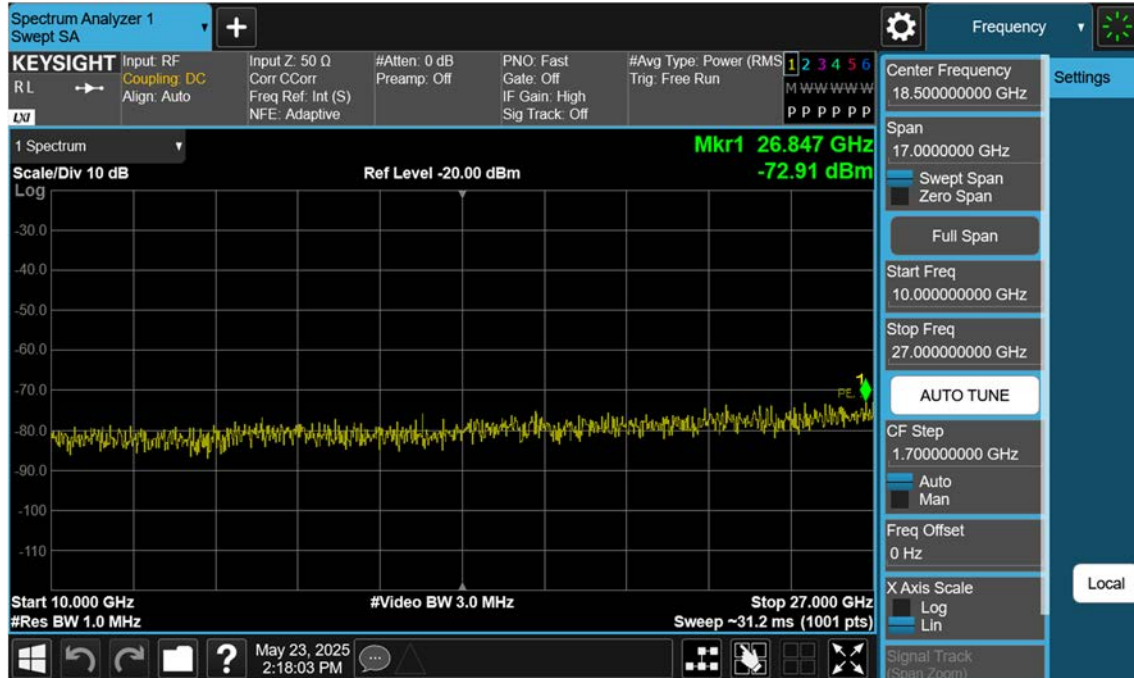
LTE B7_5 M_Conducted Spurious(Above10 G)_Low_QPSK_1RB



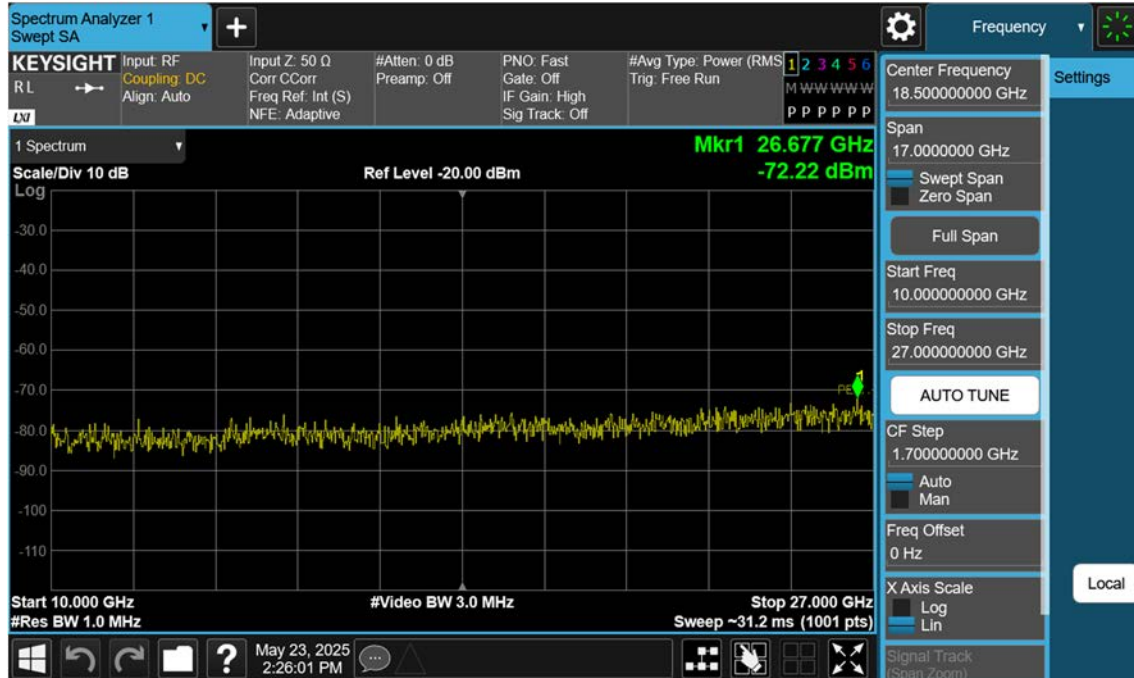
LTE B7_5 M_Conducted Spurious(Above10 G)_Mid_QPSK_1RB



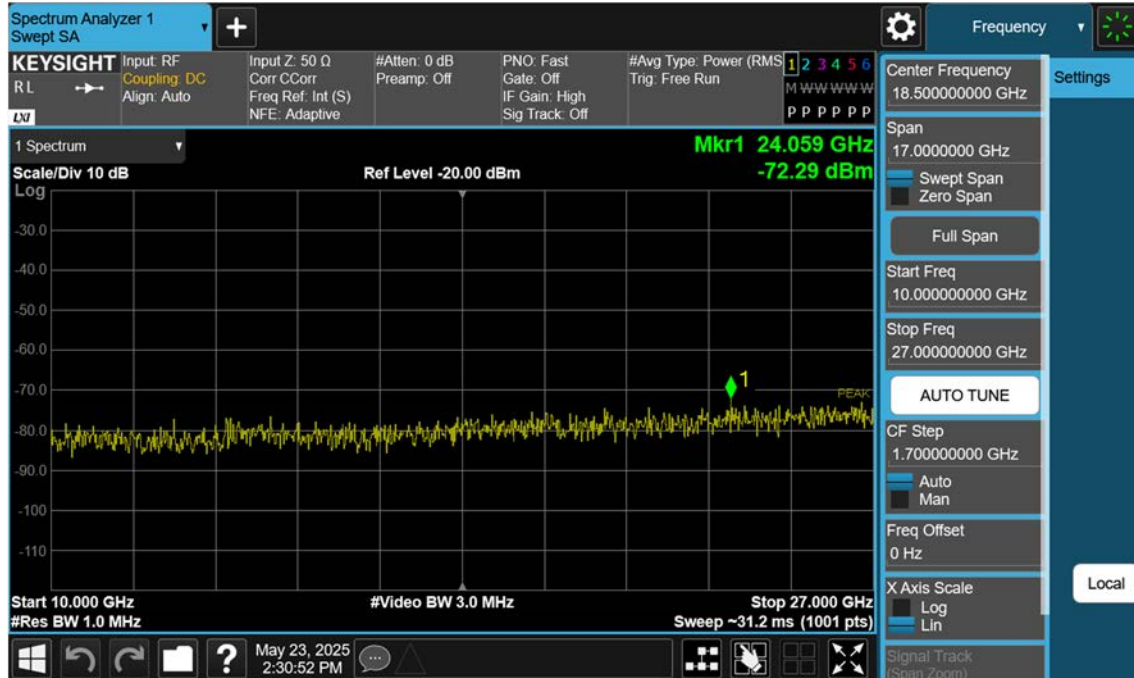
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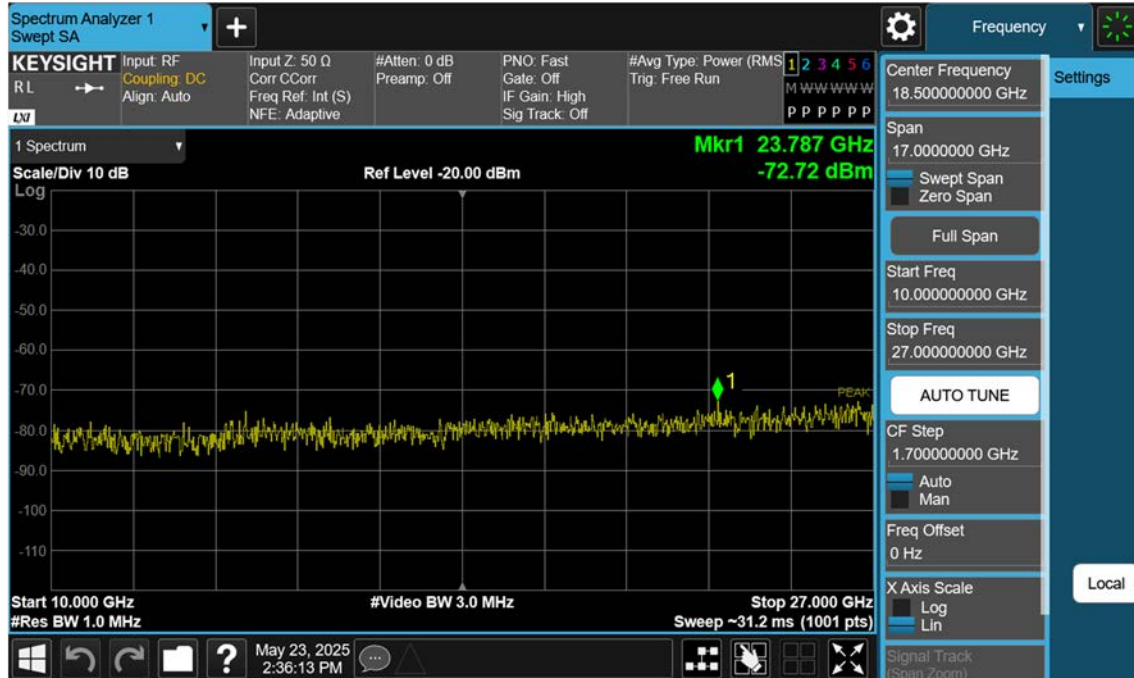
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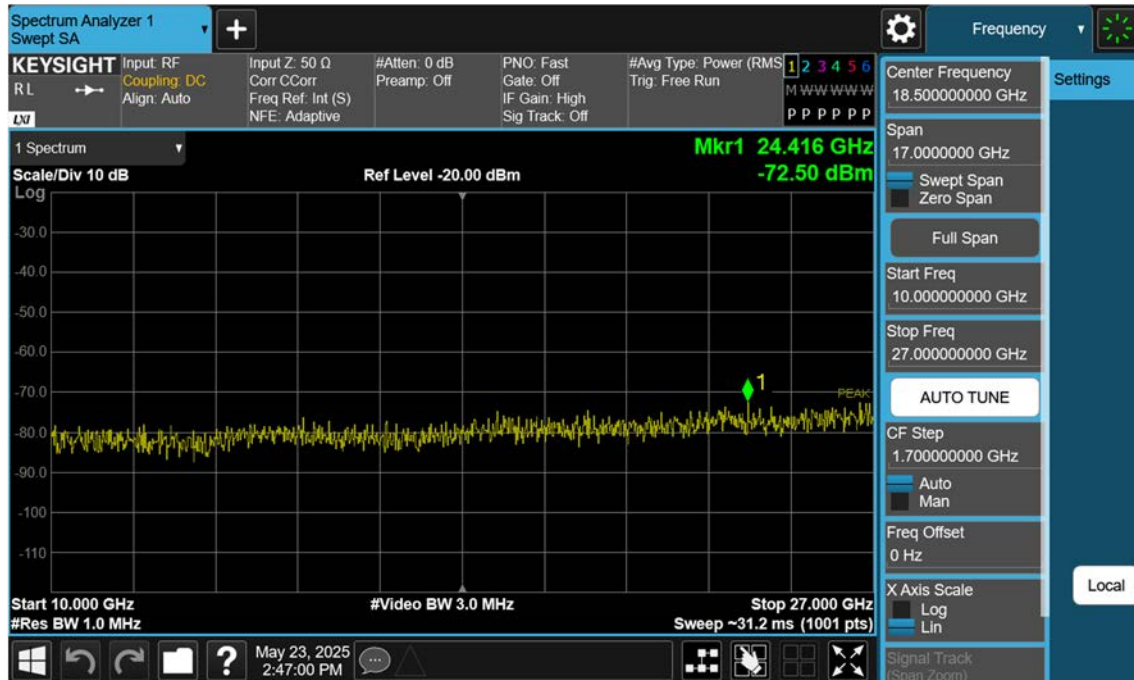
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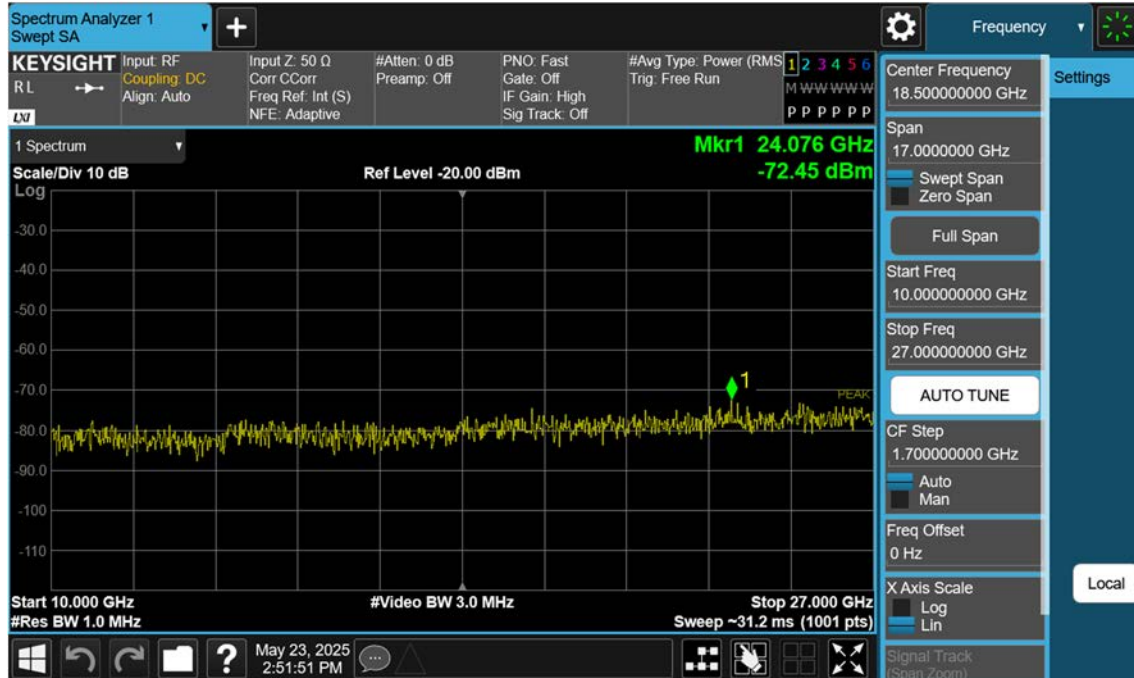
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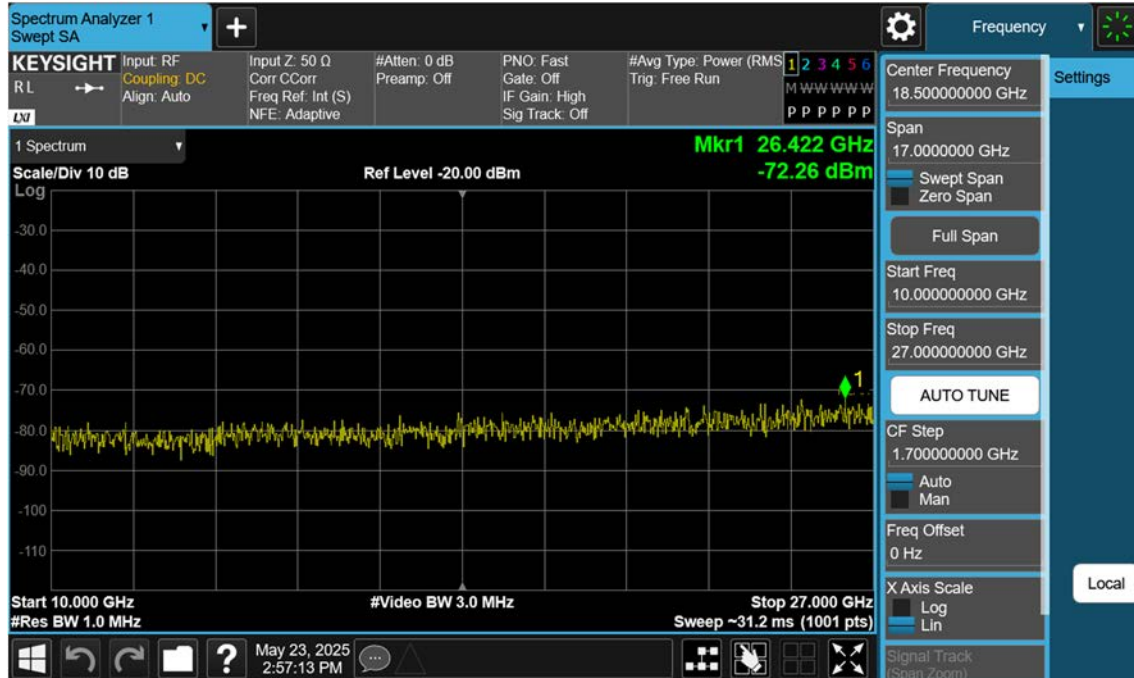
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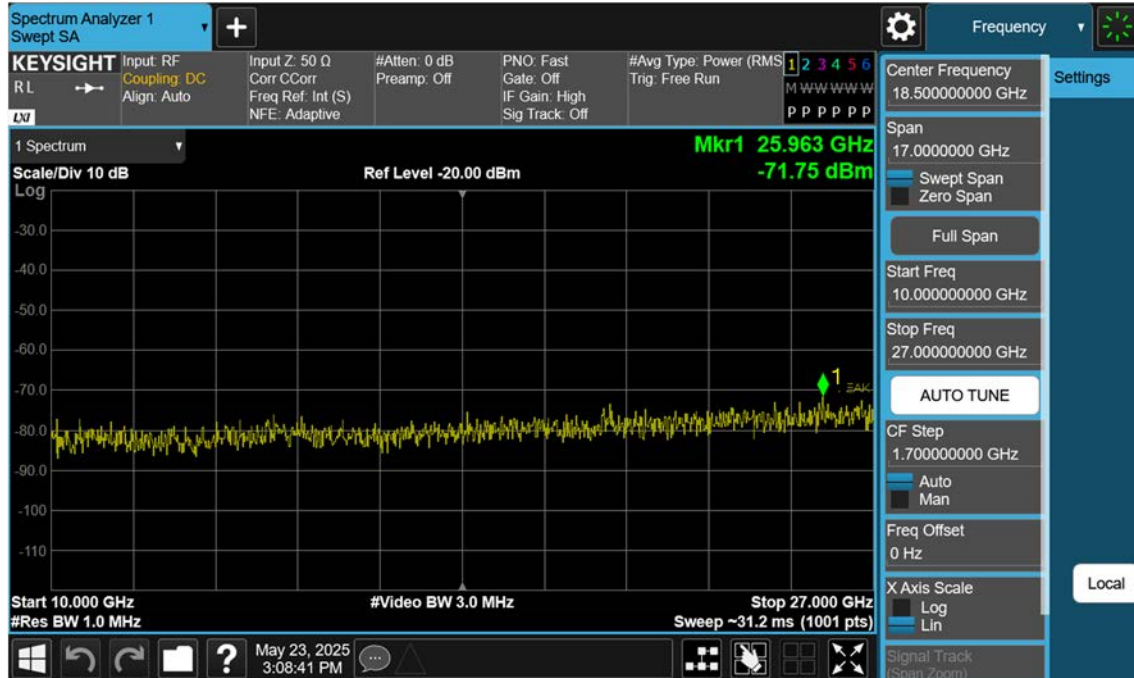
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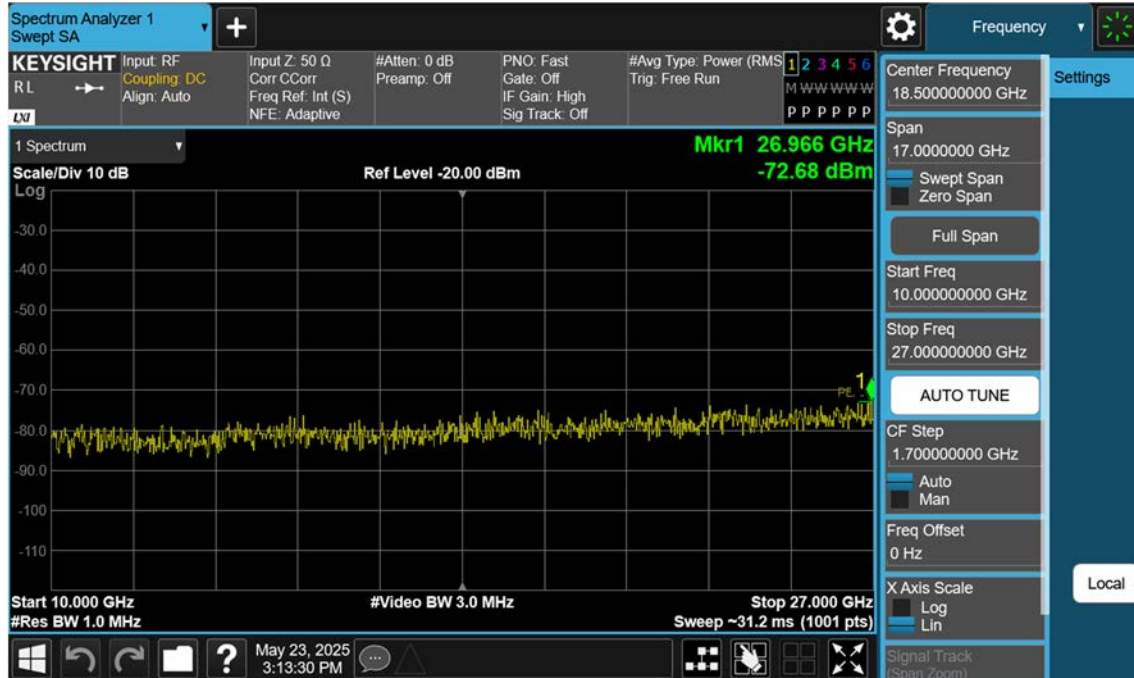
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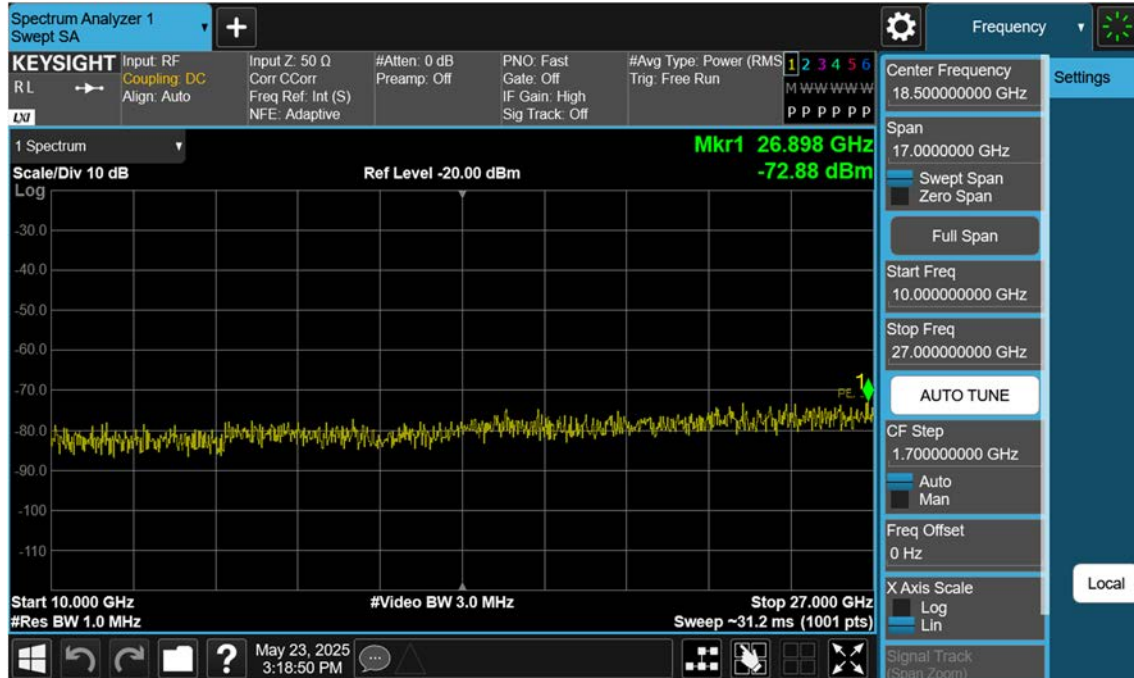
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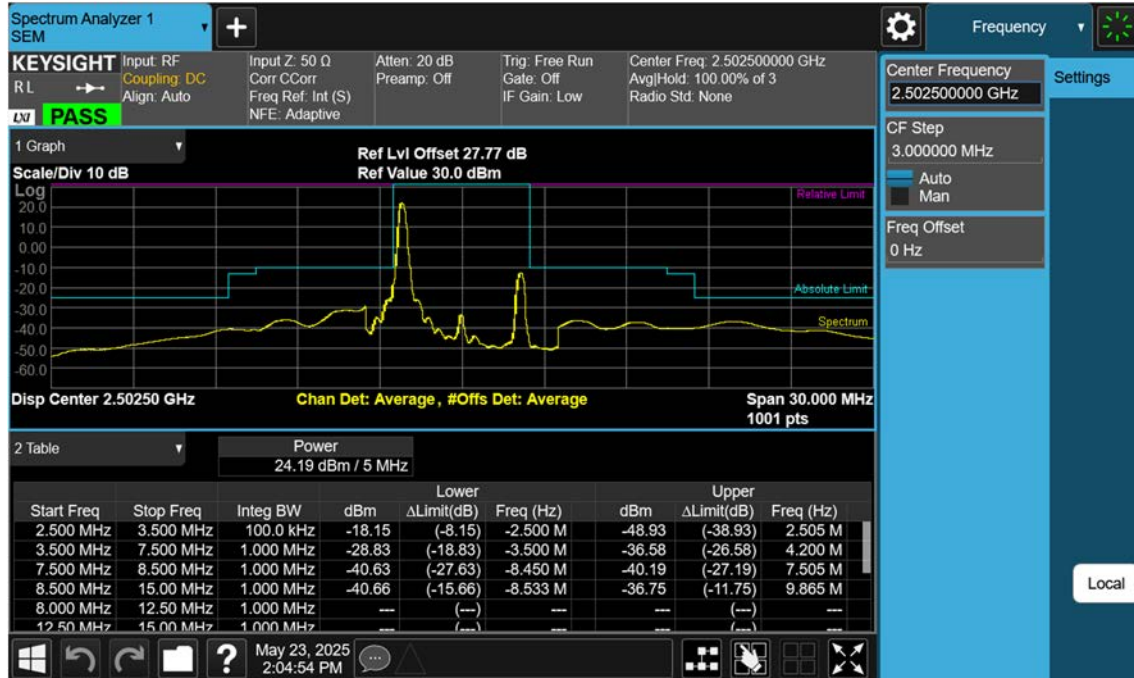
LTE B7_20 M_Conducted Spurious(Above10 G)_Mid_QPSK_1RB



LTE B7_20 M_Conducted Spurious(Above10 G)_High_QPSK_1RB



LTE B7_5 M_Channel Edge_Low_QPSK_1RB



LTE B7_5 M_Channel Edge_Lower_Low_QPSK_FullRB



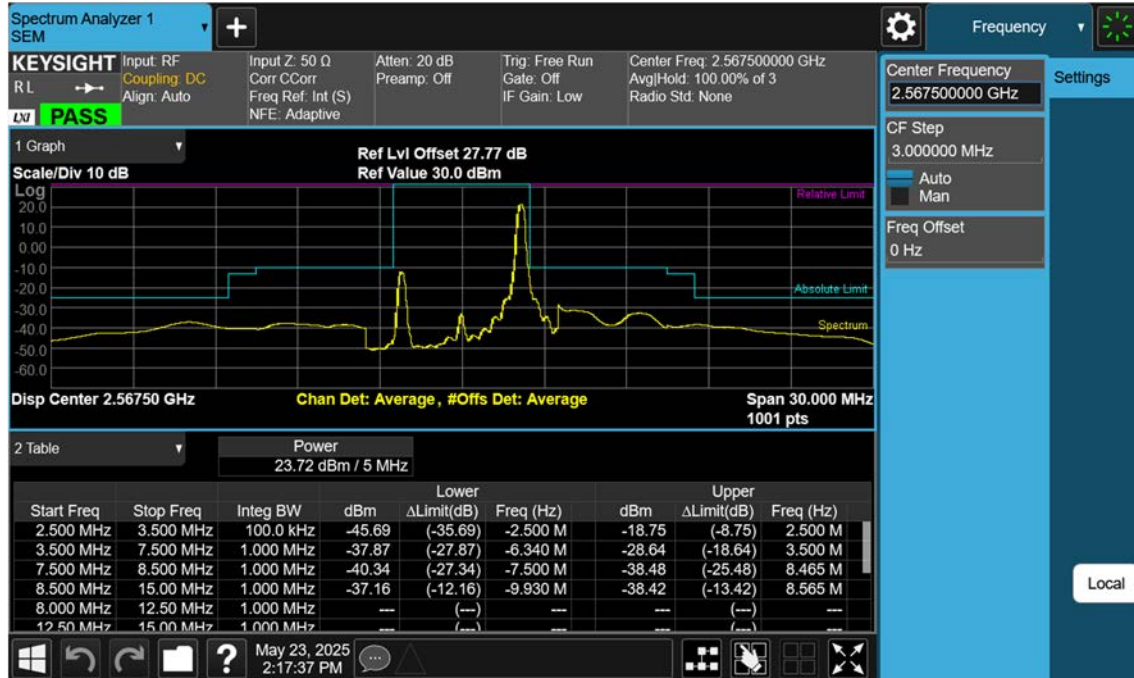
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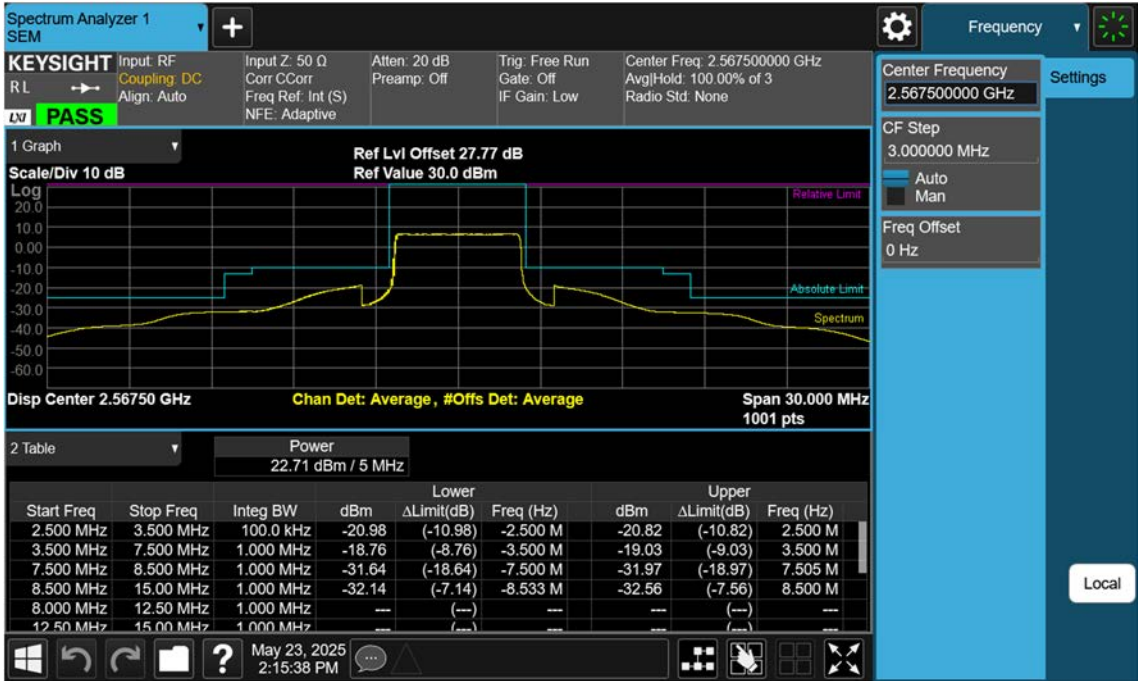
LTE B7_5 M_Channel Edge_Mid_QPSK_FullRB



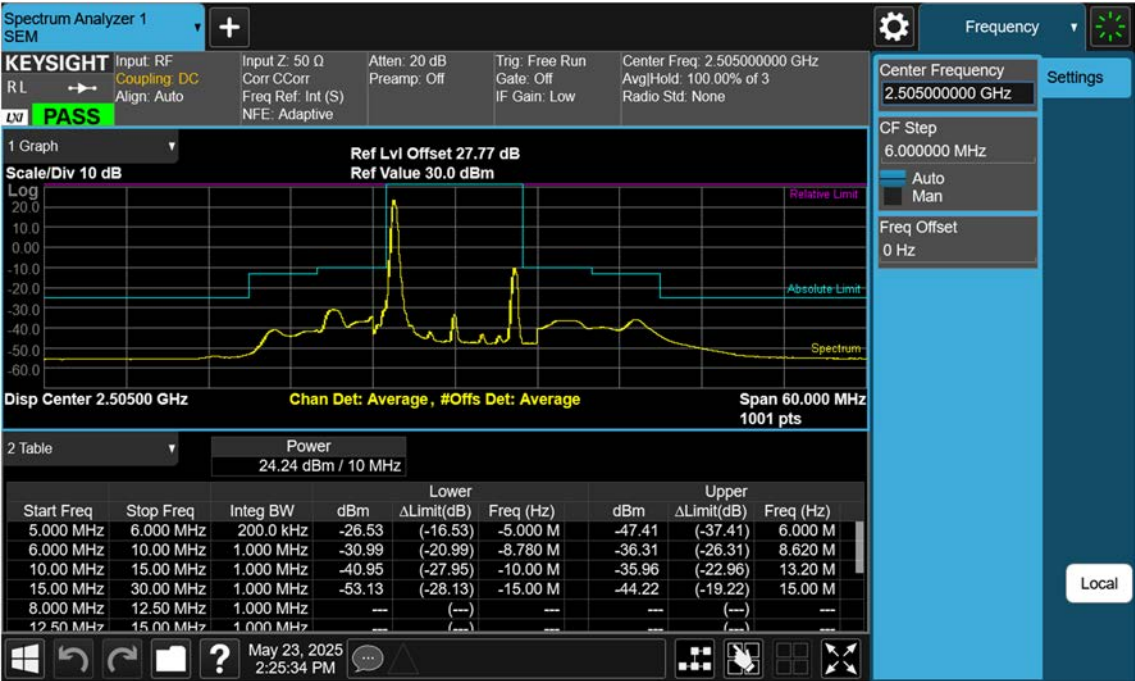
LTE B7_5 M_Channel Edge_High_QPSK_1RB



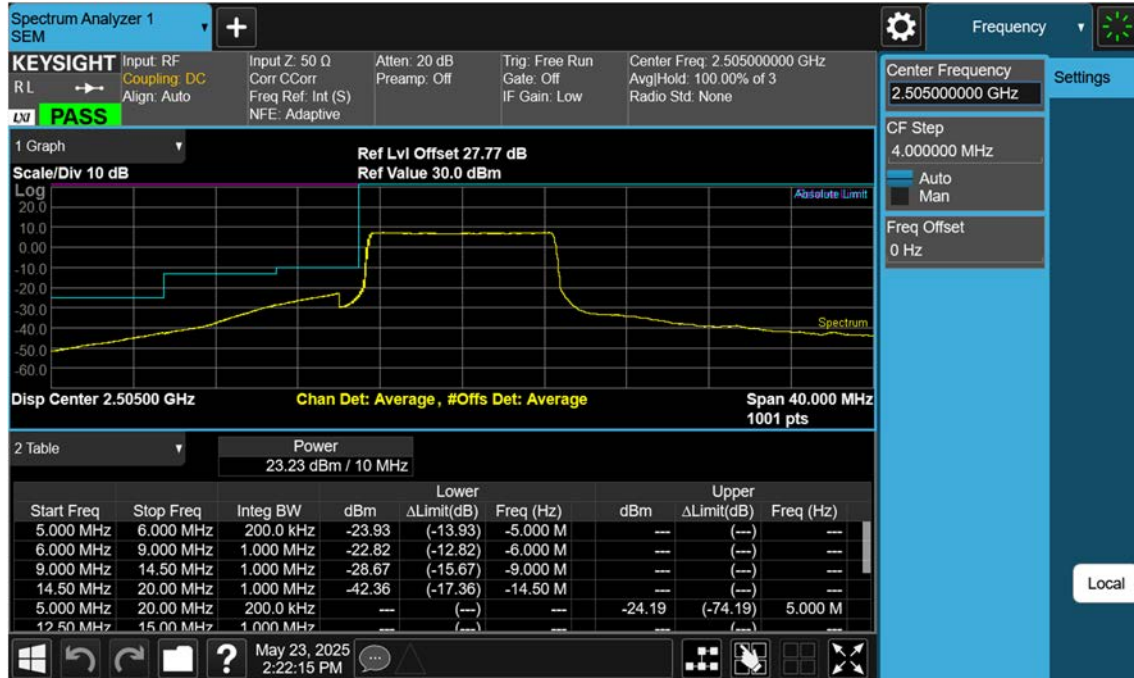
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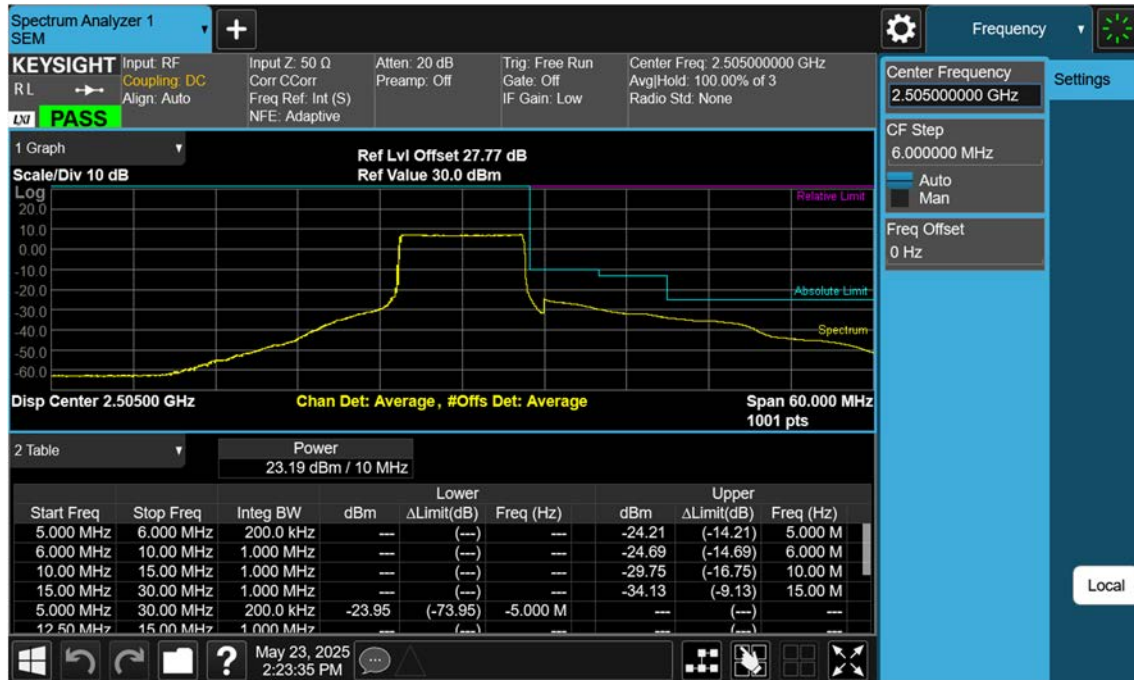
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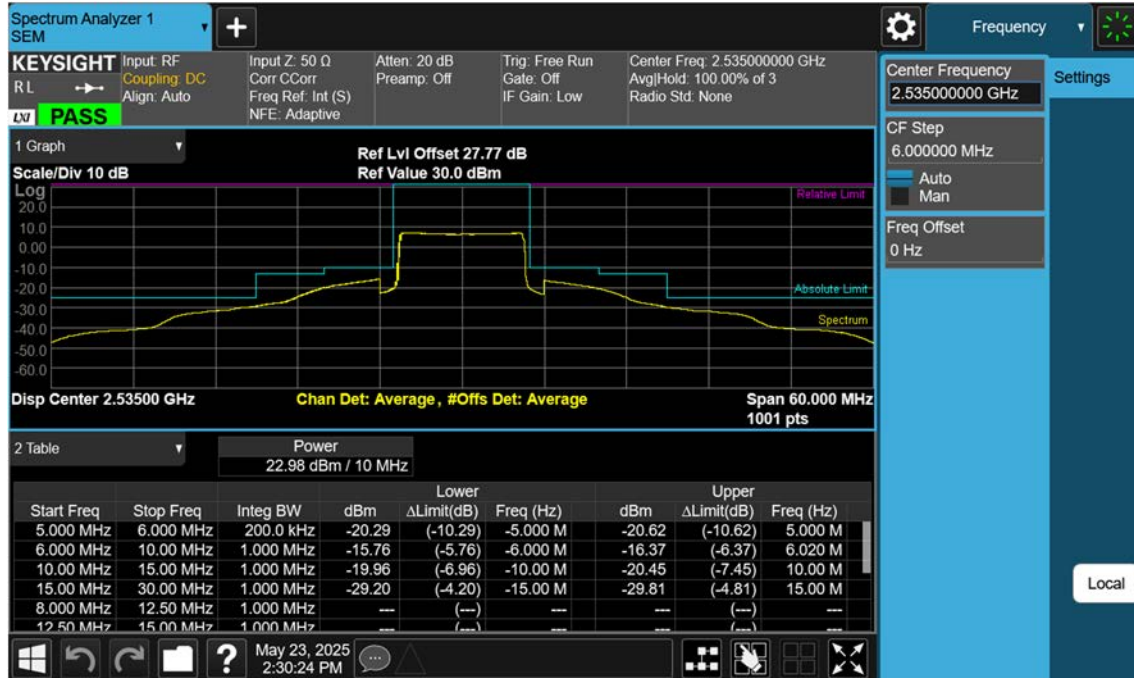
LTE B7_10 M_Channel Edge_Lower_Low_QPSK_FullRB



LTE B7_10 M_Channel Edge_Upper_Low_QPSK_FullRB



LTE B7_10 M_Channel Edge_Mid_QPSK_FullRB



LTE B7_10 M_Channel Edge_High_QPSK_1RB

