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HCT

TEST REPORT

FCC LTE Test for SM-T727U

Certification

APPLICANT
SAMSUNG Electronics Co., Ltd.

REPORT NO.
HCT-RF-1906-FC053

DATE OF ISSUE
24 June 2019

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FCC LTE Test for SM-T727U

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ID
FCC: A3LSMT727U

Applicant	**SAMSUNG Electronics Co., Ltd.** 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Eut Type Model Name Additional Model(s)	Tablet SM-T727U SM-T727P
Date of Receipt	May 22, 2019
FCC Rule Part(s)	§ 24, § 2
FCC Classification	PCS Licensed Transmitter (PCB)
Manufacturer	SAMSUNG Electronics Co., Ltd.

Tested by
Kwon Jeong
(signature)

Technical Manager
Jong Seok Lee
(signature)

HCT CO., LTD.
Soo Chan Lee
SooChan Lee / CEO

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	June 24, 2019	Initial Release

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)

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMT727U
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§ 24, § 2
EUT Type:	Tablet
Model(s):	SM-T727U
Additional Model(s)	SM-T727P
Tx Frequency:	1850.7 MHz – 1914.3 MHz (LTE – Band25 (1.4 MHz)) 1851.5 MHz – 1913.5 MHz (LTE – Band25 (3 MHz)) 1852.5 MHz – 1912.5 MHz (LTE – Band25 (5 MHz)) 1855.0 MHz – 1910.0 MHz (LTE – Band25 (10 MHz)) 1857.5 MHz – 1907.5 MHz (LTE – Band25 (15 MHz)) 1860.0 MHz – 1905.0 MHz (LTE – Band25 (20 MHz))
Date(s) of Tests:	June 04, 2019~ June 24, 2019

1.1. MAXIMUM OUTPUT POWER

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	EIRP	
				Max. Power (W)	Max. Power (dBm)
LTE – Band25 (1.4)	1850.7 - 1914.3	1M09G7D	QPSK	0.246	23.91
		1M09W7D	16QAM	0.211	23.24
		1M09W7D	64QAM	0.165	22.17
LTE – Band25 (3)	1851.5 - 1913.5	2M71G7D	QPSK	0.245	23.89
		2M70W7D	16QAM	0.209	23.20
		2M71W7D	64QAM	0.164	22.15
LTE – Band25 (5)	1852.5 - 1912.5	4M51G7D	QPSK	0.244	23.88
		4M51W7D	16QAM	0.209	23.21
		4M50W7D	64QAM	0.166	22.20
LTE – Band25 (10)	1855.0 - 1910.0	9M01G7D	QPSK	0.256	24.08
		8M98W7D	16QAM	0.220	23.42
		8M99W7D	64QAM	0.170	22.31
LTE – Band25 (15)	1857.5 - 1907.5	13M5G7D	QPSK	0.244	23.88
		13M5W7D	16QAM	0.210	23.22
		13M5W7D	64QAM	0.165	22.19
LTE – Band25 (20)	1860.0 - 1905.0	17M9G7D	QPSK	0.254	24.05
		17M9W7D	16QAM	0.217	23.36
		17M9W7D	64QAM	0.170	22.31

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Tablet with UMTS and LTE.

It also supports IEEE 802.11 a/b/g/n/ac (HT20/40/80), ANT+, Bluetooth, BT LE.

2.2. MEASURING INSTRUMENT CALIBRATION

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

2.3. TEST FACILITY

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

3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

Test Description	Test Procedure Used
Occupied Bandwidth	- KDB 971168 D01 v03r01 – Section 4.3 - ANSI C63.26-2015 – Section 5.4.4
Band Edge	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Spurious and Harmonic Emissions at Antenna Terminal	- KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7
Conducted Output Power	- N/A (See SAR Report)
Peak- to- Average Ratio	- KDB 971168 D01 v03r01 – Section 5.7 - ANSI C63.26-2015 – Section 5.2.3.4 - ANSI C63.26-2015 – Section 5.2.6(only GSM)
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Effective Radiated Power/ Effective Isotropic Radiated Power	- KDB 971168 D01 v03r01 – Section 5.2 & 5.8 - ANSI/TIA-603-E-2016 – Section 2.2.17
Radiated Spurious and Harmonic Emissions	- KDB 971168 D01 v03r01 – Section 6.2 - ANSI/TIA-603-E-2016 – Section 2.2.12

3.2 RADIATED POWER

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

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

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 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 1GHz, 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;

$$P_{d(dBm)} = Pg_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dB)}$$

   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 according to ANSI/TIA-603-E-2016.

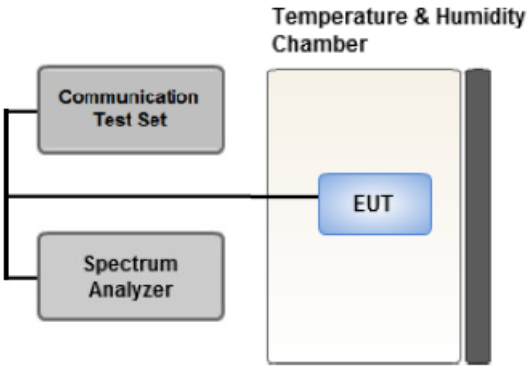
Test Settings

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

Test Note

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

3.4 PEAK- TO- AVERAGE RATIO



Test setup

① CCDF Procedure for PAPR

Test Settings

1. Set resolution/measurement bandwidth ≥ 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 ≥ 3 × RBW.

1. Set the RBW ≥ OBW.
2. Set VBW ≥ 3 × RBW.
3. Set span ≥ 2 × OBW.
4. Sweep time ≥ 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)

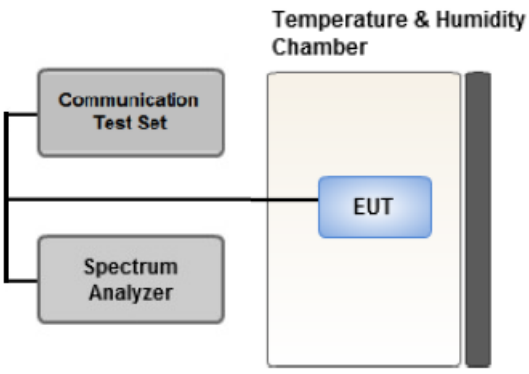
1. Set span to 2 × to 3 × the OBW.
2. Set RBW ≥ OBW.
3. Set VBW ≥ 3 × RBW.
4. Set number of measurement points in sweep ≥ 2 × span / RBW.
5. Sweep time:

   Set ≥ [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%.

3.5 OCCUPIED BANDWIDTH.



Test setup

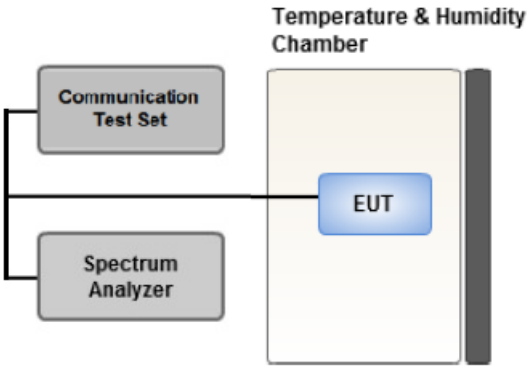
The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

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 26dB 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 ≥ 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

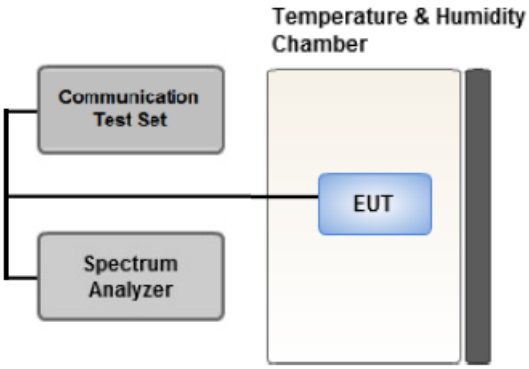
Test Overview

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 ≥ 3 MHz
3. Detector = RMS
4. Trace Mode = Average
5. Sweep time = auto
6. Number of points in sweep ≥ 2 * Span / RBW

3.7 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 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Notes

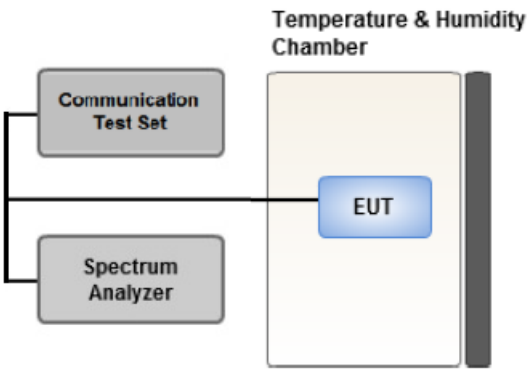
According to FCC 22.917, 24.238, 27.53 specified that power of any emission outside of The authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one

percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

All measurements were done at 2 channels(low and high operational frequency range.)

The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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.

3.8 WORST CASE(RADIATED TEST)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.
- 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.
- Of models SM-T727U and SM-T727P, we tested on SM-T727U model. And SM-T727U result is reported.
- This report covers the models SM-T727U and SM-T727P.
  These models are identical in hardware and the only difference is that the model SM-T727P does not support operations in all frequency bands and the some bands are disabled by software.
- SM-T727U with Stand alone, Keyboard, Ear-jack and Charging pad were tested and the worst case results are reported.
  (Worst case : Stand alone)

[Worst case]

Test Description	Modulation	RB size	RB offset	Axis
Effective Isotropic Radiated Power	QPSK, 16QAM, 64QAM	1	0	X
Radiated Spurious and Harmonic Emissions	QPSK	1	0	Y

3.9 WORST CASE(CONDUCTED TEST)

[Worst case]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Occupied Bandwidth	QPSK, 16QAM, 64QAM	1.4, 3, 5, 10, 15, 20	Mid	Full RB	0
Peak-To-Average Ratio	QPSK, 16QAM, 64QAM	1.4, 3, 5, 10, 15, 20	Mid	Full RB	0
Band Edge	* QPSK	1.4	Low	1	0
			High	1	5
		3	Low	1	0
			High	1	14
		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
		1.4, 3, 5, 10, 15, 20	Low, High	Full RB	0
Spurious and Harmonic Emissions at Antenna Terminal	* QPSK	1.4, 3, 5, 10, 15, 20	Low, Mid, High	1	0

* Worst case : Of all modulation, We have tested modulation of the high Conducted Output Power.
Conducted Output Power value can be confirmed on the SAR report.

- All modes of operation were investigated and the worst case configuration results are reported.
- Of models SM-T727U and SM-T727P, we tested on SM-T727U model. And SM-T727U result is reported.
- This report covers the models SM-T727U and SM-T727P.
  These models are identical in hardware and the only difference is that the model SM-T727P does not support operations in all frequency bands and the some bands are disabled by software.

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Date	Calibration Interval	Calibration Due
REOHDE & SCHWARZ	SCU 18 / AMPLIFIER	10094	04/16/2019	Annual	04/16/2020
Wainwright	WHK1.2/15G-10EF/H.P.F	4	04/02/2019	Annual	04/02/2020
Wainwright	WHK3.3/18G-10EF/H.P.F	2	04/02/2019	Annual	04/02/2020
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	11275	05/03/2019	Annual	05/03/2020
Agilent	E3632A/DC Power Supply	MY40004326	07/05/2018	Annual	07/05/2019
Schwarzbeck	UHAP/ Dipole Antenna	557	03/29/2019	Biennial	03/29/2021
Schwarzbeck	UHAP/ Dipole Antenna	558	03/29/2019	Biennial	03/29/2021
ESPEC	SU-642 / Chamber	93000718	08/07/2018	Annual	08/07/2019
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	147	09/14/2018	Annual	09/14/2019
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	9120D-1298	10/04/2018	Annual	10/04/2019
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170342	04/29/2019	Biennial	04/29/2021
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170124	01/28/2019	Biennial	01/28/2021
Agilent	N9020A/Signal Analyzer(10Hz~26.5GHz)	MY51110063	05/08/2019	Annual	05/08/2020
Hewlett Packard	8493C/ATTENUATOR(20dB)	17280	06/04/2019	Annual	06/04/2020
REOHDE & SCHWARZ	FSV40/Spectrum Analyzer(10Hz~40GHz)	100931	10/22/2018	Annual	10/22/2019
Agilent	8960 (E5515C)/ Base Station	MY48360800	09/27/2018	Annual	09/27/2019
Schwarzbeck	FMZB1513/ Loop Antenna(9kHz~30MHz)	1513-175	08/23/2018	Biennial	08/23/2020
Schwarzbeck	VULB9160/ Bilog Antenna	9160-3368	08/09/2018	Biennial	08/09/2020
Schwarzbeck	VULB9160/ Hybrid Antenna	760	03/22/2019	Biennial	03/22/2021
Anritsu Corp.	MT8821C/Wideband Radio Communication Tester	6201502997	08/13/2018	Annual	08/13/2019
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6201026545	01/30/2019	Annual	01/30/2020
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/19/2018	Annual	07/19/2019
REOHDE & SCHWARZ	ESU40 / EMI TEST RECEIVER	100524	07/27/2018	Annual	07/27/2019
HCT CO., LTD.,	FCC LTE Mobile Conducted RF Automation Test Software	-	-	-	-

Note:

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

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)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05

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, § 24.238(a)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
Conducted Output Power	§ 2.1046	N/A	**See Note1**
Peak- to- Average Ratio	§ 24.232(d)	< 13 dB	PASS
Frequency stability / variation of ambient temperature	§ 24.235	Emission must remain in band	PASS

Note:

1. See SAR Report
2. The same samples were used for SAR and EMC

6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Equivalent Isotropic Radiated Power	§ 24.232(c)	< 2 Watts max. EIRP	PASS
Radiated Spurious and Harmonic Emissions	§ 2.1053, § 24.238(a)	< 43 + 10log10 (P[Watts]) for all out-of band emissions	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

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 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

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

16QAM 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

8.1 EQUIVALENT ISOTROPIC RADIATED POWER

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1850.7	LTE B25/ 1.4 MHz	QPSK	-17.06	14.98	10.27	1.34	H	< 2.00	0.246	23.91
		16-QAM	-17.73	14.31	10.27	1.34	H		0.211	23.24
		64-QAM	-18.80	13.24	10.27	1.34	H		0.165	22.17
1882.5		QPSK	-17.73	14.40	10.29	1.36	H		0.215	23.33
		16-QAM	-18.39	13.74	10.29	1.36	H		0.185	22.67
		64-QAM	-19.40	12.73	10.29	1.36	H		0.147	21.66
1914.3		QPSK	-19.47	13.10	10.31	1.38	H		0.160	22.03
		16-QAM	-20.14	12.43	10.31	1.38	H		0.137	21.36
		64-QAM	-21.21	11.36	10.31	1.38	H		0.107	20.29

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1851.5	LTE B25/ 3 MHz	QPSK	-17.08	14.96	10.27	1.34	H	< 2.00	0.245	23.89
		16-QAM	-17.77	14.27	10.27	1.34	H		0.209	23.20
		64-QAM	-18.82	13.22	10.27	1.34	H		0.164	22.15
1882.5		QPSK	-17.66	14.47	10.29	1.36	H		0.219	23.40
		16-QAM	-18.36	13.77	10.29	1.36	H		0.186	22.70
		64-QAM	-19.36	12.77	10.29	1.36	H		0.148	21.70
1913.5		QPSK	-19.46	13.11	10.31	1.38	H		0.160	22.04
		16-QAM	-20.25	12.32	10.31	1.38	H		0.133	21.25
		64-QAM	-21.22	11.35	10.31	1.38	H		0.107	20.28

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1852.5	LTE B25/ 5 MHz	QPSK	-17.09	14.95	10.27	1.34	H	< 2.00	0.244	23.88
		16-QAM	-17.76	14.28	10.27	1.34	H		0.209	23.21
		64-QAM	-18.77	13.27	10.27	1.34	H		0.166	22.20
1882.5		QPSK	-17.46	14.67	10.29	1.36	H		0.229	23.60
		16-QAM	-18.16	13.97	10.29	1.36	H		0.195	22.90
		64-QAM	-19.19	12.94	10.29	1.36	H		0.154	21.87
1912.5		QPSK	-19.49	13.04	10.31	1.37	H		0.158	21.98
		16-QAM	-20.20	12.33	10.31	1.37	H		0.134	21.27
		64-QAM	-21.26	11.27	10.31	1.37	H		0.105	20.21

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1855.0	LTE B25/ 10 MHz	QPSK	-16.85	15.15	10.28	1.34	H	< 2.00	0.256	24.08
		16-QAM	-17.51	14.49	10.28	1.34	H		0.220	23.42
		64-QAM	-18.62	13.38	10.28	1.34	H		0.170	22.31
1882.5		QPSK	-17.10	15.03	10.29	1.36	H		0.249	23.96
		16-QAM	-17.80	14.33	10.29	1.36	H		0.212	23.26
		64-QAM	-18.87	13.26	10.29	1.36	H		0.166	22.19
1910.0		QPSK	-18.94	13.59	10.31	1.37	H		0.179	22.53
		16-QAM	-19.59	12.94	10.31	1.37	H		0.154	21.88
		64-QAM	-20.68	11.85	10.31	1.37	H		0.120	20.79

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1857.5	LTE B25/ 15 MHz	QPSK	-17.02	14.94	10.28	1.34	H	< 2.00	0.244	23.88
		16-QAM	-17.68	14.28	10.28	1.34	H		0.210	23.22
		64-QAM	-18.71	13.25	10.28	1.34	H		0.165	22.19
1882.5		QPSK	-17.57	14.56	10.29	1.36	H		0.223	23.49
		16-QAM	-18.22	13.91	10.29	1.36	H		0.192	22.84
		64-QAM	-19.26	12.87	10.29	1.36	H		0.151	21.80
1907.5		QPSK	-18.63	13.90	10.31	1.37	H		0.192	22.84
		16-QAM	-19.32	13.21	10.31	1.37	H		0.164	22.15
		64-QAM	-20.35	12.18	10.31	1.37	H		0.129	21.12

Freq (MHz)	Mod/ Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1860.0	LTE B25/ 20 MHz	QPSK	-16.85	15.11	10.28	1.34	H	< 2.00	0.254	24.05
		16-QAM	-17.54	14.42	10.28	1.34	H		0.217	23.36
		64-QAM	-18.59	13.37	10.28	1.34	H		0.170	22.31
1882.5		QPSK	-17.18	14.95	10.29	1.36	H		0.244	23.88
		16-QAM	-17.87	14.26	10.29	1.36	H		0.208	23.19
		64-QAM	-18.91	13.22	10.29	1.36	H		0.164	22.15
1905.0		QPSK	-18.73	13.69	10.31	1.37	H		0.183	22.63
		16-QAM	-19.42	13.00	10.31	1.37	H		0.156	21.94
		64-QAM	-20.50	11.92	10.31	1.37	H		0.122	20.86

8.2 RADIATED SPURIOUS EMISSIONS

▣ OPERATING FREQUENTY: 1850.7 MHz

▣ MEASURED OUTPUT POWER: 23.91 dBm = 0.246 W

▣ MOD: LTE B25

▣ MODULATION SIGNAL: 1.4 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 36.91 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26047 (1850.7)	3,701.40	-56.50	12.51	-63.30	1.98	H	-52.77	76.68
	5,552.10	-40.26	13.62	-41.54	2.72	H	-30.64	54.55
	7,402.80	-55.94	11.50	-50.93	2.92	H	-42.35	66.26
26365 (1882.5)	3,765.00	-56.53	12.41	-63.08	2.01	H	-52.68	76.59
	5,647.50	-43.39	13.79	-44.27	2.70	H	-33.18	57.08
	7,530.00	-57.12	11.64	-51.91	2.93	H	-43.20	67.11
26683 (1914.3)	3,828.60	-55.61	12.52	-61.93	2.04	H	-51.45	75.36
	5,742.90	-54.59	13.67	-54.32	2.75	V	-43.40	67.31
	7,657.20	-57.10	12.04	-52.58	2.85	H	-43.39	67.30

▣ OPERATING FREQUENTY: 1851.5 MHz

▣ MEASURED OUTPUT POWER: 23.89 dBm = 0.245 W

▣ MOD: LTE B25

▣ MODULATION SIGNAL: 3 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 36.89 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26055 (1851.5)	3,703.00	-59.01	12.51	-65.81	1.98	V	-55.28	79.17
	5,554.50	-40.59	13.63	-41.85	2.72	V	-30.94	54.83
	7,406.00	-56.76	11.50	-51.61	2.93	H	-43.04	66.93
26365 (1882.5)	3,765.00	-56.86	12.41	-63.41	2.01	V	-53.01	76.90
	5,647.50	-42.60	13.79	-43.48	2.70	H	-32.39	56.27
	7,530.00	-57.52	11.64	-52.31	2.93	V	-43.60	67.49
26675 (1913.5)	3,827.00	-56.78	12.52	-63.10	2.04	V	-52.62	76.51
	5,740.50	-56.79	13.67	-56.52	2.75	H	-45.60	69.49
	7,654.00	-57.96	12.04	-53.33	2.88	V	-44.17	68.06

▣ OPERATING FREQUENTY: 1852.5 MHz

▣ MEASURED OUTPUT POWER: 23.88 dBm = 0.244 W

▣ MOD: LTE B25

▣ MODULATION SIGNAL: 5 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 36.88 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26065 (1852.5)	3,705.00	-58.28	12.50	-64.91	2.00	V	-54.40	78.28
	5,557.50	-40.49	13.64	-41.73	2.71	H	-30.80	54.68
	7,410.00	-57.73	11.50	-52.44	2.93	H	-43.87	67.75
26365 (1882.5)	3,765.00	-56.93	12.41	-63.48	2.01	V	-53.08	76.96
	5,647.50	-43.89	13.79	-44.77	2.70	H	-33.68	57.55
	7,530.00	-57.55	11.64	-52.34	2.93	V	-43.63	67.51
26665 (1912.5)	3,825.00	-54.87	12.52	-61.15	2.05	V	-50.67	74.55
	5,737.50	-53.97	13.67	-53.70	2.75	H	-42.78	66.66
	7,650.00	-57.79	12.04	-53.05	2.91	H	-43.92	67.80

▣ OPERATING FREQUENTY: 1855.0 MHz

▣ MEASURED OUTPUT POWER: 24.08 dBm = 0.256 W

▣ MOD: LTE B25

▣ MODULATION SIGNAL: 10 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 37.08 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26090 (1855.0)	3,710.00	-57.80	12.49	-64.26	2.01	H	-53.78	77.86
	5,565.00	-39.58	13.65	-40.86	2.71	V	-29.92	54.00
	7,420.00	-58.28	11.51	-52.90	2.94	H	-44.33	68.42
26365 (1882.5)	3,765.00	-56.27	12.41	-62.82	2.01	V	-52.42	76.50
	5,647.50	-42.59	13.79	-43.47	2.70	H	-32.38	56.46
	7,530.00	-55.58	11.64	-50.37	2.93	V	-41.66	65.74
26640 (1910.0)	3,820.00	-56.54	12.52	-62.78	2.05	V	-52.31	76.39
	5,730.00	-52.71	13.69	-52.66	2.72	V	-41.69	65.77
	7,640.00	-57.75	11.99	-52.95	2.93	V	-43.89	67.97

▣ OPERATING FREQUENTY: 1857.5 MHz

▣ MEASURED OUTPUT POWER: 23.88 dBm = 0.244 W

▣ MOD: LTE B25

▣ MODULATION SIGNAL: 15 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 36.88 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26115 (1857.5)	3,715.00	-57.44	12.49	-64.09	2.02	V	-53.62	77.50
	5,572.50	-39.98	13.66	-41.30	2.71	V	-30.35	54.22
	7,430.00	-57.40	11.51	-52.18	2.94	V	-43.61	67.49
26365 (1882.5)	3,765.00	-57.05	12.41	-63.60	2.01	V	-53.20	77.07
	5,647.50	-41.20	13.79	-42.08	2.70	H	-30.99	54.86
	7,530.00	-55.45	11.64	-50.24	2.93	V	-41.53	65.41
26615 (1907.5)	3,815.00	-56.27	12.52	-62.64	2.06	H	-52.17	76.05
	5,722.50	-51.48	13.70	-51.17	2.72	V	-40.19	64.07
	7,630.00	-56.33	11.95	-51.52	2.98	V	-42.55	66.42

▣ OPERATING FREQUENTY: 1860.0 MHz

▣ MEASURED OUTPUT POWER: 24.05 dBm = 0.254 W

▣ MOD: LTE B25

▣ MODULATION SIGNAL: 20 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 37.05 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
26140 (1860.0)	3,720.00	-58.07	12.48	-64.91	2.03	H	-54.46	78.50
	5,580.00	-39.77	13.69	-40.83	2.69	V	-29.83	53.88
	7,440.00	-56.94	11.52	-51.85	2.89	V	-43.22	67.27
26365 (1882.5)	3,765.00	-57.64	12.41	-64.19	2.01	V	-53.79	77.83
	5,647.50	-42.85	13.79	-43.73	2.70	V	-32.64	56.68
	7,530.00	-51.86	11.64	-46.65	2.93	V	-37.94	61.99
26590 (1905.0)	3,810.00	-56.50	12.52	-63.00	2.06	V	-52.54	76.59
	5,715.00	-48.96	13.70	-48.78	2.72	H	-37.80	61.85
	7,620.00	-57.20	11.90	-52.40	2.94	V	-43.44	67.49

8.3 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
25	1.4 MHz	1882.5	QPSK	6	0	4.90
			16-QAM	6	0	6.13
			64-QAM	6	0	6.73
	3 MHz		QPSK	15	0	4.81
			16-QAM	15	0	6.08
			64-QAM	15	0	6.63
	5 MHz		QPSK	25	0	4.93
			16-QAM	25	0	6.08
			64-QAM	25	0	6.59
	10 MHz		QPSK	50	0	4.95
			16-QAM	50	0	6.10
			64-QAM	50	0	6.58
	15 MHz		QPSK	75	0	4.89
			16-QAM	75	0	6.05
			64-QAM	75	0	6.62
	20 MHz		QPSK	100	0	4.86
			16-QAM	100	0	6.00
			64-QAM	100	0	6.55

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 76 ~ 93.

8.4 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
25	1.4 MHz	1882.5	QPSK	6	0	1.0915
			16-QAM	6	0	1.0898
			64-QAM	6	0	1.0928
	3 MHz		QPSK	15	0	2.7063
			16-QAM	15	0	2.7035
			64-QAM	15	0	2.7061
	5 MHz		QPSK	25	0	4.5061
			16-QAM	25	0	4.5080
			64-QAM	25	0	4.5013
	10 MHz		QPSK	50	0	9.0073
			16-QAM	50	0	8.9831
			64-QAM	50	0	8.9931
	15 MHz		QPSK	75	0	13.462
			16-QAM	75	0	13.461
			64-QAM	75	0	13.467
	20 MHz		QPSK	100	0	17.938
			16-QAM	100	0	17.936
			64-QAM	100	0	17.922

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 58 ~ 75.

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)
25	1.4	1850.7	7.4018	28.591	-67.500	-38.909	-13.00
		1882.5	7.5289	28.591	-72.181	-43.590	
		1914.3	3.7199	27.976	-77.262	-49.286	
	3	1851.5	7.4018	28.591	-68.077	-39.486	
		1882.5	7.5254	28.591	-72.499	-43.908	
		1913.5	3.7144	27.976	-77.153	-49.177	
	5	1852.5	7.4018	28.591	-68.743	-40.152	
		1882.5	7.5220	28.591	-71.099	-42.508	
		1912.5	3.7010	27.976	-76.778	-48.802	
	10	1855.0	7.4028	28.591	-67.523	-38.932	
		1882.5	7.5130	28.591	-71.120	-42.529	
		1910.0	3.7064	27.976	-76.801	-48.825	
	15	1857.5	7.4038	28.591	-67.572	-38.981	
		1882.5	7.5040	28.591	-70.470	-41.879	
		1907.5	3.7064	27.976	-77.278	-49.302	
	20	1860.0	7.4048	28.591	-66.981	-38.390	
		1882.5	7.4950	28.591	-68.199	-39.608	
		1905.0	3.7134	27.976	-76.958	-48.982	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 130 ~ 165.
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	30.131

8.6 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 94 ~ 129.

8.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

▣ MODE: LTE B25

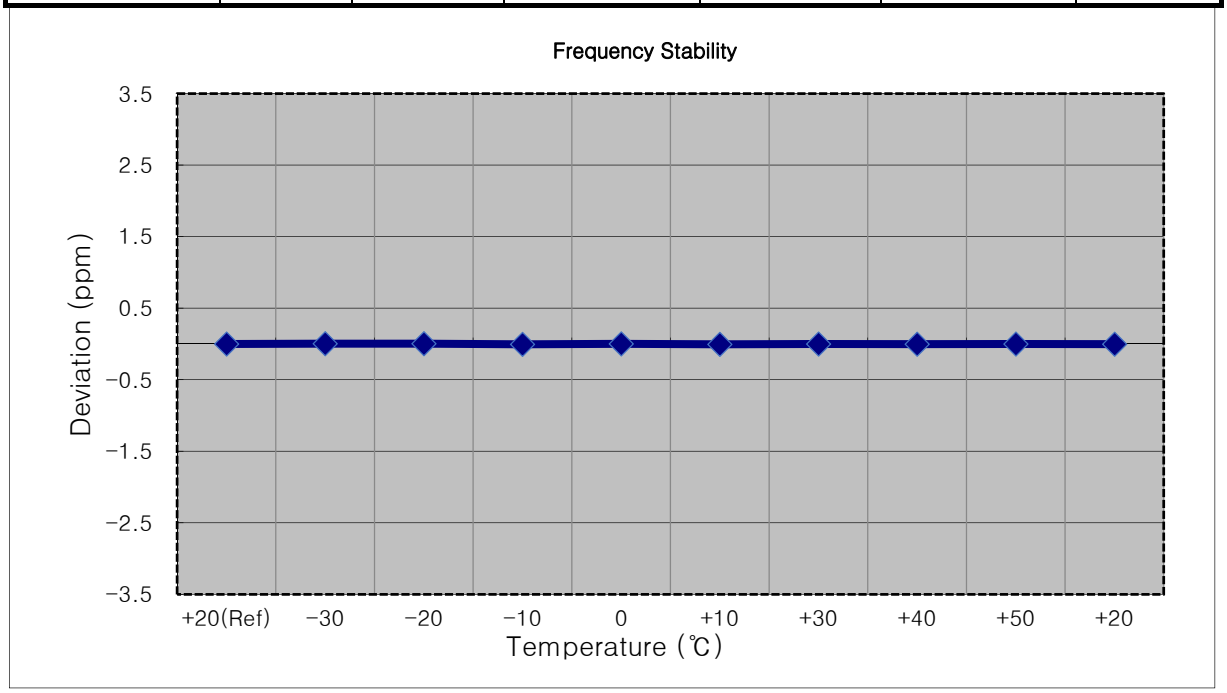
▣ OPERATING FREQUENCY: 1850,700,000 Hz

▣ CHANNEL: 26047 (1.4 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1850 700 009	0.0	0.000 000	0.000
100%		-30	1850 700 015	5.3	0.000 000	0.003
100%		-20	1850 700 016	7.1	0.000 000	0.004
100%		-10	1850 700 000	-9.5	-0.000 001	-0.005
100%		0	1850 700 012	2.3	0.000 000	0.001
100%		+10	1850 700 000	-9.7	-0.000 001	-0.005
100%		+30	1850 700 006	-3.1	0.000 000	-0.002
100%		+40	1850 700 004	-5.0	0.000 000	-0.003
100%		+50	1850 700 007	-2.4	0.000 000	-0.001
Batt. Endpoint	3.400	+20	1850 700 003	-6.0	0.000 000	-0.003



▣ MODE: LTE B25

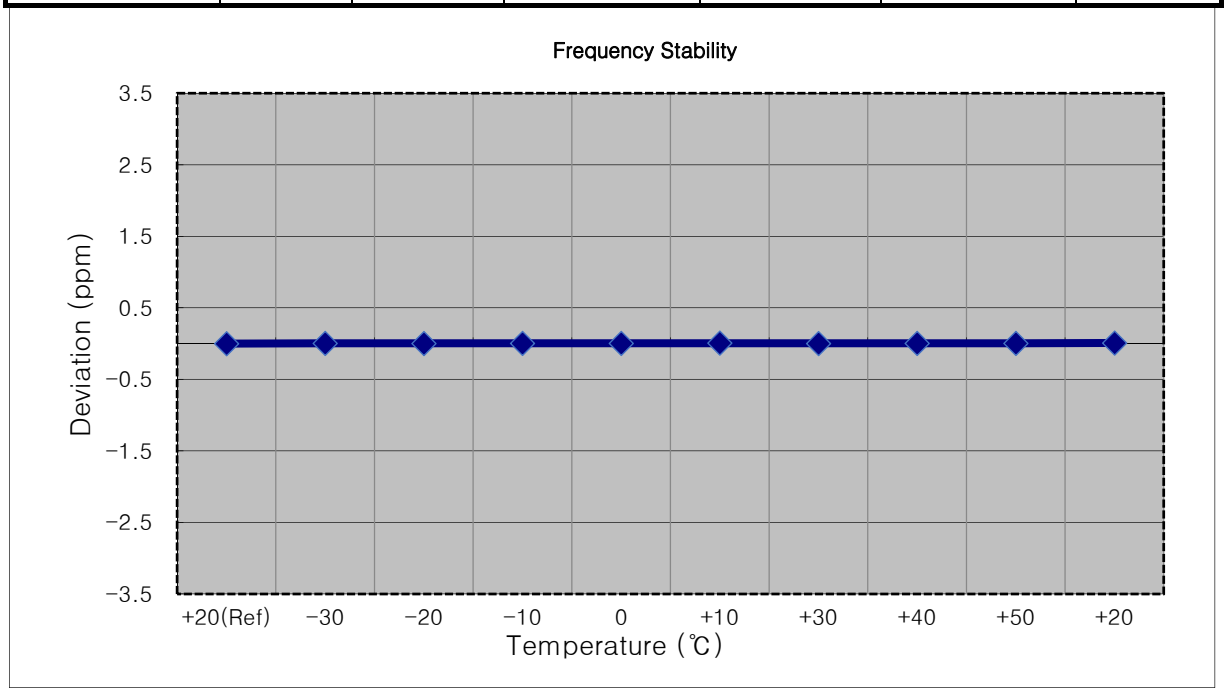
▣ OPERATING FREQUENCY: 1851,500,000 Hz

▣ CHANNEL: 26055 (3 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1851 500 004	0.0	0.000 000	0.000
100%		-30	1851 500 012	8.4	0.000 000	0.005
100%		-20	1851 500 008	4.1	0.000 000	0.002
100%		-10	1851 500 013	9.0	0.000 000	0.005
100%		0	1851 500 011	7.7	0.000 000	0.004
100%		+10	1851 500 018	14.9	0.000 001	0.008
100%		+30	1851 500 008	4.0	0.000 000	0.002
100%		+40	1851 500 013	9.2	0.000 000	0.005
100%		+50	1851 500 012	8.8	0.000 000	0.005
Batt. Endpoint	3.400	+20	1851 500 018	14.4	0.000 001	0.008



▣ MODE: LTE B25

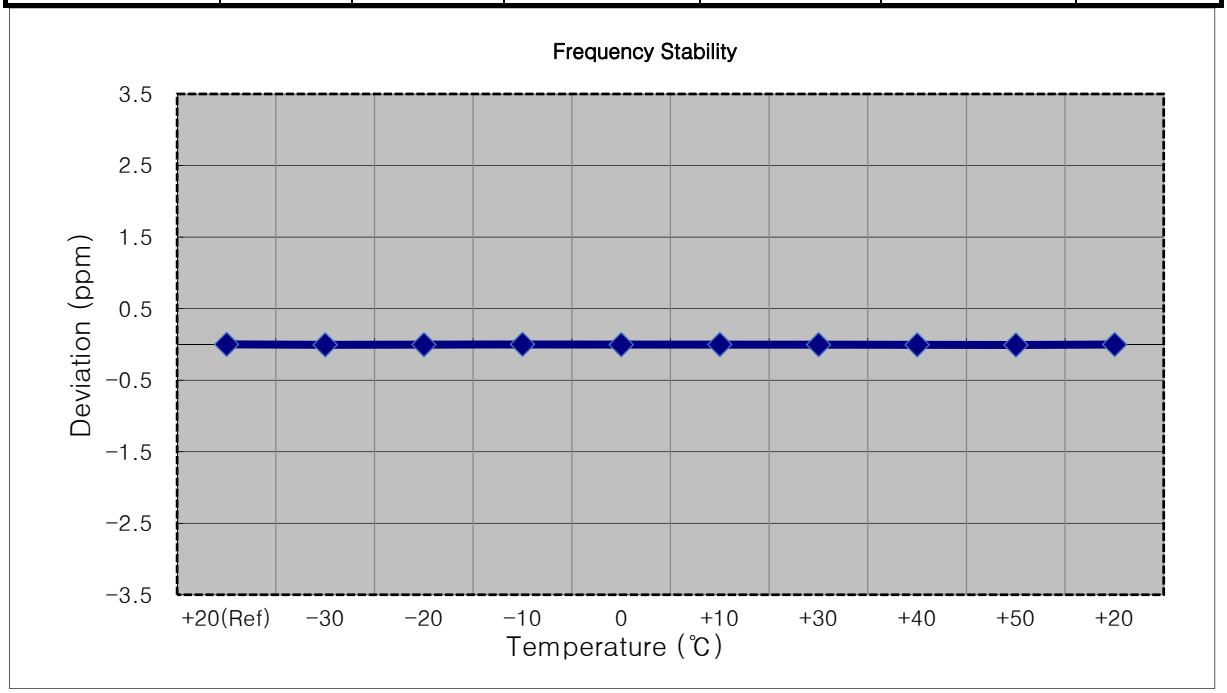
▣ OPERATING FREQUENCY: 1852,500,000 Hz

▣ CHANNEL: 26065 (5 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1852 500 005	0.0	0.000 000	0.000
100%		-30	1852 499 995	-10.3	-0.000 001	-0.006
100%		-20	1852 499 998	-7.2	0.000 000	-0.004
100%		-10	1852 500 008	2.7	0.000 000	0.001
100%		0	1852 500 000	-5.1	0.000 000	-0.003
100%		+10	1852 500 002	-3.6	0.000 000	-0.002
100%		+30	1852 499 999	-6.2	0.000 000	-0.003
100%		+40	1852 499 995	-10.3	-0.000 001	-0.006
100%		+50	1852 499 992	-13.9	-0.000 001	-0.008
Batt. Endpoint	3.400	+20	1852 500 001	-4.6	0.000 000	-0.002



▣ MODE: LTE B25

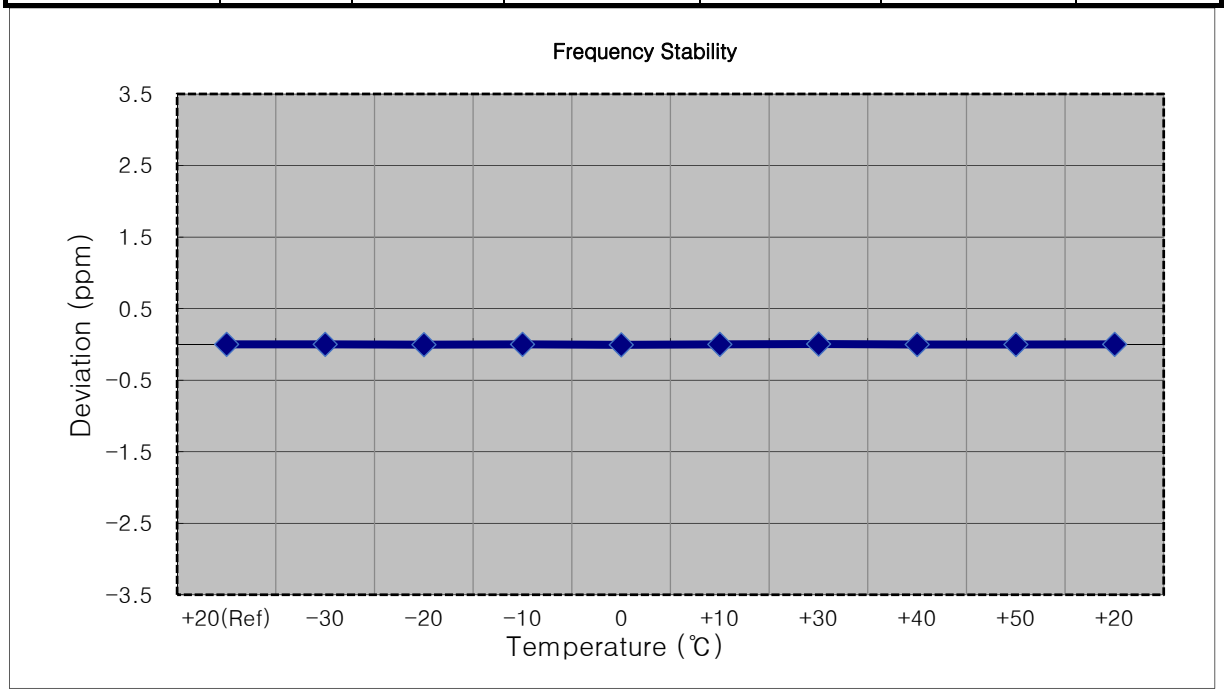
▣ OPERATING FREQUENCY: 1855,000,000 Hz

▣ CHANNEL: 26090 (10 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1854 999 995	0.0	0.000 000	0.000
100%		-30	1854 999 997	2.0	0.000 000	0.001
100%		-20	1854 999 988	-7.0	0.000 000	-0.004
100%		-10	1854 999 999	3.4	0.000 000	0.002
100%		0	1854 999 986	-9.2	0.000 000	-0.005
100%		+10	1854 999 998	2.7	0.000 000	0.001
100%		+30	1855 000 005	9.2	0.000 000	0.005
100%		+40	1854 999 993	-2.8	0.000 000	-0.002
100%		+50	1854 999 993	-2.7	0.000 000	-0.001
Batt. Endpoint	3.400	+20	1854 999 998	2.7	0.000 000	0.001



▣ MODE: LTE B25

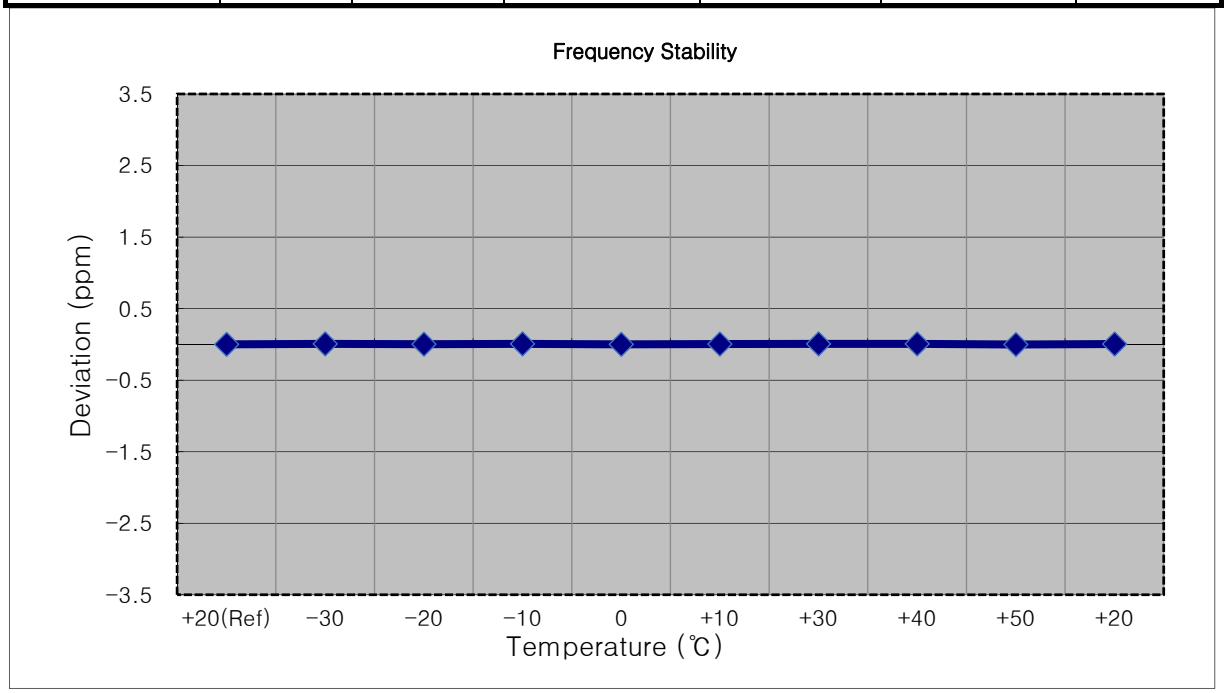
▣ OPERATING FREQUENCY: 1857,500,000 Hz

▣ CHANNEL: 26115 (15 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1857 500 011	0.0	0.000 000	0.000
100%		-30	1857 500 024	13.6	0.000 001	0.007
100%		-20	1857 500 017	6.7	0.000 000	0.004
100%		-10	1857 500 023	12.1	0.000 001	0.007
100%		0	1857 500 014	2.8	0.000 000	0.002
100%		+10	1857 500 021	10.7	0.000 001	0.006
100%		+30	1857 500 025	14.6	0.000 001	0.008
100%		+40	1857 500 024	12.8	0.000 001	0.007
100%		+50	1857 500 007	-3.7	0.000 000	-0.002
Batt. Endpoint	3.400	+20	1857 500 022	11.4	0.000 001	0.006



▣ MODE: LTE B25

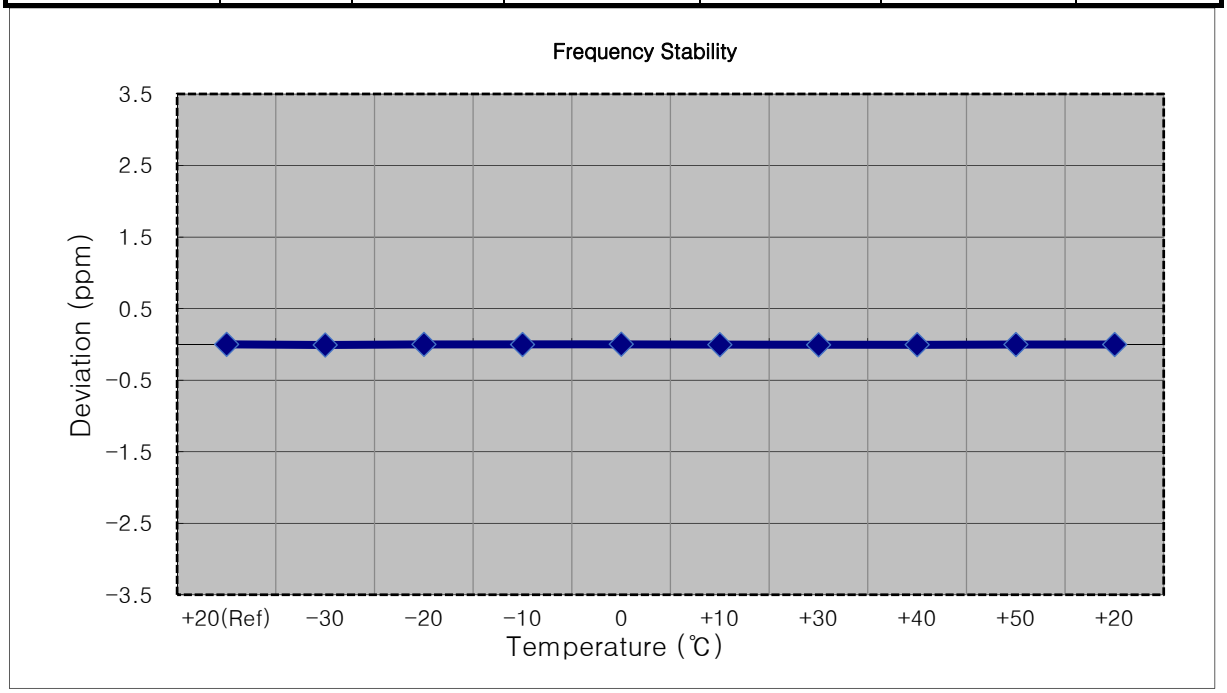
▣ OPERATING FREQUENCY: 1860,000,000 Hz

▣ CHANNEL: 26140 (20 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1859 999 985	0.0	0.000 000	0.000
100%		-30	1859 999 971	-14.0	-0.000 001	-0.008
100%		-20	1859 999 989	3.6	0.000 000	0.002
100%		-10	1859 999 981	-4.0	0.000 000	-0.002
100%		0	1859 999 990	5.3	0.000 000	0.003
100%		+10	1859 999 977	-7.8	0.000 000	-0.004
100%		+30	1859 999 976	-9.5	-0.000 001	-0.005
100%		+40	1859 999 980	-5.4	0.000 000	-0.003
100%		+50	1859 999 984	-1.6	0.000 000	-0.001
Batt. Endpoint	3.400	+20	1859 999 982	-3.1	0.000 000	-0.002



▣ MODE: LTE B25

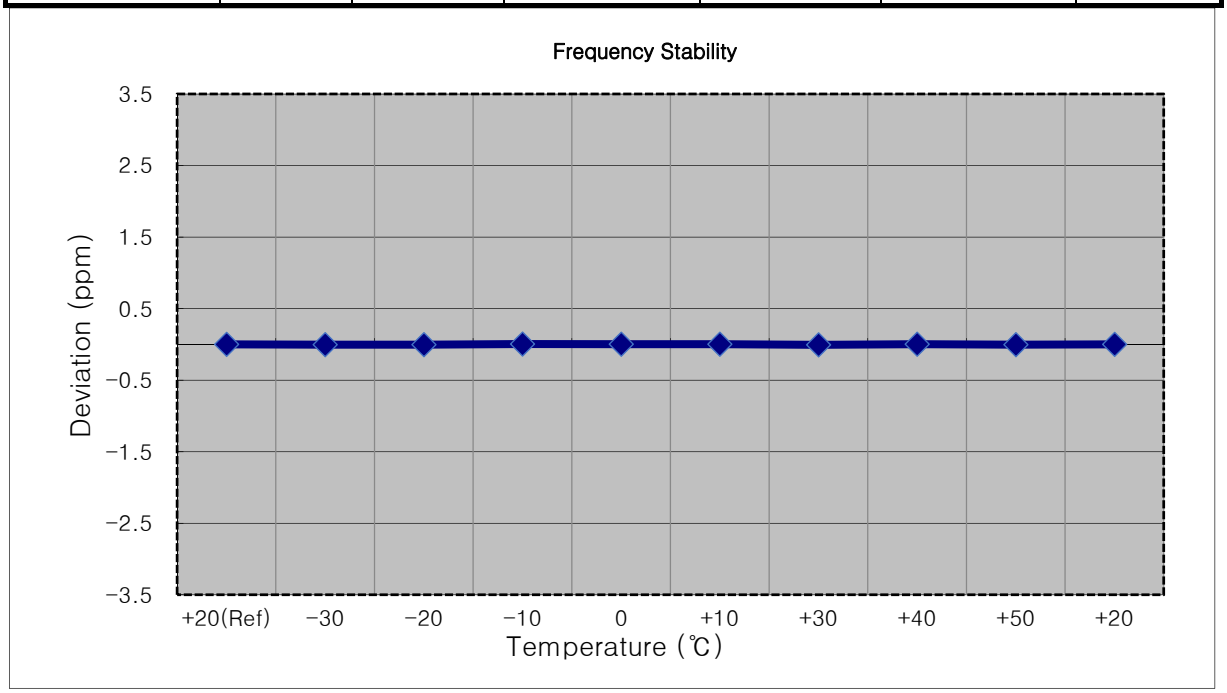
▣ OPERATING FREQUENCY: 1882,500,000 Hz

▣ CHANNEL: 26365 (1.4 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1882 499 994	0.0	0.000 000	0.000
100%		-30	1882 499 988	-6.0	0.000 000	-0.003
100%		-20	1882 499 989	-5.1	0.000 000	-0.003
100%		-10	1882 500 004	10.0	0.000 001	0.005
100%		0	1882 499 999	5.3	0.000 000	0.003
100%		+10	1882 500 001	6.6	0.000 000	0.004
100%		+30	1882 499 984	-10.3	-0.000 001	-0.005
100%		+40	1882 500 001	6.9	0.000 000	0.004
100%		+50	1882 499 986	-7.6	0.000 000	-0.004
Batt. Endpoint	3.400	+20	1882 499 997	2.9	0.000 000	0.002



▣ MODE: LTE B25

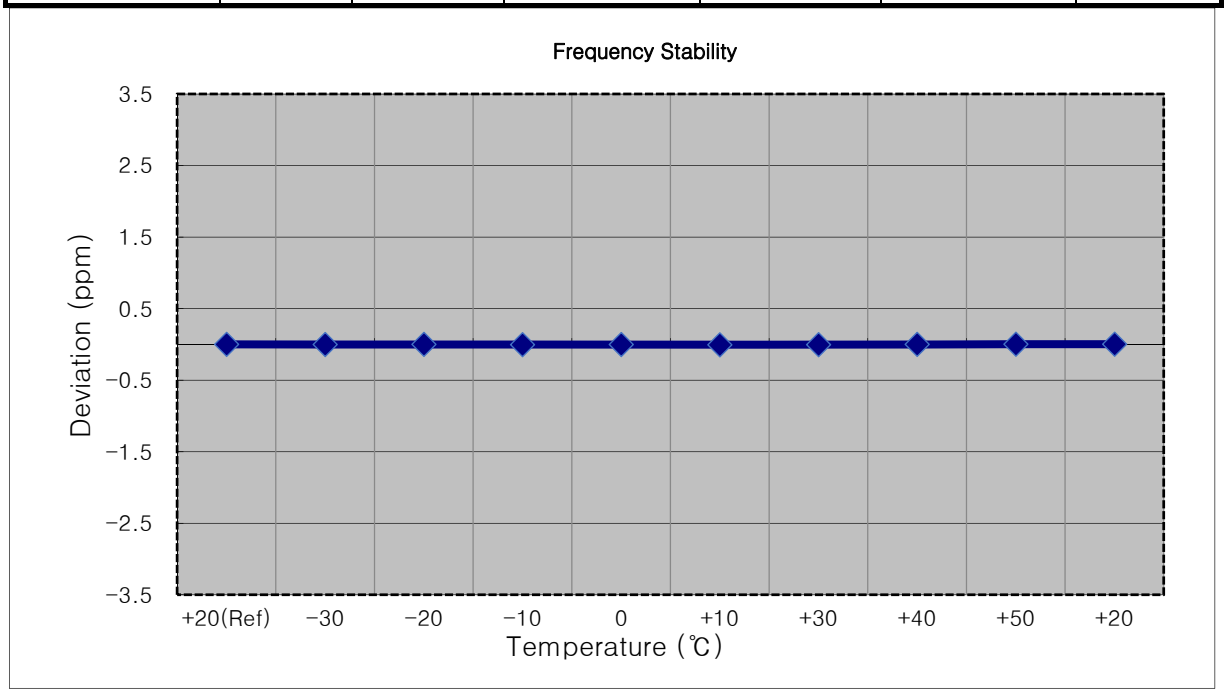
▣ OPERATING FREQUENCY: 1882,500,000 Hz

▣ CHANNEL: 26365 (3 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1882 499 990	0.0	0.000 000	0.000
100%		-30	1882 499 988	-2.8	0.000 000	-0.001
100%		-20	1882 499 993	2.3	0.000 000	0.001
100%		-10	1882 499 983	-7.9	0.000 000	-0.004
100%		0	1882 499 988	-2.0	0.000 000	-0.001
100%		+10	1882 499 980	-10.1	-0.000 001	-0.005
100%		+30	1882 499 984	-6.2	0.000 000	-0.003
100%		+40	1882 499 993	2.9	0.000 000	0.002
100%		+50	1882 499 996	5.3	0.000 000	0.003
Batt. Endpoint	3.400	+20	1882 499 996	5.8	0.000 000	0.003



▣ MODE: LTE B25

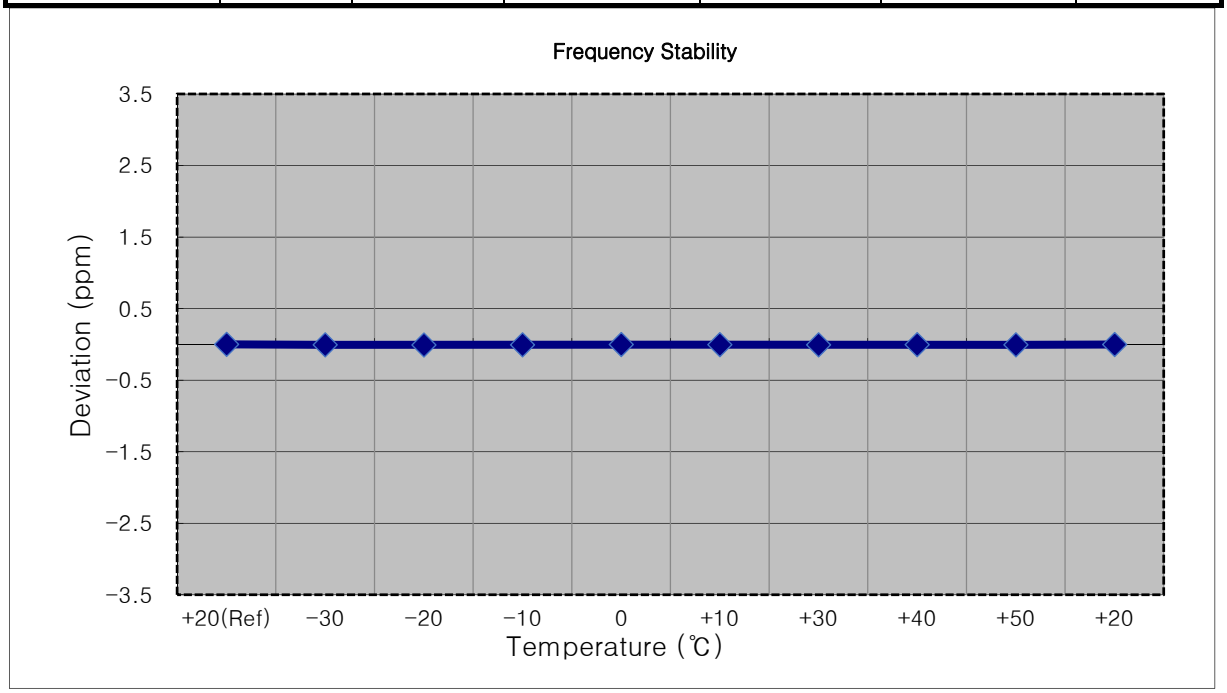
▣ OPERATING FREQUENCY: 1882,500,000 Hz

▣ CHANNEL: 26365 (5 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1882 499 995	0.0	0.000 000	0.000
100%		-30	1882 499 983	-12.2	-0.000 001	-0.006
100%		-20	1882 499 981	-14.3	-0.000 001	-0.008
100%		-10	1882 499 985	-10.0	-0.000 001	-0.005
100%		0	1882 499 991	-3.5	0.000 000	-0.002
100%		+10	1882 499 986	-8.6	0.000 000	-0.005
100%		+30	1882 499 984	-11.2	-0.000 001	-0.006
100%		+40	1882 499 990	-5.3	0.000 000	-0.003
100%		+50	1882 499 984	-10.7	-0.000 001	-0.006
Batt. Endpoint	3.400	+20	1882 499 992	-3.1	0.000 000	-0.002



▣ MODE: LTE B25

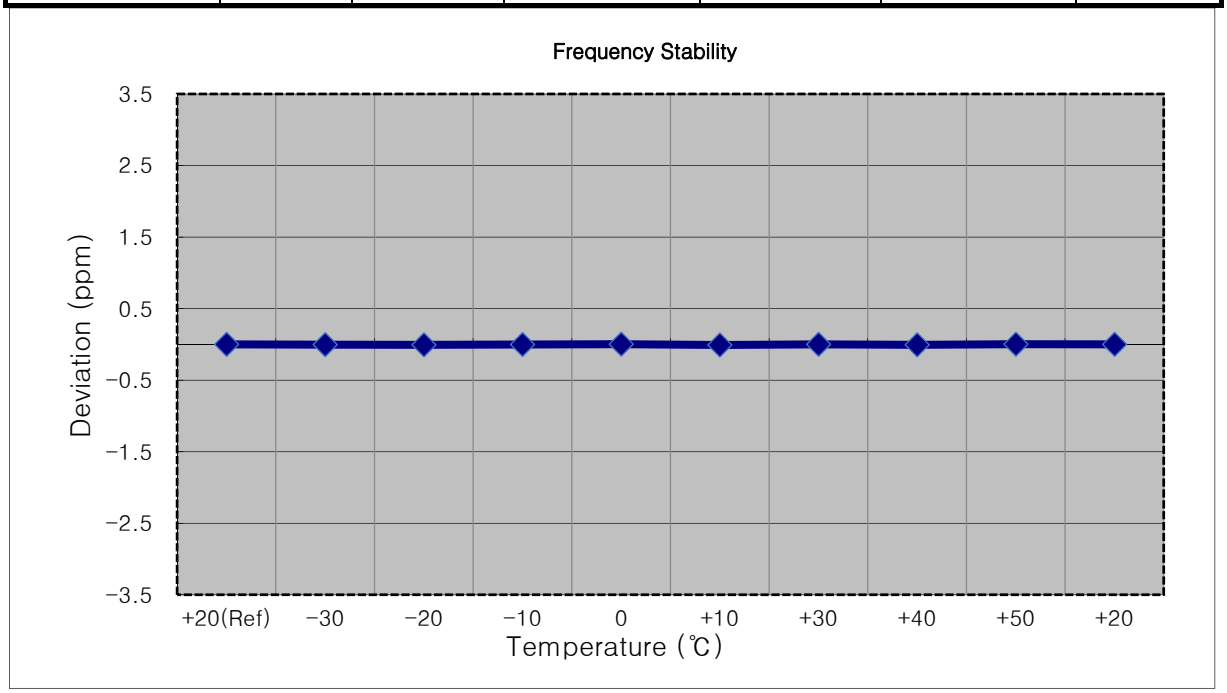
▣ OPERATING FREQUENCY: 1882,500,000 Hz

▣ CHANNEL: 26365 (10 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1882 499 988	0.0	0.000 000	0.000
100%		-30	1882 499 982	-5.9	0.000 000	-0.003
100%		-20	1882 499 976	-12.0	-0.000 001	-0.006
100%		-10	1882 499 984	-4.3	0.000 000	-0.002
100%		0	1882 499 995	6.7	0.000 000	0.004
100%		+10	1882 499 974	-14.2	-0.000 001	-0.008
100%		+30	1882 499 991	3.0	0.000 000	0.002
100%		+40	1882 499 977	-11.3	-0.000 001	-0.006
100%		+50	1882 499 993	4.9	0.000 000	0.003
Batt. Endpoint	3.400	+20	1882 499 991	3.0	0.000 000	0.002



▣ MODE: LTE B25

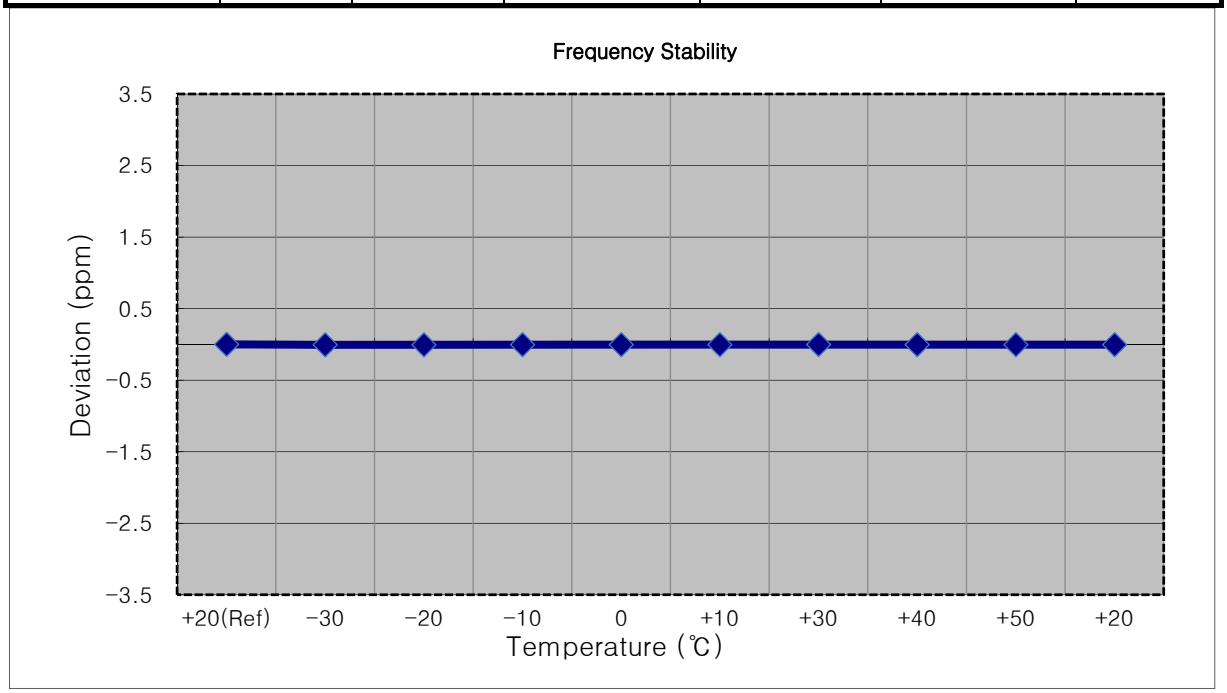
▣ OPERATING FREQUENCY: 1882,500,000 Hz

▣ CHANNEL: 26365 (15 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1882 499 993	0.0	0.000 000	0.000
100%		-30	1882 499 983	-10.0	-0.000 001	-0.005
100%		-20	1882 499 983	-9.6	-0.000 001	-0.005
100%		-10	1882 499 987	-5.5	0.000 000	-0.003
100%		0	1882 499 986	-6.7	0.000 000	-0.004
100%		+10	1882 499 987	-6.3	0.000 000	-0.003
100%		+30	1882 499 990	-3.2	0.000 000	-0.002
100%		+40	1882 499 986	-6.8	0.000 000	-0.004
100%		+50	1882 499 987	-6.2	0.000 000	-0.003
Batt. Endpoint	3.400	+20	1882 499 987	-6.3	0.000 000	-0.003



▣ MODE: LTE B25

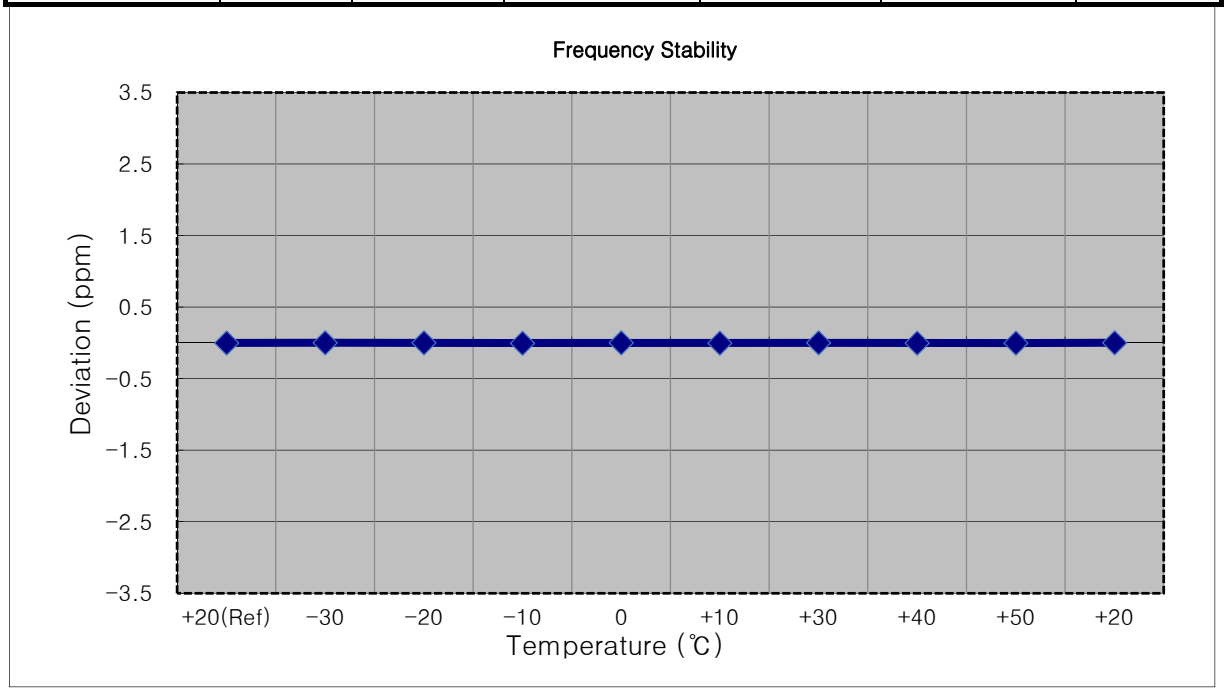
▣ OPERATING FREQUENCY: 1882,500,000 Hz

▣ CHANNEL: 26365 (20 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1882 499 999	0.0	0.000 000	0.000
100%		-30	1882 500 003	3.9	0.000 000	0.002
100%		-20	1882 500 002	3.5	0.000 000	0.002
100%		-10	1882 499 992	-7.3	0.000 000	-0.004
100%		0	1882 500 004	4.8	0.000 000	0.003
100%		+10	1882 499 996	-3.1	0.000 000	-0.002
100%		+30	1882 500 003	3.9	0.000 000	0.002
100%		+40	1882 499 993	-5.9	0.000 000	-0.003
100%		+50	1882 499 994	-5.0	0.000 000	-0.003
Batt. Endpoint	3.400	+20	1882 500 000	1.4	0.000 000	0.001



▣ MODE: LTE B25

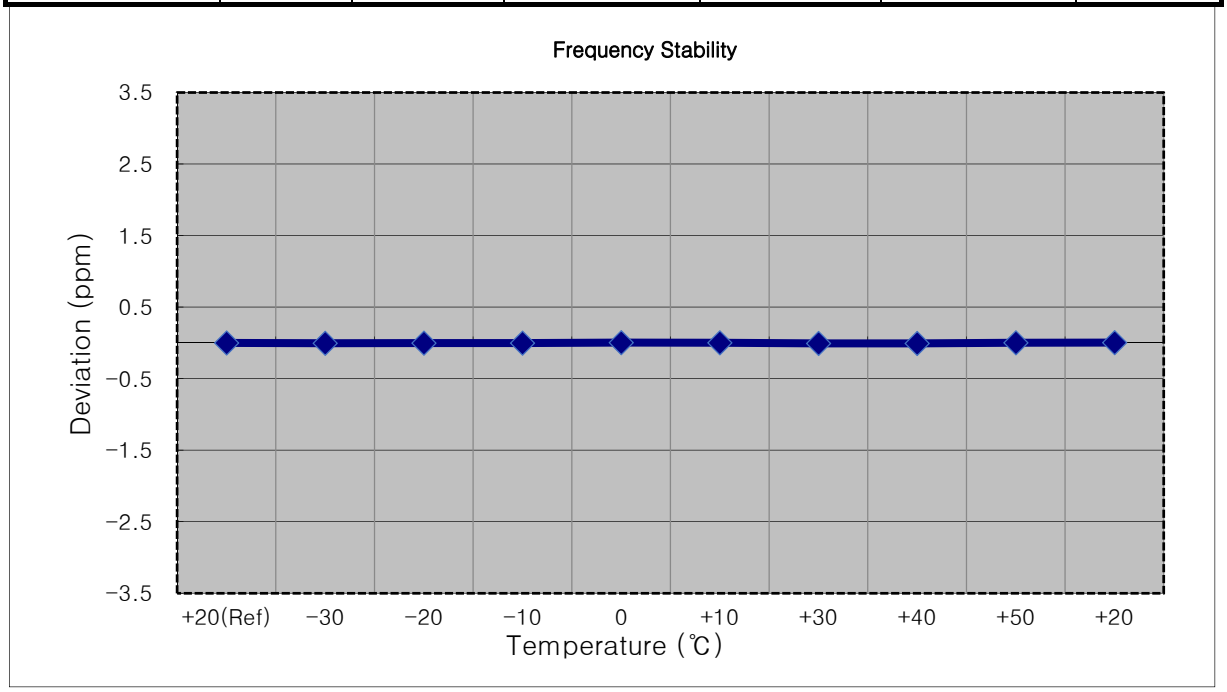
▣ OPERATING FREQUENCY: 1914,300,000 Hz

▣ CHANNEL: 26683 (1.4 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1914 299 995	0.0	0.000 000	0.000
100%		-30	1914 299 987	-8.4	0.000 000	-0.004
100%		-20	1914 299 989	-6.1	0.000 000	-0.003
100%		-10	1914 299 988	-7.0	0.000 000	-0.004
100%		0	1914 300 002	6.9	0.000 000	0.004
100%		+10	1914 299 998	3.2	0.000 000	0.002
100%		+30	1914 299 981	-14.2	-0.000 001	-0.007
100%		+40	1914 299 982	-13.1	-0.000 001	-0.007
100%		+50	1914 300 000	5.4	0.000 000	0.003
Batt. Endpoint	3.400	+20	1914 300 004	9.0	0.000 000	0.005



▣ MODE: LTE B25

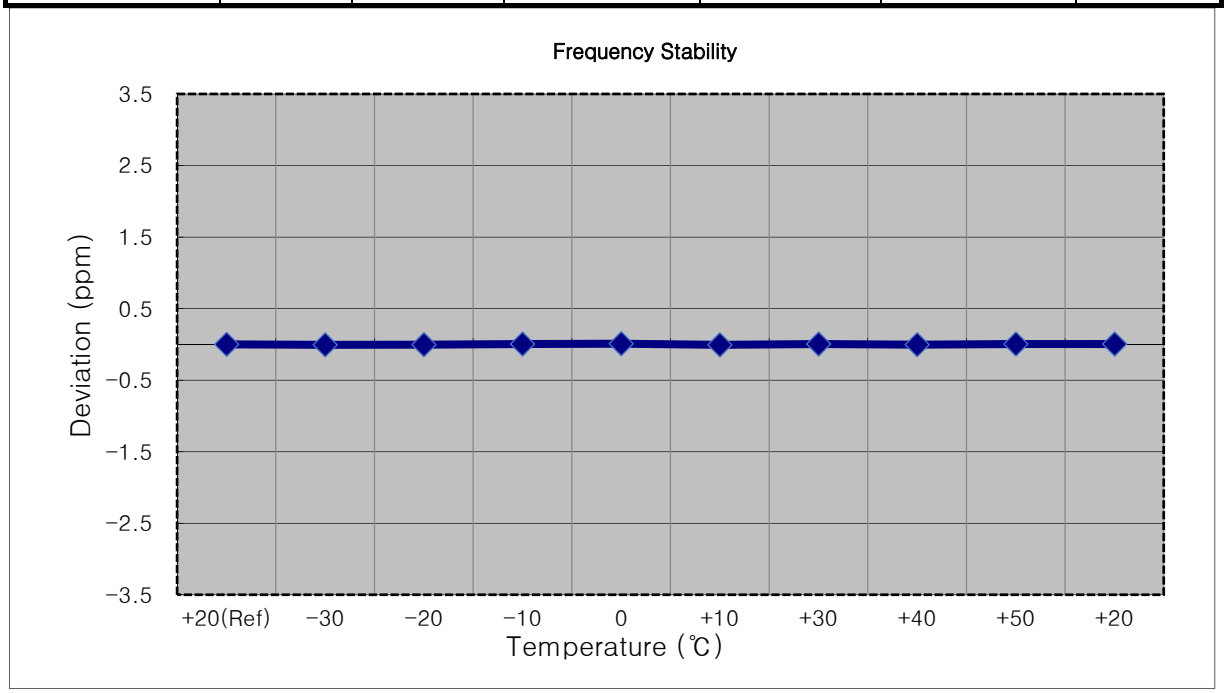
▣ OPERATING FREQUENCY: 1913,500,000 Hz

▣ CHANNEL: 26675 (3 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1913 499 994	0.0	0.000 000	0.000
100%		-30	1913 499 983	-11.3	-0.000 001	-0.006
100%		-20	1913 499 986	-8.5	0.000 000	-0.004
100%		-10	1913 500 006	11.6	0.000 001	0.006
100%		0	1913 500 012	17.7	0.000 001	0.009
100%		+10	1913 499 981	-12.8	-0.000 001	-0.007
100%		+30	1913 500 003	9.4	0.000 000	0.005
100%		+40	1913 499 986	-8.0	0.000 000	-0.004
100%		+50	1913 500 003	9.2	0.000 000	0.005
Batt. Endpoint	3.400	+20	1913 500 004	9.5	0.000 000	0.005



▣ MODE: LTE B25

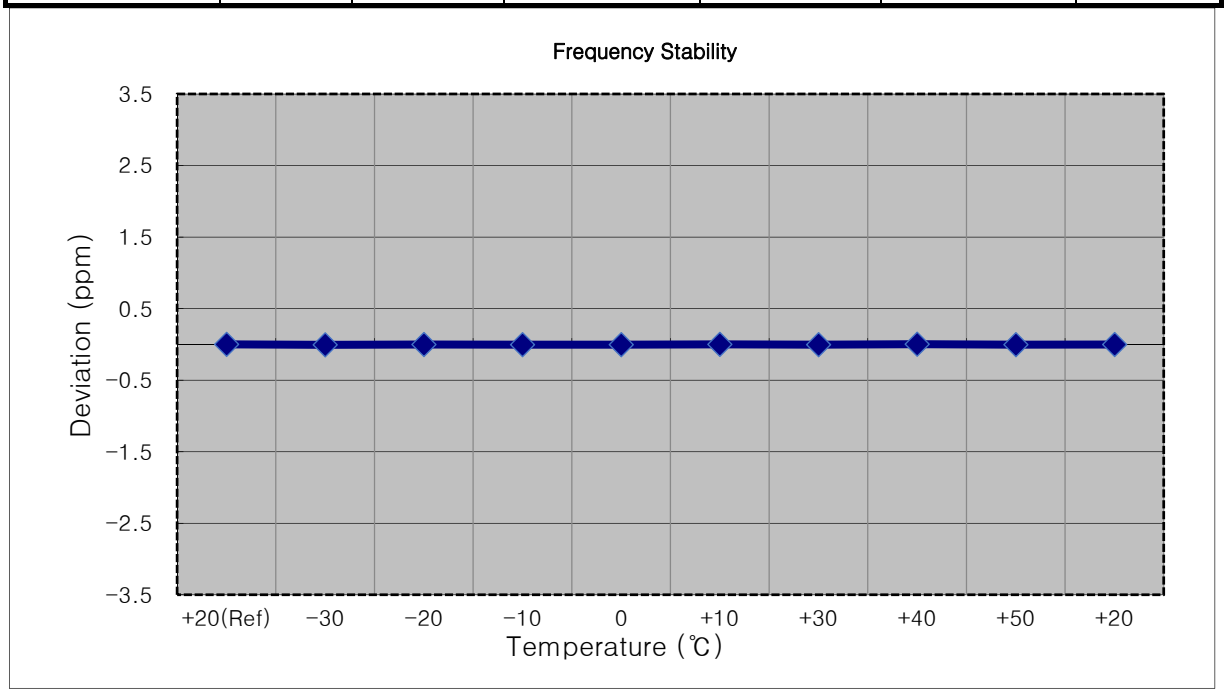
▣ OPERATING FREQUENCY: 1912,500,000 Hz

▣ CHANNEL: 26665 (5 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1912 500 006	0.0	0.000 000	0.000
100%		-30	1912 499 994	-12.0	-0.000 001	-0.006
100%		-20	1912 500 003	-2.5	0.000 000	-0.001
100%		-10	1912 499 999	-6.4	0.000 000	-0.003
100%		0	1912 499 999	-6.9	0.000 000	-0.004
100%		+10	1912 500 009	3.0	0.000 000	0.002
100%		+30	1912 500 001	-5.1	0.000 000	-0.003
100%		+40	1912 500 011	4.7	0.000 000	0.002
100%		+50	1912 500 000	-6.2	0.000 000	-0.003
Batt. Endpoint	3.400	+20	1912 500 002	-3.9	0.000 000	-0.002



▣ MODE: LTE B25

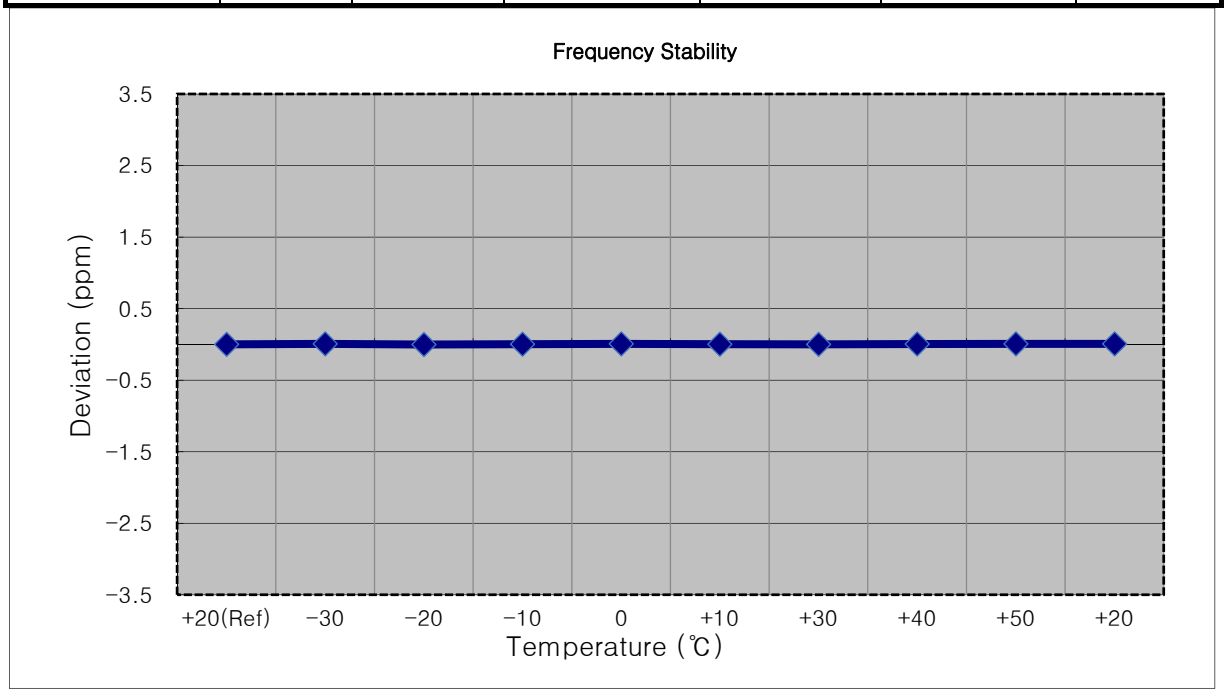
▣ OPERATING FREQUENCY: 1910,000,000 Hz

▣ CHANNEL: 26640 (10 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1910 000 002	0.0	0.000 000	0.000
100%		-30	1910 000 016	13.6	0.000 001	0.007
100%		-20	1910 000 000	-2.6	0.000 000	-0.001
100%		-10	1910 000 010	7.4	0.000 000	0.004
100%		0	1910 000 018	15.7	0.000 001	0.008
100%		+10	1910 000 007	4.9	0.000 000	0.003
100%		+30	1910 000 004	1.6	0.000 000	0.001
100%		+40	1910 000 014	11.6	0.000 001	0.006
100%		+50	1910 000 018	16.0	0.000 001	0.008
Batt. Endpoint	3.400	+20	1910 000 015	12.9	0.000 001	0.007



▣ MODE: LTE B25

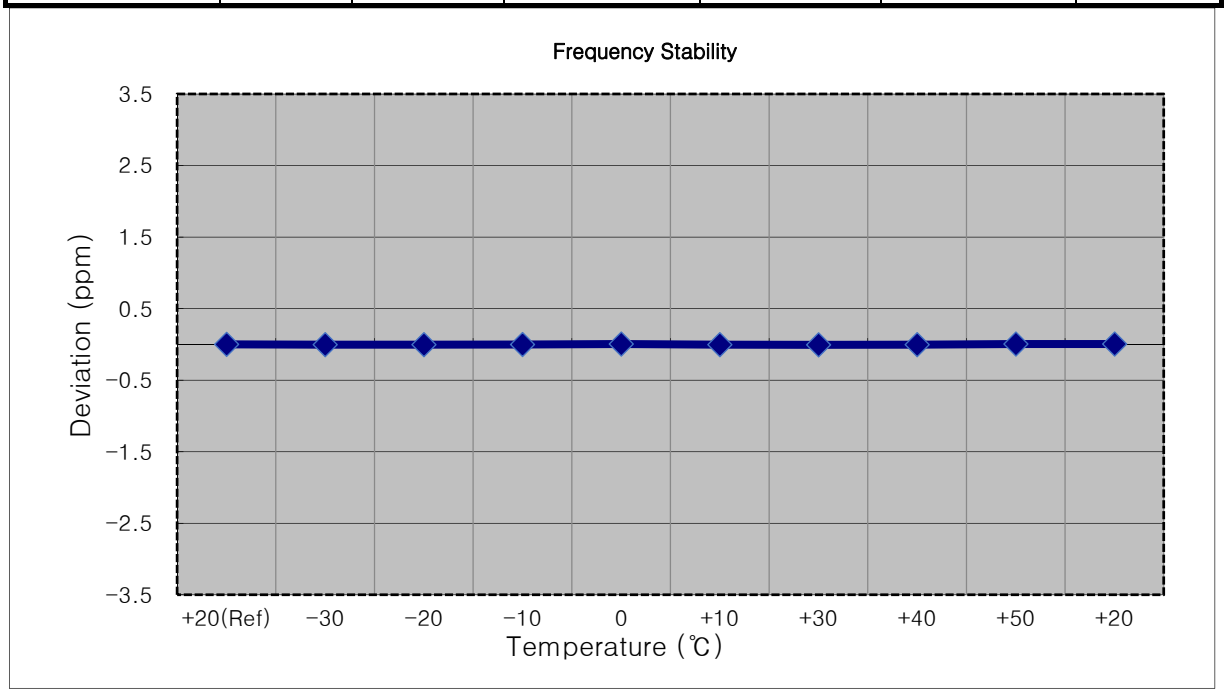
▣ OPERATING FREQUENCY: 1907,500,000 Hz

▣ CHANNEL: 26615 (15 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1907 500 002	0.0	0.000 000	0.000
100%		-30	1907 499 995	-7.3	0.000 000	-0.004
100%		-20	1907 499 994	-7.8	0.000 000	-0.004
100%		-10	1907 499 999	-3.2	0.000 000	-0.002
100%		0	1907 500 012	10.3	0.000 001	0.005
100%		+10	1907 499 995	-6.9	0.000 000	-0.004
100%		+30	1907 499 993	-9.3	0.000 000	-0.005
100%		+40	1907 499 997	-5.4	0.000 000	-0.003
100%		+50	1907 500 011	9.5	0.000 000	0.005
Batt. Endpoint	3.400	+20	1907 500 010	8.0	0.000 000	0.004



▣ MODE: LTE B25

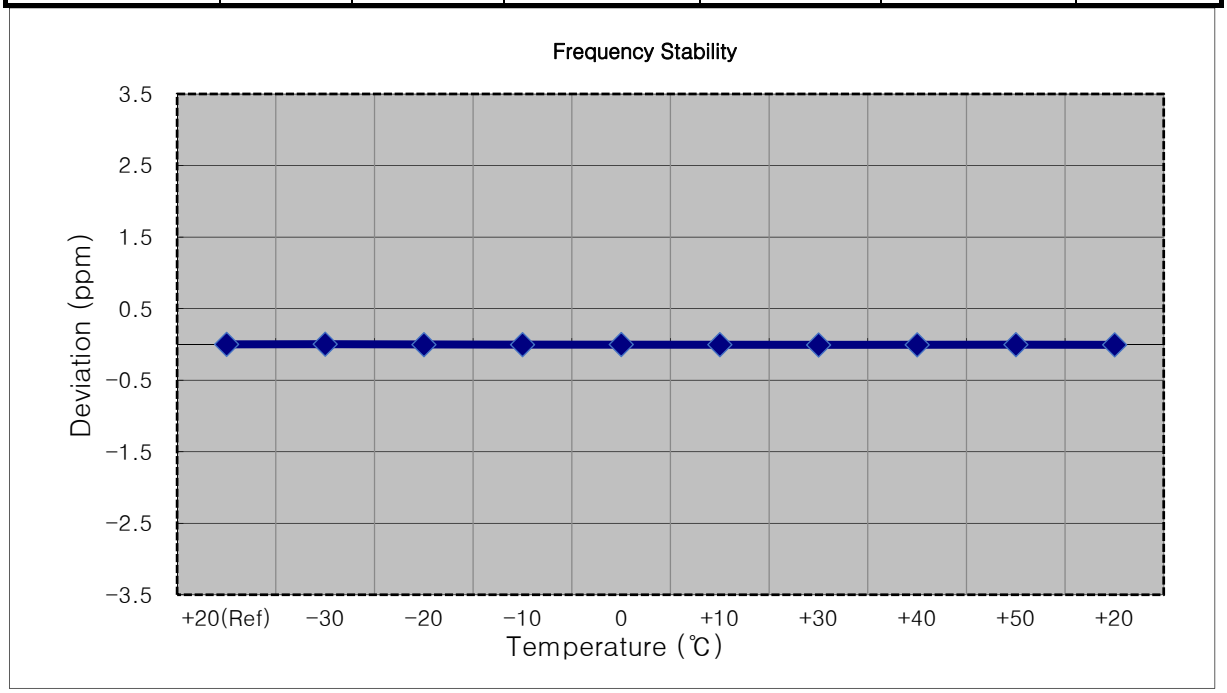
▣ OPERATING FREQUENCY: 1905,000,000 Hz

▣ CHANNEL: 26590 (20 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

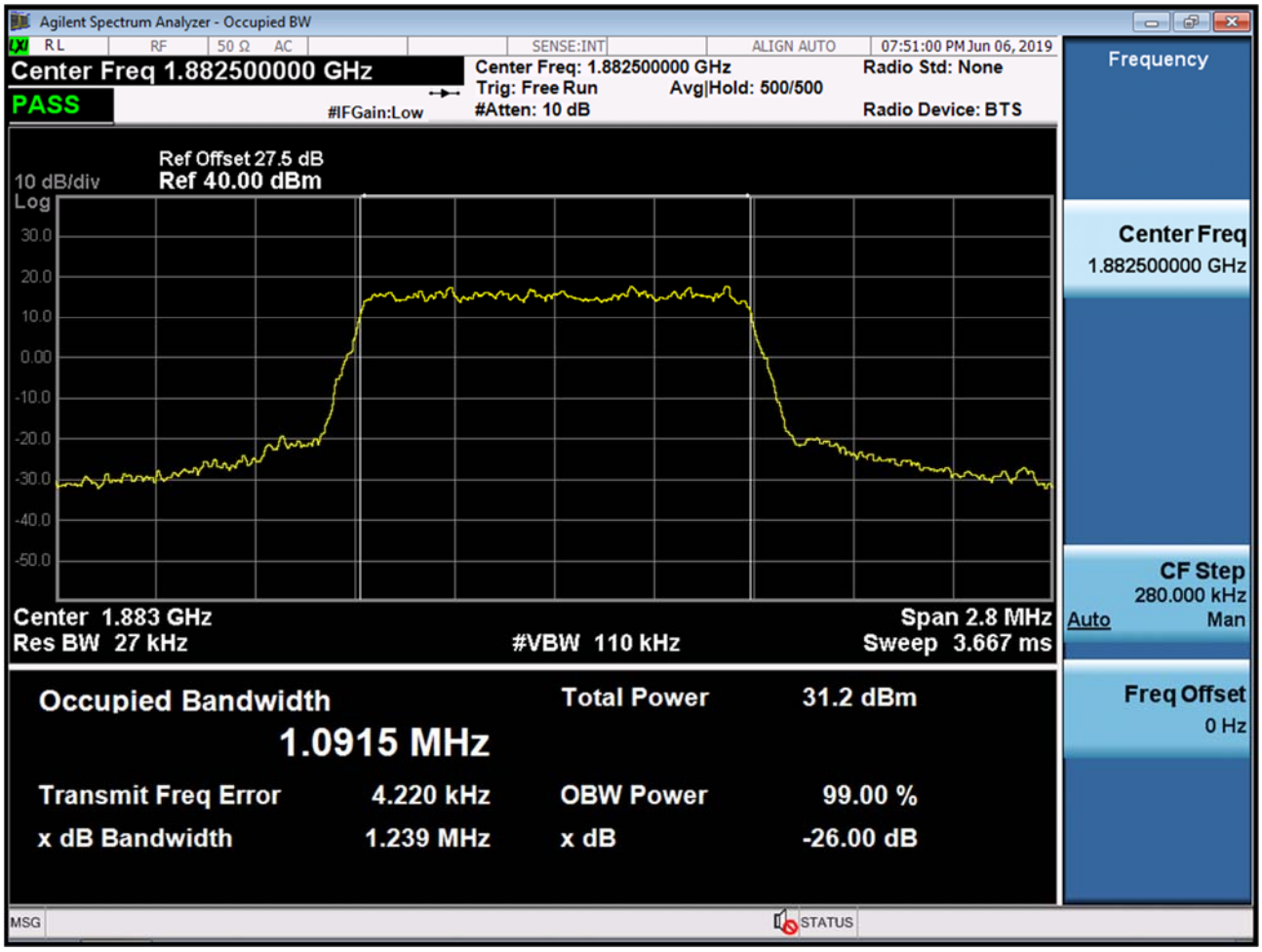
▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1904 999 990	0.0	0.000 000	0.000
100%		-30	1904 999 995	4.4	0.000 000	0.002
100%		-20	1904 999 983	-7.1	0.000 000	-0.004
100%		-10	1904 999 983	-7.8	0.000 000	-0.004
100%		0	1904 999 987	-3.5	0.000 000	-0.002
100%		+10	1904 999 983	-7.6	0.000 000	-0.004
100%		+30	1904 999 975	-15.2	-0.000 001	-0.008
100%		+40	1904 999 978	-12.7	-0.000 001	-0.007
100%		+50	1904 999 981	-9.0	0.000 000	-0.005
Batt. Endpoint	3.400	+20	1904 999 978	-12.5	-0.000 001	-0.007

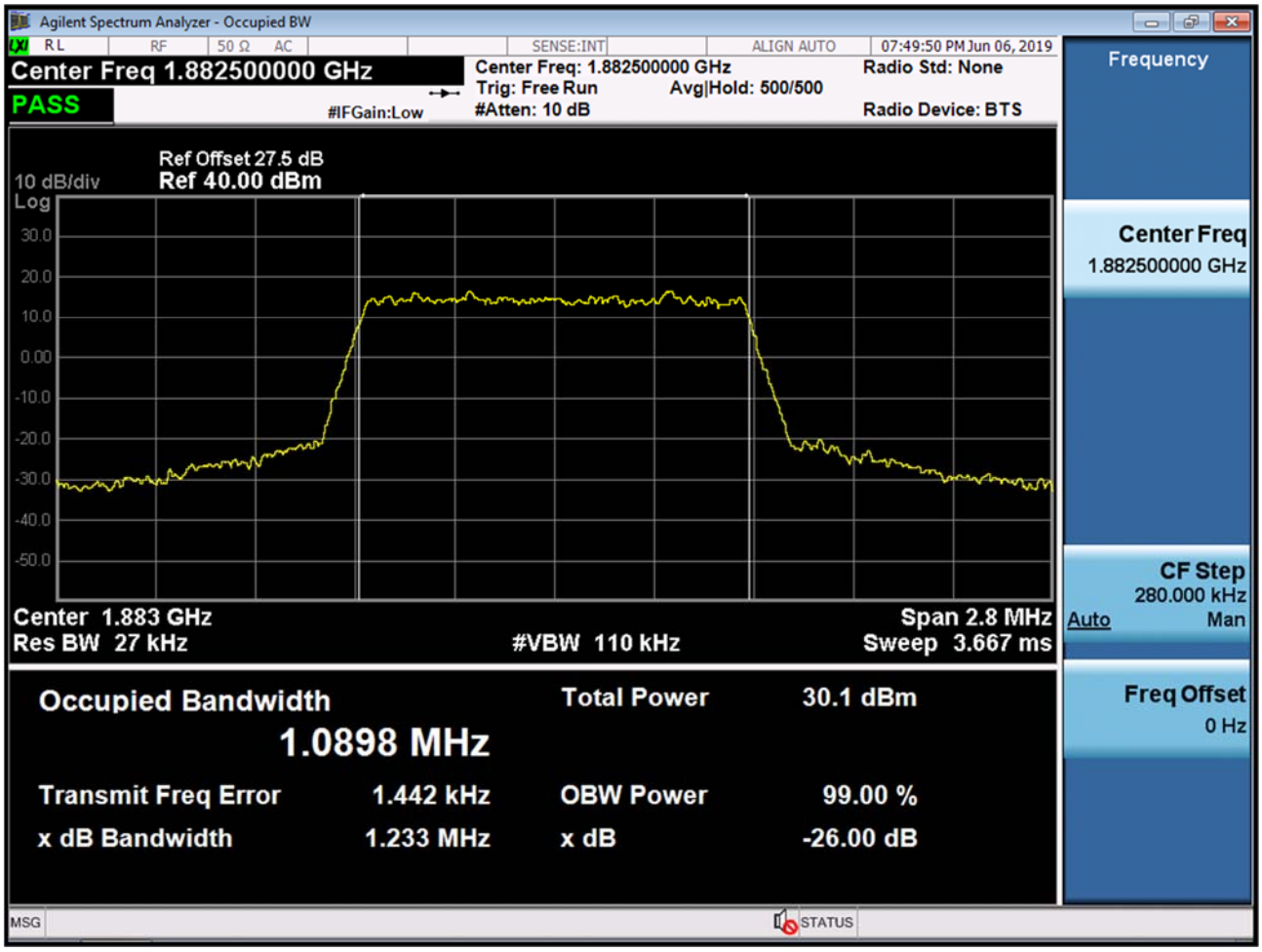


9. TEST PLOTS

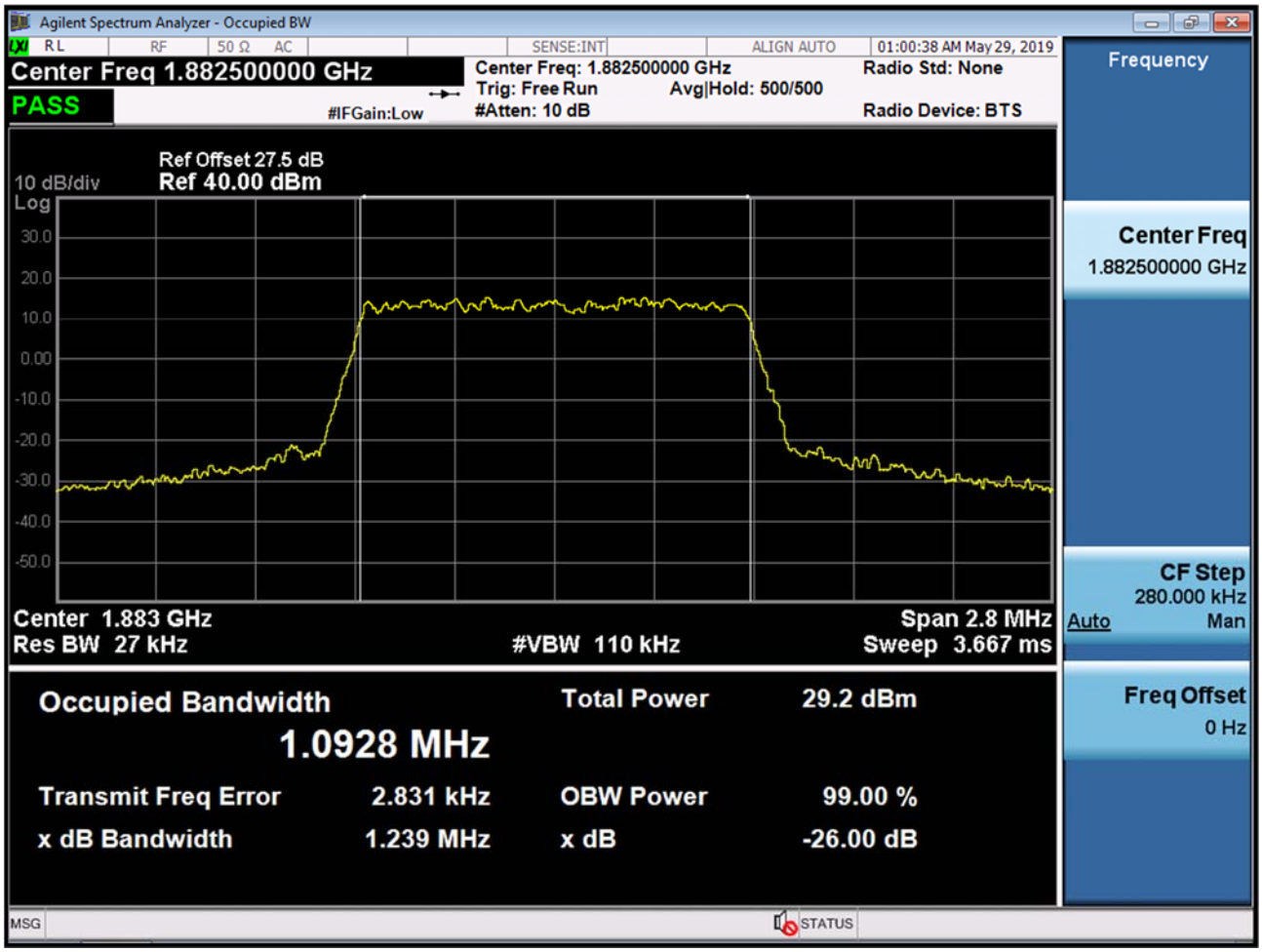
BAND 2. Occupied Bandwidth Plot (1.4M BW Ch.26365 QPSK RB 6_0)



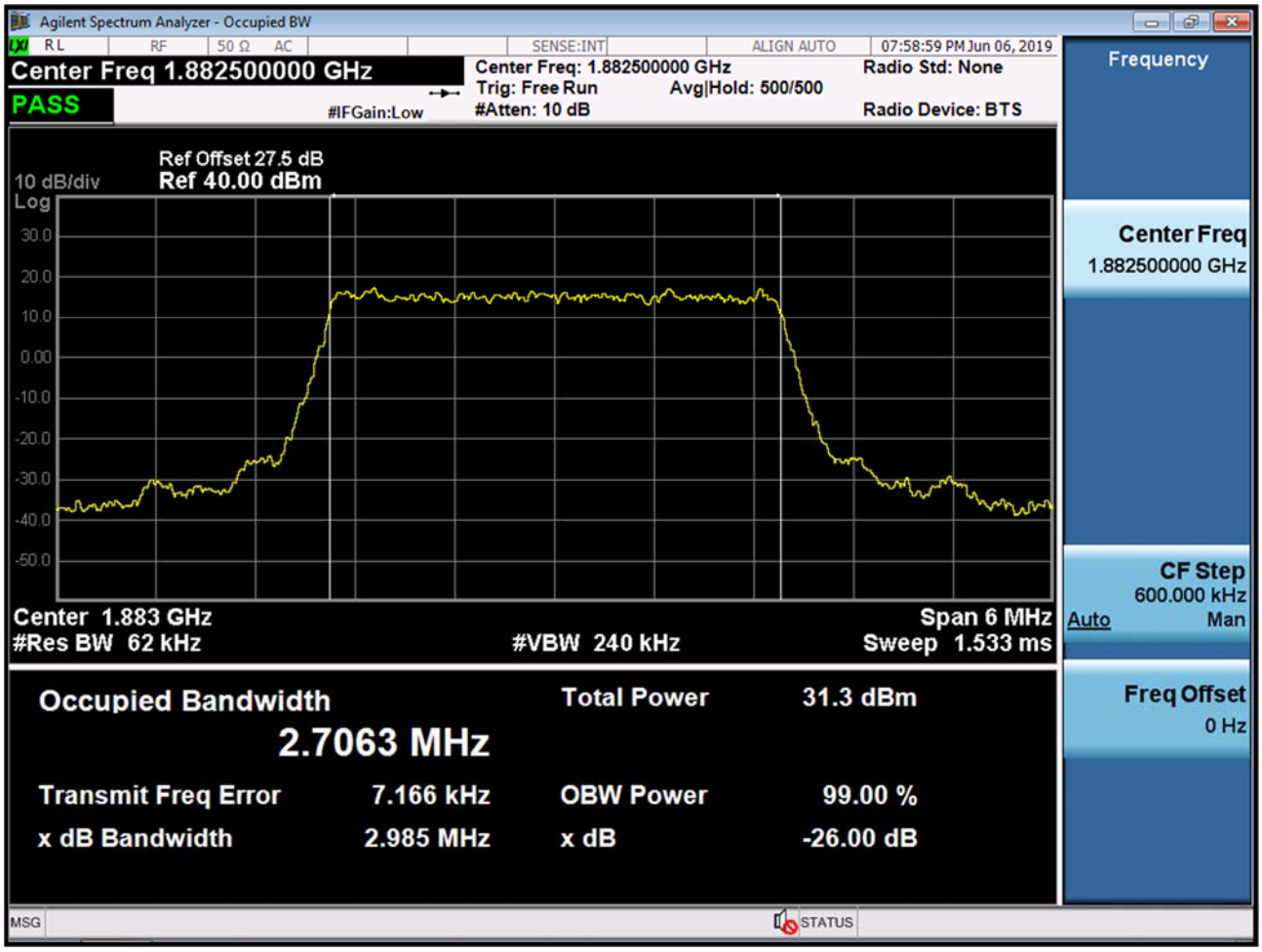
BAND 2. Occupied Bandwidth Plot (1.4M BW Ch.26365 16QAM RB 6_0)



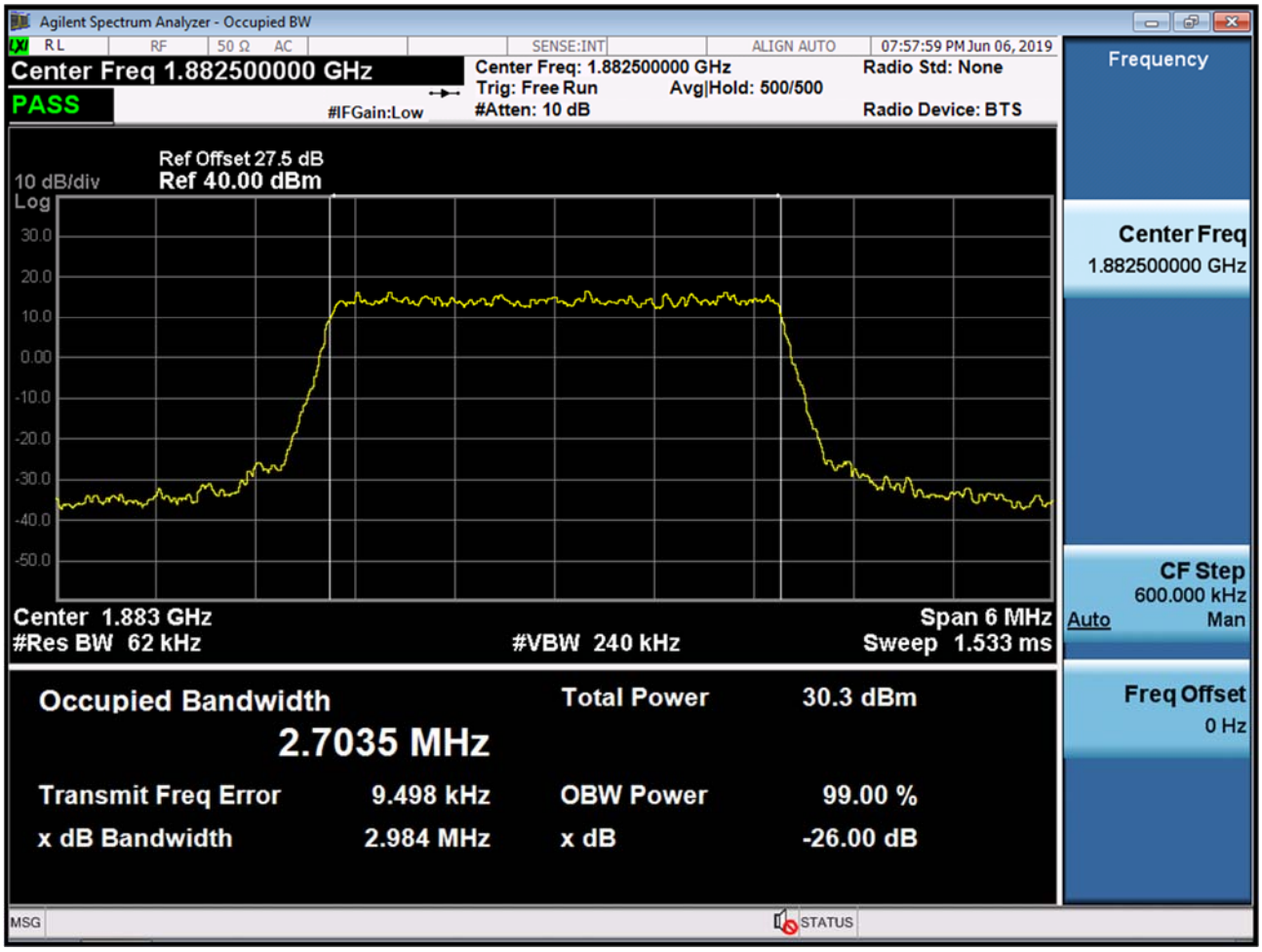
BAND 2. Occupied Bandwidth Plot (1.4M BW Ch.26365 64QAM RB 6_0)



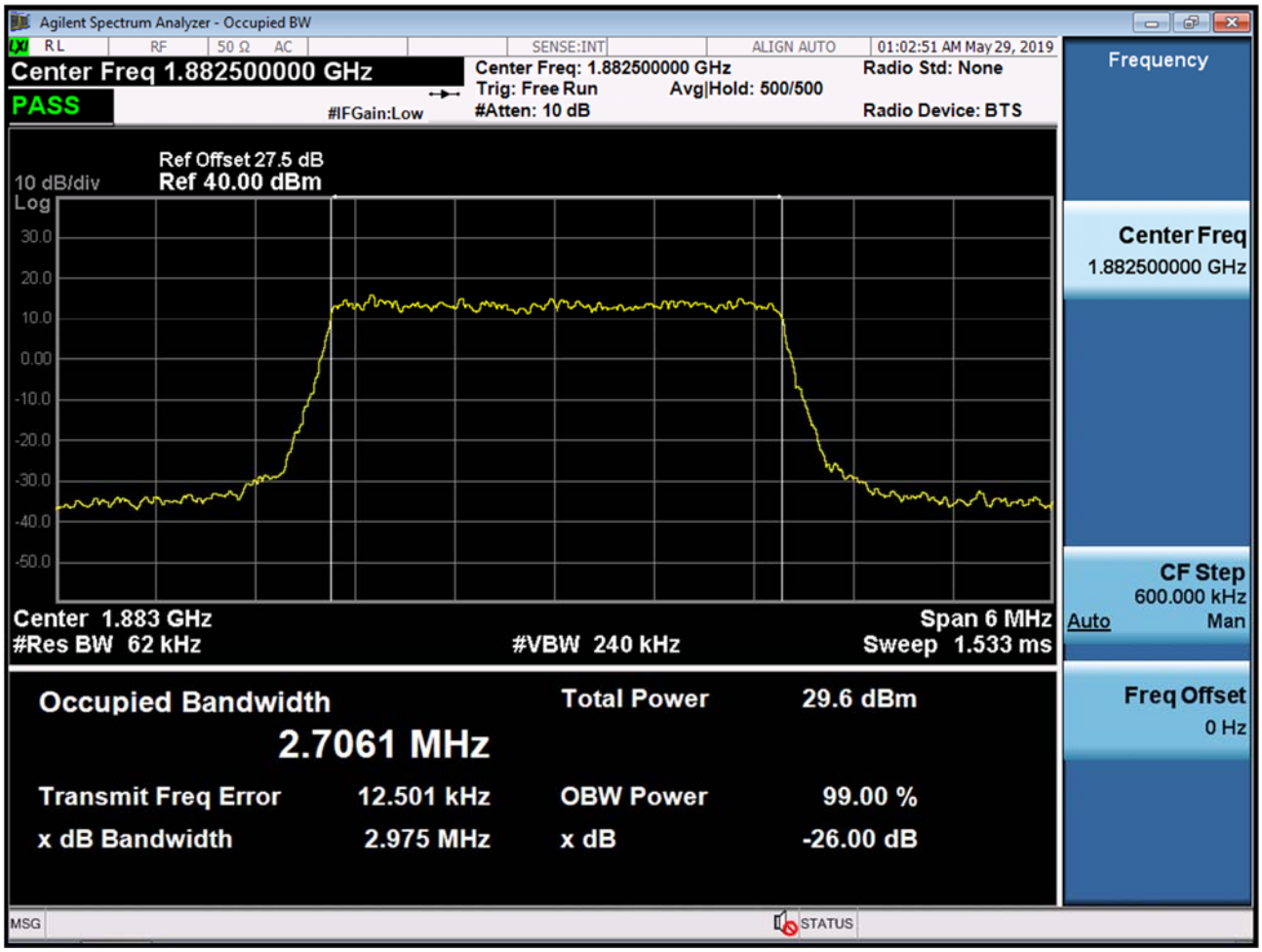
BAND 2. Occupied Bandwidth Plot (3M BW Ch.26365 QPSK RB 15_0)



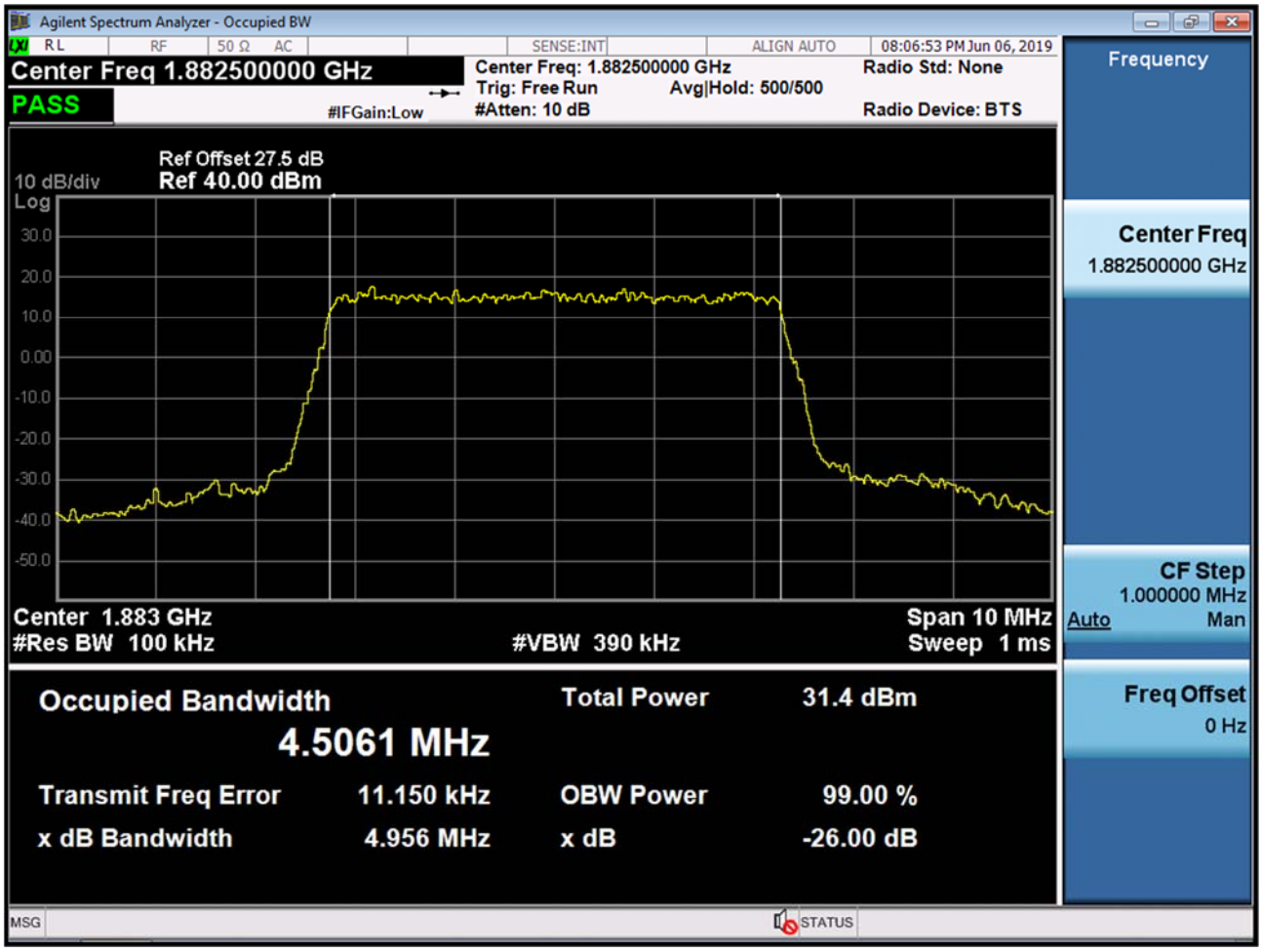
BAND 2. Occupied Bandwidth Plot (3M BW Ch.26365 16QAM RB 15_0)



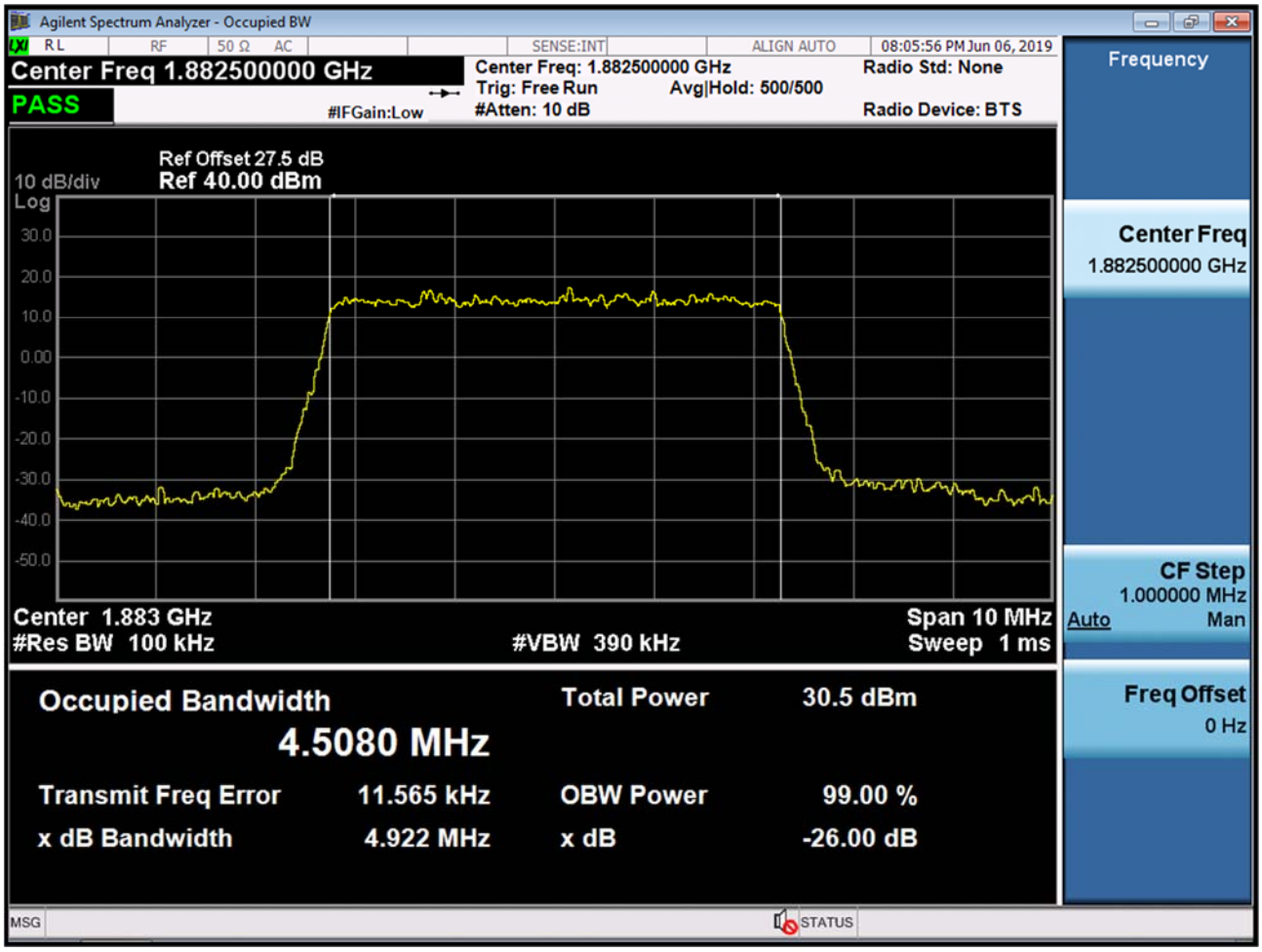
BAND 2. Occupied Bandwidth Plot (3M BW Ch.26365 64QAM RB 15_0)



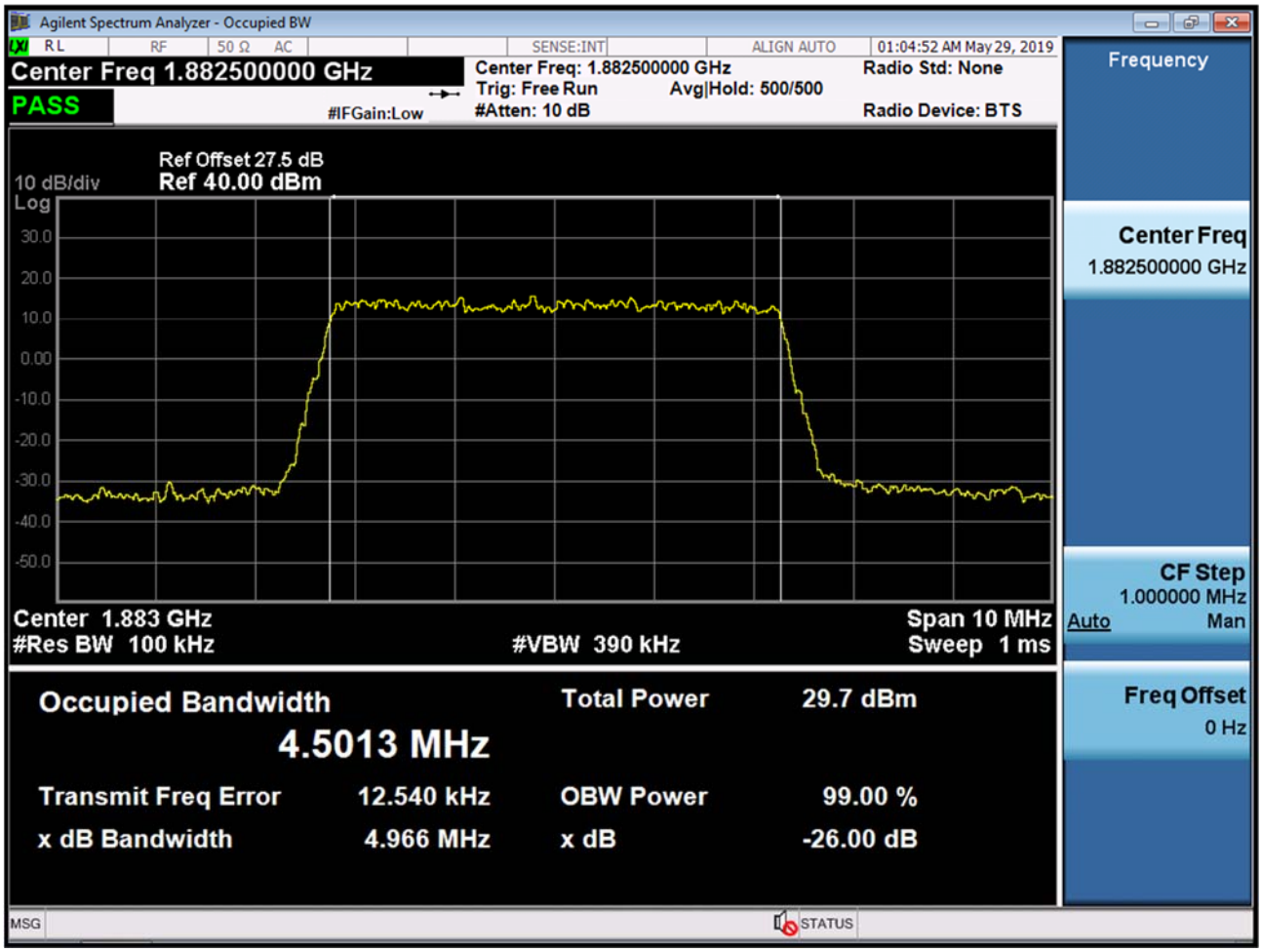
BAND 2. Occupied Bandwidth Plot (5M BW Ch.26365 QPSK RB 25_0)



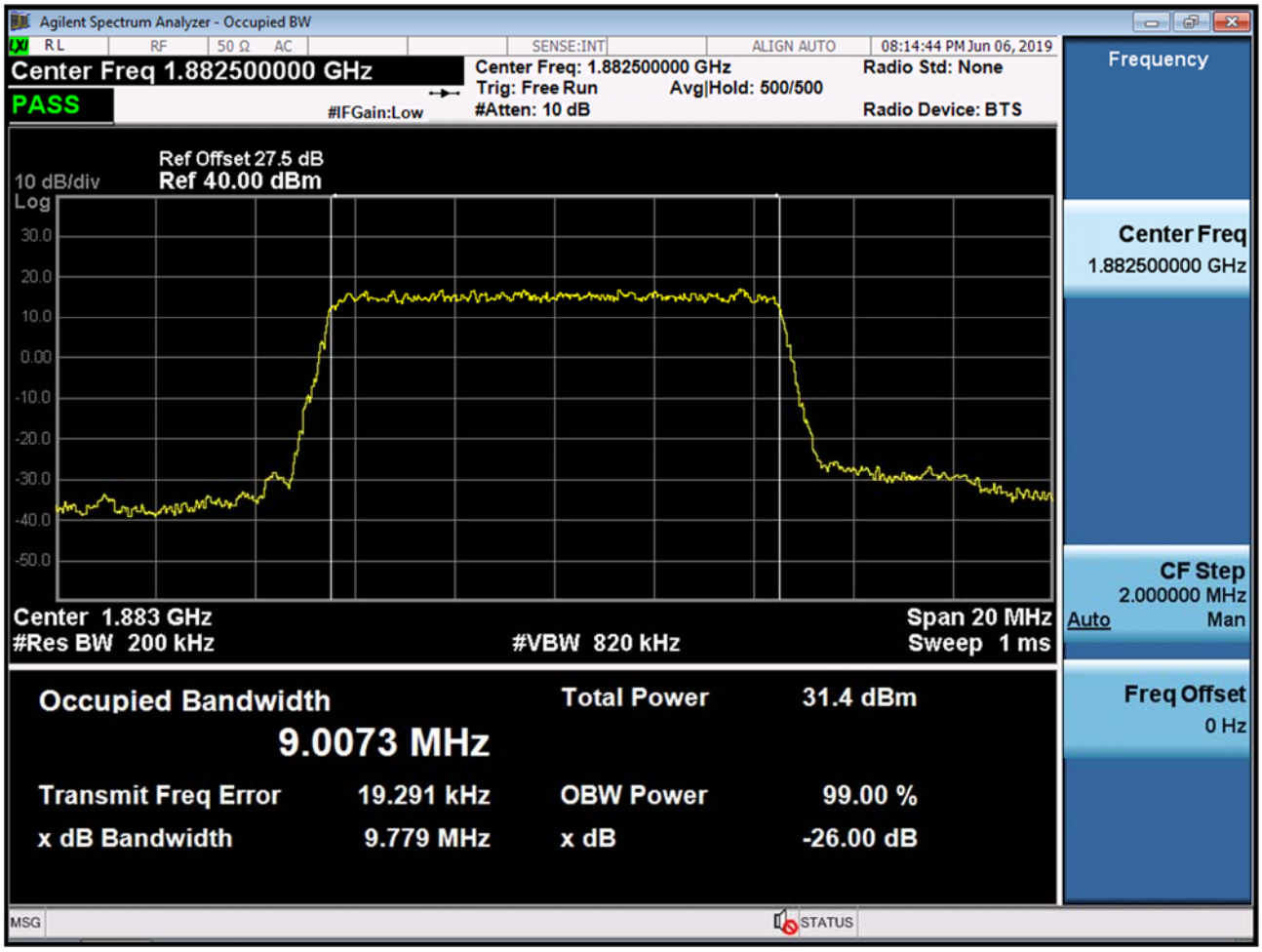
BAND 2. Occupied Bandwidth Plot (5M BW Ch.26365 16QAM RB 25_0)



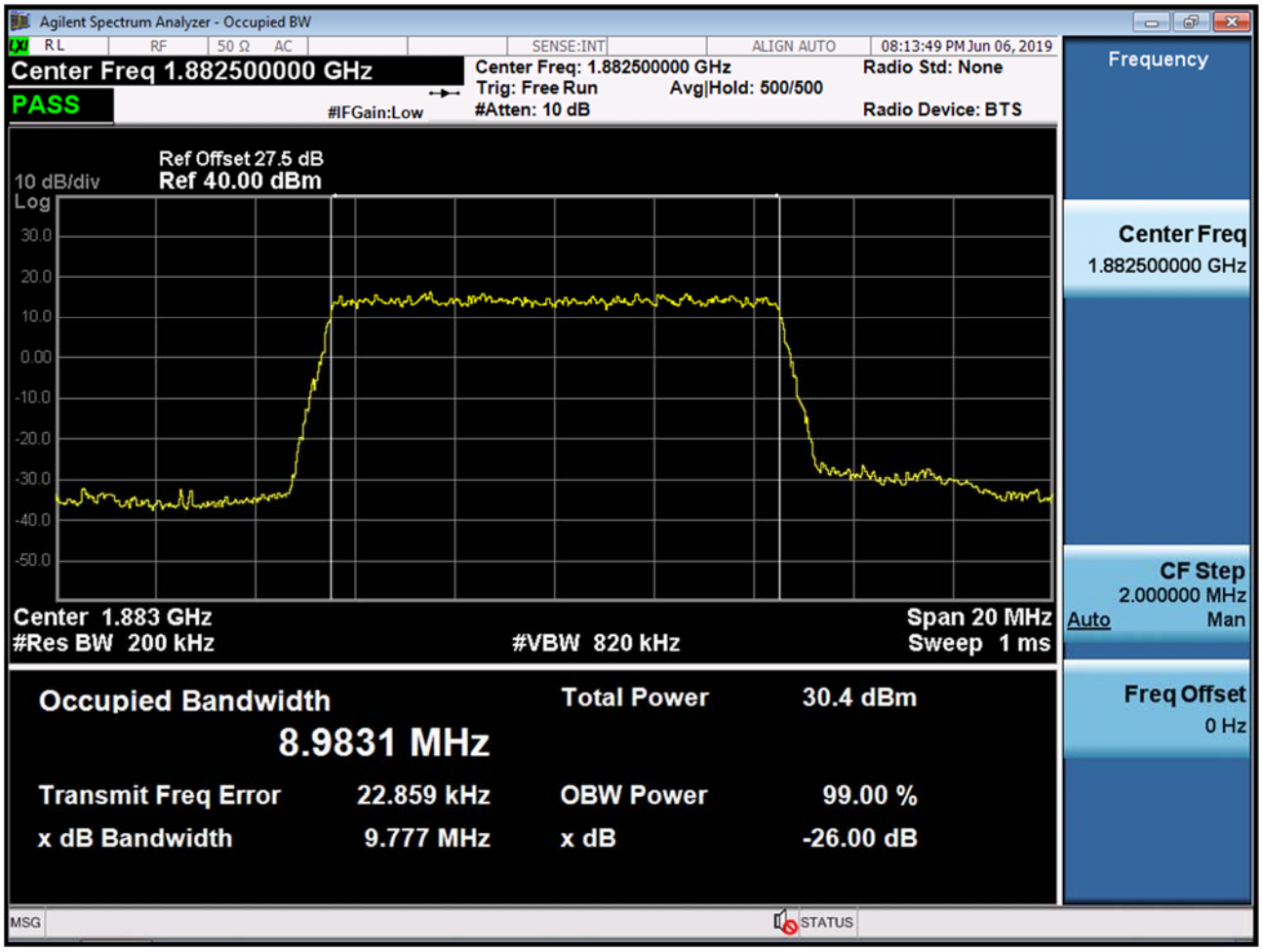
BAND 2. Occupied Bandwidth Plot (5M BW Ch.26365 64QAM RB 25_0)



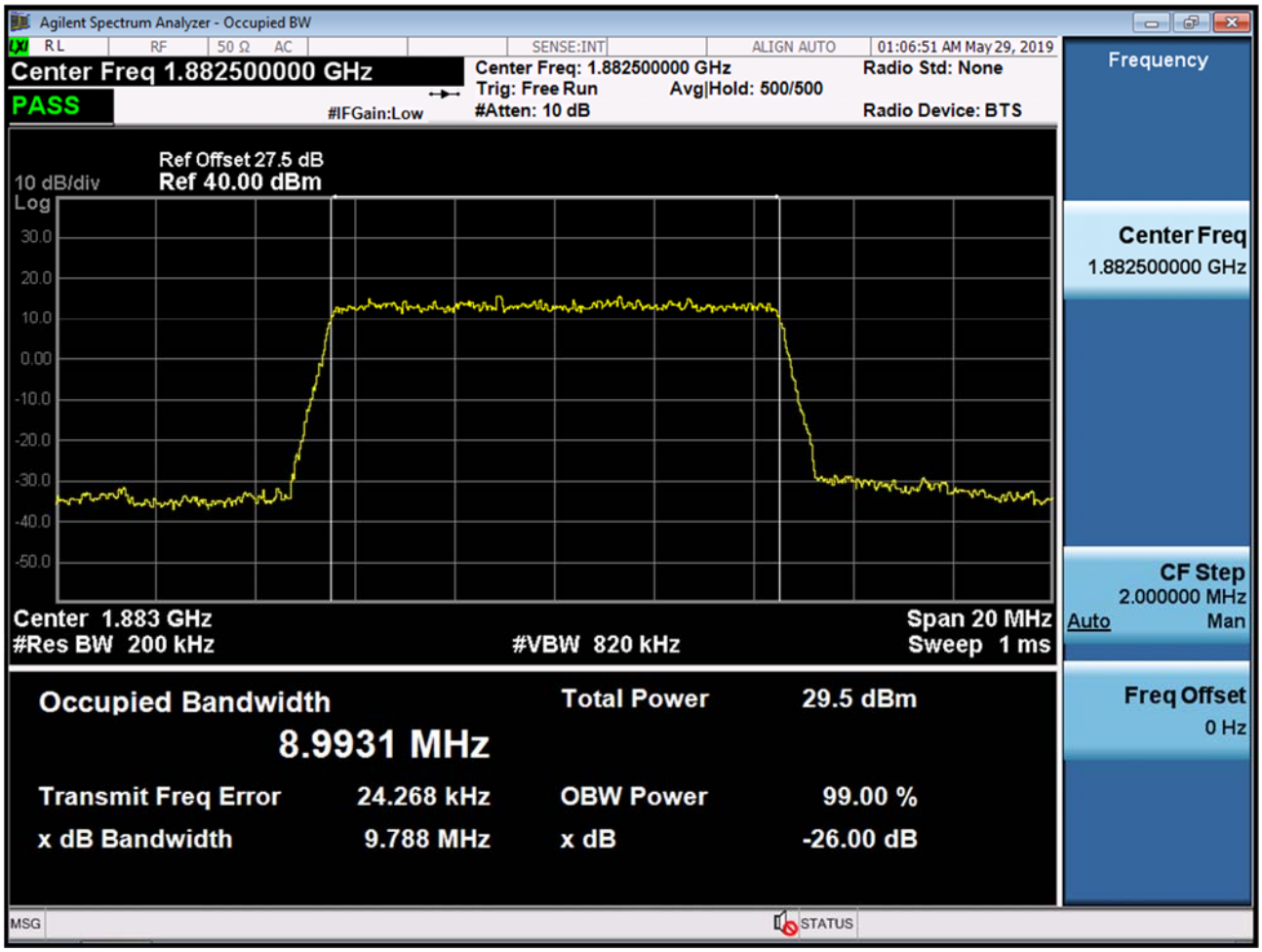
BAND 2. Occupied Bandwidth Plot (10M BW Ch.26365 QPSK RB 50_0)



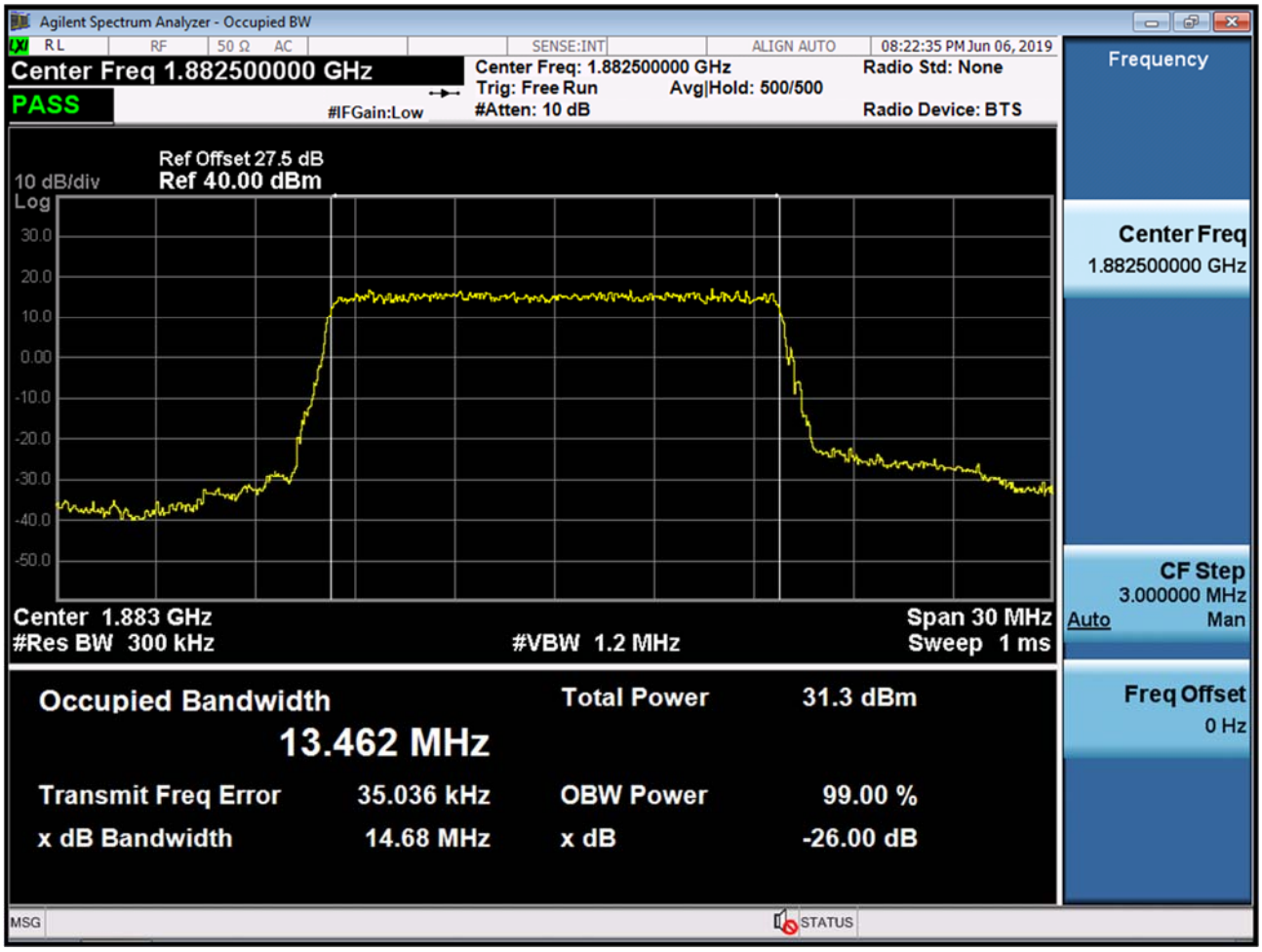
BAND 2. Occupied Bandwidth Plot (10M BW Ch.26365 16QAM RB 50_0)



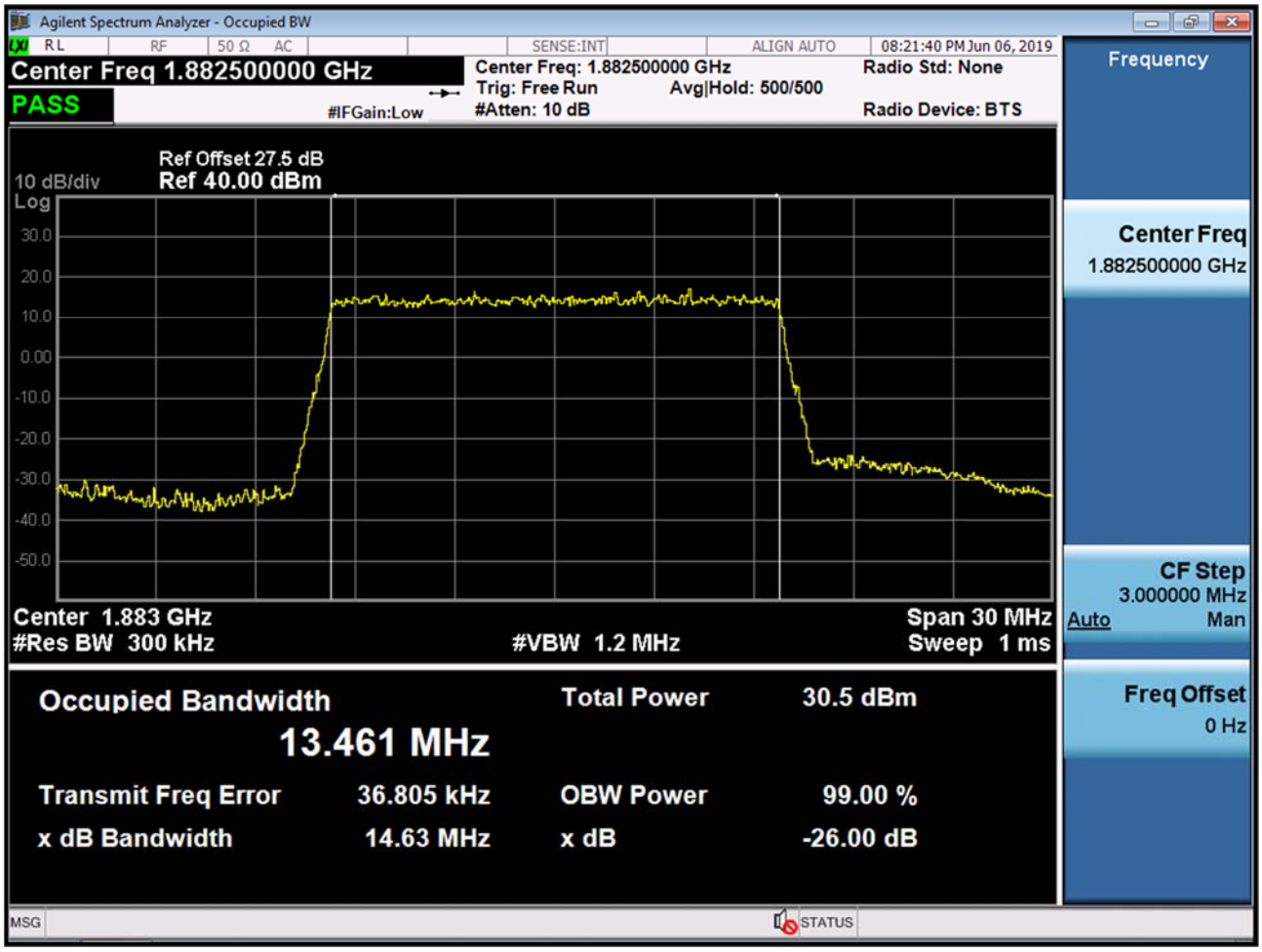
BAND 2. Occupied Bandwidth Plot (10M BW Ch.26365 64QAM RB 50_0)



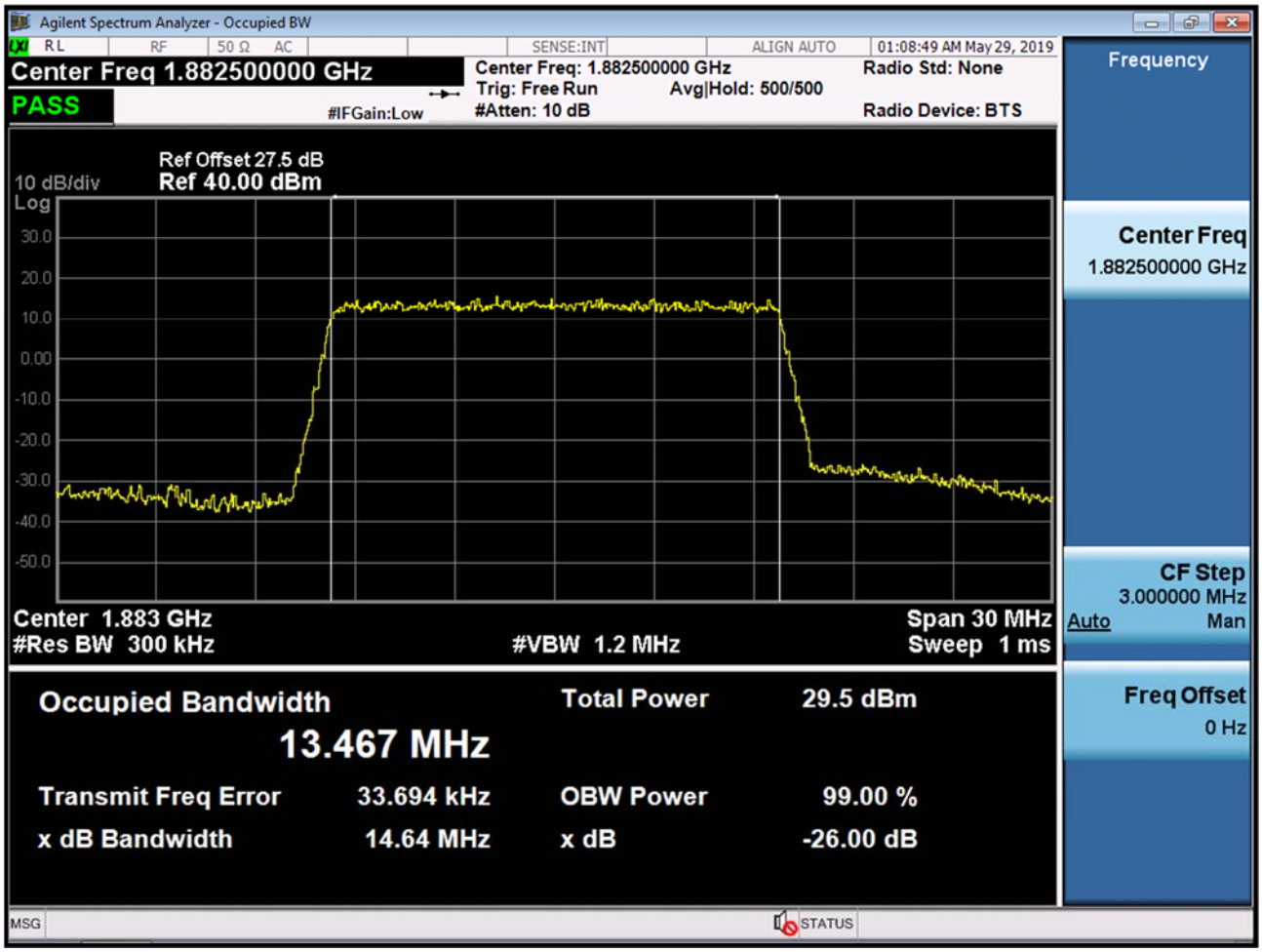
BAND 2. Occupied Bandwidth Plot (15M BW Ch.26365 QPSK RB 75_0)



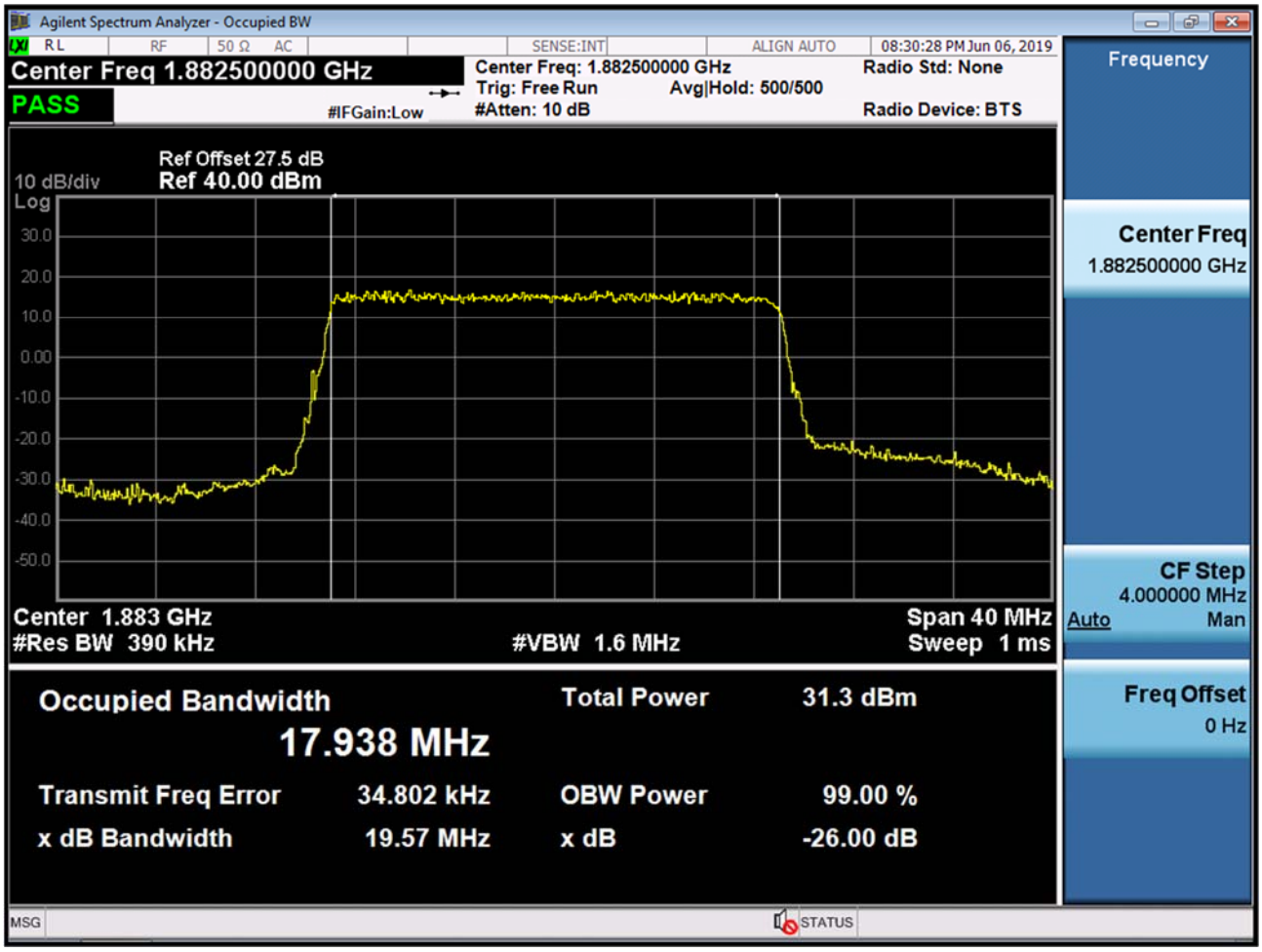
BAND 2. Occupied Bandwidth Plot (15M BW Ch.26365 16QAM RB 75_0)



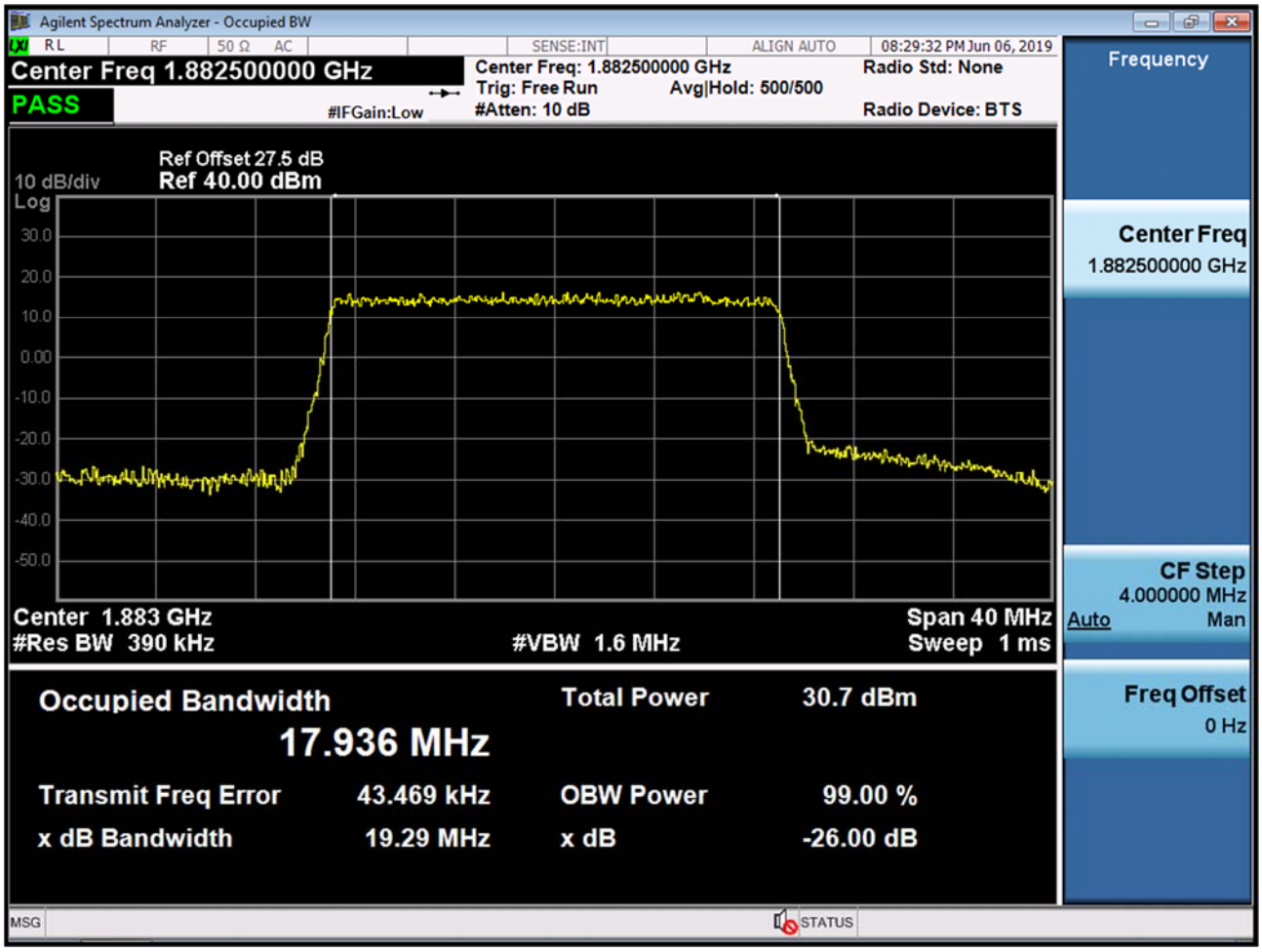
BAND 2. Occupied Bandwidth Plot (15M BW Ch.26365 64QAM RB 75_0)



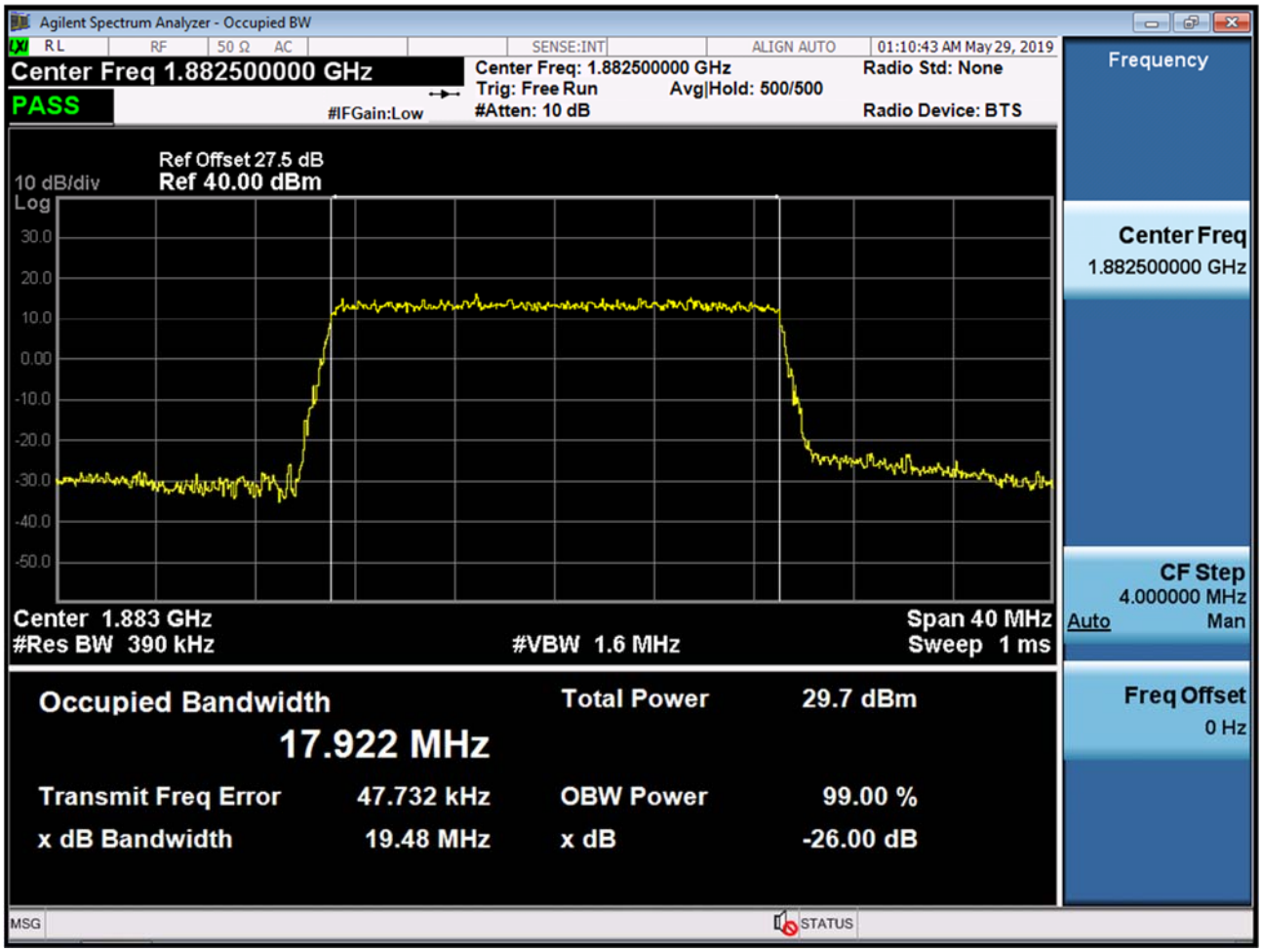
BAND 2. Occupied Bandwidth Plot (20M BW Ch.26365 QPSK RB 100_0)



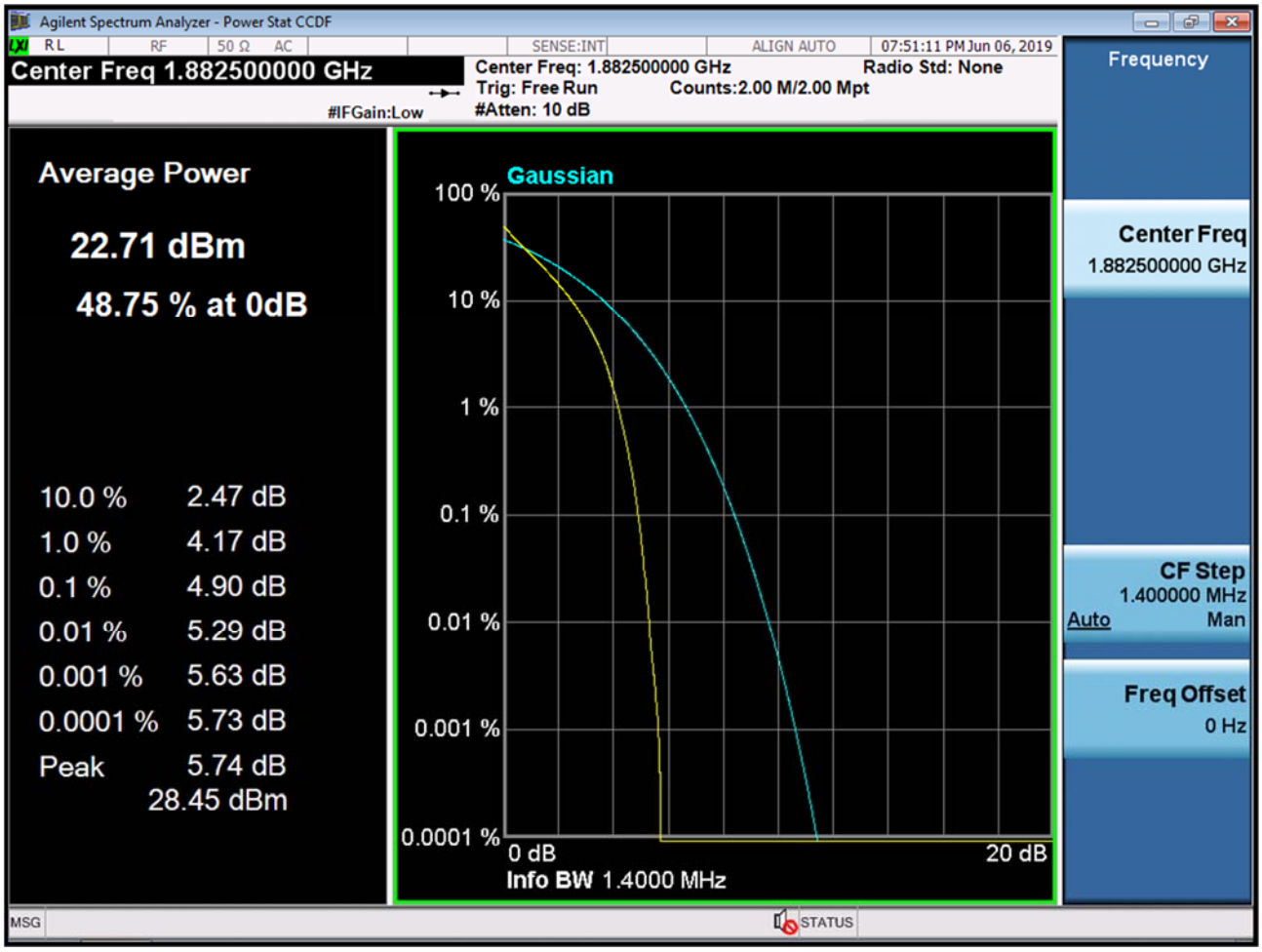
BAND 2. Occupied Bandwidth Plot (20M BW Ch.26365 16QAM RB 100_0)



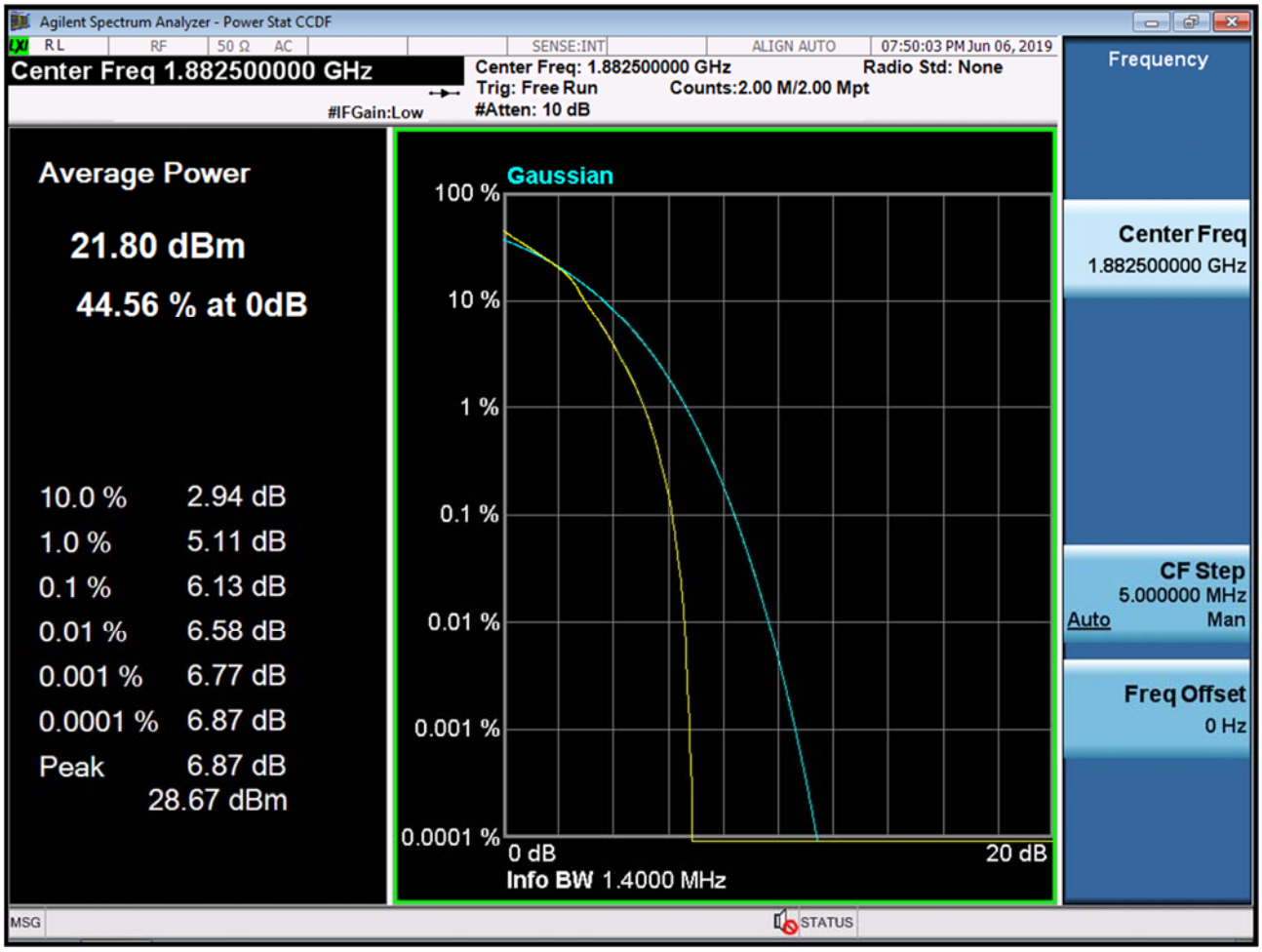
BAND 2. Occupied Bandwidth Plot (20M BW Ch.26365 64QAM RB 100_0)



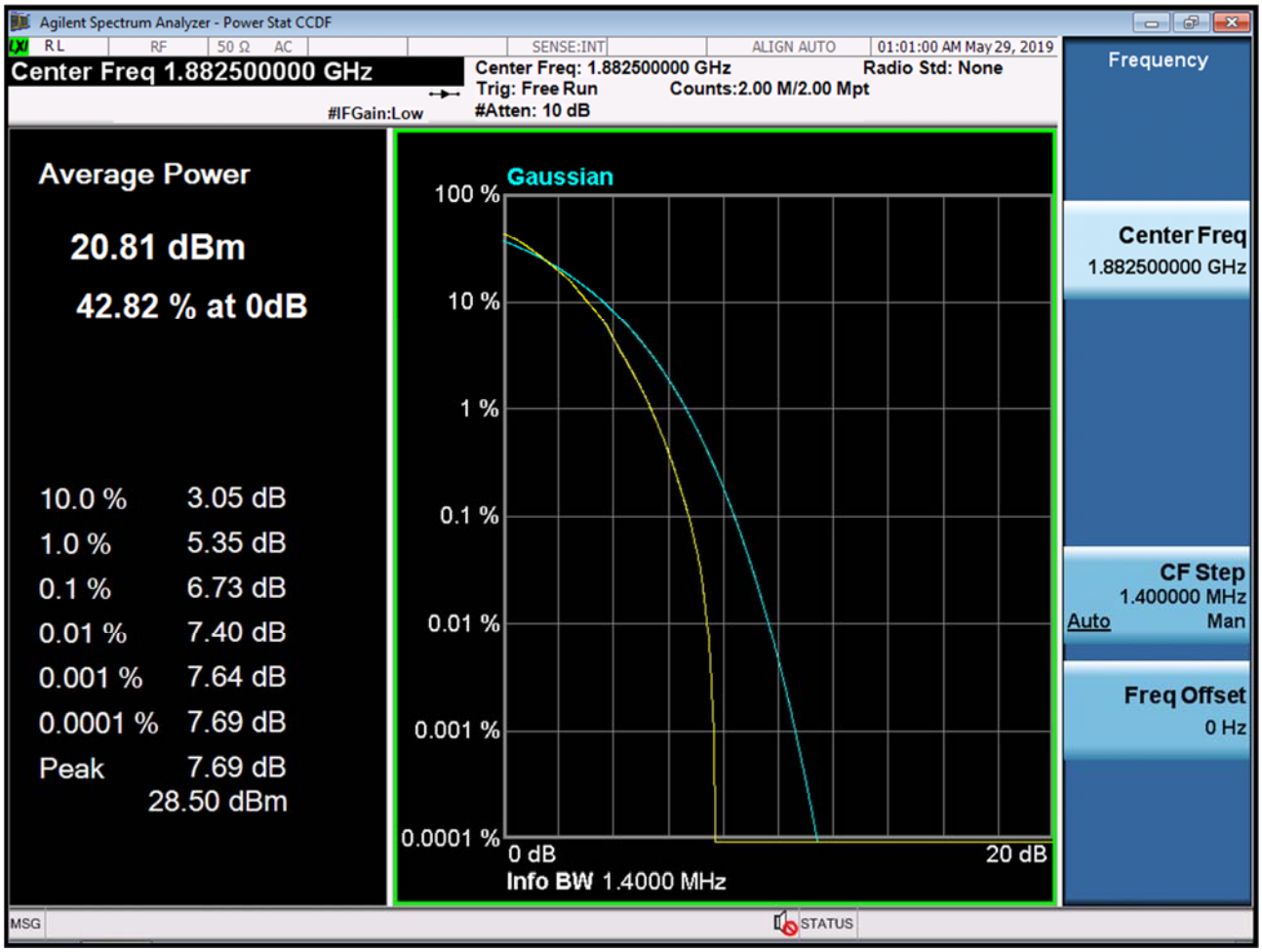
BAND 2. PAR Plot (1.4M BW Ch.26365 QPSK RB 6_0)



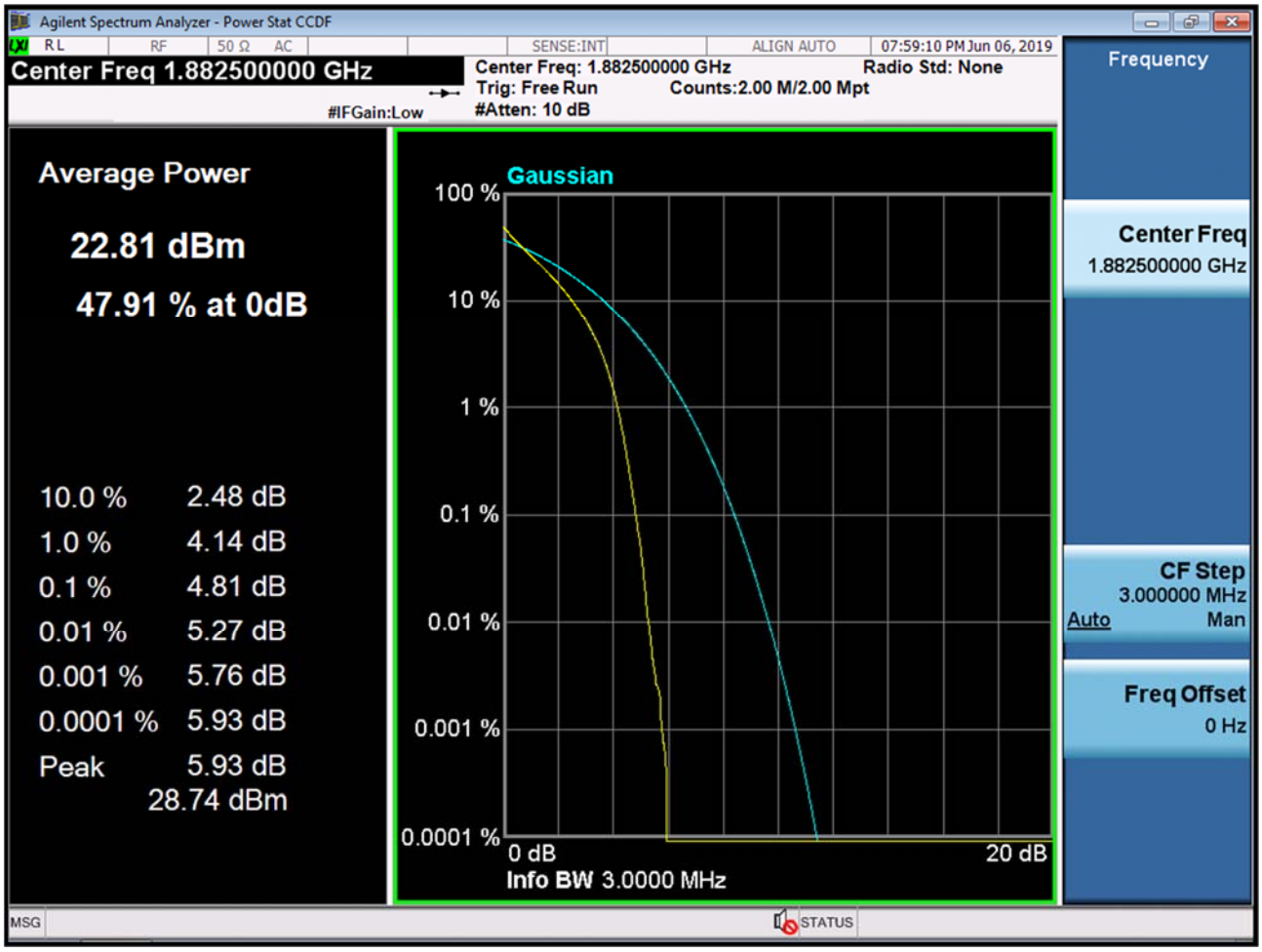
BAND 2. PAR Plot (1.4M BW Ch.26365 16QAM RB 6_0)



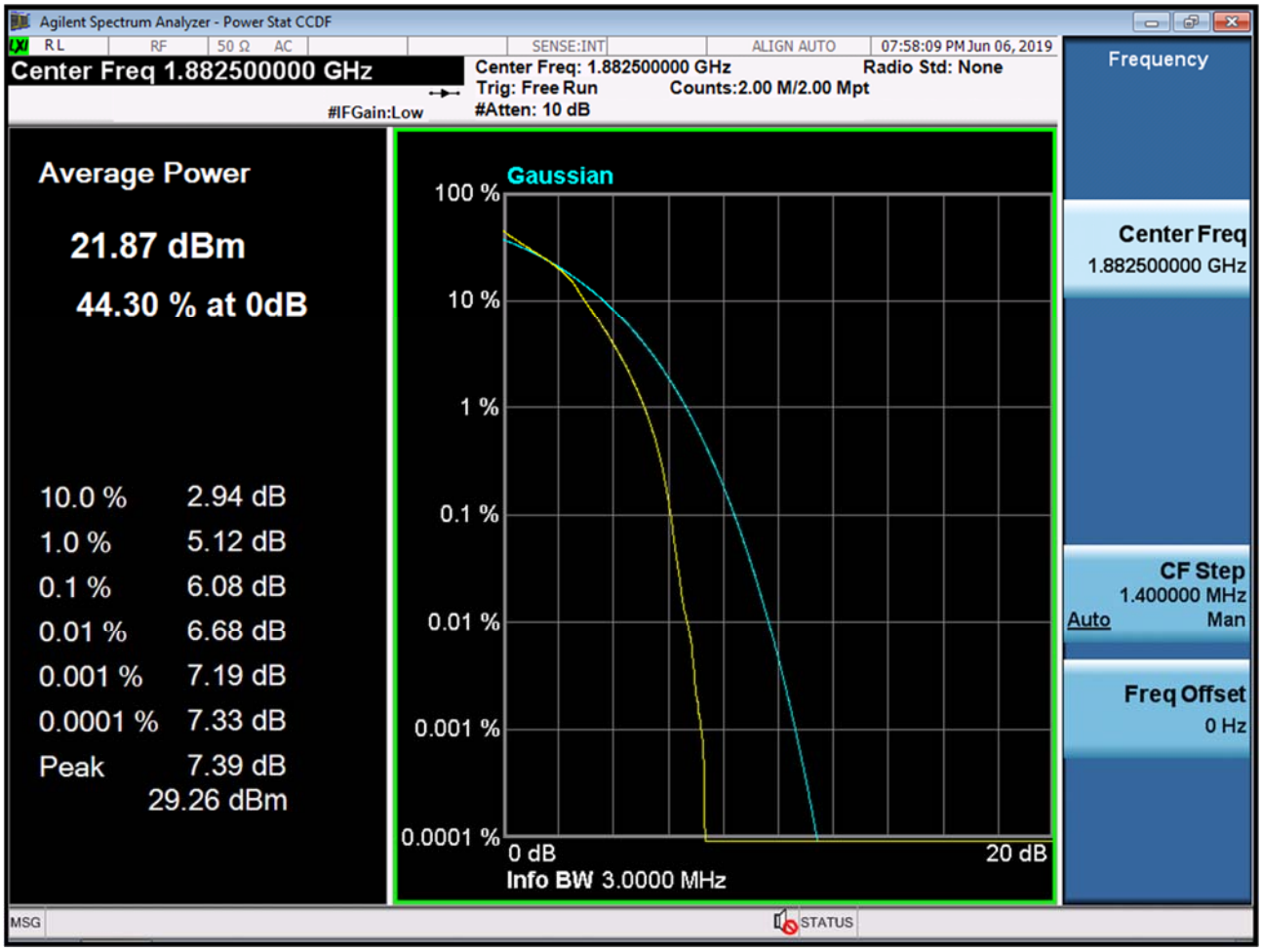
BAND 2. PAR Plot (1.4M BW Ch.26365 64QAM RB 6_0)



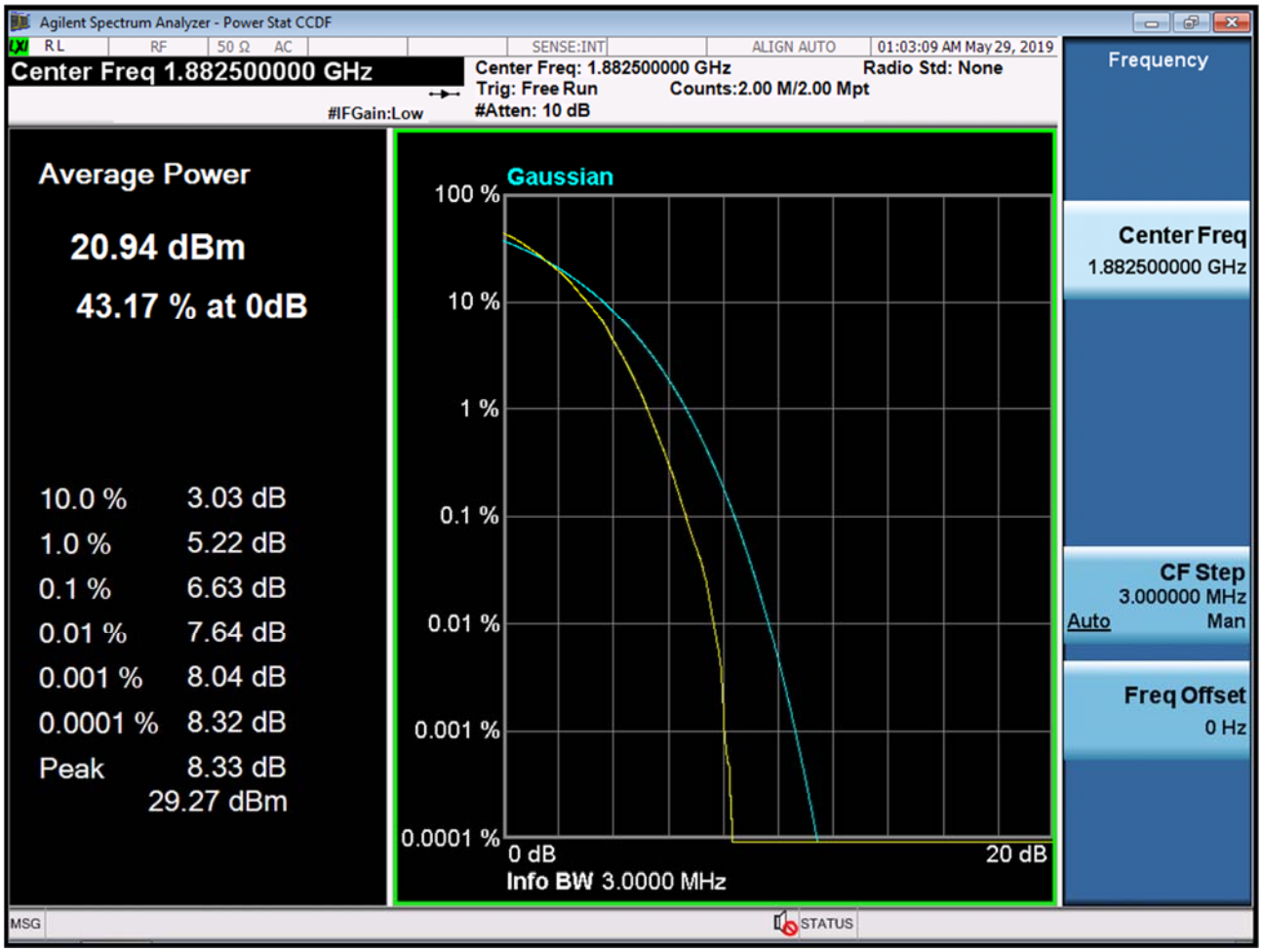
BAND 2. PAR Plot (3M BW Ch.26365 QPSK RB 15_0)



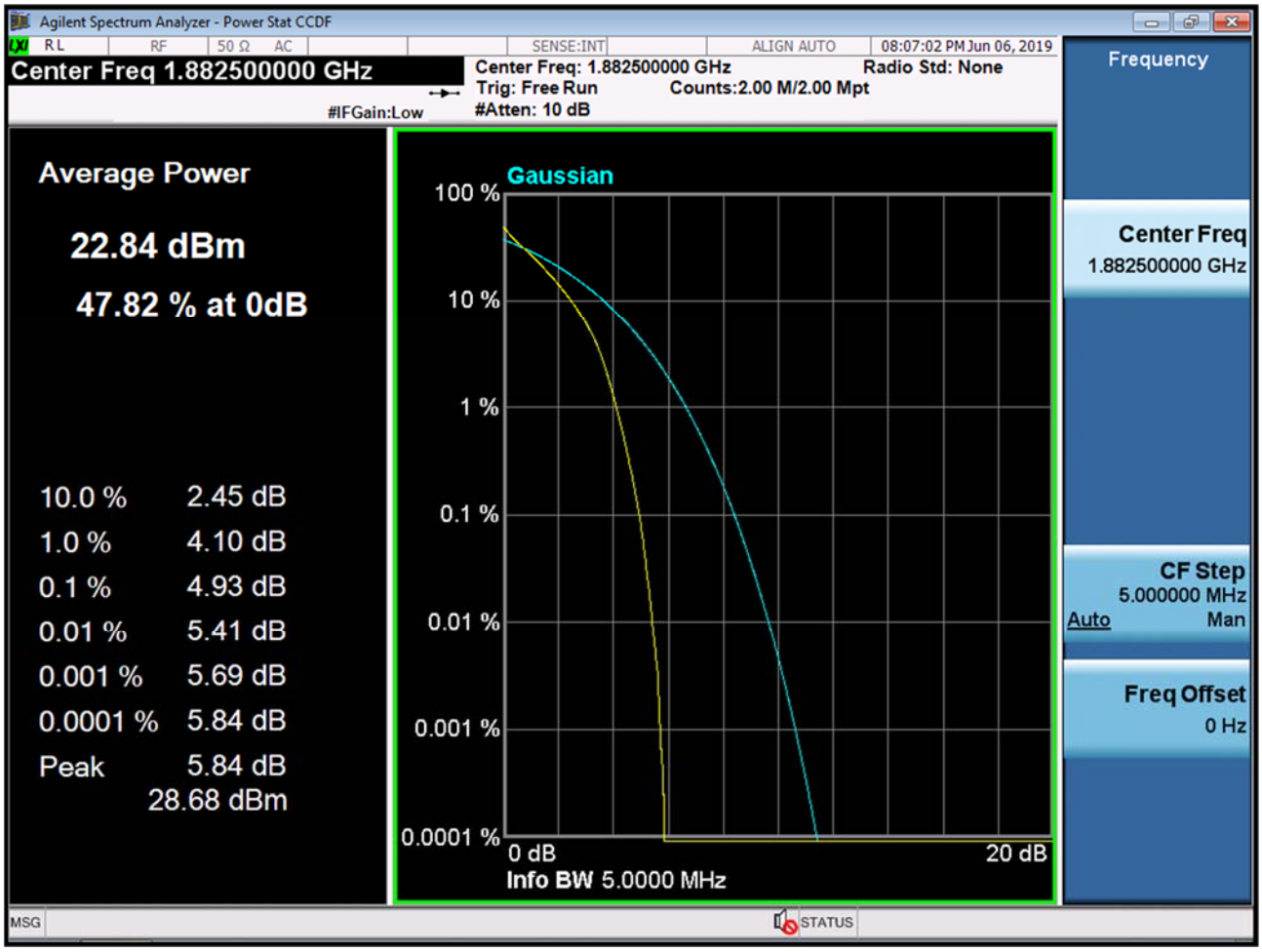
BAND 2. PAR Plot (3M BW Ch.26365 16QAM RB 15_0)



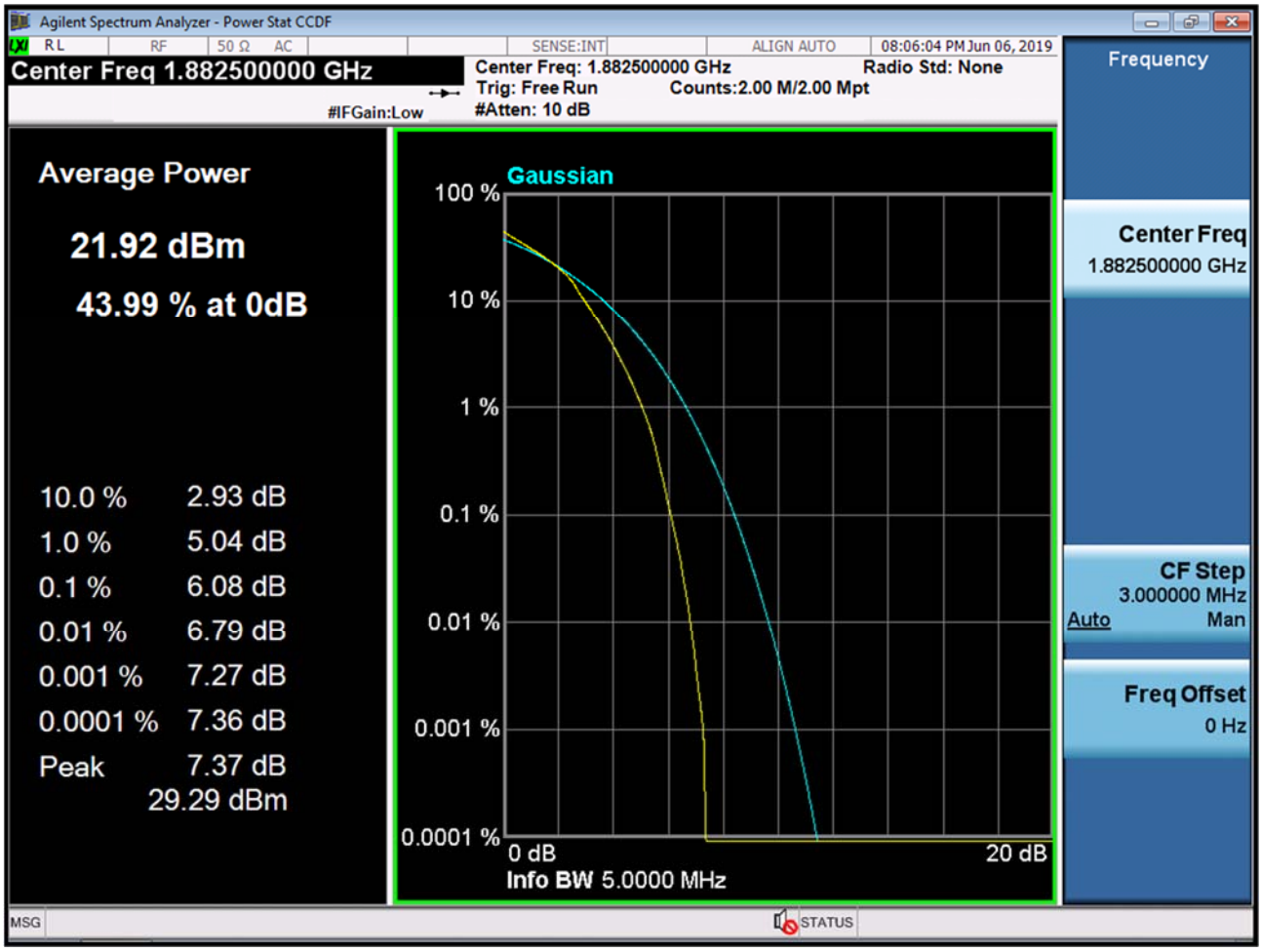
BAND 2. PAR Plot (3M BW Ch.26365 64QAM RB 15_0)



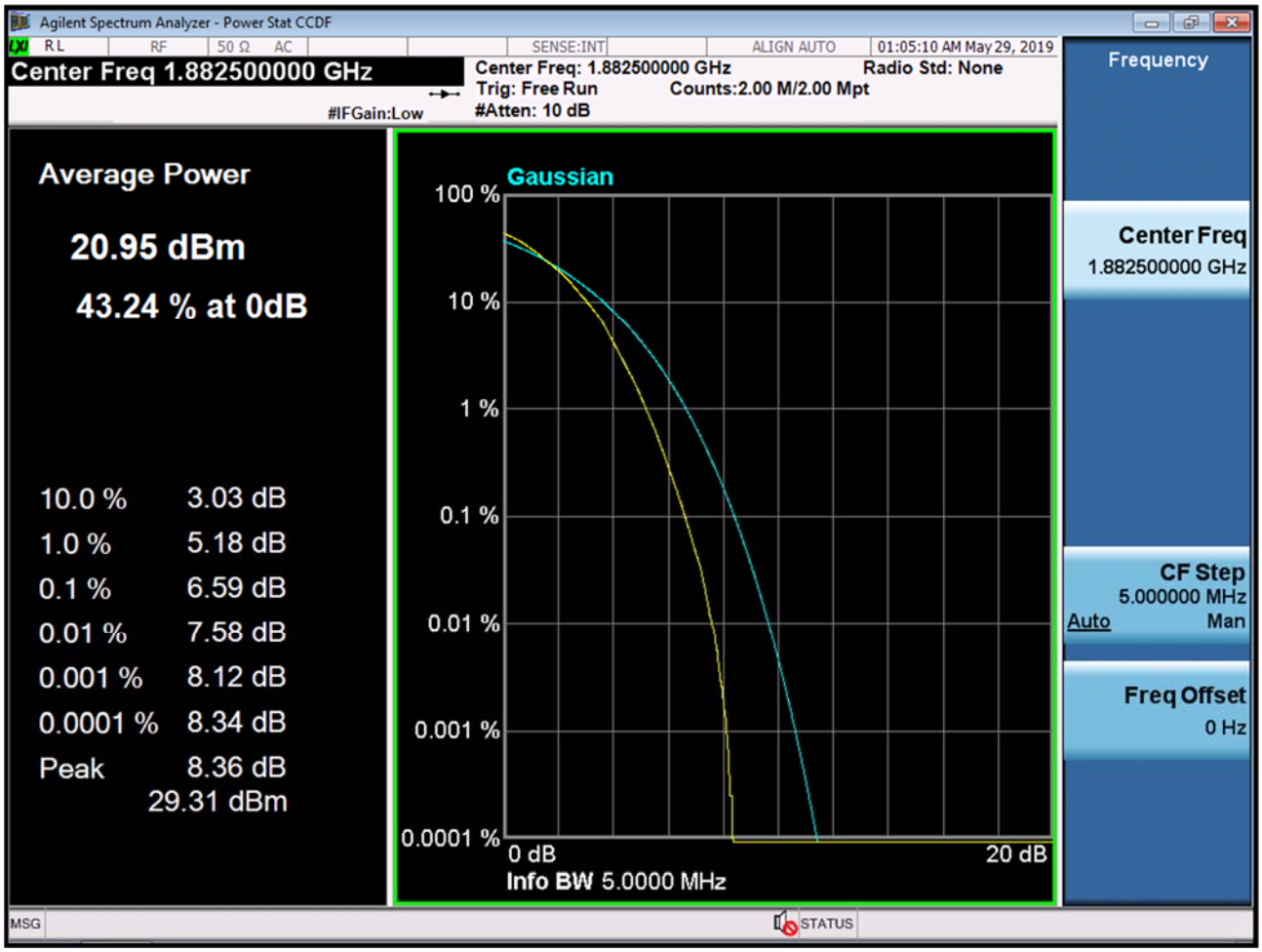
BAND 2. PAR Plot (5M BW Ch.26365 QPSK RB 25_0)



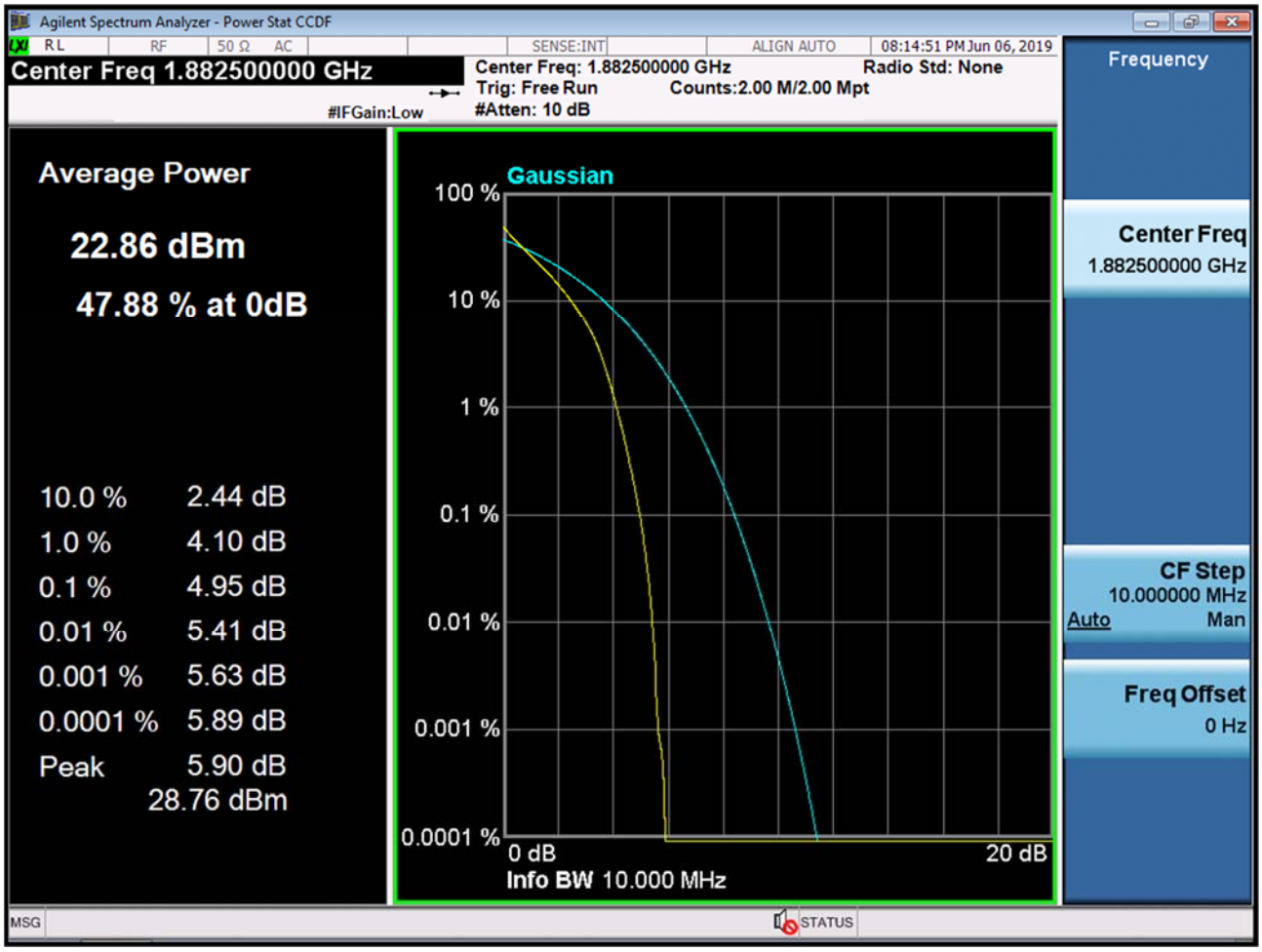
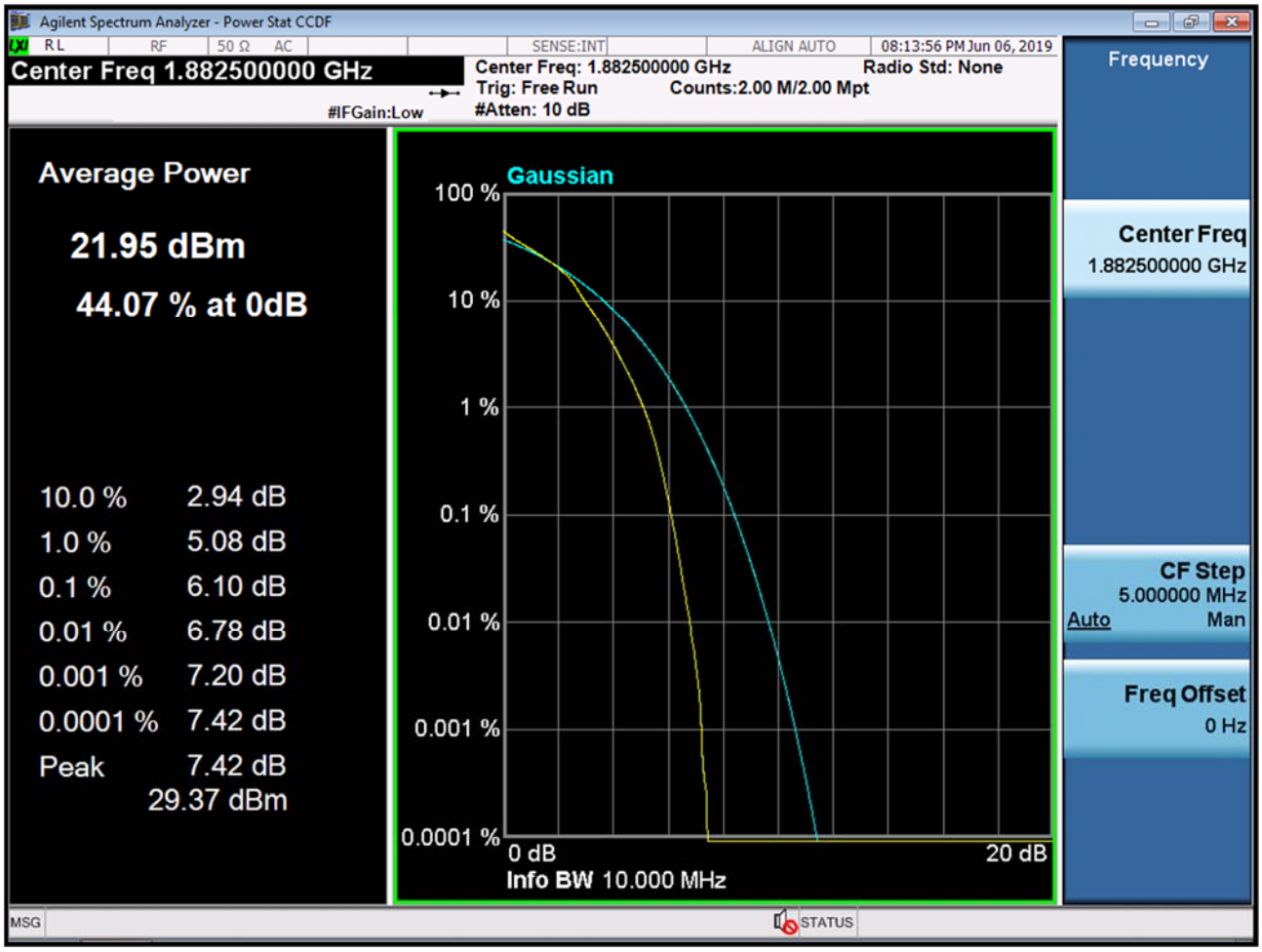
BAND 2. PAR Plot (5M BW Ch.26365 16QAM RB 25_0)



BAND 2. PAR Plot (5M BW Ch.26365 64QAM RB 25_0)



BAND 2. PAR Plot (10M BW Ch.26365 QPSK RB 50_0)



BAND 2. PAR Plot (10M BW Ch.26365 16QAM RB 50_0)