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FCC LTE REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

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

Date of Issue:
March 29, 2019

Location:
HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-RF-1903-FC058

FCC ID:	**A3LSMA202F**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

Model(s): SM-A202F/DS
EUT Type: Mobile Phone
FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s): §24, §2

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	EIRP	
				Max. Power (W)	Max. Power (W)
LTE – Band2 (1.4)	1850.7 - 1909.3	1M10G7D	QPSK	0.178	22.50
		1M10W7D	16QAM	0.131	21.16
LTE – Band2 (3)	1851.5 - 1908.5	2M72G7D	QPSK	0.179	22.53
		2M71W7D	16QAM	0.135	21.31
LTE – Band2 (5)	1852.5 - 1907.5	4M53G7D	QPSK	0.175	22.44
		4M53W7D	16QAM	0.131	21.18
LTE – Band2 (10)	1855.0 - 1905.0	9M01G7D	QPSK	0.166	22.20
		9M00W7D	16QAM	0.122	20.88
LTE – Band2 (15)	1857.5 - 1902.5	13M5G7D	QPSK	0.176	22.46
		13M5W7D	16QAM	0.128	21.07
LTE – Band2 (20)	1860.0 - 1900.0	17M9G7D	QPSK	0.175	22.44
		17M9W7D	16QAM	0.129	21.09

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)

Report prepared by : Jae Ryang Do
Engineer of Telecommunication Testing Center

Report approved by : Kwon Jeong
Manager of Telecommunication Testing Center

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1903-FC058	March 29, 2019	- First Approval Report

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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:	A3LSMA202F
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§24, §2
EUT Type:	Mobile Phone
Model(s):	SM-A202F/DS
Tx Frequency:	1850.7 MHz – 1909.3 MHz (LTE – Band2 (1.4 MHz)) 1851.5 MHz – 1908.5 MHz (LTE – Band2 (3 MHz)) 1852.5 MHz – 1907.5 MHz (LTE – Band2 (5 MHz)) 1855.0 MHz – 1905.0 MHz (LTE – Band2 (10 MHz)) 1857.5 MHz – 1902.5 MHz (LTE – Band2 (15 MHz)) 1860.0 MHz – 1900.0 MHz (LTE – Band2 (20 MHz))
Date(s) of Tests:	March 14, 2019 ~ March 26, 2019

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS and LTE.

It also supports IEEE 802.11 b/g/n, Bluetooth, BTLE, NFC.

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
Transmitter Output Power	- KDB 971168 D01 v03r01 - Section 5.2.4 - ANSI C63.26-2015 - Section 5.2.1 & 5.2.4.2
Peak- to- Average Ratio	- KDB 971168 D01 v03r01 – Section 5.7 - ANSI C63.26-2015 – Section 5.2.3.4 - 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 C63.26-2015 – Section 5.2 - 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.

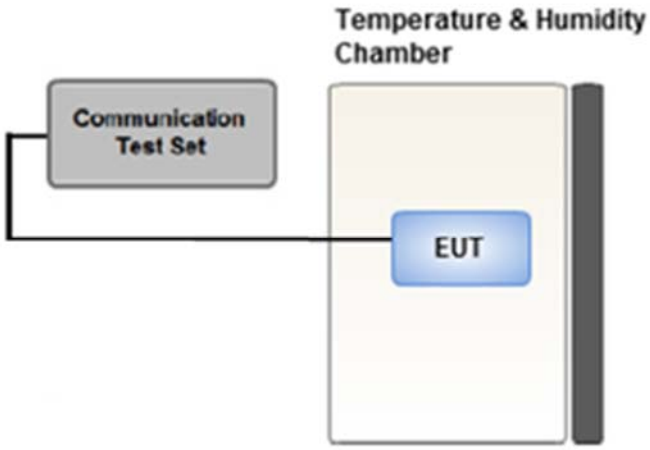
   The power is calculated by the following formula;

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

   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 Transmitter Output Power



Test setup

Test Overview

According to ANSI C63.26-2015 Section 5.2.1 when measuring the maximum RF output power from such devices, control over the EUT must be provided either through special test software (provided by manufacturer specifically for compliance testing, but not accessible by an end user) or through use of a base station emulator, communications test set, call box, or similar instrumentation that is capable of establishing a communications link with the EUT to enable control over variable parameters (e.g., output power, OBW, etc.).

In some cases, these instruments also include basic digital spectrum analyzer and/or power meter capabilities that can be utilized to measure the RF output power if the specified detectors and requirements can be realized and the measurement functions have been calibrated.

Test Settings

1. The RF port of the EUT was connected to the Communication Tester via an RF cable.
2. Conducted average power was measured using a calibrated Radio Communication Tester.

3.4 RADIATED SPURIOUS EMISSIONS

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

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

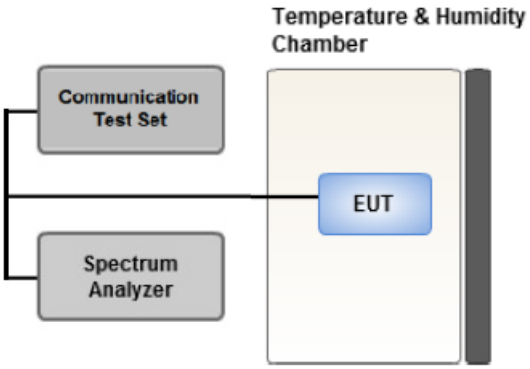
Test Settings

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 10^{th} 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

3.5 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:

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

Test Settings(Peak Power)

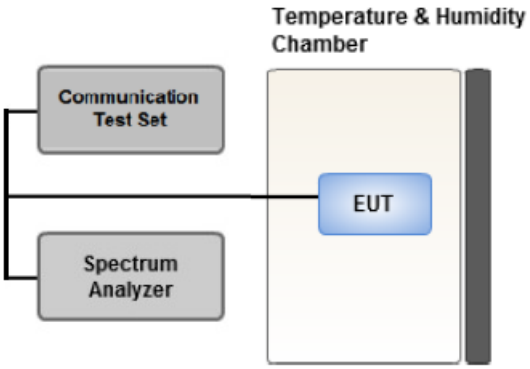
The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW ≥ 3 × RBW.

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%.

3.6 OCCUPIED BANDWIDTH.



Test setup

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

The EUT makes a call to the communication simulator.

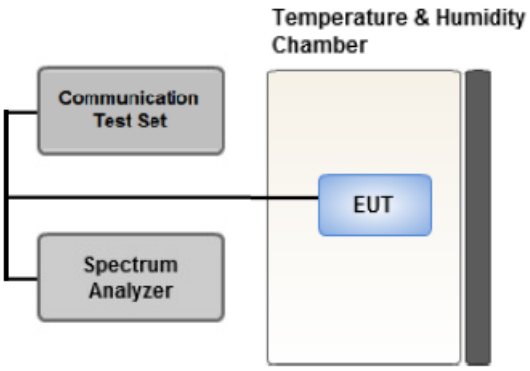
The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

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

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 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

3.7 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

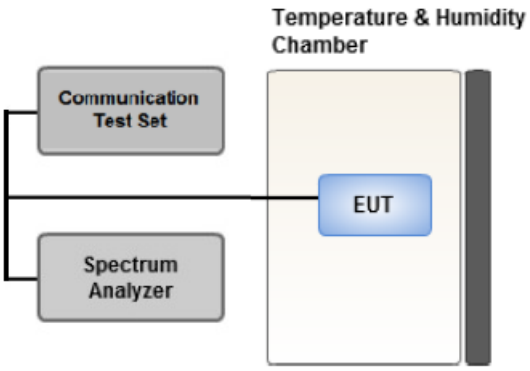
Test Overview

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

3.8 BAND EDGE



Test setup

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1% of the emission bandwidth
4. VBW > 3 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

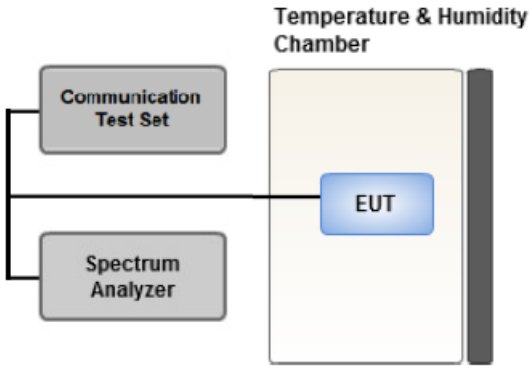
Test Notes

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.

3.9 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



Test setup

Test Overview

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015.

The frequency stability of the transmitter is measured by:

1. Temperature:

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

2. Primary Supply Voltage:

   .- Unless otherwise specified, vary primary supply voltage from 85% to 115% of the nominal value for other than hand carried battery equipment.

   .- For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

Test Settings

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

3.10 WORST CASE(RADIATED TEST)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.
- The worst case is reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the test data.
- Please refer to the table below.

[Worst case]

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

3.11 WORST CASE(CONDUCTED TEST)

[Worst case]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Transmitter Output Power	QPSK, 16QAM,	1.4, 3, 5, 10	Low Mid High	1	0
Occupied Bandwidth	QPSK, 16QAM,	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.

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Date	Calibration Interval	Calibration Due
REOHDE & SCHWARZ	SCU 18 / AMPLIFIER	10094	04/17/2018	Annual	04/17/2019
Wainwright	WHK1.2/15G-10EF/H.P.F	4	04/04/2018	Annual	04/04/2019
Wainwright	WHK3.3/18G-10EF/H.P.F	2	04/04/2018	Annual	04/04/2019
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	5001	06/07/2018	Annual	06/07/2019
Agilent	E3632A/DC Power Supply	KR75303243	05/09/2018	Annual	05/09/2019
Schwarzbeck	UHAP/ Dipole Antenna	557	03/31/2017	Biennial	03/31/2019
Schwarzbeck	UHAP/ Dipole Antenna	558	03/31/2017	Biennial	03/31/2019
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	04/25/2017	Biennial	04/25/2019
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170124	04/25/2017	Biennial	04/25/2019
Agilent	N9020A/Signal Analyzer(10Hz~26.5GHz)	MY52090906	06/08/2018	Annual	06/08/2019
Hewlett Packard	8493C/ATTENUATOR(20dB)	17280	06/21/2018	Annual	06/21/2019
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	04/06/2017	Biennial	04/06/2019
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)	5.71

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
Transmitter Output Power	§2.1046	< 7 Watts max. ERP	PASS
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. 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 B2/ 1.4 MHz	QPSK	-18.86	13.18	10.27	1.34	H	< 2.00	0.163	22.11
		16-QAM	-20.20	11.84	10.27	1.34	H		0.119	20.77
1880.0		QPSK	-18.56	13.57	10.29	1.36	H		0.178	22.50
		16-QAM	-19.90	12.23	10.29	1.36	H		0.131	21.16
1909.3		QPSK	-20.83	11.70	10.31	1.37	H		0.116	20.64
		16-QAM	-22.05	10.48	10.31	1.37	H		0.087	19.42

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 B2/ 3 MHz	QPSK	-18.89	13.15	10.27	1.34	H	< 2.00	0.161	22.08
		16-QAM	-20.15	11.89	10.27	1.34	H		0.121	20.82
1880.0		QPSK	-18.53	13.60	10.29	1.36	H		0.179	22.53
		16-QAM	-19.75	12.38	10.29	1.36	H		0.135	21.31
1908.5		QPSK	-20.56	11.97	10.31	1.37	H		0.123	20.91
		16-QAM	-21.76	10.77	10.31	1.37	H		0.093	19.71

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 B2/ 5 MHz	QPSK	-18.91	13.13	10.27	1.34	H	< 2.00	0.161	22.06
		16-QAM	-20.03	12.01	10.27	1.34	H		0.124	20.94
1880.0		QPSK	-18.62	13.51	10.29	1.36	H		0.175	22.44
		16-QAM	-19.88	12.25	10.29	1.36	H		0.131	21.18
1907.5		QPSK	-20.36	12.17	10.31	1.37	H		0.129	21.11
		16-QAM	-21.50	11.03	10.31	1.37	H		0.099	19.97

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 B2/ 10 MHz	QPSK	-18.88	13.12	10.28	1.34	H	< 2.00	0.160	22.05
		16-QAM	-20.22	11.78	10.28	1.34	H		0.118	20.71
1880.0		QPSK	-18.86	13.27	10.29	1.36	H		0.166	22.20
		16-QAM	-20.18	11.95	10.29	1.36	H		0.122	20.88
1905.0		QPSK	-19.99	12.43	10.31	1.37	H		0.137	21.37
		16-QAM	-21.30	11.12	10.31	1.37	H		0.101	20.06

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 B2/ 15 MHz	QPSK	-18.87	13.09	10.28	1.34	H	< 2.00	0.159	22.03
		16-QAM	-20.10	11.86	10.28	1.34	H		0.120	20.80
1880.0		QPSK	-18.60	13.53	10.29	1.36	H		0.176	22.46
		16-QAM	-19.99	12.14	10.29	1.36	H		0.128	21.07
1902.5		QPSK	-20.01	12.30	10.31	1.36	H		0.133	21.25
		16-QAM	-21.26	11.05	10.31	1.36	H		0.100	20.00

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 B2/ 20 MHz	QPSK	-18.88	13.08	10.28	1.34	H	< 2.00	0.159	22.02
		16-QAM	-20.19	11.77	10.28	1.34	H		0.118	20.71
1880.0		QPSK	-18.62	13.51	10.29	1.36	H		0.175	22.44
		16-QAM	-19.97	12.16	10.29	1.36	H		0.129	21.09
1900.0		QPSK	-19.54	12.77	10.31	1.36	H		0.149	21.72
		16-QAM	-20.81	11.50	10.31	1.36	H		0.111	20.45

8.2 Transmitter Output Power

Modulation	RB Size	RB Offset	Conducted Average Power (dBm)		
			18607	18900	19193
			1850.7 MHz	1880 MHz	1909.3 MHz
QPSK	1	0	22.96	23.77	23.20
	1	3	22.93	23.82	23.29
	1	5	22.84	23.79	23.43
	3	0	22.97	23.83	23.34
	3	1	22.99	23.76	23.36
	3	3	23.02	23.78	23.35
	6	0	22.03	22.71	22.36
16QAM	1	0	21.73	22.47	21.98
	1	3	21.87	22.50	22.01
	1	5	21.80	22.43	22.07
	3	0	21.99	22.73	22.26
	3	1	21.96	22.67	22.27
	3	3	21.95	22.68	22.30
	6	0	21.05	21.77	21.29

Note:

1. Limit: 2 W(=33.01dBm)
2. Bandwidth : 1.4 MHz

Modulation	RB Size	RB Offset	Conducted Average Power (dBm)		
			18615	18900	19185
			1851.5 MHz	1880 MHz	1908.5 MHz
QPSK	1	0	23.00	23.78	23.38
	1	7	22.97	23.83	23.33
	1	14	23.03	23.80	23.43
	8	0	22.03	22.66	22.31
	8	3	22.03	22.71	22.38
	8	7	22.02	22.74	22.31
	15	0	22.04	22.70	22.35
16QAM	1	0	21.82	22.59	22.11
	1	7	21.78	22.58	22.23
	1	14	21.97	22.55	22.03
	8	0	21.01	21.76	21.30
	8	3	21.07	21.71	21.33
	8	7	21.00	21.69	21.33
	15	0	21.06	21.75	21.36

Note:

1. Limit: 2 W(=33.01dBm)
2. Bandwidth : 3 MHz

Modulation	RB Size	RB Offset	Conducted Average Power (dBm)		
			18625	18900	19175
			1852.5 MHz	1880 MHz	1907.5 MHz
QPSK	1	0	23.08	23.81	23.46
	1	12	23.06	23.81	23.44
	1	24	23.10	23.89	23.49
	12	0	22.08	22.68	22.38
	12	6	22.05	22.73	22.34
	12	11	22.01	22.70	22.38
	25	0	22.05	22.71	22.36
16QAM	1	0	21.80	22.55	22.12
	1	12	22.05	22.58	22.25
	1	24	22.06	22.69	22.18
	12	0	21.05	21.73	21.32
	12	6	21.05	21.68	21.37
	12	11	21.02	21.80	21.38
	25	0	21.07	21.72	21.41

Note:

1. Limit: 2 W(=33.01dBm)
2. Bandwidth : 5 MHz

Modulation	RB Size	RB Offset	Conducted Average Power (dBm)		
			18650	18900	19150
			1855 MHz	1880 MHz	1905 MHz
QPSK	1	0	23.23	23.73	23.40
	1	24	23.19	23.77	23.54
	1	49	23.25	23.86	23.47
	25	0	22.11	22.70	22.44
	25	12	22.14	22.70	22.45
	25	24	22.15	22.76	22.45
	50	0	22.14	22.73	22.44
16QAM	1	0	21.96	22.62	22.24
	1	24	21.99	22.56	22.37
	1	49	21.96	22.63	22.23
	25	0	21.08	21.75	21.47
	25	12	21.17	21.76	21.43
	25	24	21.07	21.77	21.44
	50	0	21.18	21.77	21.50

Note:

1. Limit: 2 W(=33.01dBm)
2. Bandwidth : 10 MHz

Modulation	RB Size	RB Offset	Conducted Average Power (dBm)		
			18675	18900	19125
			1857.5 MHz	1880 MHz	1902.5 MHz
QPSK	1	0	23.25	23.74	23.56
	1	36	23.16	23.76	23.57
	1	74	23.30	23.86	23.62
	36	0	22.10	22.68	22.46
	36	18	22.17	22.69	22.49
	36	39	22.13	22.76	22.52
	75	0	22.08	22.68	22.49
16QAM	1	0	21.98	22.55	22.29
	1	36	21.93	22.56	22.33
	1	74	22.12	22.70	22.39
	36	0	21.09	21.64	21.50
	36	18	21.07	21.75	21.48
	36	39	21.13	21.76	21.52
	75	0	21.15	21.78	21.49

Note:

1. Limit: 2 W(=33.01dBm)
2. Bandwidth : 15 MHz

Modulation	RB Size	RB Offset	Conducted Average Power (dBm)		
			18700	18900	19100
			1860 MHz	1880 MHz	1900 MHz
QPSK	1	0	23.26	23.76	23.60
	1	49	23.22	23.78	23.64
	1	99	23.27	23.89	23.72
	50	0	22.16	22.68	22.59
	50	25	22.20	22.66	22.61
	50	49	22.19	22.75	22.63
	100	0	22.17	22.74	22.58
16QAM	1	0	22.00	22.41	22.44
	1	49	22.03	22.64	22.40
	1	99	22.11	22.63	22.54
	50	0	21.18	21.74	21.57
	50	25	21.20	21.79	21.55
	50	49	21.26	21.82	21.69
	100	0	21.17	21.75	21.56

Note:

1. Limit: 2 W(=33.01dBm)
2. Bandwidth : 20 MHz

8.3 RADIATED SPURIOUS EMISSIONS

▣ OPERATING FREQUENTY: 1880.0 MHz

▣ MEASURED OUTPUT POWER: 22.50 dBm = 0.178 W

▣ MOD: LTE B2

▣ MODULATION SIGNAL: 1.4 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W) = 35.50 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
18607 (1850.7)	3,701.40	-52.24	12.51	-59.04	1.98	V	-48.51	71.01
	5,552.10	-44.46	13.62	-45.74	2.72	V	-34.84	57.35
	7,402.80	-57.54	11.50	-52.53	2.92	V	-43.95	66.46
18900 (1880.0)	3,760.00	-52.12	12.40	-58.56	2.00	H	-48.16	70.66
	5,640.00	-43.88	13.78	-44.71	2.70	H	-33.63	56.13
	7,520.00	-58.65	11.57	-53.44	2.93	H	-44.80	67.30
19193 (1909.3)	3,818.60	-52.94	12.52	-59.18	2.05	V	-48.71	71.21
	5,727.90	-46.08	13.69	-46.03	2.72	V	-35.06	57.56
	7,637.20	-57.55	11.99	-52.75	2.93	H	-43.69	66.19

▣ OPERATING FREQUENTY: 1880.0 MHz

▣ MEASURED OUTPUT POWER: 22.53 dBm = 0.179 W

▣ MOD: LTE B2

▣ MODULATION SIGNAL: 3 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 35.53 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
18615 (1851.5)	3,703.00	-51.40	12.51	-58.20	1.98	V	-47.67	70.20
	5,554.50	-45.67	13.63	-46.93	2.72	V	-36.02	58.55
	7,406.00	-58.42	11.50	-53.27	2.93	V	-44.70	67.23
18900 (1880.0)	3,760.00	-53.19	12.40	-59.63	2.00	V	-49.23	71.76
	5,640.00	-45.86	13.78	-46.69	2.70	V	-35.61	58.14
	7,520.00	-59.03	11.57	-53.82	2.93	V	-45.18	67.71
19185 (1908.5)	3,817.00	-53.78	12.52	-60.02	2.05	V	-49.55	72.08
	5,725.50	-50.68	13.70	-50.50	2.72	V	-39.53	62.06
	7,634.00	-57.78	11.97	-52.97	2.96	H	-43.96	66.49

▣ OPERATING FREQUENTY: 1880.00 MHz

▣ MEASURED OUTPUT POWER: 22.44 dBm = 0.175 W

▣ MOD: LTE B2

▣ MODULATION SIGNAL: 5 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log_{10} (W) = 35.44 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
18625 (1852.5)	3,705.00	-52.02	12.50	-58.65	2.00	V	-48.14	70.58
	5,557.50	-46.15	13.64	-47.39	2.71	H	-36.46	58.90
	7,410.00	-58.02	11.50	-52.73	2.93	H	-44.16	66.60
18900 (1880.0)	3,760.00	-52.44	12.40	-58.88	2.00	V	-48.48	70.92
	5,640.00	-45.71	13.78	-46.54	2.70	V	-35.46	57.90
	7,520.00	-58.48	11.57	-53.27	2.93	V	-44.63	67.07
19175 (1907.5)	3,815.00	-54.23	12.52	-60.60	2.06	V	-50.13	72.57
	5,722.50	-47.42	13.70	-47.11	2.72	V	-36.13	58.57
	7,630.00	-58.45	11.95	-53.64	2.98	V	-44.67	67.11

▣ OPERATING FREQUENTY: 1880.00 MHz

▣ MEASURED OUTPUT POWER: 22.20 dBm = 0.166 W

▣ MOD: LTE B2

▣ MODULATION SIGNAL: 10 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log_{10} (W) = 35.20 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
18650 (1855.0)	3,710.00	-52.27	12.49	-58.73	2.01	V	-48.25	70.45
	5,565.00	-46.39	13.65	-47.67	2.71	V	-36.73	58.93
	7,420.00	-58.18	11.51	-52.80	2.94	H	-44.23	66.43
18900 (1880.0)	3,760.00	-50.39	12.40	-56.83	2.00	V	-46.43	68.63
	5,640.00	-46.51	13.78	-47.34	2.70	H	-36.26	58.46
	7,520.00	-57.69	11.57	-52.48	2.93	V	-43.84	66.04
19150 (1905.0)	3,810.00	-52.53	12.52	-59.03	2.06	V	-48.57	70.77
	5,715.00	-46.35	13.70	-46.17	2.72	V	-35.19	57.39
	7,620.00	-58.47	11.90	-53.67	2.94	V	-44.71	66.91

▣ OPERATING FREQUENTY: 1880.00 MHz

▣ MEASURED OUTPUT POWER: 22.46 dBm = 0.176 W

▣ MOD: LTE B2

▣ MODULATION SIGNAL: 15 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log_{10} (W) = 35.46 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
18675 (1857.5)	3,715.00	-53.11	12.49	-59.76	2.02	V	-49.29	71.75
	5,572.50	-46.18	13.66	-47.50	2.71	V	-36.55	59.01
	7,430.00	-57.47	11.51	-52.25	2.94	V	-43.68	66.14
18900 (1880.0)	3,760.00	-52.05	12.40	-58.49	2.00	V	-48.09	70.55
	5,640.00	-47.51	13.78	-48.34	2.70	H	-37.26	59.72
	7,520.00	-58.27	11.57	-53.06	2.93	H	-44.42	66.88
19125 (1902.5)	3,805.00	-51.05	12.52	-57.29	2.09	V	-46.86	69.33
	5,707.50	-48.79	13.70	-48.74	2.72	V	-37.76	60.22
	7,610.00	-58.42	11.87	-53.40	3.00	H	-44.53	66.99

▣ OPERATING FREQUENTY: 1880.00 MHz

▣ MEASURED OUTPUT POWER: 22.44 dBm = 0.175 W

▣ MOD: LTE B2

▣ MODULATION SIGNAL: 20 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 35.44 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	dBc
18700 (1860.0)	3,720.00	-52.55	12.48	-59.39	2.03	V	-48.94	71.38
	5,580.00	-46.65	13.69	-47.71	2.69	V	-36.71	59.15
	7,440.00	-58.17	11.52	-53.08	2.89	V	-44.45	66.89
18900 (1880.0)	3,760.00	-53.44	12.40	-59.88	2.00	V	-49.48	71.92
	5,640.00	-52.33	13.78	-53.16	2.70	V	-42.08	64.52
	7,520.00	-58.76	11.57	-53.55	2.93	H	-44.91	67.35
19100 (1900.0)	3,800.00	-50.45	12.52	-56.44	2.12	V	-46.04	68.48
	5,700.00	-48.63	13.71	-48.96	2.74	V	-37.99	60.43
	7,600.00	-58.36	11.85	-53.09	2.90	H	-44.14	66.58

8.4 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
2	1.4 MHz	1880.0	QPSK	6	0	5.93
			16-QAM	6	0	6.39
	3 MHz		QPSK	15	0	5.92
			16-QAM	15	0	6.48
	5 MHz		QPSK	25	0	5.82
			16-QAM	25	0	6.50
	10 MHz		QPSK	50	0	5.85
			16-QAM	50	0	6.43
	15 MHz		QPSK	75	0	5.83
			16-QAM	75	0	6.47
	20 MHz		QPSK	100	0	5.85
			16-QAM	100	0	6.53

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 72 ~ 83.

8.5 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
2	1.4 MHz	1880.0	QPSK	6	0	1.1006
			16-QAM	6	0	1.0965
	3 MHz		QPSK	15	0	2.7202
			16-QAM	15	0	2.7065
	5 MHz		QPSK	25	0	4.5283
			16-QAM	25	0	4.5258
	10 MHz		QPSK	50	0	9.0055
			16-QAM	50	0	8.9961
	15 MHz		QPSK	75	0	13.471
			16-QAM	75	0	13.468
	20 MHz		QPSK	100	0	17.909
			16-QAM	100	0	17.910

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 60 ~ 71.

8.6 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
2	1.4	1850.7	5.5514	28.591	-64.553	-35.962	-13.00
		1880.0	5.6391	28.591	-65.365	-36.774	
		1909.3	5.7298	28.591	-66.302	-37.711	
	3	1851.5	5.5514	28.591	-64.156	-35.565	
		1880.0	5.6371	28.591	-64.784	-36.193	
		1908.5	5.7298	28.591	-67.423	-38.832	
	5	1852.5	5.5519	28.591	-65.567	-36.976	
		1880.0	5.6341	28.591	-65.953	-37.362	
		1907.5	5.7298	28.591	-67.475	-38.884	
	10	1855.0	5.5524	28.591	-63.861	-35.270	
		1880.0	5.6272	28.591	-65.079	-36.488	
		1905.0	5.7289	28.591	-68.864	-40.273	
	15	1857.5	5.5534	28.591	-64.484	-35.893	
		1880.0	5.6207	28.591	-65.130	-36.539	
		1902.5	5.7284	28.591	-67.425	-38.834	
	20	1860.0	5.5539	28.591	-62.657	-34.066	
		1880.0	5.6142	28.591	-64.937	-36.346	
		1900.0	5.7274	28.591	-67.453	-38.862	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 120 ~ 155.
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

8.7 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 84 ~ 119.

8.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

▣ MODE: LTE B2

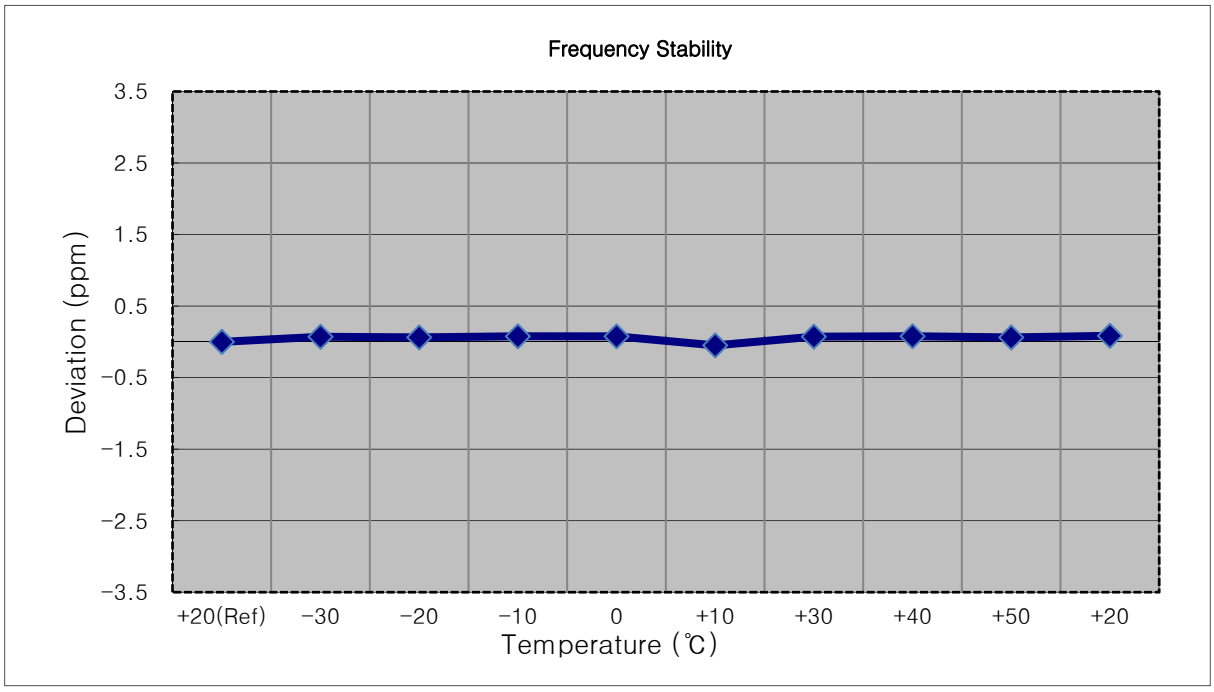
▣ OPERATING FREQUENCY: 1850,700,000 Hz

▣ CHANNEL: 18607 (1.4 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1850 700 153	0.0	0.000 000	0.000
100%		-30	1850 700 285	132.5	0.000 007	0.072
100%		-20	1850 700 268	115.4	0.000 006	0.062
100%		-10	1850 700 296	143.2	0.000 008	0.077
100%		0	1850 700 295	141.7	0.000 008	0.077
100%		+10	1850 700 061	-91.8	-0.000 005	-0.050
100%		+30	1850 700 289	135.7	0.000 007	0.073
100%		+40	1850 700 298	144.7	0.000 008	0.078
100%		+50	1850 700 268	114.8	0.000 006	0.062
Batt. Endpoint	3.400	+20	1850 700 309	156.0	0.000 008	0.084



▣ MODE: LTE B2

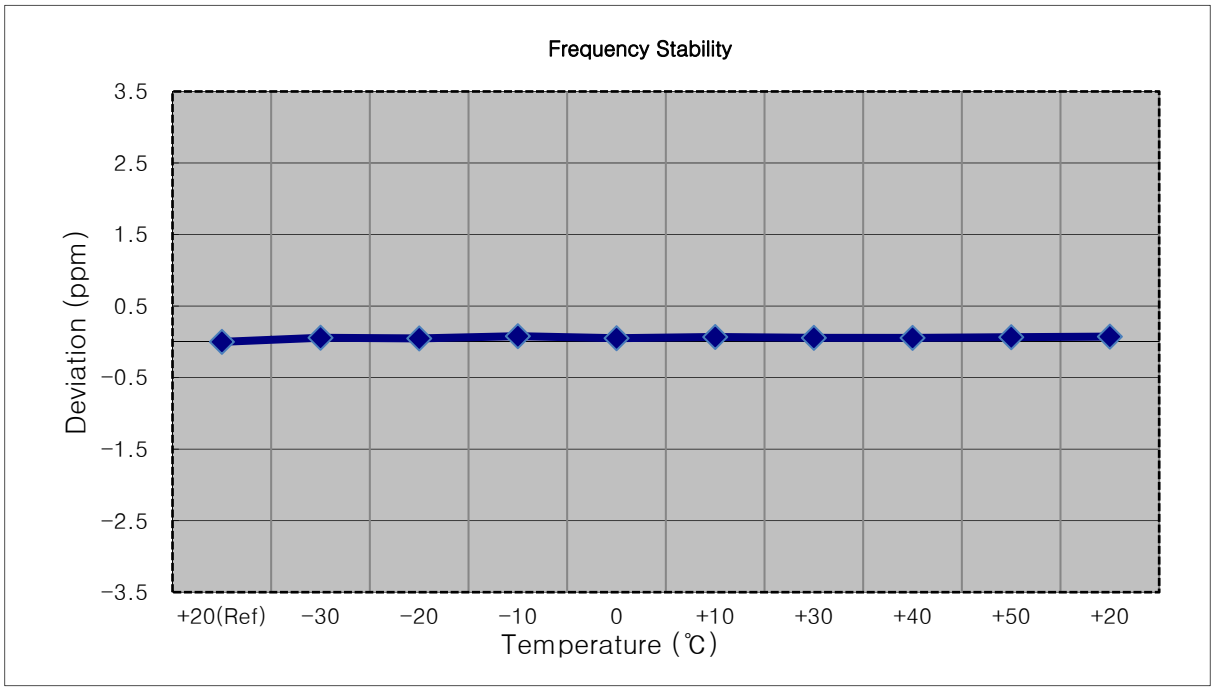
▣ OPERATING FREQUENCY: 1851,500,000 Hz

▣ CHANNEL: 18615 (3 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1851 500 138	0.0	0.000 000	0.000
100%		-30	1851 500 244	106.0	0.000 006	0.057
100%		-20	1851 500 227	88.8	0.000 005	0.048
100%		-10	1851 500 285	146.9	0.000 008	0.079
100%		0	1851 500 232	94.2	0.000 005	0.051
100%		+10	1851 500 264	125.5	0.000 007	0.068
100%		+30	1851 500 241	103.3	0.000 006	0.056
100%		+40	1851 500 240	102.0	0.000 006	0.055
100%		+50	1851 500 258	119.7	0.000 006	0.065
Batt. Endpoint	3.400	+20	1851 500 273	135.4	0.000 007	0.073



▣ MODE: LTE B2

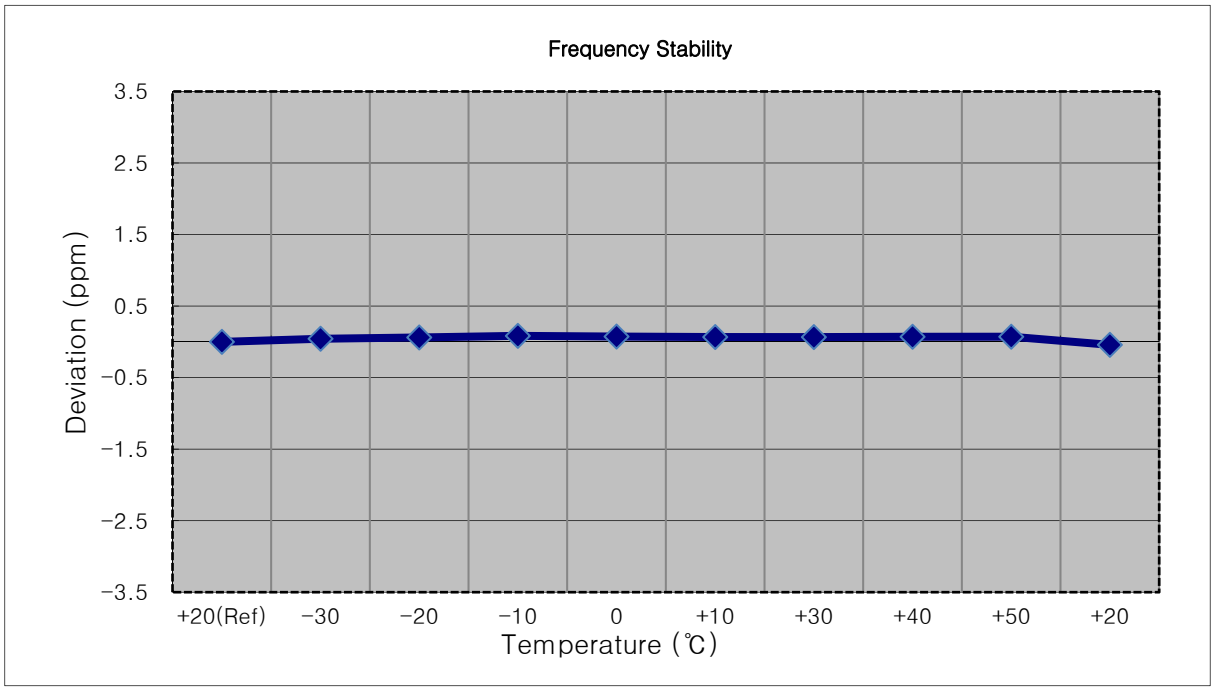
▣ OPERATING FREQUENCY: 1852,500,000 Hz

▣ CHANNEL: 18625 (5 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1852 500 139	0.0	0.000 000	0.000
100%		-30	1852 500 218	79.5	0.000 004	0.043
100%		-20	1852 500 252	112.8	0.000 006	0.061
100%		-10	1852 500 294	154.8	0.000 008	0.084
100%		0	1852 500 276	136.8	0.000 007	0.074
100%		+10	1852 500 264	124.9	0.000 007	0.067
100%		+30	1852 500 262	123.2	0.000 007	0.067
100%		+40	1852 500 269	130.5	0.000 007	0.070
100%		+50	1852 500 271	132.1	0.000 007	0.071
Batt. Endpoint	3.400	+20	1852 500 062	-76.9	-0.000 004	-0.042



▣ MODE: LTE B2

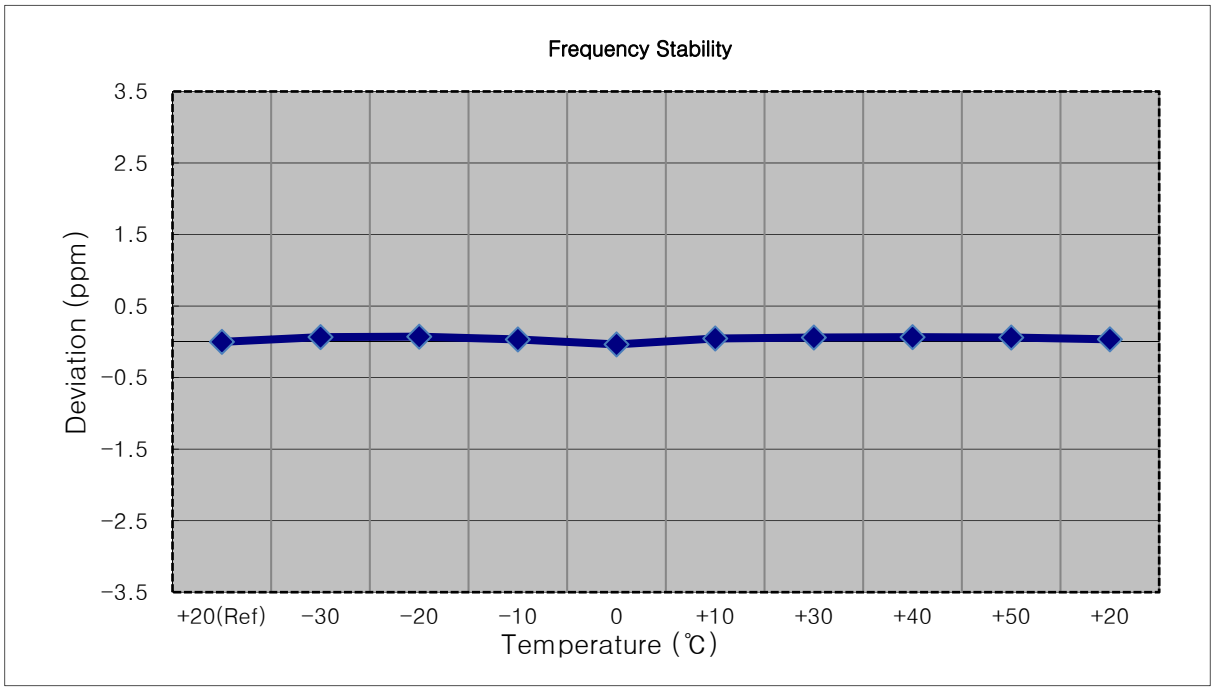
▣ OPERATING FREQUENCY: 1855,000,000 Hz

▣ CHANNEL: 18650 (10 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1855 000 115	0.0	0.000 000	0.000
100%		-30	1855 000 238	123.3	0.000 007	0.066
100%		-20	1855 000 249	134.7	0.000 007	0.073
100%		-10	1855 000 176	61.6	0.000 003	0.033
100%		0	1855 000 048	-67.0	-0.000 004	-0.036
100%		+10	1855 000 202	87.1	0.000 005	0.047
100%		+30	1855 000 227	112.0	0.000 006	0.060
100%		+40	1855 000 236	121.4	0.000 007	0.065
100%		+50	1855 000 227	111.9	0.000 006	0.060
Batt. Endpoint	3.400	+20	1855 000 180	65.3	0.000 004	0.035



▣ MODE: LTE B2

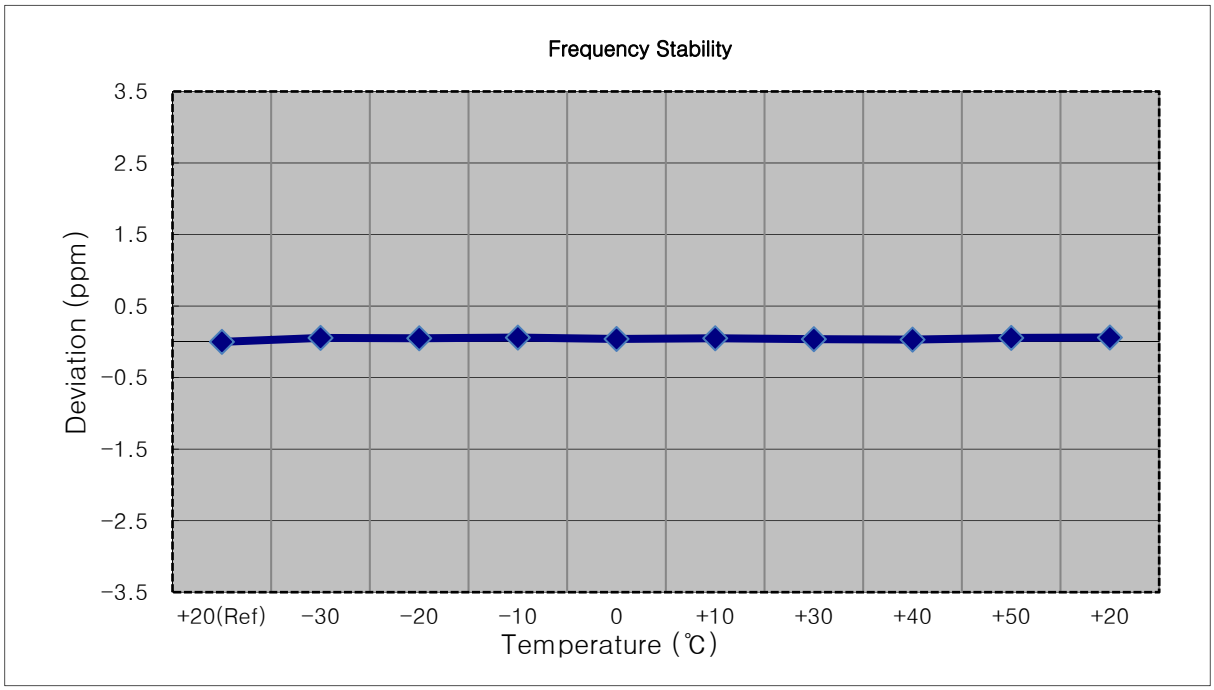
▣ OPERATING FREQUENCY: 1857,500,000 Hz

▣ CHANNEL: 18675 (15 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1857 500 082	0.0	0.000 000	0.000
100%		-30	1857 500 185	103.1	0.000 006	0.056
100%		-20	1857 500 174	92.1	0.000 005	0.050
100%		-10	1857 500 192	110.2	0.000 006	0.059
100%		0	1857 500 156	74.2	0.000 004	0.040
100%		+10	1857 500 175	93.2	0.000 005	0.050
100%		+30	1857 500 151	69.4	0.000 004	0.037
100%		+40	1857 500 139	57.6	0.000 003	0.031
100%		+50	1857 500 184	102.8	0.000 006	0.055
Batt. Endpoint	3.400	+20	1857 500 193	111.5	0.000 006	0.060



▣ MODE: LTE B2

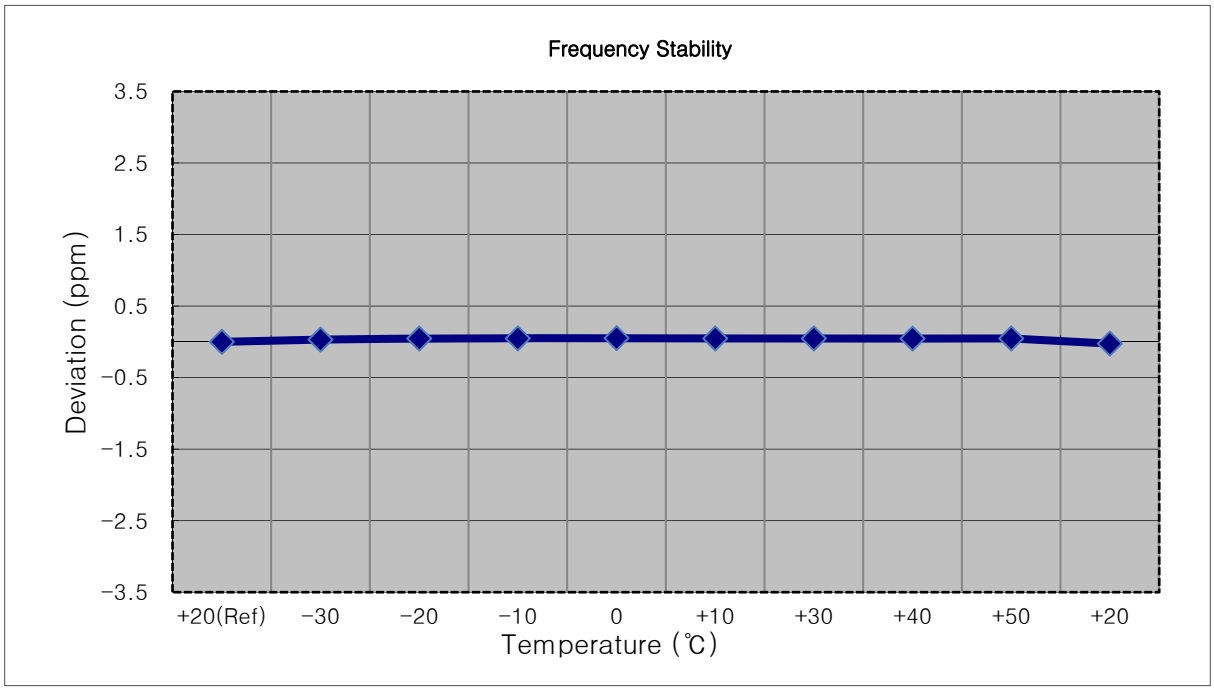
▣ OPERATING FREQUENCY: 1860,000,000 Hz

▣ CHANNEL: 18700 (20 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1860 000 092	0.0	0.000 000	0.000
100%		-30	1860 000 150	58.2	0.000 003	0.031
100%		-20	1860 000 178	85.9	0.000 005	0.046
100%		-10	1860 000 181	89.5	0.000 005	0.048
100%		0	1860 000 190	97.6	0.000 005	0.052
100%		+10	1860 000 179	87.5	0.000 005	0.047
100%		+30	1860 000 179	86.8	0.000 005	0.047
100%		+40	1860 000 177	84.7	0.000 005	0.046
100%		+50	1860 000 179	87.0	0.000 005	0.047
Batt. Endpoint	3.400	+20	1860 000 047	-45.3	-0.000 002	-0.024



▣ MODE: LTE B2

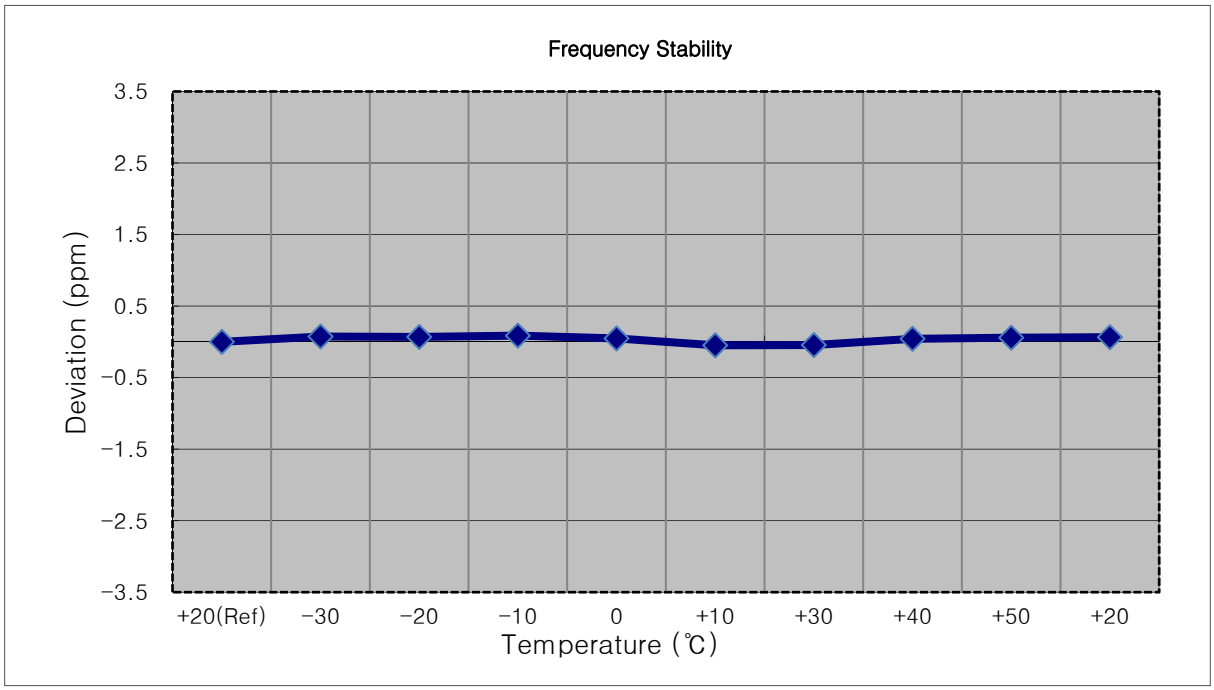
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (1.4 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1880 000 157	0.0	0.000 000	0.000
100%		-30	1880 000 297	139.9	0.000 007	0.074
100%		-20	1880 000 286	128.5	0.000 007	0.068
100%		-10	1880 000 320	162.9	0.000 009	0.087
100%		0	1880 000 247	89.5	0.000 005	0.048
100%		+10	1880 000 067	-90.7	-0.000 005	-0.048
100%		+30	1880 000 073	-84.7	-0.000 005	-0.045
100%		+40	1880 000 237	79.3	0.000 004	0.042
100%		+50	1880 000 266	108.7	0.000 006	0.058
Batt. Endpoint	3.400	+20	1880 000 280	122.1	0.000 006	0.065



▣ MODE: LTE B2

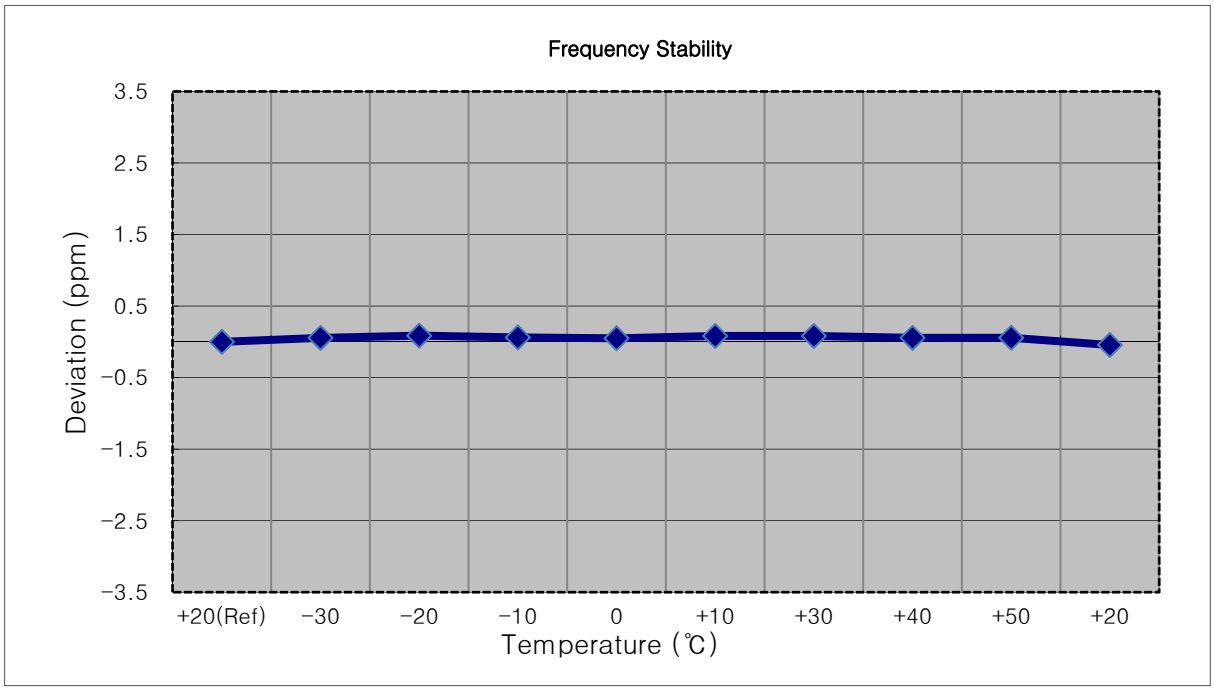
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (3 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1880 000 148	0.0	0.000 000	0.000
100%		-30	1880 000 252	104.6	0.000 006	0.056
100%		-20	1880 000 309	161.9	0.000 009	0.086
100%		-10	1880 000 263	115.9	0.000 006	0.062
100%		0	1880 000 240	92.8	0.000 005	0.049
100%		+10	1880 000 302	154.2	0.000 008	0.082
100%		+30	1880 000 302	154.7	0.000 008	0.082
100%		+40	1880 000 253	105.7	0.000 006	0.056
100%		+50	1880 000 254	106.9	0.000 006	0.057
Batt. Endpoint	3.400	+20	1880 000 065	-82.2	-0.000 004	-0.044



▣ MODE: LTE B2

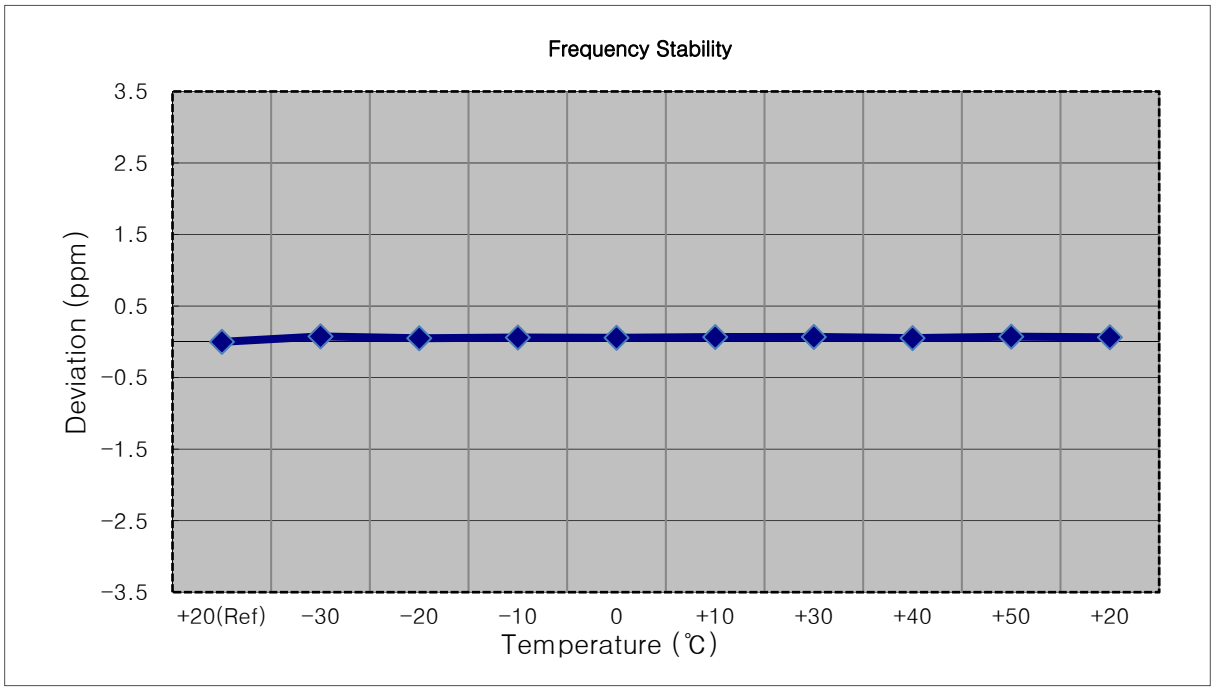
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (5 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1880 000 151	0.0	0.000 000	0.000
100%		-30	1880 000 294	142.6	0.000 008	0.076
100%		-20	1880 000 245	94.0	0.000 005	0.050
100%		-10	1880 000 265	113.6	0.000 006	0.060
100%		0	1880 000 257	106.0	0.000 006	0.056
100%		+10	1880 000 278	126.6	0.000 007	0.067
100%		+30	1880 000 280	128.3	0.000 007	0.068
100%		+40	1880 000 249	97.7	0.000 005	0.052
100%		+50	1880 000 288	136.6	0.000 007	0.073
Batt. Endpoint	3.400	+20	1880 000 270	119.0	0.000 006	0.063



▣ MODE: LTE B2

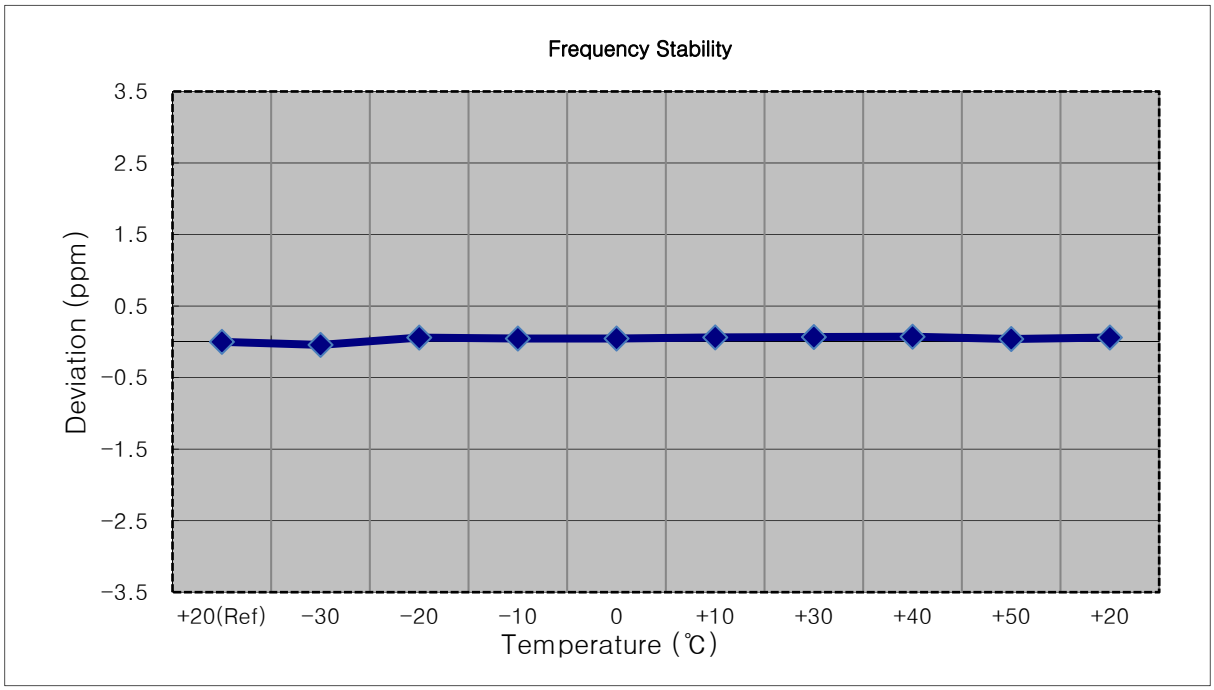
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (10 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1880 000 129	0.0	0.000 000	0.000
100%		-30	1880 000 049	-80.0	-0.000 004	-0.043
100%		-20	1880 000 241	112.7	0.000 006	0.060
100%		-10	1880 000 216	87.2	0.000 005	0.046
100%		0	1880 000 215	86.5	0.000 005	0.046
100%		+10	1880 000 245	115.9	0.000 006	0.062
100%		+30	1880 000 254	125.8	0.000 007	0.067
100%		+40	1880 000 263	134.5	0.000 007	0.072
100%		+50	1880 000 203	74.0	0.000 004	0.039
Batt. Endpoint	3.400	+20	1880 000 242	113.1	0.000 006	0.060



▣ MODE: LTE B2

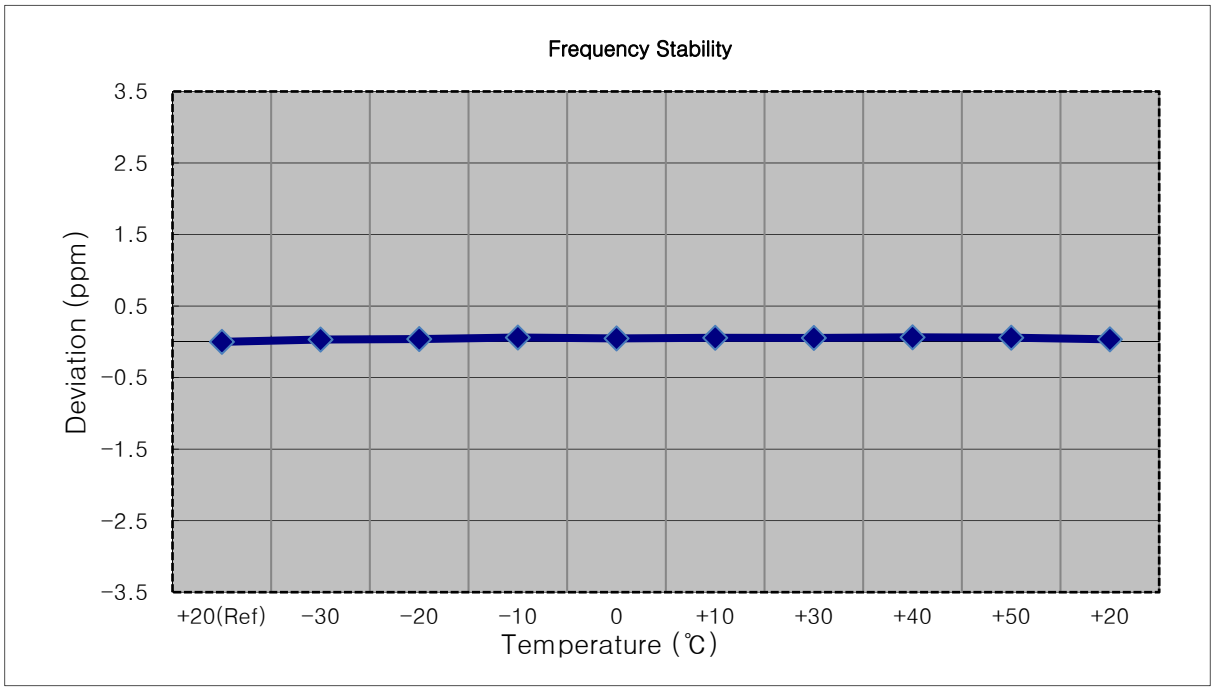
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (15 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1880 000 072	0.0	0.000 000	0.000
100%		-30	1880 000 132	60.2	0.000 003	0.032
100%		-20	1880 000 145	72.5	0.000 004	0.039
100%		-10	1880 000 185	113.1	0.000 006	0.060
100%		0	1880 000 161	89.3	0.000 005	0.047
100%		+10	1880 000 179	106.7	0.000 006	0.057
100%		+30	1880 000 174	101.6	0.000 005	0.054
100%		+40	1880 000 191	119.2	0.000 006	0.063
100%		+50	1880 000 182	109.7	0.000 006	0.058
Batt. Endpoint	3.400	+20	1880 000 139	66.5	0.000 004	0.035



▣ MODE: LTE B2

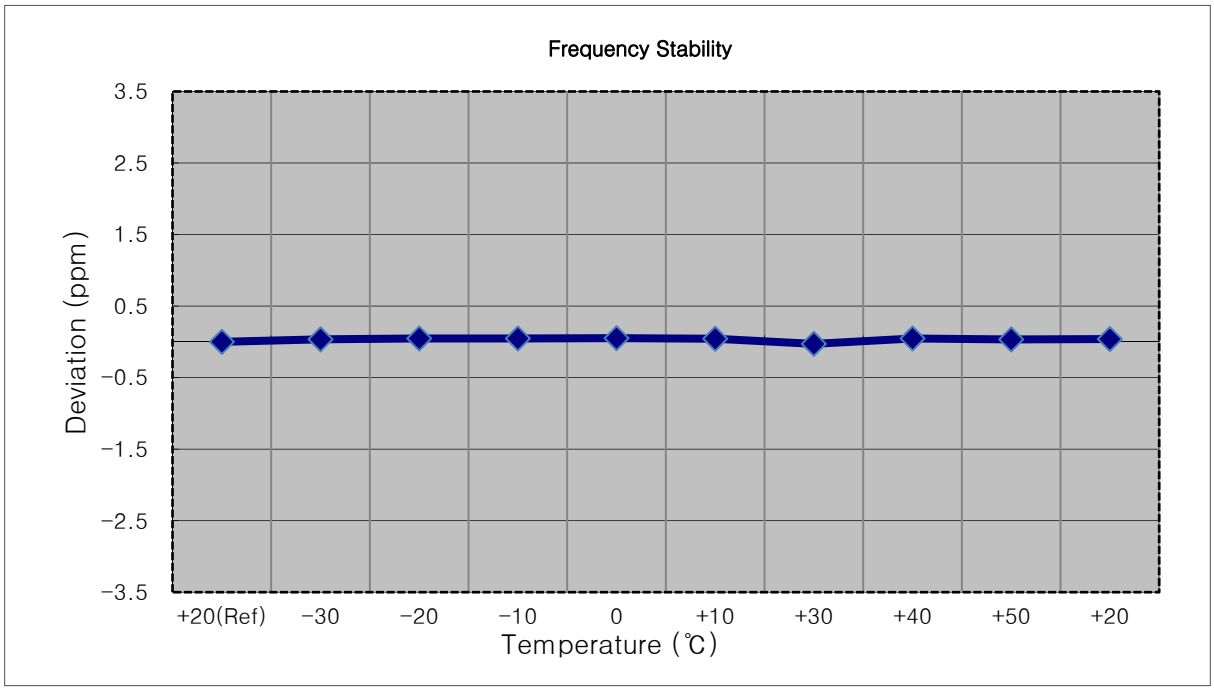
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 18900 (20 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1880 000 093	0.0	0.000 000	0.000
100%		-30	1880 000 159	66.4	0.000 004	0.035
100%		-20	1880 000 182	88.8	0.000 005	0.047
100%		-10	1880 000 180	87.6	0.000 005	0.047
100%		0	1880 000 189	96.5	0.000 005	0.051
100%		+10	1880 000 174	80.8	0.000 004	0.043
100%		+30	1880 000 039	-53.6	-0.000 003	-0.029
100%		+40	1880 000 182	88.7	0.000 005	0.047
100%		+50	1880 000 157	63.7	0.000 003	0.034
Batt. Endpoint	3.400	+20	1880 000 166	73.3	0.000 004	0.039



▣ MODE: LTE B2

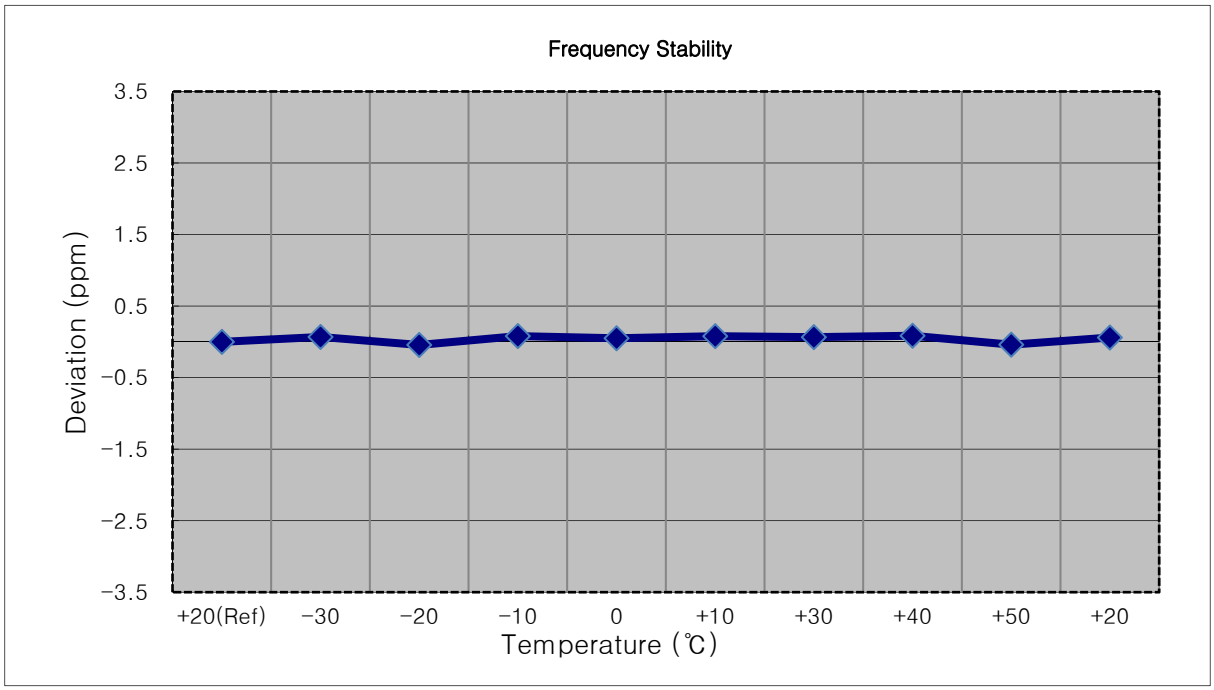
▣ OPERATING FREQUENCY: 1909,300,000 Hz

▣ CHANNEL: 19193 (1.4 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1909 299 909	0.0	0.000 000	0.000
100%		-30	1909 300 041	131.5	0.000 007	0.069
100%		-20	1909 299 826	-83.2	-0.000 004	-0.044
100%		-10	1909 300 063	154.0	0.000 008	0.081
100%		0	1909 300 005	95.2	0.000 005	0.050
100%		+10	1909 300 061	151.4	0.000 008	0.079
100%		+30	1909 300 035	125.4	0.000 007	0.066
100%		+40	1909 300 071	161.8	0.000 008	0.085
100%		+50	1909 299 834	-75.2	-0.000 004	-0.039
Batt. Endpoint	3.400	+20	1909 300 024	114.8	0.000 006	0.060



▣ MODE: LTE B2

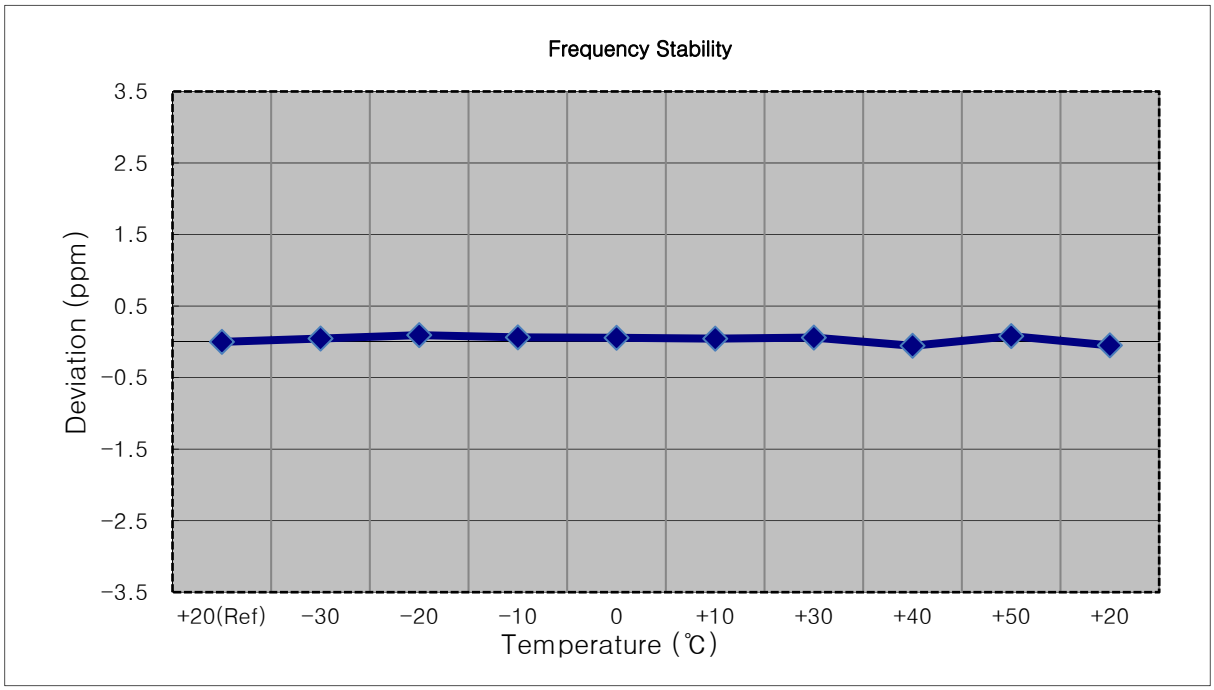
▣ OPERATING FREQUENCY: 1908,500,000 Hz

▣ CHANNEL: 19185 (3 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1908 499 907	0.0	0.000 000	0.000
100%		-30	1908 499 996	88.6	0.000 005	0.046
100%		-20	1908 500 087	179.9	0.000 009	0.094
100%		-10	1908 500 027	119.5	0.000 006	0.063
100%		0	1908 500 015	107.9	0.000 006	0.057
100%		+10	1908 499 992	85.0	0.000 004	0.045
100%		+30	1908 500 021	113.5	0.000 006	0.059
100%		+40	1908 499 803	-104.7	-0.000 005	-0.055
100%		+50	1908 500 060	153.2	0.000 008	0.080
Batt. Endpoint	3.400	+20	1908 499 814	-93.7	-0.000 005	-0.049



▣ MODE: LTE B2

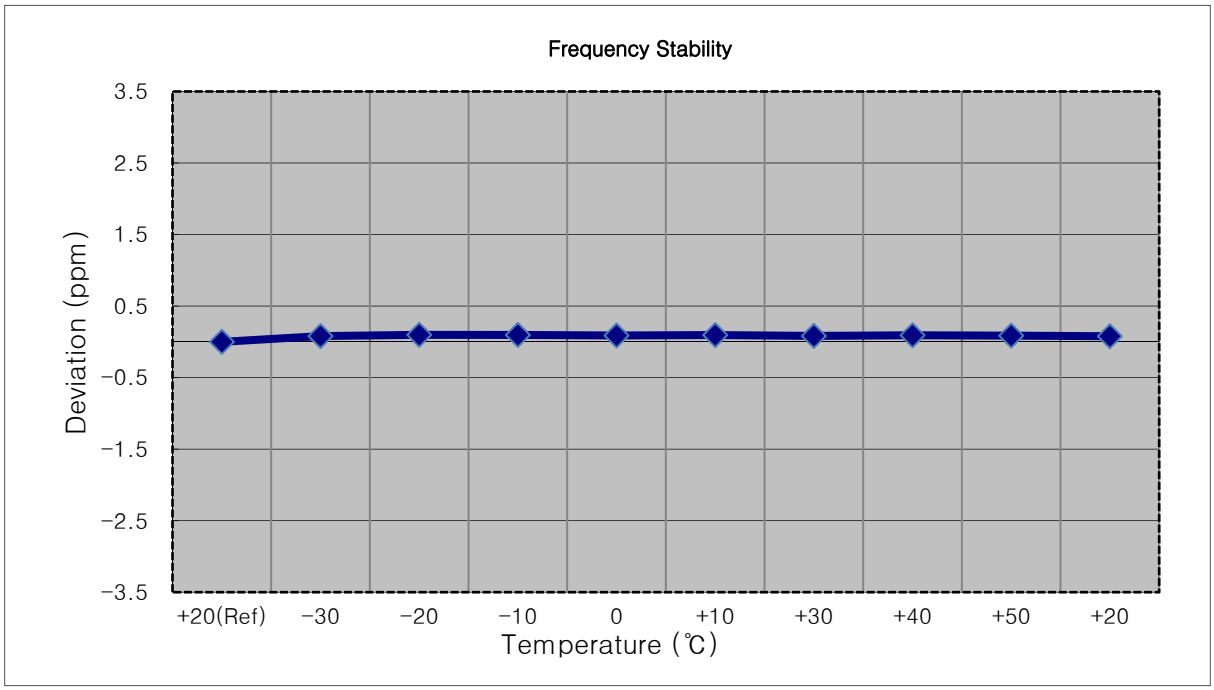
▣ OPERATING FREQUENCY: 1907,500,000 Hz

▣ CHANNEL: 19175 (5 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1907 499 907	0.0	0.000 000	0.000
100%		-30	1907 500 062	154.2	0.000 008	0.081
100%		-20	1907 500 093	185.7	0.000 010	0.097
100%		-10	1907 500 090	183.0	0.000 010	0.096
100%		0	1907 500 076	168.8	0.000 009	0.088
100%		+10	1907 500 089	181.2	0.000 009	0.095
100%		+30	1907 500 065	157.2	0.000 008	0.082
100%		+40	1907 500 083	175.2	0.000 009	0.092
100%		+50	1907 500 072	165.0	0.000 009	0.087
Batt. Endpoint	3.400	+20	1907 500 057	149.1	0.000 008	0.078



▣ MODE: LTE B2

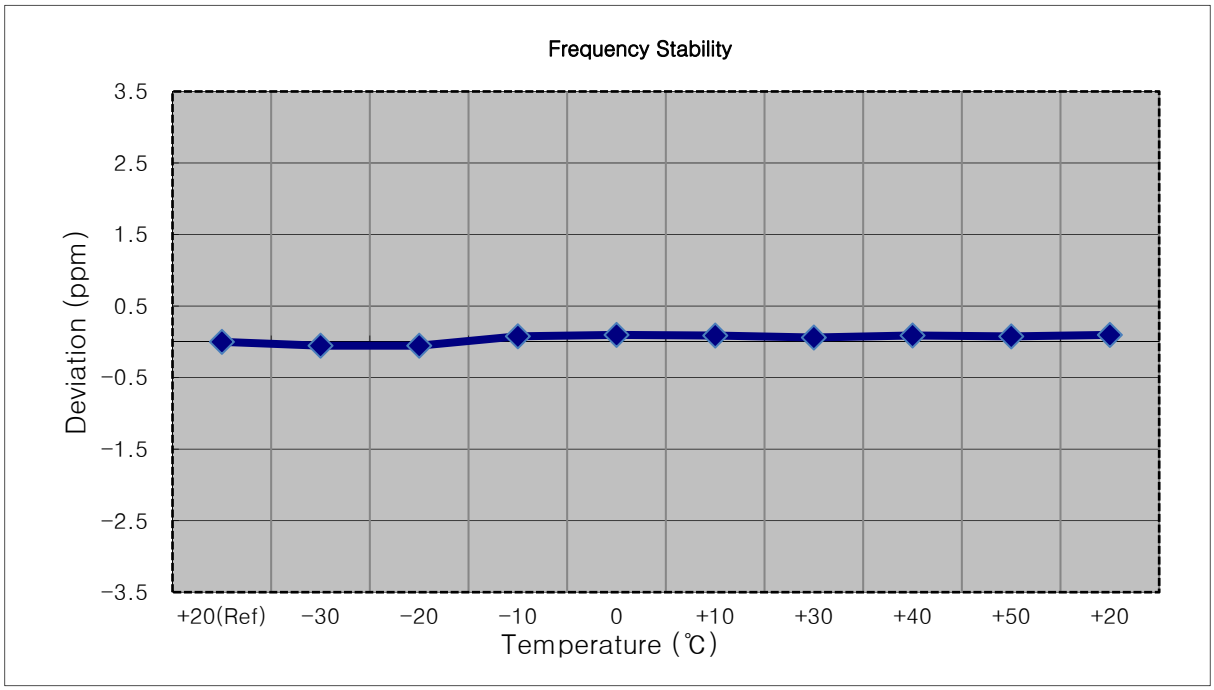
▣ OPERATING FREQUENCY: 1905,000,000 Hz

▣ CHANNEL: 19150 (10 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1905 000 110	0.0	0.000 000	0.000
100%		-30	1905 000 008	-102.8	-0.000 005	-0.054
100%		-20	1905 000 008	-102.2	-0.000 005	-0.054
100%		-10	1905 000 258	147.6	0.000 008	0.077
100%		0	1905 000 296	185.3	0.000 010	0.097
100%		+10	1905 000 279	168.2	0.000 009	0.088
100%		+30	1905 000 225	114.8	0.000 006	0.060
100%		+40	1905 000 279	168.9	0.000 009	0.089
100%		+50	1905 000 255	145.0	0.000 008	0.076
Batt. Endpoint	3.400	+20	1905 000 295	184.3	0.000 010	0.097



▣ MODE: LTE B2

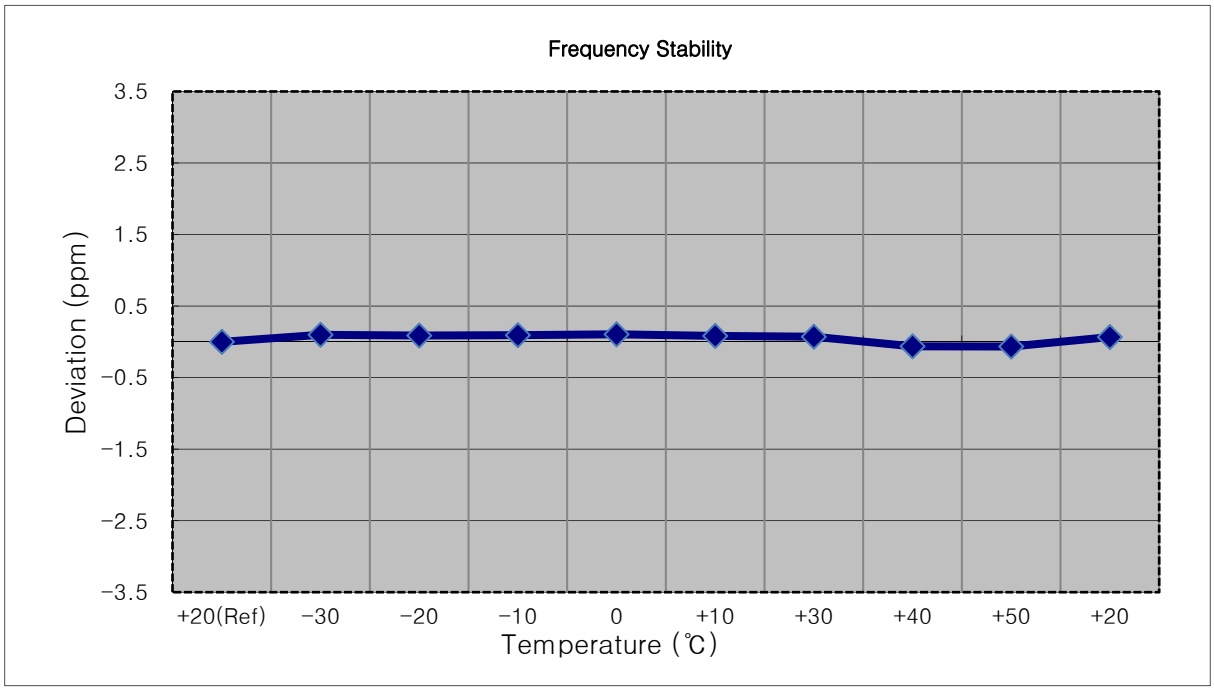
▣ OPERATING FREQUENCY: 1902,500,000 Hz

▣ CHANNEL: 19125 (15 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1902 500 125	0.0	0.000 000	0.000
100%		-30	1902 500 312	187.7	0.000 010	0.099
100%		-20	1902 500 293	167.9	0.000 009	0.088
100%		-10	1902 500 301	176.7	0.000 009	0.093
100%		0	1902 500 325	200.1	0.000 011	0.105
100%		+10	1902 500 282	157.4	0.000 008	0.083
100%		+30	1902 500 261	136.5	0.000 007	0.072
100%		+40	1902 500 006	-118.6	-0.000 006	-0.062
100%		+50	1902 500 000	-124.5	-0.000 007	-0.065
Batt. Endpoint	3.400	+20	1902 500 252	127.7	0.000 007	0.067



▣ MODE: LTE B2

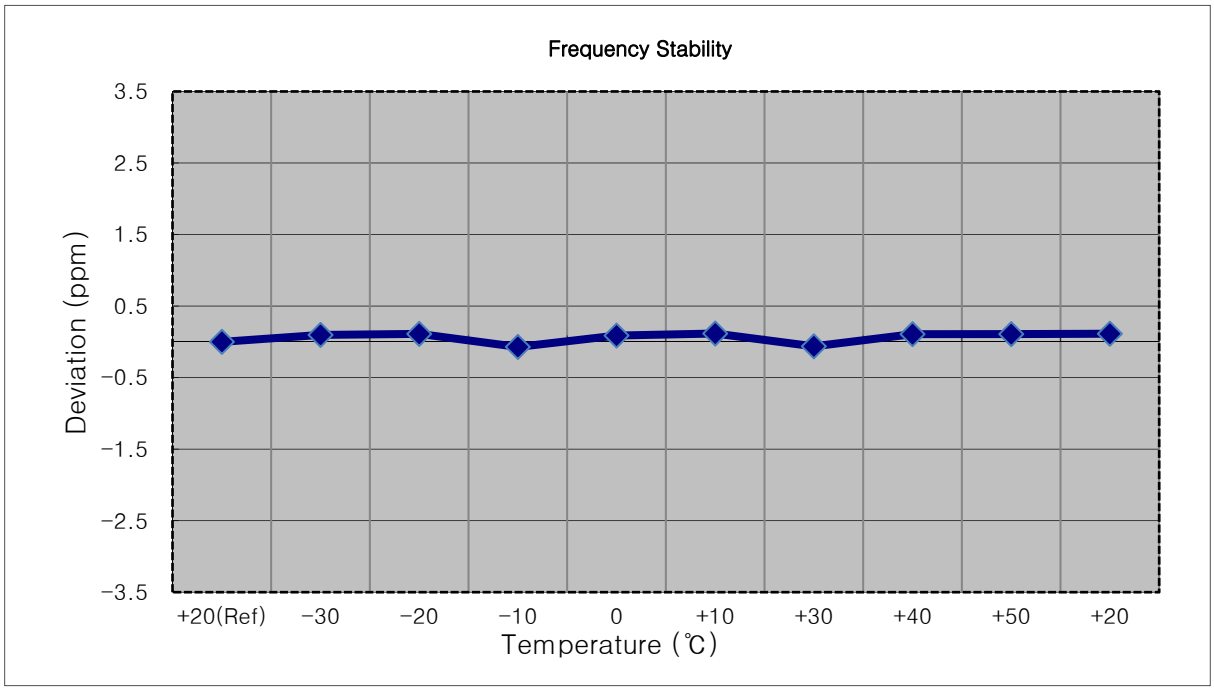
▣ OPERATING FREQUENCY: 1900,000,000 Hz

▣ CHANNEL: 19100 (20 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

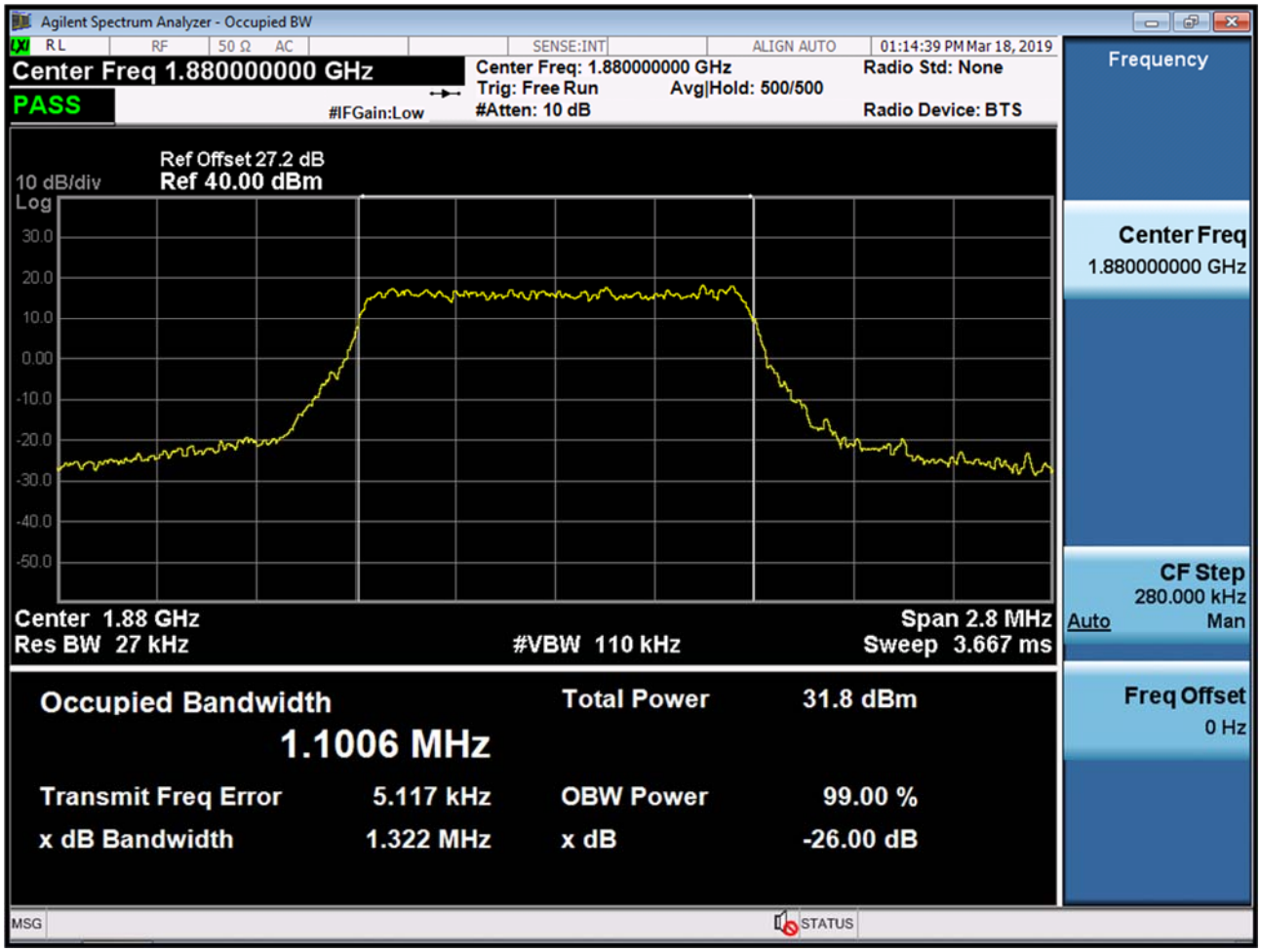
▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.850	+20(Ref)	1900 000 189	0.0	0.000 000	0.000
100%		-30	1900 000 374	184.4	0.000 010	0.097
100%		-20	1900 000 400	210.5	0.000 011	0.111
100%		-10	1900 000 055	-134.2	-0.000 007	-0.071
100%		0	1900 000 357	167.3	0.000 009	0.088
100%		+10	1900 000 410	221.0	0.000 012	0.116
100%		+30	1900 000 070	-119.7	-0.000 006	-0.063
100%		+40	1900 000 393	203.3	0.000 011	0.107
100%		+50	1900 000 395	205.6	0.000 011	0.108
Batt. Endpoint	3.400	+20	1900 000 404	214.9	0.000 011	0.113

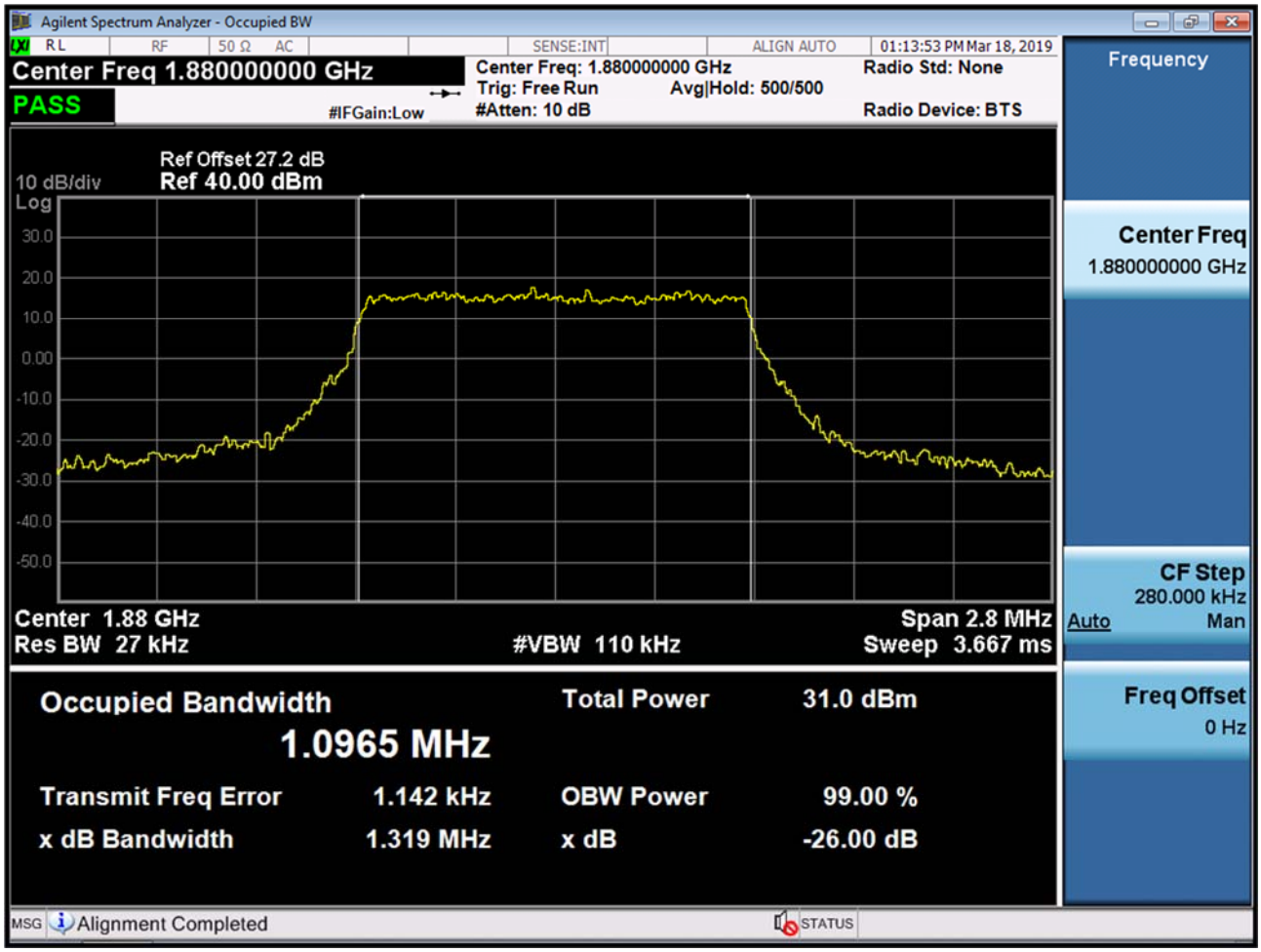


9. TEST PLOTS

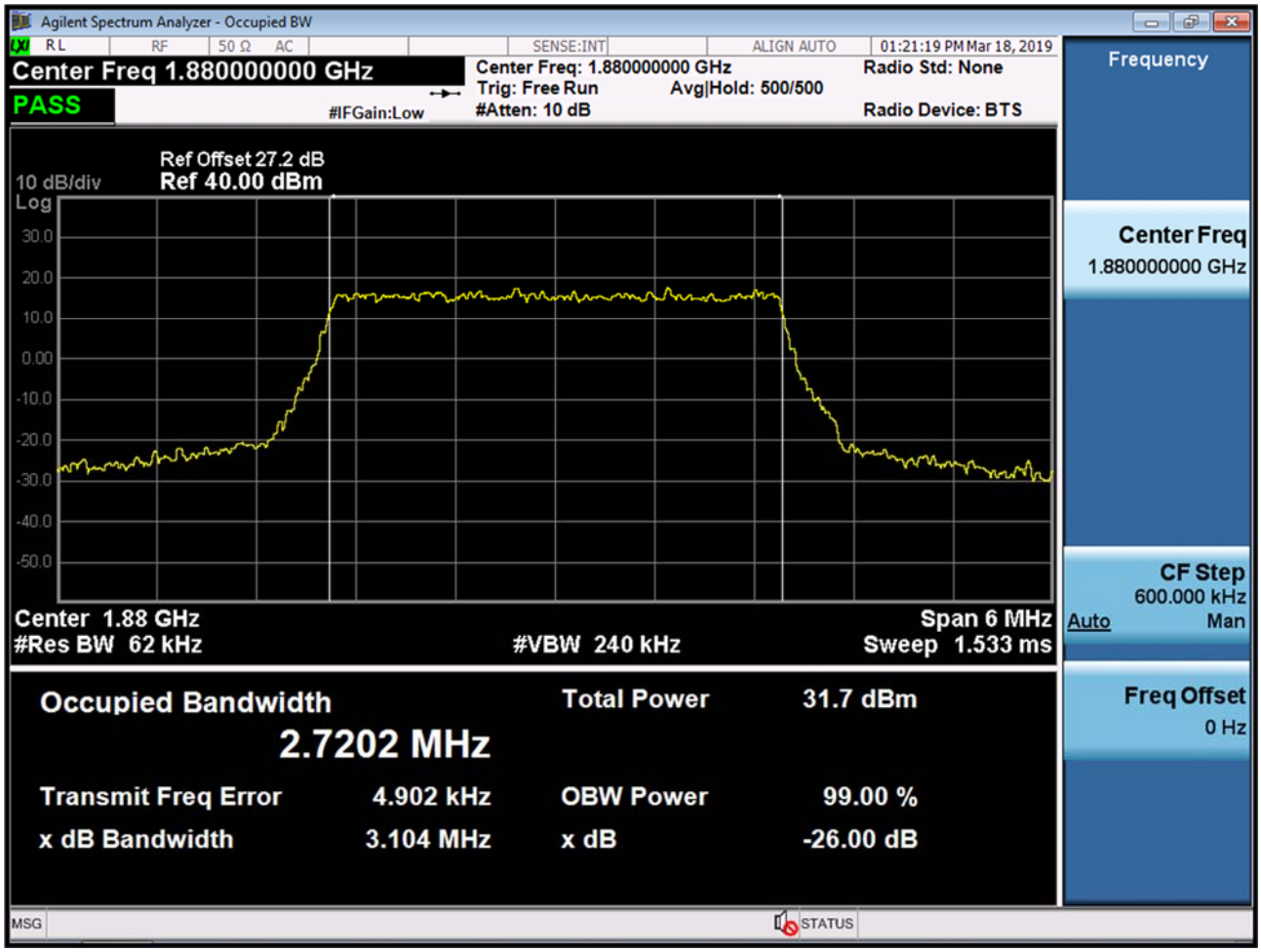
BAND 2. Occupied Bandwidth Plot (1.4M BW Ch.18900 QPSK RB 6_0)



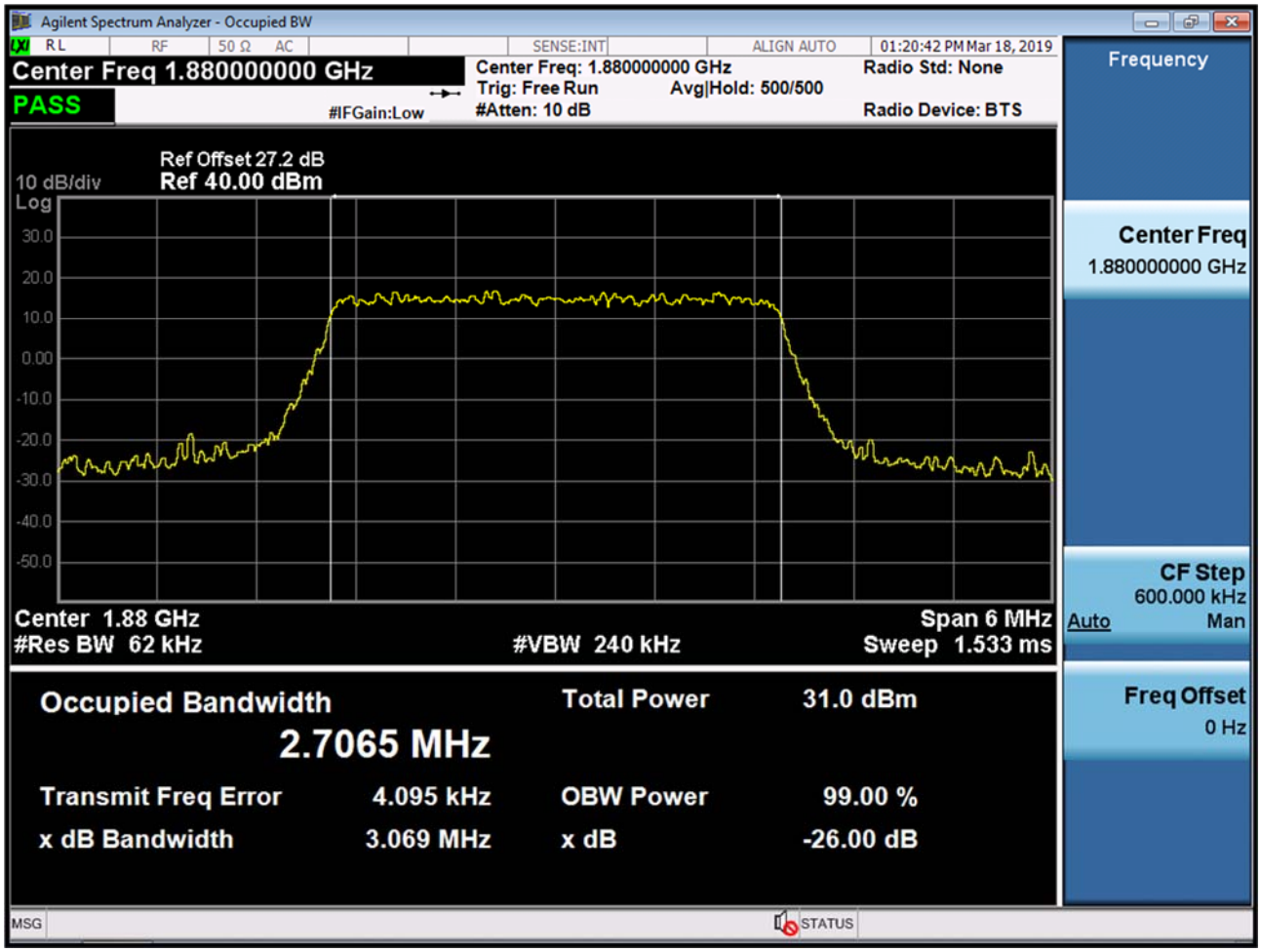
BAND 2. Occupied Bandwidth Plot (1.4M BW Ch.18900 16QAM RB 6_0)



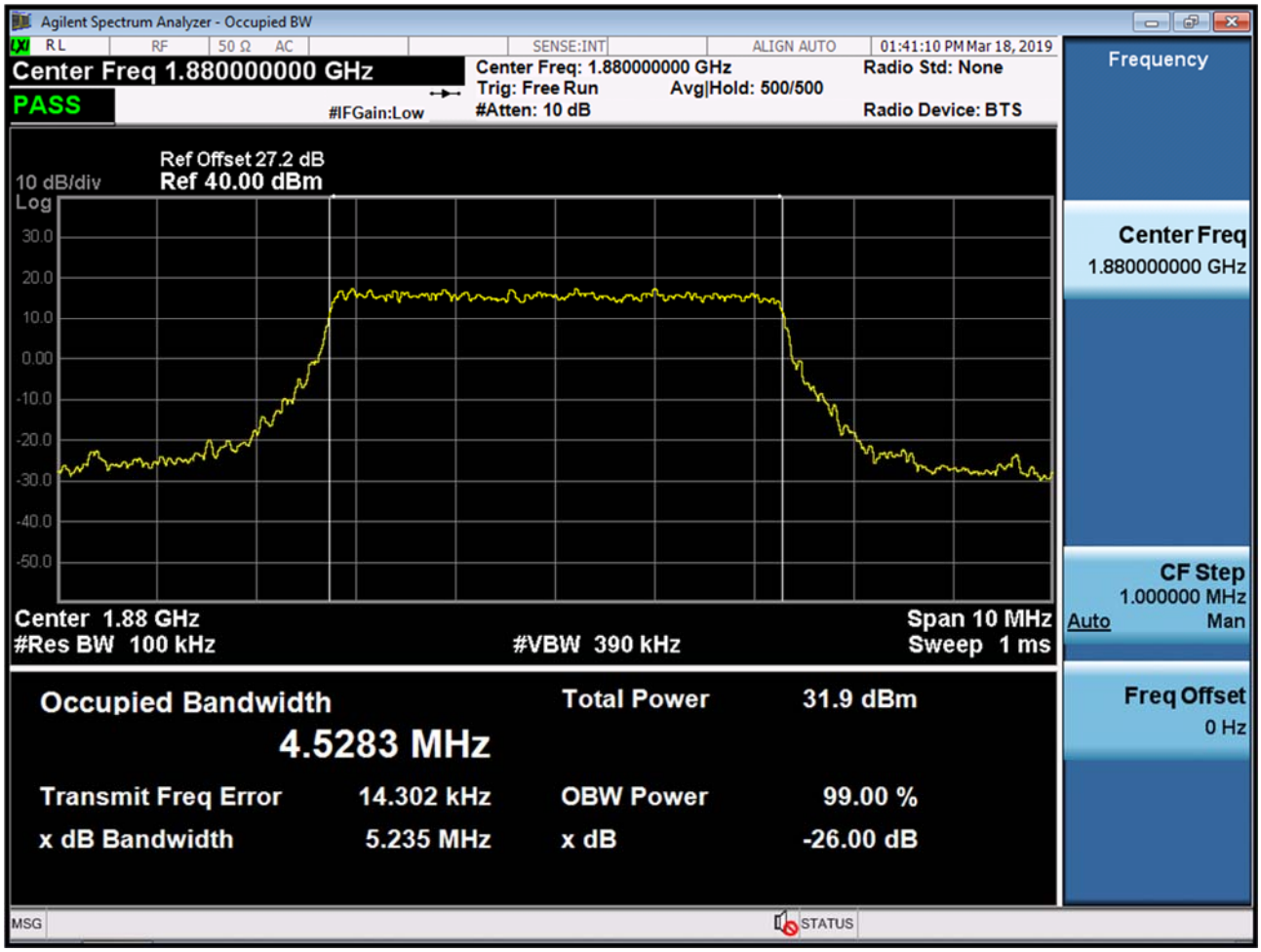
BAND 2. Occupied Bandwidth Plot (3M BW Ch.18900 QPSK RB 15_0)



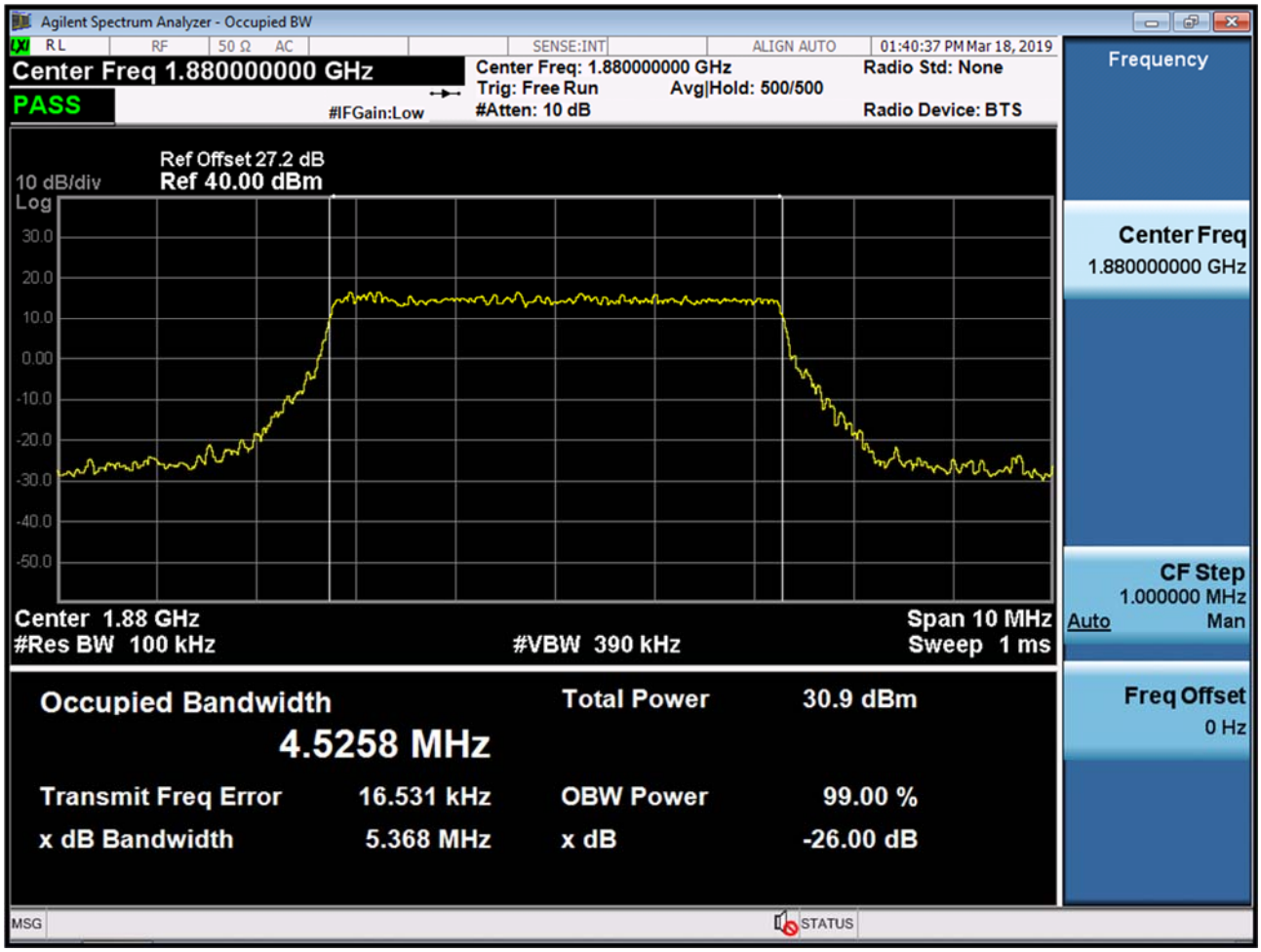
BAND 2. Occupied Bandwidth Plot (3M BW Ch.18900 16QAM RB 15_0)



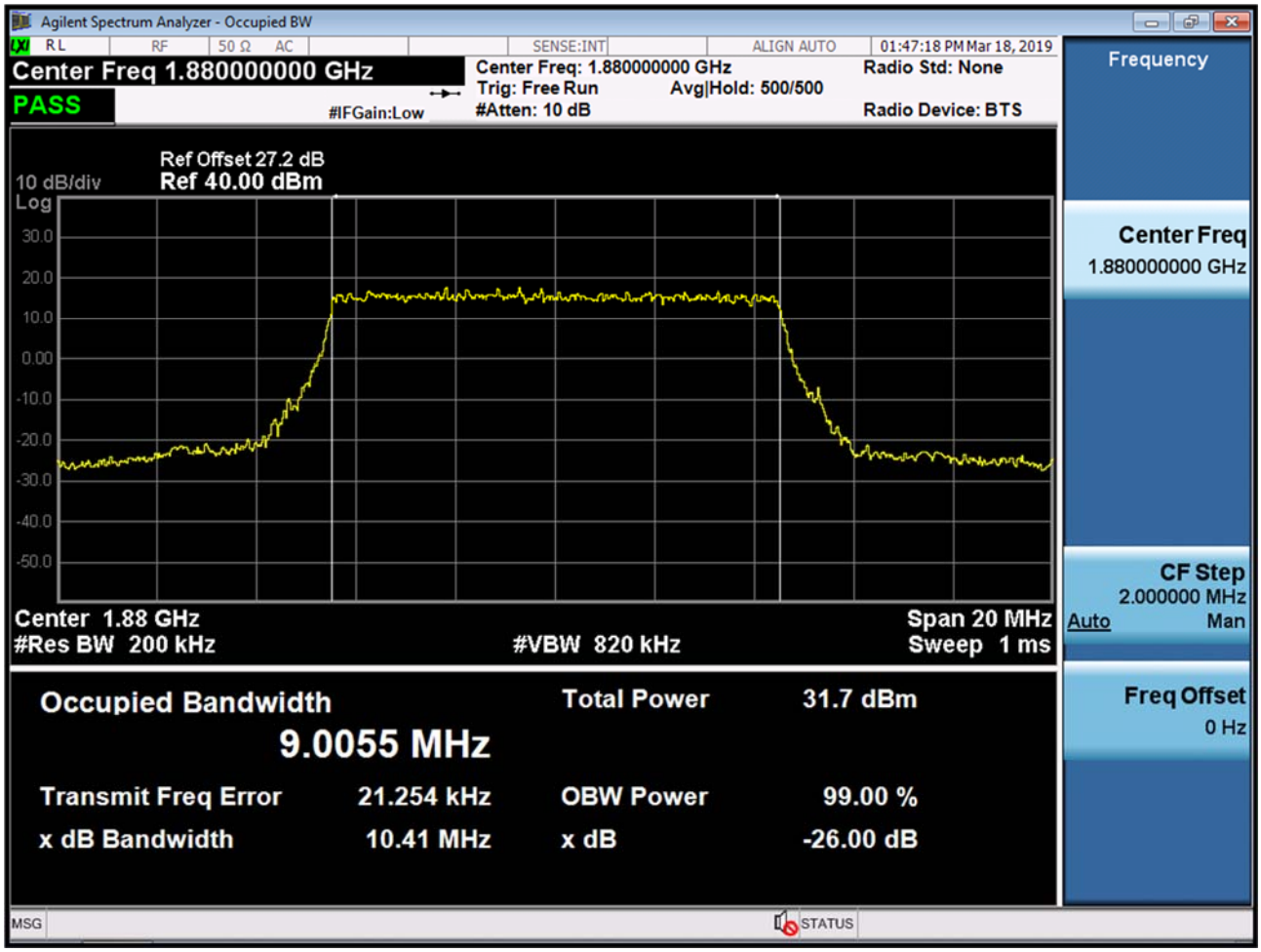
BAND 2. Occupied Bandwidth Plot (5M BW Ch.18900 QPSK RB 25_0)



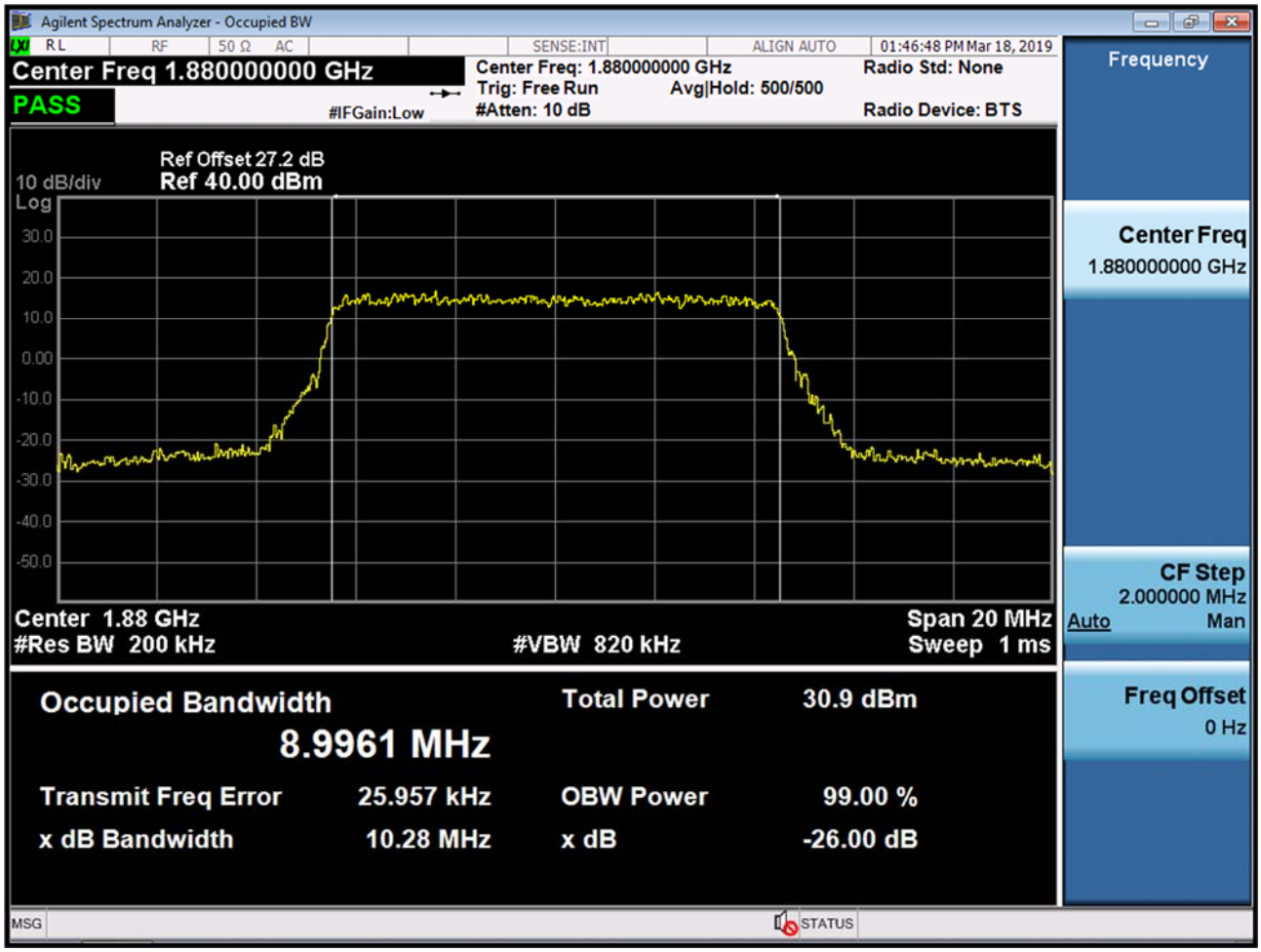
BAND 2. Occupied Bandwidth Plot (5M BW Ch.18900 16QAM RB 25_0)



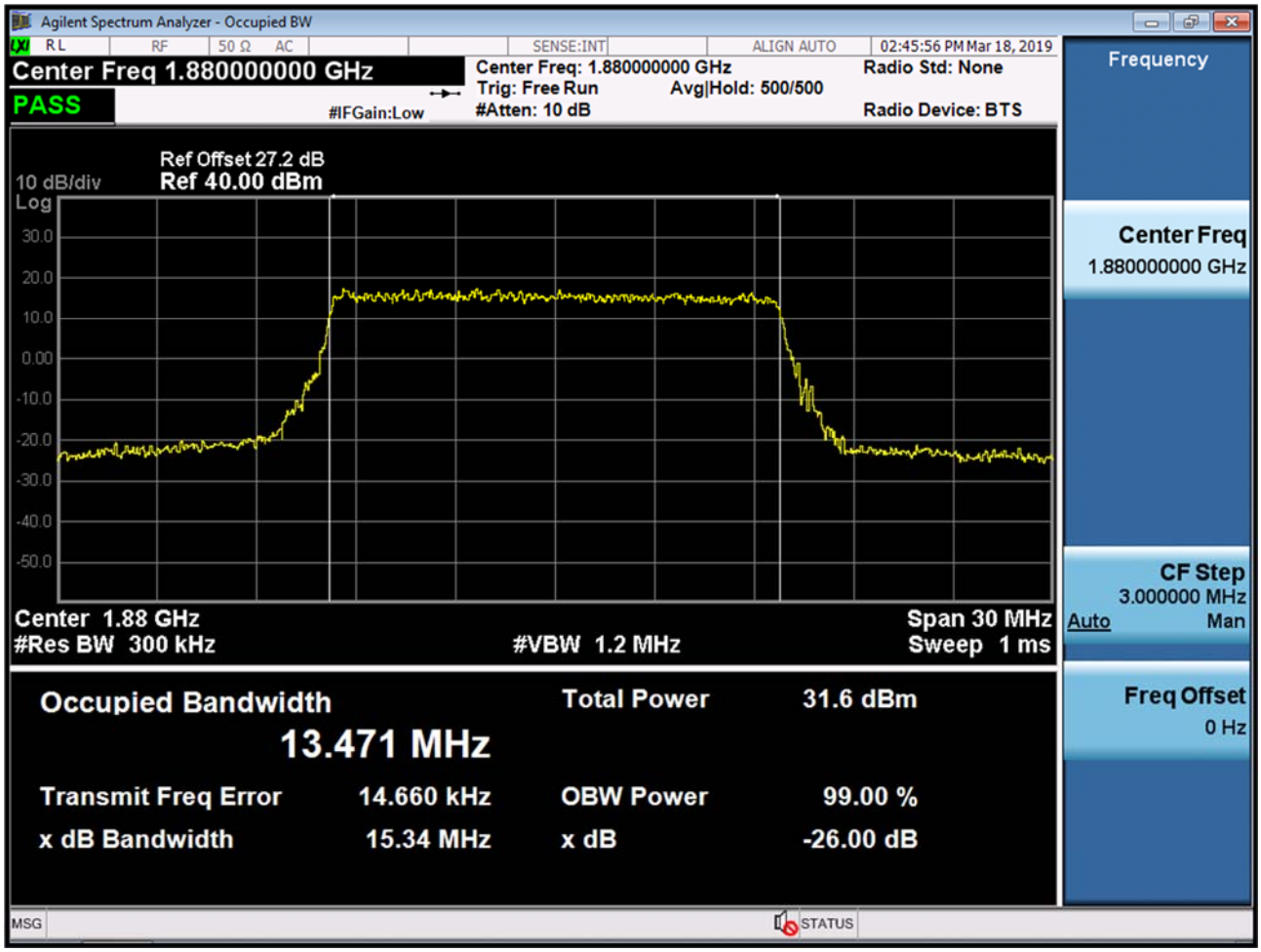
BAND 2. Occupied Bandwidth Plot (10M BW Ch.18900 QPSK RB 50_0)



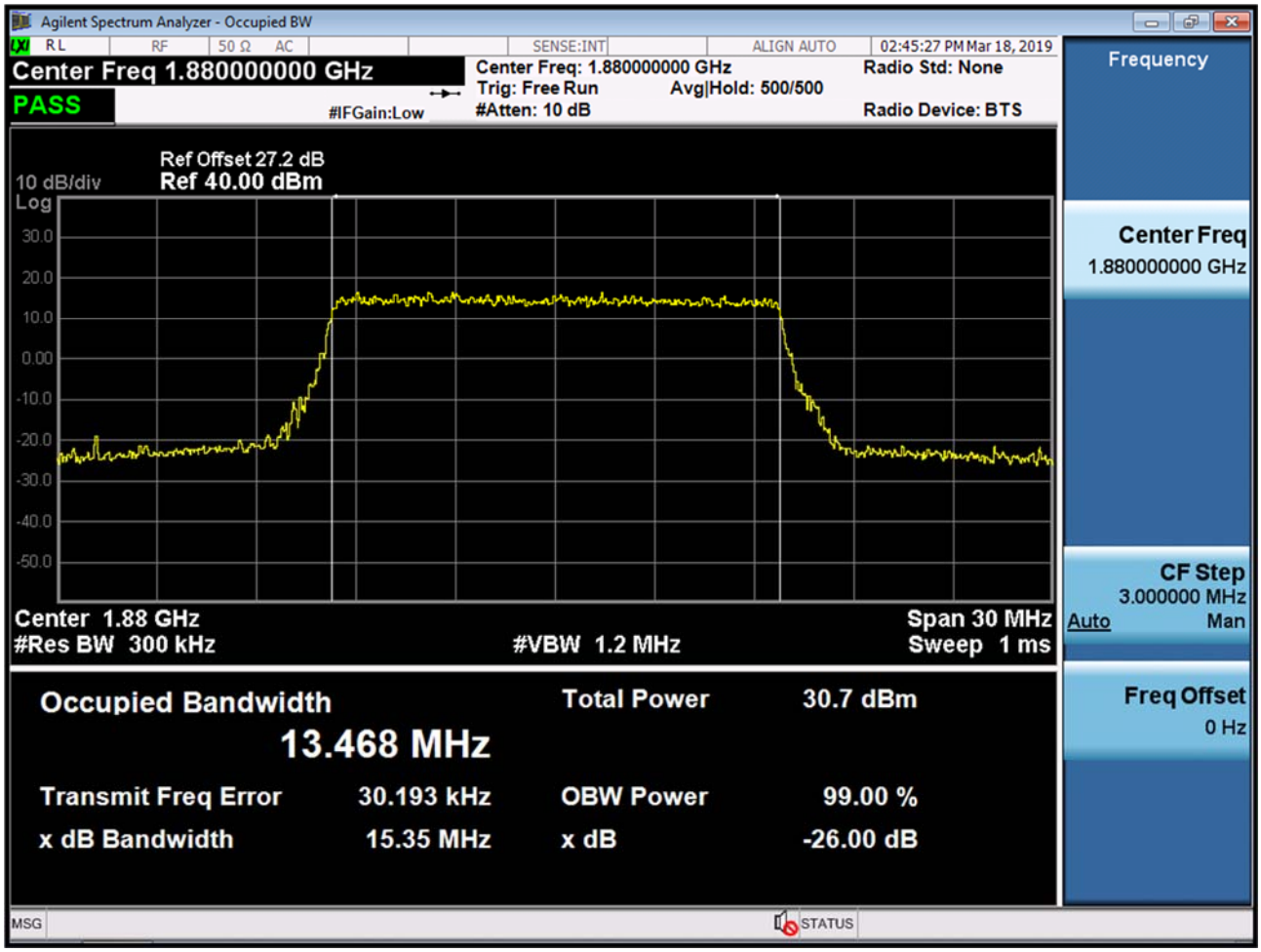
BAND 2. Occupied Bandwidth Plot (10M BW Ch.18900 16QAM RB 50_0)



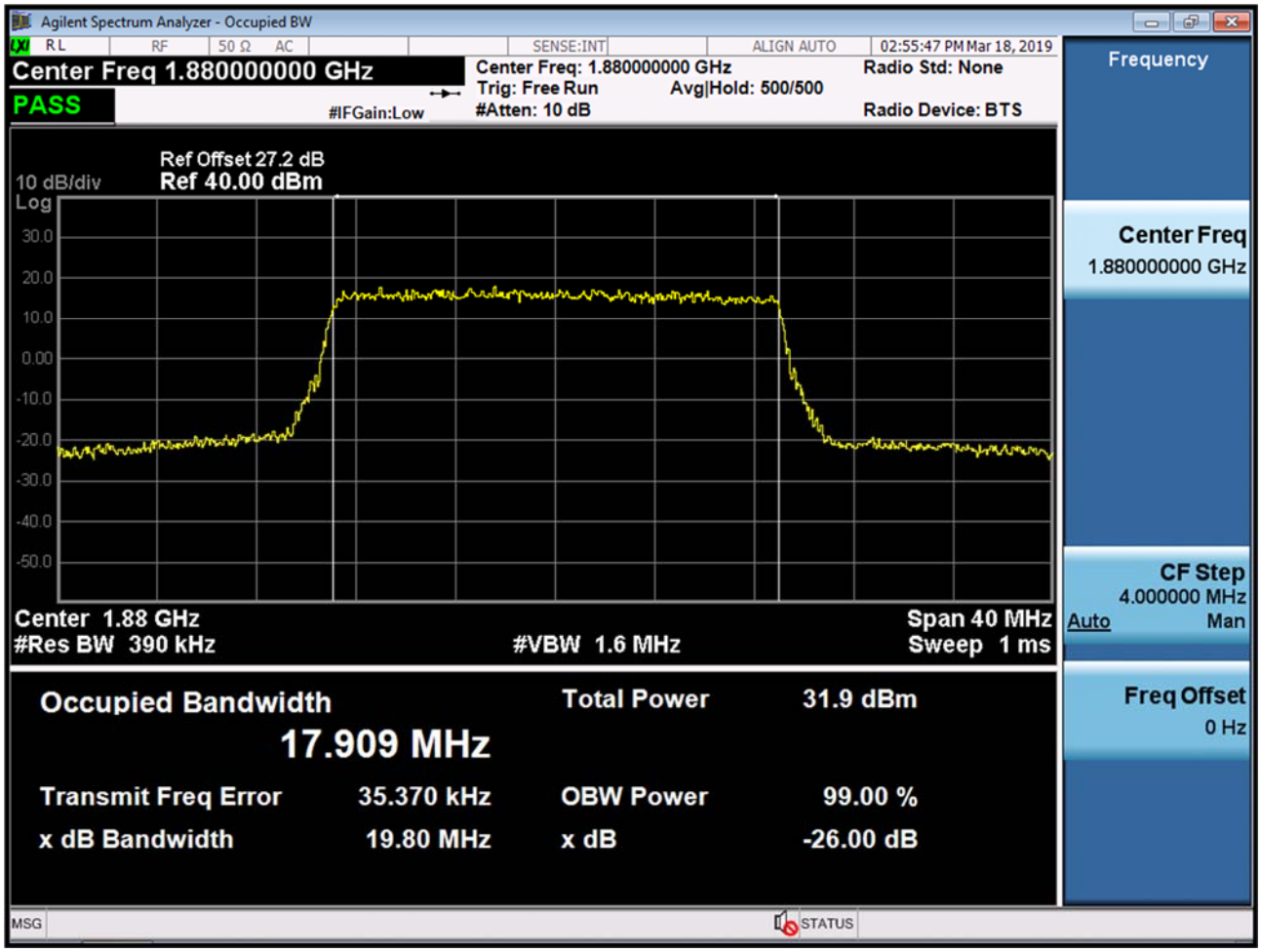
BAND 2. Occupied Bandwidth Plot (15M BW Ch.18900 QPSK RB 75_0)



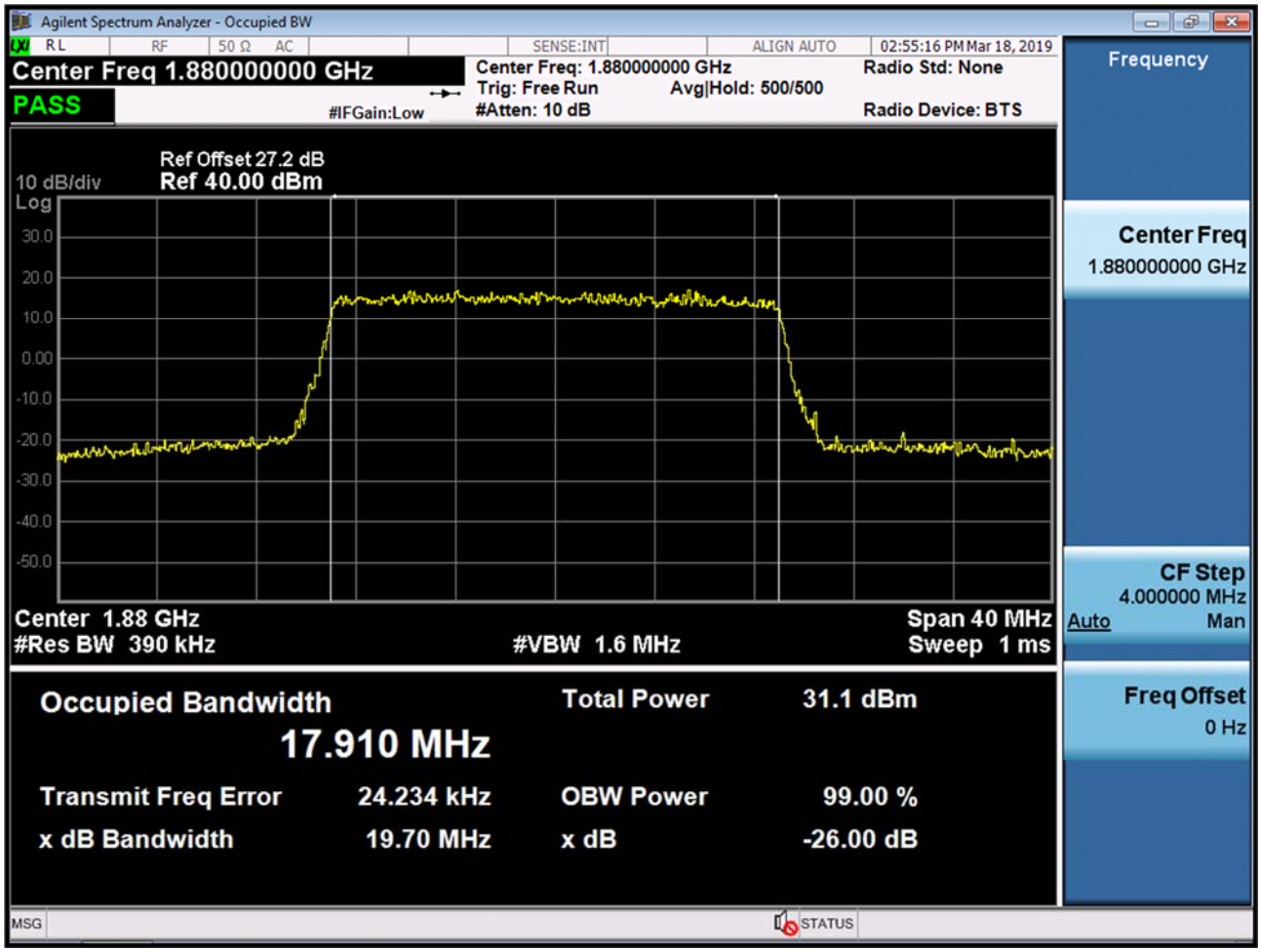
BAND 2. Occupied Bandwidth Plot (15M BW Ch.18900 16QAM RB 75_0)



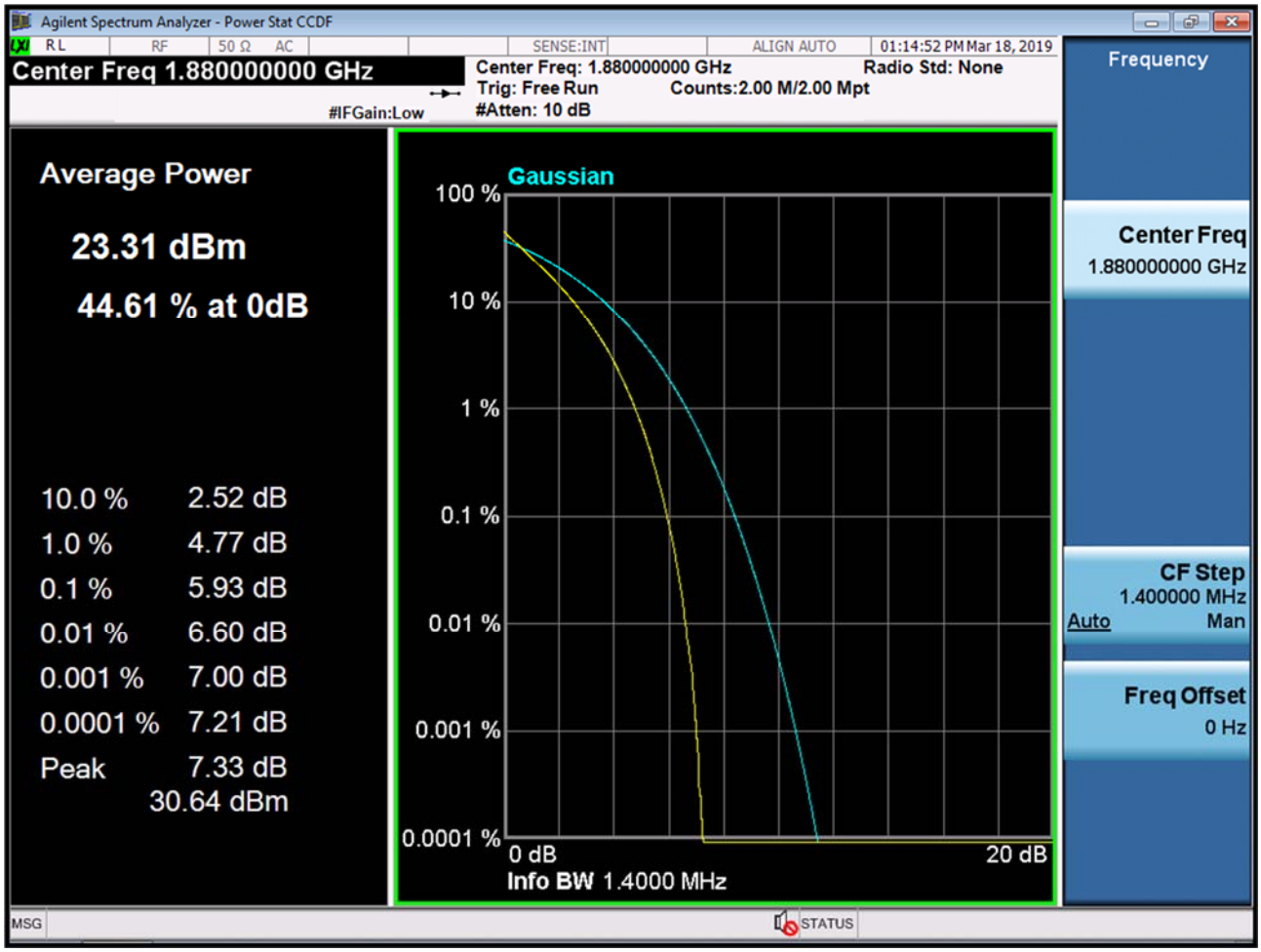
BAND 2. Occupied Bandwidth Plot (20M BW Ch.18900 QPSK RB 100_0)



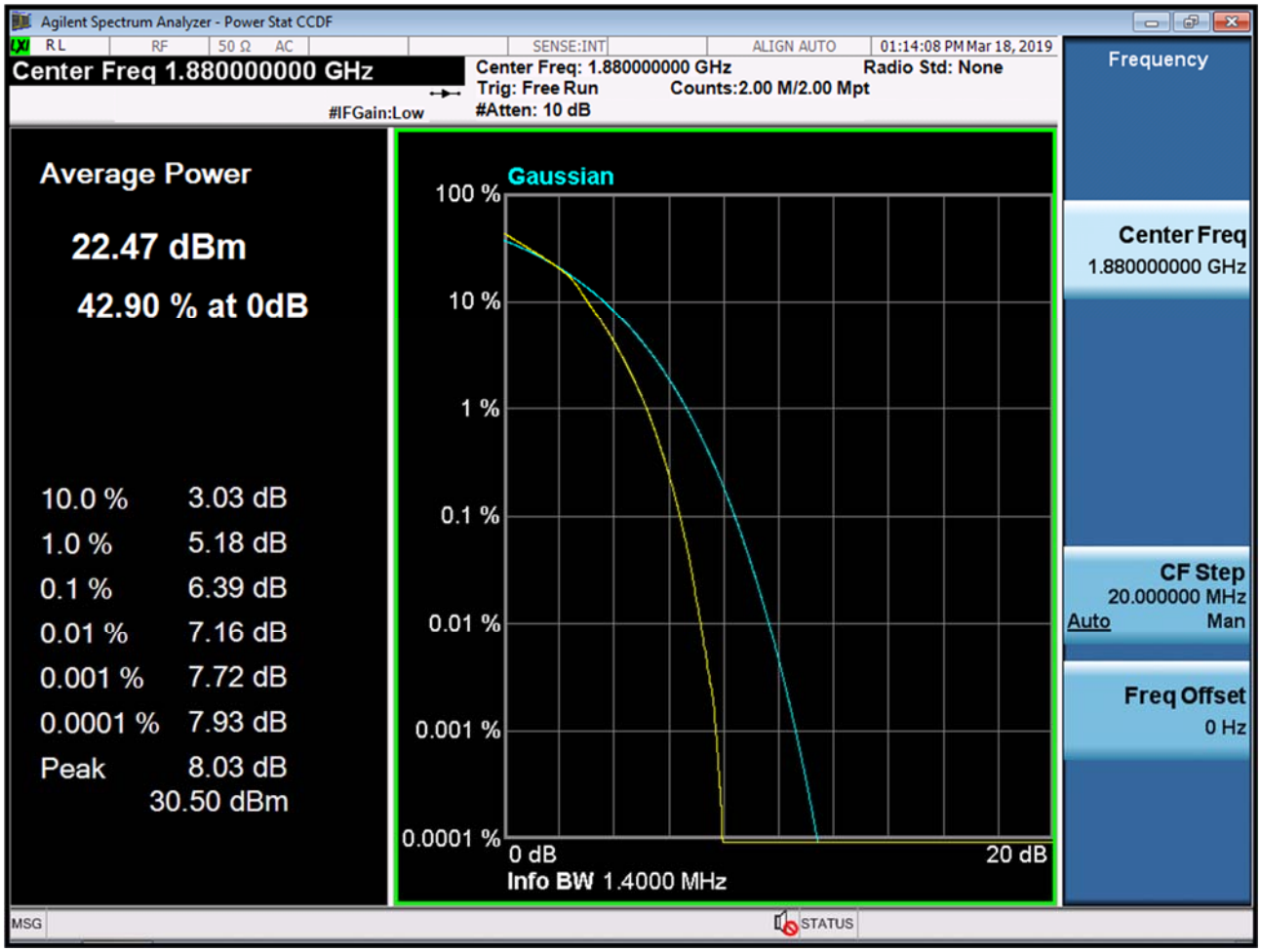
BAND 2. Occupied Bandwidth Plot (20M BW Ch.18900 16QAM RB 100_0)



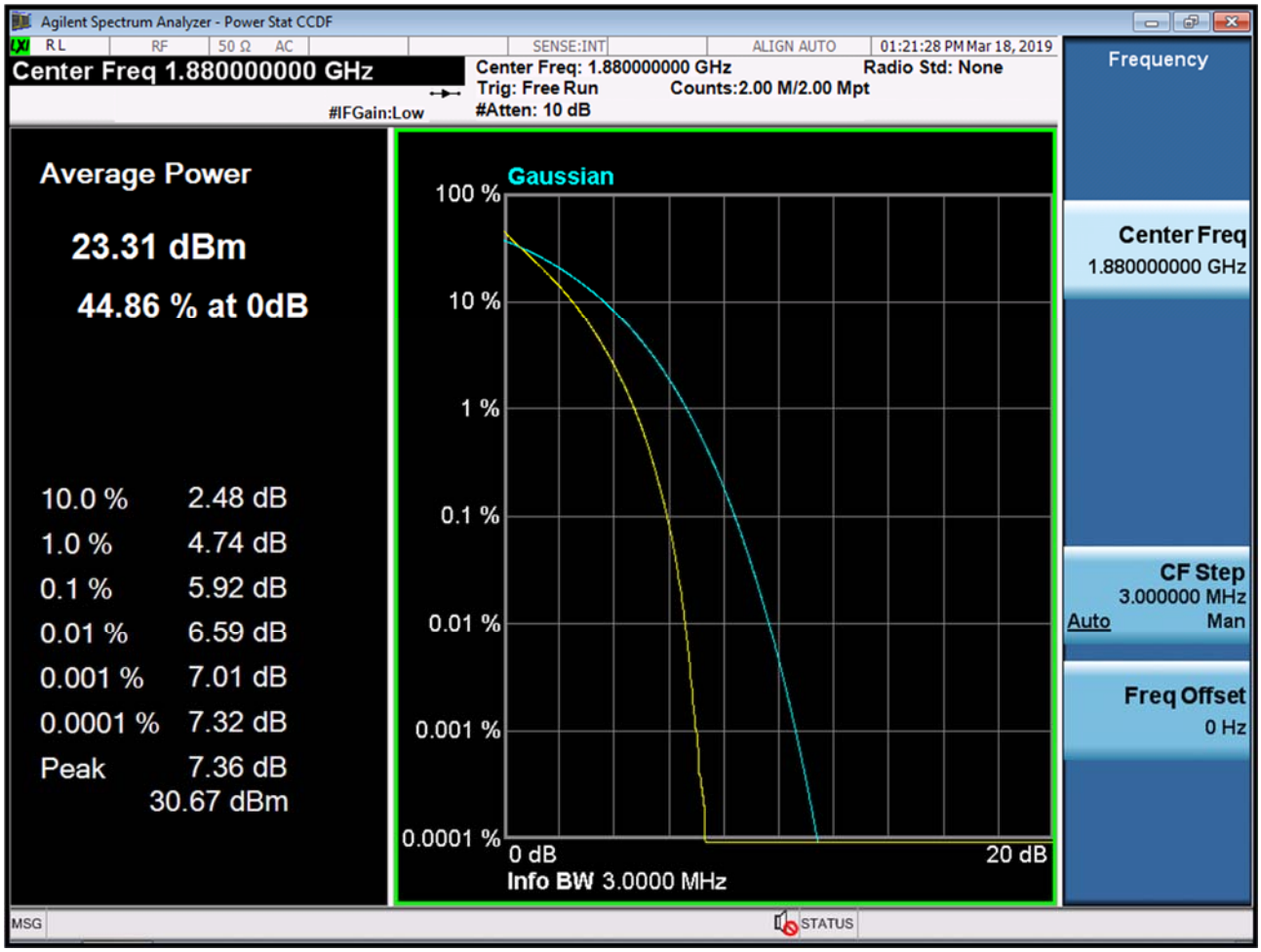
BAND 2. PAR Plot (1.4M BW Ch.18900 QPSK RB 6_0)



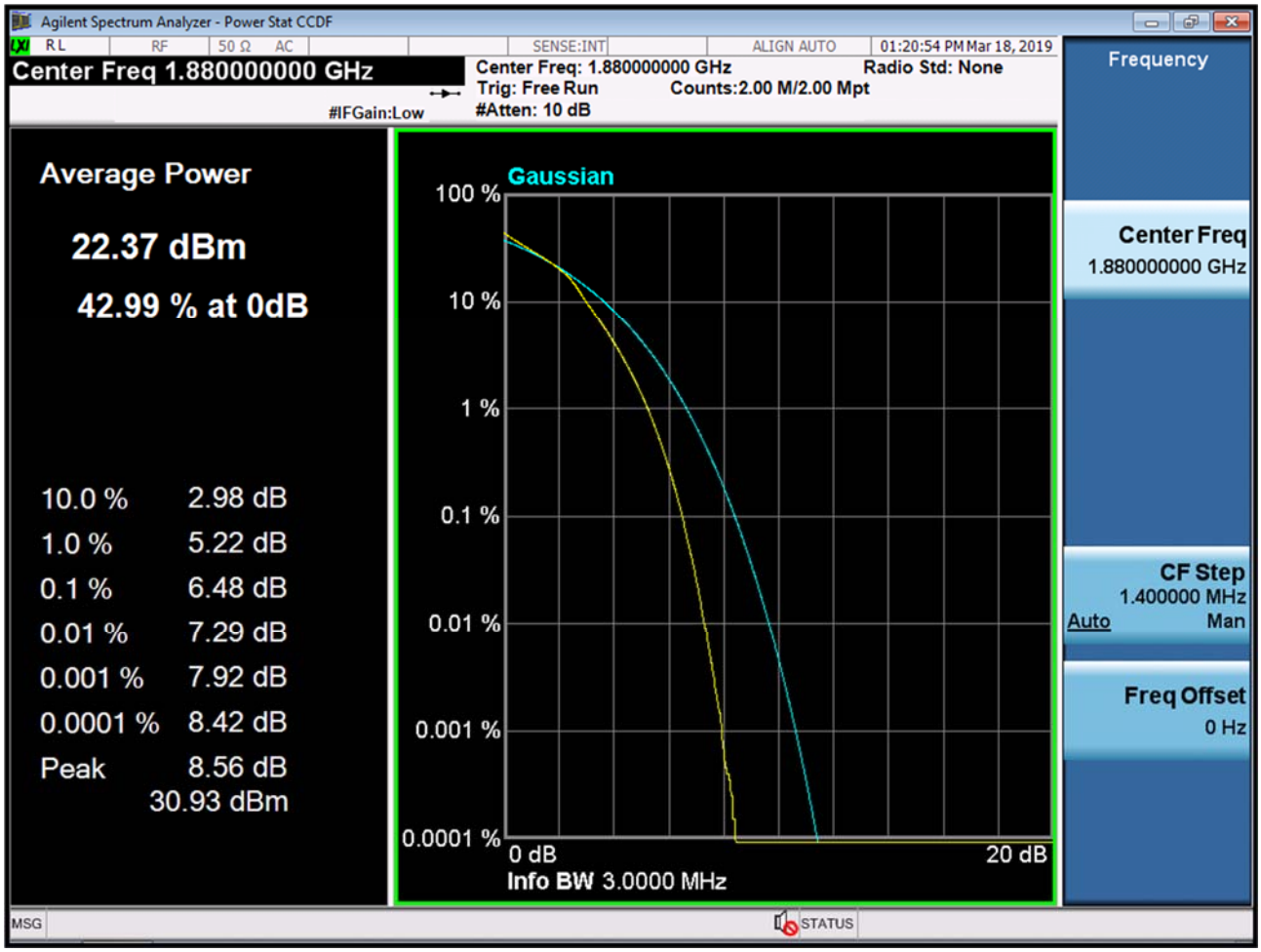
BAND 2. PAR Plot (1.4M BW Ch.18900 16QAM RB 6_0)



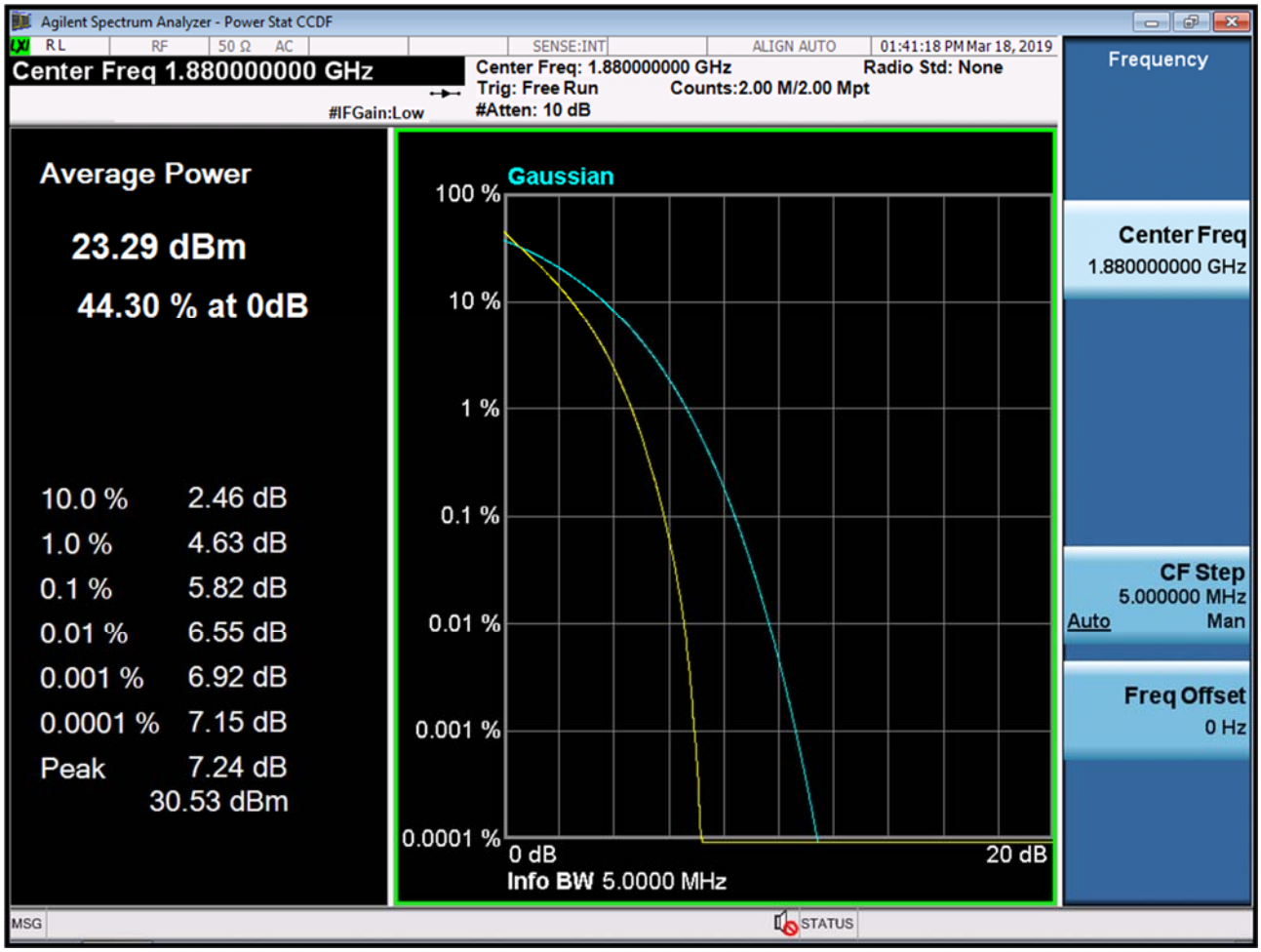
BAND 2. PAR Plot (3M BW Ch.18900 QPSK RB 15_0)



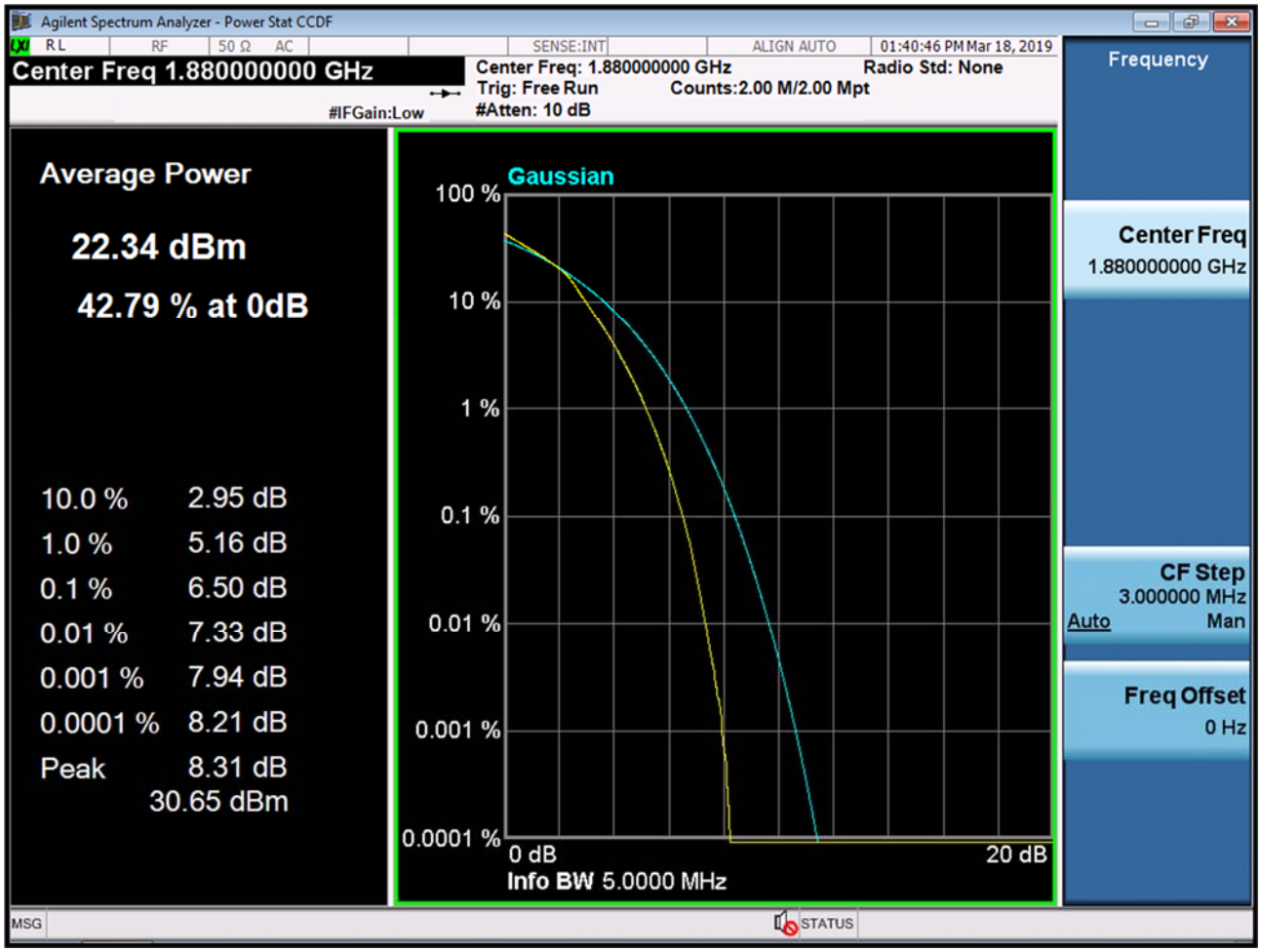
BAND 2. PAR Plot (3M BW Ch.18900 16QAM RB 15_0)



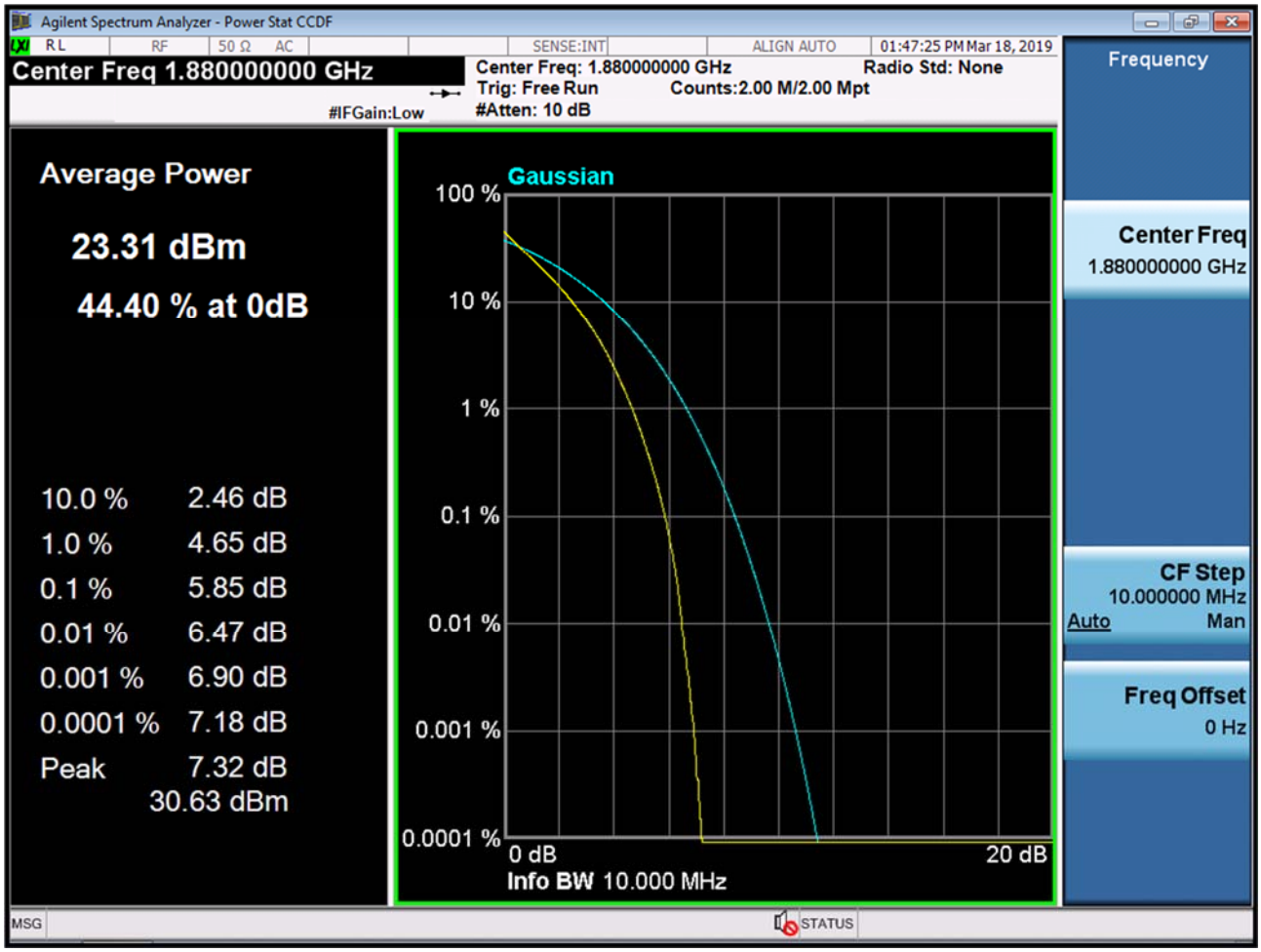
BAND 2. PAR Plot (5M BW Ch.18900 QPSK RB 25_0)



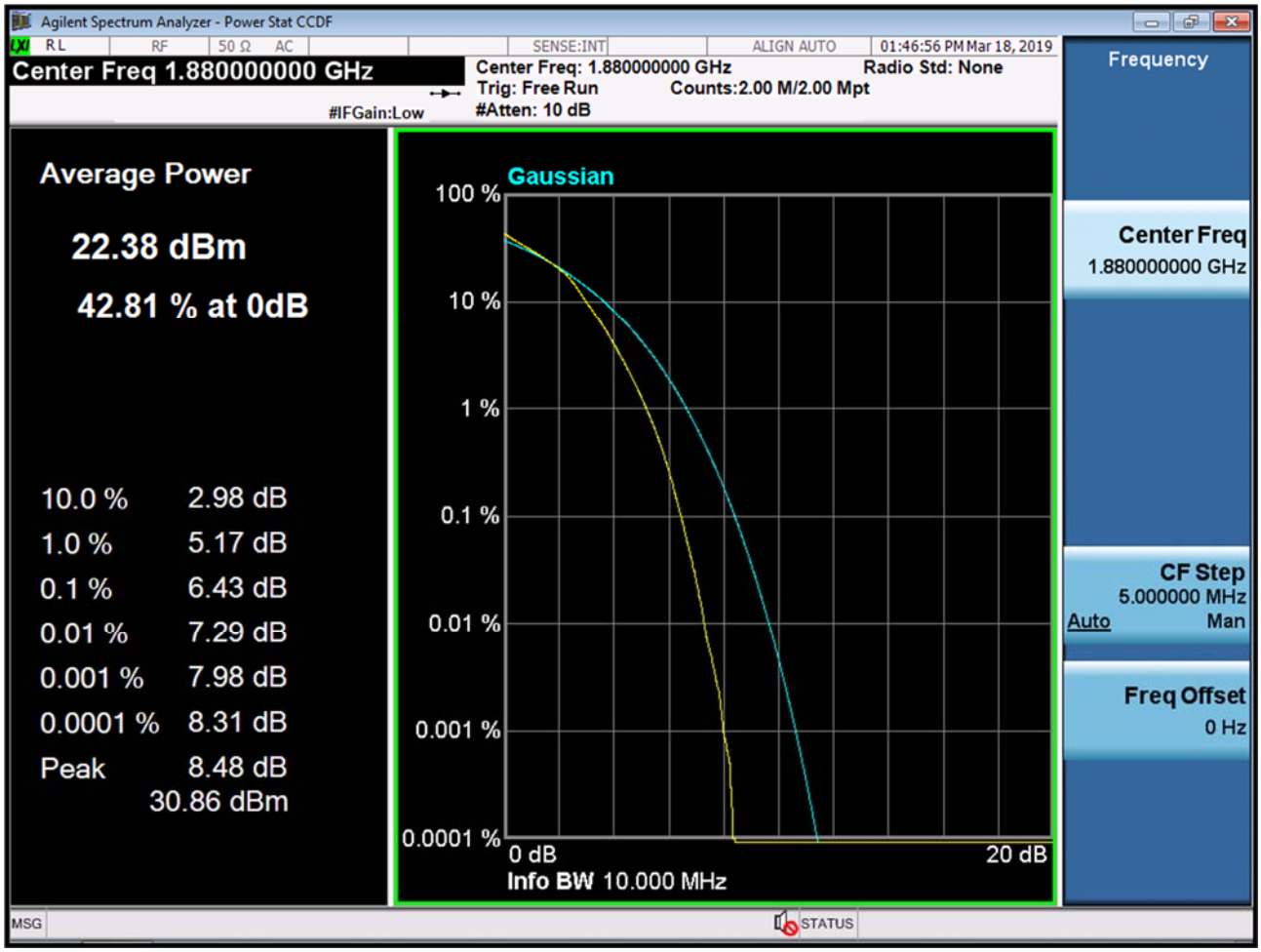
BAND 2. PAR Plot (5M BW Ch.18900 16QAM RB 25_0)



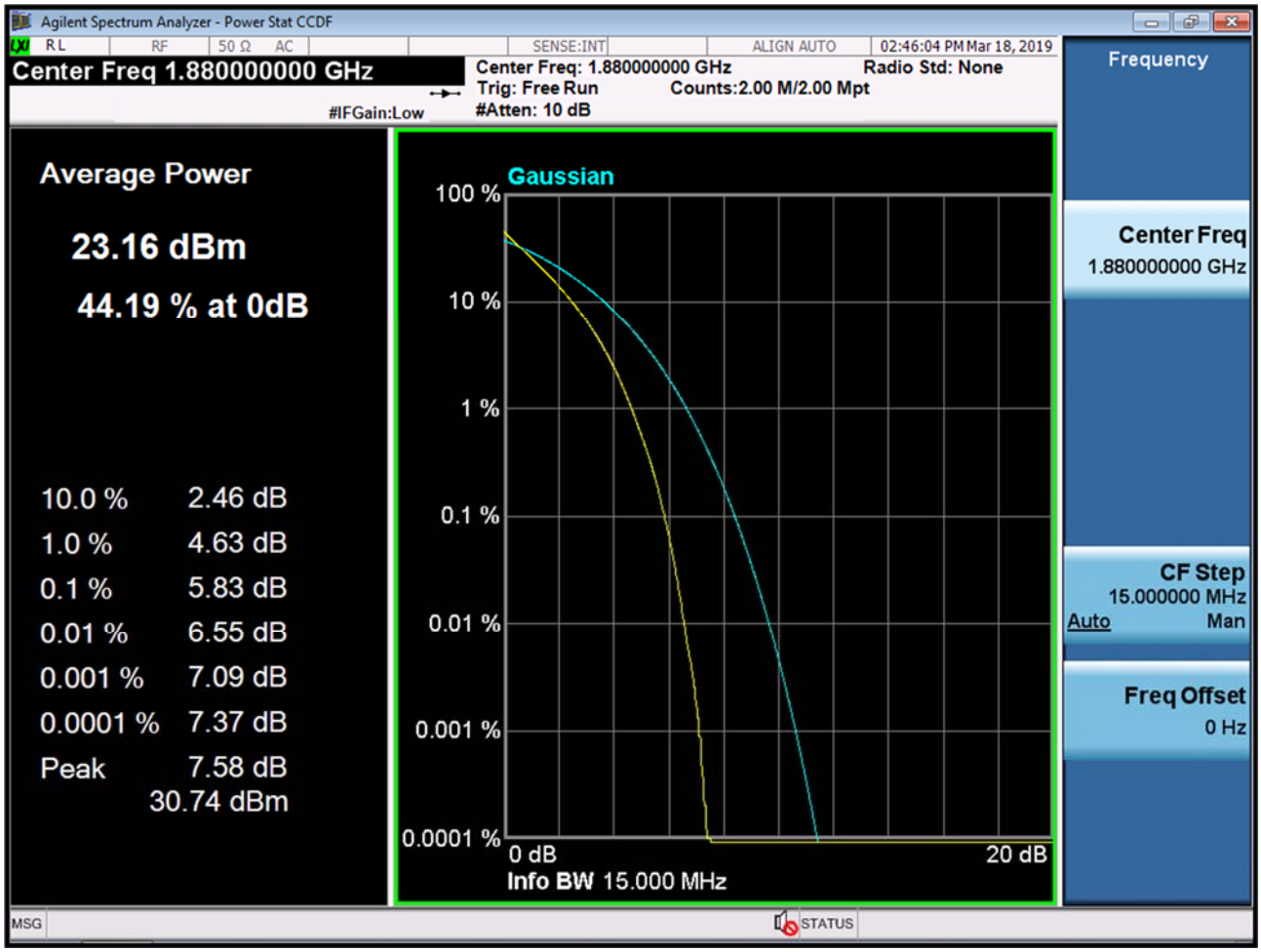
BAND 2. PAR Plot (10M BW Ch.18900 QPSK RB 50_0)



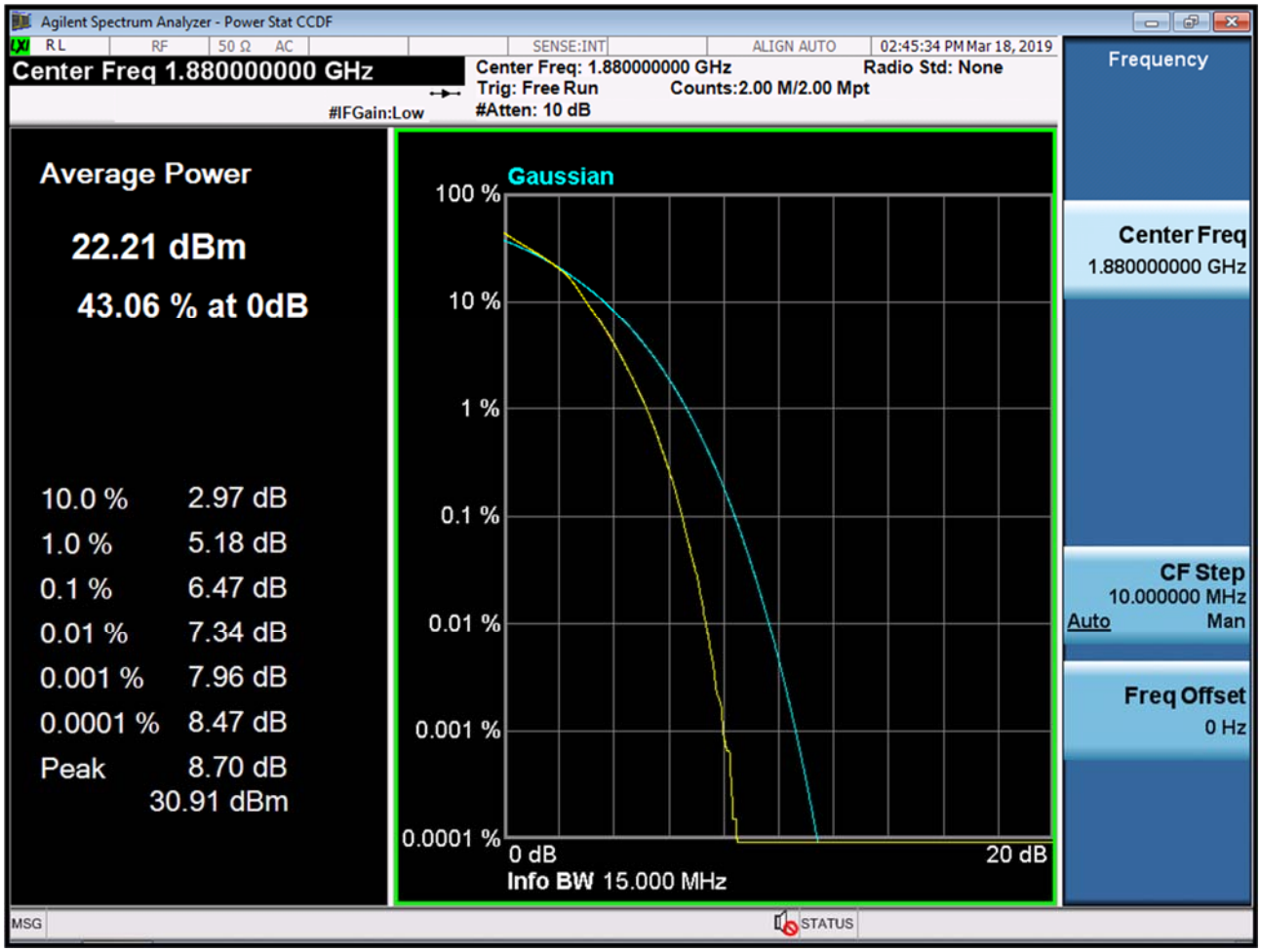
BAND 2. PAR Plot (10M BW Ch.18900 16QAM RB 50_0)



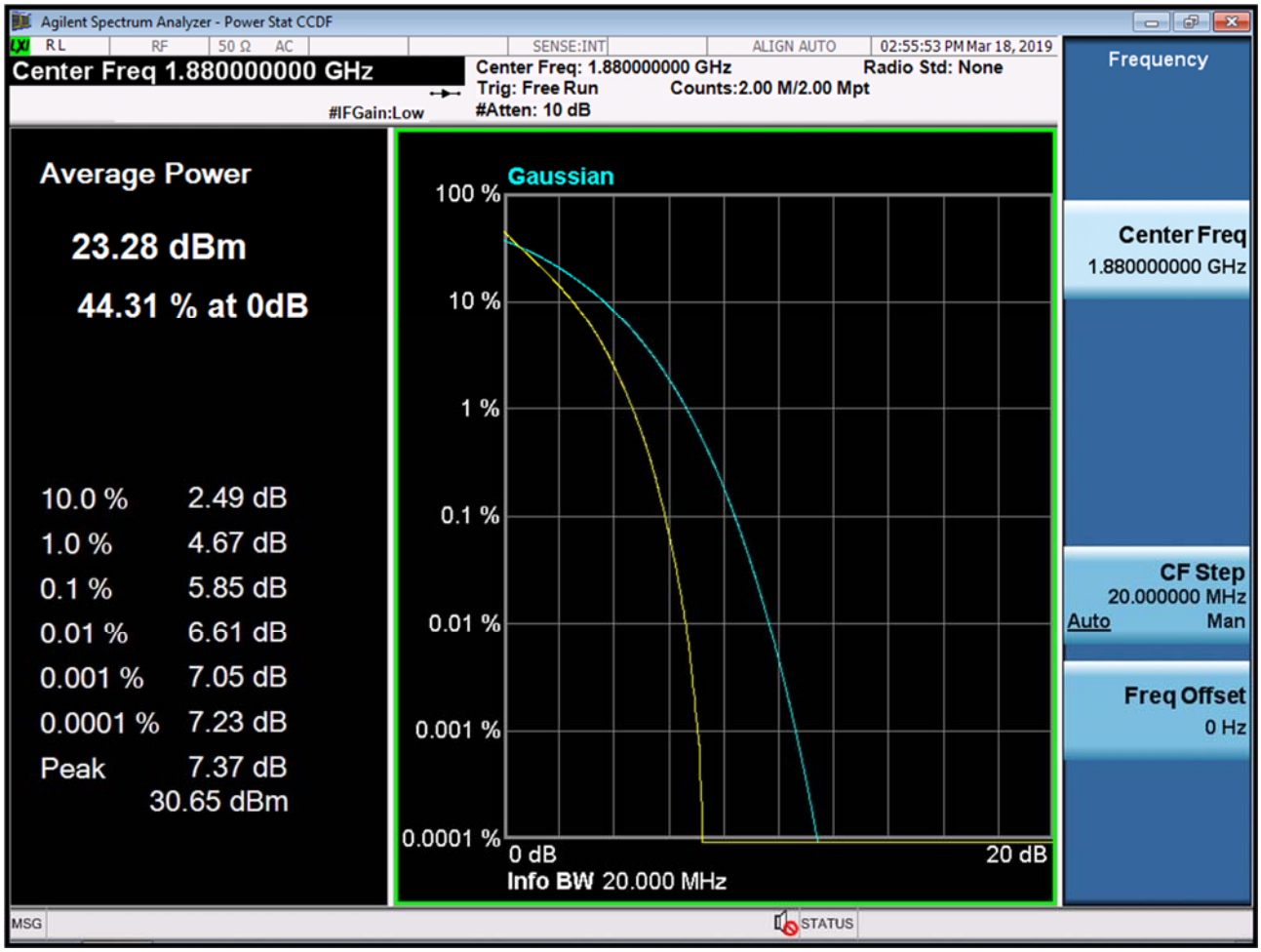
BAND 2. PAR Plot (15M BW Ch.18900 QPSK RB 75_0)



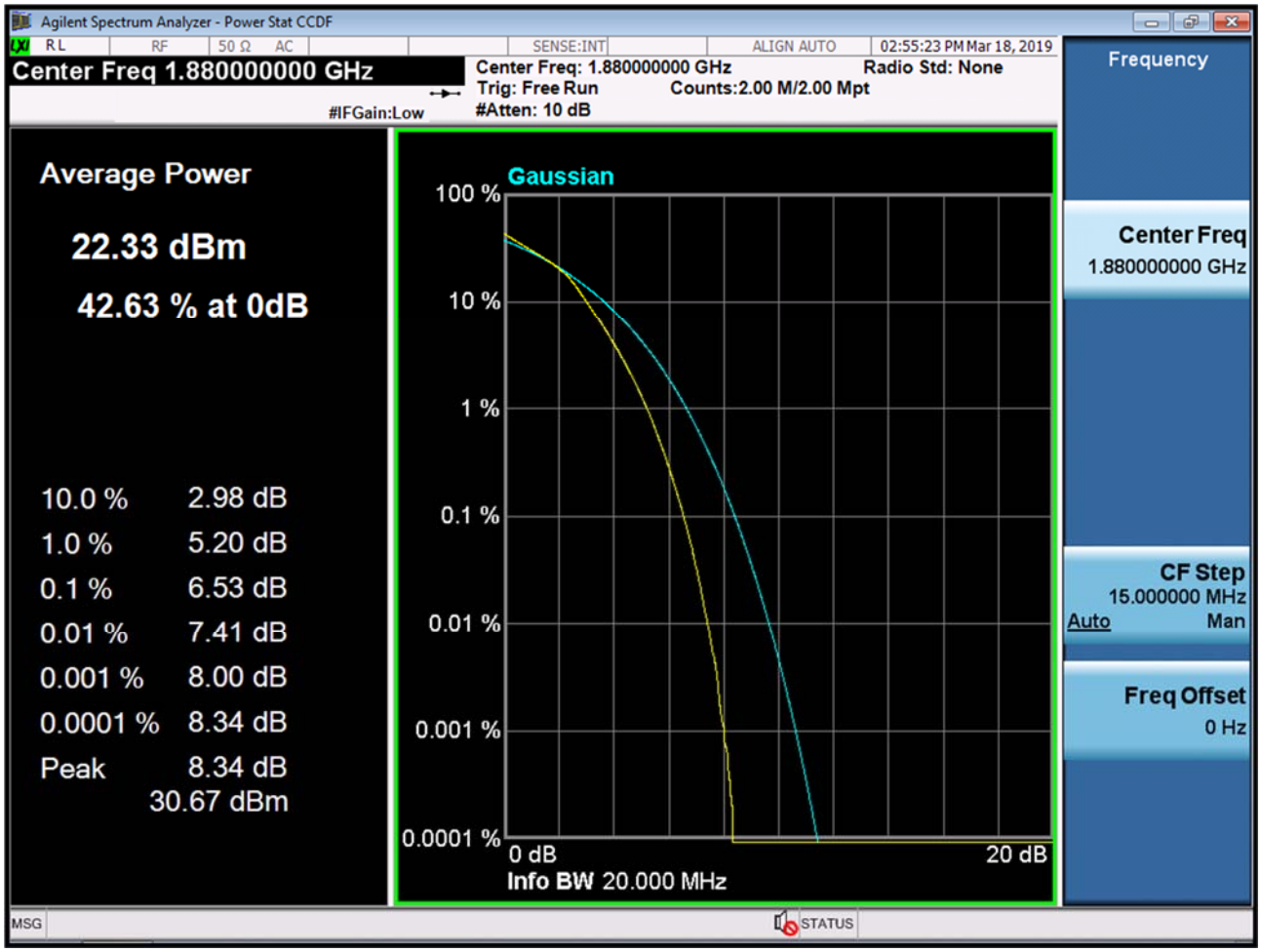
BAND 2. PAR Plot (15M BW Ch.18900 16QAM RB 75_0)



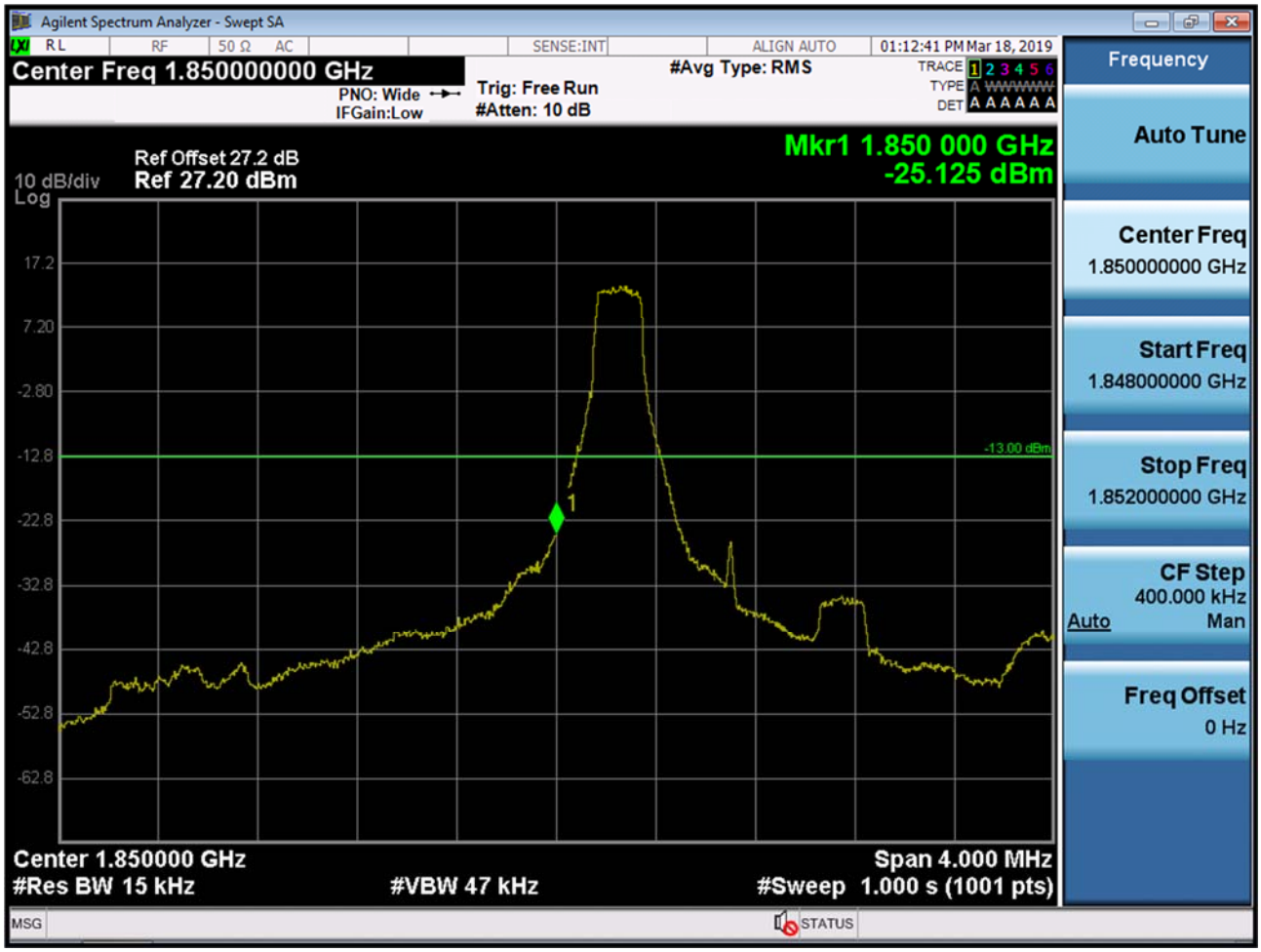
BAND 2. PAR Plot (20M BW Ch.18900 QPSK RB 100_0)



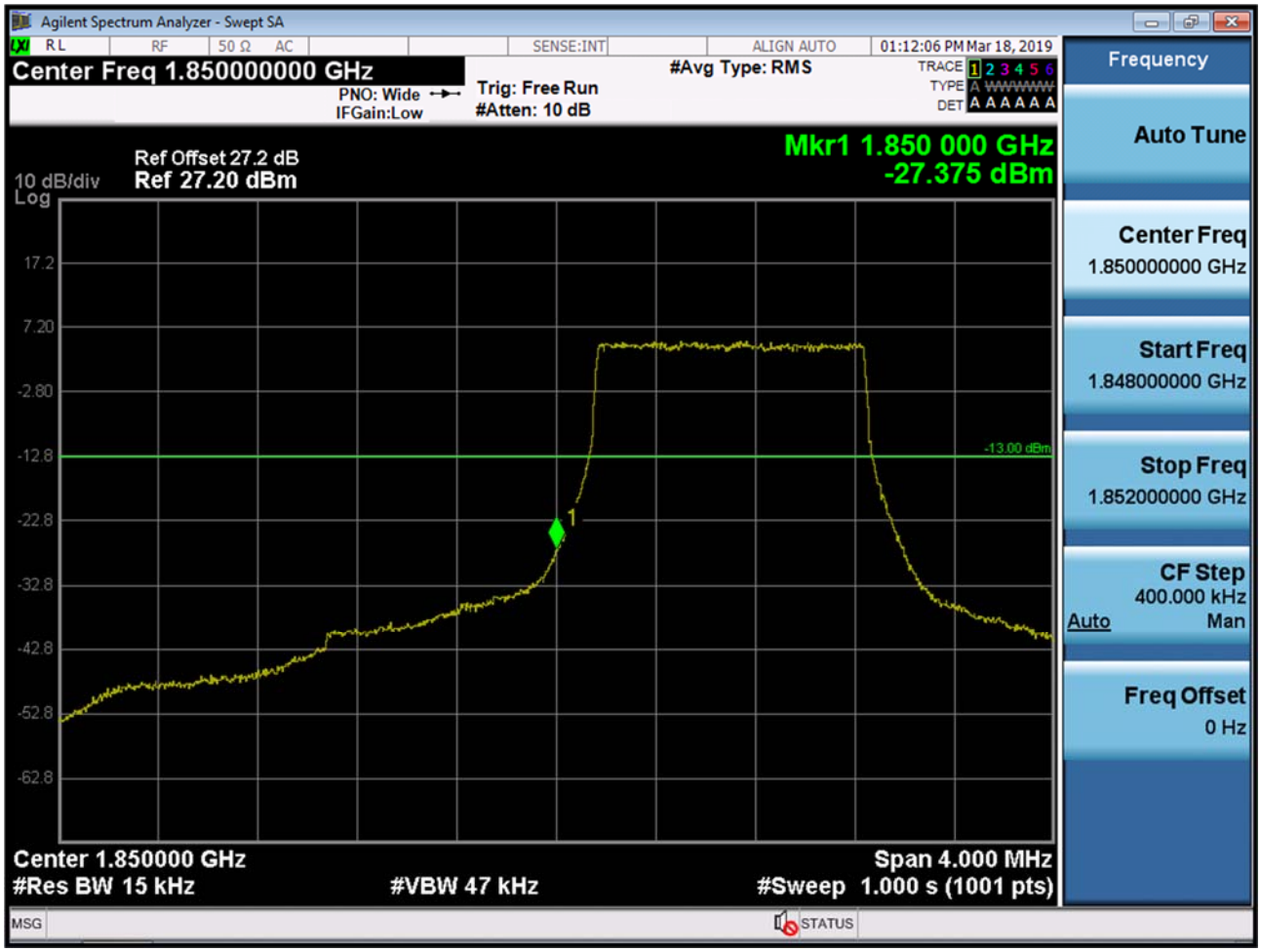
BAND 2. PAR Plot (20M BW Ch.18900 16QAM RB 100_0)



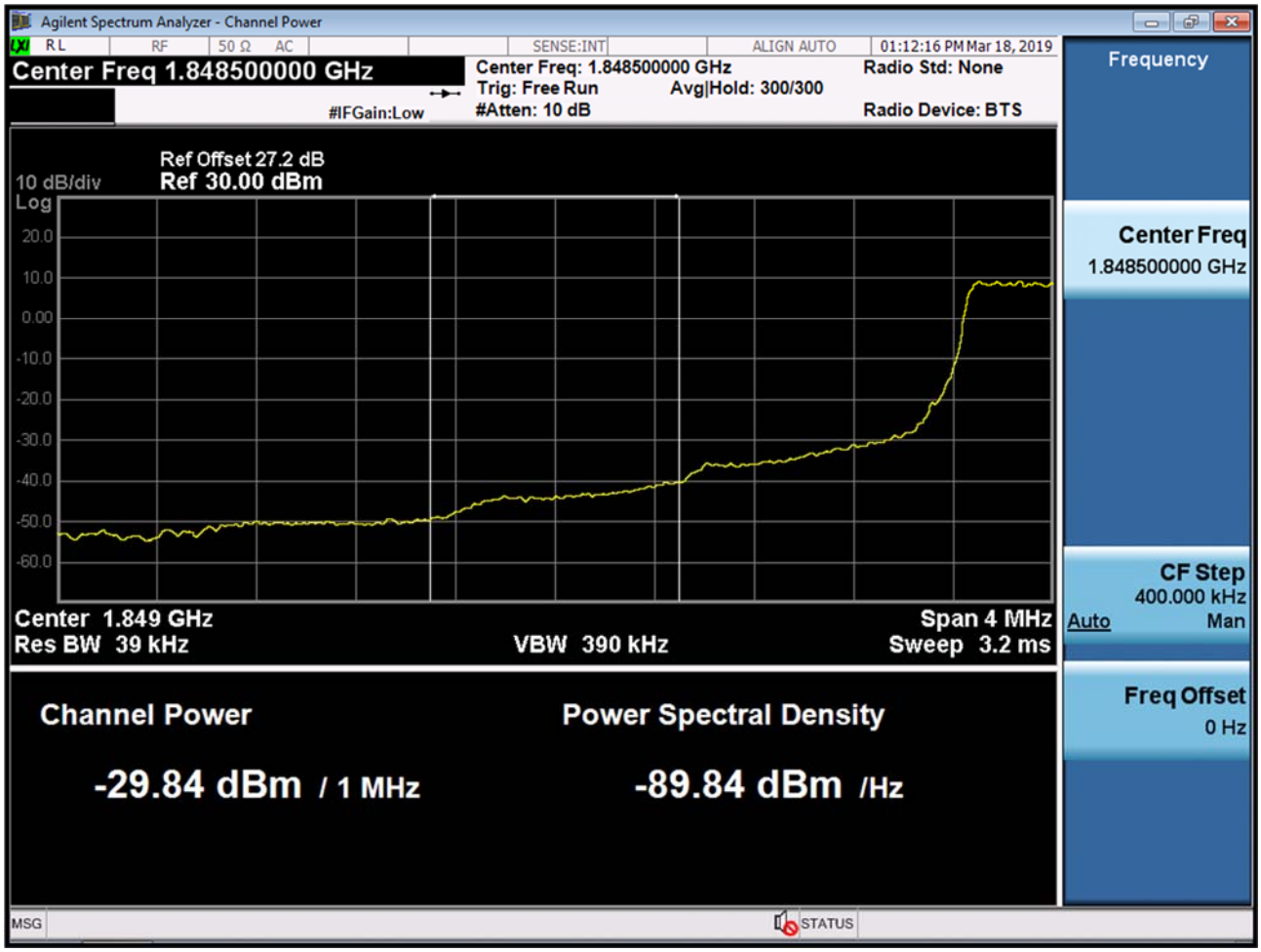
BAND 2. Lower Band Edge Plot (1.4M BW Ch.18607 QPSK_RB1_Offset 0) -1



BAND 2. Lower Band Edge Plot (1.4M BW Ch.18607 QPSK_RB6_Offset 0) -2



BAND 2. Lower Extended Band Edge Plot (1.4M BW Ch.18607 QPSK_RB6_0) -3



BAND 2. Lower Band Edge Plot (3M BW Ch.18615 QPSK_RB1_Offset 0) -1