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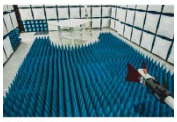

MEASUREMENT REPORT
LTE

Applicant Name:
ClearTrac Technologies, LLC
730 Quail Hollow Drive
Elizabethton, TN 37643
United States

Date of Testing:
7/31/2020 to 8/22/2020
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2007200109-03.2AVN9

FCC ID:	**2AVN910631**
APPLICANT:	**ClearTrac Technologies, LLC**

Application Type:	Class II Permissive Change
Model:	DCD-001F(female), DCD-001M(male)
EUT Type:	LTE Module
FCC Rule Part(s):	22, 24, & 27
FCC Classification:	PCS Licensed Transmitter (PCB)
Test Procedure(s):	ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01, KDB 996369 D01
Class II Permissive Change:	Please see FCC change document
Original Grant Date:	03/04/2020

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Randy Ortanez
President

ACCREDITED
CERT #2041.01

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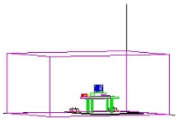
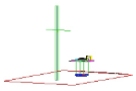


MEASUREMENT REPORT
FCC Part 22, 24, & 27



Mode	FCC Rule Part	Tx Frequency (MHz)	ERP		EIRP		Modulation
			Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)	
LTE Band 13	27	779.5 - 784.5	0.046	16.67	0.076	18.82	QPSK
LTE Band 4	27	1712.5 - 1752.5	0.162	22.11	0.266	24.26	QPSK

EUT Overview

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014 and KDB 414788 D01 v01.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.02 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.

- PCTEST TCB is a Telecommunication Class II Permissive Change Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).

- PCTEST facility is a registered (22831) test laboratory with the site description on file with ISED.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **ClearTrac Technologies, LLC LTE Module FCC ID: 2AVN910631**. This test report covers the LTE module, previously certified under FCC ID: 2AVN910631, in being integrated into the Urine Flow Device (FCC ID: 2AVN910632) which contains an RFID transmitter. The data in this reports covers the emissions due to the integration of the module.

2.2 Device Capabilities

This device contains the following capabilities:

LTE Cat. M1

LTE Band 13 and Band 4

2.3 Test Support Equipment

Dell Precision laptop	Model:	M2800	S/N:	CRKJV32	Length:	N/A
Identiv	Model:	Utrust 3700	S/N:	5.50217E+13	Length:	45cm

Table 2-1. Test Support Equipment Used

2.4 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

The LTE module was integrated into both variants (female and male) of the host Urine Flow Device. The spurious emissions were investigated with and without a sample cup attachd to the host device.

The emissions below 1GHz and above 18GHz were tested with the highest transmitting power channel and the worst case configuration.

The EUT was manipulated through three orthogonal planes of X-orientation (flatbed), Y-orientation (landscape), and Z-orientation (portrait) during the testing. Only the worst case emissions were reported in this test report. The worst orientation was found to be Y-orientation (landscape).

2.5 Software and Firmware

The test was conducted with Software version 01063-00098 Rev 1.0 installed on the EUT.

2.6 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

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3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" (KDB 971168 D01 v03r01) were used in the measurement of the EUT**.**

3.2 Radiated Power and Radiated Spurious Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Per the guidelines of KDB 412172 D01 v01r01, radiated power levels are measured using the following formula:

$$\text{ERP or EIRP} = P_T + G_T - L_C$$

Where P_T is the transmitter output power, expressed in dBm, G_T is the gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP), and L_C signal attenuation in the connecting cable between the transmitter and antenna in dB.

Per the guidance of ANSI/TIA-603-E-2016, 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 with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_{d\ [dBm]} = P_{g\ [dBm]} - \text{cable loss}_{\ [dB]} + \text{antenna gain}_{\ [dBd/dBi]}$$

Where, P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_{g\ [dBm]}$ – cable loss $_{[dB]}$.

The calculated P_d levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of 43 + 10 $\log_{10}$(Power $_{[Watts]}$). All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 474788 D01.

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4.0 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 uncertainty shown below 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.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	N9020A	MXA Signal Analyzer	8/4/2020	Annual	8/4/2021	US46470561
Rohde & Schwarz	TC-TA18	Vivaldi Antenna	8/17/2018	Biennial	8/17/2020	101072
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini Circuits	PWR-4GHS	USB Power Sensor	6/18/2020	Annual	6/18/2021	12001070013
Rohde & Schwarz	SMB100A	SMB100A Signal Generator	7/28/2020	Biennial	7/28/2021	180862
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			165450
Rohde & Schwarz	OSP130	Switch controller	2/27/2020	Annual	2/27/2021	101181
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	7/15/2020	Annual	7/15/2021	100342
Rohde & Schwarz	ESW44	EMI Test Receiver (2Hz - 44GHz)	10/16/2019	Annual	10/16/2020	101716
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/27/2020	Annual	2/27/2021	102138
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/10/2020	Annual	2/10/2021	102134
Sunol	DRH-118	Horn Antenna (1-18GHz)	2/14/2019	Biennial	2/14/2021	A102416-2
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	A051107
Espec	SCP-220	Temperature Chamber	8/27/2020	Annual	8/27/2021	OCPS5H0612K05
Schwarzbeck	UHA 9105	Dipole Antenna	4/3/2019	Biennial	4/3/2021	2696

Table 5-1. Test Equipment

Notes:

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

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6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was –81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –81.0 dBm on the spectrum analzyer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80).

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7.0 TEST RESULTS

7.1 Summary

Company Name: ClearTrac Technologies, LLC

FCC ID: 2AVN910631

FCC Classification: PCS Licensed Transmitter (PCB)

Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
27.50(b)(10) 27.50(c)(10)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 13)	< 3 Watts max. ERP	RADIATED	PASS	Section 7.2
27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4)	< 1 Watts max. EIRP			Section 7.2
2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	Undesirable Emissions (Band 13, 4)	> 43 + 10 $\log_{10}$ (P[Watts]) for all out-of-band emissions			Section 7.3
27.53(f)	Undesirable Emissions (Band 13)	< -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions less than 700Hz BW) For all emissions in the band 1559 – 1610 MHz			Section 7.3
2.1055, 27.54	Frequency Stability	Emissions must stay within the band.			Section 7.4

Table 7-1. Summary of Radiated Test Results

Notes:

1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2) For operation <1GHz, the EIRP limits in the table above are referenced to the specifications written in the relevant Radio Standards Specifications for Innovation, Science, and Economic Development Canada.
3) Two different models were tested, DCD-001F(female) and DCD-001M(male), with the integrated LTE module.

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7.2 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. 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.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
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". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

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Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

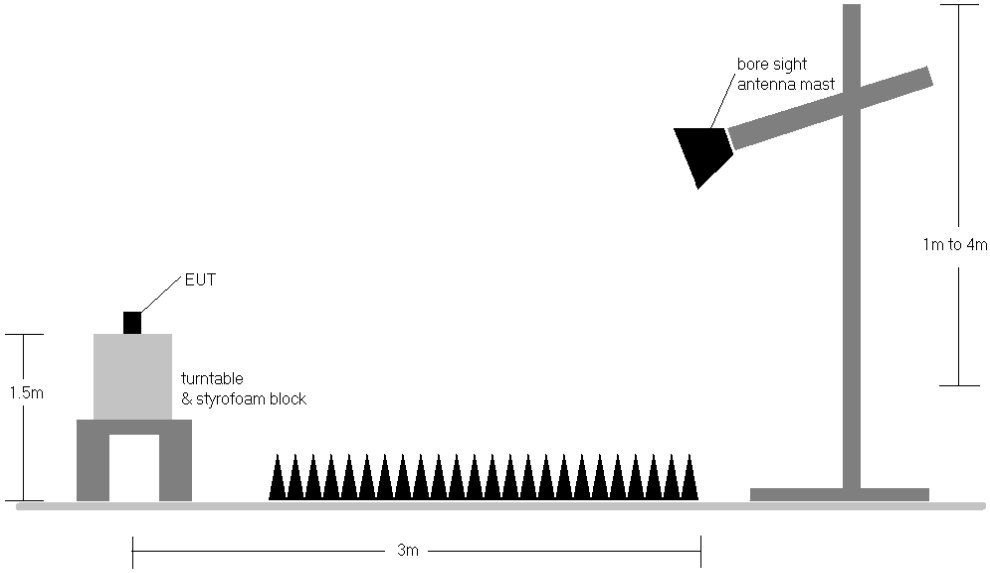

Figure 7-1. ERP/EIRP Measurement Setup

Test Notes

1) The EUT was tested in three orthogonal planes 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 tables below.

2) The Level (dBm) readings in the table were taken with a correction table loaded into the base station simulator. The correction table was used to account for the signal attenuation in the connecting cable between the transmitter and antenna.

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Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
779.50	5	QPSK	V	236	141	1 / 0	13.05	5.77	**16.67**	**0.046**	34.77	-18.11
782.00	5	QPSK	V	236	141	1 / 0	12.84	5.79	16.48	0.044	34.77	-18.29
784.50	5	QPSK	V	236	141	1 / 0	12.81	5.82	16.48	0.044	34.77	-18.29

Table 7-2. ERP Data (Band 13) FIT29

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
779.50	5	QPSK	V	230	45	1 / 0	12.50	5.77	16.12	0.041	34.77	-18.66
782.00	5	QPSK	V	230	45	1 / 0	12.53	5.79	16.17	0.041	34.77	-18.60
784.50	5	QPSK	V	230	45	1 / 0	12.54	5.82	**16.21**	**0.042**	34.77	-18.56

Table 7-3. ERP Data (Band 13) MIT22

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1712.50	5	QPSK	V	295	65	1 / 0	14.89	9.37	**24.26**	0.266	30.00	-5.74
1732.50	5	QPSK	V	295	65	1 / 0	14.79	9.22	24.01	0.252	30.00	-5.99
1752.50	5	QPSK	V	295	65	1 / 0	14.76	9.11	23.87	0.244	30.00	-6.13

Table 7-4. EIRP Data (Band 4) FIT29

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	RB Size/Offset	Substitute Level [dBm]	Ant. Gain [dBi]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
1712.50	5	QPSK	V	295	65	1 / 0	14.82	9.37	**24.19**	0.262	30.00	-5.81
1732.50	5	QPSK	V	295	65	1 / 0	14.75	9.22	23.97	0.250	30.00	-6.03
1752.50	5	QPSK	V	295	65	1 / 0	14.61	9.11	23.72	0.236	30.00	-6.28

Table 7-5. EIRP Data (Band 4) MIT22

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7.3 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

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 = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

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Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

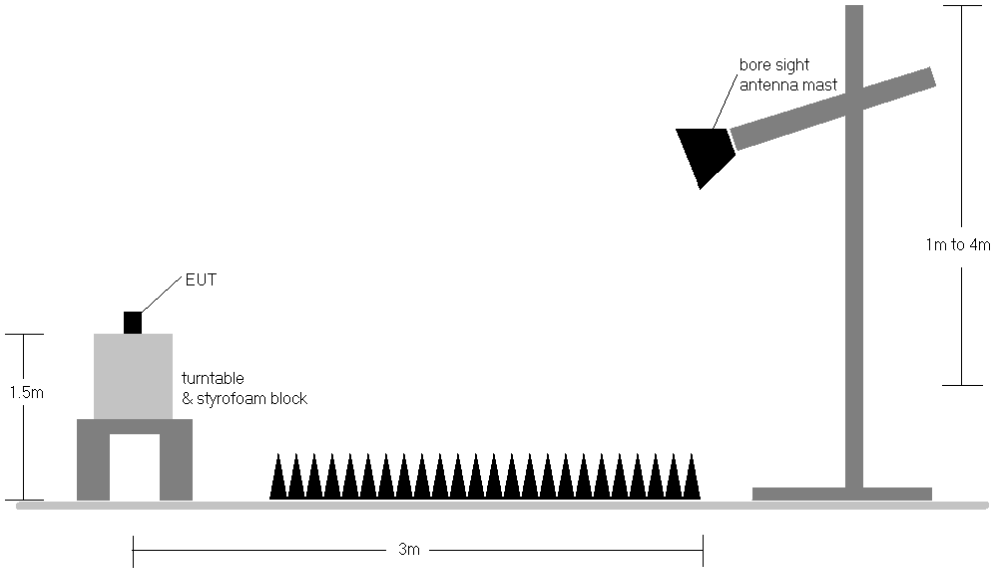

Figure 7-2. Test Instrument & Measurement Setup

Test Notes

1) The EUT was tested in three orthogonal planes 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 tables below.

2) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

3) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

4) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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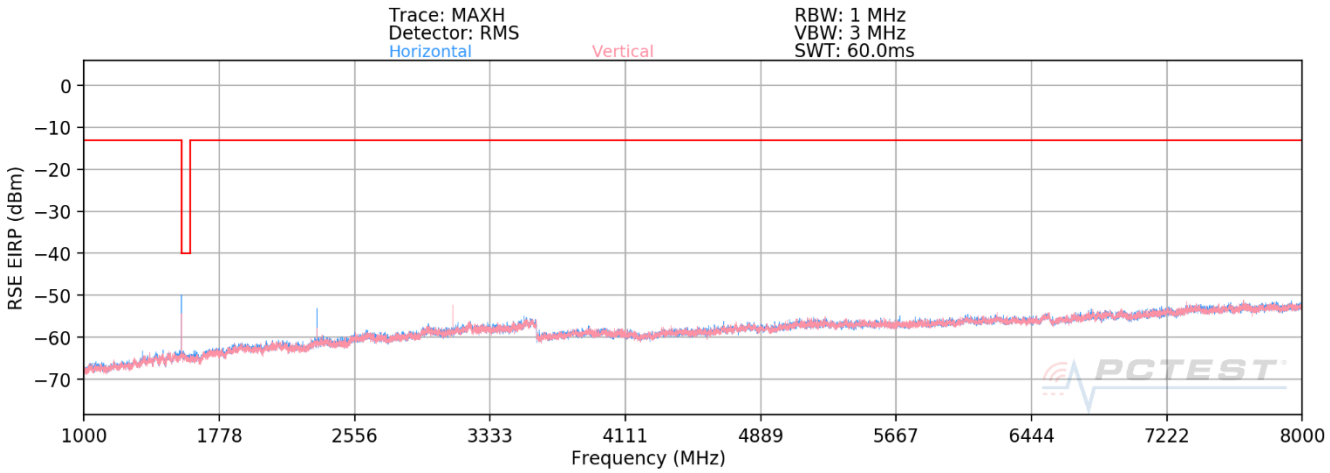
Band 13



Plot 7-1. Radiated Spurious Plot above 1GHz (Band 13) FIT29

MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.00	MHz
DISTANCE:	3	meters
WIDEBAND EMISSION LIMIT:	-40	dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1560.60	V	146	227	-59.83	9.57	-50.26	-10.3

OPERATING FREQUENCY:	782.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2342.60	H	113	153	-50.32	10.16	-40.16	-27.2
3124.60	V	124	149	-49.53	8.68	-40.85	-27.9
3906.60	V	-	-	-54.39	6.64	-47.74	-34.7
4688.60	V	-	-	-55.68	9.50	-46.18	-33.2

Table 7-3. Radiated Spurious Data (Band 13 – mid Channel) FIT29

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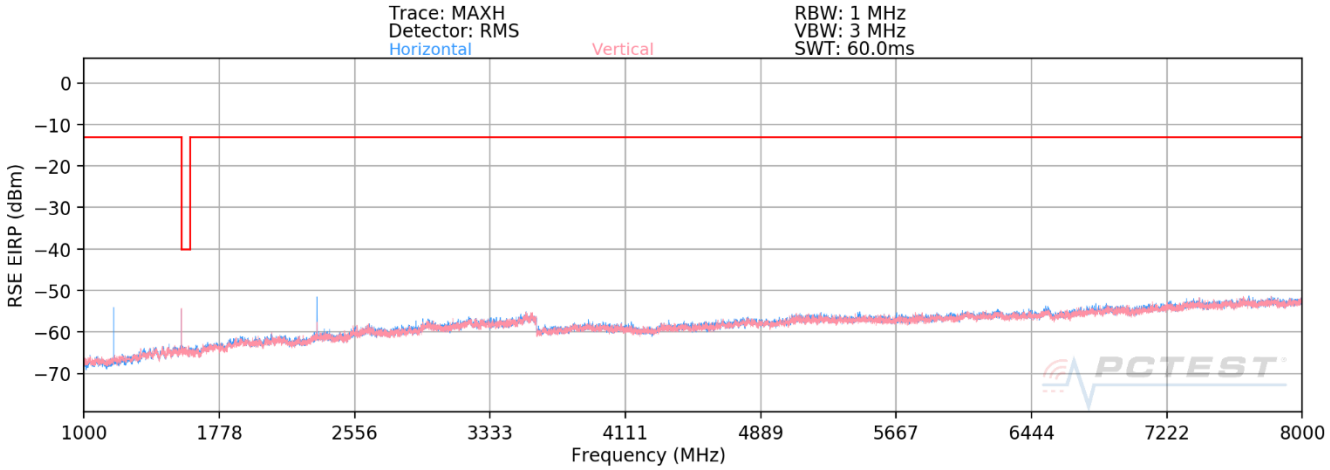

Plot 7-2. Radiated Spurious Plot above 1GHz (Band 13) MIT22

MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.00	MHz
DISTANCE:	3	meters
WIDEBAND EMISSION LIMIT:	-40	dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1560.60	H	218	288	-62.29	9.57	-52.72	-12.7

OPERATING FREQUENCY:	782.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1169.72	V	106	60	-39.89	9.14	-30.74	-17.7
2342.60	H	195	327	-49.66	10.16	-39.50	-26.5
3124.60	H	131	360	-51.84	8.68	-43.16	-30.2
3906.60	H	-	-	-53.04	6.64	-46.39	-33.4
4688.60	H	-	-	-55.93	9.50	-46.43	-33.4

Table 7-4. Radiated Spurious Data (Band 13 – mid Channel) MIT22

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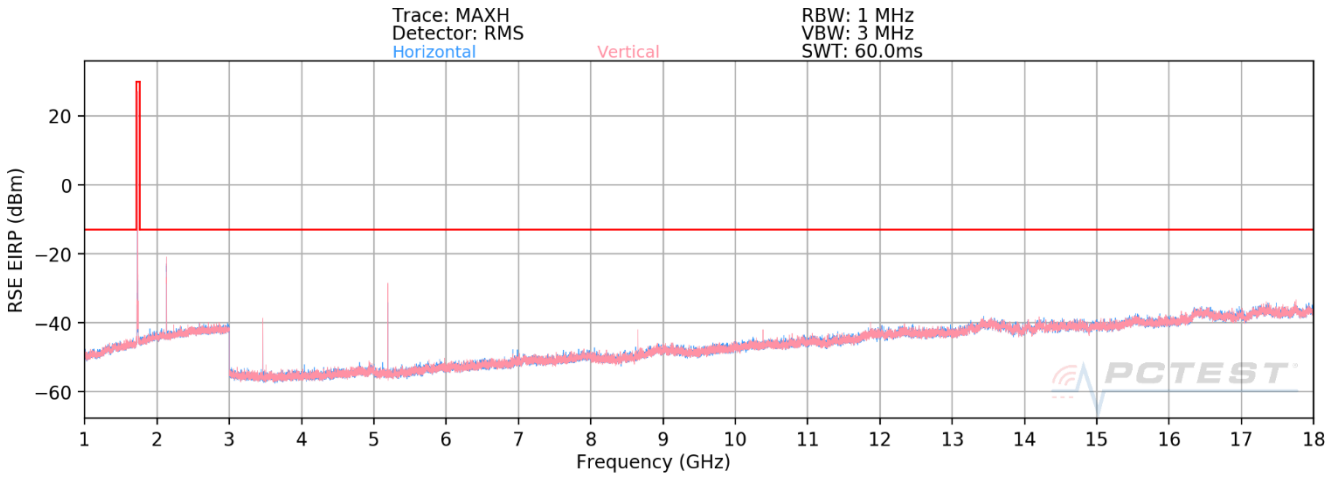
Band 4



Plot 7-3. Radiated Spurious Plot above 1GHz (Band 4) FIT29

OPERATING FREQUENCY:	1732.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3465.00	H	100	15	-38.73	6.35	-32.38	-19.4
5197.50	H	100	15	-33.40	9.05	-24.35	-11.4
6930.00	H	340	15	-48.84	9.38	-39.46	-26.5
8662.50	H	379	15	-45.22	9.58	-35.64	-22.6

Table 7-5. Radiated Spurious Data (Band 4 – mid Channel) FIT29

Note:

The ~2130MHz emission shown in the plot is the downlink signal from the base station and is not included in the measurement table.

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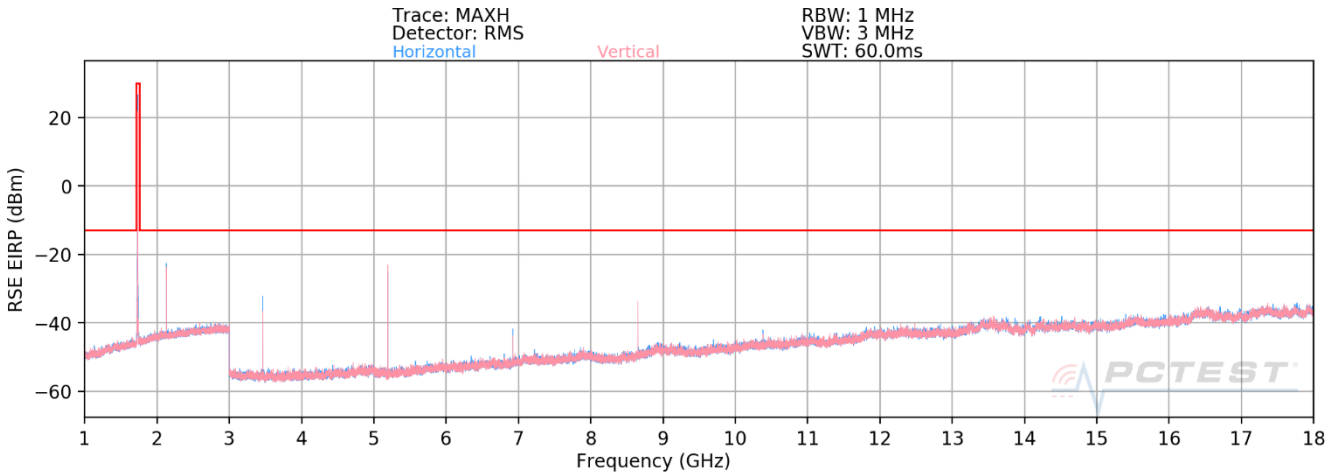

Plot 7-4. Radiated Spurious Plot above 1GHz (Band 4) MIT22

OPERATING FREQUENCY:	1732.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
3465.00	V	102	229	-38.93	6.35	-32.58	-19.6
5197.50	V	213	142	-33.99	9.05	-24.94	-11.9
6930.00	V	-	-	-52.33	9.38	-42.95	-29.9
8662.50	V	240	75	-42.95	9.58	-33.37	-20.4
10395.00	V	187	245	-44.50	9.48	-35.02	-22.0

Table 7-6. Radiated Spurious Data (Band 4 – mid Channel) MIT22

Note:

The ~2130MHz emission shown in the plot is the downlink signal from the base station and is not included in the measurement table.

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7.4 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The frequency stability of the transmitter is measured by:

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

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

Test Procedure Used

ANSI/TIA-603-E-2016

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.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

None

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Band 13 Frequency Stability Measurements

OPERATING FREQUENCY:	782,000,000	Hz
CHANNEL:	23230	
REFERENCE VOLTAGE:	12.00	VDC

FIT29

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	12.00	- 30	782,000,010	10	0.0000012
100 %	12.00	- 20	781,999,662	-338	-0.0000432
100 %	12.00	- 10	781,999,692	-308	-0.0000394
100 %	12.00	0	781,999,832	-168	-0.0000215
100 %	12.00	+ 10	782,000,258	258	0.0000330
100 %	12.00	+ 20	782,000,321	321	0.0000410
100 %	12.00	+ 30	782,000,267	267	0.0000341
100 %	12.00	+ 40	781,999,932	-68	-0.0000087
100 %	12.00	+ 50	781,999,871	-129	-0.0000165

Table 7-7. Frequency Stability Data (Band 13 – mid Channel)

Note:

Based on the results of the Freqeuncy stability test at the center the frequency deviation results measured are very small. As such it is determined that the channels at the edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range tested.

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Band 13 Frequency Stability Measurements

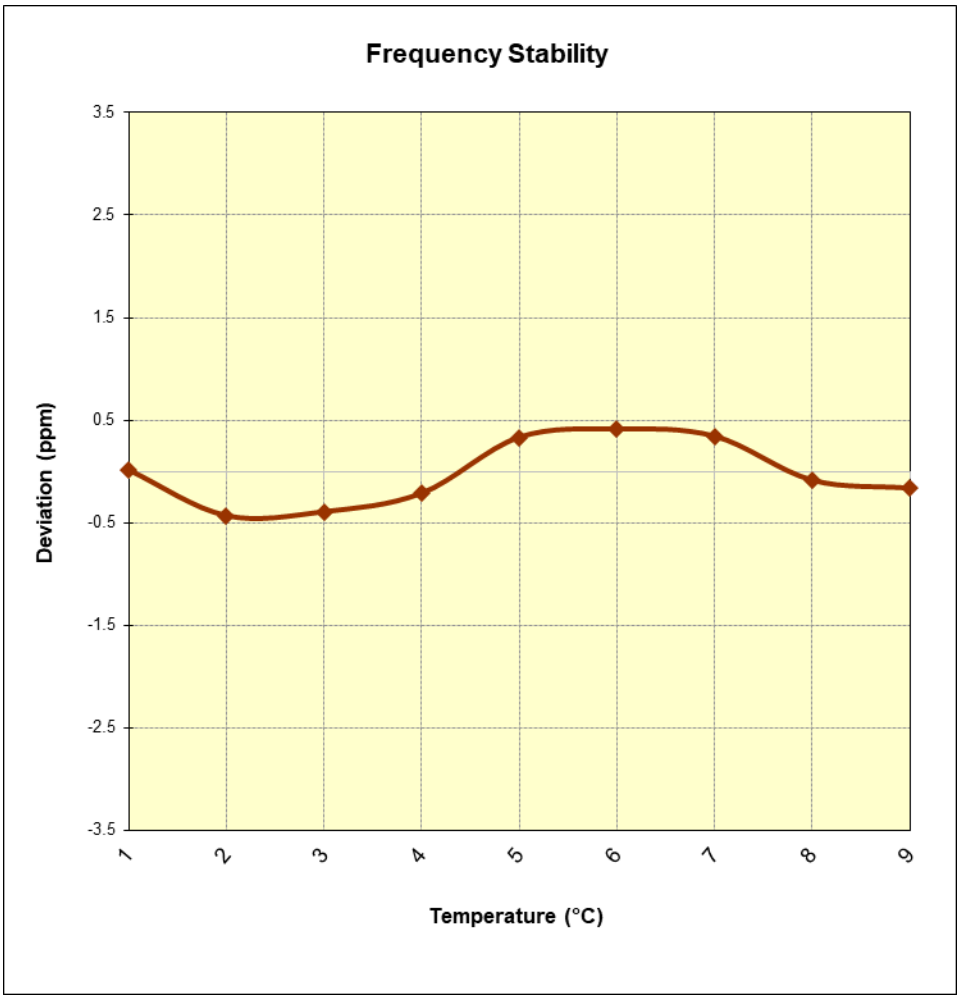

Figure 7-3. Frequency Stability Graph (Band 13)

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Band 4 Frequency Stability Measurements

OPERATING FREQUENCY: 1,732,500,000 Hz

CHANNEL: 20175

REFERENCE VOLTAGE: 12.00 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	12.00	- 30	1,732,499,995	-5	-0.0000003
100 %	12.00	- 20	1,732,499,638	-362	-0.0000209
100 %	12.00	- 10	1,732,499,675	-325	-0.0000188
100 %	12.00	0	1,732,499,874	-126	-0.0000073
100 %	12.00	+ 10	1,732,500,012	12	0.0000007
100 %	12.00	+ 20	1,732,499,951	-49	-0.0000028
100 %	12.00	+ 30	1,732,499,918	-82	-0.0000047
100 %	12.00	+ 40	1,732,500,110	110	0.0000063
100 %	12.00	+ 50	1,732,499,988	-12	-0.0000007

Table 7-8. Frequency Stability Data (Band 4 – mid Channel)

Note:

Based on the results of the Freqeuncy stability test at the center the frequency deviation results measured are very small. As such it is determined that the channels at the edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range tested.

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Band 4 Frequency Stability Measurements

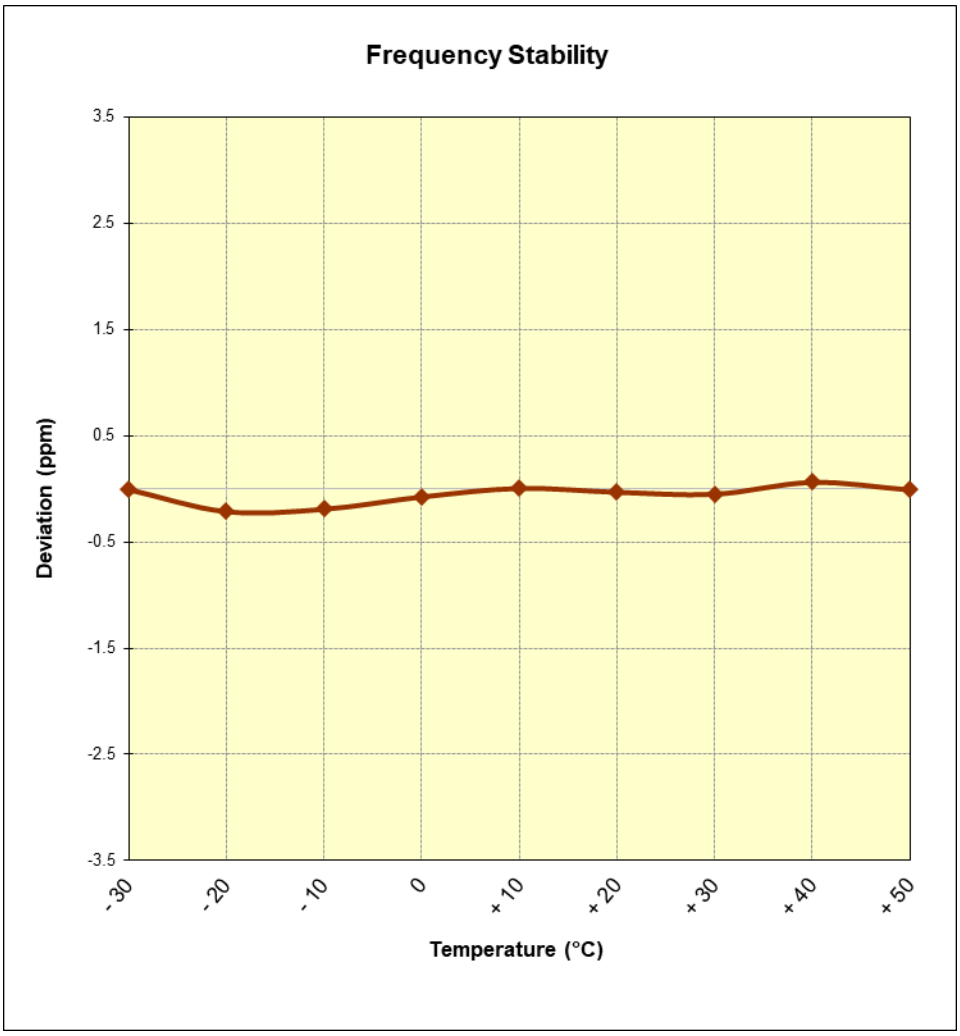

Figure 7-4. Frequency Stability Graph (Band 4)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **ClearTrac Technologies, LLC LTE Module FCC ID: 2AVN910631** complies with the requirements of FCC Part 27 and show no significant degradation in the emissions of the LTE module as a result of integrating it into the host device containing an RFID transmitter.

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