



Engineering Test Report No. 2402768-03

Report Date	November 26, 2025	
Manufacturer Name	Last Lock	
Manufacturer Address	25 W Main Street, STE 550 Madison, WI 53703	
Model No.	Smart Core – C100	
Date Received	November 13, 2025	
Test Dates	November 13, 2025 – November 21, 2025	
Specifications	FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 Innovation, Science, and Economic Development Canada, RSS-247	
Test Facility	Elite Electronic Engineering, Inc. 1516 Centre Circle, Downers Grove, IL 60515	FCC Reg. Number: 269750 IC Reg. Number: 2987A CAB Identifier: US0107
Signature	<i>Nathaniel Bouchie</i>	
Tested by	Nathaniel Bouchie	
Signature	<i>Raymond J. Klouda</i>	
Approved by	Raymond J. Klouda, Registered Professional Engineer of Illinois – 44894	
PO Number	P00080	

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1. Report Revision History

Revision	Date	Description
–	26 NOV 2025	Initial Release of Engineering Test Report No. 2402768-03

2. Introduction

2.1. Scope of Tests

This document presents the results of a series of RF emissions tests that were performed on the Last Lock Smart Core, Model No. C100 (hereinafter referred to as the Equipment Under Test (EUT)). The EUTs were manufactured and submitted for testing by Last Lock located in Madison, WI.

2.2. Purpose

The test series was performed to determine if the EUTs meet the RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, §15.247 for a Digital Modulation intentional radiator operating within the 2400 – 2483.5MHz band.

The test series was also performed to determine if the EUTs meet the RF emission requirements of the Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-Gen and Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-247 for a Digital Modulation intentional radiator operating within the 2400 – 2483.5MHz band.

Testing was performed in accordance with ANSI C63.10-2013.

2.3. Identification of the EUTs

The EUTs were identified as follows:

EUT Identification	
Product Description	Smart Core
Model/Part No.	C100
Serial No.*	109-1 112-1 24-1
Size of EUT	2.125 in x 1.25 in x 1.25 in
Software/Firmware Version	109-1 24-1 BLE Firmware
Device Type	Digitally Modulated Transmission Device
Band of Operation	2400 – 2483.5MHz
Antenna Type	Trace Antenna PN: 2450AT42E0100E
Conducted Output Power	2.019dBm
Rated Output Power	3dBm
6dB Bandwidth	880kHz
Occupied Bandwidth (99% CBW)	1.093MHz
Note*: Three EUTs were used interchangeably due to battery constraints. All EUTs are identical.	

The EUTs listed above were used throughout the test series.

3. Power Input

The EUTs were powered by 3.6VDC from internal batteries.

4. Grounding

The EUTs were not connected to ground.

5. Support Equipment

No support equipment was used during the tests.

6. Interconnect Leads

No interconnect leads were used during the tests.

7. Modifications Made to the EUTs

No modifications were made to the EUTs during the testing.

8. Modes of Operation

The EUTs were energized. The EUTs were programmed to transmit in one of the following modes:

Mode	Description
BLE Tx @ 2402MHz	This mode was achieved by holding the EUT's button down for 2 seconds, then pressing the button until the 2402MHz signal could be verified a spectrum analyzer.
BLE Tx @ 2440MHz	This mode was achieved by holding the EUT's button down for 2 seconds, then pressing the button until the 2440MHz signal could be verified a spectrum analyzer.
BLE Tx @ 2480MHz	This mode was achieved by holding the EUT's button down for 2 seconds, then pressing the button until the 2480MHz signal could be verified a spectrum analyzer.

9. Test Specifications

The tests were performed to selected portions of, and in accordance with, the test specifications.

- Federal Communications Commission "Code of Federal Regulations", Title 47, Chapter I, Subchapter A, Part 15, Subpart C
- ANSI C63.10-2013, "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"
- Federal Communications Commission Office of Engineering and Technology Laboratory Division, Guidance For Compliance Measurements On Digital Transmission Systems, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 April 2, 2019 KDB 558074 D01v05r02
- RSS-247 Issue 2, February 2017, "Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices"

10. Test Plan

No test plan was provided. Instructions were provided by personnel from Last Lock and used in conjunction with the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247, Innovation, Science, and Economic Development Canada, RSS-247, and ANSI C63.10-2013 specifications.

11. Deviation, Additions to, or Exclusions from Test Specifications

There were no deviations, additions to, or exclusions from the test specifications during this test series.

12. Laboratory Conditions

The ambient parameters of the laboratory during testing were as follows:

Ambient Parameters	Value
Temperature	24.2°C
Relative Humidity	22%
Atmospheric Pressure	1021mb

13. Summary

The following EMC tests were performed and the results are shown below:

Test Description	Requirements	Test Method	S/N	Results
6dB Bandwidth	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	109-1, 112-1, or 24-1	Conforms
Occupied Bandwidth (99%)	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	109-1, 112-1, or 24-1	Conforms
Maximum Peak Conducted Output Power	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	109-1, 112-1, or 24-1	Conforms
Effective Isotropic Radiated Power (EIRP)	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	109-1, 112-1, or 24-1	Conforms
Duty Cycle Factor Measurements	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	109-1, 112-1, or 24-1	—
Antenna Conducted Spurious Emissions	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	109-1, 112-1, or 24-1	Conforms
Spurious Radiated Emissions	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	109-1, 112-1, or 24-1	Conforms
Band-Edge Compliance	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	109-1, 112-1, or 24-1	Conforms

14. Sample Calculations

For Radiated Emissions:

The resultant field strength (FS) is a summation in decibels (dB) of the receiver meter reading (MTR), the antenna correction factor (AF), and the cable loss factor (CF). If an external preamplifier is used, the total is reduced by its gain (-PA). If a distance correction (DC) is required, it is added to the total.

$$\text{Formula 1: FS (dB}\mu\text{V/m)} = \text{MTR (dB}\mu\text{V)} + \text{AF (dB/m)} + \text{CF (dB)} + (-\text{PA (dB)}) + \text{DC (dB)}$$

To convert the Field Strength dB μ V/m term to μ V/m, the dB μ V/m is first divided by 20. The Base 10 AntiLog is taken of this quotient. The result is the Field Strength value in μ V/m terms.

$$\text{Formula 2: FS (}\mu\text{V/m)} = \text{AntiLog}[(\text{FS (dB}\mu\text{V/m)})/20]$$

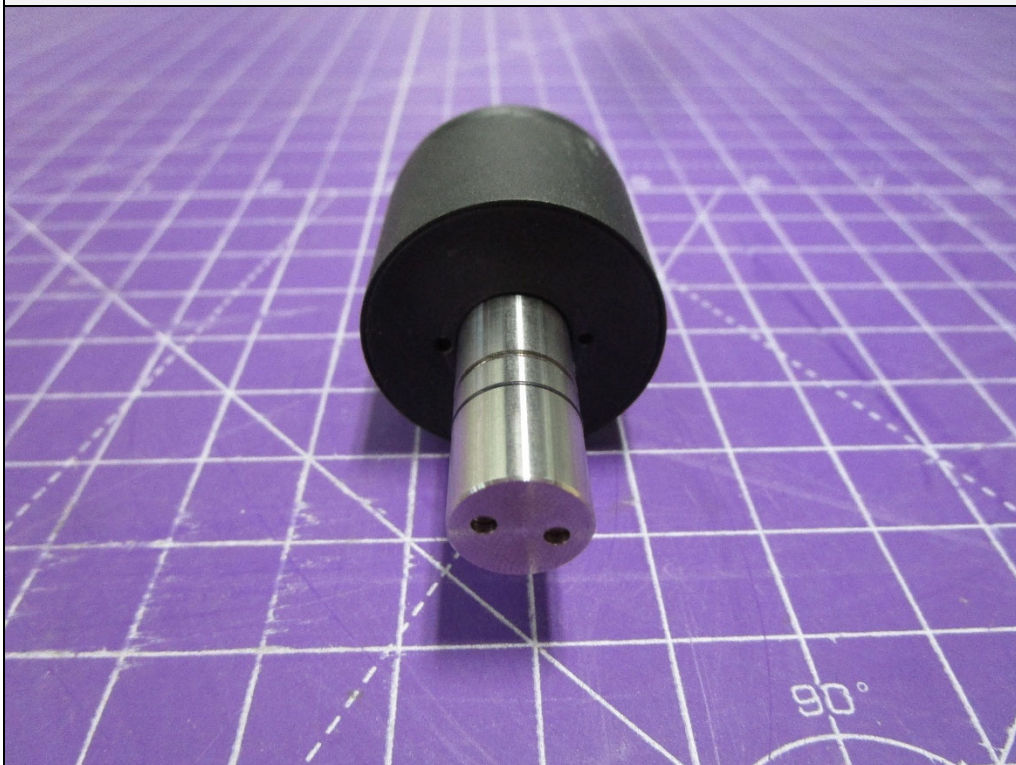
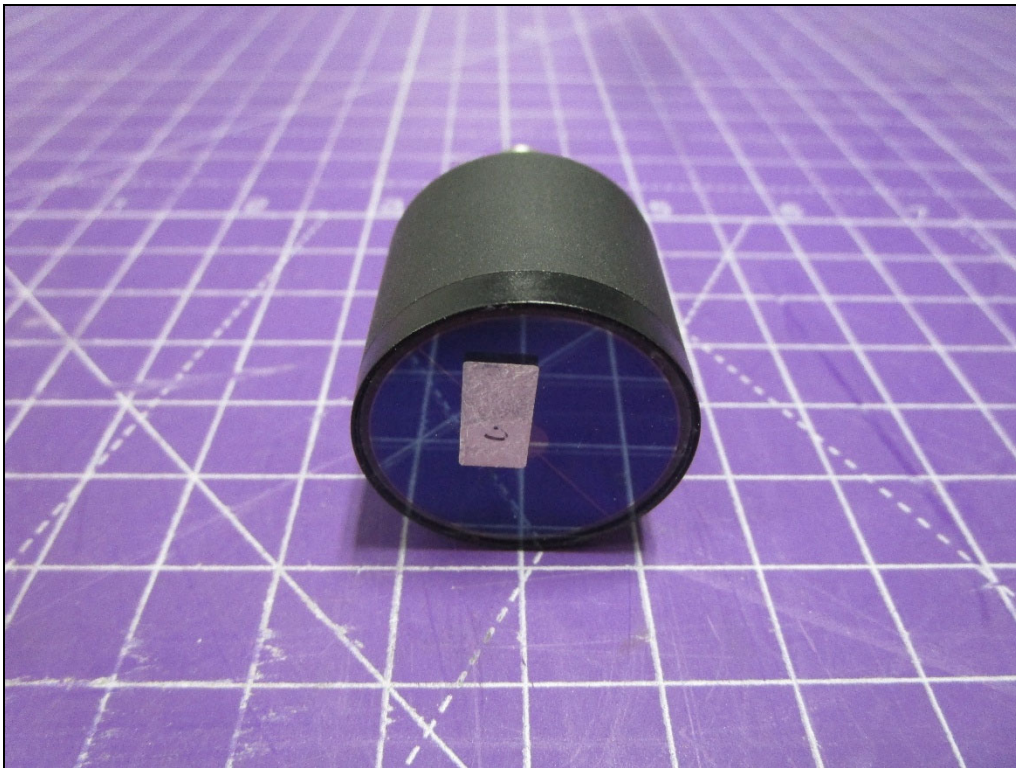
15. Statement of Conformity

The Last Lock Smart Core, Model No. C100 did fully conform to the selected requirements of FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247:

16. Certification

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247 test specifications. The data presented in this test report pertains to the EUTs as received by the customer on the test date specified. Any electrical or mechanical modifications made to the EUTs subsequent to the specified test date will serve to invalidate the data and void this certification.

17. Photographs of EUT



18. Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW10	Preamplifier	Planar	PE2-35-120-5R0-10-12-SFF	PL11685/1241	1-18GHz	3/18/2025	3/18/2026
APW18	Preamplifier	Planar	PE2-30-20G20R6G-3R0-10-12-SFF	PL34312/2148	18-26.5GHz	2/11/2025	2/11/2026
CDM5	Lab Computer	ELITE		---	---	N/A	
GSE2	SIGNAL GENERATOR (40GHZ)	ROHDE & SCHWARZ	SMB100A	183293	100KHZ-40GHZ	3/7/2025	3/7/2027
GSFB	OSP-B157W BASE UNIT	ROHDE & SCHWARZ	OSP-B157W	101071	---	9/2/2025	9/2/2027
GSFE	OSP120	ROHDE & SCHWARZ	OSP120	102278	.01-40GHZ	7/22/2025	7/22/2027
NHG1	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NWN1	DOUBLE RIDGED GUIDE ANTENNA	ETS LINDGREN	3116C	227802	10GHZ-40GHz	9/16/2024	9/16/2026
PHA0	MAGNETIC FIELD PROBE	ELECTRO-METRICS	EM-6882	134	22-230MHZ	NOTE 1	
R29F	3M ANECHOIC CHAMBER NSA	EMC TEST SYSTEMS	3M ANECHOIC		30MHZ-18GHZ	6/1/2025	6/1/2027
RBG3	EMI ANALYZER	ROHDE & SCHWARZ	ESW44	101592	2HZ-44GHZ	5/4/2025	5/4/2026
RBG4	EMI ANALYZER	ROHDE & SCHWARZ	ESW44	103007	2HZ-44GHZ	4/5/2025	4/5/2026
SES0	24VDC POWER SUPPLY	P-TRANS	FS-32024-1M	001	18-27VDC	NOTE 1	
VBV2	COMMERCIAL RADIATED EMISSIONS.EXE	ELITE		---	---	N/A	
WKA1	SOFTWARE, UNIVERSAL RCV EMI	ELITE	UNIV_RCV_EMI	1	---	I/O	

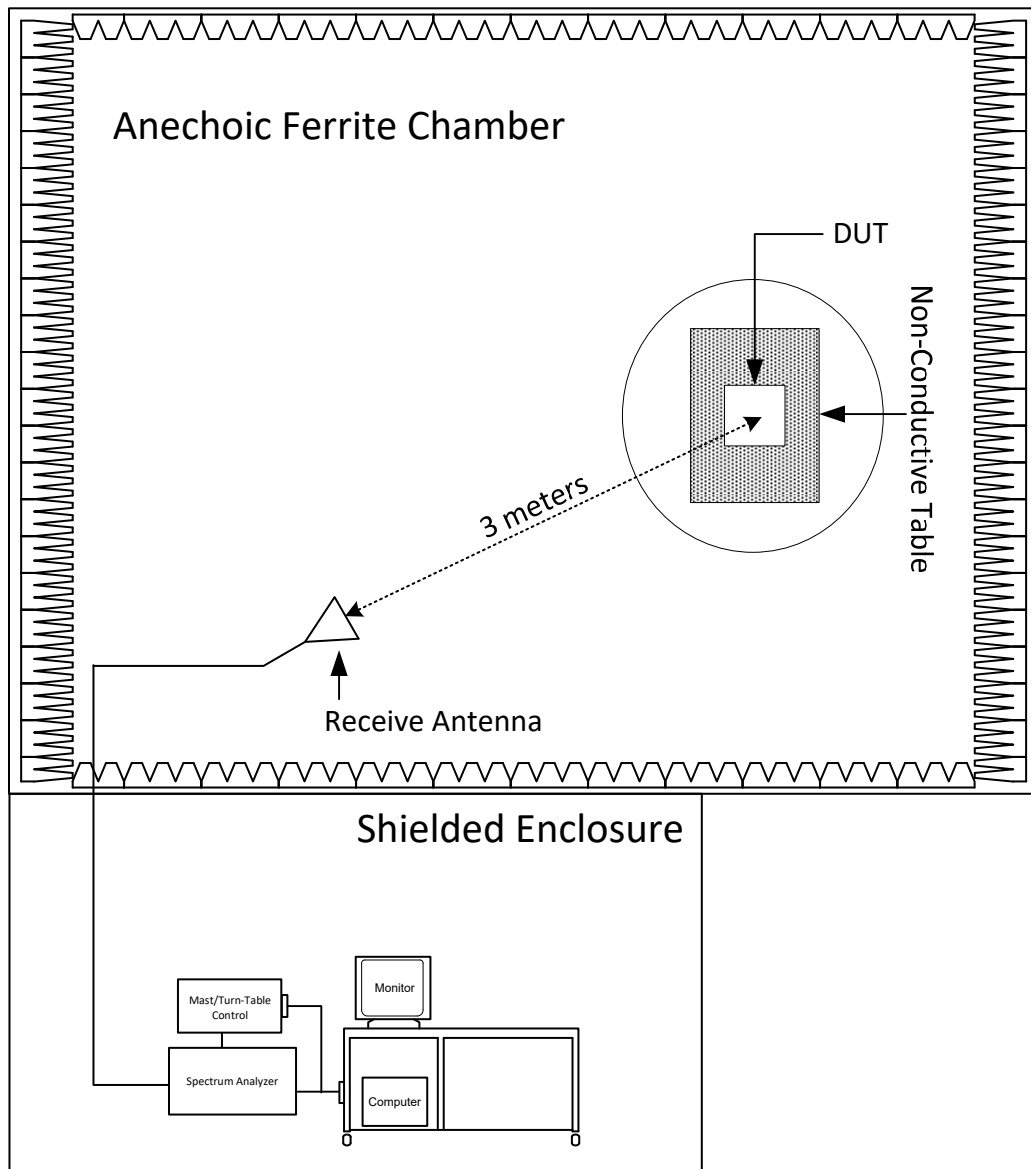
N/A: Not Applicable

I/O: Initial Only

CNR: Calibration Not Required

NOTE 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

19. Block Diagram of Test Setup



Radiated Measurements Test Setup

20. 6dB Bandwidth

EUT Information	
Manufacturer	Last Lock
Product	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz BLE Tx @ 2440MHz BLE Tx @ 2480MHz

Test Setup Details	
Setup Format	Tabletop
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Test Site Used	N/A
Notes	None

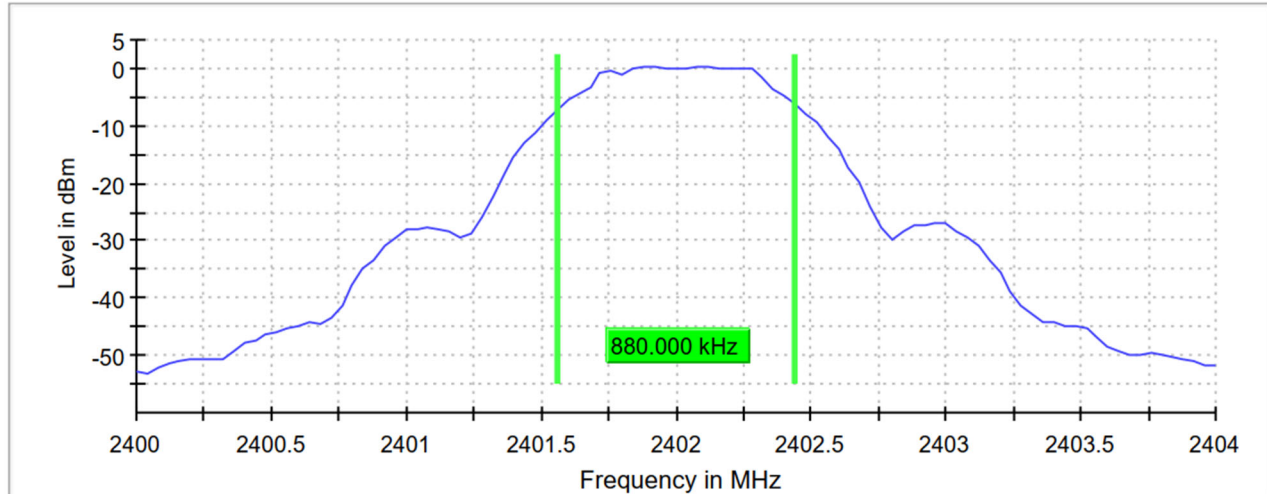
Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz)	3.1

Requirements
Systems using digital modulation techniques shall have a minimum 6dB bandwidth of 500kHz.

Procedure
The antenna port of the EUT was connected to the spectrum analyzer through 40dB of attenuation. The EUT was allowed to transmit continuously. The transmit channel was set separately to low, middle, and high channels. The resolution bandwidth (RBW) was set to 100kHz, the video bandwidth (VBW) was set to the same as or 3 times greater than the RBW, and the span was set to 3 times the RBW. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was then screenshot and saved.

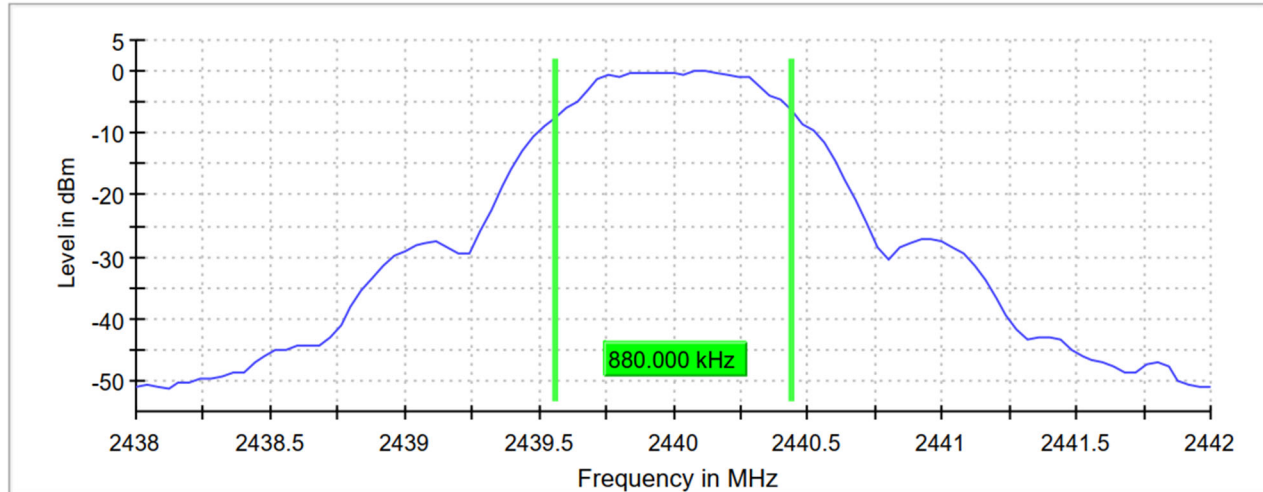
Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz
Frequency Tested	2402MHz
Result	6dB BW = 880kHz

6 dB Bandwidth



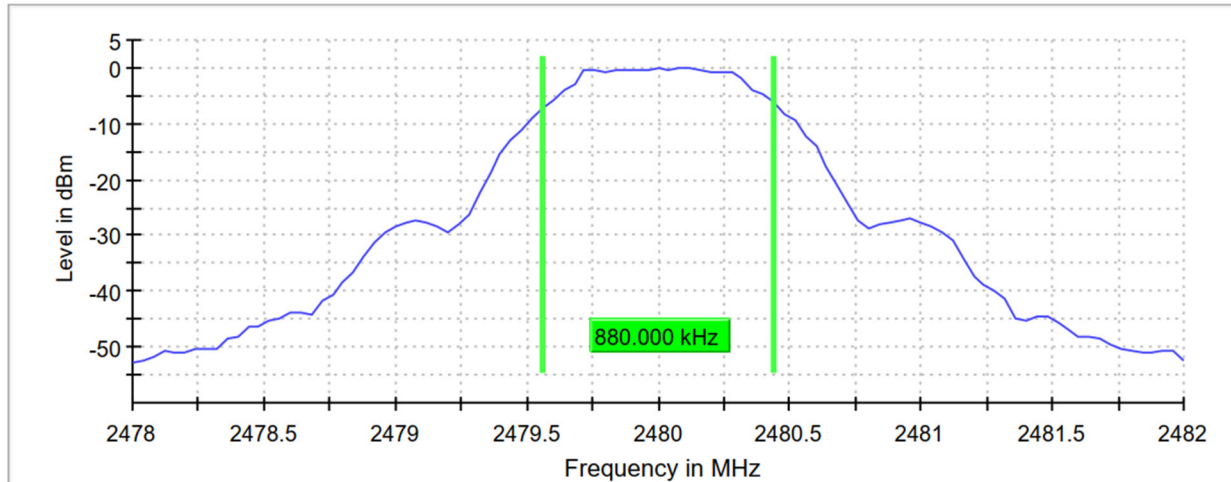
Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2440MHz
Frequency Tested	2440MHz
Result	6dB BW = 880kHz

6 dB Bandwidth



Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2480MHz
Frequency Tested	2480MHz
Result	6dB BW = 880kHz

6 dB Bandwidth



21. Occupied Bandwidth (99%)

EUT Information	
Manufacturer	Last Lock
Product	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz BLE Tx @ 2440MHz BLE Tx @ 2480MHz

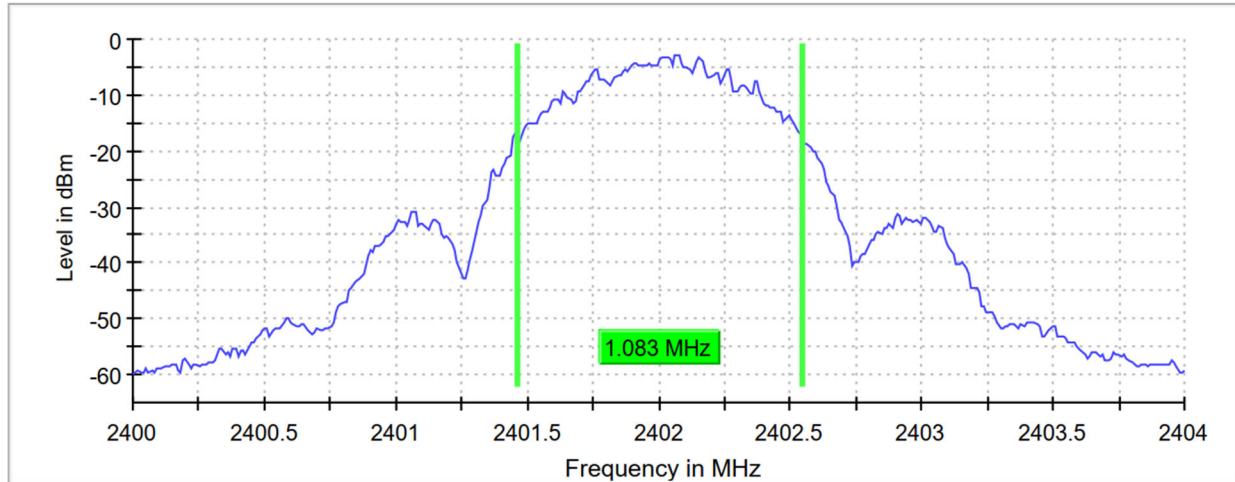
Test Setup Details	
Setup Format	Tabletop
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Test Site Used	N/A
Notes	None

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz)	3.1

Procedure
The antenna port of the EUT was connected to the spectrum analyzer through 40dB of attenuation. The EUT was allowed to transmit continuously. The transmit channel was set separately to low, middle, and high channels. The resolution bandwidth (RBW) was set to 1% to 5% of the actual occupied / x dB bandwidth, the video bandwidth (VBW) was set 3 times greater than the RBW, and the span was set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was plotted using a 'screen dump' utility.

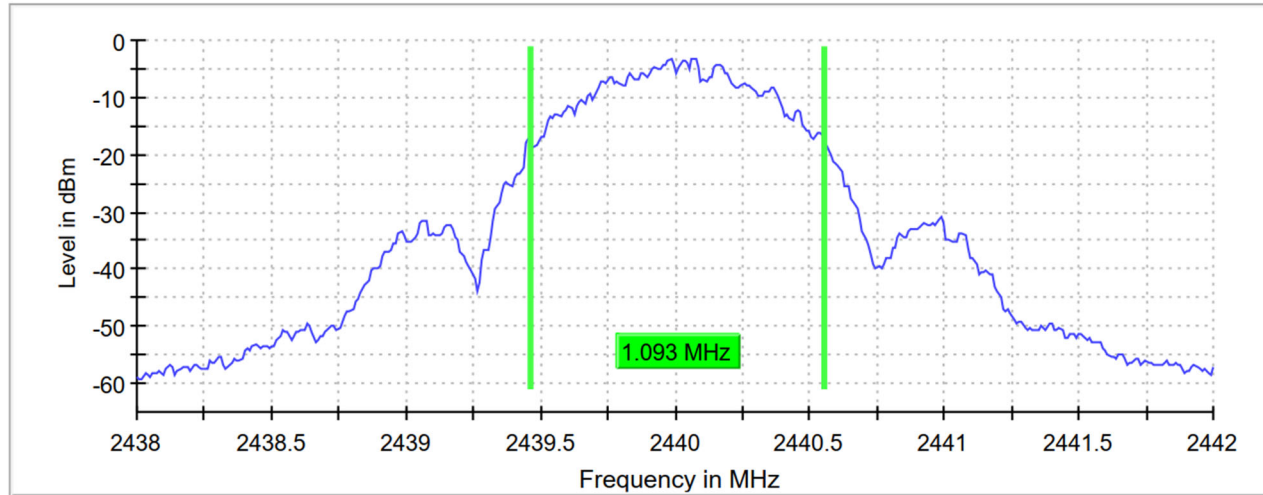
Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz
Frequency Tested	2402MHz
Result	OBW = 1.083MHz

99 % Bandwidth



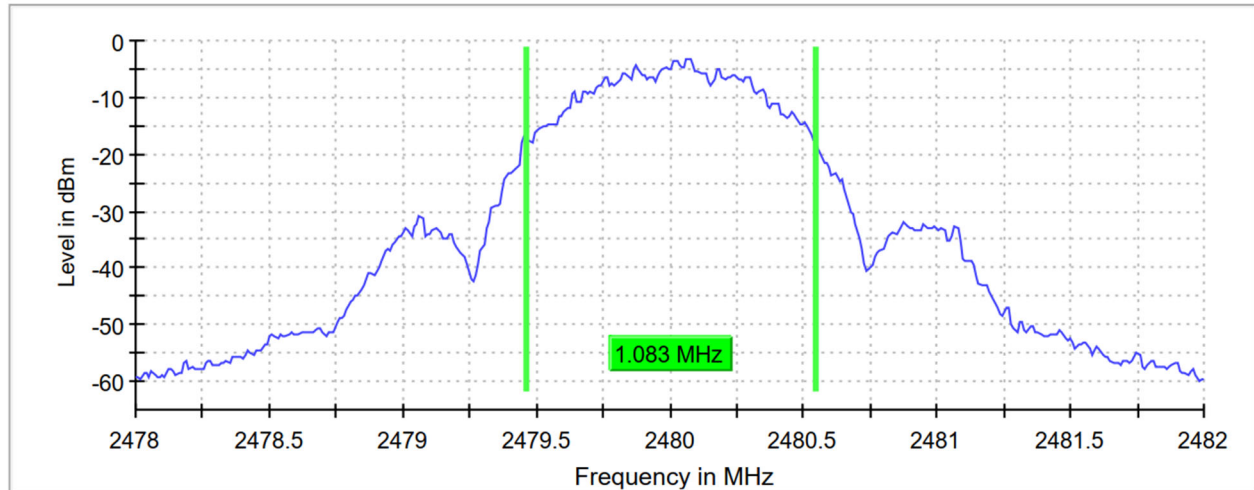
Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2440MHz
Frequency Tested	2440MHz
Result	OBW = 1.093MHz

99 % Bandwidth



Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2480MHz
Frequency Tested	2480MHz
Result	OBW = 1.083MHz

99 % Bandwidth



22. Maximum Peak Conducted Output Power

EUT Information	
Manufacturer	Last Lock
Product	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz BLE Tx @ 2440MHz BLE Tx @ 2480MHz

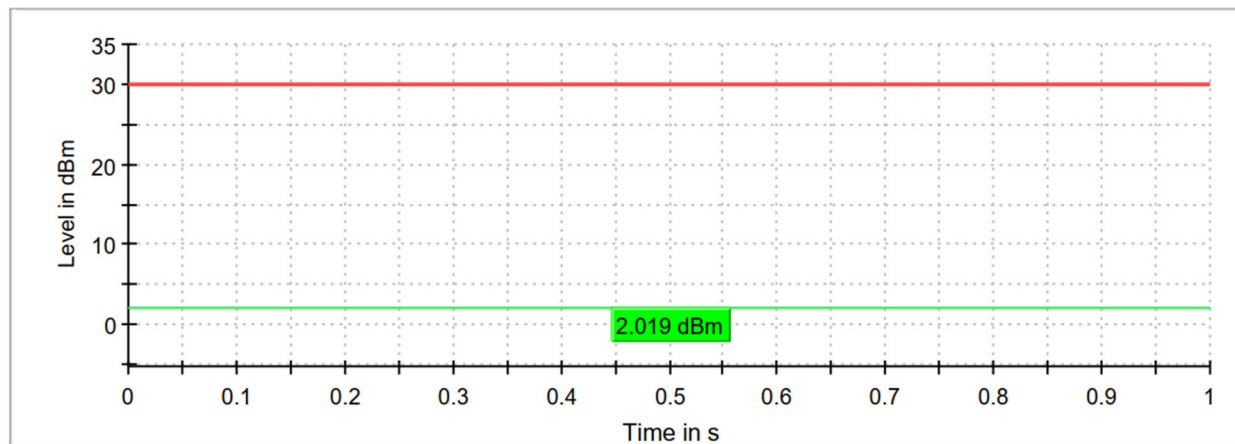
Test Setup Details	
Setup Format	Tabletop
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Test Site Used	N/A
Notes	None

Requirements
The output power shall not exceed 1W (30dBm).

Procedure
The antenna port of the EUT was connected to the spectrum analyzer through 40dB of attenuation. The EUT was set to transmit separately at the low, middle, and high channels. The resolution bandwidth (RBW) was set to greater than the 6dB bandwidth. The span was set to greater than 3 times the RBW. The 'Max-Hold' function was engaged. The maximum meter reading was recorded. The peak power output was calculated for the low, middle, and high channels.

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz
Frequency Tested	2402MHz
Result	Output Power = 1.59mW (2.019dBm)

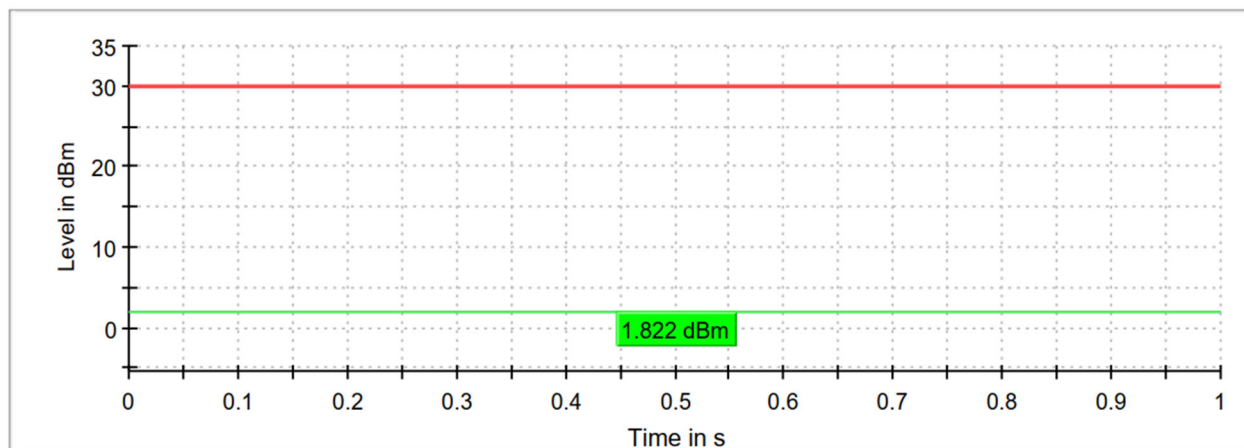
Gated Trace



— Gated Trace
 — Overall
 — Limit

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2440MHz
Frequency Tested	2440MHz
Result	Output Power = 1.52mW (1.822dBm)

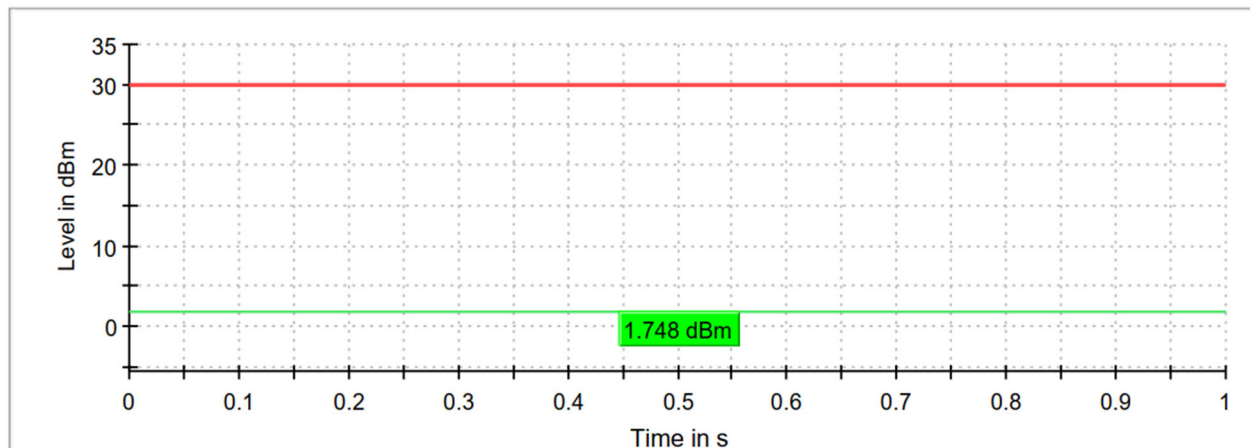
Gated Trace



— Gated Trace
 — Overall
 — Limit

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2480MHz
Frequency Tested	2480MHz
Result	Output Power = 1.50mW (1.748dBm)

Gated Trace



— Gated Trace
 — Overall
 — Limit

23. Effective Isotropic Radiated Power (EIRP)

EUT Information	
Manufacturer	Last Lock
Product	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz BLE Tx @ 2440MHz BLE Tx @ 2480MHz

Test Setup Details	
Setup Format	Tabletop
Measurement Method	Radiated
Type of Test Site	Semi-Anechoic Chamber
Test Site Used	Room 21
Type of Antennas Used	Double-ridged waveguide (or equivalent)

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz)	3.1

Requirements
The output power shall not exceed 4W (36dBm).

Procedure
The EUT was placed on the non-conductive stand and set to transmit. A double ridged waveguide antenna was placed at a test distance of 3 meters from the EUT. The resolution bandwidth (RBW) of the spectrum analyzer was set to greater than the 6dB bandwidth. The EUT was maximized for worst case emissions (or maximum output power) at the measuring antenna. The maximum meter reading was recorded. The peak power output was measured for the low, middle, and high channels. The equivalent power was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power, a dipole antenna (double ridged waveguide antenna for all measurements above 1GHz) was then set in place of the EUT and connected to a calibrated signal generator. The output of the signal generator was adjusted to match the received level at the spectrum analyzer. The signal level was recorded. The reading was then corrected to compensate for cable loss (and antenna gain for all measurements above 1GHz), as required. The peak power output was calculated for low, middle, and high hopping frequencies.

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz BLE Tx @ 2440MHz BLE Tx @ 2480MHz
Result	Max EIRP = 0.162mW (-7.9dBm)

Freq (MHz)	Ant Pol	Wide BW Meter Reading (dBμV)	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total (dBμV/m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2402.00	H	46.4	2.6	32.6	0.0	81.6	-13.7	36.0	-49.7
	V	49.2	2.6	32.6	0.0	84.4	-10.9	36.0	-46.9
2440.00	H	50.6	2.6	32.7	0.0	86.0	-9.3	36.0	-45.3
	V	52.0	2.6	32.7	0.0	87.4	-7.9	36.0	-43.9
2480.00	H	51.1	2.7	32.9	0.0	86.7	-8.6	36.0	-44.6
	V	51.8	2.7	32.9	0.0	87.4	-7.9	36.0	-43.9

24. Duty Cycle Factor Measurements

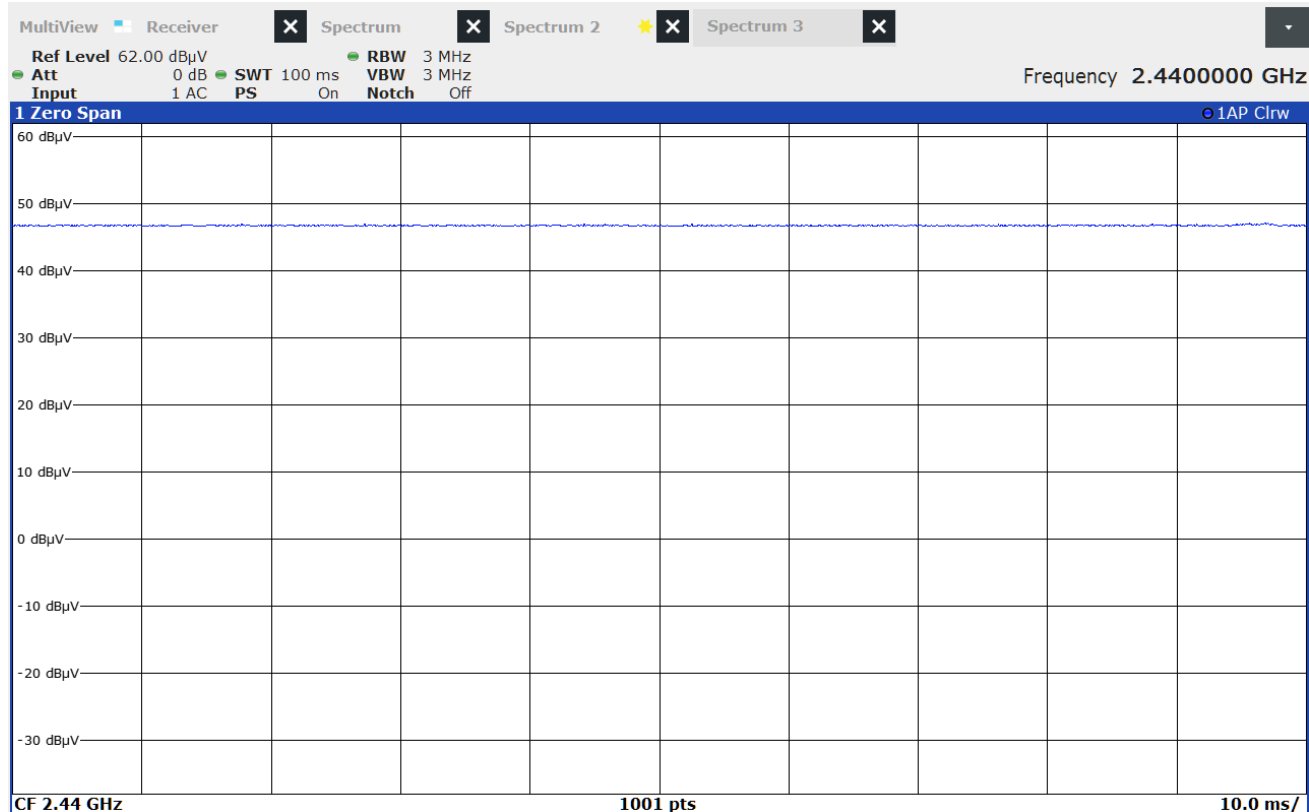
EUT Information	
Manufacturer	Last Lock
Product	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz

Test Setup Details	
Setup Format	Tabletop
Measurement Method	Antenna Conducted
Type of Test Site	Elite Test Bench
Type of Antennas Used	N/A

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz)	3.1

Procedure
The duty cycle factor is used to convert peak detected readings to average readings when pulsed modulation is employed. This factor is computed from the time domain trace of the pulse modulation signal. With the transmitter set up to transmit for maximum pulse density, the spectrum analyzer center frequency is set to the transmitter frequency with a zero span width and 10msec/div. The on-time and off-time are then measured. The on-time is total time signal level exceeds the 4th division. Off-time is time under for the word period. The duty cycle is then computed as $\left(\frac{On\ Time}{Word\ Period}\right)$, where $Word\ Period = (On\ Time + Off\ Time)$.

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz
Frequency Tested	2402MHz
Result	On Time = 100ms
Notes	None



25. Antenna Conducted Spurious Emissions

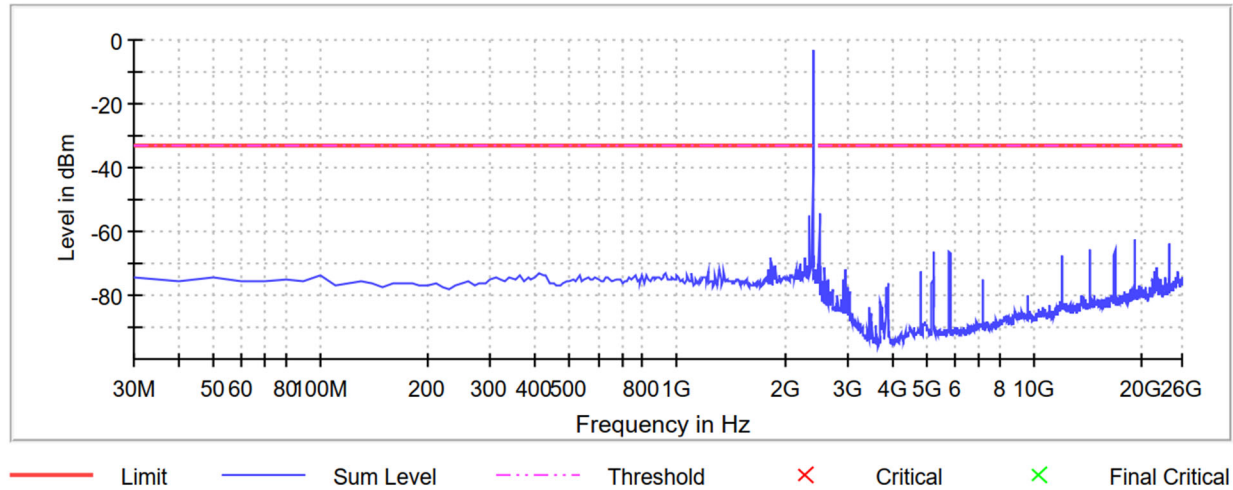
EUT Information	
Manufacturer	Last Lock
Product	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz BLE Tx @ 2440MHz BLE Tx @ 2480MHz

Test Setup Details	
Setup Format	Tabletop
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Test Site Used	N/A
Notes	None

Procedure
The antenna port of the EUT was connected to the spectrum analyzer through 40dB of attenuation. The resolution bandwidth (RBW) was set to 100kHz. The peak detector and 'Max-Hold' function were engaged. The emissions in the frequency range from 30MHz to 25GHz were observed and plotted separately with the EUT transmitting at low, middle, and high channels.

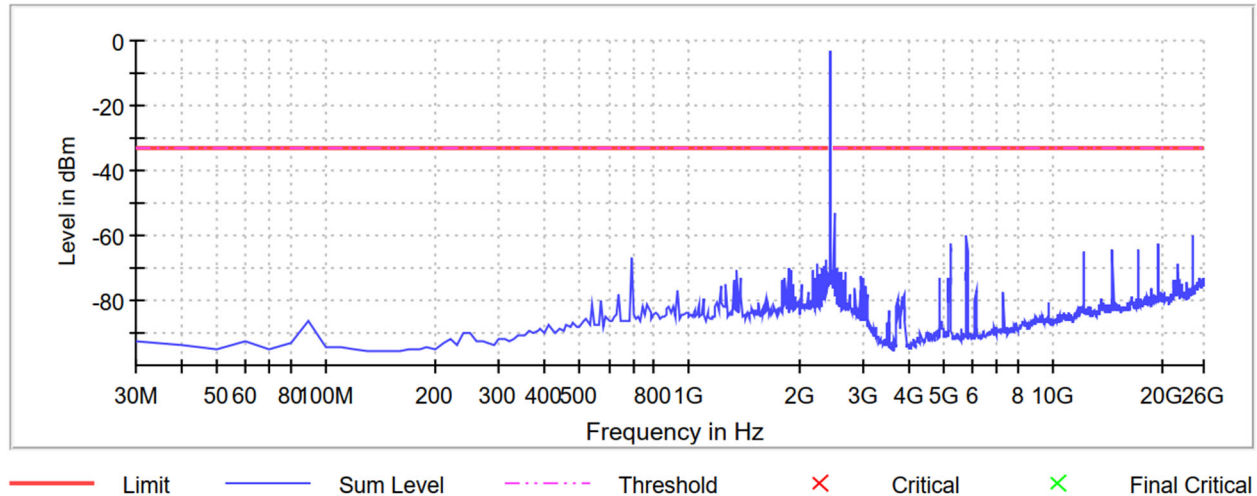
Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz
Frequency Tested	2402MHz

Spurious



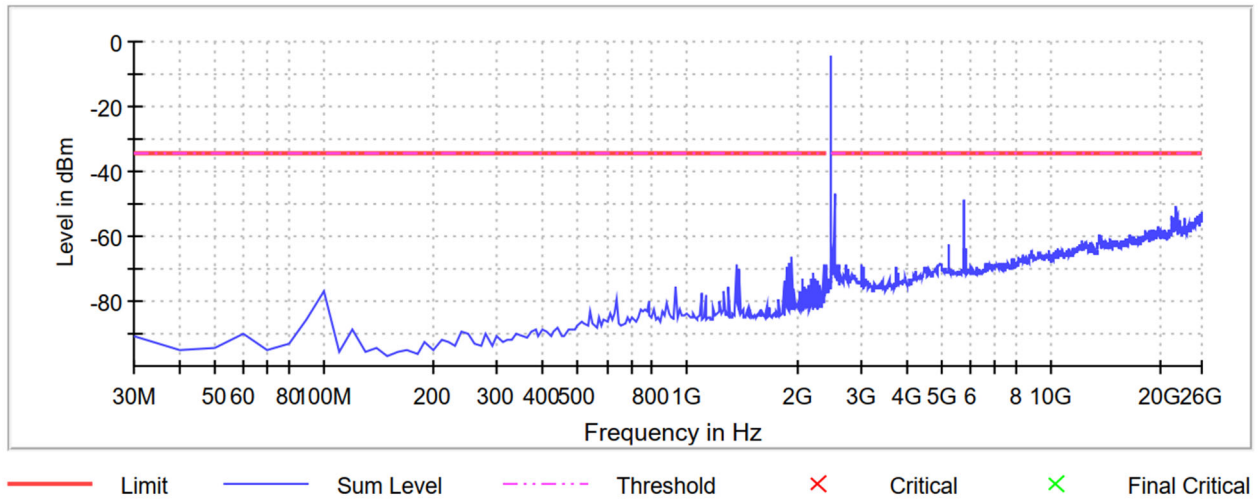
Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2440MHz
Frequency Tested	2440MHz

Spurious



Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2480MHz
Frequency Tested	2480MHz

Spurious



26. Spurious Radiated Emissions

EUT Information	
Manufacturer	Last Lock
Product	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz BLE Tx @ 2440MHz BLE Tx @ 2480MHz

Test Setup Details	
Setup Format	Tabletop
Type of Test Site	Semi-Anechoic Chamber
Test Site Used	Room 21
Type of Antennas Used	30MHz – 1GHz: Bilog (or equivalent) 1 – 18GHz: Double-Ridged Waveguide (or equivalent) Above 18GHz: Horn (or equivalent)

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz)	3.1
Radiated disturbance (electric field strength on an open area test site or alternative test site) (6 GHz – 18 GHz)	3.2
Radiated disturbance (electric field strength on an open area test site or alternative test site) (18 GHz – 26.5 GHz)	3.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (26.5 GHz – 40 GHz)	3.4

Procedure

Radiated measurements were performed in a 32ft. x 20ft. x 14ft. high shielded enclosure. The shielded enclosure prevents emissions from other sources, such as radio and TV stations, from interfering with the measurements. All power lines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads.

Preliminary radiated emissions tests were performed to determine the emission characteristics of the EUT. For the preliminary test, a broadband measuring antenna was positioned at a 3 meter distance from the EUT. The entire frequency range from 30MHz to 25GHz was investigated using a peak detector function.

The final open field emission tests were then manually performed over the frequency range of 30MHz to 25GHz.

1) For all harmonics not in the restricted bands, the following procedure was used:

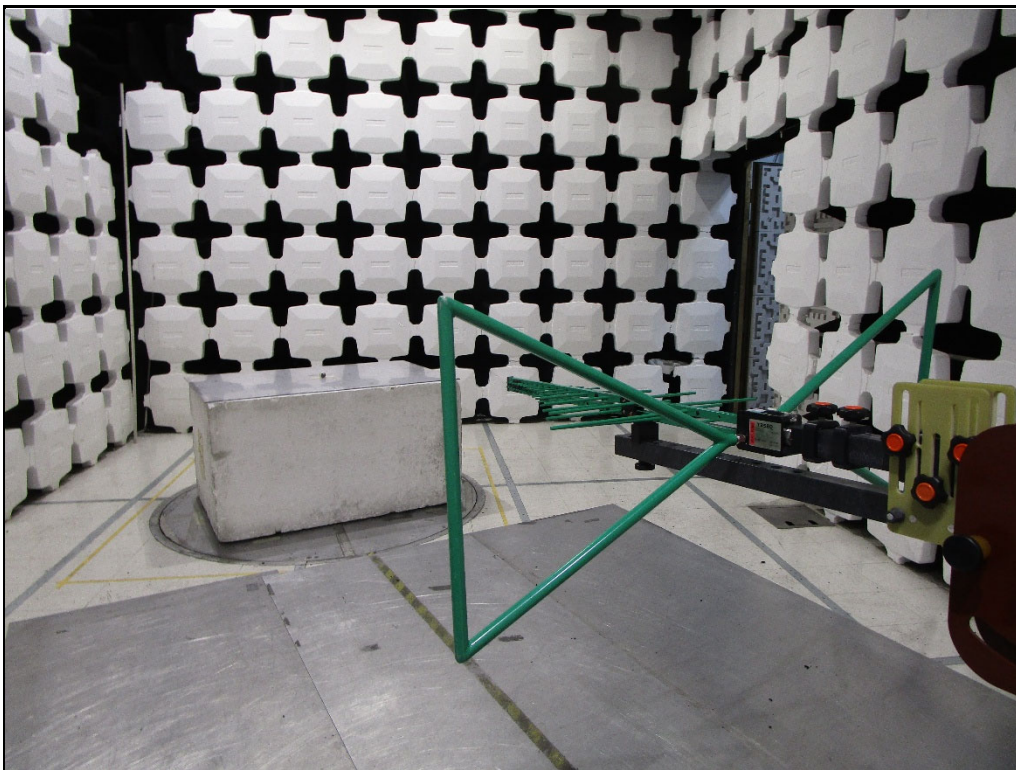
- a) The field strength of the fundamental was measured using a double ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the EUT. The EUT was placed on a 1.5 meter high non-conductive stand. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.
- b) The field strengths of all of the harmonics not in the restricted band were then measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the EUT. The EUT was placed on a 1.5 meter high non-conductive stand. A peak detector with a resolution bandwidth of 100kHz was used on the spectrum analyzer.
- c) To ensure that maximum or worst case emission levels at the fundamental and harmonics were measured, the following steps were taken when measuring the fundamental emissions and the spurious emissions:
 - i) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
 - ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
 - iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead, the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.
- d) All harmonics not in the restricted bands must be at least 20dB below levels measured at the fundamental. However, attenuation below the general limits specified in §15.209(a) is not required.

2) For all emissions in the restricted bands, the following procedure was used:

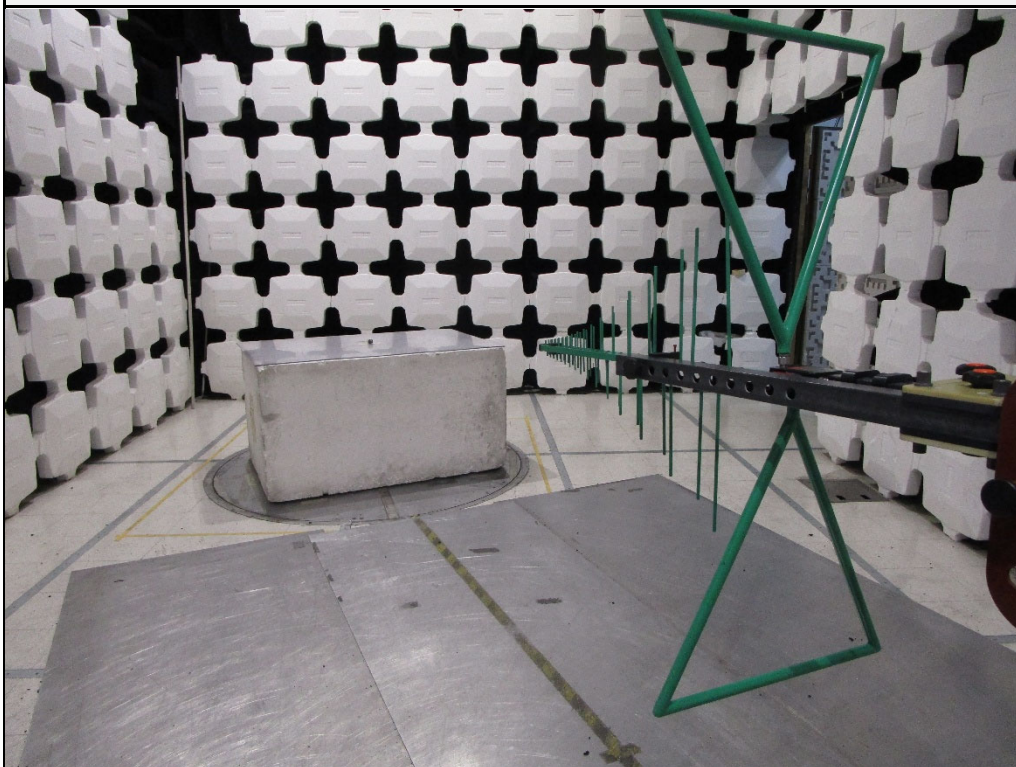
- a) The field strengths of all emissions below 1GHz were measured using a bi-log antenna. The bi-log antenna was positioned at a 3 meter distance from the EUT. The EUT was placed on an 80cm high non-conductive stand. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.
- b) The field strengths of all emissions above 1GHz were measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the EUT. The EUT was placed on a 1.5 meter high non-conductive stand. A peak detector with a resolution bandwidth of 1MHz was used on the spectrum analyzer.
- c) To ensure that maximum or worst case emission levels were measured, the following steps were taken when taking all measurements:
 - i) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
 - ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components

were measured.

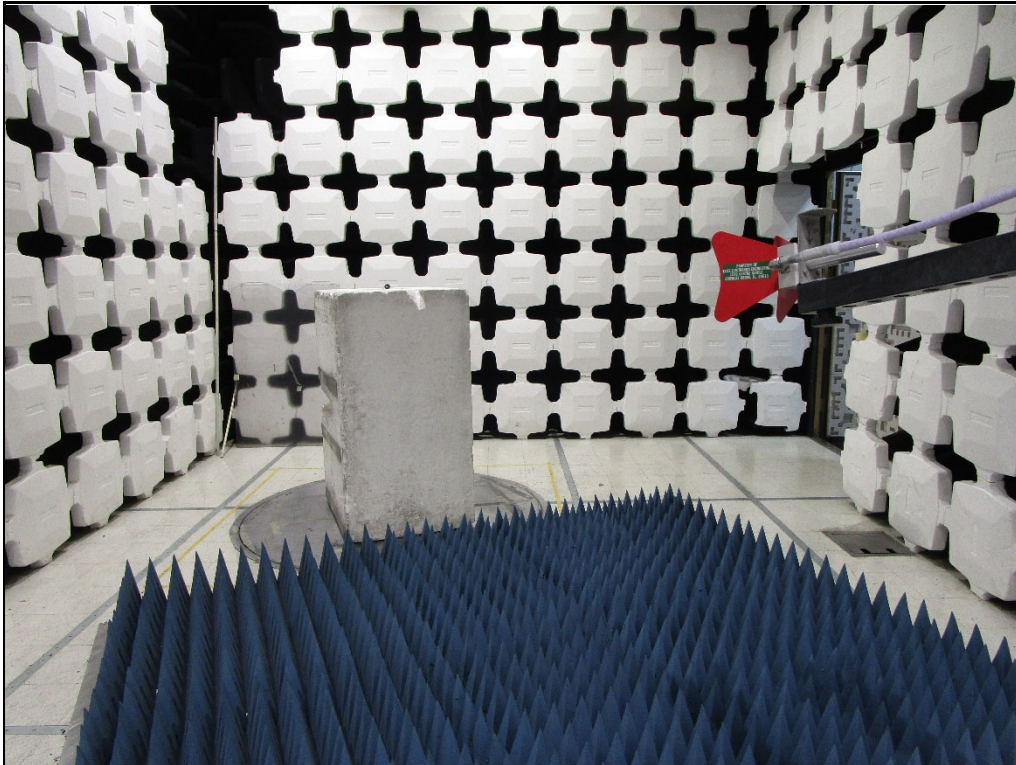
- iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
- iv) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead, the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.
- d) For all radiated emissions measurements below 1GHz, if the peak reading is below the limits listed in §15.209(a), no further measurements are required. If, however, the peak readings exceed the limits listed in §15.209(a), then the emissions are remeasured using a quasi-peak detector.
- e) For all radiated emissions measurements above 1GHz, the peak readings must comply with the §15.35(b) limits. §15.35(b) states that when average radiated emissions measurements are specified, there also is a limit on the peak level of the radiated emissions. The limit on the peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1GHz must be no greater than 20dB above the limits specified in §15.209(a).
- f) Lastly, for all radiated emissions measurements above 1GHz, the resolution bandwidth (RBW) was set to 1MHz with the video bandwidth (VBW) set to $\geq 3 \times \text{RBW}$. The detector was set to power averaging (rms). Sweep time was set to auto and a trace average of at least 100 traces was performed. The measurement was recorded and compared to the limit specified in §15.209(a).



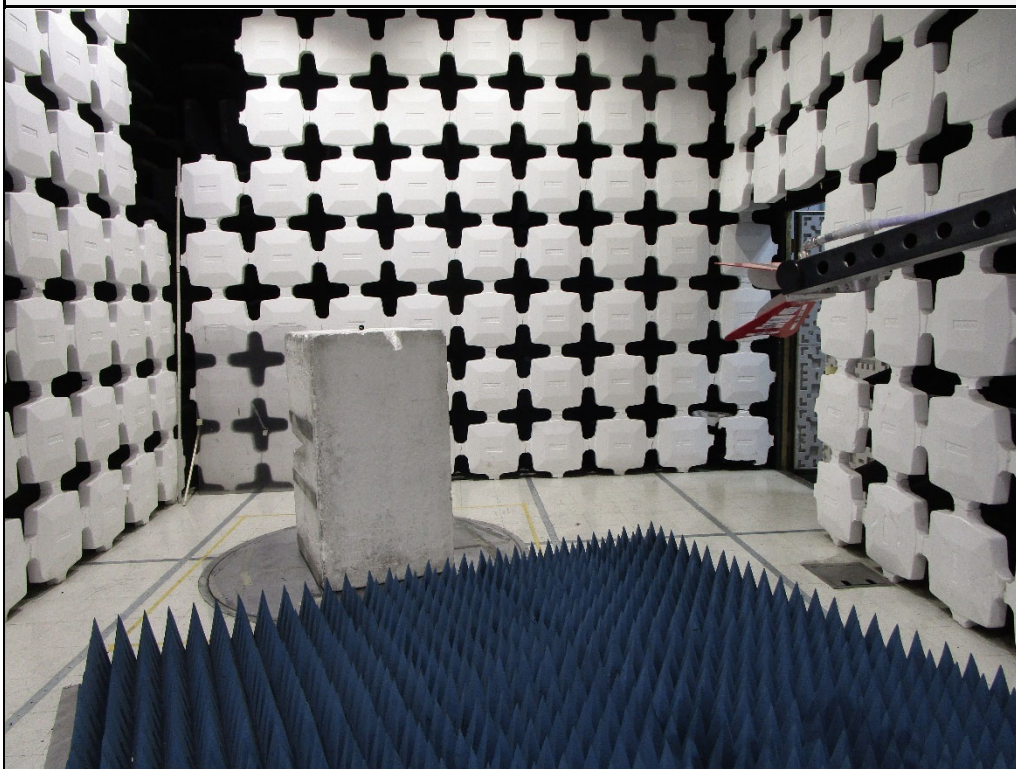
Test Setup for Spurious Radiated Emissions, 30MHz – 1GHz – Antenna Polarization Horizontal



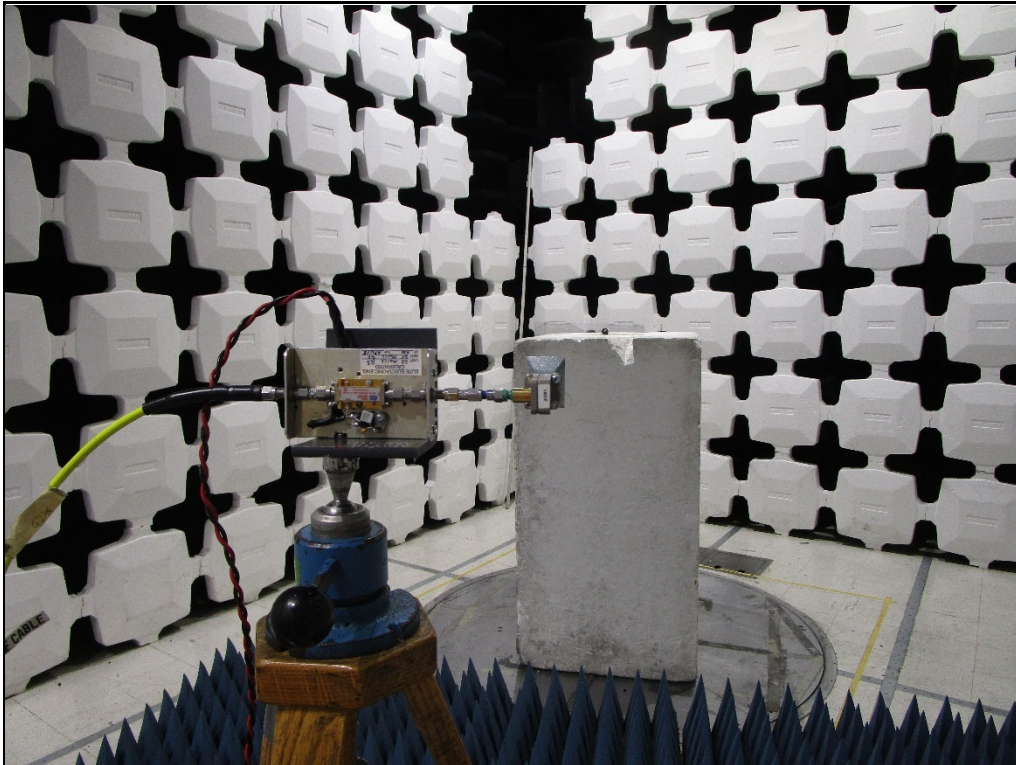
Test Setup for Spurious Radiated Emissions, 30MHz – 1GHz – Antenna Polarization Vertical



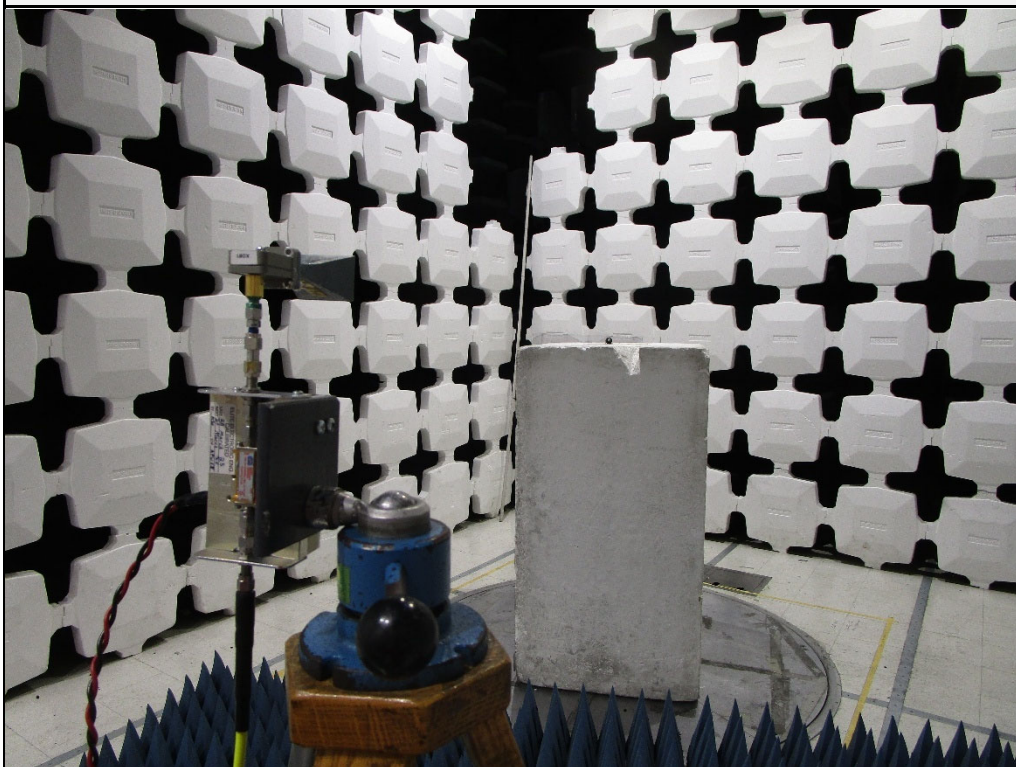
Test Setup for Spurious Radiated Emissions, 1 – 18GHz – Antenna Polarization Horizontal



Test Setup for Spurious Radiated Emissions, 1 – 18GHz – Antenna Polarization Vertical



Test Setup for Spurious Radiated Emissions, Above 18GHz – Antenna Polarization Horizontal



Test Setup for Spurious Radiated Emissions, Above 18GHz – Antenna Polarization Vertical

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz
Frequency Tested	2402MHz
Notes	Peak Measurements in the Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dB)
4804.00	H	49.1	*	3.7	34.7	-39.3	48.2	257.1	5000.0	-25.8
	V	49.4	*	3.7	34.7	-39.3	48.5	266.7	5000.0	-25.5
12010.00	H	48.7	*	6.1	39.0	-39.2	54.6	539.3	5000.0	-19.3
	V	49.0	*	6.1	39.0	-39.2	55.0	559.6	5000.0	-19.0
19216.00	H	38.1	*	2.0	40.4	-27.6	52.8	438.2	5000.0	-21.1
	V	37.9	*	2.0	40.4	-27.6	52.6	428.7	5000.0	-21.3

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz
Frequency Tested	2402MHz
Notes	Average Measurements in the Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
4804.00	H	36.62	*	3.7	34.7	-39.3	0.0	35.7	61.2	500.0	-18.2
	V	36.54	*	3.7	34.7	-39.3	0.0	35.7	60.6	500.0	-18.3
12010.00	H	36.31	*	6.1	39.0	-39.2	0.0	42.3	129.7	500.0	-11.7
	V	36.30	*	6.1	39.0	-39.2	0.0	42.2	129.5	500.0	-11.7
19216.00	H	26.69	*	2.0	40.4	-27.6	0.0	41.4	117.5	500.0	-12.6
	V	26.43	*	2.0	40.4	-27.6	0.0	41.1	114.1	500.0	-12.8

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz
Frequency Tested	2402MHz
Notes	Peak Measurements in Non-Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dB)
2402.00	H	42.49		2.6	32.6	0.0	77.7	7647.0	NA	NA
	V	46.73		2.6	32.6	0.0	81.9	12459.2	NA	NA
7206.00	H	37.94	*	4.6	35.7	-39.4	38.9	88.2	1245.9	-23.0
	V	38.07	*	4.6	35.7	-39.4	39.0	89.5	1245.9	-22.9
9608.00	H	39.04	*	5.2	36.7	-39.3	41.6	120.6	1245.9	-20.3
	V	38.04	*	5.2	36.7	-39.3	40.6	107.5	1245.9	-21.3
14412.00	H	37.95	*	6.6	39.9	-38.3	46.2	203.3	1245.9	-15.7
	V	38.09	*	6.6	39.9	-38.3	46.3	206.6	1245.9	-15.6
16814.00	H	37.82	*	7.2	42.7	-37.5	50.1	321.5	1245.9	-11.8
	V	37.16	*	7.2	42.7	-37.5	49.5	298.0	1245.9	-12.4
21618.00	H	26.43	*	2.1	40.6	-25.3	43.9	156.0	1245.9	-18.0
	V	26.41	*	2.1	40.6	-25.3	43.8	155.6	1245.9	-18.1
24020.00	H	27.25	*	2.3	40.6	-25.2	44.9	176.4	1245.9	-17.0
	V	26.53	*	2.3	40.6	-25.2	44.2	162.4	1245.9	-17.7

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2440MHz
Frequency Tested	2440MHz
Notes	Peak Measurements in the Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dB)
4880.00	H	49.1	*	3.7	34.6	-39.3	48.0	251.6	5000.0	-26.0
	V	48.9	*	3.7	34.6	-39.3	47.8	246.7	5000.0	-26.1
7320.00	H	49.1	*	4.7	35.7	-39.4	50.1	321.5	5000.0	-23.8
	V	49.0	*	4.7	35.7	-39.4	50.0	316.4	5000.0	-24.0
12200.00	H	49.0	*	6.1	39.1	-39.1	55.1	569.0	5000.0	-18.9
	V	48.8	*	6.1	39.1	-39.1	54.9	554.8	5000.0	-19.1
19520.00	H	37.7	*	2.1	40.4	-27.6	52.5	420.9	5000.0	-21.5
	V	38.0	*	2.1	40.4	-27.6	52.8	437.7	5000.0	-21.2

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2440MHz
Frequency Tested	2440MHz
Notes	Average Measurements in the Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
4880.00	H	36.42	*	3.7	34.6	-39.3	0.0	35.4	58.7	500.0	-18.6
	V	36.42	*	3.7	34.6	-39.3	0.0	35.4	58.7	500.0	-18.6
7320.00	H	36.42	*	4.7	35.7	-39.4	0.0	37.4	74.3	500.0	-16.6
	V	0.00	*	4.7	35.7	-39.4	0.0	1.0	1.1	500.0	-53.0
12200.00	H	36.23	*	6.1	39.1	-39.1	0.0	42.3	130.7	500.0	-11.7
	V	36.22	*	6.1	39.1	-39.1	0.0	42.3	130.5	500.0	-11.7
19520.00	H	26.67	*	2.1	40.4	-27.6	0.0	41.5	118.5	500.0	-12.5
	V	26.53	*	2.1	40.4	-27.6	0.0	41.3	116.6	500.0	-12.6

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2440MHz
Frequency Tested	2440MHz
Notes	Peak Measurements in Non-Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dB)
2440.00	H	44.17		2.6	32.7	0.0	79.6	9497.5	NA	NA
	V	46.90		2.6	32.7	0.0	82.3	13005.0	NA	NA
9760.00	H	38.89	*	5.2	36.9	-39.3	41.8	122.9	1300.5	-20.5
	V	38.85	*	5.2	36.9	-39.3	41.7	122.3	1300.5	-20.5
14640.00	H	37.92	*	6.7	40.2	-38.2	46.6	213.1	1300.5	-15.7
	V	38.09	*	6.7	40.2	-38.2	46.7	217.3	1300.5	-15.5
17080.00	H	38.83	*	7.3	41.9	-37.6	50.4	331.2	1300.5	-11.9
	V	38.96	*	7.3	41.9	-37.6	50.5	336.2	1300.5	-11.8
21960.00	H	27.01	*	2.1	40.6	-25.3	44.4	166.8	1300.5	-17.8
	V	27.27	*	2.1	40.6	-25.3	44.7	171.9	1300.5	-17.6
24400.00	H	27.87	*	2.1	40.6	-25.2	45.4	186.5	1300.5	-16.9
	V	26.53	*	2.1	40.6	-25.2	44.1	159.8	1300.5	-18.2

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2480MHz
Frequency Tested	2480MHz
Notes	Peak Measurements in the Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dB)
4960.00	H	49.5	*	3.7	34.4	-39.3	48.3	260.3	5000.0	-25.7
	V	49.2	*	3.7	34.4	-39.3	48.0	250.3	5000.0	-26.0
7440.00	H	48.9	*	4.7	35.7	-39.4	49.9	312.9	5000.0	-24.1
	V	48.5	*	4.7	35.7	-39.4	49.6	300.6	5000.0	-24.4
12400.00	H	49.9	*	6.1	38.9	-39.0	55.8	617.8	5000.0	-18.2
	V	49.8	*	6.1	38.9	-39.0	55.7	611.4	5000.0	-18.3
19840.00	H	37.7	*	1.9	40.4	-27.6	52.4	416.2	5000.0	-21.6
	V	38.1	*	1.9	40.4	-27.6	52.8	437.9	5000.0	-21.2
22320.00	H	37.5	*	1.9	40.6	-25.3	54.8	547.2	5000.0	-19.2
	V	38.2	*	1.9	40.6	-25.3	55.4	589.8	5000.0	-18.6

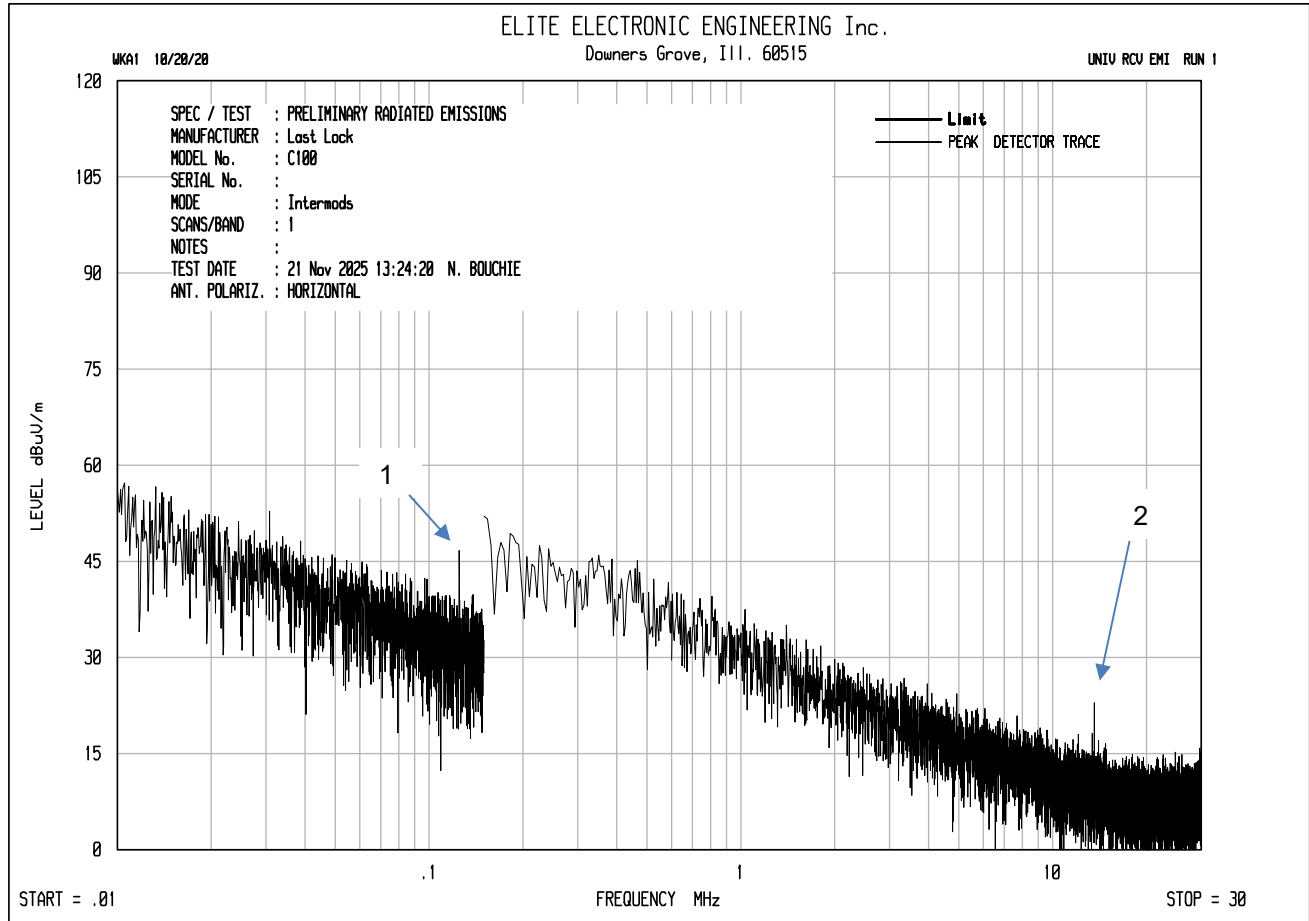
Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2480MHz
Frequency Tested	2480MHz
Notes	Average Measurements in the Restricted Bands

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
4960.00	H	36.29	*	3.7	34.4	-39.3	0.0	35.1	56.9	500.0	-18.9
	V	36.28	*	3.7	34.4	-39.3	0.0	35.1	56.8	500.0	-18.9
7440.00	H	36.25	*	4.7	35.7	-39.4	0.0	37.3	73.1	500.0	-16.7
	V	36.38	*	4.7	35.7	-39.4	0.0	37.4	74.2	500.0	-16.6
12400.00	H	37.01	*	6.1	38.9	-39.0	0.0	43.0	140.6	500.0	-11.0
	V	37.04	*	6.1	38.9	-39.0	0.0	43.0	141.0	500.0	-11.0
19840.00	H	26.40	*	1.9	40.4	-27.6	0.0	41.1	113.7	500.0	-12.9
	V	26.30	*	1.9	40.4	-27.6	0.0	41.0	112.4	500.0	-13.0
22320.00	H	25.60	*	1.9	40.6	-25.3	0.0	42.8	138.7	500.0	-11.1
	V	25.57	*	1.9	40.6	-25.3	0.0	42.8	138.3	500.0	-11.2

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2480MHz
Frequency Tested	2480MHz
Notes	Peak Measurements in Non-Restricted Bands

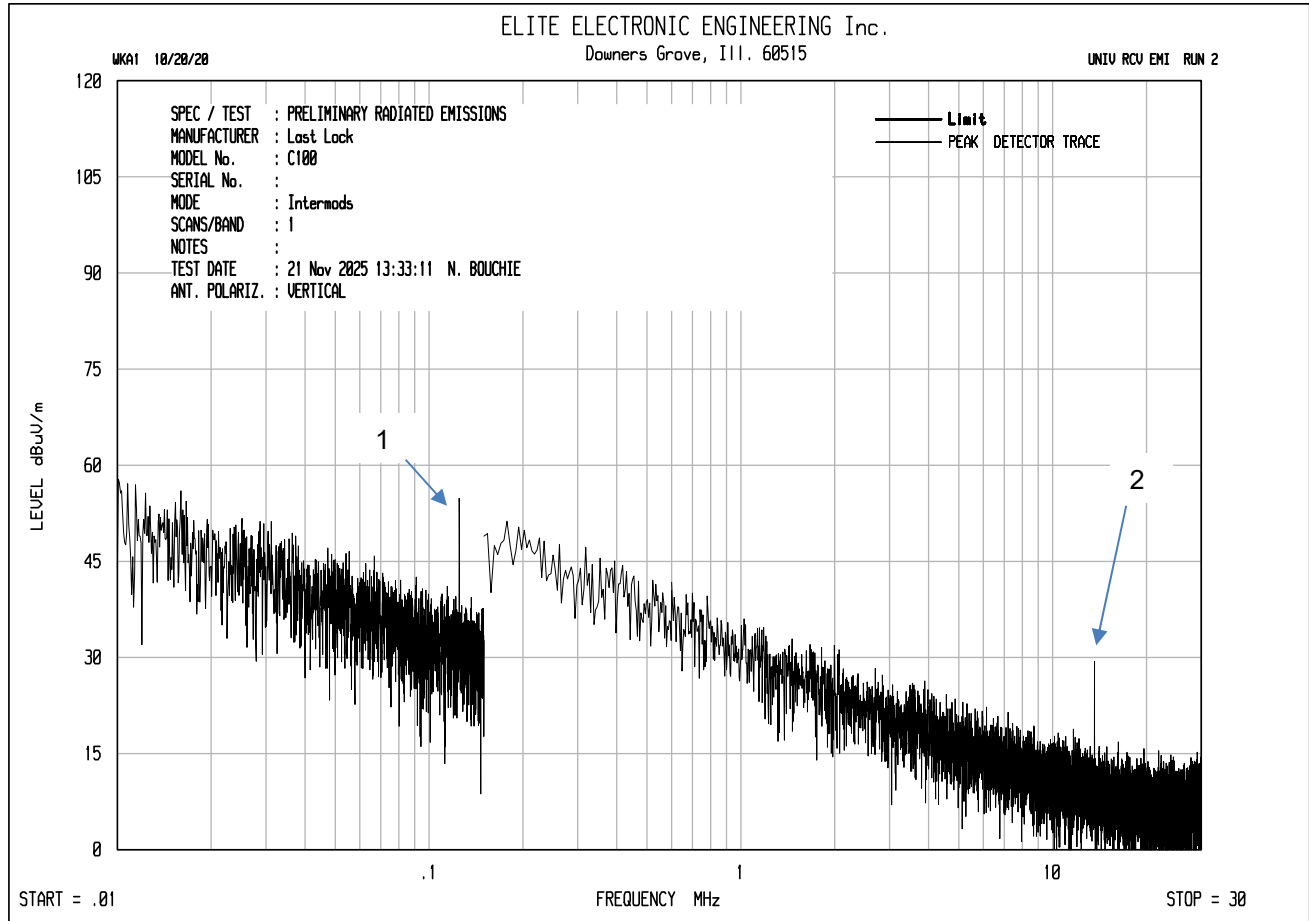
Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dB)
2480.00	H	45.07		2.7	32.9	0.0	80.7	10791.8	NA	NA
	V	46.37		2.7	32.9	0.0	82.0	12534.1	NA	NA
9920.00	H	38.86	*	5.3	37.1	-39.2	42.0	125.4	1253.4	-20.0
	V	39.03	*	5.3	37.1	-39.2	42.1	127.9	1253.4	-19.8
14880.00	H	37.93	*	6.8	40.1	-38.2	46.7	215.4	1253.4	-15.3
	V	37.47	*	6.8	40.1	-38.2	46.2	204.3	1253.4	-15.8
17360.00	H	38.47	*	7.4	41.7	-37.7	49.8	309.3	1253.4	-12.2
	V	38.86	*	7.4	41.7	-37.7	50.2	323.5	1253.4	-11.8
24800.00	H	28.34	*	2.3	40.6	-25.2	46.1	201.7	1253.4	-15.9
	V	28.54	*	2.3	40.6	-25.2	46.3	206.4	1253.4	-15.7

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	Multi-Tx
Frequencies Tested	125kHz, 13.56MHz, 2480MHz, 6489.6MHz
Notes	Intermodulation Products



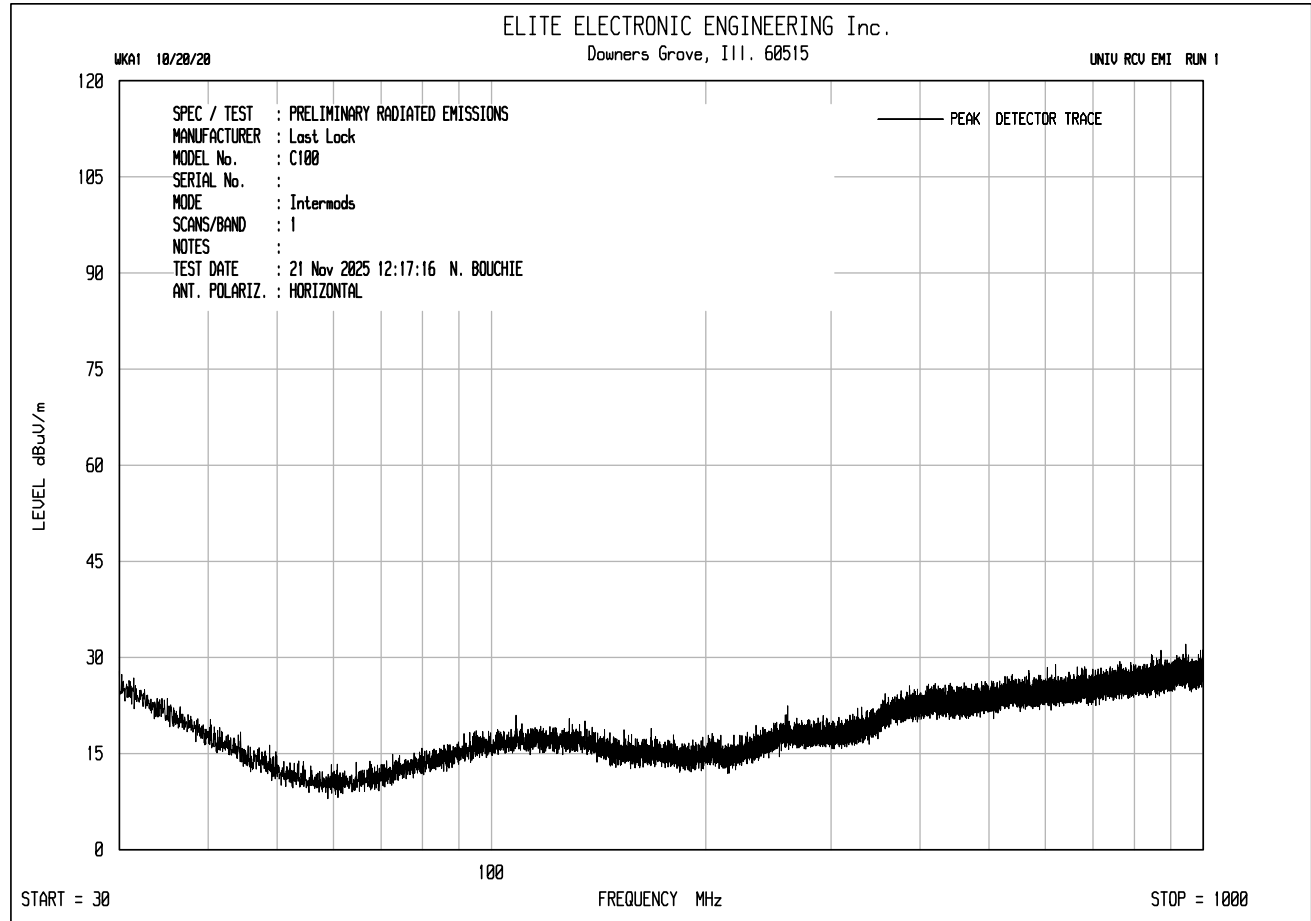
1 = 125kHz Fundamental
2 = 13.56MHz Fundamental

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	Multi-Tx
Frequencies Tested	125kHz, 13.56MHz, 2480MHz, 6489.6MHz
Notes	Intermodulation Products



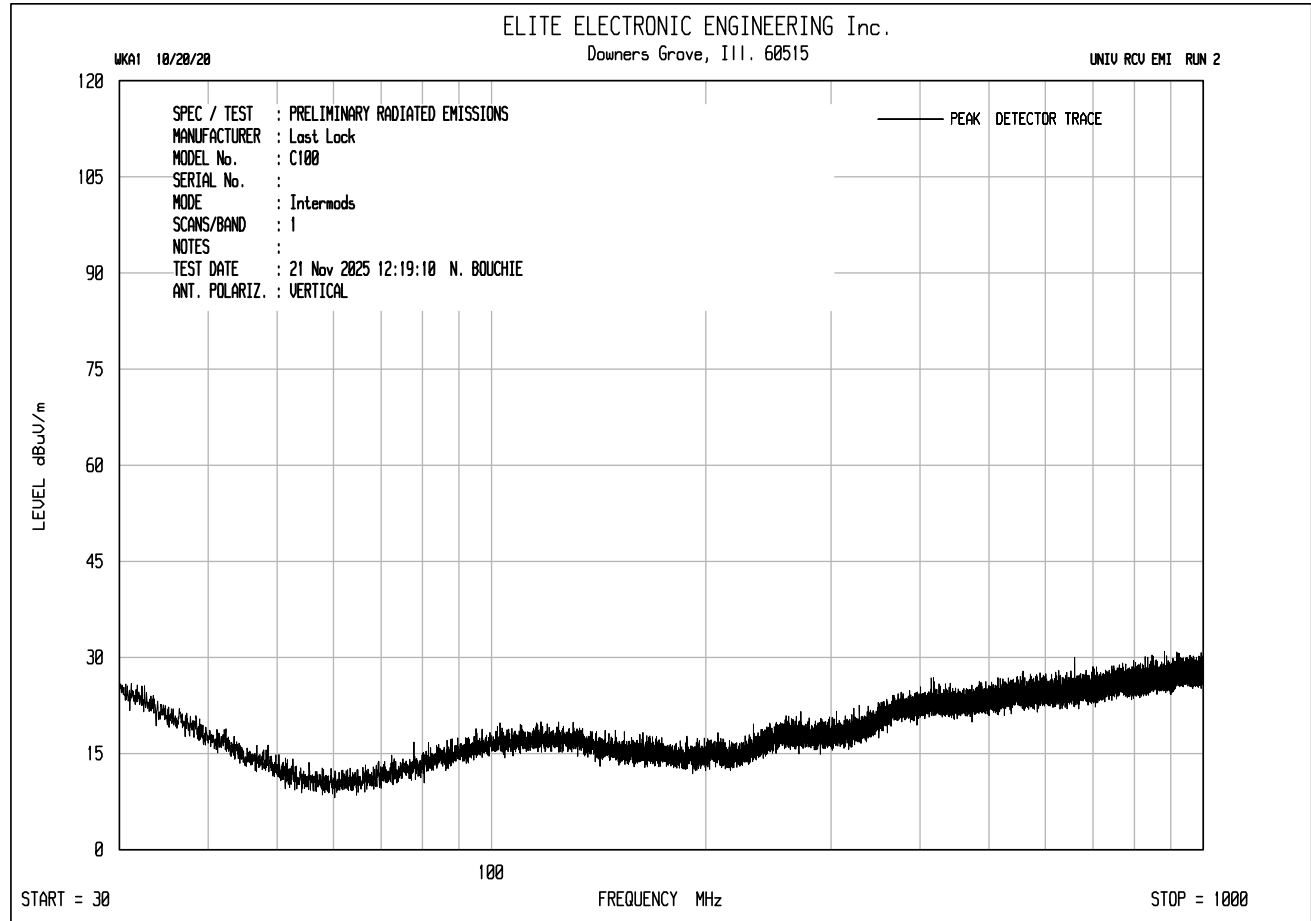
1 = 125kHz Fundamental
2 = 13.56MHz Fundamental

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	Multi-Tx
Frequencies Tested	125kHz, 13.56MHz, 2480MHz, 6489.6MHz
Notes	Intermodulation Products



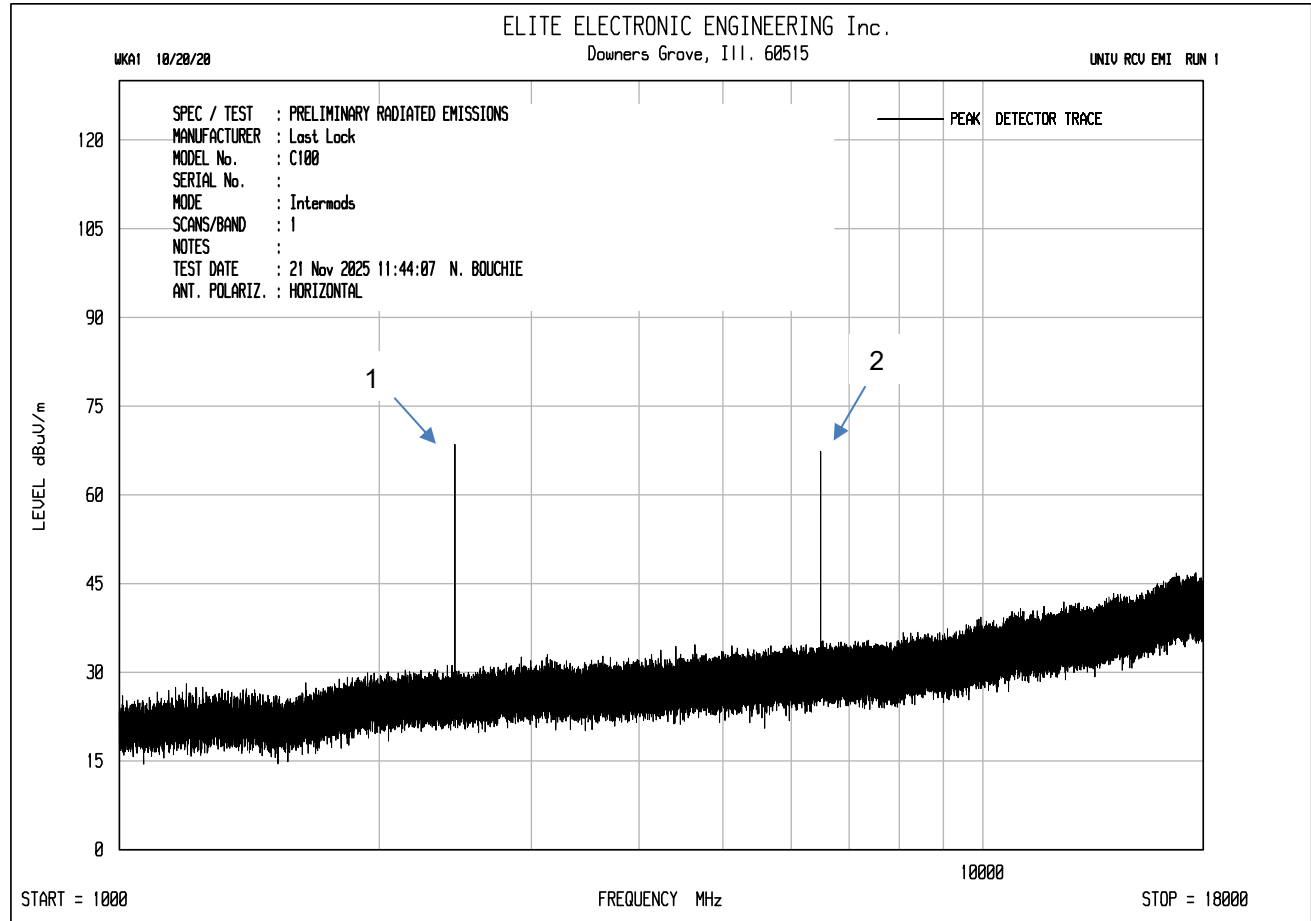
No Intermodulation Products Detected.

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	Multi-Tx
Frequencies Tested	125kHz, 13.56MHz, 2480MHz, 6489.6MHz
Notes	Intermodulation Products



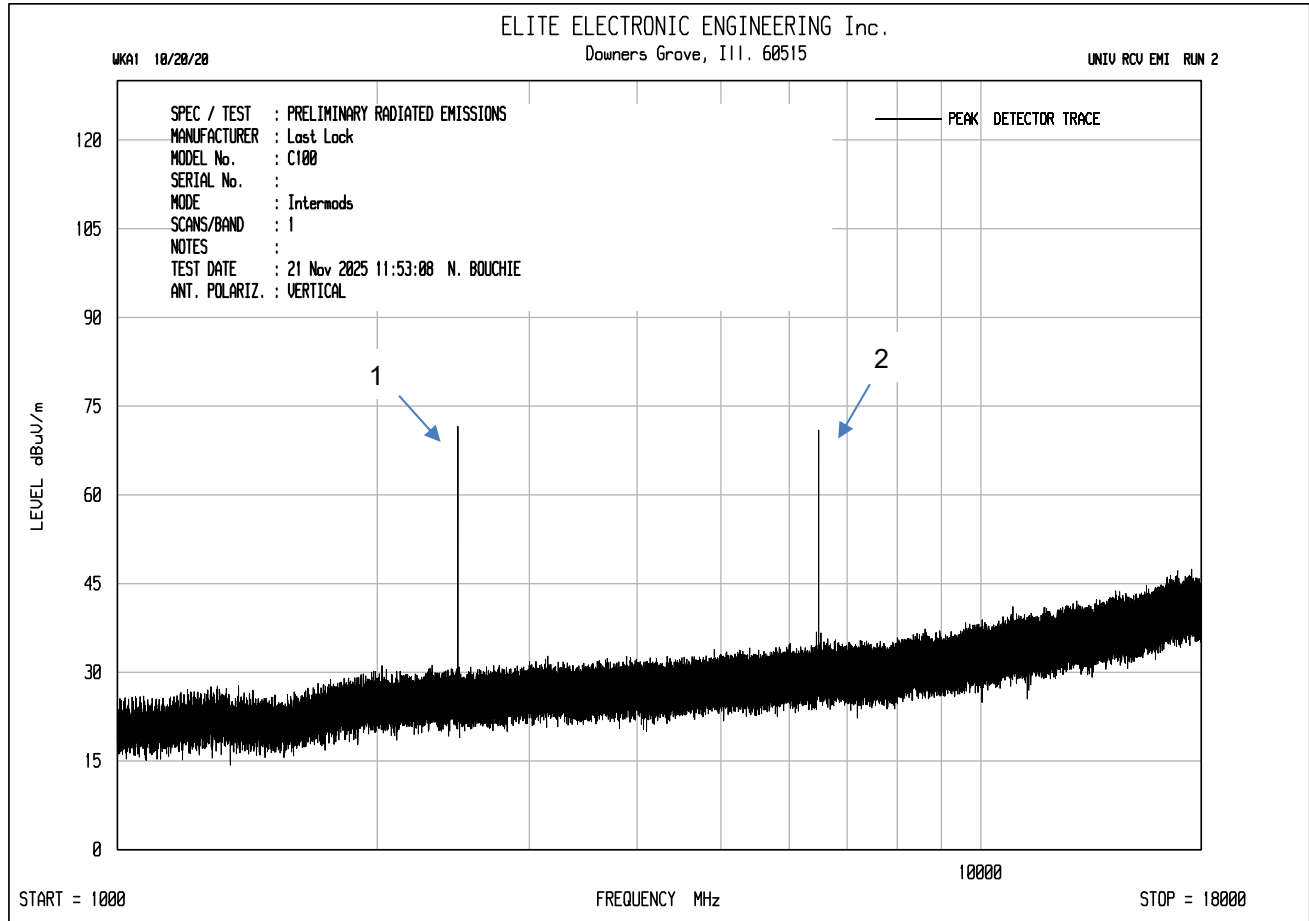
No Intermodulation Products Detected.

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	Multi-Tx
Frequencies Tested	125kHz, 13.56MHz, 2480MHz, 6489.6MHz
Notes	Intermodulation Products



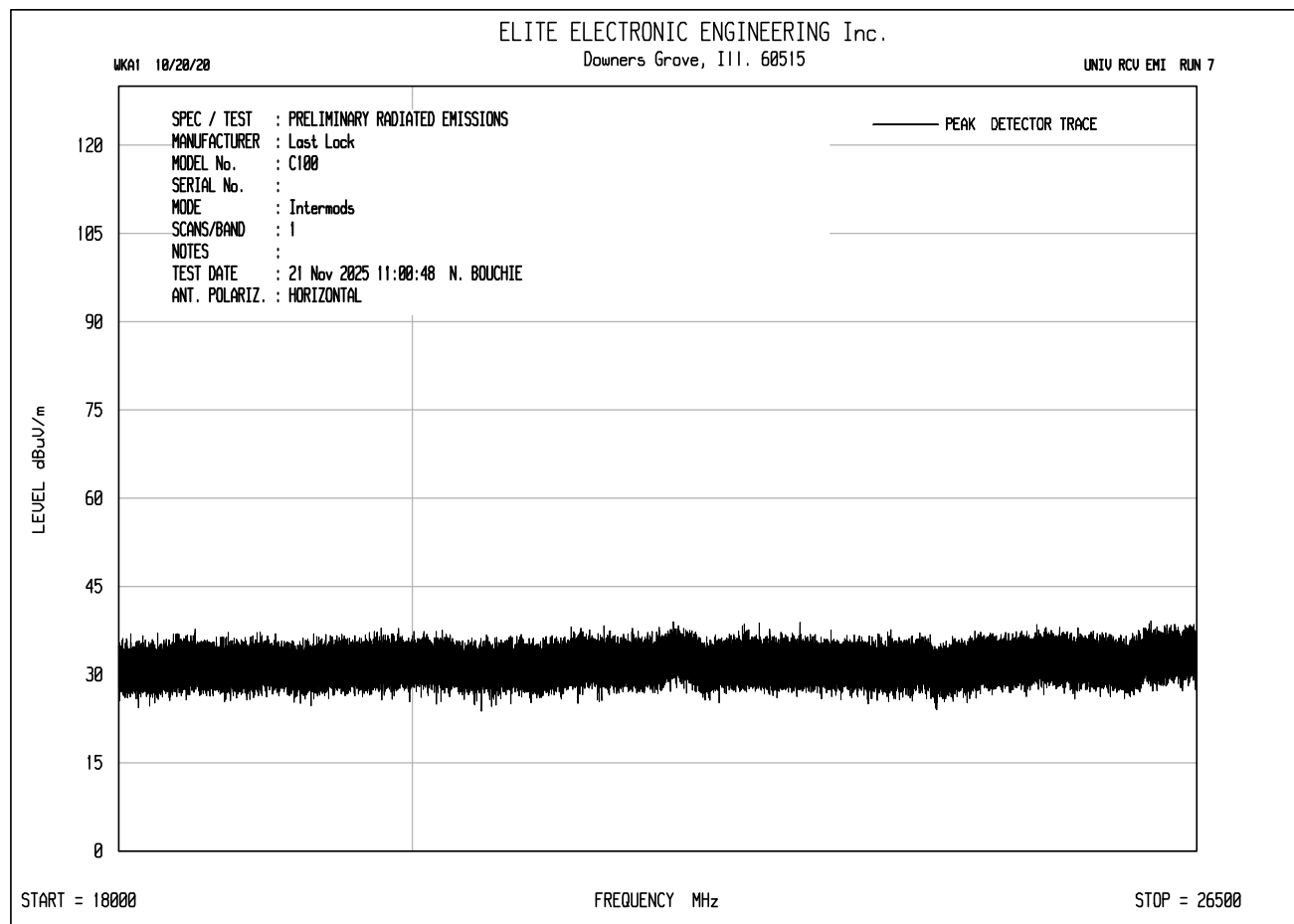
1 = 2480MHz Fundamental
2 = 6489.6MHz Fundamental

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	Multi-Tx
Frequencies Tested	125kHz, 13.56MHz, 2480MHz, 6489.6MHz
Notes	Intermodulation Products



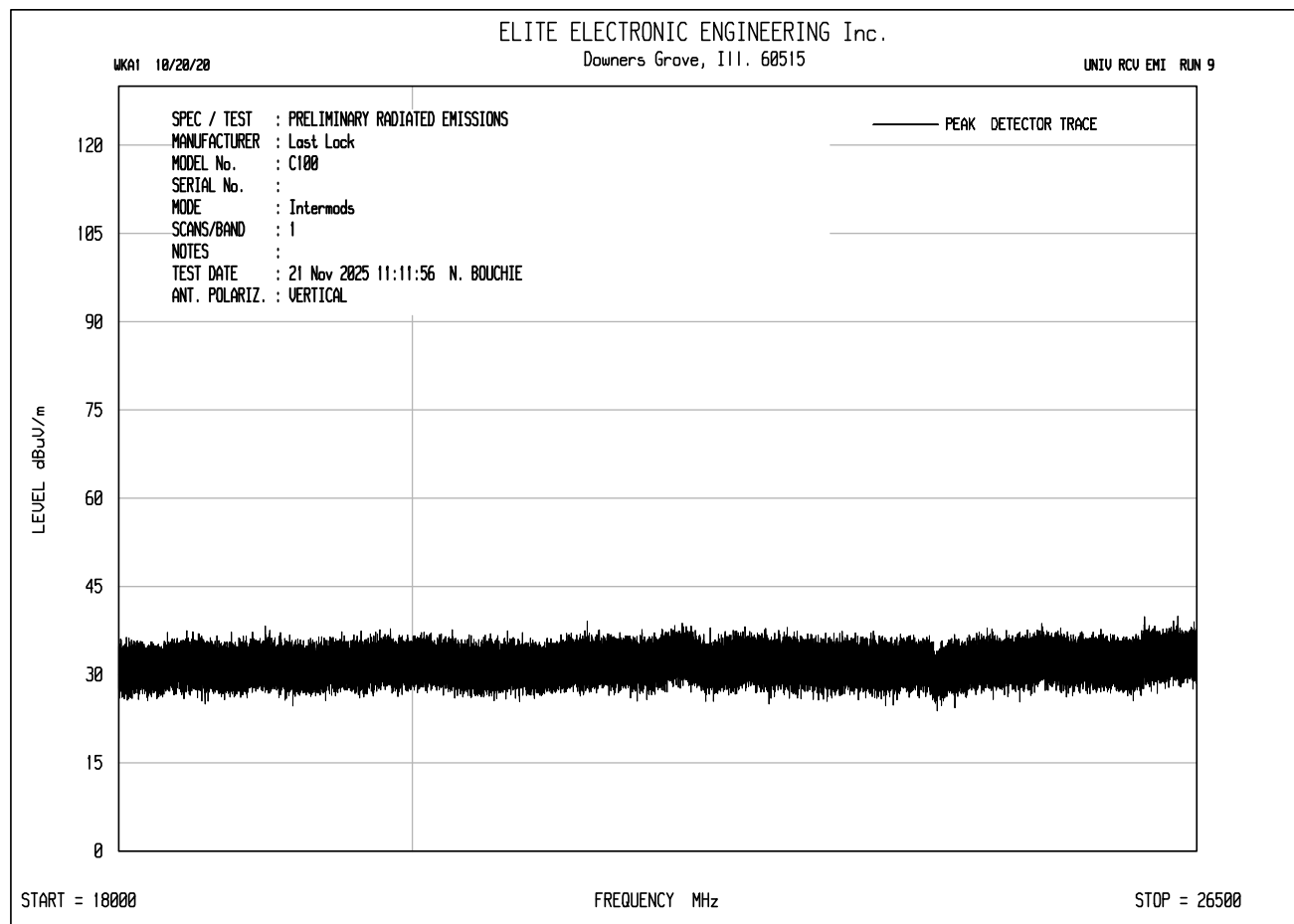
1 = 2480MHz Fundamental
 2 = 6489.6MHz Fundamental

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	Multi-Tx
Frequencies Tested	125kHz, 13.56MHz, 2480MHz, 6489.6MHz
Notes	Intermodulation Products



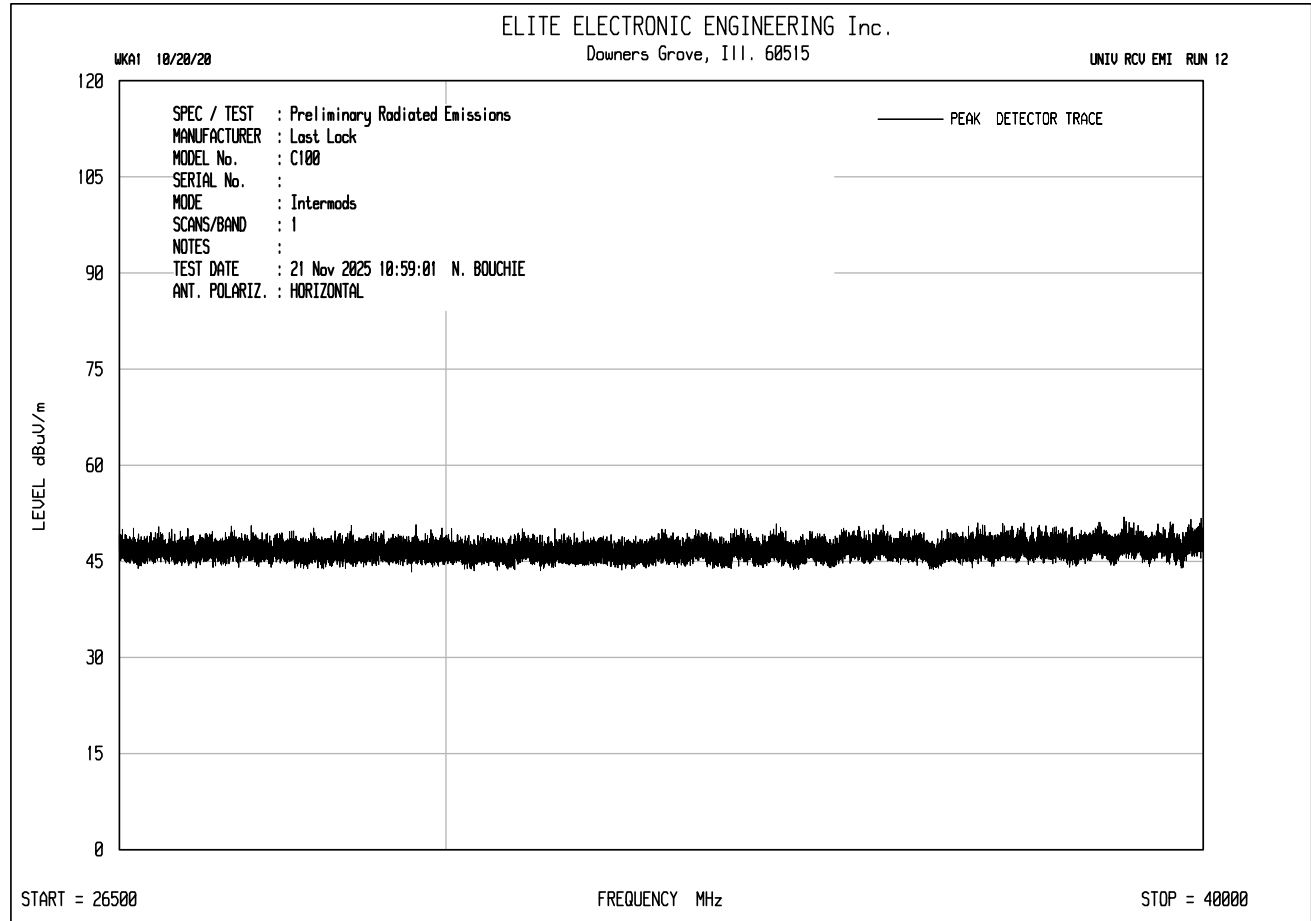
No Intermodulation Products Detected.

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	Multi-Tx
Frequencies Tested	125kHz, 13.56MHz, 2480MHz, 6489.6MHz
Notes	Intermodulation Products



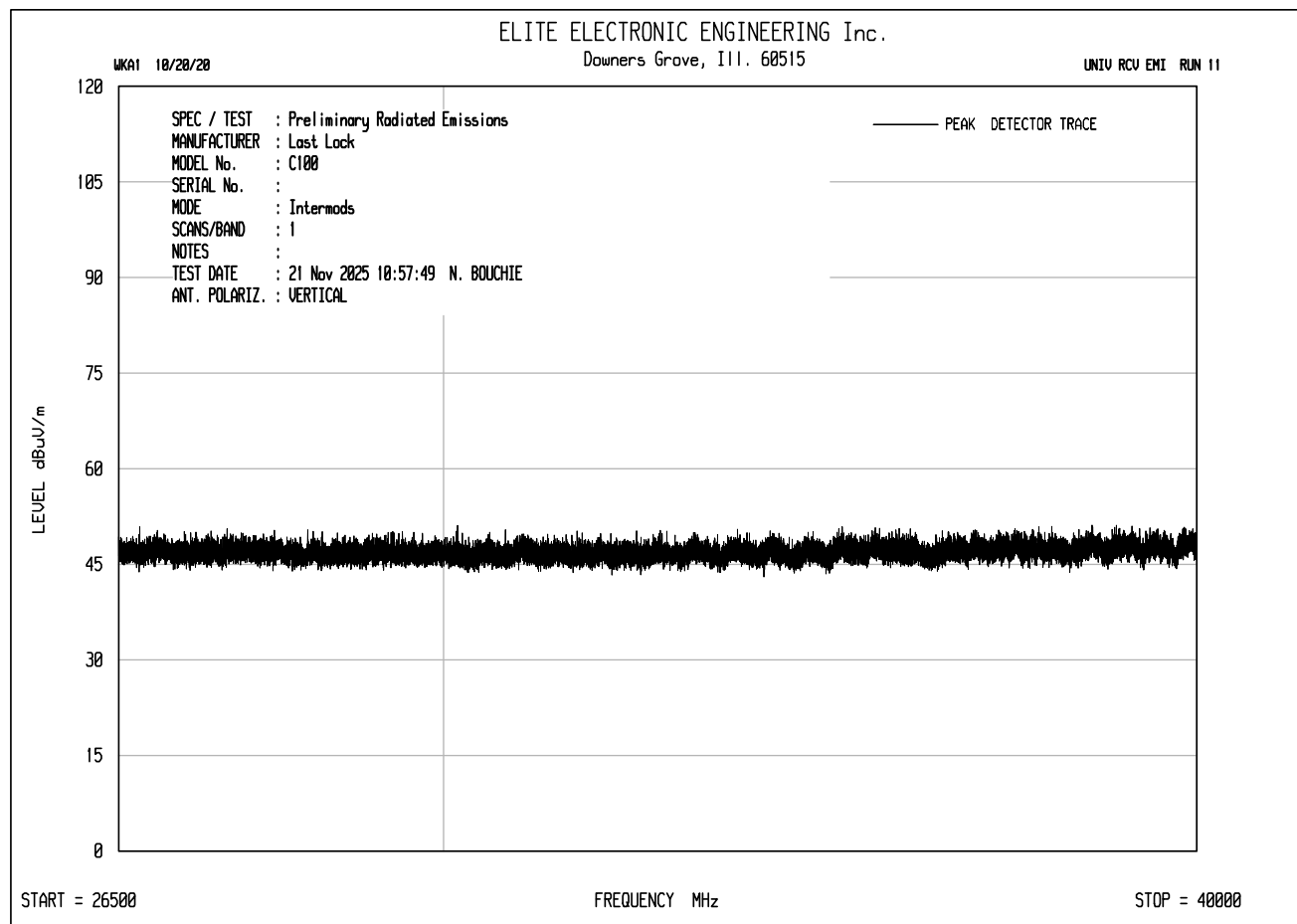
No Intermodulation Products Detected.

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	Multi-Tx
Frequencies Tested	125kHz, 13.56MHz, 2480MHz, 6489.6MHz
Notes	Intermodulation Products



No Intermodulation Products Detected.

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	Multi-Tx
Frequencies Tested	125kHz, 13.56MHz, 2480MHz, 6489.6MHz
Notes	Intermodulation Products



No Intermodulation Products Detected.

27. Band-Edge Compliance

EUT Information	
Manufacturer	Last Lock
Product	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz BLE Tx @ 2480MHz

Test Setup Details	
Setup Format	Tabletop
Measurement Method	Radiated Antenna Conducted
Type of Test Site	Semi-Anechoic Chamber Elite Test Bench
Type of Antennas Used	Double-Ridged Waveguide (or equivalent)
Notes	None

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz)	3.1

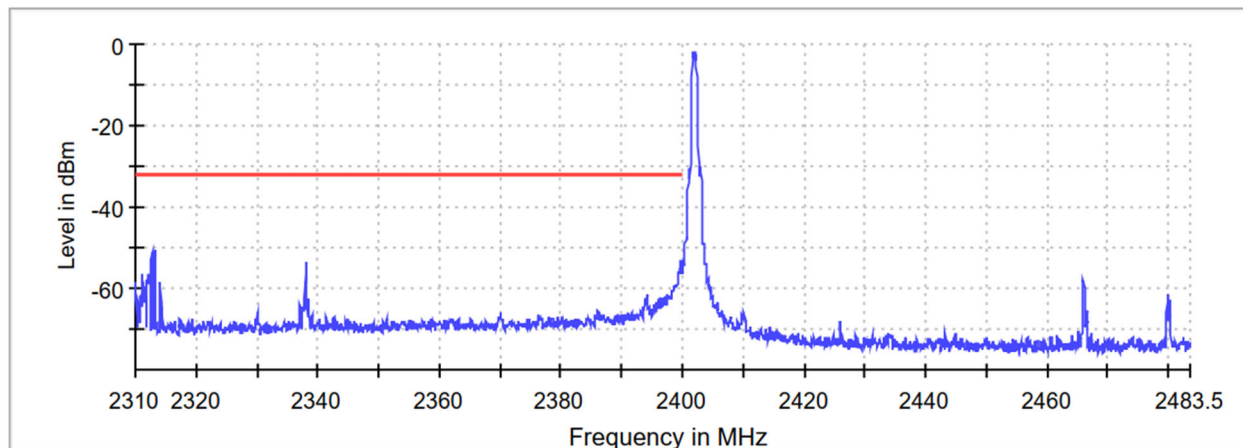
Procedure
1) Low Band Edge: - The EUT was set up inside the test chamber on a non-conductive stand and a broadband measuring antenna was placed at a test distance of 3 meters from the EUT. - The EUT was set to transmit continuously at the channel closest to the low band-edge. - The EUT was maximized for worst case emissions at the measuring antenna and the maximum meter reading was recorded. - To determine the band edge compliance, the following spectrum analyzer settings were used: - Center Frequency = 2400MHz (low band-edge frequency). - Span = Wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation. - Resolution Bandwidth (RBW) = $\geq 1\%$ of the span. 'Max-Hold' function was engaged. - The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. - The marker was set on the peak of the in-band emissions. A display line was placed 20dB down from the peak of the in-band emissions. All emissions which fall outside of the authorized band of operation must be below the 20dB down display line. (All emissions to the left of the center frequency (band-edge) must be below the display line.) - The analyzer's display was then screenshot and saved.

2) High Band Edge:

- a) The EUT was set up inside the test chamber on a non-conductive stand and set to transmit continuously at the channel closest to the high band-edge.
- b) A broadband measuring antenna was placed at a test distance of 3 meters from the EUT. The antenna was connected to the input of a spectrum analyzer.
- c) The center frequency of the analyzer was set to the high band edge (2483.5MHz).
- d) The Resolution Bandwidth was set to 1MHz.
- e) To ensure that the maximum or worst case emission level was measured, the following steps were taken:
 - o The EUT was rotated so that all of its sides were exposed to the receiving antenna.
 - o Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - o The EUT was rotated so that all of its sides were exposed to the receiving antenna.
 - o The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.
 - o The highest measured peak reading and the highest measured average reading were recorded.

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz
Frequency Tested	2402MHz
Notes	Low Band Edge

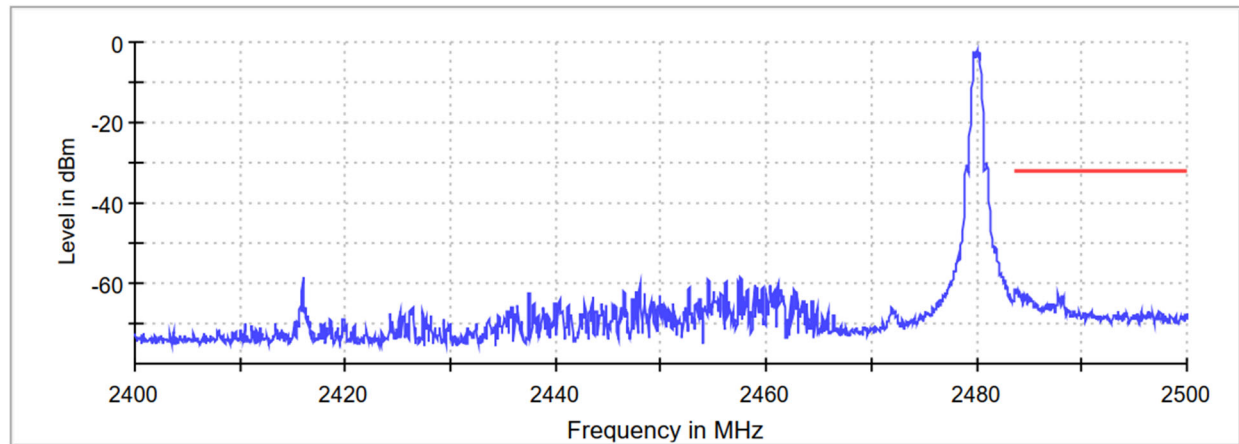
Band Edge



— Limit — Sum Level × Fail

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2480MHz
Frequency Tested	2480MHz
Notes	High Band Edge – Peak and Average Measurements

Band Edge



— Limit — Sum Level × Fail

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
2483.50	H	25.8		2.7	32.9	0.0	61.4	1179.0	5000.0	-12.5
	V	26.4		2.7	32.9	0.0	62.0	1263.3	5000.0	-11.9

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
2483.50	H	10.67		2.7	32.9	0.0	0.0	46.3	206.1	500.0	-7.7
	V	10.68		2.7	32.9	0.0	0.0	46.3	206.3	500.0	-7.7

28. Power Spectral Density

EUT Information	
Manufacturer	Last Lock
Product	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz BLE Tx @ 2440MHz BLE Tx @ 2480MHz

Test Setup Details	
Setup Format	Tabletop
Measurement Method	Antenna Conducted
Type of Test Site	Tabletop
Test Site Used	N/A
Notes	None

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz)	3.1

Requirement
The power spectral density from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

Procedure
1) The antenna port of the EUT was connected to the spectrum analyzer through a 40dB pad. 2) The EUT was then placed in the normal operation mode (for DTS devices). 3) To determine the power spectral density, the following spectrum analyzer settings were used: a) Center Frequency = Transmit Frequency b) Span = 1.5× the DTS (6dB) bandwidth c) Resolution Bandwidth (RBW) = 3kHz ≤ RBW ≤ 100kHz d) Sweep time = Auto e) Detector = Peak f) Trace Function = Max-Hold 4) A display line was then placed on the corresponding +8dBm level. 5) The analyzers display was then screenshot and saved.

Test Details	
Manufacturer	Last Lock
EUT	Smart Core
Model No.	C100
Serial No.	109-1, 112-1, or 24-1
Mode	BLE Tx @ 2402MHz
Frequency Tested	2402MHz
Result	PSD = -5.720dBm

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2402.000000	2402.022586	-5.720	8.0	PASS

Peak Power Spectral Density

