FCC PART 15, CLASS II PERMISSIVE CHANGE TEST REPORT

for the

FCC ID: YJ7-NA091171

LIMITED SINGLE MODULE, NA091171

WLL REPORT# 18890-01 REV 0

Prepared for:

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Prepared By:

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Testing Certificate AT-1448

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October 25, 2024
WLL Report# 18890-01 Rev 0

Prepared by:

Ryan Mascaro
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Reviewed by:

Steven D. Koster
President

Abstract

This report has been prepared on behalf of Stanley Black & Decker, Inc. to support the attached permissive change application for equipment authorization. The test report and application are submitted for incorporating this LMA module into a host device, in this case the DCB205BT and DCB205BTS battery. The embedded module is currently certified under FCC ID: YJ7-NA091171.

This test report documents the test configuration and Class II Permissive Change (CIIPC) test results for the Stanley Black & Decker, Inc., Single Limited Module, NA091171. The information provided in this report is only applicable to device herein documented as the EUT.

Radiated testing was performed at the 3-meyter Open Area Test Site (OATS) of Washington Laboratories, Ltd., located at: 4840 Winchester Boulevard, Suite #5., Frederick, MD 21703. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ANAB under Certificate AT-1448 as an independent FCC test laboratory. The ISED Canada number for Washington Laboratories is 3035A.

The Stanley Black & Decker, Inc., NA091171 module complies with the requirements for a Digital Transmission System (DTS) transmitter device under FCC Part 15.247.

Revision History	Description of Change	Date
Rev 0	Initial Release	October 25, 2024

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1 Introduction

1.1 Compliance Statement

The Stanley Black & Decker, Inc., NA091171 module complies with the requirements for a Digital Transmission System (DTS) transmitter device under FCC Part 15.247.

1.2 Test Scope

Tests for radiated emissions were performed. All measurements were performed in accordance with ANSI C63.10-2020 “ANSI Procedures for Compliance Testing of Unlicensed Wireless Devices”. The measurement equipment conforms to ANSI C63.2 “Specifications for Electromagnetic Noise and Field Strength Instrumentation”. The modules were tested “stand alone” as required for modular testing and approval.

1.3 Contract Information

Customer:	Stanley Black & Decker, Inc.
Purchase Order Number:	M868824
Quotation Number:	74817

1.4 Test and Support Personnel

Washington Laboratories, LTD	Ryan Mascaro
Customer Representative	Kirwan Magdamo

1.5 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Frederick, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by ANAB under Testing Certificate AT-1448 as an independent FCC test laboratory.

2 Equipment Under Test

2.1 EUT Identification

Table 1: EUT Device Summary

Manufacturer:	Stanley Black & Decker, Inc.
Embedded Module:	FCC ID: YJ7-NA091171
Host Model Number:	DCB205BT & DCB205BTS
Host Part Number:	--
Power Source & Voltage:	20VDC from battery
Software/Firmware Version:	Not Declared by Applicant
CIIPC Testing Date:	10/22/2024 and 10/23/2024

2.2 EUT Description

The NA091171 is a DTS transceiver module intended to be powered from a host 20V battery pack. The module was tested while embedded in a host device. For this report, the host was a 20V DeWalt battery pack model DCB205BT. This report also qualifies the DCB205BTS battery pack. The manufacturer has declared that the hardware and firmware are the same between the two models. The only difference is that the DCB205BTS does not advertise until provisioned by the end-user.

2.3 Test Configuration and Algorithm

The EUT was provided in a variety of engineering samples that were configured for testing. The EUT samples were loaded with test-mode software to allow individual samples to dwell, or hop, as needed for testing. The EUT was tested in a powered on, steady state. The 2.4GHz BLE radio was exercised as necessary to meet the requirements of the testing. Please note that the EUT was investigated in accordance with the module's approved test plan, which is provided in Annex A of this report. The worst-case emissions are provided throughout this report.

2.4 Deviations to the Test Standard

There were no deviations to the requirements of the standard(s).

2.5 EUT Configuration Details

The EUT was comprised of the following equipment, provided on the following page. All Modules, PCBs, etc. listed were considered as part of the EUT, as tested.

Table 2: EUT System Configuration List

Host	Description	Part Number	Serial Number	Rev. #
DCB205BT Battery Pack	Radiated Low	--	--	E2
DCB205BT Battery Pack	Radiated Mid	--	--	E2
DCB205BT Battery Pack	Radiated High	--	--	E2
DCB205BT Battery Pack	Radiated HOP	--	--	E2
DCB205BT Battery Pack	Radiated Prod.	--	--	E2

Table 3: Support Equipment

Name / Description	Manufacturer	Model Number	Calibration Data
Battery Charger	Stanley Black & Decker	DCB1104	--

Table 4: Cabling and Ports

Name / Description	Manufacturer	Model Number	Calibration Data
--	--	--	--

Figure 1: NA091171 PCB Assembly

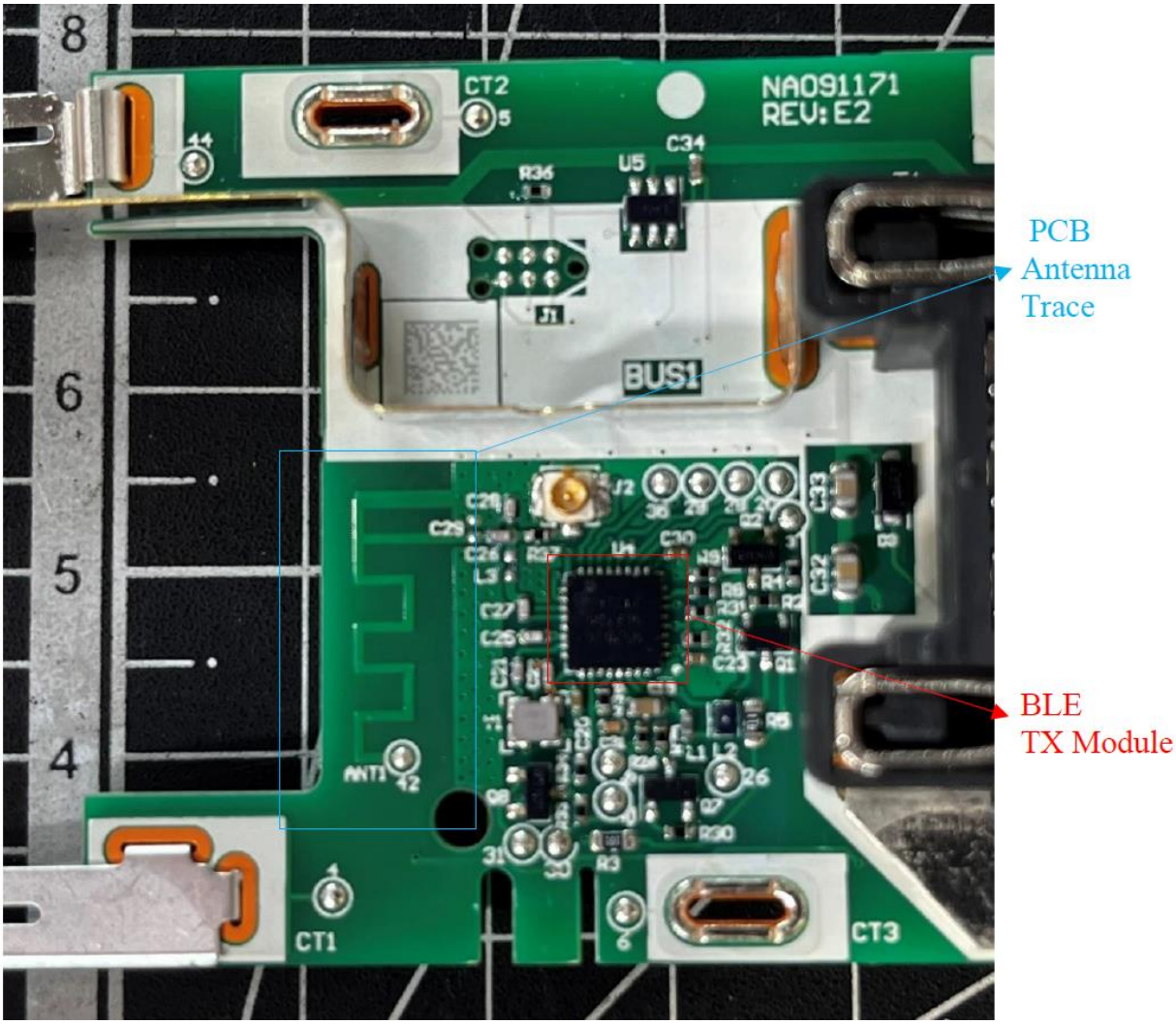


Figure 2: DCB205BT Host Product View 1

Figure 3: DCB205BT Host Product View 2

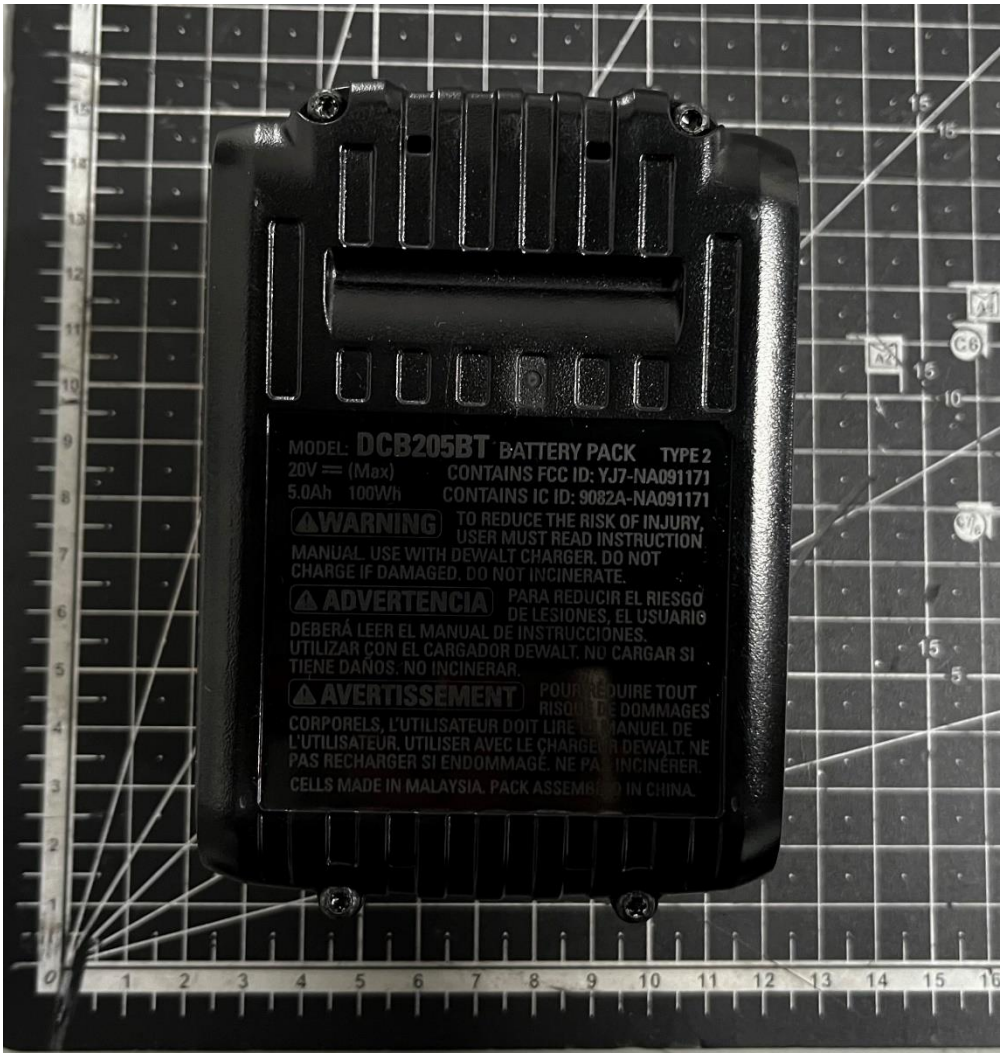


Figure 4: DCB205BT Host Product View 3

3 Test Results

The table below shows the results of testing for compliance with a Digital Transmission System in accordance with FCC Part 15.247. Full test results are shown in subsequent sub-sections.

Table 5: Testing and Results Summary

FCC Rule Part	IC Rule Part	Description	Result
15.247(a)(2)	RSS-247 [5.2 (a)]	Occupied Channel Bandwidth	Pass
15.247 (b)(3)	RSS-247 [5.4 (d)]	Transmit Output Power	Pass
15.247 (e)	RSS-247 [5.2 (b)]	Power Spectral Density	Pass
15.247 (d)	RSS-247 [5.5]	Out-of-Band Emissions (Band Edge @ 20dB below)	Pass
15.205 15.209	RSS-Gen [8.9/8.10]	General Field Strength Limits (Restricted Bands & RE Limits)	Pass
15.207	RSS-Gen [8.8]	AC Conducted Emissions	Pass

3.1 Occupied (DTS) Bandwidth

For a DTS operating in the 2.4GHz band, FCC Rule Part 15.247(a)(2) require the minimum 6dB bandwidth be at least 500 kHz.

The transmitter OBW of the EUT shall also closely resemble the original filing test data for the embedded module. In this case, the reported OBW data from the LMA filing is as follows:

Limited Module Data:

Modulation	Data Rate	TX Frequency	6dB Bandwidth	99% Bandwidth
GFSK	1 Mbps	2402 MHz	712.3 kHz	1.08 MHz

3.1.1 Measurement Method

This test was performed in accordance with Clause 11.8.2, Option 2, of ANSI C63.10-2020.

This test was performed as a 3-meter radiated emissions measurement. The transmit signal was maximized by rotating the turntable and varying the height of the test antenna.

3.1.2 Test Data

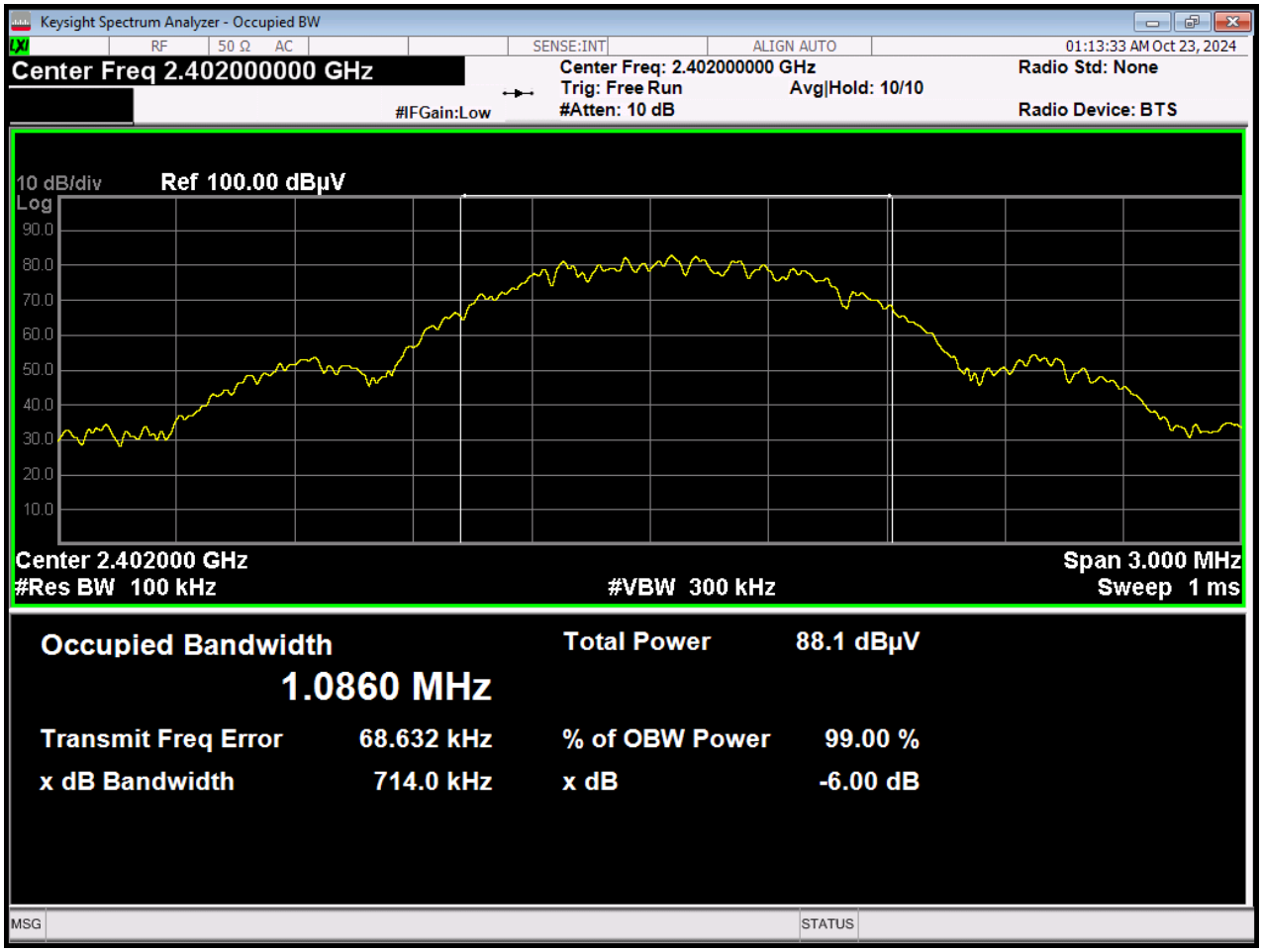
The EUT was investigated at the low and high channels. The transmitter OBW is the same for both channels. The OBW was measured several times and there is no significant difference between the low and high channels.

The EUT was configured to transmit a modulated signal, with channel hopping disabled.

The EUT is compliant with the requirements of this test.

The final CIIPC test data is provided below.

Figure 5: CIIPC Occupied Bandwidth, Low Channel, 1Mbps



3.2 Peak Transmit Power

For a DTS operating in the 2.4GHz band, FCC Rule Part 15.247(b)(3) and RSS-247, 5.4(d) require that the maximum peak conducted output power shall not exceed 30 dBm, or 1W. Additionally, the EIRP shall not exceed 36 dBm, or 4W.

The transmitter power of the EUT shall also closely resemble the original filing test data for the embedded module. In this case, the reported output power data from the LMA filing is as follows:

Limited Module Data:

Modulation	Data Rate	TX Frequency	Conducted Power (dBm)	EIRP (dBm)
GFSK	1 Mbps	2402 MHz	1.25	-4.19

3.2.1 Measurement Method

This test was performed as a 3-meter radiated emissions measurement. The transmit signal was maximized by rotating the turntable and varying the height of the test antenna. The EUT was investigated in three orthogonal axes (x, y, z). The final measurement was performed in accordance with Clause 11.9.1.1 of ANSI C63.10-2020.

3.2.2 Test Data

The EUT was investigated for worst-case emissions. In a 1MHz resolution bandwidth, the high channel of 2480MHz was found to produce a slightly higher radiated field strength.

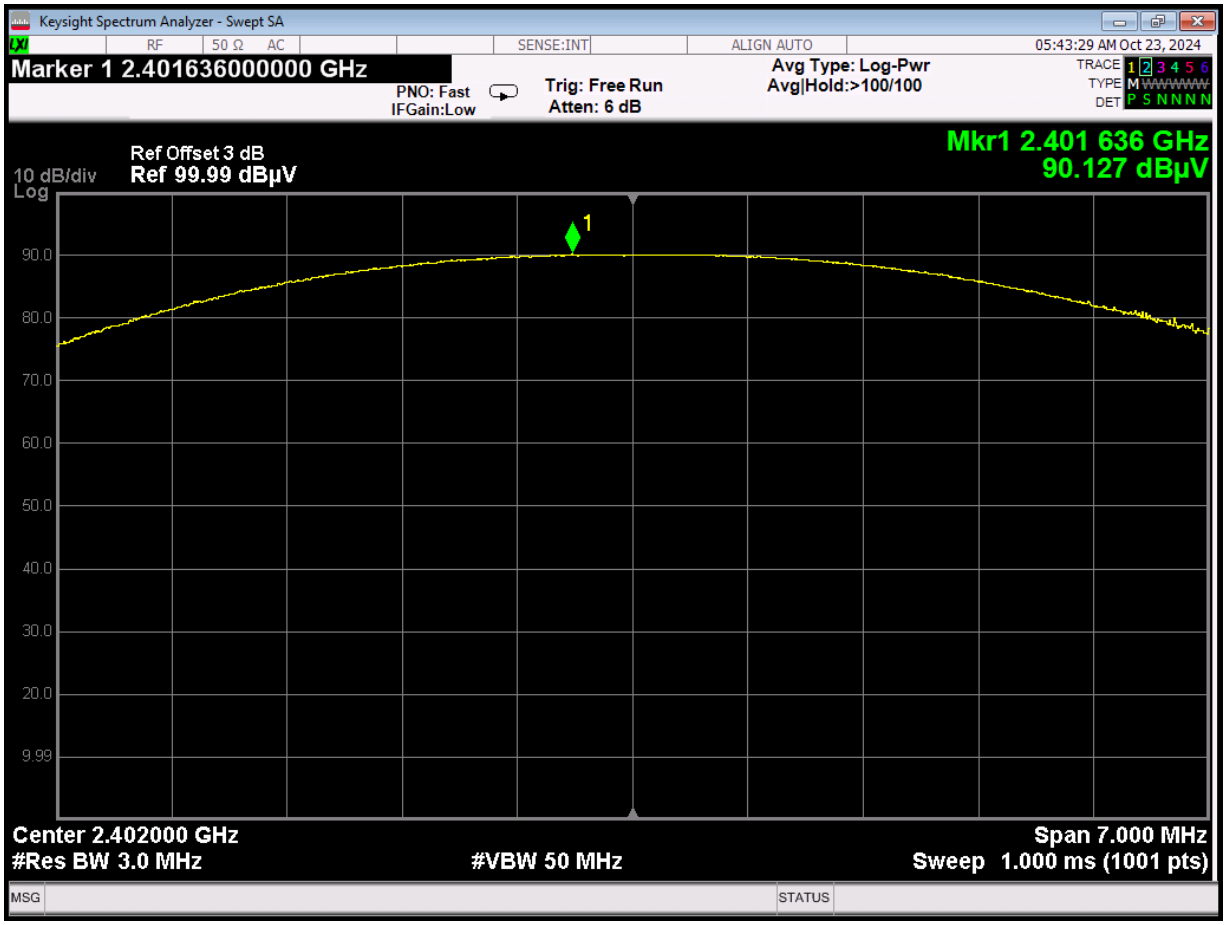
The EUT was configured to transmit a modulated signal, with channel hopping disabled.

The EUT is compliant with the requirements of this test.

The EUT employs a PCB trace antenna with a peak gain of -5.44 dBi.

The final CIIPC test data, for both low and high channels, is provided below.

Figure 6: CIIPC, Radiated Power, 1Mbps, Low Channel (3-meter Radiated)



Modulation	Data Rate	TX Frequency	SA Level (dBuV)	Corr. Factors (dB/m)	Corr. Level (dBuV/m)	Corr. EIRP (dBm)
GFSK	1 Mbps	2402 MHz	90.127	0.5	90.63	-4.33

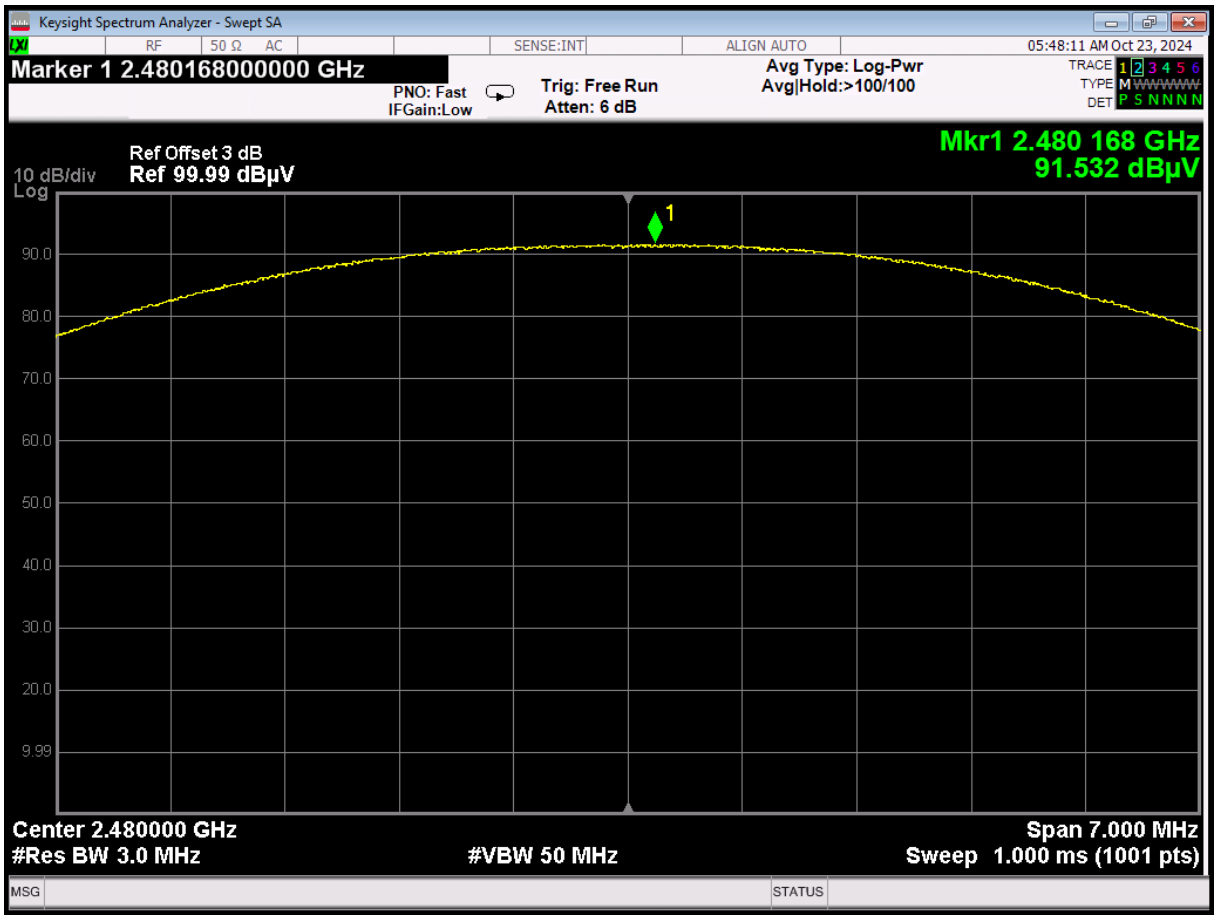
EIRP = dBuV/m + 20LOG(D_m) – 104.8

where, D_m is the measurement distance in meters

= 90.63 + 9.54 – 104.8 = -4.63 dBm EIRP

The result of -4.63 dBm EIRP is 0.44 dB lower than the EIRP listed on the original test report.

Figure 7: CIIPC, Radiated Power, 1Mbps, High Channel (3-meter Radiated)



Modulation	Data Rate	TX Frequency	SA Level (dBuV)	Corr. Factors (dB/m)	Corr. Level (dBuV/m)	Corr. EIRP (dBm)
GFSK	1 Mbps	2480 MHz	91.532	0.5	92.03	-3.22

EIRP = dBuV/m + 20LOG(D_m) – 104.8

where, D_m is the measurement distance in meters

= 92.03 + 9.54 – 104.8 = -3.22 dBm EIRP

The result of -3.22 dBm EIRP is within 0.96 dB of the EIRP listed on the original test report. This slight variation can be attributed to OATS radiated uncertainty. This result is acceptable.

3.3 Power Spectral Density

For a DTS operating in the 2.4GHz band, FCC Rule Part 15.247(e) and RSS-247, 5.2(b) require that the maximum peak power spectral density shall not exceed 8 dBm in any 3 kHz band.

The transmitter PSD of the EUT shall also closely resemble the original filing test data for the embedded module. In this case, the reported PSD data from the LMA filing is as follows:

Limited Module Data:

Modulation	Data Rate	TX Frequency	Measured PSD (dBm)
GFSK	1 Mbps	2402 MHz	1.12

3.3.1 Measurement Method

This test was performed as a 3-meter radiated emissions measurement. The transmit signal was maximized by rotating the turntable and varying the height of the test antenna. The EUT was investigated in three orthogonal axes (x, y, z). The final measurement was performed in accordance with Clause 11.10.2 of ANSI C63.10-2020.

3.3.2 Test Data

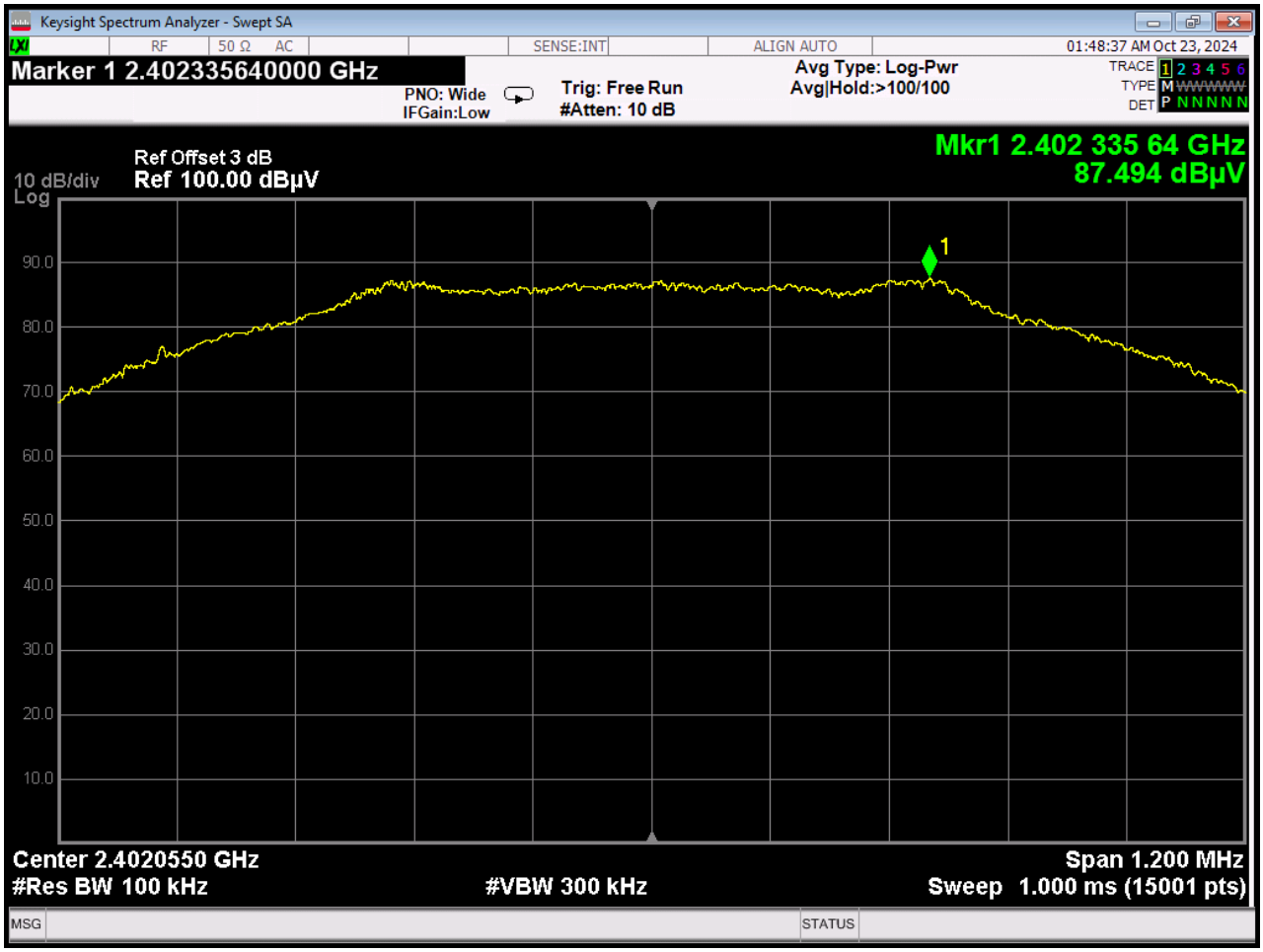
The EUT was configured to transmit a modulated signal, with channel hopping disabled.

The EUT is compliant with the requirements of this test.

The EUT employs a PCB trace antenna with a peak gain of -5.44 dBi.

The final CIIPC test data is provided below.

Figure 8: CIIPC, PSD, 1Mbps, Low Channel (3-meter Radiated)



Modulation	Data Rate	TX Frequency	SA Level (dBuV)	Corr. Factors (dB)	Corr. Level (dBuV/m)
GFSK	1 Mbps	2402 MHz	87.494	0.5	87.9

EIRP = dBuV/m + 20LOG(D_m) – 104.8
EIRP = -7.4 dBm/100kHz EIRP
The conducted equivalent (PSD) is derived from: EIRP – G_{dBi}
PSD = -7.4 – (-5.44) = -1.96 dBm/100kHz PSD (conducted equivalent)
The result of -1.96 dBm/100kHz PSD is 0.84 dB less than of the PSD listed on the original test report.

3.4 Band-edge

This section provides close-up band-edge plots of the low and high channel, with respect to the nearest authorized band-edge.

For a DTS operating in the 2.4GHz band, FCC Rule Part 15.247(d) and RSS-247, 5.5 require that in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the unwanted radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

3.4.1 Measurement Method

This test was performed as a 3-meter radiated emissions measurement. The transmit signal was maximized by rotating the turntable and varying the height of the test antenna. This test was performed in accordance with Clause 6.10 through Clause 6.10.4 of ANSI C63.10-2020.

3.4.2 Test Data

The EUT was configured to transmit a modulated signal and was investigated for worst-case emissions.

The EUT was evaluated in two modes, channel hopping enabled and channel hopping disabled.

The EUT is compliant with the requirements of this test.

The final CIIPC test data is provided below.

Figure 9: CIIPC, Worst-Case Band-Edge, Low Channel

Trace 1 = Hopping Disabled

Trace 2 = Hopping Enabled

Trace 3 = Ambient

Figure 10: CIIPC, Worst-Case Band-Edge, High Channel

Trace 1 = Hopping Disabled

Trace 2 = Hopping Enabled

Trace 3 = Ambient

3.5 Radiated Emissions

3.5.1 Requirements

Compliance Standard: FCC Part 15.247, 15.209, 15.205

Radiated Emissions, Compliance Limits	
Frequency Range	15.209 (3-meters)
30 – 88 MHz	100 µV/m
88 – 216 MHz	150 µV/m
216 – 960 MHz	200 µV/m
> 960 MHz	500 µV/m

3.5.2 Test Procedure

The requirements of FCC Part 15 and ICES-003 call for the EUT to be placed on a 1 X 1.5 meters non-conductive motorized turntable for radiated testing on a 3-meter open air test site. The height of the table is 80cm for testing below 1GHz. The height of the table is 150cm for testing above 1GHz.

The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Bi-conical and log periodic broadband antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The output of the antenna was connected to the input of the spectrum analyzer and the emissions in the frequency range of 30 MHz to 25 GHz were investigated. Both the horizontal and vertical field components were investigated.

The output from the antenna was connected, via a preamplifier, to the input of the spectrum analyzer. The detector function was set to quasi-peak or peak, as appropriate. Above 1GHz average measurement are recorded. The measurement bandwidth of the spectrum analyzer system was set to at least 120 kHz, with all post-detector filtering no less than 10 times the measurement bandwidth. Frequencies above 1GHz were performed using a measurement bandwidth of 1 MHz with a video bandwidth setting of 10 Hz for the average measurement.

3.5.3 Test Results Summary

The EUT complies with the radiated emissions requirements.

3.5.4 Radiated Data Reduction and Reporting

To convert the raw spectrum analyzer radiated data into a form that can be compared with the FCC limits, it is necessary to account for various calibration factors that are supplied with the antennas and other measurement accessories. These factors are included into the antenna factor (AF) column of the table and in the cable factor (CF) column of the table. The AF (in dB/m) and the CF (in dB) is algebraically added to the raw Spectrum Analyzer Voltage in dBµV to obtain the Radiated Electric Field in dBµV/m. This logarithm amplitude is converted to a linear amplitude, then compared to the FCC limit.

Example:

Spectrum Analyzer Voltage:	VdBµV
Antenna Correction Factor:	AFdB/m
Cable Correction Factor:	CFdB
Pre-Amplifier Gain:	GdB
Electric Field:	EdBµV/m = V dBµV + AFdB/m + CFdB - GdB
Convert to linear unit:	EdBµV/m/20 Inv log

3.5.5 Test Data

The EUT was investigated for worst-case emissions.

There were no EUT emissions detected in the frequency range of 3 GHz to 25 GHz.

A complete investigation of the radiated fundamental field strength was performed. The EUT was evaluated in three orthogonal axes (x, y, z). The EUT position the produced the highest radiated power was maintained during all testing.

The EUT was configured to transmit a modulated signal as follows:

a) for testing of 30 MHz to 1 GHz, the EUT was set to a transmitter enabled mode, the BLE transceiver was set to sweep the 2.4GHz ISM band, in an active hopping.

b) for testing of 1 GHz to 25 GHz, the EUT was set to a transmitter enabled mode, the BLE transceiver was set to dwell on the low channel and on the high channel, as needed.

Please accept the 30MHz to 1GHz test data to cover the digital portion under the provisions of 15.109(a).

The worst-case, and final, CIIPC test data is provided below.

Table 6: Worst-Case Radiated Emissions, 30MHz 1GHz (Hopping Mode)

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Detector	Comment
31.88	V	180	1.6	29.9	-0.2	30.6	100.0	-10.3	QP	AMB
36.58	V	180	1.6	23.4	-3.7	9.7	100.0	-20.3	QP	AMB
50.10	V	180	1.6	30.1	-10.6	9.4	100.0	-20.5	QP	AMB
63.84	V	0.0	1.2	29.4	-10.2	9.1	100.0	-20.8	QP	AMB
463.34	V	180	1.6	40.6	-0.4	102.3	200.0	-5.8	QP	AMB
706.00	V	180	1.6	24.0	3.5	23.7	200.0	-18.5	Peak	AMB

1. all frequencies listed were identified via a near field pre-scan.
2. AMB indicates that the emission was not detected at 3-meters

Table 7: Worst-Case Radiated Emissions, 30MHz to 25GHz, Low Channel

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Detector	Comment
2390.00	V	20	1.0	46.2	0.8	224.5	5000.0	-27.0	Peak	AMB
2390.00	V	20	1.0	32.6	0.8	46.9	500.0	-20.6	AVG	AMB
2402.00	V	20	1.0	88.7	0.5	29794.5	--	--	Peak	TX
2402.00	V	20	1.0	85.9	0.5	21584.2	--	--	AVG	TX
2862.00	V	20	1.0	45.7	0.2	198.0	5000.0	-28.0	Peak	AMB
2862.00	V	20	1.0	32.7	0.2	44.3	500.0	-21.0	AVG	AMB
4804.00	V	20	1.0	45.3	4.8	319.6	5000.0	-23.9	Peak	AMB
4804.00	V	20	1.0	33.6	4.8	82.8	500.0	-15.6	AVG	AMB

1. Spurious frequencies listed were identified via a near field pre-scan.
2. AMB indicates that the emission was not detected at 3-meters
3. No emissions were detected from the EUT in the range of 3GHz to 25GHz.
4. The restricted BE is provided

Table 8: Worst-Case Radiated Emissions, 30MHz to 25GHz, High Channel

Frequency (MHz)	Polarity H/V	Azimuth (Degree)	Ant. Height (m)	SA Level (dBuV)	Corr Factors (dB/m)	Corr. Level (uV/m)	Limit (uV/m)	Margin (dB)	Detector	Comment
2480.00	V	15	1.1	91.3	0.5	39392.9	--	--	Peak	TX
2480.00	V	15	1.1	86.6	0.5	22668.2	--	--	AVG	TX
2483.50	V	15	1.1	47.7	0.5	257.3	5000.0	-25.8	Peak	AMB
2483.50	V	15	1.1	34.0	0.5	53.2	500.0	-19.5	AVG	AMB
2862.00	V	15	1.1	44.5	0.2	172.4	5000.0	-29.2	Peak	AMB
2862.00	V	15	1.1	33.0	0.2	45.9	500.0	-20.7	AVG	AMB
4960.00	V	15	1.1	44.2	7.1	367.9	5000.0	-22.7	Peak	AMB
4960.00	V	15	1.1	31.4	7.1	84.3	500.0	-15.5	AVG	AMB

1. Spurious frequencies listed were identified via a near field pre-scan.
2. AMB indicates that the emission was not detected at 3-meters
3. No emissions were detected from the EUT in the range of 3GHz to 25GHz.
4. The restricted BE is provided

3.6 AC Powerline Conducted Emissions

3.6.1 Requirements

Compliance Standard: FCC Part 15.207

FCC Compliance Limits		
Frequency Range	Class B Digital Device	
	Quasi-peak	Average
0.15 – 0.5 MHz	66 to 56 dBµV	56 to 46 dBµV
0.5 – 5 MHz	56 dBµV	46 dBµV
0.5 – 30 MHz	60 dBµV	50 dBµV

3.6.2 Test Procedure

The requirements of FCC Part 15 and ICES-003 call for the EUT to be placed on an 80cm-high non-conductive table above a ground plane. Power to the EUT was provided through a Solar Corporation 50 Ω/50 µH Line Impedance Stabilization Network bonded to a 3 X 2-meter ground plane. The LISN has its AC input supplied from a filtered AC power source. Power was supplied to the peripherals through a second LISN. The peripherals were placed on the table in accordance with ANSI C63.4. Power and data cables were moved about to obtain maximum emissions.

The 50 Ω output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 150 kHz to 30 MHz were measured. The detector function was set to quasi-peak, peak, or average as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth. For average measurements, the post-detector filter was set to 10 Hz.

These emissions must meet the limits specified in §15.207 for quasi-peak and average measurements.

Environmental Conditions During AC Conducted Emissions Testing

Ambient Temperature:	21 °C
Relative Humidity:	55 %

3.6.3 Conducted Data Reduction and Reporting

The comparison between the Conducted emissions level and the FCC limit is calculated as shown in the following example:

Spectrum Analyzer Voltage: VdBµV(raw)

LISN Correction Factor: LISN dB

Cable Correction Factor: CF dB

Voltage: VdBµV = V dBµV (raw) + LISN dB + CF dB

3.6.4 Test Data

The EUT complies with the Class B Conducted Emissions requirements.

The EUT indirectly couples to the AC mains network via the battery pack charger.

The EUT was evaluated in both the TX enabled and TX disabled modes, both while charging.

The worst-case emission test data is provided below.

Please note for the C2PC, the manufacturer has provided the same exact physical samples that were used during the original certification. The EUT sample is the DCB205BT battery pack, containing the NA091171 module. These samples are capable of both TX On and TX Off mode(s), with simultaneous charging. As such, the test data was pulled from the original filings report #18508-01.

Table 9: AC Power Conducted Emissions Test Data

NEUTRAL / L1										
Frequency (MHz)	**Level QP (dBµV)**	**Level AVG (dBµV)**	**Cable Loss (dB)**	**LISN Corr (dB)**	**Level QP Corr (dBµV)**	**Level Avg Corr (dBµV)**	**Limit QP (dBµV)**	**Limit AVG (dBµV)**	**Margin QP (dB)**	**Margin AVG (dB)**
0.150	47.6	16.8	9.9	0.5	58.0	27.2	66.0	56.0	-8.0	-28.8
0.154	44.0	14.9	9.9	0.4	54.4	25.3	65.8	55.8	-11.4	-30.5
0.256	39.0	15.0	9.9	0.3	49.3	25.3	61.6	51.6	-12.3	-26.3
0.426	27.0	7.8	9.9	0.3	37.2	18.0	57.3	47.3	-20.1	-29.3
0.598	38.1	11.1	9.9	0.3	48.3	21.3	56.0	46.0	-7.7	-24.7
0.766	26.0	10.0	9.9	0.3	36.2	20.2	56.0	46.0	-19.8	-25.8
0.932	22.0	9.0	9.9	0.3	32.2	19.2	56.0	46.0	-23.8	-26.8
2.762	17.0	9.0	10.2	0.3	27.5	19.5	56.0	46.0	-28.5	-26.5
0.150	47.6	16.8	9.9	0.5	58.0	27.2	66.0	56.0	-8.0	-28.8
PHASE / L2										
Frequency (MHz)	**Level QP (dBµV)**	**Level AVG (dBµV)**	**Cable Loss (dB)**	**LISN Corr (dB)**	**Level QP Corr (dBµV)**	**Level Avg Corr (dBµV)**	**Limit QP (dBµV)**	**Limit AVG (dBµV)**	**Margin QP (dB)**	**Margin AVG (dB)**
0.151	48.3	17.5	9.9	0.6	58.9	28.1	65.9	55.9	-7.1	-24.9
0.156	48.1	17.1	9.9	0.6	58.7	27.7	65.7	55.7	-7.0	-28.0
0.201	43.2	15.1	9.9	0.5	53.6	25.5	63.6	53.6	-9.9	-28.0
0.243	37.6	12.9	9.9	0.4	48.0	23.3	62.0	52.0	-14.0	-28.7
0.409	27.1	8.0	9.9	0.3	37.4	18.3	57.7	47.7	-20.3	-29.4
0.573	21.5	9.0	9.9	0.3	31.7	19.2	56.0	46.0	-24.3	-26.8
0.736	18.0	8.0	9.9	0.3	28.2	18.2	56.0	46.0	-27.8	-27.8
0.902	17.9	7.0	9.9	0.3	28.1	17.2	56.0	46.0	-27.9	-28.8
1.232	14.0	6.0	9.9	0.3	24.2	16.2	56.0	46.0	-31.8	-29.8

4 Test Equipment

The table below provides a list of the test equipment used for measurements along with the calibration information.

Table 10: Test Equipment List

Test Name:	**AC Powerline Emissions**	Test Date: 6/14/2024	
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
00993	KEYSIGHT N9020B	MXA SIGNAL ANALYZER	11/6/2025
00125	SOLAR 8028-50-TS-24-BNC	LISN	4/18/2025
00126	SOLAR 8028-50-TS-24-BNC	LISN	4/18/2025
00053	HP 11947A	LIMITER TRANSIENT	1/11/2025
00825	CABLE ASSOCIATES	6-METER COAXIAL CABLE	6/1/2025

Test Name:	**Radiated Emissions**	Testing Dates: 10/22/2024 & 10/23/2024	
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
00942	AGILENT MXA-N9020A	SPECTRUM ANALYZER	12/19/2024
00425	ARA DRG-118/A	ANTENNA DRG 1-18GHZ	11/7/2024
00644	SUNOL SCIENCES CORP JB1	BICONALOG ANTENNA	11/7/2024
00955	JUNKOSHA USA MWX322-	18M HF COAXIAL CABLE	7/1/2025
00865	STORM 874-0101-036	HF COAXIAL CABLE	6/25/2025
00522	HP 8449B	PRE-AMPLIFIER 1-26.5GHZ	3/29/2025
00276	ELECTRO-METRICS BPA-100	RF PRE-AMPLIFIER	6/25/2025
00731	NARDA 4779-3	2W, 3DB ATTENUATOR	6/20/2025

5 Measurements

5.1.1 References

ANSI C63.2 (1/2016) Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 (1/2014) American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

ANSI C63.10 (9/2020) American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

5.2 Measurement Uncertainty

All results reported herein relate only to the equipment tested. The basis for uncertainty calculation uses ANSI/NCSL Z540-2-1997 (R2002) with a type B evaluation of the standard uncertainty. Elements contributing to the standard uncertainty are combined using the method described in Equation 1. to arrive at the total standard uncertainty. The standard uncertainty is multiplied by the coverage factor to determine the expanded uncertainty which is generally accepted for use in commercial, industrial, and regulatory applications and when health and safety are concerned (see Equation 2). A coverage factor was selected to yield a 95% confidence in the uncertainty estimation.

Equation 1: Standard Uncertainty

$$u_c = \pm\sqrt{\frac{a^2}{div_a{}^2} + \frac{b^2}{div_b{}^2} + \frac{c^2}{div_c{}^2} + ...}$$

where,

uc	= standard uncertainty
a, b, c,..	= individual uncertainty elements
Diva, b, c	= the individual uncertainty element divisor based on the probability distribution
Divisor	= 1.732 for rectangular distribution
Divisor	= 2 for normal distribution
Divisor	= 1.414 for trapezoid distribution

Equation 2: Expanded Uncertainty

$$U = ku_c$$

where,

U = expanded uncertainty
k = coverage factor
k ≤ 2 for 95% coverage (ANSI/NCSL Z540-2 Annex G)
uc = standard uncertainty

The measurement uncertainty complies with the maximum allowed uncertainty from CISPR 16-4-2. Measurement uncertainty is not used to adjust the measurements to determine compliance. The expanded uncertainty values for the various scopes in the WLL accreditation are provided in the table below.

Table 11: Expanded Uncertainty List

Scope	Standard(s)	Expanded Uncertainty
Conducted Emissions	CISPR11, CISPR32, CISPR14, FCC Part 15	± 2.63 dB
Radiated Emissions	CISPR11, CISPR32, CISPR14, FCC Part 15	± 4.55 dB

5.3 Environmental Conditions

Environmental Conditions During All C2PC Measurements

Ambient Temperature:	Between 19.9 and 23.9 °C
Relative Humidity:	Between 45 and 60 %

6 Annex A

This Annex provides the module's integration guide and permissive change test plan. The data provided in this section was retrieved from the EUT original filing exhibits.

NA091171 LMA BT Module Integration Manual Rev 1.1

September 11, 2024

The NA091171 BT module is intended only for use in proprietary Stanley Black and Decker li-ion power tool batteries. It is not intended for sale to third parties and these integration instructions are internal, manufacturing documents.

FCC Part 15.212(a)(1) Modular Transmitter Requirements:

(i) The module does not have its own shielding. The end-product host must be additionally tested to ensure continued RF compliance when this module is implemented. This testing must include spurious radiated emissions testing. See the host testing guidance in this integration manual.
(ii) The module's data inputs are buffered internal to the Bluetooth IC on the module.
(iii) The module contains its own power supply regulation, separate from the host.
(iv) The antenna for the module is permanent and etched into the module PCB. The antenna design cannot be changed without a Class II permissive change application for this module.
(v) The module has been tested in a stand-alone configuration, independent of any host device.
(vi) The module is labeled with its FCC ID and IC number granted by the FCC and ISED after authorization. These identification numbers must appear on a permanent label on the host device. See the labeling instructions in this integration manual.
(vii) The module complies with FCC Part 15C, Intentional Radiator requirements. § 15.247 describes operation requirements for the module transmit frequency range of 2400-2483.5 MHz.
(viii) The module meets Portable exclusion levels.

Module Integration Instructions:

The NA091171 module is an intentional radiator and is therefore governed by the FCC rules 47 CFR Part 15, Subpart C. As a Bluetooth radio transmitting in the frequency range 2400-2483.5 MHz, § 15.247 applies. The module is not for sale and only to be used by the Grantee in their proprietary power tools without any modifications to the radio circuitry or PCB antenna.

The NA091171 Grant of Authorization is issued as a Limited Modular Approval because the module does not have its own RF shield. As such, deployment of the module in a host device requires a Class II Permissive Change filing for the module. The host product must also be evaluated for RF exposure.

A fixed PCB trace antenna is integral to this radio module. This antenna cannot be modified in any way without a Class II Permissive Change filing for the module.

Changes or modifications to the module not expressly approved by Stanley Black & Decker could void the user's authority to operate the device.

Host Device Testing Guidance:

Because of the Limited Modular Approval of the NA091171 due to the lack of a shield, extra care must be exercised when evaluating all end-product hosts incorporating this module. In particular, the host device must be evaluated using the following test plan to demonstrate compliance with the following:

FCC Rule Part: 15.247
Approval FCC ID: YJ7-NA091171 (as a DTS device)
Modulation Modes: 1 Mb/s only
Maximum power: Low Channel, 1.3 mW
Highest Spectral Density: Low Channel

The host device must be investigated with the NA091171 module to demonstrate that the module still remains in compliance with the specific rule part. The permissive change test data is intended to verify that original RF conducted data such as worse case power, BW, and density are still compliant and operating correctly at intended levels within the specific host. Additional radiated testing is necessary due to the lack of shield in the module as well as ensure it maintains radiated emissions requirements within the new host.

Based on the test data from the original module filing, the following table summarizes the necessary tests to perform for a C2PC to ensure compliance for the NA091171 module when installed within a new host.

FCC Rule Part	Description	Result
15.247(a)(2)	Occupied Channel Bandwidth Test Low Channel @ 1 Mb/s	
15.247 (b)(3)	Transmit Output Power Test Low Channel @ 1 Mb/s. Note Result must be less than or equal to original value to be allowed under a C2PC.	
15.247 (e)	Power Spectral Density Test Low Channel @ 1 Mb/s	
15.247 (d)	Out-of-Band Emissions (Band Edge @ 20dB below) Test Lowest and Highest channels at 1 Mb/s for compliance at <= 2400 and >= 2483.5 MHz for both hopping and non-hopping modes.	
15.205 15.209	General Field Strength Limits (Restricted Bands & RE Limits) Investigate Low, Mid and High channels for complete radiated emissions using 1 Mb/s. Report either all data or optionally just the worse-case data if a) procedures denote full investigation was made and b) justify that only worse case was provided.	

Per Part 15.31(m), one frequency near the low-end, one frequency near the middle, and one frequency near the high-end of the frequency range are expected to be evaluated. For this device, the highest aggregate power, and highest power spectral density both occur on the low channel. For radiated emissions, the worst-case channel may be confirmed through an approved investigation. Only the data for worst-case condition among the modes needs to be included in the permissive change report if the overall testing strategy is explained and justified. For the LMA NA091171, since it has no shield, testing of radiated spurious emissions shall cover the 10th harmonic of the fundamental, per the requirements in Part 15.247, to confirm no additional parasitic or ingress related non-compliant emissions exist. In all cases, a test of each worst-case modulation is required for channels over the frequency range defined in Part 15.33(a). Since the NA091171 module uses only one modulation – only 1 Mb/s needs to be evaluated in this case.

If the host device contains additional intentional radiator devices, modular or otherwise, all transmitter devices must be operated simultaneous to ensure that the transmitters can be co-located. The host device is otherwise operated in a typical user mode. The antenna used for this transmitter must not transmit simultaneously with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures.

This modular transmitter is ONLY authorized for the specific FCC and ISED intentional radiator rules listed in the grants of authorization. The host device must be evaluated for RF compliance to any other FCC and ISED rules that apply to the host device and not covered by the modular transmitter grant. At a minimum, the host device must be evaluated for compliance to 47 CFR Part 15, Subpart B with the module installed.

All new host configurations require a Class II Permissive Change filing to the LMA authorization of this module.

Refer to the FCC KDB 996369 D04 Module Integration Guide for additional guidance.

Host Device Labeling Instructions:

The host device employing the NA091171 module shall be permanently marked with a label stating, "Contains FCC ID: YJ7-NA091171" and "Contains IC: 9082A-NA091171". If the host device employs additional certified modules, the FCC ID and IC number for each additional module can be appended to each statement. The two statements can be combined so that only one "Contains" is used, but the other text is required. E-labeling of the host device is also allowed. Check current agency regulations for e-labeling.

Host devices that comply with the RF requirements must follow the Labeling requirements in §15.19 of 47 CFR Part 15 and bear the following compliance statement in a conspicuous location on the device if space allows. If there isn't enough space to accommodate this compliance statement in at least 4 point size, the statement must be included in the user manual and on the packaging of the host device.

"This device complies with part 15 of the FCC Rules and Industry Canada License-exempt RSS standard(s). Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation."