


Test Report # 317078

Equipment Under Test: DEWALT Bluetooth Tool Module

Test Date(s): 3/22/17 – 4/17/17

Prepared for: Stanley Black & Decker
Attn: Jason Leh
701 E Joppa Road

Report Issued by: Michael Hintzke, EMC Engineer III

Signature: 


Date: 6/26/17

Report Reviewed by: Adam Alger, Quality Systems Engineer

Signature: 

Date: 6/26/2017

Report Constructed by: Michael Hintzke, EMC Engineer III

Signature: 

Date: 6/26/17

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Company: Stanley Black & Decker	Page 1 of 13	Name: DEWALT Bluetooth Tool Module
Report: TR 317078		Model: N463400(01), N471440(02), N474045(03)
Job: C-2696		Serial: Manufacturing Sample Lot

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Laird Technologies Test Services in Review

The Laird Technologies, Inc. laboratory located at W66 N220 Commerce Court Cedarburg, Wisconsin, 53012 USA is recognized through the following organizations:



A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025: 2005 with Electrical (EMC) Scope

A2LA Certificate Number: 1255.01

Scope of accreditation includes all test methods listed herein, unless otherwise noted.



Federal Communications Commission (FCC) – USA

Accredited recognition of two 3 meter Semi-Anechoic Chambers

Accredited Test Firm Registration Number: 953492



**Government
of Canada**

Innovation, Science and Economic Development Canada

ISED Site listing of two 3 meter Semi-Anechoic Chambers based on RSS-GEN – Issue 4

File Number: IC 3088A-2

File Number: IC 3088A-3

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1 TEST REPORT SUMMARY

On 6/23/17, the Equipment Under Test (EUT), DEWALT Bluetooth Tool Module, as provided by Stanley Black & Decker was evaluated for the following requirements:

Requirement	Description	Specification	Method	Result
FCC Part 1.1307, 2.1091, 2.1093	RF Exposure and equipment authorization requirements	Reported	FCC KDB 447498	Reported
ISED Canada RSS-102	Exemption Limits for Routine Evaluation — SAR Evaluation	Reported	RSS-102 Section 2.5.1	Reported

Notice:

The results relate only to the item tested and described in this report. Any modifications made to the equipment under test after the specified test date(s) may invalidate the data herein.

If the resulting measurement margin is seen to be within the uncertainty value, as listed in this report, the possibility exists that this unit may not meet the required limit specification if subsequently tested.

2 CLIENT INFORMATION

Company Name	Stanley Black & Decker
Contact Person	Jason Leh
Address	701 E. Joppa Road, Towson, MD 21286

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	Bluetooth Tool Module
Model Numbers	N463400(01), N471440(02), N474045(03)
Serial Number	Manufacturing Sample Lot
FCC ID	YJ7-N457147J
IC ID	9082A-N457147J

2.2 Product Description

The DEWALT Bluetooth Tool Module permits a User to connect their DEWALT power tool to their mobile device giving them the ability to:

- Provide tool tracking & inventory management
- Provide security by enabling/disabling the tool or sending alerts when tool is out of range
- Customize tool performance
- Provide diagnostic and technical information to the User

The DEWALT Bluetooth Tool Module was tested in the following tools:

- DCD997 – Premium Hammer Drill
- DCD992 – Premium Drill Driver
- DCF888 – Compact Impact
- DCD797 – Compact Hammer Drill Driver
- DCD792 – Compact Drill Driver

2.3 Modifications Incorporated for Compliance

None noted at time of test

2.4 Deviations and Exclusions from Test Specifications

None noted at time of test

2.5 Additional Information

The EUT was powered via a 20 VDC benchtop supply for standalone measurement or internal battery when installed in the tool. The radio module was programmed at 2402, 2440 and 2480 MHz (low, middle and high channels, respectively) with an Android device using the Nordic Semiconductor nRF Connect Version 4.10 application.

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3 REFERENCES

Publication	Edition	Date
CFR 47 Part 1	-	2017
CFR 47 Part 2	-	2017
RSS-102	Issue 5	2015

4 UNCERTAINTY SUMMARY

Using the guidance of the following publications the calculated measurement uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of $k = 2$.

References	Version / Date
CISPR 16-4-1	Ed. 2 (2009-02)
CISPR 16-4-2	Ed. 2 (2011-06)
CISPR 32	Ed. 1 (2012-01)
ANSI C63.23	2012
A2LA P103	February 4, 2016
A2LA P103c	August 10, 2015
ETSI TR 100-028	V1.3.1 (2001-03)

Measurement Type	Configuration	Uncertainty \pm
Radiated Emissions	Biconical Antenna	5.0 dB
Radiated Emissions	Log Periodic Antenna	5.3 dB
Radiated Emissions	Horn Antenna	4.7 dB
AC Line Conducted Emissions	Artificial Mains Network	3.4 dB
Telecom Conducted Emissions	Asymmetric Artificial Network	4.9 dB
Disturbance Power Emissions	Absorbing Clamp	4.1 dB
Radiated Immunity	3 Volts/meter	2.2 dB
Conducted Immunity	CDN/EM/BCI	2.4/3.5/3.4 dB
EFT Burst/Surge	Peak pulse voltage	164 volts
ESD Immunity	15 kV level	1377 Volts

Parameter	ETSI U.C. \pm	U.C. \pm
Radio Frequency, from F0	1×10^{-7}	0.55×10^{-7}
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C
Humidity	5 %	2.9 %
Supply voltages	3 %	1 %

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5 TEST DATA

5.1 Fundamental Emission

Operator	Michael Hintzke
QA	Aidi Zainal
Test Date	4/2/17
Location	Bench
Temp. / R.H.	70°F / 54%
Requirement	CFR 47 Part 15.247 (b)(3) RSS-247 section 5.4 d)
Method	FCC KDB 558074 D01 Meas Guidance v04 section 9.2.2.4

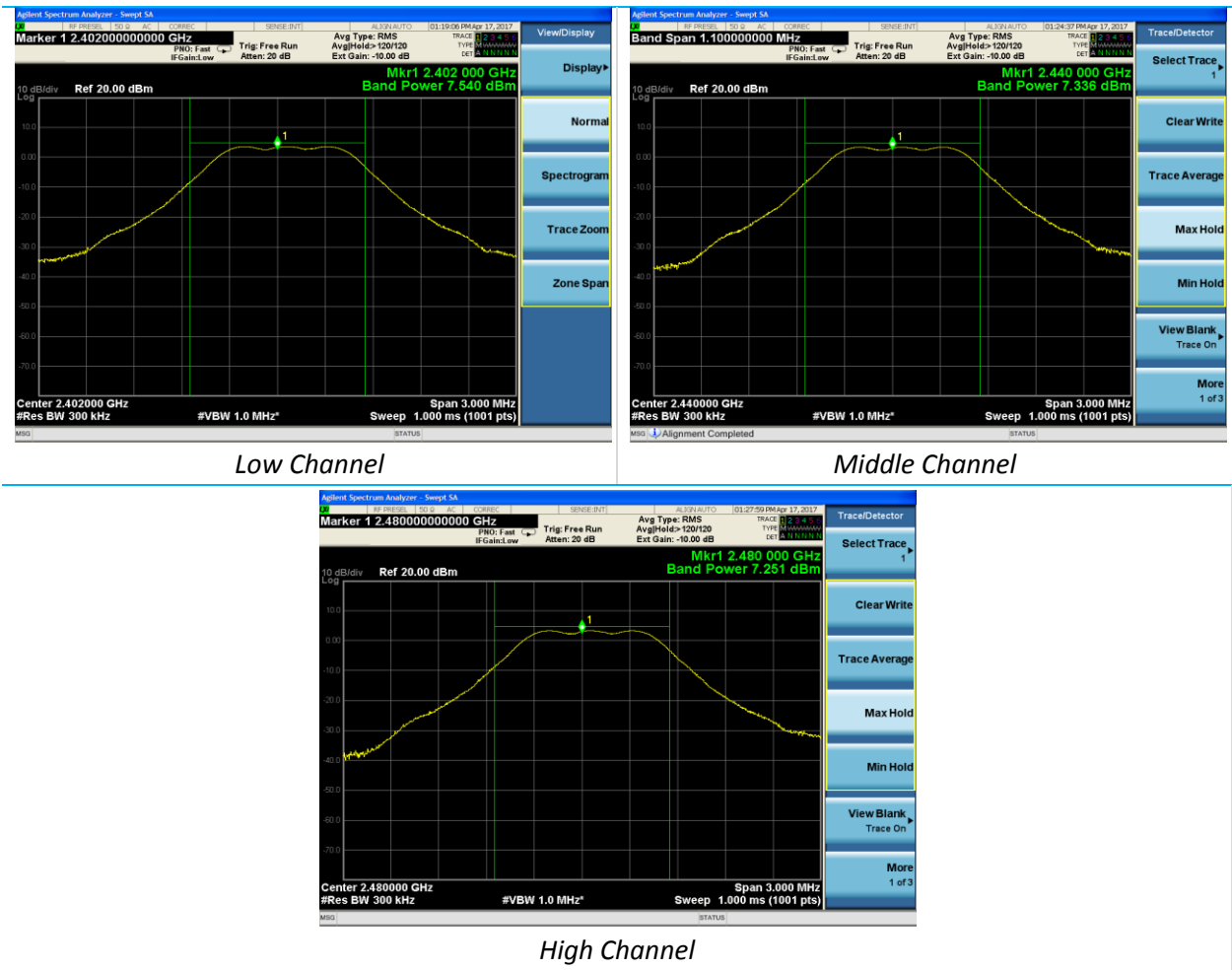
Test Parameters

Frequency	2402 MHz, 2440 MHz, 2480 MHz
Maximum Conducted Output Power Measurement Settings	<ul style="list-style-type: none"> • 300 kHz RBW / 1 MHz VBW • RMS Detector
EUT Power Input	20 VDC

Table

Channel Frequency (MHz)	Max Conducted (Average) Output Power (dBm)	Power Limit (dBm)	Margin (MHz)
2402	7.740	30	22.260
2440	7.556	30	22.444
2480	7.451	30	22.549

Plots



6 EXCLUSION CALCULATION

6.1 FCC

Maximum EIRP (adjusted for tune-up tolerance)	
Conducted (Average) Output Power	7.740 dBm @ 2402 MHz
Antenna Gain	-3.4 dBi
Tune-up Tolerance	±3 dBm
P _{out} including tune-up tolerance	7.34 dBm = 5.42 mW

6.1.1 1-g Head or Body Minimum Separation Distance

$$\frac{\text{max. power of channel, including tune - up tolerance, mW}}{\text{min. test separation distance, mm}} \times \sqrt{f_{(\text{GHz})}} \leq 3.0$$

$$\frac{5.42}{5} \times \sqrt{2.402} \leq 3.0$$

$$2.80 \leq 3.0$$

Note: KDB 447498 states that if the minimum separation distance calculated above is less than 5 mm, a distance of 5mm is applied to determine SAR test exclusion

6.2 Industry Canada

6.2.1 RSS 102 Compliance

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Note: Table 1 from RSS 102. The exemption limits represented in this table apply to 1-gram tissue, head and body, evaluation (uncontrolled). A linear extrapolation has been applied since the operating frequency is between two frequencies in Table 1.

Interpolating between 1900 MHz and 2450 MHz for 2402 MHz at a separation distance of **10 mm** yields the exemption limit of 7.3 mW for limb-worn devices.

When evaluated against RSS 102 issue 5 section 2.5, table 1:

$$\underline{5.42 \text{ mW} \leq 7.3 \text{ mW}}$$

7 REVISION HISTORY

Version	Date	Notes	Person
0	6/23/17	Initial Draft	Mike Hintzke
1	6/26/17	Draft Revision	Mike Hintzke
2	7/21/17	Change of Model Number	Mike Hintzke

END OF REPORT