

# Test Report C-3600F


**Equipment Under Test:** DCE045

**Requirement(s):** FCC 1.1310  
ISED RSS-102

**Test Date(s):** 6/7/2023

**Prepared for:** Stanley Black & Decker  
Attn: Kirwan Magdamo  
701 East Joppa Road  
Towson, MD 21286

**Report Issued by:** Anthony Smith, EMC Engineering Specialist

Signature: 

Date: 7/27/2023

**Report Reviewed by:** Adam Alger, Laboratory Manager

Signature: 

Date: 07/27/2023

**Report Constructed by:** Anthony Smith, EMC Engineering Specialist

Signature: 

Date: 7/18/2023

*This test report may not be reproduced, except in full, without approval of Laird Connectivity LLC*

Company: Stanley Black & Decker	Page 1 of 13	Name: DCE045
Report: TR3600F		Model: DCE045
Quote: NBO-01-2022-004577-2		Serial: Engineering Sample

## CONTENTS

Contents.....	2
Laird Connectivity Test Services in Review .....	3
1 Test Report Summary .....	4
2 Client Information.....	5
2.1 Equipment Under Test (EUT) Information .....	5
2.2 Product Description .....	5
2.3 Modifications Incorporated for Compliance.....	5
2.4 Deviations and Exclusions from Test Specifications .....	5
2.5 Programming Information .....	5
3 References .....	6
4 Uncertainty Summary .....	7
5 Test Data .....	8
5.1 Antenna Port Conducted Emissions.....	8
6 FCC 1-G SAR Test Exclusion Calculations .....	11
6.1 Power Calculations.....	11
6.2 Distance.....	11
6.3 SAR Test Exclusion Calculation.....	11
6.4 Result .....	11
7 IC Exemption Calculation for Routine SAR Evaluation.....	12
7.1 Power Calculations.....	12
7.2 Distance.....	12
7.3 Exemption Limits.....	12
7.4 SAR Test Exclusion Calculation.....	12
7.5 Result .....	12
8 Revision History .....	13

**Laird Connectivity Test Services in Review**

The Laird Connectivity LLC 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 17025:2017 with Electrical (EMC) Scope*

*A2LA Certificate Number: 1255.01*

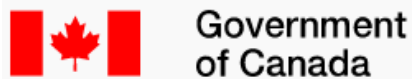
*Scope of accreditation includes all test methods listed herein unless otherwise noted*



**Federal Communications Commission (FCC) – USA**

*Accredited Test Firm Registration Number: 953492*

*Recognition of two 3 meter Semi-Anechoic Chambers*



**Innovation, Science and Economic Development Canada**

*Accredited U.S. Identification Number: US0218*

*Recognition of two 3 meter Semi-Anechoic Chambers*

Company: Stanley Black & Decker	Page 3 of 13	Name: DCE045
Report: TR3600F		Model: DCE045
Quote: NBO-01-2022-004577-2		Serial: Engineering Sample

## 1 TEST REPORT SUMMARY

On **6/7/2023** the Equipment Under Test (EUT), **DCE045**, as provided by **Stanley Black & Decker** was tested to the following requirements:

### Portable Device

Requirements	Description	Method	Result
FCC: 1.1310	Radiofrequency Radiation Exposure Limits	Distance ≤ 5mm 1g-SAR	Reported
IC: RSS-102	Radiofrequency Radiation Exposure Limits	Distance 10mm 1g-SAR	Reported

### Notice:

The results relate only to the item tested as configured and described in this report. Any additional configurations, modes of operation, or modifications made to the equipment under test after the specified test date(s) are at the decision of the client and may not apply to the data seen in this test report.

The decision rule for Pass / Fail assessment to the specification or standard listed in this test report has been agreed upon by the client and laboratory to be as follows:

Measurement Type	Rule
Emissions – Amplitude	1 dB below specified limit
Emissions – Frequency	1% less than the specification
Immunity	Tested at specified level

## 2 CLIENT INFORMATION

<b>Company Name</b>	Stanley Black & Decker
<b>Contact Person</b>	Kirwan Magdamo
<b>Address</b>	701 East Joppa Road Towson, MD 21286

### 2.1 Equipment Under Test (EUT) Information

*The following information has been supplied by the client*

<b>Product Name</b>	DCE045
<b>Model Number</b>	DCE045
<b>Serial Number</b>	Engineering Sample
<b>Additional Information</b>	FCC ID: YJ7DCE045 IC ID: 9082A-DCE045

### 2.2 Product Description

The DCE045 Bluetooth Audit Chip is designed for tracking and locating professional power tools, equipment, and machines using the DeWalt Tool Connect app which is capable of connecting with mobile devices that support Bluetooth Smart technology.

### 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 Programming Information

Device is powered via 3VDC coin cell battery. Device is programmed via a FTDI-USB cable, with the USB end connected to a programming laptop. Programming software used is nRF Connect for Desktop v4.0.0. Within the nRF Connect software the Direct Test Mode v.2.0.4 utility is used. Channels tested were 37 (2402 MHz), 17 (2440 MHz), and 39 (2480 MHz) with a 1M Data Rate. Transmit Power Settings used in the device are +4 dBm and -40 dBm.

Company: Stanley Black & Decker	Page 5 of 13	Name: DCE045
Report: TR3600F		Model: DCE045
Quote: NBO-01-2022-004577-2		Serial: Engineering Sample

### 3 REFERENCES

Publication	Edition	Date	AMD 1
FCC eCFR	-	2023	-
RSS-102	5	2015	2021
KDB 447498	-	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
CISPR 16-4-1
CISPR 16-4-2
CISPR 32
ANSI C63.23
A2LA P103
A2LA P103c
ETSI TR 100-028

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

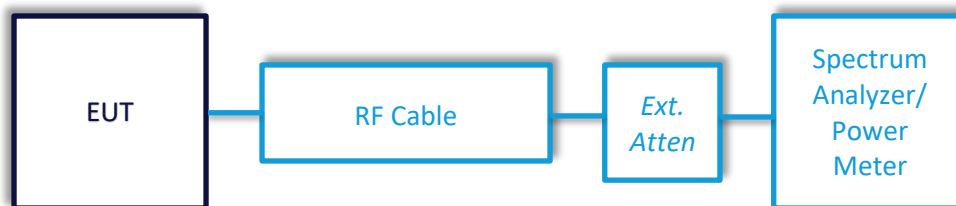
Parameter	ETSI U.C. $\pm$	U.C. $\pm$
Radio Frequency, from F0	$1 \times 10^{-7}$	$0.55 \times 10^{-7}$
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65°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

## 5 TEST DATA

### 5.1 Antenna Port Conducted Emissions

<b>Description of Measurement</b>	<p>The direct measurement of emissions at the antenna port of the EUT is achieved by use of a RF connection to a spectrum analyzer or power meter.</p> <p>The cable and attenuator factors are loaded into the analyzer or power meter allowing for direct measurement readings without the need for further corrections.</p>
<b>Example Calculations</b>	<p>Measurement (dBm) + Cable factor (dB) + External Attenuator (dB) = Corrected Reading (dBm)</p> <p>Margin (dB) = Limit (dBm) – Corrected Reading (dBm)</p>

#### Block Diagram





### 5.1.1 Peak Output Power

<b>Operator</b>	Anthony Smith	<b>QA</b>	Adam Alger
<b>Temperature</b>	21.1°C	<b>R.H. %</b>	45.3%
<b>Test Date</b>	6/7/2023	<b>Location</b>	Conducted RF Bench
<b>Requirement</b>	FCC: 15.247 (b)(3) IC: RSS-247 5.4 (d)	<b>Method</b>	ANSI C63.10 §11.9

Limits: ≤30 dBm

#### Test Parameters

<b>Frequency</b>	2402, 2440, 2480 MHz	<b>Setup</b>	Conducted
<b>RBW</b>	3 MHz	<b>VBW</b>	50 MHz
<b>Detector(s)</b>	Max Peak Hold	<b>Sweep Time</b>	Auto

#### EUT Parameters

<b>Input Power</b>	3VDC Battery	<b>Mode</b>	BLE Transmit
<b>Frequency</b>	2402, 2440, 2480 MHz	<b>Channel</b>	37, 17, 39
<b>Data Rate/Modulation</b>	BLE 1Mbps		

#### Instrumentation

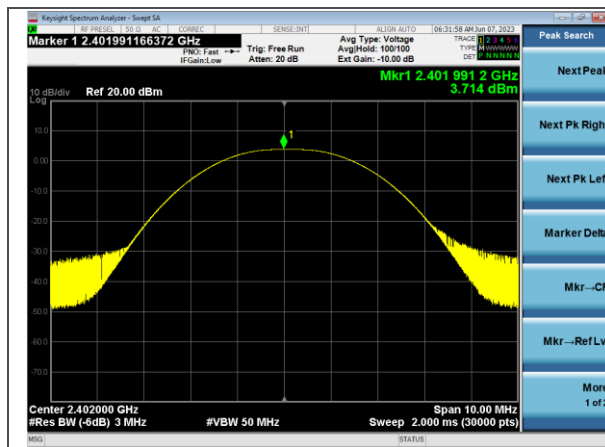
Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960172	Cable	A.H. Systems, Inc.	SAC-26G-1	387	3/22/2023	3/22/2024	Active Verification
EE 960085	Analyzer - EMI Receiver	Agilent	N9038A	MY51210148	4/11/2023	4/11/2024	Active Calibration

### Data Table

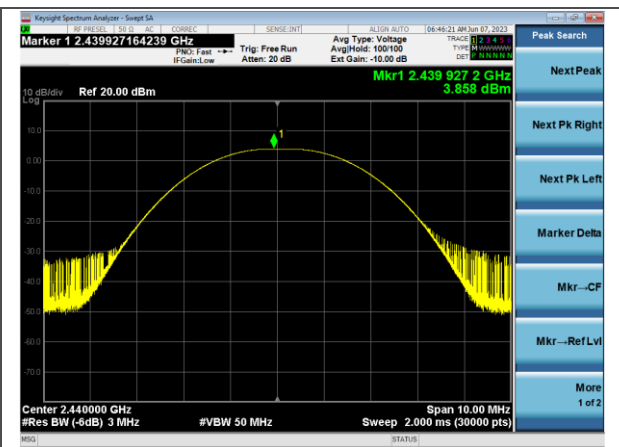
Channel	Data Rate	Transmit Power Setting	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
37	BLE 1Mbps	4	3.7	30.0	26.2
17	BLE 1Mbps	4	3.9	30.0	25.9
39	BLE 1Mbps	4	4.0	30.0	26.2

### Plots

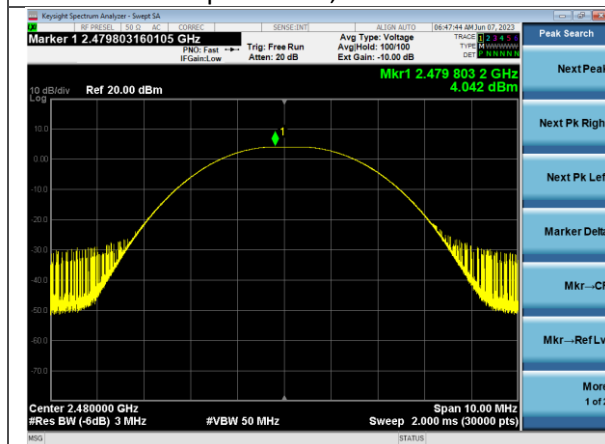
Transmit Power Setting: +4



Output Power, Channel 37



Output Power, Channel 17



Output Power, Channel 39

## 6 FCC 1-G SAR TEST EXCLUSION CALCULATIONS

### 6.1 Power Calculations

Max Power of Channel = 4.0 dBm

Tune Up Tolerance = 1 dB

Total Channel Power = 5.0 dBm = 3.2mW = 3mW

### 6.2 Distance

≤5 mm

### 6.3 SAR Test Exclusion Calculation

[(Maximum power of channel, including tune-up tolerance, mW) / (Minimum test separation distance, mm)] \* [vf(GHz)] ≤ 3 for 1-g SAR

Where:

- F(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- The value 3.0 is referred to as numeric thresholds

$$\left(\frac{3 \text{ mW}}{5 \text{ mm}}\right) \times (\sqrt{2.48}) \leq 3.0$$

$$0.6 \times 1.562 \leq 3.0$$

$$0.9 \leq 3.0$$

### 6.4 Result

The EUT is excluded from routine SAR testing as 0.9 is less than 3.0.

Company: Stanley Black & Decker	Page 11 of 13	Name: DCE045
Report: TR3600F		Model: DCE045
Quote: NBO-01-2022-004577-2		Serial: Engineering Sample

## 7 IC EXEMPTION CALCULATION FOR ROUTINE SAR EVALUATION

### 7.1 Power Calculations

Max Power of Channel = 4.0 dBm

Tune Up Tolerance = 1 dB

Peak Antenna Gain = 0 dBi

Total Channel Power = 5 dBm = 3.2 mW EIRP

### 7.2 Distance

≤5 mm

### 7.3 Exemption Limits

Table 1: SAR evaluation — Exemption limits for routine evaluation based on frequency and separation distance<sup>4,5</sup>

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

#### Interpolated Limit at 2480 MHz

$$4 + (2480 - 2450) \times \left( \frac{2 - 4}{3500 - 2450} \right) = 3.9$$

At 2480 and 5 mm the exemption limit is 3.9 mW

### 7.4 SAR Test Exclusion Calculation

3.2 mW ≤ 3.9 mW

### 7.5 Result

The EUT is excluded from routine SAR testing at 5 mm as 3.2 mW is less than 3.9 mW.

## 8 REVISION HISTORY

Version	Date	Notes	Person
1	7/14/2023	Initial Draft	Anthony Smith
2	7/18/2023	Revised Draft	Anthony Smith
3	7/27/2023	Revised Draft	Anthony Smith

**END OF REPORT**