

Test Report 3727 B

Equipment Under Test:	Ethicon Communications Module
Requirement(s):	FCC 1.1310, KDB 447498 ISED RSS-102
Test Date(s):	11/20/2023
Prepared for:	Ethicon Attn: Miranda Weidner 4545 Creek Rd. Blue Ash, OH 45242

Report Issued by: Adam Alger, Laboratory Manager

Signature: 

Date: 03/25/2025

Report Reviewed by: Adam Alger, Laboratory Manager

Signature: 

Date: 12/07/2023

Report Constructed by: Adam Hauke, EMC Engineer

Signature: 

Date: 11/20/2023

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Company: Ethicon	Page 1 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

CONTENTS

Contents.....	2
Ezurio 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 Additional Information	5
2.6 Programming / Firmware	6
2.7 Antenna Information	6
3 References	7
4 Uncertainty Summary	8
5 FCC and ISED Exemption Limits for Routine Evaluation	9
5.1 FCC MPE Limits for General Population/Uncontrolled Exposure.....	9
5.2 ISED SAR Test Exclusions per RSS-102 Issue 6	10
6 Standalone Transmission SAR Exclusion Evaluation	11
6.1 FCC SAR Exclusion Calculations	11
6.2 ISED SAR Exclusion Calculations	14
7 Simultaneous Transmission SAR Exclusion Evaluation	18
7.1 NFC and BLE simultaneous exclusion calculation.....	18
7.2 NFC and 2.4 GHz WLAN simultaneous exclusion calculation	18
7.3 NFC and 5.0 GHz WLAN simultaneous exclusion calculation	18
8 Revision History	19

Company: Ethicon	Page 2 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

Ezurio Test Services in Review

The Ezurio 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

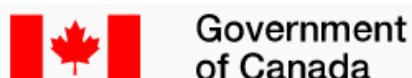
Scope of accreditation includes all test methods listed herein unless otherwise noted



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: Ethicon	Page 3 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

1 TEST REPORT SUMMARY

During **11/20/2023** the Equipment Under Test (EUT), **Ethicon Communications Module**, as provided by **Ethicon** was tested to the following requirements:

Mobile Device

Requirements	Description	Method	Compliant
FCC 1.1310(e)(1)	Radiofrequency Radiation Exposure Limits	ANSI C63.10	Reported
ISED RSS-102	Radiofrequency Radiation Exposure Limits	RSS-102	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

Company: Ethicon	Page 4 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

2 CLIENT INFORMATION

Company Name	Ethicon
Contact Person	Miranda Weidner
Address	4545 Creek Rd. Blue Ash, OH 45242

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	Ethicon Communications Module
Model Number	ETHCM
Serial Number	CM22308019
FCC ID	2BDJP-ETHCM12
IC ID	28152- ETHCM12
Contains FCC ID	SQG-SU60SOMC
Contains IC ID	3147A-SU60SOMC

2.2 Product Description

Communications Module (ETHCM) – The communications module always sits at the top of the system. It contains the power button and speakers, controls the user screen, distributes power for the system, and provides external interfaces for other connectivity to external devices. External interfaces include Ethernet and USB. It also includes four footswitch ports and a digital accessory port, which can be used for interfacing to wired accessories of the system. The communications module communicates with other modules of the system via the downstream connector.

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

Device powered from 120 VAC 60 Hz

Company: Ethicon	Page 5 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

2.6 Programming / Firmware

Device is programmed using Laird LRU and BTLRU firmware (listed in 2.7) using Windows command via Ethernet connection.

60SOM Firmware:

88W8997_SOM_sdio_uart_v5.5.48.5.bin

88W8997_mfg_sdio_uart_v16.80.205.170.bin

2.7 Antenna Information

NFC utilizes a board trace antenna.

60SIPT module using approved antenna – LSR/FlexPIFA

Gain @ 2400-2483.5 – 2.5 dBi

Gain @ 5150-5850 – 3.0 dBi

Company: Ethicon	Page 6 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

3 REFERENCES

Publication	Edition	Date
FCC eCFR 47 Part 15	-	2025
RSS-102	6	2023
ANSI C63.10	-	2020

References not on Scope of Accreditation

Publication	Edition	Date
KDB 447498 D01	06	2015

Company: Ethicon	Page 7 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

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	1×10^{-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 %

Company: Ethicon	Page 8 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

5 FCC AND ISED EXEMPTION LIMITS FOR ROUTINE EVALUATION

5.1 FCC MPE Limits for General Population/Uncontrolled Exposure

5.1.1 Standalone

Table 1 1.1310(e)(1)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3–3.0	614	1.63	*(100)	≤6
3.0–30	1842/f	4.89/f	*(900/f ²)	<6
30–300	61.4	0.163	1.0	<6
300–1,500			f/300	<6
1,500–100,000			5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	<30
1.34–30	824/f	2.19/f	*(180/f ²)	<30
30–300	27.5	0.073	0.2	<30
300–1,500			f/1500	<30
1,500–100,000			1.0	<30

f = frequency in MHz. * = Plane-wave equivalent power density.

Company: Ethicon	Page 9 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

Prediction of MPE Limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

Where: S= power density

P= power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

5.1.2 Simultaneous Transmission KDB 447498 7.2

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0 .

$$\sum_1^a \frac{S_a}{S_{alimit}} < 1.0$$

5.2 ISED SAR Test Exclusions per RSS-102 Issue 6

5.2.1 Standalone SAR Test Exclusion

6.6 Field reference level exposure exemption limits

Field reference level (FRL) exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm (i.e. mobile devices), except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 1 W (adjusted for tune-up tolerance)
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than $4.49/f^{0.5} W$ (adjusted for tune-up tolerance), where f is in MHz
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance)
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834} W$ (adjusted for tune-up tolerance), where f is in MHz
- at or above 6 GHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 5 W (adjusted for tune-up tolerance)

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the EIRP was derived.

Company: Ethicon	Page 10 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

5.2.2 Simultaneous Transmission SAR Test Exclusion

Compliance of devices with multiple transmitters capable of simultaneous transmission shall be assessed in accordance with the latest version of IEEE 1528. However, other recognized methods — such as the procedures¹⁶ published by the FCC proven to provide a conservative estimate of the SAR value — can also be used. Applicants shall include in the RF exposure technical brief all information relevant to the exact test methodology used.

6 STANDALONE TRANSMISSION SAR EXCLUSION EVALUATION

6.1 FCC SAR Exclusion Calculations

6.1.1 NFC Exclusion Calculations

Prediction frequency	13.56 MHz
Output power	-25.43 dBm
Tune-up tolerance	N/A
Maximum peak output power at antenna input terminal	0.00286 mW
Antenna gain	N/A
Prediction distance	20 cm
MPE limit at prediction frequency	1.0 mW/cm²
Power density at prediction frequency	5.69x10⁻⁷ mW/cm²

Result

The EUT's NFC radio is exempt from routine SAR evaluation as the power density of **5.69x10⁻⁷ mW/cm²** is lower than the MPE limit of **1.0 mW/cm²**.

Company: Ethicon	Page 11 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

6.1.2 BLE Exclusion Calculations

Prediction frequency	2402 MHz
Output power	9.38 dBm
Tune-up tolerance	2.0 dBm
Maximum peak output power at antenna input terminal	11.38 dBm
Maximum peak output power at antenna input terminal	13.74 mW
Antenna gain	2.5 dBi
Numeric antenna gain	1.78
Prediction distance	20 cm
MPE limit at prediction frequency	1.0 mW/cm²
Power density at prediction frequency	0.0049 mW/cm²

Result

The EUT's BLE radio is exempt from routine SAR evaluation as the power density of **0.0049 mW/cm²** is lower than the MPE limit of **1.0 mW/cm²**.

6.1.3 2.4 GHz WLAN Exclusion Calculations

Prediction frequency	2437 MHz
Output power	28.88 dBm
Tune-up tolerance	2.0 dBm
Maximum peak output power at antenna input terminal	30.88 dBm
Maximum peak output power at antenna input terminal	1224.6 mW
Antenna gain	2.5 dBi
Numeric antenna gain	1.78
Prediction distance	20 cm
MPE limit at prediction frequency	1.0 mW/cm²
Power density at prediction frequency	0.44 mW/cm²

Result

The EUT's 2.4 GHz WLAN radio is exempt from routine SAR evaluation as the power density of **0.44 mW/cm²** is lower than the MPE limit of **1.0 mW/cm²**.

Company: Ethicon	Page 12 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

6.1.4 5.0 GHz WLAN Exclusion Calculations

UNII-1

Prediction frequency	5240 MHz
Output power	20.89 dBm
Tune-up tolerance	2.0 dBm
Maximum peak output power at antenna input terminal	22.89 dBm
Maximum peak output power at antenna input terminal	194.5 mW
Antenna gain	3.0 dBi
Numeric antenna gain	2.0
Prediction distance	20 cm
MPE limit at prediction frequency	1.0 mW/cm²
Power density at prediction frequency	0.0077 mW/cm²

UNII-2a

Prediction frequency	5300 MHz
Output power	19.03 dBm
Tune-up tolerance	2.0 dBm
Maximum peak output power at antenna input terminal	21.03 dBm
Maximum peak output power at antenna input terminal	126.8 mW
Antenna gain	3.0 dBi
Numeric antenna gain	2.0
Prediction distance	20 cm
MPE limit at prediction frequency	1.0 mW/cm²
Power density at prediction frequency	0.05 mW/cm²

UNII-2c

Prediction frequency	5580 MHz
Output power	20.53 dBm
Tune-up tolerance	2.0 dBm
Maximum peak output power at antenna input terminal	22.53 dBm
Maximum peak output power at antenna input terminal	179.1 mW
Antenna gain	3.0 dBi
Numeric antenna gain	2.0
Prediction distance	20 cm
MPE limit at prediction frequency	1.0 mW/cm²
Power density at prediction frequency	0.072 mW/cm²

Company: Ethicon	Page 13 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

UNII-3

Prediction frequency	5745 MHz
Output power	20.36 dBm
Tune-up tolerance	2.0 dBm
Maximum peak output power at antenna input terminal	22.36 dBm
Maximum peak output power at antenna input terminal	172.2 mW
Antenna gain	3.0 dBi
Numeric antenna gain	2.0
Prediction distance	20 cm
MPE limit at prediction frequency	1.0 mW/cm²
Power density at prediction frequency	0.07 mW/cm²

Result

The EUT's NFC radio is exempt from routine SAR evaluation as the power density of **0.072 mW/cm²** is lower than the MPE limit of **1.0 mW/cm²**.

6.2 ISED SAR Exclusion Calculations

6.2.1 NFC Exclusion Calculations

Frequency	13.56 MHz
Output power	-25.43 dBm
Tune-up tolerance	N/A
EIRP output power	0.00286 mW

$$EIRP_{limit} = 1W$$

Result

The EUT's NFC radio is exempt from routine SAR evaluation as the maximum EIRP of **0.00286 mW** is lower than **1.0 W**

Company: Ethicon	Page 14 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

6.2.2 BLE Exclusion Calculations

Frequency	2402 MHz
Output power	9.38 dBm
Tune-up tolerance	2.0 dBm
Maximum peak output power at antenna input terminal	11.38 dBm
Maximum peak output power at antenna input terminal	13.74 mW
Antenna gain	2.5 dBi
EIRP output power	24.2 mW

$$EIRP_{limit} = 1.31 \times 10^{-2} * f^{0.6834} W = 1.31 \times 10^{-2} * 2402^{0.6834} W = 2.68 W$$

Result

The EUT's BLE radio is exempt from routine SAR evaluation as the maximum EIRP of **24.2 mW** is lower than **2.68 W**

6.2.3 2.4 GHz WLAN Exclusion Calculations

Frequency	2437 MHz
Output power	28.88 dBm
Tune-up tolerance	2.0 dBm
Maximum peak output power at antenna input terminal	30.88 dBm
Maximum peak output power at antenna input terminal	1224.6 mW
Antenna gain	2.5 dBi
EIRP output power	2.16 W

$$EIRP_{limit} = 1.31 \times 10^{-2} * f^{0.6834} W = 1.31 \times 10^{-2} * 2437^{0.6834} W = 2.7 W$$

Result

The EUT's 2.4 GHz WLAN radio is exempt from routine SAR evaluation as the maximum EIRP of **2.16 W** is lower than **2.7 W**

Company: Ethicon	Page 15 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

6.2.4 5.0 GHz WLAN Exclusion Calculations

UNII-1

Frequency	5240 MHz
Output power	20.89 dBm
Tune-up tolerance	2.0 dBm
Maximum peak output power at antenna input terminal	22.89 dBm
Maximum peak output power at antenna input terminal	194.6 mW
Antenna gain	3.0 dBi
EIRP output power	389.2 mW

$$EIRP_{limit} = 1.31 \times 10^{-2} * f^{0.6834} W = 1.31 \times 10^{-2} * 5240^{0.6834} W = 4.56 W$$

Result

The EUT's 5 GHz WLAN UNII-1 radio is exempt from routine SAR evaluation as the maximum EIRP of **389.2 mW** is lower than **4.56 W**

UNII-2a

Frequency	5300 MHz
Output power	19.03 dBm
Tune-up tolerance	2.0 dBm
Maximum peak output power at antenna input terminal	21.03 dBm
Maximum peak output power at antenna input terminal	126.8 mW
Antenna gain	3.0 dBi
EIRP output power	253.6 mW

$$EIRP_{limit} = 1.31 \times 10^{-2} * f^{0.6834} W = 1.31 \times 10^{-2} * 5300^{0.6834} W = 4.6 W$$

Result

The EUT's 5 GHz WLAN UNII-2a radio is exempt from routine SAR evaluation as the maximum EIRP of **253.6 mW** is lower than **4.6 W**

Company: Ethicon	Page 16 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

UNII-2c

Prediction frequency	5580 MHz
Output power	20.53 dBm
Tune-up tolerance	2.0 dBm
Maximum peak output power at antenna input terminal	22.53 dBm
Maximum peak output power at antenna input terminal	179.1 mW
Antenna gain	3.0 dBi
Power density at prediction frequency	358.2 mW

$$EIRP_{limit} = 1.31 \times 10^{-2} * f^{0.6834} W = 1.31 \times 10^{-2} * 5580^{0.6834} W = 4.76 W$$

Result

The EUT's 5 GHz WLAN UNII-2c radio is exempt from routine SAR evaluation as the maximum EIRP of **358.2 mW** is lower than **4.76 W**

UNII-3

Prediction frequency	5745 MHz
Output power	20.36 dBm
Tune-up tolerance	2.0 dBm
Maximum peak output power at antenna input terminal	22.36 dBm
Maximum peak output power at antenna input terminal	212.8 mW
Antenna gain	3.0 dBi
Power density at prediction frequency	172.2 mW

$$EIRP_{limit} = 1.31 \times 10^{-2} * f^{0.6834} W = 1.31 \times 10^{-2} * 5745^{0.6834} W = 4.9 W$$

Result

The EUT's 5 GHz WLAN UNII-3 radio is exempt from routine SAR evaluation as the maximum EIRP of **172.2 mW** is lower than **4.9 W**

Company: Ethicon	Page 17 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

7 SIMULTANEOUS TRANSMISSION SAR EXCLUSION EVALUATION

7.1 NFC and BLE simultaneous exclusion calculation

$$\frac{5.69 * 10^{-7}}{1.0} + \frac{0.0049}{1.0} = 0.0049$$

Result

The EUT's NFC and BLE simultaneous transmission is exempt from routine SAR evaluation as the power density ratio of **0.0049** is lower than the power density ratio limit of **1.0**.

7.2 NFC and 2.4 GHz WLAN simultaneous exclusion calculation

$$\frac{5.69 * 10^{-7}}{1.0} + \frac{0.44}{1.0} = 0.44$$

Result

The EUT's NFC and 2.4 GHz WLAN simultaneous transmission is exempt from routine SAR evaluation as the power density ratio of **0.44** is lower than the power density ratio limit of **1.0**.

7.3 NFC and 5.0 GHz WLAN simultaneous exclusion calculation

UNII-2c Worst Case

$$\frac{5.69 * 10^{-7}}{1.0} + \frac{0.072}{1.0} = 0.072$$

Result

The EUT's NFC and 5 GHz WLAN+ simultaneous transmission is exempt from routine SAR evaluation as the power density ratio of **0.072** is lower than the power density ratio limit of **1.0**.

Company: Ethicon	Page 18 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019

8 REVISION HISTORY

Version	Date	Notes	Person
0.0	11/20/2023	Initial Draft	Adam Hauke
0.1	03/24/2025	Updated Draft	Adam Alger
1	03/25/2025	Final	Adam Alger

END OF REPORT

Company: Ethicon	Page 19 of 19	Name: Ethicon Communications Module
Report: TR 3727B		Model: ETHCM
Quote: NBO-03-2023-006090-1		Serial: CM22308019