




# Test Report 3727 B

<b>Equipment Under Test:</b>	Ethicon Communications Module	
<b>Requirement(s):</b>	FCC 1.1310, KDB 447498 ISED RSS-102	
<b>Test Date(s):</b>	11/20/2023	
<b>Prepared for:</b>	Ethicon Attn: Miranda Weidner 4545 Creek Rd. Blue Ash, OH 45242	
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Signature:		Date: 03/25/2025
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Signature:		Date: 12/07/2023
<b>Report Constructed by:</b> Adam Hauke, EMC Engineer		
Signature:		Date: 11/20/2023

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## 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*



**Government  
of Canada**

### 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

## 2 CLIENT INFORMATION

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

### 2.1 Equipment Under Test (EUT) Information

*The following information has been supplied by the client*

<b>Product Name</b>	Ethicon Communications Module
<b>Model Number</b>	ETHCM
<b>Serial Number</b>	CM22308019
<b>FCC ID</b>	2BDJP-ETHCM12
<b>IC ID</b>	28152- ETHCM12
<b>Contains FCC ID</b>	SQG-SU60SOMC
<b>Contains IC ID</b>	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

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## 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

### 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

## 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 %

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## 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 <sup>2</sup> )	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 <sup>2</sup> )	<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 <sup>2</sup> )	<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.

## 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  $\leq 1.0$ .

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

## 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.

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## 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 procedures<sup>16</sup> 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
<b>MPE limit at prediction frequency</b>	<b>1.0 mW/cm<sup>2</sup></b>
<b>Power density at prediction frequency</b>	<b>5.69x10<sup>-7</sup> mW/cm<sup>2</sup></b>

### Result

The EUT's NFC radio is exempt from routine SAR evaluation as the power density of **5.69x10<sup>-7</sup> mW/cm<sup>2</sup>** is lower than the MPE limit of **1.0 mW/cm<sup>2</sup>**.

### 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
<b>MPE limit at prediction frequency</b>	<b>1.0 mW/cm<sup>2</sup></b>
<b>Power density at prediction frequency</b>	<b>0.0049 mW/cm<sup>2</sup></b>

#### Result

The EUT's BLE radio is exempt from routine SAR evaluation as the power density of **0.0049 mW/cm<sup>2</sup>** is lower than the MPE limit of **1.0 mW/cm<sup>2</sup>**.

### 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
<b>MPE limit at prediction frequency</b>	<b>1.0 mW/cm<sup>2</sup></b>
<b>Power density at prediction frequency</b>	<b>0.44 mW/cm<sup>2</sup></b>

#### Result

The EUT's 2.4 GHz WLAN radio is exempt from routine SAR evaluation as the power density of **0.44 mW/cm<sup>2</sup>** is lower than the MPE limit of **1.0 mW/cm<sup>2</sup>**.

## 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
<b>MPE limit at prediction frequency</b>	<b>1.0 mW/cm<sup>2</sup></b>
<b>Power density at prediction frequency</b>	<b>0.0077 mW/cm<sup>2</sup></b>

### 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
<b>MPE limit at prediction frequency</b>	<b>1.0 mW/cm<sup>2</sup></b>
<b>Power density at prediction frequency</b>	<b>0.05 mW/cm<sup>2</sup></b>

### 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
<b>MPE limit at prediction frequency</b>	<b>1.0 mW/cm<sup>2</sup></b>
<b>Power density at prediction frequency</b>	<b>0.072 mW/cm<sup>2</sup></b>

### 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
<b>MPE limit at prediction frequency</b>	<b>1.0 mW/cm<sup>2</sup></b>
<b>Power density at prediction frequency</b>	<b>0.07 mW/cm<sup>2</sup></b>

### Result

The EUT's NFC radio is exempt from routine SAR evaluation as the power density of **0.072 mW/cm<sup>2</sup>** is lower than the MPE limit of **1.0 mW/cm<sup>2</sup>**.

## 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
<b>EIRP output power</b>	<b>0.00286 mW</b>

$$EIRP_{limit} = 1W$$

### 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**

### 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
<b>EIRP output power</b>	<b>24.2 mW</b>

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

#### 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
<b>EIRP output power</b>	<b>2.16 W</b>

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

#### 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**

## 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
<b>EIRP output power</b>	<b>389.2 mW</b>

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

### 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
<b>EIRP output power</b>	<b>253.6 mW</b>

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

### 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**



## 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
<b>Power density at prediction frequency</b>	<b>358.2 mW</b>

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

## 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
<b>Power density at prediction frequency</b>	<b>172.2 mW</b>

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

## 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**

## 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**.

## 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**