

Prüfbericht-Nr.: <i>Test report no.:</i>	CN21UI4W 002	Auftrags-Nr.: <i>Order no.:</i>	238513955	Seite 1 von 17 Page 1 of 17
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2021-04-21	
Auftraggeber: <i>Client:</i>	Microchip Technology Inc. 2355 West Chandler Blvd. Chandler, Arizona 85224-6199, United States.			
Prüfgegenstand: <i>Test item:</i>	Bluetooth module			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	BM78abcdefg, RN4678, BM78SPPS5MC2, BM78SPPS5NC2 (a, b, c, d, e, f, g and h= 0-9, A-Z)			
Auftrags-Inhalt: <i>Order content:</i>	Test Report for CE compliance, Directive 2014/53/EU (BLE)			
Prüfgrundlage: <i>Test specification:</i>	EN 300 328 V 2.1.1			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2017-04-07			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A000528373-001			
Prüfzeitraum: <i>Testing period:</i>	2017-04-27			
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Taipei Testing Site			
Prüflaboratorium: <i>Testing laboratory:</i>	Taipei Testing Laboratories			
Prüfergebnis*: <i>Test result*:</i>	Pass			
überprüft von: <i>reviewed by:</i>		genehmigt von: <i>authorized by:</i>		
Datum: 2021-05-05 <i>Date:</i>	J a c k C h e n g	Datum: 2021-05-05 <i>Date:</i>	R y a n C h e n	
Stellung / Position: <i>Senior Project Manager</i>		Stellung / Position: <i>Senior Project Manager</i>		
Sonstiges / Other:	This report is mainly added ilac-MRA and TAF logos. The test results remain the same as the report no. 10052796 002.			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende: P(ass) = entspricht o.g. Prüfgrundlage(n)	1 = sehr gut 2 = gut 3 = befriedigend	F(all) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhaft N/T = nicht getestet
* Legend: P(ass) = passed a.m. test specification(s)	1 = very good 2 = good 3 = satisfactory	F(all) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable	5 = poor N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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TEST SUMMARY

4.1.1 RECEIVER BLOCKING

RESULT: PASS

4.1.2 GEO-LOCATION CAPABILITY

RESULT: N/A

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HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued
CN21UI4W 002	Original Release	2021-05-05

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix P: IUT Photos

Table 1: Applied Standard and Test Levels

Radio
EN 300 328 V 2.1.1

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2 Test Sites

2.1 Test Facilities

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.3 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Last Calibration	Next Calibration
Embedded Attenuator	Keysight	AD211	TW5451121	N/A	N/A
EXG-B RF Analog Signal Generator	Agilent	N5171B	MY53050377	2017/03/08	2018/03/07
Bluetooth Tester	R&S	CBT	100866	2017/03/09	2018/03/08

2.4 Measurement Uncertainty

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	± 5 %
RF power, conducted	± 1.5 dB
RF power density, conducted	± 3 dB
unwanted emissions, conducted	± 3 dB
all emissions, radiated	± 6 dB
Temperature	± 1 °C
Humidity	± 5 %
DC and low frequency voltages	± 3 %
Time	± 5 %
Duty Cycle	± 5 %

3 General Product Information

3.1 Product Function and Intended Use

The EUT is a Bluetooth module. It contains a Bluetooth 4.2 (BLE/BR/EDR) compatible module enabling the user to communicate data through a Wireless interface. For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details

Table 4: Technical Specification of EUT

Technical Specification	Value
Kind of Equipment	Bluetooth module
Operating Frequency	2402~2480 MHz
Channel Spacing	2 MHz
Channel number	40
Extreme Temperature Range	-20~70 °C
Operation Voltage	3.3 V ~ 4.2V (Tested at 3.3V)
Modulation	GFSK
Antenna gain	1.63 dBi

3.3 Independent Operation Modes

Testing was performed at the lowest operating frequency (2402MHz), at the operating frequency in the middle of the specified frequency band (2440MHz) and at the highest operating frequency (2480MHz).

The basic operation modes are:

- A. EUT transmits (TX mode), with full power, at lowest channel (2402MHz), a continuous modulated signal streaming with 100% duty cycle.
- B. EUT transmits (TX mode), with full power, at middlest channel (2440MHz), a continuous modulated signal streaming with 100% duty cycle.
- C. EUT transmits (TX mode), with full power, at highest channel (2480MHz), a continuous modulated signal streaming with 100% duty cycle.
- D. EUT receives (RX mode), at lowest channel (2402MHz), continuously.
- E. EUT receives (RX mode), at highest channel (2480MHz), continuously.
- F. Transmitter is in stand-by.
- G. EUT link operation in pseudo-random sequence on all channels (hopping mode)
- H. EUT in link mode, at lowest channel (2402MHz)
- I. EUT in link mode, at highest channel (2480MHz)

3.4 Noise Suppressing Parts

Nothing mentioned explicitly.

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Software used for testing: Test samples are provided with a data interface which makes it possible to control them through a test software installed on a notebook computer.

This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed in section 2.6 as appropriate.

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

Description	Manufacturer	Model No.	Serial No.
Notebook(EMC-06)	Lenovo	TP00048A	PB-0F8B2

5 Test Results RADIO

5.1 Conformance Requirements

5.1.1 Receiver Blocking

RESULT: PASS

Date of testing: 27-Apr-2017

Atmospheric pressure: 100-103 kPa

Test requirement: EN 300 328 V 2.1.1, clause 4.3.2.11

Test procedure: EN 300 328 V 2.1.1, clause 5.4.11

Test modes applied: H, I

Limit:

While maintaining the minimum performance criteria as defined in EN300328 v2.1.1 clause 4.3.2.11.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 14, table 15, table 16.

Receiver category 1:

Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. shall be considered as receiver category 1 equipment.

Receiver category 2:

Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 2 equipment.

Receiver category 3:

Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or adaptive equipment with a maximum RF output power of 0 dBm e.i.r.p. shall be considered as receiver category 3 equipment.

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Table 14: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
$P_{\min} + 6 \text{ dB}$	2 380 2 503,5	-53	CW
$P_{\min} + 6 \text{ dB}$	2 300 2 330 2 360	-47	CW
$P_{\min} + 6 \text{ dB}$	2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-47	CW

NOTE 1: P_{\min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal.

NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.

Table 15: Receiver Blocking parameters receiver category 2 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
$P_{\min} + 6 \text{ dB}$	2 380 2 503,5	-57	CW
$P_{\min} + 6 \text{ dB}$	2 300 2 583,5	-47	CW

NOTE 1: P_{\min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal.

NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.

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*Test Report No.*Seite 14 von 17
Page 14 of 17**Table 16: Receiver Blocking parameters receiver category 3 equipment**

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
$P_{\min} + 12 \text{ dB}$	2 380 2 503,5	-57	CW
$P_{\min} + 12 \text{ dB}$	2 300 2 583,5	-47	CW

NOTE 1: P_{\min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal.

NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.

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Receiver Blocking Test Result :

According to 10052796 001 (v1.9.1) report this device maximum RF output power less than or equal to 10dBm e.i.r.p. shall be considered as receiver category 2 equipment.

BLE (2402MHz)

Receiver Blocking				
Wanted signal mean power from Companion Device(dBm)	Blocking Signal Frequency(MHz)	Blocking Level (dBm)	Packet Error Rate (%)	Limit (%)
			BLE	
Pmin + 6 dB	2380	-57	0.13333	< 10
	2503.5	-57	0	
Pmin + 6 dB	2300	-47	0	< 10
	2583.5	-47	0	

Remark : During evaluation we found the minimum Pmin level of wanted signal is -91 dBm.

BLE (2480MHz)

Receiver Blocking				
Wanted signal mean power from Companion Device(dBm)	Blocking Signal Frequency(MHz)	Blocking Level (dBm)	Packet Error Rate (%)	Limit (%)
			BLE	
Pmin + 6 dB	2380	-57	0	< 10
	2503.5	-57	0	
Pmin + 6 dB	2300	-47	0.26667	< 10
	2583.5	-47	0.06667	

Remark : During evaluation we found the minimum Pmin level of wanted signal is -91 dBm.

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5.1.2 Geo-location capability

RESULT:

N/A

Requirement: EN 300 328 V2.1.1, clause 4.3.2.12

Note:

N/A for equipments that is not supports the geo-location capability.

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