

Prüfbericht-Nr.: <i>Test report no.:</i>	NN20MV3N (EN300328-BLE) 002	Auftrags-Nr.: <i>Order no.:</i>	238489394	Seite 1 von 18 <i>Page 1 of 18</i>
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	16-Jul-2020	
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 V2.2.2			
Wareneingangsdatum: <i>Date of sample receipt:</i>	29-Jul-2020			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A002877975-017			
Prüfzeitraum: <i>Testing period:</i>	12-Aug-2020~14-Aug-2020			
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: 31-Aug-2020 <i>Date:</i>		Datum: 31-Aug-2020 <i>Date:</i>		
Stellung / Position:	Jack Chang Senior Project Manager	Stellung / Position:	Ryan Chen Senior Project Manager	
Sonstiges / Other:	This report is mainly added ilac-MRA and TAF logos in page 1 instead of the logo in page 6. The test results remain the same as report no. NN20MV3N (EN300328-BLE) 001.			
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: 1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut Fail = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend Fail = failed a.m. test specification(s)	4 = ausreichend 4 = sufficient N/A = nicht anwendbar N/A = not applicable	5 = mangelhaft 5 = poor N/T = nicht getestet N/T = not tested
* Legend: 1 = very good P(ass) = passed a.m. test specification(s)	2 = good Fail = failed a.m. test specification(s)	3 = satisfactory Fail = failed a.m. test specification(s)	4 = sufficient 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>				

Prüfbericht - Nr.: NN20MV3N (EN300328-BLE) 002
Test Report No.

Seite 2 von 18
Page 2 of 18

TEST SUMMARY

Report Section	CE Clause	Test Item	Result
5.1.1	4.3.2.8	Transmitter Unwanted Emissions in the OOB Domain	Pass
5.1.2	4.3.2.11	Receiver Blocking	Pass

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

Contents

HISTORY OF THIS TEST REPORT	4
1. GENERAL REMARKS	5
1.1 COMPLEMENTARY MATERIALS	5
1.2 DECISION RULE OF CONFORMITY	5
2. TEST SITES	6
2.1 TEST LABORATORY	6
2.2 TEST FACILITY	6
2.3 MEASUREMENT UNCERTAINTY	7
3. GENERAL PRODUCT INFORMATION	8
3.1 PRODUCT FUNCTION AND INTENDED USE	8
3.2 SYSTEM DETAILS AND RATINGS	8
3.3 NOISE SUPPRESSING PARTS	8
4. TEST SET-UP AND OPERATION MODES	9
4.1 PRINCIPLE OF CONFIGURATION SELECTION	9
4.2 CARRIER FREQUENCY AND CHANNEL	9
4.3 TEST OPERATION AND TEST SOFTWARE	10
4.4 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	11
5. TEST RESULTS	12
5.1 TRANSMITTER REQUIREMENT	12
5.1.1 Transmitter Unwanted Emissions in the OOB Domain	12
5.1.2 Receiver Blocking	14
6. PHOTOGRAPHS OF THE TEST SET-UP	18

APPENDIX EP - PHOTOGRAPHS OF EUT

Prüfbericht - Nr.: NN20MV3N (EN300328-BLE) 002
Test Report No.

Seite 4 von 18
Page 4 of 18

HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued
NN20MV3N (EN300328-BLE) 001	Original Release	31-Aug-2020
NN20MV3N (EN300328-BLE) 002	Added ilac-MRA and TAF logos in page 1	05-May-2021

Prüfbericht - Nr.: NN20MV3N (EN300328-BLE) 002
Test Report No.

Seite 5 von 18
Page 5 of 18

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:
Appendix EP - Photographs of EUT

Applied Standard and Test Levels

Radio
EN 300 328 V 2.2.2

1.2 Decision Rule of Conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

Prüfbericht - Nr.: NN20MV3N (EN300328-BLE) 002
Test Report No.

Seite 6 von 18
Page 6 of 18

2. Test Sites

2.1 Test Laboratory

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

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.,
New Taipei City 244
Taiwan (R.O.C.)

2.3 Measurement Uncertainty

All measurement uncertainty values are shown with a coverage factor of k=2 to indicate a 95% level of confidence.

Emission Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	± 0.72 dB
RF power, conducted	± 0.72 dB
RF power density, conducted	± 0.72 dB
Unwanted emissions, conducted	± 1.63 dB
Radiated Spurious Emissions (30 MHz ~ 1 GHz)	± 1.17 dB
Radiated Spurious Emissions (1 GHz ~ 18 GHz)	± 1.96 dB
Temperature	± 1 °C
Humidity	± 3.33 %

3. General Product Information

3.1 Product Function and Intended Use

The EUT is Bluetooth module. It contains Bluetooth compatible module enabling the user to communicate data through Bluetooth interface

For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details and Ratings

Technical Specification of EUT

Item	EUT information
Kind of Equipment	Bluetooth module
Type Identification	BM78abcdefghijkl, RN4678, BM78SPPS5MC2, BM78SPPS5NC2 (a, b, c, d, e, f, g and h = 0-9, A-Z)
Operating Frequency	2402 ~ 2480 MHz
Channel number	40
Data Rate	1Mbps
Extreme Temperature Range	-20 ~ 70 °C
Operation Voltage	3.3Vdc ~ 4.2Vdc (Tested at 3.3Vdc)
Modulation	GFSK
Antenna Gain	1.63 dBi

3.3 Noise Suppressing Parts

Nothing mentioned explicitly. Please refer to photo documentation for details.

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 Carrier Frequency and Channel

Channel	Freq. (MHz)						
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

Prüfbericht - Nr.: NN20MV3N (EN300328-BLE) 002
Test Report No.
Seite 10 von 18
Page 10 of 18

4.3 Test Operation and Test Software

Setup 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 as below.

Test Software	ISRT_V2.1.32.6307
Firmware	IS1678SM_151_SPP_V1.1

The samples were used as follows:

A002877975-017

Full test was applied on all test modes, but only worst case was shown.

EUT Configure Mode	Applicable to		Description
	Transmitter unwanted emissions in the OOB domains	Receiver Blocking	
-	√	√	-

Transmitter Unwanted Emissions in the OOB Domain

- Pre-scan full test was applied on all test modes, but only the worst case was shown.
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Data Rate (Mbps)
-	2402 to 2480	2402, 2480	1.0

Receiver Blocking

- Pre-scan full test was applied on all test modes, but only the worst case was shown.
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Data Rate (Mbps)
-	2402 to 2480	2402, 2480	1.0

Test Condition

Test Item	Ambient Temperature	Relative Humidity	Tested by
Transmitter Unwanted Emissions in the OOB Domain	24.2 - 25 °C	67.1 - 67.2 %	Nick Hsu
Receiver Blocking	24.2 - 25 °C	67.1 - 67.2 %	Nick Hsu

Prüfbericht - Nr.: NN20MV3N (EN300328-BLE) 002
Test Report No.Seite 11 von 18
Page 11 of 18

4.4 Special Accessories and Auxiliary Equipment

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

Support Unit

Support Unit					
No.	Description	Brand	Model	S/N	Remark
-	Notebook	Lenovo	81BL	MPDCD6Y	--
-	Wireless Radio Communication Tester	R & S	CMW500	166924	Receiver blocking

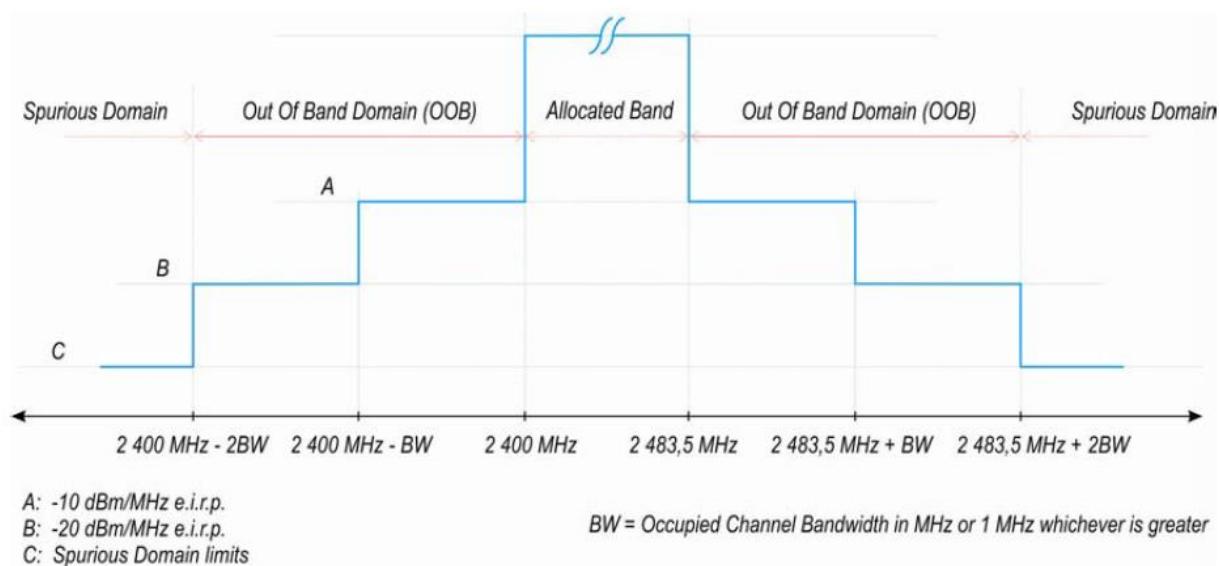
Interface Cable					
No.	Description	Shielded Type	Ferrite Core (Qty)	Length (cm)	Remark
-	USB Cable	YES	0	150	--

5. Test Results

5.1 Transmitter Requirement

5.1.1 Transmitter Unwanted Emissions in the OOB Domain

Limit



Test Procedure

EN 300 328 V 2.2.2, clause 5.4.8

Test Setup

The measurements were performed at normal environmental conditions. The measurement was performed at the lowest and the highest channel on which the equipment can operate. The equipment was configured to operate under its worst case situation with respect to output power. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator. The frequency has to be recorded for the right and left end above threshold of highest and lowest channel respectively.

Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Spectrum Analyzer	Agilent	N9010A	MY53470241	2020/6/2	2021/6/1

Prüfbericht - Nr.: NN20MV3N (EN300328-BLE) 002
*Test Report No.*Seite 13 von 18
Page 13 of 18**Test Results**

Low Channel			High Channel		
Frequency (MHz)	Level	Limit	Frequency (MHz)	Level	Limit
2399.5	-48.78	-10	2484	-59.7	-10
2399.439	-49.58	-10	2484.06	-59.43	-10
2398.439	-57.42	-20	2485.06	-62.55	-20
2398.378	-57.41	-20	2485.12	-62.63	-20

Prüfbericht - Nr.: NN20MV3N (EN300328-BLE) 002
Test Report No.

Seite 14 von 18
Page 14 of 18

5.1.2 Receiver Blocking

Limit

While maintaining the minimum performance criteria as defined in EN300328 v2.2.2 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 as below.

Receiver category 1:

- Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p.

Note: Non-adaptive equipment is categorized as receiver category 2 or receiver category 3.

Receiver category 2:

- Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % (irrespective of the maximum RF output power); or
- Equipment (adaptive or non-adaptive) with a maximum RF output power greater than 0 dBm e.i.r.p. and less than or equal to 10 dBm e.i.r.p.

Receiver category 3:

- Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % (irrespective of the maximum RF output power); or
- Equipment (adaptive or non-adaptive) with a maximum RF output power of 0 dBm e.i.r.p.

Receiver Category 1 Equipment			
Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Type of Blocking Signal
(-133 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		

Note 1: OCBW is in Hz.

Note 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

Note 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

Note 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Prüfbericht - Nr.: NN20MV3N (EN300328-BLE) 002
Test Report No.
Seite 15 von 18
Page 15 of 18

Receiver Category 2 Equipment			
Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Type of Blocking Signal
(-139 dBm + 10 × log ₁₀ (OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

Note 1: OCBW is in Hz.

Note 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

Note 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being onfigured/positioned as recorded in clause 5.4.3.2.2.

Receiver Category 3 Equipment			
Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Type of Blocking Signal
(-139 dBm + 10 × log ₁₀ (OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

Note 1: OCBW is in Hz.

Note 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 30 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

Note 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being onfigured/positioned as recorded in clause 5.4.3.2.2.

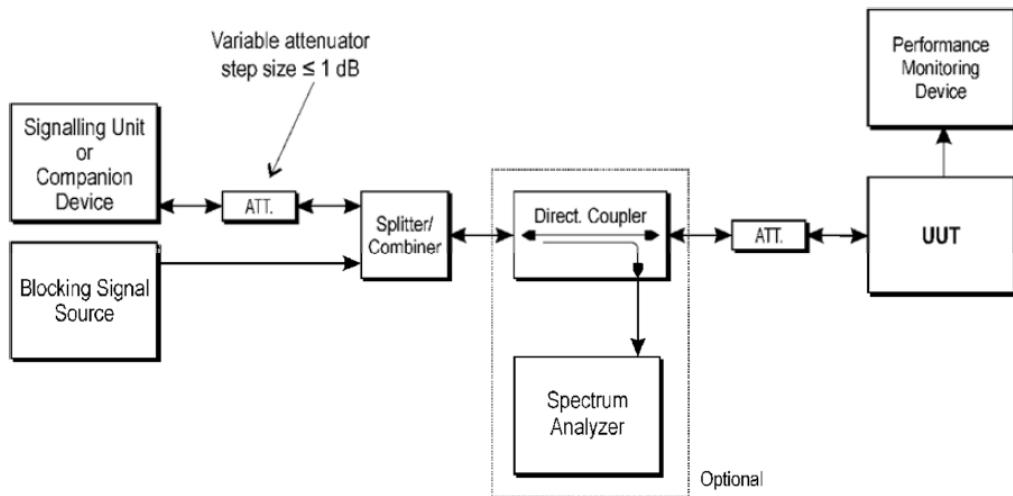
Test Procedure:

EN 300 328 V 2.2.2, clause 5.4.11

Prüfbericht - Nr.: NN20MV3N (EN300328-BLE) 002
Test Report No.

Seite 16 von 18
Page 16 of 18

Test Setup



Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Spectrum Analyzer	Agilent	N9010A	MY53470241	2020/6/2	2021/6/1
MXG Vector Signal Generator	Agilent	N5182B	MY53050524	2020/4/7	2021/4/6

Prüfbericht - Nr.: NN20MV3N (EN300328-BLE) 002
Test Report No.Seite 17 von 18
Page 17 of 18

Test Results

Category 2					
CH 0 P _{min} :	-93	OCBW(MHz)	1.07	antenna gain (dBi) :	1.63
CH 39 P _{min} :	-92	OCBW(MHz)	1.06		
Channel Number	Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	The actual blocking signal power (dBm)	PER %	Pass / Fail
0	-68.71	2380	-32.37	0.4	Pass
	-68.71	2300	-32.37	0	Pass
39	-68.75	2504	-32.37	0.4	Pass
	-68.75	2584	-32.37	0	Pass

6. Photographs of the Test Set-Up

