


Prüfbericht-Nr.: Test report no.:	NN20MV3N (EN300328-BT) 001	Auftrags-Nr.: Order no.:	238489394	Seite 1 von 19 Page 1 of 19
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	16-Jul-2020	
Auftraggeber: Client:	Microchip Technology Inc., 2355 West Chandler Blvd. Chandler, Arizona 85224-6199, United States			
Prüfgegenstand: Test item:	Bluetooth module			
Bezeichnung / Typ-Nr.: Identification / Type no.:	BM78abcdehgh, RN4678, BM78SPPS5MC2, BM78SPPS5NC2 (a, b, c, d, e, f, g and h = 0-9, A-Z)			
Auftrags-Inhalt: Order content:	Test Report for CE compliance, Directive 2014/53/EU (BT)			
Prüfgrundlage: Test specification:	EN 300 328 V2.2.2			
Wareneingangsdatum: Date of sample receipt:	29-Jul-2020			
Prüfmuster-Nr.: Test sample no.:	A002877975-017			
Prüfzeitraum: Testing period:	11-Aug-2020~12-Aug-2020			
Ort der Prüfung: Place of testing:	EMC/RF Laboratory Taipei			
Prüflaboratorium: Testing laboratory:	Taipei Testing Laboratories			
Prüfergebnis*: Test result*:	Pass			
überprüft von: reviewed by:	genehmigt von authorized by:			
Datum: 31-Aug-2020 Date:	 Jack Chang	Datum: 31-Aug-2020 Date:	 Brenda Chen	
Stellung / Position:	Senior Project Manager	Stellung / Position:	Senior Project Manager	
Sonstiges / Other:	According to 2014/53/EU, this report evaluates the Transmitter unwanted emissions in the OOB domain and Receiver Blocking. All other test items in V2.1.1 are equivalent to the version V2.2.2., please refer to report no.: 10052797 002 for the detail information. BM78SPPS5MC2, BM78SPPS5NC2 and RN4678 are identically identical to BM78abcdehgh (a, b, c, d, e, f, g and h= 0-9, A-Z) - different Part no. is due to Market strategy.			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient 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. 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.				

V05

TEST SUMMARY

Report Section	CE Clause	Test Item	Result
5.1.1	4.3.1.9	Transmitter Unwanted Emissions in the OOB Domain	Pass
5.2.1	4.3.1.12	Receiver Blocking	Pass

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

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APPENDIX EP - PHOTOGRAPHS OF EUT

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*Test Report No.***Seite 4 von 19**
*Page 4 of 19***HISTORY OF THIS TEST REPORT**

Report No.	Description	Date Issued
NN20MV3N (EN300328-BT) 001	Original Release	31-Aug-2020

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.

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

Technical Specification	Value
Kind of Equipment	Bluetooth module
Type Designation	BM78abcdefgh, RN4678, BM78SPPS5MC2, BM78SPPS5NC2 (a, b, c, d, e, f, g and h = 0-9, A-Z)
Operating Frequency	2402 ~ 2480 MHz
Channel number	79
Extreme Temperature Range	-20 ~ 70 °C
Operation Voltage	3.3Vdc ~ 4.2Vdc (Tested at 3.3Vdc)
Modulation	GFSK, $\pi/4$ QPSK, 8DPSK
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)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

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 Out-of-Band Domain

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Packet Type
-	0 to 78	0, 78	GFSK	1DH5
-	0 to 78	0, 78	8DPSK	3DH5

Receiver Blocking

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type	Packet Type
-	0 to 78	0, 78	GFSK	1DH5

Test Condition

Test Item	Ambient Temperature	Relative Humidity	Tested by
Transmitter Unwanted Emissions in the OOB Domain	24.9 - 25 °C	66.7 - 67.1 %	Nick Hsu
Receiver Blocking	24.9 - 25 °C	66.7 - 67.1 %	Nick Hsu

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

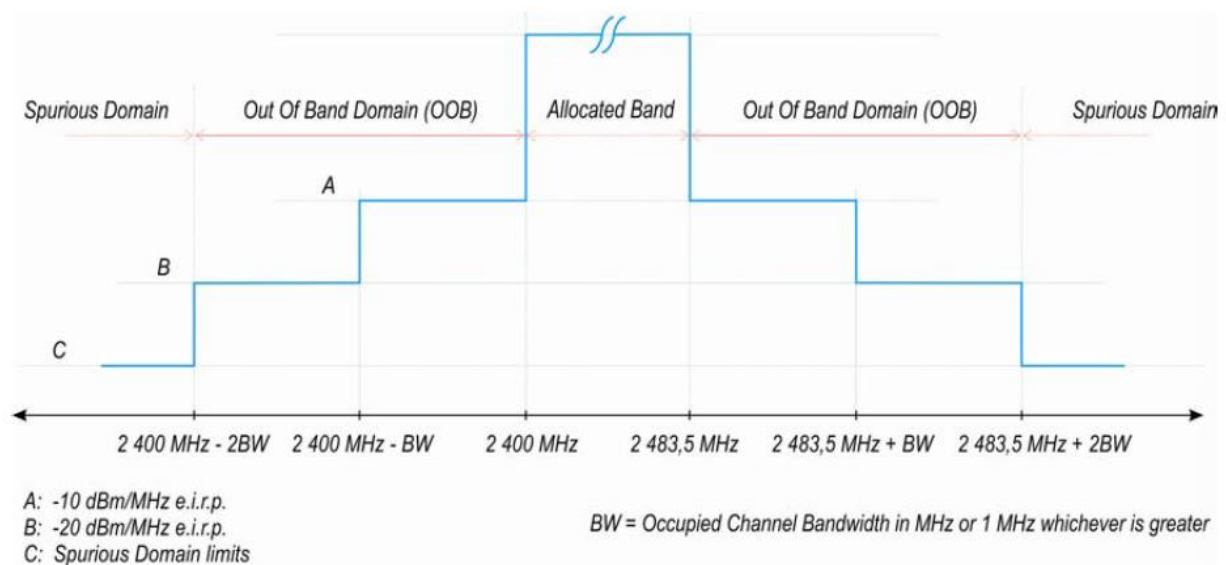
Interface Cable					
No.	Description	Shielded Type	Ferrite Core (Qty)	Length (cm)	Remark
-	USB Cable	YES	0	150	--

5. Test Results

5.1 Transmitter Requirement

5.1.1 Transmitter Unwanted Emissions in the OOB Domain

Limit



Note: The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in above figure.

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

Test Results
<1DH5>

Low Channel			High Channel		
Frequency (MHz)	Level	Limit	Frequency (MHz)	Level	Limit
2399.5	-46.69	-10	2484	-59.24	-10
2399.315	-48.51	-10	2484.186	-59.58	-10
2398.315	-56.77	-20	2485.186	-63.09	-20
2398.13	-57.88	-20	2485.372	-63.4	-20

<3DH5>

Low Channel			High Channel		
Frequency (MHz)	Level	Limit	Frequency (MHz)	Level	Limit
2399.5	-50.29	-10	2484	-61.55	-10
2399.315	-52.9	-10	2484.186	-62.19	-10
2398.315	-60.27	-20	2485.186	-63.67	-20
2398.13	-61.56	-20	2485.372	-65.46	-20

5.2 Receiver Parameters

5.2.1 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 in the tables.

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	-34	CW
	2 504		
(-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.

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
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 10 \text{ dB})$ or $(-74 \text{ dBm} + 10 \text{ dB})$ 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 $P_{\min} + 26 \text{ dB}$ 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.

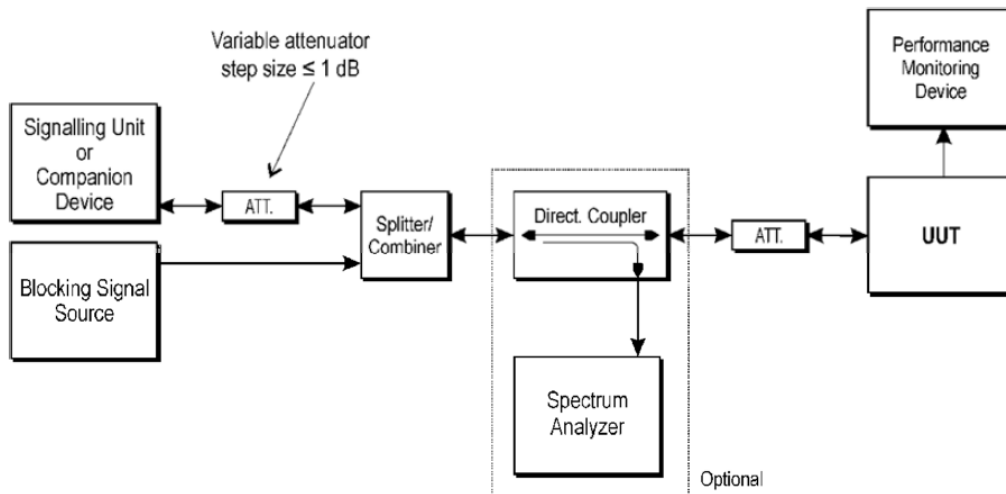
Receiver Category 3 Equipment			
Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Type of Blocking Signal
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 20 \text{ dB})$ or $(-74 \text{ dBm} + 20 \text{ dB})$ 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 $P_{\min} + 30 \text{ dB}$ 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

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

Test Results

Category 2						
CH 0 P _{min} :	-95	OCBW(MHz)	0.966	antenna gain (dBi) :	1.63	
CH 78 P _{min} :	-92	OCBW(MHz)	0.966			
Channel Number	Wanted signal mean power from companion device (dBm)		Blocking signal frequency (MHz)	The actual blocking signal power (dBm)	PER %	Pass / Fail
0	-69.15		2380	-32.37	0	Pass
	-69.15		2300	-32.37	0	Pass
78	-69.15		2504	-32.37	0	Pass
	-69.15		2584	-32.37	0	Pass

6. Photographs of the Test Set-Up

