

Prüfbericht-Nr.: Test Report No.:	50356284 001	Auftrags-Nr.: Order No.:	244198254	Seite 1 von 46 Page 1 of 46
Kunden-Referenz-Nr.: Client Reference No.:	244044963	Auftragsdatum: Order date.:	06.01.2020	
Auftraggeber: Client:	Fluke Corporation 6920 Seaway Blvd, EVERETT WA 98203, USA			
Prüfgegenstand: Test item:	Thermal Imager			
Bezeichnung / Typ-Nr.: Identification / Type No.:	TiS55+, TiS75+			
Auftrags-Inhalt: Order content:	Complete test			
Prüfgrundlage: Test specification:	EN 300 328 V2.1.1:2016			
Wareneingangsdatum: Date of receipt:	22.12.2019			
Prüfmuster-Nr.: Test sample No.:	A001046562-001, 002			
Prüfzeitraum: Testing period:	Refer to test report			
Ort der Prüfung: Place of testing:	MRT Technology (Suzhou) Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
				
14.07.2020	Hongfei Wu / PE	14.07.2020	Elliot Zhang / Reviewer	
Datum Date	Name/Stellung Name/Position	Unterschrift Signature	Datum Date	Name/Stellung Name/Position
Sonstiges / Other:				
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 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet P(ass) = passed a.m. test specifications(s) F(ail) = failed a.m. test specifications(s) N/A = not applicable 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>				

V04

TEST SUMMARY

5.1.1 RF OUTPUT POWER

RESULT: PASS

5.1.2 DUTY CYCLE, TX-SEQUENCE, TX-GAP

RESULT: N/A

5.1.3 ACCUMULATED TRANSMIT TIME, FREQUENCY OCCUPATION AND HOPPING SEQUENCE

RESULT: PASS

5.1.4 HOPPING FREQUENCY SEPARATION

RESULT: PASS

5.1.5 MEDIUM UTILIZATION (MU) FACTOR

RESULT: N/A

5.1.6 ADAPTIVITY (ADAPTIVITY FREQUENCY HOPPING)

RESULT: N/A

5.1.7 OCCUPIED CHANNEL BANDWIDTH

RESULT: PASS

5.1.8 TRANSMITTER UNWANTED EMISSIONS IN THE OOB DOMAIN

RESULT: PASS

5.1.9 TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

RESULT: PASS

5.2.1 RECEIVER SPURIOUS EMISSIONS

RESULT: PASS

5.2.2 RECEIVER BLOCKING

RESULT: PASS

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1. General Remarks

1.1 Complementary Materials

Null.

1.2 Test Specifications

The following standards were applied.

Table 1: Applied Standard and Test Levels

Radio
EN 300 328 V2.1.1:2016

2. Test Sites

2.1 Test Facilities

MRT Technology (Suzhou) Co., Ltd.
D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

The used test equipment is in accordance with CISPR 16-1 series standards for measurement of radio interference.

MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.

2.2 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

RF Output Power

Instrument	Manufacturer	Type No.	Asset No.	Cali. Due Date
Power Meter	Agilent	U2021XA	MRTSUE06030	15.11.2020
Programmable Temperature & Humidity Chamber	BAOYT	BYH-1500L	MRTSUE06051	15.11.2020
Thermohygrometer	Testo	608-H1	MRTSUE06401	08.08.2020

Accumulated Transmit Time, Frequency Occupation, Hopping Sequence, Hopping Frequency Separation, Occupied Channel Bandwidth, Transmitter Unwanted Emissions in the OOB Domain

Instrument	Manufacturer	Type No.	Asset No.	Cali. Due Date
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	15.04.2020
Thermohygrometer	Testo	608-H1	MRTSUE06401	08.08.2020

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Transmitter Unwanted Emissions in the Spurious Domain, Receiver Spurious Emissions

Instrument	Manufacturer	Type No.	Asset No.	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	01.08.2020
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	24.09.2020
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	15.11.2020
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	11.06.2020
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	30.03.2020
Broad Band Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06023	18.10.2020
Thermohygrometer	Testo	608-H1	MRTSUE06403	08.08.2020
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	30.04.2020

Receiver Blocking

Instrument	Manufacturer	Type No.	Asset No.	Cali. Due Date
Vector Signal Generator	Agilent	E4438C	MRTSUE06026	15.11.2020
Spectrum Analyzer	Agilent	N9020A	MRTSUE06106	15.04.2020
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06457	18.07.2020
Directional Coupler	Narda	4216-20	MRTSUE06065	26.03.2020
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	15.11.2020
Power Splitter	Mini-Circuits	ZFRSC-123-S+	MRTSUE06122	N/A
Thermohygrometer	Testo	608-H1	MRTSUE06402	08.08.2020

2.3 Measurement Uncertainty

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	± 5 %
RF output power, conducted	± 1.5 dB
Power Spectral Density, conducted	± 3 dB
Unwanted Emissions, conducted	± 3 dB
All emissions, radiated	± 6 dB
Temperature	± 3 °C
Supply voltages	± 3 %
Time	± 5 %

3. General Product Information

3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is a thermal imager which contains Wi-Fi and Bluetooth 4.2 module.

The aim of this report is to evaluate RF character of Bluetooth BR/EDR of the EUT. For details refer to the User Manual, Circuit Diagram and clause 3.2 of this report.

3.2 System Details

Table 4: Technical Specification of EUT

General Description of EUT	
Product Name:	Thermal Imager
Model No.:	TiS55+, TiS75+
Operation Voltage:	DC 7.2V (Li-ion)
operating temperature:	-10~50 °C
Technical Specification of 2.4GHz Wi-Fi	
Frequency Range:	2412 - 2472MHz
Modulation Type:	802.11b: DSSS 802.11g/n-HT20: OFDM
Antenna Type:	Internal Antenna
Antenna Gain:	3.2 dBi
Receiver Category:	1
Technical Specification of Bluetooth LE	
Frequency Range:	2402 - 2480MHz
Modulation Type:	GFSK
Antenna Type:	Internal Antenna
Antenna Gain:	3.2 dBi
Receiver Category:	2
Technical Specification of Bluetooth BR/EDR	
Frequency Range:	2402 - 2480MHz
Modulation Type:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Antenna Type:	Internal Antenna
Antenna Gain:	3.2 dBi
Receiver Category:	2

Note:

The above two models are same in hardware, the difference of them is only software that will not influence on RF performance. So, TiS75+ was chosen for RF test.

3.3 Independent Operation Modes

Table 5: Independent Operation Modes

Test Mode			Modulation Type	Channel Number	Channel Frequency [MHz]
Tx	Rx	Normal			
TM1	TM10	TM19	GFSK	00	2402
TM2	TM11	TM20	GFSK	39	2441
TM3	TM12	TM21	GFSK	78	2480
TM4	TM13	TM22	$\pi/4$ -DQPSK	00	2402
TM5	TM14	TM23	$\pi/4$ -DQPSK	39	2441
TM6	TM15	TM24	$\pi/4$ -DQPSK	78	2480
TM7	TM16	TM25	8DPSK	00	2402
TM8	TM17	TM26	8DPSK	39	2441
TM9	TM18	TM27	8DPSK	78	2480
Hopping Mode			Modulation Type	Channel Number	Channel Frequency [MHz]
TM28			GFSK	Hopping	2402-2480
TM29			$\pi/4$ -DQPSK	Hopping	2402-2480
TM30			8DPSK	Hopping	2402-2480

Note: The EUT was set into continuous transmitting or receiving mode in Tx or Rx mode.

3.4 Noise Suppressing Parts

Refer to schematics.

4. Test Set-up and Operation Modes

4.1 Test Methodology

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 Physical Configuration for Testing

The EUT was designed to get into related working mode with the control of computer.
Notes:

For antenna conducted measurements, the antenna was replaced by a 50Ω antenna connector.

For antenna radiated measurements, the associated cables and computer were removed.

For more details, refer to section: Photographs of the Test Set-Up.

4.3 Test Operation and Test Software

Test software: DutApiWiFi8801BrdigeEth

Table 6: Power parameter value

Packet Type	Power Parameter Value
1-DH5	default
2-DH5	default
3-DH5	default

4.4 Special Accessories and Auxiliary Equipment

Null.

4.5 Countermeasures to achieve EMC Compliance

Null.

5. Test Results RADIO

5.1 Transmitter Parameters

5.1.1 RF output power

RESULT:
PASS

Date of testing : 08.01.2020
 Ambient temperature : 25°C
 Relative humidity : 52%
 Atmospheric pressure : 101kPa
 Test requirement : EN 300 328 V2.1.1:2016, clause 4.3.1.2
 Test procedure : EN 300 328 V2.1.1:2016, clause 5.4.2.2
 Normal test voltage : DC 7.2V
 Low test temperature : -10°C
 Normal test temperature : 25°C
 High test temperature : 50°C
 Test modes applied : TM28 to TM30

Table 7: RF output power

Temp. [°C]	Packet Type	Test Mode	Antenna Gain [dBi]	Average Power [dBm]	E.I.R.P [dBm]	Limit [dBm]
25	1-DH5	TM19	3.2	2.30	5.50	20
	2-DH5	TM20		3.75	6.95	20
	3-DH5	TM21		2.65	5.85	20
-10	1-DH5	TM19		7.15	7.15	20
	2-DH5	TM20		6.85	6.85	20
	3-DH5	TM21		7.20	7.20	20
50	1-DH5	TM19		6.15	6.15	20
	2-DH5	TM20		7.25	7.25	20
	3-DH5	TM21		6.93	6.93	20

Note:

$$E.I.R.P = P_{burst} + \text{Antenna Gain.}$$
 P_{burst} : The highest burst power value measured in observant duration.

All the data rates were evaluated, only the worst case (DH5) were listed on the table above.

5.1.2 Duty Cycle, Tx-sequence, Tx-gap**RESULT:****N/A**

Test requirement : EN 300 328 V2.1.1:2016, clause 4.3.1.3

Note:

These requirements apply to non-adaptive frequency hopping equipment or to adaptive frequency hopping equipment operating in a non-adaptive mode.

These requirements do not apply for equipment with a maximum declared RF Output power of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

Therefore, these tests are not required for this device.

5.1.3 Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

RESULT:
PASS

Date of testing : 08.01.2020
 Ambient temperature : 25°C
 Relative humidity : 52%
 Atmospheric pressure : 101kPa
 Test requirement : EN 300 328 V2.1.1:2016, clause 4.3.1.4
 Test procedure : EN 300 328 V2.1.1:2016, clause 5.4.4.2
 Normal test voltage : DC 7.2V
 Test modes applied : TM28

Table 8: Accumulated Transmit Time

Packet Type	Test Mode	Investigated Channel	Accumulate Transmit Time per Hop [ms]	Number of Hops per Channel in a 6s Period	Maximum Dwell Time in a 6s Period [ms]	Limit [ms]
1-DH1	TM28	00	0.380	58	22.040	≤400
		78	0.380	59	22.420	≤400
1-DH3		00	1.635	18	29.430	≤400
		78	1.632	22	35.904	≤400
1-DH5		00	2.878	19	54.682	≤400
		78	2.875	9	25.875	≤400

Table 9: Frequency Occupation

Packet Type	Test Mode	Investigated Channel	Actual Hopping Number for Each Hopping Frequency within a Period	Limit
1-DH1	TM28	00	2	≥1
		78	2	≥1
1-DH3		00	2	≥1
		78	2	≥1
1-DH5		00	2	≥1
		78	1	≥1

Table 10: Hopping Sequence

Packet Type	Occupied Band [%]	Limit [%]	Channel Number	Limit
1-DH1	95.30	100	79	≥15
1-DH3	95.28	100	79	≥15
1-DH5	95.28	100	79	≥15

Figure 1: Accumulated Transmit Time, 1-DH1, 2402MHz

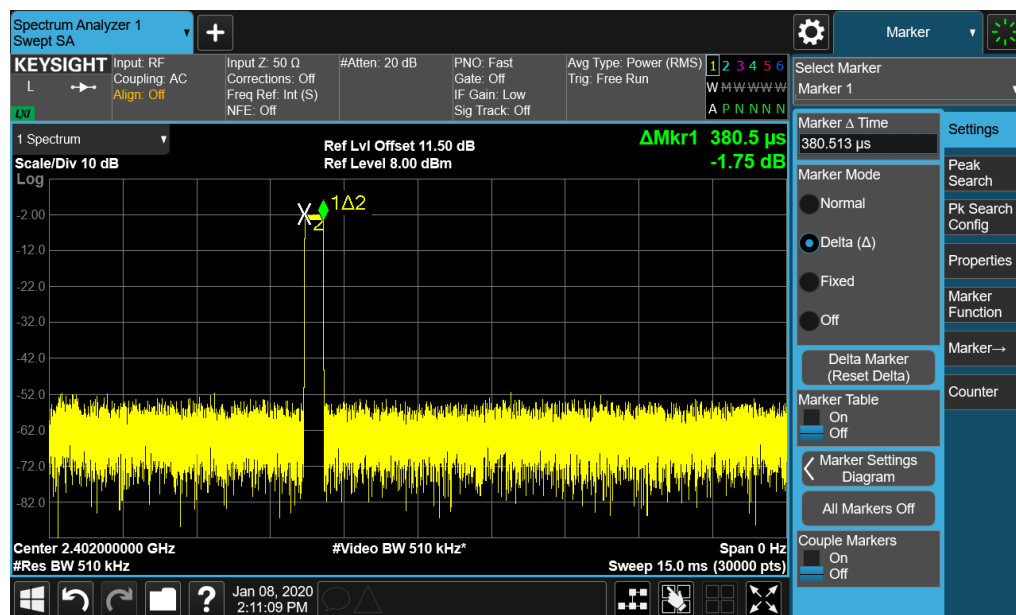
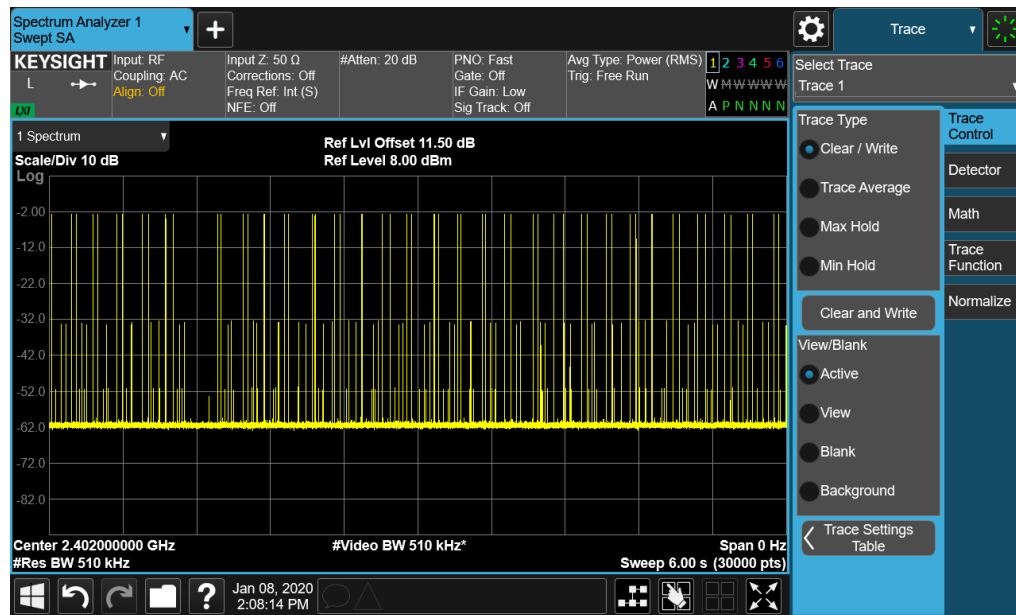


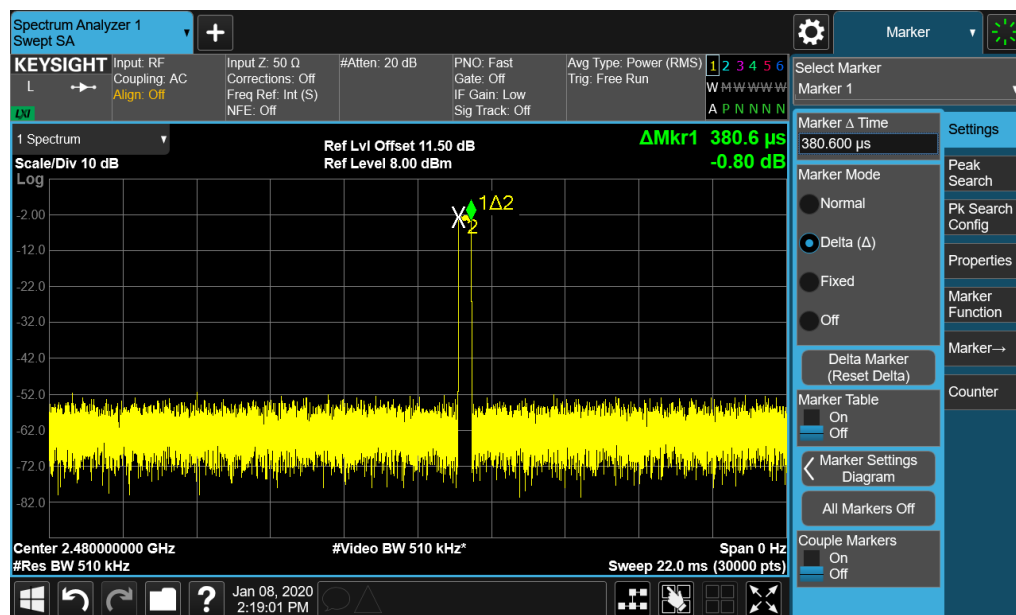
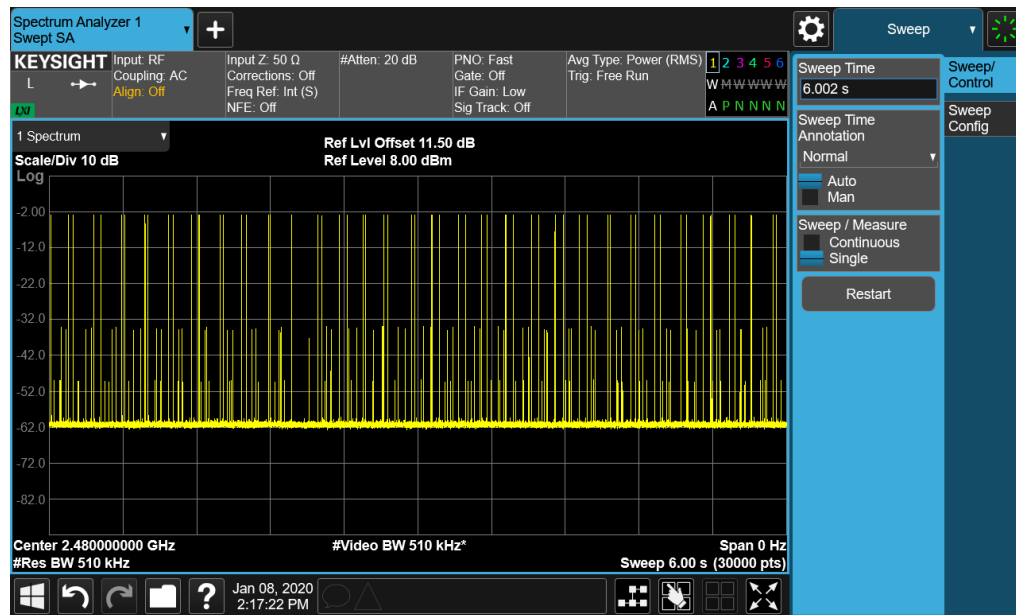
Figure 2: Accumulated Transmit Time, 1-DH1, 2480MHz


Figure 3: Accumulated Transmit Time, 1-DH3, 2402MHz

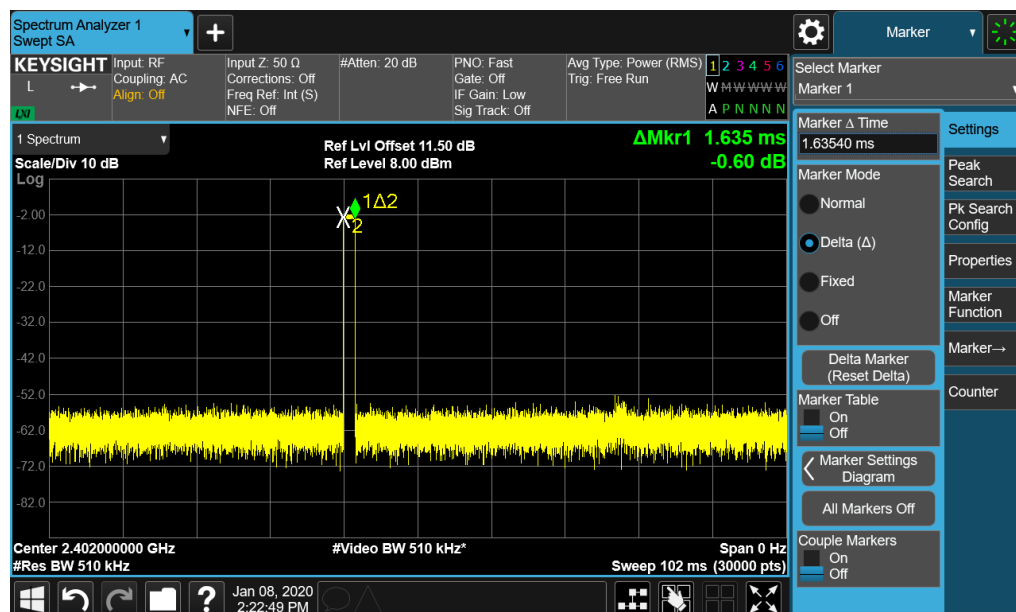
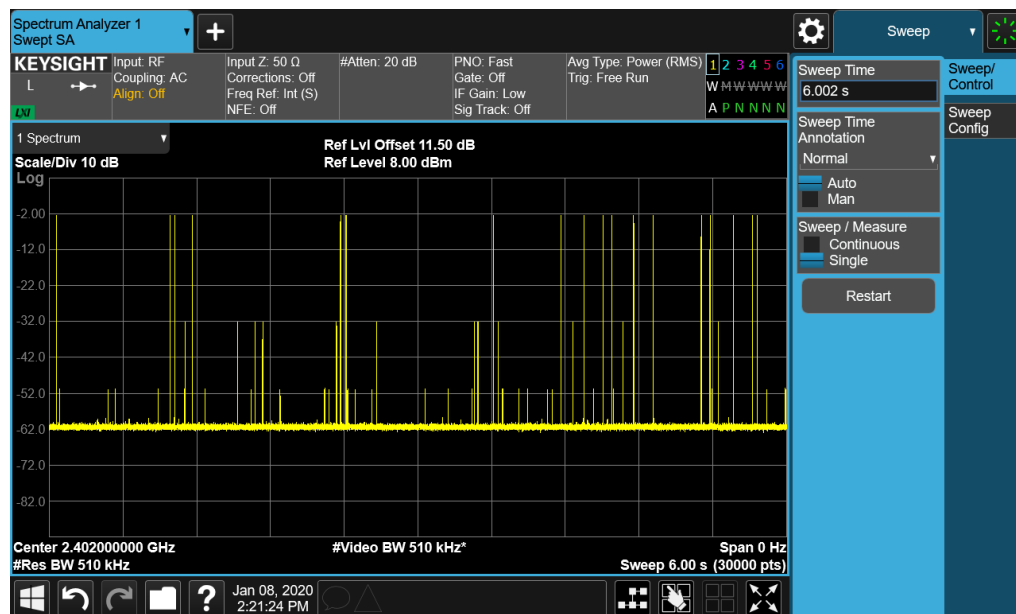


Figure 4: Accumulated Transmit Time, 1-DH3, 2480MHz

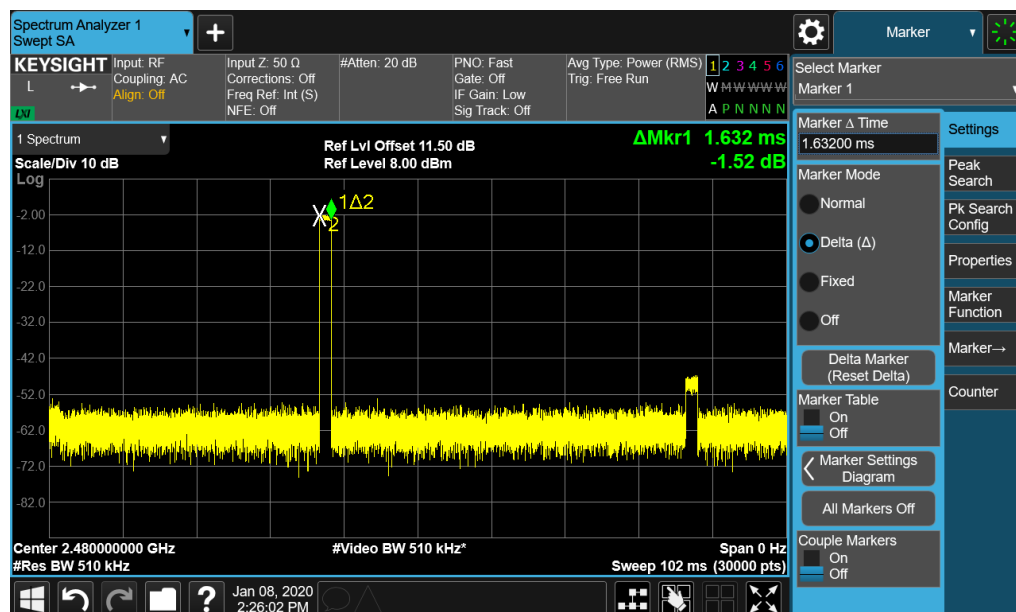
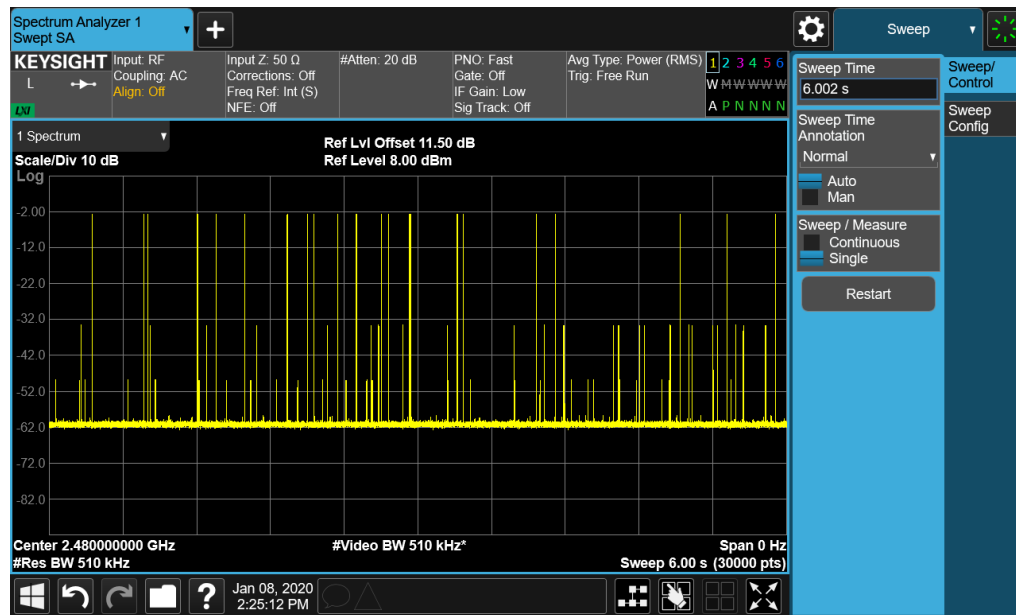


Figure 5: Accumulated Transmit Time, 1-DH5, 2402MHz

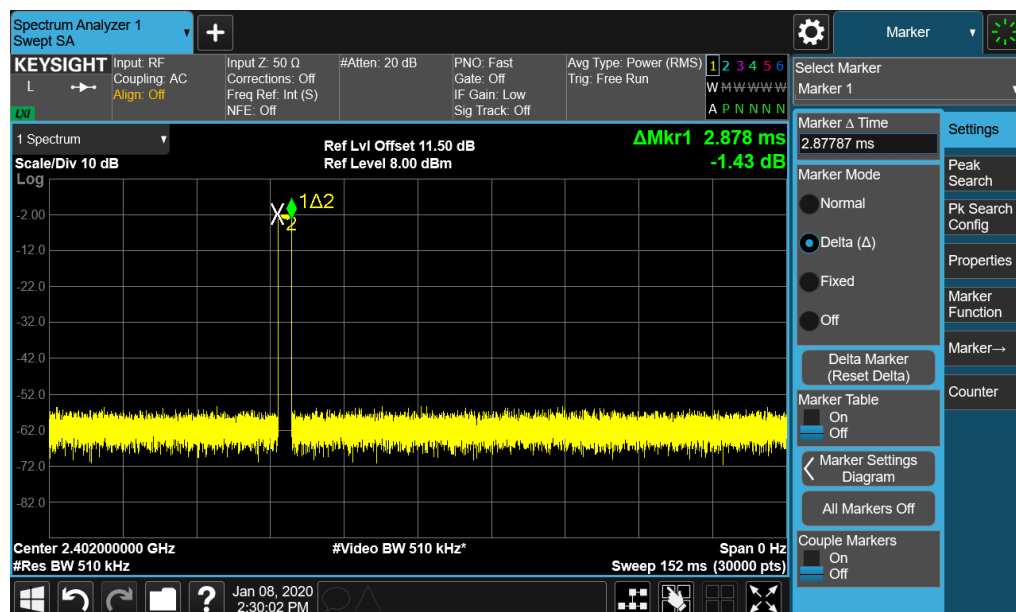
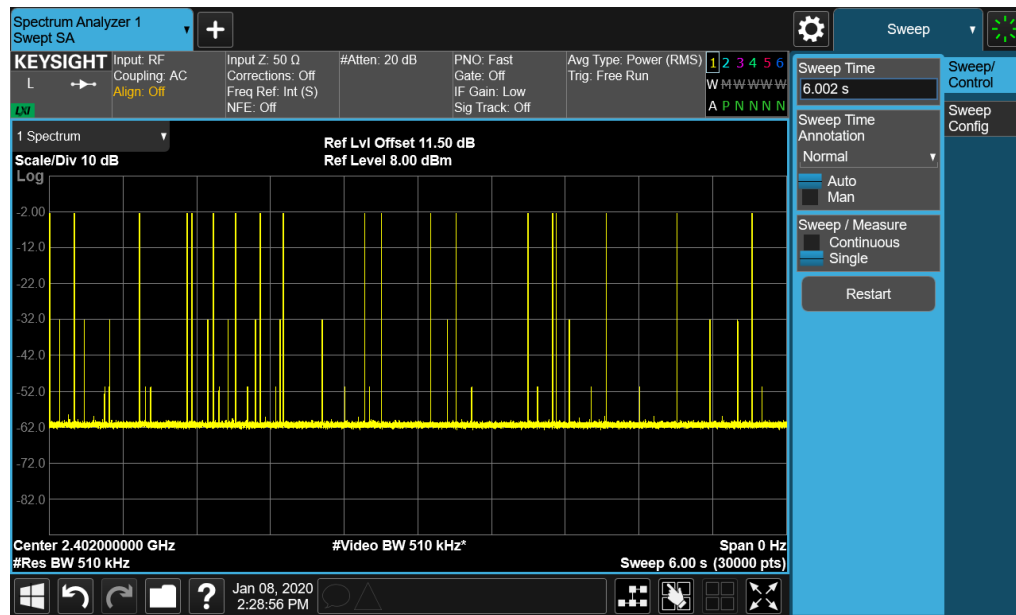
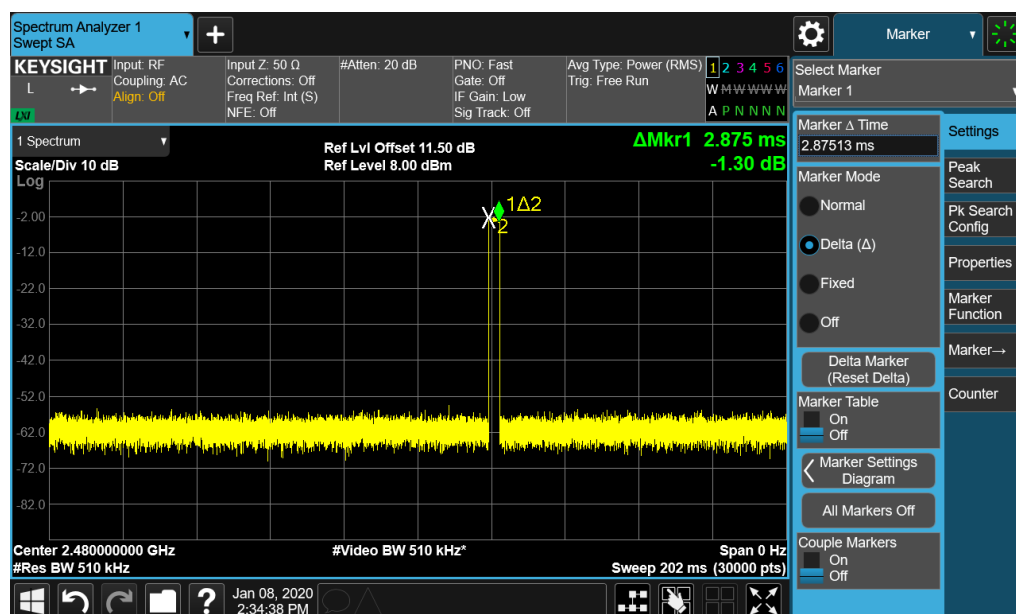
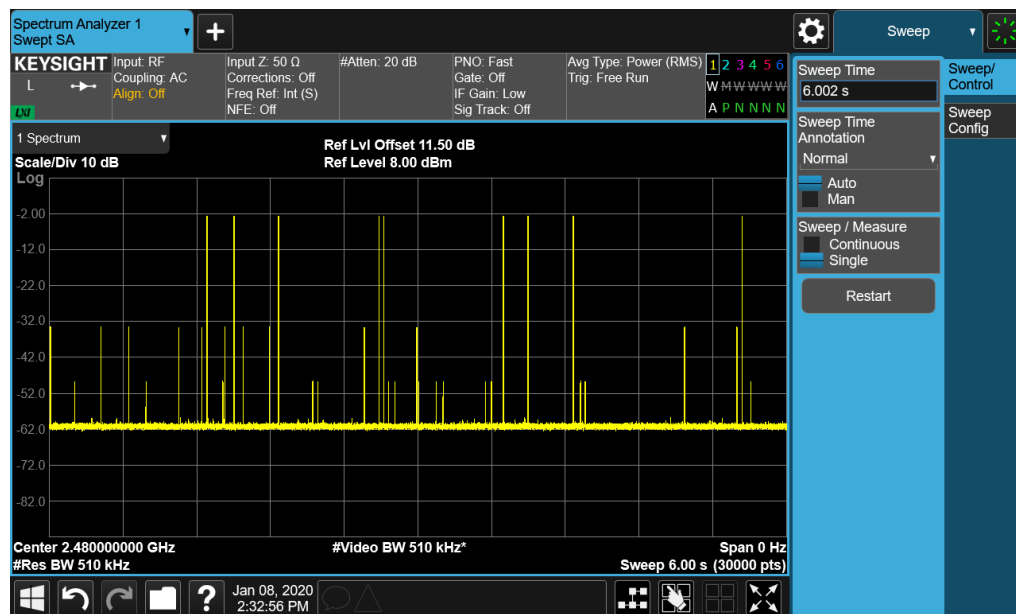


Figure 6: Accumulated Transmit Time, 1-DH5, 2480MHz



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Figure 7: Frequency Occupation, 1-DH1, 2402MHz

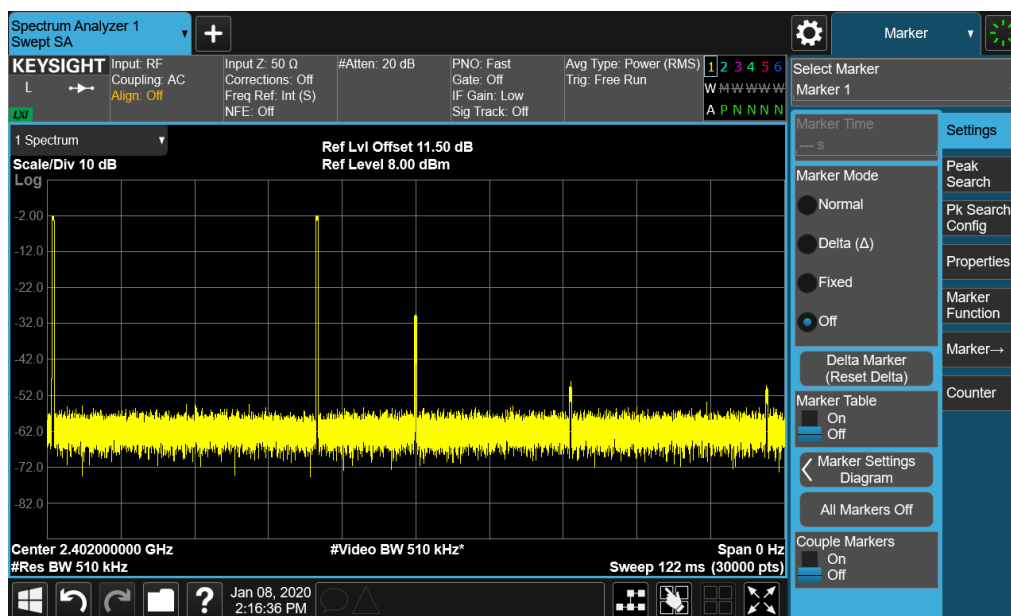


Figure 8: Frequency Occupation, 1-DH1, 2480MHz

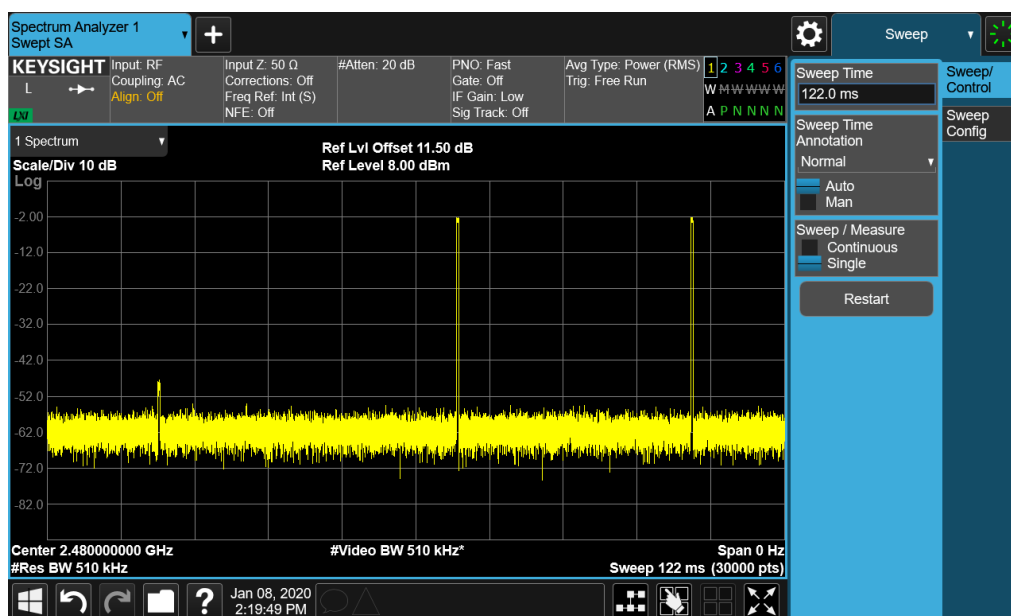


Figure 9: Frequency Occupation, 1-DH3, 2402MHz

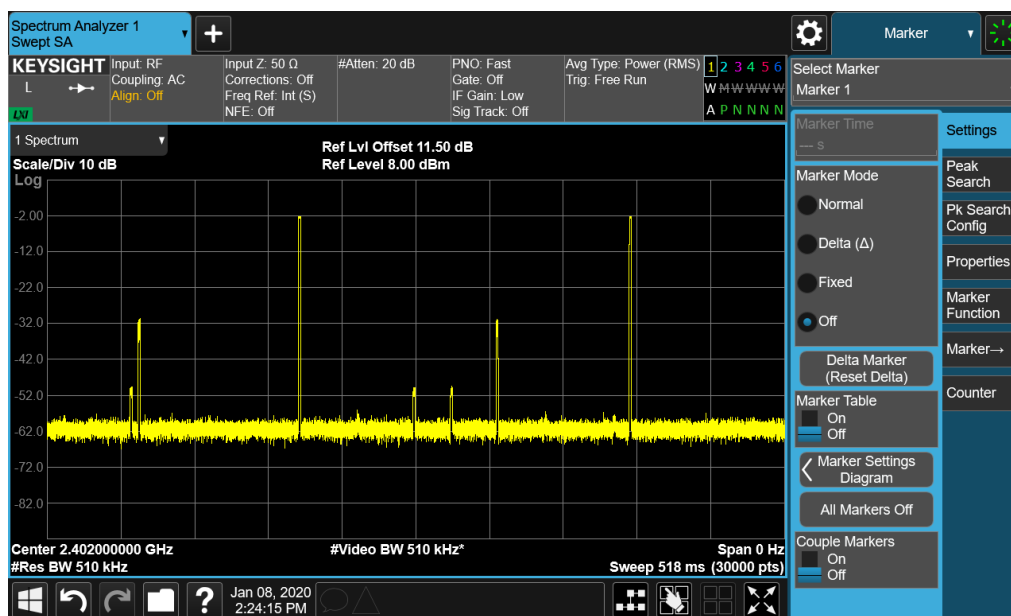
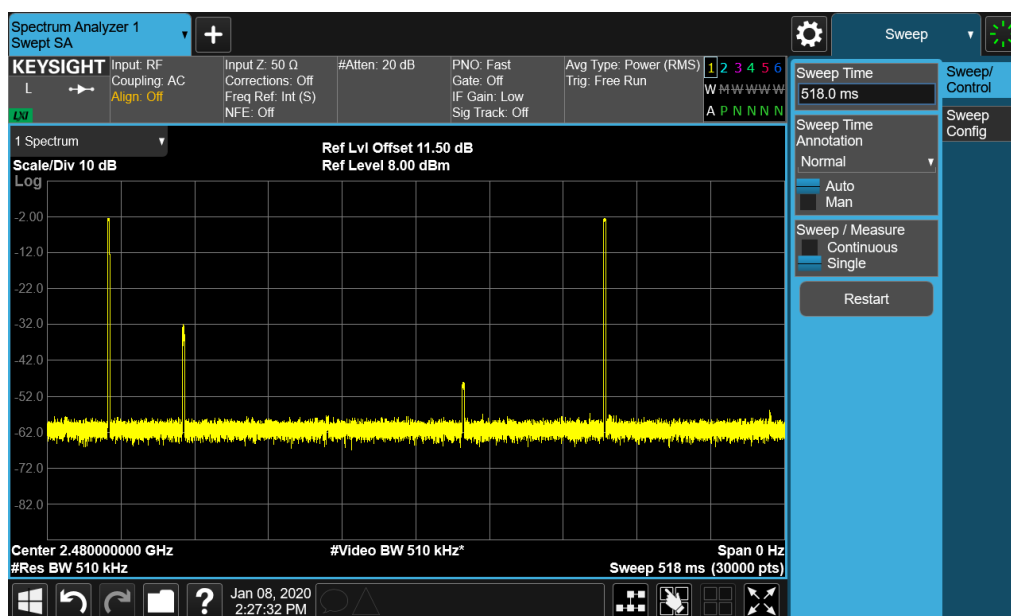


Figure 10: Frequency Occupation, 1-DH3, 2480MHz



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Figure 11: Frequency Occupation, 1-DH5, 2402MHz

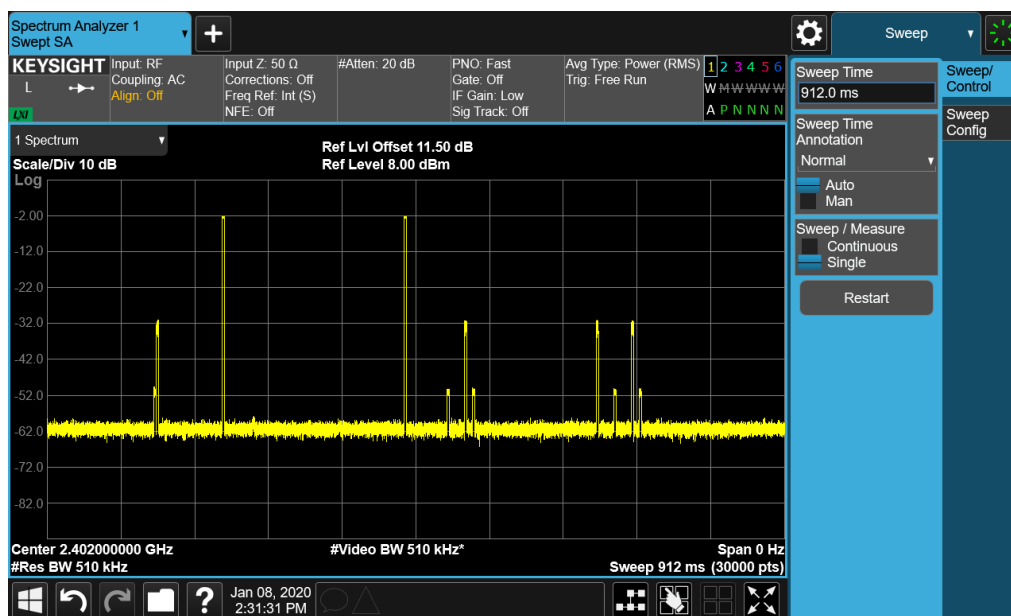


Figure 12: Frequency Occupation, 1-DH5, 2480MHz

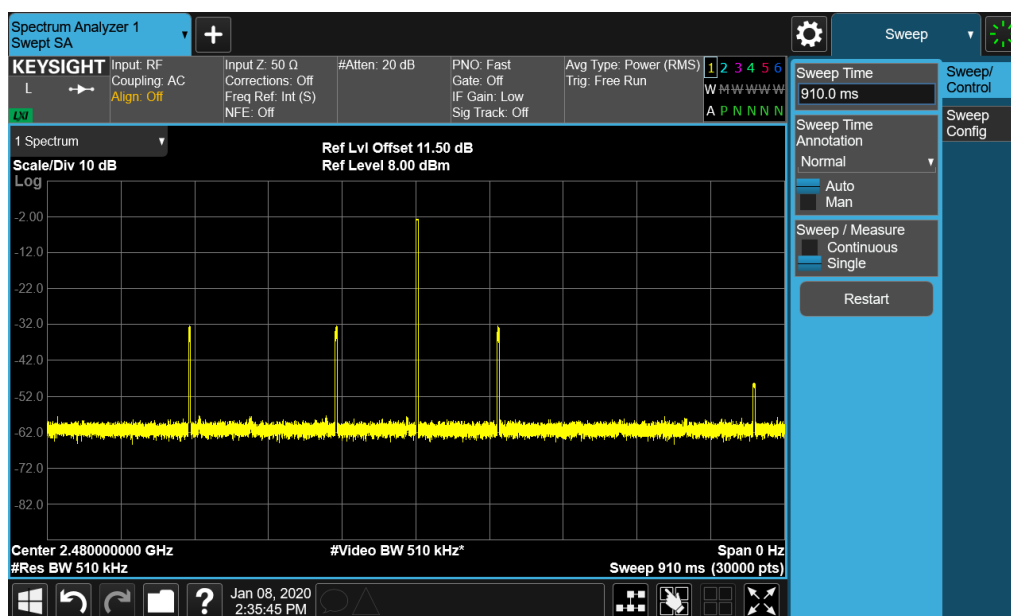


Figure 13: Hopping Sequence, 1-DH1

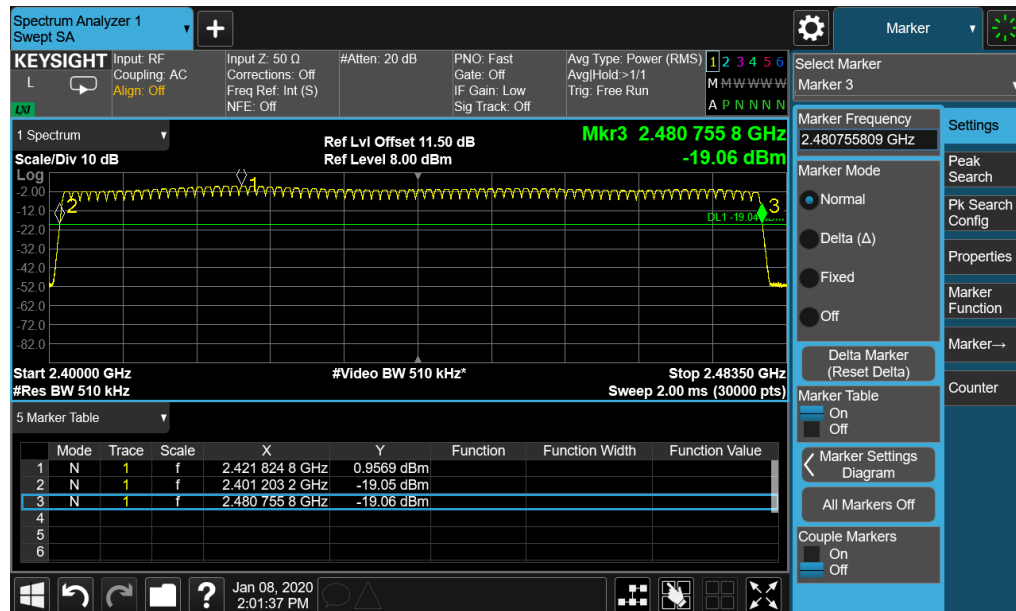


Figure 14: Hopping Sequence, 1-DH3

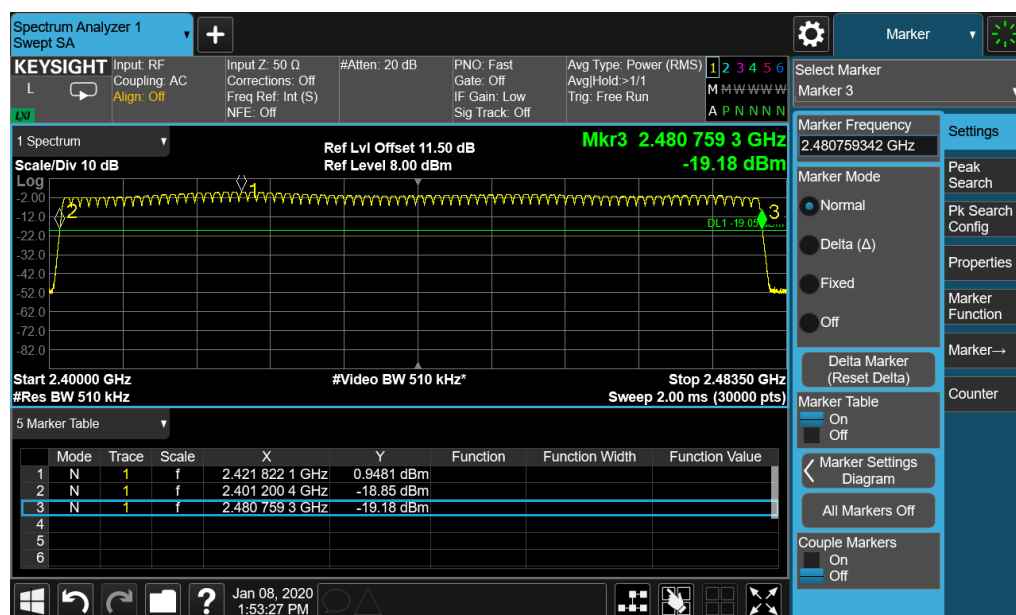
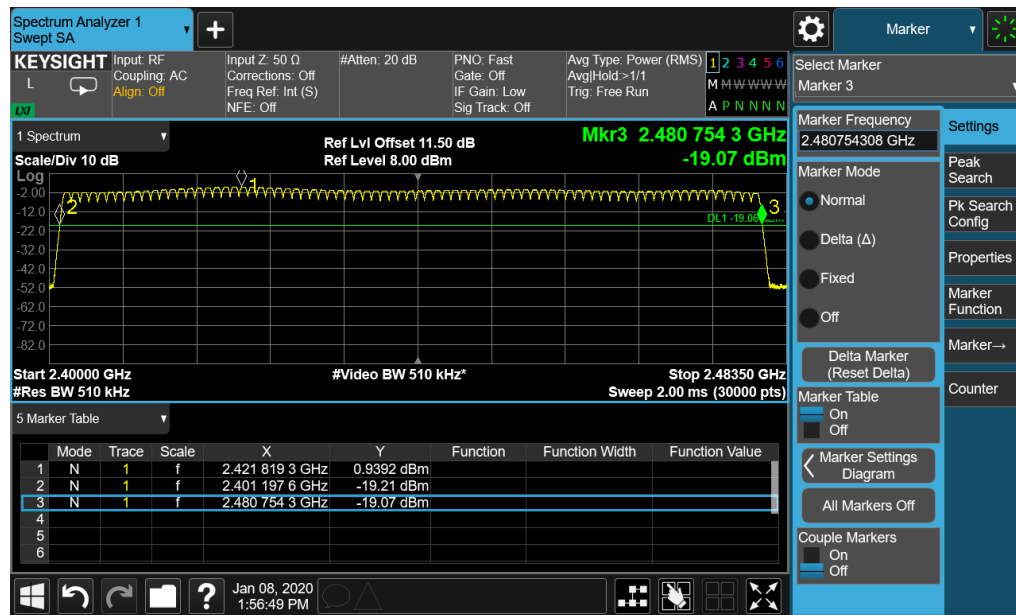


Figure 15: Hopping Sequence, 1-DH5



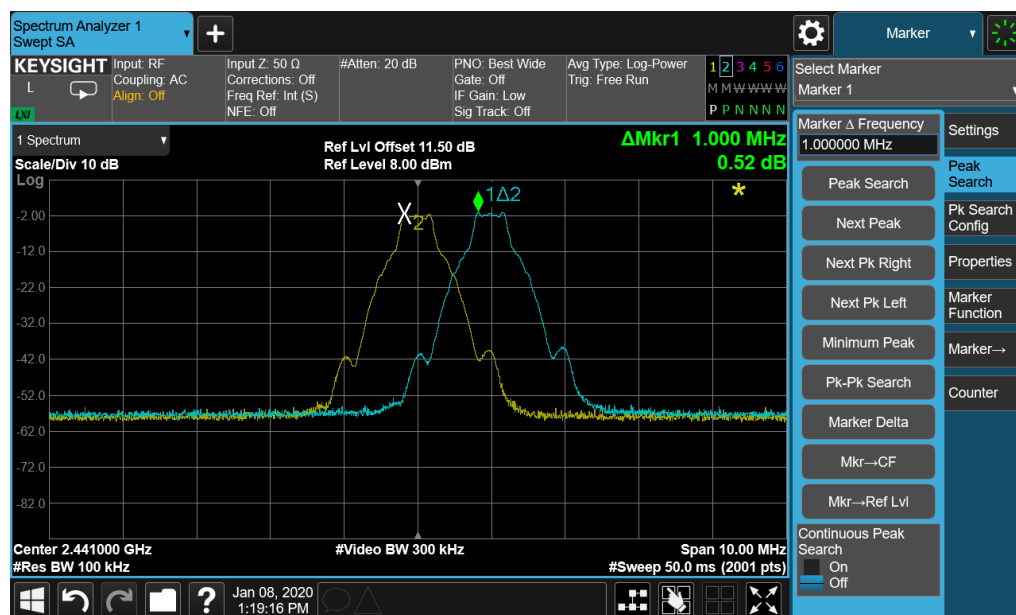
5.1.4 Hopping Frequency Separation

RESULT:
PASS

Date of testing : 08.01.2020
 Ambient temperature : 25°C
 Relative humidity : 52%
 Atmospheric pressure : 101kPa
 Test requirement : EN 300 328 V2.1.1:2016, clause 4.3.1.5
 Test procedure : EN 300 328 V2.1.1:2016, clause 5.4.5.2
 Normal test voltage : DC 7.2V
 Test modes applied : TM2, TM5, TM8

Table 11: Hopping Frequency Separation

Packet Type	Test Mode	Ch. No.	Frequency [MHz]	Channel Separation [MHz]	Limit [ms]
1-DH5	TM2	39	2441	1	≥0.1
2-DH5	TM5	39	2441	1	≥0.1
3-DH5	TM8	39	2441	1	≥0.1

Figure 16: Hopping Frequency Separation, TM2


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Figure 17: Hopping Frequency Separation, TM5

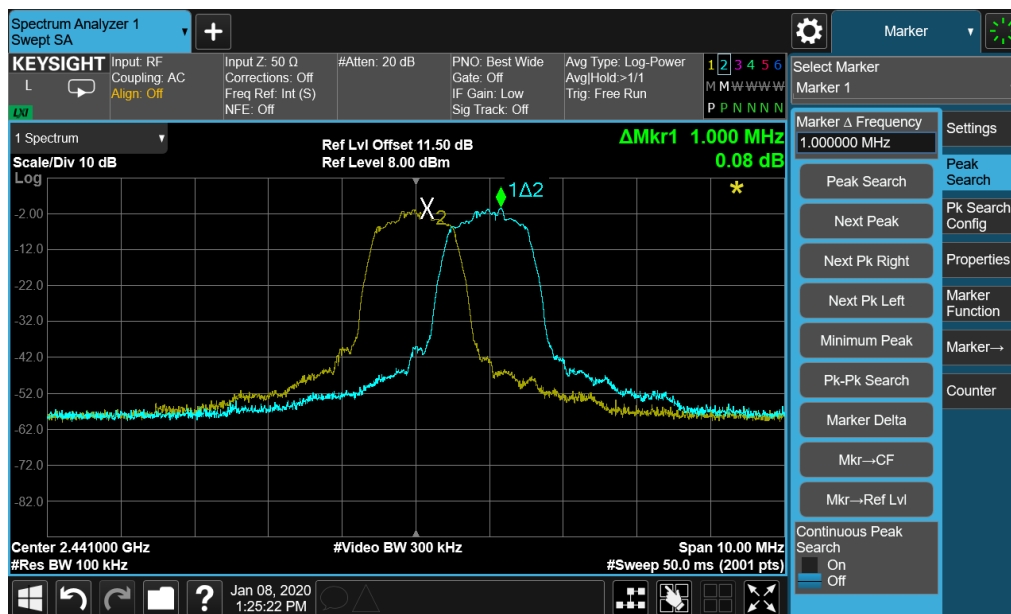
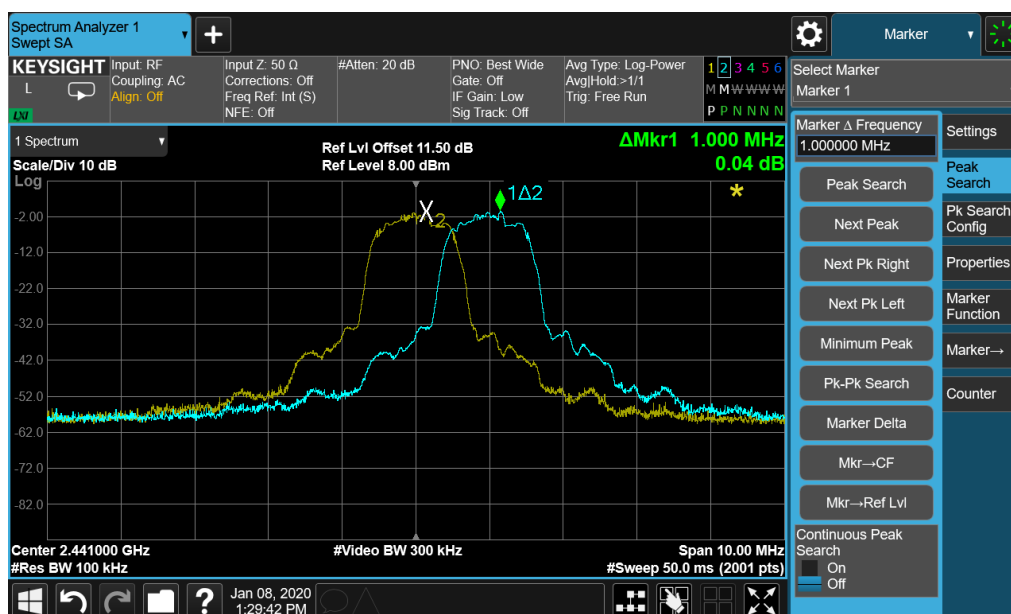


Figure 18: Hopping Frequency Separation, TM8



5.1.5 Medium Utilization (MU) Factor

RESULT:**N/A**

Test requirement : EN 300 328 V2.1.1:2016, clause 4.3.1.6
Note:

This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

Therefore, assessment of the Medium Utilization Factor is not required.

5.1.6 Adaptivity (Adaptivity Frequency Hopping)**RESULT:****N/A**

Test requirement : EN 300 328 V2.1.1:2016, clause 4.3.1.7

Note:

This requirement does not apply to non-adaptivity equipment or adaptive equipment operating in a non-adaptivity mode providing the equipment complies with the requirements and/or restrictions applicable to non-adaptive equipment.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

Therefore, this test is not required for this device.

5.1.7 Occupied Channel Bandwidth

RESULT:**PASS**

Date of testing : 08.01.2020
Ambient temperature : 25°C
Relative humidity : 52%
Atmospheric pressure : 101kPa
Test requirement : EN 300 328 V2.1.1:2016, clause 4.3.1.8
Test procedure : EN 300 328 V2.1.1:2016, clause 5.4.7.2
Normal test voltage : DC 7.2V
Test modes applied : TM1, TM3, TM4, TM6, TM7, TM9

Table 12: Occupied channel bandwidth

Packet Type	Test Mode	Frequency [MHz]	99% Bandwidth [MHz]	Verdict
1-DH5	TM1	2402	0.8729	PASS
	TM3	2480	0.8778	PASS
2-DH5	TM4	2402	1.1799	PASS
	TM6	2480	1.1743	PASS
3-DH5	TM7	2402	1.1925	PASS
	TM9	2480	1.1929	PASS

Note:

The Occupied Channel Bandwidth for each frequency fall completely within the band given in clause 1 '2,4 GHz to 2,4835 GHz'.

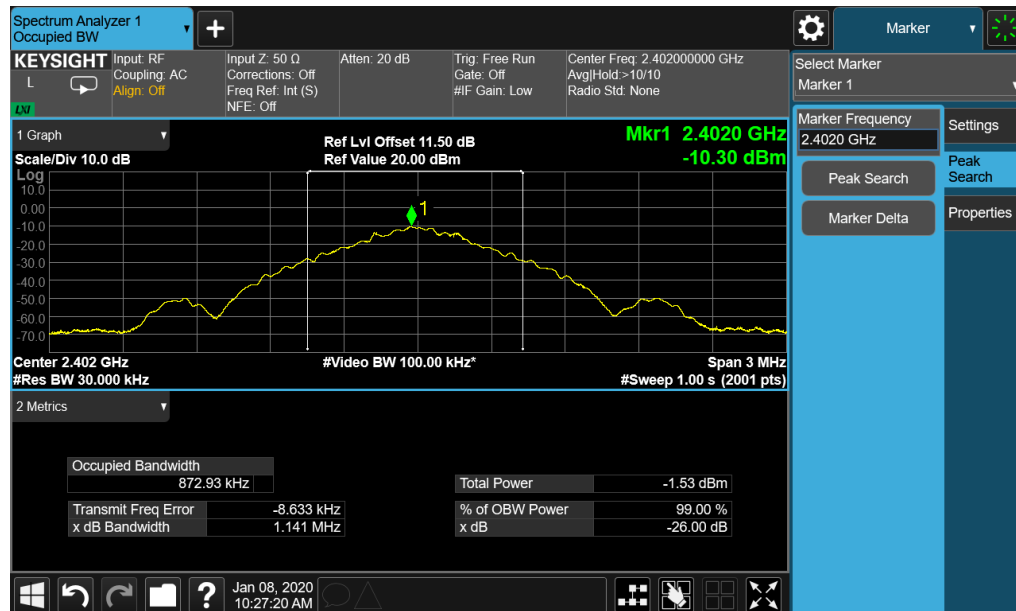
Figure 19: Occupied Channel Bandwidth, TM1

Figure 20: Occupied Channel Bandwidth, TM3


Figure 21: Occupied Channel Bandwidth, TM4

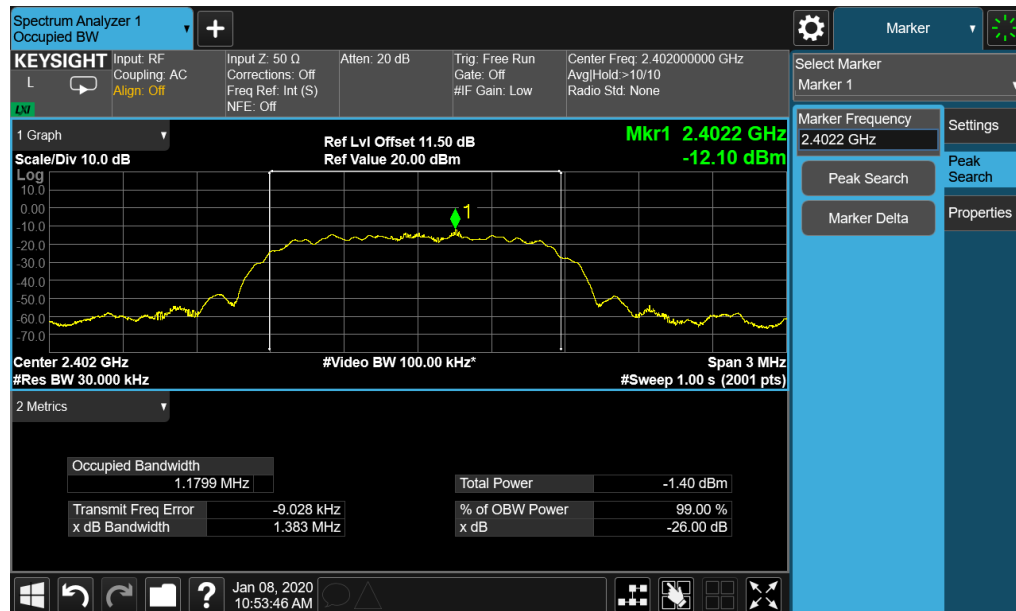


Figure 22: Occupied Channel Bandwidth, TM6

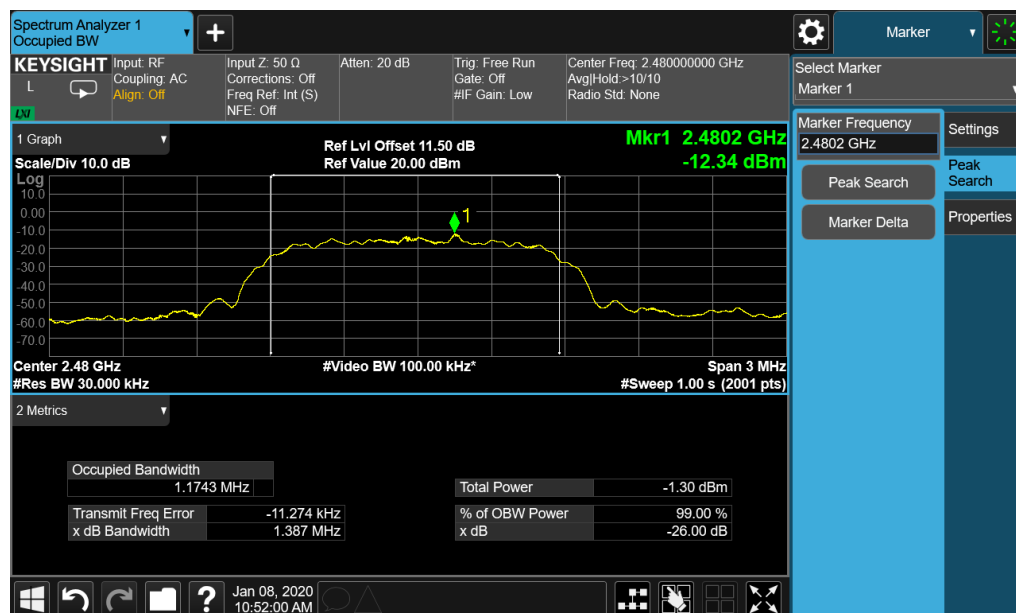


Figure 23: Occupied Channel Bandwidth, TM7

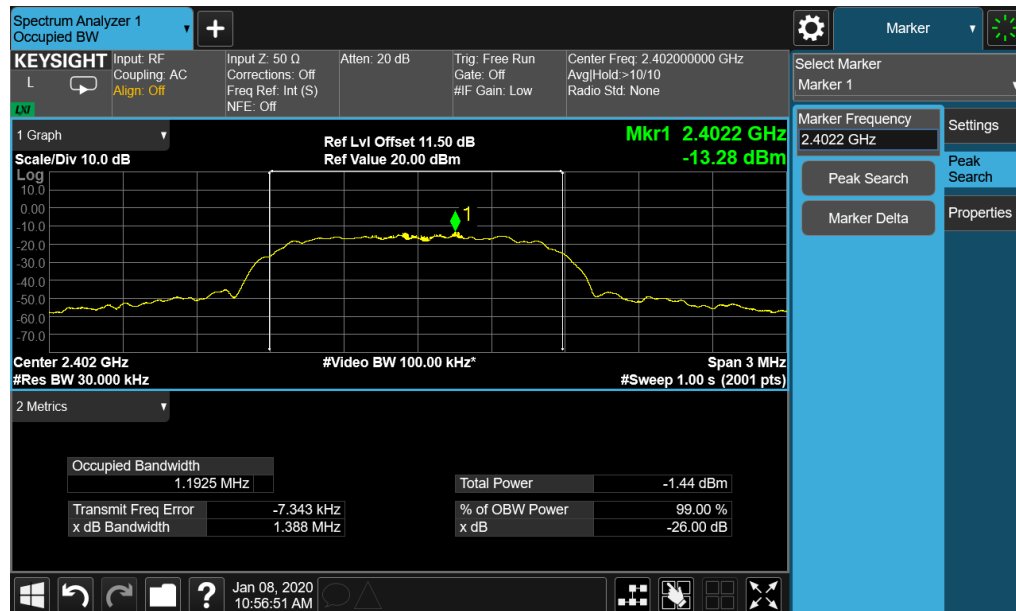
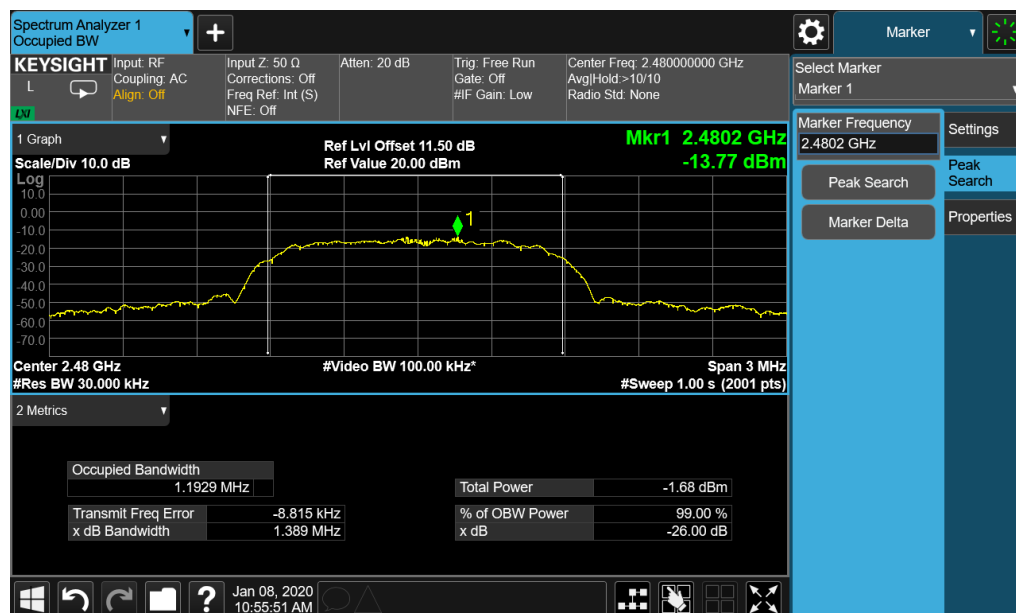


Figure 24: Occupied Channel Bandwidth, TM9



5.1.8 Transmitter unwanted emissions in the OOB domain

RESULT:
PASS

Date of testing : 08.01.2020
 Ambient temperature : 25°C
 Relative humidity : 54%
 Atmospheric pressure : 101kPa
 Test requirement : EN 300 328 V2.1.1:2016, clause 4.3.1.9
 Test procedure : EN 300 328 V2.1.1:2016, clause 5.4.8.2
 Normal test voltage : DC 7.2V
 Test modes applied : TM1, TM3, TM4, TM6, TM7, TM9

Table 13: Transmitter unwanted emissions in the OOB domain

Packet Type	Mode	Domain	Frequency [MHz]	Reading Values [dBm/MHz]	Max measured Values [dBm/MHz]	Limit [dBm/MHz]
1-DH5	TM1	2400-2BW~2400-BW	2398.63	-57.63	-54.43	-20
		2400-BW~2400	2399.50	-57.29	-54.09	-10
	TM3	2483.5~2483.5+BW	2484.00	-58.33	-55.13	-10
		2483.5+BW~2483.5+2BW	2484.88	-58.28	-55.08	-20
2-DH5	TM4	2400-2BW~2400-BW	2398.32	-57.01	-53.81	-20
		2400-BW~2400	2399.50	-53.53	-50.33	-10
	TM6	2483.5~2483.5+BW	2484.00	-57.76	-54.56	-10
		2483.5+BW~2483.5+2BW	2485.17	-58.37	-55.17	-20
3-DH5	TM7	2400-2BW~2400-BW	2398.31	-56.35	-53.15	-20
		2400-BW~2400	2399.50	-51.77	-48.57	-10
	TM9	2483.5~2483.5+BW	2484.00	-57.16	-53.96	-10
		2483.5+BW~2483.5+2BW	2485.19	-58.29	-55.09	-20

Note:
Max measured Values = Reading Values + Antenna gain

5.1.9 Transmitter unwanted emissions in the spurious domain

RESULT:
PASS

Date of testing : 22.01.2020
 Ambient temperature : 25°C
 Relative humidity : 52%
 Atmospheric pressure : 101kPa
 Test requirement : EN 300 328 V2.1.1:2016, clause 4.3.1.10
 Test procedure : EN 300 328 V2.1.1:2016, clause 5.4.9.2
 Normal test voltage : DC 7.2V
 Test modes applied : TM1, TM3, TM4, TM6, TM7, TM9

Table 14: Transmitter unwanted emissions in the spurious domain, 1-DH5

Test Mode	Freq. [MHz]	Measure Level [dBm]	Reading Level [dBm]	Over Limit [dB]	Limit [dBm]	Correct Factor [dB]	Detector Type	Pol.
TM1	647.890	-62.071	-93.194	-8.071	-54.000	31.123	PK	H
	720.155	-60.098	-93.136	-6.098	-54.000	33.038	PK	
	4542.625	-53.670	-70.112	-23.670	-30.000	16.442	PK	
	7115.875	-48.022	-73.395	-18.022	-30.000	25.373	PK	
	720.155	-62.911	-95.274	-8.911	-54.000	32.363	PK	V
	791.935	-61.590	-94.861	-7.590	-54.000	33.271	PK	
	5100.750	-53.660	-71.672	-23.660	-30.000	18.012	PK	
	8995.875	-42.923	-70.652	-12.923	-30.000	27.729	PK	
TM3	621.215	-62.669	-92.762	-8.669	-54.000	30.093	PK	H
	720.155	-60.521	-93.559	-6.521	-54.000	33.038	PK	
	5564.875	-51.401	-69.592	-21.401	-30.000	18.191	PK	
	7039.500	-48.804	-73.687	-18.804	-30.000	24.883	PK	
	720.155	-63.019	-95.382	-9.019	-54.000	32.363	PK	V
	791.935	-61.963	-95.234	-7.963	-54.000	33.271	PK	
	5329.875	-52.625	-69.827	-22.625	-30.000	17.202	PK	
	7538.875	-47.899	-73.822	-17.899	-30.000	25.923	PK	

Table 15: Transmitter unwanted emissions in the spurious domain, 2-DH5

Test Mode	Freq. [MHz]	Measure Level [dBm]	Reading Level [dBm]	Over Limit [dB]	Limit [dBm]	Correct Factor [dB]	Detector Type	Pol.
TM4	720.155	-60.144	-93.182	-6.144	-54.000	33.038	PK	H
	746.830	-60.768	-94.068	-6.768	-54.000	33.300	PK	
	4248.875	-55.001	-70.405	-25.001	-30.000	15.404	PK	
	7068.875	-48.098	-73.032	-18.098	-30.000	24.934	PK	
	720.155	-63.303	-95.666	-9.303	-54.000	32.363	PK	V
	791.935	-61.628	-94.899	-7.628	-54.000	33.271	PK	
	5065.500	-53.129	-70.317	-23.129	-30.000	17.188	PK	
	7527.125	-46.303	-72.237	-16.303	-30.000	25.934	PK	
TM6	621.215	-62.894	-92.987	-8.894	-54.000	30.093	PK	H
	720.155	-60.780	-93.818	-6.780	-54.000	33.038	PK	
	5094.875	-52.757	-70.886	-22.757	-30.000	18.129	PK	
	7368.500	-48.210	-74.041	-18.210	-30.000	25.831	PK	
	675.050	-63.199	-94.879	-9.199	-54.000	31.680	PK	V
	791.935	-61.900	-95.171	-7.900	-54.000	33.271	PK	
	4536.750	-53.253	-69.909	-23.253	-30.000	16.656	PK	
	7303.875	-48.148	-73.610	-18.148	-30.000	25.462	PK	

Table 16: Transmitter unwanted emissions in the spurious domain, 3-DH5

Test Mode	Freq. [MHz]	Measure Level [dBm]	Reading Level [dBm]	Over Limit [dB]	Limit [dBm]	Correct Factor [dB]	Detector Type	Pol.
TM7	621.215	-61.821	-91.914	-7.821	-54.000	30.093	PK	H
	720.250	-64.498	-97.540	-10.498	-54.000	33.042	RMS	
	4102.000	-54.551	-69.753	-24.551	-30.000	15.202	PK	
	6963.125	-48.325	-72.370	-18.325	-30.000	24.045	PK	
	720.155	-63.066	-95.429	-9.066	-54.000	32.363	PK	V
	791.935	-61.955	-95.226	-7.955	-54.000	33.271	PK	
	4536.750	-53.879	-70.535	-23.879	-30.000	16.656	PK	
	7556.500	-49.162	-74.810	-19.162	-30.000	25.648	PK	
TM9	621.215	-61.727	-91.820	-7.727	-54.000	30.093	PK	H
	720.155	-60.417	-93.455	-6.417	-54.000	33.038	PK	
	5512.000	-52.389	-70.679	-22.389	-30.000	18.290	PK	
	7497.750	-47.449	-73.335	-17.449	-30.000	25.886	PK	
	720.155	-62.862	-95.225	-8.862	-54.000	32.363	PK	V
	791.935	-61.307	-94.578	-7.307	-54.000	33.271	PK	
	5071.375	-53.165	-70.416	-23.165	-30.000	17.251	PK	
	7603.500	-47.382	-72.538	-17.382	-30.000	25.156	PK	

5.2 Receiver Parameters

5.2.1 Receiver Spurious Emissions

RESULT:
PASS

Date of testing : 22.01.2020
 Ambient temperature : 25°C
 Relative humidity : 52%
 Atmospheric pressure : 101kPa
 Test requirement : EN 300 328 V2.1.1:2016, clause 4.3.1.11
 Test procedure : EN 300 328 V2.1.1:2016, clause 5.4.10.2
 Normal test voltage : DC 7.2V
 Test modes applied : TM10, TM12, TM13, TM15, TM16, TM18

Table 17: Receiver Spurious Emissions, 1-DH5

Test Mode	Freq. [MHz]	Measure Level [dBm]	Reading Level [dBm]	Over Limit [dB]	Limit [dBm]	Correct Factor [dB]	Detector Type	Pol.
TM10	288.000	-62.667	-86.540	-5.667	-57.000	23.873	RMS	H
	819.000	-62.647	-96.340	-5.647	-57.000	33.693	RMS	
	1105.750	-55.647	-64.943	-8.647	-47.000	9.296	PK	
	1340.750	-54.993	-65.166	-7.993	-47.000	10.173	PK	
	720.260	-64.572	-96.940	-7.572	-57.000	32.368	RMS	V
	791.830	-65.418	-98.690	-8.418	-57.000	33.272	RMS	
	1082.250	-53.388	-59.311	-6.388	-47.000	5.923	PK	
	1581.625	-55.250	-64.251	-8.250	-47.000	9.001	PK	
TM12	288.200	-62.386	-86.250	-5.386	-57.000	23.864	RMS	H
	820.200	-61.840	-95.620	-4.840	-57.000	33.780	RMS	
	1099.875	-55.054	-64.097	-8.054	-47.000	9.043	PK	
	1710.875	-56.282	-64.200	-9.282	-47.000	7.918	PK	
	720.325	-66.249	-98.620	-9.249	-57.000	32.371	RMS	V
	864.620	-65.904	-99.850	-8.904	-57.000	33.946	RMS	
	1082.250	-53.806	-59.729	-6.806	-47.000	5.923	PK	
	1540.500	-54.400	-62.316	-7.400	-47.000	7.916	PK	

Table 18: Receiver Spurious Emissions, 2-DH5

Test Mode	Freq. [MHz]	Measure Level [dBm]	Reading Level [dBm]	Over Limit [dB]	Limit [dBm]	Correct Factor [dB]	Detector Type	Pol.
TM13	287.600	-62.379	-86.270	-5.379	-57.000	23.891	RMS	H
	820.140	-62.433	-96.210	-5.433	-57.000	33.777	RMS	
	1193.875	-56.624	-66.039	-9.624	-47.000	9.415	PK	
	1581.625	-56.256	-65.128	-9.256	-47.000	8.872	PK	
	792.320	-66.094	-99.360	-9.094	-57.000	33.266	RMS	V
	864.540	-65.899	-99.850	-8.899	-57.000	33.951	RMS	
	1082.250	-53.633	-59.556	-6.633	-47.000	5.923	PK	
	1581.625	-54.502	-63.503	-7.502	-47.000	9.001	PK	
TM15	289.590	-62.461	-86.310	-5.461	-57.000	23.849	RMS	H
	819.250	-63.524	-97.240	-6.524	-57.000	33.716	RMS	
	1581.625	-56.313	-65.185	-9.313	-47.000	8.872	PK	
	2233.750	-56.326	-68.703	-9.326	-47.000	12.377	PK	
	792.120	-66.181	-99.450	-9.181	-57.000	33.269	RMS	V
	864.540	-65.609	-99.560	-8.609	-57.000	33.951	RMS	
	1152.750	-54.861	-59.804	-7.861	-47.000	4.943	PK	
	1564.000	-53.237	-61.666	-6.237	-47.000	8.429	PK	

Table 19: Receiver Spurious Emissions, 3-DH5

Test Mode	Freq. [MHz]	Measure Level [dBm]	Reading Level [dBm]	Over Limit [dB]	Limit [dBm]	Correct Factor [dB]	Detector Type	Pol.
TM16	288.430	-62.383	-86.240	-5.383	-57.000	23.857	RMS	H
	865.000	-61.884	-96.240	-4.884	-57.000	34.356	RMS	
	1082.250	-55.845	-62.351	-8.845	-47.000	6.506	PK	
	1340.750	-56.413	-66.586	-9.413	-47.000	10.173	PK	
	792.450	-67.056	-100.320	-10.056	-57.000	33.264	RMS	V
	864.650	-65.806	-99.750	-8.806	-57.000	33.944	RMS	
	1082.250	-53.647	-59.570	-6.647	-47.000	5.923	PK	
	1440.625	-53.947	-63.030	-6.947	-47.000	9.083	PK	
TM18	325.460	-61.061	-86.190	-4.061	-57.000	25.129	RMS	H
	864.270	-61.227	-95.620	-4.227	-57.000	34.393	RMS	
	1082.250	-54.150	-60.656	-7.150	-47.000	6.506	PK	
	1581.625	-56.321	-65.193	-9.321	-47.000	8.872	PK	
	792.660	-66.600	-99.860	-9.600	-57.000	33.260	RMS	V
	864.720	-65.880	-99.820	-8.880	-57.000	33.940	RMS	
	1082.250	-53.674	-59.597	-6.674	-47.000	5.923	PK	
	1440.625	-55.493	-64.576	-8.493	-47.000	9.083	PK	

5.2.2 Receiver Blocking

RESULT:
PASS

Date of testing : 09.01.2020
 Ambient temperature : 25°C
 Relative humidity : 52%
 Atmospheric pressure : 101kPa
 Test requirement : EN 300 328 V2.1.1:2016, clause 4.3.1.12
 Test procedure : EN 300 328 V2.1.1:2016, clause 5.4.11.2
 Normal test voltage : DC 7.2V
 Test modes applied : TM19, TM21, TM22, TM24

Table 20: Receiver Blocking, TM19

P _{min} [dBm]	Wanted signal mean power from companion device [dBm]	Blocking signal frequency [MHz]	Blocking signal power [dBm]	PER [%]	Limit [%]	Verdict
-89	-83	2300	-43.8	0	10	Pass
		2380	-53.8	0	10	Pass
		2503.5	-53.8	0	10	Pass
		2583.5	-43.8	0	10	Pass

Note: The levels specified in the standards are the 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 21: Receiver Blocking, TM21

P _{min} [dBm]	Wanted signal mean power from companion device [dBm]	Blocking signal frequency [MHz]	Blocking signal power [dBm]	PER [%]	Limit [%]	Verdict
-85	-79	2300	-43.8	0.1	10	Pass
		2380	-53.8	0.1	10	Pass
		2503.5	-53.8	0.0	10	Pass
		2583.5	-43.8	0.1	10	Pass

Note: The levels specified in the standards are the 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 22: Receiver Blocking, TM22

$P_{\min}$ [dBm]	Wanted signal mean power from companion device [dBm]	Blocking signal frequency [MHz]	Blocking signal power [dBm]	PER [%]	Limit [%]	Verdict
-89	-83	2300	-43.8	1.2	10	Pass
		2380	-53.8	1.3	10	Pass
		2503.5	-53.8	0.1	10	Pass
		2583.5	-43.8	0.3	10	Pass

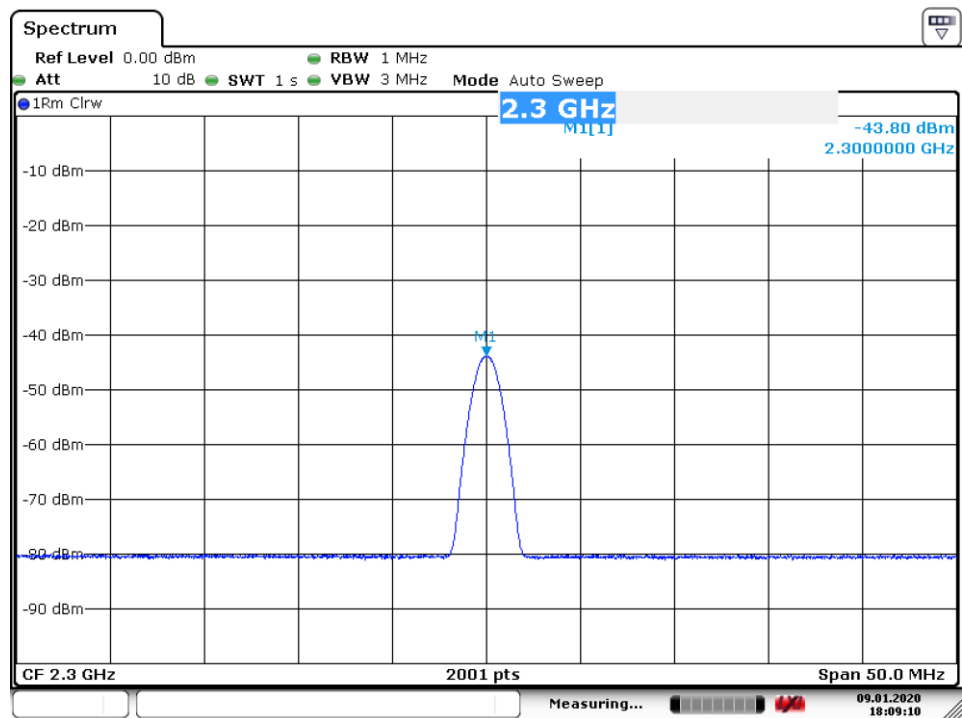
Note: The levels specified in the standards are the levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.

Table 23: Receiver Blocking, TM24

$P_{\min}$ [dBm]	Wanted signal mean power from companion device [dBm]	Blocking signal frequency [MHz]	Blocking signal power [dBm]	PER [%]	Limit [%]	Verdict
-85	-79	2300	-43.8	0.5	10	Pass
		2380	-53.8	0.7	10	Pass
		2503.5	-53.8	1.1	10	Pass
		2583.5	-43.8	1.2	10	Pass

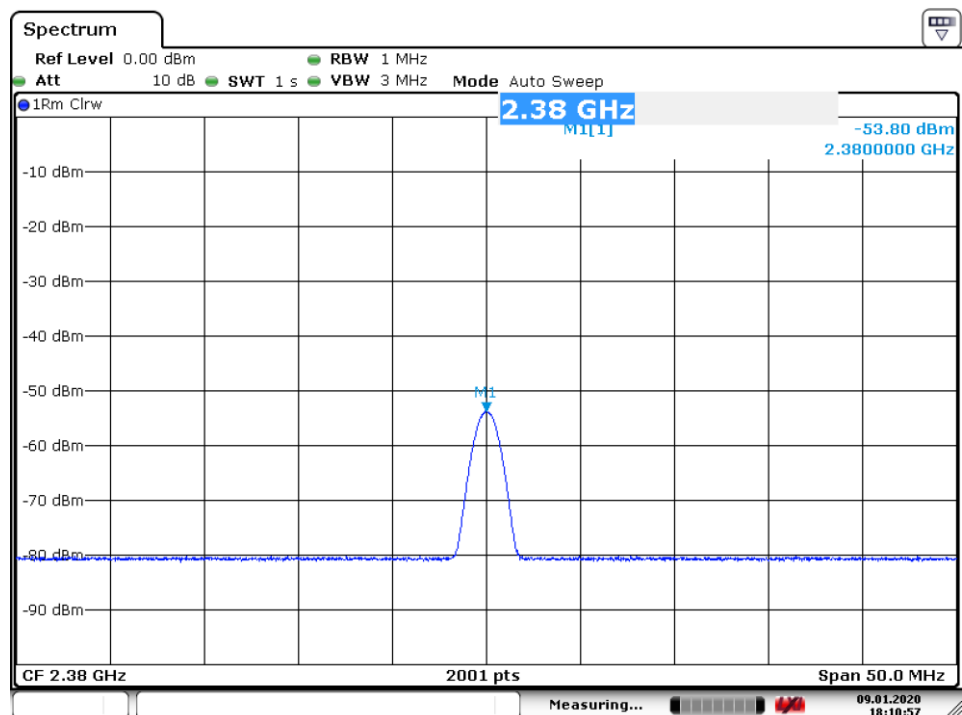
Note: The levels specified in the standards are the levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.

Figure 25: Blocking Signal, 2300MHz



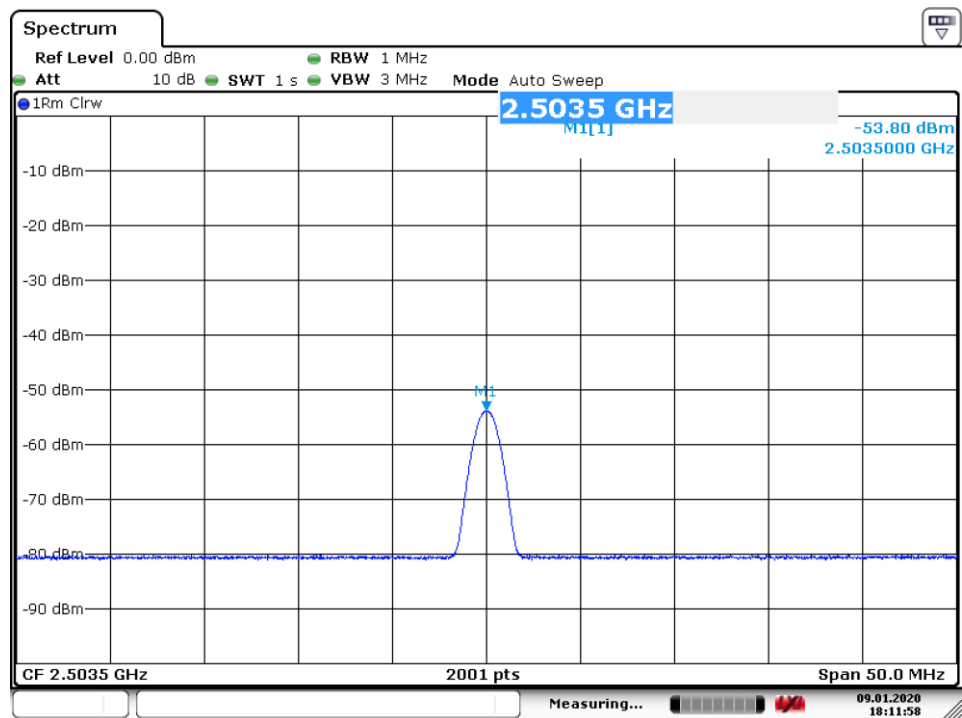
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Figure 26: Blocking Signal, 2380MHz



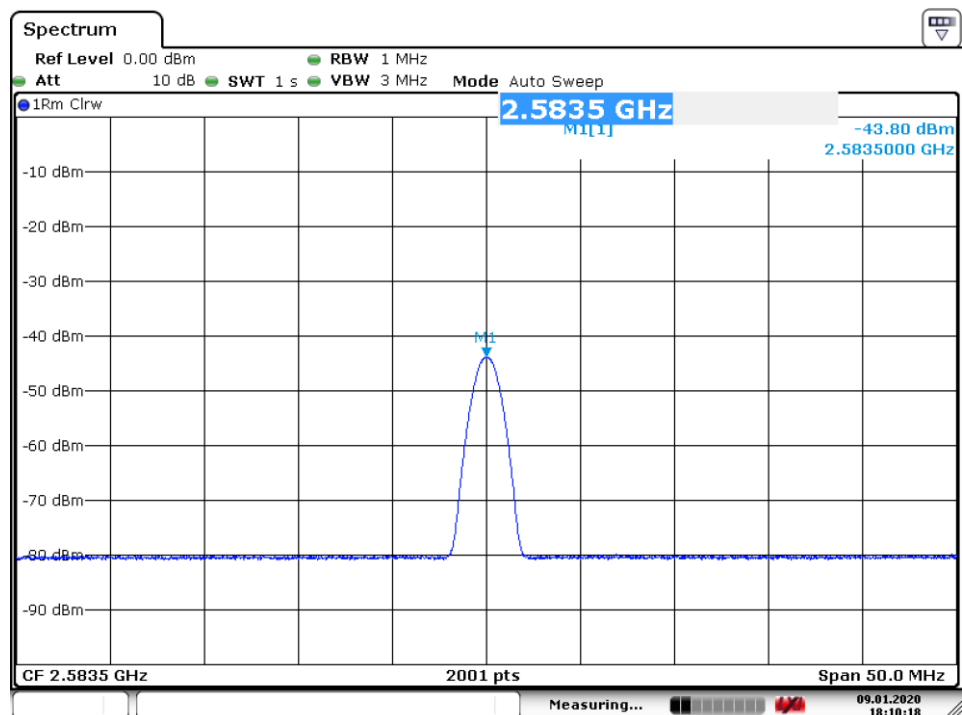
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Figure 27: Blocking Signal, 2503.5MHz



Date: 9.JAN.2020 18:11:58

Figure 28: Blocking Signal, 2583.5MHz



Date: 9.JAN.2020 18:10:18

6. Photographs of the Sample and Test Setup

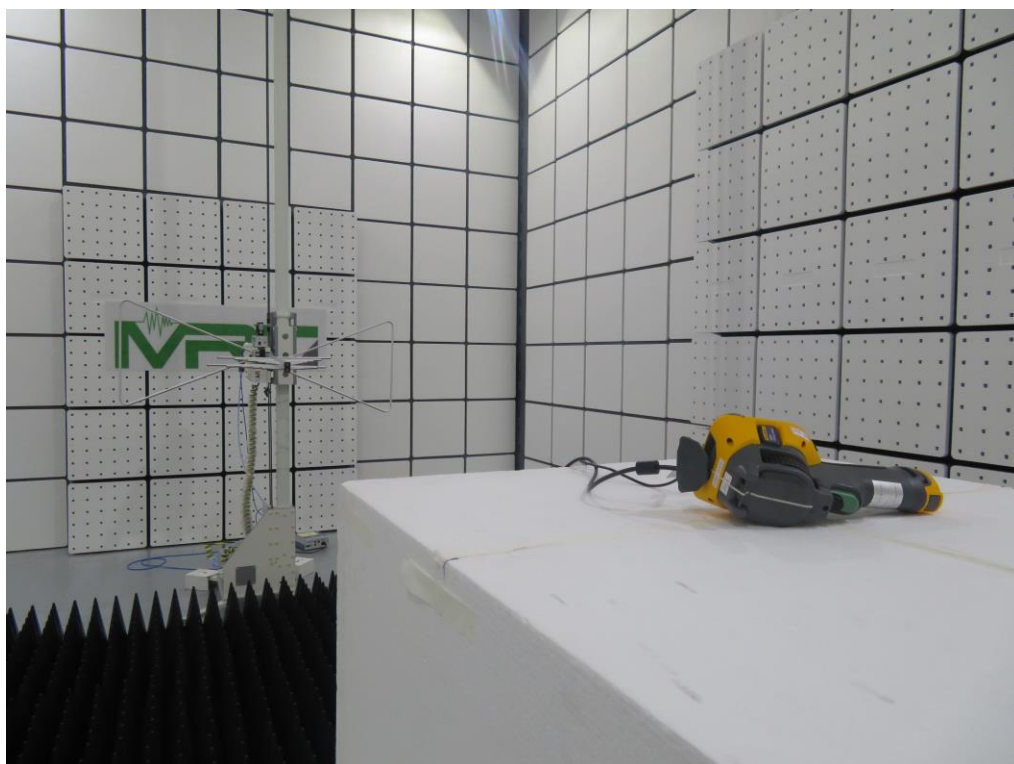
Photograph 1: Photographs of the EUT



Photograph 2: Set-up for conducted RF test



Photograph 3: Set-up for radiated spurious emission, 30MHz – 1GHz

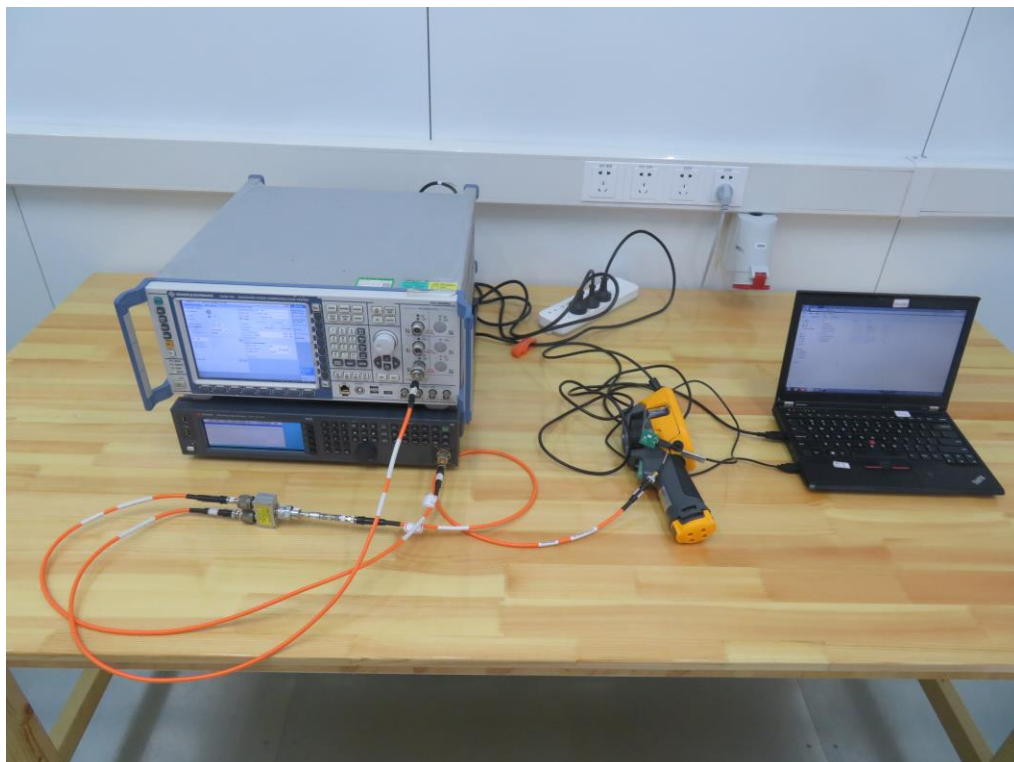


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