



Continental Automotive Systems Inc.

RCKF2B

FCC 15.231:2021

Low Power Radio

Report: ONMS0001.1, Issue Date: April 16, 2021



NVLAP LAB CODE: 200630-0



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CERTIFICATE OF TEST



Last Date of Test: April 14, 2021
Continental Automotive Systems Inc.
EUT: RCKF2B

Radio Equipment Testing

Standards

Specification	Method
FCC 15.231:2021	ANSI C63.10:2013

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions (Transmitter)	No	N/A	Not required for battery powered equipment.
6.5, 6.6	Field Strength of Fundamental	Yes	Pass	
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
6.9.2	Occupied Bandwidth	Yes	Pass	
7.4e	Periodic Operation	No	N/A	Not required to test. If applicable, this is addressed by an attestation in the equipment theory of operation.
7.5	Duty Cycle	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Kyle Holgate, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY



Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS



United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

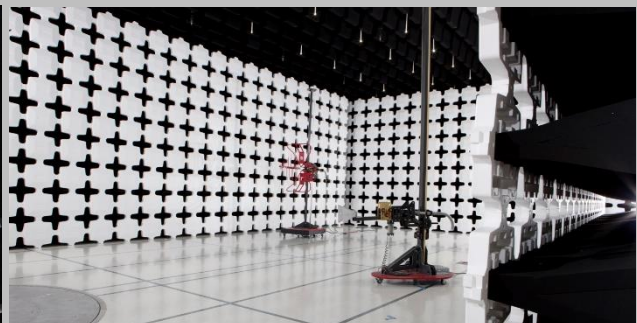
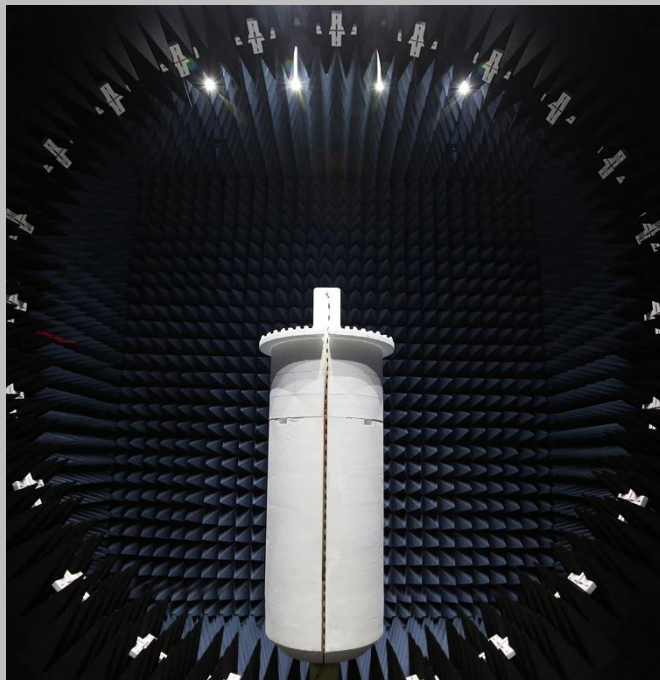
For details on the Scopes of our Accreditations, please visit:

<https://www.nwemc.com/emc-testing-accreditations>

FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157



MEASUREMENT UNCERTAINTY



Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

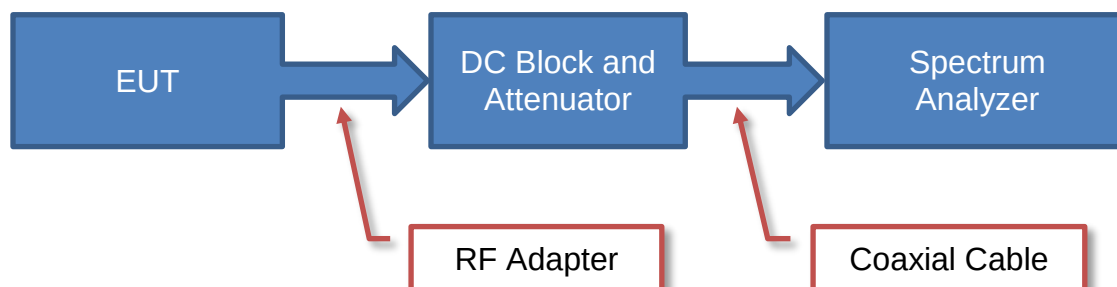
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

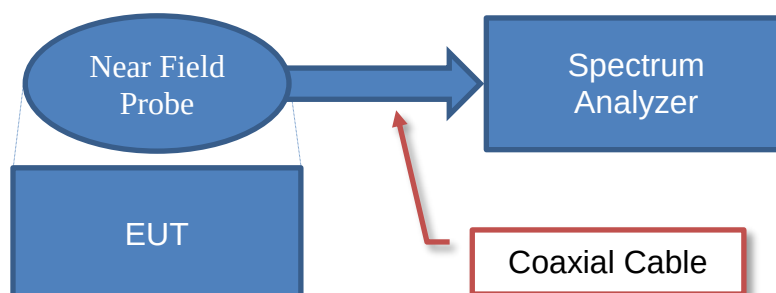
Test	+ MU	- MU
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.6 dB	-2.6 dB

Test Setup Block Diagrams

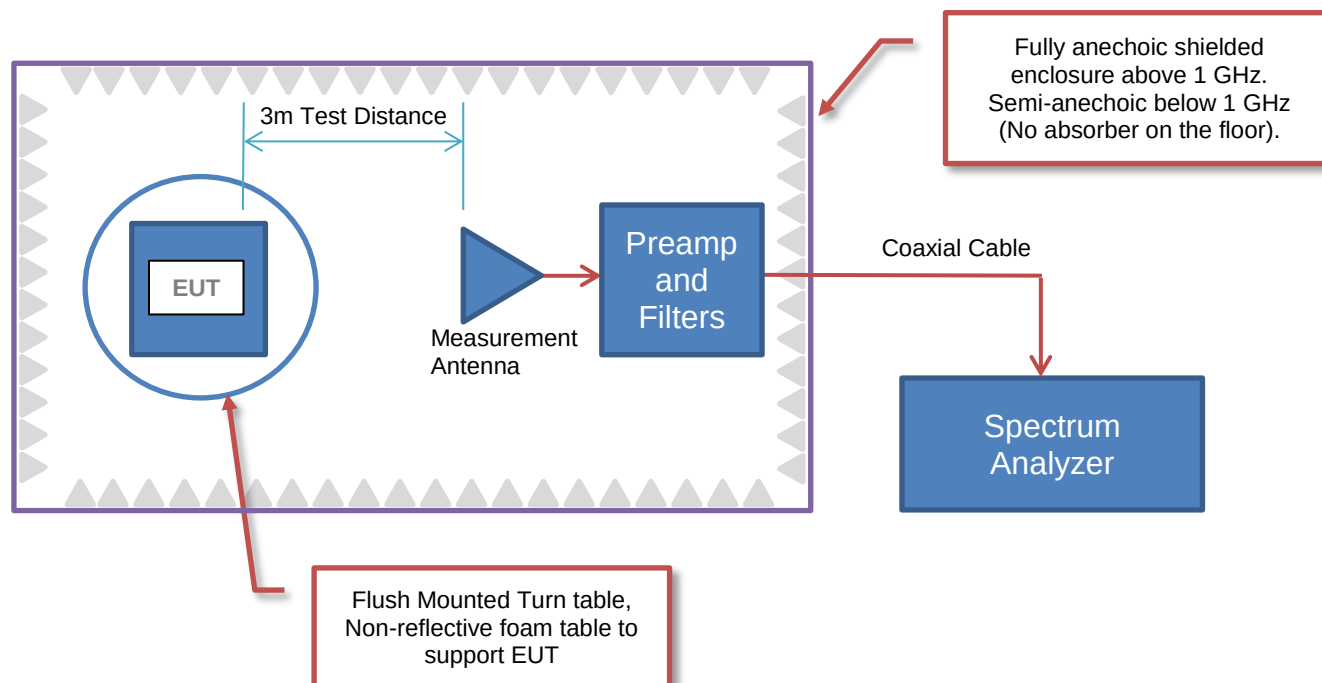
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION



Client and Equipment Under Test (EUT) Information

Company Name:	Continental Automotive Systems Inc.
Address:	4685 Investment Drive
City, State, Zip:	Troy, Michigan 48098
Test Requested By:	Jacqueline Pinto of Continental Intelligent Transportation Systems
EUT:	RCKF2B
First Date of Test:	October 20, 2020
Last Date of Test:	April 15, 2021
Receipt Date of Samples:	October 7, 2020
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

RCKF2B is a universal Remote Keyless Entry transmitter device. It is powered by 8 to 16 VDC from the vehicle. In use, this device is a standalone device that is installed inside a vehicle cabin. RCKF2B is controlled via a mobile application and connected to a mobile phone via Bluetooth. This device communicates with a vehicles access system via a wireless connection.

Testing Objective:

To demonstrate compliance to FCC 15.231 specifications.

CONFIGURATIONS



Configuration ONMS0001- 1

Software/Firmware Running during test	
Description	Version
RCKDiagnostic	Unknown

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Periodic and BLE radio	Continental Automotive Systems Inc.	RCKF2B	Engineering Sample #1

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
iPod	Apple	A1574	CCQVP29YGM18

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	2.0 m	No	Periodic and BLE radio	DC Power

CONFIGURATIONS



Configuration ONMS0003- 2

Software/Firmware Running during test	
Description	Version
RCKDiagnostic	Unknown

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Periodic and BLE radio	Continental Automotive Systems Inc.	RCKF2B	RCKF15-0521-E45F-BAA5

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
iPod	Apple	A1574	CCQVP29YGM18

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	2.0 m	No	Periodic and BLE radio	DC power supply

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2020-10-20	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2020-10-23	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2020-10-23	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2021-03-02	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2021-03-04	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2021-04-12	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2021-04-12	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	2021-04-15	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWER SETTINGS AND ANTENNAS



The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information.

ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
PCB Trace	Manufacturer	434	-11.2

The EUT was tested using the power settings provided by the manufacturer:

SETTINGS FOR ALL TESTS IN THIS REPORT

Frequency (MHz)	Modulation	Data Rate (kbps)	Power Setting
433.92	FSK	4.096	0x71
433.92	FSK	9.600	0x5D

FIELD STRENGTH OF FUNDAMENTAL



PSA-ESCI 2020.06.24.2

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Continuous Tx, CW, 433.920 MHz

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ONMS0003 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency 433 MHz Stop Frequency 435 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable	N/A	Bilog Cables	EVA	2020-11-17	2021-11-17
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2020-06-25	2021-06-25
Antenna - Biconilog	EMCO	3141	AXG	2019-07-23	2021-07-23

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was configured for continuous un-modulated CW operation at its single transmit frequency. The field strength of the transmit frequency was maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.10:2013).

Peak measurements were made with a resolution bandwidth of 100 kHz and a video bandwidth of 300 kHz for measurements at or below 1 GHz. A duty cycle correction factor was added to the peak readings to mathematically derive the average levels. The supporting screen captures and duty cycle calculation is contained in the "Duty Cycle" module in this report.

FIELD STRENGTH OF FUNDAMENTAL

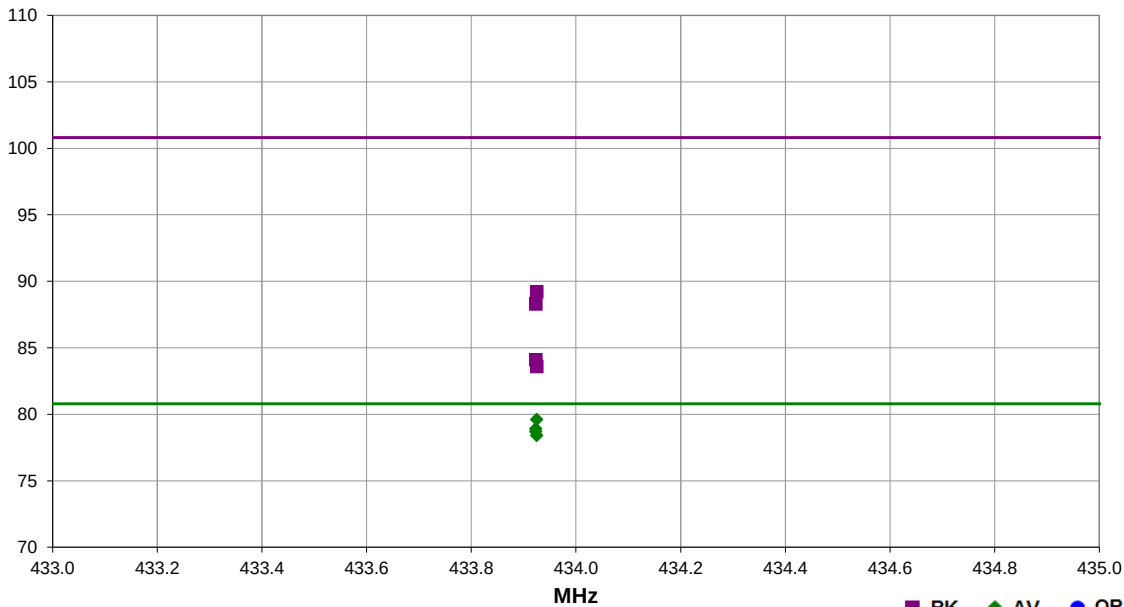


EmiR5 2021.01.08.0 PSA-ESCI 2021.03.17.0

Work Order:	ONMS0003	Date:	2021-04-12	
Project:	None	Temperature:	23 °C	
Job Site:	EV01	Humidity:	27% RH	
Serial Number:	See configuration	Barometric Pres.:	1022 mbar	
EUT:	RCKF2B			
Configuration:	2			
Customer:	Continental Automotive Systems Inc.			
Attendees:	None			
EUT Power:	12 VDC			
Operating Mode:	Continuous Tx, CW, 433.92 MHz			
Deviations:	None			
Comments:	Testing performed using worstcase orientations determined from pre-compliance testing.			
	Measurements at a power setting of 0x71 are associated with the NIS_BDL4_RKE 4.096 kbit/s data rate, which has a duty cycle of 33.162%. Measurements at a power setting of 0x5D are associated with the NIC_PASE_CMFB 9.600 kbits/s data rate which has a duty cycle of 55%			

Test Specifications	Test Method
FCC 15.231:2021	ANSI C63.10:2013

Run #	32	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
433.925	65.1	24.1	1.0	140.0	-9.6	0.0	Horz	AV	0.0	79.6	80.8	-1.2	EUT Horz, Power setting = 0x71
433.923	60.0	24.1	1.0	140.0	-5.2	0.0	Horz	AV	0.0	78.9	80.8	-1.9	EUT Horz, Power setting = 0x5D
433.923	64.2	24.1	1.0	160.0	-9.6	0.0	Vert	AV	0.0	78.7	80.8	-2.1	EUT Vert, Power setting = 0x71
433.925	59.5	24.1	1.0	157.0	-5.2	0.0	Vert	AV	0.0	78.4	80.8	-2.4	EUT Vert, Power setting = 0x5D
433.925	65.1	24.1	1.0	140.0	0.0	0.0	Horz	PK	0.0	89.2	100.8	-11.6	EUT Horz, Power setting = 0x71
433.923	64.2	24.1	1.0	160.0	0.0	0.0	Vert	PK	0.0	88.3	100.8	-12.5	EUT Vert, Power setting = 0x71
433.923	60.0	24.1	1.0	140.0	0.0	0.0	Horz	PK	0.0	84.1	100.8	-16.7	EUT Horz, Power setting = 0x5D
433.925	59.5	24.1	1.0	157.0	0.0	0.0	Vert	PK	0.0	83.6	100.8	-17.2	EUT Vert, Power setting = 0x5D

SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2020.06.24.2

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Continuous Tx, FSK, 433.920 MHz

POWER SETTINGS INVESTIGATED

12 VDC

CONFIGURATIONS INVESTIGATED

ONMS0003 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz Stop Frequency 5000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2020-06-25	2021-06-25
Antenna - Biconilog	EMCO	3141	AXG	2019-07-23	2021-07-23
Antenna - Double Ridge	EMCO	3115	AHC	2020-07-01	2022-07-01
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	2020-11-17	2021-11-17
Amplifier - Pre-Amplifier	Miteq	AMF-3D-	PAG	2020-11-17	2021-11-17
Cable	N/A	Bilog Cables	EVA	2020-11-17	2021-11-17
Cable	N/A	ble Ridge Horn Ca	EVB	2020-11-17	2021-11-17
Attenuator	Coaxicom	3910-10	AWX	2021-02-15	2022-02-15
Filter - Low Pass	Micro-Tronics	LPM50004	LFD	2021-02-15	2022-02-15
Power Supply - DC	Topward	TPS-2000	TPD	NCR	NCR

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequency in each operational band and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These "pre-scans" are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Average Detector

A CISPR quasi-peak detector was used for measurements at or below 1 GHz. A PK and AV detector was used above 1 GHz, a resolution bandwidth of 1 MHz and a video bandwidth of 3 MHz was used.

SPURIOUS RADIATED EMISSIONS

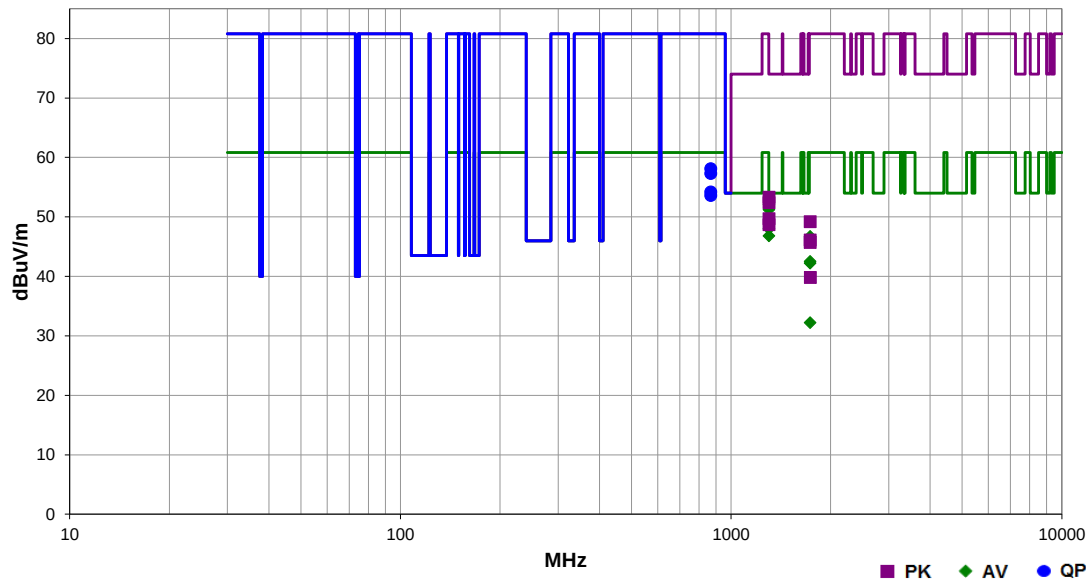


EmiRS 2021.01.08.0 PSA-ESCI 2021.03.17.0

Work Order:	ONMS0003	Date:	2021-04-12	
Project:	None	Temperature:	23.2 °C	
Job Site:	EV01	Humidity:	26% RH	
Serial Number:	See Configuration	Barometric Pres.:	1024 mbar	Tested by: Jeff Alcock
EUT:	RCKF2B			
Configuration:	2			
Customer:	Continental Automotive Systems Inc.			
Attendees:	None			
EUT Power:	12 VDC			
Operating Mode:	Continuous Tx, FSK, 433.920 MHz, 100% duty cycle			
Deviations:	None			
Comments:	Measurements performed using worst case orientation determined from pre-compliance testing. See comments below for EUT orientation, data rate, and power setting.			

Test Specifications	Test Method
FCC 15.231:2021	ANSI C63.10:2013

Run #	30	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
1301.768	59.2	-7.1	1.0	217.0	3.0	0.0	Horz	AV	0.0	52.1	54.0	-1.9	EUT Horz, 4.096 kbits/s, Power = 0x71
1301.768	58.3	-7.1	1.16	24.0	3.0	0.0	Vert	AV	0.0	51.2	54.0	-2.8	EUT on Side, 4.096 kbits/s, Power = 0x71
1301.768	55.1	-7.1	1.0	216.0	3.0	0.0	Horz	AV	0.0	48.0	54.0	-6.0	EUT Horz, 9.600 kbits/s, Power = 0x5D
1301.768	53.9	-7.1	1.16	24.0	3.0	0.0	Vert	AV	0.0	46.8	54.0	-7.2	EUT on Side, 9.600 kbits/s, Power = 0x5D
1735.688	51.4	-4.7	1.32	208.0	3.0	0.0	Horz	AV	0.0	46.7	60.8	-14.1	EUT Horz, 4.096 kbits/s, Power = 0x71
1735.688	47.2	-4.7	1.32	208.0	3.0	0.0	Horz	AV	0.0	42.5	60.8	-18.3	EUT Horz, 9.600 kbits/s, Power = 0x5D
1735.688	46.9	-4.7	1.02	93.0	3.0	0.0	Vert	AV	0.0	42.2	60.8	-18.6	EUT on Side, 4.096 kbits/s, Power = 0x71
1301.702	60.4	-7.1	1.0	217.0	3.0	0.0	Horz	PK	0.0	53.3	74.0	-20.7	EUT Horz, 4.096 kbits/s, Power = 0x71
1301.877	59.5	-7.1	1.16	24.0	3.0	0.0	Vert	PK	0.0	52.4	74.0	-21.6	EUT on Side, 4.096 kbits/s, Power = 0x71
867.927	36.0	12.1	1.0	132.0	3.0	10.0	Horz	QP	0.0	58.1	80.8	-22.7	EUT Horz, 4.096 kbits/s, Power = 0x71
867.925	35.2	12.1	1.01	203.0	3.0	10.0	Vert	QP	0.0	57.3	80.8	-23.5	EUT on Side, 4.096 kbits/s, Power = 0x71
1301.993	56.8	-7.1	1.0	216.0	3.0	0.0	Horz	PK	0.0	49.7	74.0	-24.3	EUT Horz, 9.600 kbits/s, Power = 0x5D
1301.668	55.8	-7.1	1.16	24.0	3.0	0.0	Vert	PK	0.0	48.7	74.0	-25.3	EUT on Side, 9.600 kbits/s, Power = 0x5D
867.925	32.1	12.1	1.0	132.0	3.0	10.0	Horz	QP	0.0	54.2	80.8	-26.6	EUT Horz, 9.600 kbits/s, Power = 0x5D
867.927	31.5	12.1	1.01	203.0	3.0	10.0	Vert	QP	0.0	53.6	80.8	-27.2	EUT on Side, 9.600 kbits/s, Power = 0x5D
1735.688	36.9	-4.7	1.02	93.0	3.0	0.0	Vert	AV	0.0	32.2	60.8	-28.6	EUT on Side, 9.600 kbits/s, Power = 0x5D
1735.780	53.9	-4.7	1.32	208.0	3.0	0.0	Horz	PK	0.0	49.2	80.8	-31.6	EUT Horz, 4.096 kbits/s, Power = 0x71
1735.447	50.8	-4.7	1.32	208.0	3.0	0.0	Horz	PK	0.0	46.1	80.8	-34.7	EUT Horz, 9.600 kbits/s, Power = 0x5D
1735.472	50.4	-4.7	1.02	93.0	3.0	0.0	Vert	PK	0.0	45.7	80.8	-35.1	EUT on Side, 4.096 kbits/s, Power = 0x71
1736.088	44.5	-4.7	1.02	93.0	3.0	0.0	Vert	PK	0.0	39.8	80.8	-41.0	EUT on Side, 9.600 kbits/s, Power = 0x5D

OCCUPIED BANDWIDTH



XMit 2020.03.25.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Biconilog	EMCO	3141	AXG	23-Jul-19	23-Jul-21
Cable	N/A	Bilog Cables	EVA	17-Nov-20	17-Nov-21
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFO	25-Jun-20	25-Jun-21
Power Supply - DC	Topward	TPS-2000	TPD	NCR	NCR

TEST DESCRIPTION

The EUT was transmitting at its maximum data rate.

The 20 dB occupied bandwidth is required to be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz.

OCCUPIED BANDWIDTH

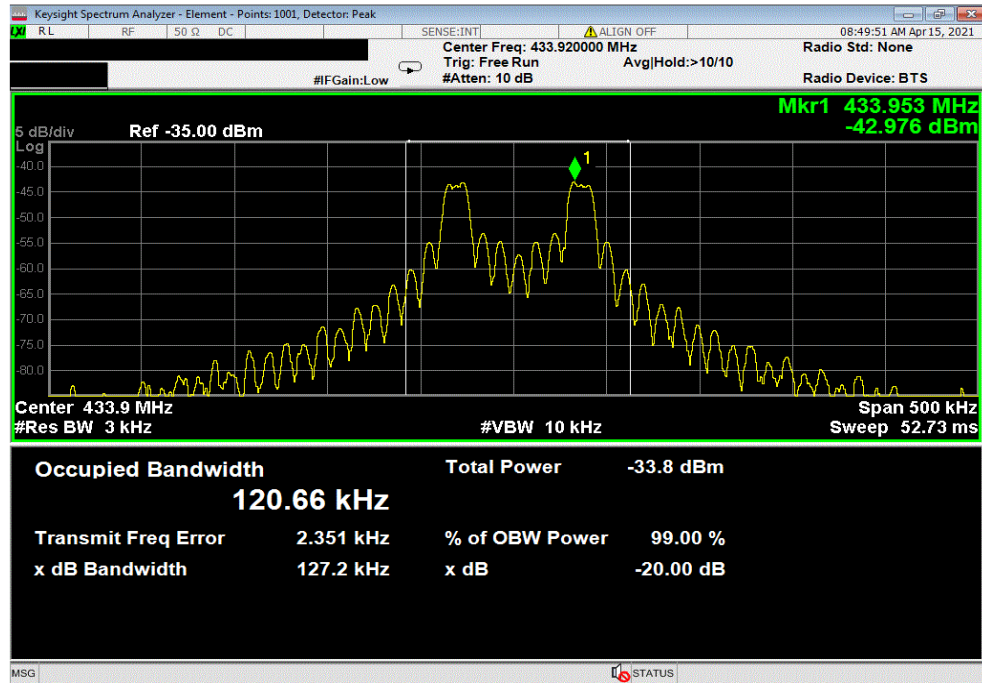


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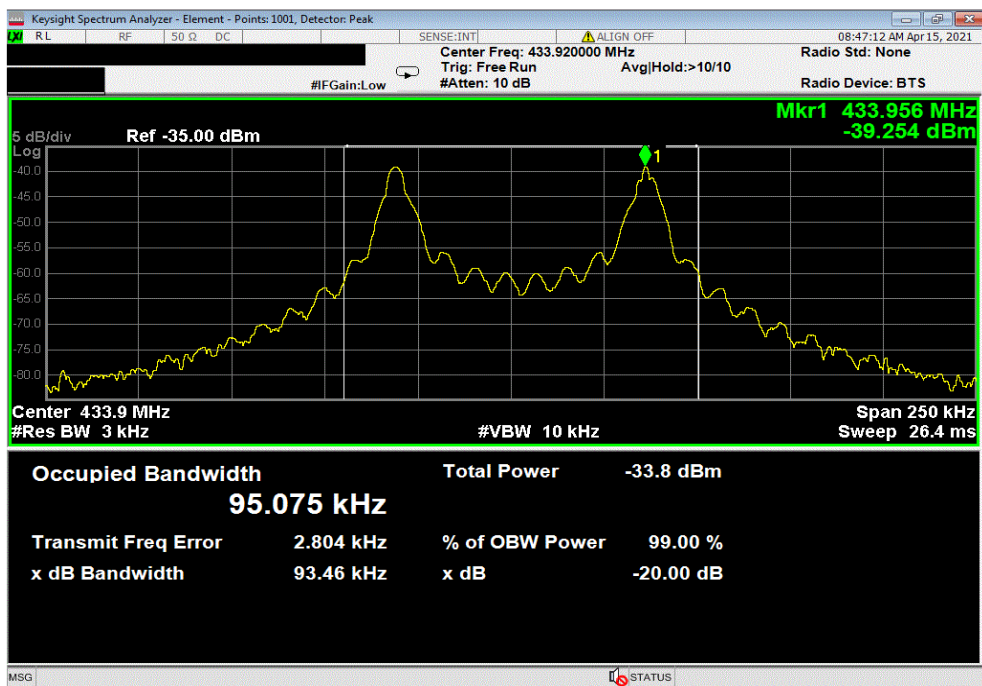
EUT: RCKF2B		Work Order: ONMS0003	
Serial Number: RCKF15-0521-E45F-BAA5		Date: 15-Apr-21	
Customer: Continental Automotive Systems Inc.		Temperature: 23.7 °C	
Attendees: None		Humidity: 32.5% RH	
Project: None		Barometric Pres.: 1021 mbar	
Tested by: Jeff Alcock	Power: 12 VDC	Job Site: EV01	
TEST SPECIFICATIONS		Test Method	
FCC 15.231:2020		ANSI C63.10:2013	
COMMENTS			
The 20 dB limit is = 433.92 MHz * 0.0025 = 1.0848 MHz			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	2	Signature 	
		Value (kHz)	Limit (kHz) Result
FSK, 433.92 MHz			
NIS_PASE_CMFB, 9.600 kbps		127.2	≤ 1084.8 Pass
NIS_BDL4_RKE, 4.069 kbps		93.46	≤ 1084.8 Pass

OCCUPIED BANDWIDTH

FSK, 433.92 MHz, NIS_PASE_CMFB, 9.600 kbps						
				Value (kHz)	Limit (kHz)	Result
				127.2	≤ 1084.8	Pass



FSK, 433.92 MHz, NIS_BDL4_RKE, 4.069 kbps						
				Value (kHz)	Limit (kHz)	Result
				93.46	≤ 1084.8	Pass



DUTY CYCLE



XMit 2020.03.25.0

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TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Probe - Near Field Set	Com-Power	PS-400	IPQ	NCR	NCR
Power Supply - DC	Topward	TPS-2000	TPD	NCR	NCR
Cable	Micro-Coax	UFD150A-1-0720-200200	EVK	13-Mar-20	13-Mar-21
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	13-Dec-19	13-Dec-20

TEST DESCRIPTION

For software controlled or pre-programmed devices, the manufacturer shall declare the duty cycle class or classes for the equipment under test. For manually operated or event dependent devices, with or without software controlled functions, the manufacturer shall declare whether the device once triggered, follows a pre-programmed cycle, or whether the transmission is constant until the trigger is released or manually reset. The manufacturer shall also give a description of the application for the device and include a typical usage pattern. The typical usage pattern as declared by the manufacturer shall be used to determine the duty cycle and hence the duty class.

Where an acknowledgement is required, the additional transmitter on-time shall be included and declared by the manufacturer.

To derive average emission measurements, a duty cycle correction factor was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where "On time" = $N1L1 + N2L2 + \dots$

Where $N1$ is the number of type 1 pulses, $L1$ is length of type 1 pulses, $N2$ is the number of type 2 pulses, $L2$ is the length of type 2 pulses, etc.

Therefore, Duty Cycle = $(N1L1 + N2L2 + \dots)/100\text{mS}$ or T , whichever is less. (Where T is the period of the pulse train.)

The measured values for the EUT's pulse train are as follows:

NIS_PASE_CMFB, 9.6 kbps:

Period = 100 mSec
Pulsewidth of Type 1 Pulse = 55 mSec
Number of Type 1 Pulses = 1

Duty Cycle Correction Factor = $20 \log \left[\frac{(1)(55 \text{ mS})}{100 \text{ mSec}} \right] = -5.2 \text{ dB}$

NIS_BLD4_RKE, 4.096 kbps:

Period = 100 mSec
Pulsewidth of Type 1 Pulse = 33.162 mSec
Number of Type 1 Pulses = 1

Duty Cycle Correction Factor = $20 \log \left[\frac{(1)(33.162 \text{ mS})}{100 \text{ mSec}} \right] = -9.6 \text{ dB}$

The duty cycle correction factor of -5.2 or -9.6 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz.

DUTY CYCLE



XMIT 2020 03.25.0

EUT: RCKF2B		Work Order: ONMS0001	
Serial Number: Engineering Sample #1		Date: 23-Oct-20	
Customer: Continental Automotive Systems Inc.		Temperature: 23.5 °C	
Attendees: None		Humidity: 33.7% RH	
Project: None		Barometric Pres.: 1017 mbar	
Tested by: Jeff Alcock	Power: 12 VDC	Job Site: EV01	
TEST SPECIFICATIONS		Test Method	
FCC 15.231:2020		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Pulse Width (ms)	Period (ms)
			On Time in 100 ms (ms)
			Result
FSK, 433.92 MHz			
NIS_PASE_CMFB, 9.600 kbps			
Sweep Time			
	10s	-	-
	500ms	55	55
NIS_BDL4_RKE, 4.069 kbps			
Sweep Time			
	10s	-	-
	500ms	31.162	102.072
			31.162
			-

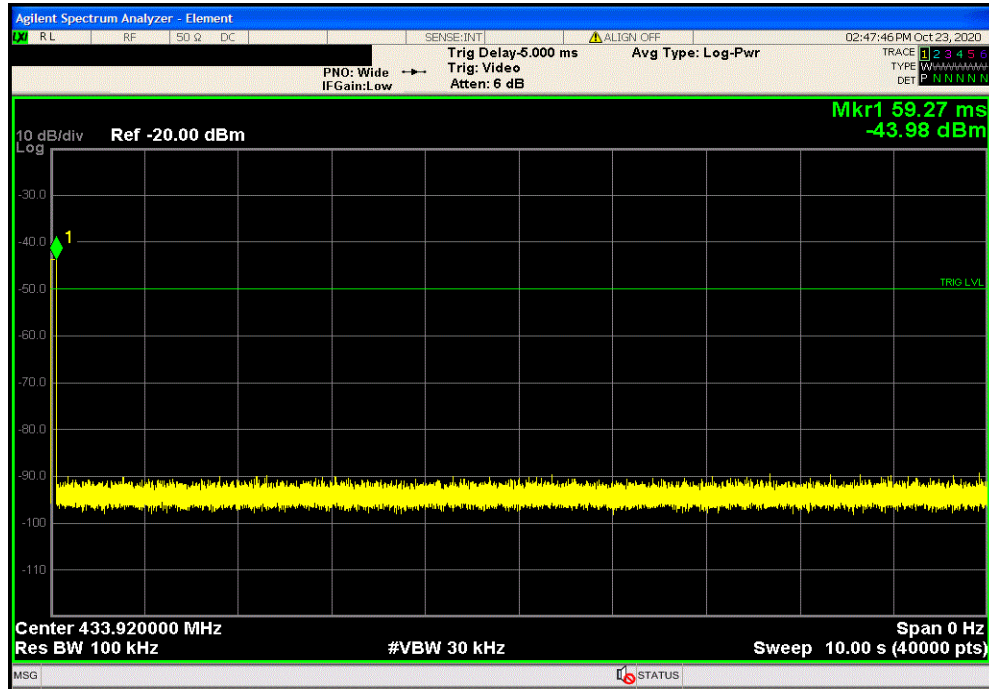
DUTY CYCLE



XMR 2020.03.25.0

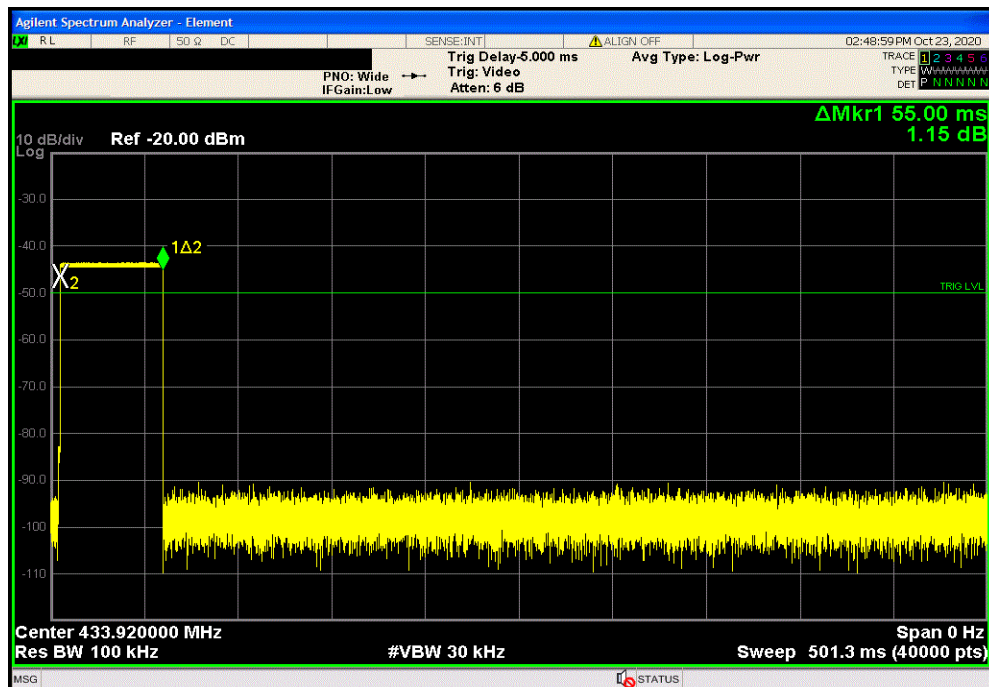
FSK, 433.92 MHz, NIS_PASE_CMFB, 9.600 kbps, Sweep Time, 10s

Pulse Width (ms)	Period (ms)	On Time in 100 ms (ms)	Result
-	-	-	-



FSK, 433.92 MHz, NIS_PASE_CMFB, 9.600 kbps, Sweep Time, 500ms

Pulse Width (ms)	Period (ms)	On Time in 100 ms (ms)	Result
55	-	55	-

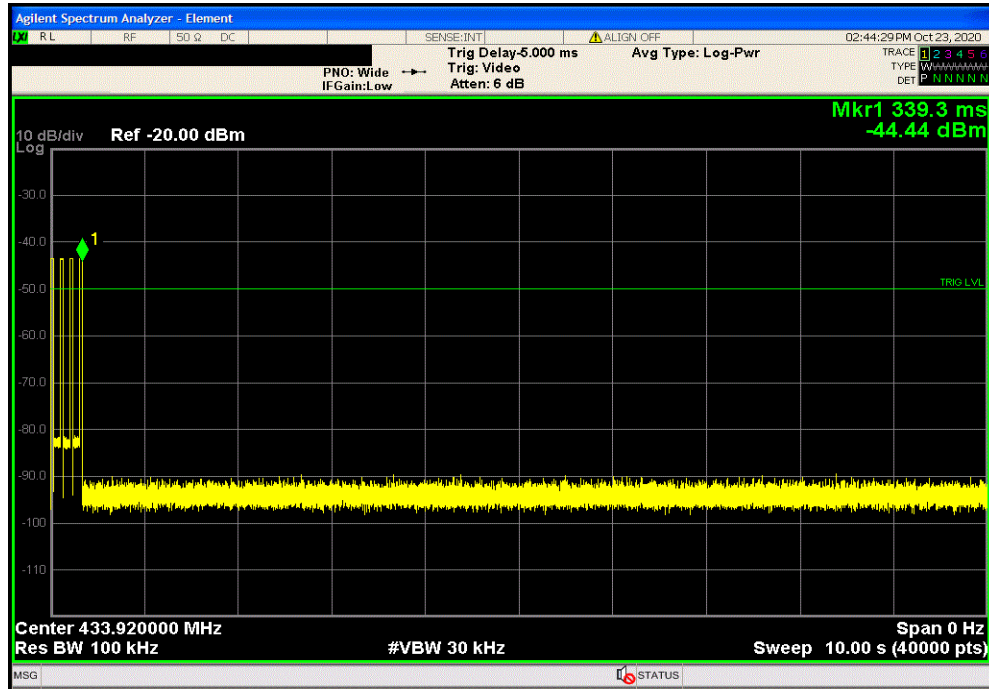


DUTY CYCLE



XMR 2020.03.25.0

FSK, 433.92 MHz, NIS_BDL4_RKE, 4.069 kbps, Sweep Time, 10s						
	Pulse Width	Period	On Time in	Result		
	(ms)	(ms)	100 ms (ms)			
	-	-	-			



FSK, 433.92 MHz, NIS_BDL4_RKE, 4.096 kbps, Sweep Time, 500ms						
	Pulse Width	Period	On Time in	Result		
	(ms)	(ms)	100 ms (ms)			
	31.162	102.072	31.162			

