

Test report No:
77830REM.004A1

Test report

FCC Rules and Regulations CFR 47, Part 15, Subpart B and C(15.207)
(10-1-23 Edition) & ICES-003 Issue 7 (October 2020)

(*) Identification of item tested	e-bike user interface controller
(*) Trademark	Bosch
(*) Model and /or type reference	BRC3600 / LED Remote
Other identification of the product	FCC ID: 2AWRC-BRC3600 IC: 26294-BRC3600
(*) Features	Features: Bluetooth Low Energy HW version: 8.0.2 SW version: 13.3.0
Manufacturer	Robert Bosch GmbH Tübinger Str.123 72757 Reutlingen Germany
Test method requested, standard	FCC Rules and Regulations CFR 47, Part 15, Subpart B and C (10-1-23 Edition) & ICES-003 Issue 7 (October 2020)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Antonio José Jurado Industrial & Automotive EMC Lab. Manager 80157242B ANTONIO JOSE JURADO (CA29507456) Firmado digitalmente por 80157242B ANTONIO JOSE JURADO (CA29507456) Fecha: 2024.08.14 12:45:12 +02'00'
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Acronyms

Acronym ID	Acronym Description
Code	EMC Test Code
Freq Rng	Frequency Range
Line	Conducted Emissions - Tested Line
MP	Measurement Point
OM	Operation Mode
S/	Sample
V	Verdict

Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the measured conducted disturbance characteristics of EUT from 150 kHz to 30 MHz is $I = \pm 3,9$ dB for quasi-peak measurements, $I = \pm 3,2$ dB for peak measurements ($k = 2$).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 30 MHz to 1000 MHz is $I = \pm 4,9$ dB for quasi-peak measurements, $I = \pm 4,6$ dB for peak measurements ($k = 2$).

The total uncertainty of the measurement system for the measured radio disturbance characteristics of EUT from 1000 MHz to 12.75 GHz is $I = \pm 2,6$ dB for peak and average measurements ($k = 2$).

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample consists of e-bike user interface controller. e-bike user interface controller with BLE.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial N°	Date of Reception	Application
S/01	77830C_60.1	eBike Display RADIATED	BCR3600	43829-0004	2024-03-22	Element Under Test
S/01	77830C_14.1	Cable HMI BCH3611_1500	--	--	2024-03-19	Auxiliary Element
S/01	77830C_1.1	Opto CAN-FD Transceiver	TJA1044GT	23-035697	2024-03-19	Auxiliary Element
S/01	77830C_14.1	Cable HMI BCH3611_1500			2024-03-19	Auxiliary Element
S/01	77830C_2.1	Opto CAN-FD Transceiver	TJA1044GT	23-035698	2024-03-19	Auxiliary Element
S/01	77830C_20.1	Optical Fiber Cable	20M	--	2024-03-19	Auxiliary Element
S/01	77830C_40.1	USB - CAN adapter	--	--	2024-03-20	Auxiliary Element
S/01	77830C_81.1	USB - CAN adapter	--	--	2024-04-22	Auxiliary Element
S/01	77830C_90.1	USB cable	--	--	2024-04-22	Auxiliary Element

Notes referenced to samples during the project:

Test sample description

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾		
	USB service port (USB-C interface for service)	<3m	[]	[]	[]		
	System cable connector (Supply+CAN FD) connected to ebike	<3m	[X]	[]	[]		
			[]	[]	[]		
			[]	[]	[]		
			[]	[]	[]		
			[]	[]	[]		
Supplementary information to the ports..... :							
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	[]	AC:	[]	[]	[]	[]	[]
	[]	AC:	[]	[]	[]	[]	[]
	[X]	DC: USB port, nom. 5VDC					
[X]	DC: System cable, nom. 13,5VDC						
Rated Power	System cable: max. 2,7W (13,5V/0,2A) / USB port: max. 2,5W (5V/0,5A)						
Clock frequencies.....:	110MHz, 55MHz, 48MHz, 2MHz, 1.1MHz						
Other parameters							
Software version	13.3.0						
Hardware version	8.0.2						
Dimensions in cm (W x H x D)	72,8 x 53,2 x 34,3 mm						
Mounting position	[]	Table top equipment					
	[]	Wall/Ceiling mounted equipment					

	☐	Floor standing equipment		
	☐	Hand-held equipment		
	☒	Other: Bicycle handlebar		
Modules/parts.....:	Module/parts of test item		Type	Manufacturer
				
				
				
				
Accessories (not part of the test item)	Description		Type	Manufacturer
				
				
				
				
				
				
Documents as provided by the applicant	Description		File name	Issue date
				
				
				
				

⁽³⁾ Only for Medical Equipment

Identification of the client

Robert Bosch GmbH
Markwiesenstraße 58 72770 Reutlingen Germany

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2024-04-09
Date (finish)	2024-05-08

Document history

Report number	Date	Description
77830REM.004	2024-08-1409	First release
77830REM.004A1	2024-08-14	Second release. It is included the spectrum analyzer settings used. This report modification cancels and replaces the test report with NIE:77830REM.004.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860mbar Max. = 1060mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 30 % Max. = 60 %
Air pressure	Min. = 860mbar Max. = 1060mbar

Remarks and comments

The tests have been performed by the technical personnel: Eduardo Gonzalez and Ismael Perez Dominguez.

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P
Partial Passed	P*

List of equipment used during the test

Control No.	Equipment	Model	Manufacturer	Next Calibration
06815	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2025-03-04
07816	EMI TEST RECEIVER 1Hz-26.5GHz	ESW26	ROHDE AND SCHWARZ	2025-12-21
04848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	---
09361	PRE-AMPLIFIER G>40dB 1-18 GHz	BLMA 0118-1M	BONN ELEKTRONIK	2024-06-12
07743	HORN ANTENNA 0,75-18GHz	3115	ETS LINDGREN	2026-08-22
07614	SEMIANECHOIC ABSORBER LINED CHAMBER V	FACT 3 200 STP	ETS LINDGREN	--
07553	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2025-04-09
06204	THREE-PHASE ARTIFICIAL NETWORK 32A	PMM L3-32	NARDA	2025-02-06

Summary

Test Specification	Requirement – Test case	Verdict	Remark
FCC CFR 47, Part 15, Subpart B (10-1-23 Edition) & ICES-003 Issue 7 (October 2020)	RE Radiated emission. Electromagnetic field measure	Pass	--
FCC CFR 47, Part 15, Subpart B and Subpart C (15.207) (10-1-23 Edition)	CE Continuous conducted emission	Pass	--
<u>Supplementary information and remarks:</u> None			

Appendix A: Test results

Appendix A content

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CE Continuous conducted emission21

Description of the operation modes

The operation modes described in this paragraph constitute a functionality of the sample under test for itself.
The operation modes used by the samples to which the present report refers, are shown in the following table:

Id	Description
OM/01	EUT ON. BLE OFF. Communication CAN activated. Power supply EUT: 13.5 Vdc + Auxiliary Power Supply: 115 VAC (Laptop). Equipment in communication with Laptop through USB.
OM/02	EUT ON. BLE OFF. Communication CAN activated. Power supply: 13.5 Vdc.
OM/03	EUT ON. BLE ON in communication with auxiliary Mobile Phone. Communication CAN activated. Power supply EUT: 13.5 Vdc + Auxiliary Power Supply: 115 VAC (Laptop). Equipment in communication with Laptop through USB.

Test standards version applied

The product standards and test standards applied for each test cases are shown in the following table:

Product Test Standard	Test standard	Requirement – Test case
FCC CFR 47, Part 15, Subpart B (10-1-23 Edition) & ICES-003 Issue 7 (October 2020)	ANSI C63.4 (2014)	RE Radiated emission.
FCC CFR 47, Part 15, Subpart B and C (15.207) (10-1-23 Edition)	ANSI C63.4 (2014)	CE Continuous conducted emission

Test Cases Details

FCC 47 CFR Part 15B

RE Radiated emission. Electromagnetic field measure

Limits

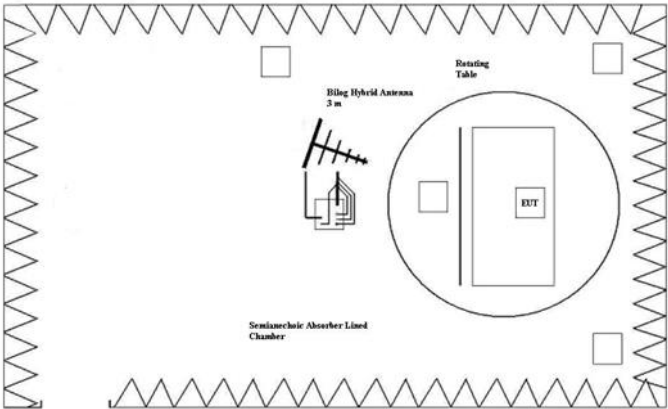
Limits of interference Class B

The applied limit for radiated emissions, 3 m distance, according to the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B (10-1-21 Edition), Secs. 15.109 & ICES-003 Issue 7 (October 2020)

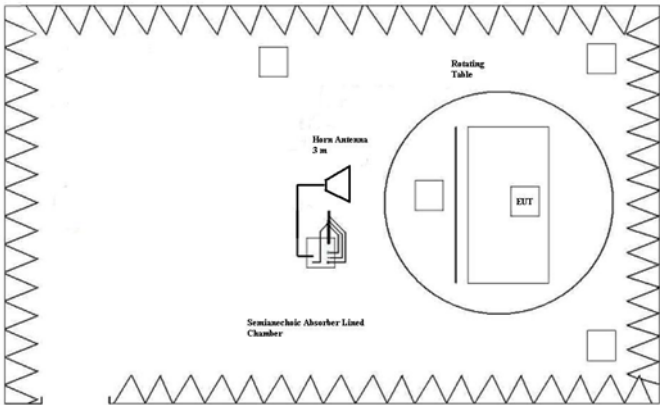
Frequency range (MHz)	FCC Part 15B		ICES-003 Issue 7		FCC Part 15B & ICES-003 Issue 7	
	QP Limit for 3 m		QP Limit for 3 m		PK Limit for 3 m	AVG Limit for 3 m
	(μ V/m)	(dB μ V/m)	(μ V/m)	(dB μ V/m)	(dB μ V/m)	(dB μ V/m)
30 to 88	100	40	100	40	---	---
88 to 216	150	43.5	150	43.5	---	---
216 to 230	200	46	200	46	---	---
230 to 960	200	46	224	47	---	---
960 to 1000	500	54	500	54	---	---
Above 1000	---	---	---	---	74	54

NOTE: FCC QP and AVG limits are in concordance with RSS-Gen Issue 5 (March 2019), Secs. 7.1 and 7.3.
Limits according to FCC Part 15B, are equal or more stringent than those of ICES-003 Issue 7.

Setup for measurements



Setup for measurements < 1GHz.



Setup for measurements > 1GHz.

Results

S/	OM	Code	Freq Rng (MHz)	V
01	OM/01	RE0101LR	[30, 1000]	P
01	OM/01	RE0101HR	[1000, 12750]	P

Analyzer parameters:

	Subrange	Step Size	IF Bandwidth	Measurement Time	Preamp
	Receiver: [ESW 26]				
	30 MHz - 1 GHz	40 kHz	120 kHz	10 ms	20 dB
	1 GHz – 18 GHz	400 kHz	1 MHz	10 ms	0 dB

Verdict

Pass

Attachments

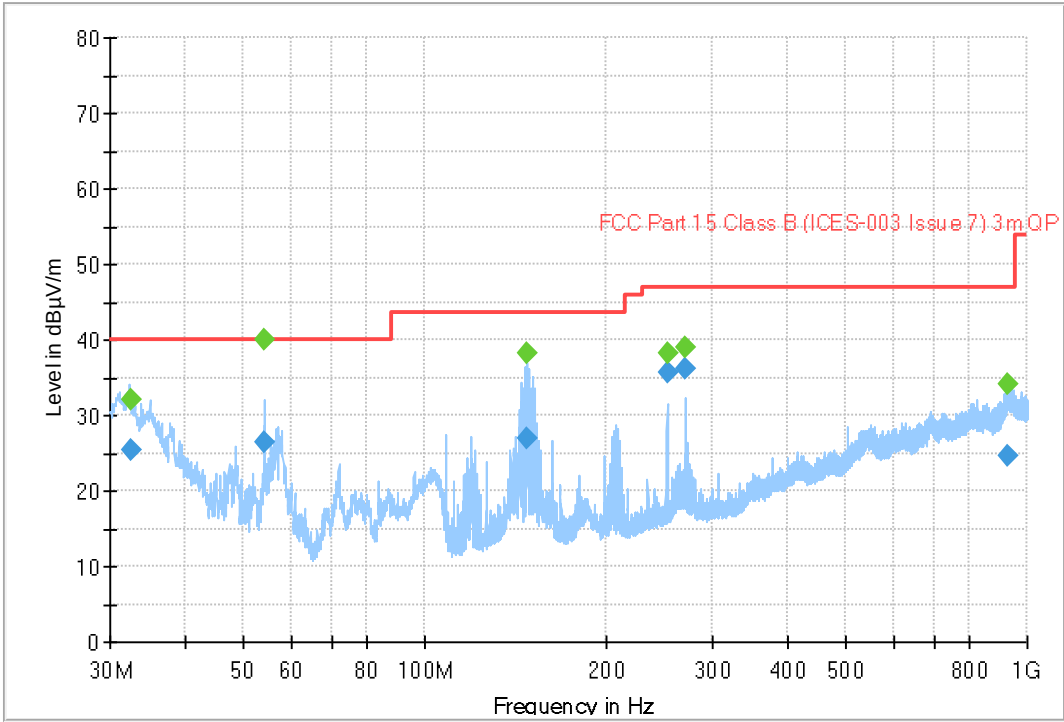
EMC Test Code = RE0101LR Frequency Range MHz = [30, 1000]

Sample ID: S/01

Operation Mode: OM/01

Images:

Full Spectrum



◆ Preview Result 1-PK+ Final_Result QPK ◆ FCC Part 15 Class B (ICES-003 Issue 7) 3mC Final_Result PK+

Tables:

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit(dBµV/m)	Margin(dB)	Meas. Time (s)	Height(cm)	Pol	Azimuth(deg)
32.622000	25.47	---	40.00	14.53	15.00	131.0	V	114.0
32.622000	---	31.97	---	---	15.00	131.0	V	114.0
54.087000	---	40.10	---	---	15.00	134.0	V	315.0
54.087000	26.48	---	40.00	13.52	15.00	134.0	V	315.0
147.746000	---	38.19	---	---	15.00	136.0	H	0.0
147.746000	26.96	---	43.52	16.56	15.00	136.0	H	0.0
252.393000	35.69	---	47.00	11.31	15.00	112.0	H	325.0
252.393000	---	38.18	---	---	15.00	112.0	H	325.0
270.449000	---	38.89	---	---	15.00	109.0	H	37.0
270.449000	36.15	---	47.00	10.85	15.00	109.0	H	37.0
930.984000	---	34.01	---	---	15.00	134.0	H	237.0
930.984000	24.68	---	47.00	22.32	15.00	134.0	H	237.0

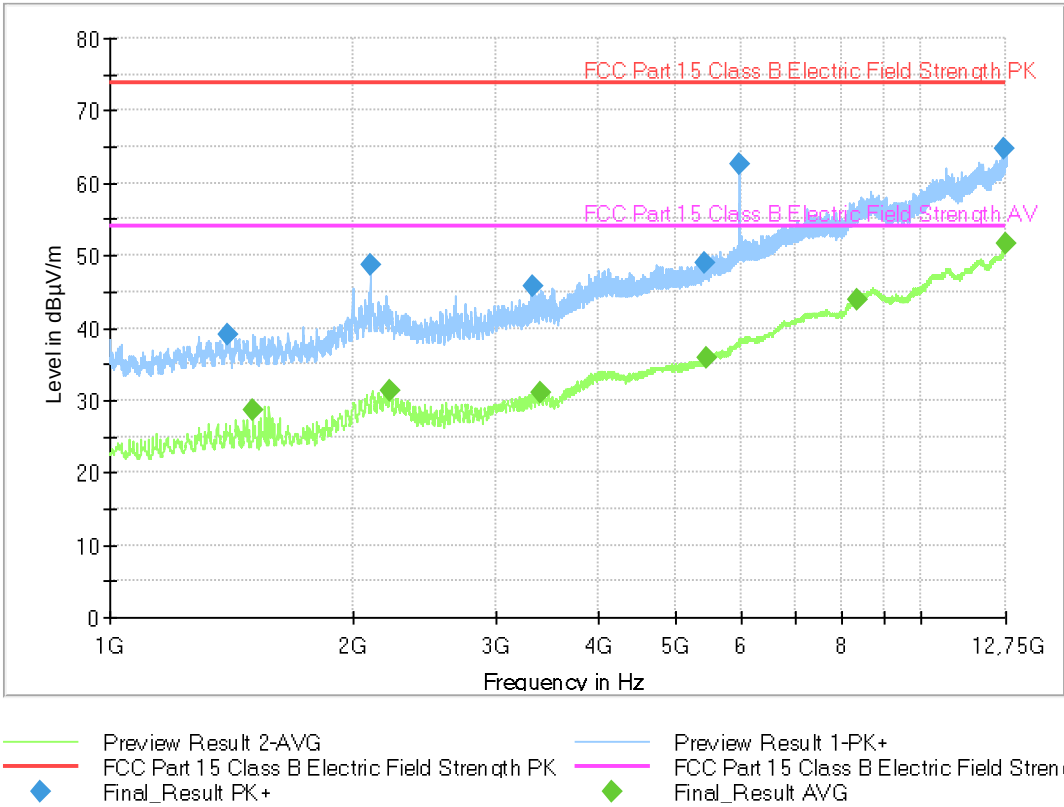
EMC Test Code = RE0101HR Frequency Range MHz = [1000, 12750]

Sample ID: S/01

Operation Mode: OM/01

Images:

Full Spectrum



Tables:

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1397.600000	38.99	---	73.97	34.98
1500.000000	---	28.64	53.97	25.33
2098.800000	48.69	---	73.97	25.28
2216.400000	---	31.27	53.97	22.70
3327.200000	45.76	---	73.97	28.21
3396.400000	---	31.12	53.97	22.85
5408.800000	48.99	---	73.97	24.98
5457.200000	---	35.78	53.97	18.19
5989.600000	62.60	---	73.97	11.37
8336.400000	---	44.00	53.97	9.97
12711.200000	64.64	---	73.97	9.33
12747.600000	---	51.75	53.97	2.22

CE Continuous conducted emission

Limits

Limits of interference Class B

The applied limit for continuous conducted emissions in power leads, according with the requirements of FCC Rules and Regulations 47 CFR Part 15, Subpart B & C (10-1-21 Edition), Secs. 15.107 & 15.207 & ICES-003 Issue 6 (April 2019), in the frequency range 0,15 to 30 MHz, for Class B equipment was:

Frequency range	Limit (dBµV)	
(MHz)	Quasi-Peak	Average
0,15 to 0,5	66 - 56	56 - 46
0,5 to 5	56	46
5 to 30	60	50

Results

S/	OM	Code	Freq Rng (MHz)	Line	V
01	OM/02	CE01020N	[0.15, 30]	N	P
01	OM/02	CE0102L1	[0.15, 30]	L1	P
01	OM/03	CE01030N	[0.15, 30]	N	P
01	OM/03	CE0103L1	[0.15, 30]	L1	P

Verdict

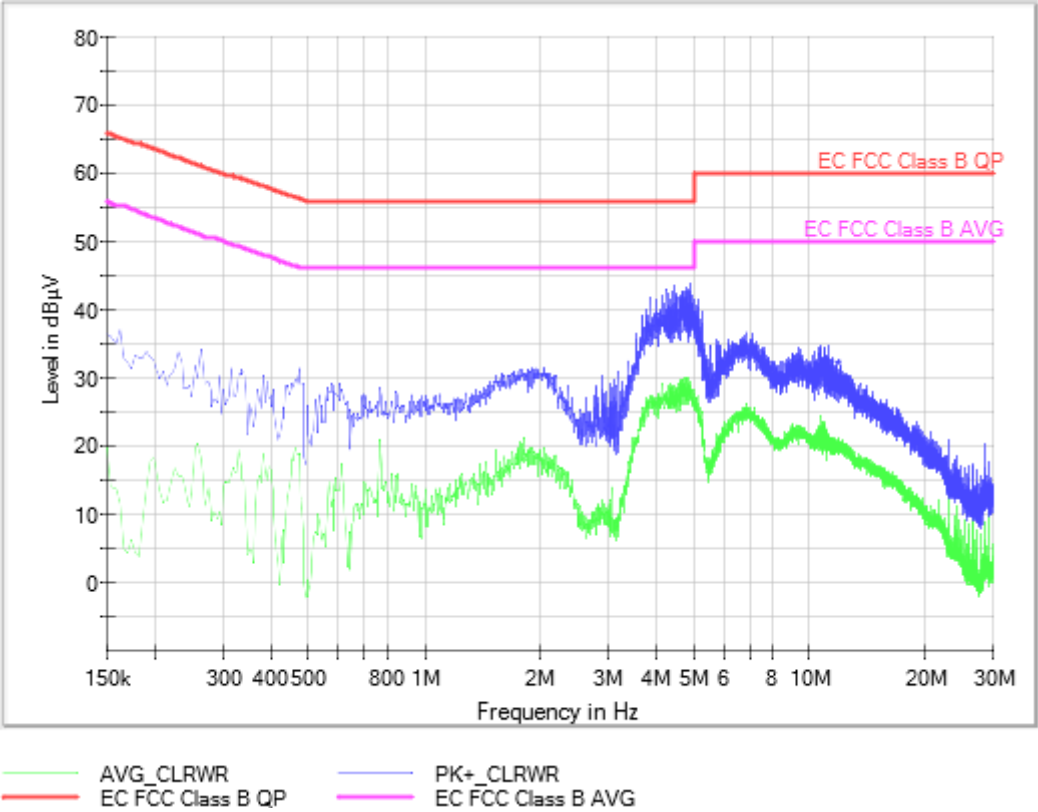
Pass

Attachments

EMC Test Code = CE01020N Frequency Range MHz = [0.15, 30]
Conducted Emissions - Tested Line = N

Sample ID: S/01
Operation Mode: OM/02

Images:



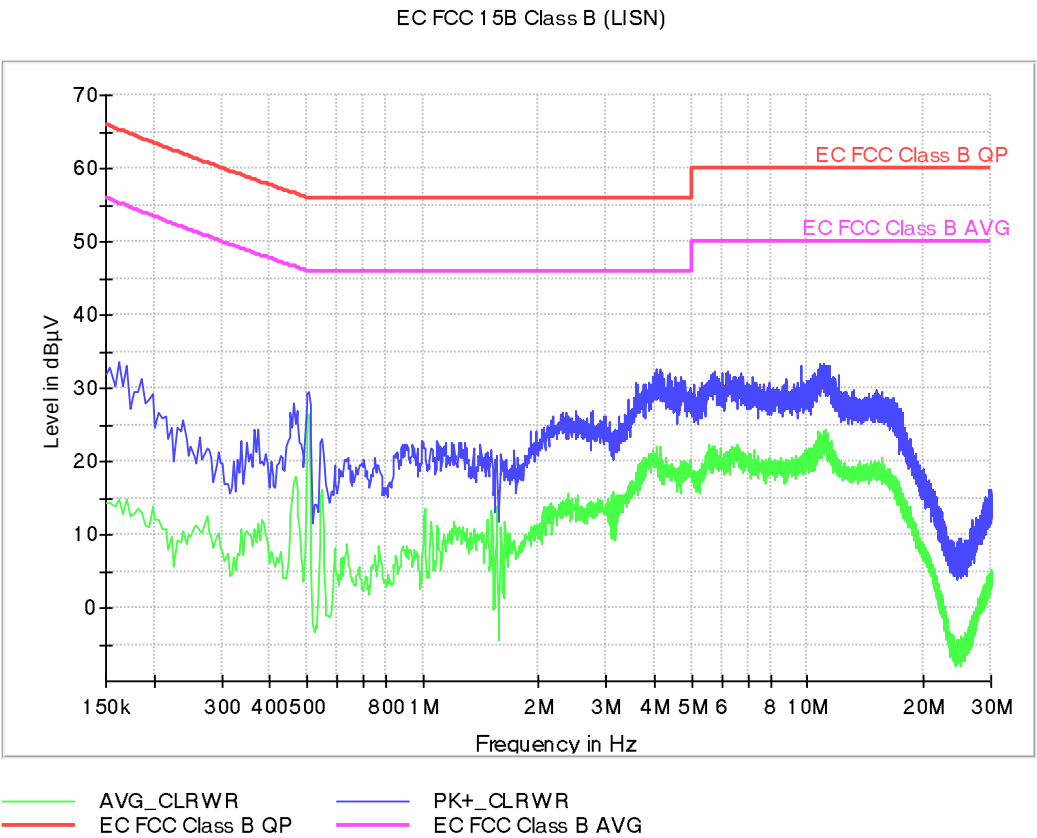
Tables:

Frequency (MHz)	PK+_CLRWR (dBµV)	AVG_CLRWR (dBµV)	Line
0.162000	37.3	11.5	N
0.262000	34.0	18.4	N
0.470000	31.5	18.6	N
0.770000	28.6	20.9	N
2.042000	31.8	18.1	N
3.554000	36.6	21.6	N
4.882000	44.1	29.6	N
6.910000	36.6	26.1	N
10.662000	34.7	21.7	N
19.222000	23.7	12.0	N

EMC Test Code = CE0102L1 Frequency Range MHz = [0.15, 30]
Conducted Emissions - Tested Line = L1

Sample ID: S/01
Operation Mode: OM/02

Images:



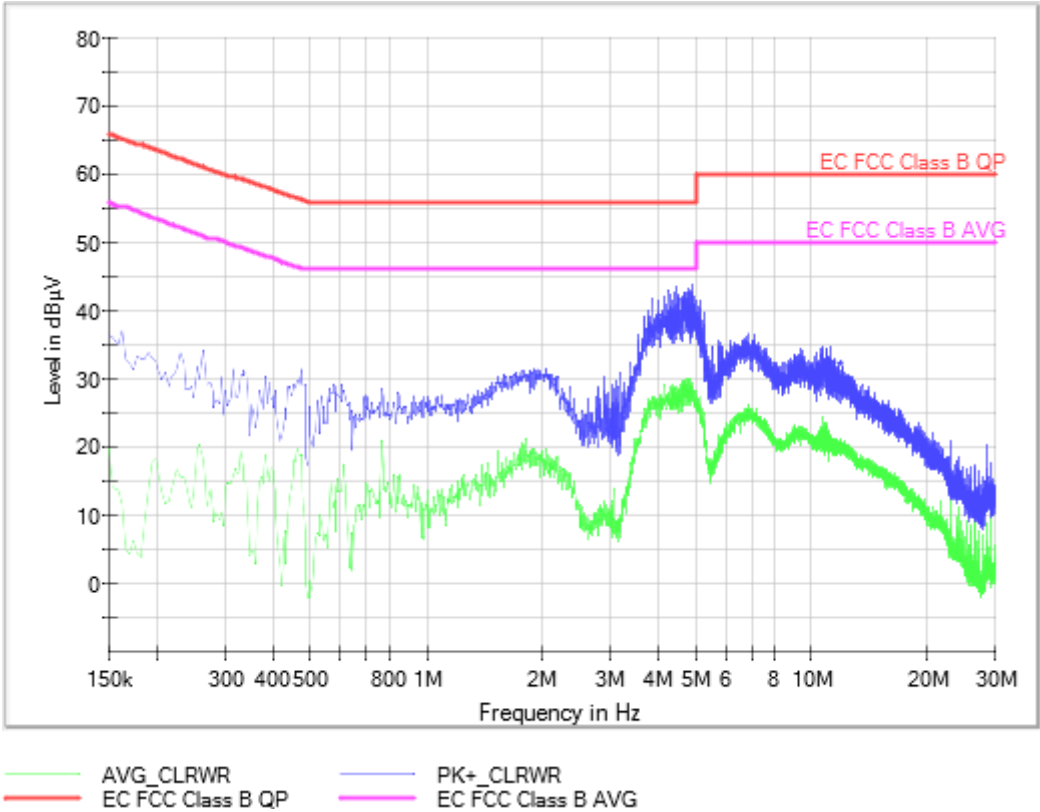
Tables:

Frequency (MHz)	PK+_CLRWR (dBµV)	AVG_CLRWR (dBµV)	Line
0.162000	33.7	14.8	L1
0.374000	24.4	11.6	L1
0.506000	29.4	26.3	L1
1.090000	22.9	11.2	L1
2.098000	24.9	13.9	L1
3.598000	30.7	18.2	L1
4.070000	32.6	22.1	L1
9.606000	33.0	20.2	L1
11.062000	33.4	23.9	L1
17.690000	25.3	14.4	L1

EMC Test Code = CE01030N Frequency Range MHz = [0.15, 30]
Conducted Emissions - Tested Line = N

Sample ID: S/01
Operation Mode: OM/03

Images:



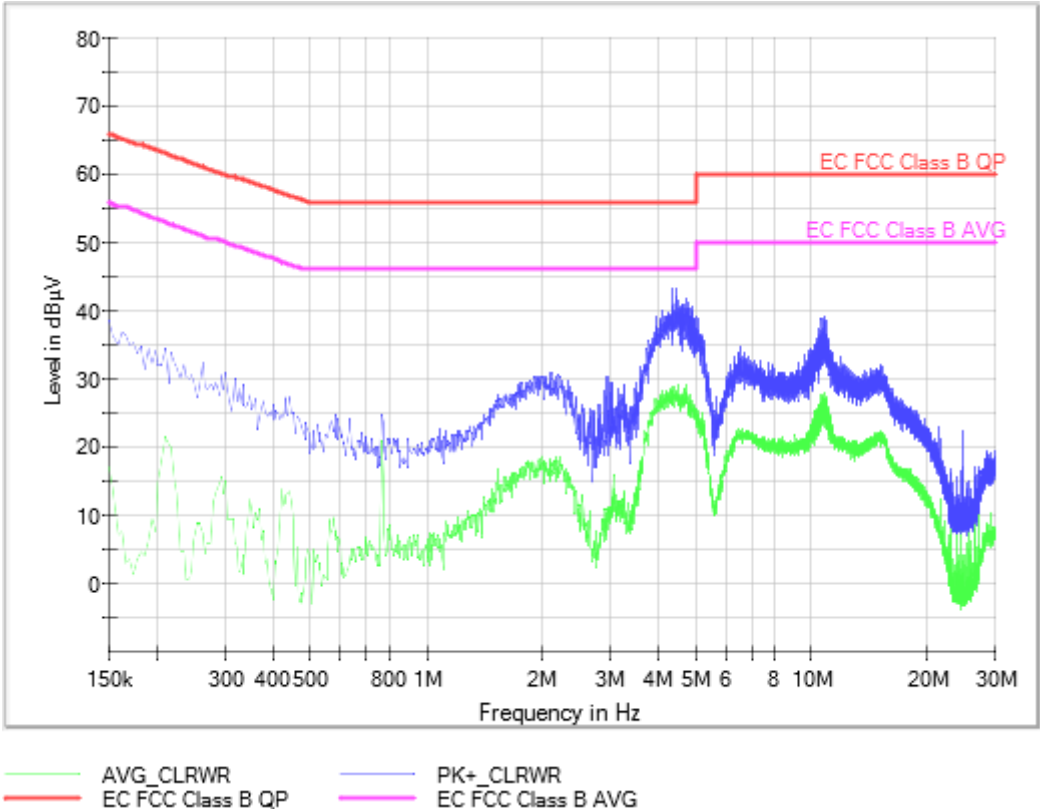
Tables:

Frequency (MHz)	PK+ CLRWR (dBµV)	AVG_CLRWR (dBµV)	Line
0.162000	37.3	11.5	N
0.262000	34.0	18.4	N
0.470000	31.5	18.6	N
0.770000	28.6	20.9	N
2.042000	31.8	18.1	N
3.554000	36.6	21.6	N
4.882000	44.1	29.6	N
6.910000	36.6	26.1	N
10.662000	34.7	21.7	N
19.222000	23.7	12.0	N

EMC Test Code = CE0103L1 Frequency Range MHz = [0.15, 30]
Conducted Emissions - Tested Line = L1

Sample ID: S/01
Operation Mode: OM/03

Images:



Tables:

Frequency (MHz)	PK+_CLRWR (dBµV)	AVG_CLRWR (dBµV)	Line
0.150000	38.5	16.9	L1
0.262000	32.5	7.5	L1
0.442000	27.2	13.4	L1
0.770000	24.9	20.9	L1
2.110000	31.0	17.5	L1
3.586000	32.0	18.2	L1
4.466000	43.4	28.2	L1
10.382000	36.2	23.0	L1
10.806000	39.4	28.0	L1
17.706000	26.3	16.0	L1