Radiated Emissions Test Report
for
Dot 2272 B5B12A (KRY 901 428/1) and Dot 2282 B5B12A (KRY 901 428/2)

Tested to: FCC Part 15 Subpart B / ICES 003 (Class B)
FCC Part 22 (Section 22.359(a))
FCC Part 27 (Section - 27.53(C))
RSS-Gen (Section 7.3)
RSS-130 (Section 4.7)
RSS-132 (Section 5.5 & 5.6)

Test Result summury

FCC/ ICES/ RSS Section	Description	Specification/Method	Pass or Fail	Results in section
15.109 / 6.2	Radiated Emissions (RE)	FCC Part 15 / ICES 003 / ANSI C63.4	Pass	3.2
15.107 / 6.1	Conducted Emissions (CE) for AC Power	FCC Part 15 / ICES 003 / ANSI C63.4	Not Applicable	
22.359 (a)	Out of band Emissions (RE)	FCC Part 22 / ANSI C63.26	Pass	3.2
27.53 (C)	Emissions Limits (RE)	FCC Part 27 / ANSI C63.26	Pass	3.2
7.3	Receiver Emissions Limits	RSS-Gen / ANSI C63.4	Pass	3.2
RSS-130 /4.7	Transmitter unwanted Emissions	RSS-130 / ANSI C63.26	Pass	3.2
RSS-132 / 5.5	Transmitter unwanted Emissions	RSS-132 / ANSI C63.26	Pass	3.2
RSS-132 / 5.6	Receiver Spurious Emissions	RSS-Gen / ANSI C63.4	Pass	3.2

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The release control record, document approvals, and laboratory Accreditations are as follows.

Release control record

This document is based on document template KG000347-TR-EMC-08-03.

Issue	Reason for change	Date released
01	initial release	14 June 2021

Approvals

Function	Name	Job title	Signature
Technical Reviewer	Scott Drysdale	Canada Wireless Manager	
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Accreditations

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1. Executive summary

This document reports the Electromagnetic Compatibility (EMC) testing performed on the product called Dot 2272 B5B12A (KRY 901 428/1) and Dot 2282 B5B12A (KRY 901 428/2) for Ericsson Canada per project number 7169009759. The objective of the test activities is to evaluate compliance of the product to following EMC regulatory standards.

The Dot 2272 B5B12A (KRY 901 428/1) and Dot 2282 B5B12A (KRY 901 428/2) is verified to comply with the Radiated Emissions requirements of these standards:

- FCC Part 15 Subpart B [6] (**Class B**)
- FCC Part 22 [7] (Emissions Limitations for public mobile services, Section 22.359(a))
- FCC Part 27 [8] (Digital Base Stations, Section - 27.53(C))
- ICES 003[9] (**Class B**)
- RSS-Gen [10] (Receiver emissions Limits, Section 7.3)
- RSS-130[11] (Transmitter unwanted Emissions, Section 4.7)
- RSS-132 [12] (Transmitter unwanted Emissions, Section 5.5)
- RSS-132[12] (Receiver Spurious Emissions, Section 5.6)

Information about the test result summary and, the equipment under test (EUT) is in the sections:

- Compliance summary
- Details of the equipment under test
- Detailed test results of Emissions

1.1 Compliance summary

The test results in this report apply only to the tested components that are identified in the section Assessed hardware.

The following table summarizes the EMC test results for the test cases performed on the Dot 2272 B5B12A (KRY 901 428/1) and Dot 2282 B5B12A (KRY 901 428/2).

Table 1: Summary of test results for the USA; FCC Part 15 subpart B

FCC Section	Description	Specification/Method	Pass or Fail	Results in section
15.109	Radiated Emissions (RE)	FCC Part 15/ANSI C63.4	Pass	3.2
15.107	Conducted Emissions (CE) for AC Power	FCC Part 15/ANSI C63.4	Not Applicable; EUT operates from POE (56 VDC).	

Table 2: Summary of test results for the USA; FCC Part 22

FCC Section	Description	Specification/Method	Pass or Fail	Results in section
22.359(a)	Emissions Limitations for public mobile services	FCC Part 22/ ANSI C63.26	Pass	3.2

Table 3: Summary of test results for the USA; FCC Part 27 subpart C

FCC Section	Description	Specification/Method	Pass or Fail	Results in section
27.53(C)	Transmitter Spurious Emissions (RE) – Digital Base Stations	FCC Part 27/ ANSI C63.26	Pass	3.2

Table 4: Summary of test results for Canada; ICES-003

ICES Section	Description	Specification/Method	Pass or Fail	Results in section
6.2	Radiated Emissions (RE)	ICES 003/ANSI C63.4	Pass	3.2
6.1	Conducted Emissions (CE) for AC Power	ICES 003/ANSI C63.4	Not Applicable; EUT operates from POE (56 VDC).	

Table 5: Summary of test results for RSS-Gen

RSS-Gen Section	Description	Specification/Method	Pass or Fail	Results in section
7.3	Receiver Radiated Emissions	RSS-Gen / ANSI C63.4	Pass	3.2
7.2	Conducted Emissions (CE) for AC Power	RSS-Gen / ANSI C63.4	Not Applicable; EUT operates from POE (56 VDC).	
7.4	Receiver Conducted Emissions	See antenna port conducted emissions in applicable test report		

Table 6: Summary of test results for the RSS-130

RSS-130 Section	Description	Specification/Method	Pass or Fail	Results in section
4.7	Transmitter unwanted Emissions	RSS-130 / ANSI C63.26	Pass	3.2

Table 7: Summary of test results for Canada, RSS-132

RSS-132 Section	Description	Specification/Method	Pass or Fail	Results in section
5.5	Transmitter unwanted Emissions	RSS-132 / ANSI C63.26	Pass	3.2
5.6	Receiver Spurious Emissions	RSS-132 / ANSI C63.26	Pass	3.2

2. Details of the equipment under test

This section describes the equipment under test (EUT).

2.1 Assessed hardware

The following table indicates the hardware components that were assessed during this test program.

Table 8: Assessed hardware

Hardware component [1]	Part number
DOT 2272 B5B12A, with internal Antenna	KRY 901 428/1
DOT 2282 B5B12A, with External Antenna	KRY 901 428/2
Table Notes	
1. The 2 units above use the same pcb and hardware. The only difference between the units is the presence of the internal/external antennas. Therefore all EMC tests were done only on the external Antenna port variant except except the Rx band testing (RSS-GEN section 7.3 & RSS 132 Section 5.6).	

2.2 Product overview

The products trade names are DOT 2272 B5B12A & DOT 2282 B5B12A. The DOT 2272 & DOT 2282 products are indoor wireless telecommunication products. They transmit and receives the cellular signals for 5G wireless systems; and operates from POE (56 VDC). This DOTs come in 2 variants as mention above in Table 8: Assessed hardware.

Figure 1: The EUT with internal antenna (DOT 2272)

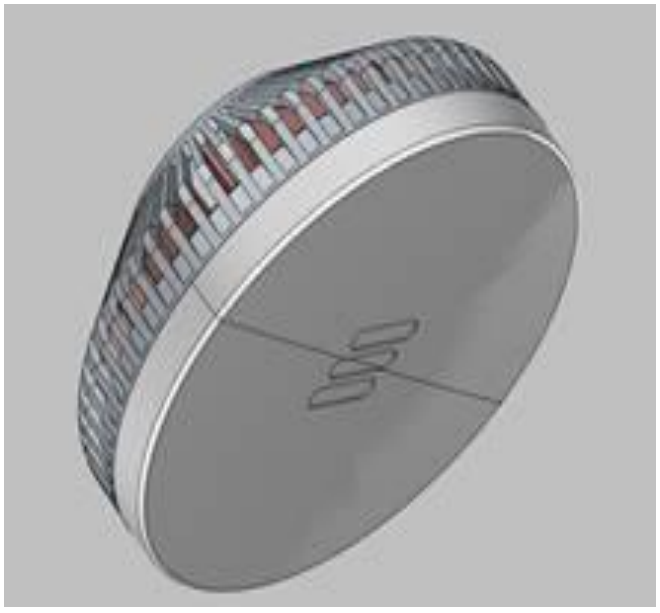
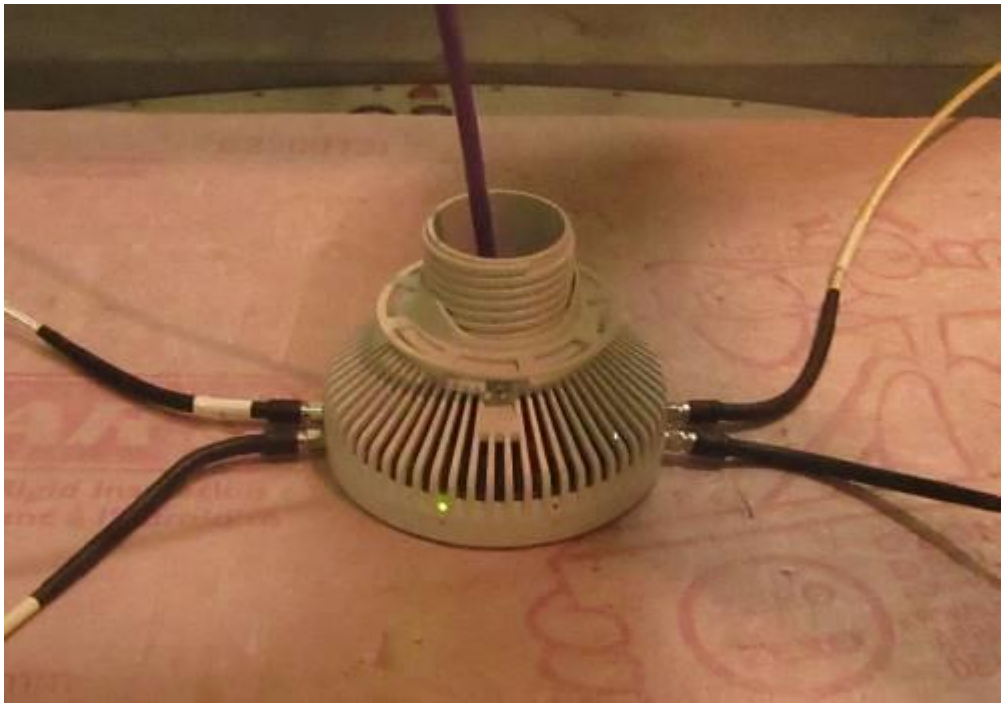


Figure 2: The EUT with External antenna (DOT 2282)



The 2 units above use the same pcb and hardware. The only difference between the units is the presence of the internal/external antennas. Therefore all EMC tests were done only on the external Antenna port variant except the Rx band testing; the configurations of the tested DOT 2272 / 2282 B5B12A are shown in the section Configurations of the EUT. The EUT was tested in a tabletop setting.

Figure 3: Product detail, DOT 2272 / 2282 B5B12A

Product data:	DOT 2282 B5B12A
Product	Ph4 Mid Tier Dot, 4T4R
Revision:	R1C
P/N:	KRY 901 428/2
Nominal Voltage:	POE, 56Vdc
Operating Temperature:	+5°C to +40°C
Bands	(B5 and B12A)
Antennas	4T4R
Output Power per band	4x50mW (FDD)
RAT support	B5: LTE-FDD, NR, NBIoT IB/GB
	B12A: LTE-FDD, NR, NBIoT IB/GB
Mixed Mode supported	B5: LTE(NBIoT) + NR
	B12A: LTE(NBIoT) + NR
IBW	B5: 25MHz, B12A: 16MHz
Nominal O/P per FDD Antenna Port:	Single Carrier: 1 x 50mW (17dBm)
	Multi-Carrier: 2 x 25mW (14 dBm)
	Multi-Carrier: 3 x 16.7mW (12.2 dBm)
	Multi-Carrier: 4 x 12.5mW (11 dBm)
	Multi-Carrier: 5 x 10mW (10 dBm)
Max number LTE carriers per Port	B5: 5 carriers
	B12A: 3 carriers
Max number of NR carriers	2
Max number of UTRA carriers	na
Modulation:	LTE: QPSK, 16QAM, 64QAM, 256 QAM (DL only)
Channel Bandwidth B5:	LTE: 5, 10MHz
	WCDMA: na
	NBIoT GB/IB: 10MHz (host LTE BW)
	NR: 5, 10, 15, 20MHz
Channel Bandwidth B12A:	LTE: 5, 10MHz
	WCDMA: na
	NBIoT GB/IB: 10MHz (host LTE BW)
	NR: 5, 10, 15MHz
IF Interface:	Digital
Channel Raster:	LTE: 100kHz,
Mounting	ceiling or wall
Dimensions: (H x W)	140 x 140 x 60mm
Weight;	0.546 kg

Configuration of the Dot 2272 B5B12A (KRY 901 428/1) and Dot 2282 B5B12A (KRY 901 428/2) that was tested is shown in the section Configurations of the EUT. The EUT was tested in a tabletop setting.

2.3 Product port definition and EUT cable information

Table 9 identifies all the cables and ports on the EUT. The Environment of the cables is indoor.

Table 9: System port definition

Port Name	Port Description	Port Type	Interface Detail	Plug-Cable Type
dRDI	Digital RDI	Telecom	ethernet	RJ-45, CAT6A
1A, 1B	RF to antenna B5, branch A & B	Antenna	RF	SMA, Coax >3m
2A, 2B	RF to antenna B12A, branch A & B	Antenna	RF	SMA, Coax >3m

2.4 Configurations of the EUT

Figure 4 and Figure 5 show the configurations of the EUT for Emissions test. Test Configurations were defined by customer.

Figure 4: Test configuration for Emission tests – TX mode, Dot 2282

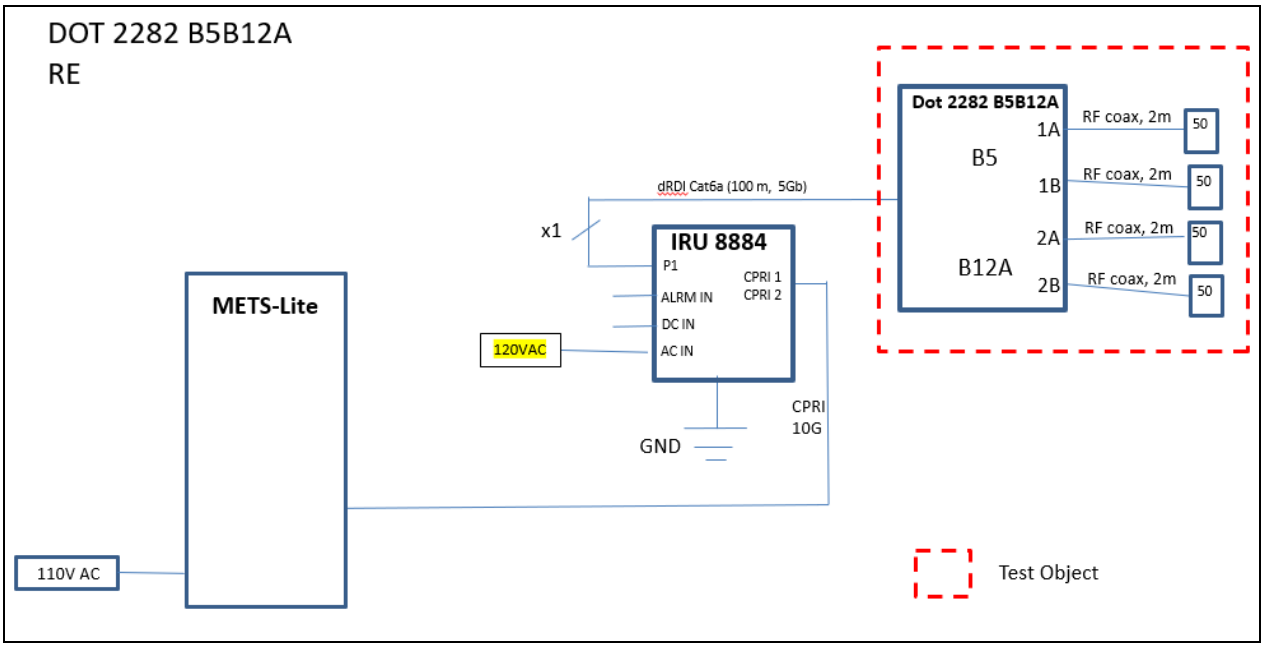
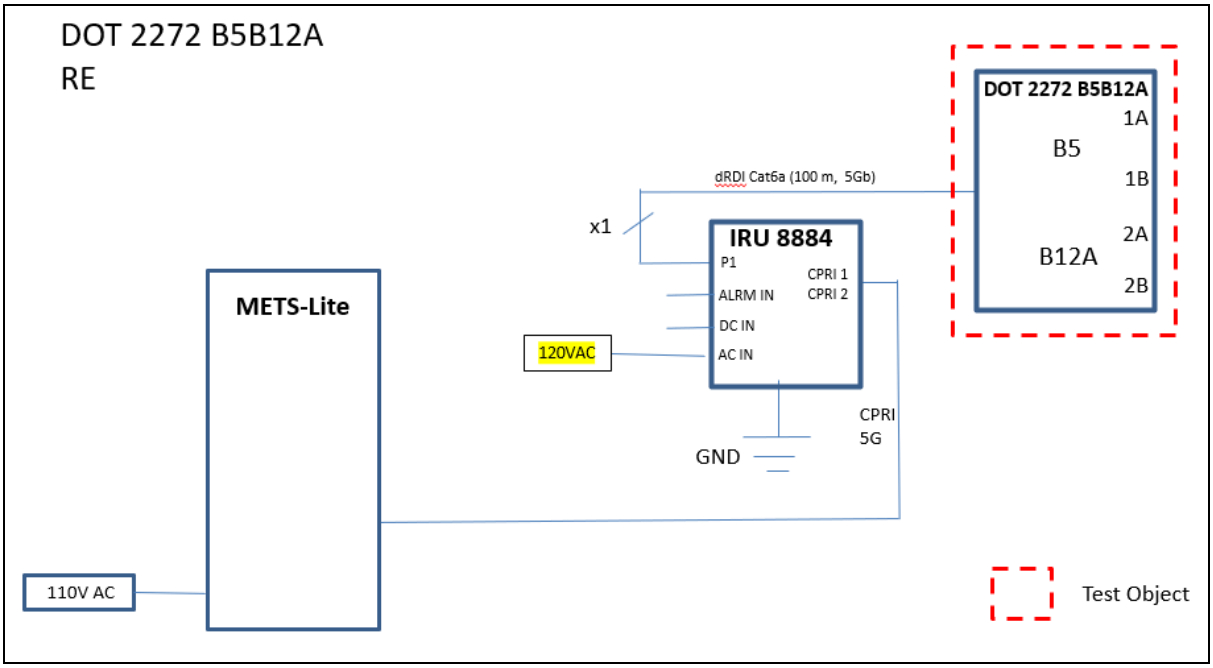


Figure 5: Test configuration for Emission tests – Rx mode, Dot 2272



2.4.1 Radiated Emissions Single RAT / Single Carrier (LTE & NBIoT)

Figure 6: Carrier detail – Config (SC1) - Middle

SR LTE Config SC1 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: LTE, 5MHz, 881.5MHz	1	B12A: LTE, 5MHz, 737MHz

Figure 7: Carrier detail – Config (SC2) - Middle

SR LTE Config SC2 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: LTE, 5MHz, 881.5MHz	1	B12A: LTE, 10MHz, 737MHz
		2	B12A: NBIoT GB, 200KHz,

Figure 8: Carrier detail – Config (SC3) – Middle

SR LTE Config SC3 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: LTE, 10MHz, 881.5MHz	1	B12A: LTE, 5MHz, 737MHz
2	B5: NBIoT GB, 200KHz,		

Figure 9: Carrier detail – Config (SC4) – Middle

SR LTE Config SC4 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: LTE, 10MHz, 881.5MHz	1	B12A: LTE, 10MHz, 737MHz
2	B5: NBIoT GB, 200KHz,	2	B12A: NBIoT GB, 200KHz,

Note: Radiated Emissions measurements were compared between SC1, SC2, SC3 and SC4 middle channel. SC1 was found to have higher emissions than SC2, SC3 and SC4; therefore EUT with SC1 carrier configuration was tested fully at middle channels and reported. See Figure 10 for tested carrier detail.

Figure 10: Tested carrier detail – Single RAT/carrier config (SC) - LTE & NBIoT

SR LTE Config SC Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: LTE, 5MHz, 881.5MHz	1	B12A: LTE, 5MHz, 737MHz

2.4.2 Radiated Emissions Single RAT / Single Carrier (NR)

Figure 11: Carrier detail – Config (SC5) – Middle

SR NR Config SC5 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: NR, 5MHz, 881.5MHz	1	B12A: NR, 5MHz, 737MHz

Figure 12: Carrier detail – Config (SC6) – Middle

SR NR Config SC6 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: NR, 10MHz, 881MHz	1	B12A: NR, 10MHz, 737MHz

Figure 13: Carrier detail – Config (SC7) – Middle

SR NR Config SC7 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: NR, 15MHz, 881MHz	1	B12A: NR, 15MHz, 737MHz

Figure 14: Carrier detail – Config (SC8) – Middle

SR NR Config SC8 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: NR, 20MHz, 881MHz	1	B12A: NR, 5MHz, 737MHz

Note: Radiated Emissions measurements were compared between SC5, SC6, SC7 and SC8 middle channel. SC5 was found to have higher emissions than SC6, SC7 and SC8; therefore EUT with SC5 carrier configuration was tested at all three channels and reported. See Figure 15 for tested carrier detail.

Figure 15: Tested carrier detail – Single RAT/carrier config (SC) - NR

SR NR Config SC BW 5M Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Bottom**	Carrier:	**Bottom**
1	B5: NR, 5MHz, 871.5MHz	1	B12A: NR, 5MHz, 731.5MHz
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: NR, 5MHz, 881.5MHz	1	B12A: NR, 5MHz, 737MHz
Carrier:	**Top**	Carrier:	**Top**
1	B5: NR, 5MHz, 891.5MHz	1	B12A: NR, 5MHz, 742.5MHz

2.4.3 Radiated Emissions Single RAT / Multi Carrier Configurations (NR)

Figure 16: Carrier detail – Config (MC1) – Middle

SR NR Config MC1 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: NR, 5MHz, 876.5MHz	1	B12A: NR, 5MHz, 732MHz
2	B5: NR, 5MHz, 881.5MHz	2	B12A: NR, 5MHz, 737MHz

Figure 17: Carrier detail – Config (MC2) – Middle

SR NR Config MC2 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: NR, 5MHz, 876.5MHz	1	B12A: NR, 5MHz, 732MHz
2	B5: NR, 5MHz, 881.5MHz	2	B12A: NR, 5MHz, 737MHz
3	B5: NR, 5MHz, 886.5MHz	3	B12A: NR, 5MHz, 742MHz

Figure 18: Carrier detail – Config (MC3) – Middle

SR NR Config MC3 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: NR, 5MHz, 871.5MHz	1	B12A: NR, 5MHz, 732MHz
2	B5: NR, 5MHz, 876.5MHz	2	B12A: NR, 5MHz, 737MHz
3	B5: NR, 5MHz, 881.5MHz	3	B12A: NR, 5MHz, 742MHz
4	B5: NR, 5MHz, 886.5MHz		
5	B5: NR, 5MHz, 891.5MHz		

Note: Radiated Emissions measurements were compared between MC1, MC2, and MC3 middle channel. MC2 was found to have higher emissions than MC1, and MC3; therefore EUT with MC2 carrier configuration was tested at middle channel and reported. See Figure 19 for tested carrier detail.

Figure 19: Tested carrier detail – Single RAT / Multi carrier config (MC) - NR

SR NR Config MC2 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: NR, 5MHz, 876.5MHz	1	B12A: NR, 5MHz, 732MHz
2	B5: NR, 5MHz, 881.5MHz	2	B12A: NR, 5MHz, 737MHz
3	B5: NR, 5MHz, 886.5MHz	3	B12A: NR, 5MHz, 742MHz

2.4.4 Radiated Emissions Multi RAT / Multi Carrier (LTE + NR)

Figure 20: Carrier detail – NR+LTE Config (MR1) – Middle

LTE + NR Config MR1 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: LTE, 5MHz, 876.5MHz	1	B12A: LTE, 5MHz, 732MHz
2	B5: NR, 5MHz, 881.5MHz	2	B12A: NR, 5MHz, 737MHz

Figure 21: Carrier detail – NR+LTE Config (MR2) – Middle

LTE + NR Config MR2 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: LTE, 5MHz, 876.5MHz	1	B12A: LTE, 5MHz, 732MHz
2	B5: NR, 5MHz, 881.5MHz	2	B12A: NR, 5MHz, 737MHz
3	B5: NR, 5MHz, 886.5MHz	3	B12A: NR, 5MHz, 742MHz

Figure 22: Carrier detail – NR+LTE Config (MR3) – Middle

LTE + NR Config MR3 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: LTE, 5MHz, 871.5MHz	1	B12A: LTE, 5MHz, 732MHz
2	B5: NR, 5MHz, 876.5MHz	2	B12A: LTE, 5MHz, 737MHz
3	B5: NR, 5MHz, 881.5MHz	3	B12A: NR, 5MHz, 742MHz
4	B5: NR, 5MHz, 886.5MHz		
5	B5: NR, 5MHz, 891.5MHz		

Note: Radiated Emissions measurements were compared between MR1, MR2, and MR3 middle channel. MR1 was found to have higher emissions than MR2 and MR3; therefore EUT with MR1 - middle carrier configuration was tested and reported.

Figure 23: Tested carrier detail – Multi RAT / Multi Carrier (MR) - LTE + NR

LTE + NR Config MR1 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: LTE, 5MHz, 876.5MHz	1	B12A: LTE, 5MHz, 732MHz
2	B5: NR, 5MHz, 881.5MHz	2	B12A: NR, 5MHz, 737MHz

2.4.5 Radiated Emissions Receiver mode (LTE + NR)

Figure 24: Tested carrier detail – MR/Rx (NR+LTE Config – Middle)

LTE + NR Config MR1 Carrier setups for Emissions			
B5 PORT 1A,1B		B12A Port 2A, 2B	
BS type 1-C, CS16 (NR, E-UTRA), TC21		BS type 1-C, CS16 (NR, E-UTRA), TC21	
Carrier:	**Middle**	Carrier:	**Middle**
1	B5: LTE, 5MHz, 876.5MHz	1	B12A: LTE, 5MHz, 732MHz
2	B5: NR, 5MHz, 881.5MHz	2	B12A: NR, 5MHz, 737MHz

2.5 Modifications of the EUT during testing

The EUT was not modified prior to or during testing.

2.6 Inventory of the EUT and support equipments

The following table identifies the inventory of the EUT.

Table 10: Inventory of the EUT

Equipment Role	Product Name	Product Number	Product Release	Product Serial#	Comments
EUT #1	DOT 2282 B5B12A	KRY 901 428/2	R1C	TD3W072745	
EUT #2	DOT 2272 B5B12A	KRY 901 428/1	R1C	TD3W067649	Used for Rx mode test (RSS-GEN7.3) only
CABLE	RDI CAT6A	na	na	na	purple straight cable 20177002104B
CABLE	RF COAX	na	na	na	
SUPPORT	IRU 8884	KRC 161 754/1	R1C	D828486322	
CABLE	CPRI, Fiber, LC/LC, 20m	na	na	na	
TEST SET	CT-10, DU-SIM, METS-Lite	LPC 102 487/1	R1C	TO1F311639	

2.7 Software and operations of the EUT

The software used to operate the system was representative of the latest production version.

IRU load: R8B712
RUX rev: R9F
RUX testDef: _RRUS_DOT_KRYB5B12A_NRFDD_FinalUse_V2

3. Detailed test results of Emissions

Emissions from systems manifest themselves in two forms: conducted emissions on cables and radiated emissions from the entire system (i.e. electronic modules, hardware, and cables). Regulatory standards restrict these different forms of emissions generated by the system.

The temperature and humidity in the test facilities are controlled. The temperature is maintained between 20 ºC and 25 ºC, with a relative humidity between 30 % and 60 %. Levels are recorded and any exceptions are included in the detailed test results sections of this report.

3.1 Measurement instrumentation

The measurement instrumentation conforms to the relevant standards in this report: ANSI C63.2, CISPR 16, CISPR 22, and CISPR 32. Calibration of the measurement instrumentation is maintained in accordance with the supplier's recommendations, or as necessary to ensure its accuracy.

3.2 Radiated Emissions, E-field

This test verifies that the EUT does not produce excess amounts of E-field Radiated Emissions (RE) that could interfere with licensed radiators.

3.2.1 Test specification and limits

The testing requirements are as follows.

Table 11: RE test requirements

Requirement	Method	Country of application
FCC Part 15, Subpart B	ANSI C63.4	USA
FCC Part 22	ANSI C63.26	USA
FCC Part 27	ANSI C63.26	USA
ICES 003	ANSI C63.4	Canada
RSS-Gen (Section 7.3)	ANSI C63.4 / ICES 0003	Canada
RSS-130	ANSI C63.26 / ICES 0003	Canada
RSS-132	ANSI C63.26 / ICES 0003	Canada

The limits of the RE tests are as follows.

Table 12: RE limits at 3m for Class B of FCC Part 15/ICES-003/RSS-Gen (Sec 7.3)

Frequency range (MHz)	ICES 003 (dBµV/m)	Detector
30 to 88	40.0	Quasi-Peak
88 to 216	43.5	Quasi-Peak
216 to 960	46.0	Quasi-Peak
960 to 1000	54.0	Quasi-Peak
1000 to 40000	54.0	Average

Table 13: EIRP limits for FCC Part 22/Part 27 & RSS 130/132

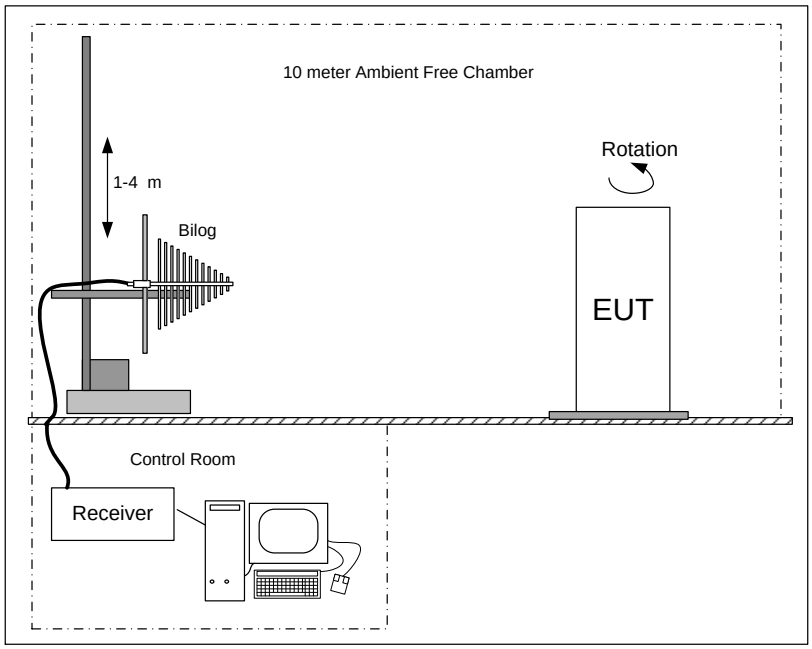
Frequency range (MHz)	EIRP Limit (dBm)	Calculated EIRP Limit in dBµV/m
30 - 40000	-13	82.2

3.2.2 Test procedure

Verifications of the test equipment and AFC were performed before the installation of the EUT in accordance with the quality assurance procedures documented in the EMC test procedures document. The test was performed according to the relevant procedures listed in Table 11.

- The EUT was placed on the turntable inside the AFC (configured for normal operation). The system and its cables were separated from the ground plane by an insulating support 10 mm in height.
- For tests between 30 MHz and 1 GHz the receive antenna (BiLog®) was placed 3 m away from the EUT. An initial scan was performed to find emissions/frequencies requiring detailed measurement. The pre-scan was performed by rotating the system 360 degrees while recording all emissions (frequency and amplitude). This procedure was repeated for antenna heights of 1 to 4 m, as well as both polarizations of the receiving antenna.
- For tests above 1 GHz the receive antenna (horn) was placed 3 m away from the EUT. Absorbing cones were placed on the floor between the antenna and the EUT. An initial scan was performed to find emissions/frequencies requiring detailed measurement. The pre-scan was performed by rotating the system 360 degrees while recording all emissions (frequency and amplitude). This procedure was repeated for antenna heights of 1 to 4 m, as well as both polarizations of the receiving antenna.
- For tests between 18 and 40 GHz the receive horn antenna was placed at a 1 m distance from the EUT with the absorbing cones placed on the floor. An initial scan was performed to find emissions/frequencies requiring detail measurement. The pre-scan was performed on all sides of the EUT, using both polarization of the receive antenna to find any system emissions.
- For all above frequency ranges, the pre-scan peak data was compared to the limits. Peaks with less than 6 dB of margin were maximized using the proper detector: the EUT was rotated in azimuth over 360 degrees to identify the direction of maximum emission, antenna height was then varied from 1 to 4 m to obtain maximum emission level.

Figure 25: Setup of Radiated Emissions



3.2.3 Calculation of the compliance margin

The following example shows the way in which the compliance margin is calculated in the "RE Test Results" tables.

The rows in these tables are defined as follows.

Meter Reading (dBµV) =	Voltage measured using the spectrum analyzer with the proper detector
Correction (dB) =	Cumulative gain or loss of pre-amplifier and cables used in the measurement path (dB) + Antenna Factor (dB)
Level (dBµV/m) =	Corrected value or field strength, that is, the parameter of interest that is compared to the limit
Margin (dB) =	Level with respect to the appropriate limit (a negative Margin indicates that the Level is below the limit and that the measurement is a Pass)

The values in the Level row are calculated as follows: Level = Meter Reading + Correction (dB)

The values in the Margin row are calculated as follows: Margin = Level - Limit

3.2.4 Measurement uncertainties

The expanded measurement instrumentation uncertainty with a 95 % level of confidence, calculated according to the method described in CISPR 16 is:

- ± 3.8 dB between 30 MHz and 1 GHz
- ± 4.7 dB between 1 GHz and 10 GHz
- ± 4.8 dB between 10 GHz and 18 GHz
- ± 4.6 dB between 18 GHz and 26.5 GHz
- ± 4.8 dB between 26.5 GHz and 40 GHz

3.2.5 Test results of RE (Single RAT / Single Carrier) - LTE

Test location: 10-meter Ambient Free Chamber (AFC)

Date tested: 18 - 31, May 2021

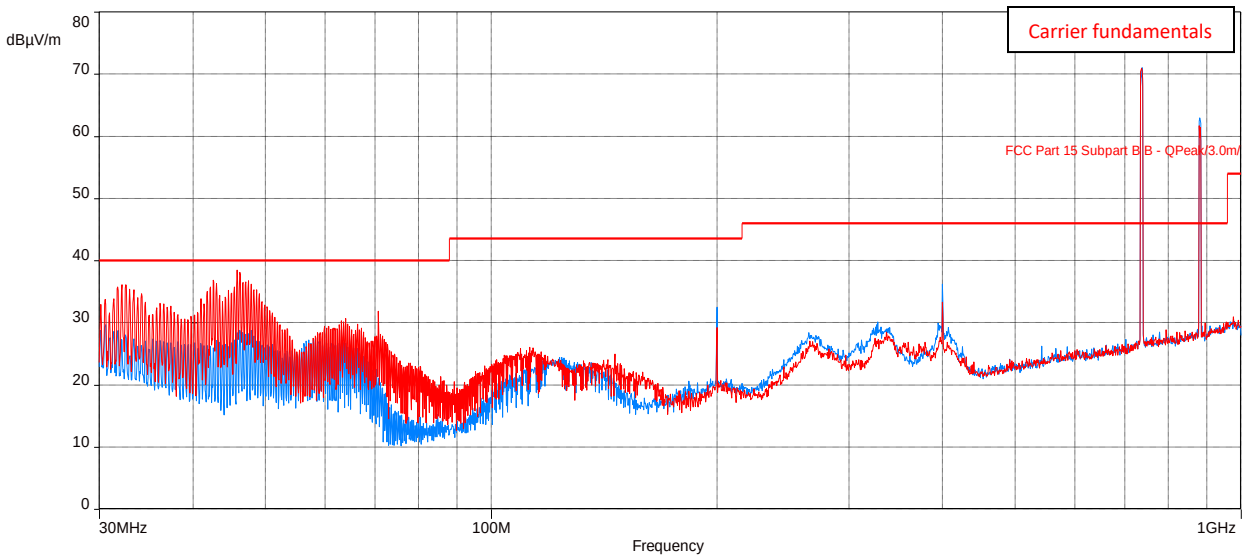
Tested by: Krupal Patel & Christopher Richer

Test configuration is listed as SC - LTE & NBIoT in Figure 10 as identified in the section Configurations of the EUT. For the following test results that have supporting data tables with worst case emissions, negative margin values indicate a pass.

Red trace – Vertical antenna polarity, Blue trace – Horizonatal antenna polarity

3.2.5.1 Single RAT/Single Carrier (SC, LTE + NBIoT– Middle channel)

Figure 26: Plot of RE at 3 m – 30 to1000 MHz (SC- LTE- Middle channel)



Note: Peaks above the limit are leakage of the EUT's fundamentals from the 50-ohm terminations.

Table 14: RE test results from 30 to 1000 MHz for FCC part 15 & ICES-003 (Middle channel)

Frequency (MHz)	Level (dBµV)	Limit Quasi-peak (dBµV)	Margin to Class B Limit (dB)	Height (m)	Azimuth (deg)	Polarization	Correction (dB)
32.57260223	35.66	40.00	-4.34	1.00	4.75	Vertical	-3.14
45.8396471	37.95	40.00	-2.05	1.00	360.00	Vertical	-10.45
46.24447403	37.54	40.00	-2.46	1.00	350.25	Vertical	-10.69
399.997221	36.43	46.02	-9.59	2.57	283.25	Horizontal	-3.32

Table 15: RE test results from 30 to 1000 MHz for FCC Part 22/27 & RSS 130/132 (Middle channel)

Frequency (MHz)	Level (dBµV)	Limit EIRP (dBµV)	Margin to EIRP Limit (dB)	Height (m)	Azimuth (deg)	Polarization	Correction (dB)
32.57260223	35.66	82.2	-46.54	1.00	4.75	Vertical	-3.14
45.8396471	37.95	82.2	-44.25	1.00	360.00	Vertical	-10.45
46.24447403	37.54	82.2	-44.66	1.00	350.25	Vertical	-10.69
399.997221	36.43	82.2	-45.77	2.57	283.25	Horizontal	-3.32

Note: In the table/Plot above, no emissions exceed the FCC part 22/27 radiated spurious emissions limit when converted to dBuV/m. For final spurious emissions measurements to FCC part 22/27, see antenna port conducted emissions in applicable test report.

Figure 27: Plot of RE at 3m from 1 to 10 GHz (SC- LTE- Middle channel)

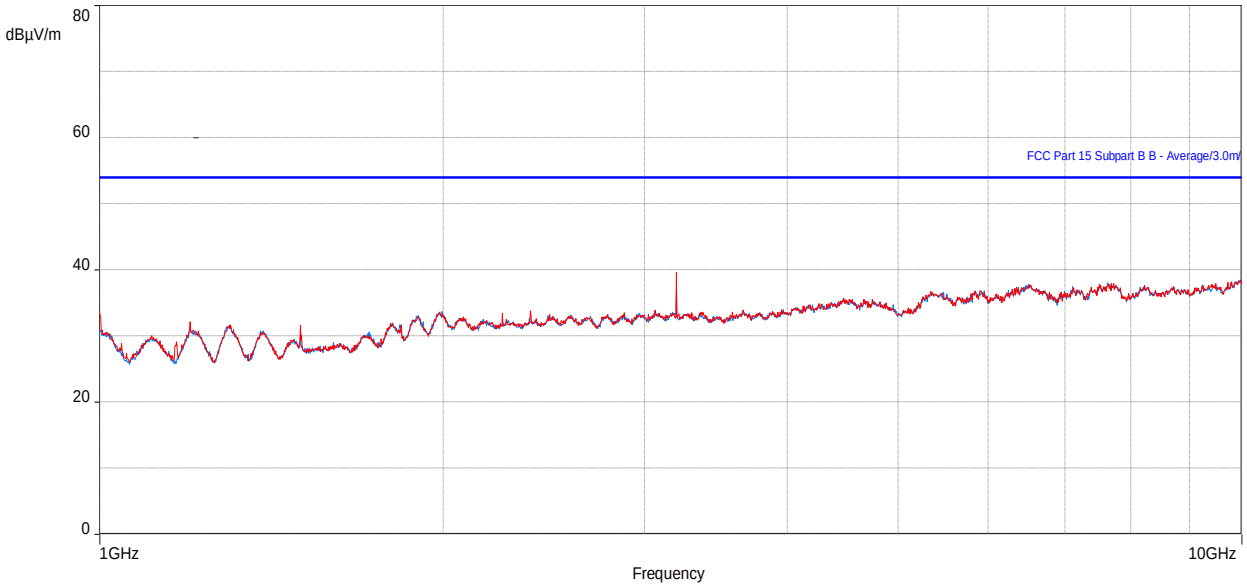


Table 16: RE test results from 1 to 10 GHz for FCC part 15 & ICES-003 (Middle channel)

Frequency (MHz)	Level Average (dBµV)	Limit Average (dBµV)	Margin to Class B Limit (dB)	Height (m)	Azimuth (degrees)	Polarization	Correction (dB)
3199.978526	38.66	53.96	-15.30	2.00	342.00	Vertical	-4.43
9790.933974	34.59	53.96	-19.37	4.00	9.50	Horizontal	4.62
9801.804167	34.59	53.96	-19.37	4.00	62.25	Vertical	4.68

Table 17: RE test results from 1 to 10 GHz for FCC Part 22/27 & RSS 130/132 (Middle channel)

Frequency (MHz)	Level (dBµV)	Limit EIRP (dBµV)	Margin to EIRP Limit (dB)	Height (m)	Azimuth (degrees)	Polarization	Correction (dB)
3199.978526	38.66	82.2	-43.54	2.00	342.00	Vertical	-4.43
9790.933974	34.59	82.2	-47.61	4.00	9.50	Horizontal	4.62
9801.804167	34.59	82.2	-47.61	4.00	62.25	Vertical	4.68

Note: In the table/Plot above, no emissions exceed the FCC part 22/27 radiated spurious emissions limit when converted to dBuV/m, except for the fundamental. For final spurious emissions measurements to FCC part 22/27, see antenna port conducted emissions in applicable test report.

3.2.6 Test results of RE (Single RAT / Single Carrier) - NR

Test location: 10-meter Ambient Free Chamber (AFC)

Date tested: 18 - 31, May 2021

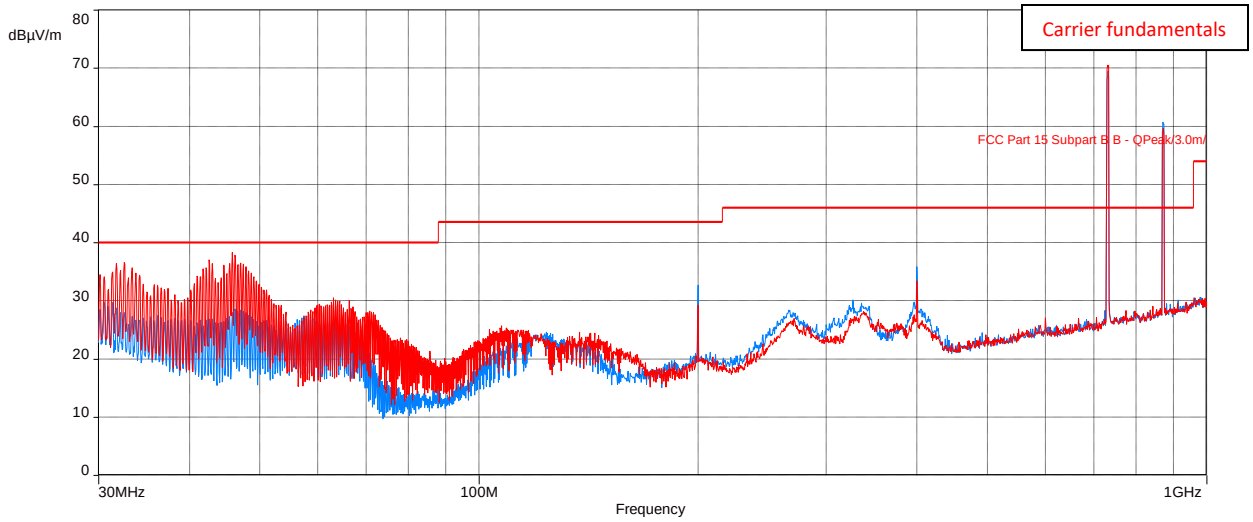
Tested by: Krupal Patel & Christopher Richer

Test configuration is listed as SC - NR in Figure 15 as identified in the section Configurations of the EUT. For the following test results that have supporting data tables with worst case emissions, negative margin values indicate a pass.

Red trace – Vertical antenna polarity, Blue trace – Horizonatal antenna polarity

3.2.6.1 Single RAT/Single Carrier (SC, NR – Bottom channel)

Figure 28: Plot of RE at 3 m – 30 to1000 MHz (SC, NR- Bottom channel)



Note: Peaks above the limit are leakage of the EUT's fundamentals from the 50-ohm terminations.

Table 18: RE test results from 30 to 1000 MHz for FCC part 15 & ICES-003 (Bottom channel)

Frequency (MHz)	Level (dBµV)	Limit Quasi-peak (dBµV)	Margin to Class B Limit (dB)	Height (m)	Azimuth (deg)	Polarization	Correction (dB)
32.57212146	35.63	40.00	-4.37	1.00	4.75	Vertical	-3.14
45.84044838	38.00	40.00	-2.00	1.00	355.25	Vertical	-10.45
46.25232659	37.43	40.00	-2.57	1.00	340.75	Vertical	-10.69
399.9973813	36.61	46.02	-9.41	2.76	283.50	Horizontal	-3.32

Table 19: RE test results from 30 to 1000 MHz for FCC Part 22/27 & RSS 130/132 (Bottom channel)

Frequency (MHz)	Level (dBµV)	Limit EIRP (dBµV)	Margin to EIRP Limit (dB)	Height (m)	Azimuth (deg)	Polarization	Correction (dB)
32.57212146	35.63	82.2	-46.57	1.00	4.75	Vertical	-3.14
45.84044838	38.00	82.2	-44.2	1.00	355.25	Vertical	-10.45
46.25232659	37.43	82.2	-44.77	1.00	340.75	Vertical	-10.69
399.9973813	36.61	82.2	-45.59	2.76	283.50	Horizontal	-3.32

Note: In the table/Plot above, no emissions exceed the FCC part 22/27 radiated spurious emissions limit when converted to dBuV/m. For final spurious emissions measurements to FCC part 22/27, see antenna port conducted emissions in applicable test report.

Figure 29: Plot of RE at 3m from 1 to 10 GHz (SC, NR- Bottom channel)

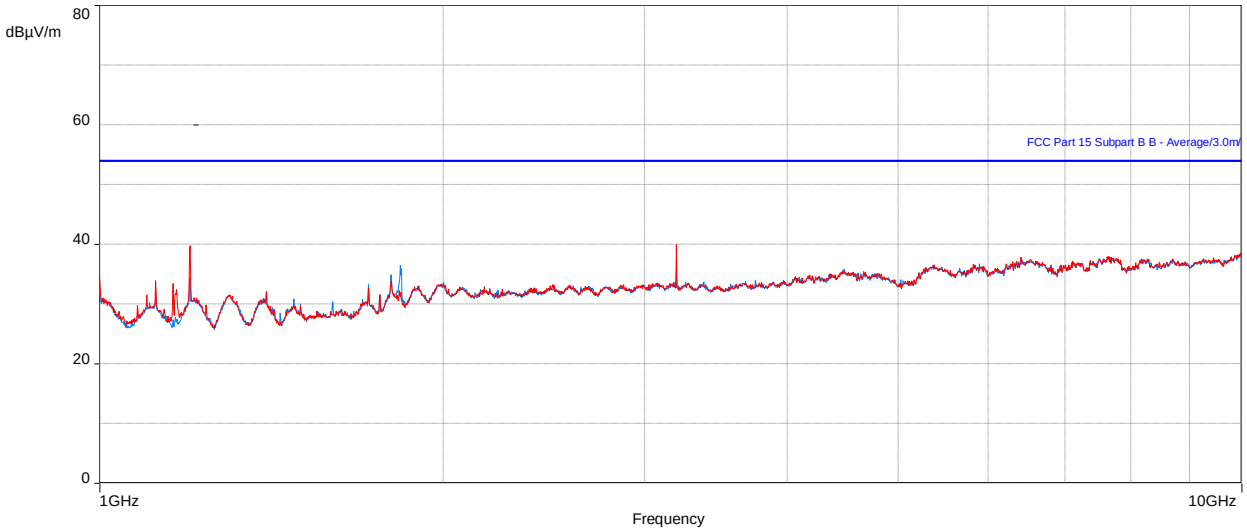


Table 20: RE test results from 1 to 10 GHz for FCC part 15 & ICES-003 (Bottom channel)

Frequency (MHz)	Level Average (dBµV)	Limit Average (dBµV)	Margin to Class B Limit (dB)	Height (m)	Azimuth (degrees)	Polarization	Correction (dB)
1199.992308	29.24	53.96	-24.72	3.04	112.75	Horizontal	-10.73
3199.978526	35.51	53.96	-18.45	2.90	84.00	Horizontal	-4.43
3199.978205	39.80	53.96	-14.16	1.93	341.00	Vertical	-4.43

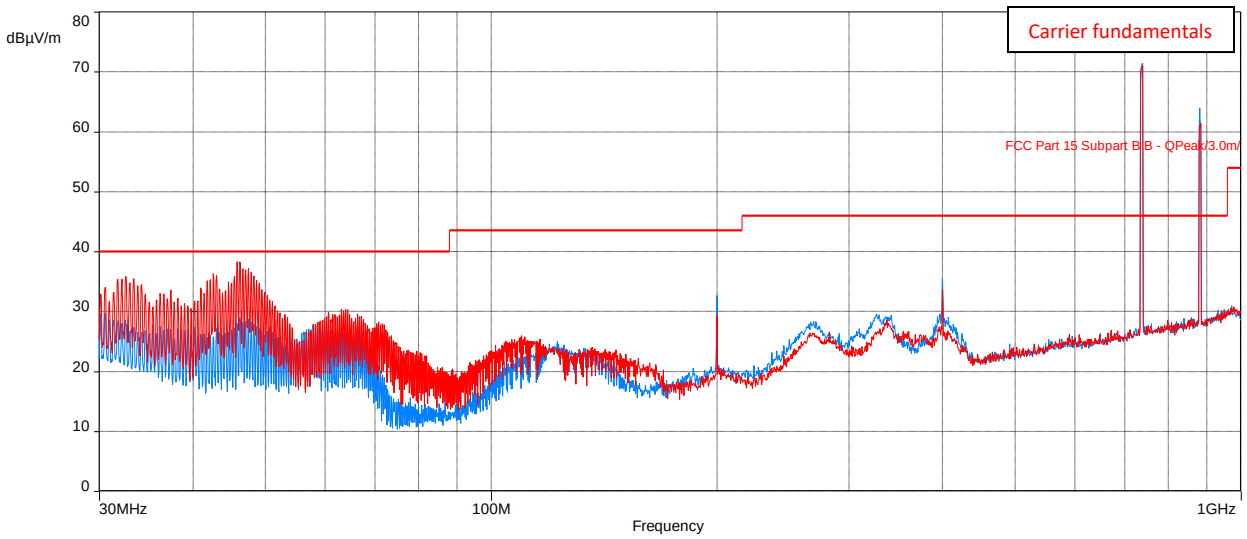
Table 21: RE test results from 1 to 10 GHz for FCC Part 22/27 & RSS 130/132 (Bottom channel)

Frequency (MHz)	Level (dBµV)	Limit EIRP (dBµV)	Margin to EIRP Limit (dB)	Height (m)	Azimuth (degrees)	Polarization	Correction (dB)
1199.992308	29.24	82.2	-52.96	3.04	112.75	Horizontal	-10.73
3199.978526	35.51	82.2	-46.69	2.90	84.00	Horizontal	-4.43
3199.978205	39.80	82.2	-42.4	1.93	341.00	Vertical	-4.43

Note: In the table/Plot above, no emissions exceed the FCC part 22/27 radiated spurious emissions limit when converted to dBuV/m, except for the fundamental. For final spurious emissions measurements to FCC part 22/27, see antenna port conducted emissions in applicable test report.

3.2.6.2 Single RAT/Single Carrier (SC, NR – Middle channel)

Figure 30: Plot of RE at 3 m – 30 to1000 MHz (SC, NR- Middle channel)



Note: Peaks above the limit are leakage of the EUT's fundamentals from the 50-ohm terminations.

Table 22: RE test results from 30 to 1000 MHz for FCC part 15 & ICES-003 (Middle channel)

Frequency (MHz)	Level (dBµV)	Limit Quasi-peak (dBµV)	Margin to Class B Limit (dB)	Height (m)	Azimuth (deg)	Polarization	Correction (dB)
32.57404454	35.48	40.00	-4.52	1.00	5.00	Vertical	-3.14
45.83920513	37.96	40.00	-2.04	1.00	362.00	Vertical	-10.45
46.24415351	37.49	40.00	-2.51	1.00	341.75	Vertical	-10.69
399.997221	36.67	46.02	-9.35	2.54	283.50	Horizontal	-3.32

Table 23: RE test results from 30 to 1000 MHz for FCC Part 22/27 & RSS 130/132 (Middle channel)

Frequency (MHz)	Level (dBµV)	Limit EIRP (dBµV)	Margin to EIRP Limit (dB)	Height (m)	Azimuth (deg)	Polarization	Correction (dB)
32.57404454	35.48	82.2	-46.72	1.00	5.00	Vertical	-3.14
45.83920513	37.96	82.2	-44.24	1.00	362.00	Vertical	-10.45
46.24415351	37.49	82.2	-44.71	1.00	341.75	Vertical	-10.69
399.997221	36.67	82.2	-45.53	2.54	283.50	Horizontal	-3.32

Note: In the table/Plot above, no emissions exceed the FCC part 22/27 radiated spurious emissions limit when converted to dBuV/m. For final spurious emissions measurements to FCC part 22/27, see antenna port conducted emissions in applicable test report.

Figure 31: Plot of RE at 3m from 1 to 10 GHz (SC, NR- Middle channel)

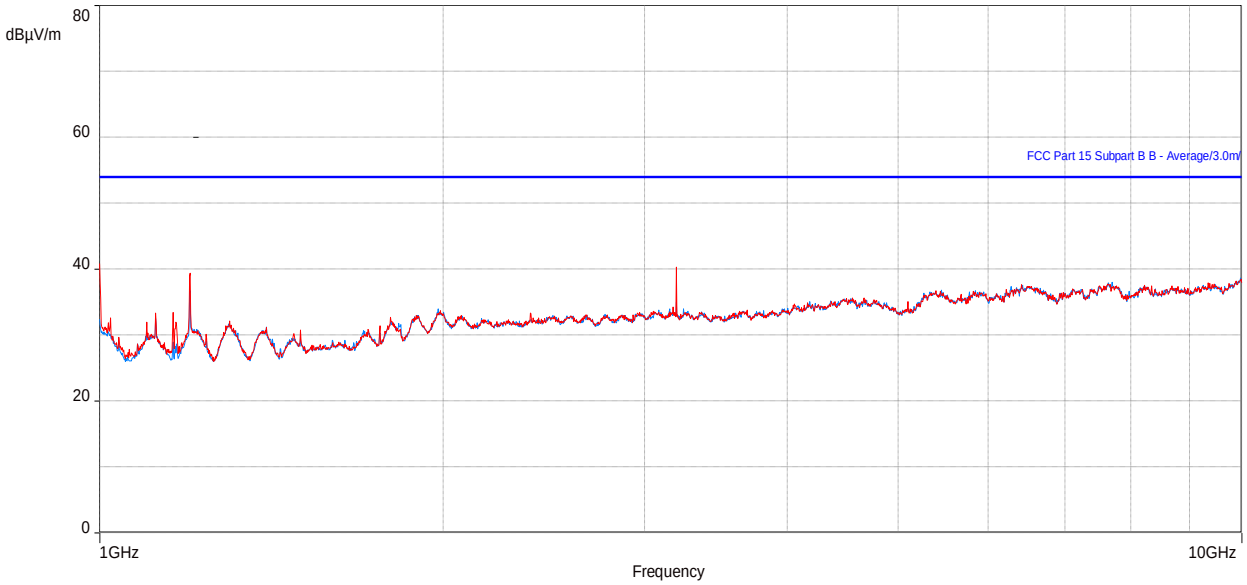


Table 24: RE test results from 1 to 10 GHz for FCC part 15 & ICES-003 (Middle channel)

Frequency (MHz)	Level Average (dBµV)	Limit Average (dBµV)	Margin to Class B Limit (dB)	Height (m)	Azimuth (degrees)	Polarization	Correction (dB)
1200.014744	30.67	53.96	-23.29	2.00	153.75	Horizontal	-10.73
1199.992308	34.10	53.96	-19.86	2.56	334.75	Vertical	-10.73
3199.978526	34.68	53.96	-19.28	4.00	69.50	Horizontal	-4.43
3199.978526	39.43	53.96	-14.53	2.01	343.25	Vertical	-4.43

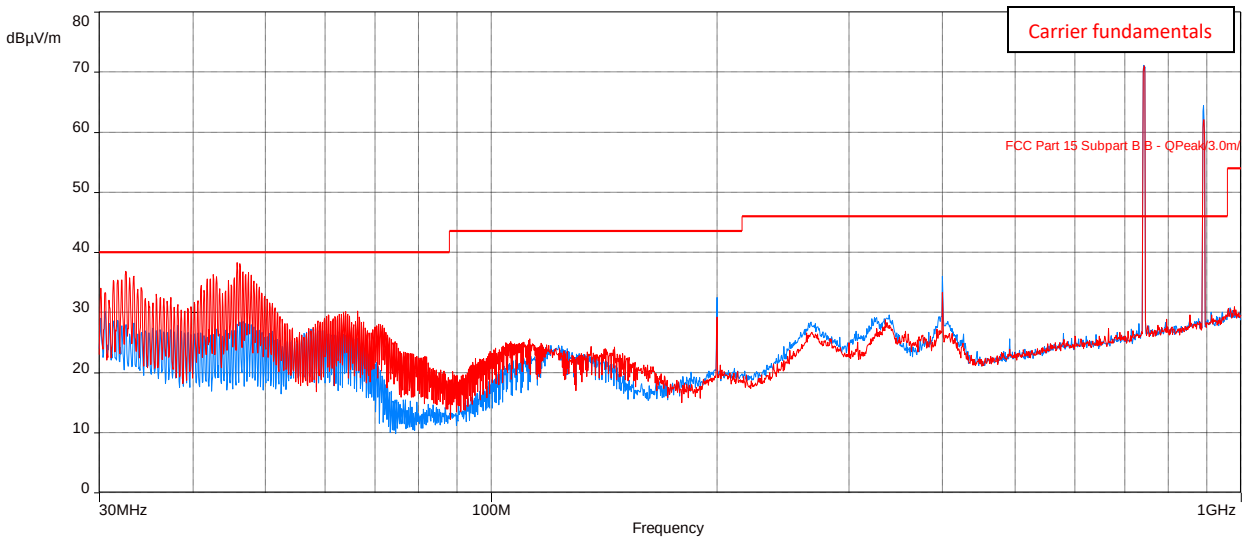
Table 25: RE test results from 1 to 10 GHz for FCC Part 22/27 & RSS 130/132 (Middle channel)

Frequency (MHz)	Level (dBµV)	Limit EIRP (dBµV)	Margin to EIRP Limit (dB)	Height (m)	Azimuth (degrees)	Polarization	Correction (dB)
1200.014744	30.67	82.2	-51.53	2.00	153.75	Horizontal	-10.73
1199.992308	34.10	82.2	-48.10	2.56	334.75	Vertical	-10.73
3199.978526	34.68	82.2	-47.52	4.00	69.50	Horizontal	-4.43
3199.978526	39.43	82.2	-42.77	2.01	343.25	Vertical	-4.43

Note: In the table/Plot above, no emissions exceed the FCC part 22/27 radiated spurious emissions limit when converted to dBuV/m, except for the fundamental. For final spurious emissions measurements to FCC part 22/27, see antenna port conducted emissions in applicable test report.

3.2.6.3 Single RAT/Single Carrier (SC, NR – Top channel)

Figure 32: Plot of RE at 3 m – 30 to1000 MHz (SC, NR -Top channel)



Note: Peaks above the limit are leakage of the EUT's fundamentals from the 50-ohm terminations.

Table 26: RE test results from 30 to 1000 MHz for FCC part 15 & ICES-003 (Top channel)

Frequency (MHz)	Level (dBµV)	Limit Quasi-peak (dBµV)	Margin to Class B Limit (dB)	Height (m)	Azimuth (deg)	Polarization	Correction (dB)
32.57420479	35.75	40.00	-4.25	1.00	4.75	Vertical	-3.14
45.84112821	37.98	40.00	-2.02	1.00	348.25	Vertical	-10.45
46.24207018	37.48	40.00	-2.52	1.00	333.75	Vertical	-10.69
399.9973813	36.49	46.02	-9.53	2.56	283.25	Horizontal	-3.32

Table 27: RE test results from 30 to 1000 MHz for FCC Part 22/27 & RSS 130/132 (Top channel)

Frequency (MHz)	Level (dBµV)	Limit EIRP (dBµV)	Margin to EIRP Limit (dB)	Height (m)	Azimuth (deg)	Polarization	Correction (dB)
32.57420479	35.75	82.2	-46.45	1.00	4.75	Vertical	-3.14
45.84112821	37.98	82.2	-44.22	1.00	348.25	Vertical	-10.45
46.24207018	37.48	82.2	-44.72	1.00	333.75	Vertical	-10.69
399.9973813	36.49	82.2	-45.71	2.56	283.25	Horizontal	-3.32

Note: In the table/Plot above, no emissions exceed the FCC part 22/27 radiated spurious emissions limit when converted to dBuV/m. For final spurious emissions measurements to FCC part 22/27, see antenna port conducted emissions in applicable test report.

Figure 33: Plot of RE at 3m from 1 to 10 GHz (SC, NR- Top channel)

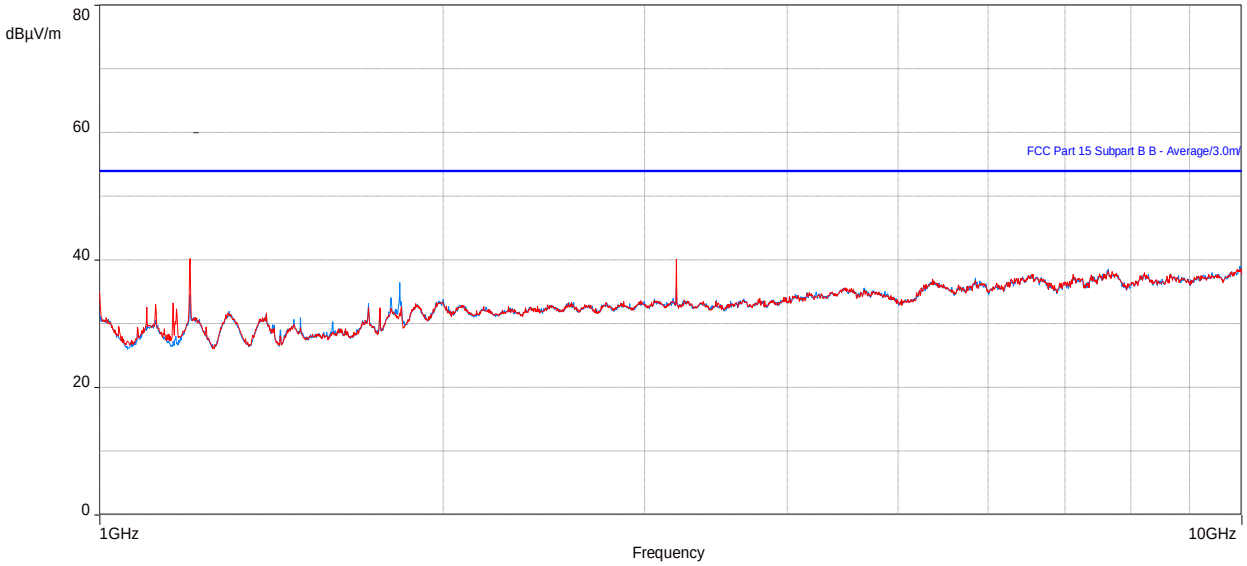


Table 28: RE test results from 1 to 10 GHz for FCC part 15 & ICES-003 (Top channel)

Frequency (MHz)	Level Average (dBµV)	Limit Average (dBµV)	Margin to Class B Limit (dB)	Height (m)	Azimuth (degrees)	Polarization	Correction (dB)
1199.842949	29.86	53.96	-24.10	1.00	111.25	Horizontal	-10.73
1199.785897	34.12	53.96	-19.84	2.49	83.00	Vertical	-10.73
3199.978526	35.22	53.96	-18.74	3.14	112.75	Horizontal	-4.43
3199.978526	38.78	53.96	-15.18	2.01	334.75	Vertical	-4.43

Table 29: RE test results from 1 to 10 GHz for FCC Part 22/27 & RSS 130/132 (Top channel)

Frequency (MHz)	Level (dBµV)	Limit EIRP (dBµV)	Margin to EIRP Limit (dB)	Height (m)	Azimuth (degrees)	Polarization	Correction (dB)
1199.842949	29.86	82.2	-52.34	1.00	111.25	Horizontal	-10.73
1199.785897	34.12	82.2	-48.08	2.49	83.00	Vertical	-10.73
3199.978526	35.22	82.2	-46.98	3.14	112.75	Horizontal	-4.43
3199.978526	38.78	82.2	-43.42	2.01	334.75	Vertical	-4.43

Note: In the table/Plot above, no emissions exceed the FCC part 22/27 radiated spurious emissions limit when converted to dBuV/m, except for the fundamental. For final spurious emissions measurements to FCC part 22/27, see antenna port conducted emissions in applicable test report.

3.2.7 Test results of RE (Single RAT/Multi Carrier) - NR

Test location: 10-meter Ambient Free Chamber (AFC)

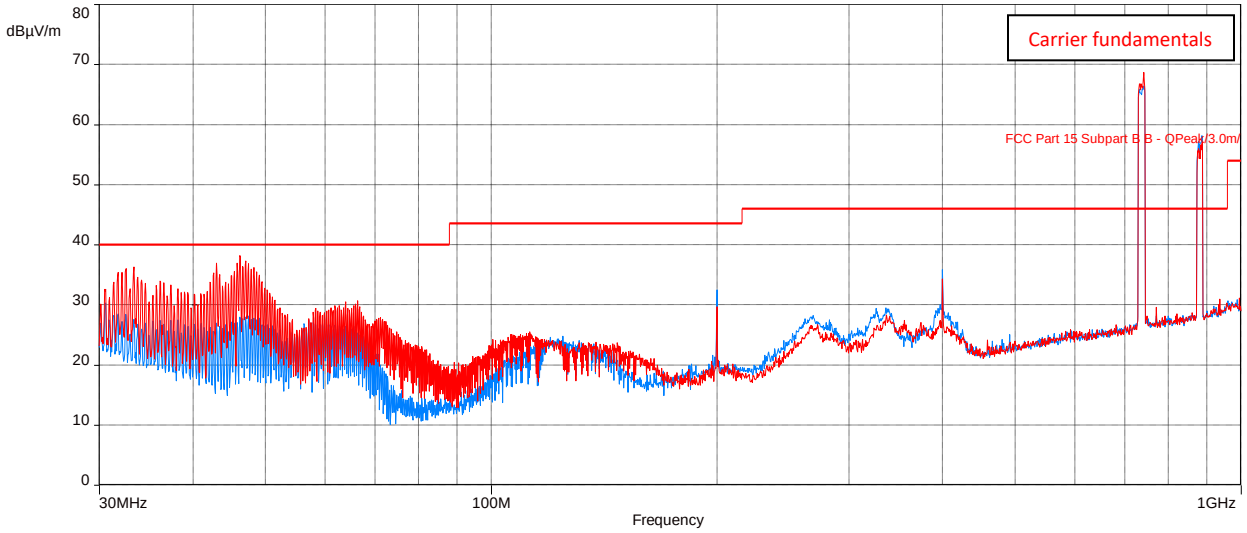
Date tested: 18 - 31, May 2021

Tested by: Krupal Patel & Christopher Richer

Test configuration is listed as MC - NR in Figure 19 as identified in the section Configurations of the EUT. For the following test results that have supporting data tables with worst case emissions, negative margin values indicate a pass.

Red trace – Vertical antenna polarity, Blue trace – Horizonatal antenna polarity

Figure 34: Plot of RE at 3 m – 30 to1000 MHz (MC, NR – Mid channel)



Note: Peaks above the limit are leakage of the EUT's fundamentals from the 50-ohm terminations.

Table 30: RE test results from 30 to 1000 MHz for FCC part 15 & ICES-003 (Mid channel)

Frequency (MHz)	Level (dBµV)	Limit Quasi-peak (dBµV)	Margin to Class B Limit (dB)	Height (m)	Azimuth (deg)	Polarization	Correction (dB)
30.56741667	29.43	40.00	-10.57	4.00	91.25	Horizontal	-2.06
46.24976249	37.97	40.00	-2.03	1.00	348.25	Vertical	-10.69
47.45378879	27.75	40.00	-12.25	1.68	276.25	Horizontal	-11.35
399.997221	36.31	46.02	-9.71	2.66	283.50	Horizontal	-3.32

Table 31: RE test results from 30 to 1000 MHz for FCC Part 22/27 & RSS 130/132 (Mid channel)

Frequency (MHz)	Level (dBµV)	Limit EIRP (dBµV)	Margin to EIRP Limit (dB)	Height (m)	Azimuth (deg)	Polarization	Correction (dB)
30.56741667	29.43	82.2	-52.77	4.00	91.25	Horizontal	-2.06
46.24976249	37.97	82.2	-44.23	1.00	348.25	Vertical	-10.69
47.45378879	27.75	82.2	-54.45	1.68	276.25	Horizontal	-11.35
399.997221	36.31	82.2	-45.89	2.66	283.50	Horizontal	-3.32

Note: In the table/Plot above, no emissions exceed the FCC part 22/27 radiated spurious emissions limit when converted to dBuV/m. For final spurious emissions measurements to FCC part 22/27, see antenna port conducted emissions in applicable test report.

Figure 35: Plot of RE at 3m from 1 to 10 GHz (MC, NR- Mid channel)

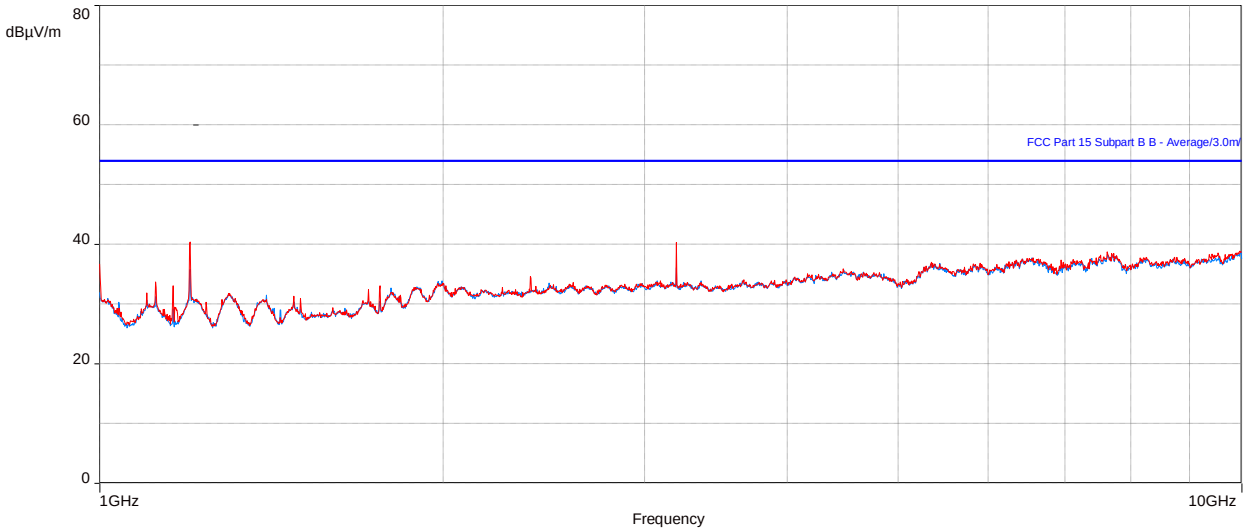


Table 32: RE test results from 1 to 10 GHz for FCC part 15 & ICES-003 (Mid channel)

Frequency (MHz)	Level Average (dBµV)	Limit Average (dBµV)	Margin to Class B Limit (dB)	Height (m)	Azimuth (degrees)	Polarization	Correction (dB)
1199.992628	29.49	53.96	-24.47	3.04	125.00	Horizontal	-10.73
1199.992308	34.78	53.96	-19.18	2.49	132.00	Vertical	-10.73
3199.978526	35.75	53.96	-18.21	2.90	84.00	Horizontal	-4.43
3199.978526	38.79	53.96	-15.17	1.52	333.75	Vertical	-4.43

Table 33: RE test results from 1 to 10 GHz for FCC Part 22/27 & RSS 130/132 (Mid channel)

Frequency (MHz)	Level (dBµV)	Limit EIRP (dBµV)	Margin to EIRP Limit (dB)	Height (m)	Azimuth (degrees)	Polarization	Correction (dB)
1199.992628	29.49	82.2	-52.71	3.04	125.00	Horizontal	-10.73
1199.992308	34.78	82.2	-47.42	2.49	132.00	Vertical	-10.73
3199.978526	35.75	82.2	-46.45	2.90	84.00	Horizontal	-4.43
3199.978526	38.79	82.2	-43.41	1.52	333.75	Vertical	-4.43

Note: In the table/Plot above, no emissions exceed the FCC part 22/27 radiated spurious emissions limit when converted to dBuV/m, except for the fundamental. For final spurious emissions measurements to FCC part 22/27, see antenna port conducted emissions in applicable test report.

3.2.8 Test results of RE (Multi RAT/Multi Carrier) - LTE + NR

Test location: 10-meter Ambient Free Chamber (AFC)

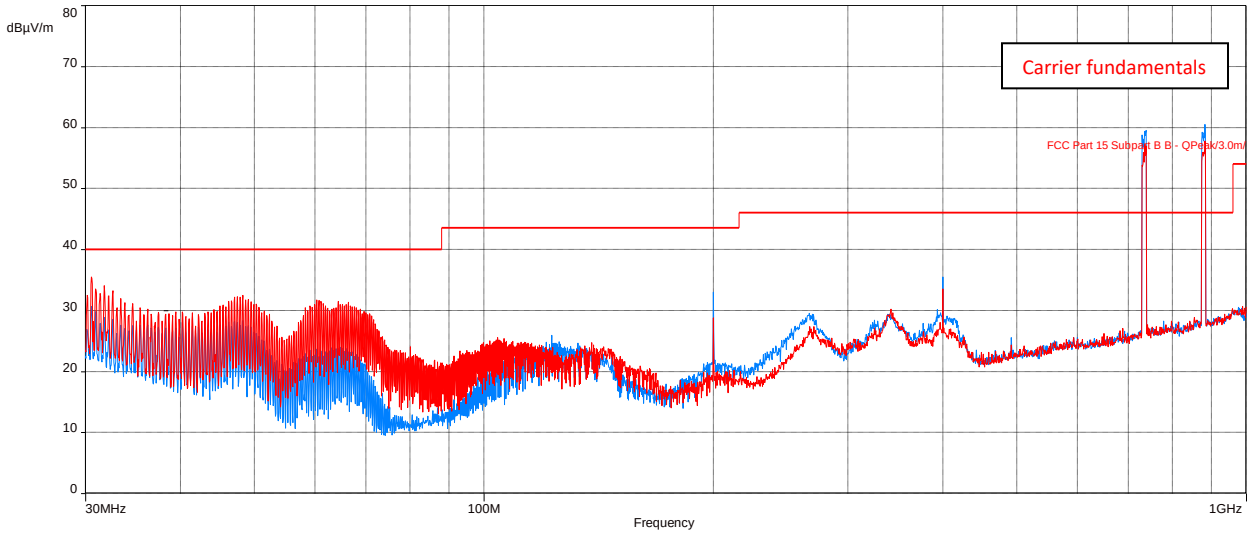
Date tested: 18 - 31, May 2021

Tested by: Krupal Patel & Christopher Richer

Test configuration is listed as MR – LTE + NR in Figure 23 as identified in the section Configurations of the EUT. For the following test results that have supporting data tables with worst case emissions, negative margin values indicate a pass.

Red trace – Vertical antenna polarity, Blue trace – Horizonatal antenna polarity

Figure 36: Plot of RE at 3 m – 30 to1000 MHz (MR, NR+LTE – Mid channel)



Note: Peaks above the limit are leakage of the EUT's fundamentals from the 50-ohm terminations.

Table 34: RE test results from 30 to 1000 MHz for FCC part 15 & ICES-003 (Mid channel)

Frequency (MHz)	Level (dBµV)	Limit Quasi-peak (dBµV)	Margin to Class B Limit (dB)	Height (m)	Azimuth (deg)	Polarization	Correction (dB)
30.57386572	35.61	40.00	-4.39	1.00	177.50	Vertical	-2.07
47.47217949	32.14	40.00	-7.86	1.00	348.00	Vertical	-11.36
199.9987341	32.77	43.52	-10.75	1.00	98.25	Horizontal	-10.34
399.9973813	34.46	46.02	-11.56	1.00	189.50	Horizontal	-3.32

Table 35: RE test results from 30 to 1000 MHz for FCC Part 22/27 & RSS 130/132 (Mid channel)

Frequency (MHz)	Level (dBµV)	Limit EIRP (dBµV)	Margin to EIRP Limit (dB)	Height (m)	Azimuth (deg)	Polarization	Correction (dB)
30.57386572	35.61	82.2	-46.59	1.00	177.50	Vertical	-2.07
47.47217949	32.14	82.2	-50.06	1.00	348.00	Vertical	-11.36
199.9987341	32.77	82.2	-49.43	1.00	98.25	Horizontal	-10.34
399.9973813	34.46	82.2	-47.74	1.00	189.50	Horizontal	-3.32

Note: In the table/Plot above, no emissions exceed the FCC part 22/27 radiated spurious emissions limit when converted to dBuV/m. For final spurious emissions measurements to FCC part 22/27, see antenna port conducted emissions in applicable test report.

Figure 37: Plot of RE at 3m from 1 to 10 GHz (MR, NR+LTE – Mid channel)

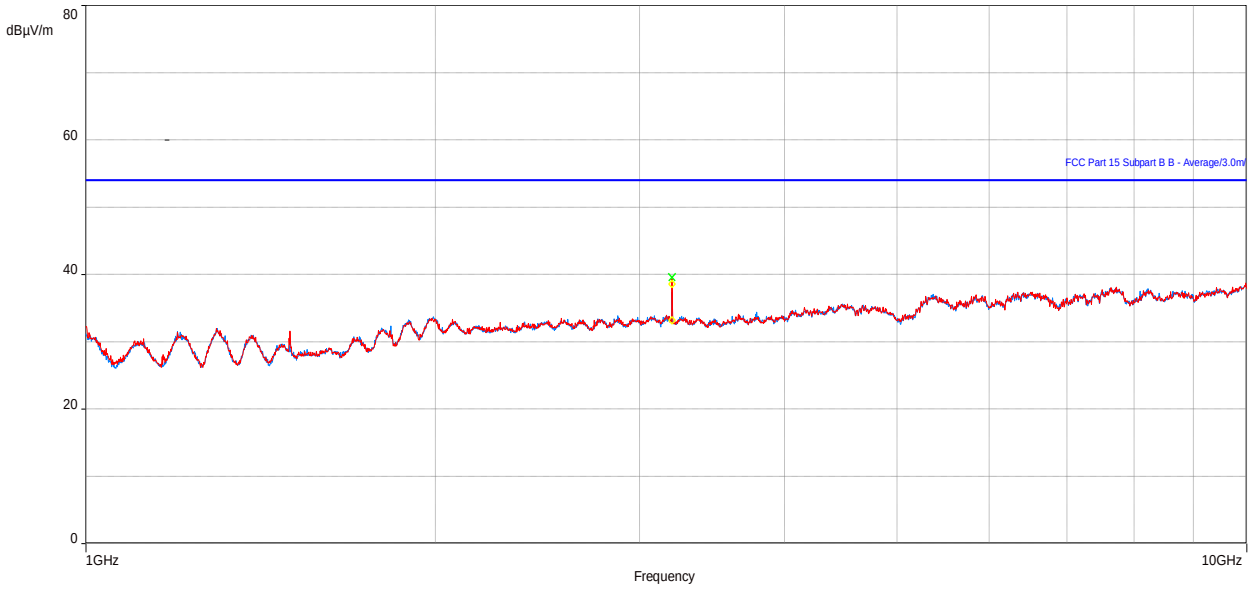


Table 36: RE test results from 1 to 10 GHz for FCC part 15 & ICES-003 (Mid channel)

Frequency (MHz)	Level Average (dBµV)	Limit Average (dBµV)	Margin to Class B Limit (dB)	Height (m)	Azimuth (degrees)	Polarization	Correction (dB)
3199.978526	39.52	53.96	-14.44	1.59	4.50	Vertical	-4.43

Table 37: RE test results from 1 to 10 GHz for FCC Part 22/27 & RSS 130/132 (Mid channel)

Frequency (MHz)	Level (dBµV)	Limit EIRP (dBµV)	Margin to EIRP Limit (dB)	Height (m)	Azimuth (degrees)	Polarization	Correction (dB)
3199.978526	39.52	82.2	-42.68	1.59	4.50	Vertical	-4.43

Note: In the table/Plot above, no emissions exceed the FCC part 22/27 radiated spurious emissions limit when converted to dBuV/m, except for the fundamental. For final spurious emissions measurements to FCC part 22/27, see antenna port conducted emissions in applicable test report.

3.2.9 Test results of RE (Receiver mode only) – LTE + NR

Test location: 10-meter Ambient Free Chamber (AFC)

Date tested: 18 - 31, May 2021

Tested by: Krupal Patel & Christopher Richer

Test configuration is listed as MR/Rx in Figure 24 as identified in the section Configurations of the EUT. For the following test results that have supporting data tables with worst case emissions, negative margin values indicate a pass.

Red trace – Vertical antenna polarity, Blue trace – Horizonatal antenna polarity

Figure 38: Plot of RE at 3 m – 30 to1000 MHz (Receiver mode only)

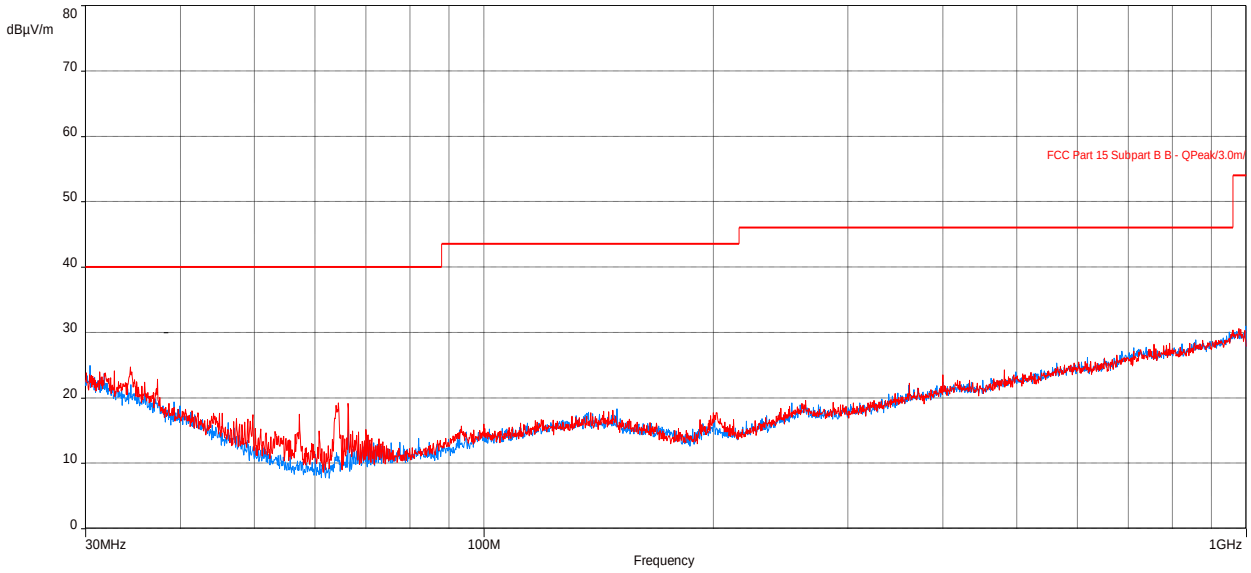


Table 38: RE test results from 30 to 1000 MHz for RSS-Gen (Rx mode only)

Frequency (MHz)	Level (dBµV)	Limit Quasi-peak (dBµV)	Margin to RSS-Gen Class B (dB)	Height (m)	Azimuth (deg)	Polarization	Correction (dB)
30.38491633	18.52	40.00	-21.48	3.94	360.00	Horizontal	-1.97
34.34384615	22.96	40.00	-17.04	1.00	127.25	Vertical	-4.10
950.3908944	23.89	46.02	-22.13	1.98	124.75	Horizontal	6.09
960.8193718	24.52	53.98	-29.46	1.95	184.75	Vertical	6.55

Figure 39: Plot of RE at 3m from 1 to 10 GHz (Receiver mode only)

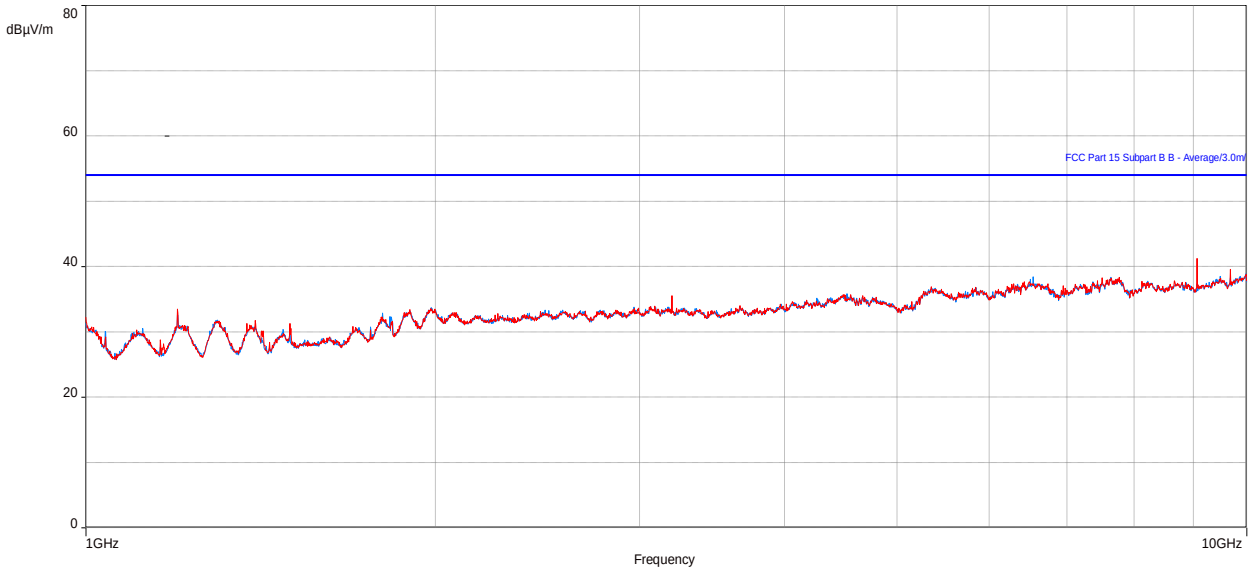


Table 39: RE test results from 1 to 10 GHz for RSS-Gen (Rx mode only)

Frequency (MHz)	Level Average (dBµV)	Limit Average (dBµV)	Margin to RSS-Gen Class B (dB)	Height (m)	Azimuth (degrees)	Polarization	Correction (dB)
3199.978526	34.66	53.96	-19.30	1.46	255.50	Vertical	-4.43
9062.437821	38.20	53.96	-15.76	1.07	329.00	Vertical	2.60
3173.44391	29.84	53.96	-24.12	4.00	111.25	Horizontal	-4.48
6545.642628	33.97	53.96	-19.99	4.00	321.50	Horizontal	1.35

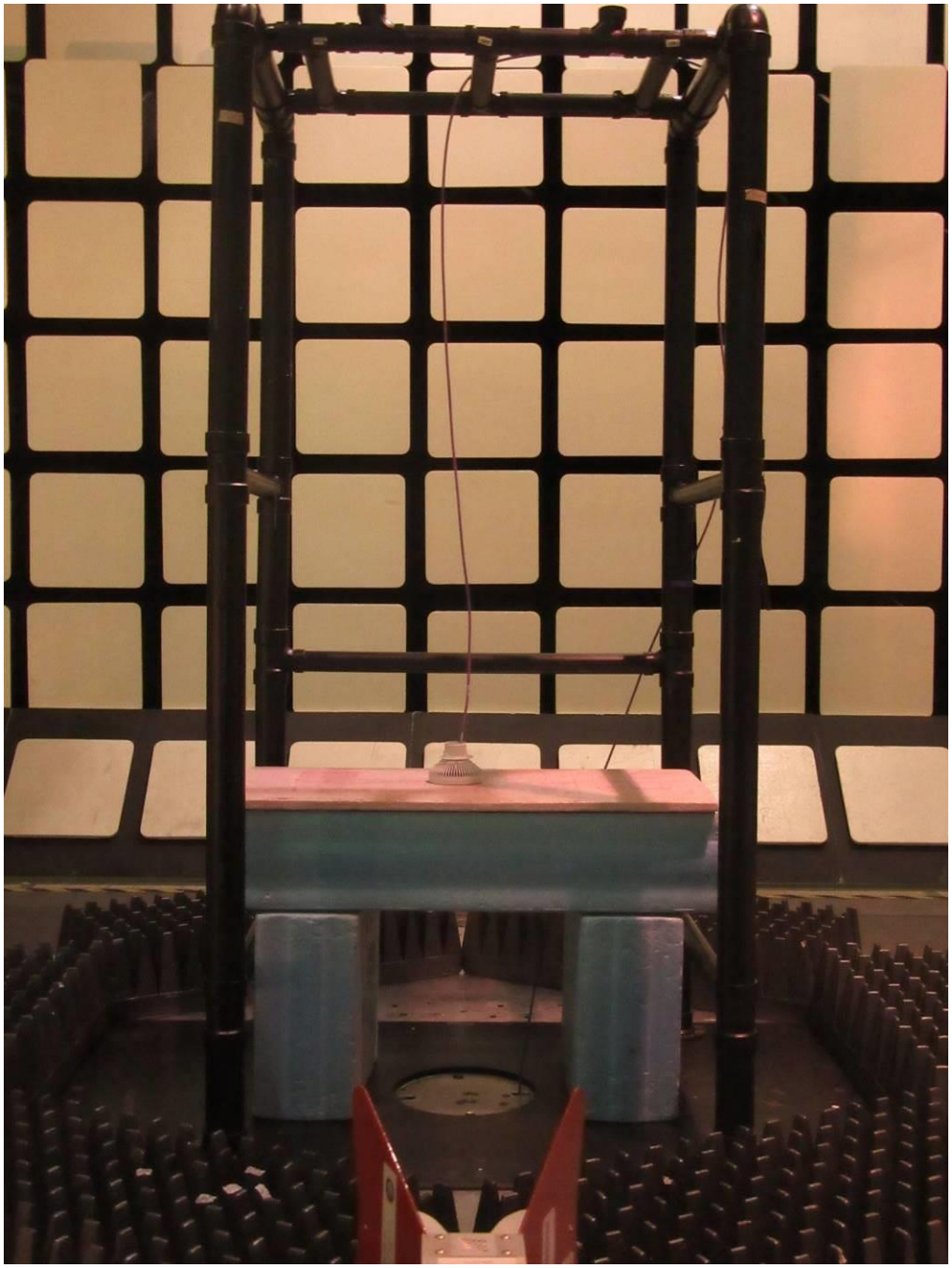
3.2.10 Radiated Emissions test setup pictures

Figure 40: Setup for RE tests at 30 MHz to 1 GHz (Tx mode – Dot 2282)

Figure 41: Setup for RE tests for above 1 GHz (Tx mode – Dot 2282)

Figure 42: Setup for RE tests at 30 MHz to 1 GHz (Rx mode – Dot 2272)

Figure 43: Setup for RE tests for above 1 GHz (Rx mode – Dot 2272)



3.2.11 Test equipment

The equipment used for E-field RE testing was as follows.

Table 40: Test equipment used for RE

Description	Make	Model number	Asset ID	Calibr. date	Calibr. due
EMC Automation Software	Nexio V3.18	BAT-EMC	F0163649	not required	not required
Bilog Antenna	TESEQ	CBL 6111D	SSG013965	2021-05-04	2022-05-04
Horn Antenna 3MCH 00003	ETS	3117	LAVE04211	2021-03-30	2022-03-30
EMI Receiver	Rohde & Schwarz	ESU26	SSG013729	2021-03-31	2022-03-31
EMI Receiver	Rohde & Schwarz	ESU40	SSG013672	2020-10-29	2021-10-29
Coaxial Cable	Huber & Suhner	106A	SSG013841	2021-01-05	2022-01-05
Coaxial Cable	Huber & Suhner	106A	SSG012711	2021-01-05	2022-01-05
Coaxial Cable	Huber & Suhner	104PEA	SSG012041	2021-01-05	2022-01-05
Coaxial Cable	Huber & Suhner	ST18/Nm/Nm/36	SSG012785	2021-01-06	2022-01-06
Coaxial Cable	Micro-Coax	UFA 210B-1-1500-504504	SSG012376	2021-01-06	2022-01-06
Pre-Amplifier	Hp	8447D	LAVE04346	2020-09-10	2021-09-10
Pre-Amplifier	BNR	LNA	SSG012360	2020-11-16	2021-11-16
Power Supply	Hewlett Packard	6216A	SSG013063	not required	not required

3.2.12 Test conclusion

The Dot 2272 B5B12A (KRY 901 428/1) and Dot 2282 B5B12A (KRY 901 428/2) have passed the E-field Radiated Emission (RE) tests with respect to the Class B limits of FCC Part 15, ICES003, and RSS - Gen (Section 7.0) and EIRP limits of FCC Part 22 (Section 22.359(a)), FCC Part 27 (Section 27.53(C)), RSS-130 (Section 4.7), and RSS-132 (Section 5.5 & 5.6).

4. References

The documents, regulations, and standards that are referenced throughout this test report are listed alphabetically as follows.

1. ANSI C63.2-2009, American National Standards Institute for Electromagnetic Noise and Field Strength Instrumentation, 10 Hz to 40 GHz – Specifications.
2. ANSI C63.26-2015, American National Standard for Compliance Testing of Transmitters Used in Licensed radio Services.
3. ANSI C63.4-2014, American National Standards Institute for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
4. CISPR 16 Publications (all parts and sections), Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods - Part 1: Radio Disturbance and Immunity Measuring Apparatus.
5. FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations, Part 2, U.S. Federal Communications Commission.
6. FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations, Part 15 Radio Frequency Devices, U.S. Federal Communications Commission.
7. FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations, Part 22 – Public Mobile Services, U.S. Federal Communications Commission.
8. FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations, Part 27 Miscellaneous Wireless Communications Services, U.S. Federal Communications Commission.
9. ICES-003 Issue 6 (2016), Spectrum Management and Telecommunications, Interference-Causing Equipment Standard: Information Technology Equipment (ITE) – Limits and methods of measurement.
10. RSS-Gen – General Requirements for Compliance of Radio Apparatus, Issue 5 (March 2019); Ministry of Industry, Government of Canada.
11. RSS-130 Issue 2 (2019), Spectrum Management and Telecommunications, Radio Standards Specification, Equipment Operating in the Frequency Bands 617- 652 MHz, 663 – 698 MHz, 698 - 756 MHz and 777-787 MHz.
12. Radio Standards Specification RSS-132, issue 3 (January 2013), Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz, Ministry of Industry, Government of Canada.

4.1 Appendix A: Abbreviations

The abbreviations of terms used in this document are as follows.

Term	Definition
A	6 dB Coaxial Attenuator (Conducted Immunity)
AAN	Asymmetric Artificial Network (ISN)
AE	Auxiliary equipment
AFC	Ambient Free Chamber
ANSI	American National Standards Institute
AVG	Average detector
BiLog	Biconical Log-Periodic Hybrid antenna (a registered trademark of Schaffner-Chase EMC Limited, 1993)
CISPR	Comité International Spécial Perturbation Radioélectrique (International Special Committee on Radio Interference)
CSA	Canadian Standards Association
EMC	Electromagnetic Compatibility
ETSI	European Telecommunications Standards Institute
EUT	equipment under test
GND	Ground
h/w	hardware
IC	Industry Canada
ICES	Canadian Specification: ICES-003, Issue 3, “Spectrum Management: Interference-causing equipment standard (Digital Apparatus)
IEC	International Electro Technical Association
ISN	Impedance Stabilization Network
LISN	Line Impedance Stabilization Network
ms	millisecond, unless otherwise specified
NA, na	not applicable
PK	Peak Detector
PS	Power Supply
QP	Quasi-peak Detector
QPA	Quasi-peak Adapter (for the Spectrum Analyzer)
RBW	Resolution Bandwidth
RE	Radiated Emissions
s/w	software
SA	Spectrum Analyzer, the CISPR 16, ANSI C63.2 Compliant EMI meter

Term	Definition
STP	Shielded Twisted Pair
T	50-ohm Coaxial Termination (Conducted Emissions / Immunity)
TL	Transient Limiter
VBW	Video Bandwidth

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