



Test Report Prepared By:

Electronics Test Centre 27 East Lake Hill Airdrie, Alberta Canada T4A 2K3

sales@etc-mpbtech.com http://www.etc-mpb.com

Telephone: 1-403-912-0037

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EMC testing of the Tektelic Communication Inc. STORK in accordance with FCC Part 15.247and ANSI C63.10: 2013 as referenced by FCC OET KDB 558074 D01 15.247 Meas Guidance v05r02.

FCC ID: 2ALEPT0008710

Test Dates: 2024-03-14 to 2024-03-19

Test Personnel: Janet Mijares

Prepared for: Tektelic Communication Inc.

7657 10th Street NE Calgary, Alberta Canada T2E 8X2 Talaphana: 1,403,238,60

Telephone: 1-403-338-6910

Imran Akram iakram@etc-mpbtech.com EMC Technologist Electronics Test Centre (Airdrie)

Marc Rousseau marc.rousseau@mpbc.ca QA Manager Electronics Test Centre (Airdrie)

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REVISION RECORD

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STORK
FCC ID:2ALEPT0008710

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1.0 INTRODUCTION

1.1 Scope

The purpose of this report is to present the results of compliance testing performed in accordance with FCC Part 15.247 and ANSI C63.10-2013 to gain FCC new Authorization for Low-Power License-Exempt transmitters. All test procedures, limits, criteria, and results described in this report apply only to the Tektelic Communication Inc. STORK test sample, referred to herein as the EUT (Equipment Under Test).

This report does not imply product endorsement by the Electronics Test Centre, A2LA, nor any Canadian Government agency.

1.2 Applicant

This test report has been prepared for Tektelic Communication Inc., located in Calgary, Alberta, Canada.

1.3 Test Sample Description

As provided to ETC (Airdrie) by Tektelic Communication Inc.:

Product Name:	STORK				
Radio	LoRa	BT			
Frequency Band	902 – 928 MHz	2400 – 2483.5 MHz			
Frequency Range	903 – 914.2 MHz	2402 – 2480 MHz			
Operating Mode	BLE				
Max Transmit Power (Conducted)	0.096 W (19.82 dBm)	0.00049 W (-3.13 dBm)			
Associated Antennas	Pulse Engineering Model# W3012 ISM 900 MHz Ceramic Antenna, Peak Gain = 2.0 dBi, Polarization = Omni directional radiation	Pulse Engineering Model# W3008 Antenna, Ceramic SMT, Gain: 1.1dBi, Polarization: Linear			
Model#	T0008396				
Serial#	2352T0001(Radiated Spurious Emission), 2352	T0002 (For antenna port Measurement)			
Power supply:	DC (Internal Battery Powered) or External D	C powered			
Note: There are two y	priont of the EUT normed on Stark (Pottery nowe	r) and Stark (External newar) There is			

Note: There are two variant of the EUT named as **Stork (Battery power)** and **Stork (External power)**. There is no difference in radio circuitry/enclosure between two variant except stork variant powered by internal battery and external DC power. The stork external power variant was chosen as a worst-case condition for emission testing. Both variant tested for emission profile and found no difference in emission. Detail differences between the models are given in **EUT description exhibit**. All three channels (LOW, MID, High) on each axis (X, Y & Z) are analyzed to determine the worse channel. Full emission scan is performed on worse channel at worse axis.

1.4 General Test Conditions

The EUT was set up and exercised using the configurations, modes of operation and arrangements defined in this report only. All inputs and outputs to and from other equipment associated with the EUT were adequately simulated. In order to meet the operational requirements during testing as per KDB 558074 D01 15.247 Meas Guidance v05r02 and ANSI C63.10-2013 clause 5.11 the device was programmed with a special firmware to transmit at a continuous transmit mode (100% duty cycle). Special firmware is strictly for testing purpose only and not available to end user. This special test case represents the worst-case duty cycle. For antenna port conducted emission SMA connector is soldered to the circuit board at the output of the radio to provide direct access to the radio output to connect spectrum analyzer

The environmental conditions are recorded during each test, and are reported in the relevant sections of this document.

1.5 Reference Standards

Standards	Description
FCC, title 47 CFR § 15.247	Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
FCC, title 47 CFR § 15.207	Conducted limits for an intentional radiator that is designed to be connected to the public utility (AC) power line.
FCC, title 47 CFR § 15.107	Conducted limits for equipment that is designed to be connected to the public utility (AC) power line.
FCC, title 47 CFR § 15.209	Radiated emission limits; general requirements
FCC, title 47 CFR § 15.109	Radiated emission limits; from unintentional radiators digital devices.
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio – Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 KHz to 40 GHz
558074 D01 15.247 Meas Guidance v05r02	Guidance For Compliance Measurements On Digital Transmission System, Frequency Hopping Spread Spectrum System, And Hybrid System Devices Operating Under Section 15.247 Of The FCC Rules

1.6 Test Methodology

Test methods are specified in the Basic Standard as referenced and/or modified by the Product Standard in the part of Section 2 of this report associated with each particular test case. EUT is tested in RX mode to cover FCC part 15 Sub Part B (Digital Circuitry).

1.6.1 Variations in Test Methodology

Any variance in methodology or deviation from the reference Standard is documented in the part of Section 2 of this report associated with each particular Test Case.

1.6.2 Test Sample Verification, Configuration & Modifications

EUT setup, configuration, protocols for operation and monitoring of EUT functions, and any modifications performed in order to meet the requirements, are detailed in each Test Case of Section 2 of this report.

1.6.3 Uncertainty of Measurement:

The factors contributing to measurement uncertainty are identified and calculated in accordance with CISPR 16-4-2: 2011.

This uncertainty estimate represents an expended uncertainty expressed at approximately 95% confidence using a coverage factor of k = 2.

Test Method	Uncertainty
Radiated Emissions Level (9 KHz – 1 GHz)	±5.8 dB
Radiated Emissions Level (1 GHz – 18 GHz)	±4.9 dB
Radiated Emissions Level (18 GHz – 26.5 GHz)	±5.0 dB
Conducted Emissions Level (150 KHz – 30 MHz)	±3.0 dB
Uncertainty Conducted Power level	±0.5 dB
Uncertainty Conducted Spurious emission level	±0.6 dB
Uncertainty for Bandwidth test	±1.5 %

2.0 TEST CONCLUSION

STATEMENT OF COMPLIANCE

The customer equipment referred to in this report was found to comply with the requirements, as summarized below.

The EUT was subjected to the following tests. Compliance status is reported as **Compliant** or **Non-compliant**. **N/A** indicates the test was Not Applicable to the EUT.

The measurement uncertainty is not accounted for determination of the statement of compliance. The statement of compliance is based only on the measurement value recorded.

Note: Maintenance of compliance is the responsibility of the Manufacturer. Any modifications to the product should be assessed to determine their potential impact on the compliance status of the EUT with respect to the standards detailed in this test report.

The following table summarizes the tests performed in terms of the specification, class or performance criterion applied, and the EUT modification state.

Test Case	Test Type	Specification	Test Sample	Modifications	Config.	Result
2.1	AC Main Conducted Emissions	15.207 / 15.109	STORK	none	see § 2.1	N/A
2.2	6dB Bandwidth	15.247(a)	STORK	none	see § 2.2	Compliant
2.3	Max Output Power	15.247(d)	STORK	none	see § 2.3	Compliant
2.4	Band Edge	15.247(d)	STORK none		see § 2.4	Compliant
2.5	Power Spectral Density	15.247(e)	STORK	none	see § 2.5	Compliant
2.6	Conducted Spurious Emissions (Non-Restricted Band)	15.247(d)	STORK	none	see § 2.6	Compliant
2.7	EUT Position	ANSI C63.4	STORK	none	see § 2.7	LoRa – X-Axis BLE - Z-Axis
2.8	Radiated Spurious Emission (Restricted Band)	15.205, 15.209 15.247(d)	STORK	none	see § 2.8	Compliant
2.9	Radiated Emission	15.109	STORK	none	see § 2.9	Compliant
2.10	RF Exposure	15.247(i)	STORK	none	see § 2.10	Exempt

Refer to the test data for applicable test conditions.

2.1 AC Main Power Line Conducted Emissions: N/A

Test Lab: Electronics Test Centre, Airdrie	EUT: STORK					
	Standard: FCC Part 15.207, FCC Part 15.107					
	Basic Standard: ANSI C63.10: 2013 Basic Standard: ANSI C63.4: 2014					
EUT sta	itus: N/A					
Comments: EUT is either internal battery powered or external 12VDC powered. No Direct/indirect connection to AC main.						

2.2 6dB Bandwidth

Test Lab: Electronics Test Centre, Airdrie **Test Personnel: Janet Mijares**

EUT: STORK

Standard: FCC PART 15.247

Date: 2024-03-19 (21.7°C, 16% RH)

Basic Standard: ANSI C63.10-2013 **FCC OET KDB 558074**

EUT status: Compliant

Specification: FCC Part 15.247 (a, 2), FCC 15.215 (c)

Criteria: Systems using digital modulation techniques may operate in the 902-928 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.2.1 Test Guidance: ANSI C63.10-2013, Clause 11.8 / FCC OET KDB 558074

This measurement is performed at low, mid and high frequencies, with modulation.

The RF output of EUT with an antenna connector is fed to the input of the spectrum analyzer through appropriate attenuation. The loss from the cable and the attenuator were added on the analyzer as gain offset setting there by allowing direct measurements, without the need for any further corrections.

For DTS the spectrum analyzer is set for a frequency span \geq (2 * OBW), \leq (5 * OBW), selected to clearly display the channel. The RBW is set to 100 kHz. The VBW is set to \geq (3 * RBW). The Peak detector is used, with the trace set to Max Hold.

The automated 99% BW function of the spectrum analyzer is engaged, and the 6 dB OBW and/or 20 dB OBW is measured with the x dB function.

2.2.2 Deviations From The Standard:

There were no deviations from the EUT setup or methodology specified in the standard.

2.2.3 Test Equipment

Testing was performed with the following equipment:

Equipment	Manufacturer	Model #	Asset #	Cal. Date	Cal. Due
EMI receiver	Agilent	N9038A (FW A.25.05)	6130	2023-08-11	2024-08-11
Temp/Humidity	Extech	42270	5871	2023-04-14	2024-04-14
Attenuator	PCB	BWS102W263	6932	2022-12-10	2025-12-10
Coaxial Cables (RF)	W.L. GORE	PGR01R01036	-	Cal. before each use	
DC Blocker	Centric RF	C0927 SMA	6987	Cal. before	e each use

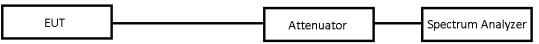
2.2.4 Test Sample Verification, Configuration & Modifications

The EUT was set to transmit continuously on a selected channel with test-specific software. The output was modulated as in normal operation.

The EUT met the requirements without modification.

Test setup diagrams for Occupied Bandwidth testing:

Conducted:



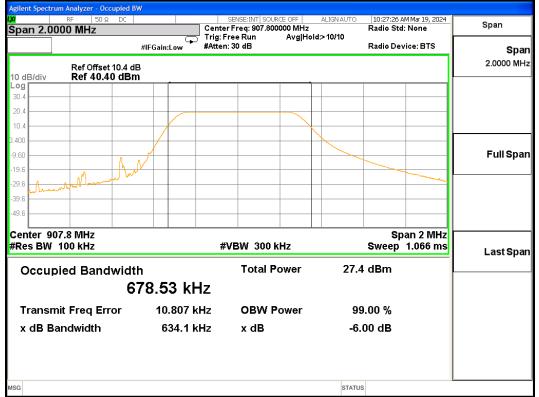
2.2.5 Channel Bandwidth Data: LoRa DTS

Mode of operation	Channel	Freq. [MHz]	6 dB BW [kHz]	Limit BW [KHz]	
	Low	903.0	633.5		
LoRa 500 KHz	Mid	907.8 634.1		≥ 500	
	High	914.2	631.4		

Screen Captures from the spectrum analyzer: Low Channel

Agilent Spectrum Analyzer - Occupied I RF 50 Q DC Ref Value 40.00 dBm	#IFGain:Low	SENSE:INT SOU Center Freq: 903.000 Trig: Free Run #Atten: 30 dB		ALIGN AUTO > 10/10	09:23:58 AM Radio Std: Radio Devi		Trace	e/Detector
10 dB/div Ref 40.00 dBr	n							
20.0							c	lear Write
0.00								
-20.0	<i>X</i>							Average
-30.0								Max Hold
Center 903 MHz #Res BW 100 kHz		#VBW 3001	(H ₇			n 2 MHz ep 1 ms		
Occupied Bandwidt	:h	Total P		27.5	dBm			Min Hold
6	78.80 kH	lz						Detector Peak
Transmit Freq Error	12.419 k	Hz OBW F	ower	99	.00 %		Auto	Mar
x dB Bandwidth	633.5 k	Hz xdB		-6.0	00 dB			
ISG DAlignment Completed				STATUS				

Screen Captures from the spectrum analyzer: MID Channel



Screen Captures from the spectrum analyzer: High Channel

Ref Offset 10.40 dB	Trig: F	SENSE:INT SOURCE OFF FrFreq: 914.200000 MHz Free Run Avg Hol 1: 30 dB	ALIGN AUTO	10:57:02 AM Mar 19, 2024 Radio Std: None Radio Device: BTS	Trace/D	etector
Ref Offset 10.4 dB I0 dB/div Ref 39.80 dBm	3					
-og 29.8 19.8					Cle	ar Writ
						Averag
0.2					N	lax Ho
enter 914.2 MHz Res BW 100 kHz	#	VBW 300 kHz		Span 1.5 MHz Sweep 1.066 ms		/lin Ho
Occupied Bandwidt	^h 76.63 kHz	Total Power	27.3	3 dBm		Detect
Transmit Freq Error x dB Bandwidth	12.151 kHz 631.4 kHz	OBW Power x dB		9.00 % 00 dB	Auto	Peał <u>M</u> a
G ⓓ File <6DB OBW.png> save			STATUS			

2.2.6 Channel Bandwidth Data: BLE

Mode of operation	Channel	Freq. [MHz]	6 dB BW [MHz]	Limit BW [KHz]
	Low	2402	666.8	
BLE	Mid	2440	665.6	≥ 500
	High	2480	666.2	

Screen Captures from the spectrum analyzer: Low Channel



Screen Captures from the spectrum analyzer: MID Channel



Screen Captures from the spectrum analyzer: High Channel

RF 50 Q DC RBW 100.00 kHz	Trig: F	sense:INT SOURCE OFF er Freq: 2.480000000 GHz Free Run Avg Hol n: 30 dB	ALIGN AUTO d:>10/10	01:40:48 PM Mar 19, 2024 Radio Std: None Radio Device: BTS	Trac	e/Detector
Ref Offset 11 dB	I					
-09 15.8 5.80					-	Clear Writ
4.20						Averag
4.2 4.2 4.2					- -	Max Ho
enter 2.48 GHz Res BW 100 kHz	#	VBW 300 kHz		Span 3 MH Sweep 1.066 m		Min Ho
Occupied Bandwidtl	ո 0403 MHz	Total Power	5.07	7 dBm		Detect
Transmit Freq Error x dB Bandwidth	-6.083 kHz 666.2 kHz	OBW Power x dB		9.00 % 00 dB	Auto	Peal <u>M</u>
36			STATU			

2.3 Max Average Output Power

Test Lab: Electronics Test Centre, Airdrie

Test Personnel: Janet Mijares

EUT: STORK

Standard: FCC PART 15.247

Basic Standard: ANSI C63.10: 2013 FCC OET KDB 558074

Date: 2024-03-19 (21.7°C, 16% RH)

EUT status: Compliant

Specification: FCC Part 15.247(b, 3)

Criteria (3) For systems using digital modulation in the 902-928 MHz bands: 1 Watt.

2.3.1 Test Guidance: ANSI C63.10-2013, Clause 11.9.2.2.2/ FCC OET KDB 558074

This measurement is performed at low, mid and high frequencies, with modulation.

The RF output of EUT with an antenna connector is fed to the input of the spectrum analyzer through appropriate attenuation. The loss from the cable and the attenuator were added on the analyzer as gain offset setting there by allowing direct measurements, without the need for any further corrections.

Output Powe	er Method AVGSA-1 For LoRa DTS
Span	≥ 1.5 times the OBW
RBW	$1 - 5$ % of the OBW, ≤ 1 MHz
VBW	≥ 3 x RBW
Number of Points in sweep	≥ 2 x Span / RBW
Sweep time	Auto
Detector	RMS (Power Averaging)
Sweep trigger	Free Run (Duty Cycle ≥98%)
Trace Average	100 traces in power Averaging (RMS)
Power measured	Integrated the spectrum across the OBW of the signal using the S/A band power measurement function, with band limit set equal to the OBW band edge.

2.3.2 Deviations From The Standard:

There were no deviations from the EUT setup or methodology specified in the standard.

2.3.3 Test Equipment

Testing was performed with the following equipment:

Equipment	Manufacturer	Model #	Asset #	Cal. Date	Cal. Due	
EMI receiver	Agilent	N9038A (FW A.25.05)	6130	2023-08-11	2024-08-11	
Temp/Humidity	Extech	42270	5871	2023-04-14	2024-04-14	
Attenuator	PCB	BWS102W263	6932	2022-12-10	2025-12-10	
Coaxial Cables (RF)	W.L. GORE	PGR01R01036	-	Cal. before each use		
DC Blocker	Centric RF	C0927 SMA	6987	Cal. before each use		

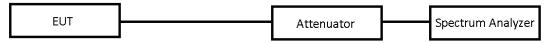
2.3.4 Test Sample Verification, Configuration & Modifications

The EUT was set to a selected channel with test-specific software. The output was modulated as in normal operation.

The EUT met the requirements without modification.

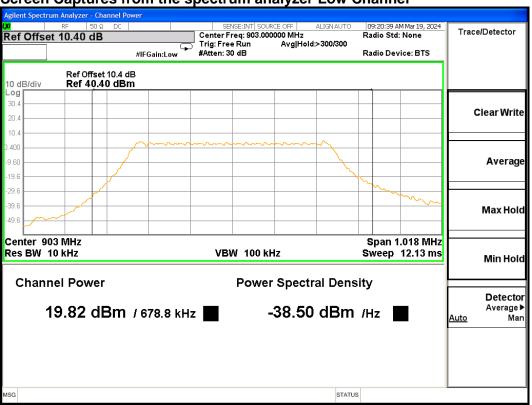
Test setup diagrams for Power testing:

Conducted:



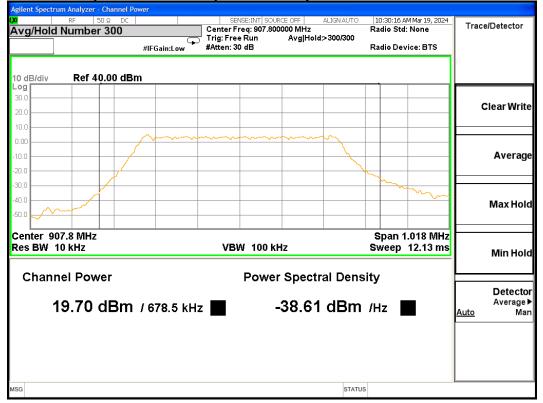
2.3.5 Max Average Output Power Data: LoRa DTS

Mode of operation	Channel	Freq. [MHz]	Max Average Power [dBm]	Limit Power [dBm]
	Low	903.0	19.82	
LoRa 500 KHz	Mid	907.8	19.70	≤ 30 (1Watt)
	High	914.2	19.67	



Screen Captures from the spectrum analyzer Low Channel

Screen Captures from the spectrum analyzer: MID Channel



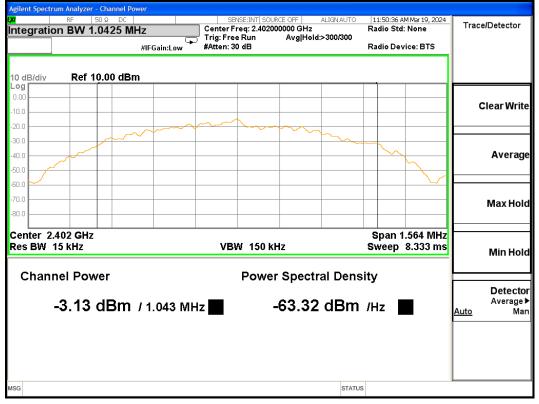
Screen Captures from the spectrum analyzer: High Channel

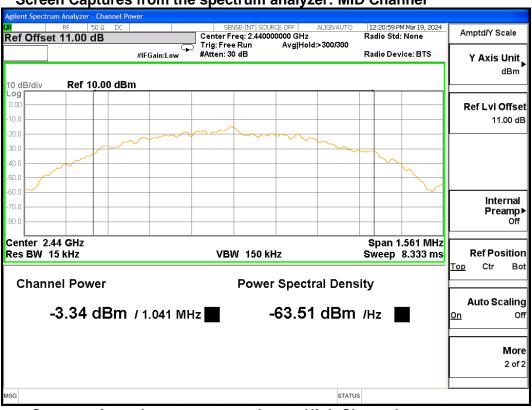


2.3.6 Max Average Output Power Data: BLE

Mode of operation	Channel	Freq. [MHz]	Max Average Power [dBm]	Limit Power [dBm]
	Low	2402	-3.13	
BLE	Mid	2440	-3.34	≤ 30 (1Watt)
	High	2480	-3.56	

Screen Captures from the spectrum analyzer Low Channel





Screen Captures from the spectrum analyzer: MID Channel





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2.4 Band Edge Attenuation

Test Lab: Electronics Test Centre, Airdrie

Test Personnel: Janet Mijares

EUT: STORK

Standard: FCC PART 15.247

Date: 2024-03-19 (21.7°C, 16% RH)

Basic Standard: ANSI C63.10: 2013 FCC OET KDB 558074

EUT status: Compliant

Specification: FCC Part 15.247(d)

Criteria: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.209(a) (see §15.205(c)).

2.4.1 Test Guidance: ANSI C63.10-2013 Clause 11.13.2 & 6.10.4, 6.10.6 / FCC OET KDB 558074

This measurement is performed at the low and high frequencies, with modulation.

The RF output of EUT with an antenna connector is fed to the input of the spectrum analyzer through appropriate attenuation. The loss from the cable and the attenuator were added on the analyzer as gain offset setting there by allowing direct measurements, without the need for any further corrections.

The spectrum analyzer is set for a frequency span to show the band edge and the nearest channel. The RBW is set to \geq 100 kHz. The VBW is set to \geq (RBW * 3). The Peak detector is used, with the trace set to Max Hold.

The attenuation is measured with the Marker Delta function.

2.4.2 Deviations From The Standard:

There were no deviations from the EUT setup or methodology specified in the standard.

2.4.3 Test Equipment

Testing was performed with the following equipment:

Equipment	Manufacturer			Cal. Date	Cal. Due	
EMI receiver	Agilent	N9038A (FW A.25.05)	6130	2023-08-11	2024-08-11	
Temp/Humidity	Extech	42270	42270 5871		2024-04-14	
Attenuator	PCB	BWS102W263	6932	2022-12-10	2025-12-10	
Coaxial Cables (RF)	W.L. GORE	PGR01R01036	-	Cal. before each use		
DC Blocker	Centric RF	C0927 SMA	6987	Cal. before each use		

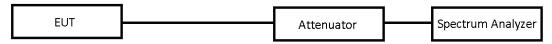
2.4.4 Test Sample Verification, Configuration & Modifications

The EUT was set to transmit continuously on a selected channel with test-specific software. The output was modulated as in normal operation.

The EUT met the requirements without modification.

Test setup diagrams for Band Edge Attenuation testing:

Conducted:



2.4.5 Band Edge Data LoRa DTS

Worse Case Data

Mode of operation	Channel	Attenuation at Band Edge	Attenuation Limit at Band Edge
Lora 500KHz	903.0	48.452dBc	
	914.2	71.497dBc	≥30 dBc

Screen Capture from the spectrum analyzer: Lower Band Edge

Agilent Spect	rum Analyzer -	Swept SA									
w Marker 2	RF 50	^{1Ω DC} 716 MHz			E:INT SOUR	Avg Typ	ALIGNAUTO e: Log-Pwr	TRA	M Mar 19, 202 CE <u>1 2 3 4 5</u>	6	Trace/Detector
		PN IFC	NO: Wide 🕞 Gain:Low	Trig: Free F #Atten: 30 (Avg Hold	l>100/100	D		I N	Select Trace
10 dB/div	Ref Offset Ref 30.4						Δıv	1kr2 1.2 48	.452 di		1
20.4										▋	
10.4							- /				Clear Write
0.400									-10.20 dE	╢	
-9.60									-10.20 ac		Trace Average
-19.6					X	3 Am	m				
-39.6		mmm	mmlamm	mon	للمسمه	in				╢	
-49.6											Max Hold
-59.6											
Start 900 #Res BW	.000 MHz 100 kHz		#VBN	V 300 kHz			Sweep 1	Stop 903 .000 ms (Min Hold
MKR MODE T	RC SCL	× 903.17	7 MLIa	Y 19.892 dBr		ction Fu	NCTION WIDTH	FUNCTI	ON VALUE	-	
2 ∆3 3 F	Γ Γ Γ		2 MHz (Δ)		В						View Blank
4 5											Trace On
6 7 8										F	More
9 10 11											1 of 3
<									>		
MSG							STATUS	6			

Screen Capture from the spectrum analyzer: Upper Band Edge



2.4.6 Band Edge Data BLE

Worse Case Data

Mode of operation	Channel	Attenuation at Band Edge	Attenuation Limit at Band Edge
BLE	2402	47.237dBc	
	2480	47.90dBc	≥ 30 dBc

Screen Capture from the spectrum analyzer: Lower Band Edge

Agilent Spectr	um Analyzer - Swe										
<mark>w</mark> Displav L	RF 50 Ω ine -33.13 c				E:INT SOUR	Avg Type	ALIGNAUTO : Log-Pwr	TRA	M Mar 19, 2024 CE 1 2 3 4 5 6		Display
10 dB/div	Ref Offset 11 Ref 30.00 d	PN IFG dB	IO: Fast ⊂₊ Sain:Low	Trig: Free #Atten: 30		AvgHold		r2 2.05	PE N N N N N ET P N N N N N 0 0 MHz .237 dB		Annotation►
20.0 10.0									203		Title▶
-10.0									-33.13 dBm	<u>0n</u>	Graticule Of
-40.0 -50.0	<u> </u>		R. 00	Anna Anton	al Law and	L-1 - 14 - 14	<u> </u>	Kann		<u>On</u>	Display Line -33.13 dBn Of
#Res BW			#VBW	300 kHz			Sweep 1	1.200 ms (2500 GHz 1001 pts)		
MXB MODE 11 1 N 1 2 ∆3 1 3 F 1 4 5 6	f f f (Δ) f	× 2.402 000 2.050 2.399 950	0 MHz (Δ)	-1.061 dBi 47.237 d -48.298 dBi	m B	CTION FU	NCTION WIDTH	FUNCTI	DN VALUE		System Display Settings
7 8 9 10 11									~		
ISG							STATU	s		L	

Screen Capture from the spectrum analyzer: Upper Band Edge

									nalyzer - Sw		gilent S
Trace/Detector	4 Mar 19, 2024 E 1 2 3 4 5 6 PE M WARAWAR	TRAC	LIGNAUTO		NSE:INT SOU			0000 MH	F 50 Ω 3.05000		<mark>/</mark> /larke
Select Trace		D		Arginola		#Atten: 3	0: Wide 🕞 ain:Low	P) IF(
1	05 MHz .900 dB		Δ						f Offset 11 ef 21.00 (10 dB/
Clear Write										∆3 `	1.00
Trace Average	-33.56 dBm									/	9.00
Max Hold	22 gow ^d ocowro	www.www	***********				∜ 3~~~~		Luma		49.0 -
Min Hold	0000 GHz 1001 pts)	.000 ms (/ 300 kHz	#VBW	×	kHz	2.4800) 3W 10) 7111111111	
View Blank Trace On					dB	-1.492 dl 47.900 -49.391 dl	MHz (Δ)	2.480 0 -3.0 2.483 0	(Δ)		1 Ν 2 Δ΄ 3 F 4 5 6
More 1 of 3	~										7 8 9 10 11
L			STATUS								sg

2.5 **Power Spectral Density**

Test Lab: Electronics Test Centre, Airdrie	EUT: STORK
Test Personnel: Janet Mijares	Standard: FCC PART 15.247
Date: 2024-03-19 (21.7°C, 16% RH)	Basic Standard: ANSI C63.10: 2013

EUT status: Compliant

Specification: FCC Part 15.247(e)

Criteria For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

2.5.1 Test Guidance: ANSI C63.10-2013, Clause 11.10.3 / FCC OET KDB 558074

This measurement is performed at low, mid and high frequencies, in continuous transmission, with modulation.

The RF output of EUT with an antenna connector is fed to the input of the spectrum analyzer through appropriate attenuation. The loss from the cable and the attenuator were added on the analyzer as gain offset setting there by allowing direct measurements, without the need for any further corrections.

Ме	thod AVGPSD-1 For DTS
Span	≥ 1.5 times the OBW
RBW	3 kHz ≤ RBW ≥ 100 kHz.
VBW	≥ 3 x RBW
Number of Points in sweep	≥ 2 x Span / RBW
Sweep time	auto couple
Detector	RMS (Power Averaging)
Sweep trigger	Free Run (Duty Cycle ≥98%)
Trace Average	Minimum 100 traces in power Averaging (RMS)
PSD measured	Use the peak marker function to determine the maximum amplitude level.
than 3 kHz) and repeat (note	eds requirement, then reduce RBW (but no less e that this may require zooming in on the emission span to meet the minimum measurement point reduced).

2.5.2 Deviations From The Standard:

There were no deviations from the EUT setup or methodology specified in the standard.

2.5.3 Test Equipment

Testing was performed with this equipment:

Equipment	Manufacturer	Model #	Asset #	Cal. Date	Cal. Due
EMI receiver	Agilent	N9038A (FW A.25.05)	6130	2023-08-11	2024-08-11
Temp/Humidity	Extech	42270	5871	2023-04-14	2024-04-14
Attenuator	PCB	BWS102W263	6932	2022-12-10	2025-12-10
Coaxial Cables (RF)	W.L. GORE	PGR01R01036	-	Cal. before	each use
DC Blocker	Centric RF	C0927 SMA	6987	Cal. before	e each use

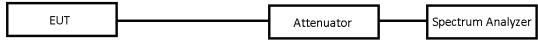
2.5.4 Test Sample Verification, Configuration & Modifications

The EUT was set to transmit continuously on a selected channel with test-specific software. The output was modulated as in normal operation.

The EUT met the requirements without modification.

Test setup diagrams for Power Spectral Density testing:

Conducted:



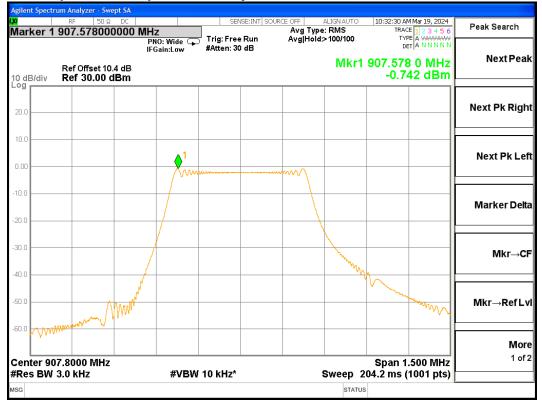
2.5.5 Average PSD Data LoRa DTS

Mode	Channel	Frequency (MHz)	Average PSD (dBm)	Limit
	Low	903.0	-0.070	
LoRa 500 KHz	Mid	907.8	-0.742	≤ 8 / 3KHz
	High	914.2	-0.873	



Screen Capture from Spectrum Analyzer: Low Channel

Screen Capture from Spectrum Analyzer: Mid Channel



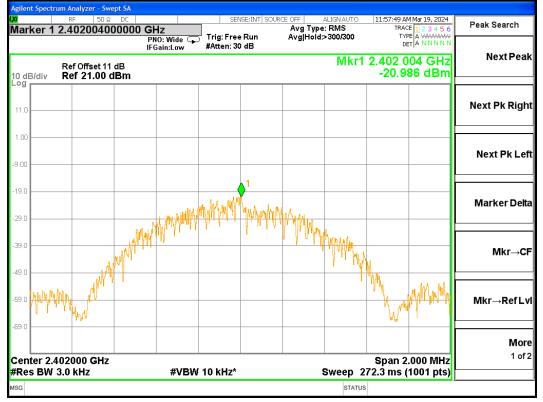


Screen Capture from Spectrum Analyzer: High Channel

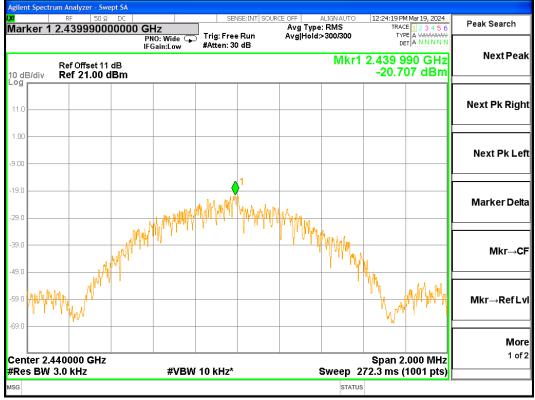
2.5.6 Average PSD Data BLE

Mode	Channel	Frequency (MHz)	Average PSD (dBm)	Limit
	Low	2402	-20.986	
BLE	Mid	2440	-20.707	≤ 8 / 3KHz
	High	2480	-21.238	

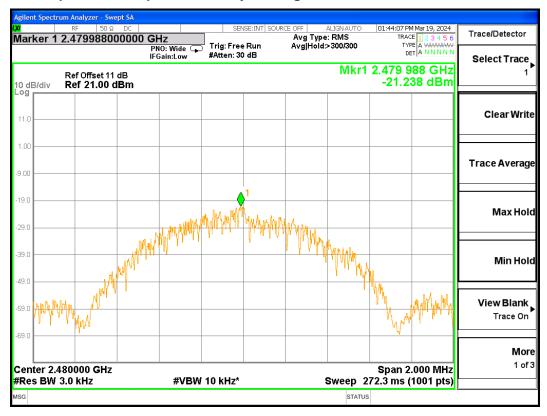
Screen Capture from Spectrum Analyzer: Low Channel



Screen Capture from Spectrum Analyzer: MID Channel



Screen Capture from Spectrum Analyzer: High Channel



2.6 Conducted Spurious Emissions (Non-Restricted Band)

Test Lab: Electronics Test Centre, Airdrie

Test Personnel: Janet Mijares

Standard: FCC PART 15.247

EUT: STORK

Basic Standard: ANSI C63.4-2014 FCC OET KDB 558470 v04 DTS

Date: 2024-03-19 (21.7°C, 16% RH)

EUT status: Compliant

Specification: FCC Part 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

2.6.1 Test Guidance: ANSI C63.10-2013, Clause 6.7

This measurement is performed at the low, mid and high frequencies, with modulation. The RF output of EUT with an antenna connector is fed to the input of the spectrum analyzer through appropriate attenuation. The loss from the cable and the attenuator were added on the analyzer as gain offset setting there by allowing direct measurements, without the need for any further corrections.

The spectrum analyzer is stepped through the spectrum in frequency spans selected to ensure acceptable frequency resolution. The RBW is set to 100 kHz. The VBW is set to ≥ 300 kHz. The Peak detector is used, with the trace set to Max Hold.

2.6.2 Deviations From The Standard:

There were no deviations from the EUT setup or methodology specified in the standard. **2.6.3** Test Equipment

Equipment	Manufacturer	Model #	Asset #	Cal. Date	Cal. Due
EMI receiver	Agilent	N9038A (FW A.25.05)	6130	2023-08-11	2024-08-11
Temp/Humidity	Extech	42270	5871	2023-04-14	2024-04-14
Attenuator	PCB	BWS102W263	6932	2022-12-10	2025-12-10
Coaxial Cables (RF)	W.L. GORE	PGR01R01036	-	Cal. before	each use
DC Blocker	Centric RF	C0927 SMA	6987	Cal. before	e each use

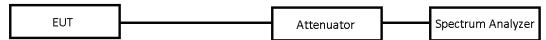
Testing was performed with the following equipment:

2.6.4 Test Sample Verification, Configuration & Modifications

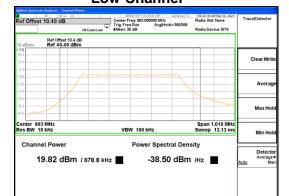
The EUT was set to a selected channel with test-specific software. The output was modulated as in normal operation.

The EUT met the requirements without modification.

Test setup diagram for Conducted Spurious Emissions testing:



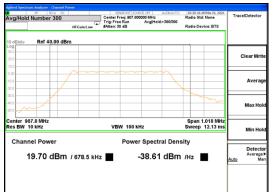
2.6.5 Conducted Emissions Data: LoRa DTS Low Channel



									-									
Agilent Sp	ectrum Analyzer	Spurious Emissions						Agiler	nt Spectru	im Analyzer - Sp	urious Emissio	ns						
w Markei	_R ⊧ r 1 7.2562 I	50Ω DC MHz	Center Fred	: 903.000000 MHz	R	10:07:56 AM Mar 19, 2024 adio Std: None	Range Table	<mark>и</mark> Spu	ır 1	RF 50 Ω	DC		Center Fre	e:INT SOURCE OFF	Rad	04:45 AM Mar 19, 2024 io Std: None	Ra	inge Table
PASS		IFGai	n:Low Trig: Free R #Atten: 30 d	un Avg Hold≫ B	R	ladio Device: BTS	Range	FAI	L		IFG	iain:Low 두	Trig: Free #Atten: 30		Rad	io Device: BTS		Rang
10 dB/di		fset 10.4 dB .80 dBm				7.2562 MHz -66.266 dBm	0n Off		B/div	Ref Offsel Ref 30.0	t 10.4 dB 10 dBm					903.05 MHz 13.167 dBm	<u>On</u>	0
-0.20 -10.2							Start Freq 30.000 kHz	20.0 10.0 0.00						pond to x:903MHz			30	Start Fre 0.000000 MH
-30.2							Stop Freq 30.000000 MHz	-10.0 -20.0 -30.0									1.00	Stop Fre 00000000 GH
-60.2 -70.2 -80.2	Antonia, mpikilikapananya	1	******	4.11.14042.141.141.001.001.001.001.001	- and the second second	tillijelatna vladelada a sala	Res BW 10.000 kHz Auto <u>Man</u>	-40.0 -50.0 -60.0									Auto	Res B 100.00 ki <u>M</u> a
Start 3	30 kHz	<u>^</u>				Stop 30 MHz FFT	Video BW 30.000 kHz	Star	rt 30 N	1Hz			·			Stop 1 GHz		Video BI 300.00 kH
Spu	ır Range	Frequency	Amplitude	Limit	ΔLi	imit	Auto <u>Man</u>	٤	Spur	Range F	requency	/ An	nplitude	Limit	∆ Lin	it	Auto	Ma
						-	Filter Type Gaussian	1						F -10.20 dB		IB 🔺	[Filter Type Gaussian
10	1	3.010 MHz	-65.27 dBm	-10.20 dBm	-55.0	7 dB	More 1 of 3									~		Mo 1 of
MSG					STATUS			MSG							STATUS			

Ref Offs	et 11.00 d	50 Ω DC dB	Cente	SENSE:INT SOURCE	0 MHz	Radio Std	M Mar 19, 2024 : None	Range Table
PASS]	IFGain		ree Run : 30 dB	Avg Hold:>10/	10 Radio Dev	vice: BTS	Rang
10 dB/div		fset 11 dB 0.60 dBm)64 GHz 55 dBm	<u>on</u> c
.600								Start Fre
9.40								1.000000000 GI
19.4								
29.4								Stop Fr
49.4								10.00000000 G
59.4								
59.4								Res B 100.00 k
79.4								Auto <u>M</u>
Start 1 G	GHz					Sto	p 10 GHz	Video B 300.00 k
Spur	Range	Frequency	Amplitud	e	Limit	∆ Limit		Auto <u>M</u>
1	3	1.806 GHz	-23.15 dB				^	
							=	Filter Type Gaussian
								Mo
							~	1 0
							×.	-

MID Channel



Agil	ent Spect		- Spurious Emission							Agile	ent Spectr		Spurious Emission	15						_	
Av	g/Hol	d Numbe	50 Ω DC	Center	ENSE:INT SOURC	000 MHz	0 10:39:35 AM Radio Std:	4 Mar 19, 2024 None	Range Table	Sta	art Lim	RF 10.30	^{50 Ω} DC dBm		Center F	VSE:INT SOUP	0000 MHz	R	10:44:40 AM Mar 19, 20 adio Std: None	24	Range Table
PA	SS]	IFG	ain:Low #Atten:	ee Run 30 dB	Avg Hold>10/10	Radio Dev		Range	FA	JL		IFG	ain:Low 두	Trig: Fre #Atten: 3		Avg Hold>1		adio Device: BTS		Range
	dB/div		fset 10.4 dB 0.00 dBm				105 -49.4	.01 kHz 16 dBm	0n Off		dB/div		set 10.4 dB 0.00 dBm						907.80 MF 13.148 dBi	z n	2 Off
Lo; 0.0 -10. -20.									Start Freq 30.000 kHz		0				orresp ntal Tx				1		Start Freq 30.000000 MHz
-30. -40. -50.	⊳ <mark>∖</mark> 1—								Stop Freq 30.000000 MHz	-10.0 -20.0 -30.0	0 0 0									1	Stop Freq .000000000 GHz
-60. -70. -80.		an de la competencia		******	len influentieten genetie	indayin, adapting the	ii Madaa ya ka	na an a	Res BW 10.000 kHz Auto <u>Man</u>	-50.0										Aut	Res BW 100.00 kHz o <u>Man</u>
Sta	art 30	kHz	· • ·				Sto	o 30 MHz FFT	Video BW 30.000 kHz	Sta	art 30 M	ИНz							Stop 1 GH	z	Video BW 300.00 kHz
	Spur	Range	Frequency	Amplitude	,	Limit	∆ Limit		Auto <u>Man</u>		Spur	Range	Frequency	/ Ar	nplitude		Limit	ΔL	imit	Aut	o <u>Man</u>
								-	Filter Type Gaussian							F -			∂dB _		Filter Type Gaussian
								×	More 1 of 3										~		More 1 of 3
MSG						ST/	TUS			MSG								STATUS			

Ref Offs	RF 5	50 Ω DC d B	Center Fre	q: 907.800000 MHz	ALIGNAUTO	Radio Std:	M Mar 19, 2024 None	Ran	ge Table
PASS]	IFGain:	Low Trig: Free F	Run Avg Hold dB	>10/10	Radio Dev			Rang
10 dB/div		fset 11 dB 0.60 dBm				1.81 -27.9	54 GHz 87 dBm	<u>On</u>	c
20.6									Otart Fr
10.6									Start Fre
.600								1.000	000000 G
9.40									
19.4	1								Stop Fr 000000 G
29.4								10.000	000000 G
39.4								-	
49.4									Res B 100.00 k
59.4								Auto	M
Start 1 C	GHz					Sto	p 10 GHz		Video B
								Auto	300.00 k
Spur	Range	Frequency	Amplitude	Limit		Limit		Auto	<u></u>
							^	-	iter Typ
1									
1									
1							=		
1							=		Gaussia
1							=		Gaussia
1							=		

High Channel



Agile	nt Spect		- Spurious Emission							Agiler	nt Spectru		Spurious Emiss	ions						
Re1	Valu	e 10.60 d	50Ω DC Bm	Center Fr	eq: 921.900000 MHz		11:12:42 AM Mar 19, 202 Radio Std: None	24	Range Table	v∦ Stai	rt Limi	RF 50	dBm		Center F	NSE:INT SOURCE OFF	ALIGNAUTO	11:14:10 AM Mar 19, 20 Radio Std: None	24	Range Table
PA	SS		IFGa	in:Low #Atten: 30			Radio Device: BTS	Γ	Range	FAI	L		I	FGain:Low 두	#Atten: 3		010:>10/10	Radio Device: BTS		Range
	IB/div		fset 10.4 dB 0.60 dBm				125.02 kH -51.893 dBr	z n	0 <u>n</u> Off		IB/div		et 10.4 dB .60 dBm					914.00 MH 12.215 dBi	z n	2 Off
Log 0.600 -9.40 -19.4									Start Freq 30.000 kHz	Log 20.6 10.6 0.600						espond to I Tx:914.2 I	MHz			Start Freq 30.000000 MHz
-29.4 -39.4 -49.4	1								Stop Freq 30.000000 MHz	-9.40 -19.4 -29.4									1	Stop Freq .000000000 GHz
-59,4 -69,4 -79,4	-	innelliged i Managana tabasi		Net gran da un fining and a thin work in fait		and a state of the state of the	1614.2014/10/14/14/14/14/14/14/14/14/14/14/14/14/14/	A	Res BW 10.000 kHz uuto <u>Man</u>	-39.4 -49.4 -59.4									Aut	Res BW 100.00 kHz o <u>Man</u>
Sta	rt 30	kHz	· • ·		· · · ·		Stop 30 MH FFT		Video BW 30.000 kHz	Sta	rt 30 N	1Hz	·			· ·		Stop 1 GH	z	Video BW 300.00 kHz
	Spur	Range	Frequency	Amplitude	Limit	Δ	Limit	A	uto <u>Man</u>	s	Spur	Range	Frequen	cy Ar	nplitude	Limi	it .	∆ Limit	Aut	o <u>Man</u>
							.09 dB 📤		Filter Type Gaussian	1						F -10.33 c		0.14 dB		Filter Type Gaussian
							~		More 1 of 3									~		More 1 of 3
MSG						STATUS				MSG							STATU	IS		

ef Offse		50.9 DC SENSE:INT SOURCE.OFF ALIGNAUTO 11:16:15 AM Mar19; 2 00 dB Center Freq: \$21,90000 MHz Radio Std: None Trig: Free Run Avg Hold>10/10 None							Range Table	
PASS		IFGain:			/ 10/10	Radio Dev	ice: BTS	Rang		
10 dB/div		set 11 dB 1.20 dBm				1.82 -27.8	85 GHz 21 dBm	<u>On</u>	<u>On</u> 0	
-og 21.2 11.2								1.00	Start Fre	
8.80 18.8 28.8	1							10.00	Stop Fr 0000000 G	
18.8 18.8 58.8								Auto	Res B 100.00 k <u>M</u>	
tart 1 G	Hz	~				Sto	p 10 GHz		Video B 300.00 kH Auto <u>Ma</u>	
Spur	Range	Frequency	Amplitude	Limit		∆ Limit		Auto		
1							=	F	F ilter Typ Gaussia	
									M 0 1 c	
							~			

2.6.6 Conducted Emissions Data: BLE



MID Channel

	12:26:08 PM Mar 19, 2024	E OFF ALIGNAUTO	ENCE INT SOL DO	CEN	ns	ourious Emissio			Ag	12:20:59 PM Mar 19, 2024	DURCE OFF ALIGNAUTO	SENSE:INT SO	SF		ectrum Analyzer - RF S	gilent Sp
Range Table	Radio Std: None	0000 GHz Avg Hold>10/10	Freq: 2.4400000 ee Run	🚽 Trig: Free			10.40 dB	f Offset		Radio Std: None	0000000 GHz Avg Hold:>300/300	Freq: 2.440 ree Run	Center F	IB	fset 11.00 d	ef Of
Rar	Radio Device: BTS 95.011 kHz		30 dB	#Atten: 30	Gain:Low			SS	Y Axis Unit	Radio Device: BTS		: 30 dB	:Low #Atten: 3	#IFGai		
<u>On</u>	-48.253 dBm					60 dBm	Ref Offse Ref 13.6	dB/div		· · · · ·).00 dBm	iv Ref 10	10 dB/d
Start F								ō	Ref Lvi Offset							0.00
30.000								4	11.00 dB -6.							10.0
Stop F									-26							30.0
30.000000 N								N .	-36						and the second s	40.0
Res								4	Internal						/	60.0 🗠
10.000 Auto		ter i stepp slavent er sjølig is sig	ie mariniety a	, A Singaporta dipo	Marinining and a	-			Preamp Off							70.0
	Stop 30 MHz						z	art 30 kH	s	Span 1.561 MHz					2.44 GHz	L enter
Video 1 30.000	FFT								Ref Position Ctr Bot	Sweep 8.333 ms	kHz	BW 150	VB		V 15 kHz	tes Bi
Auto <u>N</u>	Limit D.37 dB			mplitude 3.71 dBm		Frequency 95.01 kHz	-	Spur F		y	er Spectral Dens	Powe		er	annel Pow	Cha
Filter Typ									Auto Scaling		-63.51 dBm		41 MHz		2 24	
Gaussia									Off	Hz	-65.51 UBIII			JDIII / 1.0	-3.34 (
м	_								More							
1	~								2 of 2							
	8	STATUS							MS		STATUS					SG
					กร	ourious Emissio	Analyzer - Sp	ont Spectrum	Ag					Spurious Emissions	ectrum Analyzer -	gilent Sp
Range Table	12:28:40 PM Mar 19, 2024 Radio Std: None	E OFF ALIGNAUTO	ENSE:INT SOURCE	Center Fr		2 DC	.8F 50 ⊈ -33.34 dl		i Da	12:27:03 PM Mar 19, 2024 Radio Std: None	OURCE OFF ALIGNAUTO	SENSE:INT SO	Center F	o	.imit -33.34	tart l
Rar	Radio Device: BTS	Avg Hold>10/10	ee Run 30 dB	Trig: Free #Atten: 30	Gain:Low			IL		Radio Device: BTS	Avg Hold>10/10	:30 dB	Low #Atten: 3	IFGair		PASS
<u>On</u>	2.4400 GHz -4.9478 dBm					t 11 dB 20 dBm	Ref Offse Ref 14.2	dB/div	off	889.59 MHz -59.020 dBm				set 10.4 dB 3.60 dBm	Ref Off	10 dB/d
Abs Start Li							1	3	Start Freq							.0g 3.60
-33.34 d		an and to						1	30.000000 MHz							5.40
Abs Stop Li	7	spond to Tx:2440 MH:						8	-16 -28							16.4 26.4
-33.34 d Auto	2	TX.2440 IVII I		anaam					Stop Freq .000000000 GHz		+	_				16.4 -
					~~~			3	-45	↓						16.4
Peak Excurs 6.00									Res BW 100.00 kHz							ð6.4 <mark></mark>
6.00								B	to <u>Man</u> -79							/6.4
Pk Thresh	Stop 10 GHz							art 1 GH:	Video BW 300.00 kHz	Stop 1 GHz					30 MHz	start :
-90.00 d	Limit	Limit A	,	mplitude	y An	Frequency	tange l	Spur F	to <u>Man</u>	_imit	Limit 🛛	e	Amplitude	Frequency	r Range	Spu
Attenuat	.50 dB 🔷		n F-33						Filter Type	23 dB 🔷						
Auto M									Gaussian							
	_															
2 M									More 1 of 3							
	×									×						
	5	STATUS			ns	aurious Emissio	Analyzer - Sp	ont Spectrum	MSi Ag		STATUS			Sourious Emissions	ectrum Analyzer -	gilent Sr
Range Table	12:31:21 PM Mar 19, 2024 Radio Std: None	E OFF ALIGNAUTO	ENSE:INT SOURCE	Center Fr		2 DC			Peak Search	12:30:15 PM Mar 19, 2024 Radio Std: None	OURCE OFF ALIGNAUTO		Center F	0Ω DC	sfset 12.20 d	ef Of
Rar	Radio Device: BTS	Avg Hold>10/10	ee Run 30 dB	Trig: Free #Atten: 30	Gain:Low			SS	P	Radio Device: BTS	Avg Hold>10/10	ree Run : 30 dB	Low Trig: Fre #Atten: 3	IFGair		PASS
<u>On</u>	25.596 GHz -44.986 dBm						Ref Offse	- Diala	NextPeak	13.642 GHz -48.028 dBm				set 12.2 dB		10 dB/d
Start F							Ref 16.2		Lo					5.40 dBm	N Rei IX	.og 5.40
18.000000000								- 	Next Pk Right							1.60
								1	-13 -23							4.6
Stop Fr 26.00000000 0	1								Next Pk Left 3				<b>1</b>			34.6
									-43				<u> </u>			44.6 54.6
Res 100.00								1	Marker Delta							64.6
Auto <u>N</u>									-73							74.6
Video	Stop 26 GHz						z	art 18 GH	S	Stop 18 GHz					10 GHz	tart
300.00 Auto <u>N</u>	Limit	Limit A	,	mplitude	y An	Frequency	tange l	Spur F		_imit	Limit 🛛	e	Amplitude	Frequency	r Range	Spu
Filter Typ	244 dB 🔷			9.58 dBm		24.75 GHz			I	07 dB 🔷			-44.41 dBm	15.24 GHz	4	1
Gaussia									I	-						
M 1									More 1 of 2							
	×									~						
	Б	STATUS							MS		STATUS					SG

# High Channel

					ms	Spurious Emissio	m Analyzer -	eilent Spect							Channel Power	ctrum Analyzer -	gilent Sp
Range Table Ran	PM Mar 19, 2024 d: None evice: BTS	Radio Sto 10	2.485000000 GHz n Avg Hold>10/1	Trig: Free Run	Gain:Low	dBm	RF S t-33.56	X	Trace/Detector		01:41:55 Pf Radio Std: Radio Dev	ALIGN AUTO	: 2.480000000 GHz un Avg Hold	Trig: Free R	DC DC		٥
On	0.02 kHz 648 dBm					set 10.4 dB									00 dBm	<b>D</b> -6.44	
Start Fr 30.000 k		-45.0				.60 dBm	Ref 1:	10 dB/div Log 5.60	Clear Write						.00 dBm	Ref 10	0 dB/di
Stop Fr								-14.4				~~~~		~~~~			20.0
30.000000 N								34.4 44.4 54.4		$\overline{}$							40.0 50.0 60.0
Res E 10.000 k Auto <u>N</u>	-	anter parte d'Angeliet eu glane	internative international states and the second states of the second states of the second states of the second	S. S. S. S. Stradi Strate			nikistelipinnen	64.4	Max Hold								70.0
Video E 30.000 k	op 30 MHz FFT	Sto				^	Hz	Start 30		1.56 MHz 8.267 ms	Span Sweep		150 kHz	VBW		2.48 GHz 15 kHz	
Auto M	^	Δ Limit -13.72 dB	Limit -33.56 dBm	7.28 dBm		Frequency 120.0 kHz	Range 1	Spur 1	Detector		sity	al Dens	ower Spectr	F	er	nnel Pow	Cha
Filter Typ Gaussia	2								Average▶ <u>Auto</u> Man	•	∣/Hz	dBm	-63.73	MHz	<b>¦Bm /</b> 1.04	-3.56 (	
10	×																
		STATUS						ISG	h		JS	STATU					SG
Range Table	PM Mar 19, 2024	AUTO 01:51:02	VT SOURCE OFF ALIGN	SENSE:IN	ns	Spurious Emissio	RF S	XI		M Mar 19, 2024	01:49:59 Pf	ALIGNAUTO	INT SOURCE OFF	SENSE Center Fred	Spurious Emissions	ue 15.60 dl	٥
Ran	vice: BTS	10 Radio De	n Avg Hold>10/1	Tria: Eroo Dur	Gain:Low		t -33.56		Range	vice: BTS	Radio Dev	>10/10	un Avg Hold	Trig: Free R	IFGain	ue 15.60 a	PASS
<u>On</u>	801 GHz 199 dBm	-5.74				set 11 dB 5.20 dBm	Ref Off Ref 16	10 dB/div		15 MHz 25 dBm					et 10.4 dB .60 dBm	Ref Off Ref 15	I0 dB/di
Abs Start Lii -33.56 di		o ) MHz	correspond to ntal Tx:2480	F <mark>AIL (F)</mark> c Fundame	-   F   F		-	6.20 -3.80 -13.8	Start Freq 30.000000 MHz								5.60 4.40 14.4
Abs Stop Lin -33.56 di Auto N								-33.8	Stop Freq 1.00000000 GHz								24.4 34.4
Peak Excursi					<u> </u>			-53.8 -63.8	Res BW 100.00 kHz	1							54.4 64.4
6.00	op 10 GHz	Ste					łz	-73.8	Auto <u>Man</u>	op 1 GHz	St					0 MHz	74.4
Pk Thresh -90.00 di		∆ Limit	Limit	mplitude	y Ar	Frequenc	Range	Spur	Video BW 300.00 kHz Auto <u>Man</u>		∆ Limit		Limit	Amplitude	Frequency		Spu
Attenuati	•		F -33.56 dBm						Filter Type Gaussian	-							
M0 2.0									More 1 of 3								
	<b>×</b>	STATUS						ISG		×	JS	STATU					.sg
	PM Mar 19, 2024	INUTO 01-53-31	NT SOURCE OFF ALIGN	SENSE:IN	ens	Spurious Emissio		Agilent Spect		M Mar 19, 2024	01-52-09 P	ALIGNAUTO	INT SOURCE OFF	SENSE	Spurious Emissions		gilent Sp
Peak Search Next Pe		Radio De	2.485000000 GHz n Avg Hold>10/1	Center Freq: 2 Trig: Free Run #Atten: 30 dB	Sain:Low		t -33.56	Start Lin PASS	NextBack	vice: BTS	Radio Std: Radio Dev	>10/10	: 2.485000000 GHz un Avg Hold B	Trig: Free F	d <b>Bm</b> IFGain	mit -33.56	Start L PASS
	362 dBm					set 13 dB 2.20 dBm		10 dB/div Log		502 GHz 17 dBm					et 12.2 dB .40 dBm	Ref Off Ref 17	0 dB/di
Next Pk Rig								8.20 -1.80 -11.8	Next Pk Right								7.40
Next Pk L	1							-21.8	Next Pk Left					1			22.6 32.6
Marker De								-51.8									i2.6
	op 26 GHz	Ste					Hz	5tart 18	z	p 18 GHz	Sto					0 GHz	72.6
	^	Δ Limit -7.224 dB	Limit -33.56 dBm	mplitude 0.78 dBm		Frequency 25.41 GHz	Range	Spur 1		^	∆ Limit I1.18 dB		Limit -33.56 dB	Amplitude	Frequency 13.64 GHz	Range	Spu 1
	-									-							
									More	_							
<b>M</b> d 1 d	×								1 of 2	~							

#### 2.7 EUT Positioning Assessment

Test Lab: Electronics Test Centre, Airdrie

Test Personnel: Janet Mijares

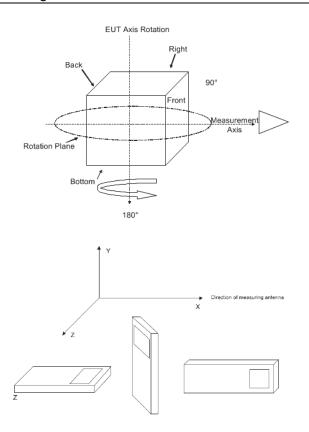
Date: 2024-03-14 (21.7°C, 12.18% RH)

EUT: STORK Standard: FCC PART 15.247 Basic Standard: ANSI C63.4-2014

**Comments**: LoRa :X-Axis, BLE: Z-Axis

#### Specification: ANSI C63.4-2014, Clause 6.3.2.1

Portable, small, lightweight, or modular devices that may be handheld, worn on the body, or placed on a table during operation shall be positioned on a non-conducting platform, the top of which is 80 cm above the reference ground plane. The preferred area occupied by the EUT arrangement is 1 m by 1.5 m, but it may be larger or smaller to accommodate various sized EUTs (see Figure 6, Figure 7, and Figure 9). For testing purposes, ceiling- and wall-mounted devices also shall be positioned on a tabletop (see also 6.3.4 and 6.3.5). In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level.



#### 2.8 Radiated Spurious Emissions (within restricted band)

Test Lab: Electronics Test Centre, Airdrie

Test Personnel: Janet Mijares

EUT: STORK Standard: FCC PART 15.247/15.209

-Date: 2024-03-(14/15/18) (21.6° C.17.5 % RH)

Basic Standard: ANSI C63.10-2013

# EUT status: Compliant

#### Specification: FCC PART 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

MHz	MHz	MHz	MHz	MHz	GHz	GHz
0.0900000 -	8.2910000 -	16.804250 -	162.01250 -	1660.0000 -	3.6000000 -	14.470000 –
0.1100000	8.2940000	16.804750	167.17000	1710.0000	4.4000000	14.500000
0.4950000 -	8.3620000 -	25.500000 -	167.72000 -	1718.8000 –	4.5000000 –	15.350000 –
0.5050000	8.3660000	25.670000	173.20000 <mark> </mark>	1722.2000	5.1500000	16.200000
2.1735000 -	8.3762500 -	37.500000 -	240.00000 –	2200.0000 –	5.3500000 –	17.700000 –
2.1905000	8.3867500	38.250000	285.00000	2300.0000	5.4600000	21.400000
4.1250000 -	8.4142500 -	73.000000 -	322.00000 -	2310.0000 –	7.2500000 –	22.010000 –
4.1280000	8.4147500	74.600000	335.40000	2390.0000	7.7500000	23.120000
4.1772500 -	12.290000 -	74.800000 -	399.90000 –	2483.5000 –	8.0250000 -	23.600000 –
4.1777500	12.293000	75.200000	410.00000	2500.0000	8.5000000	24.000000
4.2072500 -	12.519750 -	108.00000 -	608.00000 -	2655.0000 -	9.0000000 –	31.200000 –
4.2077500	12.520250	121.94000 **	614.00000	2900.0000	9.2000000	31.800000
5.6770000 -	12.576750 -	123.00000 -	960.00000 –	32600000 –	9.3000000 –	36.430000 -
5.6830000	12.577250	138.00000 <mark>**</mark>	1240.0000 <mark>***</mark>	3267.0000	9.5000000	36.500000
6.2150000 -	13.360000 -	149.90000 -	1300.0000 –	3332.0000 –	10.600000 –	Above
6.2180000	13.410000	150.05000	1427.0000 <mark>***</mark>	3339.0000	12.700000	38.600000
6.2677500 -	16.420000 -	156.52475-	1435.0000 –	3345.8000 –	13.250000 –	
6.2682500	16.423000	156.52525	1626.5000	3358.0000	13.400000	
6.3117500 - 6.3122500	16.694750 - 16.695250	156.70000 - 156.90000	1645.5000 – 1646.5000	3500.0000 – 3600.0000		

#### **Restricted Bands of Operation:**

# 2.8.1 Test Guidance: ANSI C63.10-2013, Clause 13.4.2

From 9 kHz to 150 kHz (resolution bandwidth of 200 Hz) and from 150 kHz to 30 MHz (resolution bandwidth 9 kHz) measurements are performed with a loop antenna (as per KDB 460108).

From 30 MHz to 1000 MHz, measurements are performed with a broadband biconilog antenna and a resolution bandwidth of 120 kHz.

Above 1000 MHz, measurements are performed with a DRG Horn antenna or a Standard Gain horn, and a resolution bandwidth of 1 MHz The EUT is raised to 150 cm above the ground plane, and the area between the EUT and the antenna mast is covered with RF absorbent material.

The scan is performed at discreet increments of turntable azimuth and antenna height, which are selected in accordance with the applicable standard in order to assure capture of frequencies of interest. Optimization is performed based on the scan data.

Frequencies having peak emissions within 10dB of the limits are optimized. The EUT is rotated in azimuth over 360 degrees and the direction of maximum emission is noted.

Antenna height is varied from 1 - 4 meters at this azimuth to obtain the maximum emission. Then the maximum level is measured with the appropriate detector and recorded. Up to 1 GHz, measurements are performed with a Quasi-Peak detector. Above 1 GHz, measurements are recorded with Peak and/or Average detectors, as applicable.

#### 2.8.2 Deviations From The Standard:

There were no deviations from the EUT setup or methodology specified in the standard.

Equipment	Manufacturer	Model #	Asset #	Cal. Date (yyyy-mm-dd)	Cal. Due (yyyy-mm-dd)
EMC Software	UL	Ver. 9.5	ETC-SW-EMC 2.1	N	/Α
EMI receiver	Agilent	N9038A (FW A.25.05)	6130	2023-08-11	2024-08-11
Loop Antenna (9KHz – 30MHz)	EMCO	6502	10868	2023-06-21	2025-06-21
Biconilog Antenna (30 – 1000 MHz)	AR	JB1	6905	2023-11-29	2025-11-29
DRG Horn (1 – 18 GHz)	EMCO	3115	19357	2022-10-05	2024-10-05
STD Horn (18-26 GHz)	Quinstar	QWH-KRPS00	6163	2022-10-10	2025-10-10
Humidity/Temp Logger	Extech Ins. Corp.	42270	5892	2023-04-14	2024-04-14
Pre-Amplifier (30 – 1400 MHz)	HP	8447D	9291	*2024-01-23	2025-01-23
L.N. Amplifier (1 – 18 GHz)	MITEQ	JS43-01001800-21-5P	4354	*2024-01-23	2025-01-23
L.N. Amplifier (18 – 26 GHz)	MITEQ	JS44-01002650-33-3P	6163	*2024-01-23	2025-01-23
RE Cable below 1GHz	Insulated Wire Inc.	KPS-1501A-3600- KPA-01102006	4419	*2024-01-23	2025-01-23
Re Cable Above 1 GHz	A.H. System Inc.	SAC-26G-8.23	6187	*2024-01-23	2025-01-23
0.9GHz Notch Filter	Microtronics	BRM20784	6947	*2024-01-23	2025-01-23

# 2.8.3 Test Equipment

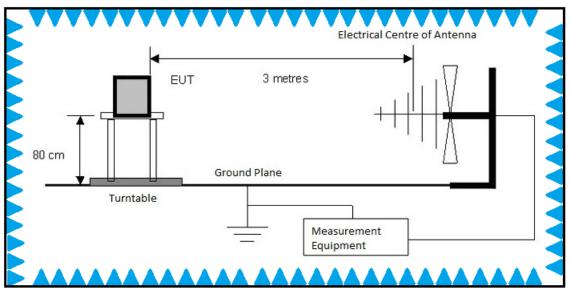
Testing was performed with the following equipment:

* In-house verification

# 2.8.4 Test Sample Verification, Configuration & Modifications

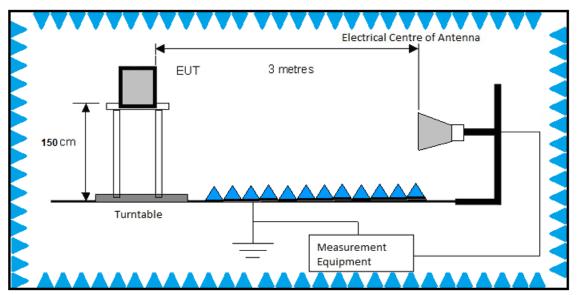
The EUT was set to a selected channel with test-specific software. The output was modulated as in normal operation. LoRa radio is transmitting at mid channel in ingle carrier configuration and high channel in dual carrier configurations.

The EUT met the requirements without modification.



# Test setup diagram for Radiated Spurious Emissions testing (below 1GHz):

#### Test setup diagram for Radiated Spurious Emissions testing (above 1GHz):



# 2.8.5 Radiated Emissions Data: LoRa DTS

The emissions data are presented in tabular form, showing turntable azimuth, antenna height and polarization, the uncorrected spectrum analyzer reading, the correction factors applied, the net result, the value of the limit at the frequency investigated, and the Delta between the result and the limit.

Meter Reading in  $dB_{\mu}V$  + Antenna Factor in dB/m + Gain/Loss Factor in dB = Corrected Field Strength in  $db_{\mu}V/m$ .

#### Delta = Field Strength – Limit

#### Notes:

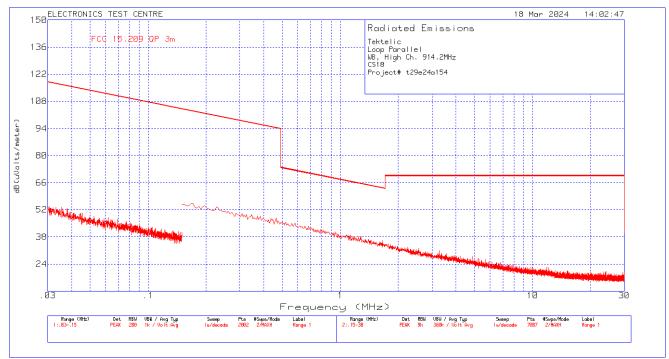
- When a preamp is used, the resulting gain is compensated, producing a negative value for the Cable Loss.
- Measurements reported are the result of adjusting the turntable azimuth and antenna height to obtain the maximum EUT emission. This may produce a different reading than the plot trace. The plot is a Peak Hold function obtained at discreet increments of height and azimuth, while the reported measurement is obtained with the appropriate Quasi Peak or Average detector after the height and azimuth have been adjusted for maximum emission.
- Preliminary scans were performed for all channels in Transmit modes. The High band channel 914.2 MHz was selected as the worst-case condition for detailed examination.
- In Transmit mode, the EUT was assessed up to 10.0 GHz.

Freq. Marker	Freq. [GHz]	Raw reading[ dBµv]	Det	Antenna Factor [dB/m]	Pre amp Gain [dB]	Corrected Reading [dBµv/m]	FCC 15.209 Limit [dBµv/m]	Delta [dB]	Azimuth [Deg]	Height [cm]	Polarization
1	2.74	42.84	PK	29.2	-32.4	39.64	74	-34.36	4	163	Horizontal
1	2.74	36.02	AV	29.2	-32.4	32.82	54	-21.18	4	163	Horizontal
2	2.74	42.95	PK	29.2	-32.4	39.75	74	-34.25	0	167	Vertical
2	2.74	34.7	AV	29.2	-32.4	31.5	54	-22.50	0	167	Vertical
3	4.57	48.43	PK	32.6	-31	50.03	74	-23.97	182	100	Horizontal
3	4.57	46.27	AV	32.6	-31	47.87	54	-6.13	182	100	Horizontal
4	4.57	44.97	PK	32.6	-31	46.57	74	-27.43	134	100	Vertical
4	4.57	41.32	AV	32.6	-31	42.92	54	-11.08	134	100	Vertical

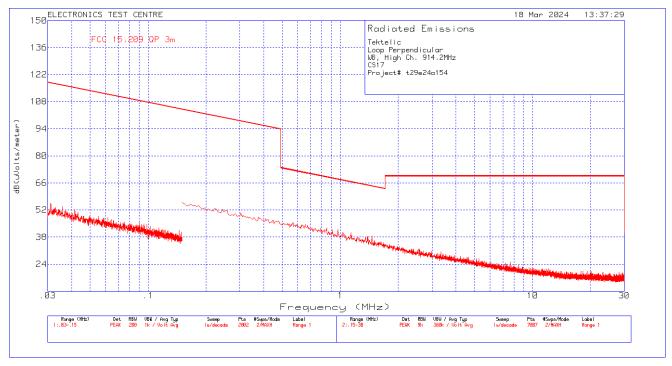
## Negative values for Delta indicate compliance.

**QP:** Quasi-Peak Detector, PK: Peak Detector, AV: Average Detector * Spurious Emission in Restricted Band

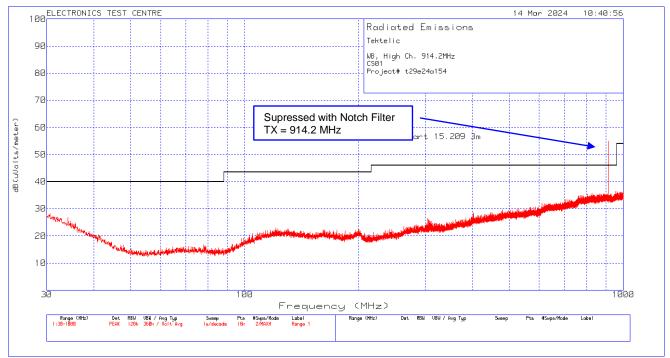
#### Plot of Radiated Emissions: Parallel

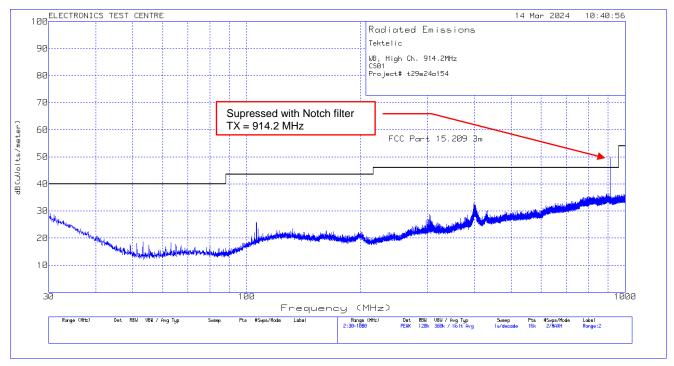


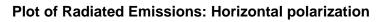
#### Plot of Radiated Emissions: Perpendicular

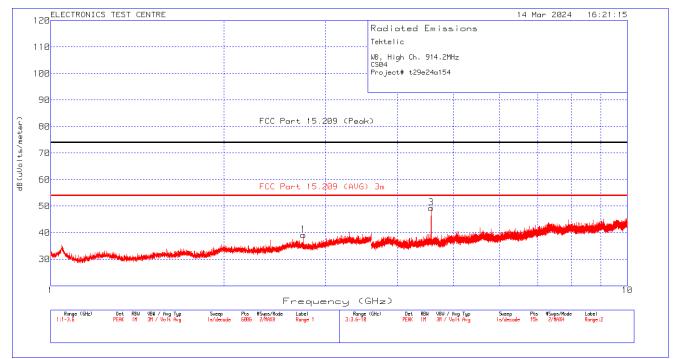


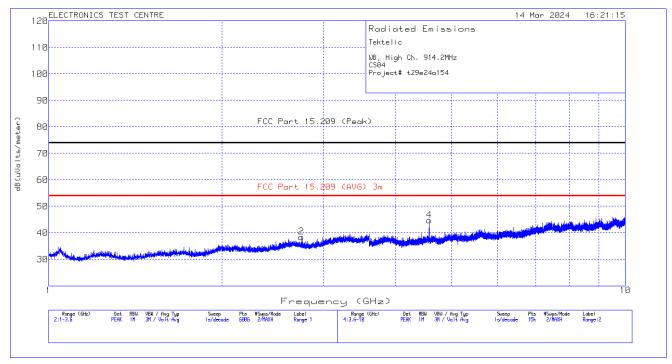












# 2.8.6 Radiated Emissions Data: BLE

The emissions data are presented in tabular form, showing turntable azimuth, antenna height and polarization, the uncorrected spectrum analyzer reading, the correction factors applied, the net result, the value of the limit at the frequency investigated, and the Delta between the result and the limit.

Meter Reading in  $dB\mu V$  + Antenna Factor in dB/m + Gain/Loss Factor in dB = Corrected Field Strength in  $db\mu V/m$ .

#### Delta = Field Strength – Limit

#### Notes:

- When a preamp is used, the resulting gain is compensated, producing a negative value for the Cable Loss.
- Measurements reported are the result of adjusting the turntable azimuth and antenna height to obtain the maximum EUT emission. This may produce a different reading than the plot trace. The plot is a Peak Hold function obtained at discreet increments of height and azimuth, while the reported measurement is obtained with the appropriate Quasi Peak or Average detector after the height and azimuth have been adjusted for maximum emission.
- Preliminary scans were performed for all channels in Transmit modes. The LOW band channel 2402 MHz was selected as the worst-case condition for detailed examination.
- In Transmit mode, the EUT was assessed up to 26.0 GHz.

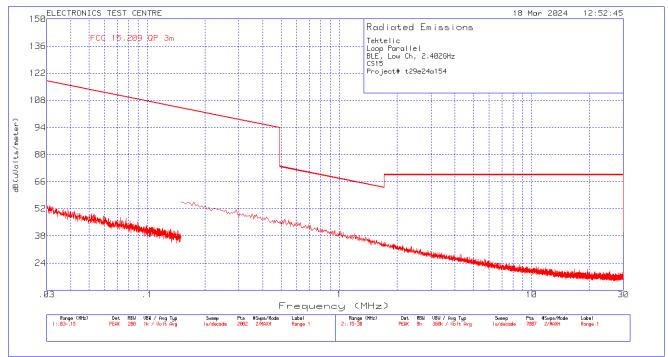
Freq. Marker	Freq. [GHz]	Raw reading[ dBµv]	Det	Antenna Factor [dB/m]	Pre amp Gain [dB]	Corrected Reading [dBµv/m]	FCC 15.209 Limit [dBµv/m]	Delta [dB]	Azimuth [Deg]	Height [cm]	Polarization
1	0.80	32.65	QP	11.7	-24	20.35	40	-19.65	9	102	Vertical
2	0.1061	19.46	QP	15.9	-23.6	11.76	43.53	-31.77	358	178	Vertical
1	17.91	27.07	PK	46.8	-16.1	57.77	74	-16.23	248	244	Horizontal
1	17.91	14.67	AV	46.8	-16.1	45.37	54	-8.63	248	244	Horizontal
2	17.90	27.6	PK	46.9	-16.1	58.4	74	-15.60	101	280	Vertical
2	17.90	14.71	AV	46.9	-16.1	45.51	54	-8.49	101	280	Vertical
1	20.78	25.54	PK	35.3	-19.3	41.54	74	-32.46	29	396	Vertical
1	20.78	13.1	AV	35.3	-19.3	29.1	54	-24.9	29	396	Vertical

#### Negative values for Delta indicate compliance.

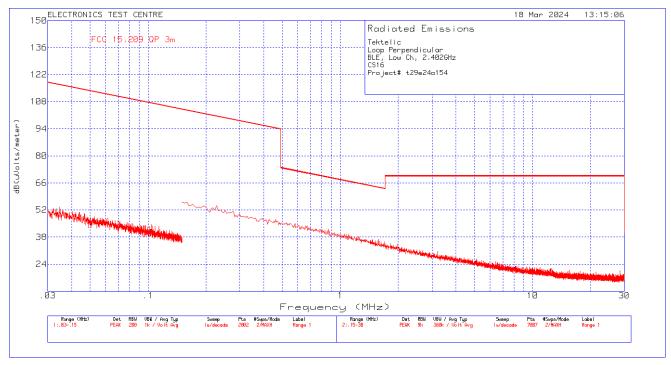
QP: Quasi-Peak Detector, PK: Peak Detector, AV: Average Detector

* Spurious Emission in Restricted Band

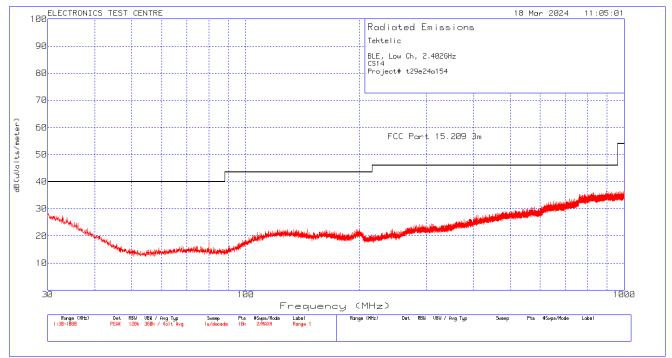
#### Plot of Radiated Emissions: Parallel

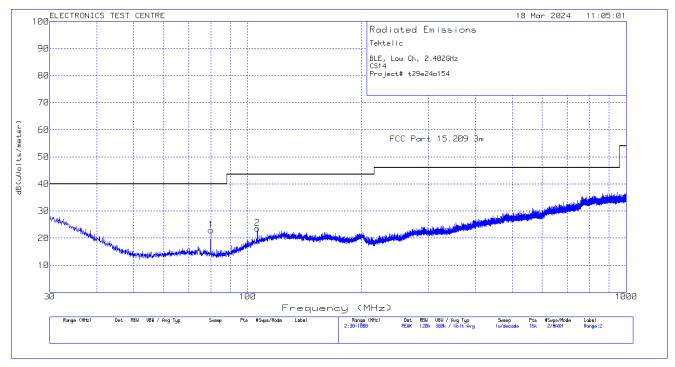


#### Plot of Radiated Emissions: Perpendicular

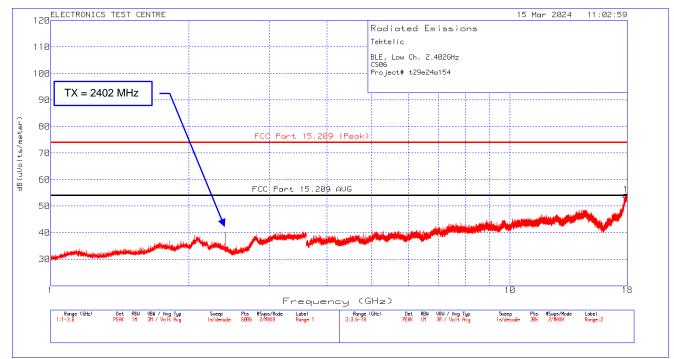


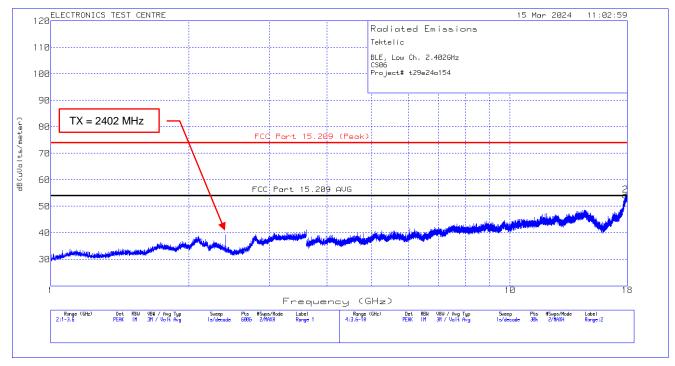






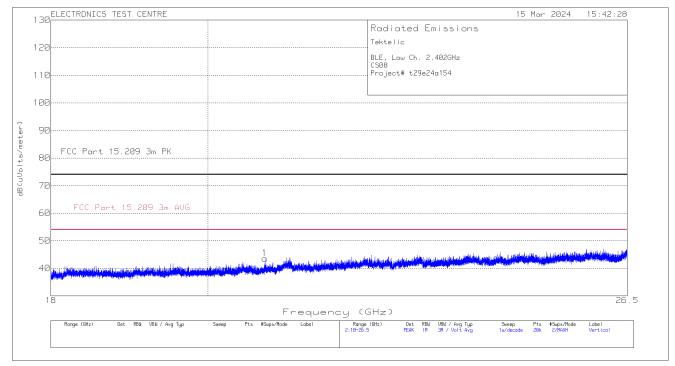






#### Plot of Radiated Emissions: Horizontal polarization

1.3P	ELECTRONICS TEST CENTRE	15 Mar 2024 15:42:28
120		Radiated Emissions Tektelic
11E		BLE, Low Ch. 2.482GHz CSBB Project# t29e24a154
100		
98		
88	FCC Part 15.209 3m PK	
78		
68	FCC Part 15.209 3m AVG	
50	]	
40	ning second to the first first to the first second	
1	8	26.5 Frequency (GHz)
	Range (GHz) Det RBW UBW / Avg Typ 1:18-25.5 PEAK 1M 3M / Volt Avg	Sweep Pts #Swps/Mode Label Range (6Hz) Det R6W VBW / Avg Typ Sweep Pts #Swps/Mode Label 1s/decode 28k 188/MXH Harizantal



# 2.9 Radiated Emissions (RX Mode)

Test Lab: Electronics Test Centre, Airdrie Test Personnel: Janet Mijares Date: 2024/03/(14/15) (21° C, 15.2% RH) EUT: STORK Standard: FCC Part 15.109 Basic Standard: ANSI C63.4: 2014 Class: B

# **EUT status: Compliant**

Frequency (MHz)	FCC Part 15.109 Class B Limit (3m)
30 – 88	40 (dBµV/m)
88 – 216	43.52 (dBµV/m)
216 – 960	46.02 (dBµV/m)
Above 960	53.98 (dBµV/m)

**Criteria:** The radiated emissions produced by a device, measured at a distance of 3 meters, shall not exceed the limits as specified.

## 2.9.1 Test Guidance:

From 30 MHz to 1000 MHz, measurements are performed with a broadband biconilog antenna and a resolution bandwidth of 120 kHz.

Above 1000 MHz, measurements are performed with a DRG Horn antenna or a Standard Gain horn, and a resolution bandwidth of 1 MHz.

The scan is performed at discreet increments of turntable azimuth and stepped antenna height, with peak detector and Max Hold function which are selected in accordance with the applicable standard in order to assure capture of frequencies of interest. Optimization is performed based on the scan data.

After the pre-scan is completed, the frequencies of interest are optimized. The EUT is rotated in azimuth over 360 degrees and the direction of maximum emission is noted.

Antenna height is varied from 1 - 4 meters at this azimuth to obtain the maximum emission. Then the maximum level is measured with the appropriate detector and recorded. This may produce a different reading than the pre scan trace. Up to 1 GHz, measurements are performed with a Quasi-Peak detector. Above 1 GHz, measurements are recorded with Peak and/or Average detectors, as applicable.

# 2.9.2 Deviations From The Standard:

There were no deviations from the EUT setup or methodology specified in the standard.

# 2.9.3 Test Equipment

Testing was performed with the following equipment:

Equipment	Manufacturer	Model #	Asset #	Cal. Date (yyyy-mm-dd)	Cal. Due (yyyy-mm-dd)
EMC Software	UL	Ver. 9.5	ETC-SW-EMC 2.1	N/A	
EMI receiver	Agilent	N9038A (FW A.25.05)	6130	2023-08-11	2024-08-11
Biconilog Antenna (30 – 1000 MHz)	AR	JB1	6905	2023-11-29	2025-11-29
DRG Horn (1000 – 18000 MHz)	EMCO	3115	19357	2022-10-05	2024-10-05
Humidity/Temp Logger	Extech Ins. Corp.	42270	5892	2023-04-14	2024-04-14
Pre-Amplifier (30 – 1400 MHz)	HP	8447D	9291	*2024-01-23	2025-01-23
Low Noise Amplifier (1 – 18 GHz)	MITEQ	JS43-01001800-21- 5P	4354	*2024-01-23	2025-01-23
RE Cable below 1GHz	Insulated Wire Inc.	KPS-1501A-3600- KPA-01102006	4419	*2024-01-23	2025-01-23
Re Cable Above 1 GHz	A.H. System Inc.	SAC-26G-8.23	6187	*2024-01-23	2025-01-23

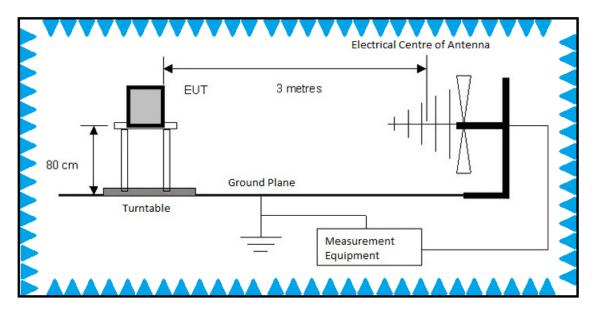
* In-house verification.

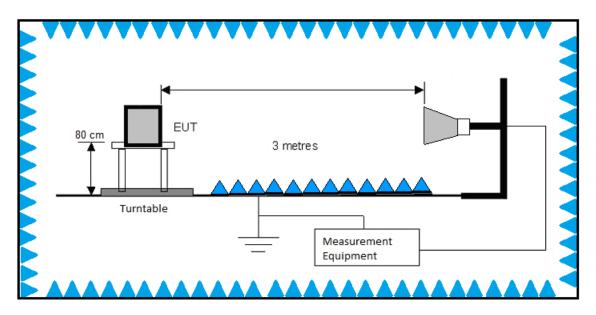
## 2.9.4 Test Sample Verification, Configuration & Modifications

To cover the unintentional radiated emission. The EUT was configured in receive mode. Unit was placed at the center of turntable in semi-anechoic chamber 80cm above the ground plane and at a distance of 3m from the test receive antenna.

The EUT met the requirements without modification. Power cable is soldered to the battery terminal to connect the DC power supply during radiated emission.

#### EUT RX configuration Block Diagram for Radiated Emissions testing:

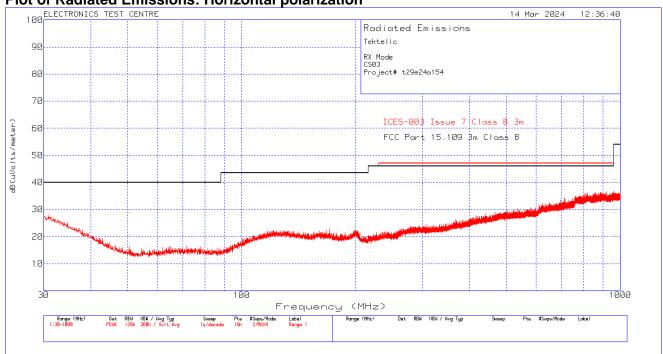




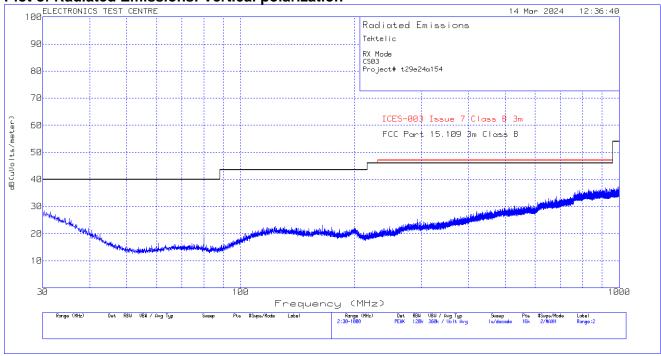
2.9.5 Radiated Emissions Data:

#### Emission is more than 20 dB below the limit

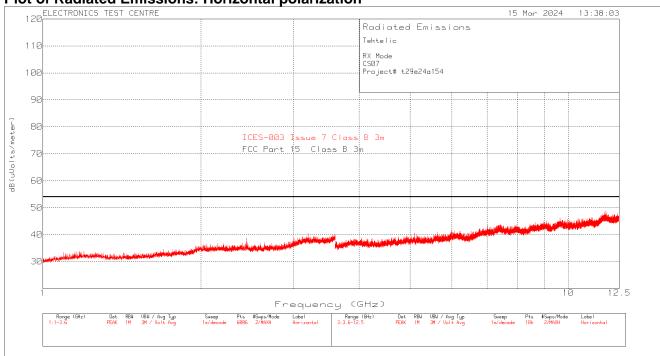
Meter Reading in dB_µV + Antenna Factor in dB/m + Gain/Loss Factor in dB = Corrected Field Strength in db_µV/m.

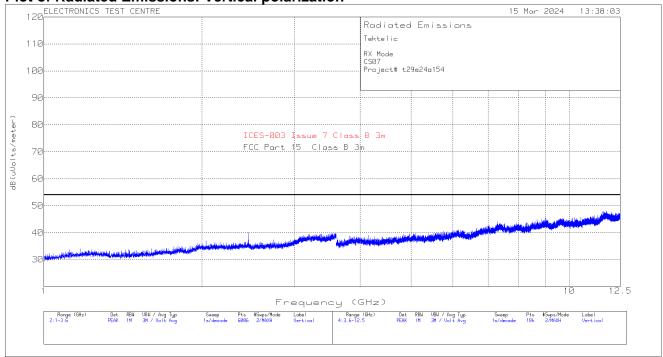


#### Plot of Radiated Emissions: Horizontal polarization









# 2.10 RF Exposure

Test Lab: Electronics Test Centre, Airdrie

EUT: STORK

Date:

**Test Personnel:** 

Standard: FCC PART 15.247

# EUT status: Exempt from SAR Evaluation

**Compliant:** RF exposure assessment to be provided in a separate Exhibit.

# 3.0 TEST FACILITY

#### 3.1 Location

The STORK was tested at the Electronics Test Centre laboratory located in Airdrie, Alberta, Canada. The Radio Frequency Anechoic Chamber (RFAC), identified as Chamber 1, has a usable working space measuring 10.6 m long x 7.3 m wide x 6.5 m high.

Measurements taken at this site are accepted by Industry Canada as evidence of conformity per registration file # 2046A. This site is also listed with the FCC under Registration Number CA2046.

The floor, walls and ceiling consist of annealed steel panels. The walls and ceiling are covered with ferrite tile, augmented by RF absorbant foam material on the end wall nearest the turntable, and on the adjacent walls and the ceiling. The chamber floor supports a 15 cm high internal floor, constructed of annealed steel panels, that forms the ground plane, and is bonded to the chamber walls.

The 3-m diameter turntable is flush-mounted with the floor. A sub-floor cable-way is provided to route cables between the turntable pit and EUT support equipment located in the Control Room. Cables reach the EUT through an opening in the centre of the turntable.

Test instrumentation and EUT support equipment is located in the Control Room, consisting of two shielded vestibules joined together at the side of the main room. Cables are routed through bulkhead panels between the rooms and the test chamber as required. Power feeds are routed into the main room and vestibules through line filters providing at least 100 dB of attenuation between 10 kHz and 10 GHz.

Either floor mounted or table-top equipment can be tested at this facility.

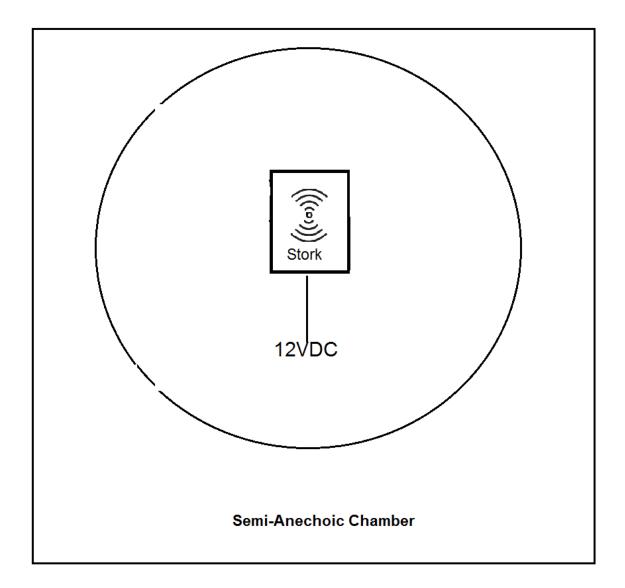
#### 3.2 Grounding Plan

The STORK was placed at the center of the test chamber turntable on top of an 80-cm high polystyrene foam table below 1GHz and at 1.5m high polystyrene foam table above 1 GHz for transmits mode and 80cm high for RX mode. No provision is made within the STORK for an earth ground connection.

#### 3.3 Power Supply

Power supplied via DC power supply.

#### Appendix A – Test Setup Block Diagram



# End of Document