FCC and IC Test Report

Sepura Limited Tetra Mobile Radio, Model: SCG22

In accordance with FCC 47 CFR Part 90, FCC 47 CFR Part 2, Industry Canada RSS-119 and ISED RSS-GEN

Prepared for: Sepura Limited 9000 Cambridge Research Park **Beach Drive** Waterbeach Cambridge **CB25 9TL** United Kingdom

Add value. **Inspire trust.**

FCC ID: XX6SCG2229

IC: 8739A-SCG2229

COMMERCIAL-IN-CONFIDENCE

Document 75948283-05 Issue 02

SIGNATURE				
John				
NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE	
Neil Rousell	Senior Engineer	Authorised Signatory	11 August 2020	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 90, FCC 47 CFR Part 2, Industry Canada RSS-119 and ISED RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	George Porter	11 August 2020	George fur
Testing	Graeme Lawler	11 August 2020	GtMawler.
FCC Accreditation	ISED Accredit	ation	

90987 Octagon House, Fareham Test Laboratory 12669A Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 90: 2019, FCC 47 CFR Part 2: 2019, Industry Canada RSS-119: Issue 12 (05-2015) and ISED RSS-GEN: Issue 5 (04-2018) + A1 (03-2019) for the tests detailed in section 1.3.



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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	06 May 2020
2	Correction of configuration-mode title	11 August 2020

Table 1

1.2 Introduction

Applicant	Sepura Limited
Manufacturer	Sepura Limited
Model Number(s)	SCG22
Serial Number(s)	1PR002007GPH5XV
Hardware Version(s)	Pre-production
Software Version(s)	1785 004 10138
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 90:2019 FCC 47 CFR Part 2: 2019 Industry Canada RSS-119: Issue 12 (05-2015) ISED RSS-GEN: Issue 5 (04-2018) + A1 (03-2019)
Order Number Date	PLC-PO015398-1 12-February-2020
Date of Receipt of EUT	10-March-2020
Start of Test	16-March-2020
Finish of Test	07-April-2020
Name of Engineer(s)	George Porter and Graeme Lawler
Related Document(s)	ANSI C63.26: 2015



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 90, FCC 47 CFR Part 2 and Industry Canada RSS-119 and ISED Canada RSS-GEN is shown below.

Conting	Specification Clause			Test Description	Posult Commonte/Pass Standard	Commonte (Doos Stordovd	
Section	Part 90	Part 2	RSS-119	RSS-GEN	GEN		Comments/Base Standard
Configuration	n and Mode: TI	ETRA 406 MHz	to 430 MHz - T	ransmit			
2.1	90.205	2.1046	5.4	6.12	Maximum Conducted Output Power	Pass	ANSI C63.26: 2015
2.2	90.207	2.1047	5.2	-	Types of Emissions	Pass	-
2.3	90.209	2.1049	5.5	6.7	Bandwidth Limitations	Pass	ANSI C63.26: 2015
2.4	90.210	2.1051	5.8	6.13	Spurious Emissions at Antenna Terminals	Pass	ANSI C63.26: 2015
2.5	90.210	2.1053	5.8	6.13	Radiated Spurious Emissions	Pass	ANSI C63.26: 2015
2.6	90.213	2.1055	5.3	6.11	Frequency Stability	Pass	ANSI C63.26: 2015
2.7	90.214	-	5.9	-	Transient Frequency Behaviour	Pass	-
2.8	90.221	-	5.8.9.1	-	Adjacent Channel Power	Pass	-
Configuration	n and Mode: TI	ETRA 450 MHz	to 470 MHz - 1	ransmit			
2.1	90.205	2.1046	5.4	6.12	Maximum Conducted Output Power	Pass	ANSI C63.26: 2015
2.2	90.207	2.1047	5.2	-	Types of Emissions	Pass	ANSI C63.26: 2015
2.3	90.209	2.1049	5.5	6.7	Bandwidth Limitations	Pass	ANSI C63.26: 2015
2.4	90.210	2.1051	5.8	6.13	Spurious Emissions at Antenna Terminals	Pass	-
2.5	90.210	2.1053	5.8	6.13	Radiated Spurious Emissions	Pass	ANSI C63.26: 2015
2.6	90.213	2.1055	5.3	6.11	Frequency Stability	Pass	ANSI C63.26: 2015
2.7	90.214	-	5.9	-	Transient Frequency Behaviour	Pass	-
2.8	90.221	-	5.8.9.1	-	Adjacent Channel Power	Pass	-

Table 2



1.4 Application Form

Equipment Description

Technical Description: (Please provide a brief description of the intended use of the equipment)	TETRA mobile radio for use within cars, trucks, mobile and fixed control rooms, motorcycles, boats and trains, with Wi-Fi, Bluetooth, GPS and Ethernet functions
Manufacturer:	Sepura
Model:	SCG22
Part Number:	SCG2229
Hardware Version:	Pre-production
Software Version:	1785 004 10138
FCC ID (if applicable)	XX6SCG2229
IC ID (if applicable)	8739A-SCG2229

Intentional Radiators

Technology	TETRA	Bluetooth LE	Bluetooth Classic / EDR	Wi-Fi 802.11b, g	Wi-Fi 802.11n	Wi-Fi 802.11n
Frequency Band (MHz)	380 - 470 MHz	2402 - 2480 MHz	2402 - 2480 MHz	2412 - 2462 MHz	2412 - 2462 MHz	2422 - 2452 MHz
Conducted Declared Output Power (dBm)	41.5	7.4	7.382	16.5	16.5	16.5
Antenna Gain (dBi)	2	Element 3: 2 dBi	Element 3: 2 dBi	Element 3: 2 dBi	Element 3: 2 dBi	Element 3: 2 dBi
Supported Bandwidth(s) (MHz)	0.025 / 0.02	1	1	20	20	40
Modulation Scheme(s)	π/4 DQPSK	GFSK	GFSK π/4 DQPSK 8DPSK	802.11b: CCK, DBPSK, DQPSK 802.11g: BPSK, QPSK, 16QAM, 64QAM	BPSK, QPSK, 16QAM, 64QAM	BPSK, QPSK, 16QAM, 64QAM
ITU Emission Designator	22K0DXW 20K0DXW	1M18F1D	1M01F1D 1M01G1D	19M7G1D	19M7D1D	36M8D1D
Bottom Frequency (MHz)	380	2402	2402	2412	2412	2422
Middle Frequency (MHz)	425	2441	2441	2437	2437	2437
Top Frequency (MHz)	470	2480	2480	2462	2462	2452



Un-intentional Radiators

Highest frequency generated or used in the device or on which the device operates or tunes	2480 MHz		
Lowest frequency generated or used in the device or on which the device operates or tunes	32.768 kHz		
Class A Digital Device (Use in commercial, industrial or business environment)			
Class B Digital Device (Use in residential environment only) \Box			

AC Power Source

AC supply frequency:	Hz
Voltage	V
Max current:	А
Single Phase Three Phase	

DC Power Source

Nominal voltage:	12	V
Extreme upper voltage:	15.6	V
Extreme lower voltage:	10.8	V
Max current:	5	A

Battery Power Source None

Voltage:			V
End-point voltage:			V (Point at which the battery will terminate)
Alkaline 🗆 Leclanche 🗆 Lithium 🗆 Nicke	el Cadmium 🗆 Lead A	$d = \frac{1}{2} (Vehicle reg$	ulated)
Other	Please detail:		

Charging

Can the EUT transmit whilst being charged Yes D	No 🗆
---	------

Temperature

Minimum temperature:	-20	°C
Maximum temperature:	+60	°C

Antenna Characteristics

Antenna connector 🖂		State impedance	50	Ohm	
Temporary antenna conne	ector 🗆		State impedance		Ohm
Integral antenna \Box	Type:		Gain		dBi
External antenna 🖂	Type:		Gain		dBi
For external antenna only: Standard Antenna Jack ⊠ If yes, describe how user is prohibited from changing antenna (if not professional installed): Equipment is only ever professionally installed ⊠ Non-standard Antenna Jack □					istalled):



Ancillaries (if applicable)

Manufacturer:	Sepura	Part Number:	GPSB4
Model:	GPSB4 Vehicle Roof Antenna	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	AFB-TET
Model:	AFB-VAR 380-430 MHz antenna	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	AFB-UT
Model:	AFB-VAR 406-472 MHz antenna	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-02012 rev001
Model:	Extended SCG Loudspeaker / IO USB Host lead	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-02014 rev001
Model:	Extended SCG Expansion Board Loudspeaker / 8 GPIO lead	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	Netgear GS105 ProSAFE Gigabit Switch
Model:	Netgear GS105 ProSAFE Gigabit Switch	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-02010
Model:	SCG Power/ignition Lead	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-00069
Model:	Mobile Remote Cable 5.0M	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-00670
Model:	HBC Interface and Hands-free Box	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-00079
Model:	Remote Microphone And Switch Set	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-00292
Model:	Remote Microphone (Handsfree Kit) 3m	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-01801
Model:	Handset Based Console (HBC3)	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-00082
Model:	Detachable Loudspeaker extension Cable	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-00062
Model:	Fist microphone	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-01808
Model:	SCC3 (colour console)	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-01961
Model:	CC VAC RSM (Long Cable)	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-00719
Model:	Loudspeaker	Country of Origin:	Unknown
Manufacturer:	Sepura	Part Number:	300-01837
Model:	Loudspeaker	Country of Origin:	Unknown

I hereby declare that the information supplied is correct and complete. Name: Chris Beecham Position held: Conformance Engineer Date: 10 March 2020



1.5 Product Information

1.5.1 Technical Description

TETRA mobile radio for use within cars, trucks, mobile and fixed control rooms, motorcycles, boats and trains, with Wi-Fi, Bluetooth, GPS and Ethernet functions.

1.5.2 Test Setup Diagrams

Unless otherwise specified, conducted tests were performed using the setup in the diagram below:



Figure 1 – Conducted Test Setup Diagram

1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.

The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State Description of Modification still fitted to EUT		Modification Fitted By	Date Modification Fitted	
Model: SCG22, Serial Number: 1PR002007GPH5XV				
0	As supplied by the customer	Not Applicable	Not Applicable	

Table 3



1.8 Test Location

TÜV SÜD conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation			
Configuration and Mode: TETRA 406 MHz to 430 MHz - Transmit					
Maximum Conducted Output Power	George Porter	UKAS			
Types of Emissions	George Porter	UKAS			
Bandwidth Limitations	George Porter	UKAS			
Spurious Emissions at Antenna Terminals	George Porter	UKAS			
Radiated Spurious Emissions	Graeme Lawler	UKAS			
Frequency Stability	George Porter	UKAS			
Transient Frequency Behaviour	George Porter	UKAS			
Adjacent Channel Power	George Porter	UKAS			
Configuration and Mode: TETRA 450 MHz to 470 MHz	z - Transmit				
Maximum Conducted Output Power	George Porter	UKAS			
Types of Emissions	George Porter	UKAS			
Bandwidth Limitations	George Porter	UKAS			
Spurious Emissions at Antenna Terminals	George Porter	UKAS			
Radiated Spurious Emissions	Graeme Lawler	UKAS			
Frequency Stability	George Porter	UKAS			
Transient Frequency Behaviour	George Porter	UKAS			
Adjacent Channel Power	George Porter	UKAS			

Table 4

Office Address:

Octagon House Concorde Way Segensworth North Fareham Hampshire PO15 5RL United Kingdom



2 Test Details

2.1 Maximum Conducted Output Power

2.1.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.205 FCC 47 CFR Part 2, Clause 2.1046 Industry Canada RSS-119, Clause 5.4 ISED RSS-GEN, Clause 6.12

2.1.2 Equipment Under Test and Modification State

SCG22 S/N: 1PR002007GPH5XV - Modification State 0

2.1.3 Date of Test

23-March-2020 to 24-March-2020

2.1.4 Test Method

The test was applied in accordance with the test method requirements of FCC 47 CFR Part 90, Industry Canada RSS-119, and ISED RSS-GEN with reference to ANSI C63.26, clause 5.2.3.3.

The EUT was configured to transmit on maximum power on the bottom, middle and top channels in burst mode. The EUT was connected to a spectrum analyser via a cable and 30 dB of attenuation. The path loss was measured using a network analyser and entered as a reference level offset in the spectrum analyser including the manufacturers declared maximum antenna gain. The RBW of the spectrum analyser was set to 100 kHz and the video bandwidth to 300 kHz with the trace set to max hold using a peak detector and the result was recorded.

2.1.5 Environmental Conditions

Ambient Temperature	24.7 - 25.3 °C
Relative Humidity	19.3 - 24.8 %

2.1.6 Test Results

TETRA 406 MHz to 430 MHz - Transmit

406.1125 MHz		418.0500 MHz		429.98	75 MHz
Result (dBm)	Result (W)	Result (dBm) Result (W)		Result (dBm)	Result (W)
41.214	13.225	41.418	13.861	41.598	14.448

Table 5 - ERP

TETRA 450 MHz to 470 MHz - Transmit

450.02	50.025 MHz 460.025 MHz		MHz 469.975 MHz		′5 MHz
Result (dBm)	Result (W)	Result (dBm) Result (W)		Result (dBm)	Result (W)
41.334	13.596	41.295	13.474	41.419	13.864

Table 6 - ERP



FCC 47 CFR Part 90, Limit Clause 90.205

Frequency (MHz)	Limit
< 25	1000 W
25 to 50	300 W
72 to 76	300 W
150 to 174	Refer to 90.205 (d) of the specification
217 to 220	Refer to 90.259 of the specification
220 to 222	Refer to 90.729 of the specification
421 to 430	Refer to 90.279 of the specification
450 to 470	Refer to 90.205 (h) of the specification
470 to 512	Refer to 90.307 and 90.309 of the specification
758 to 775 and 788 to 805	Refer to 90.541 and 90.542 of the specification
806 to 824, 851 to 869, 869 to 901 and 935 to 940	Refer to 90.635 of the specification
902 to 927.25	LMS systems operating pursuant to subpart M of the specification : 30 W
927.25 to 928	LMS equipment: 300 W
929 to 930	Refer to 90.494 of the specification
1427 to 1429.5 and 1429.5 to 1432	Refer to 90.259 of the specification
2450 to 2483.5	5 W
4940 to 4990	Refer to 90.1215 of the specification
5850 to 5925	Refer to subpart M of the specification
All other frequency bands	On a case by case basis

Table 7 - FCC Limits for Maximum ERP



Industry Canada RSS-119, Limit Clause 5.4

The output power shall be within $\pm 1 \text{ dB}$ of the manufacturer's rated power listed in the equipment specifications.

Frequency (MHz)	Transmitter Output Power (W)		
	Base/Fixed Equipment	Mobile Equipment	
27.41 to 28 and 29.7 to 50	300	30	
72 to 76	No Limit	1	
138 to 174	111100	60	
217 to 217 and 219 to 220	See SRSP-512 for ERP limit	30*	
220 to 222	110	50	
406.1 to 430 and 450 to 470	See SRSP-511 for ERP limit	60	
768 to 776 and 798 to 806	110	30 3 W ERP for portable equipment	
806 to 821, 851 to 866, 821 to 824 and 866 to 869	110	30	
896 to 901 and 935 to 940	110	60	
929 to 930 and 931 to 932	110	30	
928 to 929, 952 to 953, 932 to 932.5 and 941 to 941.5	110	30	
932.5 to 935 ad 941.5 to 944	110	30	
*Equipment is generally authorised for effective radiated power (ERP) of less than 5 W.			

Table 8 - Industry Canada Limits for Transmitter Output Power



2.1.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Attenuator (10 dB, 75 W)	Bird	8308-100	386	12	23-Jul-2020
Power Supply Unit	Hewlett Packard	6253A	441	-	O/P Mon
Attenuator (10dB, 10W)	Bird	8343-100	478	-	O/P Mon
Multimeter	lso-tech	IDM101	2424	12	12-Dec-2020
Attenuator (10dB/100W)	Bird	8343-100	495	12	18-Nov-2020
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-Apr-2020
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
Frequency Standard	Spectracom	SecureSync 1200- 0408-0601	4393	6	16-Apr-2020
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	21-Oct-2020
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020
Electronic Calibration Module	Keysight Technologies	85093C	5188	12	21-May-2020
1 Meter Cable	Teledyne	PR90-088-1MTR	5193	12	30-Jul-2020

Table 9

O/P Mon – Output Monitored using calibrated equipment



2.2 Types of Emissions

2.2.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.207 FCC 47 CFR Part 2, Clause 2.1047 Industry Canada RSS-119, Clause 5.2

2.2.2 Equipment Under Test and Modification State

SCG22 S/N: 1PR002007GPH5XV - Modification State 0

2.2.3 Date of Test

25-March-2020 to 26-March-2020

2.2.4 Test Method

This test was performed on middle frequency using a modulated carrier output from the EUT and measured on a spectrum analyser. The path loss was measured using a network analyser and entered as a reference level offset in the spectrum analyser including the manufacturers declared maximum antenna gain. The spectrum analyser was set to the transmit frequency. The burst measurements were made in zero span mode and the frequency spectrum with a span sufficient to show the transmitters response. The signal was maximised and stabilised for >1 minute and the marker function of the spectrum analyser was used. The trace plots were recorded.

2.2.5 Environmental Conditions

Ambient Temperature	22.2 - 23.2 °C
Relative Humidity	22.4 - 23.9 %

2.2.6 Test Results

TETRA 406 MHz to 430 MHz - Transmit

Keysight Sp	ectrum Analyzer - Swept SA									
Warker 1	RF 50 Ω DO			SENSE:EXT SOUR	CE OFF A	Ava Type:	Loa-Pw	r	05:16:21 TR	PM Mar 25, 2020
Merker	A 15.1000 ms	NFE I	PNO: Fast ++-	. Trig: Video #Atten: 20	dB				٦	
10 dB/div	Ref Offset 33.21 o Ref 43.21 dBn	iB n	Gameon						ΔMkr1	13.18 ms -1.85 dB
Log	that when the second second	Juliphi ne dat	Ano manana	ality in the second second	-monthllM	allow de los d	and a shall			
33.2										
23.2										
13.2								1Δ2		TRIG LVL
3.21	X2							<u></u>		
-6.79										
-16.8										
-26.8								<u> </u> .		· · ·
hall ha	-4M/W							help	₩^\ ₺₺ ₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽	uluuluuduluuluu
-46.8										
Res BW	18.050000 MHz 3.0 MHz		#VB	W 3.0 MHz			s	wee	20.00 ms	span 0 Hz (1001 pts)
MSG						STATUS				

Figure 2 - Burst Length



No. No.	evcinht Ser	ctrum A	nahizer - Swent C/		_	_	_		_				
	cyargine spe	RF	50 Q D					SENSE:EXT SOUR	CE OFE AI	IGN AUTO		05:41:46	PM Mar 25, 2020
Mar	rker 1	Δ 56	6000 ms					Trig Delay	-80.00 ms	Avg Type:	Log-Pwr	TR	ACE 1 2 3 4 5 6
	i të 1			NFI	E	PNO: Fas	t →	Trig: Video)		-	т	
						IFGain:Lo	N	#Atten: 20	dB				DEI
		Def (Defense 22.04	u m								∆Mkr1 :	56.60 ms
10 d	Bidiy	Ref	43 21 dBn	40 0									13.40 dB
Log			40.2 T GBI		A starting to the	-	1					-	
33.0	,												
00.2													
23.2	2												
					X ₂								
13.2				<u> </u>	12								
												1Δ2	TRIG LVL
3.21													
-6.79													
10.0													
-16.0													
-26.8			1				-		1 1	1 1	-		
	Ш.Х.,	1	الم ما ما				1.14		hada da	al ta confli	k ha stille		di k.
-36.8	MIN W	u an	ah waan harada	WH-	×		WUM,	vw ana na kata kata kata kata kata kata ka	NUMADAVA	ahinaharahinah	(Manala) and a second		with the second
50.0													
-46.8													
Cen	nter 41	8.050	000 MHz										Span 0 Hz
Res	5 BW 3	.0 MH	Z				#VB	W 3.0 MHz			Swee	o 100.0 ms	; (1001 pts)
MSG										STATUS			
				_									

Figure 3 - Burst Period



Figure 4 - Frequency Spectrum



TETRA 450 MHz to 470 MHz - Transmit



Figure 5 - Burst Length



Figure 6 - Burst Period





Figure 7 - Frequency Spectrum

FCC 47 CFR Part 90, Limit Clause 90.207

As per FCC Part 90.207 (b) through (n).

FCC 47 CFR Part 2, Limit Clause 2.1047

Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

Industry Canada RSS-119, Limit Clause 5.3

Equipment that operates in the bands 768-776 MHz and 798-806 MHz shall use digital modulation. Mobile and portable transmitters that operate in these bands may have analogue modulation capability only as a secondary mode in addition to their primary digital mode. However, mobile and portable transmitters that operate only on the low-power channels as defined in SRSP-511 may employ any type of modulation.



2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Attenuator (10 dB, 75 W)	Bird	8308-100	386	12	23-Jul-2020
Power Supply Unit	Hewlett Packard	6253A	441	-	O/P Mon
Attenuator (10dB, 10W)	Bird	8343-100	478	-	O/P Mon
Attenuator (10dB/100W)	Bird	8343-100	495	12	18-Nov-2020
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-Apr-2020
Multimeter	lso-tech	IDM101	2424	12	12-Dec-2020
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
Frequency Standard	Spectracom	SecureSync 1200- 0408-0601	4393	6	16-Apr-2020
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	21-Oct-2020
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020
Electronic Calibration Module	Keysight Technologies	85093C	5188	12	21-May-2020
1 Meter Cable	Teledyne	PR90-088-1MTR	5193	12	30-Jul-2020

Table 10

O/P Mon – Output Monitored using calibrated equipment



2.3 Bandwidth Limitations

2.3.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.209 FCC 47 CFR Part 2, Clause 2.1049 Industry Canada RSS-119, Clause 5.5 ISED RSS-GEN, Clause 6.7

2.3.2 Equipment Under Test and Modification State

SCG22 S/N: 1PR002007GPH5XV - Modification State 0

2.3.3 Date of Test

24-March-2020 to 25-March-2020

2.3.4 Test Method

The test was applied in accordance with the test method requirements of FCC 47 CFR Part 90, Industry Canada RSS-119, and ISED RSS-GEN with reference to ANSI C63.26, Clause 5.4.

The EUT was configured to transmit on maximum power on the bottom, middle and top channels in burst mode. The EUT was connected to a spectrum analyser via a cable and 30 dB of attenuation. The path loss was measured using a network analyser and entered as a reference level offset in the spectrum analyser including the manufacturers declared maximum antenna gain. The RBW of the spectrum analyser was set to 300 Hz and the video bandwidth to 1 kHz with the trace set to max hold using a peak detector and the result was recorded.

2.3.5 Environmental Conditions

Ambient Temperature24.7 - 24.8 °CRelative Humidity20.2 - 24.8 %

2.3.6 Test Results

TETRA 406 MHz to 430 MHz - Transmit

406.1125 MHz	418.0500 MHz	429.9875 MHz		
20.933	20.914	20.935		

Table 11



- Keysight Spectrum Analyzer - C	Occupied BW						
LXI RF 50	Ω DC	SENSE:E	XT SOURCE OFF	ALIGN AUTO		11:35	:03 AM Mar 24, 2020
Ref Value 42.17 dB	m	Cer	ter Freq: 406.112	500 MHz	0/40	Radio Std:	None
	NFE #IFGai	n:Low #At	ten: 32 dB	Avginolu.>1	10/10	Radio Dev	ice: BTS
Ref Offse 10 dB/div Ref 42.	et 33.17 dB 17 dBm						
Log					1		
32.2		AA- ~~		<u>~</u> ~ ~ -			
22.2	/^	\sim		" "m			
12.2	/Y				Μ		
0.47	کے				γ		
2.17							
-7.83					+		
-17.8	0-0-0				+		
-27.8 margane	~ Jone de 10					margh	Vale and marked
37.8							
(7.0							
-47.8							
Center 406.11250 M	Hz		1			Spa	an 50.00 kHz
#Res BW 300 Hz			#VBW 1 kH	z		Swee	ep 527.2 ms
Occupied Ban	dwidth Tota	I Power	45.6 dBm				
			-26 00 dB				
20.933	KHZ ^ 4		-20.00 uB				
	x dE	Ref Pwr	31.0 dBm	at 406.1	14900	MHZ	
	L	ower Boundary			Upper	Boundary	
	Frequency	Abs Power	Rel Power	Free	uency	Abs Power	Rel Power
Occupied Bandwidth	406.102150 MHz	18 dBm	-27.4 dBc	406.12308	3 MHz	19.0 dBm	-26.6 dBc
x dB Bandwidth	406.100391 MHz	5.03 dBm		406.12489	4 MHz	5.03 dBm	
100				OTATIO			
MSG				STATUS			

Figure 8 - 406.1125 MHz



Figure 9 - 418.0500 MHz



Kausiakt Saastaura Anakaraa (Description DM/					
Keysight Spectrum Analyzer - C		CENCE-E		ALIGN AUTO	11:4	5-22 AM Mar 24, 2020
Ref Offeet 33 24 de	32 DC	Cer	ter Freg: 429.987	500 MHz	Radio St	d: None
	NFE #IFGa	in:Low #At	g: Free Run ten: 32 dB	Avg Hold:>10/10	Radio De	vice: BTS
Ref Offso 10 dB/div Ref 42.	et 33.24 dB 24 dBm					
22.2 12.2		~~~~~		M		
-7.76						
-27.8 -27.8 -27.8	when				w how wy	ᠳ <i>ᡎᡊᡙᢉᢇᡊᡐᡐ</i> ᠬᠬᡊᠧ _{ᢧᢇ}
-37.8						
Center 429.98750 M #Res BW 300 Hz	Hz		#VBW 1kH	z	Sp Swe	an 50.00 kHz ep 527.2 ms
Occupied Ban 20.935	dwidth Tota kHz x dE	Il Power	46.0 dBm -26.00 dB	ot 420.0800	00 MH-	
	Xue	DKEIFWI	31.4 UBIII	at 429.9099		
	L	ower Boundary			Jpper Boundary	
	Frequency	Abs Power	Rel Power	Frequency	Abs Power	Rel Power
Occupied Bandwidth	429.977144 MHz	19 dBm	-27.3 dBc	429.998079 MH	19.1 dBm	-26.9 dBc
x dB Bandwidth	429.975401 MHz	5.38 dBm		429.999884 MH	5.38 dBm	
MSG				STATUS		

Figure 10 - 429.9875 MHz



TETRA 450 MHz to 470 MHz - Transmit

450.025 MHz	460.025 MHz	469.975 MHz
20.932	20.923	20.940

Keysight Spectrum Analyzer - 0	Occupied BW		CENCE-EY		ALIG			10:51:	46 AM Mar 25, 2020
Center Freq 450.02	25000 MHz		Cent	er Freq: 450.0250	000 M	Hz		Radio Std:	None
	NFE	#IFGain:Low	Trig: #Atte	: Free Run en: 32 dB		Avg Hold:>10	/10	Radio Devi	ce: BTS
Ref Offs 15 dB/div Ref 47.	et 33.29 dB . 00 dBm								
Log									
32.0		\sim	\sim	$\sim\sim\sim\sim\sim$	~~~	m			
17.0	~^	~ *					γ		
2.00							\neg		
-13.0						H	<u> </u>		
-28.0 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	- Alman - Alman							m	a martin
-43.0									
-58.0									
73.0									
-7.5.0									
-88.0									
Center 450.02500 M	Hz							Spa	n 50.00 kHz
#Res BW 300 Hz				#VBW 1 kH	Z			Swee	p 527.2 ms
Occupied Ban	dwidth	Total Pov	ver	45.8 dBm					
20 932	kHz	x dB		-26.00 dB					
20.002		x dB Ref	Pwr	31.1 dBm	at	450.02	7400 M	Hz	
	Lower Boundary						Upper Bo	oundary	
	Free	quency	Abs Power	Rel Power		Frequ	ency	Abs Power	Rel Power
Occupied Bandwidth	450.0146	55 MHz	18 dBm	-27.3 dBc		450.035587	MHz	19.4 dBm	-26.4 dBc
x dB Bandwidth	450.0129	11 MHz	5.14 dBm			450.037388	MHz	5.14 dBm	
MSG						STATUS			

Table 12

Figure 11 - 450.025 MHz

🔤 Keysight Spectrum Analyzer - C	ccupied BW						
RF 50	ΩDC	SENSE:E	XT SOURCE OFF	ALIGN AUTO		10:58: Dadia Std:	11 AM Mar 25, 2020
Ref Offset 33.33 de	NEE		a: Free Run	AvalHold:>1	10/10	Raulo Stu.	None
	#IFG	Gain:Low 🔭 #At	ten: 32 dB			Radio Devi	ce: BTS
Ref Offse 15 dB/div Ref 47.	et 33.33 dB 04 dBm						
12 D							
17.0		$\sim\sim\sim\sim$	$\sim\sim\sim\sim\sim$	Jum	~		
17.0					M		
2.04							
-13.0							
-28.0 mmmmmm	And the for the				*~~*	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m mar
-43.0							
59.0							
-30.0							
-73.0							
-88.0							
Center 460.02500 MI	Hz		#\/B\M_4_LU	-		Spa	n 50.00 kHz
#Res DW JUU HZ				2		Swee	p 527.2 ms
Occupied Ban	dwidth To	tal Power	45.7 dBm				
20 923	kHz xd	B	-26.00 dB				
	x d	B Ref Pwr	31.1 dBm	at 460.0	27350 MI	lz	
		Lower Boundary			Upper Bo	undary	
	Frequenc	Abs Power	Rel Power	Free	uency	Abs Power	Rel Power
Occupied Bandwidth	460.014667 MI	Iz 18 dBm	-27.5 dBc	460.03558	39 MHz	19.1 dBm	-26.6 dBc
x dB Bandwidth	460.012893 MI	Iz 5.06 dBm		460.03739	97 MHz	5.06 dBm	
MSG				STATUS			





	Occupied BW							
RF 50	ΩDC		SENSE:E	XT SOURCE OFF	ALIGN AUTO		11:05:	02 AM Mar 25, 202
enter Freq 469.97	'5000 MHz		Cer	nter Freq: 469.975	000 MHz	-10/10	Radio Std:	None
	NFE	#IFGain:Lo	w 🕈 #At	ten: 32 dB	Avginoid.	210/10	Radio Devi	ice: BTS
Ref Offso 5 dB/div Ref 47.	et 33.33 dB 04 dBm					_		
2.0		~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			
2.04	^مر 📃	//				M		
3.0		_						
8.0	- Andrew A						and the second second	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
3.0								
3.0								
8.0								
enter 469.97500 M	H7						Sna	n 50.00 k⊦
Res BW 300 Hz				#VBW 1 kH	z		Swee	ep 527.2 m
Occupied Ban	dwidth	Total F	ower	45.8 dBm				
		x dB		-26 00 dB				
20.940	КПZ	x dB R	ef Pwr	31.2 dBm	at 469	.977400	MHz	
		Lower	Boundary			Uppe	er Boundarv	
	Fre	quency	Abs Power	Rel Power	Fr	equency	Abs Power	Rel Pow
ccupied Bandwidth	469.964650 MHz 19 dBm		-27.3 dBc	469.985	590 MHz	19.4 dBm	-26.5 d	
dB Bandwidth	469.9628	92 MHz	5.22 dBm		469.987	396 MHz	5.22 dBm	

Figure 13 - 469.975 MHz

FCC 47 CFR Part 90, Limit Clause 90.209

< 22 kHz

Operations using equipment designed to operate with a 25 kilohertz channel bandwidth may be authorized up to a 20 kilohertz bandwidth unless the equipment meets the Adjacent Channel Power limits of Part 90.221 in which case operations may be authorized up to a 22 kilohertz bandwidth.

Industry Canada RSS-119, Limit Clause 5.5

The maximum permissible occupied bandwidth shall not exceed the authorized bandwidth specified in table 3 of the test specification for the equipment's frequency band as specified below.

< 22 kHz (Where Spectrum Mask Y is applied).



2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Attenuator (10 dB, 75 W)	Bird	8308-100	386	12	23-Jul-2020
Power Supply Unit	Hewlett Packard	6253A	441	-	O/P Mon
Attenuator (10dB, 10W)	Bird	8343-100	478	-	O/P Mon
Attenuator (10dB/100W)	Bird	8343-100	495	12	18-Nov-2020
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-Apr-2020
Multimeter	lso-tech	IDM101	2424	12	12-Dec-2020
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
Frequency Standard	Spectracom	SecureSync 1200- 0408-0601	4393	6	16-Apr-2020
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	21-Oct-2020
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020
Electronic Calibration Module	Keysight Technologies	85093C	5188	12	21-May-2020
1 Meter Cable	Teledyne	PR90-088-1MTR	5193	12	30-Jul-2020

Table 13

O/P Mon – Output Monitored using calibrated equipment



2.4 Spurious Emissions at Antenna Terminals

2.4.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.210 FCC 47 CFR Part 2, Clause 2.1051 Industry Canada RSS-119, Clause 5.8 ISED RSS-GEN, Clause 6.13

2.4.2 Equipment Under Test and Modification State

SCG22 S/N: 1PR002007GPH5XV - Modification State 0

2.4.3 Date of Test

26-March-2020 to 30-March-2020

2.4.4 Test Method

For emissions where the frequency is removed less than 250 % of the authorised bandwidth measurements were performed conducted as follows:

The EUT was connected to a spectrum analyser via a cable and attenuator. The path loss between the EUT and analyser was calibrated using a network analyser and entered into the spectrum analyser as a reference level offset. The reference level for the mask was established with an RBW approximately 2 or 3 times the emission bandwidth. The RBW was then reduced to 100 Hz as stated in RSS-119, clause 4.2.2, with a VBW of 3 times RBW. The mask as per FCC 47 CFR Part 90.210 (b) was applied.

2.4.5 Environmental Conditions

Ambient Temperature	23.2 - 24.1 °C
Relative Humidity	16.0 - 22.3 %



2.4.6 Test Results

TETRA 406 MHz to 430 MHz - Transmit



Figure 14 - 406.1125 MHz, Transmitter Mask



Figure 15 - 418.0500 MHz, Transmitter Mask









Figure 17 - 406.1125 MHz, 9 kHz to 150 kHz



🛄 Key	/sight Spectru	ım Analyzer - Swep	ot SA							
L <mark>XI</mark>		RF 50 Ω	DC		SENSE:EXT SOUR	RCE OFF AL		log-Pur	02:03:27	PM Mar 27, 2020
PAS	S	1.679000 P	NFE	PNO: Close 🕞 IFGain:Low	⊃ Trig: Free Atten: 6 d	Run B	Avg Hold:>	100/100	т	TYPE MWWWWW DET NNNNNN
10 dE	3/div	tef Offset 33.2 tef 10.00 dl	21 dB Bm						Mkr1 11 -38.	.679 kHz 643 dBm
LUg	Trace 1	Pass								
0.00										
-10.0										DL1 -13.00 dBm
-20.0										
-30.0										
-40.0	1									
	ľΜ									
-60.0		h								
-60.0		how	mm	mm	m	www				
-70.0							my a	Ama	winny	ο Δ
-80.0									~~~~~	
Star #Res	t 9.00 kl s BW 1.	Hz) kHz		#VE	3W 3.0 kHz			Sweer	Stop /	150.00 kHz (1001 pts)
MSG							STATUS			





Figure 19 - 429.9875 MHz - 9 kHz to 150 kHz



	ysight Spect	trum Analy RF	zer - Swept SA 50 Ω DC			SENSE:EXT SOUR	RCE OFF AL	IGN AUTO		02:29:31	E PM Mar 27, 2020
Mar PAS	ker 1 ′ SS	165.30	0000 kl	IZ NFE F	PNO: Wide 🕞	Trig: Free Atten: 6 d	Run B	Avg Type: Avg Hold:>	Log-Pwr 100/100	TR	ACE 1 2 3 4 5 6 TYPE M
10 di	B/div	Ref Offe Ref 10	set 33.17 d) .00 dB m	IB 1						Mkr1 16 -60.	5.30 kHz 561 dBm
LOG	Trace	1 Pass	;								
0.00											
-10.0											DL1 -13.00 dBm
-20.0											
-30.0											
-40.0											
-50.0											
-30.0	▲1										
-60.0	\sim	\sim	$\sim \sim \sim \sim$	~~~~~	·····	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~	~~~~~	······	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-70.0											
-80.0											
Star	1 0.150	0 MHz								Stop 1	.0000 MHz
#Re	s BW 1	0 kHz			#VB	W 30 kHz			Swee	o 1.000 ms	s (1001 pts)
MSG								STATUS			



🔤 Ke	ysight Spec	trum Anal	yzer - Swept SA	4							
L <mark>XI</mark>		RF	50 Ω DC			SENSE:EXT SOUR	RCE OFF AL	IGN AUTO	l og Dug	02:33:25	PM Mar 27, 2020
Mar PAS	s s		00000 K	NFE	PNO: Wide 🕞 IFGain:Low	Trig: Free Atten: 6 d	Run B	Avg Hold:>	100/100	1	
10 di	3/div	Ref Off Ref 1	fset 33.21 d 0.00 dBn	dB N						Mkr1 17 -60.	7.20 kHz 146 dBm
109	Trace	1 Pas	S				Í				
0.00											
-10.0											DL1 -13.00 dBm
-20.0											
-30.0											
-40.0											
50.0											
-50.0	1										
-60.0	~~~	$\sim \sim$	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	·····	~~~~^	m.	~~~~~	\sim	
-70.0											
-80.0											
Star	t 0 150	0 MH	7							Stop 1	0000 MHz
#Re	s BW 1	0 kHz			#VE	3W 30 kHz			Sweep	1.000 ms	(1001 pts)
MSG								STATUS			

Figure 21 - 418.0500 MHz, 150 kHz to 1 MHz



in Kej LXI	ysight Spect	rum Analyz RF	er - Swept SA 50 Ω DC			SENSE:EXT SOU	RCE OFF AL	IGN AUTO		02:37:57	PM Mar 27, 2020
Mar PAS	ker 1 1 SS	57.65	0000 ki	NFE	PNO: Wide G	Trig: Free Atten: 6 d	Run B	Avg Type: Avg Hold:>	Log-Pwr 100/100	1	ACE 1 2 3 4 5 6 TYPE MWWWWWW DET NNNNNN
10 dE	3/div	Ref Offs Ref 10.	et 33.24 c . 00 dBm	IB 1						Mkr1 15 -61.	7.65 kHz 036 dBm
LOG	Trace	1 Pass									
0.00											
-10.0											DL1 -13.00 dBm
-20.0											
-30.0											
-40.0											
10.10											
-50.0	<u>۱</u>										
-60.0	~~~~	~~~	\sim		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	h	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	·····
-70.0											
-80.0											
Star #Re	t 0.150 s BW 1	0 MHz 0 kHz			#V	BW 30 kHz			Swee	2 Stop 1.000 ms	.0000 MHz 6 (1001 pts)
MSG								STATUS			





Figure 23 - 406.1125 MHz, 1 MHz to 30 MHz



🛄 Kej LXI	ysight Spec	trum Analyzer - Swept RF 50 Ω	DC		SENSE:EXT SOUR	RCE OFF AL	LIGN AUTO		03:10:07	PM Mar 27, 2020
Mar PAS	ker 1 ′ SS	10.51200000	DO MHz NFE	PNO: Wide G	Trig: Free Atten: 6 d	Run B	Avg Type: Avg Hold:>	Log-Pwr 100/100	TR	ACE 1 2 3 4 5 6 TYPE MWWWW DET NNNNN
10 dE	B/div	Ref Offset 33.2 Ref 10.00 dE	1 dB 3m						Mkr1 10 -53.	.512 MHz 730 dBm
Log	Trace	1 Pass								
0.00										
-10.0										DL1 -13.00 dBm
-20.0										
-30.0										
-40.0										
-50.0										
-60.0		halle for th ough the states	Western and the second states		heferier Deutseineren	ynytrylligingerflu	man by top age		****	****
-70.0										
-80.0										
Star #Re	t 1.00 l s BW 3	MHz 30 kHz		#VE	W 100 kHz			Swee	Stop	30.00 MHz
MSG							STATUS			

Figure 24 - 418.0500 MHz, 1 MHz to 30 MHz



Figure 25 - 429.9875 MHz - 1 MHz to 30 MHz



	IFGain:Low	Trig: F #Atten	ree Run : 18 dB	Avg Ty Avg Ho	/pe: Log-Pwr Id:>100/100	TR T	ACE 1 2 3 4 5 6 YPE MWWWWW DET P NNNN
Ref Offset 32.17 dE 10 dB/div Ref 20.00 dBm 10 0 10	3 				2	Mkr2 406 43.7	20 MHz 218 dBm
-500 -70.0 Start 30.0 MHz #Res BW 1.0 MHz	#	≠VBW 3.0 M	IHz		Swee	Stop p 1.000 ms	600.0 MHz (1001 pts)
MKR MODE TRC SCL X 1 1 1 1 1 2 N 1 1 1 3 1 1 1 1 3 1 1 1 1 3 1 1 1 1 4 1 1 1 1 5 6 6 1 1 9 1 1 1 1 11 1 1 1 1	69.90 MHz -21 406.20 MHz 43	Y .071 dBm .218 dBm	FUNCTION	FUNCTION WIDTH	F	UNCTION VALUE	





Figure 27 - 418.0500 MHz, 30 MHz to 600 MHz



Keysight Spe	ctrum Ai RF	nalyzer - Swept SA 50 Ω DC			SENSE:EXT SO	URCE OFF	ALIGN AU	го		02:34:41 PM Mar 30, 2020
Marker 4	497.	970000000	MHZ NFE P IF	NO: Fast 😱 Gain:Low	Trig: Fre #Atten: 1	e Run 18 dB	Avg Avg	g Type: Log-Pw Hold:>100/100	r	TRACE 1 2 3 4 5 0 TYPE MWWWW DET PNNNN
10 dB/div	Ref (Ref	Offset 32.19 di 20.00 dBm	3						Mkr	4 497.97 MHz -21.706 dBm
10.0						1		3		
-10.0	1									DL1 -13.00 dDm
-20.0	X						$\hat{\chi}^2$		4	
-30.0 -40.0 -40.0	<u> </u>	and the second of the second of the second sec	, and the Association of the Second Second	مەربە الىرويەر مىرايى مىيەرى	الأساليط مهومهم معرفون		and the state of t	and a second sec	and the second s	ungelyn de antronomen antronomen a
-50.0										
-70.0										
Start 30.0 #Res BW	MHz 1.0 №	1Hz		#VB	W 3.0 MH	z		s	weep 1.00	Stop 600.0 MHz 00 ms (1001 pts)
MKR MODE TR	C SCL	X	67.62 MHz	۲ -17.767	FL dBm	INCTION	FUNCTION WI	тн	FUNCTION	VALUE
2 N 1 3 N 1 4 N 1	f f f		<u>362.88 MHz</u> 430.14 MHz 497.97 MHz	<u>-23.496</u> 43.346 -21.706	dBm dBm dBm					
5										E
8										
11										
MSG							ST	ATUS		





Figure 29 - 406.1125 MHz, 600 MHz to 6 GHz



Keysight Sp (X) Marker 1	RF 50 Ω	ot SA DC 0000 GHz NFE PI	SENSE NO: Fast G Tr Gain:Low #A	EXT SOURCE OFF	ALIGN AUTO Avg Typ Avg Hol	be: Log-Pwr d:>100/100	11:31:12 TR	AM Mar 30, 2020 AACE 1 2 3 4 5 6 TYPE M WWWWW DET P NNNN
10 dB/div	Ref Offset 34.′ Ref 20.00 d	16 dB Bm					Mkr1 4.8 -21.	55 2 GHz 757 dBm
10.0 0.00								
-10.0	المليب وهداهين وراري ورواري	hin mar bus from a short on the	walaya di Maratan Marata Bangina	nandaran ta manadara	and the second	18	1	DL1 -13.00 dDm
-40.0 -50.0								
-60.0 -70.0								
Start 0.6 #Res BW	00 GHz / 1.0 MHz		#VBW 3.	0 MHz		Swee	Stop 9.000 ms	6.000 GHz (1001 pts)
MKR MODE T 1 N 2 3 4	RC SCL 1 f	X 4.855 2 GHz	Y -21.757 dBm	FUNCTION	FUNCTION WIDTH	F	UNCTION VALUE	
5 6 7 8 9								
10 11 MSG				Ш.	STATUS			





Figure 31 - 429.9875 MHz - 600 MHz to 6 GHz



TETRA 450 MHz to 470 MHz - Transmit







Figure 33 - 460.025 MHz, Transmitter Mask





Figure 34 - 469.975 MHz, Transmitter Mask



Figure 35 - 450.025 MHz, 9 kHz to 150 kHz




Figure 36 - 460.025 MHz, 9 kHz to 150 kHz



Figure 37 - 469.975 MHz - 9 kHz to 150 kHz



🔤 Kej	ysight Spectr	um Analyze	r - Swept SA								
I <mark>XI</mark> Mar	ker 1 1	RF 55 100		17		SENSE:EXT SOUR	RCE OFF AL	IGN AUTO	Log-Pwr	02:45:16 TR	PM Mar 27, 2020
PAS	S	55.100		NFE	PNO: Wide 🕞 IFGain:Low	─ Trig: Free Atten: 6 d	Run B	Avg Hold:>	100/100	1	
10 45		Ref Offse	et 33.29 d	В						Mkr1 15 -60	i5.10 kHz 492 dBm
Log		Deen	oo abii			<u> </u>	Y				
	Trace	Fass									
0.00											
-10.0											DL1 -13.00 dBm
-2U.U											
.30.0											
-30.0											
-40.0											
-50.0											
	<u>1</u>										
-60.0											
		\sim	\sim	\sim	$\sim\sim\sim\sim$	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	\sim	$\sim\sim\sim$	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	$\sim\sim\sim$
-70.0											
-80.0											
Star	t 0.1500	MHz								Stop 1	.0000 MHz
#Res	s BW 10	kHz			#VI	3W 30 kHz			Swee	o 1.000 ms	s (1001 pts)
MSG								STATUS			

Figure 38 - 450.025 MHz, 150 kHz to 1 MHz

Ke	ysight Spec	trum Anal	yzer - Swept SA			arties met equi				00.57.40	
Mar	ker 1	⊮⊧ 162.7:	50000 kl	lz		SENSE:EXT SOUP	CEOFF AL	Avg Type:	Log-Pwr	02:57:46 TR	ACE 1 2 3 4 5 6
PAS	S			NFE F	PNO: Wide 🕞 FGain:Low	Atten: 6 d	Run B	Avg Hold:>	100/100	1	
		Ref Of	set 33.33 c	IB						Mkr1 16	2.75 kHz
10 dl Loa	3/div	Ref 1	0.00 dBn	1						-59.	999 dBm
	Trace	1 Pas	S				Ĭ				
0.00											
40.0											
-10.0											DL1 -13.00 dBm
-20.0											
-30.0											
-40.0											
10.0											
-50.0											
	≜ ¹										
-60.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		······			\sim	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~
-70.0											
-80.0											
Star #Do	t 0.150		2		-#\/D	W 20 KU-			Current	Stop 1	.0000 MHz
#Re	S'BW 1	IU KHZ			#VB	JU SU KHZ		STATUS	Sweep	- 1.000 Ms	(Tour prs)
maG								514105			

Figure 39 - 460.025 MHz, 150 kHz to 1 MHz



🔤 Kej	/sight Spectru	n Analyzer - Swept	SA							
Mar PAS	ker 1 18 S	3.150000 I	kHz NFE	PNO: Wide 🕞	Trig: Free Atten: 6 d	RUN B	Avg Type: I Avg Hold:>	Log-Pwr 100/100	02:59:30 TR	PM Mar 27, 2020 ACE 1 2 3 4 5 6 TYPE M WWWWW DET N N N N N N
10 dE	R B/div R	ef Offset 33.33 ef 10.00 dB	dB m						Mkr1 18 -61.	3.15 kHz 813 dBm
LUg	Trace 1	Pass								
0.00										
-10.0										DL1 -13.00 dBm
-20.0										
-30.0										
-40.0										
-50.0										
-60.0	1	~ ~ ~								
-70.0		mm	·····	·~~~	·····			·····	~~~~~	~~~~~
-60.0										
Star #Do	t 0.1500	MHz		-43.05				Current	Stop 1	.0000 MHz
MSG	s вw 10	KHZ		#VE	W SU KHZ		STATUS	Swee	5 1.000 ms	r(1001 pts)

Figure 40 - 469.975 MHz - 150 kHz to 1 MHz



Figure 41 - 450.025 MHz, 1 MHz to 30 MHz



9 PM Mar 27, 2020 RACE 1 2 3 4 5 0 TYPE M DET N N N N N N
.362 MHz .261 dBm
DL1 -13.00 dBm
.1
the strength of the strength o
30.00 MHz
s (1001 pts)

Figure 42 - 460.025 MHz, 1 MHz to 30 MHz

Key	/sight Spec	trum Ana	lyzer - Swept SA			CENCE-EXT COUR				02:22:28	
Mari PAS	ker 1 S	24.08	4000000	MHz NFE F	PNO: Wide G FGain:Low	Trig: Free Atten: 6 d	Run B	Avg Type: Avg Hold:>	Log-Pwr 100/100	03.23.36 TF	ACE 1 2 3 4 5 6 TYPE M WWWW DET N N N N N N
10 dE	3/div	Ref 0 Ref 1	ffset 33.33 o 0.00 dBm	IB ì						Mkr1 24 -56.	084 MHz 634 dBm
0.00	Trace	1 Pas	S								
-10.0											DI 1 -13 00 dBm
-20.0											
-30.0											
-40.0											
-50.0										1	
-60.0	Wexand ¹	in dia in	the states	wyhandynak	Newparation	******	1-++-' 1 ++ 1+ ++	here an	anal-salaya	ala an	Mines that
-70.0											
-80.0											
Star #Res	t 1.00 s BW (MHz 30 kHz	2		#V	BW 100 kHz			Sweep	Stop 0 1.000 ms	30.00 MHz (1001 pts)
MSG								STATUS			

Figure 43 - 469.975 MHz - 1 MHz to 30 MHz



Keysight Spe 134 Marker 4	ctrum A RF 513.	nalyzer - Swept SA 50 Ω DC 3600000000	0 MHz	2	ENSE:EXT !	SOURCE OFF	ALIGN AUTO Avg Ty	ype: Log-Pwr	02:46	55 PM Mar 30, 2020
			NFE P	NO: Fast 😱 Gain:Low	Trig: F #Atten	ree Run : 18 dB	Avg Ho	old:>100/100		DET P NNNN
10 dB/div	Ref Ref	Offset 32.19 c 20.00 dBn	iB 1						Mkr4 5 -20	13.36 MHz).045 dBm
Log 10.0								3		
0.00										
-10.0	\Diamond^1						<mark>2</mark>		4=	DL1 -13.00 dDm
-30.0	Man not	hundranistan	بالمسالية ورومتني ويروم	ر. 14 مىرىسىرى مىچىرىسى مىرىسى	وي والاستان الم	Sector and and an and and	man have been and have	www.w	mand	and and a start of a local start of the
-40.0										
-60.0										
-70.0										
Start 30.0 #Res BW	MHz 1.0 N	ЛНz		#VBI	N 3.0 M	Hz		Sv	Sto veep 1.000 m	p 600.0 MHz 1s (1001 pts)
MKR MODE TR	C SCL	:	× 68 19 MHz	- 23 426	dBm	FUNCTION	FUNCTION WIDTH		FUNCTION VALUE	
2 N 1 3 N 1	f		387.96 MHz 450.09 MHz	-24.496 43.344	dBm dBm					
4 N 1 5	f		513.36 MHz	-20.045	dBm					E
6 7 8										
9										
11 										
MSG							STATUS	S		





Figure 45 - 460.025 MHz, 30 MHz to 600 MHz



Keysight Spectrum Analyzer - Swept SA RF 50 DC Marker 4 546.420000000 N	MHz FE PNO: Fast IFGain:Low #	:EXT SOURCE OFF	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	02:57:59 PM Mar 30, 2020 TRACE 2 3 4 5 6 TYPE MUNICIPAL OF POINT O
Ref Offset 32.2 dB 10 dB/div Ref 20.00 dBm 10 0 0 10 0 0 10 0 0 10 0 0 10 0 0 10 0 0 10 0 0 -20 0 1 -30 0 0 -40 0 0 -60 0 0		2	2 2	Mkr4 546.42 MHz -23.512 dBm
Start 30.0 MHz #Res BW 1.0 MHz MkR MoDE TRC SCL X	#VBW 3	.0 MHz		Stop 600.0 MHz veep 1.000 ms (1001 pts)
1 N 1 f 3 2 N 1 f 3 3 N 1 f 4 4 N 1 f 5 6 7 7 7 7 9 9 1 1 1 11 1 1 1 1	84 / Z MHZ -26,165 dBr 9195 MHz -24,307 dBr 70.04 MHz 43,671 dBr 46,42 MHz -23,512 dBr			





Figure 47 - 450.025 MHz, 600 MHz to 6 GHz



Keysight Spectrum Analyzer - Swept SA RF 50 Ω DC Marker 1 4.876800000000 N) GHz FE PNO: Fast	E:EXT SOURCE OFF	ALIGN AUTO Avg Type: Log-Pv Avg Hold:>100/10	11:46:40 AM Mar 30, 2020 Vr TRACE 2 3 4 5 6 Vr TYPE
Ref Offset 34.16 dB 10 dB/div Ref 20.00 dBm	IFGain:Low #	Atten: 18 dB		Mkr1 4.876 8 GHz -22.834 dBm
-20.0 -20.0	and all a start and a start and a start and a start a start and a start and a start a start a start a start as	an a	and a second and a s	1
-40.0				
-70.0				
Start 0.600 GHz #Res BW 1.0 MHz	#VBW 3	3.0 MHz		Stop 6.000 GHz Sweep 9.000 ms (1001 pts)
MKR MODE TRC SCL X 2 3 4 5 6 7 8 9 10 11 4 5 6 7 8 9 10 1 1 1 1 1 1 1 1 1 1 1 1 1	¥ 1876 8 GHz -22.834 dBr	FUNCTION 6		FUNCTION VALUE





Figure 49 - 469.975 MHz - 600 MHz to 6 GHz

FCC 47 CFR Part 90, Limit Clause 90.210

The EUT shall comply with emission mask B as per FCC 47 CFR Part 90, clause 90.210.

Industry Canada RSS-119, Limit Clause 5.8

The EUT shall comply with emission mask B as per Industry Canada RSS-119, clause 5.8.



2.4.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Attenuator (10 dB, 75 W)	Bird	8308-100	386	12	23-Jul-2020
Power Supply Unit	Hewlett Packard	6253A	441	-	O/P Mon
Attenuator (10dB, 10W)	Bird	8343-100	478	-	O/P Mon
Attenuator (10dB/100W)	Bird	8343-100	495	12	18-Nov-2020
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-Apr-2020
Multimeter	lso-tech	IDM101	2424	12	12-Dec-2020
Filter (Hi Pass)	Mini-Circuits	NHP-600	2834	12	25-Oct-2018
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	26-Feb-2021
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
Frequency Standard	Spectracom	SecureSync 1200- 0408-0601	4393	6	16-Apr-2020
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	21-Oct-2020
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020
Cable (18 GHz)	Rosenberger	LU7-036-2000	5035	-	O/P Mon
Electronic Calibration Module	Keysight Technologies	85093C	5188	12	21-May-2020
1 Meter Cable	Teledyne	PR90-088-1MTR	5193	12	30-Jul-2020

Table 14

O/P Mon – Output Monitored using calibrated equipment



2.5 Radiated Spurious Emissions

2.5.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.210 FCC 47 CFR Part 2, Clause 2.1053 Industry Canada RSS-119, Clause 5.8 ISED RSS-GEN, Clause 6.13

2.5.2 Equipment Under Test and Modification State

SCG22 S/N: 1PR002007GPH5XV - Modification State 0

2.5.3 Date of Test

16-March-2020

2.5.4 Test Method

Testing was performed in accordance with ANSI C63.26, clause 5.5.

Prescans and final measurements were performed using the direct field strength method. The regulatory limit of -13 dBm/MHz has been converted to a field strength limit in accordance with ANSI C63.26, clause 5.2.7 equation c)

Example calculation E (dBuV/m) = EIRP (dBm) - 20log(d) + 104.8 where (d) is the measurement distance. E (dBuV/m) = -13 - 20log(3) + 104.8 E (dBuV/m) = 82.26



¹ Antenna is obresigned for measurements < 1 GHz.</p>
² Height from the EUT to ground is 0.8 m for measurements < 1 GHz.</p>

Figure 50 – Test Setup Diagram

The EUT was placed on the non-conducting platform in a manner typical of a normal installation. Ports on the EUT were terminated with loads as described in ANSI C63.4 clause 6.2.4. For multiple connectors of the same type, additional interconnecting cables were connected and pre-scans performed to determine whether the level of the emissions were increased by >2 dB.



2.5.5 Environmental Conditions

Ambient Temperature18.3 °CRelative Humidity35.1 %

2.5.6 Test Results

TETRA 406 MHz to 430 MHz - Transmit

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 15 - 406.1125 MHz – 30 MHz to 5 GHz



Figure 51 - 406.1125 MHz - 30 MHz to 5 GHz – Vertical





Figure 52 - 406.1125 MHz - 30 MHz to 5 GHz - Horizontal



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 16 - 418.0500 MHz - 30 MHz to 5 GHz



Figure 53 - 418.0500 MHz - 30 MHz to 5 GHz - Vertical



Figure 54 - 418.0500 MHz - 30 MHz to 5 GHz - Horizontal



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 17 - 429.9875 MHz – 30 MHz to 5 GHz



Figure 55 - 429.9875 MHz - 30 MHz to 5 GHz - Vertical



Figure 56 - 429.9875 MHz - 30 MHz to 5 GHz - Horizontal



TETRA 450 MHz to 470 MHz - Transmit

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
899.931	76.14	82.20	6.06	Peak	301	105	Vertical	-

Table 18 - 450.025 MHz – 30 MHz to 5 GHz



Figure 57 - 450.025 MHz - 30 MHz to 1 GHz - Vertical





Figure 58 - 450.025 MHz - 30 MHz to 1 GHz - Horizontal



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 19 - 460.025 MHz - 30 MHz to 5 GHz



Figure 59 - 460.025 MHz - 30 MHz to 5 GHz - Vertical







Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation	Orientation
*								

Table 20 - 469.975 MHz – 30 MHz to 5 GHz



Figure 61 - 469.975 MHz - 30 MHz to 5 GHz - Vertical



Figure 62 - 469.975 MHz - 30 MHz to 5 GHz - Horizontal



FCC 47 CFR Part 90, Limit Clause 90.210

The EUT shall comply with emission mask B as per FCC 47 CFR Part 90, clause 90.210.

Industry Canada RSS-119, Limit Clause 5.8

The EUT shall comply with emission mask B as per Industry Canada RSS-119, clause 5.8.

2.5.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Screened Room (5)	Rainford	Rainford	1545	36	23-Jan-2021
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	ти
DC Power Supply	Hewlett Packard	6269B	1909	-	ти
Multimeter	lso-tech	IDM101	2417	12	11-Nov-2020
Antenna with permanent attenuator (Bilog)	Chase	CBL6143	2904	24	30-Sep-2021
Comb Generator	Schaffner	RSG1000	3034	-	ти
Cable (Yellow, Rx, Km-Km 2m)	Scott Cables	KPS-1501-2000- KPS	4527	6	09-Jun-2020
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	ти
4dB Attenuator	Pasternack	PE7047-4	4935	24	30-Sep-2021
Hygrometer	Rotronic	HP21	4989	12	02-May-2020
EmX Emissions Software	TUV SUD	EmX	5125	-	Software
8 Meter Cable	Teledyne	PR90-088-8MTR	5212	12	30-Aug-2020
Horn Antenna (1-10GHz)	Schwarzbeck	BBHA 9120 B	5215	12	10-Mar-2021
EMI Test Receiver	Rohde & Schwarz	ESW44	5382	12	08-Oct-2020

Table 21

TU - Traceability Unscheduled



2.6 Frequency Stability

2.6.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.213 FCC 47 CFR Part 2, Clause 2.1055 Industry Canada RSS-119, Clause 5.3 ISED RSS-GEN, Clause 6.11

2.6.2 Equipment Under Test and Modification State

SCG22 S/N: 1PR002007GPH5XV - Modification State 0

2.6.3 Date of Test

31-March-2020 to 06-April-2020

2.6.4 Test Method

This test was performed in accordance with ANSI C63.26, Clause 5.6. and the requirements of FCC 47 CFR Part 2, Clause 2.1055 (a)(2), (d)(1).

The EUT was set to transmit on maximum power with an unmodulated carrier on bottom, middle and top channels. The EUT was connected to a spectrum analyser using an external 10 MHz frequency reference. The difference between the frequency of the fundamental and the frequency of the assigned channel in accordance with the manufacturer's documentation was recorded. In accordance with FCC 47 CFR, Clause 2.1055, the temperature was varied from -30 °C to +50 °C in 10 ° steps at nominal voltage and at ambient temperature for both minimum and maximum voltage extremes.

2.6.5 Environmental Conditions

Ambient Temperature	22.2 - 25.7 °C
Relative Humidity	18.6 - 39.3 %

2.6.6 Test Results

TETRA 406 MHz to 430 MHz - Transmit

Voltage	Frequency Error (ppm)				
	406.1125 MHz	418.0500 MHz	429.9875 MHz		
10.8 V DC	0.092	0.090	0.087		
15.6 V DC	0.111	0.072	0.070		

Table 22 - Frequency Stability Under Voltage Variations



Temperature		Frequency Error (ppm)	
	406.1125 MHz	418.0500 MHz	429.9875 MHz
+50.0 °C	0.055	0.072	0.070
+40.0 °C	0.073	0.072	0.070
+30.0 °C	0.055	0.054	0.052
+20.0 °C	0.037	0.036	0.035
+10.0 °C	0.074	0.090	0.070
0°C	0.185	0.197	0.192
-10.0 °C	0.148	0.144	0.140
-20.0 °C	0.203	0.179	0.192
-30.0 °C	0.092	0.126	0.140

Table 23 - Frequency Stability Under Temperature Variations



TETRA 450 MHz to 470 MHz - Transmit

Voltage	Frequency Error (ppm)				
	450.025 MHz	460.025 MHz	469.975 MHz		
10.8 V DC	0.083	0.081	0.080		
15.6 V DC	0.083	0.098	0.096		

Table 24 - Frequency Stability Under Voltage Variations

Temperature	Frequency Error (ppm)				
	450.025 MHz	460.025 MHz	469.975 MHz		
+50.0 °C	0.083	0.082	0.064		
+40.0 °C	0.067	0.065	0.064		
+30.0 °C	0.033	0.049	0.048		
+20.0 °C	0.033	0.049	0.048		
+10.0 °C	0.083	0.082	0.080		
0 °C	0.183	0.196	0.207		
-10.0 °C	0.167	0.147	0.144		
-20.0 °C	0.183	0.179	0.176		
-30.0 °C	0.133	0.130	0.144		

Table 25 - Frequency Stability Under Voltage Variations

FCC 47 CFR Part 90, Limit Clause 90.213

5 ppm

Industry Canada RSS-199, Limit Clause 5.3

5 ppm



2.6.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Power Supply Unit	Hewlett Packard	6253A	441	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-Apr-2020
Multimeter	lso-tech	IDM101	2424	12	12-Dec-2020
Climatic Chamber	TAS	Micro 225	2892	-	O/P Mon
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	26-Feb-2021
Thermocouple Thermometer	Fluke	51	3172	12	02-Jan-2021
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
Frequency Standard	Spectracom	SecureSync 1200- 0408-0601	4393	6	16-Apr-2020
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	21-Oct-2020
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020
Cable (18 GHz)	Rosenberger	LU7-036-2000	5035	-	O/P Mon
Electronic Calibration Module	Keysight Technologies	85093C	5188	12	21-May-2020
1 Meter Cable	Teledyne	PR90-088-1MTR	5193	12	30-Jul-2020

Table 26

O/P Mon - Output Monitored using calibrated equipment



2.7 Transient Frequency Behaviour

2.7.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.214 Industry Canada RSS-119, Clause 5.9

2.7.2 Equipment Under Test and Modification State

SCG22 S/N: 1PR002007GPH5XV - Modification State 0

2.7.3 Date of Test

06-April-2020 to 07-April-2020

2.7.4 Test Method

This test was performed on bottom, middle and top frequencies using an unmodulated carrier output from the EUT and measured on a spectrum analyser in accordance with TIA Standard 603 (Referenced in Industry Canada RSS-119, Clause 5.9).

The EUT configuration application used to transmit an unmodulated signal was 2.25 kHz higher than the nominal centre frequency of the channel. Therefore, the trace plots recorded were centred on 2.25 kHz higher than the bottom, middle and top nominal centre frequencies.

2.7.5 Environmental Conditions

Ambient Temperature	23.0 - 25.0 °C
Relative Humidity	27.8 - 33.2 %

2.7.6 Test Results

TETRA 406 MHz to 430 MHz - Transmit













Figure 65 - 418.0500 MHz, Switch On Transients









Figure 67 - 429.9875 MHz, Switch On Transients





Figure 68- 429.9875 MHz, Switch Off Transients



TETRA 450 MHz to 470 MHz - Transmit







Figure 70- 450.025 MHz, Switch Off Transients









Figure 72- 460.025 MHz, Switch Off Transients









Figure 74- 469.975 MHz, Switch Off Transients



FCC 47 CFR Part 90, Limit Clause 90.214

Time Interval	Maximum Frequency Difference	150 to 174 MHz	421 to 512 MHz		
Transient Frequency Behavio	bur for Equipment Designed to C	Dperate on 25 kHz Channels			
T ₁	± 25.0 kHz	5.0 ms	10.0 ms		
T ₂	± 12.5 kHz	20.0 ms	25.0 ms		
T ₃	± 25.0 kHz	5.0 ms	10.0 ms		
Transient Frequency Behavio	our for Equipment Designed to C	Dperate on 12.5 kHz Channels			
T ₁	± 12.5 kHz	5.0 ms	10.0 ms		
T ₂	± 6.25 kHz	20.0 ms	25.0 ms		
T ₃	± 12.5 kHz	5.0 ms	10.0 ms		
Transient Frequency Behaviour for Equipment Designed to Operate on 6.25 kHz Channels					
T ₁	± 6.25 kHz	5.0 ms	10.0 ms		
T ₂	± 3.125 kHz	20.0 ms	25.0 ms		
T ₃	± 6.25 kHz	5.0 ms	10.0 ms		

Table 27

Industry Canada RSS-119, Limit Clause 5.9

Channel Bandwidth	Time Intervals	Maximum Frequency	Transient Duration Limit (ms)			
(KHZ)		Difference (KHZ)	138 to 174 MHz	406.1 to 512 MHz		
25.0	t ₁	± 25.0	5	10		
	t ₂	±12.5	20	25		
	t ₃	± 25.0	5	10		
12.5	t ₁	± 12.5	5	10		
	t ₂	± 6.25	20	25		
	t ₃	± 12.5	5	10		
6.25	t ₁	± 6.25	5	10		
	t ₂	± 3.125	20	25		
	t ₃	± 6.25	5	10		

Table 28



2.7.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Signal Generator	Rohde & Schwarz	SMX	115	12	15-Jul-2020
Power Divider	Weinschel	1506A	604	12	23-Apr-2020
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-Apr-2020
Multimeter	Iso-tech	IDM101	2424	12	12-Dec-2020
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	26-Feb-2021
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
Signal Analyser	Rohde & Schwarz	FSQ 26	3545	12	27-Mar-2021
Frequency Standard	Spectracom	SecureSync 1200- 0408-0601	4393	6	16-Apr-2020
1 metre N-Type Cable	Florida Labs	NMS-235SP-39.4- NMS	4510	12	18-Jul-2020
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020
Cable (18 GHz)	Rosenberger	LU7-036-2000	5035	-	O/P Mon
Electronic Calibration Module	Keysight Technologies	85093C	5188	12	21-May-2020
1 Meter Cable	Teledyne	PR90-088-1MTR	5193	12	30-Jul-2020

Table 29



2.8 Adjacent Channel Power

2.8.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.221 Industry Canada RSS-119, Clause 5.8.9.1

2.8.2 Equipment Under Test and Modification State

SCG22 S/N: 1PR002007GPH5XV - Modification State 0

2.8.3 Date of Test

07-April-2020

2.8.4 Test Method

This test was performed conducted on the modulated carrier output from the EUT, measured using a spectrum analyser. The spectrum analyser was set to the transmit frequency, span to 0.2 MHz to measure the 3 x 25 kHz adjacent channels below and above the carrier.

A measurement integration bandwidth of 18 kHz was set, and the measurement used the Adjacent Channel Power function of the spectrum analyser.

2.8.5 Environmental Conditions

Ambient Temperature	22.2 - 22.6 °C
Relative Humidity	31.4 - 33.6 %

2.8.6 Test Results

TETRA 406 MHz to 430 MHz - Transmit

Offset (kHz)	Adjacent Channel Power (dB)								
	406.1125 MHz	418.0500 MHz	429.9875 MHz						
-25	-63.62	-63.47	-63.23						
+25	-62.47	-62.57	-61.55						
-50	-71.52	-71.45	-71.61						
+50	-71.57	-71.84	-72.11						
-75	-76.97	-76.88	-76.92						
+75	-76.89	-76.88	-77.20						

Table 30



Keysight Specti	rum Analyzer - ACP	20		65465 D/T 0040						- 7 💌
Center Fre	Center Freq 406.112500 MHz Center Freq: 406.112500 MHz Radio Std: None									M Apr 07, 2020 ne
	NFE IFIGain:Low #Atten: 20 dB Radio Device: BTS									
			Guilleon							
15 dB/div	Ref Offset 3 Ref 60.00	32.17 dB) dBm								
Log										
45.0			-63.6 dE	39.7 3c	dBm.	-62.5 dBc	.			•
30.0	-77.0 dBc	-71.5 dBc		i jerek	Mr.A.		-71.6 d	Bc	-76.9 dBc	
15.0										
0.00					1					
-15.0										
-30.0					1	4				
-45.0		and the second second	and a mark and			Aller Aller	when when when			RMS AVG
-60.0	- and a star and a star as a st								THE WEATHINGT - How	m the second
75.0										
-73.0										
Center 406	.1125 MHz							~	Span 2	200.0 kHz
#Res BW 1	1 kHz			#VB	WI kH	z			Sweep	762.6 ms
Total Carrie	er Power	39.722 dBm/ 18	00 kHz	ACP-I	BW					
					Lo	ower	Upper			
Carrier Pov	wer	Filter	Offset Freq	Integ BW	dBc	dBm o	dBc dBm	Filter	_	
1 39.72	2 dBm / 18.00) kHz -3 dB	25.00 kHz	18.00 kHz	-63.62	-23.90 -62	.47 -22.75	-3 dB		
			50.00 kHz	18.00 kHz	-71.52	-31.79 -71	.57 -31.85	-3 dB		
			75.00 kHz	18.00 kHz	-76.97	-37.25 -76	.89 -37.17	-3 dB		
MSG						STATUS	3			
							1			

Figure 75 - 406.1125 MHz



Figure 76 - 418.0500 MHz



Keysight Spect	rum Analyzer - ACP)								- C 🗙
l <mark>XI</mark>	RF 50 Ω	DC		SENSE:EXT SOUR	CE OFF	ALIGN AUTO		_	02:04:08 PI	4 Apr 07, 2020
Center Fre	eq 429.987	500 MHz		Center Free	q: 429.9870 200	000 MHz AvalH	old:>10/10	Ra	dio Std: Noi	1e
		NFE	IFGain:Low	#Atten: 20	dB			Ra	dio Device:	втя
	Dof Offect	32 10 dB								
15 dB/div	Ref 60.00	0 dBm								
Log										
45.0			. 6224	40.0	dBm	• 81.5 dPc	- L.			
30.0	-76.9 dBc	-71.6 dBc	-03.2 u	1 America	1 min	-p1.5 ubc	-72.1	:Bc	-77.2 dBc	
15.0				++	h					
0.00					\`\					
-15.0										
20.0				⊢/	i,					
-30.0			and a supervision	+ ²⁴		and the seal	Arten La			
-45.U	norm framenta	a var a sugar a						* Transford	have been and the second	RMS AVG
-60.0										
-75.0										
	0076 841-									
#Res BW	.9875 IVINZ 1 kH7			#VB	W 1 kH	7			Sween	200.0 KHZ 762.6 ms
<i>"</i>						-			encop	
Total Carrie	er Power	40.028 dBm/ 18	.00 kHz	ACP-I	BW					
					Lo	ower	Upper			
Carrier Pov	wer	Filter	Offset Freq	Integ BW	dBc	dBm	dBc dBm	Filter	-	
1 40.02	8 dBm / 18.00	0 kHz -3 dB	25.00 kHz	18.00 kHz	-63.23	-23.21 -6	1.55 -21.52	-3 dB		
			50.00 kHz	18.00 kHz	-71.61	-31.58 -7	2.11 -32.09	-3 dB		
			75.00 kHz	18.00 kHz	-76.92	-36.90 -7	7.20 -37.17	-3 dB		
MSG						STATU	JS		4	

Figure 77 - 429.9875 MHz



TETRA 450 MHz to 470 MHz - Transmit

Offset (kHz)	Adjacent Channel Power (dB)								
	450.025 MHz	460.025 MHz	469.975 MHz						
-25	-62.93	-61.93	-61.45						
+25	-62.57	-61.43	-60.94						
-50	-71.99	-72.12	-71.89						
+50	-71.94	-72.27	-72.14						
-75	-77.17	-77.01	-77.23						
+75	-76.99	-77.30	-77.18						

Table 31

Keysight Spec	trum Analyzer - AC	;P													
	RF 50 Ω	DC			_	SEN	SE:EXT SOU	RCE OFF	00500	ALIGN AL	JTO			02:18:16	PM Apr 07, 2020
Center Fr	eq 450.02	5000 N	IHZ				Trig: Free	eq: 450. Run	02500	Av	alHold::	>10/10	R	adio Sta: N	one
-		NF	- I	FGain	n:Low	<u></u>	#Atten: 20	dB			01		Ra	adio Device	BTS
15 d <u>B/div</u>	Ref Offset Ref 60.0	t 32.19 d I 0 dBm	В												
Log 45.0															
43.0					-62.9 df	3c	-40.2	l dBm	÷	-62.6 (iBc		_		-
30.0	-77.2 dBc	- -	72.0 dBc				Anth	W W				-71.9 c	Bc	-77.0 dB	С
15.0						\vdash			٦.						
0.00		+ +				\vdash			+			+			
-15.0						$\left \right $									
-30.0							\square		_\t						
-45.0				han	monghaber	Ĩ.				Junear	mar	mum			EMS AVO
	and the second second											l	- man	************	****
-60.0															
-75.0															
Center 450	0 0250 MHz				~					-		1		Snan	200.0 kHz
#Res BW	1 kHz						#VE	3W 1	kHz					Sweep	762.6 ms
Total Carri	ier Power	40.146	dBm/ 18.	00 kł	Hz		ACP	-IBW							
									Lov	ver	ι	Jpper			
Carrier Po	wer		Filter	Off	set Freq	1	nteg BW	d	Bc	dBm	dBc	dBm	Filter		
1 40.14	46 dBm / 18.0	0 kHz	-3 dB	25	.00 kHz		18.00 kHz	-62.	93	-22.79	-62.57	-22.43	-3 dB		
				50	.00 kHz		18.00 kHz	-71.	99	-31.85	-71.94	-31.79	-3 dB		
				75	.00 kHz		18.00 kHz	-77.	17	-37.03	-76.99	-36.84	-3 dB		
MSG				L						S	TATUS			4	
MSG										S	ATUS				

Figure 78 - 450.025 MHz



Keysight Spectr	rum Analyzer - ACP									
LXI	RF 50 Ω	DC		SENSE:EXT SOUR	CE OFF	ALIGN AUTO		_	02:33:00 P	M Apr 07, 2020
Center Fre	q 460.025	000 MHz		Center Free Trig: Free R	1: 460.0250 Sun	AvalHi	old:>10/10	Ra	idio Std: No	ne
		NE	FGain:Low	#Atten: 20 d	B			Ra	dio Device:	втя
	Def Offert	30.0 40								
15 dB/div	Ref 60.00) dBm								
Log										
45.0			610.45	40.2	dBm-	• 81.4 dPc	1			
30.0	-77.0 dBc	-72.1 dBc	-01.9 UL		mont	-p1.4 ubc	-72	.3 dBc	-77.3 dBc	
15.0					- Λ					
0.00										
-15.0				1						
20.0				\mathcal{N}	1	-				
-30.0			amanner	~		- march	www.			
-45.U	re and a submission	And the second second						The second second	and the second	FMS AVC
-60.0										
-75.0										
Contor 460	0250 MHz		· · ·							
#Res BW 1	.0250 MHZ			#VB	W 1 kH	z			Sweep	762.6 ms
	_	10.105.10.110				_				
Total Carrie	er Power	40.185 dBm/ 18.	UU KHZ	ACP-I	BW					
		F 10			Lo	ower	Upper			
Carrier Pov	ver	Filter	Offset Freq	Integ BW	dBc	dBm	dBc df	Bm Filter	-	
1 40.18	5 dBm / 18.00	kHz -3 dB	25.00 kHz	18.00 kHz	-61.93	-21.74 -6	1.43 -21.	25 -3 dB		
			50.00 kHz	18.00 kHz	-72.12	-31.94 -72	2.27 -32.	08 -3 dB		
			75.00 kHz	18.00 kHz	-77.01	-36.82 -7	7.30 -37.	11 -3 dB		
MSG						STATU	IS		-	

Figure 79 - 460.025 MHz



Figure 80 - 469.975 MHz


FCC Part 90, Limit Clause 90.221(b)

Frequency Offset	Maximum ACP (dBc) for devices \leq 1W	Maximum ACP (dBc) for devices > 1W
25 kHz	-55	-60
50 kHz	-70	-70
75 kHz	-70	-70

Table 32

NOTE: In any case, no requirement in excess of -36 dBm shall apply.

Industry Canada RSS-119. Limit Clause

None specified for 406 to 430 MHz and 450 to 470 MHz.

2.8.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 1.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Power Supply Unit	Hewlett Packard	6253A	441	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-Apr-2020
Multimeter	Iso-tech	IDM101	2424	12	12-Dec-2020
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	26-Feb-2021
Hygrometer	Rotronic	I-1000	3220	12	25-Sep-2020
Frequency Standard	Spectracom	SecureSync 1200- 0408-0601	4393	6	16-Apr-2020
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	21-Oct-2020
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020
Cable (18 GHz)	Rosenberger	LU7-036-2000	5035	-	O/P Mon
Electronic Calibration Module	Keysight Technologies	85093C	5188	12	21-May-2020
1 Meter Cable	Teledyne	PR90-088-1MTR	5193	12	30-Jul-2020

Table 33

O/P Mon - Output Monitored using calibrated equipment



3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty		
Transient Frequency Behaviour	± 0.2 Hz		
Types of Emissions	-		
Adjacent Channel Power	± 3.0 dB		
Frequency Stability	± 11 Hz		
Radiated Spurious Emissions	30 MHz to 1 GHz: ± 5.2 dB 1 GHz to 18 GHz: ± 6.3 dB		
Spurious Emissions at Antenna Terminals	± 3.45 dB		
Bandwidth Limitations	± 58.05 Hz		
Maximum Conducted Output Power	± 3.2 dB		

Table 34

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.