# FCC and ISEDC Test Report

Sepura Ltd Portable TETRA handset, Model: SC2028

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

Prepared for: Sepura Ltd 9000 Cambridge Research Park Beach Drive Waterbeach Cambridge, CB25 9TL United Kingdom Add value. Inspire trust.

FCC ID: XX6SC2028

IC: 8739A-SC2028

# COMMERCIAL-IN-CONFIDENCE

Document 75947270-05 Issue 01

SIGNATURE			
Massell			
NAME	JOB TITLE	RESPONSIBLE FOR	ISSUE DATE
Matthew Russell	RF Team Leader	Authorised Signatory	06 January 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 ISEDC RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Francis Kane	06 January 2020	FKane.
Testing	Graeme Lawler	06 January 2020	GA Lawlar.
FCC Accreditation	ISEDC Accred	litation	- · ·

90987 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: 2018, FCC 47 CFR Part 2: 2018, Industry Canada RSS-119: Issue 12 (05-2015) and ISEDC 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 January 2020

## Table 1

#### 1.2 Introduction

Applicant	Sepura Ltd
Manufacturer	Sepura Ltd
Model Number(s)	SC2028
Serial Number(s)	1PR001947GKE03R and 1PR001925GK63ZJ
Hardware Version(s)	Pre-Production
Software Version(s)	2001 730 07367
Number of Samples Tested	2
Test Specification/Issue/Date	FCC 47 CFR Part 90: 2018 FCC 47 CFR Part 2: 2018 Industry Canada RSS-119: Issue 12 (05-2015) ISEDC RSS-GEN: Issue 5 (04-2018) + A1 (03-2019)
Order Number Date	PLC-PO014257-2 11-October-2019
Date of Receipt of EUT	06-December-2019
Start of Test	09-December-2019
Finish of Test	18-December-2019
Name of Engineer(s)	Francis Kane 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, Industry Canada RSS-119 and ISEDC RSS-GEN is shown below.

Section		Specificat	ion Clause		Test Description	Result	Comments/Base Standard
	Part 90	Part 2	RSS-119	RSS-GEN			
Configuratio	n and Mode: TE	TRA 809 MHz to	o 824 MHz - Tra	nsmit High capa	city battery		
2.1	90.205	2.1046	5.4	6.12	Maximum Conducted Output Power	Pass	
2.2	90.209	2.1049	5.5	6.7	Bandwidth Limitations	Pass	
2.3	90.210	2.1051	5.8	6.13	Spurious Emissions at Antenna Terminals	Pass	
2.4	90.210	2.1055	5.3	6.11	Frequency Stability	Pass	
2.5	90.221	-	-	-	Adjacent Channel Power	Pass	
2.6	90.207	2.1047	5.2	-	Types of Emissions	Pass	
2.7	90.210	2.1051	5.8	6.13	Radiated Spurious Emissions	Pass	
Configuration and Mode: TETRA 851 MHz to 869 MHz - Transmit High capa		icity battery					
2.1	90.205	2.1046	5.4	6.12	Maximum Conducted Output Power	Pass	
2.2	90.209	2.1049	5.5	6.7	Bandwidth Limitations	Pass	
2.3	90.210	2.1051	5.8	6.13	Spurious Emissions at Antenna Terminals	Pass	
2.4	90.210	2.1055	5.3	6.11	Frequency Stability	Pass	
2.5	90.221	-	-	-	Adjacent Channel Power	Pass	
2.6	90.207	2.1047	5.2	-	Types of Emissions	Pass	
2.7	90.210	2.1051	5.8	6.13	Radiated Spurious Emissions	Pass	

Table 2



## 1.4 Application Form

## Equipment Description

Technical Description: (Please provide a brief description of the intended use of the equipment)	The SC20 hand-portable terminal is a TETRA enabled radio with Bluetooth and Wi-Fi capability
Manufacturer:	Sepura Limited
Model:	SC2028
Part Number:	N/A
Hardware Version:	Pre-Production
Software Version:	2001 730 07367
FCC ID (if applicable)	XX6SC2028
IC ID (if applicable)	8739A-SC2028

## Intentional Radiators

Technology	TETRA	TETRA	BT Classic/EDR	BLE	WLAN
Frequency Band (MHz)	806-824	851-869	2402-2480	2402-2480	2412-2462
Conducted Declared Output Power (dBm)	34	34	7.382	7.382	16.5
Antenna Gain (dBi)	> 0	> 0	2.5	2.5	2.5
Supported Bandwidth(s) (MHz)	25 kHz	25 kHz	1	2	16.5 22 16.5
Modulation Scheme(s)	π/4 DQPSK	π/4 DQPSK	8PSK, DQPSK, GFSK	8PSK, DQPSK, GFSK	802.11g, 802.11b 802.11n
ITU Emission Designator	22K0DXW	22K0DXW	1M00F1D	2M00F1D	16M5D1D 22M0G1D 16M5D1D
Bottom Frequency (MHz)	806	851	2402	2402	2412
Middle Frequency (MHz)	815	860	2441	2441	2437
Top Frequency (MHz)	824	869	2480	2480	2462

## 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:	A
Single Phase  Three Phase	

## DC Power Source

Nominal voltage:	7.4	V
Extreme upper voltage:	7.4	V
Extreme lower voltage:	6.2	V
Max current:	2	А

## Battery Power Source

Voltage:	7.4	V
End-point voltage:	6.2	V (Point at which the battery will terminate)
Alkaline $\Box$ Leclanche $\boxtimes$ Lithium $\Box$ Nicke	el Cadmium 🗆 Lead Acid* 🗆 *(Vehicle reg	gulated)
Other	Please detail:	

## Charging

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

## Temperature

Minimum temperature:	-30	°C
Maximum temperature:	+65	°C

## Antenna Characteristics

Antenna connector 🛛 TETRA		State impedance	50	Ohm	
Temporary antenna connector		State impedance		Ohm	
Integral antenna 🖂	Type:	PCB	State impedance	50	Ohm
External antenna	Type:		State impedance		dBI



## Ancillaries (if applicable)

Manufacturer:	Part Number:	
Model:	Country of Origin:	

The SC2028 may be used with standard SC20 accessories, batteries, chargers, belt clips, holsters, remote speaker and microphones, earpieces etc

I hereby declare that the information supplied is correct and complete.

Name: Chris Beecham Position held: Conformance Engineer Date: 21 October 2019



## 1.5 Product Information

#### 1.5.1 Technical Description

The SC20 hand-portable terminal is a TETRA enabled radio with Bluetooth and Wi-Fi capability.

## **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: SC2028: Serial Number: 1PR001925GK63ZJ					
0	As supplied by the customer		Not Applicable		
Model: SC2028: Serial Number: 1PR001947GKE03R					
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 809 MHz to 824 MHz - Transmit High capacity battery					
Maximum Conducted Output Power	UKAS				
Bandwidth Limitations	Francis Kane	UKAS			
Spurious Emissions at Antenna Terminals	Francis Kane	UKAS			
Frequency Stability	Francis Kane	UKAS			
Adjacent Channel Power	Francis Kane	UKAS			
Types of Emissions	Francis Kane	UKAS			
Radiated Spurious Emissions	Graeme Lawler	UKAS			
Configuration and Mode: TETRA 851 MHz to 869 MHz	z - Transmit High capacity battery				
Maximum Conducted Output Power	Francis Kane	UKAS			
Bandwidth Limitations	Francis Kane	UKAS			
Spurious Emissions at Antenna Terminals	Francis Kane	UKAS			
Frequency Stability	Francis Kane	UKAS			
Adjacent Channel Power	Francis Kane	UKAS			
Types of Emissions	Francis Kane	UKAS			
Radiated Spurious Emissions	Graeme Lawler	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 ISEDC RSS-GEN, Clause 6.12

#### 2.1.2 Equipment Under Test and Modification State

SC2028, S/N: 1PR001947GKE03R - Modification State 0

## 2.1.3 Date of Test

09-December-2019

#### 2.1.4 Test Method

The test was applied in accordance with ANSI C63.26, Clause 5.2.4.3.1.

## 2.1.5 Environmental Conditions

Ambient Temperature	22.8 - 23.7 °C
Relative Humidity	40.1 - 42.8 %

#### 2.1.6 Test Results

TETRA 809 MHz to 824 MHz - Transmit High capacity battery

806.02	806.025 MHz 815.000 MHz		823.975 MHz		
Result (dBm)	Result (W)	Result (dBm) Result (W)		Result (dBm)	Result (W)
34.51	2.825	34.42	2.767	34.58	2.767

#### Table 5 – ERP

TETRA 851 MHz to 869 MHz - Transmit High capacity battery

851.025 MHz		/Hz 860.000 MHz		868.97	75 MHz
Result (dBm)	Result (W)	Result (dBm) Result (W)		Result (dBm)	Result (W)
34.63	2.904	34.41	2.761	34.23	2.649

## Table 6 – ERP



## FCC 47 CFR Part 90, Limit Clause 90.205

Frequency (MHz)	Limit
806 to 824, 851 to 869, 869 to 901 and 935 to 940	Refer to 90.635 of the specification

## Table 7 - FCC Limits for Maximum ERP

## Industry Canada RSS-119, Limit Clause 5.4

The output power shall be within ±1 dB of the manufacturer's rated power listed in the equipment specifications.

Frequency (MHz)	Transmitter Output Power (W)	
	Base/Fixed Equipment Mobile Equipment	
806 to 821, 851 to 866, 821 to 824 and 866 to 869	110	30

## 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 2.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Multimeter	Fluke	75 Mk3	455	12	11-Oct-2020
Hygromer	Rotronic	A1	2138	12	05-Mar-2020
Attenuator (20 dB, 150 W)	Narda	769-20	3367	12	17-Jul-2020
Attenuator (10dB, 150W)	Narda	769-10	3368	12	17-Jul-2020
1 metre K-Type Cable	Florida Labs	KMS-180SP-39.4- KMS	4520	12	12-Nov-2020
Quad Power Supply	Rohde & Schwarz	HMP4040	4955	-	O/P Mon
EXA	Keysight Technologies	N9010B	4968	24	21-Dec-2019
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020
Electronic Calibration Module	Keysight Technologies	85093C	5188	12	21-May-2020

## Table 9

O/P Mon – Output Monitored using Calibrated Equipment



#### 2.2 Bandwidth Limitations

## 2.2.1 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 ISEDC RSS-GEN, Clause 6.7

## 2.2.2 Equipment Under Test and Modification State

SC2028, S/N: 1PR001947GKE03R - Modification State 0

#### 2.2.3 Date of Test

09-December-2019

## 2.2.4 Test Method

The test was performed in accordance with ANSI C63.26, clause 5.4.4.

#### 2.2.5 Environmental Conditions

Ambient Temperature22.5 - 22.7 °CRelative Humidity42.6 - 42.9 %

## 2.2.6 Test Results

TETRA 809 MHz to 824 MHz - Transmit High capacity battery

806.025 MHz	815.000 MHz	823.975 MHz
Result (kHz)	Result (kHz)	Result (kHz)
21.221	21.204	21.256

## Table 10 - Occupied Bandwidth Results



Spectrum Occupied	n Analyzer 1	+					₽	Frequency	崇
KEYSI	GHT Input: RF Coupling: AC Align: Auto	Input Z: 50 Ω A Corrections: Off F Freq Ref: Ext (S) NFE: Adaptive	Atten: 20 dB Preamp: Off	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 80 Avg Hold:>10/10 Radio Std: None	6.025000 MHz D Ə	Center Fr 806.0250	equency 000 MHz	Settings
1 Graph	v	Ref	f LvI Offset 30.9	90 dB			50.000 k	Hz	
Scale/Di Log 25.0 15.0 5.00 -5.00	v 10.0 dB	Ref	f Value 35.00 df	Bm Mary Angeneratives	w		CF Step 5.000 kH Auto Man	z	
-15.0 -25.0 -35.0 -45.0 -55.0	whanner					Multimeter	Freq Offs 0 Hz	et,	
Center 8	06 MHz	Vic	ieo BW 4.7000	kHz*	0	Span 50 kHz			
2 Metrics	Troubled Bandwidth					<del>, 210 ms (1001</del> pts)			
	21.2	21 kHz		Total Power		41.7 dBm			
	Transmit Freq Error x dB Bandwidth	304 Hz 24.32 kHz		% of OBW Pow x dB	er	99.00 % -26.00 dB			
	) ( ] [	Dec 09, 2019 3:34:35 PM							





Figure 2 - 815.000 MHz Occupied Bandwidth



Spectrum Analy Occupied BW	yzer 1 📊 🕇	ŀ					₽	Frequenc	y <b>y</b> ∦
KEYSIGHT	Input: RF Coupling: AC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Ext (S) NFE: Adaptive	Atten: 20 dB Preamp: Off	Trig: Free Run Gate: Off #IF Gain: Low	Center Freq: 82 Avg Hold:>10/1 Radio Std: Non	23.975000 MHz 0 e	Center Fre 823.9750	equency 00 MHz	Settings
1 Graph Scale/Div 10.0	v ) dB	R	ef LvI Offset	30.90 dB 0 dBm			Span 50.000 k⊦	Ηz	
Log 25.0 15.0 5.00		- And -			MANN -		CF Step 5.000 kHz Auto Man	2	
-5.00 -15.0 -25.0 -35.0	monorman				hum	mmunnun	Freq Offse 0 Hz	et	
-45.0 -55.0 Center 824 MH	Hz	v	/ideo BW 4.70	000 kHz*		Span 50 kH	IZ		
Res BW 470.0	0 Hz				Swee	ep 270 ms (1001 pt	5)		
Occu	pied Bandwidth 21.256	5 kHz		Total Power		40.9 dBm			
Trans x dB	smit Freq Error Bandwidth	298 H 24.36 kH	z	% of OBW Pow x dB	er	99.00 % -26.00 dB			
<b>1</b> 5	C ] ?	Dec 09, 2019 3:56:41 PM							

Figure 3 - 823.975 MHz Occupied Bandwidth



## TETRA 851 MHz to 869 MHz - Transmit High capacity battery

851.025 MHz	860.000 MHz	868.975 MHz
Result (kHz)	Result (kHz)	Result (kHz)
21.407	21.410	21.114

## Table 11 - Occupied Bandwidth Results



Figure 4 - 851.025 MHz Occupied Bandwidth



Figure 5 - 860.000 MHz Occupied Bandwidth



Spectrum Analyzer 1 Occupied BW	• +				ť	Frequency	V ( <u>s17</u> 718
KEYSIGHT Input: R Couplin Align: A	RF Input 2 g: AC Correc uto Freq F NFE: J	Z: 50 Ω Atten: 20 d ctions: Off Preamp: Of Ref: Ext (S) Adaptive	B Trig: Free Run ff Gate: Off #IF Gain: Low	Center Freq: 868.975000 M Avg Hold:>10/10 Radio Std: None	Hz Ca B	enter Frequency 68.975000 MHz	Settings
1 Graph	•	Ref LvI Offs	et 30.90 dB		5	0.000 kHz	
Scale/Div 10.0 dB Log 25.0 15.0 5.00	المر	Ref Value 35	5.00 dBm	Martin Contraction	5	F Step .000 kHz Auto Man	
-5.00 -15.0 -25.0 -35.0	minant			mummm	Angeline Fr	req Offset Hz	
-55.0 Center 869 MHz Res BW 470.00 Hz		Video BW 4	.7000 kHz*	Sp Sweep 270 ms	an 50 kHz (1001 pts)		
2 Metrics	۲						
Occupied Bar	ndwidth 21.114 kHz		Total Power	40.2 dBn	n		
Transmit Free x dB Bandwid	q Error ith	253 Hz 24.60 kHz	% of OBW Pow x dB	er 99.00 % -26.00 dt	6 3		
	Dec 3:55	09, 2019 9:03 PM					

Figure 6 - 868.975 MHz Occupied Bandwidth

## FCC 47 CFR Part 90, Limit Clause 90.209

Operations using equipment designed to operate with a 25 kHz channel bandwidth may be authorized up to a 22 kHz bandwidth if the equipment meets the Adjacent Channel Power limits of FCC 47 CFR Part 90.221.

## 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



## 2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Multimeter	Fluke	75 Mk3	455	12	11-Oct-2020
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-Apr-2020
Hygromer	Rotronic	A1	2138	12	05-Mar-2020
Attenuator (20 dB, 150 W)	Narda	769-20	3367	12	17-Jul-2020
Attenuator (10dB, 150W)	Narda	769-10	3368	12	17-Jul-2020
Frequency Standard	Spectracom	SecureSync 1200- 0408-0601	4393	6	16-Apr-2020
1 metre K-Type Cable	Florida Labs	KMS-180SP-39.4- KMS	4520	12	12-Nov-2020
Quad Power Supply	Rohde & Schwarz	HMP4040	4955	-	O/P Mon
EXA	Keysight Technologies	N9010B	4968	24	21-Dec-2019

## Table 12

O/P Mon - Output Monitored using calibrated equipment



## 2.3 Spurious Emissions at Antenna Terminals

#### 2.3.1 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 ISEDC RSS-GEN, Clause 6.13

### 2.3.2 Equipment Under Test and Modification State

SC2028, S/N: 1PR001947GKE03R - Modification State 0

#### 2.3.3 Date of Test

10-December-2019 to 11-December-2019

#### 2.3.4 Test Method

This test was performed in accordance with ANSI C63.26, clause 5.7.

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 in to 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 at least 1% of the emission bandwidth, with a VBW of 3 times RBW.

For emissions where the frequency is removed more 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 in to the spectrum analyser as a reference level offset. The analyser was configured with a peak detector and max hold trace. For measurements above 1800 MHz, a high pass filter was used. Measurements were also performed radiated as recorded in section 2.7 of this report.

## 2.3.5 Environmental Conditions

Ambient Temperature	22.1 - 22.7 °C
Relative Humidity	32.5 - 35.8 %



## 2.3.6 Test Results



TETRA 809 MHz to 824 MHz - Transmit High capacity battery





Figure 8 - 815.000 MHz, Transmitter Mask





#### Figure 9 - 823.975 MHz, Transmitter Mask



Figure 10 - 806.025 MHz, 9 kHz to 150 kHz



Spect Swep	rum Anal t SA	yzer 1		Spectrum Analyzer 2 Swept SA	· +					<b>‡</b>	Marker	- * 崇
KEY	Sight	Input: I Coupli Align: J	RF <mark>ng: DC</mark> Auto	Input Ζ: 50 Ω Corrections: Off Freq Ref: Ext (S) NFE: Adaptive	Atten: 6 dB PNO: Be Preamp: Off Gate: Of IF Gain: Sig Tract		Vide #Avg Type Trig: Free / ff	: Log-Power Run	123456 M <del>WWWM</del> PNNNNP	Select Marker Marker 1		
1 Spe	ctrum	_	•	R	Ref Lvi Offset 30.90 dB			Mkr1 14.9		Marker Frequ 14.922 kHz	iency	Settings
Scale Log	Scale/Div 10 dB			R	tef Level 10.00	dBm		-4	8.07 dBm	Peak Se	arch	Peak Search
0.00 -10.0 -20.0									DL1-13.00 dBm	Next Pe	eak	Pk Search Config
-30.0 -40.0	1.									Next Pk i	Right	Properties
-50.0 -60.0	- And	~~~~~	~~~~~		where where a	2000-000-000				Next Pk	Left	Marker Function
-70.0 -80.0							www.		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Minimum	Peak	Marker→
Start #Res	9.00 kHz BW 1.0 l	Hz		1	#Video BW 3.0	) kHz	s	Sto weep 1.00 r	op 150.00 kHz ms (1001 pts)	Pk-Pk Se	earch	Counter
5 Mar	ker Table		v							Marker [	Delta	
1	Mode N	Trace	Scale f	e X 14.922 kHz	Y -48.07 dBm	Function	Function Wid	h Func	tion Value	Mkr→	CF	
2										Mkr→Re	ef Lvl	
4 5 6										Continuous P Search On	'eak	
	5	6		<b>?</b> Dec 10, 2019 5:46:49 PM		upled			BX	Off		

#### Figure 11 - 815.000 MHz, 9 kHz to 150 kHz



Figure 12 - 823.975 MHz - 9 kHz to 150 kHz



Spect Swep	rum Anal t SA	yzer 1		Spectrum Analyzer 2 Swept SA	· +							Marker	▼ <mark>\$!/</mark>
KEY	SIGHT	Input: I Couplin Align: A	RF ng: DC Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Ext (S) NFE: Adaptive	Atten: 6 dB Preamp: Off	PNO: Best V Gate: Off IF Gain: Low Sig Track: O	Vide v vff	#Avg Type: Log-Power Trig: Free Run		1 2 3 4 5 6 1 <del>www m</del> 2 n n n n p	Select Ma Marker 1	rker	
1 Spe	ctrum		•	F	Ref LvI Offset 30.90 dB			M	kr1 16	7.85 kHz	Marker Fr 167.850 I	equency (Hz	Settings
Scale Log	/Div 10 (	B		F	Ref Level 10.00	dBm			-61	.83 dBm	Peak	Search	Peak Search
0.00 -10.0 -20.0										11-13.00 dBm	Nex	t Peak	Pk Search Config
-30.0 -40.0											Next	Pk Right	Properties
-50.0 -60.0	• <u>1</u>		~~~~	· · · · · · · · · · · · · · · · · · ·	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	·····				~~~~~~	Next	Pk Left	Marker Function
-70.0 -80.0											Minim	um Peak	Marker→
Start #Res	0.1500 N BW 10 k	Hz Hz			#Video BW 30	kHz		Swee	Stop p 1.00 ms	1.0000 MHz s (1001 pts)	Pk-Pl	< Search	Counter
5 Mar	ker Table		•								Mark	er Delta	
1	Mode N	Trace	Scale f	e X 167.85 kHz	Y -61.83 dBm	Function	Fun	ction Width	Functio	on Value	Mk	r→CF	
2 3											Mkr-	→Ref Lvl	
4 5 6											Continuou Search On	ıs Peak	
	5	6		Pec 10, 2019 5:41:04 PM		upled				H X	Off		

Figure 13 - 806.025 MHz, 150 kHz to 1 MHz



Figure 14 - 815.000 MHz, 150 kHz to 1 MHz



Spect Swep	rum Analı t SA	yzer 1		Spectrum Analyzer 2 Swept SA	<b>+</b>				Marker	· · · · · · · · · · · · · · · · · · ·
KEY	Sight	Input: R Couplin Align: A	RF Ig: DC Nuto	Input Z: 50 Ω Corrections: Off Freq Ref: Ext (S) NFE: Adaptive	Atten: 6 dB Preamp: Off	PNO: Best Wic Gate: Off IF Gain: Low Sig Track: Off	le #Avg Type: Lo Trig: Free Rur	g-Power 123456 MWWWWM PNNNP	Select Marker Marker 1	,
1 Spe	ctrum		•	F	Ref LvI Offset 30.90 dB		М	kr1 167.00 kHz	Marker Frequency 167.000 kHz	Settings
Scale Log	/Div 10 c	B		F	Ref Level 10.00	dBm		-45.70 dBm	Peak Search	Peak Search
-10.0 -20.0								DL1-13.00 dBm	Next Peak	Pk Search Config
-30.0 -40.0	1								Next Pk Right	Properties
-50.0 -60.0	$\bigwedge$	~~~~~	^_~	And		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			Next Pk Left	Marker Function
-70.0 -80.0									Minimum Peak	Marker→
Start #Res	0.1500 M BW 10 k	Hz Hz			#Video BW 30	kHz	Swe	Stop 1.0000 MHz ep 1.00 ms (1001 pts)	Pk-Pk Search	Counter
5 Mar	ker Table		V						Marker Delta	
1	Mode N	Trace	Scale f	e X 167.00 kHz	Y -45.70 dBm	Function	Function Width	Function Value	Mkr→CF	
2									Mkr→Ref Lvl	
4 5 6									Continuous Peak Search	
	5	2		2 Dec 10, 2019		upled			Off	

#### Figure 15 - 823.975 MHz - 150 kHz to 1 MHz



Figure 16 - 806.025 MHz, 1 MHz to 30 MHz



Spectrum Ana Swept SA	alyzer 1		Spectrum Analyzer 2 Swept SA	· +					<b>‡</b>	Marker	▼ <mark>\$1/</mark> 718
	T Input: F Couplir Align: A	RF 1g: DC Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Ext (S) NFF <sup>-</sup> Adaptive	Atten: 20 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Lo Sig Track: (	#Avg Type: Trig: Free R w	Log-Power 12 un M P N	. 3 4 5 6 /WWWM I N N N P	Select Marke Marker 1	r	<b>v</b>
1 Spectrum		v	F	Ref LvI Offset 30.90 dB			Mkr1 2.334		Marker Frequ 2.334000 M	uency Hz	Settings
Scale/Div 10	dB		F	Ref Level 40.00	dBm		-43.8	8 dBm	Peak Se	earch	Peak Search
20.0									Next P	eak	Pk Search Config
0.00							OL1	-13.00 dBm	Next Pk	Right	Properties
-20.0									Next Pk	Left	Marker Function
-40.0 -50.0	nengaganal mangana	hannaah		www.www.www.www.	mhoresen providence	mutation	hegel, metter for a superior	-martidan)	Minimum	I Peak	Marker→
Start 1.00 MI #Res BW 30	lz kHz			#Video BW 10	) kHz	Sw	Stop 30 eep 1.00 ms (1	0.00 MHz 1001 pts)	Pk-Pk S	earch	Counter
5 Marker Table		v							Marker	Delta	
Mode 1 N	Trace 1	Scale f	e X 2.334 MHz	Y -43.88 dBm	Function	Function Width	Function	√alue	Mkr→	CF	
2 3 4									Mkr→R	ef Lvl	
5 6									Continuous F Search	Peak	
<b>1</b> 5	2		Pec 10, 2019 5:21:01 PM		upled				Off		

#### Figure 17 - 815.000 MHz, 1 MHz to 30 MHz



Figure 18 - 823.975 MHz - 1 MHz to 30 MHz



Specti Swept	rum Anal SA	yzer 1		Spectrum A Swept SA	nalyzer 2	•	+							Marker	۲ ۲
KEY	Sight	Input: F Couplir Align: A	RF ng: AC Auto	Input Z: Correcti Freq Re NEF: Ar	50 Ω ons: Off f: Ext (S) taptive	Atten: Pream	20 dB np: Off	PNO: F Gate: 0 IF Gair Sig Tra	Fast Off 1: Low ack: Off	#Avg Type: L Trig: Free Ru	.og-Power in	123456 MWWWW PNNNN	Select Marke	Marker r 2	
1 Spei	ctrum		۲	NI E. 70	F	Ref Lvi	Offset 3	0.90 dB		Mki	1.2	23 99 GHz	Marke 1.223	r Frequency 987069 GHz	Settings
Scale	/Div 10 (	iB				Ref Lev	el 40.00	dBm			-2	6.61 aBm	F	eak Search	Peak Search
20.0 10.0														Next Peak	Pk Search Config
0.00 -10.0												DL1 13.00 dBm	N	ext Pk Right	Properties
-20.0 -30.0	<del>اروانډې پرد کمور</del>	rindo elas fe	- and a state		مريد مريد المريد ال	an an an	-	hanna channa agus agus agus agus agus agus agus agu			و بهمور و بهمور و مورد و	ang kalang kalaya		lext Pk Left	Marker Function
-40.0 -50.0													Mi	inimum Peak	Marker→
Start #Res	0.0300 G BW 1.0 I	Hz NHz				#Vide	o BW 3.	0 MHz		Swe	Sto eep 1.00	op 1.8000 GHz ms (1001 pts)	Р	k-Pk Search	Counter
5 Marl	ker Table		•										_ N	larker Delta	
1	Mode N	Trace 1	Scale f	e X 80:	5.26 MHz	36	Y 6.92 dBn	Functi n	on Fi	unction Width	Fund	tion Value		Mkr→CF	
2	N	1	f	1.22	3 99 GHz	-26	6.61 dBn	n					N	lkr→Ref Lvl	
4 5 6													Contir Searc	nuous Peak h	
	5	6		? Dec 1 4:58:	D, 2019 11 PM	$\mathbb{D}/$	7							)ff	

#### Figure 19 - 806.025 MHz, 30 MHz to 1.8 GHz



Figure 20 - 815.000 MHz, 30 MHz to 1.8 GHz



Spectrum Analyzer 1 Swept SA	Spectrum Analyzer 2 Swept SA	<b>+</b>				Marker Marker	▼ <mark>\$1/</mark> 718
KEYSIGHT Input: RF Coupling: Align: Aut	Input Z: 50 Ω AC Corrections: Off o Freq Ref: Ext (S) NEE: Adaptive	Atten: 20 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Log-Powe Trig: Free Run	P 1 2 3 4 5 6 M WWWWW P N N N N N	Select Marker Marker 2	
1 Spectrum		Ref LvI Offset 30.90 dB		Mkr2 1.2	231 62 GHz	Marker Frequency 1.231616379 GHz	Settings
Scale/Div 10 dB		Ref Level 40.00 dB	m		26.61 0.511	Peak Search	Peak Search
20.0						Next Peak	Pk Search Config
-10.0			,		DL1 13.00 dBm	Next Pk Right	Properties
-20.0 -30.0		and the second	rimming and regarded with order		รสู <del>โนเหตุสถาวีสุ</del> ประสาร	Next Pk Left	Marker Function
-40.0						Minimum Peak	Marker→
Start 0.0300 GHz #Res BW 1.0 MHz		#Video BW 3.0 M	Hz	Steep 1.00	top 1.8000 GHz 0 ms (1001 pts)	Pk-Pk Search	Counter
5 Marker Table						Marker Delta	
Mode Trace S 1 N 1 2 N 1	cale X f 822.96 MH; f 1.231 62 GH;	Y z 37.04 dBm z -26.61 dBm	Function Fu	nction Width Fur	nction Value	Mkr→CF	
3 4 5						Mkr→Ref Lvl Continuous Peak	
	<b>?</b> Dec 10, 2019					On Off	_

#### Figure 21 - 823.975 MHz - 30 MHz to 1.8 GHz



Figure 22 - 806.025 MHz, 1.8 GHz to 6 GHz



Spectrum Analyzer 1 Swept SA	Spectrum Analyzer 2 Swept SA	• +				Marker	· ا
KEYSIGHT Coupling: AC Align: Auto	Input Ζ: 50 Ω Corrections: Off Freq Ref: Ext (S) NEF: Adaptive	Atten: 8 dB PNO: Fa Preamp: Off Gate: Of IF Gain: Sig Trac		#Avg Type: Lo Trig: Free Run	g-Power 123456 MWWWWW PNNNN	Select Marker Marker 1	
1 Spectrum v	R	ef LvI Offset 32	2.40 dB	Mk	r1 3.303 6 GHz	Marker Frequency 3.303600000 GHz	Settings
Scale/Div 10 dB	R	tef Level 30.00 c	dBm		-35.03 dBm	Peak Search	Peak Search
10.0						Next Peak	Pk Search Config
-10.0					DL1 -13.00 dBm	Next Pk Right	Properties
-30.0 -40.0	And the second second second second	nterson manufacture	**************************************		harran and an an arafada arana	Next Pk Left	Marker Function
-50.0						Minimum Peak	Marker→
Start 1.800 GHz #Res BW 1.0 MHz		#Video BW 3.0	MHz	Swee	Stop 6.000 GHz p 7.00 ms (1001 pts)	Pk-Pk Search	Counter
5 Marker Table v						Marker Delta	
Mode Trace Scale	e X 3.303 6 GHz	Y -35.03 dBm	Function	Function Width	Function Value	Mkr→CF	
2 3						Mkr→Ref Lvl	
5						Continuous Peak Search	
<b>1</b> 500	<b>?</b> Dec 10, 2019					Off	

Figure 23 - 815.000 MHz, 1.8 GHz to 6 GHz



Figure 24 - 823.975 MHz - 1.8 GHz to 6 GHz



Spectrum Analyzer 1 Swept SA	Spectrum Analyzer 2 Swept SA	• +				Marker	- " 崇
KEYSIGHT Coupling: AC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Ext (S) NFF: Adaptive	Atten: 10 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Lo Trig: Free Run	g-Power 123456 MWWWWW PNNNNN	Select Marker Marker 1	
1 Spectrum v	F	Ref LvI Offset 30.90 dB		N	lkr1 7.056 GHz	Marker Frequency 7.056000000 GHz	Settings
Scale/Div 10 dB	F	Ref Level 30.00 d	lBm		-36.25 dBm	Peak Search	Peak Search
10.0						Next Peak	Pk Search Config
-10.0					DL1-13.00 dBm	Next Pk Right	Properties
-30.0 -40.0	nemaleultruseas	and the set of the stand of the stand of the set	the section of the se	-distantionalisteration	<sub>มมูล</sub> ถาติจารจัดมีหารูลสู่ <sub>ยา</sub> งเสราร์สุด <sub>การ</sub> สู่ป <sub>ัต</sub> นเกาะ	Next Pk Left	Marker Function
-50.0						Minimum Peak	Marker→
Start 6.000 GHz #Res BW 1.0 MHz		#Video BW 3.0	MHz	Swee	Stop 10.000 GHz ep 6.67 ms (1001 pts)	Pk-Pk Search	Counter
5 Marker Table 🔹 🔻						Marker Delta	
Mode Trace Scale	e X 7.056 GHz	Y -36.25 dBm	Function	Function Width	Function Value	Mkr→CF	
2 3						Mkr→Ref Lvl	
5						Continuous Peak Search	
	<b>?</b> Dec 10, 2019					Off	

#### Figure 25 - 806.025 MHz, 6 GHz to 10 GHz



Figure 26 - 815.000 MHz, 6 GHz to 10 GHz



Spectrum Analy Swept SA	yzer 1	Spectrum Analyzer 2 Swept SA	<b>+</b>		иат. <u>— — —</u>	D		Marker	、 栄
	Coupling: AC Align: Auto	Corrections: Off Freq Ref: Ext (S)	Atten: 10 dB Preamp: Off	PNU: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg type: t Trig: Free Ri	.og-Power 1 In M	2 3 4 5 6	Select Marker Marker 1	
1 Spectrum	T	NI L. Audpuve	Ref LvI Offset 30	0.90 dB		Mkr1 9.9	08 GHz	Marker Frequency 9.908000000 GHz	Settings
Scale/Div 10 d	B	F	Ref Level 30.00	dBm		-36.'	12 dBm	Peak Search	Peak Search
10.0								Next Peak	Pk Search Config
-10.0						Q	.1 -13.00 dBm	Next Pk Right	Properties
-30.0 -40.0	-u-orthogoaraged	and the second standing and the second standing and the second standing and the second standing and the second	and the state of the	constances and a second	ang	a Jane Martha Party	مرد المراسم	Next Pk Left	Marker Function
-50.0								Minimum Peak	Marker→
Start 6.000 GH #Res BW 1.0 M	lz MHz		#Video BW 3.0	MHz	Sw	Stop 1 eep 6.67 ms	0.000 GHz (1001 pts)	Pk-Pk Search	Counter
5 Marker Table	٣							Marker Delta	
Mode 1 N	Trace Scal	le X 9.908 GHz	Y -36.12 dBm	Function	Function Width	Functior	n Value	Mkr→CF	
2 3								Mkr→Ref Lvl	
4 5 6								Continuous Peak Search	]
<b>1</b> 5	2	Dec 10, 2019 4:48:50 PM	$\square$				8 🗙	Off	

Figure 27 - 823.975 MHz - 6 GHz to 10 GHz





#### TETRA 851 MHz to 869 MHz - Transmit High capacity battery

#### Figure 28 - 851.025 MHz, Transmitter Mask



Figure 29 - 860.000 MHz, Transmitter Mask





#### Figure 30 - 868.975 MHz, Transmitter Mask



Figure 31 - 851.025 MHz, 9 kHz to 150 kHz



Spect Swep	rum Anal t SA	yzer 1		Spectrum Analyzer 2 Swept SA	<b>, +</b>						<b>‡</b>	Marker	- * 崇
KEY	Sight	Input: I Couplin Align: A	RF ng: DC Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Ext (S) NFE: Adaptive	Atten: 6 dB Preamp: Off	PNO: Bes Gate: Off IF Gain: L Sig Track	st Wide .ow : Off	#Avg Type: Lo Trig: Free Rur	ng-Power	123456 M <del>WWWW</del> M PNNNNP	Select Mar Marker 1	ker	
1 Spe	ctrum		v	F	Ref LvI Offset 3	0.90 dB		Mkr1 15.768 kHz			Marker Frequency 15.768 kHz		Settings
Scale Log	/Div 10 (	B		F	Ref Level 10.00 dBm			-48.16		8.16 dBm	Peak Search		Peak Search
-10.0 -20.0										DL1-13.00 dBm	Nex	t Peak	Pk Search Config
-30.0 -40.0	1										Next I	Pk Right	Properties
-50.0 -60.0	m	~~~~	~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	^						Next	Pk Left	Marker Function
-70.0 -80.0						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	warne of the second		مەر بىيەل، رامولىرو	m	Minim	um Peak	Marker→
Start #Res	9.00 kHz BW 1.0 I	Hz			#Video BW 3.	0 kHz		Swe	Stop ep 1.00 m	o 150.00 kHz Is (1001 pts)	Pk-Pk	Search	Counter
5 Mar	ker Table		v								Mark	er Delta	
1	Mode N	Trace	Scale f	e X 15.768 kHz	Y -48.16 dBm	Function	Fu	Inction Width	Funct	on Value	Mki	·→CF	
23											Mkr–	Ref Lvl	
4 5 6											Continuou Search On	s Peak	
	5	2		2 Dec 10, 2019 5:45:02 PM		oupled					Off		

Figure 32 - 860.000 MHz, 9 kHz to 150 kHz



Figure 33 - 868.975 MHz - 9 kHz to 150 kHz



Spect Swep	rum Anai t SA	lyzer 1		Spectrum Analyzer 2 Swept SA	<b>+</b>						<b>Ç</b>	Marker	- " 影
KEY	isight Sight	Input: Coupli Align:	RF ing: DC Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Ext (S) NFE: Adaptive	Atten: 6 dB Preamp: Off	PNO: Best Gate: Off IF Gain: Lo Sig Track: (	Wide w Off	#Avg Type: Lo Trig: Free Rur	ng-Power 1	123456 MWWWWM PNNNNP	Select Mar Marker 1	ker	
1 Spe	ctrum		T	F	Ref LvI Offset 30.90 dB Mkr1 150.00 kH		50.00 kHz	Marker Fr 150.000 k	equency (Hz	Settings			
Scale Log	e/Div 10	dB		F			0.63 dBm	Peak	Search	Peak Search			
-10.0 -20.0										DL1-13.00 dBm	Nex	t Peak	Pk Search Config
-30.0 -40.0											Next	Pk Right	Properties
-50.0 -60.0	1-	~~~	~~~~			~~~~	~~~			Next	Pk Left	Marker Function	
-70.0 -80.0									~~~~~		Minim	um Peak	Marker→
Start #Res	0.1500 N BW 10 F	MHz (Hz			#Video BW 30	) kHz		Swe	Sto ep 1.00	p 1.0000 MHz ms (1001 pts)	Pk-Pł	Search	Counter
5 Mai	ker Table		v								Mark	er Delta	
1	Mode N	Trace	Scale	e X 150.00 kHz	Y -60.63 dBm	Function	Fu	nction Width	Fund	tion Value	Mk	r→CF	
2 3											Mkr–	→Ref Lvl	
4											Continuou Search	is Peak	
•				Dec 10, 2019							On Off		
	<u>)</u>	( ]		5:41:50 PM		upled							

Figure 34 - 851.025 MHz, 150 kHz to 1 MHz



Figure 35 - 860.000 MHz, 150 kHz to 1 MHz



Spect Swept	rum Anal <u>y</u> t SA	yzer 1		Spectrum Analyzer 2 Swept SA	· +					<b>‡</b>	Marker	- * 崇
KEY	Sight	Input: I Couplin Align: /	RF ng: DC Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Ext (S) NFE: Adaptive	Atten: 6 dB Preamp: Off	PNO: Best V Gate: Off IF Gain: Low Sig Track: O	Vide #Avg T Trig: F ff	ype: Log ree Run	Power 123456	Select Marke Marker 1	er	
1 Spe	ctrum		Ref LvI Offset 30.90 dB			Mkr1 181.45 kHz		Marker Frequency 181.450 kHz		Settings		
Scale Log	/Div 10 d	B		F	lef Level 10.00	dBm			-61.88 dBm	Peak S	earch	Peak Search
-10.0 -20.0									DL1 -13.00 dBm	Next F	Peak	Pk Search Config
-30.0 -40.0										Next Pk	Right	Properties
-50.0 -60.0	1	~~~^	~~~~					~~~~~		Next P	k Left	Marker Function
-70.0 -80.0										Minimur	n Peak	Marker→
Start #Res	0.1500 M BW 10 k	Hz Hz			#Video BW 30	kHz		Sweep	Stop 1.0000 MHz 1.00 ms (1001 pts)	Pk-Pk S	Search	Counter
5 Marl	ker Table		v							Marker	Delta	
1	Mode N	Trace 1	Scale f	e X 181.45 kHz	Y -61.88 dBm	Function	Function \	Vidth	Function Value	Mkr–	→CF	
2 3										Mkr→F	Ref Lvl	
5 6										Continuous Search	Peak	
	5	6		Pec 10, 2019 5:42:49 PM		upled				Off		

Figure 36 - 868.975 MHz - 150 kHz to 1 MHz



Figure 37 - 851.025 MHz, 1 MHz to 30 MHz



Spectrum Ana Swept SA	ılyzer 1		Spectrum Analyzer 2 Swept SA	<b>+</b>						\$	Marker	- * 崇
	Input: RF Coupling: Align: Aut	DC o	Input Z: 50 Ω Corrections: Off Freq Ref: Ext (S) NFF: Adaptive	Atten: 20 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Lo Sig Track	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off		g-Power	123456 MWWWWM PNNNNP	Select Mark Marker 1	ker	
1 Spectrum	•		R	Ref LvI Offset 30.90 dB			Mkr1 27.477 M		.477 MHz	Marker Fre 27.477000	quency ) MHz	Settings
Scale/Div 10	dB		<b>F</b>	tef Level 40.00	dBm			-4	3.38 aBm	Peak	Search	Peak Search
20.0										Next	Peak	Pk Search Config
0.00									DL1 13.00 dBm	Next F	Pk Right	Properties
-20.0										Next	Pk Left	Marker Function
-40.0 -50.0	varenalitaren d	Laytern	washersthered and a superior		ont have not a start	<sub>يول</sub> يسي, لرو	an a	ا <sup>ر</sup> ویکھی اور	mularstrender	Minimu	ım Peak	Marker $\rightarrow$
Start 1.00 MH #Res BW 30	lz kHz			#Video BW 100	) kHz		Swee	Sto Stop 1.00 r	op 30.00 MHz ns (1001 pts)	Pk-Pk	Search	Counter
5 Marker Table	· · · ·									Marke	er Delta	
Mode 1 N	Trace S	icale f	X 27.477 MHz	Y -43.38 dBm	Function	Fu	Inction Width	Func	tion Value	Mkr	→CF	
2 3 4										Mkr→	Ref Lvl	
5 6										Continuou: Search On	s Peak	
<b>4</b> 5	2		Dec 10, 2019 5:19:01 PM		upled					Off		

#### Figure 38 - 860.000 MHz, 1 MHz to 30 MHz



Figure 39 - 868.975 MHz - 1 MHz to 30 MHz



Spectrum Anal Swept SA	yzer 1		Spectrum Analyzer 2 Swept SA	<b>+</b>						₽	Marker	- * 崇
	Input: RF Coupling Align: Au	= J: AC Jto	Input Ζ: 50 Ω Corrections: Off Freq Ref: Ext (S) NEF: Adaptive	Atten: 20 dB Preamp: Off	PNO: Gate: IF Gai Sin Tra	Fast Off n: Low ack: Off	#Avg Type: Lu Trig: Free Ru	og-Power n	123456 MWWWWW PNNNNN	Select Mark Marker 2	ker	
1 Spectrum		v	F	Ref LvI Offset 30.90 dB			Mkr2 1.208		)8 73 GHz	Marker Frequency 1.208728448 GHz		Settings
Scale/Div 10	B			Ref Level 40.0	0 dBm			-2	7.10 aBm	Peak	Search	Peak Search
20.0										Next	Peak	Pk Search Config
0.00										Next F	Pk Right	Properties
-20.0	har and the			Last mart water	un magan sartabiladara.	2	-	***	romantana	Next Pk Left		Marker Function
-40.0										Minimu	ım Peak	Marker→
Start 0.0300 0 #Res BW 1.0	Hz MHz			#Video BW 3	.0 MHz		Swe	Sto ep 1.00 i	p 1.8000 GHz ns (1001 pts)	Pk-Pk	Search	Counter
5 Marker Table		v								Marke	er Delta	
Mode 1 N	Trace	Scale f	X 851.28 MHz	Y 36.92 dB	Functi m	on Fi	Inction Width	Fund	tion Value	Mkr	→CF	
2 N 3 4	1	T	1.208 /3 GHZ	-27.10 dB	m					Mkr→	Ref Lvl	
5										Continuous Search	s Peak	
	2		2 Dec 10, 2019 5:05:01 PM							Off		

Figure 40 - 851.025 MHz, 30 MHz to 1.8 GHz



Figure 41 - 860.000 MHz, 30 MHz to 1.8 GHz


Spectrum An Swept SA	alyzer 1	S S	pectrum Analyzer 2 wept SA	<b>+</b>					<b>‡</b>	Marker	▼ <mark>**</mark>
	T Input: RF Coupling: Align: Aut	AC lo	Input Ζ: 50 Ω Corrections: Off Freq Ref: Ext (S) NFE: Adaptive	Atten: 20 dB Preamp: Off	PNO: Gate: IF Gai Sig Tr	Fast Off n: Low ack: Off	#Avg Type: Lo Trig: Free Rur	0g-Power 123456 M₩₩₩₩₩ PNNNNP	Select Marker Marker 2		
1 Spectrum	, dP		F	Ref LvI Offset	30.90 dB		Mkr	2 1.107 64 GHz	Marker Frequ 1.107640086	iency 6 GHz	Settings
					авт			-27.00 0.011	Peak Se	arch	Search
20.0									Next Pe	eak	Pk Search Config
0.00								DL1 13.00 dBm	Next Pk	Right	Properties
-20.0	-			panglasahi int	el-hiliois-th-da	2 Jahoner Australia	alla contra torre al alla der	mater along of the second states	Next Pk	Left	Marker Function
-40.0 -50.0									Minimum	Peak	Marker→
Start 0.0300 #Res BW 1.0	GHz MHz			#Video BW 3	.0 MHz		Swe	Stop 1.8000 GHz ep 1.00 ms (1001 pts)	Pk-Pk Se	earch	Counter
5 Marker Tabl	e T								Marker [	Delta	
Mode 1 N	Trace S	Scale f	X 868.98 MHz	Y 36.75 dB	Funct	ion F	unction Width	Function Value	Mkr→	CF	
2 N 3 4			1.107 64 GHZ	-27.08 dB					Mkr→Re	ef Lvi	
5 6									Continuous P Search On	eak	
<b>1</b> 5	6		Dec 10, 2019 5:08:56 PM						Off		

Figure 42 - 868.975 MHz - 30 MHz to 1.8 GHz



Figure 43 - 851.025 MHz, 1.8 GHz to 6 GHz



Spectrum Anal Swept SA	yzer 1	Spectrum Analyzer 2 Swept SA	• +				Marker	۲ **
	' Input: RF Coupling: AC Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Ext (S)	Atten: 8 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Of	#Avg Type: Lo Trig: Free Run f	g-Power 123456 MWWWWW PNNNNN	Select Marker Marker 1	
1 Spectrum		n L. Aupuro	Ref LvI Offset 3	2.40 dB	Mk	r1 2.677 8 GHz	Marker Frequency 2.677800000 GHz	Settings
Scale/Div 10 c	B		Ref Level 30.00	dBm		-34.79 dBm	Peak Search	Peak Search
10.0							Next Peak	Pk Search Config
-10.0						DL1-13.00 dBm	Next Pk Right	Properties
-30.0 -40.0 +++++++++++++++++++++++++++++++++++	ي. مەرمەنىمالىدىن	and the second s	daren martingalatikan			مرور المرور ا	Next Pk Left	Marker Function
-50.0							Minimum Peak	Marker→
Start 1.800 GH #Res BW 1.0 I	lz /Hz		#Video BW 3.0	MHz	Swee	Stop 6.000 GHz p 7.00 ms (1001 pts)	Pk-Pk Search	Counter
5 Marker Table	v						Marker Delta	
Mode 1 N	Trace Sca 1 f	le X 2.677 8 GH:	Y z34.79 dBm	Function	Function Width	Function Value	Mkr→CF	
2 3							Mkr→Ref Lvl	
5							Continuous Peak Search	
<b>4</b> 7	6	Dec 10, 2019 4:40:13 PM	$\square$				Off	

Figure 44 - 860.000 MHz, 1.8 GHz to 6 GHz



Figure 45 - 868.975 MHz - 1.8 GHz to 6 GHz



Spectr Swept	um Anal SA	yzer 1		Spectrum Analyze Swept SA	r 2	• +						<b>‡</b>	Marker	7 柴
KEY	Sight	Input: RF Coupling Align: Au	= j: AC ito	Input Z: 50 Ω Corrections: C Freq Ref: Ext	Atter ff Prea (S)	n: 10 dB Imp: Off	PNO: F Gate: 0 IF Gair Sig Tra	ast Off Low	#Avg Type: Trig: Free I	Log-Power Run	123456 MWWWWW	Select Ma Marker 1	rker	•
1 Spec	trum	-	T	III E. Adapare	Ref Lv	I Offset 3	0.90 dB	UK. OII		Mkr1	9.088 GHz	Marker Fi 9.088000	requency 0000 GHz	Settings
Scale/	'Div 10 d	3B			Ref Le	vel 30.00	dBm			~	35.73 dBm	Peak	Search	Peak Search
10.0												Nex	kt Peak	Pk Search Config
-10.0 -20.0											OL1 -13.00 dBm	Next	Pk Right	Properties
-30.0 -40.0	llang <sup>h</sup> ar <sup>g</sup> hachta	hender vielen	18 April		enered gas		adaler and	mulliona		Jungton Commercy	وروسوفار فالقريقوسوسري	Next	t Pk Left	Marker Function
-50.0 -60.0												Minim	num Peak	Marker→
Start 6 #Res I	6.000 GH 3W 1.0 I	iz MHz			#Vid	eo BW 3.(	0 MHz		SI	Sto weep 6.67	op 10.000 GHz ms (1001 pts)	Pk-P	k Search	Counter
5 Mark	er Table		v									Mark	er Delta	
1	Mode N	Trace	Scale f	X 9.088 (	Hz -	Y 35.73 dBm	Function	n	Function Widt	h Fun	ction Value	Mł	rr→CF	
2												Mkr-	→Ref Lvl	
4 5 6												Continuo Search	us Peak	
	5			<b>?</b> Dec 10, 201	9	$\wedge$						Off		

#### Figure 46 - 851.025 MHz, 6 GHz to 10 GHz



Figure 47 - 860.000 MHz, 6 GHz to 10 GHz



Spectrum Analy: Swept SA	zer 1 Input: RF	Spectrum Analyzer 2 Swept SA	Atten: 10 dB	PNO <sup>:</sup> Fast	#Ava Type I a	a-Power	123456	Marker	<b>、</b> 崇
	Coupling: AC Align: Auto	Corrections: Off Freq Ref: Ext (S)	Preamp: Off	Gate: Off IF Gain: Low Sig Track: Off	Avg Hold:>100 Trig: Free Rur	)/100 )		Select Marker Marker 1	•
1 Spectrum	•	R	ef LvI Offset 3	0.90 dB	N	lkr1 9	.424 GHz	Marker Frequency 9.424000000 GHz	Settings
Scale/Div 10 dl	3	R	lef Level 30.00	dBm		-3	5.93 dBm	Peak Search	Peak Search
10.0								Next Peak	Pk Search Config
-10.0							DL1-13.00 dBm	Next Pk Right	Properties
-30.0 -40.0		Jan Mary and an and an and a star of the	*****	and the state of the second	وسليك والمراجع والمراجع والمراجع والمحافظ والمحافظ والمحافظ والمحافظ والمحافظ والمحافظ والمحافظ والمحافظ والمح		hagenter fra Planderse fra d	Next Pk Left	Marker Function
-50.0								Minimum Peak	Marker→
Start 6.000 GHz #Res BW 1.0 M	z Hz		#Video BW 3.0	) MHz	Swe	Stoj ep 6.67 r	p 10.000 GHz ns (1001 pts)	Pk-Pk Search	Counter
5 Marker Table	۲							Marker Delta	
Mode 1	Frace Scal	e X 9.424 GHz	Y -35.93 dBm	Function	Function Width	Func	tion ∨alue	Mkr→CF	
2								Mkr→Ref Lvl	
4 5 6								Continuous Peak Search On	
<b>1</b> 5		Pec 10, 2019 4:45:56 PM						Off	

Figure 48 - 868.975 MHz - 6 GHz to 10 GHz

# FCC 47 CFR Part 90, Limit Clause 90.210

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

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.



# 2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Multimeter	Fluke	75 Mk3	455	12	11-Oct-2020
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-Apr-2020
Hygromer	Rotronic	A1	2138	12	05-Mar-2020
Frequency Standard	Spectracom	SecureSync 1200- 0408-0601	4393	6	16-Apr-2020
1 metre K-Type Cable	Florida Labs	KMS-180SP-39.4- KMS	4520	12	12-Nov-2020
Quad Power Supply	Rohde & Schwarz	HMP4040	4955	-	O/P Mon
High Pass filter	Wainwright	WHKX12-1290- 1500-18000-80SS	4961	-	O/P Mon
EXA	Keysight Technologies	N9010B	4968	24	21-Dec-2019
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020
Electronic Calibration Module	Keysight Technologies	85093C	5188	12	21-May-2020

## Table 13

O/P Mon - Output Monitored using calibrated equipment



### 2.4 Frequency Stability

### 2.4.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.210 FCC 47 CFR Part 2, Clause 2.1055 Industry Canada RSS-119, Clause 5.3 ISEDC RSS-GEN, Clause 6.11

### 2.4.2 Equipment Under Test and Modification State

SC2028, S/N: 1PR001947GKE03R - Modification State 0

### 2.4.3 Date of Test

09-December-2019 to 13-December-2019

### 2.4.4 Test Method

This test was performed in accordance with ANSI C63.26, clause 5.6. and the requirements of FCC CFR 47 Part 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 2.1055, the temperature was varied from -20°C to +50° in 10° steps at nominal voltage and at 20 °C for both minimum and maximum voltage extremes.

### 2.4.5 Environmental Conditions

Ambient Temperature	22.5 - 23.5 °C
Relative Humidity	36.9 - 48.1 %



# 2.4.6 Test Results

TETRA 809 MHz to 824 MHz - Transmit High capacity battery

Voltage	Frequency Error (ppm)				
	806.025 MHz	815.000 MHz	823.975 MHz		
6.2 V DC	0.365	0.364	0.345		
7.4 V DC	0.360	0.367	0.341		

# Table 14 - Frequency Stability Under Voltage Variations

Temperature	Frequency Error (ppm)					
	806.025 MHz	815.000 MHz	823.975 MHz			
+50.0 °C	0.457	0.471	0.462			
+40.0 °C	0.476	0.456	0.482			
+30.0 °C	0.547	0.536	0.528			
+20.0 °C	0.521	0.558	0.530			
+10.0 °C	0.639	0.672	0.623			
0 °C	0.538	0.547	0.538			
-10.0 °C	0.563	0.540	0.566			
-20.0 °C	0.545	0.573	0.538			
-30.0 °C	0.191	0.172	0.174			

Table 15 - Frequency Stability Under Temperature Variations



Voltage	Frequency Error (ppm)				
	851.025 MHz	860.000 MHz	868.975 MHz		
6.2 V DC	0.356	0.383	0.342		
7.4 V DC	0.357	0.379	0.344		

# Table 16 - Frequency Stability Under Voltage Variations

Temperature	Frequency Error (ppm)					
	851.025 MHz	860.000 MHz	868.975 MHz			
+50.0 °C	0.463	0.463	0.457			
+40.0 °C	0.469	0.476	0.455			
+30.0 °C	0.541	0.531	0.518			
+20.0 °C	0.561	0.564	0.534			
+10.0 °C	0.629	0.626	0.632			
0 °C	0.535	0.545	0.539			
-10.0 °C	0.555	0.557	0.560			
-20.0 °C	0.549	0.545	0.499			
-30.0 °C	0.172	0.179	0.170			

### **Table 17 - Frequency Stability Under Temperature Variations**

# FCC 47 CFR Part 90, Limit Clause 90.213

806 to 809 MHz: 1.5 ppm 809 to 824 MHz: 2.5 ppm 851 to 854 MHz 1.5 ppm 854 to 869 MHz 2.5 ppm

### Industry Canada RSS-199, Limit Clause 5.3

2.5 ppm



# 2.4.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Multimeter	Fluke	75 Mk3	455	12	11-Oct-2020
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-Apr-2020
Hygromer	Rotronic	A1	2138	12	05-Mar-2020
Climatic Chamber	TAS	Micro 225	2892	-	O/P Mon
Thermocouple Thermometer	Fluke	51	3174	12	07-Feb-2020
Frequency Standard	Spectracom	SecureSync 1200- 0408-0601	4393	6	16-Apr-2020
1 metre K-Type Cable	Florida Labs	KMS-180SP-39.4- KMS	4520	12	12-Nov-2020
Quad Power Supply	Rohde & Schwarz	HMP4040	4955	-	O/P Mon
EXA	Keysight Technologies	N9010B	4968	24	21-Dec-2019
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020

# Table 18

O/P Mon - Output Monitored using calibrated equipment



## 2.5 Adjacent Channel Power

### 2.5.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.221

### 2.5.2 Equipment Under Test and Modification State

SC2028, S/N: 1PR001947GKE03R - Modification State 0

### 2.5.3 Date of Test

10-December-2019 to 11-December-2019

### 2.5.4 Test Method

The Adjacent Channel Power 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 measure the 3 channels below and above the carrier. The signal was averaged over 200 sweeps and measured using the Adjacent Channel Power function of the spectrum analyser. The traces were recorded.

### 2.5.5 Environmental Conditions

Ambient Temperature	22.2 - 22.3 °C
Relative Humidity	34.6 - 36.5 %

### 2.5.6 Test Results

TETRA 809 MHz to 824 MHz - Transmit High capacity battery

Offset (kHz)	Adjacent Channel Power (dB)						
	806.025 MHz	815.000 MHz	823.975 MHz				
-25	-59.96	-61.80	-61.82				
+25	-61.02	-61.93	-61.48				
-50	-68.96	-69.60	-69.33				
+50	-69.13	-69.55	-69.34				
-75	-74.89	-74.56	-74.24				
+75	-75.13	-74.78	-74.48				

Table 19 - Adjacent Channel Power



Keysight S	Spectrum Analyzer -	ACP								
<mark>IXI</mark> Contor	RF 50		Center	SENSE:EXT SOUR		ALIGN AUTO	10:50:52 AM	Dec 10, 2019		File
Center	PREAMP	NFE IFGain:L	ow #Atten	ree Run : 34 dB	Avg Hold	1: 200/200	Radio Devic	e: BTS	<u>7</u>	File
15 dB/div	Ref Offs Ref 55	et 31.6 dB .60 dBm							~	Explorer
40.6 25.6	-74.9 dBc	-69.0 dBc	-60.0 dBc	347 -	-61.0 dBc	-69.1 dBc	-75.1 dBc	•	Pa	age Setup
-4.40										
-49.4 -64.4					*********		~~~	RMS AVG		Print
Center 8 #Res BV	806.0250 MH N 100 Hz	1z	#\	/BW 1 kHz	D\\/	s	Span 20 weep FFT	0.0 kHz 58.37 s	٦	Restore Down
Carrier	Dower	Filter	Offect From		Lo	wer	Upper dBc dBm	Filtor		
1 34	4.656 dBm / 18	3.00 kHz -3 dB	25.00 kHz 50.00 kHz	18.00 kHz 18.00 kHz	-59.96 -68.96	-25.30 -61 -34.31 -69	.02 -26.36 .13 -34.48	-3 dB -3 dB		Minimize
			75.00 KHZ	18.00 KHZ	-74.89	-40.23 -75	.13 -40.47	-3 dB	×	Exit
MSG			L			STATUS	5		<u>l</u>	



Keysight S	Spectrum Analyzer - /	ACP											
<mark>(X)</mark> Conton	RF 50			Con	SENSE:	EXT SOU		ALIGN AU	JTO 1	0:51:38 AM	Dec 10, 2019	-	Frequency
Center	Freq 815.00	NFF		Trig	: Free Ru	in i	Avg He	old: 200/20	0	iulo stu. i	Te		
	PREAMP	IFGa	n:Low	#Att	en: 34 di	3			Ra	adio Devic	e: BTS		
	Paf Offe	at 31 6 dB										1	
15 dB/div	Ref 55	.60 dBm											
Log						-							
4U.b			61.8		34.6		61.0						Center Freq
25.6	-74.6	-69.6	dBc	-	aBm		dBc	-69	.6	-74.8		8	15.000000 MHz
10.6	dBc	dBc			eliphic teres	×~~		dBo	a 🛛	dBc			
-4.40				- /		٦.							
-19.4				11									
-34.4				1/									
40.4				$\mathcal{A}$		14					1		
-43.4											RMS AVO		
-64.4													
-79.4													
Centers	215 0000 MH									Enan 2(			
#Res BV	V 100 Hz	12			#VBW	1 kH:	7		Swe	ep FFT	58.37 s	11	CF Step
													20.000 KHZ Man
Total Ca	arrier Power	34.630 dBm/	18.00 kHz	2		ACP-	IBW					Auto	
	_						L	ower	L	lpper			
Carrier	Power	Filte	r Offse	et Fred	a Inte	eg BW	dBo	: dBm	dBc	dBm	Filter		Freq Offset
1 34	1.630 dBm / 18	3.00 kHz -3 dB	25.0	0 kHz	18	00 kHz	-61.80	-27.17	-61.93	-27.30	-3 dB		0 Hz
			50.0	0 kHz	18	.00 kHz	-69.60	-34.97	-69.55	-34.92	-3 dB	-	
			75.0	0 kHz	18	.00 kHz	-74.56	-39.93	-74.78	-40.15	-3 dB		
MSG			•					ST	TATUS			<u>.</u>	

Figure 50 - Adjacent Channel Power - 815.000 MHz



🔤 Keysight Sp	ectrum Analyzer - AC	CP											
	RF 50 Ω			Contr	SENSE:EX	T SOUR		ALIGN AUT	10 10	:52:28 AM [	Dec 10, 2019	F	requency
Center F	req 823.97			Trig:	Free Run	1	Avg Ho	d: 200/200	, na	ulo 3tu. 1	lone		
	PREAMP	IFGa	n:Low	#Atte	n: 34 dB				Ra	dio Devic	e: BTS		
	Paf Official	316 40											
15 dB/div	Ref 55.6	i0 dBm											
LOG 40.6				-		•							Contor From
25.0	+ +	·	-61.8	-1 h		1	-61.5		.    -		•		2 075000 MU
20.0	-74.2 dBc	-69.3 dBc	dBc				dBc	-69.3 dBc	3	-74.5 dBc		°2	3.975000 WHZ
10.6		ura.		1	tern dats soot	N.				- unit.			
-4.40				1		1							
-19.4													
-34.4						H							
-49.4				×									
-64.4											RMS AVG		
70.4													
-79.4													
Center 82	23.9750 MHz								5	Span 20	0.0 kHz		CE Sten
#Res BW	100 Hz			#	¢VB₩	1 kHz	:		Swee	ep FFT	58.37 s		20.000 kHz
Total Car	rrier Power	34.674 dBm	18.00 kHz	2		ACP-	IBW					Auto	Man
							L	ower	U	pper			
Carrier P	ower	Filte	r Offse	et Freq	Integ	, BW	dBc	dBm	dBc	dBm	Filter		Freq Offset
1 34.	674 dBm / 18.0	00 kHz -3 dB	25.0	0 kHz	18.0	0 kHz	-61.82	-27.15	-61.48	-26.80	-3 dB		0 Hz
			50.0	0 kHz	18.0	0 kHz	-69.33	-34.65	-69.34	-34.66	-3 dB		
			75.0	0 kHz	18.0	0 kHz	-74.24	-39.57	-74.48	-39.80	-3 dB		
MSG								ST	ATUS				
								017					

Figure 51 - Adjacent Channel Power - 823.975 MHz



Offset (kHz)	Adjacent Channel Power (dBc)						
	851.025 MHz	860.000 MHz	868.975 MHz				
-25	-60.95	-61.31	-61.75				
+25	-60.34	-60.52	-60.96				
-50	-68.62	-68.95	-69.16				
+50	-68.6	-68.76	-69.09				
-75	-73.77	-74.07	-74.17				
+75	-74.06	-74.07	-74.49				

# Table 20 - Adjacent Channel Power

🔤 Keysight S	Spectrum Analyzer - A	СР								- 6 ×
LXI	RF 50 S	2 DC		SENSE:EXT SOUR	CE OFF	ALIGN AUTO	10:49:43 AM	Dec 10, 2019	Free	uency
Center	Freq 851.02	5000 MHz	Cente	er Freq: 801.0200 Free Run	AvalHol	d· 200/200	Radio Std: P	lone		,,
	PREAMP	NFE IFGain:L	ow #Atte	n: 34 dB			Radio Devic	e: BTS		
15 dB/div	Ref Offse Ref 55.6	t 31.6 dB 60 dBm								
40.6				26					Cr	onter Fred
25.6			-61.8	dBm	-61.0	·		•	851.0	25000 MHz
10.0	-74.2 dBc	-69.2 dBc	dBc	handmarker	dBc	-69.1 dBc	-74.5 dBc		001.0	20000 1411 12
10.6			۳L							
-4.40				1						
-19.4										
-34.4										
-49.4				<u>`</u>						
-64.4								RMS AVG		
70.4										
-75.4										
Center 8	851.0250 MHz	z					Span 20	0.0 kHz		CE Stop
#Res BV	V 100 Hz		#	VBW 1 kHz		Sv	veep FFT	58.37 s		20.000 kHz
Total Ca	arrier Power	34.558 dBm/ 18	.00 kHz	ACP-I	BW				Auto	Man
					Lo	wer	Upper			
Carrier	Power	Filter	Offset Freq	Integ BW	dBc	dBm d	Bc dBm	Filter	Fi Fi	eq Offset
1 34	4.558 dBm / 18.0	00 kHz -3 dB	25.00 kHz	18.00 kHz	-61.75	-27.20 -60.9	96 -26.41	-3 dB		0 Hz
			50.00 kHz	18.00 kHz	-69.16	-34.60 -69.0	09 -34.53	-3 dB		
			75.00 kHz	18.00 kHz	-74.17	-39.61 -74.4	49 -39.93	-3 dB		
MSG			L			STATUS			<u> </u>	
						0.7100				

Figure 52 - Adjacent Channel Power - 851.025 MHz



Keysight Spectrum Analyzer - ACP							
	Conto	SENSE:EXT SOURC		IGN AUTO 1	0:48:09 AM De	c 10, 2019	Frequency
Center Fred 860.000000 MHz	Trig: I	Trig: Free Run Avg Hold: 200/200					
PREAMP IFG	ain:Low #Atter	n: 34 dB		Ra	idio Device	BTS	
Ref Offset 31.6 dB 15 dB/div <b>Ref 55.60 dBm</b>							
40.6	-	-24 /					Center Fred
25.6 74.4 50.0	-61.3	dBm	-60.5 +	000	·		860 000000 MHz
10.6 dBc dBc	dBc	handhunun	dBc	-68.8 dBc	-74.1 dBc		000.000000 11112
4.40	/ĭ						
10.4							
-13.4							
-34.4							
-49.4						RMS AVG	
-64.4							
-79.4							
Center 860.0000 MHz					Span 20	).0 kHz	0.5.01
#Res BW 100 Hz	#	VBW 1 kHz		Swe	ep FFT	100 ns	20.000 kHz
Total Carrier Power 34.443 dBn	n/ 18.00 kHz	ACP-II	зw				<u>Auto</u> Man
			Lowe	er U	nner		
Carrier Power Filt	er Offset Freq	Integ BW	dBc	dBm dBc	dBm	Filter	Freq Offset
1 34.443 dBm / 18.00 kHz -3 d	B 25.00 kHz	18.00 kHz	-61.31 -2	26.86 -60.52	-26.07	-3 dB	0 Hz
	50.00 kHz	18.00 kHz	-68.95 -3	34.51 -68.76	-34.31	-3 dB	
	75.00 kHz	18.00 kHz	-74.07 -3	39.63 -74.07	-39.62	-3 dB	
MSG				STATUS			





Figure 54 - Adjacent Channel Power - 868.975 MHz



## FCC Part 90, Limit Clause 90.221(c)

Frequency Offset	Maximum ACP (dBc) for devices ≤ 1W	Maximum ACP (dBc) for devices > 1W
25 kHz	-55	-55
50 kHz	-65	-65
75 kHz	-65	-70

# Table 21 - Adjacent Channel Power Limits

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

Industry Canada RSS-119

Not required for 806-824 and 851-870 MHz

## 2.5.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Multimeter	Fluke	75 Mk3	455	12	11-Oct-2020
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-Apr-2020
Hygromer	Rotronic	A1	2138	12	5-Mar-2020
Frequency Standard	Spectracom	SecureSync 1200- 0408-0601	4393	6	16-Apr-2020
1 metre K-Type Cable	Florida Labs	KMS-180SP-39.4- KMS	4520	12	12-Nov-2020
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	21-Oct-2020
Quad Power Supply	Rohde & Schwarz	HMP4040	4955	-	O/P Mon
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020

### Table 22

O/P Mon – Output Monitored using calibrated equipment



### 2.6 Types of Emissions

#### 2.6.1 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

### 2.6.2 Equipment Under Test and Modification State

SC2028, S/N: 1PR001947GKE03R - Modification State 0

#### 2.6.3 Date of Test

18-December-2019

#### 2.6.4 Test Method

This test was performed on middle frequency using a modulated carrier output from the EUT and measured on a spectrum analyser. The signal level was referenced to the power test measured in the anechoic chamber and offset in the spectrum analyser. 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 >1minute and the marker function of the spectrum analyser was used. The trace plots were recorded.

#### 2.6.5 Environmental Conditions

Ambient Temperature	23.4 - 24.2 °C
Relative Humidity	42.1 - 42.6 %

#### 2.6.6 Test Results

TETRA 809 MHz to 824 MHz - Transmit High capacity battery









Figure 56 - Burst Period



Figure 57 - Frequency Spectrum





Figure 58 - Burst Length



Figure 59 - Burst Period





Figure 60 - 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.



# 2.6.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 2.

Instrument	Manufacturer	Туре No	TE No	Calibration Period (months)	Calibration Due
Multimeter	Fluke	75 Mk3	455	12	11-Oct-2020
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	16-Apr-2020
Hygromer	Rotronic	A1	2138	12	05-Mar-2020
Frequency Standard	Spectracom	SecureSync 1200- 0408-0601	4393	6	16-Apr-2020
1 metre K-Type Cable	Florida Labs	KMS-180SP-39.4- KMS	4520	12	12-Nov-2020
Quad Power Supply	Rohde & Schwarz	HMP4040	4955	-	O/P Mon
EXA	Keysight Technologies	N9010B	4968	24	21-Dec-2019

## Table 23

O/P Mon – Output Monitored using calibrated equipment



### 2.7 Radiated Spurious Emissions

#### 2.7.1 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 ISEDC RSS-GEN, Clause 6.13

### 2.7.2 Equipment Under Test and Modification State

SC2028, S/N: 1PR001925GK63ZJ - Modification State 0

#### 2.7.3 Date of Test

17-December-2019

#### 2.7.4 Test Method

A preliminary profile of the Spurious Radiated Emissions was obtained up to the 10th harmonic by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber.

Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

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 -13dBm / 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

#### 2.7.5 Environmental Conditions

Ambient Temperature	18.5 °C
Relative Humidity	37.0 %

#### 2.7.6 Test Results

TETRA 809 MHz to 824 MHz - Transmit High capacity battery

Frequency (MHz)	Level (dBm)
*	

#### Table 24 - 806.025 MHz - Emissions Results









Figure 62 - 806.025 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation X









Figure 64 - 806.025 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation Y









Figure 66 - 806.025 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation Z



Frequency (MHz)	Level (dBm)
*	

### Table 25 - 815.000 MHz - Emissions Results

\*No emissions were detected within 10 dB of the limit.



Figure 67 - 815.000 MHz - 30 MHz to 10 GHz - Vertical, EUT Orientation X



Figure 68 - 815.000 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation X

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Figure 70 - 815.000 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation Y









Figure 72 - 815.000 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation Z



Frequency (MHz)	Level (dBm)
*	

### Table 26 - 815.000 MHz - Emissions Results



Figure 73 - 823.975 MHz - 30 MHz to 10 GHz - Vertical, EUT Orientation X



Figure 74 - 823.975 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation X









Figure 76 - 823.975 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation Y









Figure 78 - 823.975 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation Z



Frequency (MHz)	Level (dBm)
*	

# Table 27 - 851.025 MHz - Emissions Results



Figure 79 - 851.025 MHz - 30 MHz to 10 GHz - Vertical, EUT Orientation X









Figure 81 - 851.025 MHz - 30 MHz to 10 GHz - Vertical, EUT Orientation Y









Figure 83 - 851.025 MHz - 30 MHz to 10 GHz - Vertical, EUT Orientation Z









Frequency (MHz)	Level (dBm)
*	

### Table 28 - 860.000 MHz - Emissions Results



Figure 85 - 860.000 MHz - 30 MHz to 10 GHz - Vertical, EUT Orientation X



Figure 86 - 860.000 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation X









Figure 88 - 860.000 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation Y








Figure 90 - 860.000 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation Z



Frequency (MHz)	Level (dBm)
*	

### Table 29 - 860.000 MHz - Emissions Results

\*No emissions were detected within 10 dB of the limit.



Figure 91 - 868.975 MHz - 30 MHz to 10 GHz - Vertical, EUT Orientation X



Figure 92 - 868.975 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation X









Figure 94 - 868.975 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation Y









Figure 96 - 868.975 MHz - 30 MHz to 10 GHz - Horizontal, EUT Orientation Z



### FCC 47 CFR Part 90, Limit Clause 90.210

The EUT shall comply with emission mask B as per FCC 47 CFR Part 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.

### 2.7.7 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	-	TU
Antenna with permanent attenuator (Bilog)	Chase	CBL6143	2904	24	30-Sep-2021
Comb Generator	Schaffner	RSG1000	3034	-	TU
Cable 1503 2M 2.92(P)m 2.92(P)m	Rhophase	KPS-1503A-2000- KPS	4293	12	08-Nov-2020
Mast Controller	Maturo Gmbh	NCD	4810	-	TU
Tilt Antenna Mast	Maturo Gmbh	TAM 4.0-P	4811	-	TU
Double Ridge Broadband Horn Antenna	Schwarzbeck	BBHA 9120 B	4848	12	11-Mar-2020
High Pass filter	Wainwright	WHKX12-1290- 1500-18000-80SS	4961	-	O/P Mon
Hygrometer	Rotronic	HP21	4989	12	02-May-2020
Network Analyser	Keysight Technologies	E5063A	5018	12	20-May-2020
EmX Emissions Software	TUV SUD	EmX	5125	-	Software
8 Meter Cable	Teledyne	PR90-088-8MTR	5212	12	30-Aug-2020
EMI Test Receiver	Rohde & Schwarz	ESW44	5382	12	08-Oct-2020

### Table 30

O/P Mon – Output Monitored using calibrated equipment TU - Traceability Unscheduled



# 3 Photographs

### 3.1 Test Setup Photographs



Figure 97 – Radiated Emission Setup, EUT Orientation X





Figure 98 – Radiated Emission Setup, EUT Orientation Y





Figure 99 – Radiated Emission Setup, EUT Orientation Z



## 4 Measurement Uncertainty

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

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

### Table 31

### 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.