

Electromagnetic Compatibility Test Report

Test Report No: POT 160620 Issued on: June 16, 2020

Product Name Cellotrack Nano with MultiSense and Cellosense

> Tested According to RTCA/DO-160G Section 21

Tests Performed for

Pointer Telocation Ltd. 14 Hamelacha Street, Rosh-Ha'ayin 48091, Israel Tel: 972-3-5723111

QualiTech EMC Laboratory

30 Hasivim St, Petah-Tikva, 49517, Israel Tel: 972-3-926 8443 Fax: 972-3-928 7490





The information contained herein is the property of QualiTech, EMC Lab and is supplied without liability for errors or omissions.

The copyright for this document vests in QualiTech, EMC Lab. All rights reserved.

This Test Report may not be reproduced, by any method, without the written permission of the QualiTech, EMC Lab.

If and when such permission is granted, the report must be reproduced only in the full format.

Test Personnel

æb A

Tests Performed By: ------

Nissim Bitan Agi Yizhak

[3 hours **Report Prepared By:**

Bina Talkar

Rami Nal

Report Approved By: -----

Rami Nataf EMC Lab. Manager QualiTech EMC Laboratory



Test Report details:

Test commencement date:	08.06.2020
Test completion date:	08.06.2020
Customer's Representative:	Itamar Gohary
Issued on:	16.06.2020

Assessment information:

This report contains an assessment of the EUT against Electromagnetic Compatibility based upon tests carried out on the samples submitted. The results contained in this report relate only to the items tested. Manufactured products will not necessarily give identical results due to production and measurement tolerances. QualiTech, EMC Lab does not assume responsibility for any conclusion and generalization drawn from the test results with regards to other specimens or samples of type of the equipment represented by test item.

The EUT was set up and exercised using the configuration, modes of operation and arrangements defined in this report only.

Modifications:

Modifications made to the EUT
None

Modifications made to the Test Standard

None



Summary of Compliance Status

The EUT was tested according to the following test method. Test results are given in full in section 4.

Test method	Description of the Test Method/Requirement	Category	Test Results		
Section 21	Emission of Radio Frequency Energy				
Section 21	Radiated RF Emissions (100 MHz – 6 GHz)	Н	Pass		





Table of Contents

1.	APP	LICABLE DOCUMENTS:	.6
	1.1.	Referenced documents:	.6
2.	DES	CRIPTION OF THE EUT:	.7
	2.1.	General Description:	.7
	2.2.	EUT Configuration:	.7
	2.3.	EUT Cards/Modules List:	.8
	2.4.	Cables Identification:	.8
	2.5.	Clock Frequencies Table:	.8
3.	TEST	FFACILITY & UNCERTAINTY OF MEASUREMENT	.9
	3.1.	Accreditation/Registration reference:	.9
	3.2.	Test Facility description	.9
	3.3.	The measurement software used:	10
	3.4.	Uncertainty of Measurement:	10
4.	RAD	IATED EMISSIONS, ELECTRIC FIELD (100 MHZ – 6 GHZ)	11
5.	APP	ENDIX	25



1. Applicable Documents:

The following documents form a part of this procedure to the extent specified herein. Unless listed by date as of a particular issue, the issue in effect on the date of the test shall be applicable. In the event of conflict between documents referenced herein and the contents of this procedure, this procedure shall be a superseding requirement.

1.1. Referenced documents:

RTCA/DO-160G Environmental conditions and test procedures for airborne equipment



2. Description of the EUT:

General description of the EUT, configuration used for Emission and Immunity testing, and the method of performance verification were defined by the manufacturer. The acceptance performance criterion was declared by the manufacture.

2.1. General Description:

The CelloTrack Nano device provides precisely the knowledge to manage cargo and mobile assets effectively. It enables real-time as well as offline monitoring of the location and condition of cargo, assets and goods, including specific alerts related to issues and delays, using its internal sensors and the capability to track a wide area of remote wireless sensors MultiSenses and CelloSense around it

2.2. EUT Configuration:

EUT Configuration for Emissions Testing:





2.3. EUT Cards/Modules List:

No	Hardware Component Manufacturer's Catalog Number		Serial Number	Hardware Revision	Quantity
1	Cellotrack Nano	GC9771004-000	24435	В	1
2	MultiSense TH	715-50200	208880	D	1
3	CelloSense	715-50600	260000	А	1

2.4. Cables Identification:

Port/Line Name @ EUT	Туре	Indoor/ outdoor	Impedance [Ohm]	Typical Length [m]	Tested Length [m]	# of ports/ boards available	# of ports/ boards connected	From	То
Not applicable									

2.5. Clock Frequencies Table:

Frequency [MHz]	Location
16MHz	Cellotrack Nano micro processor



3. Test Facility & Uncertainty of Measurement

3.1. Accreditation/Registration reference:

- A2LA Certificate Number: 1633.01

3.2. Test Facility description

The tests were performed at the EMC Laboratory, QualiTech Division, ECI Telecom

Address: 30, Hasivim St., Petah Tikva, Israel. Tel: 972-3-926-6994

3m Anechoic Chamber:

Two 3m-screened chambers are used in two configurations: the semi-anechoic chamber for Radiated Emission measurements and the full-anechoic chamber for Radiated Immunity tests.

Semi Anechoic Configuration:

Measurement distance	3m
Chamber dimensions	9.5m x 6.5m x 5.2m
Antenna height	1 - 4m
Shielding Effectiveness	Magnetic field ≥80dB at 15 kHz ≥90dB at 100 kHz Electric field >120dB from 1MHz to 1GHz >110dB from 1GHz to 10GHz
Absorbing material	Ferrite tiles on the walls and ceiling Emerson and Cuming absorbing material in selected positions on the walls
Normalized Site Attenuation measured at 5 positions	±3.9dB, 30MHz to 200MHz ±3dB, 200MHz to 1000MHz
Transmission Loss measured at 5 positions, at 1.5m height	±3dB, 1GHz to 18GHz

Full-Anechoic Configuration:

Measurement distance	3m		
Chamber dimensions	7m x 4m x 3m		
Antenna height	1.55m at Horizontal & Vertical polarizations		
Shielding Effectiveness	Magnetic field ≥80dB at 15 kHz ≥90dB at 100 kHz Electric field >120dB from 1MHz to 1GHz >110dB from 1GHz to 10GHz		
Absorbing material	Ferrite tiles on the walls and ceiling Emerson and Cuming absorbing material in selected positions on the walls and floor		
Field Uniformity to EN61000-4-3	±3dB 80MHz to 18GHz		



3.3. The measurement software used:

Software Name	Software Version	
Test Software "TILE	Version 7.1.4.1	

3.4. Uncertainty of Measurement:

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements ". Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Test Name	Range	Expanded U lab Uncertainty	U CISPR Uncertainty
	30MHz-200MHz, Horizontal Polarization	$\pm 4.20 \text{ dB}$	±5.06
	30MHz-200MHz, Vertical Polarization	± 4.89 dB	±5.17
Dedicted Emission	200MHz-1000MHz, Horizontal Polarization	± 5.23 dB	±5.34
Kadiated Emission	200MHz-1000MHz, Vertical Polarization	± 629 dB	±6.32
	1.0GHz -6.0GHz	± 5.11 dB	±5.18
	6.0GHz-18.0GHz	± 5.17 dB	±5.48

Note: QualiTech EMC labs expanded measurement instrumentation has less uncertainty than the industry norm and compliance is deemed to occur as no measured disturbance exceeds the disturbance limit.

Note: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.



4. Radiated Emissions, Electric Field (100 MHz – 6 GHz)

Date of Test: 08.06.2020 Relative Humidity: 47% Ambient Temperature: 22.9 °C Atmospheric Pressure: 1011.4 hPa Test Engineer: Agi Yizhak

Test Method: RTCA/DO-160G, Section 21.5

Compliance Status: The EUT complies with the **Category H** requirements.

Requirements

The test shall be performed RTCA/DO-160G, Section 21.4. E-Field emissions shall not be radiated in excess of the applicable limit shown in **Figure 4.1**







The test procedures shall be as follows:

- 1. Maintain testing setup.
- 2. Turn on the measurement equipment and allow a sufficient time for stabilization
- 3. Verify that the ambient fields at least 6 dB below the specified limit. Take plots of the ambient fields.
- 4. EUT Testing: Perform the following test using the measuring system block diagram shown in Figures 4.2:
 - a) Turn on the EUT and allow a sufficient time for stabilization.
 - b) Scan the spectrum for each frequency range using the following settings:

Frequency range, MHz	NB Res. Bandwidth	NB Video Bandwidth	Minimum measurement time	Minimum Sweep time, s
100-200	10 kHz	30 kHz	1.5 s/MHz	12.5
200-400	10 kHz	30 kHz	1.5 s/MHz	12.5
400-960	100 kHz	300 kHz	0.15 s/MHz	120.0
960-6000	1 MHz	3 MHz	15 s/GHz	255.0

List of Test Equipment:

Measurement receiver Agilent E7405A

Data recording device

Antennas:

30~MHz to 200~MHz, Biconical, 137~cm tip to tip Schwarzbeck VHBB9124 w/BBA9106

200 MHz to 1 GHz, Double Ridged Horn, EMCO 3106

1 GHz – 6 GHz, Double Ridged Horn, A.R.A. DRG-118/A

Low Noise Amplifier 1 GHz – 6 GHz, MITEQ AMF-5D-010180-30-10P- GW

Test Results:

Table 4.1: Radiated emission ambient noise measurement results

Frequency, MHz	Antenna Polarization	Measured Level, dBµV/m	Limit, dBµV/m	Delta*, dB	Pass/Fail
Ambient noise was at least 10 dB below the limit.					Pass

*Delta = Measured Level - Limit

Table 4.2: Radiated emission test results: Receive mode

Frequency, MHz	Antenna Polarization	Measured Level, dBµV/m	Limit, dBµV/m	Delta*, dB	Pass/Fail
965	Н	39.03	45.5	5.47	Pass
961	V	40	45.5	5.5	Pass





Figure 4.2: Radiated Emissions, Electric Field



🔤 Key	sight Spect	rum An	alyzer - Swept SA								- 6 ×
L <mark>XI</mark>		RF	50 Ω DC	CORREC		SENSE:INT SOUR	ICE OFF 🔥 🛕	LIGN OFF	V-16	11:14:52	AM Jun 08, 2020
Mari PAS	ker 1 1 S	89. PR	EAMP	0 MHZ NFE	PNO: Fast 🕞 FGain:High	Trig: Free #Atten: 2 c	Run IB	Avg Type: Avg Hold: 8	voltage 1/100	T	DET P NNNN
										Mkr1 1	89.5 MHz
10 dE	3/div	Ref	68.99 dBµ'	V/m						6.662	dBµV/m
Log	Trace	1 Pa	ss								
59.0											
49.0											
39.0											
29.0											
19.0											
											,1
8.99							1 .				1
-1.01	ما بعد ا	t at the	ast hill late.	kalland tars				WWW W	. And the state of	, Mind Million of	碱碱酸碱酶
	i i i fili i i i i i i i i i i i i i i i	ri mir	Mahala	u dhinan a Ailin d	e Abdille an Analy	Alla, Casta Inti	l na dd fana wle	վերեւ երել եր	Ma Akabaran Jara	a na Trei	1 I IV.
-11.0											
-21.0											
Start #Res	t 100.0 s BW_0	0 MH CISP	IZ R) 9 kHz		#VE	W 30 kHz			#Swe	Stop 2 ep 12.50 s	00.00 MHz (1001 pts)
MSG								STATUS		op 12.00 3	(noor proj

Plot 4.1: RE ambient noise within 100 - 200 MHz, vertical polarization

Display line is Limit

Plot 4.2: RE test results within 100 – 200 MHz, vertical polarization

🚾 Kej	ysight Spect	rum Ar	nalyzer - Swept SA								- 6 ×
Mar	ker 1 1	RF 020	50 Ω DC			SENSE:INT SOUR	RCE OFF A	LIGN OFF Ava Type:	Voltage	11:18:31 TR	AM Jun 08, 2020
PAS	S			NFE	PNO: Fast G	Trig: Free	Run	Avg Hold: 4	/100	1	
		PF	REAMP		-Gain:High	#Atten: 2 t	10			Miged 4	02.0 MH-
10 de	Idiu	Dof	69 00 dBu	Vino						6.528	dBuV/m
Log	Trace	1 Da	00.99 UDµ			<u> </u>					
	nace	11.6	33								
59.0											
49.0											
20.0											
39.0											
29 N											
20.0											
19.0											
8.99											
							ىلىرى.	1.1.		6. a. 1 8. Bu	Juli, and
-1.01	a.h. h. h. h.	uad	with him in	LIG. CANALAS A	adika ta dahih	. Indiliter and	Nature NY	Martinium	anti la fili dati	网络网络	MPMAL AN
	i wayini	r W I	water in the second	MAN A DAY	haha é téréné	o Alfal at Hiller IV Ive	անուցից երութ ։	a d in 10 - 36	L. wets .	1.6.4.4.4.	
-11.0											
-21.0											
Star	t 100.0	0 MI	IZ				^			Stop 2	00.00 MHz
#Re	s BW (O	151	R) 9 kHz		#VI	SW 30 KHz			#Swe	ep 12.50 s	(1001 pts)

Display line is Limit



- Ke	ysight Spec	trum Ar	nalyzer - Swept SA								
Swe	ep Tir	_{RF} ne 1	2.5 s	CORREC		SENSE:INT SOUR	CE OFF 🔼 A	Avg Type:	Voltage	11:10:22 TR	AM Jun 08, 2020 ACE 1 2 3 4 5 6
PAS	SS	PF	REAMP	NFE I	PNO:Fast 🕞 Gain:High	Trig: Free #Atten: 2 d	Run IB	Avg Hold:	14/100	Т	
										Mkr1 1	08.2 MHz
10 di	B/div	Ref	68.99 dBµ'	V/m						-1.820	dBµV/m
LOg	Trace	1 Pa	ss			Ì					
59.0	<u> </u>										
49.0		_1									
39.0											
29.0	<u> </u>					<u> </u>					
10.0											
19.0											
8.99	<u> </u>										
		<u>_1</u>		1. U.S.		انت با		and a data	a lakin, ha	ามปล่อ ได้เห	hild a balling by
-1.01	MAN	tγγ∧t	vill of through	in the second second	haller (1444)	al an	thread Andrea	a waa ahaa h	alla di na malalala	hand also with a d	And A DI AND
-11 0				1							
11.0											
-21.0		_									
Star	t 100.0	0 MI	lz							Stop 2	00.00 MHz
#Re	s BW (JISP	R)9 kHz		#VE	SW 30 kHz			#Swe	ep 12.50 s	(1001 pts)
MSG								STATUS			

Plot 4.3: RE ambient noise within 100 – 200 MHz, horizontal polarization

Display line is Limit

Plot 4.4: RE test results within 100 – 200 MHz, horizontal polarization





Key	ysight Spec	trum An	alyzer - Swept SA								- 5 ×
L <mark>XI</mark>		RF	50 Ω DC	CORREC		SENSE:INT SOUR	RCE OFF 🛛 🛕 A	LIGN OFF		11:44:56	AM Jun 08, 2020
Mar PAS	ker 1 : S	202.(PR	00000000	0 MHz	PNO: Fast 🕞 FGain:High	⊃ Trig: Free #Atten: 2 c	Run IB	Avg Type: Avg Hold: 4	Voltage //100	TR T	ACE 1 2 3 4 5 6 YPE MWWWW DET P NNNN
										Mkr1 2	02.0 MHz
10 dE	3/div	Ref	68.99 dBµ	V/m						9.323	dBµV/m
Log	Trace	1 Pa	SS				Í .				
59.0											
49.0											
39 N											
00.0											
29.0											
19.0	. 1										
8.99	• '										
	Windley	ett la	h Monton a data	di stasta	المار المراجع		Akaka Internet	a silatud ta a	dalahis Hawa	ակի միսիա	Al Andrew Mark
-1.01		Jan 41	and Nahihwalaw	ut and the state		+AMANA ANA ANA ANA ANA ANA ANA ANA ANA AN	a Managara Ma	WALMER AND A	ladi da Militada	u w più	al haad beer het.
-11.U											
-21.0											
Star	t 200.0) MHz	2							Stop	400.0 MHz
#Re	s BW (CISP	R)9 kHz		#VE	3W 30 kHz			#Swe	ep 12.50 s	(1001 pts)
MSG								STATUS			

Plot 4.5: RE ambient noise within 200 – 400 MHz, vertical polarization

Display line is Limit

Plot 4.6: RE test results within 200 – 400 MHz, vertical polarization





🔤 Kej	ysight Spect	rum Anal	lyzer - Swept SA								- 6 ×
L <mark>XI</mark>		RF	50 Ω DC	CORREC		SENSE:INT SOUR	RCE OFF 🔥 🔥 A	LIGN OFF		11:41:12	AM Jun 08, 2020
Mar PAS	ker 1 3 S	92.00 PRE	0000000 Amp	0 MHz	PNO:Fast 🕞 FGain:High	Trig: Free #Atten: 2 c	Run IB	Avg Type: Avg Hold: 2	Voltage /100	TR	ACE 123456 TYPE MWWWW DET PNNNNN
										Mkr1 3	92.0 MHz
10 dE	3/div	Ref 6	8.99 dBµ'	V/m						9.126	dBµV/m
Log	Trace	1 Pas	s								
59 N											
00.0											
49.0											
39.0											
29.0											
19.0											
0.00											♦ ¹
0.99	u lala ta	ասել.					1 .	i a lis	ound tot	tati s d	տ էս նաև
-1.01	Mundi	WW	i na an	a handlig	يليه ليحد بالأنبايه		the of Alesta	i ki ja karla	, MALANIA		
			d and tid	an handad ta th	AMI, AMIMM	Abdalli Alladi H	de likter in de der likte		d an air an an an air an ai	Lange of the	The strate
-11.0											
-21.0											
Star	t 200 <u>.0</u>	MHz		^						Stop	400.0 MHz
#Re	s BW (0	CISPR	k) 9 kHz		#VE	SW 30 kHz			#Swe	ep 12.50 s	(1001 pts)
MSG								STATUS			

Plot 4.7: RE ambient noise within 200 – 400 MHz, horizontal polarization

Display line is Limit

Plot 4.8: RE test results within 200 – 400 MHz, horizontal polarization





🔤 Kej	ysight Spec	trum Ana	lyzer - Swept SA								
(<u>))</u>		RF	50 Ω DC	CORREC		SENSE:INT SOUR	RCE OFF 🛛 🛕 A	LIGN OFF	Voltage	12:08:21	PM Jun 08, 2020
Mar PAS	ker 1 S	927.5 PRE	2000000 Amp	0 MHZ NFE	PNO: Fast C IFGain:High	Trig: Free #Atten: 2 d	Run IB	Avg Type: Avg Hold: 1	19/100	T	AGE 1 2 3 4 5 6 YPE MWWWW DET P NNNN
										Mkr1 92	7.52 MHz
10 dE	3/div	Ref 7	0.00 dBµ	V/m						27.982	dBµV/m
Log	Trace	1 Pas	s								
60.0											
50.0	<u> </u>										
40.0											
30.0											<mark>≬</mark> 1
00.0								L. B.L. I	البيارية	All Long taxed	e wood and
20.0	s an dt.	ul ul	New Automatic	n Mandulle	HALLAND	pt should be	ll for the second state of the	ANNA TANA	WALLAND AND A	heller have been a	ta hadha an allad ann
	ul Marilan a	. duk t	ten und leded	1 F W							
10.0											
0.00											
0.00											
-10.0											
-20.0											
Star	t 400.0	MHz	^							Stop	960.0 MHz
#Re	s BW (CISPR	l) 120 kH	z	#V	BW 3.0 MHz			#Swe	ep 8.500 s	(1001 pts)
MSG								STATUS			

Plot 4.9: RE ambient noise within 400 – 960 MHz, vertical polarization

Display line is Limit

Plot 4.10: RE test results within 400 – 960 MHz, vertical polarization





🔤 Kej	ysight Spec	trum Anal	yzer - Swept SA									- 6 ×
LXI		RF	50 Ω DC	CORREC		S	ENSE:INT SOUR	CE OFF 🔥	ALIGN OFF	Voltage	12:10:10 TR	PM Jun 08, 2020
PAS	Ker 1 S SS	PRE		NFE	PNO: Fast IFGain:High	₽	Trig: Free F #Atten: 2 d	Run B	Avg Hold: 2	2/100	T	YPE MWWWWW DET PNNNNN
40.15		D -6 7	0.00 -10-1	<i>fl=-</i>							Mkr1 943	3.20 MHz
Log	Braiv	Ref 7	υ.υυ αθμι	//m				/	1		20.011	abpenni
	Trace	1 Pas	s									
60.0	<u> </u>											
	L											
50.0												
40.0												
												_
30.0												\ 1
									1.	م ا ال ا	daa da	IL. Indian
20.0	. ut to	J. L.	المريد المراسل	a s dables	մեստեն	1 dill	itti Linak ükt	durthad the	h. Line Work		HAN HAN AN	H M M M M M
	N HIM	-₩U	WWW/WW	ahammin ma	all Market and a state	1.0.01	alahin L		11			
10.0	⊢-́											
0.00	<u> </u>											
-10.0												
-20.0												
Star	t 400.0	MHz							×		Stop	960.0 MHz
#Re	s BW (CISPR	l) 120 kHz	4	#	VBV	V 3.0 MHz			#Swe	ep 8.500 s	(1001 pts)
MSG									STATUS			

Plot 4.11: RE ambient noise within 400 – 960 MHz, horizontal polarization

Display line is Limit







🔤 Keysig	ht Spectrum Analyzer	- Swept SA							- 7 💌
<mark>(X)</mark> Morika	RF 1 001 620	50 Ω DC CORF	REC	SENSE:INT SOUR	CE OFF 🔥	ALIGN OFF	Voltage	12:59:25 TR	PMJun 08, 2020
PASS	PREAM	NFE P	PNO: Fast G	Trig: Free #Atten: 2 d	Run B	Avg Hold:	19/100	1	
								Mkr1 99	1.68 MHz
10 dB/c	liv Ref 70.0	10 dBµV/m						37.690	dBµV/m
T	race 1 Pass)					
60.0									
50.0									
50.0									
40.0							 •	1	
ل ا	W. And Alexand	Multon maked	here when which	have been the week	hainhallelle	how have the	Willow to West of	MAP HIP BROWN	Mary Mary
30.0	or the left reas			in an Irohad	ted ob et		de la se a		s distante des
20.0									
10.0									
0.00									
-10.0									
-20.0									
Start (#Res).96000 GHz 3W (CISPR)	MHz	#V	BW 3.0 MHz			#Swe	Stop 1.	00000 GHz
MSG						STATUS			(Later pro)

Plot 4.13: RE ambient noise within 960 – 1000 MHz, vertical polarization

Display line is Limit



- Kej	ysight Spec	trum An	alyzer - Swept SA								- 6 ×
Swe	ep Tir	ne 1.	50 Ω DC	CORREC		SENSE:INT SOUR	CEOFF A	Avg Type:	Voltage	12:54:05 TR	PMJun 08, 2020 ACE 1 2 3 4 5 6
PAS	SS	PR	EAMP	NFE	PNO: Fast 🖵 Gain:High	Trig: Free #Atten: 2 d	Run B	Avg Hold:>	100/100	I	
										Mkr1 924	4.72 MHz
10 de	B/div	Ref	70.00 dBµ'	V/m							dBµV/m
208	Trace	1 Pa	SS) i i i i i i i i i i i i i i i i i i i					
60.0											
50.0											
40.0	<u> </u>							,			
	y flake hered 1	(Per Tak	ana ana ana ana ana ana ang ang ang ang	Martinetary	-loollelyll-rates	halandanagalang	ala Manandra an	When returned from the	walding with	hard all the second and a second s	and the states of the second
30.0	⊨										
20.0											
20.0											
10.0											
0.00											
-10.0											
-20.0											
Star #Bo	t 0.960	100 G			#\/B	W 2 0 MHz			#Swo	Stop 1.	00000 GHz
#Re	5 DW (GISP			#VD	W J.O WIHZ			#SWE	ep 1.000 s	(1001 pts)

Display line is Limit



www. Keysight Spectrum Analyzer - Swept	SA				- 5 ×
LXI RF 50 Ω	DC CORREC	SENSE:INT SOUR	CE OFF ALIGN OFF	Voltage	12:57:56 PM Jun 08, 2020
PASS PREAMP	NFE PNO: IFGair	: Fast 😱 Trig: Free n:High #Atten: 2 d	Run Avg Hold: B	26/100	
				Mk	r1 980.16 MHz
10 dB/div Ref 70.00 dE	μV/m			3	7.468 dBµV/m
Trace 1 Pass					
60.0					
50.0					
40.0			1		
40.0	ليستعقبه الألبي والتر	Lata a distant II.	والمستعد الملاط المستعدان	والمتعادية المتعادية	والألفظ بنيو أربعته المالي
30.0	AM Anadros Matama	almad interaction additional Andrews	and the state of the	ALANNA WAARANA AAAA	an anthe anthe an Althouse and A
20.0					
10.0					
0.00					
-10.0					
20.0					
-20.0					
Start 0.96000 GHz #Res BW (CISPR) 1 MH	z	#VBW 3.0 MHz		#Sweep 1	top 1.00000 GHz 1.000 s (1001 pts)
MSG			STATUS		

Plot 4.15: RE ambient noise within 960 – 1000 MHz, horizontal polarization

Display line is Limit







🔤 Keysight Spe	ectrum Analyzer - Swept SA				- 6 -
L <mark>XI</mark>	RF 50 Ω DC CORR	EC	SENSE:INT SOURCE OFF	ALIGN OFF	01:27:08 PM Jun 08, 2020
Marker 1 PASS	4.840000000000 GH	PNO: Fast C IFGain:Low	Trig: Free Run Atten: 6 dB	Avg Type: Voltage	TRACE 1 2 3 4 5 6 TYPE WWWWWWW DET P N N N N N
10 dB/div	Ref 80.00 dBµV/m				Mkr1 4.840 GHz 42.80 dBµV/m
Trace	e 1 Pass				
70.0					
60.0					
50.0					
40.0					an up a dage a share and a prove all agenter for
المحمد الي	llowanton lallow - Jone lybelowalow	whallworkallow	W toget Warden de aler des d	And the her and provide the second	
30.0			1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		
20.0					
10.0					
0.00					
-10.0					
Start 1.00 Res BW (0	0 GHz CISPR) 1 MHz	#V	BW 3.0 MHz	#\$	Stop 6.000 GHz Sweep 90.00 s (1001 pts)
MSG				STATUS	

Plot 4.17: RE ambient noise within 1000 – 6000 MHz, vertical polarization





Photograph 4.1: RE Antenna positioning, Biconical antenna 100MHz – 200MHz

Photograph 4.2: RE Antenna positioning, Horn antenna, 200MHz – 1GHz









Photograph 4.3: RE Antenna positioning, Horn antenna, 1GHz – 6GHz



5. Appendix

Appendix A: Per customer's request, EUT was tested in Transmit mode, Frequency Transmit mode 1.95 GHz DL BS, 2.140GHz UP BS. Test results as follows.

Frequency, GHz	Antenna Polarization	Measured Level, dBµV/m	Limit, dBµV/m	Delta*, dB	Pass/Fail
1.95	V	87.72	65	22.72	NA
3.9	V	64.38	69	-4.62	NA
1.95	Н	94.088	65	29.912	NA
3.9	Н	66.45	69	-2.55	NA
5.85	Н	74	73	1	NA

Radiated emission test results: Transmit mode

*Delta = Measured Level - Limit

RE test results within 1000 - 6000 MHz, vertical polarization



AF 50.0 DC COURC	SENSEDNE SOURCE OFF	A N TON OFF	01:42:55 PH 3th 00, 2020	Current Times 00.0 -	
r 1 5.850000000000 GHz	PN0: Fast Trig: Free Run IFGaln:Low #Atten: 20 dB	Avg Type: Voltage Avg/Hold: 5/100	TRACE 1 2.3.4.5.6 TVEC NAMES AND DET PINKING N	Sweep Time 30.0 S	PN0: Fast Trig: Free R IFiSain:Low #Atten: 20 d
Ref 97.00 dBuV/m			Mkr1 5.850 GHz 52.728 dBµV/m	10 dB/dky Ref 97.00 dB	μVim
				07.0	
				22.0	
				67.0	
_				G7.0	
			i	4.5	
			and the second second second second	37.0	
يها والمسرورية المراجع المعرف المراجع المعاري المعاري المعاري المعاري المعالية المراجع المعالية المراجع المعاري	ידי הגיגוי הייין אייין איי אייין אייין איי	formal fulling		and the strange to a strange	ومتارعي أأمن سوقة ومحادث ومرادية مدرارية مراري كرزه
				100	
				7.00	
.000 GHz			Stop 6.000 GHz	Start 1.000 GHz	
V (CISPR) 1 MHz	#VBW 3.0 MHz	#Sy/	eep 90.00 s (1001 pts)	Res BW (CISPR) 1 MHz	#VBW 3.0 MHz
IO Meak Hound		STATUS		V9G	

Stop 6.0 90.00 s (10



🚥 Key	ysight Spectrum Analyzer - Swept SA				- F ×		
LXI	RF 50Ω DC 0	CORREC	SENSE:INT SOURCE OFF	ALIGN OFF	02:18:54 PM Jun 08, 2020		
Mar	ker 1 5.05000000000000	PNO: Fast G IFGain:Low	Trig: Free Run #Atten: 20 dB	Avg Type: Voltage Avg Hold: 3/100	TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N		
					Mkr1 5.050 GHz		
10 dE	3/div Ref 97.00 dBµV/m				45. 109 uBµV/m		
Log							
87.0							
77.0							
67.0							
07.0		,					
57.0							
47.0					<u>1</u>		
					the second to share a bashowberry		
97.0				and the second	ng fil Name and And a star a shirt a subjective		
37.0	l,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	المراجع والمراجع المراجع		to and provide the second			
		^~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	ward work and a second and a	Al Augusta			
27.0							
17.0							
7.00							
7.00							
Star	Start 1 000 GHz Stop 6 000 GHz						
Res	BW (CISPR) 1 MHz	#V	BW 3.0 MHz	#	Sweep 90.00 s (1001 pts)		
MEG				STATUS			
mag				STATUS			

RE ambient noise within 1000 – 6000 MHz, horizontal polarization

Display line is Limit











Appendix B: Additional test photographs



Photograph 1:Auxiliary Set Up

Photograph 2:Cellular Base station





Appendix C: List of test equipment used

Description	Manufacturer	Model	Serial No.	Cal Due
EMC Analyzer	Agilent	E7405A	US41160436	04/09/2020
Current Probe	FCC	F-35A	44	10/10/2020
Biconical Antenna 30MHz to 300MHz	Schwarzbeck	VHBB 9124	9124-595	21/04/2022
Double Ridged antenna 200 MHz -1 GHz	EMCO	3106	62700	16/11/2020
Horn Antenna (EMM) 1-18GHz	A.R.A	DRG-118/A	17188	17/09/2020
Low-Noise Amplifier 1GHz to 18GHz	MITEQ	AMF-5D-010180-30- 10P-GW	618653	31/09/2020
LISN-Automotive	Schwarzbeck	NNBM 8124	8124-223	16/09/2020
LISN-Automotive	Schwarzbeck	NNBM 8124	8124-648	16/09/2020



Appendix D: Accreditation Certificate





End of the Test Report