

# FCC/ISED RF TEST REPORT



**Vista Labs**  
TEST • CERTIFY • COMPLY

Test Report Number.....	NSC-19112121-LC-FCC-IC
Applicant.....	<b>Nortek Security &amp; Control LLC/GTO Access</b>
Applicant Address.....	5919 Sea Otter Place, Carlsbad, CA 92010 USA
Product Name.....	Digital Keypad
Model Number.....	MMK100, MMK200
Family Product/Model.....	N/A
FCC ID.....	I6H-MMK100
ISED ID.....	21449-MMK00
Date of EUT received.....	11/20/2019
Date of Test.....	11/20/2019 – 11/26/2019
Report Issue Date.....	12/04/2019
Test Standards.....	<b>47CFR Part 15.231</b> <b>RSS-210 Issue 2.0: Feb 2017</b> <b>RSS-Gen Issue 9: Aug 2016</b>
Test Result.....	Pass

Issued By:

## Vista Laboratories

1261 Puerta Del Sol, San Clemente, CA 92673 USA

[www.vista-compliance.com](http://www.vista-compliance.com)

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report. This report is not to be reproduced by any means except in full and in any case not without the written approval of Vista Laboratories.

Tested by:

Bruce Li/Test Engineer

Approved By:

David Zhang/Technical Manager

<b>Report Number:</b>	NSC-19112121-LC-FCC-IC
<b>Product:</b>	Digital Keypad
<b>Model Number:</b>	MMK100, MMK200



# Laboratory Introduction

Vista Labs is an A2LA accredited 17025 compliant regulatory compliance testing laboratories (Cert. number: 4848-01) strategically located in Orange County, providing services in the electrical and telecommunication industries. Vista labs is also recognized testing facility for Australia (ACMA), Chinese Taipei (BSMI), Chinese Taipei (NCC), Hong Kong (OFCA), Israel (MOC), Korea (RRA), Singapore (IMDA), Vietnam (MIC), etc.

Our comprehensive testing services include safety testing, EMC emission and susceptibility testing, RF and wireless testing (including DFS).

As your partner, Vista investigates appropriate test standards, develops test plans, performs troubleshooting & failure analysis, reviews documentation, and provides test reports for a complete compliance testing and certification package.



**Accredited Laboratory**

A2LA has accredited

**VISTA LABORATORIES, INC.**  
San Clemente, CA

for technical competence in the field of

**Electrical Testing**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-IAC-IAF Communiqué dated April 2017).



Presented this 21<sup>st</sup> day of June 2018.



President and CEO  
For the Accreditation Council  
Certificate Number 4848.01  
Valid to July 31, 2020

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

## 17025 Product Testing Accreditation Certificate



**Accredited Product Certification Body**

A2LA has accredited

**VISTA LABORATORIES, INC.**  
San Clemente, CA

This product certification body is accredited in accordance with the recognized International Standard ISO/IEC 17065:2012 Requirements for bodies certifying products, processes and services. This product certification body also meets the A2LA R308 – Specific Requirements – ISO/IEC 17065 – Telecommunication Certification Body Accreditation Program and R322 – Specific Requirements – Notified Body Accreditation Requirements. This accreditation demonstrates technical competence for a defined scope and the operation of a management system.



Presented this 1<sup>st</sup> day of October 2018.



President and CEO  
For the Accreditation Council  
Certificate Number 4848.02  
Valid to July 31, 2020

For the product certification schemes to which this accreditation applies, please refer to the organization's Product Certification Scope of Accreditation.

## 17065 Product Certification Accreditation Certificate



Electromagnetic Compatibility  
Radio Frequency  
Product Certification  
International Approval

1261 Puerta Del Sol  
San Clemente, CA, 92673  
+1 (949) 393-1123  
[www.vista-compliance.com](http://www.vista-compliance.com)

<b>Report Number:</b>	NSC-19112121-LC-FCC-IC
<b>Product:</b>	Digital Keypad
<b>Model Number:</b>	MMK100, MMK200



**TABLE OF CONTENTS**

**1 GENERAL INFORMATION .....5**

1.1 Applicant .....5

1.2 Product information .....5

1.3 Test standard and method .....6

1.4 Test Purpose and statement .....6

**2 TEST SITE INFORMATION .....7**

**3 MODIFICATION OF EUT.....7**

**4 TEST CONFIGURATION AND OPERATION.....7**

4.1 EUT test configuration.....7

4.2 EUT test mode .....7

4.3 Supporting Equipment .....8

4.4 EUT setup diagram .....8

4.5 EUT operation .....8

4.6 Test software.....8

**5 EUT AND TEST SETUP PICTURES .....9**

5.1 EUT pictures .....9

5.2 EUT test setup pictures .....10

**6 TEST SUMMARY .....12**

**7 UNCERTAINTY OF MEASUREMENT .....13**

**8 TEST SUMMARY AND RESULT .....14**

8.1 Field Strength and Radiated Spurious Emissions into Restricted Frequency Bands .....14

**9 TEST INSTRUMENT LIST .....25**



**Report Number:** NSC-19112121-LC-FCC-IC  
**Product:** Digital Keypad  
**Model Number:** MMK100, MMK200



### REVISION HISTORY

Revision	Issue Date	Description	Note
Original	12/04/2019	Original release	N/A

<b>Report Number:</b>	NSC-19112121-LC-FCC-IC
<b>Product:</b>	Digital Keypad
<b>Model Number:</b>	MMK100, MMK200



## 1 General Information

### 1.1 Applicant

<b>Applicant:</b>	Nortek Security & Control LLC/GTO Access
<b>Applicant address:</b>	5919 Sea Otter Place, Carlsbad, CA 92010 USA
<b>Manufacturer:</b>	Nortek Security & Control LLC/GTO Access
<b>Manufacturer Address:</b>	5919 Sea Otter Place, Carlsbad, CA 92010 USA

### 1.2 Product information

<b>Product Name</b>	Digital Keypad
<b>Model Number</b>	MMK100, MMK200
<b>Family Model Number</b>	N/A
<b>Serial Number</b>	MD1907(MMK100), MD1906(MMK200)
<b>Frequency Band</b>	318MHz
<b>Type of modulation</b>	OOK
<b>Equipment Class/ Category</b>	DSC
<b>Maximum output power</b>	Field strength: - 73.0 dBuV/m (MMK100) at 3m distance - 72.7 dBuV/m (MMK200) at 3m distance
<b>Antenna Information</b>	Integral antenna
<b>Clock Frequencies</b>	N/A
<b>Port/Connectors</b>	N/A
<b>Input Power</b>	CR2032 Battery
<b>Power Adapter Manu/Model</b>	N/A
<b>Power Adapter SN</b>	N/A
<b>Hardware version</b>	N/A
<b>Software version</b>	N/A
<b>Simultaneous Transmission</b>	N/A
<b>Additional Info</b>	Testing is to support FCC/ISED C2PC due to hardware change described per associated C2PC request letter.

<b>Report Number:</b>	NSC-19112121-LC-FCC-IC
<b>Product:</b>	Digital Keypad
<b>Model Number:</b>	MMK100, MMK200



### 1.3 Test standard and method

<b>Test standard</b>	47CFR Part 15.231 RSS-210 Issue 2.0: Feb 2017 RSS-Gen Issue 9: Aug 2016
<b>Test method</b>	RSS-Gen Issue 9: Aug 2016 ANSI C63.10: 2013

### 1.4 Test Purpose and statement

The purpose of this test report is intended to demonstrate the compliance of product listed in section 1.2, received from company listed in section 1.1, to the requirements of standard and method listed in section 1.3. Based on our test results, we conclude that the product tested complies with the requirements of the standards indicated.

## 2 Test site information

<b>Lab performing tests</b>	<b>Vista Laboratories</b>
<b>Lab Address</b>	1261 Puerta Del Sol, San Clemente, CA 92673 USA
<b>Phone Number</b>	+1 (949) 393-1123
<b>Website</b>	www.Vista-compliance.com

Test condition	Test Engineer	Test Environment	Test Date
Radiated	David Zhang	23.0°C / 58.2%/1006 mbar	06/13/2019

## 3 Modification of EUT

The EUT is an engineering test sample loaded with RF test firmware specifically designed to support the RF TX/RX measurement in different aspects. No modification on the hardware.

## 4 Test configuration and operation

### 4.1 EUT test configuration

EUT is mounted onto a development board to support testing. A laptop with test software is used to send command to EUT. The test command is used to set EUT to different transmission mode in terms of radio mode bandwidth, power level, test channel, etc.

### 4.2 EUT test mode

Radio	Channel	Frequency (MHz)	Bandwidth (KHz)
LoRA	Low	902.3	125
LoRA	Mid	908.5	125
LoRA	High	914.9	125
LoRA	Low	903.0	500
LoRA	Mid	907.8	500
LoRA	High	914.2	500

### 4.3 Supporting Equipment

Index	Description	Model	S/N	Brand	Remark
-	-	-	-	-	-

### 4.4 EUT setup diagram



### 4.5 EUT operation

The control of EUT is test software on test laptop.

### 4.6 Test software

Index	Description	Remark
1	EMISoft Vasona 6.0049	EMC/Spurious emission test software used during testing

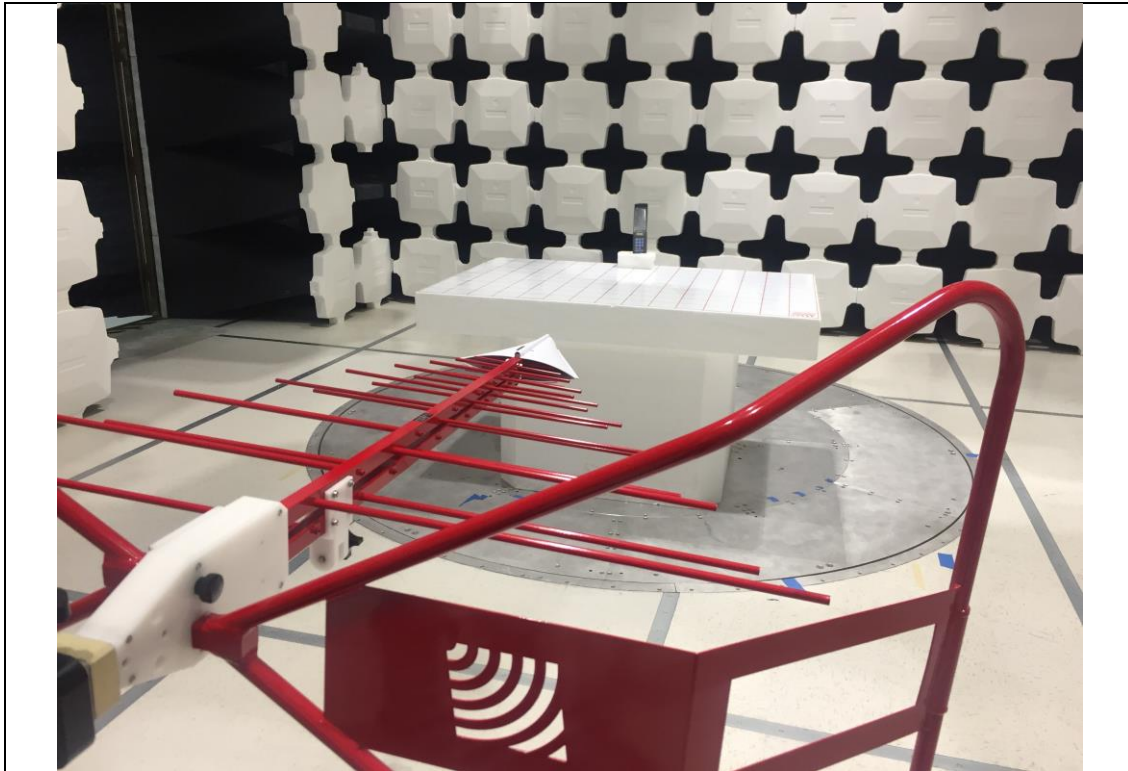


## 5 EUT and test setup pictures

### 5.1 EUT pictures

	
<p align="center"><b>EUT Top View – MMK100</b></p>	<p align="center"><b>EUT Bottom View – MMK100</b></p>
	
<p align="center"><b>EUT Top View – MMK200</b></p>	<p align="center"><b>EUT Bottom View – MMK200</b></p>

## 5.2 EUT test setup pictures



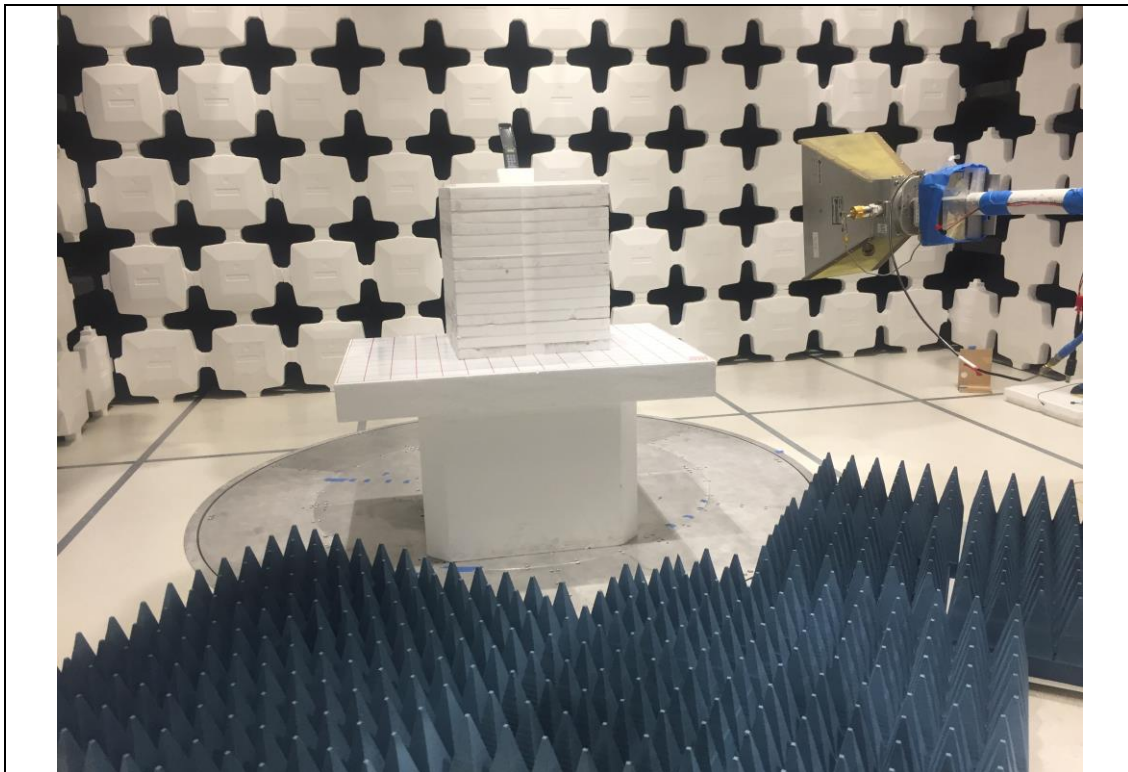
Radiated Emissions Below 1GHz setup – MMK100



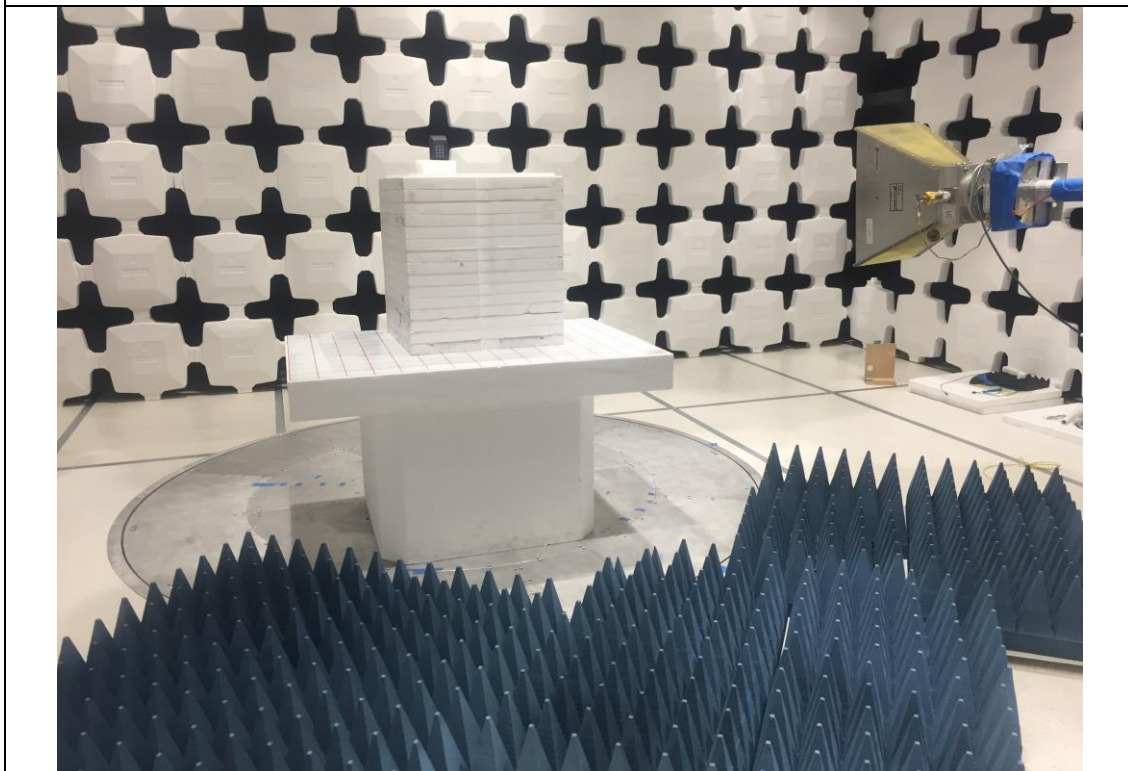
Radiated Emissions Below 1GHz setup – MMK200



<b>Report Number:</b>	NSC-19112121-LC-FCC-IC
<b>Product:</b>	Digital Keypad
<b>Model Number:</b>	MMK100, MMK200



**Radiated Emissions Above 1GHz setup – MMK100**



**Radiated Emissions Above 1GHz setup – MMK200**

**Report Number:** NSC-19112121-LC-FCC-IC  
**Product:** Digital Keypad  
**Model Number:** MMK100, MMK200



## 6 Test Summary

ISED Rules	ISED Rules	Test Item	Section	Verdict
§15.205, §15.209, §15.231 (b)	RSS-210 §4.3, §A1.2	Field strength & Unwanted Emissions into Restricted Frequency Bands	8.1	Pass

<b>Report Number:</b>	NSC-19112121-LC-FCC-IC
<b>Product:</b>	Digital Keypad
<b>Model Number:</b>	MMK100, MMK200



## 7 Uncertainty of Measurement

Test item	Measurement Uncertainty (dB)
RF Output Power (Conducted)	±1.2 dB
Power Spectral Density	±0.9 dB
Unwanted Emission (conducted)	±2.6 dB
Occupied Channel Bandwidth	±5 %
Radiated Emission (9KHz-30MHz)	±3.5 dB
Radiated Emission (30MHz-1GHz)	±4.6 dB
Radiated Emission (1-18GHz)	±4.9 dB
Radiated Emission (18-40GHz)	±3.5 dB

## 8 Test summary and result

### 8.1 Field Strength and Radiated Spurious Emissions into Restricted Frequency Bands

#### 8.1.1 Requirement

§15.205, §15.209, §15.231 (b)

RSS-210 §4.3, §A1.2

Per §15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	
13.36-13.41			

Per §15.231 (b), in addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1,250 to 3,750	125 to 375
174-260	3750	375
260-470	3,750 to 12,500	375 to 1,250
Above 470	12500	1250

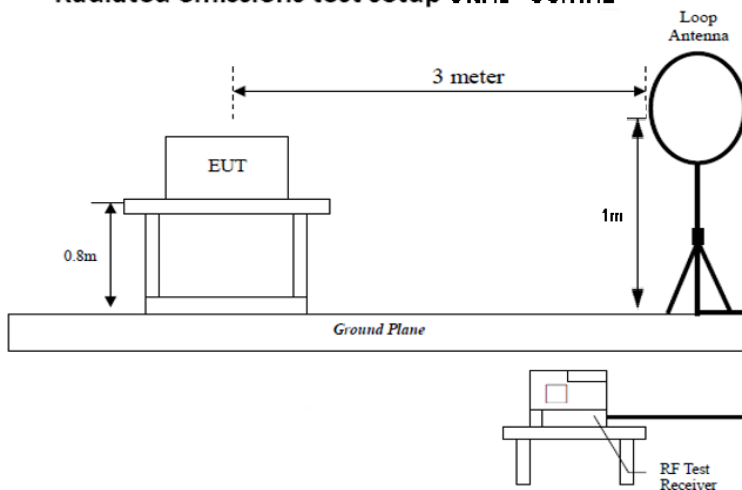
Note:

(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

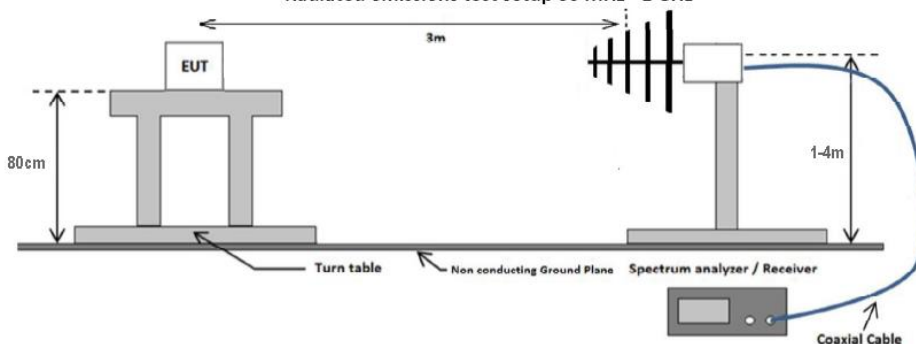
(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

### 8.1.2 Test setup

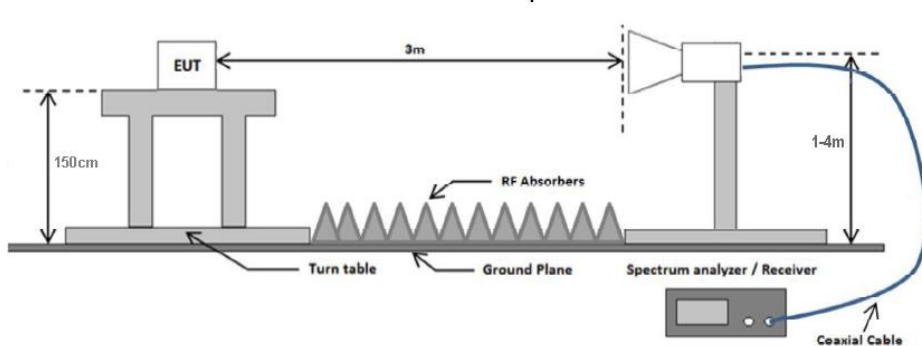
**Radiated emissions test setup 9KHz - 30MHz**



**Radiated emissions test setup 30 MHz - 1 GHz**



**Radiated emissions test setup above 1 GHz**



<b>Report Number:</b>	NSC-19112121-LC-FCC-IC
<b>Product:</b>	Digital Keypad
<b>Model Number:</b>	MMK100, MMK200



### 8.1.3 Test Procedure

According to subclause 6.4, 6.5, 6.6 and 7.6 in ANSI C63.10-2013 as well as the procedures for maximizing and measuring radiated emissions that are described in ANSI C63.10 was followed. Bore-sight antenna mast was used during the scanning to point to EUT to maximize the emission. The process will be repeated in 3 EUT orientations.

#### For general emission measurement:

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
  - a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
  - b. The EUT was then rotated to the direction that gave the maximum emission.
  - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 300 Hz for frequency below 150KHz.
4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10 kHz for frequency between 150KHz – 30MHz.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-Peak detection at frequency between 30MHz - 1GHz.
6. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak and average measurement at frequency above 1GHz.
7. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

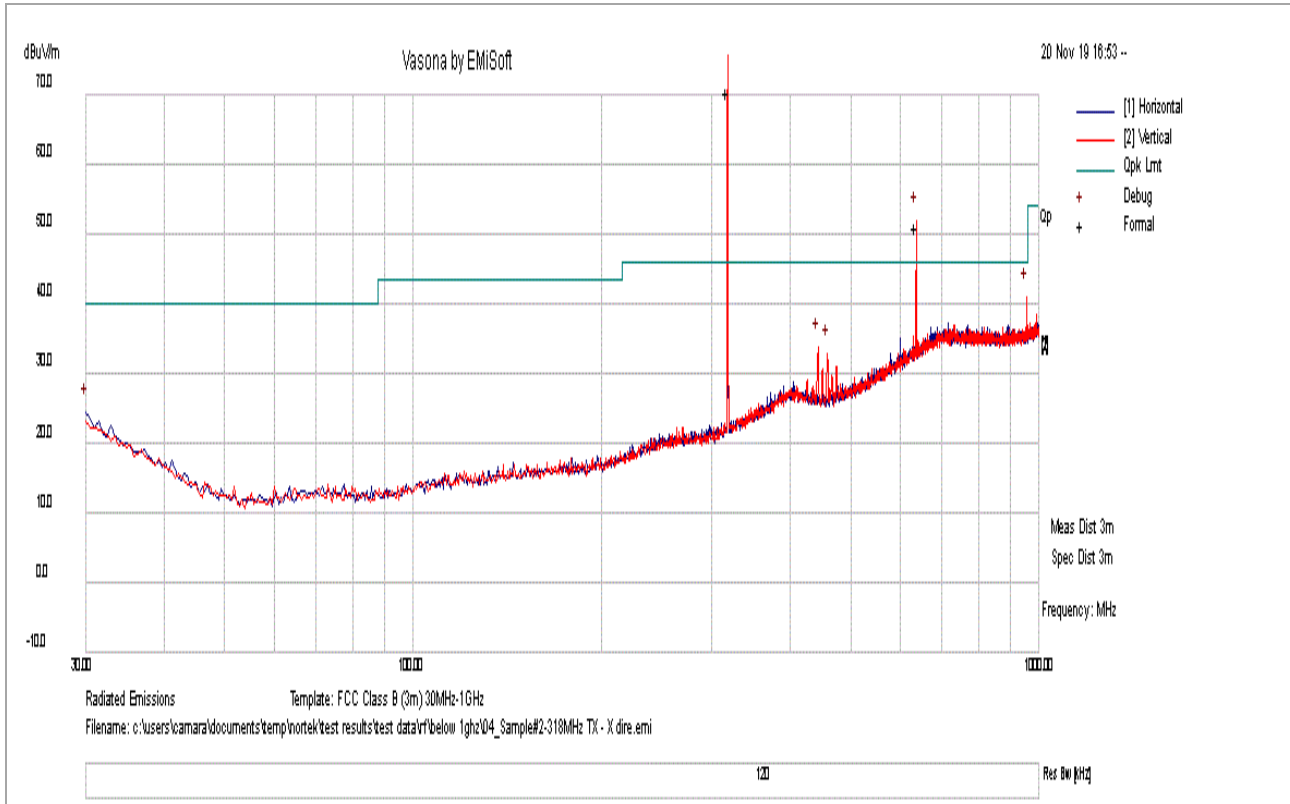
#### To Determination of spurious and fundamental emissions:

1. Identify the unlicensed wireless device fundamental frequency.
2. Verify that the fundamental does not fall in any restricted frequency bands
3. Note the field strength limit at 3 m, from the appropriate regulatory requirement for the fundamental frequency of the device.
4. Note the spurious emission limits at 3 m, from the appropriate regulatory requirement for spurious emissions from the device.
5. Measure the fundamental frequency of the device, and compute the average value of the emission using the appropriate duty cycle correction. Do the same for spurious emissions from the device.
6. Record the result.



8.1.4 Test Result

Test Standard:	47CFR 15.231, RSS-210	Mode:	MMK100
Frequency Range:	30-1000MHz	Test Date:	12/20/2019
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Bruce Li
Remark:	X orientation	Test Result:	Pass



Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table deg	Limit dBuV/m	Margin dB
318.024	87.5	5.8	-17.7	75.5	PK	H	100	349	95.8	-20.3
318.024	78.9	5.8	-17.7	66.9	AV	H	100	349	75.8	-8.9
636.04	52.3	7.2	-8.6	50.9	PK	V	100	310	75.8	-24.9
636.04	43.7	7.2	-8.6	42.3	AV	V	100	310	55.8	-13.5

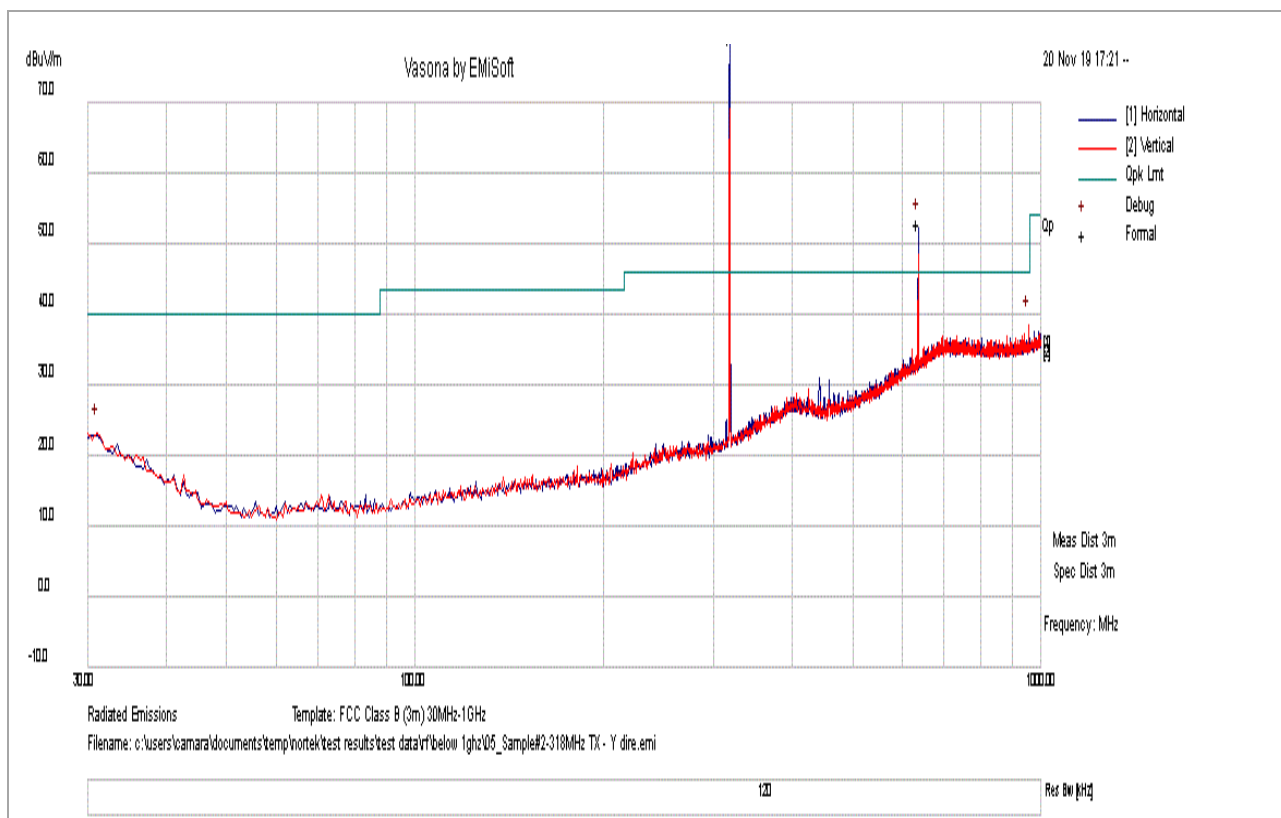
Duty cycle/average factor per original filing:

20 log (Actual On Time / Total Time)  
 20 log (36.75 / 100) = -8.6  
 Duty Cycle Correction Factor at least 8.6 dB

**Report Number:** NSC-19112121-LC-FCC-IC  
**Product:** Digital Keypad  
**Model Number:** MMK100, MMK200



<b>Test Standard:</b>	<b>47CFR 15.231, RSS-210</b>	<b>Mode:</b>	<b>MMK100</b>
<b>Frequency Range:</b>	<b>30-1000MHz</b>	<b>Test Date:</b>	<b>12/20/2019</b>
<b>Antenna Type/Polarity:</b>	<b>Bi-Log/Hor &amp; Ver</b>	<b>Test Personnel:</b>	<b>Bruce Li</b>
<b>Remark:</b>	<b>Y orientation</b>	<b>Test Result:</b>	<b>Pass</b>



Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table deg	Limit dBuV/m	Margin dB
318.024	91.5	5.8	-17.7	79.6	PK	H	107	360	95.8	-16.2
318.024	82.9	5.8	-17.7	71.0	AV	H	107	360	75.8	-4.8
636.047	54.3	7.2	-8.6	52.9	PK	H	108	0	75.8	-22.9
636.047	45.7	7.2	-8.6	44.3	AV	H	108	0	55.8	-11.5

Duty cycle/average factor per original filing:

$20 \log (\text{Actual On Time} / \text{Total Time})$   
 $20 \log (36.75 / 100) = -8.6$   
 Duty Cycle Correction Factor at least 8.6 dB



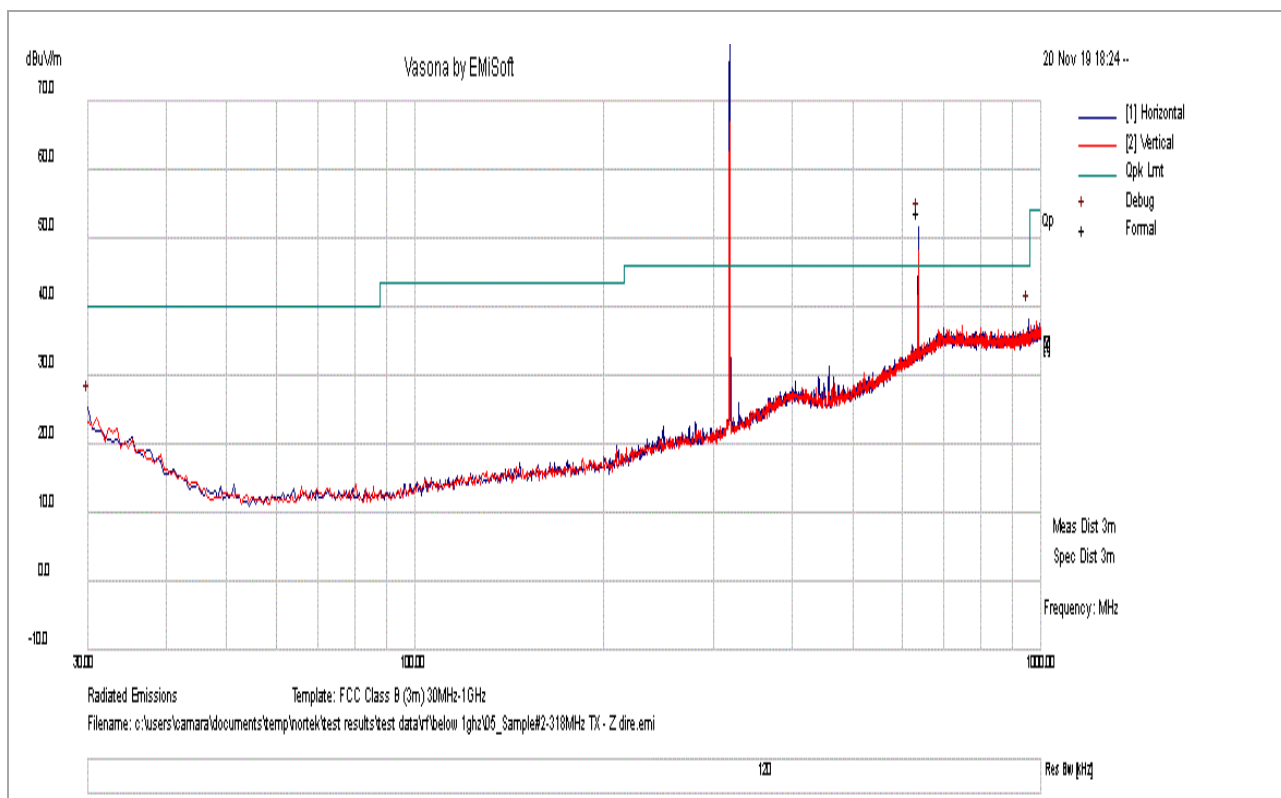
Electromagnetic Compatibility  
 Radio Frequency  
 Product Certification  
 International Approval

1261 Puerta Del Sol  
 San Clemente, CA, 92673  
 +1 (949) 393-1123  
[www.vista-compliance.com](http://www.vista-compliance.com)

Report Number: NSC-19112121-LC-FCC-IC  
 Product: Digital Keypad  
 Model Number: MMK100, MMK200



Test Standard:	47CFR 15.231, RSS-210	Mode:	MMK100
Frequency Range:	30-1000MHz	Test Date:	12/20/2019
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Bruce Li
Remark:	Z orientation	Test Result:	Pass



Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table deg	Limit dBuV/m	Margin dB
318.025	93.6	5.8	-17.7	81.6	PK	H	100	8	95.8	-14.2
318.025	85	5.8	-17.7	73	AV	H	100	8	75.8	-2.8
636.051	55.2	7.2	-8.6	53.9	PK	H	137	160	75.8	-21.9
636.051	46.6	7.2	-8.6	45.3	AV	H	137	160	55.8	-10.5

Duty cycle/average factor per original filing:

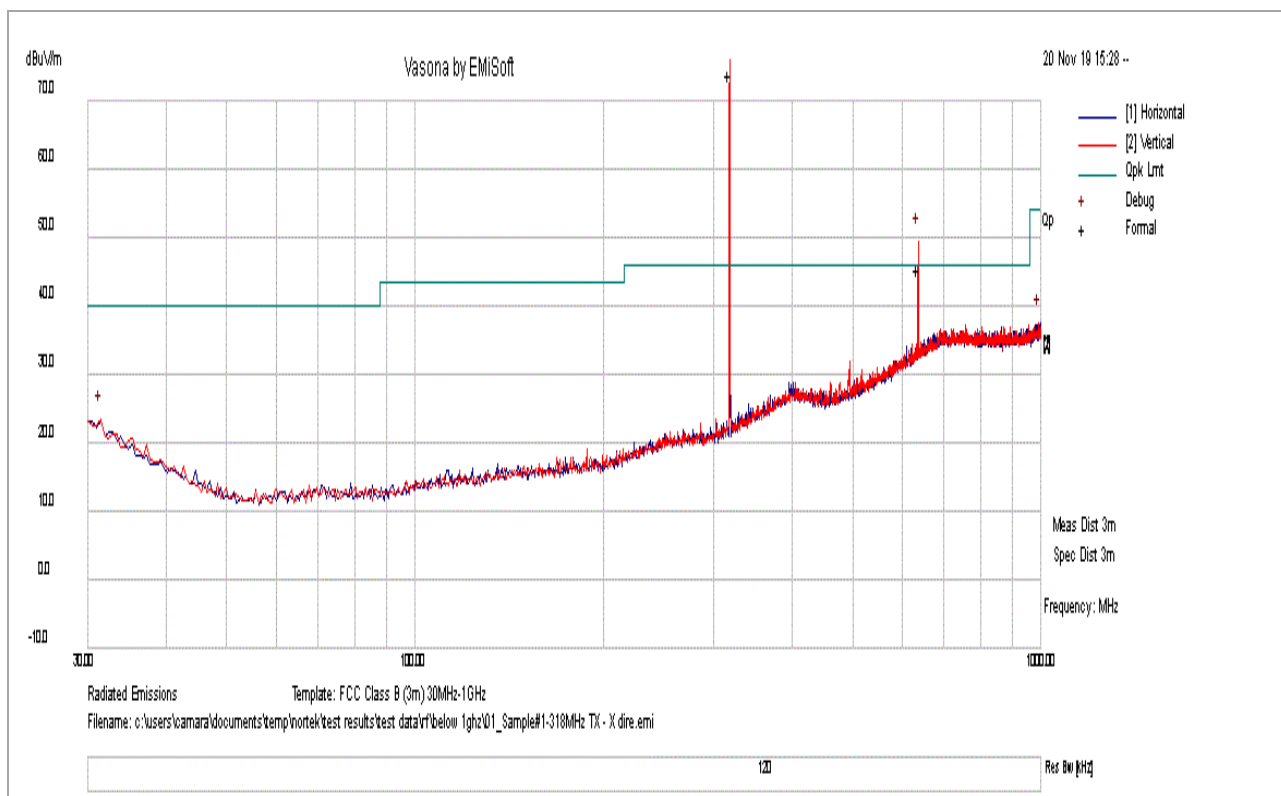
20 log (Actual On Time / Total Time)  
 20 log (36.75 / 100) = -8.6  
 Duty Cycle Correction Factor at least 8.6 dB



Electromagnetic Compatibility  
 Radio Frequency  
 Product Certification  
 International Approval

1261 Puerta Del Sol  
 San Clemente, CA, 92673  
 +1 (949) 393-1123  
[www.vista-compliance.com](http://www.vista-compliance.com)

<b>Test Standard:</b>	<b>47CFR 15.231, RSS-210</b>	<b>Mode:</b>	<b>MMK200</b>
<b>Frequency Range:</b>	<b>30-1000MHz</b>	<b>Test Date:</b>	<b>12/20/2019</b>
<b>Antenna Type/Polarity:</b>	<b>Bi-Log/Hor &amp; Ver</b>	<b>Test Personnel:</b>	<b>Bruce Li</b>
<b>Remark:</b>	<b>X orientation</b>	<b>Test Result:</b>	<b>Pass</b>



Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table deg	Limit dBuV/m	Margin dB
318.011	87.9	5.8	-17.7	75.9	PK	H	100	77	95.8	-19.9
318.011	79.3	5.8	-17.7	67.3	AV	H	100	77	75.8	-8.5
636.018	50.6	7.2	-8.6	49.3	PK	V	169	16	75.8	-26.5
636.018	42	7.2	-8.6	40.7	AV	V	169	16	55.8	-15.1

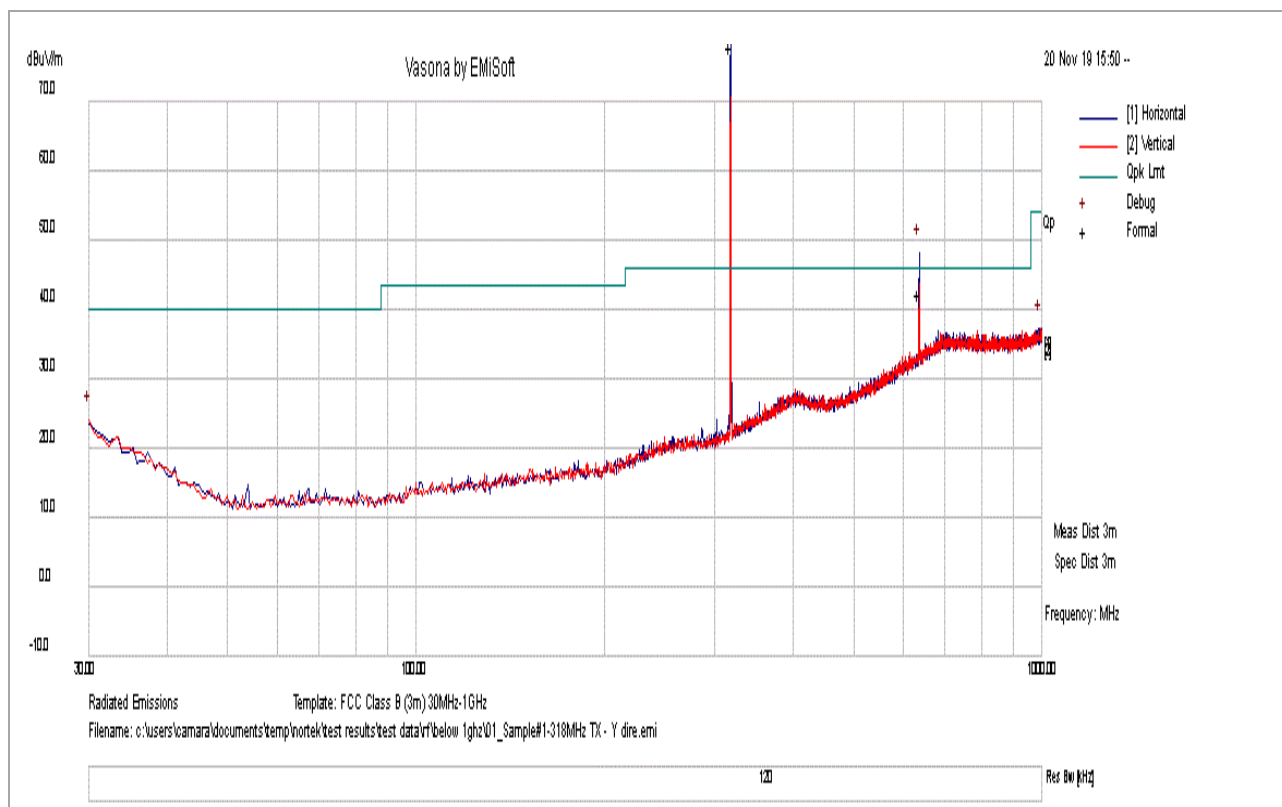
Duty cycle/average factor per original filing:

$20 \log (\text{Actual On Time} / \text{Total Time})$   
 $20 \log (36.75 / 100) = -8.6$   
 Duty Cycle Correction Factor at least 8.6 dB

**Report Number:** NSC-19112121-LC-FCC-IC  
**Product:** Digital Keypad  
**Model Number:** MMK100, MMK200



<b>Test Standard:</b>	<b>47CFR 15.231, RSS-210</b>	<b>Mode:</b>	<b>MMK200</b>
<b>Frequency Range:</b>	<b>30-1000MHz</b>	<b>Test Date:</b>	<b>12/20/2019</b>
<b>Antenna Type/Polarity:</b>	<b>Bi-Log/Hor &amp; Ver</b>	<b>Test Personnel:</b>	<b>Bruce Li</b>
<b>Remark:</b>	<b>Y orientation</b>	<b>Test Result:</b>	<b>Pass</b>



Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table deg	Limit dBuV/m	Margin dB
318.009	92.2	5.8	-17.7	80.2	PK	H	134	1	95.8	-15.6
318.009	83.6	5.8	-17.7	71.6	AV	H	134	1	75.8	-4.2
636.014	49.5	7.2	-8.6	48.1	PK	V	286	250	75.8	-27.7
636.014	40.9	7.2	-8.6	39.5	AV	V	286	250	55.8	-16.3

Duty cycle/average factor per original filing:

$20 \log (\text{Actual On Time} / \text{Total Time})$   
 $20 \log (36.75 / 100) = -8.6$   
 Duty Cycle Correction Factor at least 8.6 dB



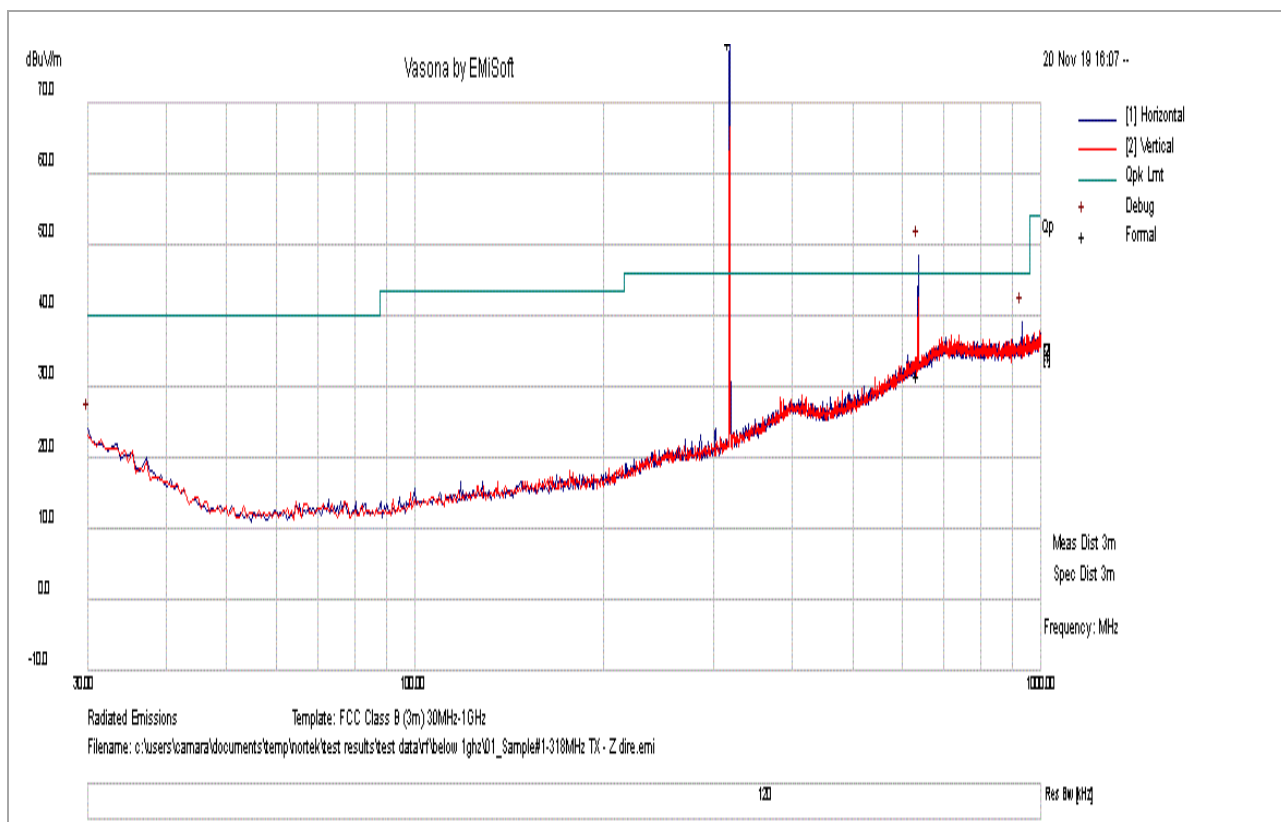
Electromagnetic Compatibility  
 Radio Frequency  
 Product Certification  
 International Approval

1261 Puerta Del Sol  
 San Clemente, CA, 92673  
 +1 (949) 393-1123  
[www.vista-compliance.com](http://www.vista-compliance.com)

**Report Number:** NSC-19112121-LC-FCC-IC  
**Product:** Digital Keypad  
**Model Number:** MMK100, MMK200



<b>Test Standard:</b>	<b>47CFR 15.231, RSS-210</b>	<b>Mode:</b>	<b>MMK200</b>
<b>Frequency Range:</b>	<b>30-1000MHz</b>	<b>Test Date:</b>	<b>12/20/2019</b>
<b>Antenna Type/Polarity:</b>	<b>Bi-Log/Hor &amp; Ver</b>	<b>Test Personnel:</b>	<b>Bruce Li</b>
<b>Remark:</b>	<b>Z orientation</b>	<b>Test Result:</b>	<b>Pass</b>



Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table deg	Limit dBuV/m	Margin dB
318.005	93.2	5.8	-17.7	81.3	PK	H	109	358	95.8	-14.5
318.005	84.6	5.8	-17.7	72.7	AV	H	109	358	75.8	-3.1
636.017	49.6	7.2	-8.6	48.2	PK	V	240	354	75.8	-27.6
636.017	41	7.2	-8.6	39.6	AV	V	240	354	55.8	-16.2

Duty cycle/average factor per original filing:

$20 \log (\text{Actual On Time} / \text{Total Time})$   
 $20 \log (36.75 / 100) = -8.6$   
 Duty Cycle Correction Factor at least 8.6 dB

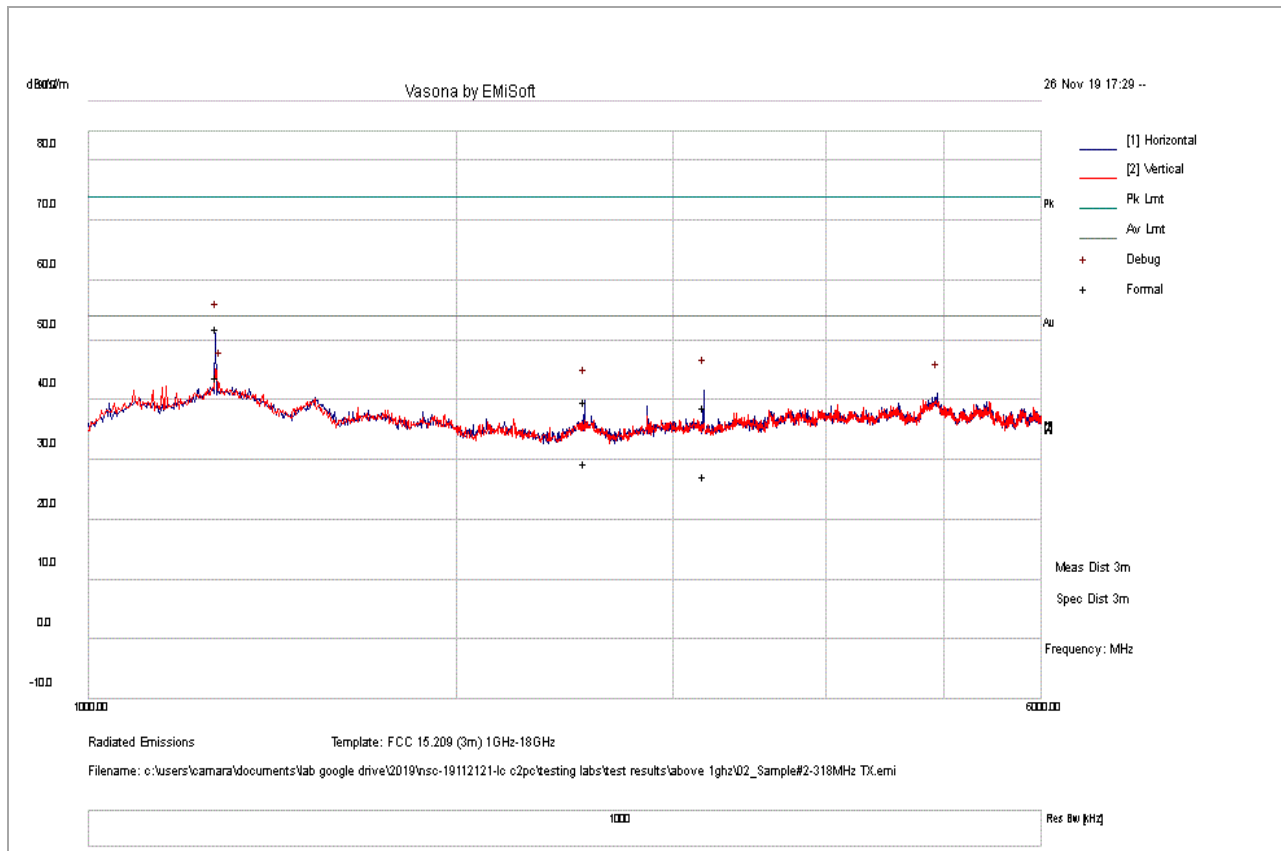


Electromagnetic Compatibility  
 Radio Frequency  
 Product Certification  
 International Approval

1261 Puerta Del Sol  
 San Clemente, CA, 92673  
 +1 (949) 393-1123  
[www.vista-compliance.com](http://www.vista-compliance.com)

**Above 1GHz result**

<b>Test Standard:</b>	<b>47CFR 15.231, RSS-210</b>	<b>Mode:</b>	<b>MMK100</b>
<b>Frequency Range:</b>	<b>30-1000MHz</b>	<b>Test Date:</b>	<b>12/20/2019</b>
<b>Antenna Type/Polarity:</b>	<b>Bi-Log/Hor &amp; Ver</b>	<b>Test Personnel:</b>	<b>Bruce Li</b>
<b>Remark:</b>	<b>Z orientation</b>	<b>Test Result:</b>	<b>Pass</b>



Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table deg	Limit dBuV/m	Margin dB
1272.028	57.4	14.5	-19.7	52.1	PK	H	161	17	74	-21.9
3180.268	42.6	15.5	-19.4	38.7	PK	H	156	276	74	-35.3
2544.125	46.6	14.9	-21.6	39.8	PK	H	184	32	74	-34.2
1272.028	49.1	14.5	-19.7	43.8	AV	H	161	17	54	-10.2
3180.268	31.3	15.5	-19.4	27.4	AV	H	156	276	54	-26.6
2544.125	36.2	14.9	-21.6	29.5	AV	H	184	32	54	-24.5

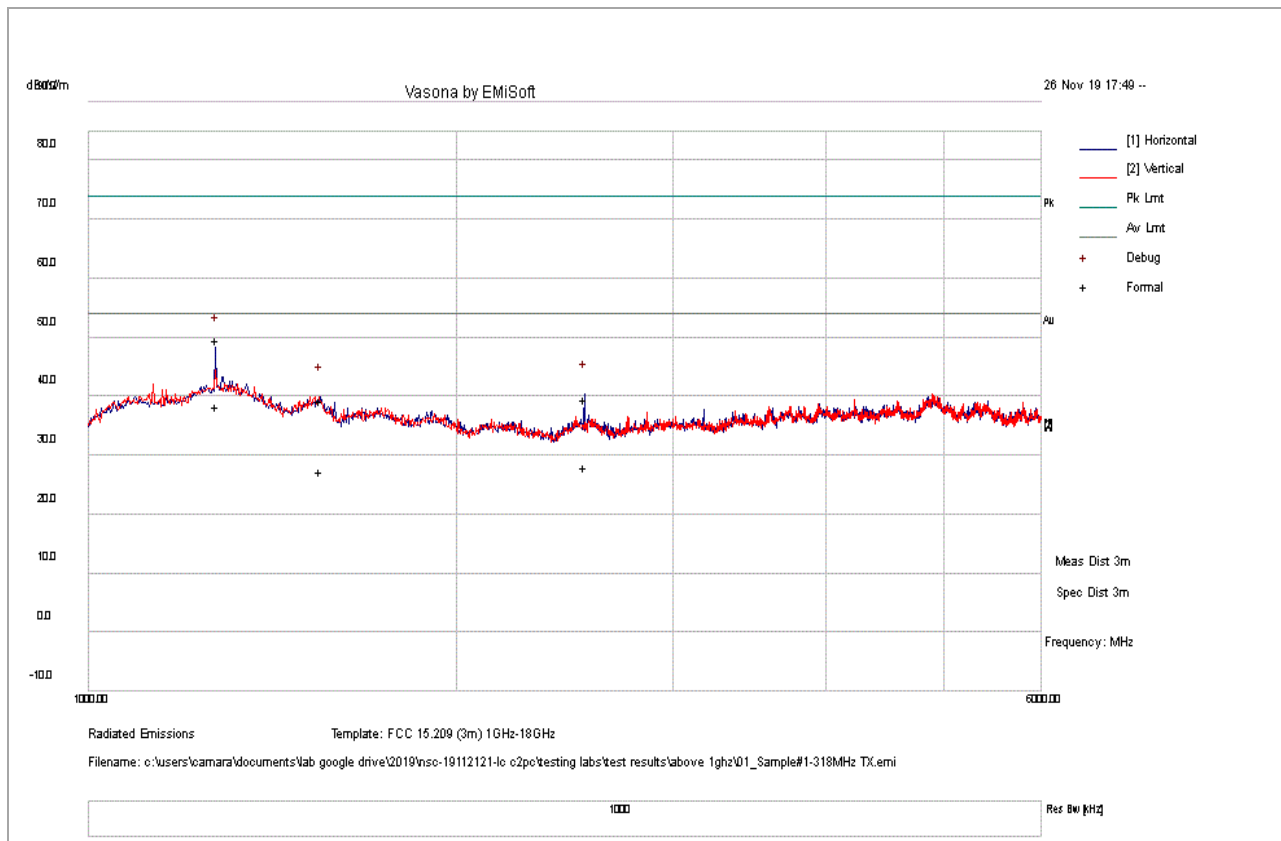
**Note:**

- 1) For above 1GHz, all different orientation was verified but only the worst case result is shown here.
- 2) Limit against 15.209 is used since the limit is more stringent than 15.231.

**Report Number:** NSC-19112121-LC-FCC-IC  
**Product:** Digital Keypad  
**Model Number:** MMK100, MMK200



<b>Test Standard:</b>	<b>47CFR 15.231, RSS-210</b>	<b>Mode:</b>	<b>MMK200</b>
<b>Frequency Range:</b>	<b>30-1000MHz</b>	<b>Test Date:</b>	<b>12/20/2019</b>
<b>Antenna Type/Polarity:</b>	<b>Bi-Log/Hor &amp; Ver</b>	<b>Test Personnel:</b>	<b>Bruce Li</b>
<b>Remark:</b>	<b>Z orientation</b>	<b>Test Result:</b>	<b>Pass</b>



Frequency MHz	Raw dB	Cable dB	AF dB	Level dBuV/m	Det	Pol deg	Height cm	Table deg	Limit dBuV/m	Margin dB
1271.908	54.8	14.5	-19.7	49.6	PK	H	103	123	74	-24.4
2544.233	46.4	14.9	-21.6	39.7	PK	H	151	305	74	-34.3
1545.038	46.7	14.8	-22.1	39.4	PK	H	117	278	74	-34.6
1271.908	43.7	14.5	-19.7	38.4	AV	H	103	123	54	-15.6
2544.233	34.9	14.9	-21.6	28.2	AV	H	151	305	54	-25.8
1545.038	34.5	14.8	-22.1	27.3	AV	H	117	278	54	-26.7

Note:

- 1) For above 1GHz, all different orientation was verified but only the worst case result is shown here.
- 2) Limit against 15.209 is used since the limit is more stringent than 15.231.



Electromagnetic Compatibility  
 Radio Frequency  
 Product Certification  
 International Approval

1261 Puerta Del Sol  
 San Clemente, CA, 92673  
 +1 (949) 393-1123  
[www.vista-compliance.com](http://www.vista-compliance.com)



<b>Report Number:</b>	NSC-19112121-LC-FCC-IC
<b>Product:</b>	Digital Keypad
<b>Model Number:</b>	MMK100, MMK200



## 9 Test instrument list

Equipment	Manufacturer	Model	Serial Number	Cal. Date	Cal. Due
Semi-Anechoic Chamber	ETS-Lindgren	10M	VL001	5/11/2019	5/11/2020
Shielding Control Room	ETS-Lindgren	Series 81	VL006	N/A	N/A
Spectrum Analyzer	Keysight	N9020A	MY50110074	5/4/2019	5/4/2020
EMC Test Receiver	R&S	ESL6	100230	5/7/2019	5/7/2020
LISN (9KHz – 30MHz)	EMCO	3816/2	9705-1066	5/4/2019	5/4/2020
Bi-Log Antenna	ETS-Lindgren	3142E	217921	11/15/2019	11/15/2020
Horn Antenna (1-18GHz)	Electro-Metrics	EM-6961	6292	5/2/2019	5/2/2020
Horn Antenna (18-40GHz)	Com-Power	AH-840	101109	5/2/2019	5/2/2020
Preamplifier	RF Bay, Inc.	LPA-10-20	11180621	5/10/2019	5/10/2020
True RMS Multi-meter	UNI-T	UT181A	C173014829	5/10/2019	5/10/2020
Temp / Humidity / Pressure Meter	PCE Instruments	PCE-THB 40	R062028	5/9/2019	5/9/2020
RF Attenuator	Pasternack	PE7005-3	VL061	5/10/2019	5/10/2020
Preamplifier 100KHz - 40GHz	Aeroflex	33711-392-77150-11	064	5/10/2019	5/10/2020
EM Center Control	ETS-Lindgren	7006-001	160136	N/A	N/A
Turn Table	ETS-Lindgren	2181-3.03	VL002	N/A	N/A
Boresight Antenna Tower	ETS-Lindgren	2171B	VL003	N/A	N/A
Loop Antenna (9k-30MHz)	Com-Power	AL-130	121012	5/9/2019	5/9/2020
RE test cable(below 6GHz)	Vista	RE-6GHz-01	RE-6GHz-01	5/10/2019	5/10/2020
RE test cable (1-18GHz)	PhaseTrack	II-240	RE-18GHz-01	5/10/2019	5/10/2020
RE test cable (>18GHz)	Sucoflex	104	344903/4	5/10/2019	5/10/2020
Pulse limiter	Com-Power	LIT-930A	531727	5/15/2019	5/15/2020
CE test cable #1	FIRST RF	FRF-C-1002-001	CE-6GHz-01	5/10/2019	5/10/2020
CE test cable#2	FIRST RF	FRF-C-1002-001	CE-6GHz-02	5/9/2019	5/9/2020