Intentional Radiator Test Report

Applicable Standards:
FCC 47 CFR Part 15.225:2010 Subpart C – Intentional Radiators
Industry Canada RSS-210, Issue 8
Industry Canada RSS-GEN, Issue 3

Equipment Under Test:	Cordless Hand Scanner
Model Number:	DuraScan D600
Serial Number:	N/S
Prepared for:	Socket Mobile, Inc. 39700 Eureka Drive Newark, CA 94560
Tested by:	Bob Cole
Prepared by:	Amy Jones
Verified and Approved by:	Bob Cole
	Authorized Signatory

EMCE Engineering, Inc.
44366 S. Grimmer Blvd.
Fremont, CA 94538

NVLAP Testing Lab Code 200092-0

ACCREDITED BY THE NATIONAL VOLUNTARY LABORATORY
ACCREDITATION PROGRAM FOR THE SPECIFIC SCOPE
OF ACCREDITATION UNDER LAB CODE #: 200092-0

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Test Report Revision History

Report Format	Report Version	Description	Issue Date
EMCE-TRF-RFID_FCC_IC	1.0	Original	10-20-2016
EMCE-TRF-RFID_FCC_IC	2.0	Updated template (Obsolete)	1-31-2017

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EXHIBITS

ADMINISTRATIVE INFORMATION

Test Laboratory:	EMCE Engineering 44366 S. Grimmer Blvd. Fremont, CA 94538 USA Tel : 510-490-4307, Fax : 510-490-3441
Facility No. registered through NVLAP:	NVLAP Testing Lab Code: 200092-0
Test Site:	FCC : US5291, IC : 3324A
Applicant Company Name :	Socket Mobile, Inc.
Applicant Contact Name :	Leonard Ott – CTO, Socket Mobile, Inc.
Application Purpose :	Original
EUT Description :	Cordless Hand Scanner
Product Name :	DuraScan D600
Model Number :	DuraScan D600
Serial Number :	N/S
Applied Requirements :	FCC 47 CFR §15.207, 15.209, 15.225: 2010 & Canadian Standards RSS-GEN Issue 3, RSS-210 Issue 8
FCC ID :	LUBD600
IC :	2925A-D600
Equipment Class :	C
Power Supply:	1400 mAh Lithium - Ion Battery
RF Operating Frequency (ies)	13.56 MHz
Modulation	RFID
Emission Designator	DXX
Receipt of EUT :	1-27-2017
Date of Testing :	1-28-2017 thru 2-1-2017
Tested By :	Bob Cole
Peak Power :	54.7 dBuV/M
Test Report Approved By -CTO :	Bob Cole
Test Report Number :	4279-1
Test Report Issue Date :	2-7-2017
Test Report Prepared By:	Amy Jones
Test Report Reviewed By:	Bob Cole

The tests listed in this report have been completed to demonstrated compliance to the FCC 47 CFR Section 15.225, as well as Industry Canada Radio Standard RSS-210, Issue 8 and RSS-GEN Issue 3.

2.0 EUT AND ACCESSORY INFORMATION

PREPARATION OF EUT FOR TEST

Setup of EUT

Power to EUT: 1400 mAh Lithium - Ion Battery
Grounding of EUT: N/A
Software: N/A

No Support Equipment was used.

Support Equipment				
Description	Model Number	Serial Number	Manufacturer	Power Cable Description
N/A				
Cable Description				
From	To	Length (Meters)	Shielded (Y/N)	Ferrite Loaded (Y/N)
N/A				

3.0 SUMMARY OF TEST RESULTS

Test Standard		Description	Pass / Fail
47 CFR Part 15.225: 2010	RSS 210 Issue 8		
15.203		Antenna Requirement	**Pass**
15.207(a)	RSS Gen(7.2.2)	Conducted Emissions Voltage	**N/A**
15.225(a)	RSS210(A2.6)	Limit in the band of 13.553 – 13.567 MHz	**Pass**
15.225(b)	RSS210(A2.6)	Limit in the band of 13.410 – 13.553 MHz and 13.567 – 13.710 MHz	**Pass**
15.225(c)	RSS210(A2.6)	Limit in the band of 13.110 –13.410 MHz and 13.710 – 14.010 MHz	**Pass**
15.225(d), 15.209	RSS210(A2.6)	Limit outside the band of 13.110 – 14.010 MHz	**Pass**
15.225(e)	RSS210(A2.6)	Frequency Stability	**Pass**
	RSS-210(5.9.1)	Occupied Bandwidth	**N/A**
ANSI C63.4: 2009/ RSS-Gen Issue 3 PS: All measurement uncertainties are not taken into consideration for all presented test result.			

PASS The EUT passed that particular test.
FAIL The EUT failed that particular test.
008 Not Applicable due to product type.

4.0 MODIFICATIONS

There were no modifications installed by EMCE Engineering.

Any modifications installed previous to testing by the Manufacturer will be incorporated in each production model sold or leased.

5.0 TEST RESULTS

5.1 Antenna Requirement

Requirement(s): 47 CFR §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The antenna must meet at least one of the following requirements:

a) Antenna must be permanently attached to the device.
b) Antenna must use a unique type of connector to attach to the device.
c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.

Results: **PASS**

Comments: The RFID antenna measures 28mm x 14mm, and is integrated to the main PCB board, which is permanently fixed to the device. Further data: See Exhibit 2 EUT Internal PCB Photos.

5.2 Conducted Emissions Voltage

Requirement(s): 47 CFR §15.207

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

Procedures:

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
2. "Ave" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is ±3.5dB.
4. Environmental Conditions

Temperature	24ºC
Relative Humidity	45%
Atmospheric Pressure	1010mbar

Test Date :

Tested By :

Results: **N/A**

Comments: Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. This device employs battery power.

5.3 Radiated Emission < 30MHz (9kHz - 30MHz, H-Field)

Requirement(s): 47 CFR §15.225 & RSS-210 (A2.6) & RSS-310 (3.7)

Procedures: **For < 30MHz,** Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit at the highest output power. The EUT was set 3 meters away from the measuring antenna. The loop antenna was positioned 1 meters above the ground from the centre of the loop. The measuring bandwidth was set to 10 kHz. (Note: During testing the receive antenna was rotated about its axis to maximize the emission from the EUT.)

The limit is converted from microvolt/meter to decibel microvolt/meter.

Sample Calculation: Corrected Amplitude = Raw Amplitude (dBµV/m) + ACF (dB) + Cable Loss (dB) – Distance Correction Factor

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, is +/-6dB.
4. Environmental Conditions

Temperature	24ºC
Relative Humidity	45%
Atmospheric Pressure	1010mbar

Test Date : 1-28-2017

Tested By : Bob Cole

Results: **Pass**

FCC 47 CFR §15.225 Radiated Emissions
9 kHz – 30 MHz

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 •

Customer: **Socket Mobile, Inc.**
Specification: **15.209 9k-30M FCC Limits 10M**
Work Order #: **4279** Date: 1/28/2017
Test Type: **Radiated Scan** Time: 1:42:41 PM
Equipment: **Cordless Hand Scanner** Sequence#: 1
Manufacturer: Socket Mobile Tested By: Bob Cole
Model: DuraScan D600
S/N: N/A

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Cordless Hand Scanner*	Socket Mobile	DuraScan D600	N/A

Support Devices:

Function	Manufacturer	Model #	S/N

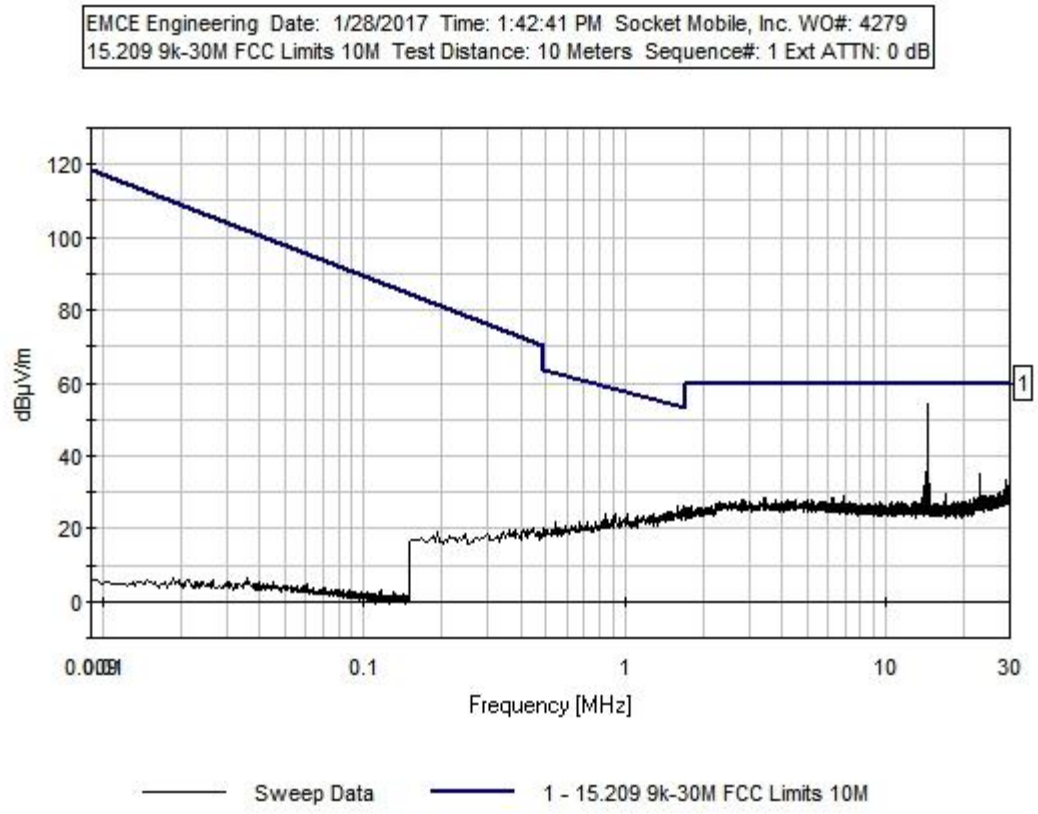
Test Conditions / Notes:

Transducer Legend:

Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq	Rdng					Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant


EMCE Engineering Date: 1/28/2017 Time: 1:42:41 PM Socket Mobile, Inc. WO#: 4279
15.209 9k-30M FCC Limits 10M Test Distance: 10 Meters Sequence#: 1 Ext ATTN: 0 dB
120
100
80
60
40
20
0
dBµV/m
0.1
1
10
30
Frequency [MHz]
1
Sweep Data
1 - 15.209 9k-30M FCC Limits 10M

5.4 Radiated Emissions > 30 MHz (30MHz – 1 GHz, E-Field)

Requirement(s): 47 CFR §15.209; 47 CFR §15.225(d) & RSS-210 (A2.6)

Procedures: **For > 30MHz,** Radiated emissions were measured according to ANSI C63.4. The EUT was set to transmit at the highest output power. The EUT was set 10 meter away from the measuring antenna. The Log periodic antenna was positioned 1 meter above the ground from the centre of the antenna. The measuring bandwidth was set to 120 kHz. (Note: During testing the receive antenna was raise from 1~4 meters to maximize the emission from the EUT.)

The limit is converted from microvolt/meter to decibel microvolt/meter.

Sample Calculation: Corrected Amplitude = Raw Amplitude (dBµV/m) + ACF (dB) + Cable Loss(dB) – Distance Correction Factor

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, is +/-6dB.
4. Environmental Conditions

Temperature	24°C
Relative Humidity	45%
Atmospheric Pressure	1010mbar

Test Date : 1-28-2017

Tested By : Bob Cole

Results: **Pass**

FCC Part 15B Radiated Emissions
30 MHz – 1 GHz

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 •

Customer: **Socket Mobile, Inc.**
Specification: **EN55022B RADIATED**
Work Order #: **4279** Date: 1/28/2017
Test Type: **Radiated Scan** Time: 2:34:50 PM
Equipment: **Cordless Hand Scanner** Sequence#: 8
Manufacturer: Socket Mobile Tested By: Bob Cole
Model: DuraScan D600
S/N: N/A

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Cordless Hand Scanner*	Socket Mobile	DuraScan D600	N/A

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

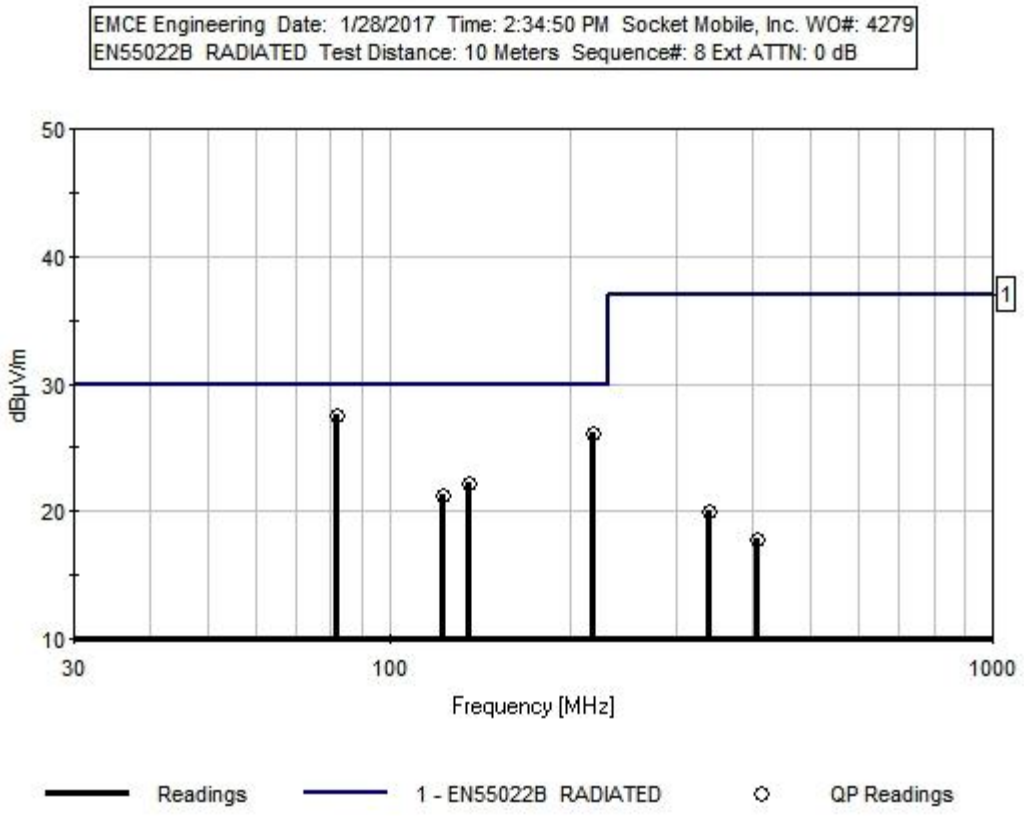
Transducer Legend:

T1=25' LMR #001 T2=8447 Pre-Amp Asset 377
T3=Sunol JB1 SNA061416

Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	135.597M QP	34.8	+0.1	+26.7	+14.1		+0.0 226	22.3	30.0	-7.7	Vert 120
2	122.477M QP	34.1	+0.1	+26.7	+13.8		+0.0 109	21.3	30.0	-8.7	Horiz 125
3	81.358M QP	35.4	+0.5	+27.0	+18.7		+0.0 180	27.6	37.0	-9.4	Vert 125
4	339.009M QP	32.7	+0.1	+26.7	+13.9		+0.0 94	20.0	30.0	-10.0	Horiz 142
5	217.002M QP	34.1	+0.5	+27.0	+18.5		+0.0 172	26.1	37.0	-10.9	Horiz 128
6	406.877M QP	31.7	+0.1	+26.8	+12.9		+0.0 219	17.9	30.0	-12.1	Vert 175


EMCE Engineering Date: 1/28/2017 Time: 2:34:50 PM Socket Mobile, Inc. WO#: 4279
EN55022B RADIATED Test Distance: 10 Meters Sequence#: 8 Ext ATTN: 0 dB
50
40
30
20
10
dBµV/m
1
30
100
1000
Frequency [MHz]
Readings
1 - EN55022B RADIATED
QP Readings

5.5 Frequency Stability

Requirement(s): 47 CFR §15.225(e) & RSS-210 (A2.6)

Procedures: Frequency Stability was measured according to 47 CFR §2.1055. Measurement was taken with spectrum analyzer. The spectrum analyzer bandwidth and span was set to read in hertz. A voltmeter was used to monitor when varying the voltage.

Limit: ±0.01% of 13.5589 MHz = 1355 Hz

Environmental Conditions	Temperature	24°C
	Relative Humidity	45%
	Atmospheric Pressure	1010mbar

Test Date : 1-28-2017

Tested By : Bob Cole

Results: **Pass**

Frequency Stability versus Temperature: The Frequency tolerance of the carrier signal shall be maintained within ± 0.01% of the operating frequency over a temperature variation of -20ºC to +50ºC at normal supply voltage.

Reference Frequency: 13.559975 MHz

Temperature (ºC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
50	13.559888	87	<0.01	Pass
40	13.559895	80	<0.01	Pass
30	13.559858	117	<0.01	Pass
20	Reference (13.559975 MHz)			
10	13.559871	104	<0.01	Pass
0	13.559901	74	<0.01	Pass
-10	13.559870	105	<0.01	Pass
-20	13.559844	131	<0.01	Pass

Frequency Stability versus Input Voltage: The Frequency tolerance of the carrier signal shall be maintained within ± 0.01%, the frequency of the transmitter was measured at 85% and at 115% of the rated power supply voltage at 20ºC environmental temperature.

Carrier Frequency: 13.559975 MHz at 20°C at 5VDC

Measured Voltage ±15% of nominal (DC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
4.25	13.559992	17	<0.01	Pass
5.75	13.559994	19	<0.01	Pass

5.6 Fundamental Field Strength Test Result

Requirement(s):

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, is +/-6dB.
4. Environmental Conditions

Temperature	24°C
Relative Humidity	45%
Atmospheric Pressure	1010mbar

Test Date : 1-28-2017

Tested By : Bob Cole

Results: **Pass**

Comments: EUT Operates at a frequency of 13.56 MHz.

Test Requirement:

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

Peak Output Power
Per CFR 47, Section 15.225 and RSS-210 Issue 8 A2.6

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 •

Customer: **Socket Mobile, Inc.**
Specification: **RFID FCC Mask 10 Meter**
Work Order #: **4279** Date: 1/28/2017
Test Type: **Radiated Scan** Time: 2:12:32 PM
Equipment: **Cordless Hand Scanner** Sequence#: 6
Manufacturer: Socket Mobile Tested By: Bob Cole
Model: Durascan D600
S/N: N/A

***Test Equipment*:**

Function	S/N	Calibration Date	Cal Due Date	Asset #

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Cordless Hand Scanner*	Socket Mobile	Durascan D600	N/A

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

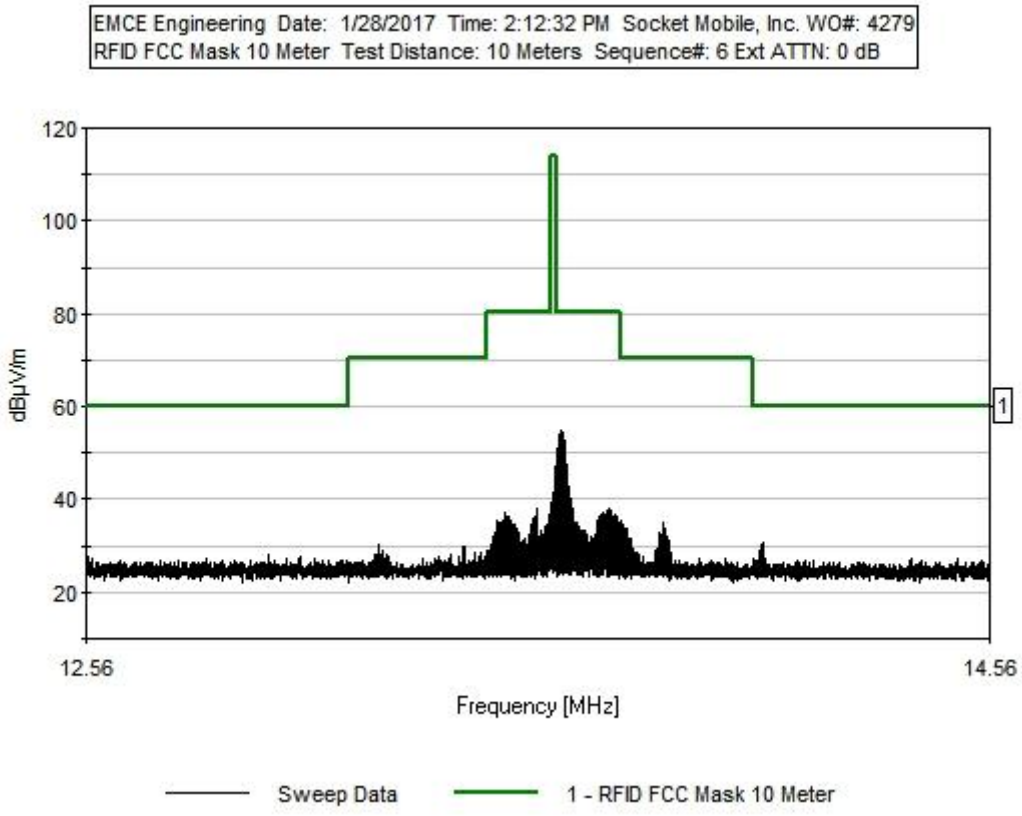
Transducer Legend:

T1=25' LMR #001 T2=ComPower Loop AL-130R
T3=8447 Pre-Amp Asset 377

Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Distance: 10 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	13.561M	40.8	+0.1	-37.1	+27.3		+0.0	50.7	80.5	-29.8	Perpe
2	13.562M	40.6	+0.1	-37.1	+27.3		+0.0	50.5	80.5	-30.0	Perpe
3	13.560M	40.0	+0.1	-37.1	+27.3		+0.0	49.9	80.5	-30.6	Perpe
4	13.580M	38.7	+0.1	-37.1	+27.3		+0.0	48.6	80.5	-31.9	Perpe
5	12.563M	17.9	+0.1	-37.0	+27.3		+0.0	27.7	60.0	-32.3	Perpe
6	14.486M	17.5	+0.1	-37.1	+27.3		+0.0	27.4	60.0	-32.6	Perpe


EMCE Engineering Date: 1/28/2017 Time: 2:12:32 PM Socket Mobile, Inc. WO#: 4279
RFID FCC Mask 10 Meter Test Distance: 10 Meters Sequence#: 6 Ext ATTN: 0 dB
120
100
80
60
40
20
dBµV/m
1
12.56
14.56
Frequency [MHz]
Sweep Data
1 - RFID FCC Mask 10 Meter

5.7 Occupied Bandwidth

Requirement(s): RSS-210 (5.9.1)

Procedures: Occupied Bandwidth was measured according to RSS-210 (5.9.1). Measurement was taken with spectrum analyzer. The spectrum analyzer bandwidth and span was set to read in hertz.

Environmental Conditions	Temperature	24°C
	Relative Humidity	45%
	Atmospheric Pressure	1010mbar

Test Date :

Tested By :

(Not Applicable Due to Product Type)

Frequency	Occupied Bandwidth (99%)

6.0 TEST EQUIPMENT

Equipment	Serial Number	Last Calibration Date	Calibration Due Date
Omega-IBTHXBP	14490199	7/8/2016	7/8/2017
Schaffner-NSG435	5892	7/8/2016	7/8/2017
Fluke-87	64920001	6/28/2016	6/28/2017
Sunol Sciences-JB1	A061416	6/27/2016	6/27/2017
EMCO-3816-2	9809-1089	8/12/2016	8/12/2017
Rohde & Schwarz-FSV40	101424	6/20/2016	6/20/2017
Sunol Sciences-JB6	A042610	6/15/2016	6/15/2017
A. H. Systems-SAS-571	236	6/13/2016	6/13/2017
Com-Power-C50E	561034	2/22/2016	2/22/2017
Com-Power-M225E	511107	2/22/2016	2/22/2017
Com-Power-T8SE	511402	2/22/2016	2/22/2017

END OF REPORT