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Date: 25 May 2016

Customer:

Getac Inc.
400 Exchange
Suite 100
Irvine, CA 92602

Purchase Order Number: PO#03211601

-
- A. TESTS: Hero Emissions (RE102)
- B. TEST ITEMS: Two (2) Tablets, P/N F110 S/N's RF539F0595, RF539F0597
One (1) Tablet RX10 S/N RG139R0076
- C. SPECIFICATIONS:
1. MIL-STD-461F
 2. ANSI NCSL Z540-1
 3. ISO 17025:2005


D. RESULTS:

This is to certify that the Tablets were subjected to the above tests according to the above specifications.

See pages 7-10 for Summary of Test Results.

The Tablets were returned to Getac Inc. for further evaluation.

Test data, an equipment list, and photographs are attached.


Steve Samples,
Preparer


James Grosik,
Program Manager


Stephan Samples,
Quality Assurance Manager

This report and the information contained herein represents the results of testing of only those articles/products identified in this document and selected by the client. The tests were performed to specifications and/or procedures approved by the client. National Technical Systems ("NTS") makes no representations expressed or implied that such testing fully demonstrates efficiency, performance, reliability, or any other characteristic of the articles being tested, or similar products. This report should not be relied upon as an endorsement or certification by NTS of the equipment tested, nor does it present any statement whatsoever as to the merchantability or fitness of the test article or similar products for a particular purpose. This document shall not be reproduced except in full without written approval from NTS.

REVISION SUMMARY

<u>Revision</u>	<u>Date</u>	<u>Affected Page (s)</u>	<u>Affected Paragraph (s)</u>
Initial Release	25 May 2016	N/A	N/A

Note: Paragraphs affected by revisions are indicated by a superscript of the revision number appearing just after the paragraph title in the body of the report. Due to the revisions, some items may change pages.

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TEST CONCEPT STATEMENT

After reviewing several reports pertinent to hazards of electromagnetic radiation to ordnance safety, the following method was developed to ensure both the repeatability and technical accuracy of the measurements.

It was determined that the measurement technique should be as close as practicable to the standard procedures outlined in MIL STD. 461E and later revisions in the interest of measurement repeatability, basic technical understanding and, scientific measurement validity. The basis for this is the fact that the inverse square law relationship between, in this case, far field measurements made at the one meter distance with the test object orientated to produce the maximum signal strength in the measurement receiver can be accurately extrapolated down to a near field boundary of $\lambda/2\pi$ since the 20 dB per decade slope verses distance extends to $\lambda/10$ with roughly 5% measurement precision. The only deviation to standard MIL-STD-461 procedures was that the test article's maximum radiation orientation was pre-determined by utilizing a broad band free field probe as a detector for all the different modes of transmit operation. During test, the specific orientation of maximum radiation for a given transmit mode was used to position the test article in order to insure that the maximum possible level was obtained and recorded in the measurement receiver. The conversion from **dB μ V/m** to **V/m** is $10^{(((\text{dB}\mu\text{V/m})-120)/20)}$.

A word of caution is in order regarding the utilization of field measurements and antenna gain to derive potential hazard and non-hazard conditions. The derivations I reviewed did not take into account the total available transmitter output power as a limiting factor and the field strength boundary curve doesn't seem to have any relationship to physical reality over much of its curve. A typical military initiator has a No Fire rating of 1A and an All Fire range exceeding 3A with a typical bridge wire resistance, when cold, of 1 Ohm. By Ohm's law this means that the initiator can dissipate one (1) Watt continuously without firing, and can fire somewhere above one (1) Watt, and will fire above three (3) Watts. This means that a one (1) Watt transmitter cannot fire ordnance regardless of antenna gain or transmit frequency. There is no relationship between free field strength and coupled power. In other words, even if I generate a 100 V/m field strength with a one Watt transmitter and a high gain antenna (it's easily done), I can't couple one Watt into the initiator without invoking 100% efficiency. Interestingly, automobile initiators (air bag) generally use one (1) Watt as the All Fire condition. This is about 5 dB lower than the military requirement. This in itself is an important safety factor for ordnance. The difficulty with the HERO curve is the fact that at its low point, the safe no hazard boundary is 0.5 V/m ($0.00066 \text{ Watts/m}^2$) between 2 MHz and roughly 80 MHz. We have to put the E-field probe in the anechoic chamber to achieve those low levels! Indeed, a lightning strike several miles away will generate radio static orders of magnitude greater than 0.5 V/m starting well below 2 MHz and extending to well over 100 MHz. A solar burst can also achieve levels much higher than 0.5 V/m over the entire earth and with an even wider bandwidth.

Although this isn't a factor in this application, a realistic specification should be undertaken in order to make it useful in the future. At the very least, the total available power from a device and the inability to couple that power efficiently to ordnance should be recognized as a limiting factor in any calculation of safety margin as a first principle approach.

Jim Vogler, PhD.

SAFE DISTANCE CALCULATIONS

Safe distance calculations

The safe distance calculation is derived by invoking the inverse square law relationship. Specifically, the measured level is compared to HERO limit level and difference, in dB, is obtained by subtraction. The difference, in dB, is then used to calculate the distance to the test article that would intersect the HERO limit. The formula is $\text{distance} \times \text{antilog}(\text{dB}/20)$. The distance in our test was 1 meter in all cases, and the level was always below the HERO limit, making the dB difference always a negative number. The justification for this approach comes directly from proven antenna theory, (Ref. 1-4).

1) *Harold A. Wheeler, "Fundamental Limitations of Small Antennas", Proc. IRE, 35, (1947), pp. 1479-1484*

2) *John Krause, Antennas, McGraw-Hill, 1950*

3) *Charles Capps, "Near Field or Far Field", EDN, August 16, 2001, pp. 95-102.*

4) *Hans Gregory Schantz, "A Near Field Propagation Law and A Novel Fundamental Limit to Antenna Gain Versus Size", IEEE APS Conference July 2004*

SUMMARY OF TEST RESULTS

Hero Emissions (RE102) Test

Specification / Reference:

Document: MIL-STD-461F

Test Items: Tablets P/N F110 S/N's RF539F0595 (AT&T), RF539F0597 (Verizon)

Date Started: 11 April 2016

Date Completed: 22 April 2016

Test Summary:

The Tablets were subjected to the Hero Emissions (RE102) in accordance with MIL-STD-461F, with reference to HERO emissions. The purpose of testing was to verify that the F110 Rugged Tablet with the integrated GOBI firmware can be operated safely.

The measurement equipment was configured according to the RE102 Test Procedure. The equipment was calibrated in accordance with the requirements of MIL-STD-461F for radiated emissions testing. Receiver antenna was placed one (1) meter distant from the radiation source (test article).

The following steps layout the testing of the Tablets:

1. Place the tablet inside the test chamber.
2. Verify the F110 Tablet was connected to 4G via the home screen. Enable Skype™.
3. Confirm strongest broadcast signal from test subject. Use this orientation for the remaining testing.
4. Conduct a HERO scan to verify that the F110 tablets were operating on the 4G signal only (via Skype).
5. Conduct 4G cellular scans (as required) for GOBI firmware, primary and backup.

During the exposure, a Low Pass Filter (LPF) was used to force the F110 tablet to connect to the 700 MHz frequency band when needed. An additional scan was performed using a Band Pass Filter (BPF) to force the F110 tablet to connect to the 1900MHz frequency band when needed. Scan results are noted in Table 1.

Test Results:

No physical anomalies were noted.

Reference: Test Logs and photographs for additional test detail.

Results Summary Tables RE102 / HERO Testing (F110)

F110 Tablet Mode & Polarity	Frequency (MHz)	Measured RE102 dBuV/m	Converted to HERO V/m	≈dB Below HERO Spec	Calculated Safe Distance (in)	Effective Safe Distance (in)
Verizon 4G/LTE Primary Vertical Edge 4	783.94	113.7	0.48	-20.1	3.89"	0"
Verizon 4G/LTE Backup Vertical Edge 4	786.75	110.9	0.35	-22.9	2.82"	0"
AT&T 4G/LTE Primary Vertical Edge 4	709.32	98.2	0.08	-34.7	0.72"	0"
AT&T 4G/LTE Backup Vertical Edge 4	1893.2	101.6	0.12	-39.8	0.40"	0"
LPF (700MHz) AT&T 4G/LTE Primary Vertical Edge 4	708.96	101.3	0.12	-31.6	1.03"	0"
LPF (700 MHz) AT&T 4G/LTE Backup Vertical Edge 4	707.88	97.7	0.08	-35.2	0.68"	0"
BPF (1900 MHz) AT&T 4G/LTE Primary Vertical Edge 4	1891.1	108.7	0.27	-32.7	0.92"	0"

Table 1

Note: The Practical (Effective) Safe Distance between the Tablet and any ordinance is 0" because the antenna elements for the Tablet are internal.

Hero Emissions (RE102) Test**Specification / Reference:****Document:** MIL-STD-461F**Test Items:** Tablet P/N RX10 S/N RG139R0076**Date Started:** 13 April 2016**Date Completed:** 10 May 2016**Test Summary:**

The Tablet was subjected to the Hero Emissions (RE102) in accordance with MIL-STD-461F, with reference to HERO emissions. The purpose of testing was to verify that the RX10 Rugged Tablet can operate safely.

The measurement equipment was configured according to the RE102 Test Procedure. The equipment was calibrated in accordance with the requirements of MIL-STD-461F for radiated emissions testing. Receiver antenna was placed one (1) meter distant from the radiation source (test article).

The following steps layout the testing of the Tablets:

1. Place the tablet inside the test chamber.
2. Verify the RX10 Tablet was connected using the home screen. Enable Skype™.
3. Confirm strongest broadcast signal from test subject. Use this orientation for the remaining testing.
4. Conduct a HERO scan to verify that the RX10 tablet was operating on the Wi-Fi, 3G or 4G/LTE signal (via Skype).
5. Conduct Wi-Fi and cellular scans.

Scan results are noted in Table 2.

Test Results:

No physical anomalies were noted.

Reference: Test Logs and photographs for additional test detail.

Results Summary Tables RE102 / HERO Testing (RX10)

RX10 Mode & Polarity	Frequency (MHz)	Measured RE102 dBuV/m	Converted to HERO V/m	≈dB Below HERO Spec	Calculated Safe Distance (in)	Effective Safe Distance (in)
Verizon (Full Power) 3G Vertical Edge 3	842.43	99	0.09	-35.4	0.67"	0"
Verizon (Full Power) 4G/LTE Vertical Edge 3	783.54	103.2	0.14	-30.6	1.16"	0"
Verizon (Full Power) 4G/LTE Vertical Edge 3	1723.9	106.8	0.22	-33.8	0.80"	0"
AT&T (Full Power) 3G Vertical Edge 3	1908.6	123.2	1.45	-18.3	4.79"	0"
AT&T (Full Power) 4G/LTE Vertical Edge 3	709.69	121.4	1.17	-11.5	10.48"	0"
AT&T (Full Power) 4G/LTE Vertical Edge 3	1908.3	119.5	0.94	-22.0	3.13"	0"
802.11b 2.4GHz Vertical Edge 4	2464.4	113.7	0.48	-30.0	1.24"	0"
802.11g 2.4GHz Vertical Edge 4	2459.1	110.2	0.32	-33.5	0.83"	0"
802.11n 2.4GHz Vertical Edge 4	2463.8	110	0.32	-33.7	0.81"	0"
802.11a 5GHz Vertical Edge 4	5748.6	106.9	0.22	-44.1	0.25"	0"
802.11n 5GHz Vertical Edge 4	5747.6	107.1	0.23	-43.9	0.25"	0"
802.11ac 5GHz Vertical Edge 4	5747.6	106.4	0.21	-44.6	0.23"	0"

Table 2

Note: The Practical (Effective) Safe Distance between the Tablet and any ordinance is 0" because the antenna elements for the Tablet are internal.

FACTUAL DATA

Tempe, AZ

EMI Log

[illegible]

Test Personnel:

Customer Witness:



RE102/HERO Testing

PR046489

F110 Tablet Mode and Polarity	Frequency (MHz)	Measured RE102 dBuV/m	Converted HERO V/m	dB Below HERO Spec	Calculated Safe Distance	Effective Safe Distance
Verizon 4G/LTE Primary Vert Edge 4	783.94	113.7	0.48	-20.1	3.89"	0"
Verizon 4G/LTE Backup Vert Edge 4	786.75	110.9	0.35	-22.9	2.82"	0"
AT&T 4G/LTE Primary Vert Edge 4	709.32	98.2	0.08	-34.7	0.72"	0"
AT&T 4G/LTE Backup Vert Edge 4	1893.2	101.6	0.12	-39.8	0.40"	0"
*AT&T 4G/LTE Primary Vert Edge 4	708.96	101.3	0.12	-31.6	1.03"	0"
*AT&T 4G/LTE Backup Vert Edge 4	707.88	97.7	0.08	-35.2	0.68"	0"
**AT&T 4G/LTE Primary Vert Edge 4	1891.1	108.7	0.27	-32.7	0.92"	0"

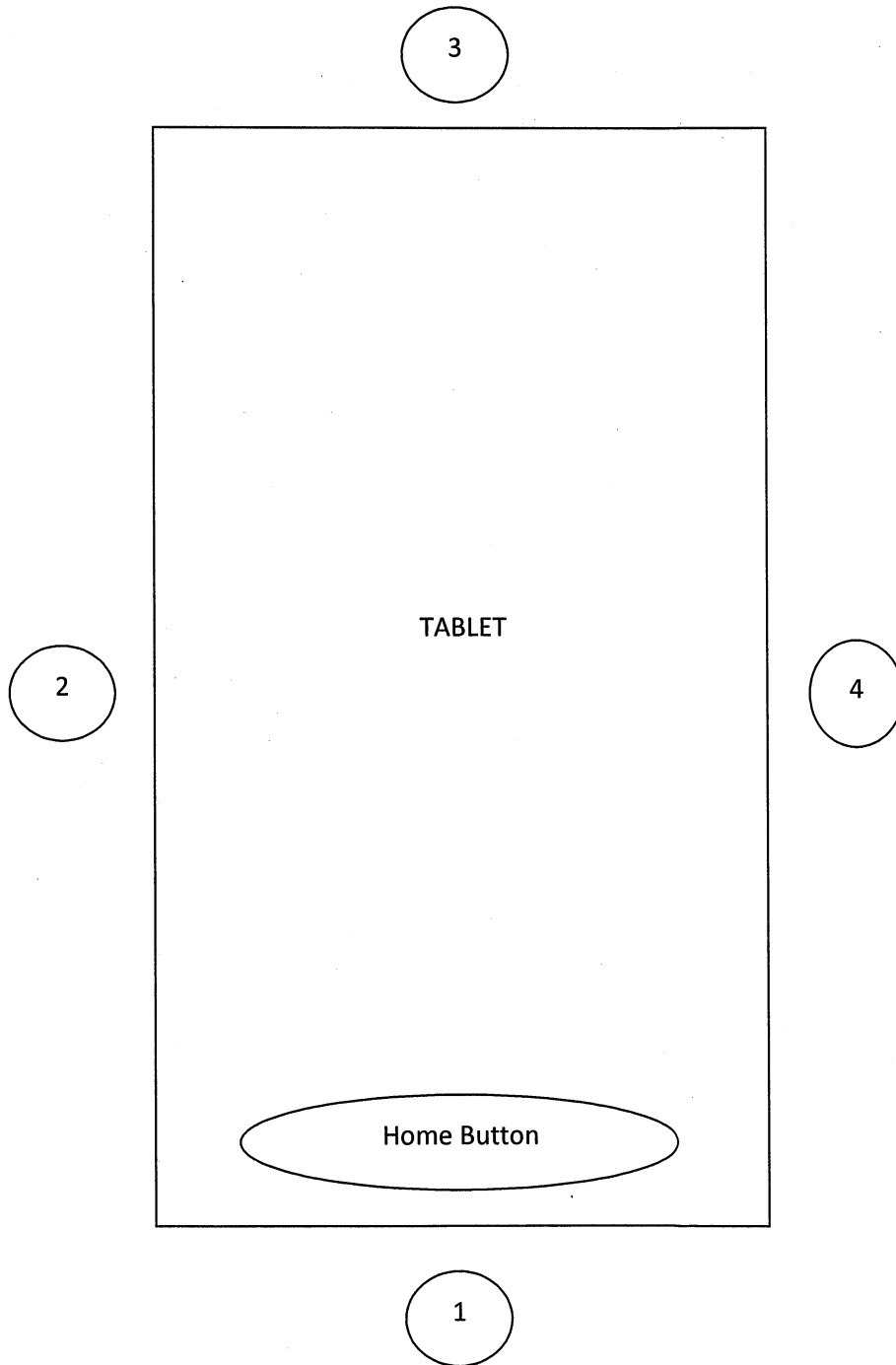
Note: The Practical (Effective) Safe Distance between the F110 and any ordinance is 0" because the antenna elements for the F110 are internal.

*Conducted with a LPF to force the F110 to connect to the 700MHz Frequency Band only.

** Conducted with a BPF to force the F110 to connect to the 1900MHz Frequency Band only.

F110 Tablet		
Mode (Frequency)	Verizon (frequency/band)	Complete
AT&T 4G/LTE	700MHz (band 17, block B/C) 1900MHz (band 2)	x
Verizon 4G/LTE	700MHz (band 13, block C)	x

F110 Tablet Position of Highest Radiation		
Tablet	AT&T 4G/LTE	Verizon 4G/LTE
F110	Vertical – Edge 4	Vertical – Edge 4



hp

EMI-TEST
EMISSION LEVEL [dBuV/m]

PEAK

11 Apr 2016 10:18:08

RE-102 HERO Nuclear 600MHz-1GHz

Getac Inc PR046489

F110 PN 52628707000P

SN RF539F0597 Verizon 4G/LTE

Primary Firmware Vert Side 4

180

160

140

120

100

600

1000

Nuclear Unsafe

HERO SAFE 2-1

HERO UNSAFE 2-2

FREQUENCY [MHz]

EMI-TEST

11 Apr 2016 10:18:08

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -45 dB of Limit Line #1

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	783.94	113.7	-20.1
2	781.55	111.3	-22.4
3	777.96	110.4	-23.3

EMI-TEST

11 Apr 2016 10:18:08

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -45 dB of Limit Line #2
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	783.94	113.7	-32.1
2	781.55	111.3	-34.4
3	777.96	110.4	-35.3

EMI-TEST

11 Apr 2016 10:18:08

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -45 dB of Limit Line #3

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	783.94	113.7	-42.8

EMI-TEST

11 Apr 2016 11:15:19

EMISSION LEVEL [dBuV/m]

PEAK

hp

180

RE-102 HERO Nuclear 600MHz-1GHz

Getac Inc PR046489

F110 PN 52628707000P

SN RF539F0597 Verizon 4G/LTE

Secondary Firmware Vert Side 4

160

Nuclear Unsafe

140

HERO SAFE 2-1

120

HERO UNSAFE 2-2

100

600

1000

FREQUENCY [MHz]

EMI TEST

11 Apr 2016 11:15:19

1. MIL-STD 461E setups
1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -50 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	786.75	110.9	-22.9
2	777.96	109	-24.7
3	779.95	107.7	-26.0
4	775.59	94.6	-39.1

EMI TEST

11 Apr 2016 11:15:19

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -50 dB of Limit Line #2

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	786.75	110.9	-34.9
2	777.96	109	-36.7
3	779.95	107.7	-38.0

EMI TEST

11 Apr 2016 11:15:19

1. MIL-STD 461E setups
1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -50 dB of Limit Line #3
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	786.75	110.9	-45.6
2	777.96	109	-47.5
3	779.95	107.7	-48.8

hp

EMI-TEST
EMISSION LEVEL [dBuV/m] PEAK

13 Apr 2016 07:27:02

RE-102 HERO Nuclear 600MHz-1GHz

Getac Inc PR046489

F110 PN 52628707000P

SN RF539F0595 AT&T 4G/LTE

Primary Firmware Vert Side 4

180

160

140

120

100

600

1000

Nuclear Unsafe

HERO SAFE 2-1

HERO UNSAFE 2-2

AT&T
4G/LTEVERIZON
4G/LTECELL BOOSTER / REPEATER
IN CHAMBER *

3G

FREQUENCY [MHz]

EMI-TEST

13 Apr 2016 07:27:02

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -37 dB of Limit Line #1

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	709.32	98.2	-34.7
2	707.16	97.9	-35.0
3	712.95	96.2	-36.7

EMI-TEST

13 Apr 2016 07:27:02

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -47 dB of Limit Line #2
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	709.32	98.2	-46.7

EMI-TEST

13 Apr 2016 07:27:02

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -58 dB of Limit Line #3
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	709.32	98.2	-57.9

hp

EMI-TEST
EMISSION LEVEL [dBuV/m]

PEAK

13 Apr 2016 08:06:48

180

RE-102 HERO Nuclear 1.7-2 GHz

Getac Inc PR046489

F110 PN 52628707000P

SN RF539F0595 AT&T 4G/LTE

Backup Firmware Vert Side 4

Nuclear Unsafe

160

HERO SAFE 2-1

HERO UNSAFE 2-2

140

120

100

1700

2000

FREQUENCY [MHz]

P2046489

EMI-TEST

13 Apr 2016 08:06:48

1. MIL-STD 461E setups

1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -40 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1893.2	101.6	-39.8

12046489

EMI-TEST

13 Apr 2016 08:06:48

1. MIL-STD 461E setups

1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -52 dB of Limit Line #2
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1893.2	101.6	-51.8

~~PR046489~~

EMI-TEST

13 Apr 2016 08:06:48

1. MIL-STD 461E setups

1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -59 dB of Limit Line #3
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1893.2	101.6	-58.5

hp

EMI-TEST
EMISSION LEVEL [dBuV/m]

PEAK

14 Apr 2016 13:12:01

180

RE-102 HERO Nuclear 600MHz-1GHz

Getac Inc PR046489

F110 PN 52628707000P

SN RF539F0595 AT&T 4G/LTE LPF

Primary Firmware Vert Side 4

160

Nuclear Unsafe

HERO SAFE 2-1

140

HERO UNSAFE 2-2

120

100

600

1000

FREQUENCY [MHz]

EMI-TEST

14 Apr 2016 13:12:01

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -32 dB of Limit Line #1

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	708.96	101.3	-31.6

P2046489

EMI-TEST

14 Apr 2016 13:12:01

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -44 dB of Limit Line #2

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	708.96	101.3	-43.6

P204689

EMI TEST

14 Apr 2016 13:12:01

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -55 dB of Limit Line #3
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	708.96	101.3	-54.8

hp

EMI-TEST

EMISSION LEVEL [dBuV/m]

PEAK

14 Apr 2016

13: 22: 38

180

160

140

120

100

600

1000

Nuclear Unsafe

HERO SAFE 2-1

HERO UNSAFE 2-2

RE-102 HERO Nuclear 600MHz-1GHz

Getac Inc PR046489

F110 PN 52628707000P

SN RF539F0595 AT&T 4G/LTE LPF

Backup Firmware Vert Side 4

FREQUENCY [MHz]

EMI-TEST

14 Apr 2016 13:22:38

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -36 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	707.88	97.7	-35.2
2	710.41	97.3	-35.6

EMI-TEST

14 Apr 2016 13:22:38

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -48 dB of Limit Line #2

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	707.88	97.7	-47.2
2	710.41	97.3	-47.6

EMI-TEST

14 Apr 2016 13:22:38

1. MIL-STD 461E setups
 1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -59 dB of Limit Line #3
 peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	707.88	97.7	-58.4
2	710.41	97.3	-58.8

hp

EMI-TEST
EMISSION LEVEL [dBuV/m]

PEAK

22 Apr 2016 08:03:10

180

RE-102 HERO Nuclear 1.7-2 GHz

Getac Inc PR046489

F110 PN 52628707000P

SN RF539F0595 AT&T 4G/LTE

Primary Firmware Vert Side 4

Nuclear Unsafe

160

HERO SAFE 2-1

HERO UNSAFE 2-2

140

120

100

1700

2000

FREQUENCY [MHz]

EMI-TEST

22 Apr 2016 08:03:10

1. MIL-STD 461E setups

1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -33 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1891.1	108.7	-32.7

EMI TEST

22 Apr 2016 08:03:10

1. MIL-STD 461E setups

1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -45 dB of Limit Line #2
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1891.1	108.7	-44.7

EMI TEST

22 Apr 2016 08:03:10

1. MIL-STD 461E setups

1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -52 dB of Limit Line #3
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1891.1	108.7	-51.4



RE102/HERO Testing

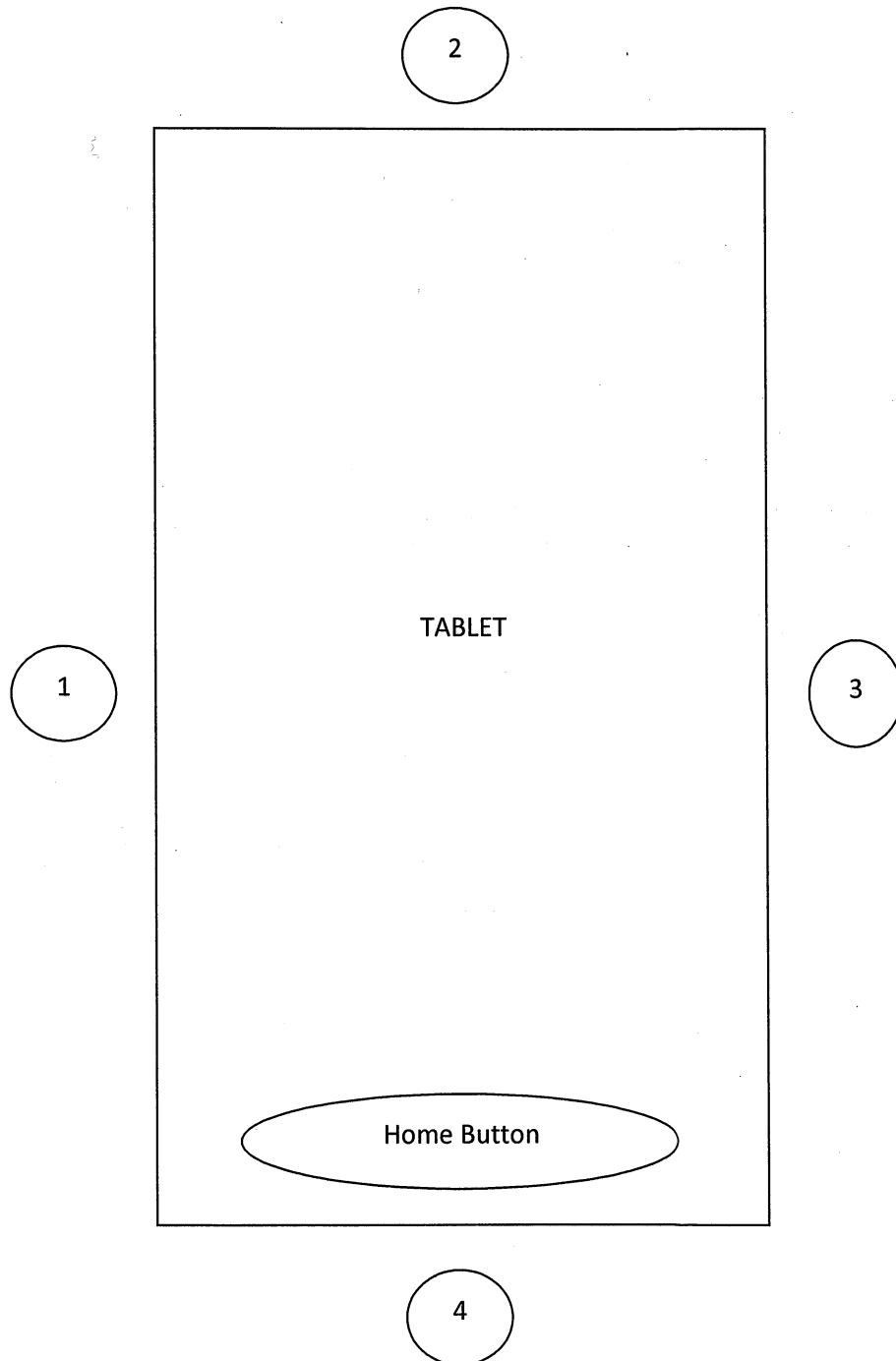
PR046489

RX10 Mode and Polarity	Frequency (MHz)	Measured RE102 dBuV/m	Converted HERO V/m	dB Below HERO Spec	Calculated Safe Distance	Effective Safe Distance
Verizon (Full Power) 3G Vert Edge 3	842.43	99	0.09	-35.4	0.67"	0"
Verizon (Full Power) 4G/LTE Vert Edge 3	783.54	103.2	0.14	-30.6	1.16"	0"
Verizon (Full Power) 4G/LTE Vert Edge 3	1723.9	106.8	0.22	-33.8	0.80"	0"
AT&T (Full Power) 3G Vert Edge 3	1908.6	123.2	1.45	-18.3	4.79"	0"
AT&T (Full Power) 4G/LTE Vert Edge 3	709.69	121.4	1.17	-11.5	10.48"	0"
AT&T (Full Power) 4G/LTE Vert Edge 3	1908.3	119.5	0.94	-22.0	3.13"	0"
802.11b 2.4GHz Vert Face (4)	2464.4	113.7	0.48	-30.0	1.24"	0"
802.11g 2.4GHz Vert Face (4)	2459.1	110.2	0.32	-33.5	0.83"	0"
802.11n 2.4GHz Vert Face (4)	2463.8	110	0.32	-33.7	0.81"	0"
802.11a 5GHz Vert Face (4)	5748.6	106.9	0.22	-44.1	0.25 "	0"
802.11n 5GHz Vert Face (4)	5747.6	107.1	0.23	-43.9	0.25"	0"
802.11ac 5GHz Vert Face (4)	5747.6	106.4	0.21	-44.6	0.23"	0"

Note: The Practical (Effective) Safe Distance between the RX10 and any ordinance is 0" because the antenna elements for the RX10 are internal.

RX10 Tablet		
Mode (Frequency)	Verizon (frequency/band)	Complete
Verizon 3G	850MHz (band 0)	x
Verizon 4G/LTE	700MHz (band 13, block C)	x
AT&T 3G	850MHz (band 5)	x
AT&T 4G/LTE	700MHz (band 17, block B/C) 1900MHz (band 2)	x
Mode	frequency/channel	Complete
802.11b	2.4GHz	x
802.11g	2.4GHz	x
802.11n	2.4GHz	x
802.11a	5GHz	x
802.11n	5GHz	x
802.11ac	5GHz	x

Apple IPAD Position of Highest Radiation		
Tablet	WiFi	Cellular
RX10	Vertical – Face (Edge 4 down)	Vertical – Edge 3



hp

EMI-TEST
EMISSION LEVEL [dBuV/m] PEAK

13 Apr 2016 14:04:46

180

RE-102 HERO Nuclear 2.3-2.5GHz

Getac Inc PR046489

RX10 PN 52628719001E

SN RG139R0076

802.11b (2.4GHz) Face Side 4

Nuclear Unsafe

160

HERO SAFE 2-1

HERO UNSAFE 2-2

140

120

100

2300

2500

FREQUENCY [MHz]

EMI-TEST

13 Apr 2016 14:04:46

1. MIL-STD 461E setups

1.39 RE-102 HERO Nuclear 2.3-2.5GHz

Peaks above -31 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	2464.4	113.7	-30.0
2	2460.5	113.6	-30.1
3	2463.8	113.3	-30.4
4	2462.4	112.9	-30.8

PR046489

EMI-TEST

13 Apr 2016 14:04:46

1. MIL-STD 461E setups

1.39 RE-102 HERO Nuclear 2.3-2.5GHz

Peaks above -43 dB of Limit Line #2

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	2464.4	113.7	-42.0
2	2460.5	113.6	-42.1
3	2463.8	113.3	-42.4
4	2462.4	112.9	-42.8

PR046489

EMI-TEST

13 Apr 2016 14:04:46

1. MIL-STD 461E setups

1.39 RE-102 HERO Nuclear 2.3-2.5GHz

Peaks above -48 dB of Limit Line #3
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	2464.4	113.7	-47.5
2	2460.5	113.6	-47.6
3	2463.8	113.3	-47.9

PR046489

hp

EMI-TEST
EMISSION LEVEL [dBuV/m] PEAK

13 Apr 2016 14:09:57

180

RE-102 HERO Nuclear 2.3-2.5GHz

Getac Inc PR046489

RX10 PN 52628719001E

SN RG139R0076

Nuclear Unsafe

802.11g (2.4GHz) Face Side 4

160

HERO SAFE 2-1

HERO UNSAFE 2-2

140

120

100

2300

2500

FREQUENCY [MHz]

EMI-TEST

13 Apr 2016 14:09:57

1. MIL-STD 461E setups

1.39 RE-102 HERO Nuclear 2.3-2.5GHz

Peaks above -34 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	2459.1	110.2	-33.5

PR046489

EMI-TEST

13 Apr 2016 14:09:57

1. MIL-STD 461E setups

1.39 RE-102 HERO Nuclear 2.3-2.5GHz

Peaks above -46 dB of Limit Line #2
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	2459.1	110.2	-45.5

PR046489

EMI-TEST

13 Apr 2016 14:09:57

1. MIL-STD 461E setups

1.39 RE-102 HERO Nuclear 2.3-2.5GHz

Peaks above -52 dB of Limit Line #3

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	2459.1	110.2	-51.0
2	2466.5	109.3	-51.9

PR046489

hp

EMI-TEST
EMISSION LEVEL [dBuV/m]

PEAK

13 Apr 2016 14:45:41

180

RE-102 HERO Nuclear 2.3-2.5GHz

Getac Inc PR046489

RX10 PN 52628719001E

SN RG139R0076

802.11n (2.4GHz) Face Side 4

Nuclear Unsafe

160

HERO SAFE 2-1

HERO UNSAFE 2-2

140

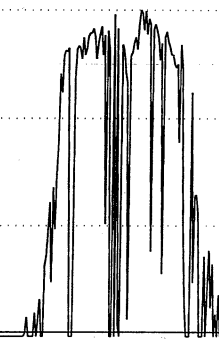
120

100

2300

2500

FREQUENCY [MHz]



EMI-TEST

13 Apr 2016 14:45:41

1. MIL-STD 461E setups
1.39 RE-102 HERO Nuclear 2.3-2.5GHz

Peaks above -34 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	2463.8	110	-33.7

PR046489

EMI-TEST

13 Apr 2016 14:45:41

1. MIL-STD 461E setups

1.39 RE-102 HERO Nuclear 2.3-2.5GHz

Peaks above -46 dB of Limit Line #2
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	2463.8	110	-45.7

PR046489

EMI-TEST

13 Apr 2016 14:45:41

1. MIL-STD 461E setups

1.39 RE-102 HERO Nuclear 2.3-2.5GHz

Peaks above -52 dB of Limit Line #3

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	2463.8	110	-51.2
2	2460.5	109.6	-51.6

PR046489

hp

EMI-TEST
EMISSION LEVEL [dBuV/m]

PEAK

13 Apr 2016 14:49:41

190

RE-102 HERO Nuclear 5-6GHz

Getac Inc PR046489

RX10 PN 52628719001E

SN RG139R0076

802.11a (5GHz) Face Side 4

170

Nuclear Unsafe

HERO SAFE 2-1

HERO UNSAFE 2-2

150

130

110

5000

6000

FREQUENCY [MHz]

EMI-TEST

13 Apr 2016 14:49:41

1. MIL-STD 461E setups

1.38 RE-102 HERO Nuclear 5-6GHz

Peaks above -45 dB of Limit Line #1

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	5748.6	106.9	-44.1
2	5743.4	106.6	-44.4

PR046489

EMI-TEST

13 Apr 2016 14:49:41

1. MIL-STD 461E setups
1.38 RE-102 HERO Nuclear 5-6GHz

Peaks above -57 dB of Limit Line #2
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	5748.6	106.9	-56.1
2	5743.4	106.6	-56.4

PR046489

EMI-TEST

13 Apr 2016 14:49:41

1. MIL-STD 461E setups

1.38 RE-102 HERO Nuclear 5-6GHz

Peaks above -58 dB of Limit Line #3
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	5748.6	106.9	-57.7

PR046489

hp

EMI-TEST
EMISSION LEVEL [dBuV/m]

PEAK

13 Apr 2016 15:02:42

190

RE-102 HERO Nuclear 5-6GHz

Getac Inc PR046489

RX10 PN 52628719001E

SN RG139R0076

802.11ac (5GHz) Face Side 4

170

Nuclear Unsafe

HERO SAFE 2-1

HERO UNSAFE 2-2

150

130

110

5000

6000

FREQUENCY [MHz]

EMI TEST

13 Apr 2016 15:02:42

1. MIL-STD 461E setups
1.38 RE-102 HERO Nuclear 5-6GHz

Peaks above -45 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	5747.6	106.4	-44.6

PR046489

EMI-TEST

13 Apr 2016 15:02:42

1. MIL-STD 461E setups
1.38 RE-102 HERO Nuclear 5-6GHz

Peaks above -57 dB of Limit Line #2
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	5747.6	106.4	-56.6

PR046489

EMI-TEST

13 Apr 2016 15:02:42

1. MIL-STD 461E setups
1.38 RE-102 HERO Nuclear 5-6GHz

Peaks above -59 dB of Limit Line #3
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	5747.6	106.4	-58.2

PR046489

hp

EMI-TEST
EMISSION LEVEL [dBuV/m]

PEAK

13 Apr 2016 14:54:50

190

RE-102 HERO Nuclear 5-6GHz

Getac Inc PR046489

RX10 PN 52628719001E

SN RG139R0076

802.11n (5GHz) Face Side 4

170

Nuclear Unsafe

HERO SAFE 2-1

HERO UNSAFE 2-2

150

130

110

5000

6000

FREQUENCY [MHz]

EMI-TEST

13 Apr 2016 14:54:50

1. MIL-STD 461E setups

1.38 RE-102 HERO Nuclear 5-6GHz

Peaks above -44 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	5747.6	107.1	-43.9

PR046489

EMI-TEST

13 Apr 2016 14:54:50

1. MIL-STD 461E setups

1.38 RE-102 HERO Nuclear 5-6GHz

Peaks above -56 dB of Limit Line #2
peak criteria = 6 dB

PR046489

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	5747.6	107.1	-55.9

EMI-TEST

13 Apr 2016 14:54:50

1. MIL-STD 461E setups
1.38 RE-102 HERO Nuclear 5-6GHz

Peaks above -58 dB of Limit Line #3
peak criteria = 6 dB

PR046489

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	5747.6	107.1	-57.5

hp

EMI-TEST
EMISSION LEVEL [dBuV/m]

PEAK

19 Apr 2016 10:54:11

RE-102 HERO Nuclear 1.7-2 GHz

Getac Inc PR046489

RX10 PN 52628719001E

SN RG139R0076 **FULL POWER**

AT&T 3G Vert Side 3

Nuclear Unsafe

HERO SAFE 2-1

HERO UNSAFE 2-2

180

160

140

120

100

1700

2000

FREQUENCY [MHz]

EMI-TEST

19 Apr 2016 10:54:11

PR046489

1. MIL-STD 461E setups

1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -20 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1908.6	123.2	-18.3

EMI-TEST

19 Apr 2016 10:54:11

PR046489

1. MIL-STD 461E setups

1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -35 dB of Limit Line #2

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1908.6	123.2	-30.3

EMI-TEST

19 Apr 2016 10:54:11

PR046489

1. MIL-STD 461E setups

1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -40 dB of Limit Line #3
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1908.6	123.2	-36.9

hp

EMI-TEST
EMISSION LEVEL [dBuV/m]

PEAK

20 Apr 2016 10:40:06

RE-102 HERO Nuclear 600MHz-1GHz
Getac Inc PR046489
RX10 PN 52628719001E
SN RG139R0076 Full Power
AT&T 4G/LTE Vert Side 3

180

160

140

120

100

600

1000

Nuclear Unsafe

HERO SAFE 2-1

HERO UNSAFE 2-2

AT&T
4G/LTE

VERIZON
4G/LTE

FREQUENCY [MHz]

EMI-TEST

20 Apr 2016 10:40:06

PR046489

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -12 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	709.69	121.4	-11.5

EMI-TEST

20 Apr 2016 10:40:06

PR046489

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -35 dB of Limit Line #3
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	709.69	121.4	-34.7

EMI-TEST

20 Apr 2016 10:40:06

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -24 dB of Limit Line #2
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	709.69	121.4	-23.5

hp

EMI-TEST
EMISSION LEVEL [dBuV/m]

PEAK

20 Apr 2016 13:17:35

RE-102 HERO Nuclear 600MHz-1GHz

Getac Inc PR046489

RX10 PN 52628719001E

SN RG139R0076 Full Power

Verizon 4G/LTE Vert Side 3

180

160

140

120

100

600

1000

Nuclear Unsafe

HERO SAFE 2-1

HERO UNSAFE 2-2

FREQUENCY [MHz]

EMI TEST

20 Apr 2016 13:17:35

PR046489

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -31 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	783.54	103.2	-30.6
2	781.94	102.9	-30.8

EMI-TEST

20 Apr 2016 13:17:35

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -43 dB of Limit Line #2
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	783.54	103.2	-42.6
2	781.94	102.9	-42.8

EMI-TEST

20 Apr 2016 13:17:35

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -54 dB of Limit Line #3
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	783.54	103.2	-53.3
2	781.94	102.9	-53.6
3	785.94	102.8	-53.7

hp

EMI-TEST

EMISSION LEVEL [dBuV/m]

PEAK

20 Apr 2016

14:03:31

180

RE-102 HERO Nuclear 1.7-2 GHz

Getac Inc PR046489

RX10 PN 52628719001E

SN RG139R0076 Full Power

Verizon 4G/LTE Vert Side 3

Nuclear Unsafe

160

HERO SAFE 2-1

HERO UNSAFE 2-2

140

120

100

1700

2000

FREQUENCY [MHz]

EMI-TEST

20 Apr 2016 14:03:31

1. MIL-STD 461E setups

1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -34 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1723.9	106.8	-33.8

EMI-TEST

20 Apr 2016 14:03:31

1. MIL-STD 461E setups

1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -46 dB of Limit Line #2
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1723.9	106.8	-45.8

EMI-TEST

20 Apr 2016 14:03:31

1. MIL-STD 461E setups

1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -53 dB of Limit Line #3
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1723.9	106.8	-52.9

hp

EMI-TEST
EMISSION LEVEL [dBuV/m]

PEAK

20 Apr 2016 14:35:36

RE-102 HERO Nuclear 1.7-2 GHz

Getac Inc PR046489

RX10 PN 52628719001E

SN RG139R0076 Full Power

AT&T 4G/LTE Vert Side 3

Nuclear Unsafe

HERO SAFE 2-1

HERO UNSAFE 2-2

180

160

140

120

100

1700

2000

FREQUENCY [MHz]

EMI-TEST

20 Apr 2016 14:35:36

1. MIL-STD 461E setups
1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -23 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1908.3	119.5	-22.0

EMI-TEST

20 Apr 2016 14:35:36

1. MIL-STD 461E setups
1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -35 dB of Limit Line #2
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1908.3	119.5	-34.0

EMI-TEST

20 Apr 2016 14:35:36

1. MIL-STD 461E setups
1.41 RE-102 HERO Nuclear 1.7-2 GHz

Peaks above -41 dB of Limit Line #3
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	1908.3	119.5	-40.6

hp

EMI-TEST
EMISSION LEVEL [dBuV/m]

PEAK

10 May 2016 09:02:06

RE-102 HERO Nuclear 600MHz-1GHz
Getac Inc PR046489
RX10 PN 52628719001E
SN RG139R0076 Full Power
Verizon 3G Vert Side 3

180

160

140

120

100

600

1000

Nuclear Unsafe

HERO SAFE 2-1

HERO UNSAFE 2-2

FREQUENCY [MHz]

EMI-TEST

10 May 2016 09:02:06

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -40 dB of Limit Line #1

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	842.43	99	-35.4

PR076789

EMI-TEST

10 May 2016 09:02:06

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -50 dB of Limit Line #2

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	842.43	99	-47.4

EMI-TEST

10 May 2016 09:02:06

1. MIL-STD 461E setups

1.40 RE-102 HERO Nuclear 600MHz-1GHz

Peaks above -60 dB of Limit Line #3

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV/m)	DELTA
1	842.43	99	-57.8

EQUIPMENT LIST

NTS ID	Description	Last Cal	Cal Due
<u>EMI HERO (RE102)</u>		<u>11-Apr-16</u>	
JV043 (Old ID #) JV043	HP Spec. analyzer, Option 462 Impulse Bandwidth Model No: 85662A Serial No: 3026A19911	20-Nov-15	30-Nov-16
JV044 (Old ID #) JV044	HP Spectrum analyzer Model No: 8566B Serial No: 3014A07158	20-Nov-15	30-Nov-16
JV045 (Old ID #) JV045	HP RF Preselector 20Hz - 2GHz Model No: 85685A Serial No: 2724A00672	20-Nov-15	30-Nov-16
TE0661 (Old ID #) TE0661	Emco Double Ridged Horn 1-18GHz Model No: 3115 Serial No: 2751	14-Jul-14	31-Jul-16
TE0783 (Old ID #) TE0783	EMCO Double Ridged Horn 200 - 2000 MHz Model No: 3106 Serial No: 2079	15-Jul-14	31-Jul-16
TE1207 (Old ID #) TE1207	Panashield EMI Chamber 20(W) x28x (D) x12(H) Model No: Custom Serial No:	MO	NCR

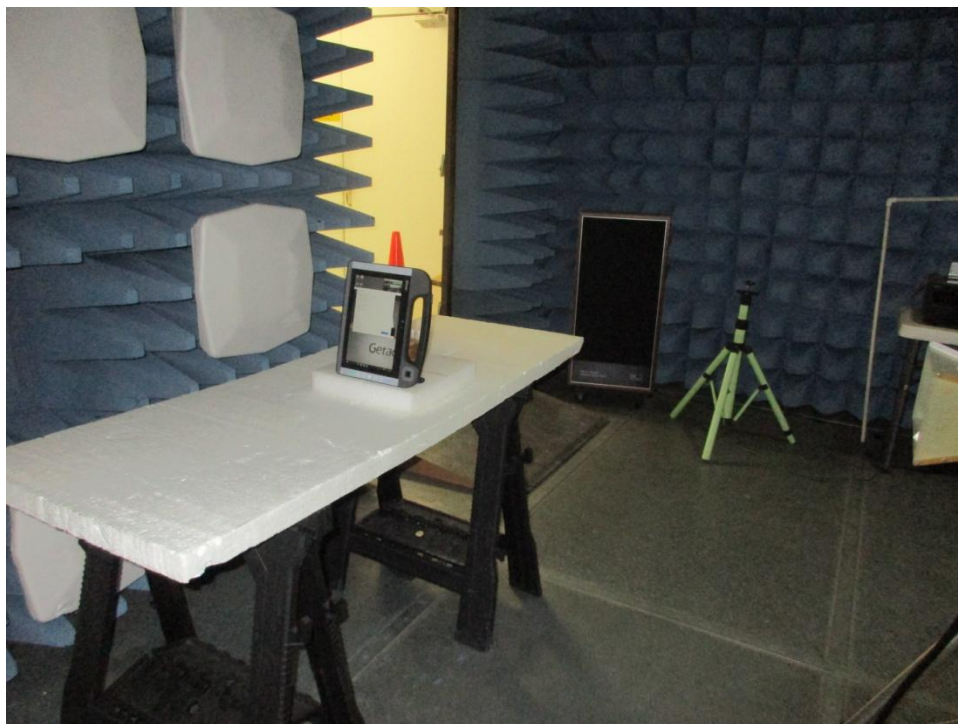
MO: Maintenance Only
NCR: No Calibration Required
VAT: Verified at Test
NPCR: No Periodic Calibration Required
FIO: For Indication Only



11 April 2016 -- HERO Wi-Fi Vertical Edge 4
Getac Inc. Tablet, P/N F110, S/N RF539F0595 & RF539F0597



13 April 2016 -- HERO Wi-Fi Vertical-Face Edge 4 Down
Getac Inc. Tablet, P/N RX10, S/N RG139R0076



19 April 2016 -- HERO Cellular Vertical Edge 3
Getac Inc. Tablet, P/N RX10, S/N RG139R0076

End of Report