**FCC CFR47 PART 15 SUBPART C**

**MANUFACTURER'S TEST REPORT**

**FOR**

**WIRELESS SHOCK PROCESSOR AND TRANSMITTER**

**MODEL NUMBER: 5819S**

**FCC ID: CFS8DL5819S**

**REPORT NUMBER: R10784367-E1A**

**ISSUE DATE: 2015-09-11**

*Prepared for*
**HONEYWELL SECURITY**
**2 CORPORATE CENTER DR**
**SUITE 100 PO BOX 9040**
**MELVILLE**
**NY, 11747, USA**

*Prepared by*
**UL LLC**
**12 LABORATORY DR.**
**RESEARCH TRIANGLE PARK, NC 27709 USA**
**TEL: (919) 549-1400**

NVLAP Lab code: 200246-0

Revision History

| Ver. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| 1 | 2015-06-23 | Initial Issue | Jeff Moser |
| 2 | 2015-09-11 | Revised antenna type (page 7), 15.231e limits to 15.231b limits (Section 7.1) and Test Procedure info (page 14). | Jeff Moser |

# TABLE OF CONTENTS

# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** HONEYWELL SECURITY
2 CORPORATE CENTER DR
SUITE 100 PO BOX 9040
MELVILLE, NY, 11747, USA

**EUT DESCRIPTION:** WIRELESS SHOCK PROCESSOR AND TRANSMITTER

**MODEL:** 5819S

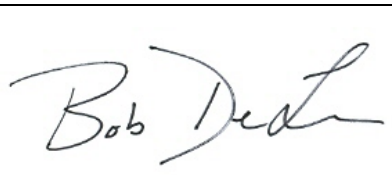
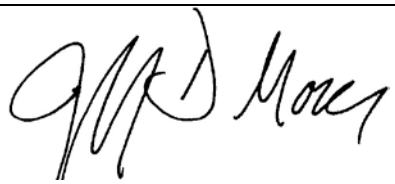
**SERIAL NUMBER:** Non-serialized sample (Sample #1)

**DATE TESTED:** June 03-04, 2015

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| FCC PART 15 SUBPART C (Duty Cycle, Fundamental and Spurious Emissions, only). | PASS |

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

| Approved & Released For UL LLC By: | Prepared By: |
|---|---|
|  |  |
| Bob DeLisi | Jeff Moser |
| Certification Engineer | EMC Program Manager |
| UL – Consumer Technology Division | UL – Consumer Technology Division |

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2 and FCC CFR 47 Part 15. This report is a manufacturer's specification report that included duty cycle, fundamental and radiated spurious, only.

Note – Radiated testing above 1GHz was performed on a 1.5m table height, per ANSI C63.10: 2013. All other testing was performed per ANSI C63.10: 2009.

# 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA.

| 12 Laboratory Dr., RTP, NC 27709 |
|---|
| ☐ Chamber A |
| ☒ Chamber C |

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2002460.htm.

# 4. CALIBRATION AND UNCERTAINTY

## 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

## 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

## 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Test | Uncertainty |
|---|---|
| Radiated Emissions (0.01-30 MHz) | +/- 2.14 dB |
| Radiated Emissions (30-1000 MHz) | +/- 6.04 dB (3m) |
| Radiated Emissions (1-6 GHz) | +/- 5.96 dB |

Uncertainty figures are valid to a confidence level of 95%.

# 5. EQUIPMENT UNDER TEST

## 5.1. DESCRIPTION OF EUT

The EUT is a wireless shock processor and transmitter intended for security purposes. The transmitter operates at 344.94 MHz.

## 5.2. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a rigid wire antenna.

## 5.3. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was ESK5985-XXXXA-X, rev. E.

The test utility software used during testing was ESK5985-XXXXA-X, rev. E

## 5.4. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z. It was determined that the X orientation was the worst-case orientation. Therefore, all final radiated testing was performed with the EUT in X orientation.

## 5.5. MODIFICATIONS

No modifications were made during testing.

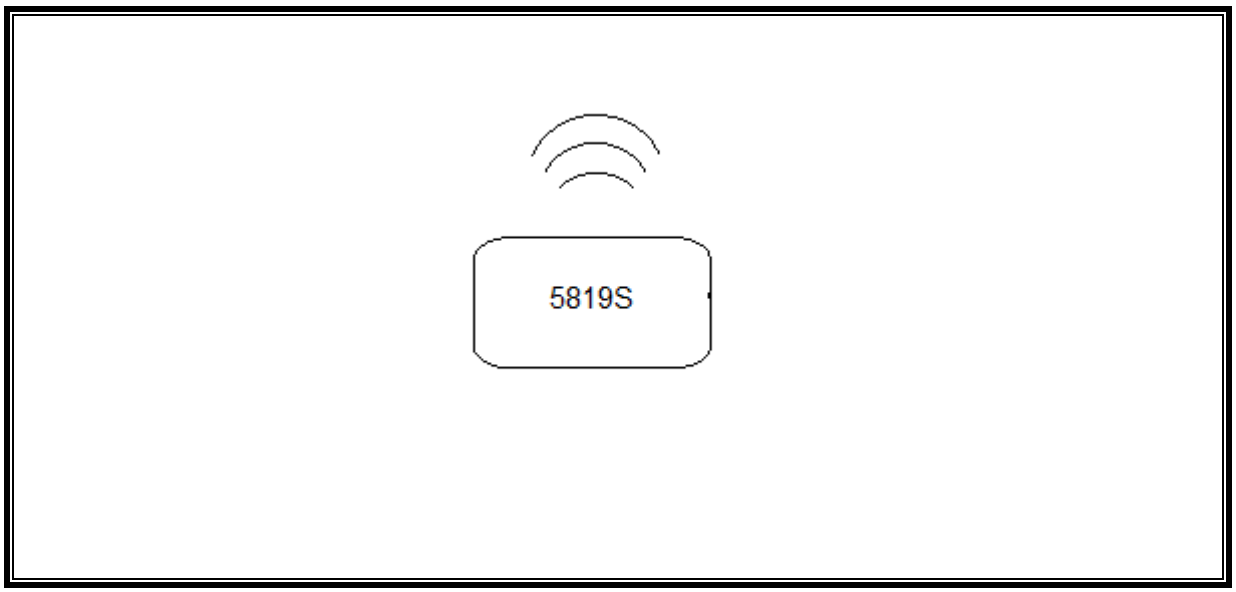
## 5.6. DESCRIPTION OF TEST SETUP

**I/O CABLES - None**

**TEST SETUP**

The EUT is installed as a table top device. Test software exercised the radio card.

**SETUP DIAGRAM FOR TESTS**



# 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Radiated Emission Measurement Equipment

| Equip. ID | Description | Manufacturer | Model Number | Last Cal. | Next Cal. |
|---|---|---|---|---|---|
| AT0059 | Active Loop Antenna | EMCO | 6502 | 2015-03-17 | 2016-03-31 |
| AT0066 | Hybrid Broadband Antenna | Sunol Sciences Corp. | JB1 | 2014-07-10 | 2015-07-31 |
| AT0062 | Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz | ETS Lindgren | 3117 | 2014-07-22 | 2015-07-31 |
| SAC_G (Hybrid) | Gain-Loss string for Hyrbid antenna at 3m | Various | Various | 2015-02-01 | 2016-02-29 |
| SAC_G (3117) | Gain-Loss string for 3117 antenna at 3m | Various | Various | 2015-02-01 | 2016-02-29 |
| SA0018 | Spectrum Analyzer | Agilent | N9030A | 2014-06-26 | 2015-06-30 |
| SOFTEMI | EMI Software | UL | Version 9.5 | NA | NA |
| HI0069 | Temp/Humid/Pressure Meter | Cole-Parmer | 99760-00 | 2014-06-27 | 2015-06-27 |

## 6.1. DUTY CYCLE

**LIMITS**

FCC §15.35 (c)
The measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

**CALCULATION**

Average Reading = Peak Reading (dBuV/m) + 20log (Duty Cycle), Where Duty Cycle is
(# of long pulses * long pulse width) + (# of short pulses * short pulse width) / 100 or T

**RESULTS**

The manufacturer declared the worst-case duty cycle to be 10%, which translates into a duty cycle correction factor of -20.0dB.

# 7. RADIATED EMISSION TEST RESULTS

## 7.1. TX RADIATED SPURIOUS EMISSION

**LIMITS**

FCC §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 emission (microvolts/meter) |
|---|---|---|
| 40.66-40.70 | 2250 | 225 |
| 70-130 | 1250 | 125 |
| 130-174 | 1250 to 3750[1] | 125 to 375[1] |
| 174-260 | 3750 | 375 |
| 260-470 | 3750 to 12,500[1] | 375 to 1250[1] |
| Above 470 | 12,500 | 1250 |

1 Linear interpolation

Note – This is a manufacturer's specification report. Verification of restrictions noted in 15.231 (a)(3) were not conducted. Duty cycle measurements were also not conducted.

§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 |
| [1]0.495 - 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 - | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.52525 | 2655 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 156.7 - 156.9 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 162.0125 - 167.17 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 167.72 - 173.2 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 240 - 285 | 3600 - 4400 | ([2]) |
| 13.36 – 13.41 | 322 - 335.4 | | |

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
2 Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30.0 | 30 | 30 |
| 30-88 | 100** | 3 |
| 88-216 | 150** | 3 |
| 216-960 | 200** | 3 |
| Above 960 | 500 | 3 |

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 72 MHz, 76 88 MHz, 174 216 MHz or 470 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

**TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz measurements and 1.5 m above the ground plane for above 1GHz measurements. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

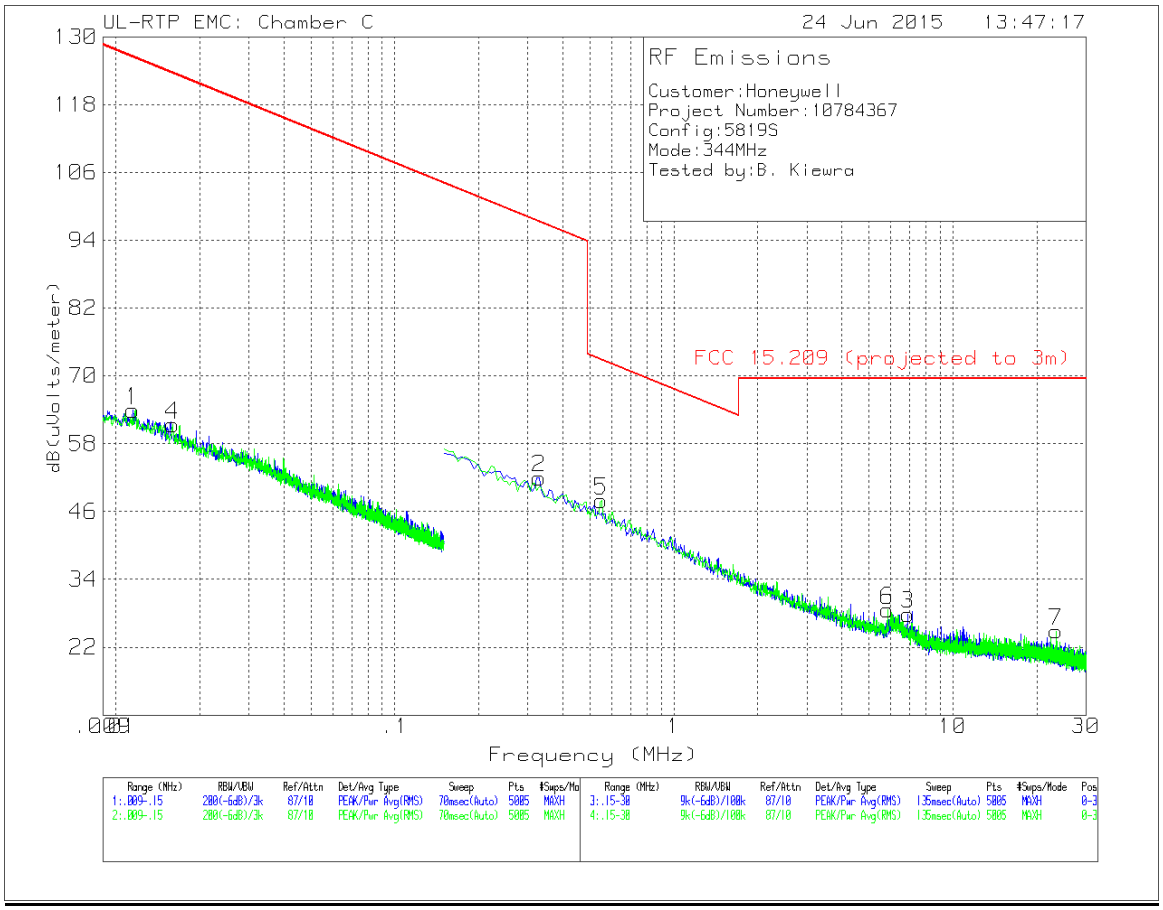
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 1 MHz for peak measurements and as applicable for average measurements.

The spectrum from 30 MHz to 4 GHz is investigated with the transmitter set to the transmit frequency in each applicable band.

The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

## RESULTS

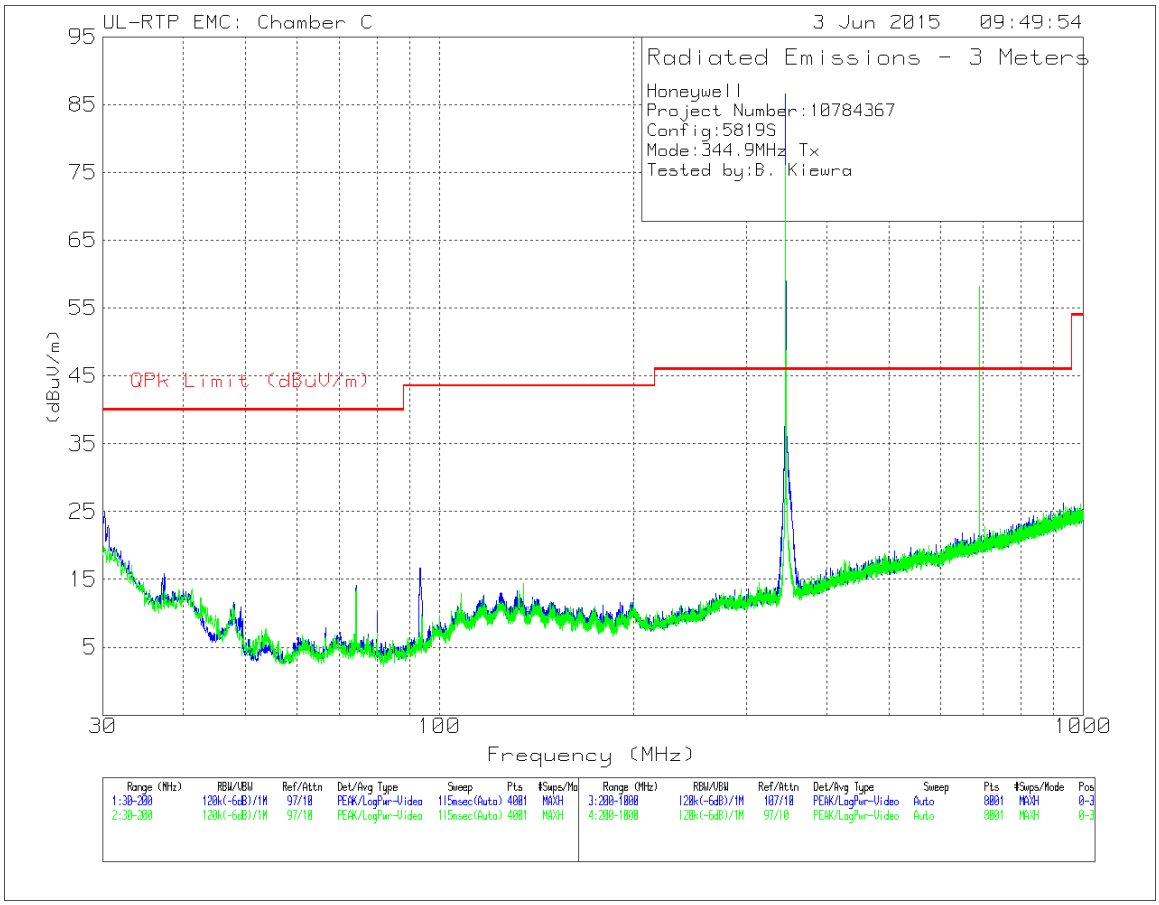
## HARMONICS AND TX SPURIOUS EMISSION (10kHz – 30MHz)




| Marker | Frequency (MHz) | Meter Reading (dBuV) | Det | AF (dB/m) | Amp/Cbl/ Fltr/Pad | ATA216 Cable (dB) | Corrected Reading dB(uVolts/ meter) | FCC 15.209 (projected to 3m) | Margin (dB) | Azimuth (Degs) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .012 | 45.10 | Pk | 18.8 | 0 | 0 | 63.90 | 126.38 | -62.48 | 0-360 |
| 4 | .016 | 44.74 | Pk | 16.6 | 0 | 0 | 61.34 | 123.54 | -62.20 | 0-360 |
| 2 | .329 | 41.45 | Pk | 10.3 | .1 | .1 | 51.95 | 97.26 | -45.31 | 0-360 |
| 5 | .550 | 37.32 | Pk | 10.4 | .1 | .1 | 47.92 | 72.80 | -24.88 | 0-360 |
| 6 | 5.829 | 17.40 | Pk | 10.7 | .3 | .2 | 28.60 | 69.54 | -40.94 | 0-360 |
| 3 | 6.902 | 16.53 | Pk | 10.7 | .3 | .3 | 27.83 | 69.54 | -41.71 | 0-360 |
| 7 | 23.420 | 14.17 | Pk | 9.6 | .6 | .5 | 24.87 | 69.54 | -44.67 | 0-360 |

Pk - Peak detector

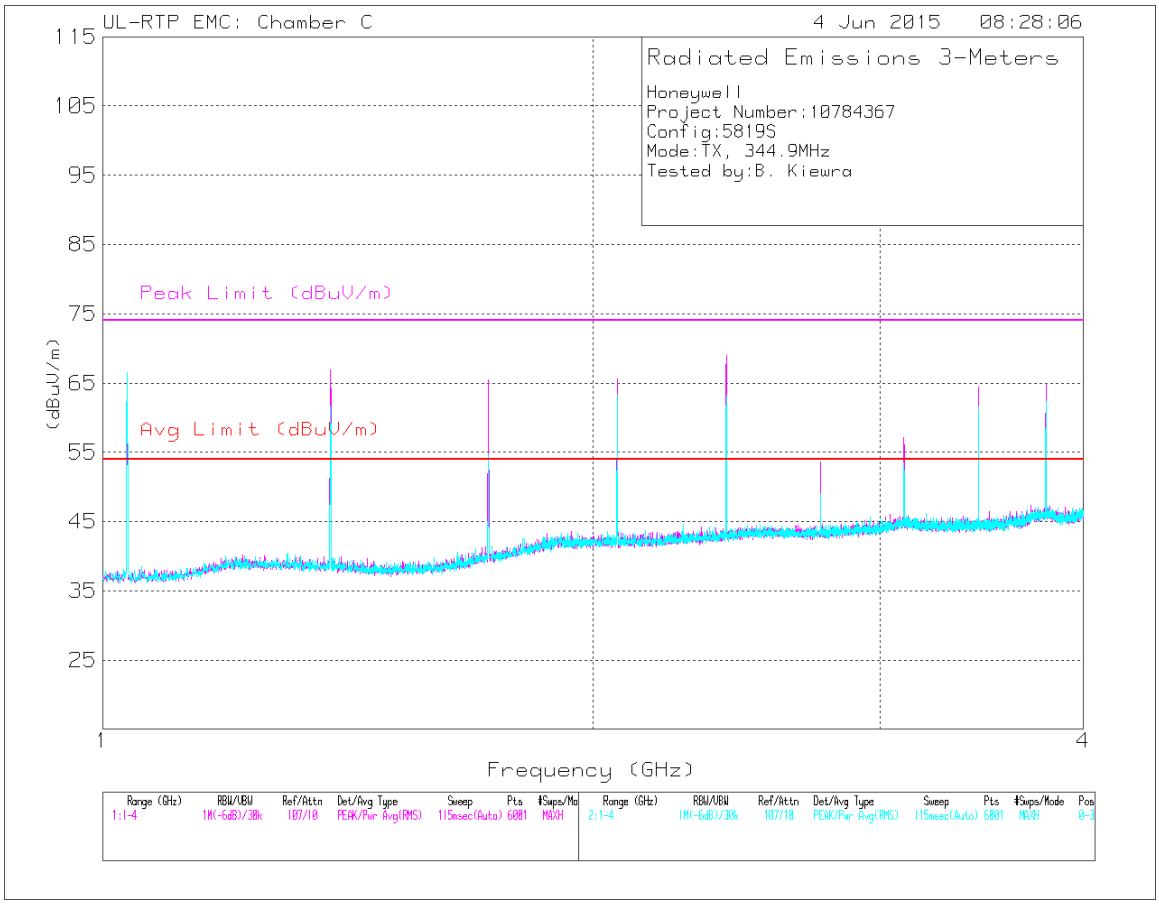
## FUNDAMENTAL, HARMONICS AND TX SPURIOUS EMISSION (30 – 1000 MHz)




Customer: Honeywell
Project Number: 10784367
Config: 5819S
Mode: 344.9MHz Tx
Tested by: B. Kiewra

| Freq (MHz) | Meter Reading [dBuV] | Detector* | Antenna Factor [dB/m] | Gain/Loss [dB] | Peak Field Strength [dBuV/m] | FCC 15.231 Peak Limit [dBuV/m] | Margin [dB] | DCF (dB) | Average Field Strength [dBuV/m] | FCC 15.231 Average Limit [dBuV/m] | Margin [dB] | Azimuth [Degs] | Height [cm] | Antenna Polarity | In Restricted Band? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 344.94 | 101.70 | Pk | 14.10 | -29.60 | 86.2 | 97.3 | -11.1 | -20.0 | 66.2 | 77.3 | -11.1 | 294 | 102 | H | N |
| 689.88 | 67.97 | Pk | 20.00 | -28.60 | 59.4 | 77.3 | -17.9 | -20.0 | 39.4 | 57.3 | -17.9 | 313 | 126 | H | N |
| | | | | | | | | | | | | | | | |
| 344.94 | 91.49 | Pk | 14.10 | -29.60 | 76.0 | 97.3 | -21.3 | -20.0 | 56.0 | 77.3 | -21.3 | 196 | 212 | V | N |
| 689.88 | 66.90 | Pk | 20.00 | -28.60 | 58.3 | 77.3 | -19.0 | -20.0 | 38.3 | 57.3 | -19.0 | 129 | 100 | V | N |
| *PK = Peak, QP = Quasi-Peak | | | | | | | | | | | | | | | |
| Average Field Strength computed as follows for the above fundamental and harmonics: PK + DCF, where DCF is a duty-cycle correction factor based on the manufacturer's declared worst-case duty cycle of 10%. | | | | | | | | | | | | | | | |

## HARMONICS AND TX SPURIOUS EMISSIONS ABOVE 1GHz




Customer: Honeywell
Project Number: 10784367
Config: 5819S
Mode: 344.9MHz Tx
Tested by: B. Kiewra

| Freq (GHz) | Meter Reading [dBuV] | Detector* | Antenna Factor [dB/m] | Gain/Loss [dB] | Peak Field Strength [dBuV/m] | 15.231 Peak Limit [dBuV/m] | Margin [dB] | DCF (dB) | Average Field Strength [dBuV/m] | FCC 15.231 Average Limit [dBuV/m] | Margin [dB] | Azimuth [Degs] | Height [cm] | Antenna Polarity | In Restricted Band? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.035 | 66.38 | Pk | 27.10 | -30.20 | 63.28 | 74.0 | -10.7 | -20.0 | 43.3 | 54.0 | -10.7 | 111 | 107 | H | Y |
| 1.380 | 67.82 | Pk | 28.40 | -29.30 | 66.92 | 74.0 | -7.1 | -20.0 | 46.9 | 54.0 | -7.1 | 292 | 302 | H | Y |
| 1.725 | 64.23 | Pk | 29.50 | -28.30 | 65.43 | 77.3 | -11.8 | -20.0 | 45.4 | 57.3 | -11.8 | 282 | 216 | H | N |
| 2.070 | 61.61 | Pk | 31.50 | -27.50 | 65.61 | 77.3 | -11.6 | -20.0 | 45.6 | 57.3 | -11.6 | 331 | 300 | H | N |
| 2.415 | 63.53 | Pk | 32.10 | -26.60 | 69.03 | 77.3 | -8.2 | -20.0 | 49.0 | 57.3 | -8.2 | 101 | 249 | H | N |
| 2.760 | 47.50 | Pk | 32.30 | -26.20 | 53.60 | 74.0 | -20.4 | -20.0 | 33.6 | 54.0 | -20.4 | 312 | 115 | H | Y |
| 3.105 | 49.54 | Pk | 33.30 | -25.70 | 57.14 | 77.3 | -20.1 | -20.0 | 37.1 | 57.3 | -20.1 | 83 | 350 | H | N |
| 3.450 | 56.52 | Pk | 32.80 | -24.90 | 64.42 | 77.3 | -12.8 | -20.0 | 44.4 | 57.3 | -12.8 | 298 | 291 | H | N |
| 3.795 | 56.48 | Pk | 33.40 | -24.90 | 64.98 | 74.0 | -9.0 | -20.0 | 45.0 | 54.0 | -9.0 | 323 | 359 | H | Y |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 1.035 | 69.56 | Pk | 27.10 | -30.20 | 66.46 | 74.0 | -7.5 | -20.0 | 46.5 | 54.0 | -7.5 | 169 | 249 | V | Y |
| 1.380 | 62.43 | Pk | 28.40 | -29.20 | 61.63 | 74.0 | -12.4 | -20.0 | 41.6 | 54.0 | -12.4 | 98 | 116 | V | Y |
| 1.725 | 53.52 | Pk | 29.50 | -28.30 | 54.72 | 77.3 | -22.5 | -20.0 | 34.7 | 57.3 | -22.5 | 168 | 378 | V | N |
| 2.070 | 59.22 | Pk | 31.50 | -27.50 | 63.22 | 77.3 | -14.0 | -20.0 | 43.2 | 57.3 | -14.0 | 210 | 128 | V | N |
| 2.415 | 57.64 | Pk | 32.10 | -26.60 | 63.14 | 77.3 | -14.1 | -20.0 | 43.1 | 57.3 | -14.1 | 21 | 379 | V | N |
| 2.760 | 42.87 | Pk | 32.30 | -26.20 | 48.97 | 74.0 | -25.0 | -20.0 | 29.0 | 54.0 | -25.0 | 217 | 161 | V | Y |
| 3.105 | 45.89 | Pk | 33.30 | -25.70 | 53.49 | 77.3 | -23.8 | -20.0 | 33.5 | 57.3 | -23.8 | 12 | 366 | V | N |
| 3.450 | 53.72 | Pk | 32.80 | -24.90 | 61.62 | 77.3 | -15.6 | -20.0 | 41.6 | 57.3 | -15.6 | 64 | 109 | V | N |
| 3.795 | 53.90 | Pk | 33.40 | -24.90 | 62.40 | 74.0 | -11.6 | -20.0 | 42.4 | 54.0 | -11.6 | 211 | 102 | V | Y |

*PK = Peak, Av = Average

Average Field Strength computed as follows for the above fundamental and harmonics: PK + DCF, where DCF is a duty-cycle correction factor based on the manufacturer's declared worst-case duty cycle of 10%.

# END OF REPORT