



TEST REPORT

Test Report No. : UL-RPT-RP12122204-716A V3.0

Manufacturer : Philips Lifeline Systems Inc.
Model No. : 319PHB
FCC ID : BDZ319PHB
Technology : SRD
Test Standard(s) : FCC Parts 15.209(a) & 15.231

1. This test report shall not be reproduced in full or partial, without the written approval of UL VS LTD.
2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 3.0 supersedes all previous versions.

Date of Issue: 13 AUGUST 2018

Checked by:

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Senior Test Engineer, Radio Laboratory

Company Signatory:

Sarah Williams
Senior Test Engineer, Radio Laboratory
UL VS LTD



This laboratory is accredited by UKAS.
The tests reported herein have been
performed in accordance with its terms
of accreditation.

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1. Customer Information

Company Name:	Philips Lifeline Systems Inc.
Address:	111 Lawrence Street, Framingham MA 01702 - USA

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.231
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Radio Frequency Devices) - Section 15.231
Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.209
Site Registration:	209735
Location of Testing:	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	12 April 2018 to 27 June 2018

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.231(a) & (b)	Transmitter Fundamental Field Strength	
Part 15.231(c)	Transmitter 20 dB Bandwidth	
Part 15.231(a)	Periodic Operation	
Part 15.35(c)	Transmitter Duty Cycle	
Part 15.231(b) & 15.209	Transmitter Radiated Emissions	
Key to Results  = Complied  = Did not comply		

2.3. Methods and Procedures

Reference:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	Philips Lifeline
Model Name or Number:	319PHB
Test Sample Serial Number:	01180322000123 (<i>Radiated sample #1</i>)
Hardware Version:	PHB_V1.0
Software Version:	319PHB_1002_cont
FCC ID:	BDZ319PHB

Brand Name:	Philips Lifeline
Model Name or Number:	319PHB
Test Sample Serial Number:	01180322000108 (<i>Radiated sample #2</i>)
Hardware Version:	PHB_V1.0
Software Version:	319PHB_1002
FCC ID:	BDZ319PHB

3.2. Description of EUT

The Equipment Under Test was a Personal Help Button. It is a signal initiating device for emergency alarm systems and contains a 319.5 MHz transmitter. It is powered from an internal 3.0 Volt battery.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Power Supply Requirement:	Nominal	3.0 Volt lithium battery
Type of Unit:	Transceiver	
Modulation	Amplitude-shift keying (On-Off keying)	
Transmit Frequency Range:	319.5 MHz	

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	3.0 Volt lithium battery
Brand Name:	Panasonic
Model Name or Number:	CR 2032
Serial Number:	Not marked or stated

4. Operation and Monitoring of the EUT during Testing

4.4. Operating Modes

The EUT was tested in the following operating test modes, unless otherwise stated:

- Transmitting with a modulated carrier at maximum output power on a fixed frequency of 319.5 MHz.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration:

- The EUT was fitted with an internal 3 Volt battery. A fully charged battery was used for all tests.
- All measurements were performed as radiated tests.
- Fundamental field strength, 20 dB emission bandwidth and radiated emissions tests were performed using a modified sample that was supplied continuously transmitting (Serial Number: 01180322000123). This unit transmitted continuously as soon as the battery was connected.
- Periodic operation and duty cycle tests were performed using an unmodified sample (Serial Number: 01180322000108).
- The customer supplied a document named 'Lynx Device description' dated 28th March 2018. This contained the operational description of the EUT.
- As a result of FCC KDB correspondence, additional testing has been carried out to support the worst-case duty cycle.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter Fundamental Field Strength

Test Summary:

Test Engineer:	Andrew Edwards	Test Date:	12 April 2018
Test Sample Serial Number:	01180322000123		

FCC Reference:	Part 15.231(a) & Part 15.231(b)
Test Method Used:	ANSI C63.10 Section 7.6.1 and Sections 6.3 & 6.5 (see note below)

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	42

Note(s):

- The EUT has a manually operated transmitter that ceases to transmit in less than 5 seconds as required by §15.231(a)(1). The EUT also automatically transmits a status message 8 data packets at pseudo-random intervals between 64.5 and 67.59 minutes. Each transmission contains eight data packets and the transmission time is 17.9 ms. There is a maximum of two transmissions within 100 ms. The total transmission is therefore less than two seconds per hour as required by §15.231(a)(3).
- To obtain the average limit at the fundamental frequency of 319.5 MHz (which is not in a restricted band), the $\mu\text{V/m}$ field strength values shown in §15.231(b) were linearly interpolated and then converted to $\text{dB}\mu\text{V/m}$. The limit at 260 MHz (f_{lower}) is 3,750 $\mu\text{V/m}$ and at 470 MHz (f_{upper}) it is 12,500 $\mu\text{V/m}$. The limit at 319.5 MHz was calculated following the procedure shown in ANSI C63.10 Section 7.6.2:

$$\text{Limit } [\mu\text{V/m}] = \text{Lim}_{\text{lower}} + \Delta F [(\text{Lim}_{\text{upper}} - \text{Lim}_{\text{lower}}) / (f_{\text{upper}} - f_{\text{lower}})]$$

$$\text{where } \Delta F = f_c - f_{\text{lower}} = 319.5 - 260 = 59.5$$

$$\text{Limit} = 3750 + 59.5 * [(12500 - 3750) / (470 - 260)]$$

$$= 3750 + 59.5 * [8750 / 210]$$

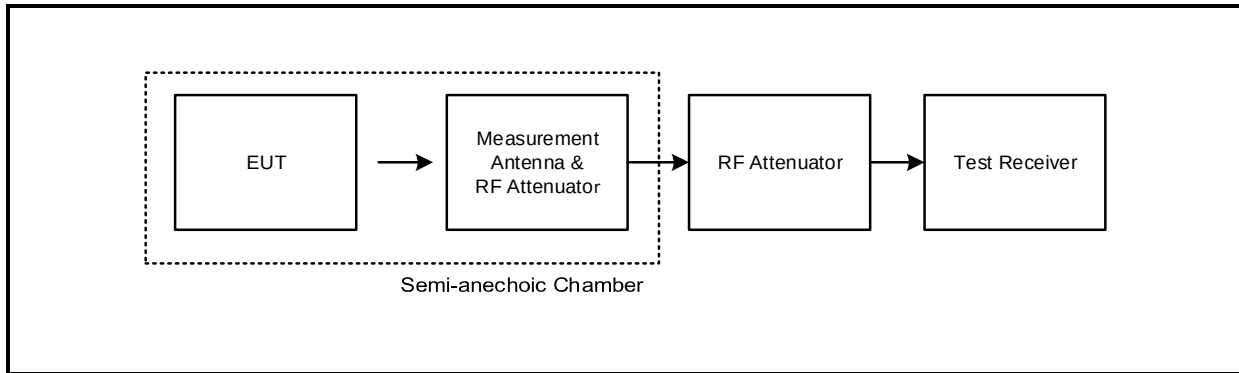
$$= 6229.2 \mu\text{V/m}$$

$$\text{dB}\mu\text{V/m} = 20 * \log (\mu\text{V/m})$$

$$= 20 * \log (6229.2 \mu\text{V})$$

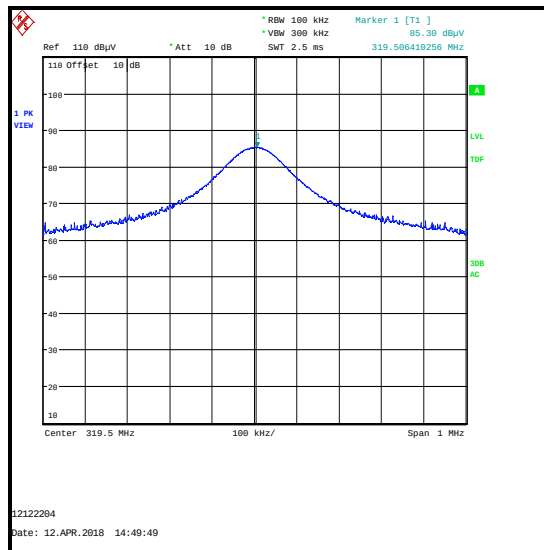
$$\text{Average Limit at 319.5 MHz} = 75.9 \text{ dB}\mu\text{V/m}$$

- The average level of the fundamental was determined by subtracting the duty cycle correction factor from the measured peak level.
- Measurements were made with the test antenna in the horizontal and vertical planes and the EUT in the X, Y and Z planes. The highest level was recorded in the below table.

Transmitter Fundamental Field Strength (continued)**Test setup:**

Transmitter Fundamental Field Strength (continued)**Results:**

Frequency (MHz)	Peak Level (dBμV/m)	Duty Cycle Correction (dB)	Average Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
319.500	85.3	-16.0	69.3	75.9	6.6	Complied

**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2003	Thermohygrometer	Testo	608-H1	45046641	27 Feb 2019	12
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	21 Feb 2019	12
M1630	Test Receiver	Rohde & Schwarz	ESU40	100233	03 Aug 2018	12
A2888	Antenna	Schwarzbeck	VULB 9163	9163-941	25 Apr 2018	12
A2147	Attenuator	AtlanTecRF	AN18-06	09020206-06	25 Apr 2018	12
A2916	Attenuator	AtlanTecRF	AN18W5-10	832827#1	21 Feb 2019	12

5.2.2. Transmitter 20 dB Bandwidth**Test Summary:**

Test Engineer:	Ian Watch	Test Date:	27 June 2018
Test Sample Serial Number:	01180322000123		

FCC Reference:	Part 15.231(c)
Test Method Used:	ANSI C63.10 Section 6.9.2

Environmental Conditions:

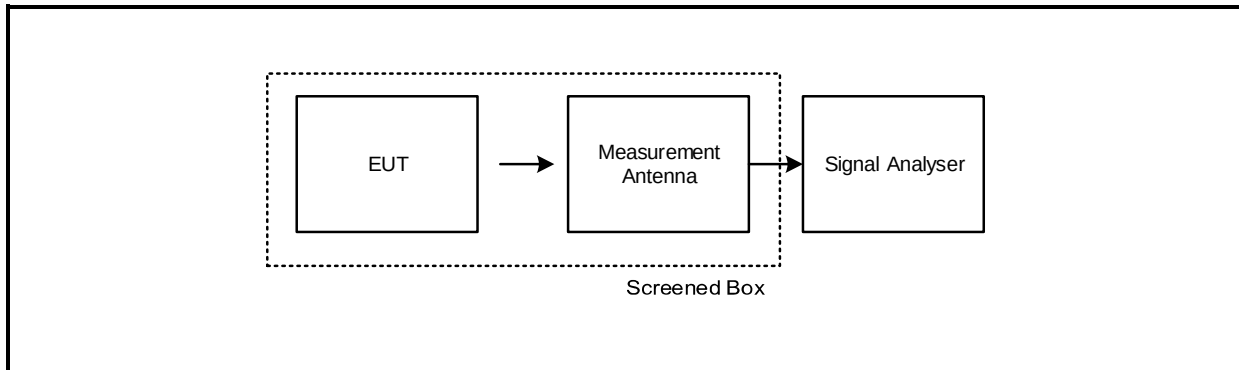
Temperature (°C):	21
Relative Humidity (%):	45

Note(s):

1. The 20 dB bandwidth of the emission shall be no wider than 0.25% of the centre frequency of the EUT.
2. The limit has been calculated as:

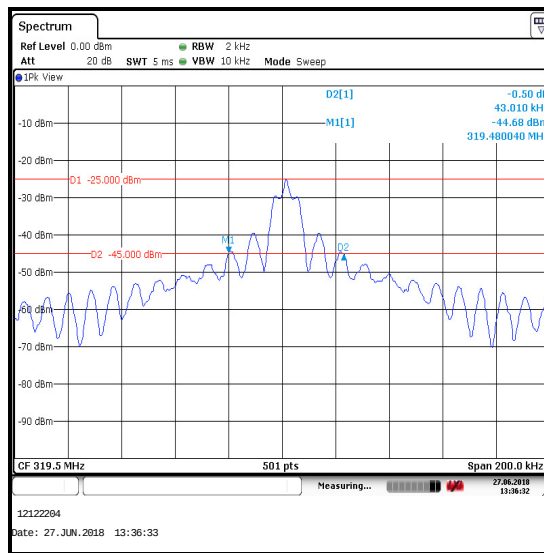
$$0.0025 * 319.5 \text{ MHz} = 0.79875 \text{ MHz}$$

3. During measurements, the RBW was set to 2 kHz which is between 1 and 5% of the occupied bandwidth. The VBW was set to 10 kHz which is as close to 3 x RBW as the signal analyser allowed without being below 3 x RBW.

Test setup:

Transmitter 20 dB Bandwidth (continued)**Results:**

Transmitter 20 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
43.010	798.750	755.74	Complied

**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2038	Thermohygrometer	Testo	608-H1	45124919	27 Mar 2019	12
M2033	Signal Analyser	Rohde & Schwarz	FSV13	101667	31 May 2019	12

5.2.3. Periodic Operation**Test Summary:**

Test Engineer:	Ian Watch	Test Dates:	29 April 2018 & 27 June 2018
Test Sample Serial Number:	01180322000108		

FCC Reference:	Part 15.231(a)
Test Method Used:	ANSI C63.10 Section 7.4

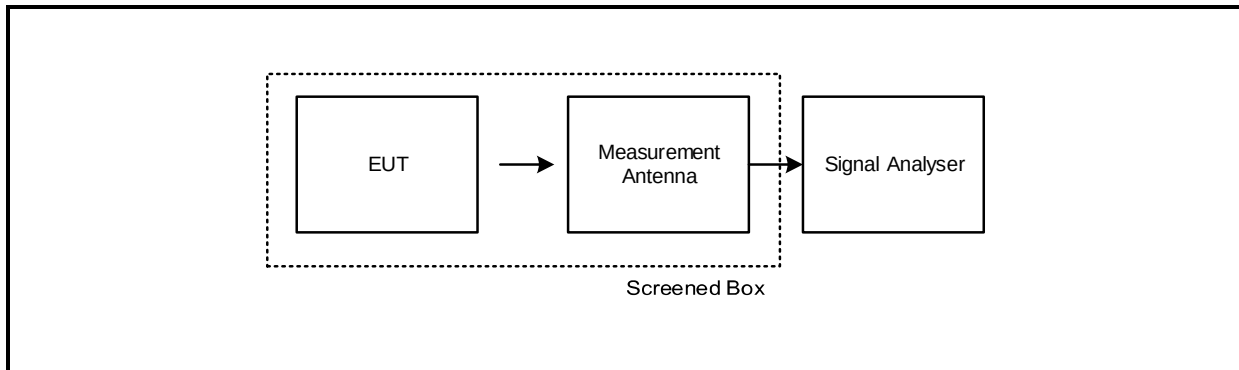
Environmental Conditions:

Temperature (°C):	22 to 24
Relative Humidity (%):	42 to 44

Note(s):

1. The customer declared an emergency transmission period of 8 data packets duration when the user button is manually pressed and an automatic periodic status message transmission of 8 data packets duration at pseudo-random intervals between 64.5 and 67.59 minutes.
2. Tests were performed to verify the declared transmission periods.
3. One periodic transmission was observed within a 70 minute measurement period. The transmission consisted of 8 data packets with each packet having an 18 ms duration. Total transmission time of the packets (using 100 % duty cycle within each packet as worst case):

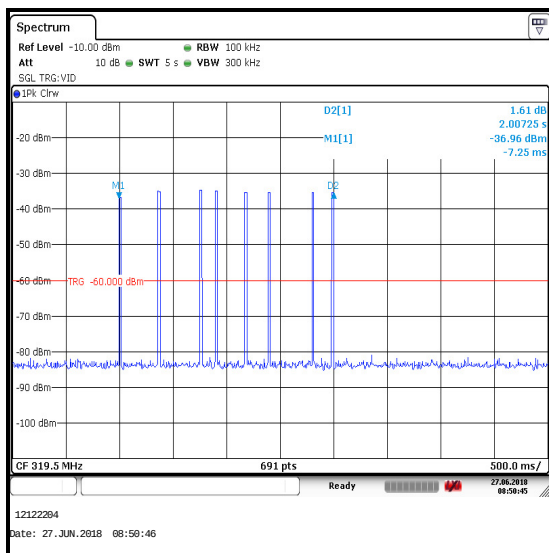
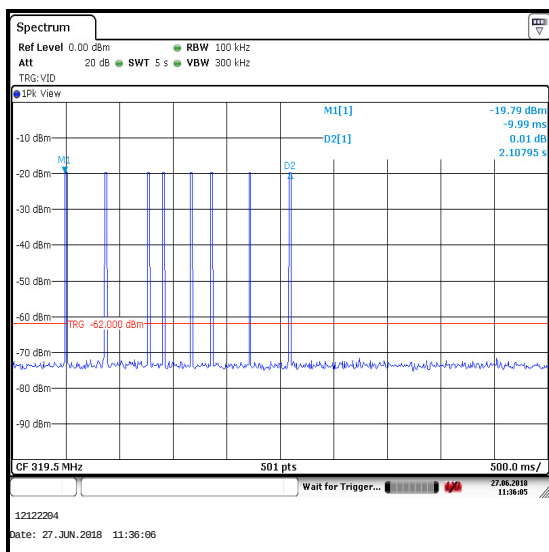
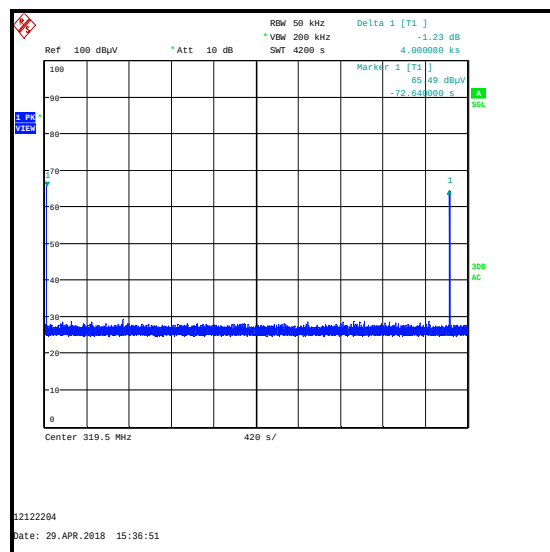
$$8 * 0.018 \text{ seconds} = 0.144 \text{ seconds}$$

Test setup:

Periodic Operation (continued)**Results:**

Emergency Transmission Duration (seconds)	§15.231(a)(1) Limit (seconds)	Margin (seconds)	Result
2.007	<5.0	2.993	Complied

Periodic Status Transmission Duration (seconds)	§15.231(a)(3) Limit (seconds/hour)	Margin (seconds)	Result
0.144	<2.0	1.856	Complied

**Emergency transmission duration****Periodic Status transmission duration****Amount of Periodic Status transmissions within a 70 minute period**

Periodic Operation (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2038	Thermohygrometer	Testo	608-H1	45124919	27 Mar 2019	12
M2033	Signal Analyser	Rohde & Schwarz	FSV13	101667	31 May 2019	12

5.2.4. Transmitter Duty Cycle**Test Summary:**

Test Engineer:	Ian Watch	Test Dates:	29 April 2018 to 27 June 2018
Test Sample Serial Number:	01180322000108		

FCC Reference:	Part 15.35(c)
Test Method Used:	ANSI C63.10 Sections 7.5 & 7.6

Environmental Conditions:

Temperature (°C):	21 to 25
Relative Humidity (%):	34 to 46

Note(s):

1. The EUT uses Amplitude-shift keying (ASK) / On-Off Keying (OOK) during transmissions therefore the duty cycle depends on the binary data contained within an RF packet. The EUT supplied for testing transmits RF packets containing random data therefore the duty cycle varies between packets.
2. Two RF packets are transmitted within a 100 ms period. Each RF packet contains 65 bits. A logic '0' is sent by a transmitter on time of 122 μ s followed by a transmitter off period of 122 μ s, total time 244 μ s. A logic '1' is sent by a transmitter on time of 122 μ s followed by a transmitter off period of 244 μ s, total time 366 μ s. The longest transmitter on time within a transmitted packet is when all '0's are transmitted.
3. Tests were performed to confirm two RF packets are transmitted within a 100 ms period during an emergency transmission initiated by a user button press and to measure the '0' and '1' bit transmission times. As it was not possible to measure an RF packet containing all '0' bits, the worst case on time during an RF packet was calculated as:

$$65 \text{ bits} * 122 \mu\text{s} = 7.93 \text{ ms}$$

4. The total transmitter maximum on time within 100 ms was:

$$7.93 \text{ ms} * 2 \text{ RF packets} = 15.86 \text{ ms}$$

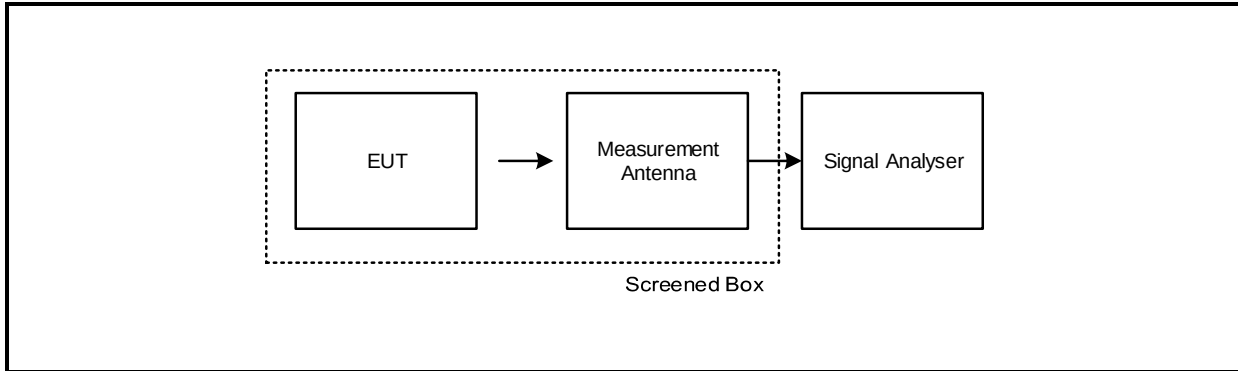
5. The worst-case duty cycle was calculated as:

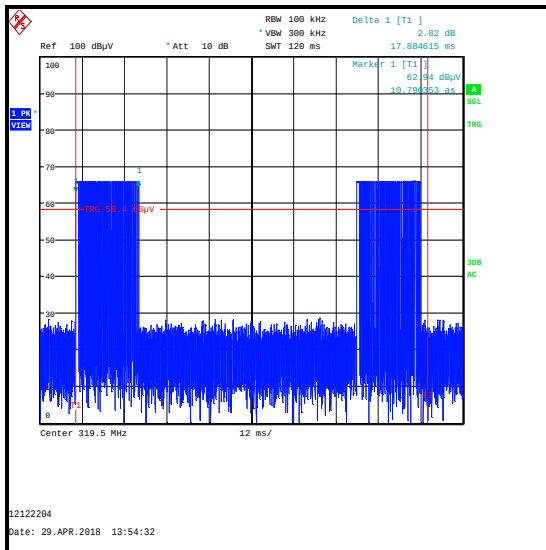
$$\text{Duty Cycle} = 20 \text{ Log } ((n1t1 + n2t2)/T)$$

$$\text{Duty Cycle} = 20 \text{ Log } ((15.86 / 100 \text{ ms}))$$

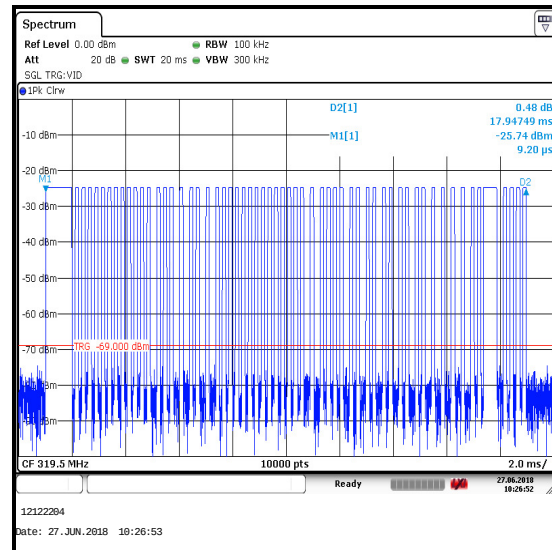
$$\text{Duty Cycle} = 20 \text{ Log } (0.1586)$$

$$\text{Duty Cycle} = -16.0 \text{ dB}$$

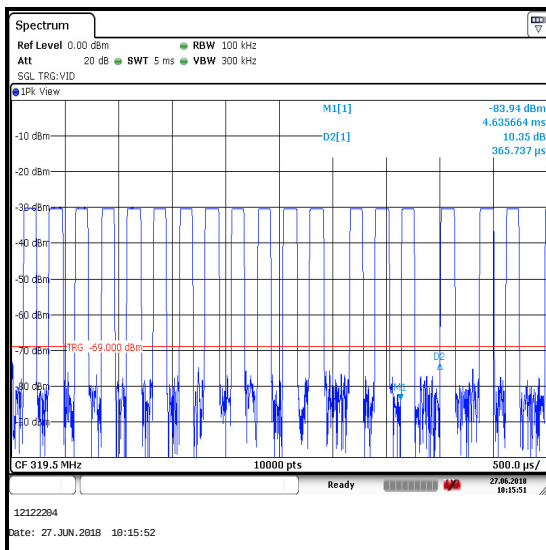
Transmitter Duty Cycle (continued)**Test setup:**

Transmitter Duty Cycle (continued)**Results:**

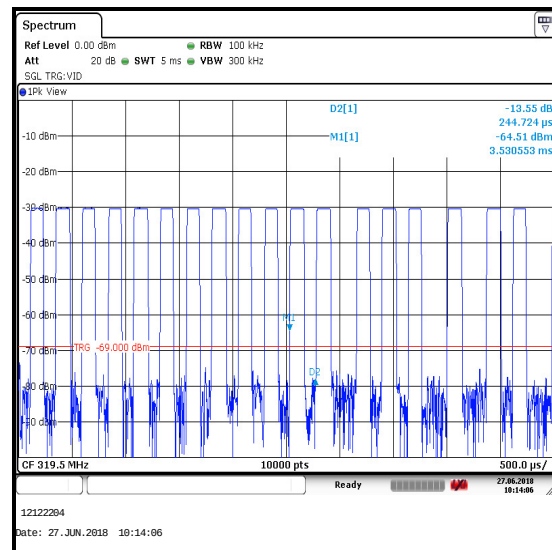
Two 20 ms RF packets transmitted during a 100 ms period



Typical RF packet containing random data (for information only)



**Duration of logical 1 transmission during an RF packet
(RF on time 122 μs + RF off time 244 μs = 366 μs)**



**Duration of logical 0 transmission during an RF packet
(RF on time 122 μs + RF off time 122 μs = 244 μs)**

Transmitter Duty Cycle (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2003	Thermohygrometer	Testo	608-H1	45046641	27 Feb 2019	12
M2038	Thermohygrometer	Testo	608-H1	45124919	27 Mar 2019	12
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	21 Feb 2019	12
M1630	Test Receiver	Rohde & Schwarz	ESU40	100233	03 Aug 2018	12
A2888	Antenna	Schwarzbeck	VULB 9163	9163-941	25 Apr 2018	12
M2033	Signal Analyser	Rohde & Schwarz	FSV13	101667	31 May 2019	12
A2147	Attenuator	AtlanTecRF	AN18-06	09020206-06	25 Apr 2018	12
A2916	Attenuator	AtlanTecRF	AN18W5-10	832827#1	21 Feb 2019	12

NOTE: All test equipment was within the current calibration period on the date of testing

5.2.5. Transmitter Radiated Emissions**Test Summary:**

Test Engineer:	Andrew Edwards	Test Date:	12 April 2018
Test Sample Serial Number:	01180322000123		

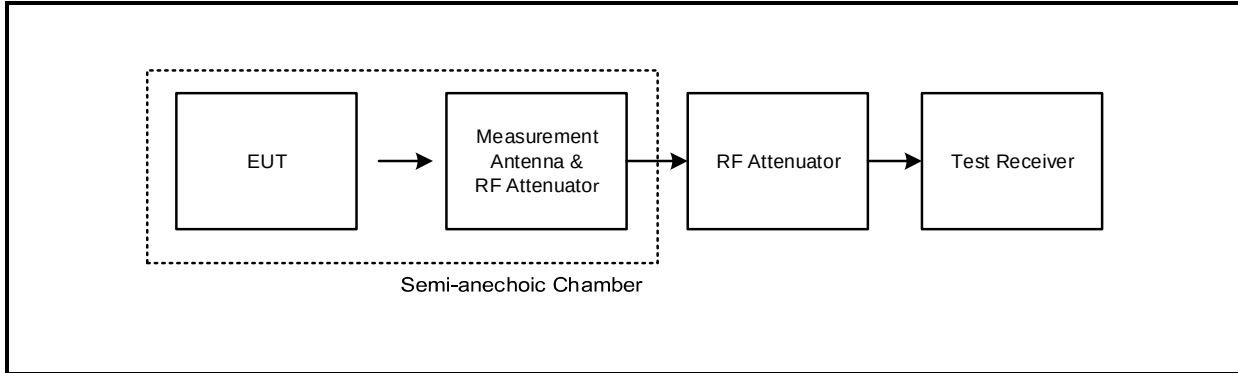
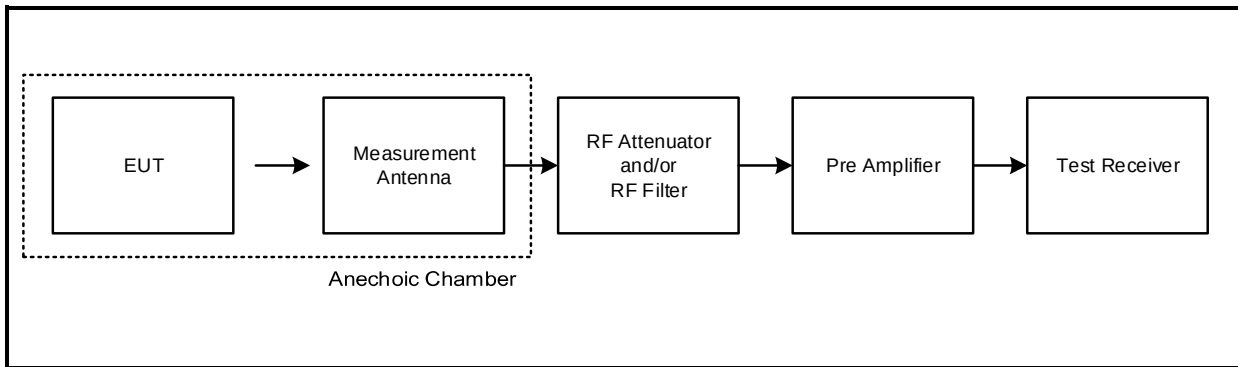
FCC Reference:	Parts 15.231(b) & 15.205
Test Method Used:	ANSI C63.10 Sections 6.3 and 6.5
Frequency Range	30 MHz to 1 GHz

Environmental Conditions:

Temperature (°C):	24
Relative Humidity (%):	44

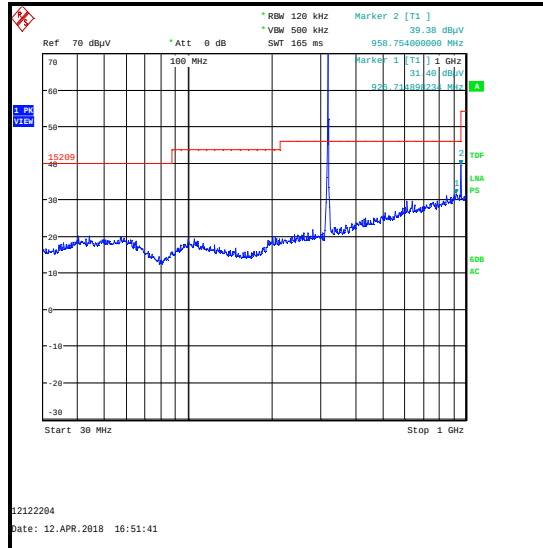
Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. FCC Part 15.209 general limits are shown on the pre-scan plot.
3. All other emissions were at least 20 dB below the appropriate limit or below the noise floor of the measurement system.
4. The emission shown on the result plot at approximately 319.5 MHz is the EUT fundamental.
5. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0017) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
6. Pre-scans were performed and markers placed on the highest measured levels. The test receiver resolution bandwidth was set to 120 kHz and video bandwidth 500 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. FCC Part 15.209 general limits are shown on the pre-scan plot.
7. Final measurements were performed on the emissions noted during pre-scans and the results entered the table below. The test receiver resolution bandwidth was set to 120 kHz, a CISPR quasi-peak detector was used and span wide enough to see the whole emission.

Transmitter Radiated Emissions (continued)**Test setup for radiated measurements:****Semi-anechoic chamber****Anechoic chamber**

Transmitter Radiated Emissions (continued)**Results: Quasi-Peak**

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
958.504	Horizontal	39.2	61.9	22.7	Complied



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2003	Thermohygrometer	Testo	608-H1	45046641	27 Feb 2019	12
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	21 Feb 2019	12
M1630	Test Receiver	Rohde & Schwarz	ESU40	100233	03 Aug 2018	12
A2888	Antenna	Schwarzbeck	VULB 9163	9163-941	25 Apr 2018	12
A2147	Attenuator	AtlanTecRF	AN18-06	09020206-06	25 Apr 2018	12

Transmitter Radiated Spurious Emissions (continued)**Test Summary:**

Test Engineer:	Andrew Edwards	Test Date:	13 April 2018
Test Sample Serial Number:	01180322000123		

FCC Reference:	Parts 15.231(b) & 15.205
Test Method Used:	ANSI C63.10 Sections 6.3 and 6.6
Frequency Range	1 GHz to 3.5 GHz

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	48

Note(s):

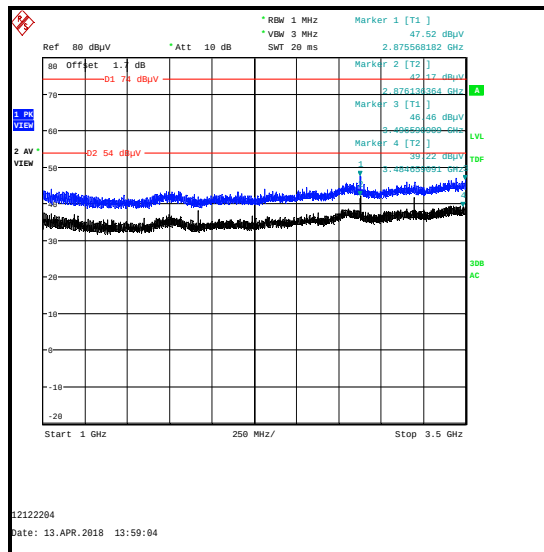
1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. FCC Part 15.209 general limits are shown on the pre-scan plot.
3. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
4. All final measurements above 1 GHz were tested in accordance with ANSI C63.10 Section 6.6.4.3 (Note 1), if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.
5. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0017) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 1.5 m above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
6. Pre-scans were performed and a marker placed on the highest measured level of the appropriate plot. The test receiver resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. The sweep time was set to auto.

Transmitter Radiated Spurious Emissions (continued)**Restricted Band Results:**

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
2875.658	Vertical	48.2	54.0	5.8	Complied

Non-Restricted Band Results:

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Duty Cycle Correction (dB)	Average Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
1917.060	Horizontal	45.2	-16.0	29.2	61.9	32.7	Complied
3195.030	Vertical	46.6	-16.0	30.6	61.9	31.3	Complied

Transmitter Radiated Spurious Emissions (continued)

Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2003	Thermohygrometer	Testo	608-H1	45046641	27 Feb 2019	12
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	21 Feb 2019	12
M1630	Test Receiver	Rohde & Schwarz	ESU40	100233	03 Aug 2018	12
A2683	Pre- Amplifier	Agilent	8449B	3008A02100	19 Feb 2019	12
A2889	Antenna	Schwarzbeck	BBHA 9120 B	BBHA 9120 B 653	19 Feb 2019	12
A2908	High Pass Filter	Wainwright Instruments	WHJE5-920-1000-4000-60EE	3	22 Feb 2019	12

6. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Fundamental Field Strength	319.5 MHz	95%	±4.65 dB
20 dB Bandwidth	319.5 MHz	95%	±4.59 dB
Duty Cycle / Periodic Operation	319.5 MHz	95%	±1.14 %
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±4.65 dB
Radiated Spurious Emissions	1 GHz to 3.3 GHz	95%	±2.94 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version
2.0	4	-	Changed company name and address at the request of the customer
	6	-	Corrected hardware and software versions
	9	-	Changed Note 1 at the request of the customer
	14 & 15	-	Corrected periodic status message duration. Changed Note 1.
3.0	17	-	At the request of the TCB, changed test method 'ANSI C63.10 Section 7.5' to 'ANSI C63.10 Sections 7.5 & 7.6'

--- END OF REPORT ---