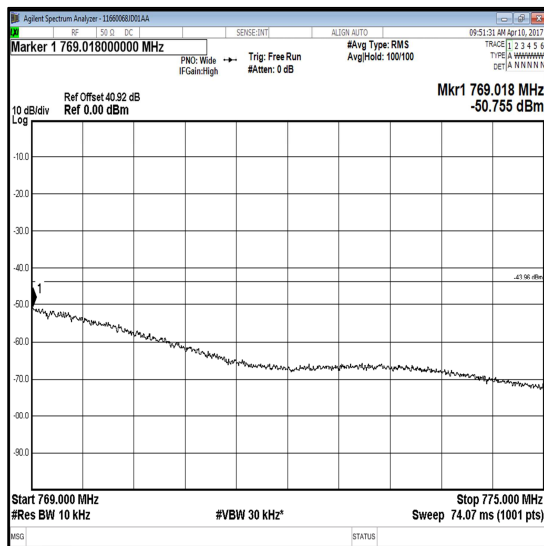
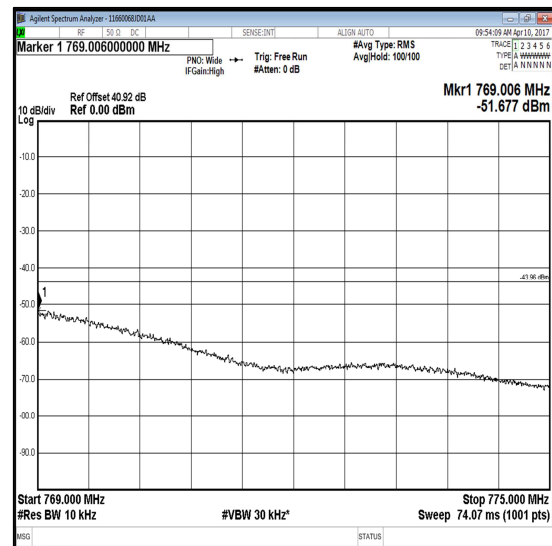
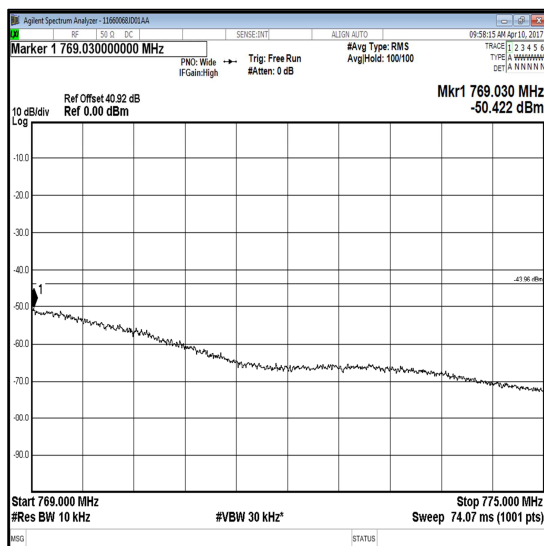
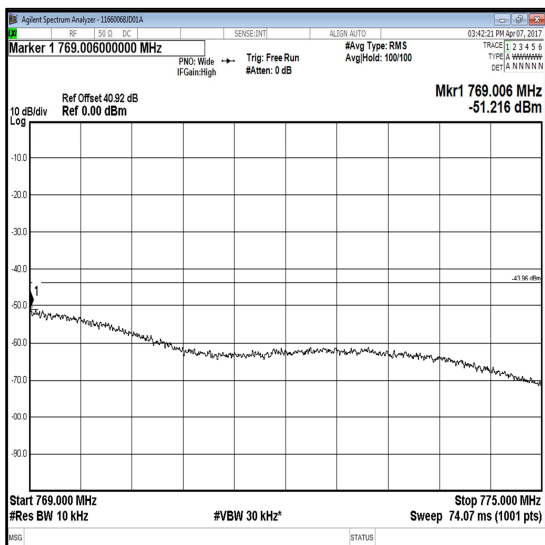
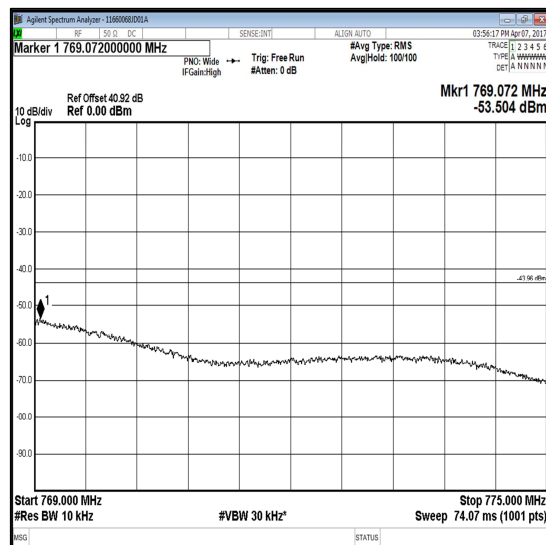
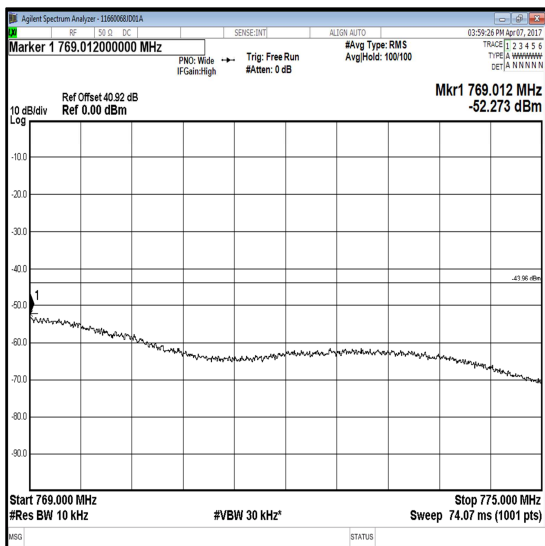


Transmitter Conducted Emissions Limitations (continued)**Results: 10 MHz Channel Bandwidth / Single Channel / 769 MHz to 775 MHz**

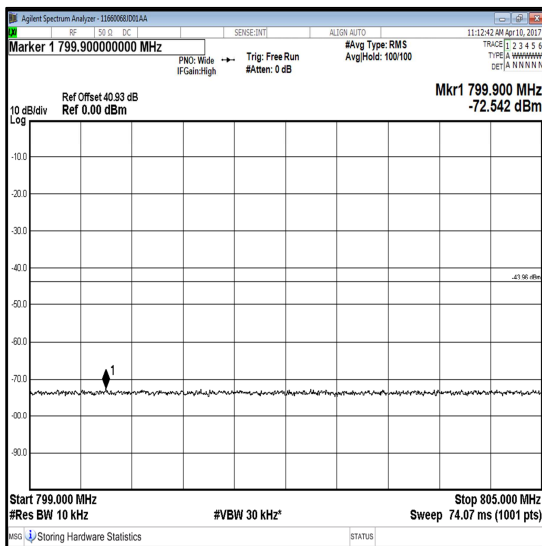
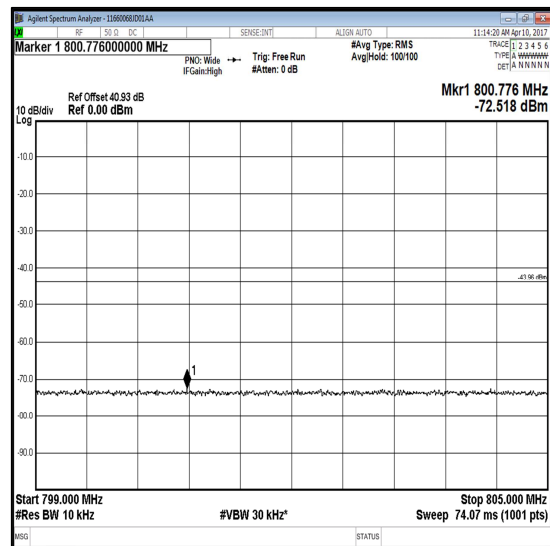
Modulation	Peak Emission Level RXTX1 (dBm)	Peak Emission Level RXTX2 (dBm)	Combined Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
QPSK	-50.76	-51.22	-47.96	-43.96	4.00	Complied
16QAM	-51.68	-53.50	-49.47	-43.96	5.51	Complied
64QAM	-50.42	-52.27	-48.24	-43.96	4.28	Complied

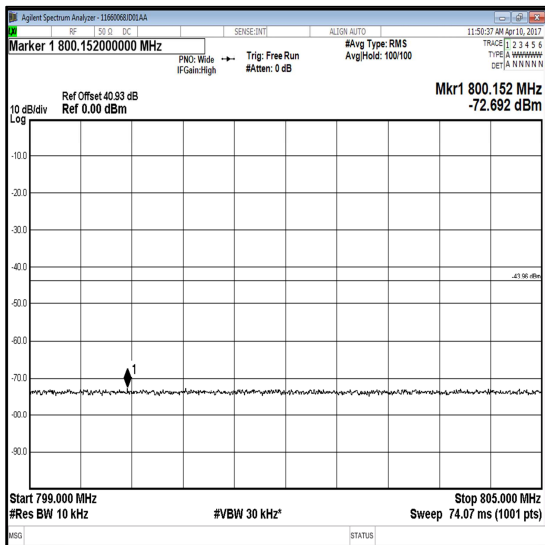
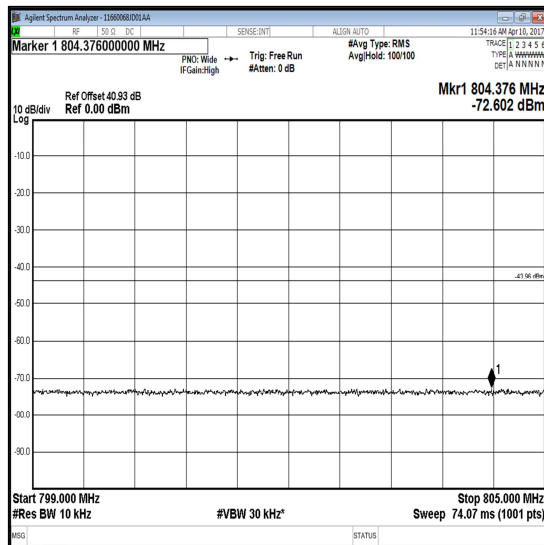
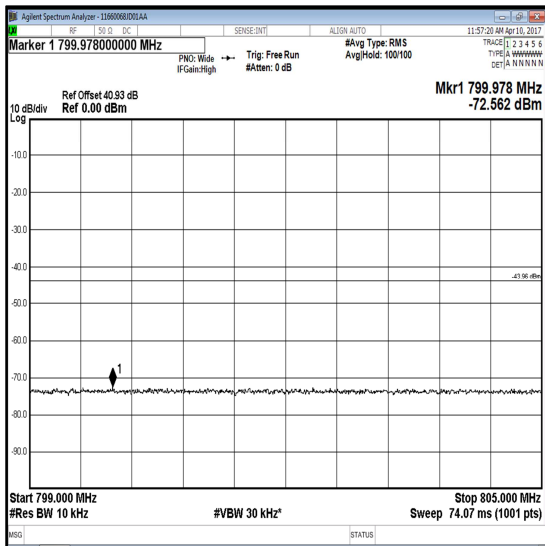
Results: 10 MHz Channel Bandwidth / Single Channel / 769 MHz to 775 MHz / RxTx1**QPSK****16QAM****64QAM**

Transmitter Conducted Emissions Limitations (continued)**Results: 10 MHz Channel Bandwidth / Single Channel / 769 MHz to 775 MHz / RxTx2****QPSK****16QAM****64QAM**

Transmitter Conducted Emissions Limitations (continued)**Results: 10 MHz Channel Bandwidth / Single Channel / 799 MHz to 805 MHz**

Modulation	Peak Emission Level RXTX1 (dBm)	Peak Emission Level RXTX2 (dBm)	Combined Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
QPSK	-72.54	-72.69	-69.61	-43.96	25.65	Complied
16QAM	-72.52	-72.60	-69.55	-43.96	25.59	Complied
64QAM	-72.80	-72.56	-69.67	-43.96	25.71	Complied

Results: 10 MHz Channel Bandwidth / Single Channel / 799 MHz to 805 MHz / RxTx1**QPSK****16QAM****64QAM**

Transmitter Conducted Emissions Limitations (continued)**Results: 10 MHz Channel Bandwidth / Single Channel / 799 MHz to 805 MHz / RxTx2****QPSK****16QAM****64QAM**

Transmitter Conducted Emissions Limitations (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	22 Feb 2018	12
M1832	Signal Analyser	Agilent	N9010A	MY53470303	29 Mar 2018	24
A2924	Attenuator	AtlanTecRF	AN18W5-20	832828#7	Calibrated before use	-
A2522	Attenuator	AtlanTecRF	AN18-20	832797#3	Calibrated before use	-
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	26 Oct 2017	24
M281	Power Meter	Hewlett Packard	E4418A	GB37170210-01	16 Feb 2018	12
M1227	Power Sensor	Agilent	8487D	3318A02122	22 Jun 2017	12

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

Test Engineer:	David Doyle	Test Dates:	05 May 2017 to 09 May 2017
Test Sample Serial Number:	BHMBH01000213		

FCC Reference:	Parts 90.543(c) and 2.1053
Test Method Used:	KDB 971168 D01 Sections 5.8, 6 & 7
Frequency Range:	30 MHz to 32 GHz

Environmental Conditions:

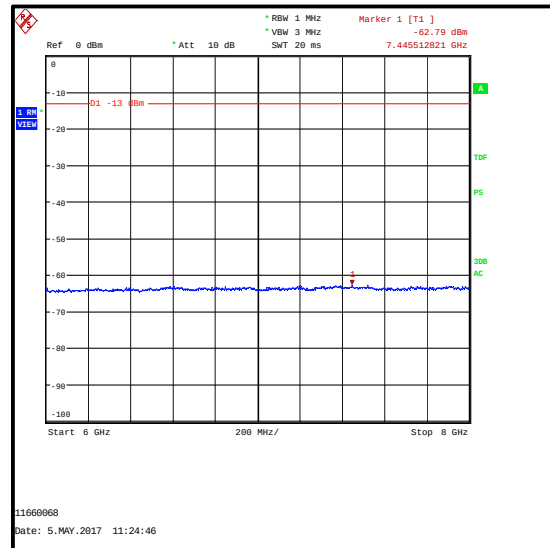
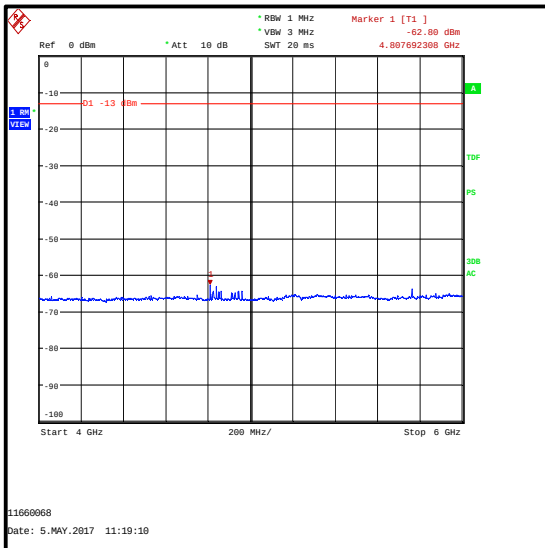
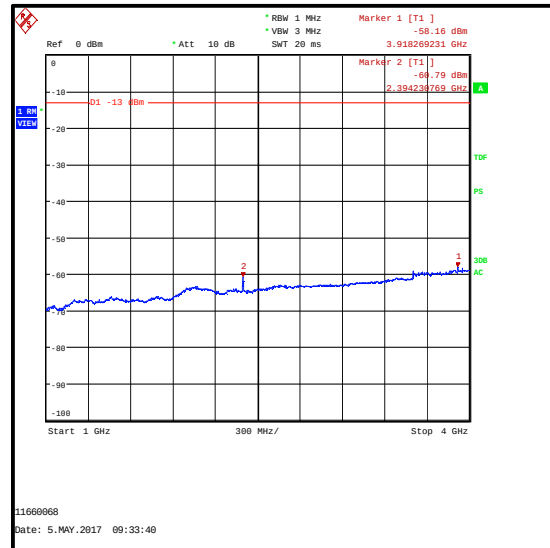
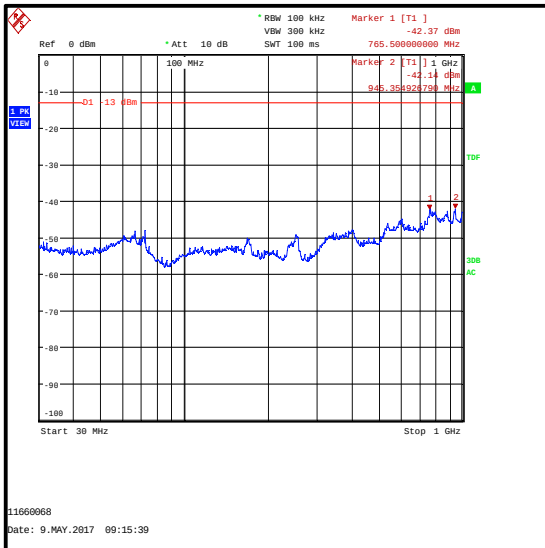
Temperature (°C):	23 to 24
Relative Humidity (%):	35 to 37

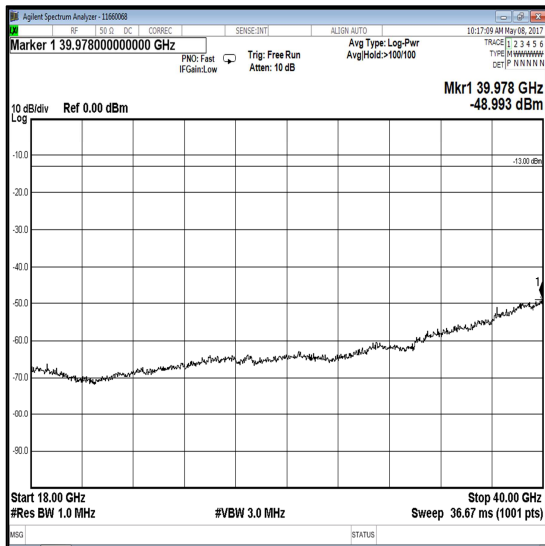
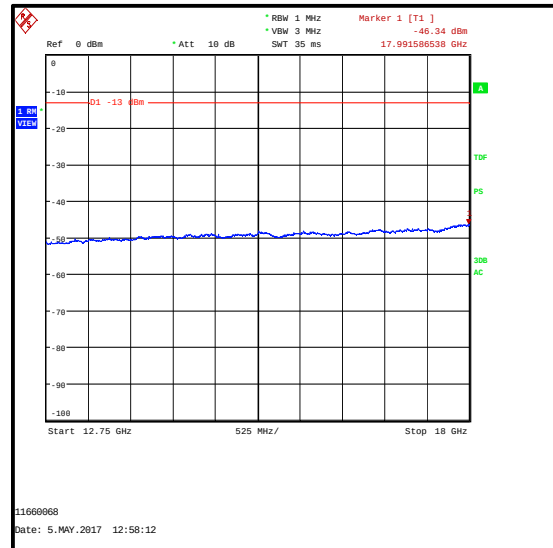
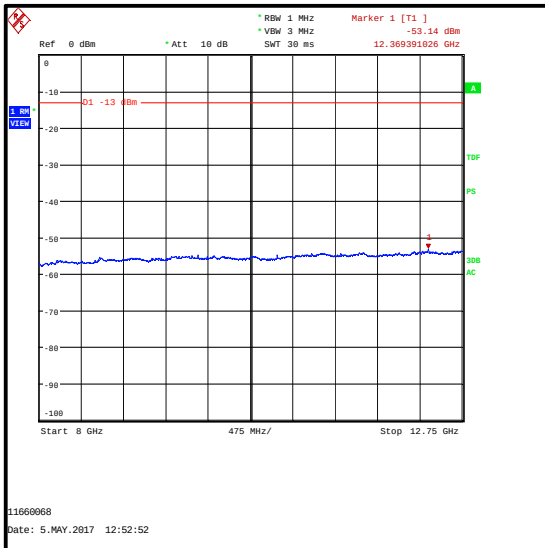
Note(s):

1. The EUT was set to transmit with 16QAM modulation applied, as this was found to have the highest output power and was therefore deemed worst case.
2. The emission seen on the 30 MHz to 1 GHz plot at approximately 765.5 MHz is the EUT carrier.
3. All emissions shown on the pre-scan plots were investigated and found to be ambient, or >20 dB below the applicable limit or below the measurement system noise floor. Therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.
4. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0017) at a distance of 3 metres. The EUT was vertically oriented and 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.
5. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0002) at a distance of 3 metres. The EUT was vertically oriented and 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.
6. Pre-scans were only required to 32 GHz but have been carried out to 40 GHz.

Results:

Frequency (MHz)	Antenna Polarisation	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
945.355	Vertical	-42.1	-13.0	29.1	Complied

Transmitter Radiated Emissions (continued)**Results:**

Transmitter Radiated Emissions (continued)**Results:**

Transmitter Radiated Emissions (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M2003	Thermohygrometer	Testo	608-H1	45046641	22 Feb 2018	12
K0017	3m RSE Chamber	Rainford EMC	N/A	N/A	14 Apr 2018	12
M1995	Amplifier	Rohde & Schwarz	ESU40	100428	13 Apr 2018	12
A2903	Antenna	Schwarzbeck	VULB 9163	9163-944	22 Aug 2017	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	16 Nov 2017	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	28 Oct 2017	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	09 Nov 2017	12
A1818	Antenna	EMCO	3115	00075692	08 Nov 2017	12
A253	Antenna	Flann Microwave	12240-20	128	08 Nov 2017	12
A254	Antenna	Flann Microwave	14240-20	139	08 Nov 2017	12
A255	Antenna	Flann Microwave	16240-20	519	08 Nov 2017	12
A256	Antenna	Flann Microwave	18240-20	400	08 Nov 2017	12
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	22 Feb 2018	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	28 Feb 2018	12
A2895	Antenna	Schwarzbeck	BBHA 9170	9170-728	11 Apr 2018	12
A2896	Pre-Amplifier	Schwarzbeck	BBV 9721	9721-023	09 Nov 2017	12
M1832	Signal Analyser	Agilent	N9010A	MY53470303	28 Mar 2018	24

5.2.7. Transmitter Frequency Stability (Temperature Variation)**Test Summary:**

Test Engineer:	Patrick Jones	Test Dates:	17 May 2017 to 19 May 2017
Test Sample Serial Number:	BHMBH01000213		

FCC Reference:	Part 2.1055
Test Method Used:	KDB 971168 Section 9.0 / FCC Part 2.1055 and Notes below

Environmental Conditions:

Ambient Temperature (°C):	25 to 28
Ambient Relative Humidity (%):	40 to 51

Note(s):

1. A bench power supply was connected to the EUT via a customer supplied power cable at the nominal voltage of 28.0 VDC.
2. Temperature was monitored throughout the test with a calibrated digital thermometer.
3. Frequency stability was measured using a signal analyser marker placed at the lower 99% occupied bandwidth point (bottom channel) or higher 99% occupied bandwidth point (top channel). The delta between the marker frequency and band edge frequency is the margin. The signal analyser's frequency count function was used to give the marker a 1 Hz resolution.
4. During occupied bandwidth testing, the 5 MHz channel bandwidth was shown to use a larger proportion of the channel bandwidth than a 10 MHz channel bandwidth. Therefore, this configuration will result in the emission being closer to the band edge. A 5 MHz channel bandwidth was used for all frequency stability measurements.
5. The fundamental emissions remain within the authorised band of operation during all tests.
6. Frequency error was calculated by finding the difference between the reference frequency measured at +20 °C (f_{nom}) and the frequency measured at the required temperature (f_m) then converted to PPM. The following equation was used:

$$\text{Frequency error in PPM} = ((f_m - f_{nom}) * 1000000) / f_{nom}$$

$$\text{e.g. } f_m = 758.279034; f_{nom} = 758.285048 \\ ((758.279034 - 758.285048) * 1000000) / 758.285048 = 7.93 \text{ PPM}$$

Transmitter Frequency Stability (Temperature Variation) (continued)**Results: Bottom Channel / RxTx1 (760.5 MHz)**

Temperature (°C)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Frequency Error (PPM)	Result
-30	758.279034	758.0	0.279034	7.93	Complied
-20	758.275518	758.0	0.275518	12.57	Complied
-10	758.284962	758.0	0.284962	0.11	Complied
0	758.275358	758.0	0.275358	12.78	Complied
10	758.278451	758.0	0.278451	8.70	Complied
20	758.285048	758.0	0.285048	0.00	Complied
30	758.286123	758.0	0.286123	1.42	Complied
40	758.275661	758.0	0.275661	12.38	Complied
50	758.278733	758.0	0.278733	8.33	Complied

Results: Top Channel / RxTx1 (765.5 MHz)

Temperature (°C)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Frequency Error (PPM)	Result
-30	767.731410	768.0	0.268590	9.96	Complied
-20	767.731199	768.0	0.268801	9.69	Complied
-10	767.730523	768.0	0.269477	8.81	Complied
0	767.729711	768.0	0.270289	7.75	Complied
10	767.722331	768.0	0.277669	1.87	Complied
20	767.723763	768.0	0.276237	0.00	Complied
30	767.727570	768.0	0.272430	4.96	Complied
40	767.730948	768.0	0.269052	9.36	Complied
50	767.714867	768.0	0.285133	11.59	Complied

Transmitter Frequency Stability (Temperature Variation) (continued)**Results: Bottom Channel / RxTx2 (760.5 MHz)**

Temperature (°C)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Frequency Error (PPM)	Result
-30	758.283522	758.0	0.283522	8.43	Complied
-20	758.274950	758.0	0.274950	2.88	Complied
-10	758.275417	758.0	0.275417	2.26	Complied
0	758.275625	758.0	0.275625	1.99	Complied
10	758.275321	758.0	0.275321	2.39	Complied
20	758.277131	758.0	0.277131	0.00	Complied
30	758.277957	758.0	0.277957	1.09	Complied
40	758.274871	758.0	0.274871	2.98	Complied
50	758.274601	758.0	0.274601	3.34	Complied

Results: Top Channel / RxTx2 (765.5 MHz)

Temperature (°C)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Frequency Error (PPM)	Result
-30	767.724487	768.0	0.275513	1.95	Complied
-20	767.721386	768.0	0.278614	2.09	Complied
-10	767.718179	768.0	0.281821	6.27	Complied
0	767.724291	768.0	0.275709	1.69	Complied
10	767.724637	768.0	0.275363	2.14	Complied
20	767.722992	768.0	0.277008	0.00	Complied
30	767.721919	768.0	0.278081	1.40	Complied
40	767.721677	768.0	0.278323	1.71	Complied
50	767.723062	768.0	0.276938	0.09	Complied

Transmitter Frequency Stability (Temperature Variation) (continued)**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	22 Feb 2018	12
E0518	Environmental Chamber	TAS	LTCL 1200	24000107	Calibrated before use	-
M1643	Thermometer	Fluke	52II	18890136	20 Apr 2018	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	06 Mar 2018	12
S0577	DC power Supply	TTI	CPX400S	436670	Calibrated before use	-
M122	DVM	Fluke	77	64910017	26 Apr 2018	12
A2924	Attenuator	AtlanTecRF	AN18W5-20	832828#7	Calibrated before use	-
A2522	Attenuator	AtlanTecRF	AN18-20	832797#3	Calibrated before use	-
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	26 Oct 2017	24
M281	Power Meter	Hewlett Packard	E4418A	GB37170210-01	16 Feb 2018	12
M1227	Power Sensor	Agilent	8487D	3318A02122	22 Jun 2017	12

5.2.8. Transmitter Frequency Stability (Voltage Variation)**Test Summary:**

Test Engineer:	Patrick Jones	Test Dates:	18 May 2017 to 19 May 2017
Test Sample Serial Number:	BHMBH01000213		

FCC Reference:	Part 2.1055
Test Method Used:	KDB 971168 Section 9.0 / FCC Part 2.1055 and Notes below

Environmental Conditions:

Ambient Temperature (°C):	24 to 28
Ambient Relative Humidity (%):	35 to 51

Note(s):

1. A bench power supply was connected to the EUT via a customer supplied power cable. Voltage was monitored throughout the test with a calibrated digital voltmeter. Minimum, nominal and maximum voltages tested were stated by the customer.
2. Frequency stability was measured using a signal analyser marker placed at the lower 99% occupied bandwidth point (bottom channel) or higher 99% occupied bandwidth point (top channel). The delta between the marker frequency and band edge frequency is the margin. The signal analyser's frequency count function was used to give the marker a 1 Hz resolution.
3. During occupied bandwidth testing, the 5 MHz channel bandwidth was shown to use a larger proportion of the channel bandwidth than a 10 MHz channel bandwidth. Therefore, this configuration will result in the emission being closer to the band edge. A 5 MHz channel bandwidth was used for all frequency stability measurements.
4. The fundamental emissions remain within the authorised band of operation during all tests.
5. Frequency error was calculated by finding the difference between the reference frequency measured at 28 Volts (f_{nom}) and the frequency measured at the required voltage (f_m) then converted to PPM. The following equation was used:

$$\text{Frequency error in PPM} = (((f_m - f_{nom}) * 1000000) / f_{nom})$$

$$\text{e.g. } f_m = 758.274947; f_{nom} = 758.285048$$

$$(((758.274947 - 758.285048) * 1000000) / 758.285048) = 13.32 \text{ PPM}$$

Transmitter Frequency Stability (Voltage Variation) (continued)**Results: Bottom Channel (760.5 MHz)**

Supply Voltage (V)	Measured Frequency RxTx1 (MHz)	Measured Frequency RxTx2 (MHz)	Lower Band Edge Limit (MHz)	Margin RxTx1 (MHz)	Margin RxTx2 (MHz)	Max Error (PPM)	Result
20.0	758.274947	758.277305	758.0	0.274947	0.277305	13.32	Complied
28.0	758.285048	758.277131	758.0	0.285048	0.277131	0.00	Complied
33.0	758.279030	758.278760	758.0	0.279030	0.278760	7.94	Complied

Results: Top Channel (765.5 MHz)

Supply Voltage (V)	Measured Frequency RxTx1 (MHz)	Measured Frequency RxTx2 (MHz)	Upper Band Edge Limit (MHz)	Margin RxTx1 (MHz)	Margin RxTx2 (MHz)	Max Error (PPM)	Result
20.0	767.724269	767.729871	768.0	0.275731	0.270129	8.96	Complied
28.0	767.723763	767.722992	768.0	0.276237	0.277008	0.00	Complied
33.0	767.723070	767.724137	768.0	0.276930	0.275863	1.49	Complied

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	22 Feb 2018	12
E0518	Environmental Chamber	TAS	LTCL 1200	24000107	Calibrated before use	-
M1643	Thermometer	Fluke	52II	18890136	20 Apr 2018	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	06 Mar 2018	12
S0577	DC power Supply	TTI	CPX400S	436670	Calibrated before use	-
M122	DVM	Fluke	77	64910017	26 Apr 2018	12
A2924	Attenuator	AtlanTecRF	AN18W5-20	832828#7	Calibrated before use	-
A2522	Attenuator	AtlanTecRF	AN18-20	832797#3	Calibrated before use	-
M1252	Signal Generator	Hewlett Packard	83640A	3119A00489	26 Oct 2017	24
M281	Power Meter	Hewlett Packard	E4418A	GB37170210-01	16 Feb 2018	12
M1227	Power Sensor	Agilent	8487D	3318A02122	22 Jun 2017	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
Conducted Output Power	758 to 768 MHz	95%	±0.76 dB
Frequency Stability	758 to 768 MHz	95%	±1.62 ppm
Occupied Bandwidth	758 to 768 MHz	95%	±3.92 %
Conducted Spurious Emissions	9 kHz to 32 GHz	95%	±2.62 dB
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±5.65 dB
Radiated Spurious Emissions	1 GHz to 32 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	59 - 64	-	Added results in PPM and additional notes

--- END OF REPORT ---