

Prüfbericht - Nr.: 19660293 001		Seite 1 von 48	
<i>Test Report No.:</i>		<i>Page 1 of 48</i>	
Auftraggeber: <i>Client:</i>		e-Con Systems India Pvt Ltd. Rishabh Infopark, RR Tower # IV, Thiru-Vi-Ka Industrial Estate Guindy, Chennai -600032	
Gegenstand der Prüfung: <i>Test item:</i>		SOMWB1	
Bezeichnung: <i>Identification:</i>	WL1835_PCIE_CARD_REV1	Serien-Nr.: <i>Serial No.</i>	01
Wareneingangs-Nr.: <i>Receipt No.:</i>	1803214346	Eingangsdatum: <i>Date of receipt:</i>	20.03.2017
Prüfört: <i>Testing location:</i>	Refer Page 4 of 48 for test facilities		
Prüfgrundlage: <i>Test specification:</i>	FCC Part 15 subpart C- 15.247 ANSI C63.10-2013		
Prüfergebnis: <i>Test Result:</i>	Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>The test items passed the test specification(s).</i>		
Prüflaboratorium: <i>Testing Laboratory:</i>	TÜV Rheinland (India) Pvt. Ltd. 82/A, 3rd Main, West Wing, Electronic City Phase 1 Hosur Road, Bangalore – 560 100. India FCC Registration No.: 176555		
geprüft / tested by:		kontrolliert / reviewed by:	
21.03.2017	Raghavendra Katti Engineer	19.04.2017	Saibaba Siddapur Assistant Manager
<i>Datum</i> <i>Date</i>	<i>Name/Stellung</i> <i>Name/Position</i>	<i>Unterschrift</i> <i>Signature</i>	<i>Unterschrift</i> <i>Signature</i>
Sonstiges / Other Aspects: FCC ID: 2ALXI-SOMWB1			
Abkürzungen:	P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet	Abbreviations:	P(ass) = passed F(ail) = failed N/A = not applicable N/T = not tested
<p>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</p> <p><i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i></p>			

TÜV Rheinland India Pvt. Ltd. 82/A, 3rd Main, West Wing Electronic City Phase 1, Hosur Road, Bangalore-560100, India Tel.: +9180 6723 3500 · Fax: +9180 6723 3542 · Web: www.tuv.com

Test Item	FCC	Results
Peak Output Power	FCC 15.247(b) (1)	Pass
20dB Bandwidth	FCC 15.247(a)(1)	Pass
Number of Hopping Channels	FCC 15.247(a)(1)(ii)	Pass
Carrier Frequency Separation	FCC 15.247(a)(1)	Pass
Time of Occupancy (Dwell Time)	FCC 15.247 (a)(1)(iii)	Pass
Band-edge compliance of RF Conducted Emissions	FCC 15.247(d)	Pass
Radiated Spurious Emissions and Restricted bands of operation	FCC 15.209 & 15.205	Pass
Conducted Emissions on A.C Power Lines	FCC Part 15.207	Pass

Note: Conducted measurements are done according to the procedure given in KDB No. **DA 00-705** March 2000

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Appendix 1: Test Setup Photo

Appendix 2: EUT External Photo

Appendix 3: EUT Internal Photo

Appendix 4: FCC Label and Label Location

Appendix 5: Block Diagram & Operational Description

Appendix 6: Specification of EUT

Appendix 7: Schematic of EUT

Appendix 8: Bill of Material

Appendix 9: User Manual

Appendix 10: Maximum Permissible Exposure Calculation

Equipment	Manufacturer	Model Name	Serial Number	Calibration Due Date	Periodicity	Used for Test Items
EMI Test Receiver	Rohde & Schwarz	ESU 40	100288	29-10-2017	Yearly	Spurious Radiated Emissions
Broadband Antenna	Frankonia	ALX-4000	ALX-4000-806	10-06-2017	Yearly	
Active Loop Antenna	Frankonia	LAX-10	LAX-10-800	22-12-2017	Yearly	
Broadband Horn Antenna	Frankonia	HAX-18	HAX18-802	16-03-2018	Yearly	
Emission Horn Antenna	ETS Lindgren	116706	00107323	02-11-2017	Yearly	
Semi Anechoic Chamber	Frankonia	-	-	-	-	Antenna - Port Conducted Tests
Spectrum Analyser	Agilent Technologies	E4407B	US41192772	13-02-2018	Yearly	
Signal Analyser	Rohde & Schwarz	FSV7	101644	01-12-2017	Yearly	
LISN	Rohde & Schwarz	ENV216	100022	07-09-2017	Yearly	
EMI Receiver	Rohde & Schwarz	ESR7	101133	10-12-2017	Yearly	Conducted Emission Test on AC Power Lines

Testing Facilities

TUV Rheinland (India) Private Limited
108 , Beside ISBR Business School,
Electronic city Phase I
Bangalore - 560 100.

General Product Information

Product Function and Intended Use

The product can operate in Wi-Fi (802.11b, g, and n mode) and supports Bluetooth and BLE and its use cases are

- Internet of Things
- Industrial and Home Automation
- Multimedia
- Smart Gateway and Metering
- Home Electronics
- Video Conferencing
- Home Appliances and White Goods
- Video Camera and Security

Ratings and System Details

Operating Frequency Range	2400MHz – 2483.50MHz	
No. of channel	79	
Channel Spacing	1MHz	
Modulation	1Mbps	GFSK
	2Mbps	$\pi/4$ -DQPSK
	3Mbps	8DPSK
Transmitted Power	11.43 dBm / 13.48 mw	
Number of antenna	2	
Antenna Gain	2 dBi	
Antenna Type	Dipole and PCB antenna	
Supply Voltage to Product	5VDC from USB	
Environmental conditions	-20 deg.C to 70 deg.C	

Test Conditions:

Supply Voltage: 5 VDC from USB

Environmental conditions:

Temperature: +26.4

RH: 58.4%

Test Set-up and Operation Mode

Principle of Configuration Selection

Transmission was enabled with continuous transmission on low, mid and high channel & also used hopping mode for testing.

Test Operation and Test Software

HCI Tester for BT, BLE was used to enable continuous transmission with duty cycle more than 98%, changing channels (low/mid/high) and select data rates on the EUT for the tests in this report.

Special Accessories and Auxiliary Equipment

- None

Countermeasures to achieve EMC Compliance

- None

Test Modes – Data Rates and Modulations

For Radiated spurious emissions, the tests were performed for all data rates and only worst case results are reported in this report.

Antenna Port measurements are performed on the following paths

Chain 0 - CH1

Chain 1 - CH2

Bluetooth & BLE will transmit only on chain 0 or CH1 & Wi-Fi will transmit b/g/n (SISO) mode on Chain 1 or CH2 & Wi-Fi n mode with MIMO will transmit on both Chain 0 & Chain 1.

List of Antenna: Table 1

Manufacturer	Antenna Type	Gain	Antenna Part No.	Operating Frequency (GHz)
LSR	Dipole	2	001-0012	2.4-2.5
Laird	PCB	2	CAF94505	2.4-2.5

Transmission configuration

Mode	Chain 0	Chain 1
IEEE802.11b	Yes	No
IEEE802.11g	Yes	No
IEEE802.11n 20MHz (SISO)	Yes	No
IEEE802.11n 20MHz MIMO	Yes	Yes
IEEE802.11n 40MHz (SISO)	Yes	No
Bluetooth & BLE	Yes	No

Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1,5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±3 °C
Supply voltages	±3 %
Time	±5 %

List of Centre Frequencies: Table 2

Frequency Band (MHz)	Channel No.	Channel Frequency (MHz)
2400 – 2483.5 BT(BDR+EDR)	0	2402
	1	2403
	2	2404
	3	2405
	:	:
	:	:
	:	:
	37	2439
	38	2440
	39	2441
	40	2442
	:	:
	:	:
	:	:
	74	2476
	75	2477
	76	2478
	77	2479
	78	2480

Power level Settings used:

Across all Channels	
Bluetooth 1Mbps	13 dBm
Bluetooth 2 Mbps	10 dBm
Bluetooth 3 Mbps	10 dBm
BLE	11 dBm

Test Methodology

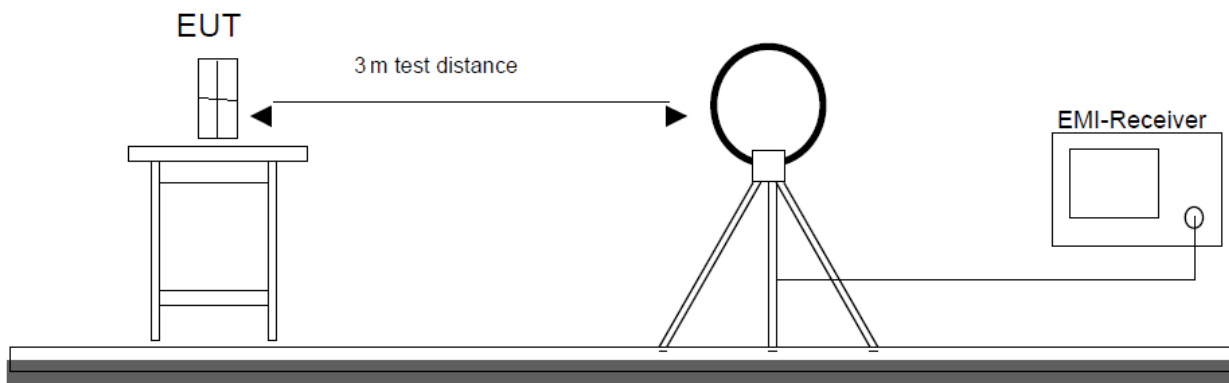
Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013 & RSS Gen. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable for below 1GHz & 1.5m height for above 1GHz measurement, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000MHz was performed by horn antenna. The measurement below 30MHz was performed by loop antenna.

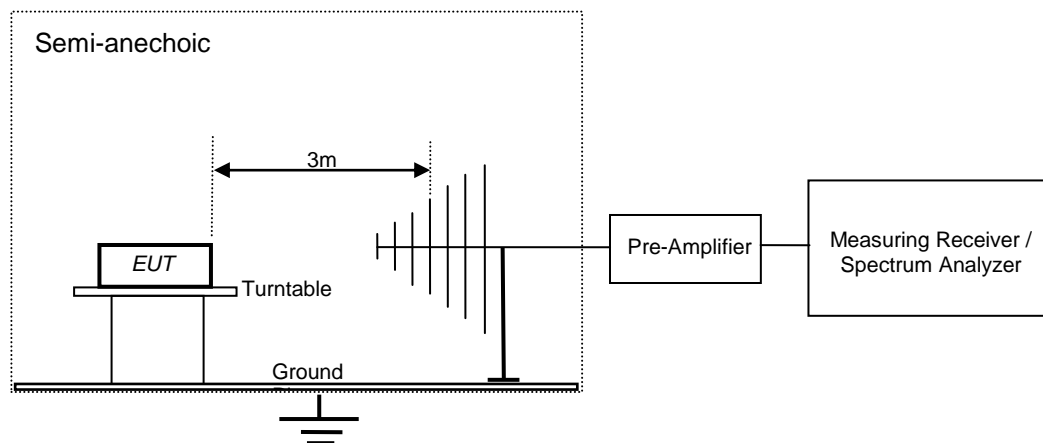
The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded.

Test Setup Configuration

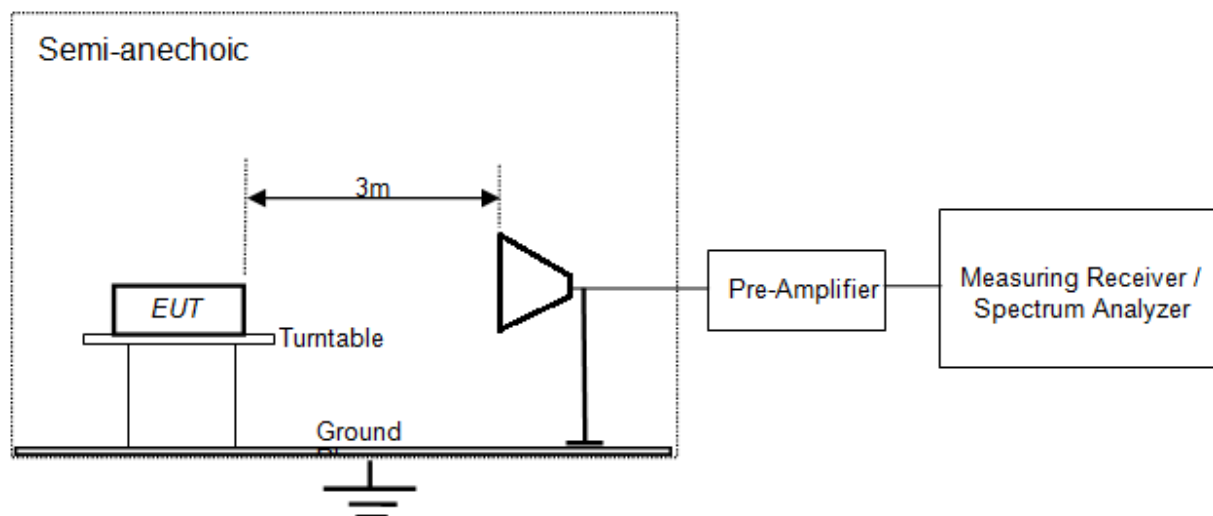
Frequency Range 9 kHz -30 MHz



Frequency Range 30MHz -1GHz

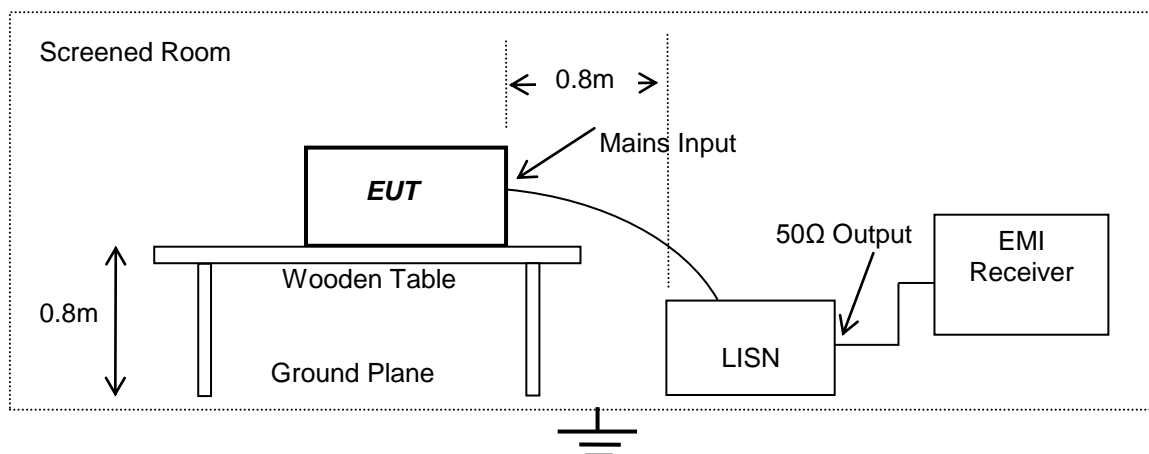


Frequency above 1GHz



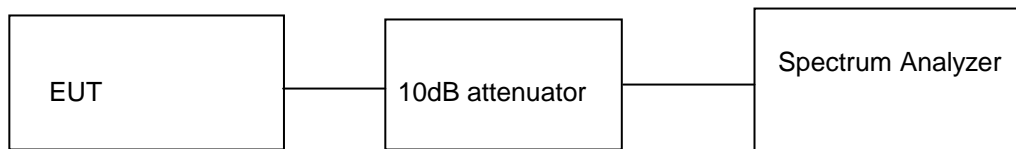
Conducted Emission Test on A.C. mains line

The equipment under test (EUT) was placed on a wooden table 80cm above the ground plane, the LISN was placed 80cm away from the EUT. The test was performed in accordance with ANSI C63.10 - 2013, with the following: an initial measurement was performed in peak and average detection mode on the live and neutral lines. The pre-scan was performed by peak detection on both live and neutral conductors. Any emissions recorded within 20dB of the relevant limit line were re-measured using quasi-peak and average detections, the 6 worst cases were recorded in the table of results.



Test Results
Peak Output Power
Result
Pass

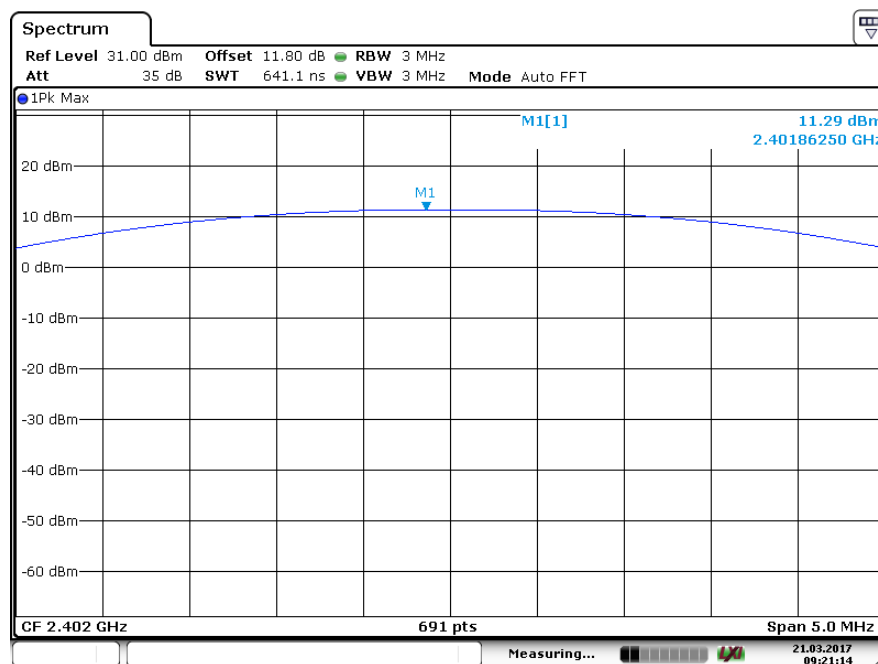
Test Specification FCC 15.247 (b) (1)
Measurement Bandwidth (RBW) 3MHz
Detector Peak
Requirement <125 mW

Test Method:


Attenuator (10dB) + cable loss (1.8dB) = 11.8dB Considered in the test result

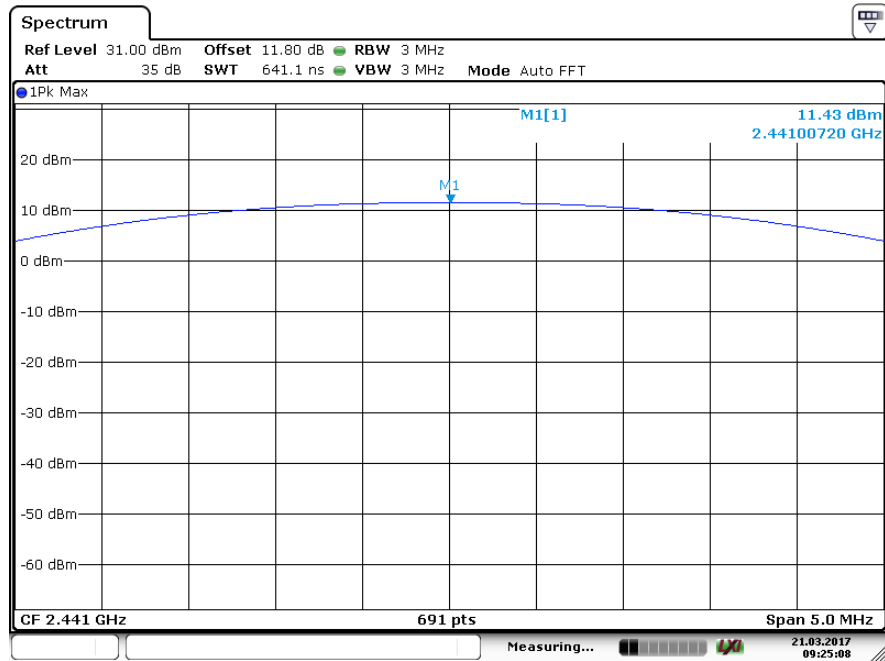
Test Result:
Modulation Type: GFSK

Channel	Frequency (MHz)	Peak Output power (dBm)	Limit (dBm)
Low	2402	11.29	20.96
Mid	2440	11.43	20.96
High	2480	11.31	20.96



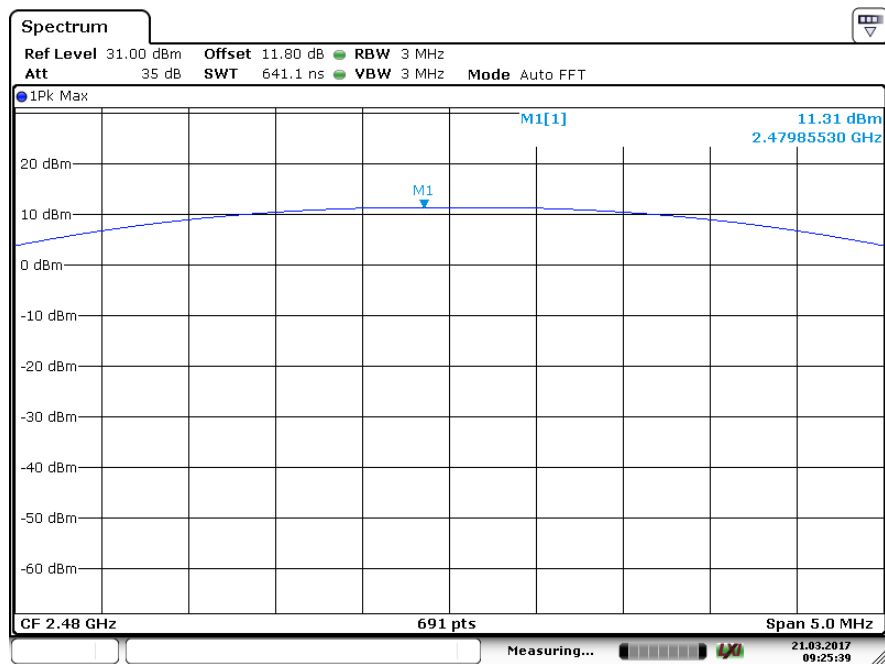
Date: 21.MAR.2017 09:21:14

Channel Frequency: 2402 MHz



Date: 21 MAR 2017 09:25:08

Channel Frequency: 2440 MHz

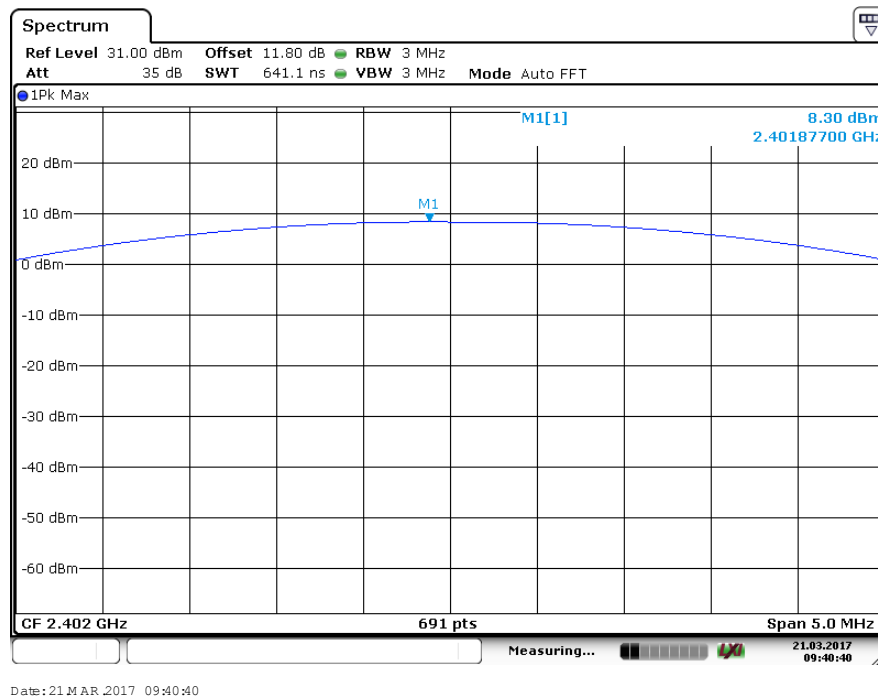
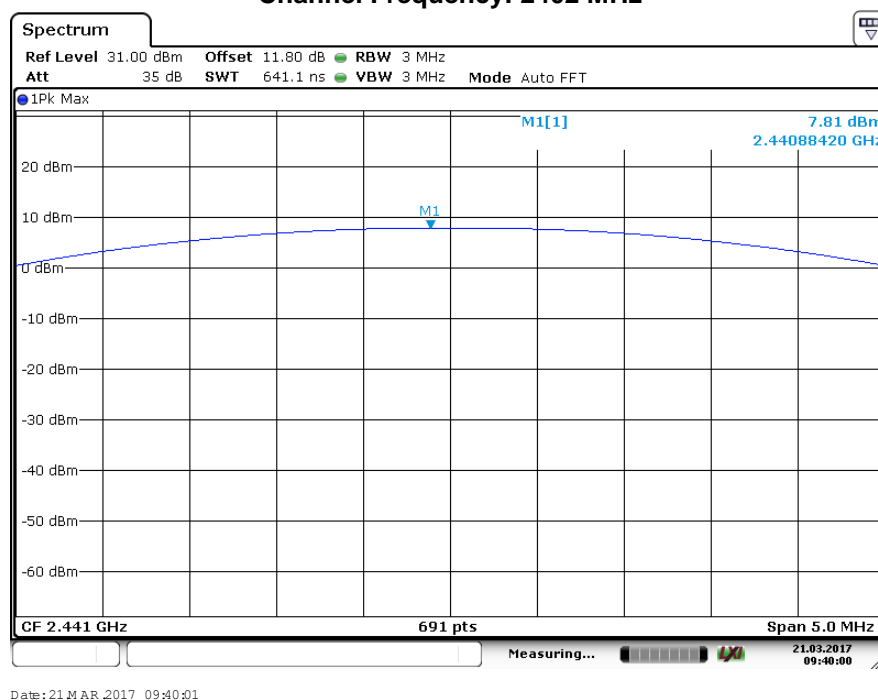


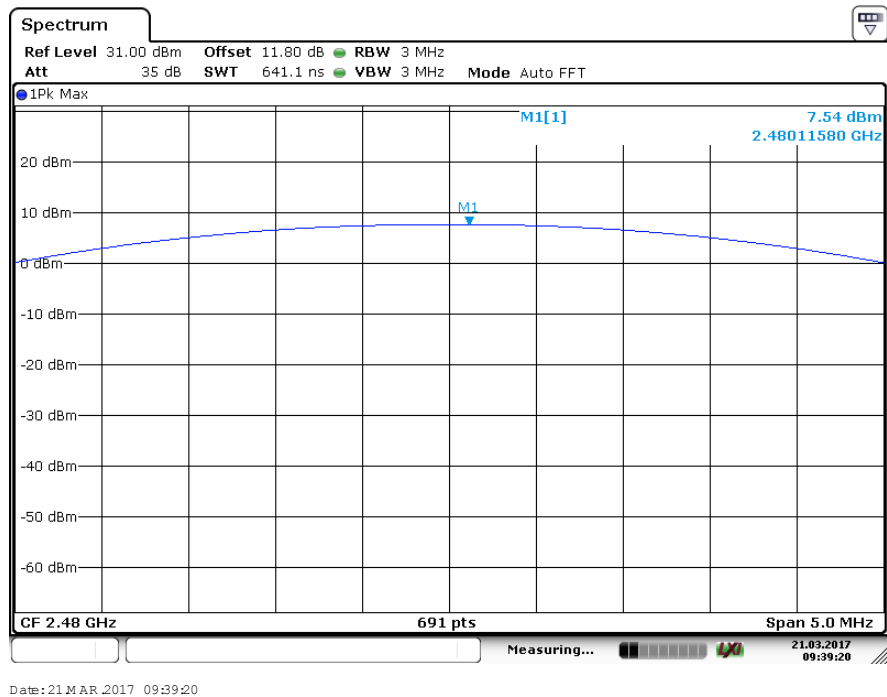
Date: 21 MAR 2017 09:25:39

Channel Frequency: 2480 MHz

Test Results:

Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)
Low	2402	8.30	20.96
Mid	2440	7.81	20.96
High	2480	7.54	20.96


Channel Frequency: 2402 MHz

Channel Frequency: 2440 MHz

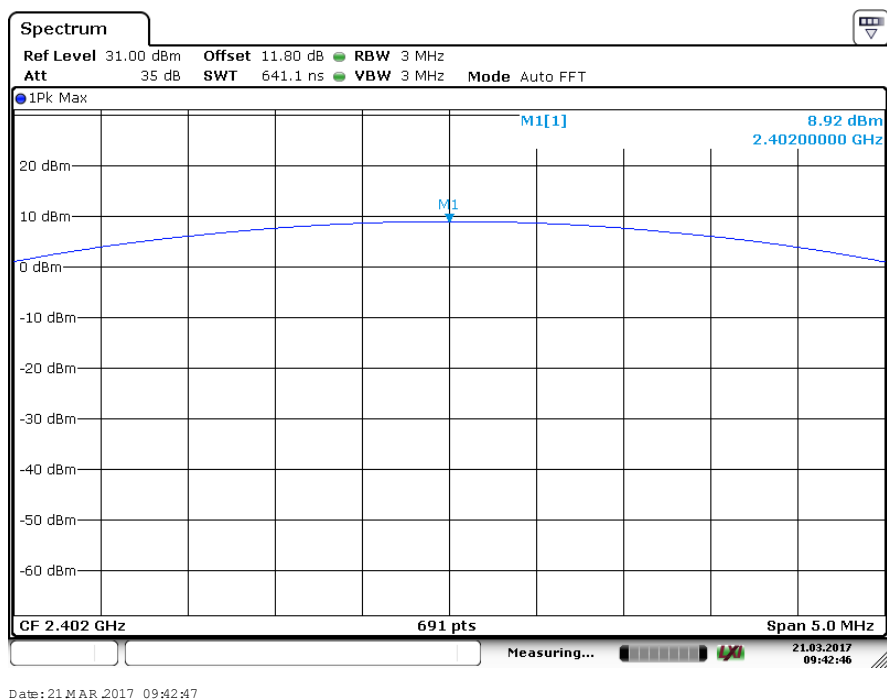


Channel Frequency: 2480 MHz

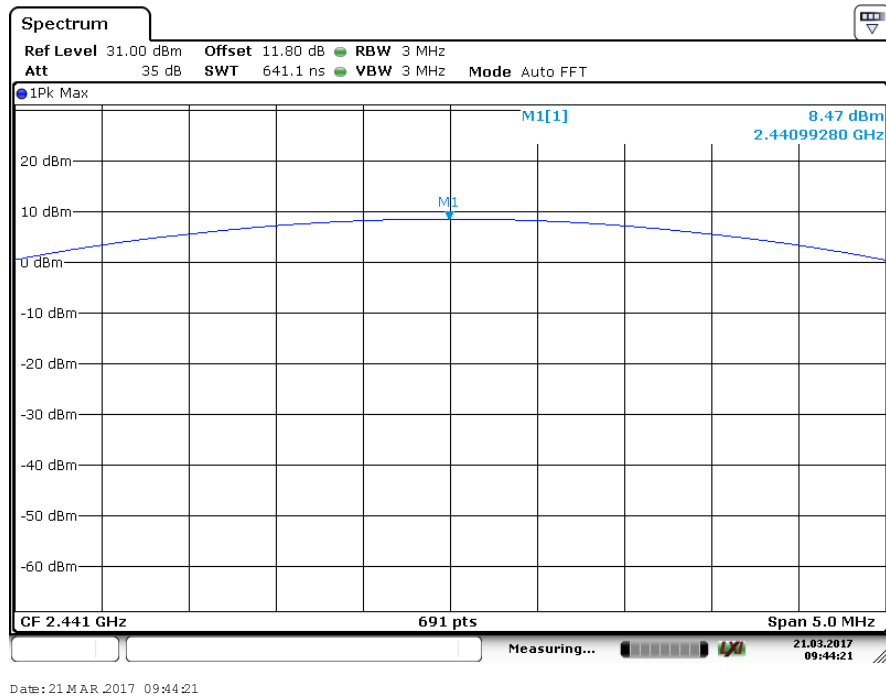
Modulation Type: 8 DPSK

Test Results:

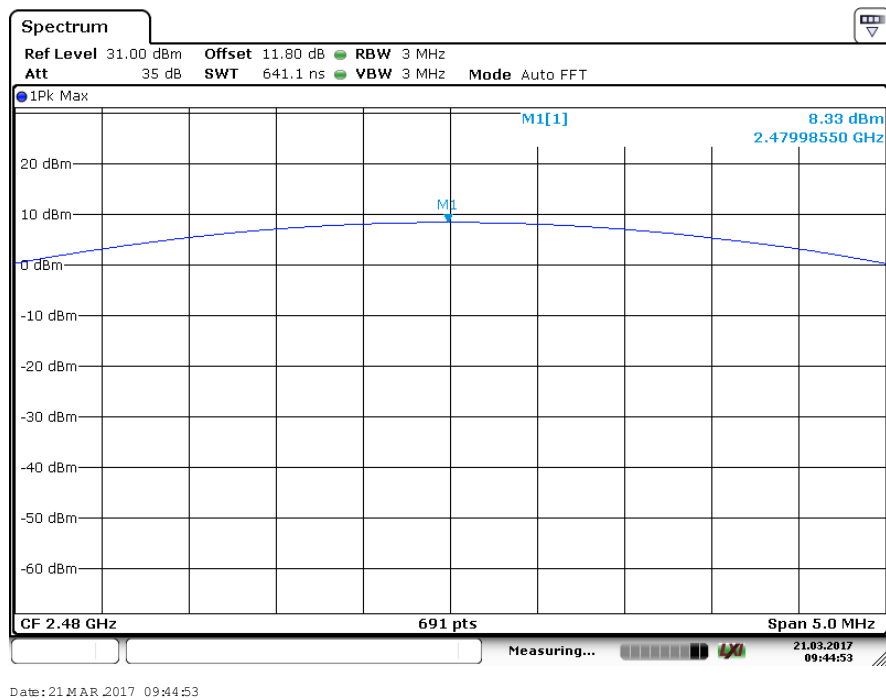
Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)
Low	2402	8.92	20.96
Mid	2440	8.47	20.96
High	2480	8.33	20.96



Channel Frequency: 2402 MHz



Channel Frequency: 2440 MHz



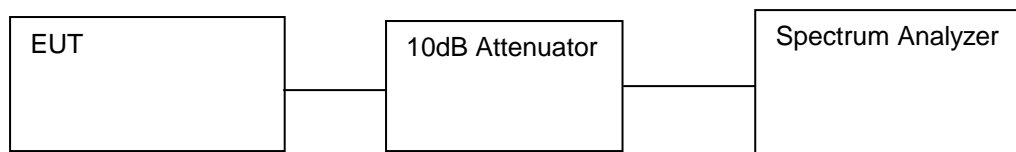
Channel Frequency: 2480 MHz

Test Specification FCC 15.247 (a)(1)

Detector Function Peak

Requirement The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. The system RF bandwidth is equal to the channel bandwidth multiplied by the number of channels in the hopset. The hopset shall be such that the near-term distribution of frequencies appears random, with sequential hops randomly distributed in both direction and magnitude of change in the hopset while the long-term distribution appears evenly distributed.

Test Method:

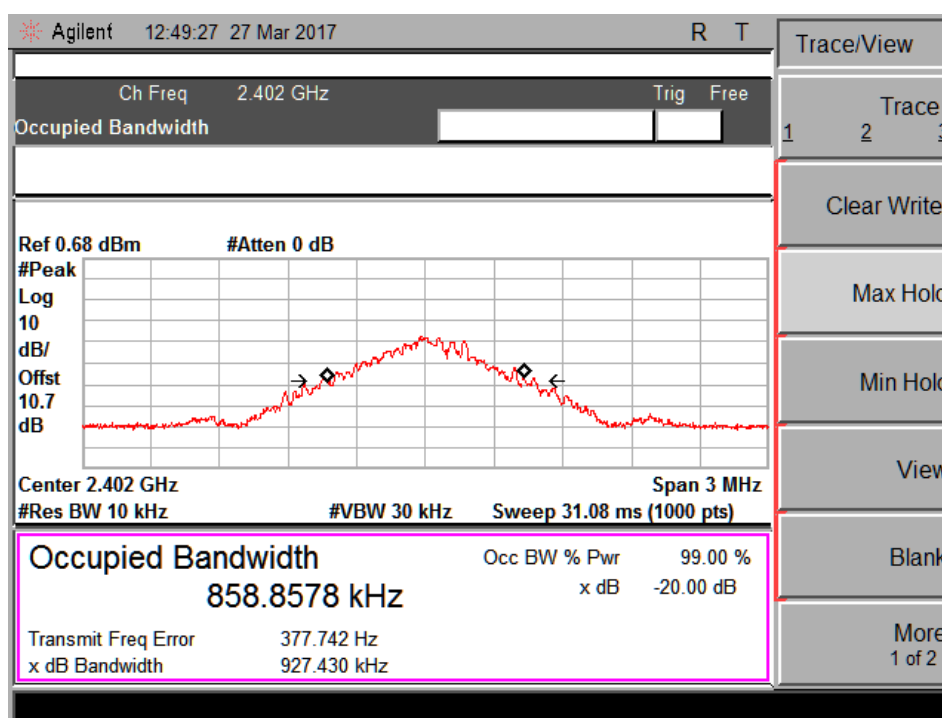


Attenuator (10dB) + cable loss (0.7dB) = 10.7dB Considered in the test result

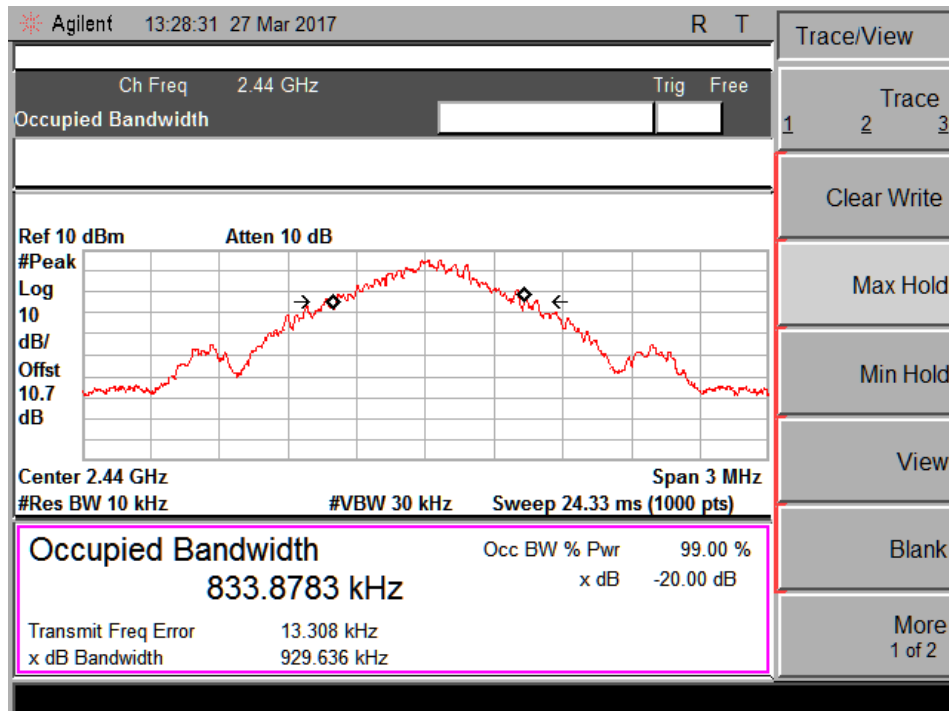
Test Result:

Modulation Type: GFSK

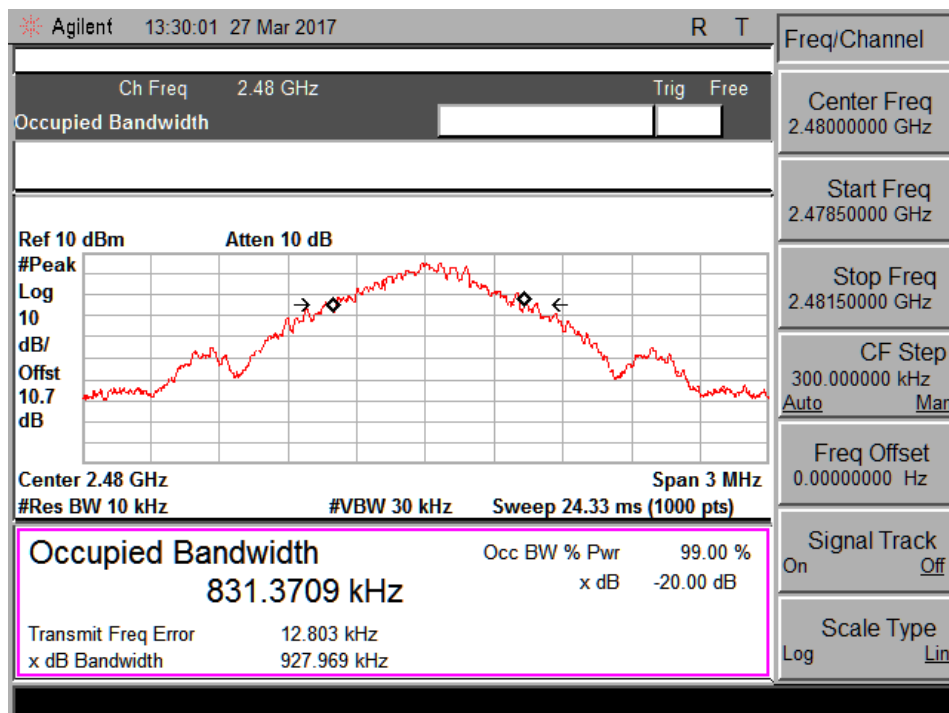
Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
Low	2402	927.43	858.85
Mid	2440	929.63	833.87
High	2480	927.96	831.37



Channel Low: 20dB Bandwidth Measurement



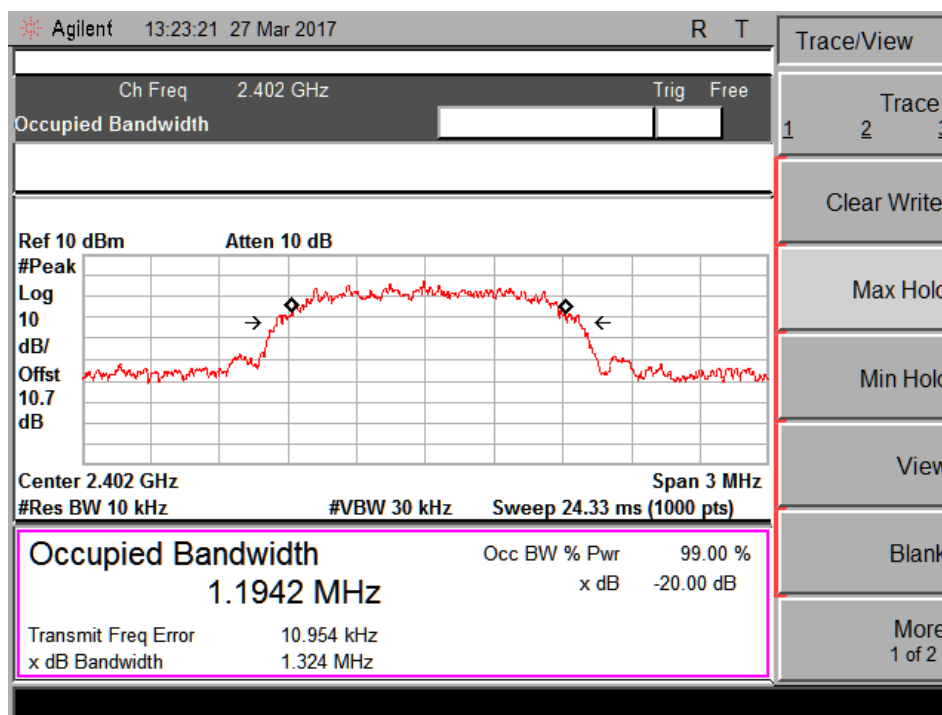
Channel Mid: 20dB Bandwidth Measurement

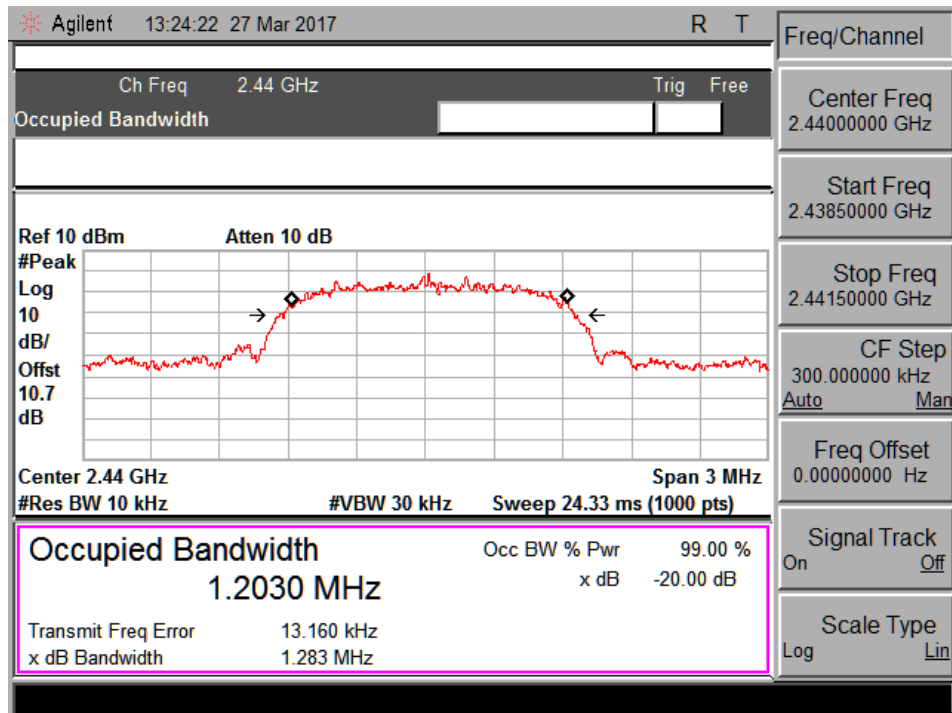


Channel High: 20dB Bandwidth Measurement

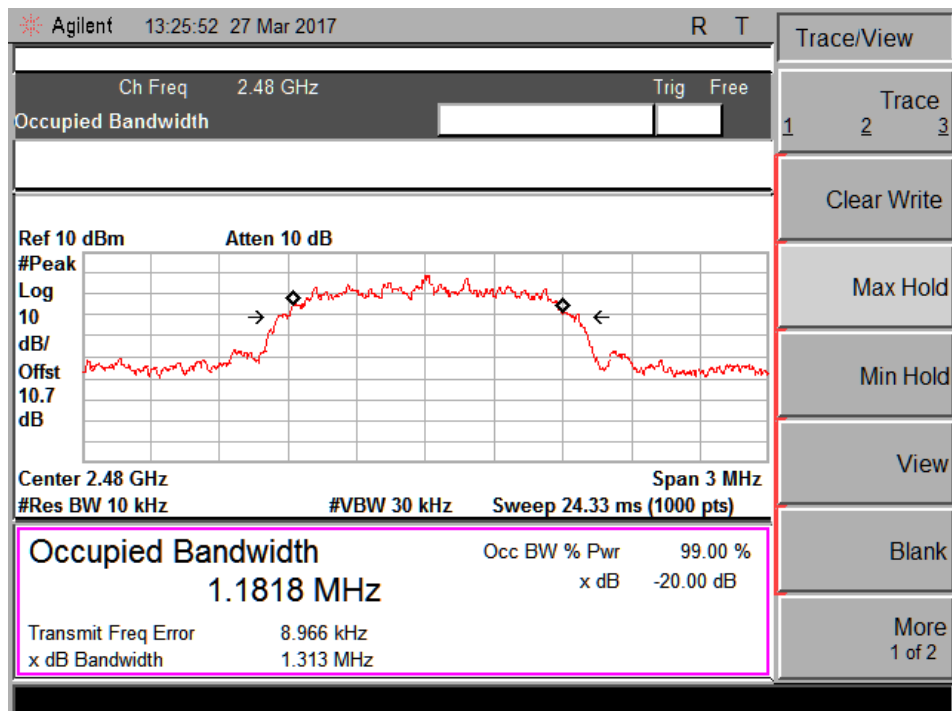
Test Results:

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Low	2402	1.324	1.194
Mid	2440	1.283	1.203
High	2480	1.313	1.181


Channel Low: 20dB Bandwidth Measurement



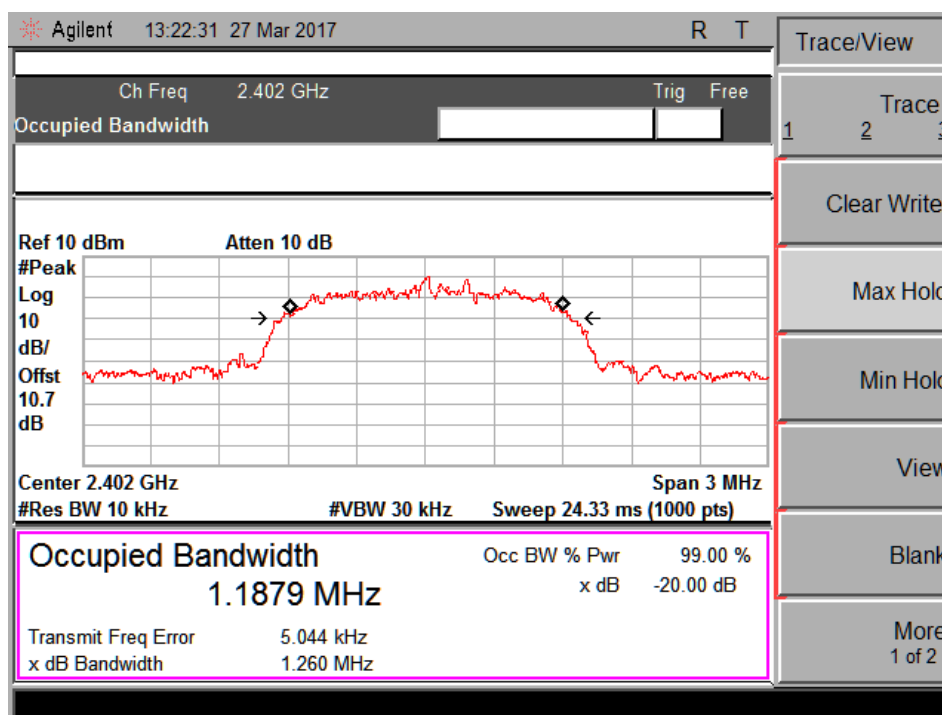
Channel Mid: 20dB Bandwidth Measurement



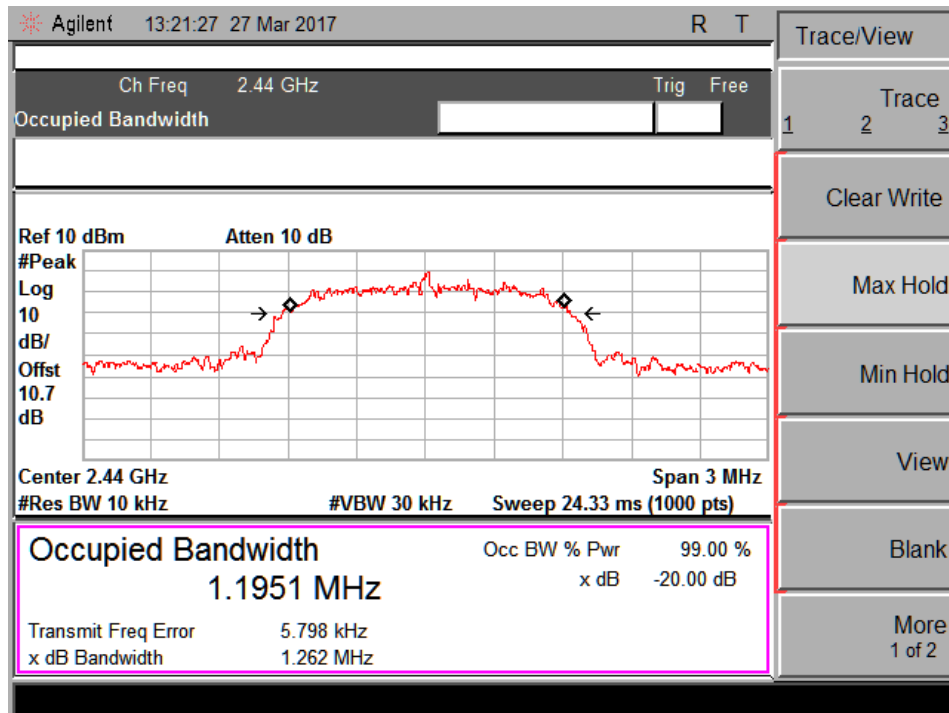
Channel High: 20dB Bandwidth Measurement

Test Results:

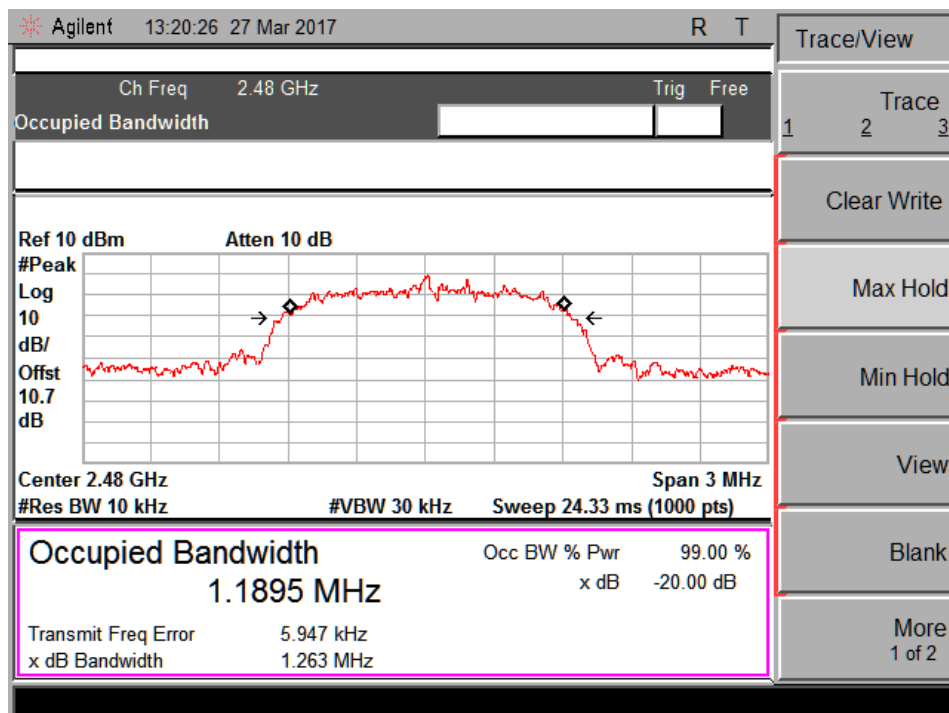
Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Low	2402	1.260	1.187
Mid	2440	1.262	1.195
High	2480	1.263	1.189



Channel Low: 20dB Bandwidth Measurement



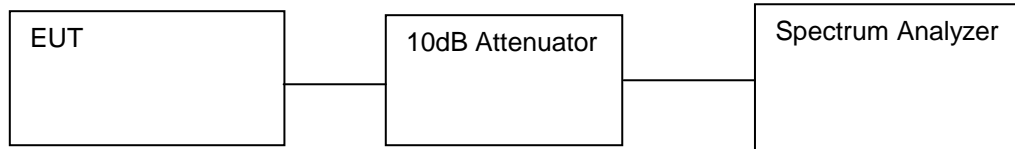
Channel Mid: 20dB Bandwidth Measurement



Channel High: 20dB Bandwidth Measurement

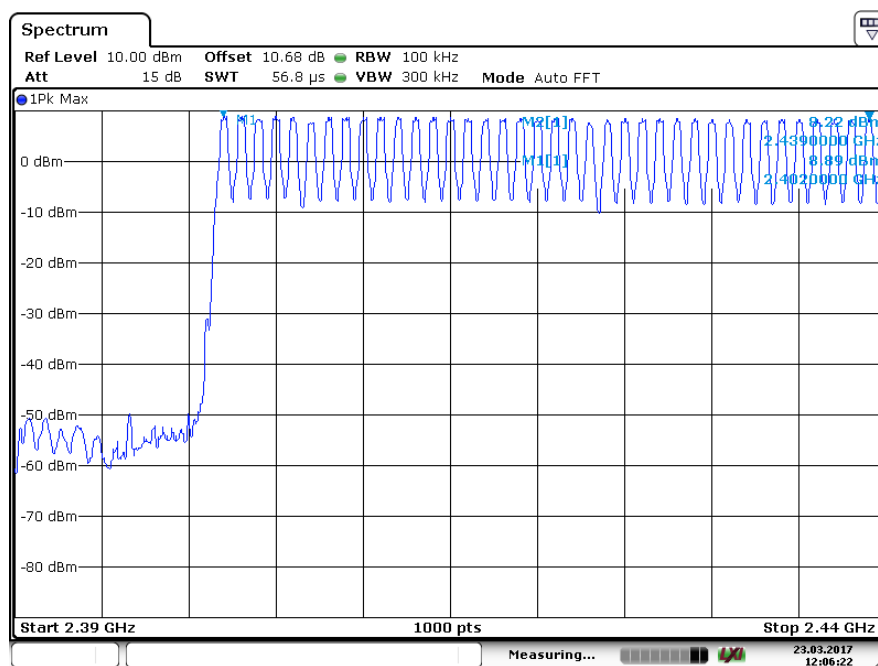
Test Specification	FCC 15.247 (a)(1)(ii)
Detector Function	Peak
Requirement	Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels

Test Method:



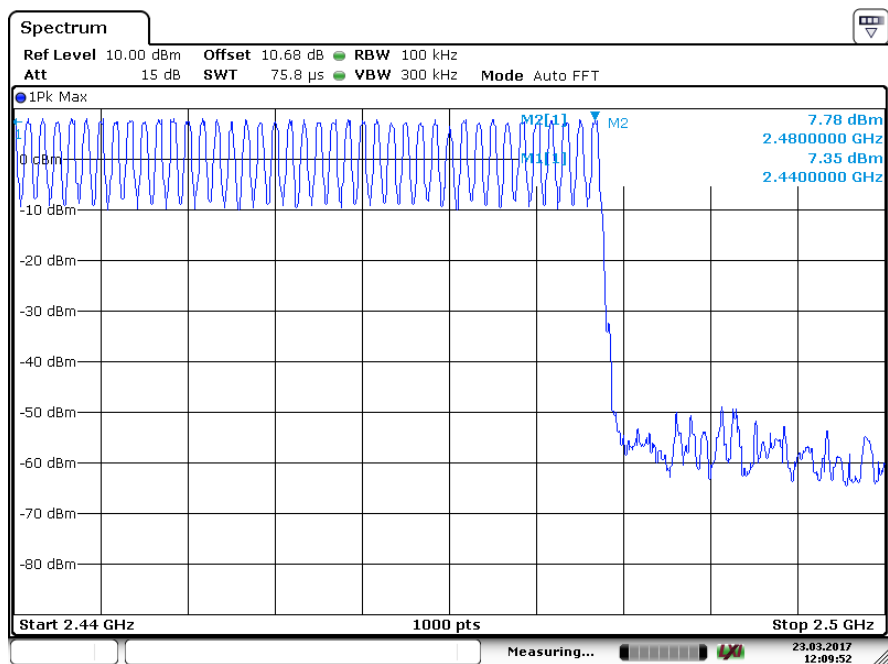
Attenuator (10dB) + cable loss (0.68dB) = 10.68dB Considered in the test result

Test Result:



Date: 23.MAR.2017 12:06:21

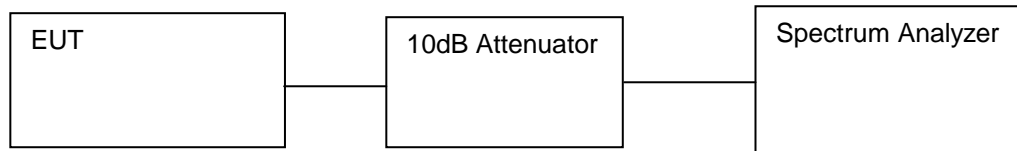
Number of Hopping Channels: 38



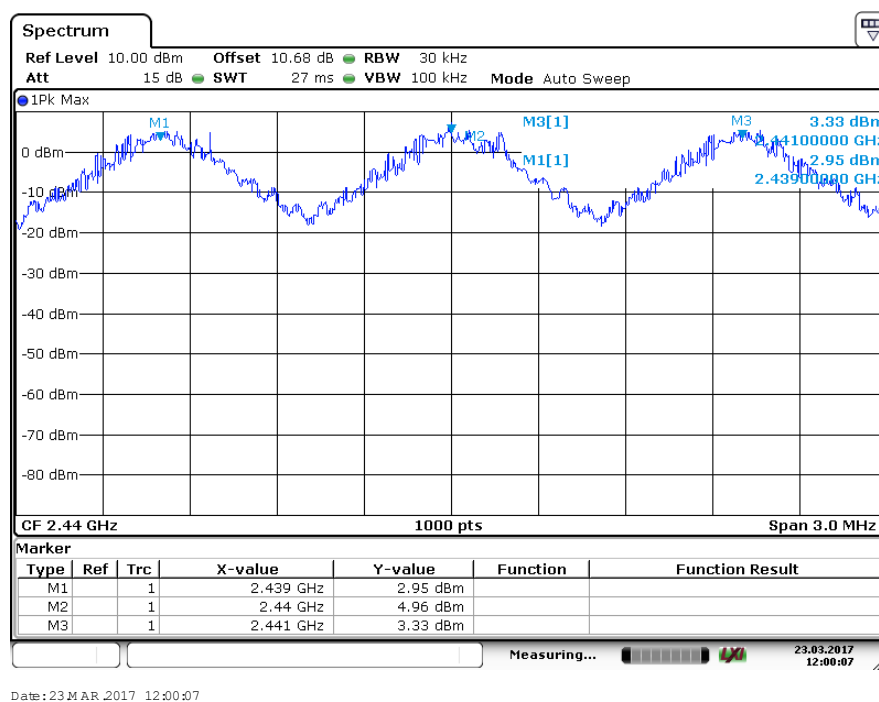
Date: 23 MAR 2017 12:09:51

Number of Hopping Channels: 41**Total Number of hopping channels = 79 (38+41)**

Test Specification	FCC 15.247 (a)(1)
Detector Function	Peak
Requirement	Frequency hopping systems shall have hopping channel carrier frequency separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater

Test Method:


Attenuator (10dB) + cable loss (0.68dB) = 10.68dB Considered in the test result

Test Result:


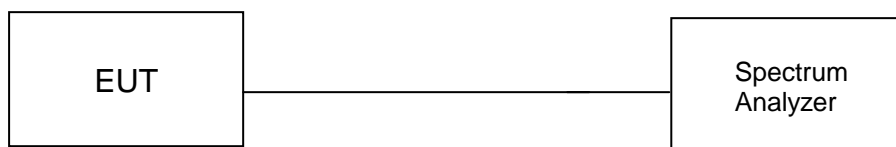
Date: 23 MAR 2017 12:00:07

Channel Separation

Test Specification FCC 15.247 (a)(1)(iii)

Detector Function Peak

Requirement The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the Number of Hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided That a minimum of 15 hopping channels are used.

Test Method:

Test Result:

Time slot		Time Slot (s)
DH	Measurement Value (sec)	
DH5	0.0029	0.310
2DH5	0.0030	0.320
3DH5	0.0030	0.320

Measurement Method

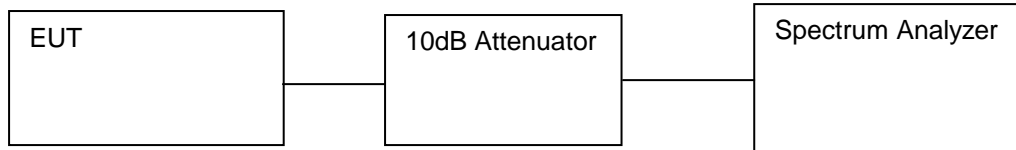
Period Time = 0.4(sec)*79 (hopping channel) = 31.6 s

DH Time slot = Measurement value (Sec)*(1600/ (6*79))*Period time

Test Specification FCC 15.247 (d)

Detector Function Peak

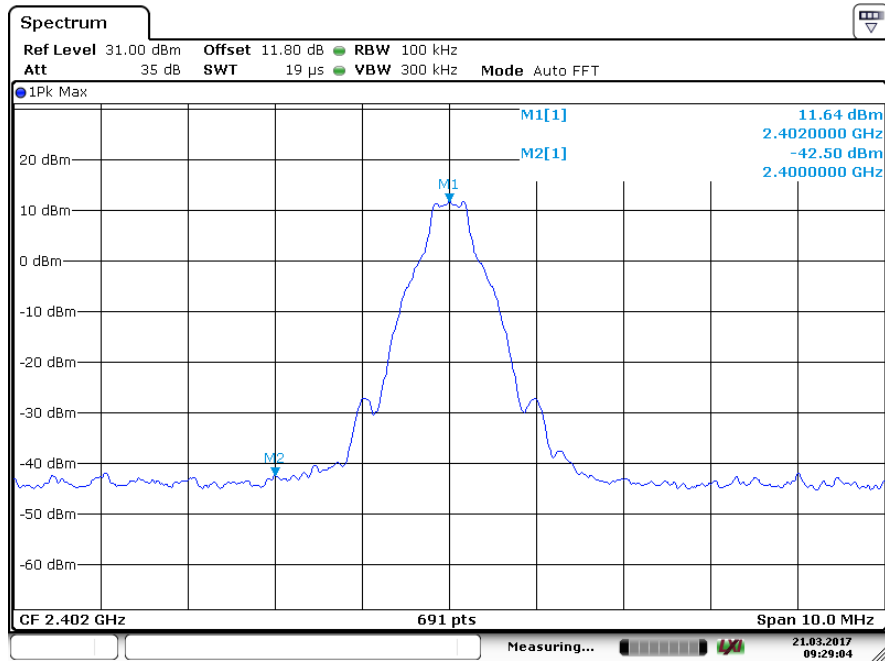
Requirement In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Test Method:


Attenuator (10dB) + cable loss (1.8dB) = 11.8dB Considered in the test result

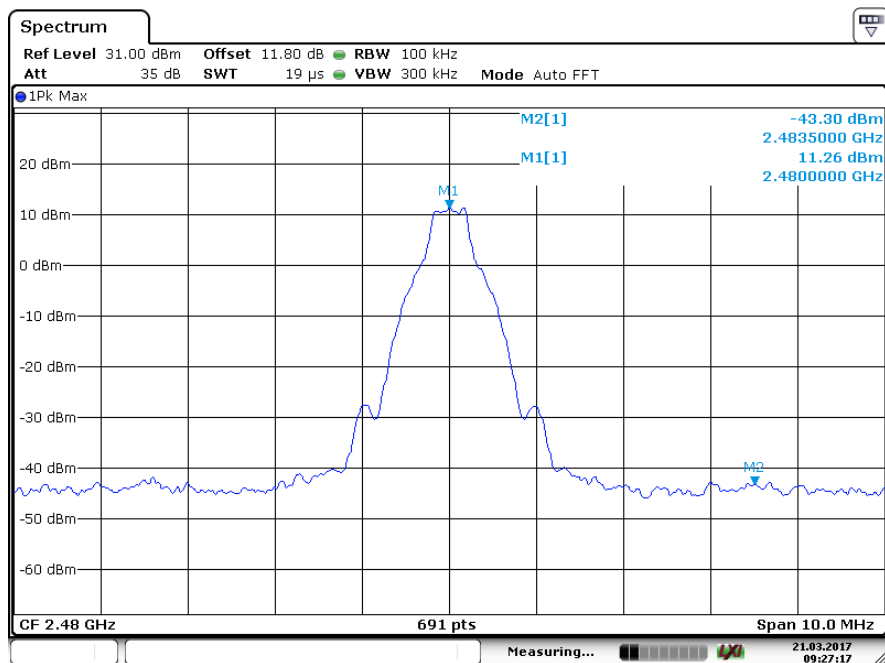
Modulation Type: GFSK
Test Result:

Channel	Fundamental Frequency (MHz)	Value at Band Edge		Limit (dBc)
		Frequency (MHz)	Value (dBc)	
Low	2402.00	2400.0	54.14	20
High	2480.00	2483.5	54.56	20



Date: 21 MAR 2017 09:29:04

Channel Low

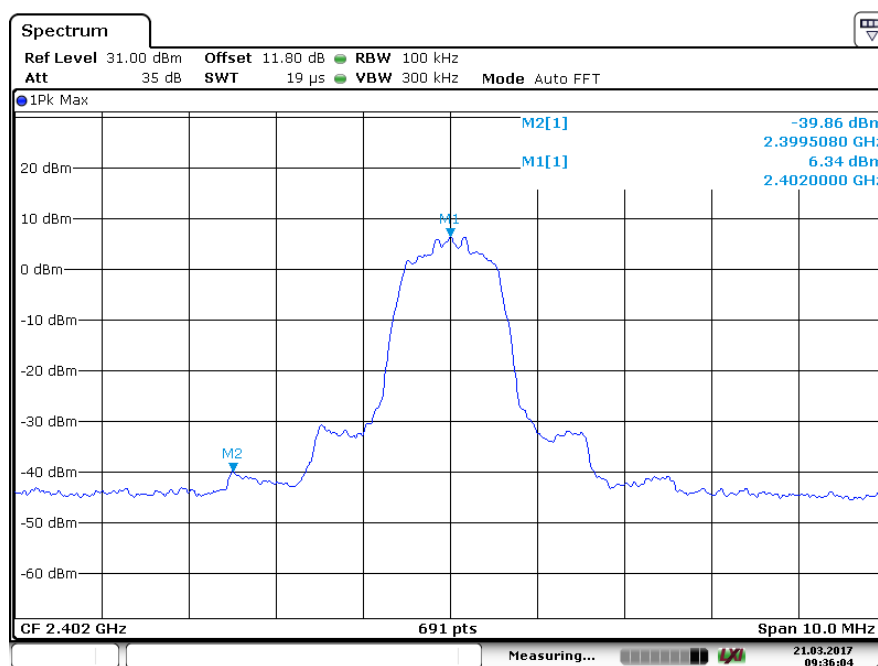


Date: 21 MAR 2017 09:27:17

Channel High

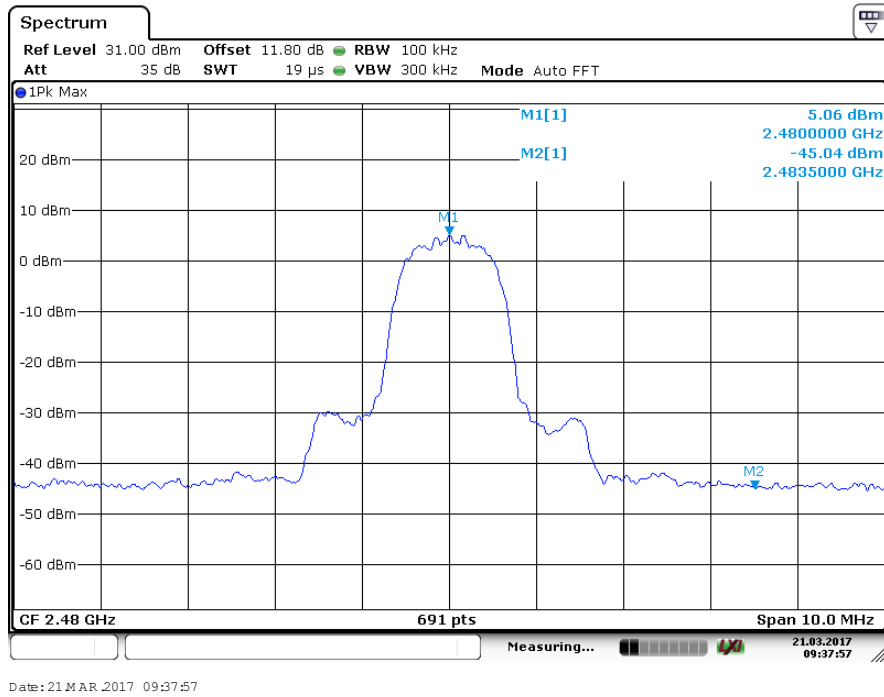
Test Results:

Channel	Fundamental Frequency (MHz)	Value at Band Edge		Limit (dBc)
		Frequency (MHz)	Value (dBc)	
Low	2402.00	2400.0	-46.2	20
High	2480.00	2483.5	-50.1	20



Date: 21 MAR 2017 09:36:04

Channel Low

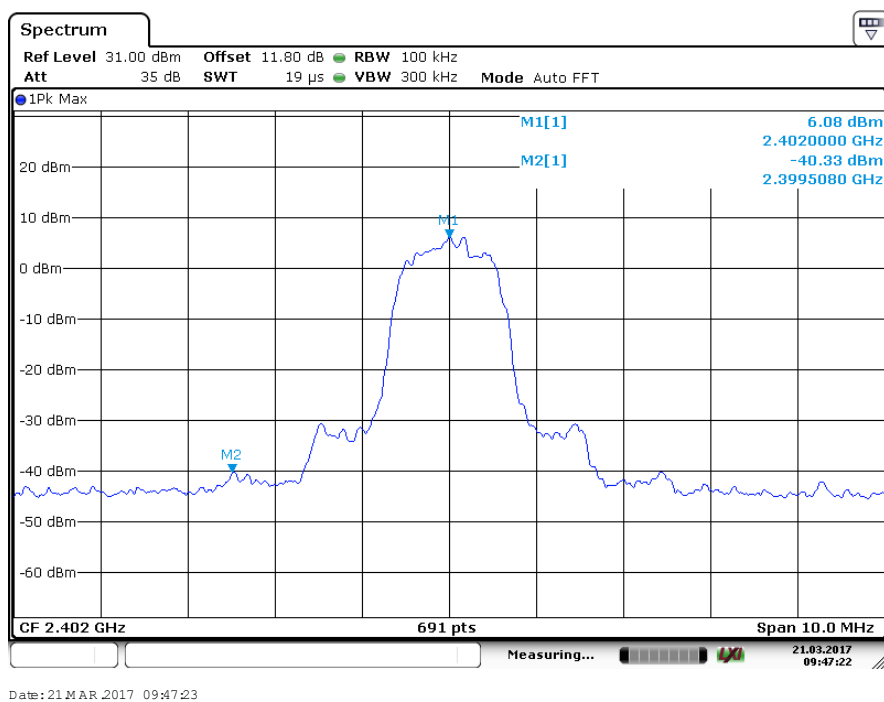


Channel High

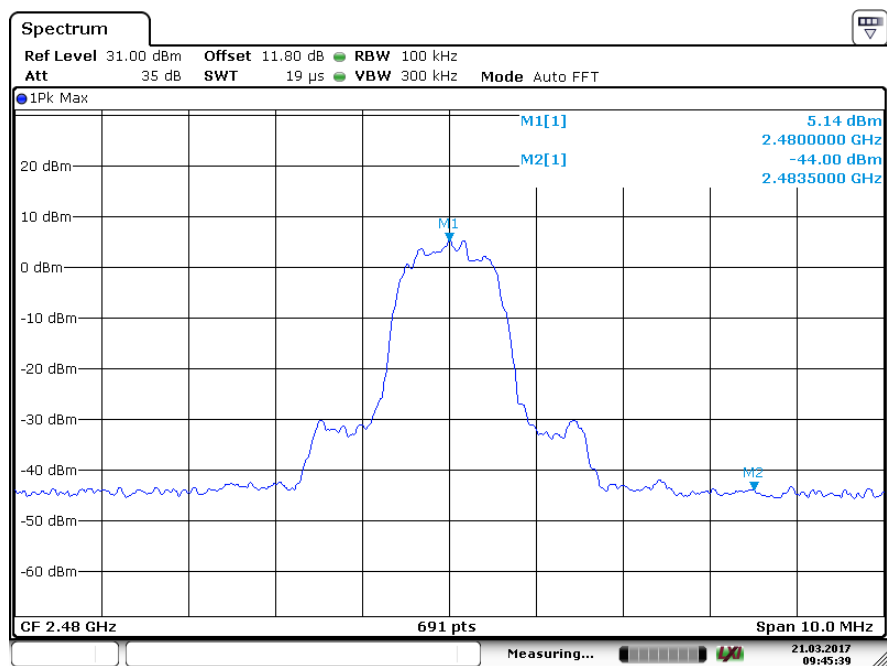
Modulation Type: 8 DPSK

Test Results:

Channel	Fundamental Frequency (MHz)	Value at Band Edge		Limit (dBc)
		Frequency (MHz)	Value (dBc)	
Low	2402.00	2400.0	-46.41	20
High	2480.00	2483.5	-49.14	20



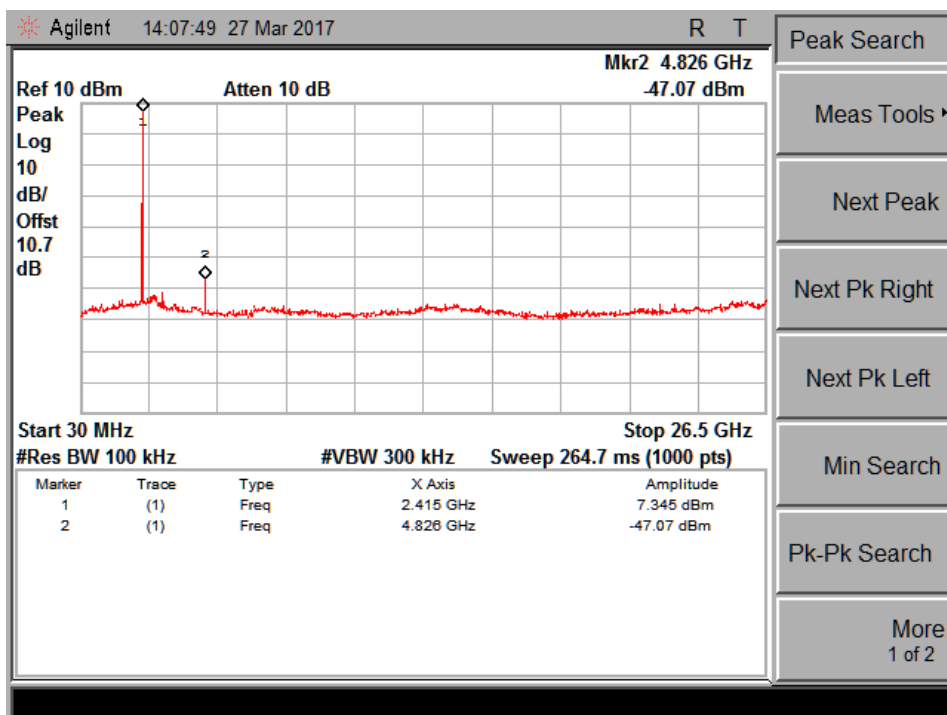
Channel Low



Date: 21.MAR.2017 09:45:39

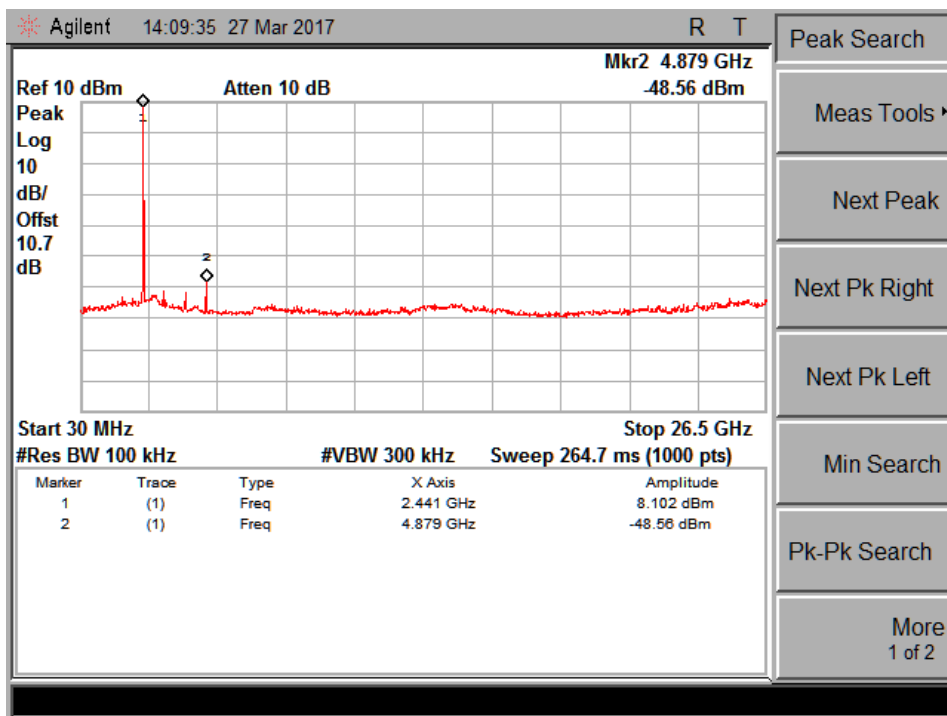
Channel High

30MHz to 26.5GHz Spurious Emissions



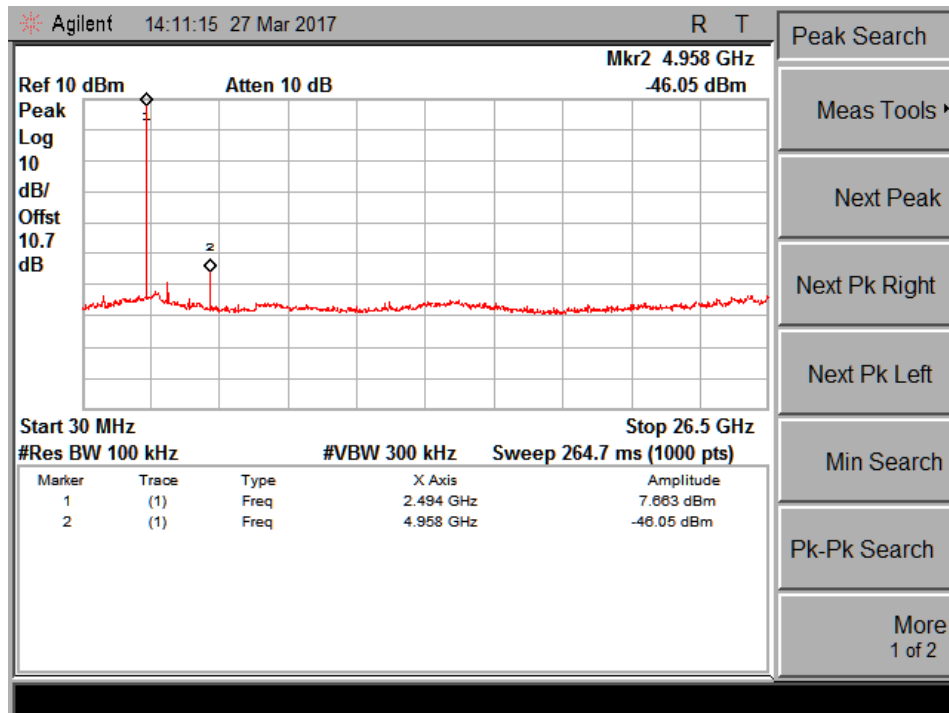
Channel: Low

Modulation: GFSK



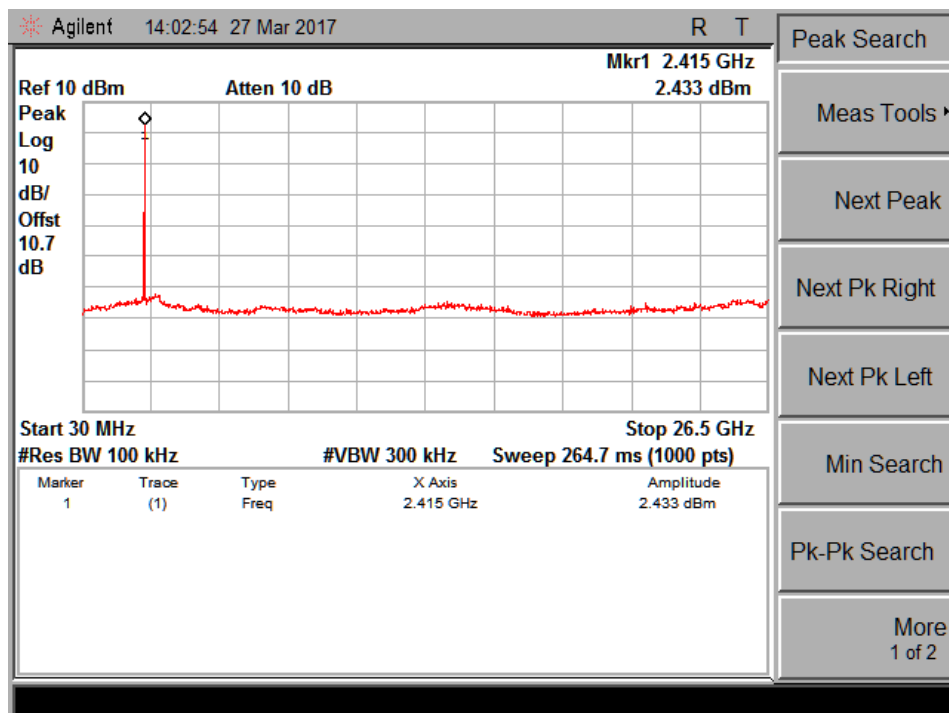
Channel: Mid

Modulation: GFSK



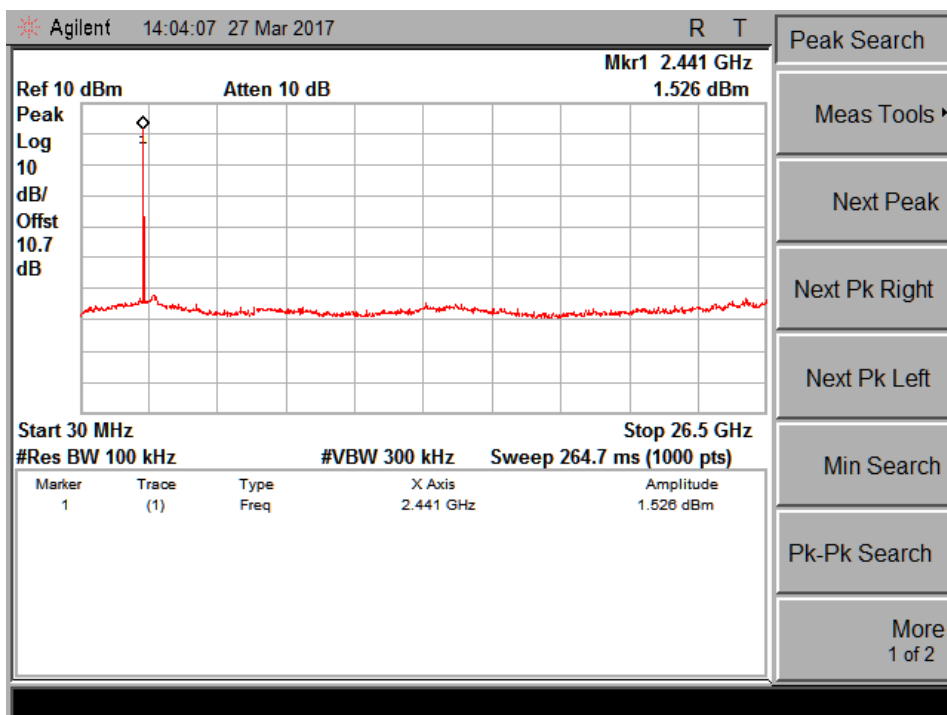
Channel: High

Modulation: GFSK



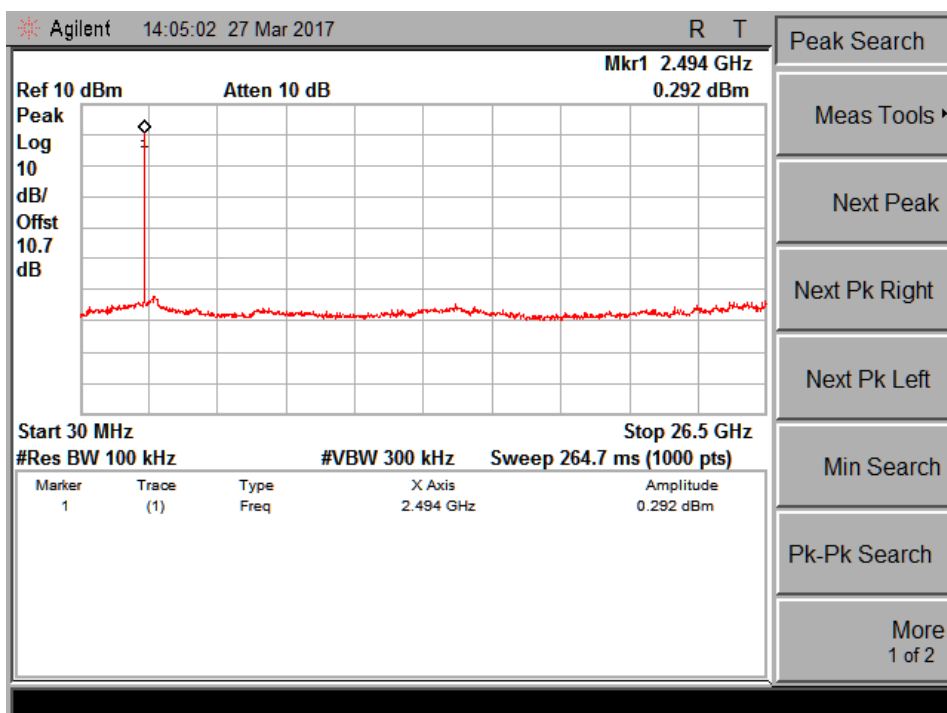
Channel: Low

Modulation: Pi/4 DQPSK



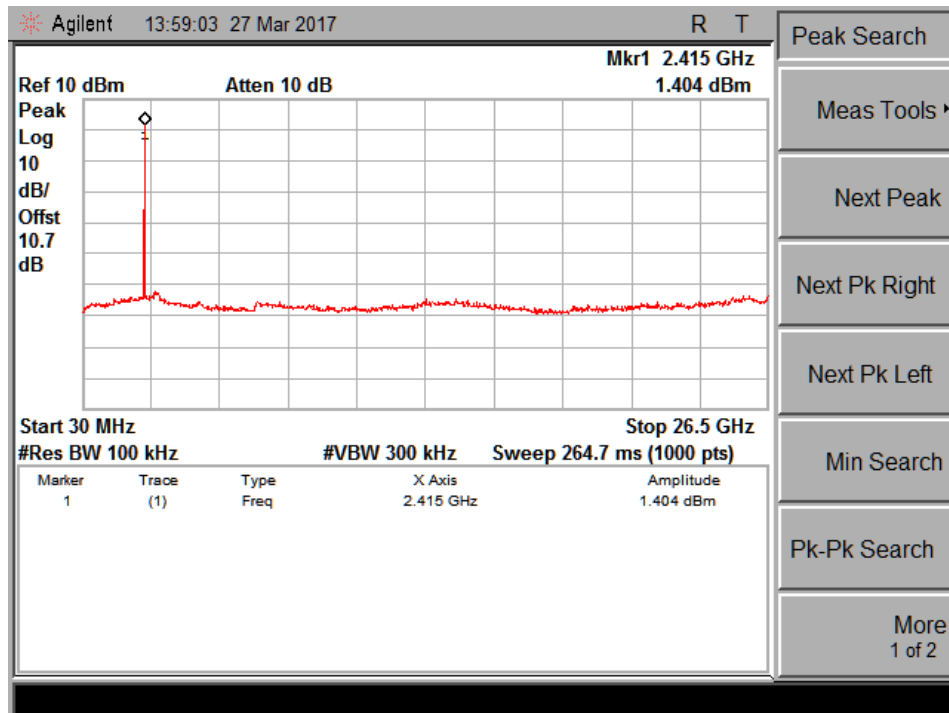
Channel: Mid

Modulation: Pi/4 DQPSK



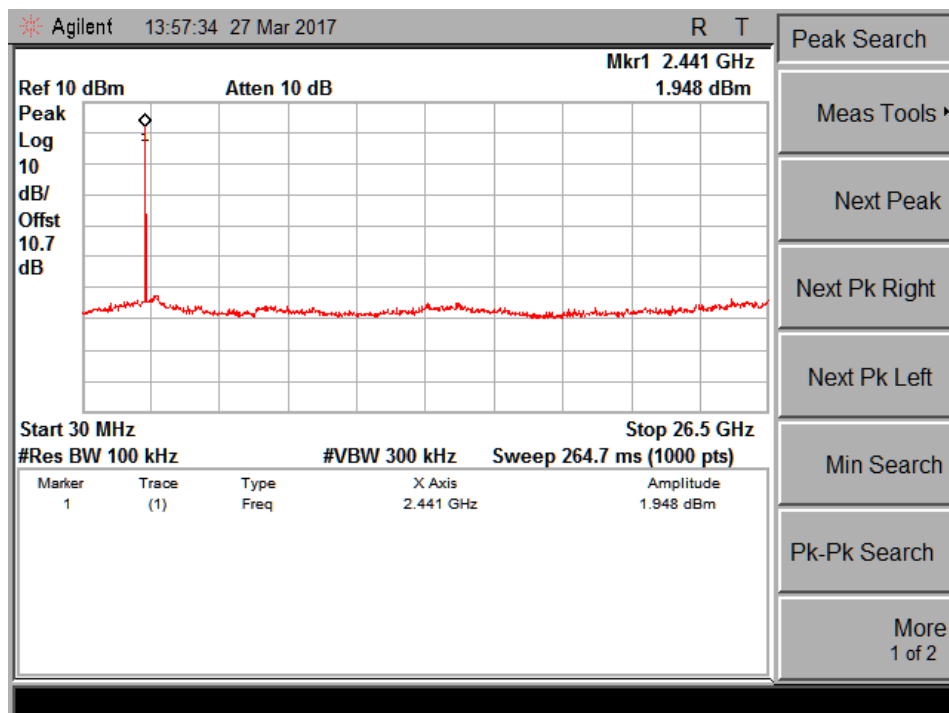
Channel: High

Modulation: Pi/4 DQPSK



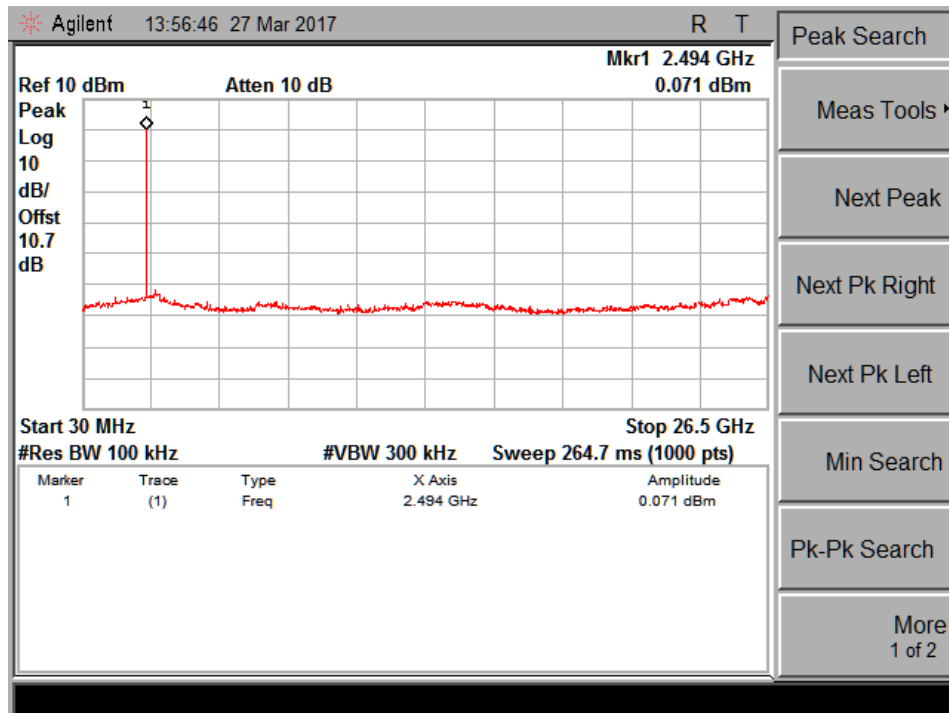
Channel: Low

Modulation: 8 DPSK



Channel: Mid

Modulation: 8 DPSK



Channel: High

Modulation: 8 DPSK

Test Specification	FCC 15.209 &15.205
Test Method	ANSI C63.10-2013
Measurement Location	Semi Anechoic Chamber
Measuring Frequency Range	9kHz to 40GHz (Up to 10 th harmonic of the highest fundamental frequency)
Measuring Distance	3m
Detection	QP for frequency below 1GHz, Peak, Average for frequency above 1GHz
Requirement	As per the limits mentioned in the bellow table

Radiated Spurious Emission Limits:

Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * the limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 88, 50 – 53.80, 53.80 – 43.00 and 49.5dBμV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

Test results:**For Frequency Range 9kHz – 30MHz**

All emissions were below 20dB from the limit, hence not reported.

**Worst case test results for the frequencies in the range 30MHz- 1GHz are reported in below table.
For the Frequency range 30MHz -1GHz**

Polarization	Frequency (MHz)	Unwanted Spurious Emission (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Vertical	480.07 MHz	38.09	46	-07.91
	960.12 MHz	38.27	54	-15.73
Horizontal	119.99 MHz	30.91	43.5	-12.59
	240.05 MHz	30.87	46	-15.13
	480.07 MHz	39.58	46	-06.42
	960.06 MHz	38.28	54	-15.72

Dipole Antenna

Modulation type: GFSK

Data rate	channel	Polarization	Frequency (MHz)	Spurious Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
1Mbps	Low	Vertical	2390(Pk)	61.21	74	-12.79
			2390(Av)	35.38	54	-18.62
			2402(Pk)	108.18	*	-
			2402(Av)	107	*	-
			4804(Pk)	52.73	74	-21.27
			4804(Av)	40.45	54	-13.55
		Horizontal	2390(Pk)	52.74	74	-21.26
			2390(Av)	28.65	54	-25.35
			2402(Pk)	98.87	*	-
			2402(Av)	97.63	*	-
			4804(Pk)	50.35	74	-23.65
			4804(Av)	39.06	54	-14.94
	Mid	Vertical	2440(Pk)	105.79	*	-
			2440(Av)	105.37	*	-
			4880(Pk)	57.94	74	-16.06
			4880(Av)	52.31	54	-01.69
		Horizontal	2440(Pk)	99.11	*	-
			2440(Av)	94.74	*	-
			4880(Pk)	53.92	74	-20.08
			4880(Av)	46.13	54	-07.87
	High	Vertical	2483.5(Pk)	53.4	74	-20.60
			2483.5(Av)	42.38	54	-11.62
			2480(Pk)	107.85	*	-
			2480(Av)	106.57	*	-
			4960(Pk)	53.2	74	-20.80
			4960(Av)	45.7	54	-08.30
		Horizontal	2483.5(Pk)	45.5	74	-28.50
			2483.5(Av)	32.56	54	-21.44
			2480(Pk)	99.11	*	-
			2480(Av)	93.95	*	-
			4960(Pk)	51.41	74	-22.59
			4960(Av)	41.13	54	-12.87

Data rate	channel	Polarization	Frequency (MHz)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2Mbps	Low	Vertical	2390(Pk)	57.95	74	-16.05
			2390(Av)	34.97	54	-19.03
			2402(Pk)	104.97	*	-
			2402(Av)	102.27	*	-
			4804(Pk)	52.29	74	-21.71
			4804(Av)	42.17	54	-11.83
		Horizontal	2390(Pk)	50.71	74	-23.29
			2390(Av)	30.28	54	-23.72
			2402(Pk)	96.98	*	-
			2402(Av)	92.44	*	-
			4804(Pk)	50.42	74	-23.58
			4804(Av)	39.76	54	-14.24
	Mid	Vertical	2440(Pk)	103.66	*	-
			2440(Av)	100.22	*	-
			4880(Pk)	51.89	74	-22.11
			4880(Av)	40.48	54	-13.52
		Horizontal	2440(Pk)	96.93	*	-
			2440(Av)	93.44	*	-
			4880(Pk)	51.51	74	-22.49
			4880(Av)	38.03	54	-15.97
	High	Vertical	2483.5(Pk)	58.42	74	-15.58
			2483.5(Av)	44.35	54	-9.65
			2480(Pk)	103.69	*	-
			2480(Av)	100.12	*	-
			4960(Pk)	51.52	74	-22.48
			4960(Av)	39.82	54	-14.18
		Horizontal	2483.5(Pk)	50.98	74	-23.02
			2483.5(Av)	34.21	54	-19.79
			2480(Pk)	96.55	*	-
			2480(Av)	90.63	*	-
			4960(Pk)	51.1	74	-22.9
			4960(Av)	38.07	54	-15.93

Data rate	channel	Polarization	Frequency (MHz)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
3Mbps	Low	Vertical	2390(Pk)	56.58	74	-17.42
			2390(Av)	35.45	54	-18.55
			2402(Pk)	104.67	*	-
			2402(Av)	100.98	*	-
			4804(Pk)	52.61	74	-21.39
			4804(Av)	41.47	54	-12.53
		Horizontal	2390(Pk)	47.99	74	-26.01
			2390(Av)	28.93	54	-25.07
			2402(Pk)	95.69	*	-
			2402(Av)	88.17	*	-
			4804(Pk)	50.67	74	-23.33
			4804(Av)	39.7	54	-14.3
	Mid	Vertical	2440(Pk)	104.31	*	-
			2440(Av)	100.28	*	-
			4880(Pk)	50.37	74	-23.63
			4880(Av)	40.72	54	-13.28
		Horizontal	2440(Pk)	97.79	*	-
			2440(Av)	93.85	*	-
			4880(Pk)	50.25	74	-23.75
			4880(Av)	37.93	54	-16.07
	High	Vertical	2483.5(Pk)	57.67	74	-16.33
			2483.5(Av)	43.57	54	-10.43
			2480(Pk)	103.3	*	-
			2480(Av)	99.12	*	-
			4960(Pk)	51.34	74	-22.66
			4960(Av)	39.85	54	-14.15
		Horizontal	2483.5(Pk)	49.44	74	-24.56
			2483.5(Av)	35.46	54	-18.54
			2480(Pk)	94.92	*	-
			2480(Av)	89.94	*	-
			4960(Pk)	51.27	74	-22.73
			4960(Av)	38.06	54	-15.94

Modulation type: GFSK

Data rate	channel	Polarization	Frequency (MHz)	Emission (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1Mbps	Low	Vertical	2390(Pk)	59.52	74	-14.48
			2390(Av)	32.41	54	-21.59
			2402(Pk)	106.95	*	-
			2402(Av)	104.95	*	-
			4804(Pk)	53.92	74	-20.08
			4804(Av)	46.82	54	-07.18
		Horizontal	2390(Pk)	53.89	74	-20.11
			2390(Av)	30.22	54	-23.78
			2402(Pk)	101.75	*	-
			2402(Av)	99.75	*	-
			4804(Pk)	52.95	74	-21.05
			4804(Av)	45.64	54	-08.36
	Mid	Vertical	2440(Pk)	107.02	*	-
			2440(Av)	107.42	*	-
			4880(Pk)	56.75	74	-17.25
			4880(Av)	45.94	54	-08.06
		Horizontal	2440(Pk)	97.54	*	-
			2440(Av)	91.86	*	-
			4880(Pk)	51.8	74	-22.2
			4880(Av)	43.53	54	-10.47
	High	Vertical	2483.5(Pk)	46.82	74	-27.18
			2483.5(Av)	45.35	54	-08.65
			2480(Pk)	109.08	*	-
			2480(Av)	108.62	*	-
			4960(Pk)	52.01	74	-21.99
			4960(Av)	39.33	54	-14.67
		Horizontal	2483.5(Pk)	44.35	74	-29.65
			2483.5(Av)	30.99	54	-23.01
			2480(Pk)	96.23	*	-
			2480(Av)	91.83	*	-
			4960(Pk)	48.81	74	-25.19
			4960(Av)	34.55	54	-19.45

Data rate	channel	Polarization	Frequency (MHz)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2Mbps	Low	Vertical	2390(Pk)	59.64	74	-14.36
			2390(Av)	37.94	54	-16.06
			2402(Pk)	106.2	*	-
			2402(Av)	104.32	*	-
			4804(Pk)	51.1	74	-22.90
			4804(Av)	35.8	54	-18.2
		Horizontal	2390(Pk)	49.56	74	-24.44
			2390(Av)	28.71	54	-25.29
			2402(Pk)	94.1	*	-
			2402(Av)	90.32	*	-
			4804(Pk)	47.82	74	-26.18
			4804(Av)	33.18	54	-20.82
	Mid	Vertical	2440(Pk)	104.89	*	-
			2440(Av)	102.27	*	-
			4880(Pk)	50.7	74	-23.30
			4880(Av)	34.11	54	-19.89
		Horizontal	2440(Pk)	95.36	*	-
			2440(Av)	90.56	*	-
			4880(Pk)	49.39	74	-24.61
			4880(Av)	35.43	54	-18.57
	High	Vertical	2483.5(Pk)	51.84	74	-22.16
			2483.5(Av)	47.32	54	-06.68
			2480(Pk)	104.92	*	-
			2480(Av)	102.17	*	-
			4960(Pk)	50.33	74	-23.67
			4960(Av)	33.45	54	-20.55
		Horizontal	2483.5(Pk)	49.83	74	-24.17
			2483.5(Av)	32.64	54	-21.36
			2480(Pk)	93.67	*	-
			2480(Av)	88.51	*	-
			4960(Pk)	48.5	74	-25.50
			4960(Av)	31.49	54	-22.51

Data rate	channel	Polarization	Frequency (MHz)	Emission (dBµV/m)	Limit (dBµV/m)	Margin (dB)
3Mbps	Low	Vertical	2390(Pk)	58.27	74	-15.73
			2390(Av)	38.42	54	-15.58
			2402(Pk)	105.9	*	-
			2402(Av)	103.03	*	-
			4804(Pk)	51.42	74	-22.58
			4804(Av)	35.1	54	-18.9
		Horizontal	2390(Pk)	46.84	74	-27.16
			2390(Av)	27.36	54	-26.64
			2402(Pk)	92.81	*	-
			2402(Av)	86.05	*	-
			4804(Pk)	48.07	74	-25.93
			4804(Av)	33.12	54	-20.88
	Mid	Vertical	2440(Pk)	105.54	*	-
			2440(Av)	102.33	*	-
			4880(Pk)	49.18	74	-24.82
			4880(Av)	34.35	54	-19.65
		Horizontal	2440(Pk)	96.22	*	-
			2440(Av)	90.97	*	-
			4880(Pk)	48.13	74	-25.87
			4880(Av)	35.33	54	-18.67
	High	Vertical	2483.5(Pk)	51.09	74	-22.91
			2483.5(Av)	46.54	54	-07.46
			2480(Pk)	104.53	*	-
			2480(Av)	101.17	*	-
			4960(Pk)	50.15	74	-23.85
			4960(Av)	33.48	54	-20.52
		Horizontal	2483.5(Pk)	48.29	74	-25.71
			2483.5(Av)	33.89	54	-20.11
			2480(Pk)	92.04	*	-
			2480(Av)	87.82	*	-
			4960(Pk)	48.67	74	-25.33
			4960(Av)	31.48	54	-22.52

* * -> Fundamental Frequency

Pk - > Peak Detector

Av->Average Detector

Test Specification : FCC Part 15.207
Test Method : ANSI C63.10-2013
Testing Location : Screened room
Measurement Bandwidth : 9kHz
Frequency Range : 150kHz – 30MHz
Supply Voltage : 110VAC,60Hz

Conducted Emission Test Limits:

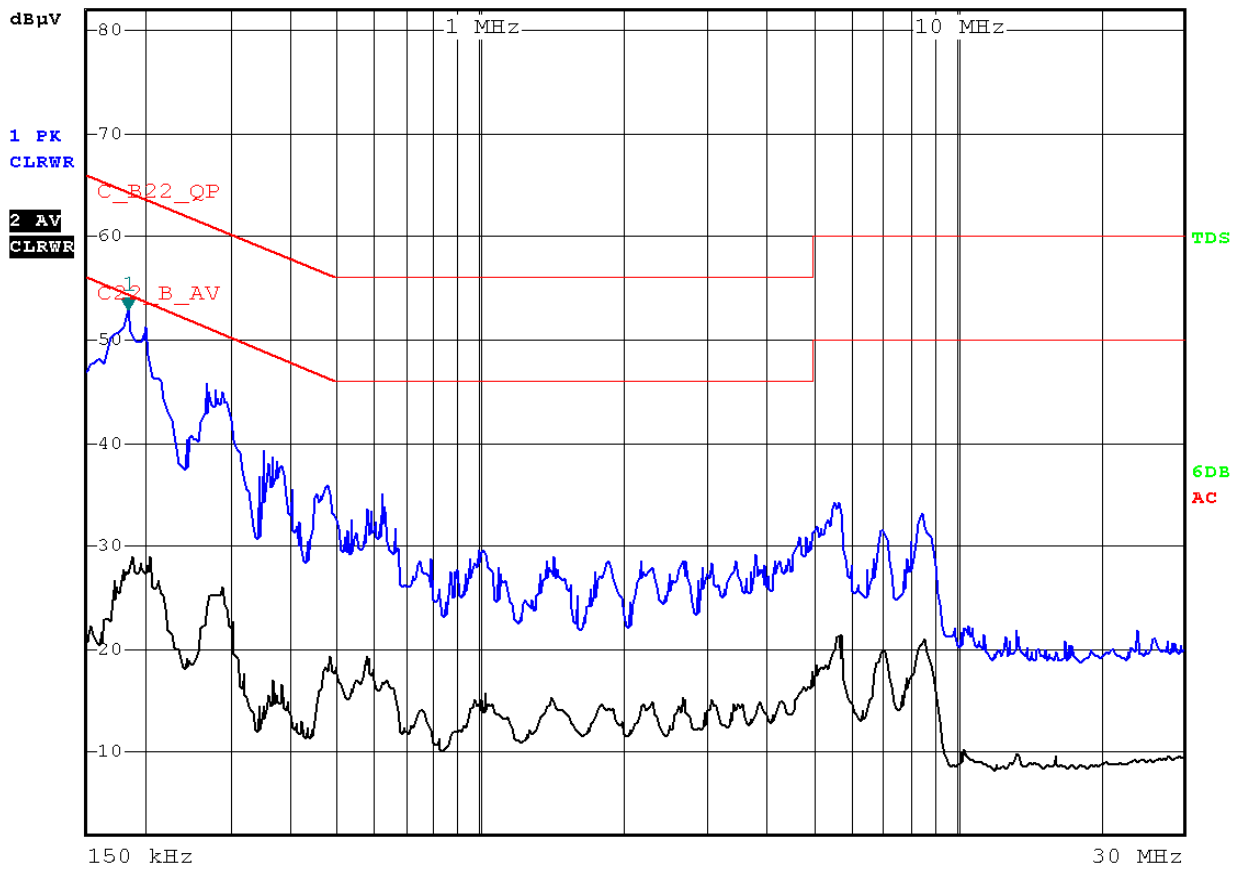
Frequency of Emission (MHz)	QP Limit (dB μ V)	AV Limit (dB μ V/m)
0.15 – 0.5	66 – 56*	56 – 46*
0.5 – 5	56	46
5 – 30	60	50

* Decreases with the logarithm of the frequency

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Test Results:



RBW 9 kHz Marker 1 [T1]
MT 20 ms 52.86 dBμV
Att 10 dB AUTO PREAMP ON 182.000000000 kHz



Econ Sys_Esontk1_110V_60Hz_line

Date: 11.APR.2017 19:07:41

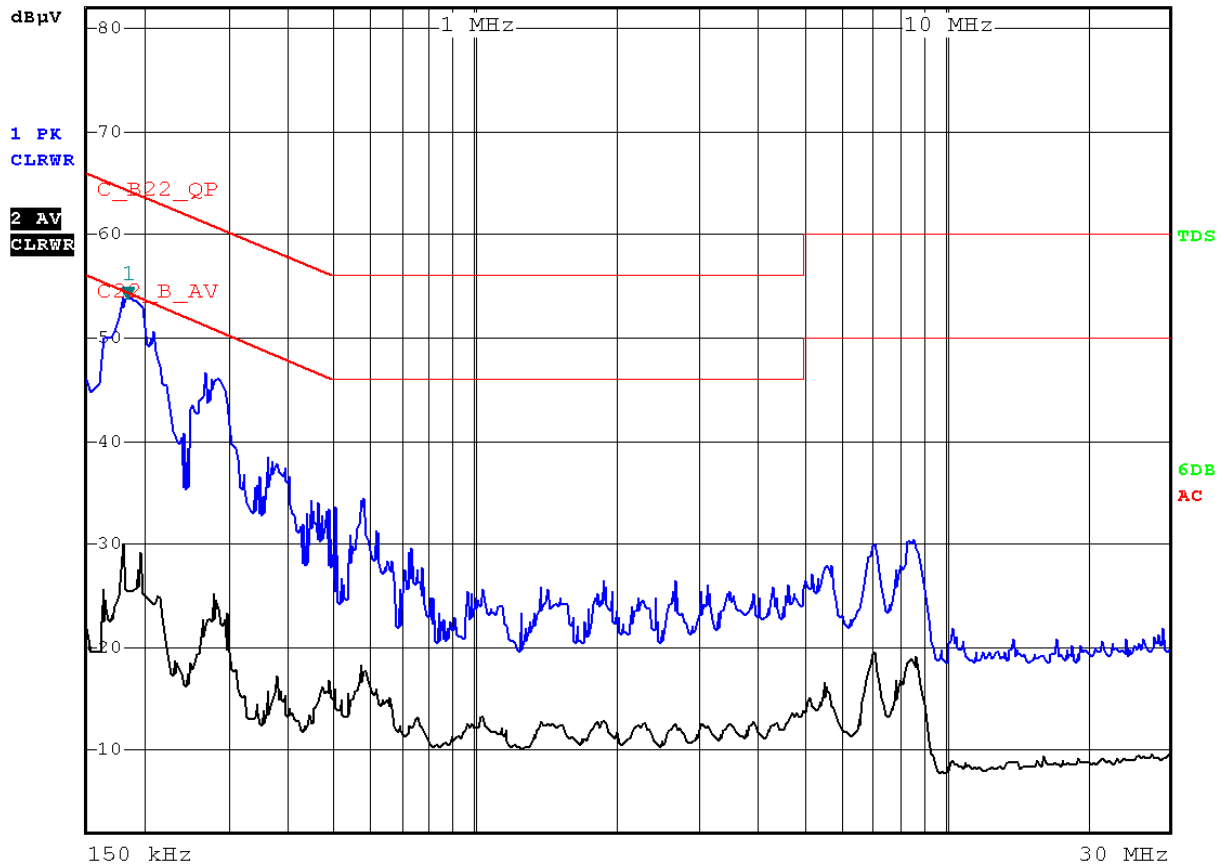
Line Graph

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	C_B22_QP			
Trace2:	C22_B_AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB	
1 Quasi Peak	182 kHz	44.49	-19.90	
2 Average	202 kHz	27.56	-25.95	
1 Quasi Peak	266 kHz	36.88	-24.35	
2 Average	286 kHz	25.11	-25.52	
1 Quasi Peak	350 kHz	29.49	-29.46	
1 Quasi Peak	478 kHz	27.78	-28.59	
2 Average	578 kHz	19.26	-26.73	
1 Quasi Peak	622 kHz	25.21	-30.78	
1 Quasi Peak	5.554 MHz	26.63	-33.36	
2 Average	5.714 MHz	19.38	-30.61	
1 Quasi Peak	6.922 MHz	26.05	-33.94	
1 Quasi Peak	8.466 MHz	26.83	-33.16	
2 Average	8.626 MHz	18.73	-31.26	

Econ Sys_Esomtk1_110V_60Hz_line

Date: 11.APR.2017 19:09:51

Line Table


RBW 9 kHz Marker 1 [T1]
MT 20 ms 53.68 dBμV
Att 10 dB AUTO PREAMP ON 182.000000000 kHz


Econ Sys_Esomtk1_110V_60Hz_neutral

Date: 11.APR.2017 19:14:38

Neutral Graph

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	C_B22_QP			
Trace2:	C22_B_AV			
Trace3:	---			
	TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2	Average	178 kHz	26.34	-28.23
1	Quasi Peak	178 kHz	46.05	-18.52
1	Quasi Peak	266 kHz	37.87	-23.36
2	Average	278 kHz	23.83	-27.03
1	Quasi Peak	446 kHz	25.51	-31.43
2	Average	574 kHz	17.79	-28.20
1	Quasi Peak	578 kHz	26.35	-29.64
1	Quasi Peak	730 kHz	19.56	-36.43
1	Quasi Peak	1.882 MHz	18.06	-37.93
1	Quasi Peak	5.634 MHz	23.60	-36.39
2	Average	5.642 MHz	16.64	-33.35
1	Quasi Peak	7.078 MHz	23.87	-36.12
2	Average	7.086 MHz	17.28	-32.71
2	Average	8.486 MHz	17.87	-32.12
1	Quasi Peak	8.614 MHz	24.76	-35.23

Econ Sys_Esomtk1_110V_60Hz_neutral

Date: 11.APR.2017 19:20:51

Neutral Table

END OF TEST REPORT