FCC TEST REPORT

Test report
On Behalf of
DeltaTrak Inc.
For
Wireless data logger
Model No.: FLASHLINK RTL 22366

FCC ID: 2ATXY-22366

Prepared for :	**DeltaTrak Inc.** 1236 Doker Drive, Modesto, CA 95351 US
Prepared By :	**Shenzhen HUAK Testing Technology Co., Ltd.** **1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China**
Date of Test:	**August 10, 2019~ August 27, 2019**
Date of Report:	**August 28, 2019**
Report Number:	**HK1907041535E**

TEST RESULT CERTIFICATION

Applicant's name ..... :	**DeltaTrak Inc.**
Address..... :	1236 Doker Drive, Modesto, CA 95351 US
Manufacture's Name ..... :	**DeltaTrak Inc.**
Address..... :	1236 Doker Drive, Modesto, CA 95351 US

Product description

Trade Mark..... :	DeltaTrak
Product name ..... :	Wireless data logger
Model and/or type reference... :	FLASHLINK RTL 22366
Standards ..... :	FCC Rules and Regulations Part 22, Part 24 & Part 27 ANSI C63.26:2015

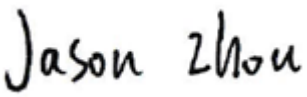
Date of Test ..... :	
Date (s) of performance of tests ..... :	August 10, 2019~ August 27, 2019
Date of Issue ..... :	August 28, 2019
Test Result..... :	**Pass**

Testing Engineer : 

(Gary Qian)

Technical Manager : 

(EdenHu)

Authorized Signatory : 

(Jason Zhou)

Revision History

Revision	Issue Date	Revisions	Revised By
000	August 28, 2019	Initial Issue	Jason Zhou

Contents

1 TEST STANDARDS

The tests were performed according to following standards:
FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
FCC Part 22 Subpart H: PRIVATE LAND MOBILE RADIO SERVICES.
FCC Part 24 Subpart E: PUBLIC MOBILE SERVICES
FCC Part 27 Subpart L: MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
ANSI/TIA-603-E-2016: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.
ANSI C63.26-2015: IEEE/ANSI Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
FCCKDB971168D01 Power Meas License Digital Systems

2 SUMMARY

2.1 Product Description

EUT	:	Wireless data logger
Model Number	:	FLASHLINK RTL 22366
Model Difference Declaration	:	The probe is an optional function shows in EUT photos.
Test Model	:	FLASHLINK RTL 22366
Power Supply	:	DC 3.70V by Battery
Hardware version	:	B95MR41B
Software version	:	B9B_DeltaTrak_L03
GSM		
Support Bands	:	☒GSM 850 ☒PCS 1900 ☒GSM 900 ☒PCS 1800
GSM FCC Operation Frequency	:	US-Bands: GSM 850(UL: 824 – 848 MHz/DL: 869 – 894 MHz) GSM 1900(UL: 1850 –1910 MHz/DL: 1930 – 1990 MHz) NON US-bands: GSM 900(UL: 880 – 915 MHz/DL: 925 – 960 MHz) GSM 1800(UL: 1710 – 1785 MHz/DL: 1805 – 1880 MHz)
Channel Separation	:	0.2MHz
Modulation Technology	:	GMSK, 8PSK
Antenna Type And Gain	:	Internal Antenna GSM900: +0.8dBi DCS1800: -0.24dBi GSM850: +0.34dBi PCS1900: -0.31dBi
UTRA		
Support Bands	:	☒WCDMA BAND I ☒WCDMA BAND II ☒WCDMA BAND IV ☒WCDMA BAND V ☒ WCDMA BAND VIII
UTRA FCC Operation Frequency	:	US-Bands: WCDMA BAND V (UL: 824 – 848 MHz/DL: 869 – 894 MHz) WCDMA BAND II (UL: 1850 –1910 MHz/DL: 1930 – 1990 MHz) WCDMA BAND IV(UL: 1710 –1755 MHz/DL: 2110 – 2155 MHz) NON US-bands: WCDMA BAND I (UL: 1920 – 1980 MHz/DL: 2110 – 2170 MHz) WCDMA BAND VIII(UL: 880 – 915 MHz/DL: 925 – 960 MHz)
Channel Separation	:	0.2 MHz
Modulation Technology	:	OFDM (16QAM, QPSK)
Antenna Type And Gain	:	Internal Antenna WCDMA BAND I: +0.21dBi WCDMA BAND II: -0.27dBi WCDMA BAND IV: -0.53dBi WCDMA BAND V: +0.32dBi WCDMA BAND VIII: +0.86dBi

GSM/WCDMA Card Slot :

	Maximum ERP/EIRP (dBm)	Max. Peak Conducted Power (dBm)	Max. Average Burst Power (dBm)
GSM 850	28.94	32.98	31.39
PCS 1900	26.47	29.04	27.81
UMTS BAND II	21.15	24.59	22.53
UMTS BAND IV	20.96	24.18	22.64
UMTS BAND V	21.05	25.43	23.48

2.2 Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate

2.3 Short description of the Equipment under Test (EUT)

2.3.1 General Description

EUT is subscriber equipment in the GSM/WCDMA system. Frequency bands Shows in section 2.1.

2.4 Normal Accessory setting

Fully charged battery was used during the test.

2.5 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

2.6 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2ATXY-22366** filing to comply with FCC Part 22 Rules, FCC Part 24 Rules and FCC Part 27 Rules.

2.7 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Test Facility

Designation Number: CN1229
Test Firm Registration Number: 616276

The 3m-Semi anechoic test site fulfills CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010

3.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.3 Test Description

PCS 1900 and UMTS BAND II:

Test Item	FCC Rule No.	Requirements	Judgement
Effective (Isotropic) Radiated Power	2.1046, 24.232(c)	EIRP ≤ 2W(33dBm)	Pass
Bandwidth	2.1049 24.238(a)	OBW: No limit. EBW: No limit.	Pass
Band Edges	2.1051, 24.238(a)	-13dBm	Pass
Spurious Emission at Antenna Terminals	2.1051, 24.238(a)	-13dBm	Pass
Field Strength of Spurious Radiation	2.1053, 24.238(a)	-13dBm	Pass
Frequency Stability	2.1055, 24.235	the fundamental emission stays within the authorized frequency block.	Pass
Peak to average ratio	24.232(d)	<13dB	Pass

GSM850 and UMTS BAND V:

Test Item	FCC Rule No.	Requirements	Judgement
Effective (Isotropic) Radiated Power	2.1046, 2.913(a)	EIRP ≤ 7W(33dBm)	Pass
Occupied Bandwidth	2.1049	OBW: No limit.	Pass
Emission Bandwidth	22.917(b)	EBW: No limit.	Pass
Band Edges Compliance	2.1051, 22.917(a)(b)	KDB 971 168 D02 971168 D02 Misc OOBE License Digital Systems v01 &27.53(m) for detail the limit is upon different OBW	Pass
Spurious Emission at Antenna Terminals	2.1051, 22.917	-13dBm	Pass
Field Strength of Spurious Radiation	2.1053, 22.917	-13dBm	Pass
Frequency Stability	2.1055, 22.355	the fundamental emissions stay within the authorized bands of operation. (2.5ppm)	Pass

UMTS BAND IV:

Test Item	FCC Rule No.	Requirements	Judgement
Effective (Isotropic) Radiated Power	2.1046, 27.50(d)	EIRP ≤ 2W(33dBm)	Pass
Bandwidth	2.1049	OBW: No limit. EBW: No limit.	Pass
Band Edges	2.1051, 27.53(h)	-13dBm	Pass
Spurious Emission at Antenna Terminals	2.1051, 27.53(h)	-13dBm	Pass
Field Strength of Spurious Radiation	2.1053, 27.53(h)	-13dBm	Pass
Frequency Stability	2.1055, 27.54	the fundamental emissions stay within the authorized bands of operation. (2.5ppm)	Pass
Peak to average ratio	27.50(d)	<13dB	Pass

3.4 Equipments Used during the Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 27, 2018	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 27, 2018	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 27, 2018	1 Year
4.	Spectrum analyzer	R&S	FSP40	HKE-025	Dec. 27, 2018	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 27, 2018	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 27, 2018	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 27, 2018	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 27, 2018	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 27, 2018	1 Year
10.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Dec. 27, 2018	1 Year
11.	Pre-amplifier	EMCI	EMC051845 SE	HKE-015	Dec. 27, 2018	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 27, 2018	1 Year
13.	EMI Test Software EZ-EMC	Tonscend	JS1120-B	HKE-083	Dec. 27, 2018	N/A
14.	Power Sensor	Agilent	E9300A	HKE-086	Dec. 27, 2018	1 Year
15.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 27, 2018	1 Year
16.	Signal generator	Agilent	N5182A	HKE-029	Dec. 27, 2018	1 Year
17.	Signal Generator	Agilent	83630A	HKE-028	Dec. 27, 2018	1 Year
18.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 27, 2018	3 Year
19.	WIDEBAND RADIO COMMUNICATION	R&S	CMW 500	HKE-027	Dec. 27, 2018	1 Year

3.5 Measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to ETSI TR 100 028 " Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics" and is documented in the HUAK quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for HUAK is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	3.10 dB	(1)
Radiated Emission	1~18GHz	3.70 dB	(1)
Radiated Emission	18-40GHz	3.90 dB	(1)
Conducted Disturbance	0.15~30MHz	1.63 dB	(1)
Conducted Power	9KHz~18GHz	0.61 dB	(1)
Spurious RF Conducted Emission	9KHz~40GHz	1.22 dB	(1)
Band Edge Compliance of RF Emission	9KHz~40GHz	1.22 dB	(1)
Occuiped Bandwidth	9KHz~40GHz	-	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4 DESCRIPTION OF TEST MODES

During the testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication Tester (CMU 200)to ensure max power transmission and proper modulation. Three channels (The top channel, the middle channel and the bottom channel) were chosen for testing on both GSM and PCS frequency band.

*****Note:** GSM/GPRS 850, GSM/GPRS 1900, WCDMA/HSPA band II, WCDMA/HSPA band IV, WCDMA/HSPA band V mode have been tested during the test.

The worst condition was recorded in the test report if no other modes test data.

5 TEST CONDITIONS AND RESULTS

5.1 OUTPUT POWER

5.1.1 CONDUCTED OUTPUT POWER

5.1.1.1 MEASUREMENT METHOD

The transmitter output port was connected to base station.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Measure the maximum burst average power and average power for other modulation signal.

The EUT was setup for the max output power with pseudo random data modulation. Power was measured with Spectrum Analyzer. The measurements were performed on all modes(GSM/GPRS 850, GSM/GPRS 1900, WCDMA/HSPA band II, WCDMA/HSPA band IV, WCDMA/HSPA band V)at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

5.1.1.2 MEASUREMENT RESULT

Conducted Output Power Limits for GSM/GPRS 850 band		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
GSM	33 dBm (2W)	+1/- 1
GPRS	33 dBm (2W)	+1/- 1
Conducted Output Power Limits for GSM/GPRS 1900 band		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
GSM	30 dBm (1W)	+1/- 1
GPRS	33 dBm (2W)	+1/- 1
Conducted Output Power Limits for UMTS band II		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
WCDMA	24dBm (0.25W)	+1.7/-3.7
Conducted Output Power Limits for UMTS band IV		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
WCDMA	24dBm (0.25W)	+1.7/- 3.7
Conducted Output Power Limits for UMTS band V		
Mode	**Nominal Peak Power**	**Tolerance(dB)**

WCDMA	24dBm (0.25W)	+1.7/- 3.7

GSM 850

Mode	Frequency (MHz)	Reference Power	Peak Power	Tolerance	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power (dBm)	Peak to Average Ratio
GPRS850 (1 Slot)	824.2	33	33.00	0.00	31.65	-9	22.65	1.35
	836.6	33	**32.98**	-0.02	**31.39**	-9	22.39	1.59
	848.8	33	32.64	-0.36	31.74	-9	22.74	0.90
GPRS850 (2 Slot)	824.2	30	30.39	0.39	29.13	-6	23.13	1.25
	836.6	30	30.70	0.70	29.20	-6	23.20	1.50
	848.8	30	30.80	0.80	29.51	-6	**23.51**	1.29
GPRS850 (3 Slot)	824.2	28.74	26.96	-1.78	25.73	-4.26	21.47	1.23
	836.6	28.74	27.22	-1.52	25.81	-4.26	21.55	1.41
	848.8	28.74	27.22	-1.52	25.93	-4.26	21.67	1.29
GPRS850 (4 Slot)	824.2	27	25.86	-1.14	24.97	-3	21.97	0.90
	836.6	27	26.24	-0.76	25.02	-3	22.02	1.22
	848.8	27	26.26	-0.74	24.82	-3	21.82	1.45
EGPRS850 (1 Slot)	824.2	27	26.10	-0.90	23.38	-9	14.38	2.72
	836.6	27	26.53	-0.47	23.60	-9	14.60	**2.94**
	848.8	27	26.84	-0.16	24.10	-9	15.10	2.74
EGPRS850 (2 Slot)	824.2	24	24.62	0.62	21.71	-6	15.71	2.91
	836.6	24	24.54	0.54	21.81	-6	15.81	2.73
	848.8	24	24.56	0.56	22.34	-6	16.34	2.22
EGPRS850 (3 Slot)	824.2	22.74	22.21	-0.53	19.59	-4.26	15.33	2.62
	836.6	22.74	22.38	-0.36	19.51	-4.26	15.25	2.87
	848.8	22.74	22.58	-0.16	19.95	-4.26	15.69	2.63
EGPRS850 (4 Slot)	824.2	21	20.62	-0.38	18.08	-3	15.08	2.54
	836.6	21	20.92	-0.08	18.25	-3	15.25	2.67
	848.8	21	21.24	0.24	18.92	-3	15.92	2.32

PCS 1900

Mode	Frequency (MHz)	Reference	Peak Power	Tolerance	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power(dBm)	Peak to Average Ratio
GPRS1900 (1 Slot)	1850.2	30	28.87	-1.13	**27.81**	-9	18.81	1.06
	1880	30	28.49	-1.51	27.40	-9	18.40	1.09
	1909.8	30	**29.04**	-0.96	27.71	-9	18.71	1.33
GPRS1900 (2 Slot)	1850.2	27	25.58	-1.42	24.11	-6	18.11	1.47
	1880	27	25.66	-1.34	24.57	-6	18.57	1.08
	1909.8	27	25.12	-1.88	24.10	-6	18.10	1.03
GPRS1900 (3 Slot)	1850.2	25.23	24.31	-0.92	23.23	-4.26	18.97	1.08
	1880	25.23	24.35	-0.88	23.12	-4.26	18.86	1.23
	1909.8	25.23	24.28	-0.95	23.18	-4.26	18.92	1.09
GPRS1900 (4 Slot)	1850.2	24	23.12	-0.88	21.87	-3	18.87	1.25
	1880	24	23.32	-0.68	21.76	-3	18.76	1.56
	1909.8	24	23.33	-0.67	21.88	-3	18.88	1.45
EGPRS1900 (1 Slot)	1850.2	27	27.53	0.53	25.16	-9	16.16	2.38
	1880	27	27.04	0.04	24.53	-9	15.53	2.51
	1909.8	27	27.49	0.49	24.77	-9	15.77	2.72
EGPRS1900 (2 Slot)	1850.2	24	24.11	0.11	21.37	-6	15.37	2.74
	1880	24	24.72	0.72	21.91	-6	15.91	2.80
	1909.8	24	24.25	0.25	21.57	-6	15.57	2.68
EGPRS1900 (3 Slot)	1850.2	22.74	22.86	0.12	20.05	-4.26	15.79	2.81
	1880	22.74	23.25	0.51	20.47	-4.26	16.21	2.78
	1909.8	22.74	23.08	0.34	20.42	-4.26	16.16	2.66
EGPRS1900 (4 Slot)	1850.2	21	21.84	0.84	18.98	-3	15.98	2.86
	1880	21	21.13	0.13	18.13	-3	15.13	**3.00**
	1909.8	21	21.73	0.73	18.80	-3	15.80	2.93

UMTS BAND II

Mode	Frequency (MHz)	Reference power	Peak Power	Tolerance	Avg.Burst Power	Peak to Average Ratio
RMC	1852.4	24	**24.59**	0.59	**22.53**	2.06
	1880	24	24.21	0.21	21.83	2.38
	1907.6	24	23.38	-0.62	22.27	1.11
HSDPA Subtest 1	1852.4	24	22.91	-1.09	21.22	1.69
	1880	24	23.10	-0.90	20.76	2.34
	1907.6	24	22.99	-1.01	20.94	2.05
HSDPA Subtest 2	1852.4	24	22.29	-1.71	20.24	2.05
	1880	24	22.13	-1.87	19.89	2.24
	1907.6	24	21.65	-2.35	20.58	1.07
HSDPA Subtest 3	1852.4	24	22.15	-1.85	19.95	2.20
	1880	24	21.21	-2.79	19.81	1.40
	1907.6	24	22.32	-1.68	19.95	2.38
HSDPA Subtest 4	1852.4	24	21.41	-2.59	20.05	1.36
	1880	24	22.19	-1.81	20.34	1.85
	1907.6	24	22.36	-1.64	20.87	1.49
HSUPA Subtest 1	1852.4	24	22.87	-1.13	20.73	2.14
	1880	24	21.65	-2.35	20.31	1.33
	1907.6	24	22.24	-1.76	20.33	1.91
HSUPA Subtest 2	1852.4	24	23.09	-0.91	21.69	1.40
	1880	24	22.99	-1.01	21.67	1.32
	1907.6	24	23.10	-0.90	21.49	1.62
HSUPA Subtest 3	1852.4	24	23.73	-0.27	21.33	2.40
	1880	24	23.41	-0.59	21.24	2.17
	1907.6	24	23.56	-0.44	21.20	2.36
HSUPA Subtest 4	1852.4	24	23.28	-0.72	21.04	2.24
	1880	24	23.56	-0.44	22.27	1.29
	1907.6	24	24.29	0.29	22.28	2.01
HSUPA Subtest 5	1852.4	24	22.16	-1.84	21.04	1.13
	1880	24	22.73	-1.27	21.68	1.04
	1907.6	24	24.44	0.44	22.04	**2.40**

UMTS BAND IV

Mode	Frequency (MHz)	Reference power	Peak Power	Tolerance	Avg.Burst Power	Peak to Average Ratio
RMC	1712.4	24	**24.18**	0.18	**22.64**	1.54
	1732.4	24	23.57	-0.43	21.98	1.59
	1752.6	24	24.03	0.03	22.14	1.89
HSDPA Subtest 1	1712.4	24	23.72	-0.28	22.06	1.66
	1732.4	24	23.89	-0.11	22.18	1.71
	1752.6	24	24.03	0.03	21.80	2.23
HSDPA Subtest 2	1712.4	24	23.05	-0.95	21.17	1.88
	1732.4	24	22.86	-1.14	21.08	1.79
	1752.6	24	22.77	-1.23	20.82	1.96
HSDPA Subtest 3	1712.4	24	22.57	-1.43	20.37	2.19
	1732.4	24	21.44	-2.56	20.19	1.25
	1752.6	24	22.24	-1.76	20.52	1.72
HSDPA Subtest 4	1712.4	24	21.87	-2.13	19.79	2.08
	1732.4	24	21.60	-2.40	20.05	1.55
	1752.6	24	21.34	-2.66	20.09	1.25
HSUPA Subtest 1	1712.4	24	21.94	-2.06	20.14	1.80
	1732.4	24	22.27	-1.73	20.49	1.78
	1752.6	24	22.14	-1.86	20.57	1.57
HSUPA Subtest 2	1712.4	24	21.82	-2.18	20.67	1.15
	1732.4	24	22.65	-1.35	20.17	**2.48**
	1752.6	24	22.87	-1.13	20.45	2.42
HSUPA Subtest 3	1712.4	24	22.63	-1.37	21.52	1.11
	1732.4	24	23.84	-0.16	21.84	1.99
	1752.6	24	23.07	-0.93	21.35	1.72
HSUPA Subtest 4	1712.4	24	23.58	-0.42	21.36	2.22
	1732.4	24	22.55	-1.45	20.93	1.61
	1752.6	24	22.28	-1.72	21.18	1.10
HSUPA Subtest 5	1712.4	24	23.07	-0.93	21.01	2.06
	1732.4	24	23.42	-0.58	22.17	1.25
	1752.6	24	23.13	-0.87	22.12	1.01

UMTS BAND V

Mode	Frequency (MHz)	Reference power	Peak Power	Tolerance	Avg.Burst Power	Peak to Average Ratio
RMC	826.4	24	25.15	1.15	**23.48**	1.67
	836.4	24	24.59	0.59	23.45	1.14
	846.6	24	**25.43**	1.43	23.24	2.19
HSDPA Subtest 1	826.4	24	24.15	0.15	22.36	1.79
	836.4	24	23.39	-0.61	22.18	1.21
	846.6	24	24.78	0.78	22.31	2.46
HSDPA Subtest 2	826.4	24	23.90	-0.10	22.23	1.67
	836.4	24	23.78	-0.22	22.22	1.56
	846.6	24	24.08	0.08	22.07	2.02
HSDPA Subtest 3	826.4	24	23.50	-0.50	21.14	2.36
	836.4	24	23.97	-0.03	21.62	2.34
	846.6	24	23.54	-0.46	21.85	1.68
HSDPA Subtest 4	826.4	24	23.67	-0.33	22.23	1.45
	836.4	24	23.75	-0.25	22.13	1.63
	846.6	24	24.89	0.89	22.39	**2.50**
HSUPA Subtest 1	826.4	24	24.36	0.36	22.60	1.75
	836.4	24	24.33	0.33	22.51	1.82
	846.6	24	24.16	0.16	23.00	1.17
HSUPA Subtest 2	826.4	24	24.59	0.59	22.39	2.20
	836.4	24	24.61	0.61	22.40	2.21
	846.6	24	24.85	0.85	22.75	2.10
HSUPA Subtest 3	826.4	24	24.80	0.80	22.82	1.98
	836.4	24	24.12	0.12	22.49	1.63
	846.6	24	24.00	0.00	22.47	1.53
HSUPA Subtest 4	826.4	24	24.27	0.27	22.56	1.71
	836.4	24	23.44	-0.56	22.44	1.01
	846.6	24	24.68	0.68	22.48	2.19
HSUPA Subtest 5	826.4	24	24.68	0.68	22.78	1.90
	836.4	24	25.32	1.32	22.92	2.39
	846.6	24	23.56	-0.44	22.44	1.13

According to 3GPP 25.101 sub-clause 6.2.2 , the maximum output power is allowed to be reduced by following the table.

Table 6.1aA: UE maximum output power with HS-DPCCH and E-DCH

UE Transmit Channel Configuration	CM(db)	MPR(db)
For all combinations of ,DPDCH,DPCCH HS-DPDCH,E-DPDCH and E-DPCCH	0≤ CM≤3.5	MAX(CM-1,0)
Note: CM=1 for β_c/β_d=12/15, β_{hs}/β_c=24/15.For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.		

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to average ratios (PAR) of the HSUPA signal. This prevents saturating the full range of the TX DAC inside of device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (a function of the combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH).

When E-DPDCH channels are present the beta gains on those channels are reduced firsts to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

The SW currently recalculates the cubic metric every time the beta gains on the E-DPDCH are reduced. The cubic metric will likely get lower each time this is done .However, there is no reported reduction of maximum output power in the HSUPA mode since the device also provides a compensate for the power back-off by increasing the gain of TX_AGC in the transceiver (PA) device.

The end effect is that the DUT output power is identical to the case where there is no MPR in the device.

5.1.2 RADIATED OUTPUT POWER

5.1.2.1 MEASUREMENT METHOD

The measurements procedures specified in ANSI/TIA-603-E-2016 were applied.

1. Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signal operating below 1GHz are performed using dipole antennas. Measurements on signals operating above 1GHz are performed using broadband horn antennas. All measurements are performed as RMS average measurements while the EUT operating at its maximum duty cycle, at maximum power, and at the approximate frequencies.
2. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.
3. The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established as ARpl=Pin + 2.15 - Pr. TheARpl is the attenuation of “reference path loss”, and including the gain of receive antenna, the cable loss and the air loss. The measurement results are obtained as described below: Power=PMea+ARpl
4. The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.
5. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.
6. The EUT is then put into continuously transmitting mode at its maximum power level.
7. Power mode measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c). The "reference path loss" from Step1 is added to this result.
8. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (Pin).
9. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi...

5.1.2.2 PROVISIONS APPLICABLE

Mode	FCC Part Section(s)	Nominal Peak Power
GSM/GPRS 850	22.913(a)(2)	<=38.45dBm (7W). ERP
GSM/GPRS 1900	24.232(c)	<=33dBm (2W). EIRP
UMTS BAND II	24.232(c)	<=33dBm (2W),EIRP
UMTS BAND IV	27.50(d)	<=30dBm (1W),EIRP
UMTS BANDV	22.913(a)(2)	<=38.45dBm (7W).ERP

5.1.2.3 Measurement Result

Radiated Power (ERP) for GPRS/EGPRS 850				
Mode	Frequency	Result		Conclusion
		Max. Peak ERP (dBm)	Polarization Of Max. ERP	
GPRS	824.2	**28.94**	Horizontal	Pass
	836.6	27.72	Horizontal	Pass
	848.8	28.79	Horizontal	Pass
	824.2	27.34	Vertical	Pass
	836.6	25.51	Vertical	Pass
	848.8	25.95	Vertical	Pass
EGPRS	824.2	18.18	Horizontal	Pass
	836.6	18.98	Horizontal	Pass
	848.8	19.26	Horizontal	Pass
	824.2	**20.05**	Vertical	Pass
	836.6	19.34	Vertical	Pass
	848.8	19.18	Vertical	Pass

Radiated Power (E.I.R.P) for GPRS/EGPRS 1900				
Mode	Frequency	Result		Conclusion
		Max. Peak E.I.R.P.(dBm)	Polarization Of Max. E.I.R.P.	
GPRS	1850.2	**26.47**	Horizontal	Pass
	1880.0	24.70	Horizontal	Pass
	1909.8	25.85	Horizontal	Pass
	1850.2	21.53	Vertical	Pass
	1880.0	22.97	Vertical	Pass
	1909.8	21.76	Vertical	Pass
EGPRS	1850.2	**19.71**	Horizontal	Pass
	1880.0	19.45	Horizontal	Pass
	1909.8	18.85	Horizontal	Pass
	1850.2	19.20	Vertical	Pass
	1880.0	19.21	Vertical	Pass
	1909.8	18.54	Vertical	Pass

Radiated Power (E.I.R.P) for UMTS band II				
Mode	**Frequency**	**Result**		**Conclusion**
		Max. Peak E.I.R.P (dBm)	**Polarization Of Max. E.I.R.P**	
UMTS	1852.4	19.75	Horizontal	Pass
	1880	**21.15**	Horizontal	Pass
	1907.6	20.53	Horizontal	Pass
	1852.4	17.92	Vertical	Pass
	1880	18.94	Vertical	Pass
	1907.6	18.13	Vertical	Pass

Radiated Power (E.I.R.P) for UMTS band IV				
Mode	Frequency	Result		Conclusion
		Max. Peak E.I.R.P (dBm)	Polarization Of Max. E.I.R.P	
UMTS	1712.4	18.23	Horizontal	Pass
	1732.4	**20.96**	Horizontal	Pass
	1752.6	19.79	Horizontal	Pass
	1712.4	18.15	Vertical	Pass
	1732.4	18.42	Vertical	Pass
	1752.6	17.99	Vertical	Pass

Radiated Power (ERP) for UMTS band V				
Mode	Frequency	Result		Conclusion
		Max. Peak ERP (dBm)	Polarization Of Max. ERP	
UMTS	826.4	20.75	Horizontal	Pass
	836.4	19.79	Horizontal	Pass
	846.6	**21.05**	Horizontal	Pass
	826.4	18.59	Vertical	Pass
	836.4	18.97	Vertical	Pass
	846.6	19.06	Vertical	Pass

Note: Above is the worst mode data.

5.2 PEAK-TO-AVERAGE RATIO

5.2.1 MEASUREMENT METHOD

Use one of the procedures presented in 4.1 to measure the total peak power and record as PPk. Use one of the applicable procedures presented 4.2 to measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

PAPR (dB) = PPk (dBm) - PAvg (dBm).

5.2.2 PROVISIONS APPLICABLE

This is the test for the Peak-to-Average Ratio from the EUT.

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

5.2.3 MEASUREMENT RESULT

Modes	Max Peak to Average Ratio(dB)	Upper limit(dB)	Result
GSM850	2.94	13	Pass
PCS1900	3.00	13	Pass
UMTS BAND II	2.40	13	Pass
UMTS BAND IV	2.48	13	Pass
UMTS BAND V	2.50	13	Pass
Note: refer to section of 5.1.1.2.			

5.3 OCCUPIED BANDWIDTH

5.3.1 MEASUREMENT METHOD

1. The Occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper Frequency limits, the mean power radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

2. RBW=1~5% of the expected OBW, VBW>=3 x RBW, Detector=Peak, Trace mode=max hold, Sweep=auto couple, and the trace was allowed to stabilize.

5.3.2 PROVISIONS APPLICABLE

The emission bandwidth is defined as two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power

5.3.3 MEASUREMENT RESULT

Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
GSM850	GPRS	LCH	246.29	320.7	PASS
		MCH	246.07	308.9	PASS
		HCH	250.07	321.0	PASS
	EGPRS	LCH	245.48	315.7	PASS
		MCH	248.55	315.4	PASS
		HCH	250.56	311.3	PASS

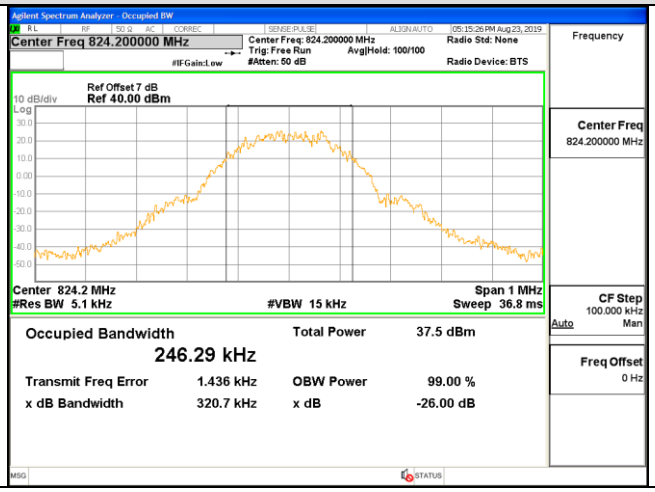
Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
GSM1900	GPRS	LCH	244.12	315.7	PASS
		MCH	243.61	308.7	PASS
		HCH	246.93	322.1	PASS
	EGPRS	LCH	242.49	318.1	PASS
		MCH	247.04	317.9	PASS
		HCH	248.98	316.1	PASS

For GSM

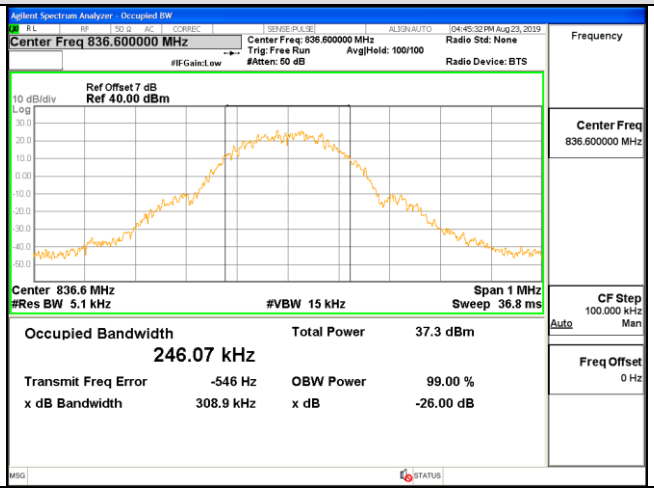
Test Band=GSM850/PCS1900

Test Mode=GPRS/EGPRS

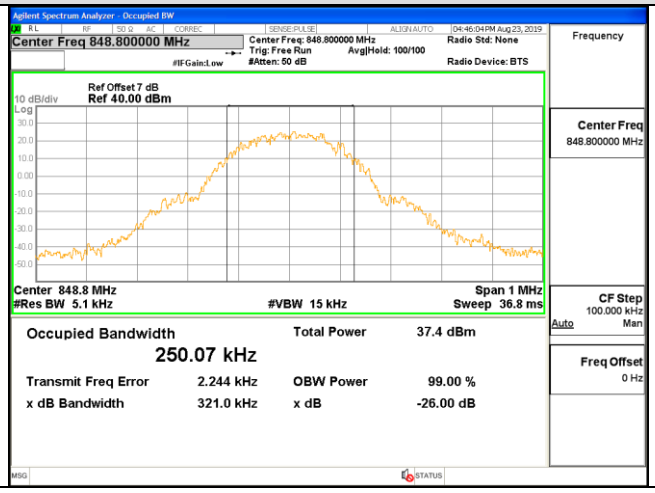
GSM 850-LCH-GPRS



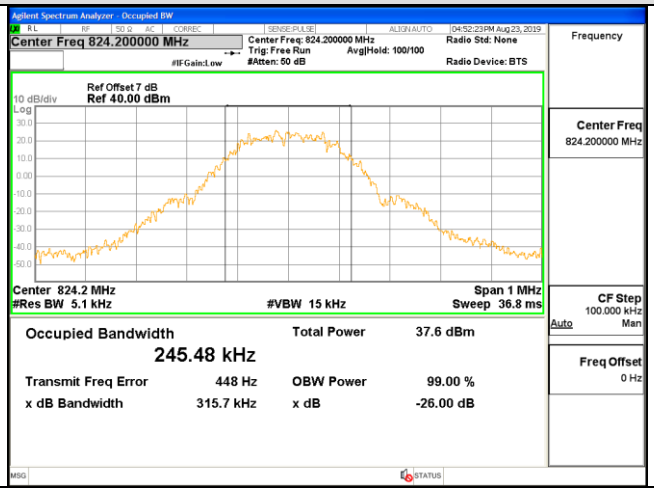
GSM 850-MCH-GPRS



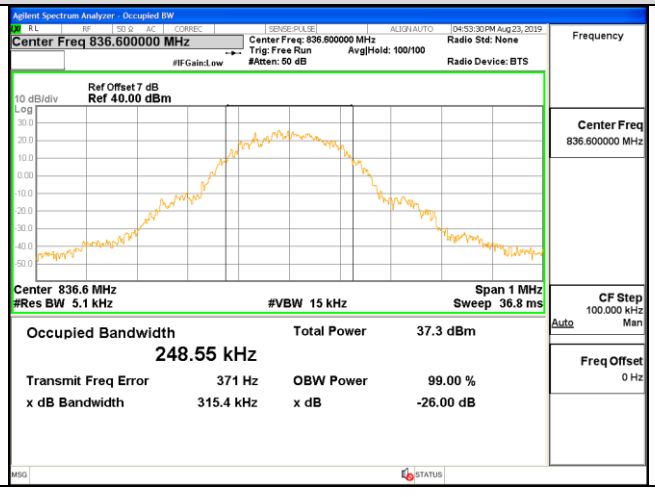
GSM 850-HCH- GPRS



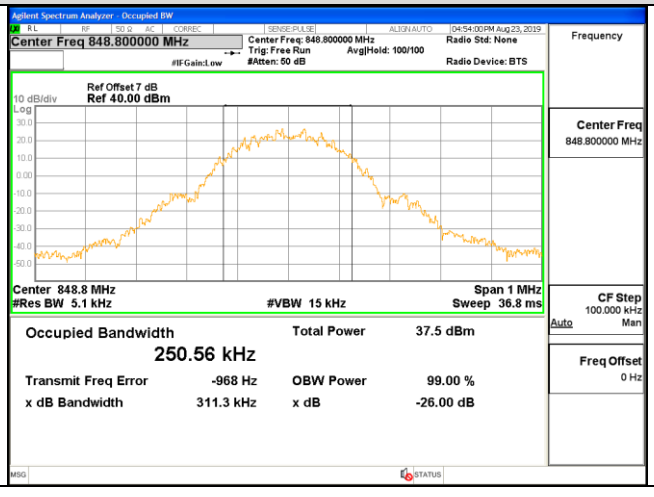
GSM 850-LCH-EGPRS



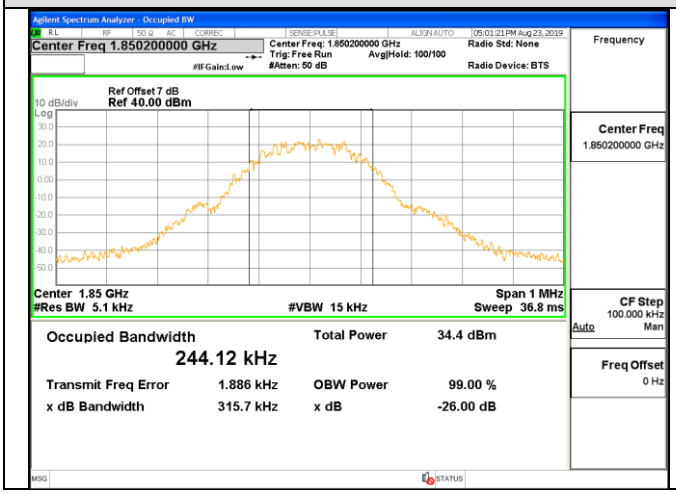
GSM 850-MCH-EGPRS



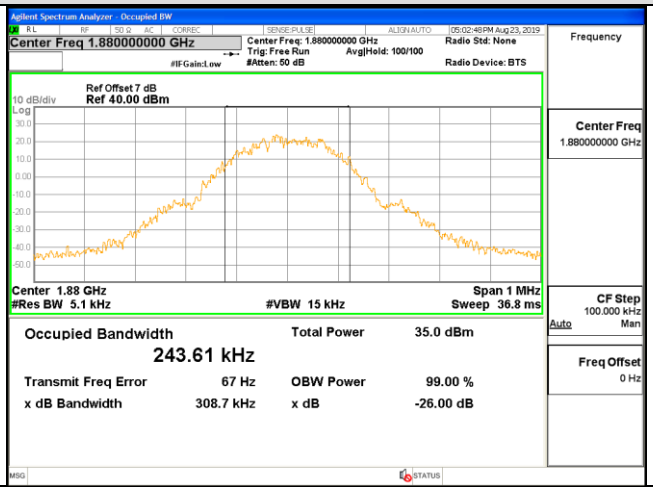
GSM 850-HCH-EGPRS



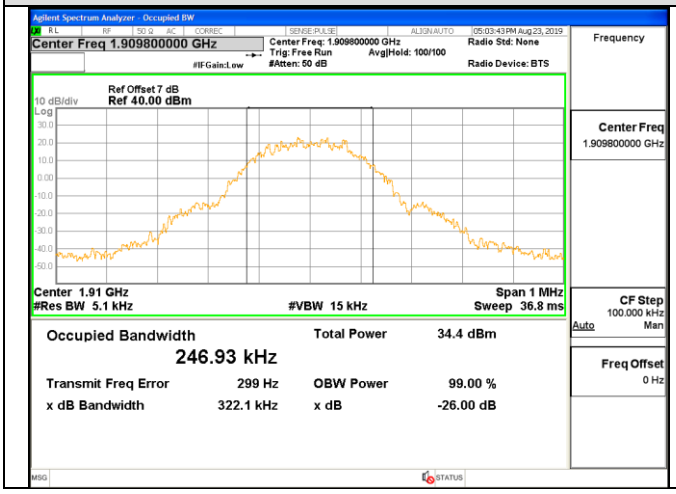
GSM 1900-LCH-GPRS



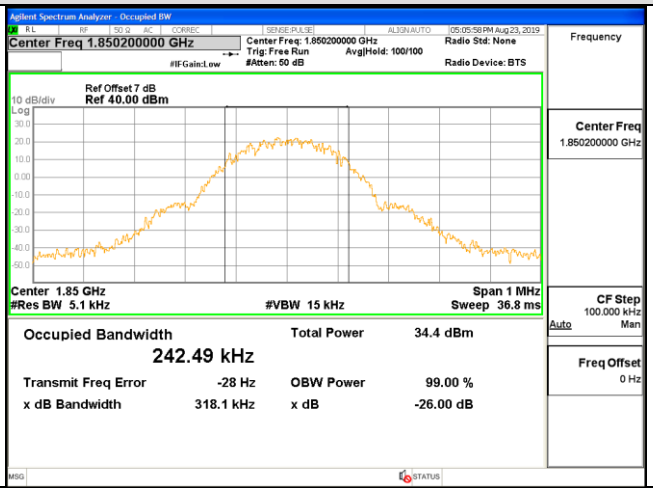
GSM 1900-MCH-GPRS



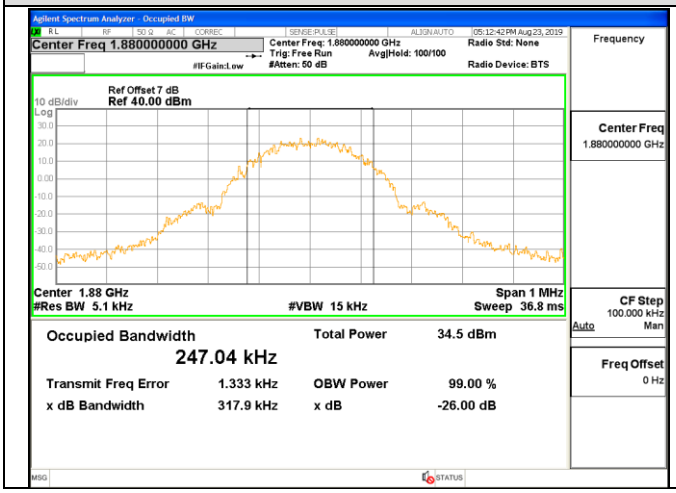
GSM 1900-HCH-GPRS



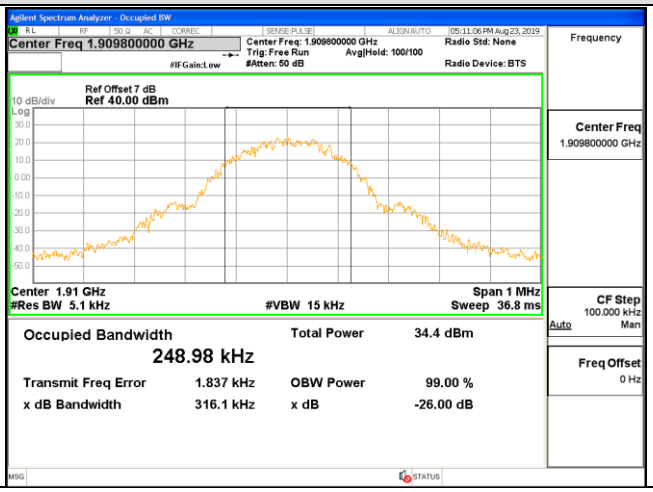
GSM 1900-LCH-EGPRS



GSM 1900-MCH-EGPRS



GSM 1900-HCH-EGPRS



Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
WCDMA 850	UMTS	LCH	4141.1	4604	PASS
		MCH	4134.5	4639	PASS
		HCH	4147.9	4638	PASS

Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
WCDMA 1900	UMTS	LCH	4119.8	4633	PASS
		MCH	4142.8	4628	PASS
		HCH	4135.5	4615	PASS

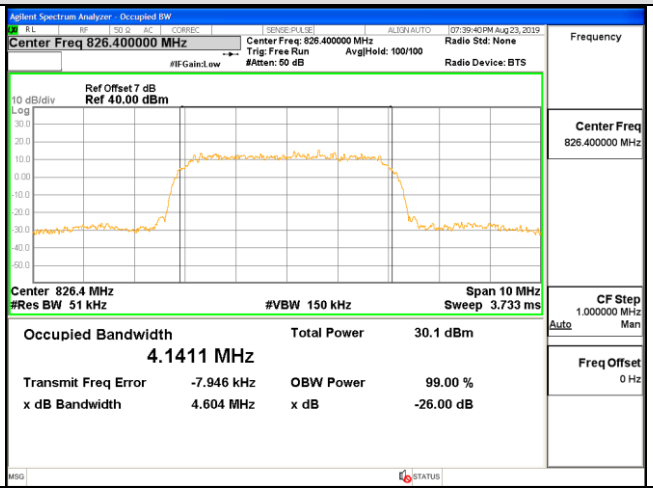
Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
WCDMA 1700	UMTS	LCH	4159.8	4649	PASS
		MCH	4161.7	4668	PASS
		HCH	4151.7	4648	PASS

For WCDMA

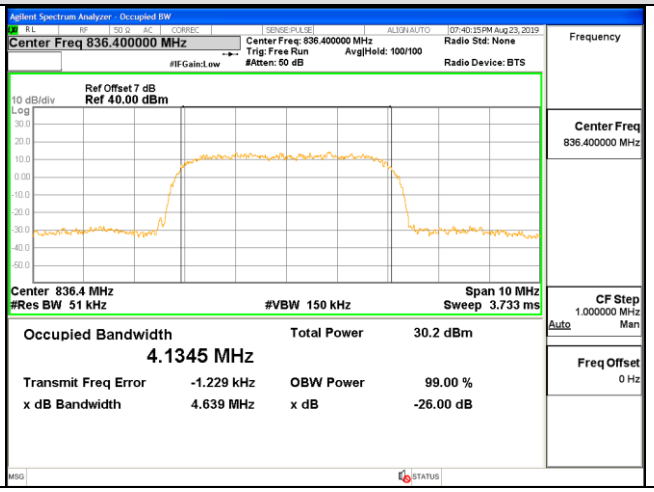
Test Band=WCDMA850/WCDMA1900

Test Mode=UMTS

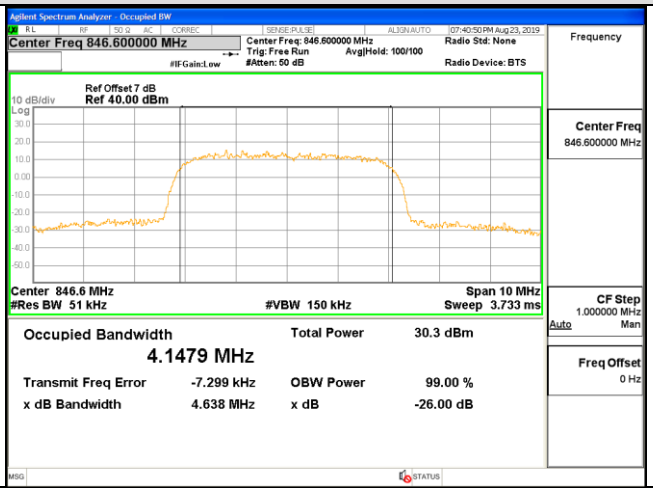
WCDMA 850-LCH



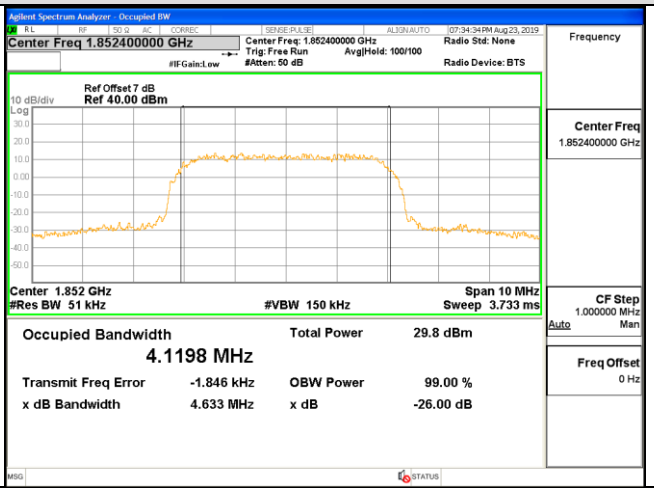
WCDMA 850-MCH



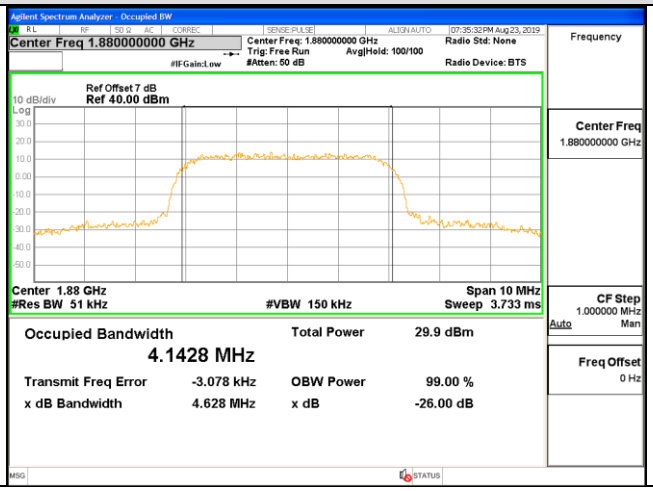
WCDMA 850-HCH



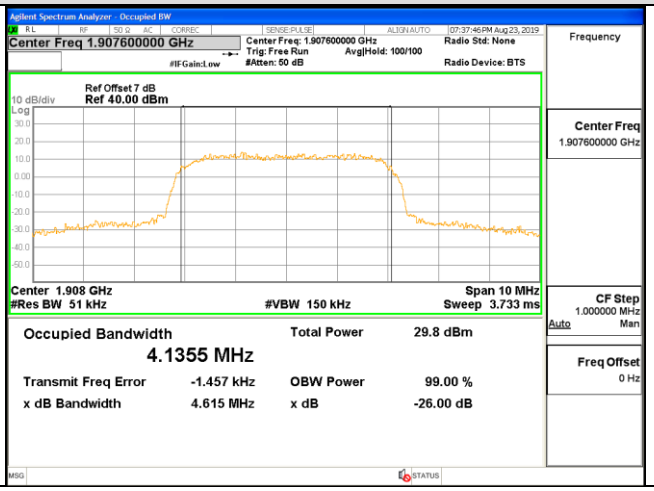
WCDMA 1900-LCH

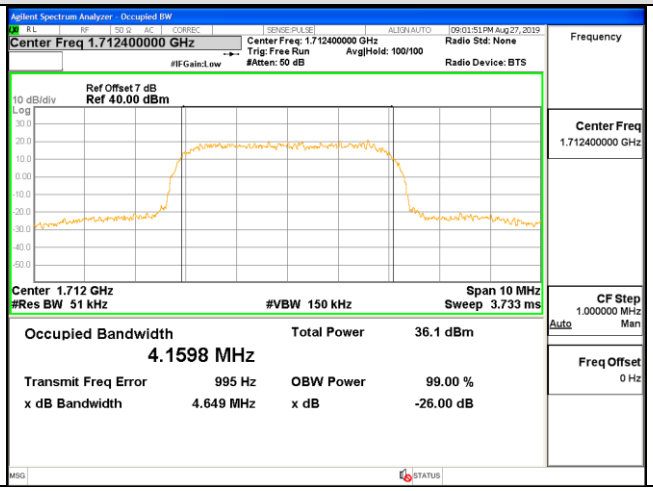
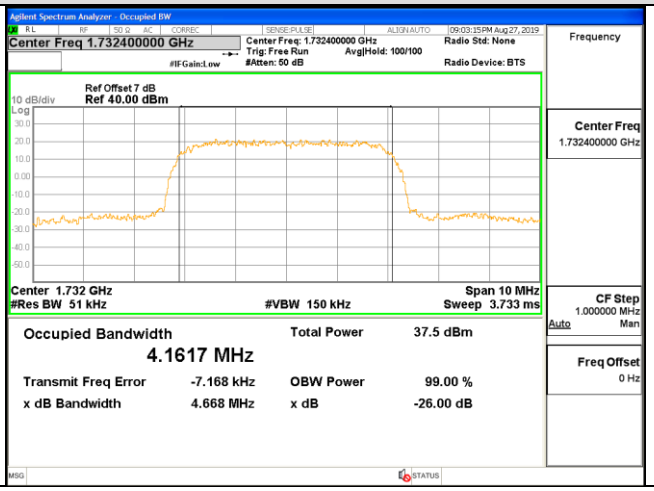


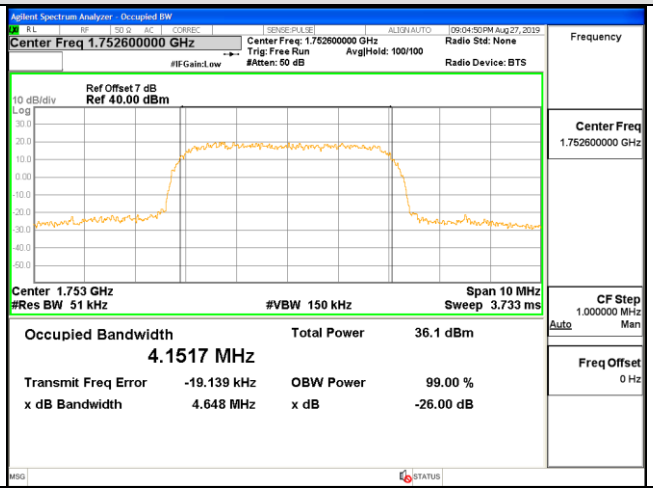
WCDMA 1900-MCH



WCDMA 1900-HCH



WCDMA 1700-MCH	WCDMA 1700-HCH
	

WCDMA 1700-MCH	/
	/

5.4 BAND EDGE

5.4.1 MEASUREMENT METHOD

1. All out of band emissions are measured with an analyzer spectrum connected to the antenna terminal of the EUT while the EUT at its maximum duty cycle, at maximum power, and at the approximate frequencies. All data rates were investigated to determine the worst case configuration

2. The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

3. Start and stop frequency were set such that the band edge would be placed in the center of the plot.

4. Span was set large enough so as to capture all out of band emissions near the band edge.

5. RBW>1% of the emission bandwidth, VBW >=3 x RBW, Detector=RMS, Number of points>=2 x Span/RBW, Trace mode=max hold, Sweep time=auto couple, and the trace was allowed to stabilize

5.4.2 PROVISIONS APPLICABLE

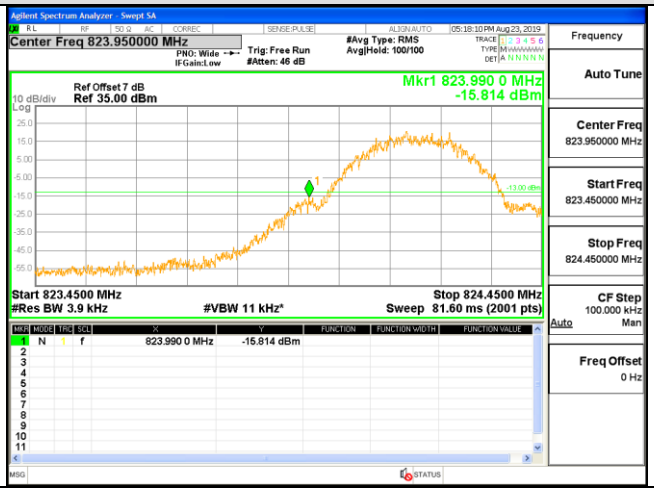
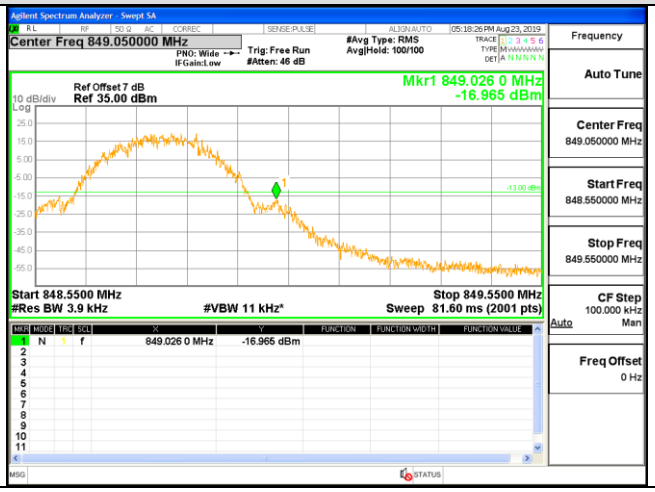
As Specified in FCC rules of 22.917(a), 24.238(a)and KDB 971168 D1 V03R01.

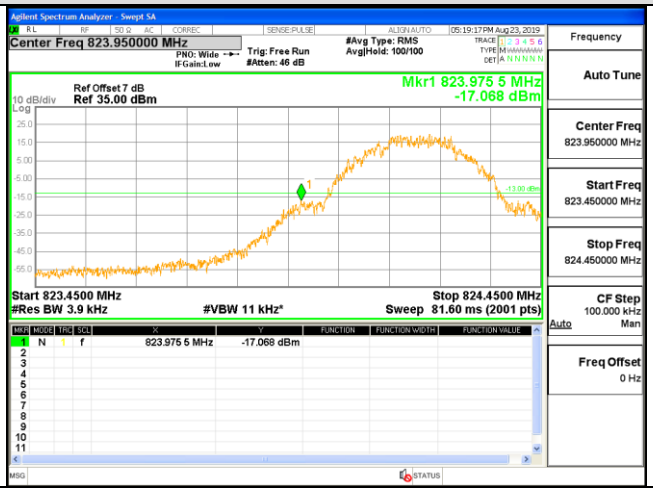
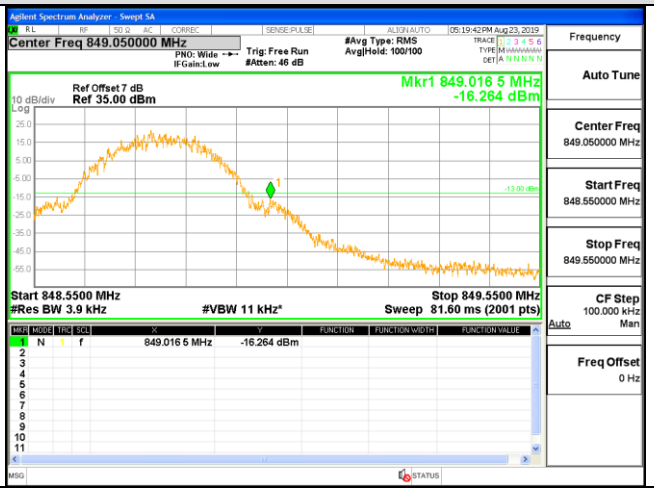
5.4.3 Test Results

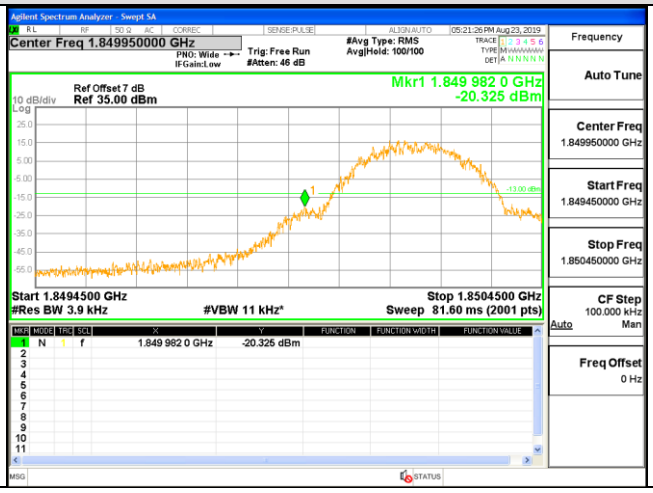
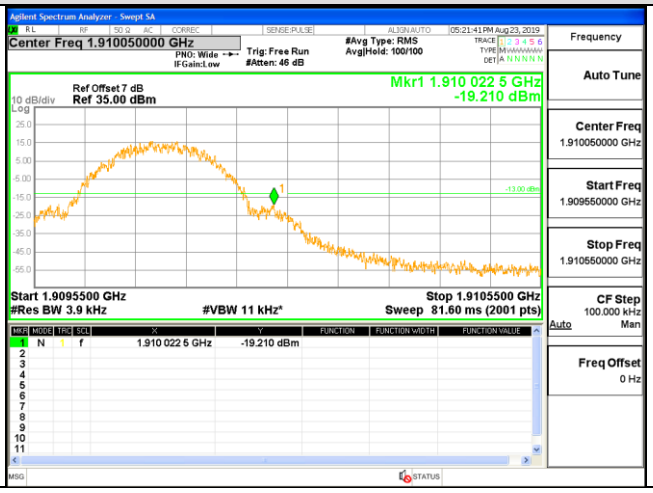
For GSM

Test Band=GSM850/GSM1900

Test Mode= GPRS /EGPRS

GSM 850-LCH-GPRS	GSM 850-HCH- GPRS
	

GSM 850-LCH-EGPRS	GSM 850-HCH-EGPRS
	

GSM 1900-LCH-GPRS	GSM 1900-HCH-GPRS
	

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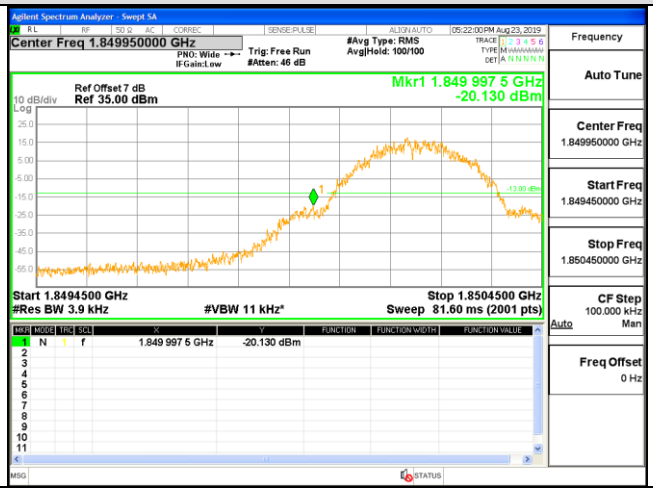
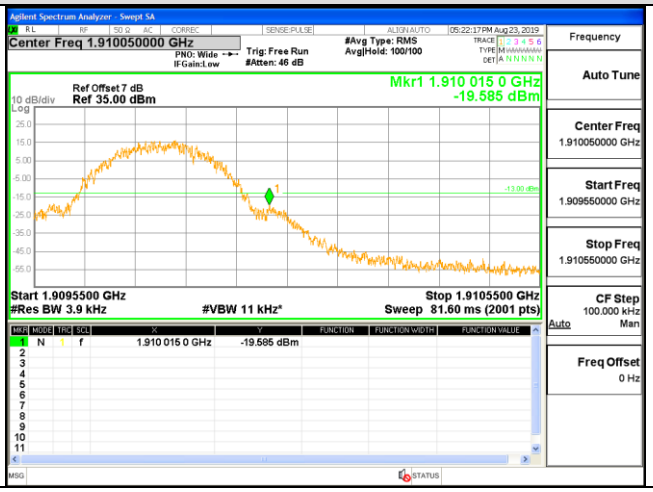
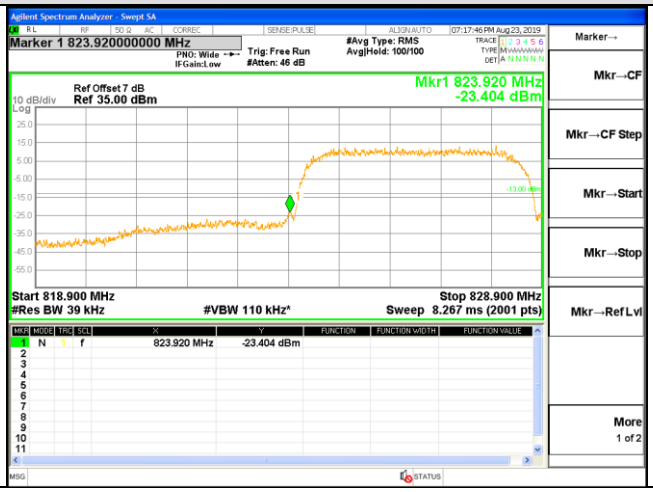
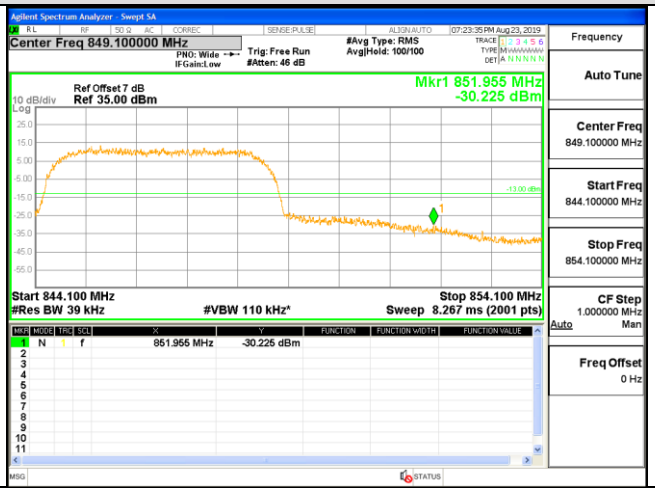
	

For WCDMA

Test Band=WCDMA850/WCDMA1900/WCDMA1700

Test Mode=UMTS

WCDMA 850-LCH	WCDMA 850-HCH
	

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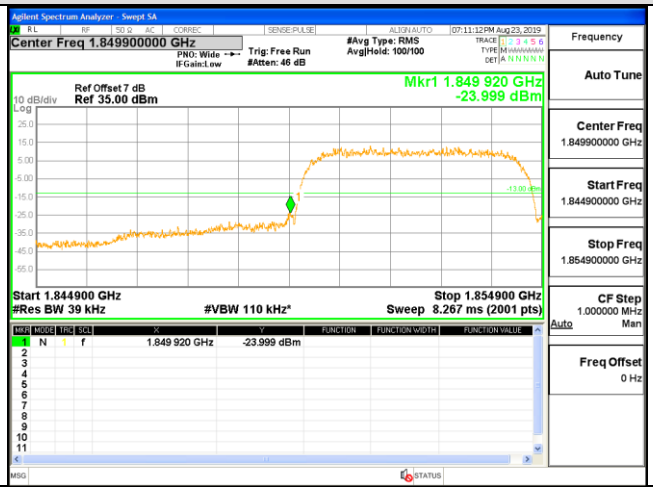
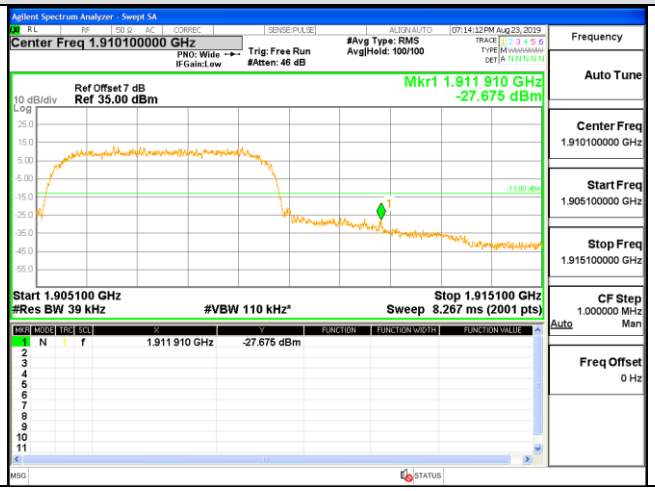
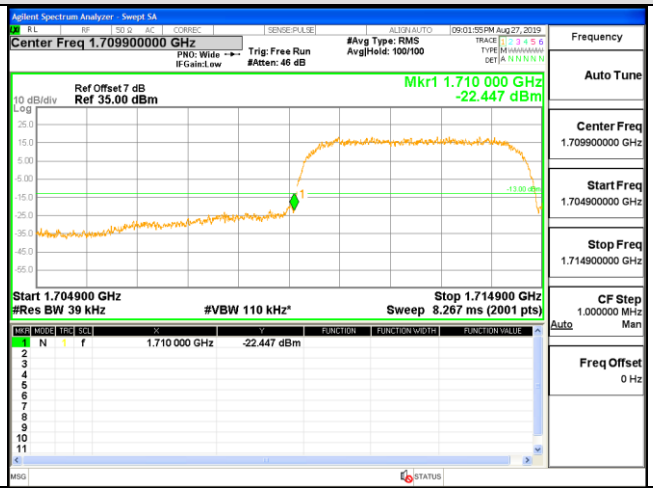
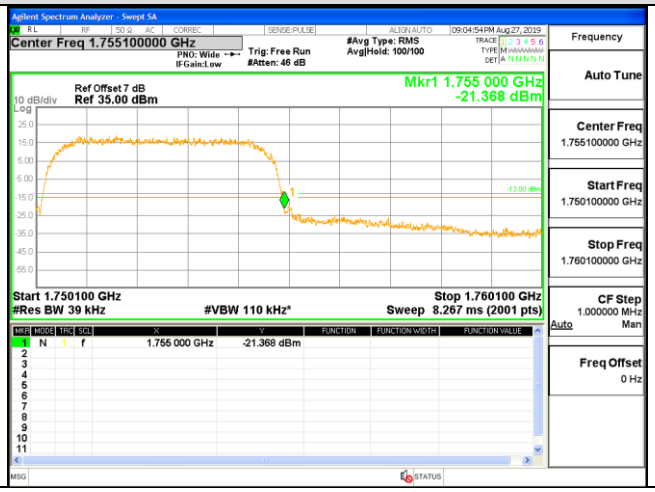
	

WCDMA 1700-LCH	WCDMA 1700-HCH
	

5.5 SPURIOUS EMISSION

5.5.1 CONDUCTED SPURIOUS EMISSION

5.5.1.1 MEASUREMENT METHOD

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. The level of the carrier and the various conducted spurious and harmonic frequency is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10^{th} harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the approximate frequencies. All data rates were investigated to determine the worst case configuration.

2. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM850, data taken from 30 MHz to 9 GHz.

3. Determine EUT transmit frequencies: the following typical channelswere chosen to conducted emissions testing.

Typical Channels for testing of GSM 850	
Channel	Frequency (MHz)
128	824.2
190	836.6
251	848.8

Typical Channels for testing of PCS 1900	
Channel	Frequency (MHz)
512	1850.2
661	1880.0
810	1909.8

Typical Channels for testing of UMTS band II	
Channel	Frequency (MHz)
9262	1852.4
9400	1880
9538	1907.6

Typical Channels for testing of UMTS band IV	
Channel	Frequency (MHz)
1312	1712.4
1412	1732.4
1513	1752.6

Typical Channels for testing of UMTS band V	
Channel	Frequency (MHz)
4132	846.4
4182	836.4
4233	846.6

5.5.1.2 PROVISIONS APPLICABLE

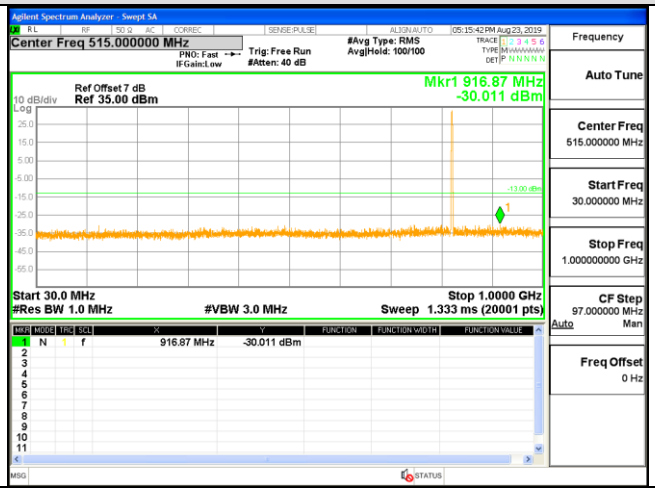
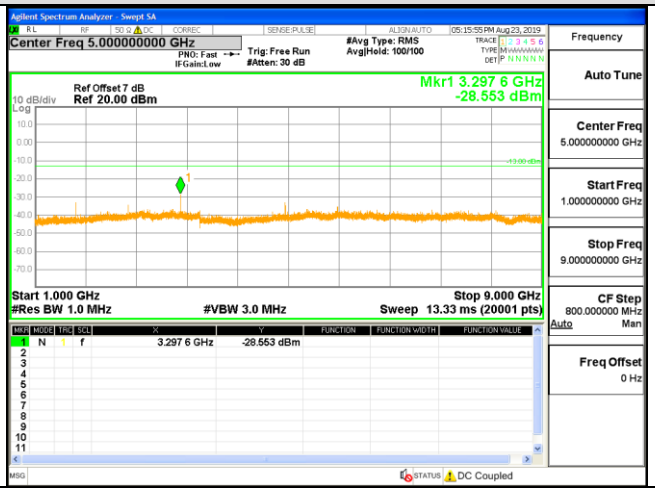
On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

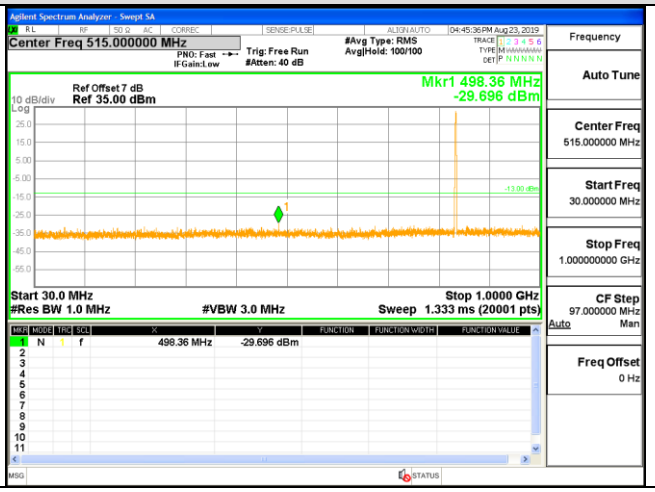
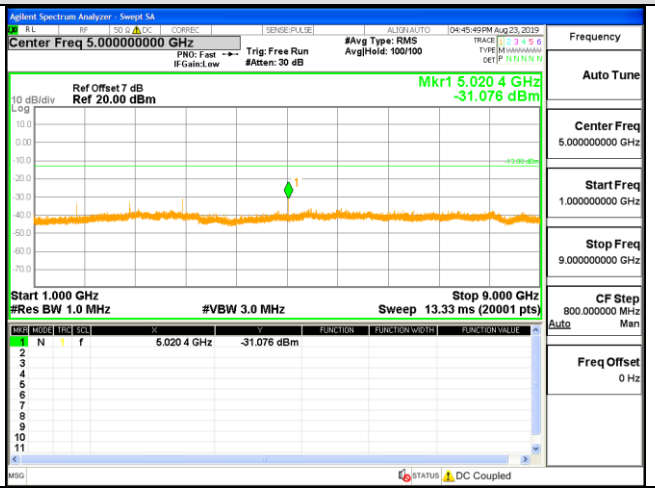
5.5.1.3 MEASUREMENT RESULT

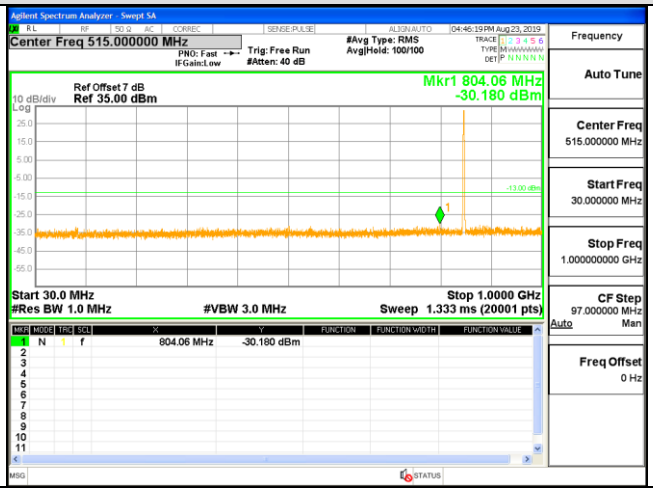
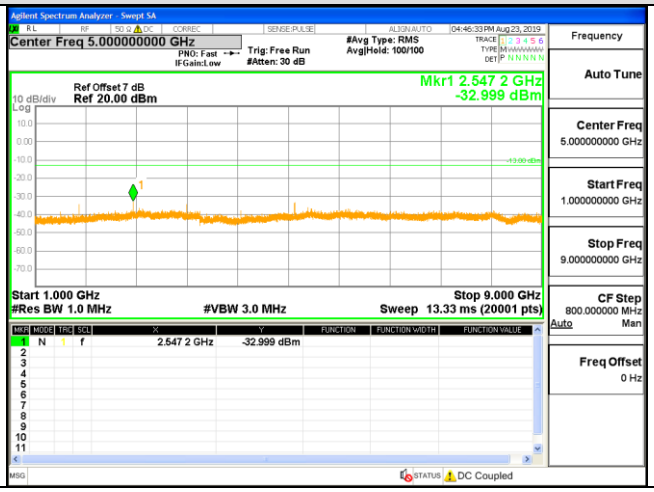
Test Results

Test Band=GSM850/GSM1900 Test

Mode=GPRS/EGPRS

GSM 850-LCH-GPRS	GSM 850-LCH-GPRS
	

GSM 850-MCH-GPRS	GSM 850-MCH-GPRS
	

GSM 850-HCH-GPRS	GSM 850-HCH-GPRS
	
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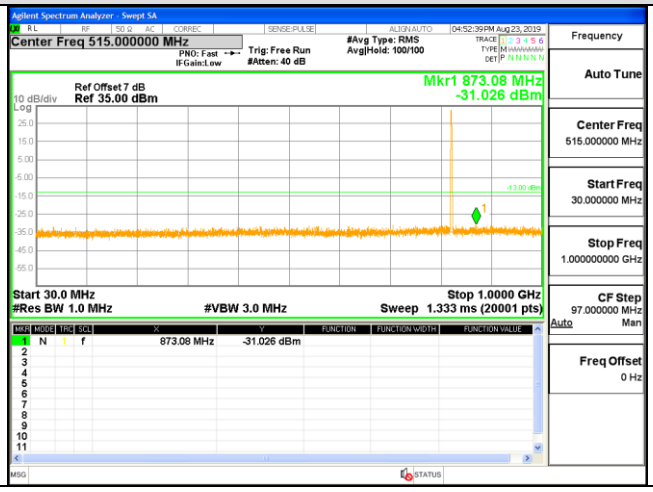	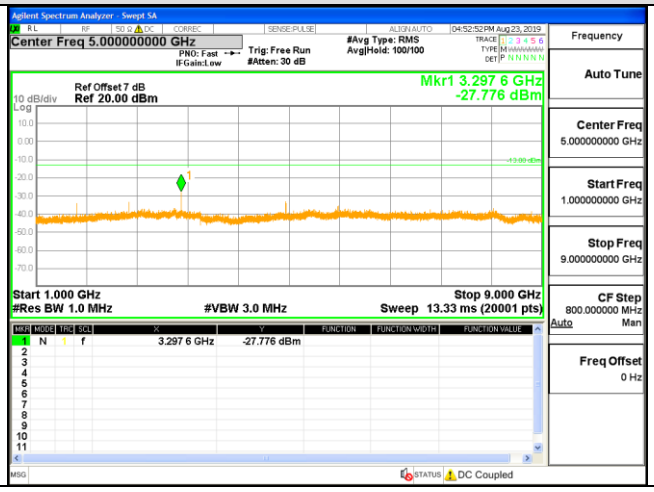
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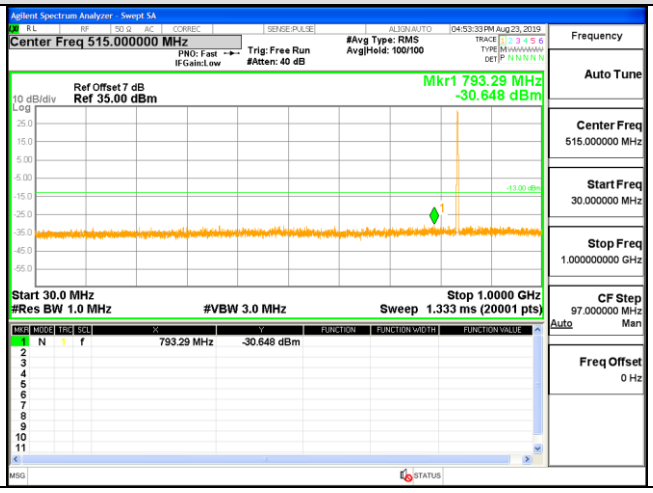
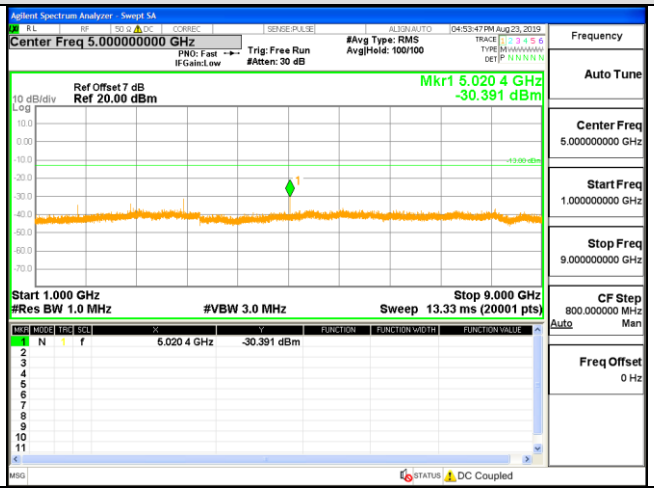
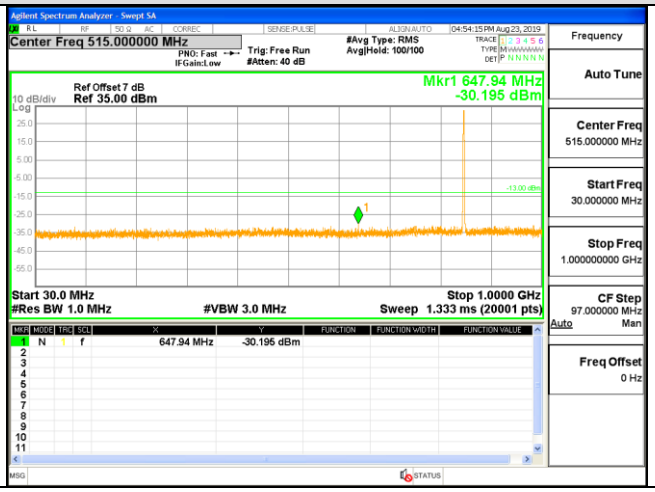
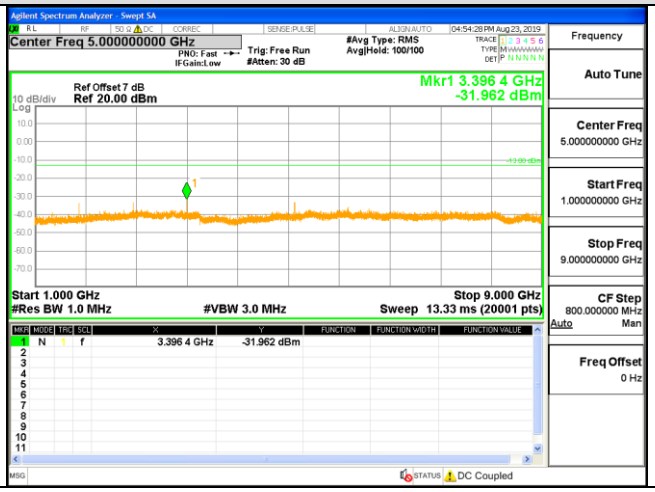
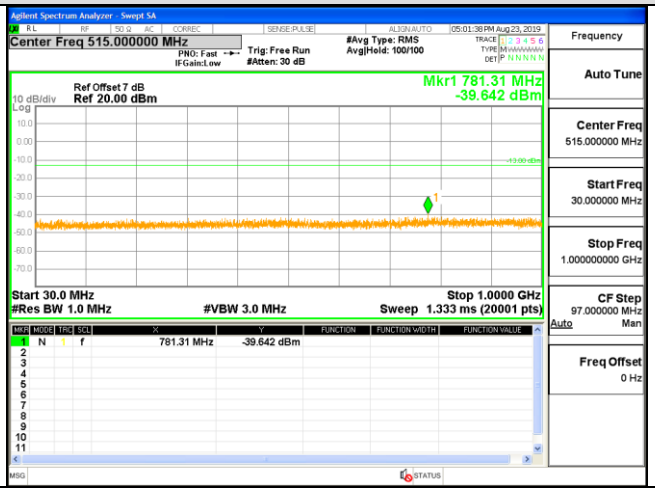
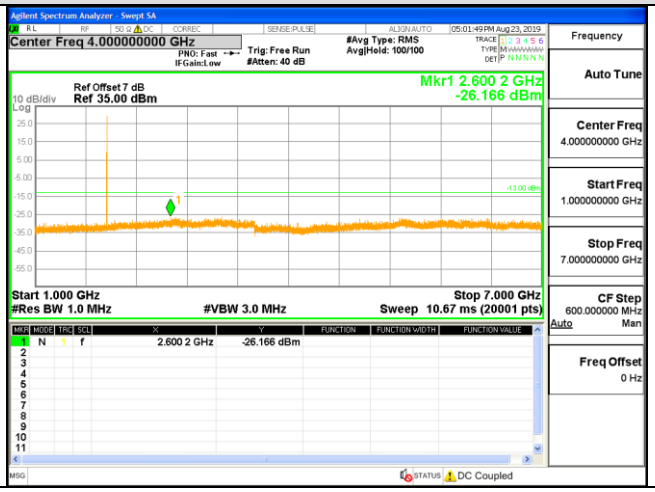
	

GSM 850-HCH-EGPRS	GSM 850-HCH-EGPRS
	

GSM 1900-LCH-GPRS	GSM 1900-LCH-GPRS
	

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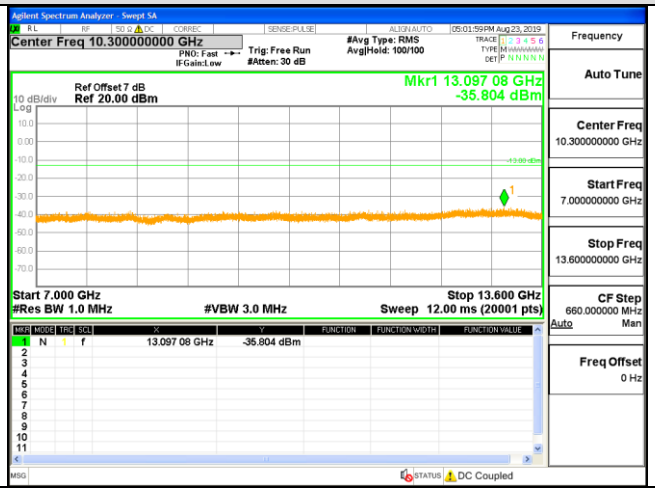	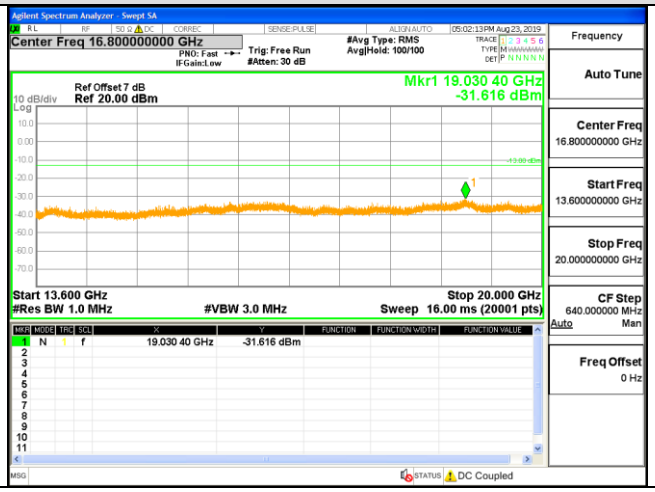

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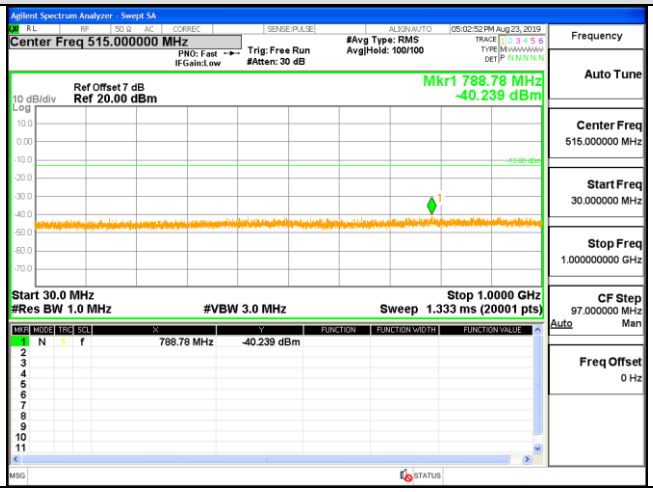	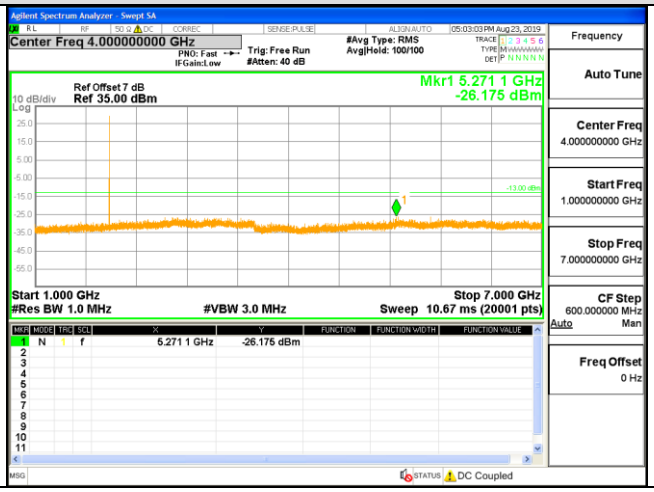
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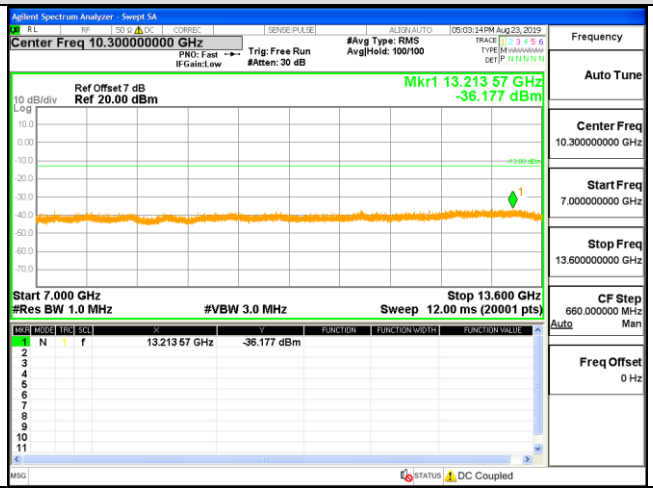	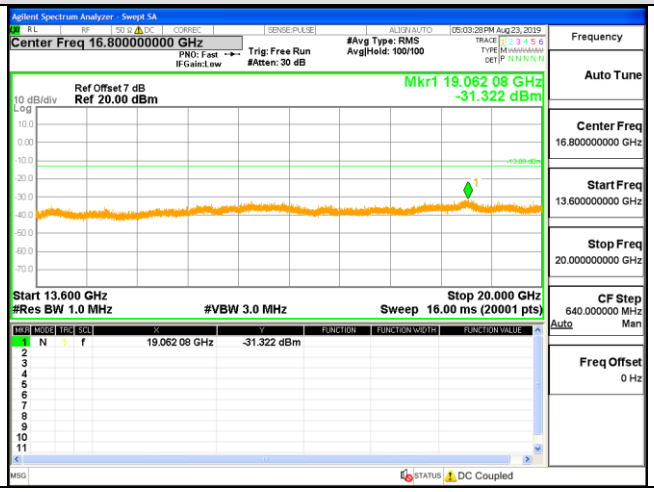
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