



FCC CFR 47 Part 90 Class II Permissive Change Test Report

APPLICANT	CODAN RADIO COMMUNICATIONS
ADDRESS	43 ERIE STREET VICTORIA BC V8V 1P8
FCC ID	H4JUT-4E850
MODEL NUMBER	UT-4E850-00-300
PRODUCT DESCRIPTION	MT-4E 800 MHz TRANSMITTER
DATE SAMPLE RECEIVED	09/04/2019
FINAL TEST DATE	09/12/2019
TESTED BY	Franklin Rose
APPROVED BY	Tim Royer
TEST RESULTS	☒ PASS ☐ FAIL

Report Number	Report Version	Description	Issue Date
2057UT19 PT90_TestReport	Rev1	Initial Issue	09/13/2018

THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.

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GENERAL REMARKS

Summary

The device under test does:

- ☒ Fulfill the general approval requirements as identified in this test report and was selected by the customer.
- ☐ Not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669
Designation #: US1070

Tested by:



Name and Title	Franklin Rose, Project Manager / EMC Testing Technician
Date	09/13/2018

Reviewed and Approved by:



Name and Title	Tim Royer, Project Manager / EMC Testing Engineer
Date	09/16/2018

GENERAL INFORMATION

EUT Description	MT-4E 800 MHz TRANSMITTER
FCC ID	H4JUT-4E850
Model Number	UT-4E850-00-300
Operating Frequency	768 - 869 MHz
Test Frequencies	807.5, 817, 852.5, 862, 868.9875 MHz
Modulation	FM
EUT Power Source	☐ 110–120Vac/50– 60Hz
	☒ DC Power (13.8 V)
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☐ Pre-Production
	☒ Production
Type of Equipment	☒ Fixed
	☐ Mobile
	☐ Portable
Antenna Connector	N-type
Test Conditions	The temperature was 26°C Relative humidity of 50%.
Modification to the EUT	No Modification to EUT.
Test Exercise	The EUT was placed in continuous transmit and was operated in “Test Mode” for digital emissions tests.
Applicable Standards	ANSI/TIA 603-E:2016, ANSI C63.26, FCC CFR 47 Part 2, Part 90
Test Facility	Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA. Designation #: US1070

RESULTS SUMMARY

Rule Part No.	Test Item	Results
2.1046(a), 90.205(d)	RF Power Output	Unchanged
2.1033(c)(4), 90.209(b)(5)	Modulation Characteristics	Unchanged
2.1047(a)	Audio Frequency Response and Low Filter	Unchanged
2.1047(b)	Modulation Limiting	Unchanged
2.1049 (c), 90.210(b)(1), (2), (d)(1), (2)	Occupied Bandwidth & Emission Masks	PASS
2.1051(a), 90.210(b)(3), (d)(3)	Spurious Emissions at Antenna Terminals	PASS
2.1053(a), 90.210(b)(3), (d)(3)	Field Strength of Spurious Emissions	PASS
2.1055(a)(2), 90.213	Frequency Stability	Unchanged

Note: Tests were conducted to show the equipment has been fundamentally unchanged. These tests were done on a selection of frequencies to spot-check the device against previous results. All passing results were substantially unchanged from previous data.

RF POWER OUTPUT

FCC Rule Parts: FCC Part 2.1046(a), 90.205(k), (r), 90.635

(k) 806-824 MHz, 851-869 MHz, 896-901 MHz and 935-940 MHz. Power and height limitations are specified in §90.635

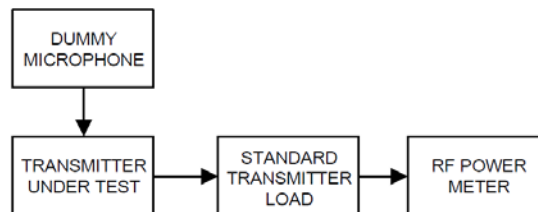
(r) All other frequency bands. Requested transmitter power will be considered and authorized on a case by case basis.

§90.635 Limitations on power and antenna height.

(a) The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table. These are maximum values, and applicants will be required to justify power levels and antenna heights requested.

(b) The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

Method of Measurement: TIA-603-E, 2.2.1



Test Data: Unchanged from original equipment authorization

Part 2.1033 (c)(8) DC Input into Final Amplifier

Test Data: Unchanged from original equipment authorization

MODULATION CHARACTERISTICS

FCC Rule Parts: Part 2.1033(c)(4)

Analog Signals

Emission Designator	Description	Modulation Type	M (modulation Freq., kHz)	R (rate, baud)	D (deviation, kHz)	K (numeric constant)	S (symbols)	Bandwidth Calculation	Necessary Bandwidth
11K0F3E	Narrowband Analog FM Voice	FM	3.0	-	2.5	1.0	-	$B_n = 2M + 2DK$	11.00
14K0F3E	Narrowband Analog FM Voice	FM	3.0	-	4.0	1.0	-		14.00
16K0F3E	Wideband Analog FM Voice	FM	3.0	-	5.0	1.0	-		16.00

Digital Signals

Emission Designator	Description	Modulation Type	M (modulation Freq., kHz)	R (rate, baud)	D (deviation, kHz)	K (numeric constant)	S (symbols)	Bandwidth Calculation	B _n (necessary bandwidth, kHz)
8K10F1E	P25 Phase I C4FM Voice	4FSK	-	9600	1.8	0.916	4	$B_n = (R/\log_2 S) + 2DK$	8.10
8K10F1D	P25 Phase I C4FM Data	4FSK	-	9600	1.8	0.916	4		8.10
9K20F1D	Zetron/Daniels Paging	QPSK	-	12000	-	0.767	4	$B_n = 2RK/\log_2 S$	9.20

Test Data: Unchanged from original equipment authorization

AUDIO FREQUENCY RESPONSE & LOW PASS FILTER

Rule Part No.: 2.1047(a)

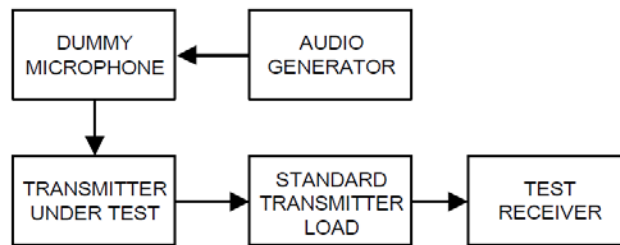
Requirements:

(a) *Voice modulated communication equipment.* A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

Test Procedure: TIA 603-E, 2.2.6.2.2, 2.2.15 (Using the Test Setup from section 2.2.6).

Note: The Low Pass Filter is digital, and has no “input” or “output” as found in the method of measurement, above. Testing has been altered accordingly to show the operation of the filter.

Note: Testing deviates from TIA 603-E 2.2.6.2.2 and 2.2.15. The Audio Frequency Response and Low Pass Filter Response plot data has been taken simultaneously using the Modulation Meter reading of Deviation (kHz), satisfying the requirements above.



Test Data: Unchanged from original equipment authorization

MODULATION LIMITING

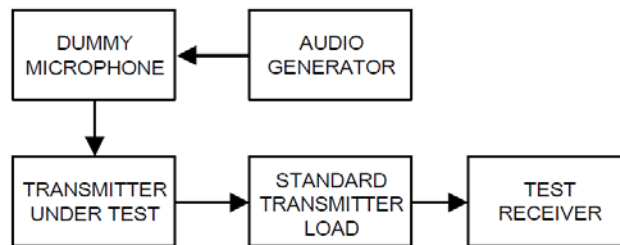
Rule Part No.: 2.1047(b)

Requirements:

(b) Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

Test Procedure: TIA 603-E, 2.2.3

Note: The test method is not sufficient to meet the standard of FCC Pt. 2.1047 alone. Deviation (kHz), as recorded from test equipment, has been converted into percentage as required above.



Test Data: Unchanged from original equipment authorization

OCCUPIED BANDWIDTH & EMISSION MASK

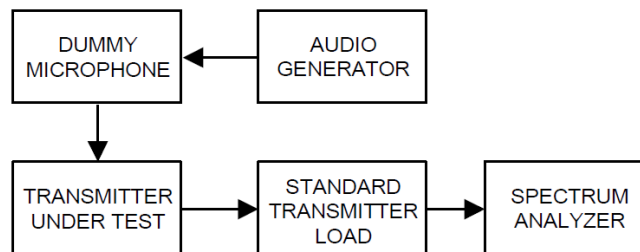
FCC Rule Parts: 2.1049 (c)

(c) Radiotelephone transmitters equipped with a device to limit modulation or peak envelope power shall be modulated as follows. For single sideband and independent sideband transmitters, the input level of the modulating signal shall be 10 dB greater than that necessary to produce rated peak envelope power.

(1) Other than single sideband or independent sideband transmitters—when modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. The input level shall be established at the frequency of maximum response of the audio modulating circuit.

Method of Measurement: ANSI C63.26, 5.4.4 (using Test Setup from TIA 603-E 2.2.11, below)

Note: The receiver's automatic 99% Occupied Bandwidth function was used. The function is identical in operation to ANSI C63.26, 5.4.4, Step e.



OCCUPIED BANDWIDTH & EMISSION MASK

FCC Rule Parts: 90.210(b)(1), (2), (d)(1), (2)

FCC CFR 47 Part 90 Emission Masks						
Frequency Band (MHz)	Mask for equipment with audio low pass filter			Mask for equipment without audio low pass filter		
	6.25 kHz	12.5 kHz	25 kHz	6.25 kHz	12.5 kHz	25 kHz
806 - 809	B, 20 kHz ABW			H, 20 kHz ABW		
809 - 817	D, 11.25 kHz ABW		B, 20 kHz ABW	D, 11.25 kHz ABW		G, 20 kHz ABW
817 - 824	D, 20 kHz ABW		B, 20 kHz ABW	D, 20 kHz ABW		G, 20 kHz ABW
851 - 854	B, 20 kHz ABW			H, 20 kHz ABW		
854 - 862	D, 11.25 kHz ABW		B, 20 kHz ABW	D, 11.25 kHz ABW		G, 20 kHz ABW
862 - 869	D, 20 kHz ABW		B, 20 kHz ABW	D, 20 kHz ABW		G, 20 kHz ABW
All other bands	B			C		

Requirements:

Calculation	Limit (dBc)	dBc	dBm
#1 (Mask A, B, C, G, H)	$43 + 10 * \text{Log}(P)$	48.62	-13.00
#3 (Mask D)	$7.27(5.625 - 2.88)$	19.96	15.66
	$7.27(12.5 - 2.88)$	69.94	-34.32

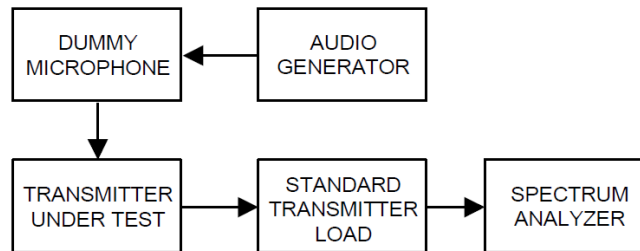
MASK B, 20 kHz Authorized BW			
Requirement	f_d (kHz)	Level (dBc)	Level (dBm)
$\geq 250\%$ of ABW, see #1	≤ -50	48.62	-13.00
-100% to -250% of ABW, ≥ 35 dBc	-50	35.00	0.62
	-20		
-50% to -100% of ABW, ≥ 25 dBc	-20	25.00	10.62
	-10		
(Fundamental)	0	0.00	35.62
+ 50% to 100% of ABW, ≥ 25 dBc	+ 10	25.00	10.62
	+ 20		
+ 100% to 250% of ABW, ≥ 35 dBc	+ 20	35.00	0.62
	+ 50		
$\geq 250\%$ of ABW, see #1	$\geq + 50$	48.62	-13.00

MASK D, 11.25/20 kHz ABW			
Requirement	f_d (kHz)	Level (dBc)	Level (dBm)
≤ -12.5 kHz, see #3	≤ -12.5	48.62	-13.00
- 5.625 kHz to -12.5 kHz, see #3	-12.5	69.94	-34.32
	-5.625	19.96	15.66
-5.625 kHz > fundamental < +5.625 kHz, 0 dBc	-5.625	0.00	35.62
	0		
	+ 5.625		
+ 5.625 kHz to +12.5 kHz, see #3	+ 5.625	19.96	15.66
	+ 12.5	69.94	-34.32
$\geq +12.5$ kHz, see #3	$\geq + 12.5$	48.62	-13.00

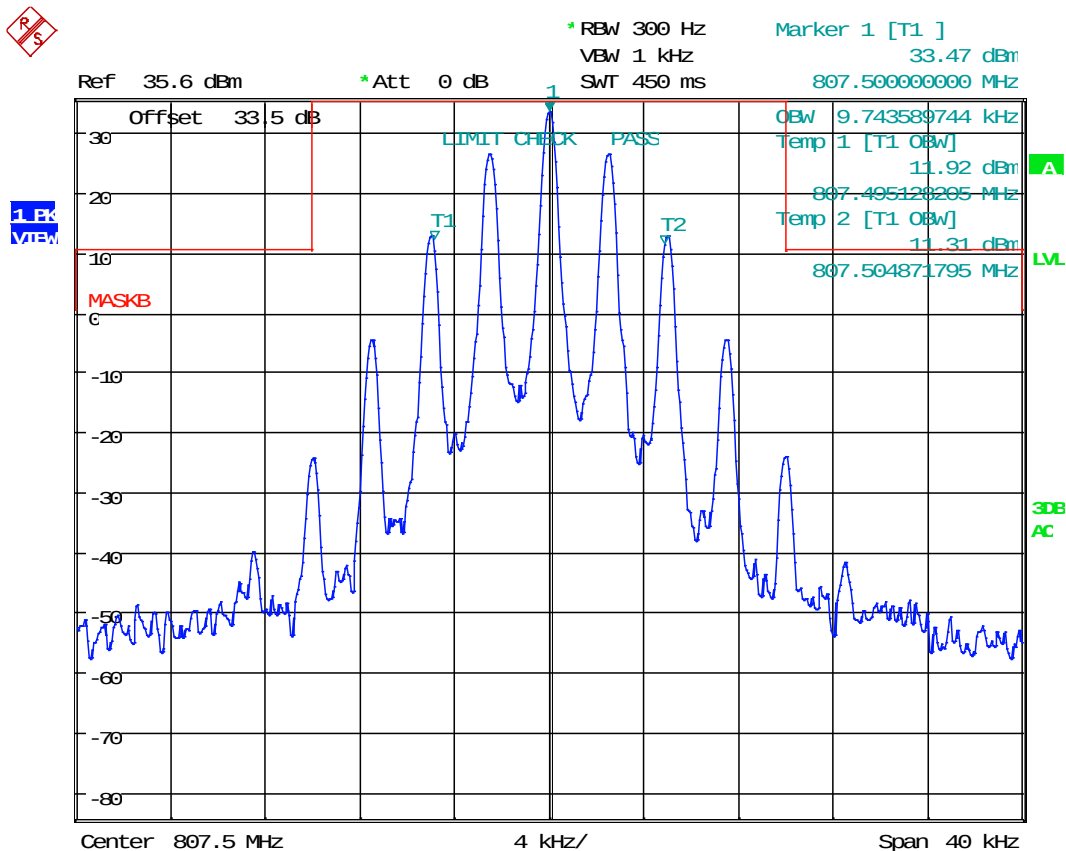
Applicant: CODAN RADIO COMMUNICATIONS
 FCC ID: H4JUT-4E850
 Report: 2057UT19 PT90_TestReport_Rev1

OCCUPIED BANDWIDTH & EMISSION MASK

Method of Measurement: ANSI C63.26, 5.4.4 (using Test Setup from TIA 603-E 2.2.11, below)



Test Data: 807.5 MHz, 11K0F3E

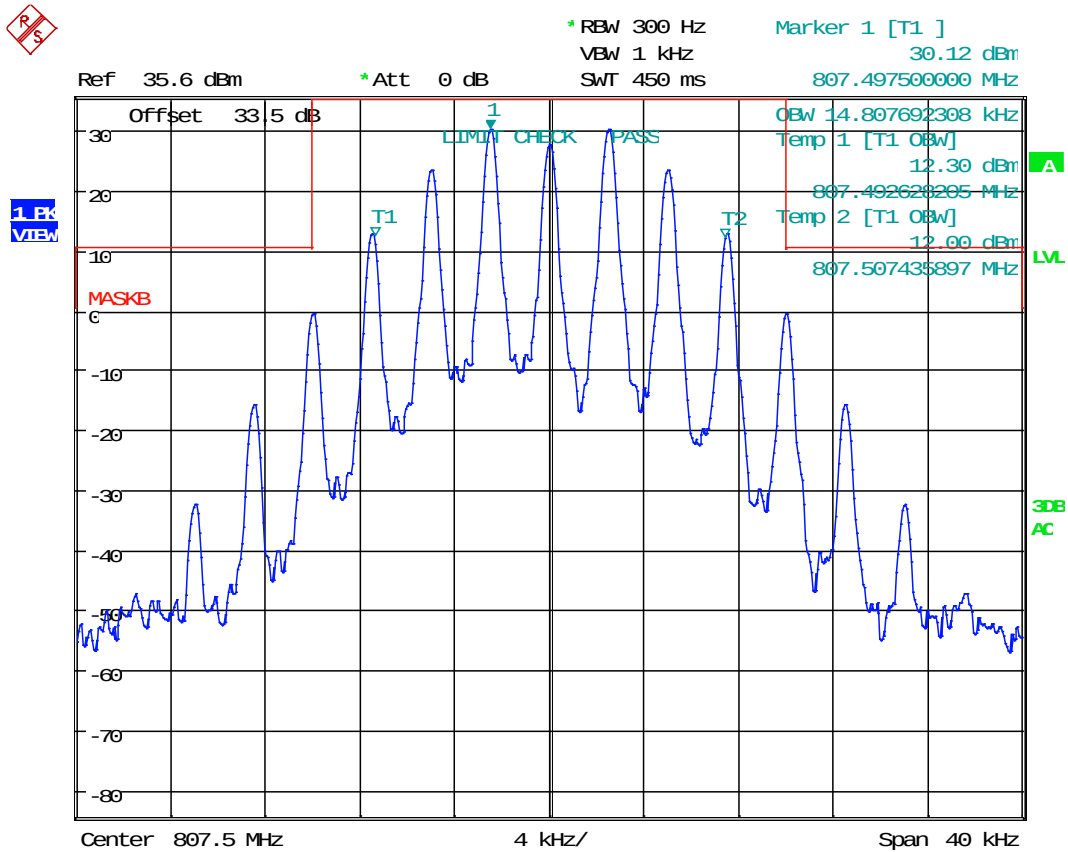


Date: 11.SEP.2019 17:42:13

99 % OBW = 9.74 kHz

OCCUPIED BANDWIDTH & EMISSION MASK

Test Data: 807.5 MHz, 16K0F3E

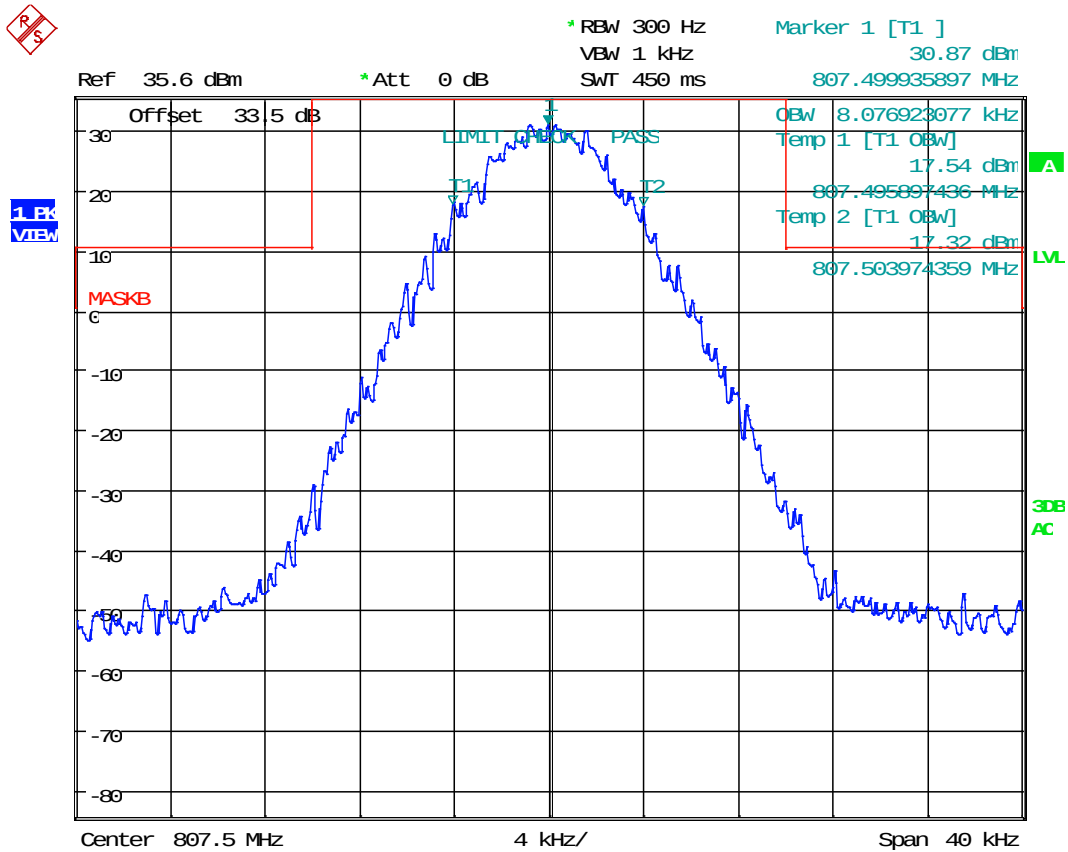


Date: 11.SEP.2019 17:46:33

99 % OBW = 14.81 kHz

OCCUPIED BANDWIDTH & EMISSION MASK

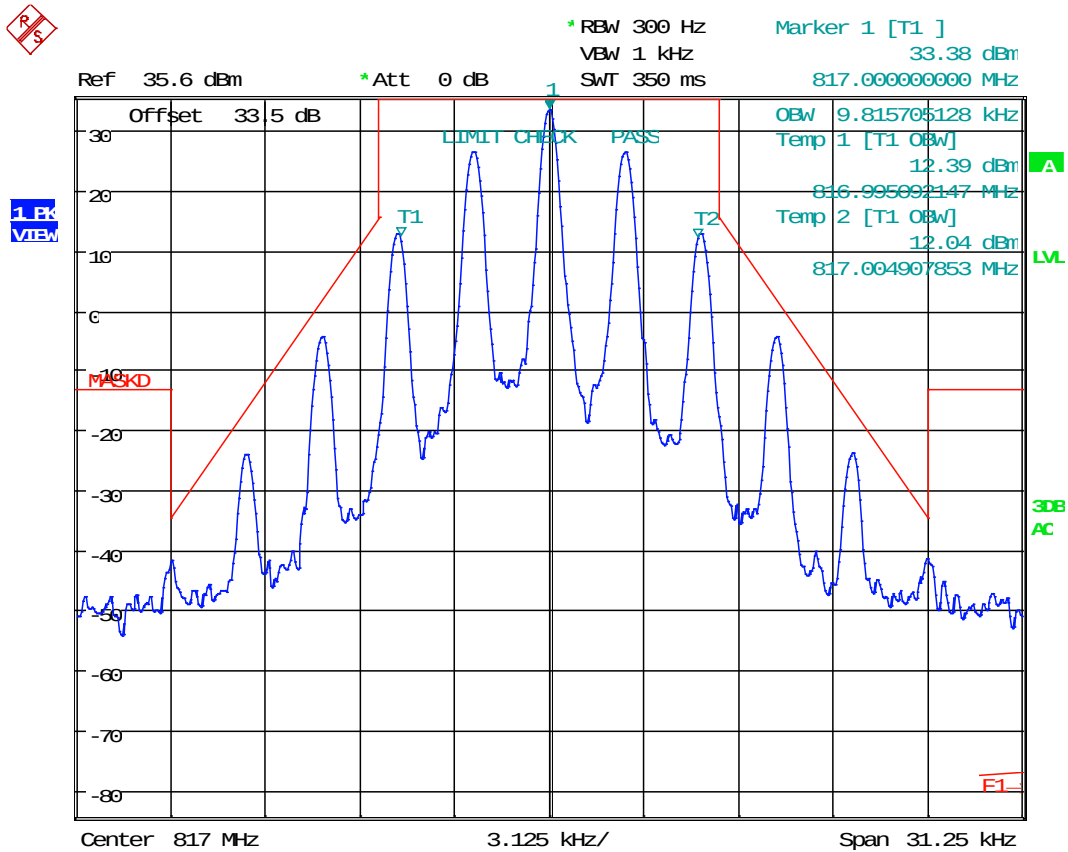
Test Data: 807.5 MHz, 9K20F1D



99 % OBW = 8.08 kHz

OCCUPIED BANDWIDTH & EMISSION MASK

Test Data: 817.0 MHz, 11K0F3E

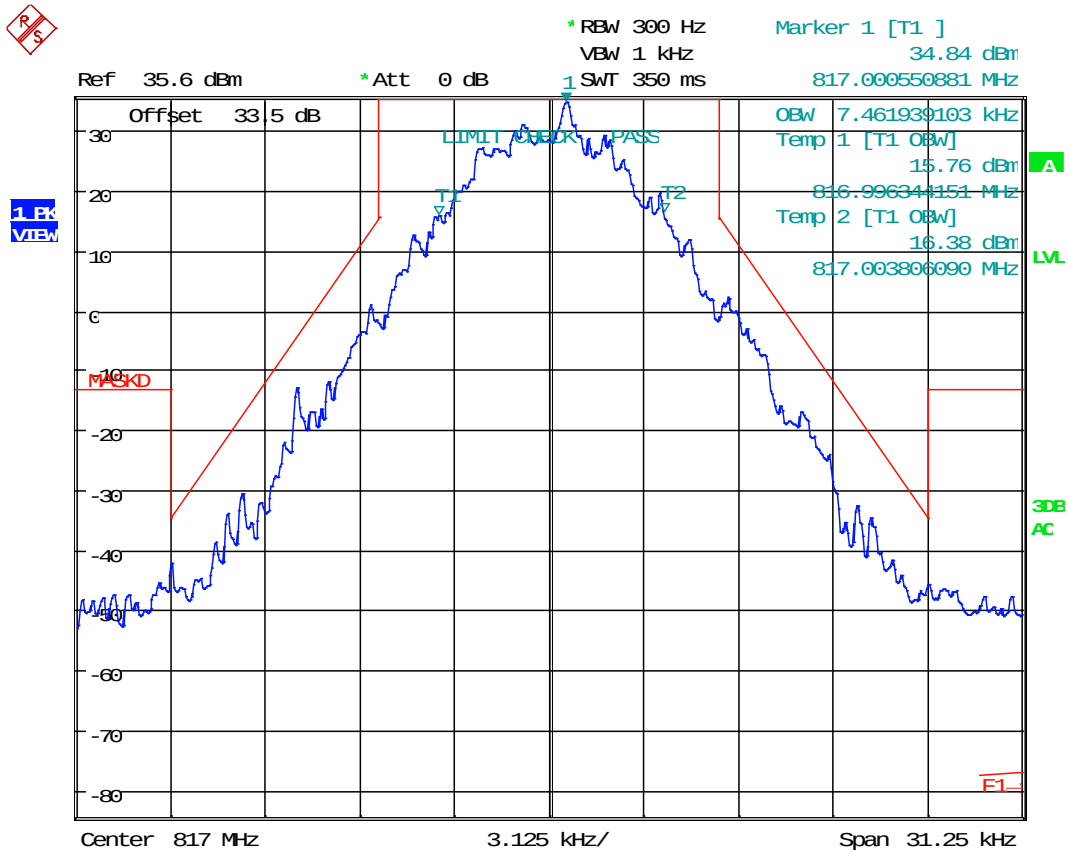


Date: 11.SEP.2019 18:02:49

99 % OBW = 9.82 kHz

OCCUPIED BANDWIDTH & EMISSION MASK

Test Data: 817.0 MHz, 8K10F1E/F1D

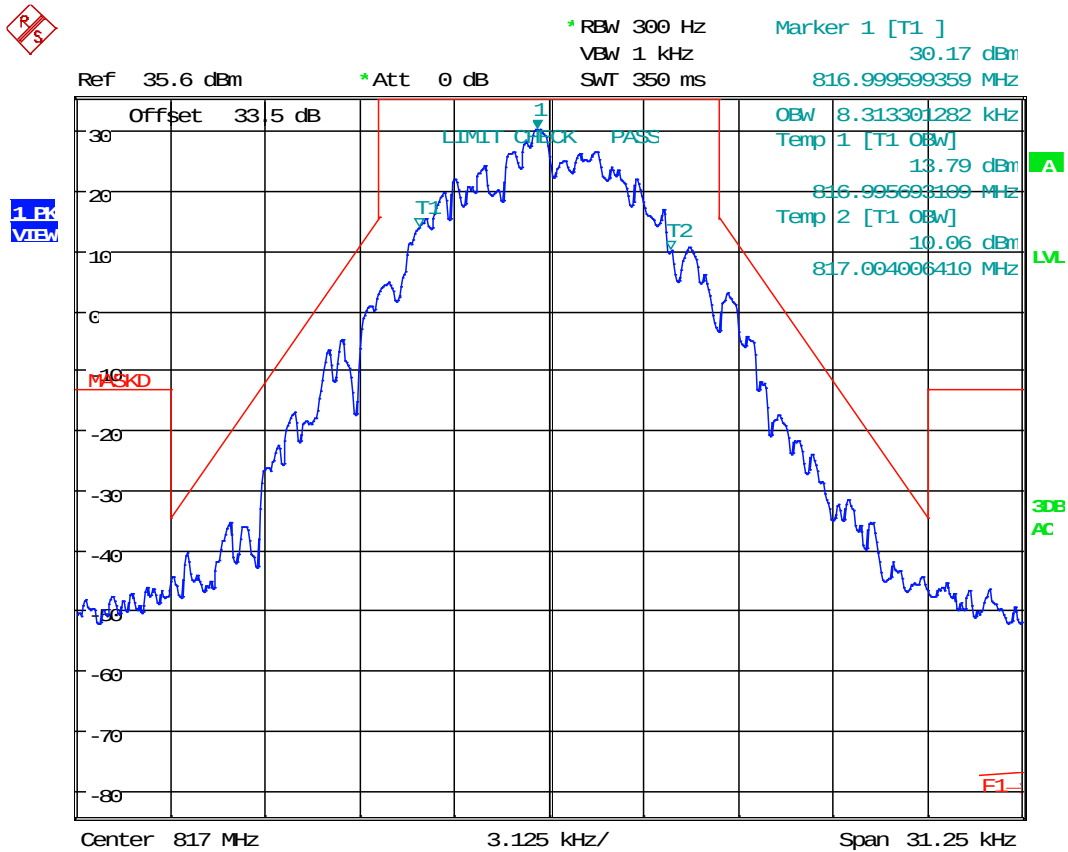


Date: 11.SEP.2019 18:03:44

99 % OBW = 7.46 kHz

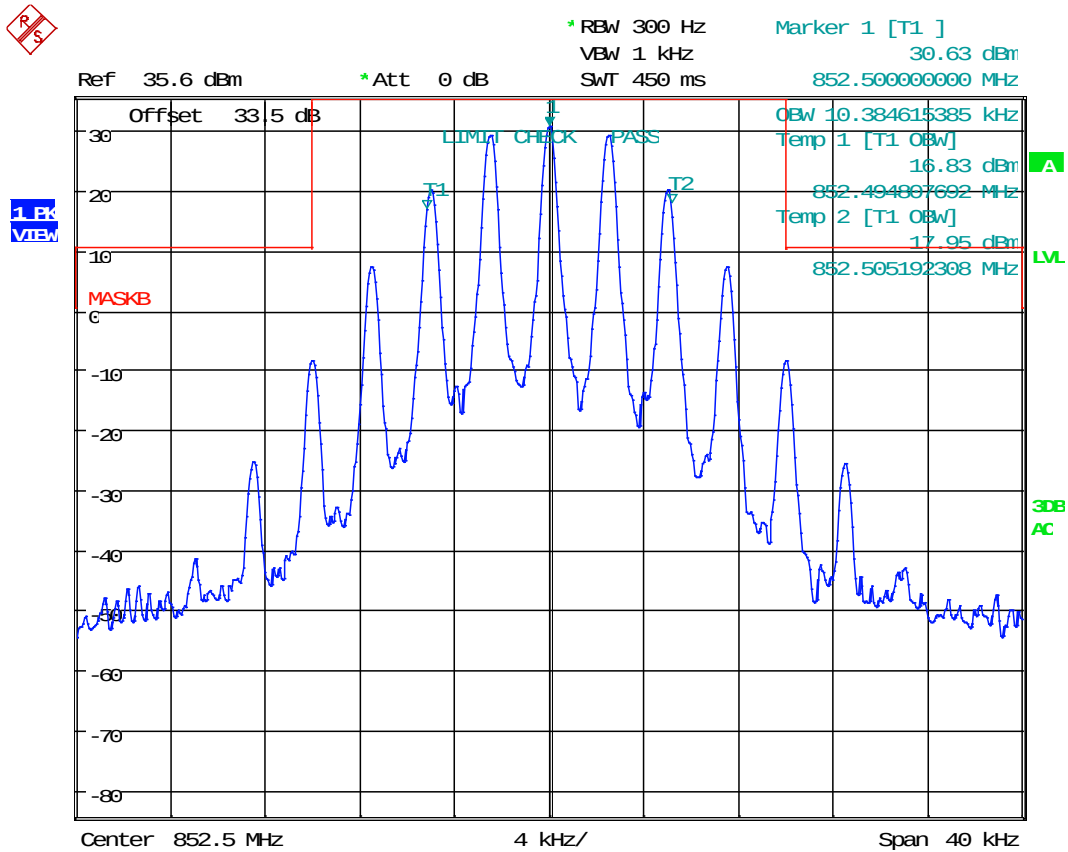
OCCUPIED BANDWIDTH & EMISSION MASK

Test Data: 817.0 MHz, 9K20F1D



OCCUPIED BANDWIDTH & EMISSION MASK

Test Data: 852.5 MHz, 14K0F3E

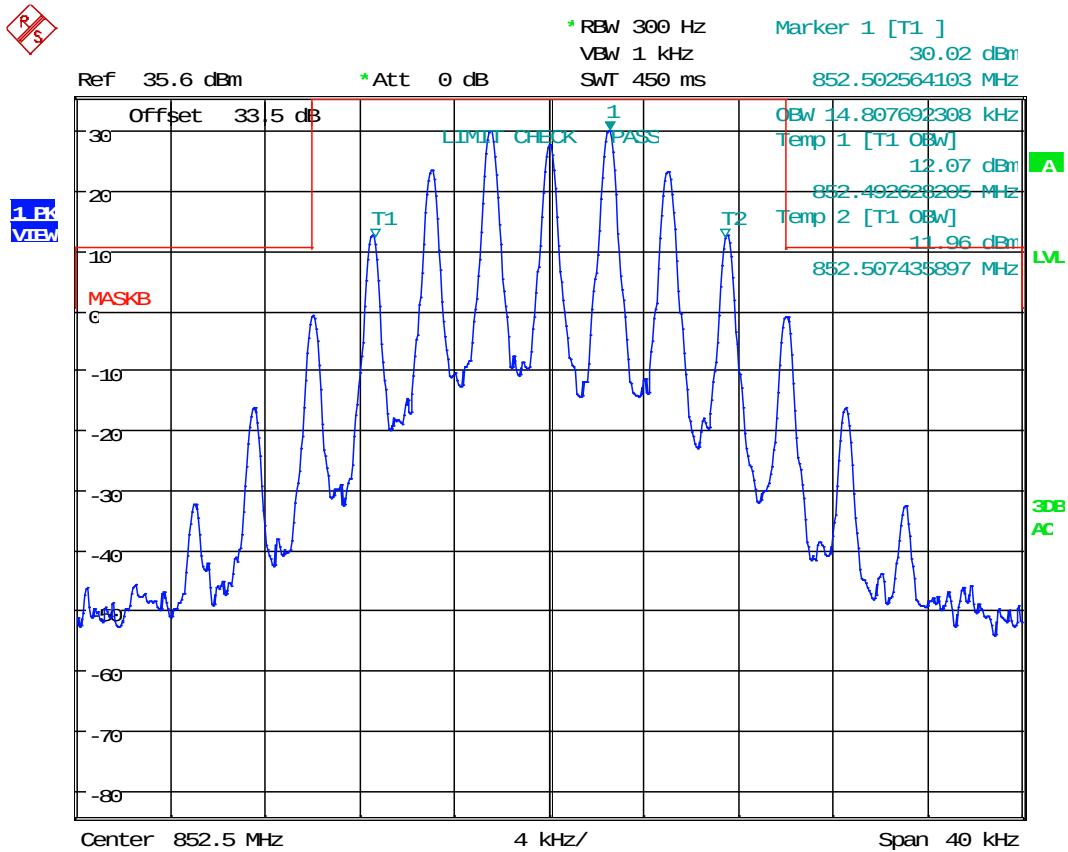


Date: 11.SEP.2019 17:49:38

99 % OBW = 10.39 kHz

OCCUPIED BANDWIDTH & EMISSION MASK

Test Data: 852.5 MHz, 16K0F3E

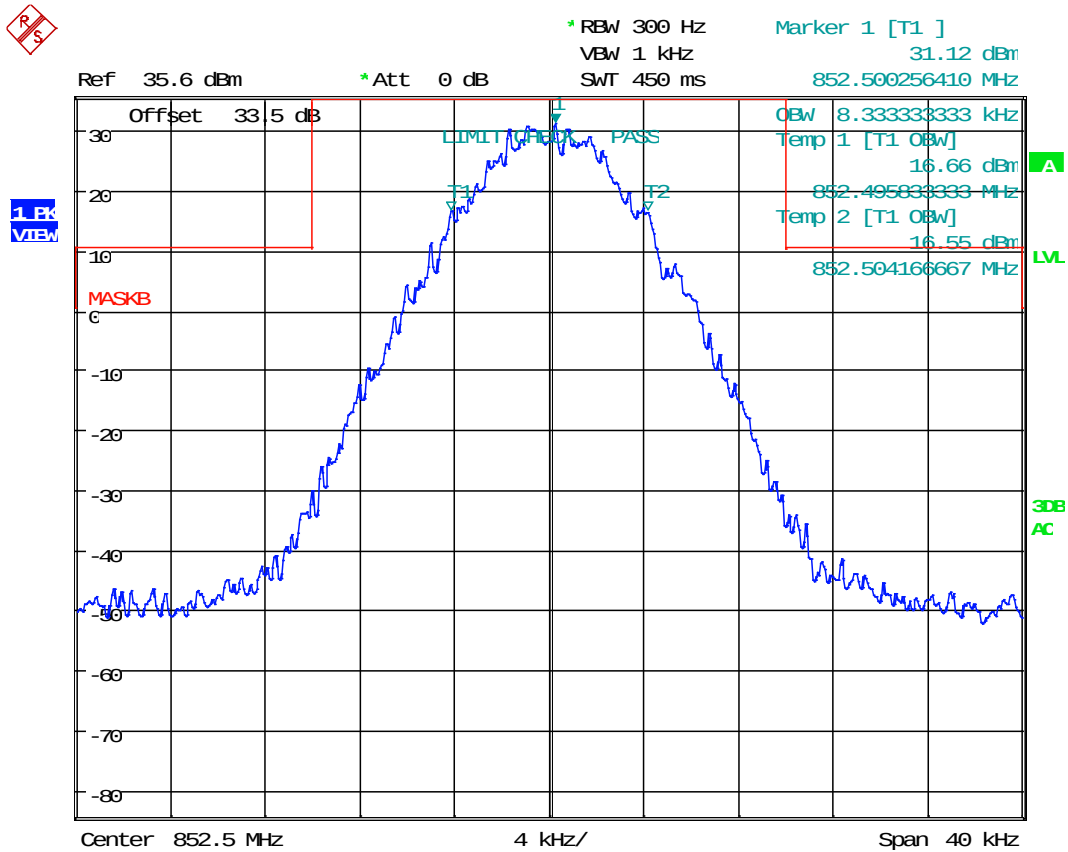


Date: 11.SEP.2019 17:50:53

99 % OBW = 14.81 kHz

OCCUPIED BANDWIDTH & EMISSION MASK

Test Data: 852.5 MHz, 9K20F1D

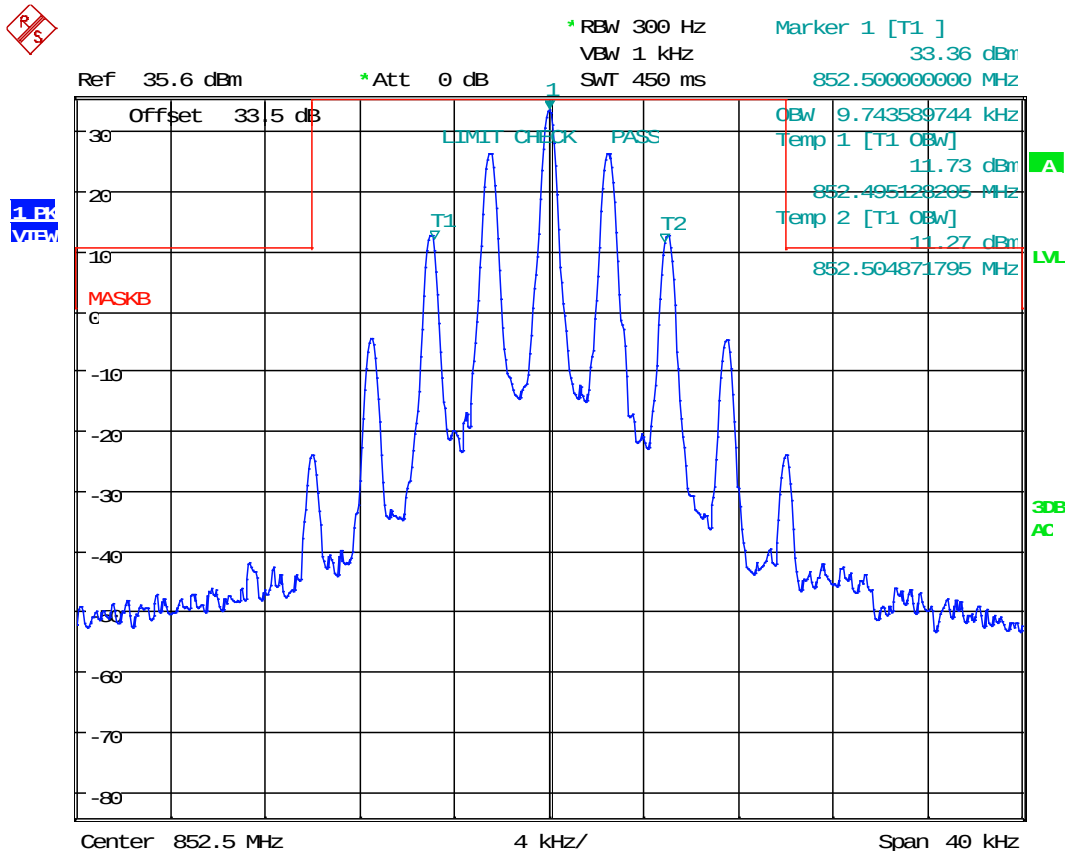


Date: 11.SEP.2019 17:53:16

99 % OBW = 8.33 kHz

OCCUPIED BANDWIDTH & EMISSION MASK

Test Data: 862.0 MHz, 11K0F3E

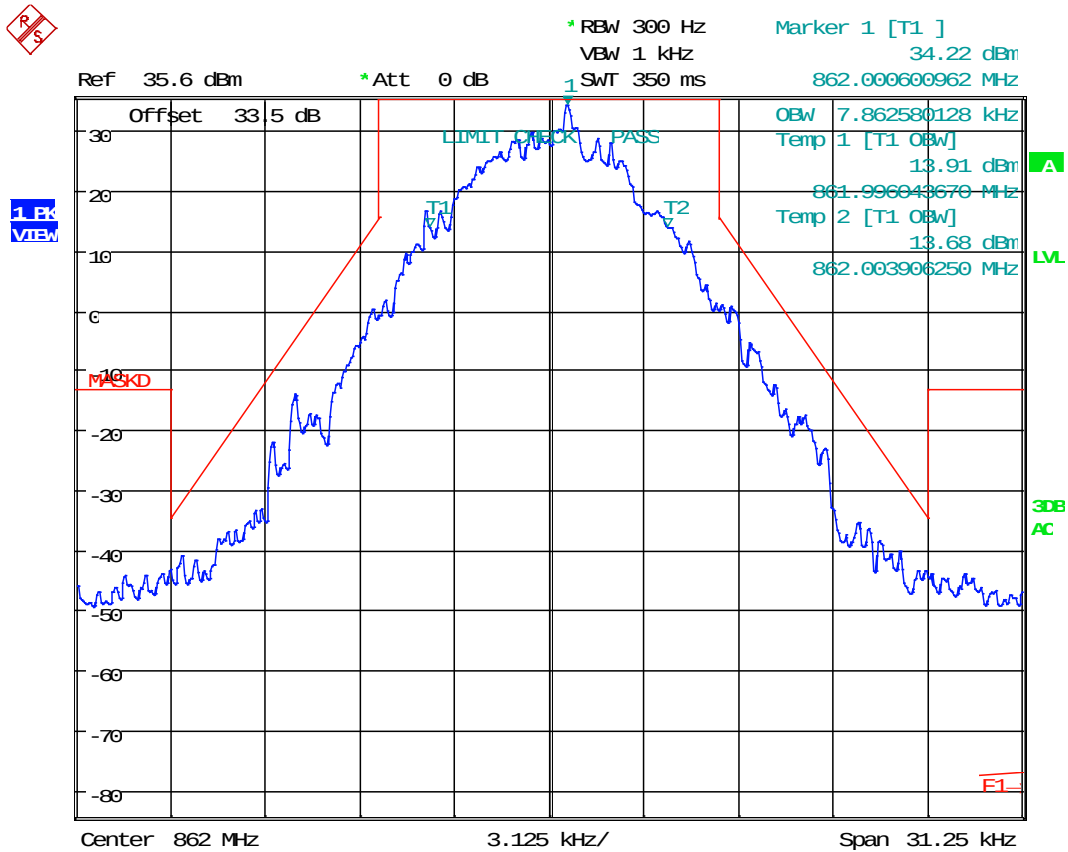


Date: 11.SEP.2019 17:52:07

99 % OBW = 9.74 kHz

OCCUPIED BANDWIDTH & EMISSION MASK

Test Data: 862.0 MHz, 8K10F1E/F1D

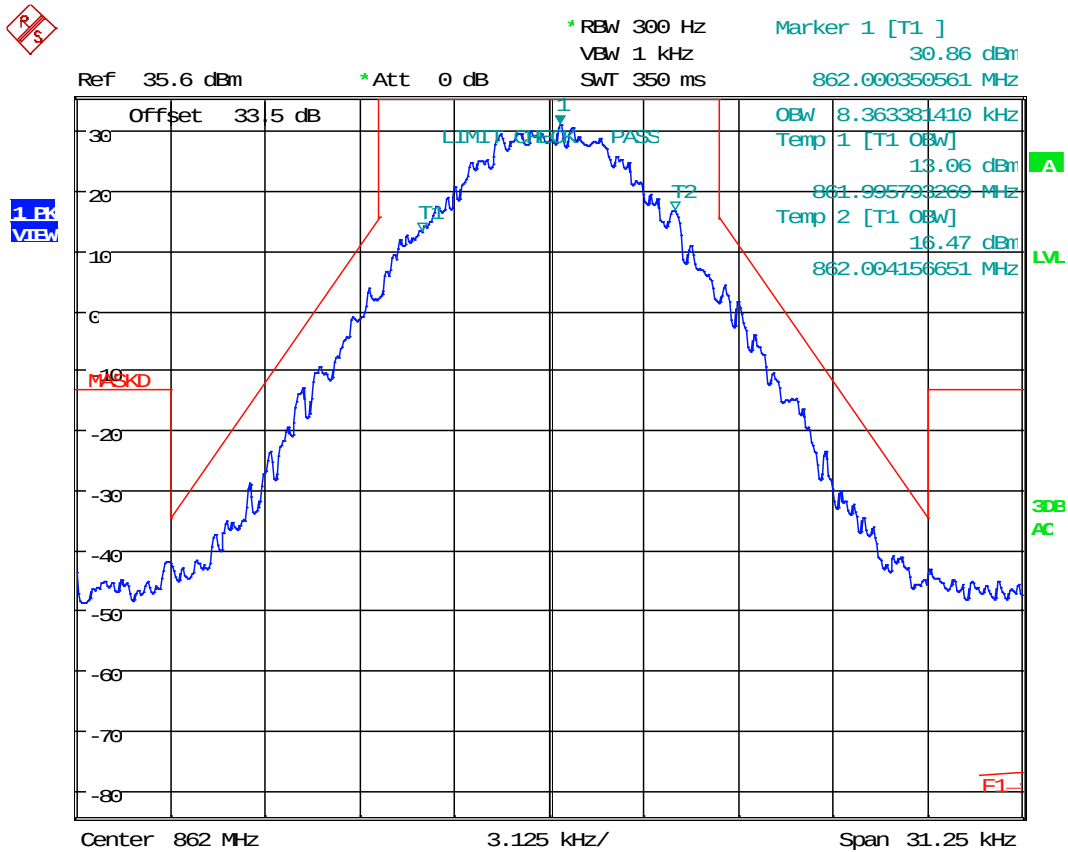


Date: 11.SEP.2019 18:05:34

99 % OBW = 7.86 kHz

OCCUPIED BANDWIDTH & EMISSION MASK

Test Data: 862.0 MHz, 9K20F1D

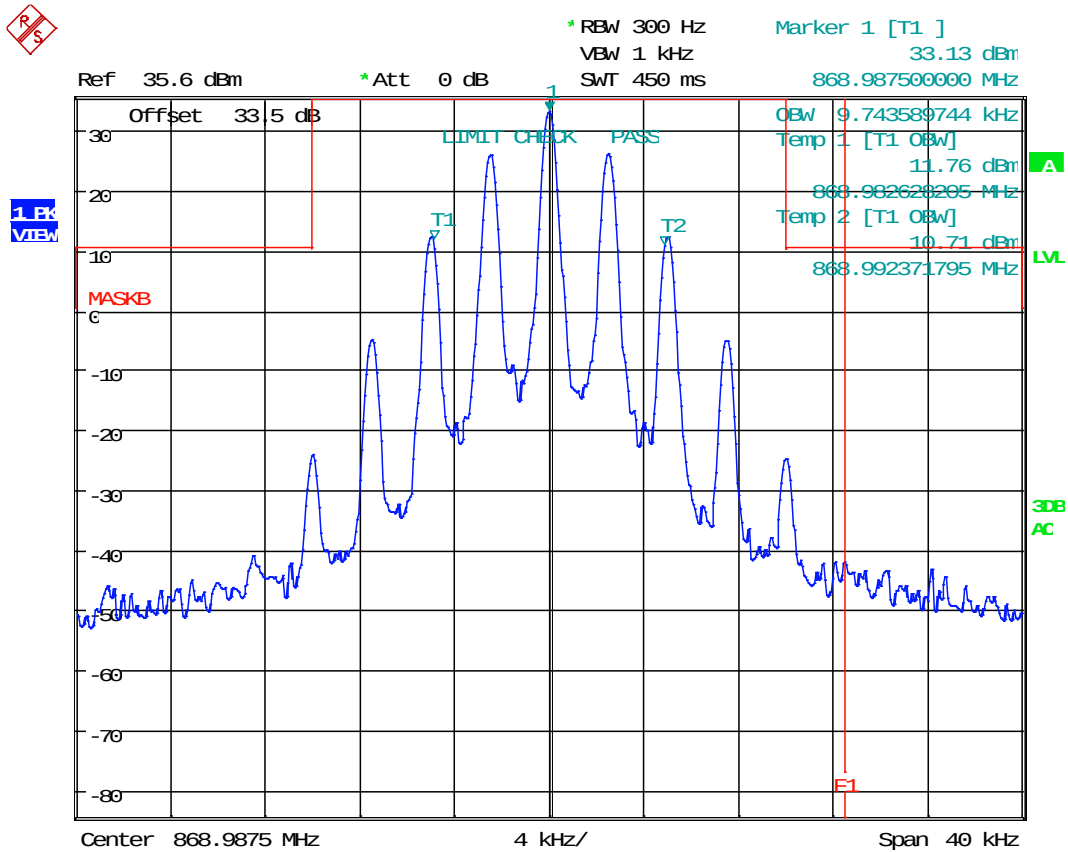


Date: 11.SEP.2019 18:06:08

99 % OBW = 8.36 kHz

OCCUPIED BANDWIDTH & EMISSION MASK

Test Data: 869.9875 MHz, 11K0F3E

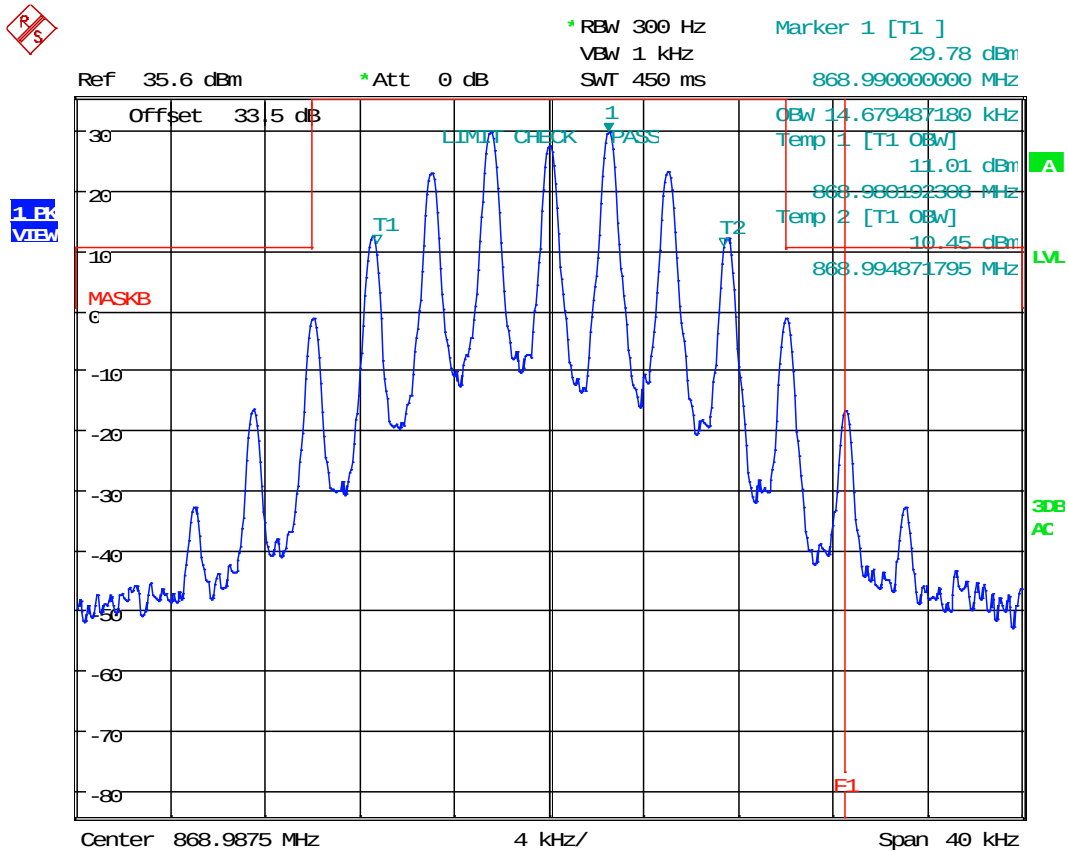


Date: 11.SEP.2019 17:55:15

99 % OBW = 9.74 kHz

OCCUPIED BANDWIDTH & EMISSION MASK

Test Data: 869.9875 MHz, 16K0F3E



Date: 11.SEP.2019 17:58:03

99 % OBW = 14.68 kHz

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

FCC Rule Parts: FCC Part 2.1051(a), 90.210(b)(3), (d)(3)

Requirements:

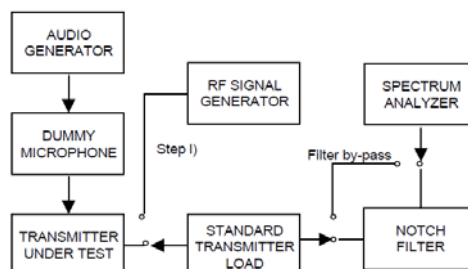
Calculation	Limit (dBc)	dBc	dBm
#1 (Mask A, B, C, G, H)	$43 + 10 * \text{Log}(P)$	48.62	-13.00
#3 (Mask D)	7.27(5.625 - 2.88)	19.96	15.66
	7.27(12.5 - 2.88)	69.94	-34.32

MASK B, 20 kHz Authorized BW			
Requirement	f_d (kHz)	Level (dBc)	Level (dBm)
$\geq 250\%$ of ABW, see #1	≤ -50	48.62	-13.00
-100% to -250% of ABW, ≥ 35 dBc	-50	35.00	0.62
	-20		
-50% to -100% of ABW, ≥ 25 dBc	-20	25.00	10.62
	-10		
(Fundamental)	0	0.00	35.62
+ 50% to 100% of ABW, ≥ 25 dBc	+ 10	25.00	10.62
	+ 20		
+ 100% to 250% of ABW, ≥ 35 dBc	+ 20	35.00	0.62
	+ 50		
$\geq 250\%$ of ABW, see #1	$\geq + 50$	48.62	-13.00

MASK D, 11.25/20 kHz ABW			
Requirement	f_d (kHz)	Level (dBc)	Level (dBm)
≤ -12.5 kHz, see #3	≤ -12.5	48.62	-13.00
- 5.625 kHz to -12.5 kHz, see #3	-12.5	69.94	-34.32
	-5.625	19.96	15.66
-5.625 kHz > fundamental < +5.625 kHz, 0 dBc	-5.625	0.00	35.62
	0		
	+ 5.625		
+ 5.625 kHz to +12.5 kHz, see #3	+ 5.625	19.96	15.66
	+ 12.5	69.94	-34.32
$\geq +12.5$ kHz, see #3	$\geq + 12.5$	48.62	-13.00

Method of Measurement: ANSI/TIA-603-E

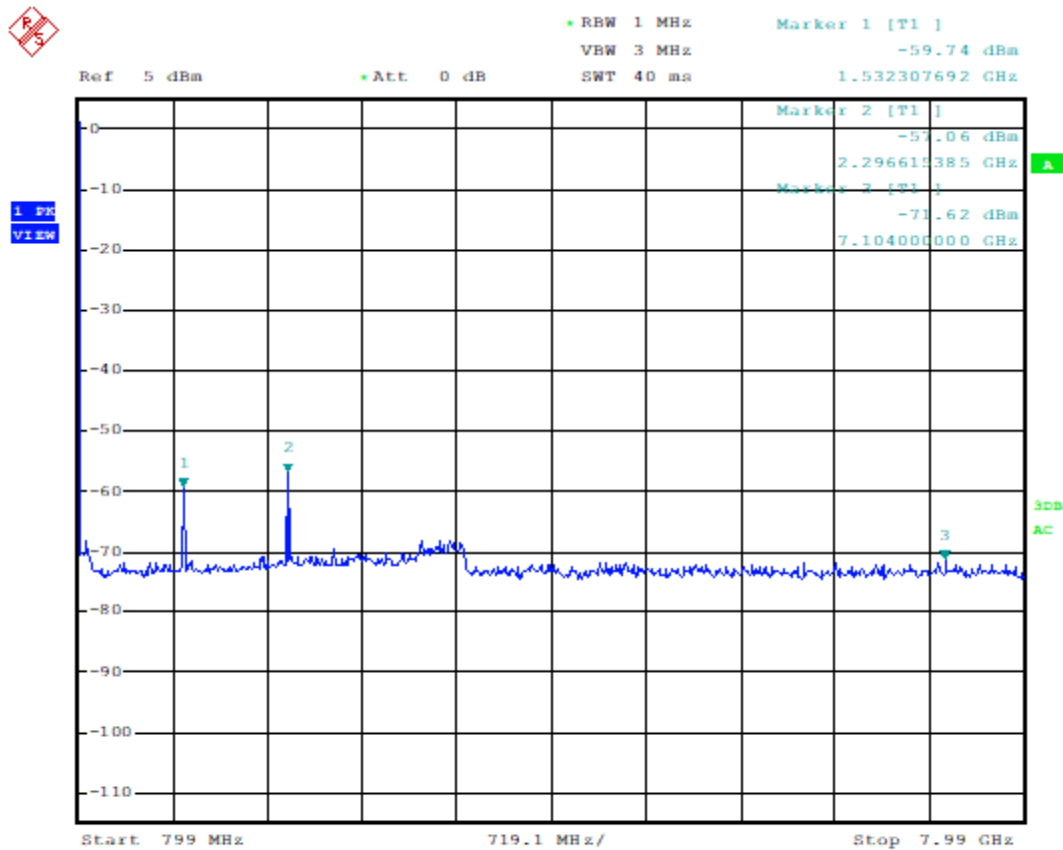
Test Procedure: TIA 603-E, 2.2.13



Applicant: CODAN RADIO COMMUNICATIONS
 FCC ID: H4JUT-4E850
 Report: 2057UT19 PT90_TestReport_Rev1

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: Low End of Band, Analog Emission

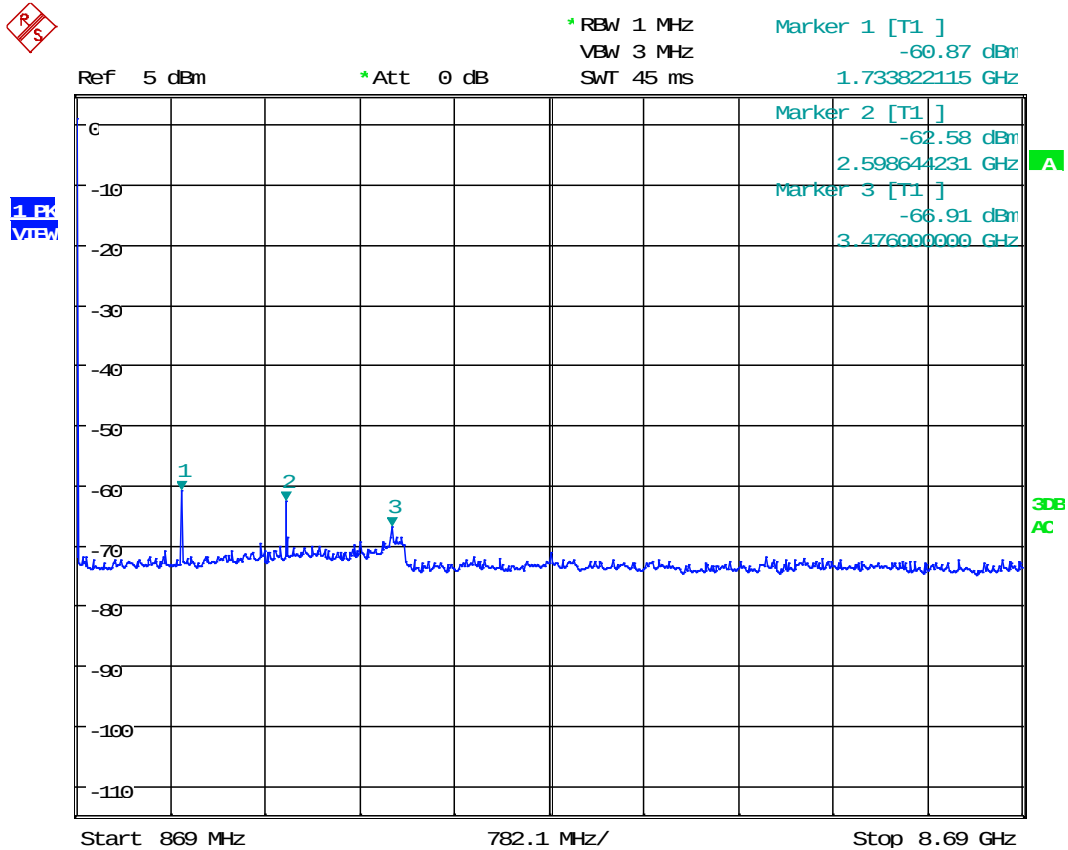


Date: 11.SEP.2019 17:22:36

Marker	Harmonic (MHz)	Loss at Harmonic (dB)	Analyzer offset (dB)	Measured Level (dBm)	Correction (dB)	Level (dBm)	Limit (dBc)	Limit (dBm)	Margin (dB)
1	1532.3	33.62	0.00	-59.74	33.62	-26.12	48.62	-13.00	13.12
2	2296.6	33.72	0.00	-57.06	33.72	-23.34	48.62	-13.00	10.34
3	7104.0	33.85	0.00	-71.62	33.85	-37.77	48.62	-13.00	24.77

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: High End of Band, Analog Emission

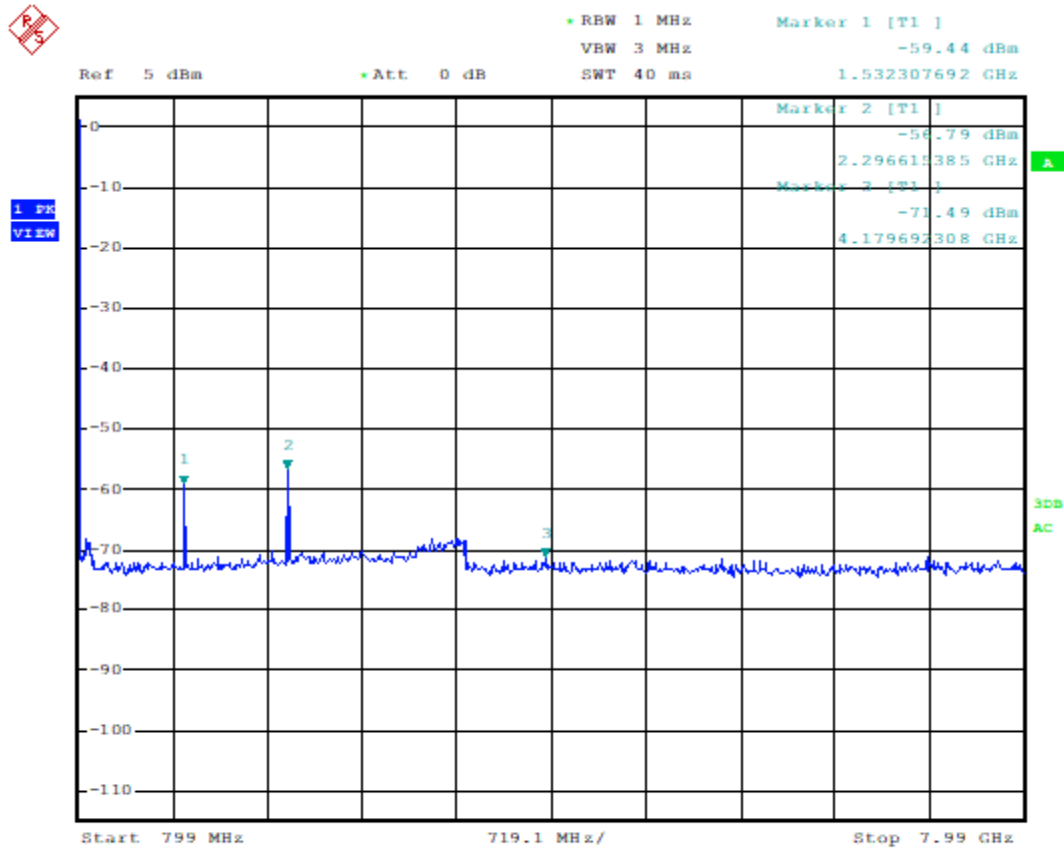


Date: 11.SEP.2019 17:25:00

Marker	Harmonic (MHz)	Loss at Harmonic (dB)	Analyzer offset (dB)	Measured Level (dBm)	Correction (dB)	Level (dBm)	Limit (dBc)	Limit (dBm)	Margin (dB)
1	1733.8	33.60	0.00	-60.87	33.60	-27.27	48.62	-13.00	14.27
2	2598.6	33.73	0.00	-62.58	33.73	-28.85	48.62	-13.00	15.85
3	3476.0	34.02	0.00	-66.91	34.02	-32.89	48.62	-13.00	19.89

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: Low End of Band, Digital Emission

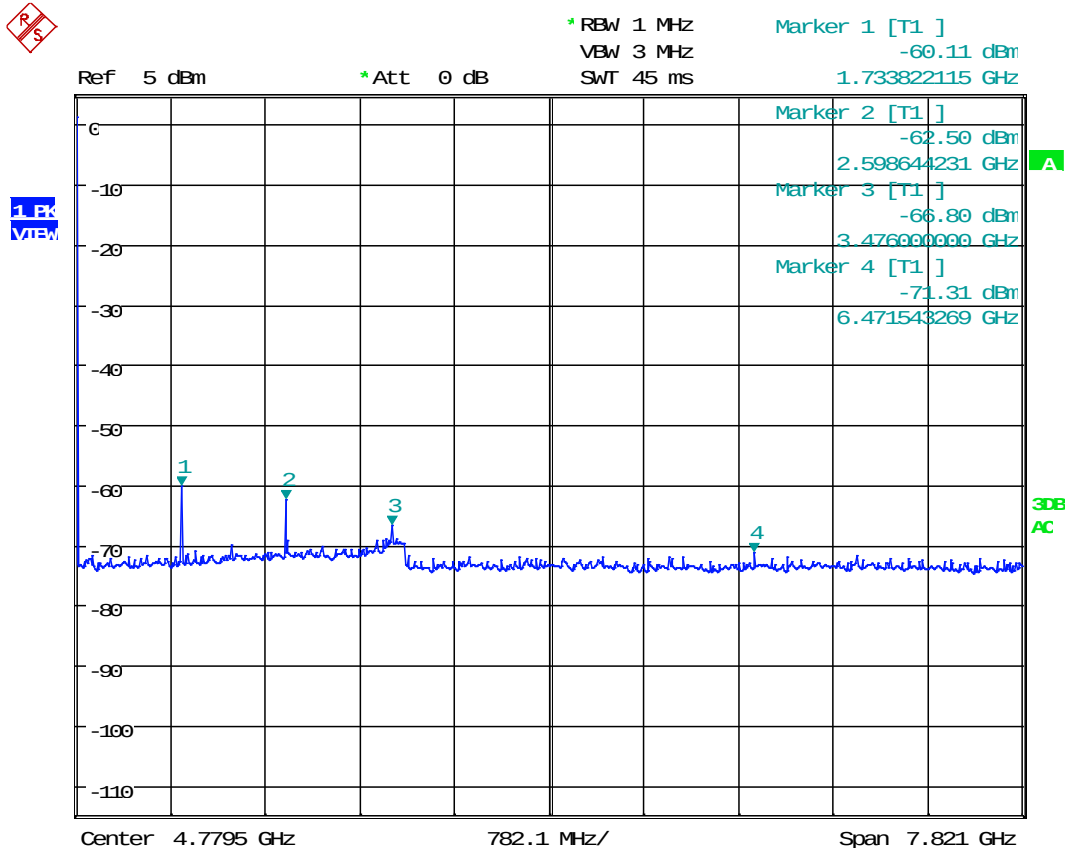


Date: 11.SEP.2019 17:23:47

Marker	Harmonic (MHz)	Loss at Harmonic (dB)	Analyzer offset (dB)	Measured Level (dBm)	Correction (dB)	Level (dBm)	Limit (dBc)	Limit (dBm)	Margin (dB)
1	1532.3	33.62	0.00	-59.44	33.62	-25.82	48.62	-13.00	12.82
2	2296.6	33.72	0.00	-56.79	33.72	-23.07	48.62	-13.00	10.07
3	4179.7	34.18	0.00	-71.49	34.18	-37.31	48.62	-13.00	24.31

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Data: High End of Band, Digital Emission



Date: 11.SEP.2019 17:26:39

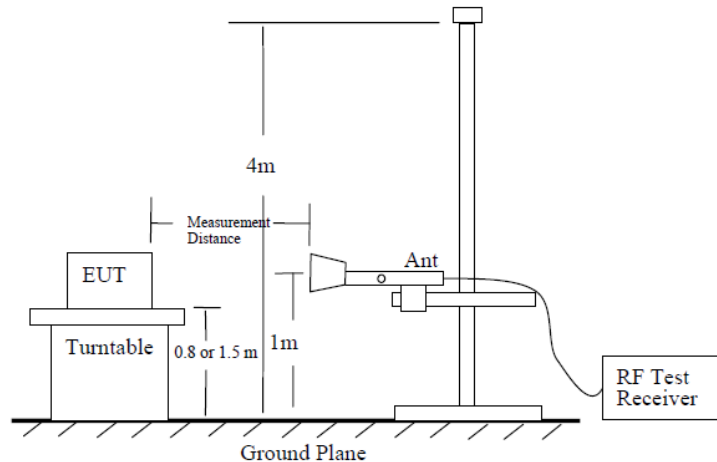
Marker	Harmonic (MHz)	Loss at Harmonic (dB)	Analyzer offset (dB)	Measured Level (dBm)	Correction (dB)	Level (dBm)	Limit (dBc)	Limit (dBm)	Margin (dB)
1	1733.8	33.60	0.00	-60.11	33.60	-26.51	48.62	-13.00	13.51
2	2598.6	33.73	0.00	-62.50	33.73	-28.77	48.62	-13.00	15.77
3	3476.0	34.02	0.00	-66.80	34.02	-32.78	48.62	-13.00	19.78
4	6471.5	34.46	0.00	-71.31	34.46	-36.85	48.62	-13.00	23.85

FIELD STRENGTH OF SPURIOUS EMISSIONS

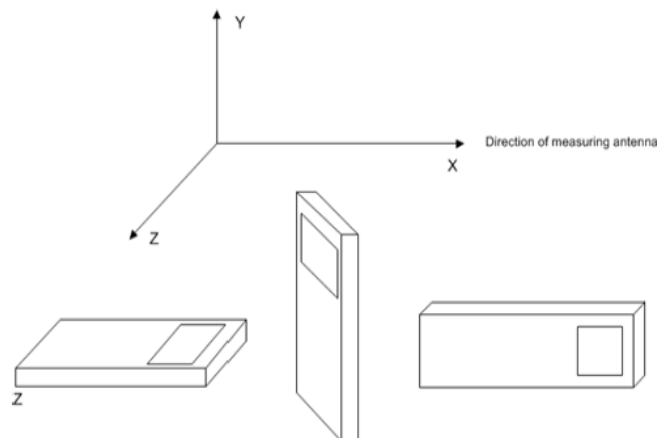
FCC Rule Parts: FCC Part 2.1053(a), 90.210(d)(3)

Method of Measurement: ANSI C63.26, 5.5.4

Test Site Setup:



EUT Orientation(s):



Note: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from the lowest frequency generated internally to at least the tenth harmonic of the fundamental. Measurements were made at the test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669. The measurements below represent the worst case of all the frequencies tested.

Note: The six (6) highest emissions or more of each worst-case operational modes of the EUT are represented below. Emissions 20 dB below the limit are not required to be reported.

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: Low End of Band, Analog Emission

Mode	Tuned Frequency (MHz)	Emission Frequency (MHz)	Detector	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBμV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
ANALOG	799.00	40.06	PK	28.05	V	0.70	13.29	3.00	42.04	-55.34	-13.00	42.34
ANALOG	799.00	62.78	PK	30.35	V	0.93	6.67	3.00	37.95	-59.42	-13.00	46.42
ANALOG	799.00	63.05	PK	25.18	H	0.93	6.59	3.00	32.70	-64.67	-13.00	51.67
ANALOG	799.00	105.34	PK	27.92	V	1.18	10.47	3.00	39.57	-57.81	-13.00	44.81
ANALOG	799.00	138.53	PK	24.11	H	1.33	14.96	3.00	40.40	-56.97	-13.00	43.97
ANALOG	799.00	162.74	PK	23.85	V	1.47	16.33	3.00	41.65	-55.73	-13.00	42.73
ANALOG	799.00	203.84	PK	25.27	H	1.62	10.72	3.00	37.61	-59.76	-13.00	46.76
ANALOG	799.00	439.36	PK	23.79	V	2.40	15.70	3.00	41.89	-55.49	-13.00	42.49
ANALOG	799.00	904.00	PK	24.03	V	3.54	22.10	3.00	49.67	-47.70	-13.00	34.70
ANALOG	799.00	937.92	PK	23.58	H	3.59	22.60	3.00	49.77	-47.61	-13.00	34.61
ANALOG	799.00	1531.00	PK	25.03	V	4.54	27.76	3.00	57.33	-40.05	-13.00	27.05
ANALOG	799.00	1531.00	PK	29.08	H	4.54	27.76	3.00	61.38	-36.00	-13.00	23.00
ANALOG	799.00	2299.00	PK	26.28	V	5.50	31.51	3.00	63.29	-34.09	-13.00	21.09
ANALOG	799.00	2299.00	PK	32.19	H	5.50	31.51	3.00	69.20	-28.18	-13.00	15.18
ANALOG	799.00	3073.00	PK	27.77	V	6.40	32.69	3.00	66.86	-30.52	-13.00	17.52
ANALOG	799.00	3073.00	PK	28.82	H	6.40	32.69	3.00	67.91	-29.47	-13.00	16.47
ANALOG	799.00	4187.00	PK	28.42	V	7.12	33.34	3.00	68.88	-28.49	-13.00	15.49
ANALOG	799.00	5326.00	PK	28.27	V	8.09	34.28	3.00	70.64	-26.74	-13.00	13.74
ANALOG	799.00	7086.00	PK	28.60	H	9.37	36.30	3.00	74.27	-23.11	-13.00	10.11

Test Data: High End of Band, Analog Emission

Mode	Tuned Frequency (MHz)	Emission Frequency (MHz)	Detector	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBμV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
ANALOG	869.00	63.73	PK	31.45	V	0.94	6.45	3.00	38.84	-58.54	-13.00	45.54
ANALOG	869.00	64.27	PK	24.35	H	0.94	6.35	3.00	31.64	-65.73	-13.00	52.73
ANALOG	869.00	128.33	PK	26.95	V	1.28	12.60	3.00	40.83	-56.54	-13.00	43.54
ANALOG	869.00	133.36	PK	23.77	H	1.31	13.87	3.00	38.95	-58.43	-13.00	45.43
ANALOG	869.00	171.98	PK	23.52	V	1.53	15.00	3.00	40.05	-57.33	-13.00	44.33
ANALOG	869.00	193.88	PK	23.19	H	1.60	14.76	3.00	39.55	-57.83	-13.00	44.83
ANALOG	869.00	203.20	PK	24.00	H	1.62	10.74	3.00	36.36	-61.01	-13.00	48.01
ANALOG	869.00	217.92	PK	26.75	V	1.69	10.34	3.00	38.78	-58.60	-13.00	45.60
ANALOG	869.00	884.16	PK	24.21	H	3.55	22.27	3.00	50.03	-47.35	-13.00	34.35
ANALOG	869.00	980.16	PK	24.26	V	3.69	22.51	3.00	50.46	-46.92	-13.00	33.92
ANALOG	869.00	1738.00	PK	24.52	V	4.83	29.57	3.00	58.92	-38.46	-13.00	25.46
ANALOG	869.00	1738.00	PK	25.32	H	4.83	29.57	3.00	59.72	-37.66	-13.00	24.66
ANALOG	869.00	2607.00	PK	24.23	V	5.81	32.41	3.00	62.45	-34.93	-13.00	21.93
ANALOG	869.00	2607.00	PK	24.11	H	5.81	32.41	3.00	62.33	-35.05	-13.00	22.05
ANALOG	869.00	3476.00	PK	25.00	V	6.88	32.65	3.00	64.53	-32.85	-13.00	19.85
ANALOG	869.00	3476.00	PK	27.30	H	6.88	32.65	3.00	66.83	-30.55	-13.00	17.55
ANALOG	869.00	5377.00	PK	28.36	H	8.17	34.32	3.00	70.85	-26.53	-13.00	13.53
ANALOG	869.00	6270.00	PK	23.64	V	8.61	35.39	3.00	67.64	-29.74	-13.00	16.74
ANALOG	869.00	6270.00	PK	25.49	V	8.61	35.39	3.00	69.49	-27.89	-13.00	14.89

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: Low End of Band, Digital Emission

Mode	Tuned Frequency (MHz)	Emission Frequency (MHz)	Detector	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBμV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
DIGITAL	799.00	63.05	PK	29.84	V	0.93	6.59	3.00	37.36	-60.01	-13.00	47.01
DIGITAL	799.00	64.27	PK	24.55	H	0.94	6.35	3.00	31.84	-65.53	-13.00	52.53
DIGITAL	799.00	124.93	PK	26.58	V	1.27	11.69	3.00	39.54	-57.84	-13.00	44.84
DIGITAL	799.00	165.59	PK	23.41	H	1.49	15.84	3.00	40.74	-56.64	-13.00	43.64
DIGITAL	799.00	192.11	PK	23.22	V	1.60	14.32	3.00	39.14	-58.24	-13.00	45.24
DIGITAL	799.00	230.08	PK	27.20	V	1.74	10.30	3.00	39.24	-58.14	-13.00	45.14
DIGITAL	799.00	281.28	PK	24.63	H	2.05	12.95	3.00	39.63	-57.74	-13.00	44.74
DIGITAL	799.00	839.36	PK	24.05	H	3.45	22.04	3.00	49.54	-47.84	-13.00	34.84
DIGITAL	799.00	905.92	PK	23.97	V	3.55	22.27	3.00	49.79	-47.59	-13.00	34.59
DIGITAL	799.00	1531.00	PK	28.20	V	4.54	27.76	3.00	60.50	-36.88	-13.00	23.88
DIGITAL	799.00	1531.00	PK	31.64	H	4.54	27.76	3.00	63.94	-33.44	-13.00	20.44
DIGITAL	799.00	2299.00	PK	31.74	V	5.50	31.51	3.00	68.75	-28.63	-13.00	15.63
DIGITAL	799.00	2299.00	PK	31.79	H	5.50	31.51	3.00	68.80	-28.58	-13.00	15.58
DIGITAL	799.00	3074.00	PK	29.39	V	6.40	32.69	3.00	68.48	-28.89	-13.00	15.89
DIGITAL	799.00	3074.00	PK	30.72	H	6.40	32.69	3.00	69.81	-27.56	-13.00	14.56
DIGITAL	799.00	4648.00	PK	28.27	H	7.44	33.91	3.00	69.62	-27.75	-13.00	14.75
DIGITAL	799.00	4802.00	PK	29.20	V	7.08	33.93	3.00	70.21	-27.17	-13.00	14.17

Test Data: High End of Band, Digital Emission

Mode	Tuned Frequency (MHz)	Emission Frequency (MHz)	Detector	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Distance (m)	Field Strength (dBμV/m)	ERP (dBm)	Limit (dBm)	Margin (dBm)
DIGITAL	869.10	40.47	PK	29.48	V	0.71	13.25	3.00	43.44	-53.94	-13.00	40.94
DIGITAL	869.10	63.59	PK	24.39	H	0.94	6.48	3.00	31.81	-65.57	-13.00	52.57
DIGITAL	869.10	125.20	PK	23.98	H	1.27	11.76	3.00	37.01	-60.37	-13.00	47.37
DIGITAL	869.10	184.09	PK	26.71	V	1.57	13.40	3.00	41.68	-55.69	-13.00	42.69
DIGITAL	869.10	230.72	PK	28.33	V	1.74	10.31	3.00	40.38	-57.00	-13.00	44.00
DIGITAL	869.10	924.48	PK	23.89	H	3.58	22.21	3.00	49.68	-47.70	-13.00	34.70
DIGITAL	869.10	944.32	PK	24.23	V	3.60	22.60	3.00	50.43	-46.95	-13.00	33.95
DIGITAL	869.10	1738.00	PK	24.93	V	4.83	29.57	3.00	59.33	-38.05	-13.00	25.05
DIGITAL	869.10	1738.00	PK	24.91	H	4.83	29.57	3.00	59.31	-38.07	-13.00	25.07
DIGITAL	869.10	2607.00	PK	25.90	V	5.81	32.41	3.00	64.12	-33.26	-13.00	20.26
DIGITAL	869.10	2607.00	PK	26.19	H	5.81	32.41	3.00	64.41	-32.97	-13.00	19.97
DIGITAL	869.10	3476.00	PK	32.28	V	6.88	32.65	3.00	71.81	-25.57	-13.00	12.57
DIGITAL	869.10	3476.00	PK	33.15	H	6.88	32.65	3.00	72.68	-24.70	-13.00	11.70
DIGITAL	869.10	4802.00	PK	29.47	V	7.08	33.93	3.00	70.48	-26.90	-13.00	13.90
DIGITAL	869.10	7893.00	PK	28.13	H	10.16	35.84	3.00	74.13	-23.25	-13.00	10.25

FREQUENCY STABILITY

FCC Rule Parts: FCC Part 2.1055(a)(2), 90.213

§90.213 Frequency stability.

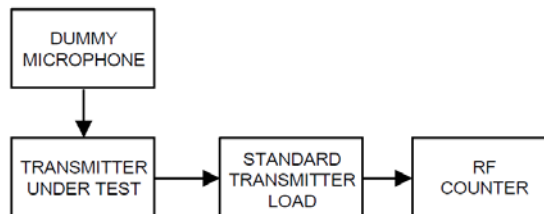
(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

MINIMUM FREQUENCY STABILITY
[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
806-809	¹⁴ 1.0	1.5	1.5
809-824	¹⁴ 1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5

¹⁴Control stations may operate with the frequency tolerance specified for associated mobile frequencies.

Method of Measurements: TIA 603-E, 2.2.2



Test Data: Unchanged from original equipment authorization

STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The measurement uncertainty was calculated for all measurements listed in this test report according To CISPR 16-4 or ENTR 100-028 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: “Uncertainty in EMC Measurements” and is documented in the Timco Engineering, Inc. quality system according 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 Timco Engineering, Inc. is reported:

Test Items	Measurement Uncertainty	Notes
RF Frequency Accuracy	± 49.5 Hz	(1)
RF Conducted Power	± 0.93 dB	(1)
Conducted spurious emission of transmitter valid up to 40GHz	± 1.86 dB	
Occupied Bandwidth	± 2.65 %	
Audio Frequency Response	± 1.86 dB	
Modulation limiting	± 1.88 %	
Radiated RF Power	± 1.4 dB	
Maximum frequency deviation: Within 300 Hz and 6kHz of audio freq.	± 1.88 %	
Within 6kHz and 25kHz of audio Freq.	± 2.04 %	
Rad Emissions Sub Meth up to 26.5GHz	± 2.14 dB	
Adjacent channel power	± 1.47 dB	(1)
Transient Frequency Response	± 1.88 %	
Temperature	± 1.0 °C	(1)
Humidity	± 5.0 %	

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

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Biconical 1057	Eaton	94455-1	1057	12/13/17	12/13/19
Antenna: Log-Periodic 1243	Eaton	96005	1243	04/20/18	04/20/20
Coaxial Cable - Chamber 3 cable set (backup)	Micro-Coax	Chamber 3 cable set (backup)	KMKM-0244-02 KMKM-0670-01 KFKF-0197-00	02/27/19	02/27/21
CHAMBER	Panashield	3M	N/A	03/12/19	03/12/21
Antenna: Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	01/30/17	01/30/20
Software: Field Strength Program	Timco	N/A	Version 4.10.7.0	N/A	N/A
EMI Test Receiver R & S ESU 40	Rohde & Schwarz	ESU 40	100320	08/28/18	08/28/20
Bore-sight Antenna Positioning Tower	Sunol Sciences	TLT2	N/A	N/A	N/A
Attenuator N 30dB 100W DC-6G	Pasternack	PE7214-30	#109	08/23/19	08/23/21
Attenuator N 3dB 100W DC-6G	Pasternack	PE7015-3	#21	08/23/19	08/23/21
Coaxial Cable - BMBM-0061-01 RG400	Pasternack	PE3582LF-24	BMBM-0061-01	08/23/19	08/23/21
Coaxial Cable - BMBM-0122-01 RG400	Pasternack	PE3582LF-48	BMBM-0122-01	08/23/19	08/23/21
Coaxial Cable - BMBM-0183-01 RG400	Pasternack	PE3582LF-72	BMBM-0183-01	08/23/19	08/23/21
Terminator N 20W DC-18G	Narda	8205	#14	N/A	N/A

*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

END OF TEST REPORT