TELTEST Laboratories
Tait Ltd
Report Number 3655

LABORATORY TEST REPORT

RADIO PERFORMANCE MEASUREMENTS

for the

TMBL3B Mobile Transceiver

Tested in accordance with:

FCC 47 CFR Part 90

RSS-119 Issue 12
RSS-Gen Issue 4

Report Revision:	1	
Issue Date:	30 June 2015	
PREPARED BY:	L. M. White	_____ Test Technician
CHECKED & APPROVED BY:	M. C. James	_____ Laboratory Technical Manager

OATS FCC LISTING REGISTRATION: 837095
OATS IC LISTING REGISTRATION: SITE# 737A-1

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation.

This document must not be reproduced except in full, without the written permission of the Compliance Laboratory Manager

TELTEST Laboratories (A Division of Tait Communications)
PO Box 1645, 558 Wairakei Road, Christchurch, New Zealand.
Telephone: 64 3 358 3399
FAX: 64 3 359 4632

TABLE OF CONTENTS

REVISION 2
INTRODUCTION 3
STATEMENT OF COMPLIANCE 4
MODULATION TYPES, NECESSARY BANDWIDTH & EMISSION DESIGNATORS 5
TEST RESULTS 7
TRANSMITTER OUTPUT POWER (CONDUCTED) 7
TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS 8
TRANSMITTER MODULATION LIMITING 11
TRANSMITTER OCCUPIED BANDWIDTH AND SPECTRUM MASKS 15
TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED) 40
TRANSMITTER SPURIOUS EMISSIONS (RADIATED) 50
TRANSMITTER FREQUENCY STABILITY - TEMPERATURE 54
TRANSMITTER FREQUENCY STABILITY - VOLTAGE 58
RECEIVER SPURIOUS EMISSIONS (CONDUCTED) 59
TEST EQUIPMENT LIST 60
ANNEX A – TEST SETUP DETAILS 62

REVISION

Date	Revision	Comments
30 June 2015	1	Initial test report

INTRODUCTION

This report demonstrates that the TMBL3B 30 W mobile transceiver complies with FCC 47 Part 90, and RSS-119 Issue 12 & RSS-Gen Issue 4. This radio supports analog, digital FFSK, P25 phase-1, P25 phase-2, and Digital Mobile Radio modulations.

REPORT PREPARED FOR
Tait Communications
PO Box 1645
558 Wairakei Road
Christchurch
New Zealand

DESCRIPTION OF SAMPLE

Manufacturer	Tait Limited
Equipment:	Mobile Transceiver
Type:	TMBL3B
Product Code:	T02-00012-YPAA
Serial Number(s):	20288278
Quantity:	1

Modulation		Channel Spacing	Speech Channels	Symbol Rate (symbols/sec)	Data Rate (bps)
Analogue FM		12.5 kHz	1	-	-
FFSK	Fast Frequency Shift Keying	12.5 kHz	-	1200	1200
		12.5 kHz	-	2400	2400
Digital Mobile Radio (DMR)	4 Level FSK (2 slot TDMA) (ETSI TS102 361-1)	12.5 kHz	2	4800	9600
APCO P25 Phase 1	C4FM (TIA 102)	12.5 kHz	1	4800	9600
APCO P25 Phase 2	H-CPM (2 slot TDMA) (TIA 102)	12.5 kHz	2	6000	12000

HARDWARE & SOFTWARE

Type	*Analog and DMR*	*P25 Phase I & II*
Hardware ID	TMBB14-L300_0006	TMBB14-L300_0006
Boot Code	QMB1B_S00_3.01.03.0001	QMB1B_S00_3.01.03.0001
DSP	QMB1A_E00_2.01.00.0018	QMB1A_A02_2.01.00.0025
Radio Application	QMB1F_E00_2.01.00.0018	QMB1F_A00_2.01.00.0025
FPGA Image	QMB1G_S00_1.07.00.0002	QMB1G_S00_1.07.00.0002

TEST CONDITIONS
All testing was performed between 16 → 26 June 2015, and under the following conditions:

Ambient temperature:	15°C → 30°C
Relative Humidity:	20% → 75%
Standard Test Voltage	13.8 V_{DC}

STATEMENT OF COMPLIANCE

We, TELTEST LABORATORIES of 558 Wairakei Road, Christchurch, New Zealand, declare under our sole responsibility that the product:

Equipment:	Mobile Transceiver
Type:	TMBL3B
Product Code:	T02-00012-YPAA
Serial Number(s):	20288278
Quantity:	1

to which this declaration relates, is in conformity with the following standards:

FCC 47 CFR Part 90

RSS-119 Issue 12 & RSS-Gen Issue 4

Signature: _____

M. C. James
Laboratory Technical Manager

Date: _____

MODULATION TYPES, NECESSARY BANDWIDTH & EMISSION DESIGNATORS

MODULATION TYPES:

F3E	Analogue Frequency Modulation (FM)	
F2D	FFSK	1200 bps and 2400 bps
FXW	DMR Digital Voice	9600 bps
FXD	DMR Digital Data	9600 bps
F1E, F7E	P25 phase 1 Digital Voice	9600 bps
F1D, F7D	P25 phase 1 Digital Data	9600 bps
F1W	P25 phase 2 Digital Voice / Data	12000 bps

CHANNEL SPACINGS: 12.5 kHz

EMISSION DESIGNATORS:

	12.5 kHz
Analog FM	11K0F3E
FFSK Data 1200 bps	6K60F2D
FFSK Data 2400 bps	7K80F2D
Digital Voice DMR	7K60FXW
Digital Data DMR	7K60FXD
Digital Voice P25 phase 1	8K10F1E
Digital Data P25 phase 1	8K10F1D
Digital Voice P25 phase 2	8K10F1W
Digital Data P25 phase 2	8K10F1W

CALCULATIONS

Equation: Bn = 2M + 2Dk
(M is highest modulating frequency; D is peak allowable deviation; k is a constant of 1 for FM)

Analog Voice 12.5 kHz Bandwidth

Necessary bandwidth
M = 3.0 kHz
D = 2.5 kHz
Bn = (2x3.0) + (2x2.5) x 1
= 11.0 kHz

Emission Designator
11K0F3E
F3E represents an FM voice transmission

Fast Frequency Shift Keying (FFSK – 1200 bps) 12.5 kHz Bandwidth

Necessary bandwidth
M = 1.8 kHz
D = 1.5 kHz (60% of peak deviation)
Bn = (2 x 1.8) + (2 x 1.5) x 1
= 6.6 kHz

Emission Designator
6K60F2D
F2D represents a FM data transmission with the use of a modulating sub carrier

Fast Frequency Shift Keying (FFSK – 2400 bps) 12.5 kHz Bandwidth

Necessary bandwidth
M = 2.4 kHz
D = 1.5 kHz (60% of peak deviation)
Bn = (2 x 2.4) + (2 x 1.5) x 1
= 7.8 kHz

Emission Designator
7K80F2D
F2D represents a FM data transmission with the use of a modulating sub carrier

Digital Voice 12.5 kHz Bandwidth DMR

99% bandwidth
= 7.6 kHz

Emission Designator
7K60FXW
FXW represents a FM Time Division Multiple Access (TDMA) combination of data and telephony

Emission Designators – Continued

Digital Data 12.5 kHz Bandwidth DMR

99% bandwidth	Emission Designator
= 7.6 kHz	**7K60FXD**

FXD represents FM Time Division Multiple Access (TDMA) data only

Digital Voice 12.5 kHz Bandwidth P25 phase 1

99% bandwidth	Emission Designator
= 8.1 kHz	**8K10F1E**
	F1E represents a digital FM voice transmission

Digital Data 12.5 kHz Bandwidth P25 phase 1

99% bandwidth	Emission Designator
= 8.1 kHz	**8K10F1D**
	F1D represents an digital FM data transmission

Digital Voice 12.5 kHz Bandwidth P25 phase 2

99% bandwidth	Emission Designator
= 8.1 kHz	**8K10F1W**
	F1W represents a single FM telephony channel

Digital Data 12.5 kHz Bandwidth P25 phase 2

99% bandwidth	Emission Designator
= 8.1 kHz	**8K10F1W**
	F1W represents digital FM data transmission

TEST RESULTS

TRANSMITTER OUTPUT POWER (CONDUCTED)

SPECIFICATION: FCC 47 CFR 2.1046
RSS-119 5.4

GUIDE: TIA/EIA-603D 2.2.1

MEASUREMENT PROCEDURE:
1. Refer Annex A for Equipment set up.
2. The coaxial attenuator has an impedance of 50 Ohms.
3. The unmodulated output power was measured with an RF Power meter.

MEASUREMENT RESULTS:

Manufacturer's Rated Output Power: Switchable: 30 W and 2 W

Nominal 30 W	896.1 MHz	900.9 MHz	935.1 MHz	939.9 MHz
Measured	33.5	32.7	31.1	30.2
Variation (%)	11.8	9.1	3.8	0.7
Variation (dB)	0.5	0.4	0.2	0.0
Nominal 2 W	896.1 MHz	900.9 MHz	935.1 MHz	939.9 MHz
Measured	2.3	2.3	2.2	2.1
Variation (%)	12.9	14.7	7.6	7.3
Variation (dB)	0.5	0.6	0.3	0.3
Measurement Uncertainty		± 0.6 dB		

LIMIT CLAUSES:

FCC 47 CFR 90.205 (s)
The output power shall not exceed by more than 20%... the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

RSS-119 5.4
The output power shall be within ±1.0 dB of the manufacturer's rated power.

TRANSMITTER AUDIO FREQUENCY RESPONSE - PRE-EMPHASIS

SPECIFICATION: FCC 47 CFR 2.1047 (a)

GUIDE: TIA/EIA-603D 2.2.6

MEASUREMENT PROCEDURE:
1. Refer Annex A for Equipment set up.
2. An audio input tone of 1000 Hz was applied with the level set to obtain 20% of maximum deviation. This was used as the 0 dB reference point.
3. The AF was varied while the audio level was held constant.
4. The response in dB relative to 1000 Hz was measured.

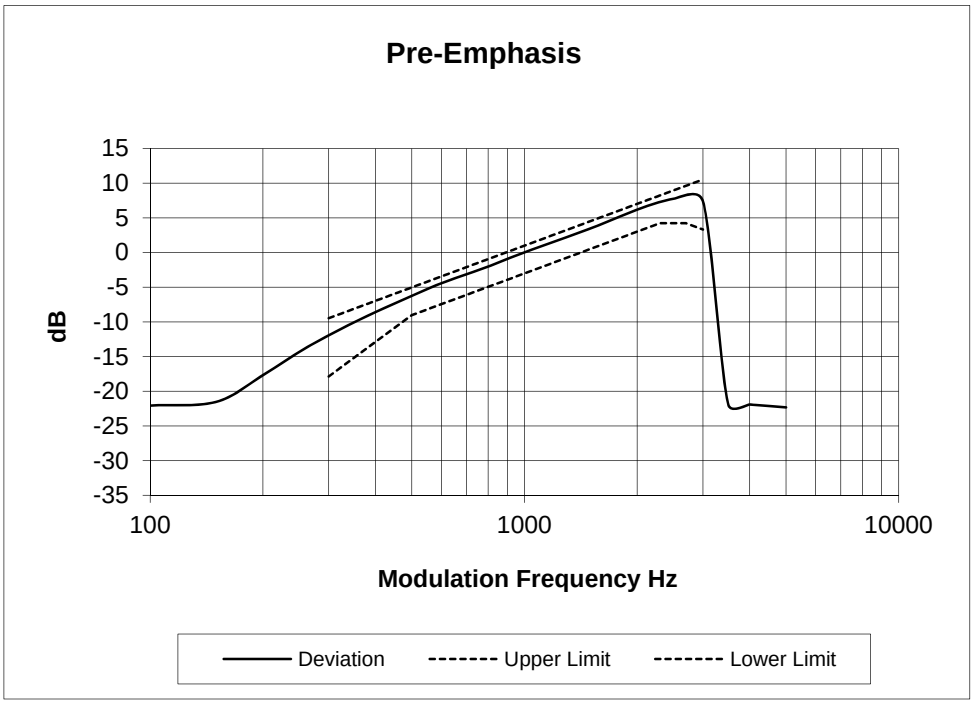
MEASUREMENT RESULTS:
See the plots on the following pages for 12.5 kHz channel spacing tested at 30 W transmit power.

LIMIT CLAUSE: TIA/EIA-603D 3.2.6

Transmitter Audio Frequency Response – Pre-emphasis

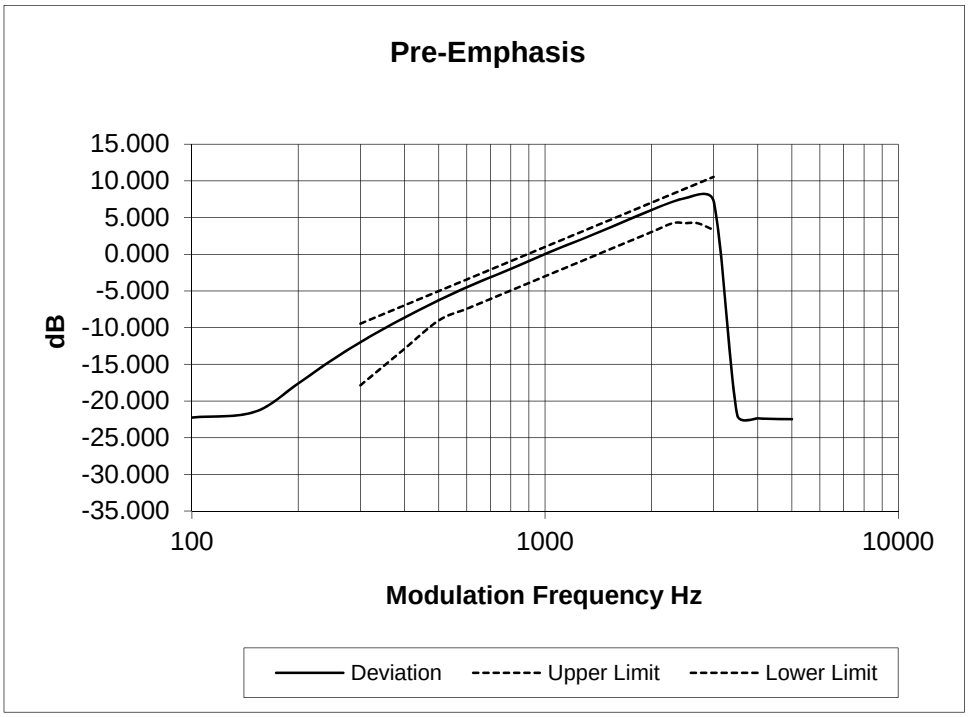
SPECIFICATION: FCC CFR 2.1047 (a)

Tx FREQUENCY: 896.1 MHz 12.5 kHz Channel Spacing

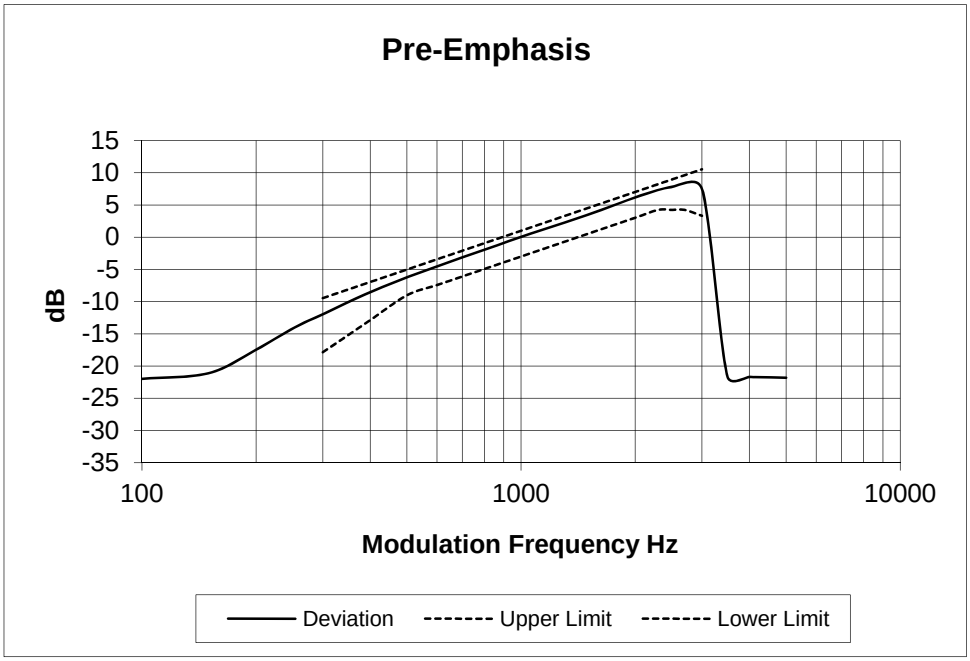


Transmitter Audio Frequency Response – Pre-emphasis – Continued

Tx FREQUENCY: 900.9 MHz 12.5 kHz Channel Spacing

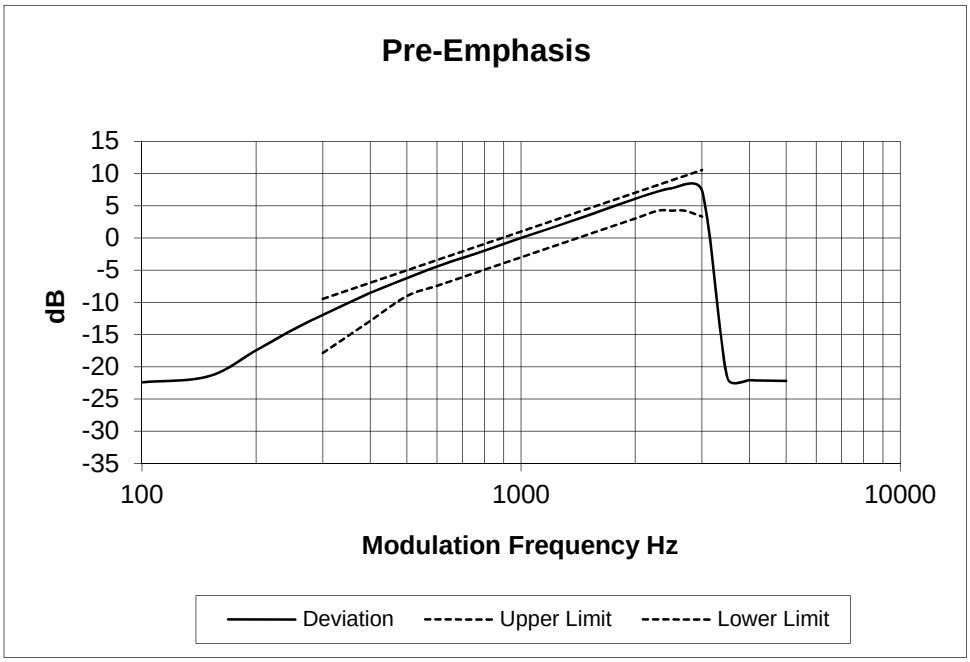


Tx FREQUENCY: 935.1 MHz 12.5 kHz Channel Spacing



Transmitter Audio Frequency Response – Pre-emphasis – Continued

Tx FREQUENCY: 939.9 MHz 12.5 kHz Channel Spacing



TRANSMITTER MODULATION LIMITING

SPECIFICATION: FCC 47 CFR 2.1047 (b)

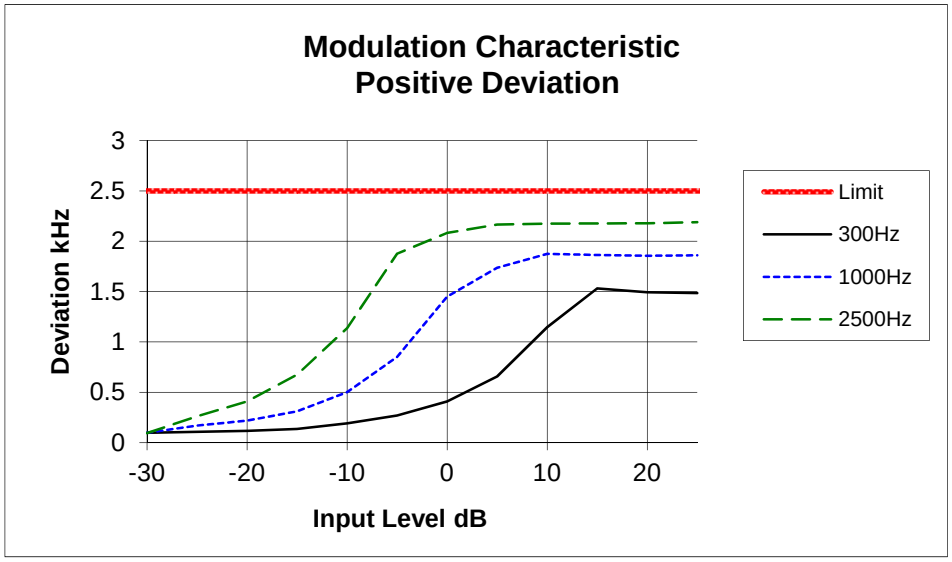
GUIDE: TIA/EIA-603D 2.2.3

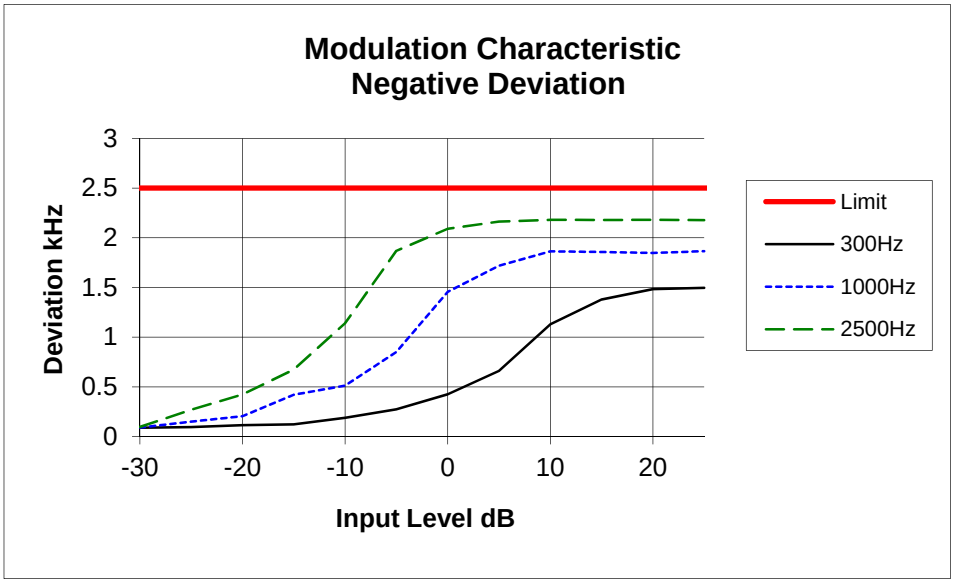
MEASUREMENT PROCEDURE:
1. Refer Annex A for Equipment set up.
2. The modulation response was measured at three audio frequencies while varying the input level.
3. Measurements were made for both Positive and Negative Deviation.

MEASUREMENT RESULTS:
See the plots on the following pages for 12.5 kHz channel spacing.

LIMIT CLAUSE: TIA/EIA-603D 1.3.4.4

Tx FREQUENCY: 896.1 MHz 12.5 kHz Channel Spacing

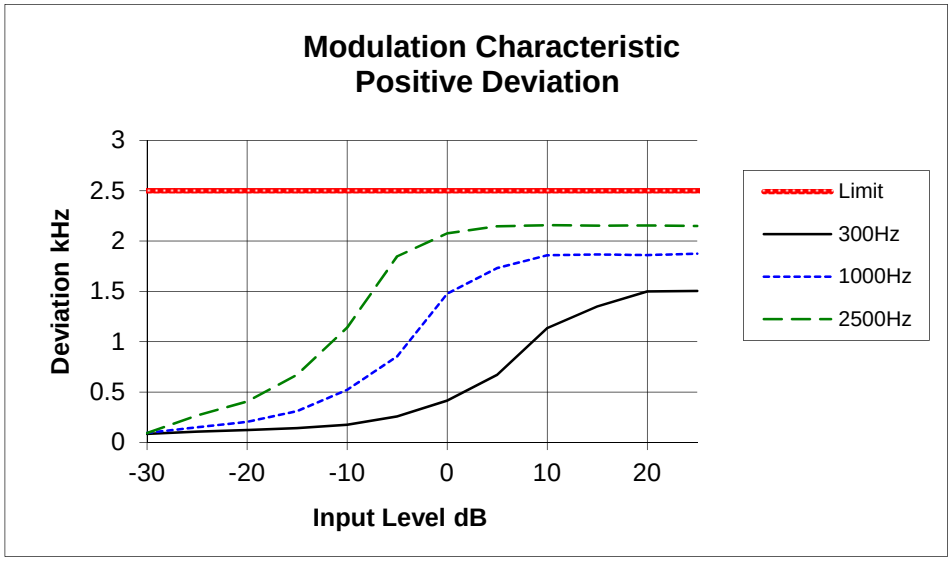


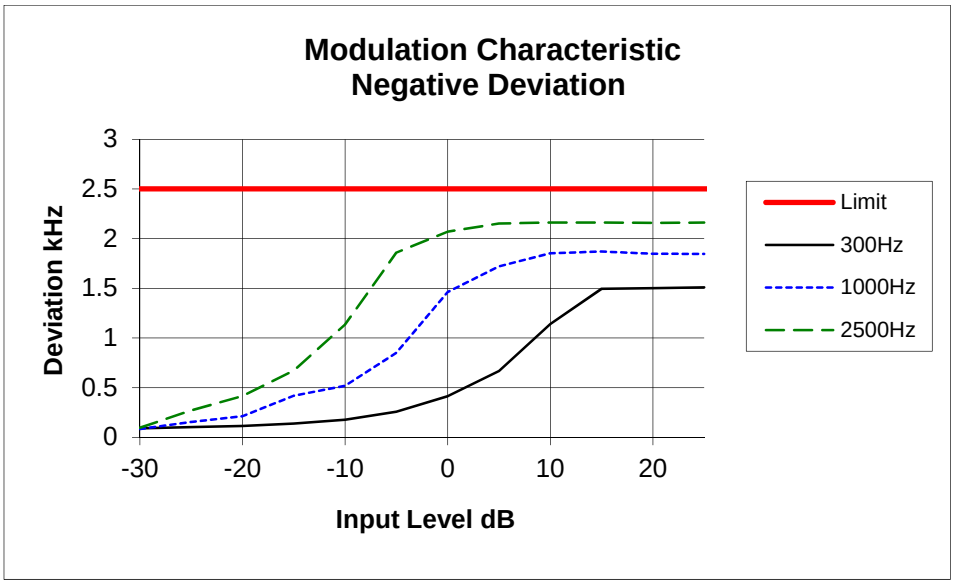


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 900.9 MHz 12.5 kHz Channel Spacing

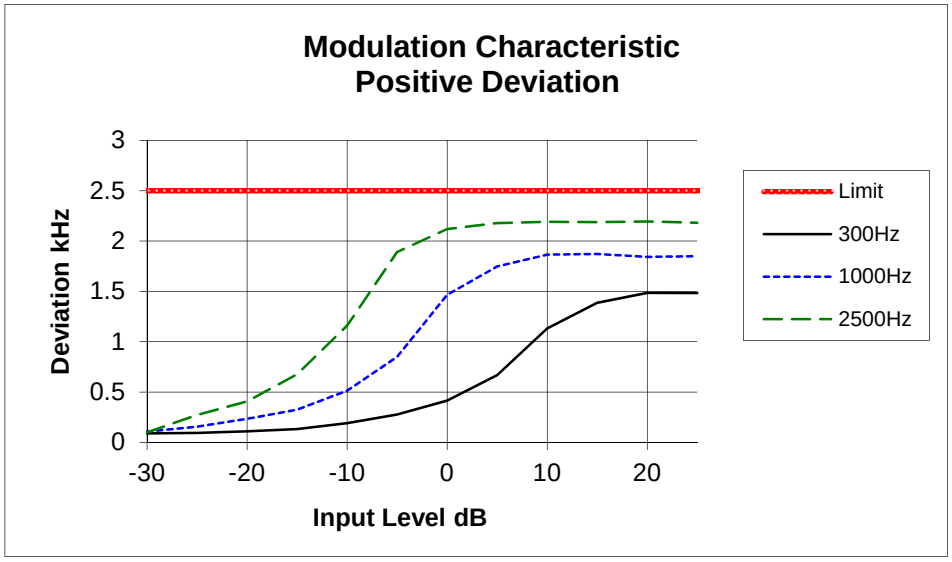


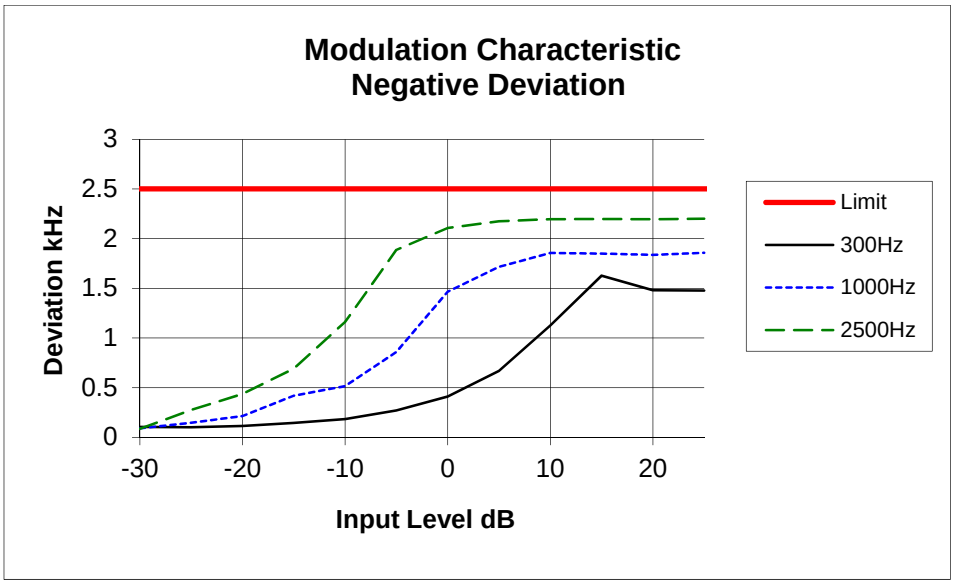


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 935.1 MHz 12.5 kHz Channel Spacing

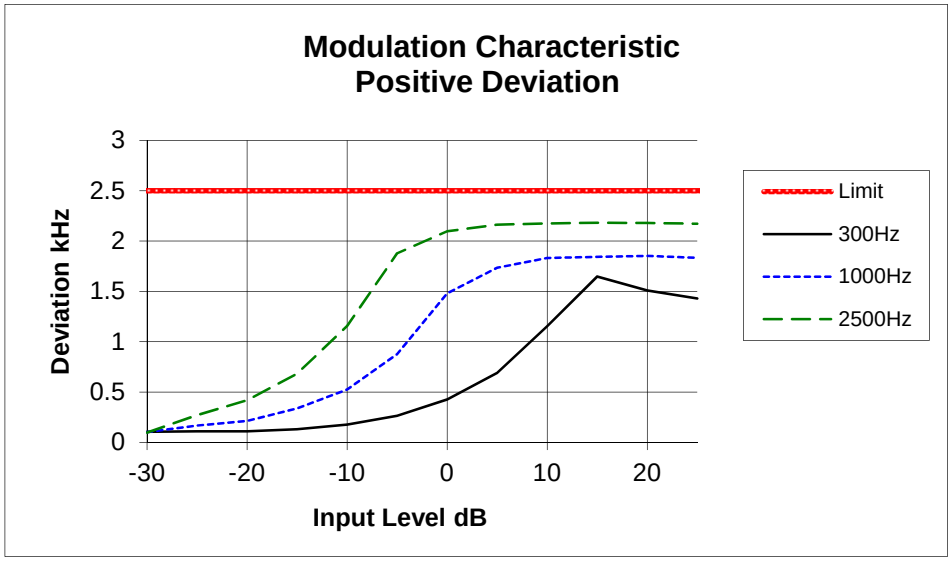


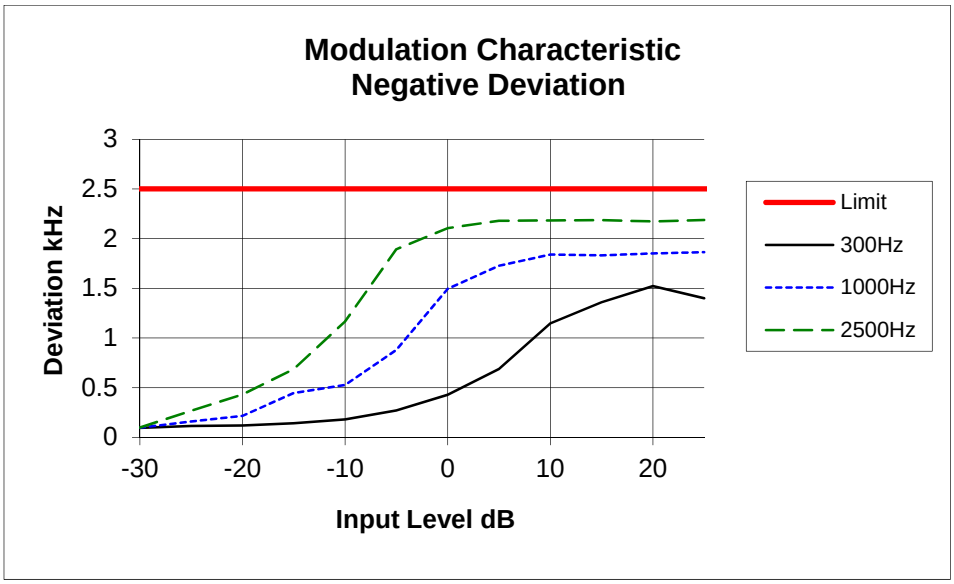


Transmitter Modulation Limiting

SPECIFICATION: FCC CFR 2.1047 (b)

Tx FREQUENCY: 939.9 MHz 12.5 kHz Channel Spacing





TRANSMITTER OCCUPIED BANDWIDTH AND SPECTRUM MASKS

SPECIFICATION:	FCC 47 CFR 2.1049 (c)	RSS-119 5.5
GUIDE:	TIA/EIA-603D 2.2.11	

MEASUREMENT PROCEDURE:

1. Refer Annex A for Equipment Set up.
2. For analog measurements: The EUT was modulated by a 2500 Hz tone at an input level 16 dB above a level that produced 50% deviation. The input level was established at the frequency of maximum response of the audio modulating circuit.
   For Data measurements: The EUT was modulated with an internally generated pseudo random bit sequence at the appropriate Baud rates.
3. The Occupied Bandwidth was measured on the Spectrum Analyser, with bandwidth settings as follows.

   Emission Mask I – Resolution Bandwidth = 300 Hz, Video Bandwidth = 3 kHz
   Emission Mask J – Resolution bandwidth = 300 Hz, Video Bandwidth = 3 kHz

MEASUREMENT RESULTS:
See the plots on the following pages for 12.5 kHz channel spacing.

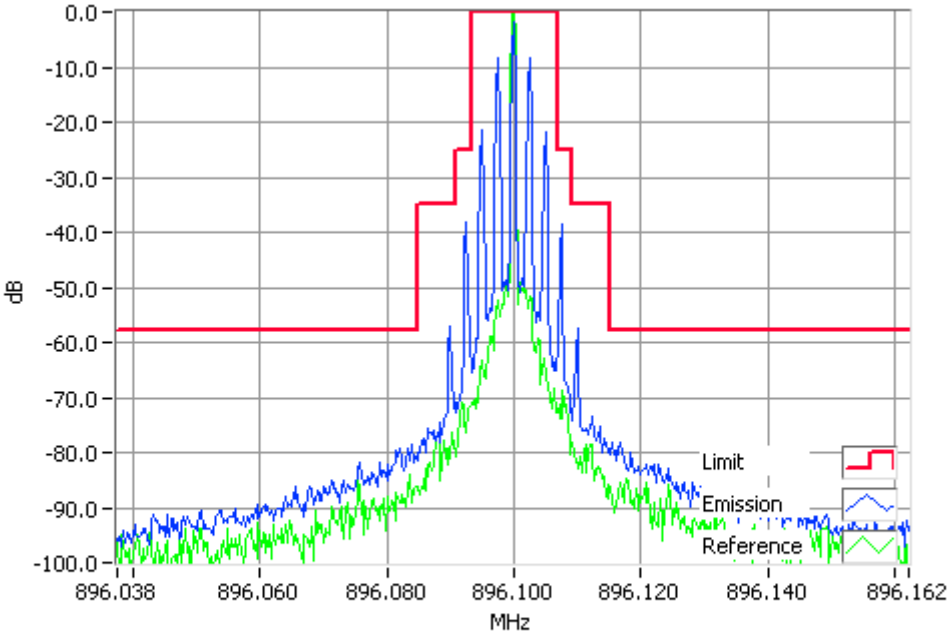
LIMIT CLAUSE:	FCC 47 CFR 90.210	RSS-119 5.5
EMISSION MASKS		
Emission Mask I	12.5 kHz Channel Spacing	Analog,
Emission Mask J	12.5 kHz Channel Spacing	FFSK, Digital Voice/Data
DATA SPEED		
Digital Voice/Data	12.5 kHz Channel Spacing	9600 bps
FFSK	12.5 kHz Channel Spacing	1200 bps & 2400 bps

Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

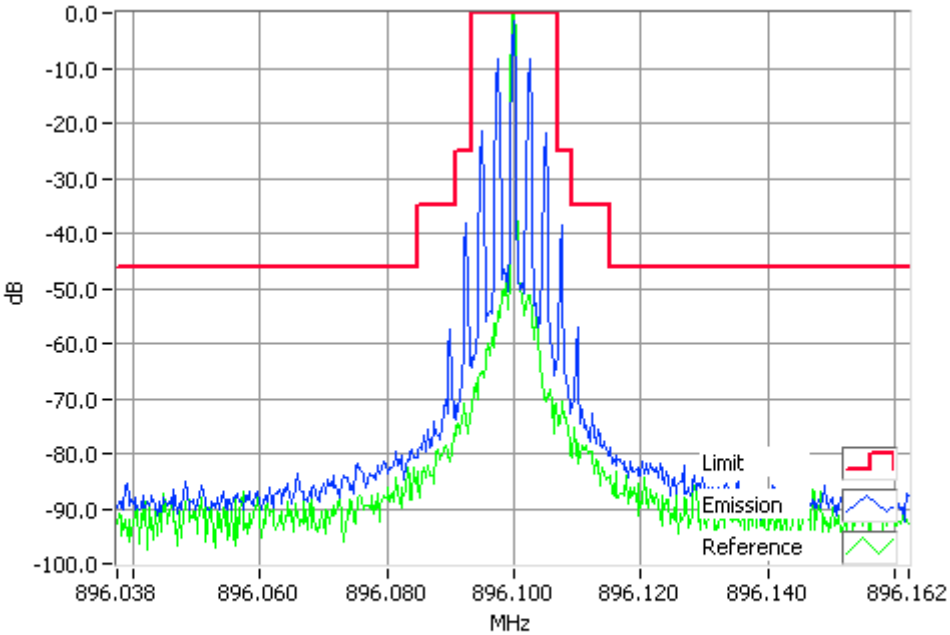
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 896.1 MHz 30 W 12.5 kHz Channel Spacing



Analogue Modulation 896.1000MHz Mask I 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 896.1 MHz 2 W 12.5 kHz Channel Spacing



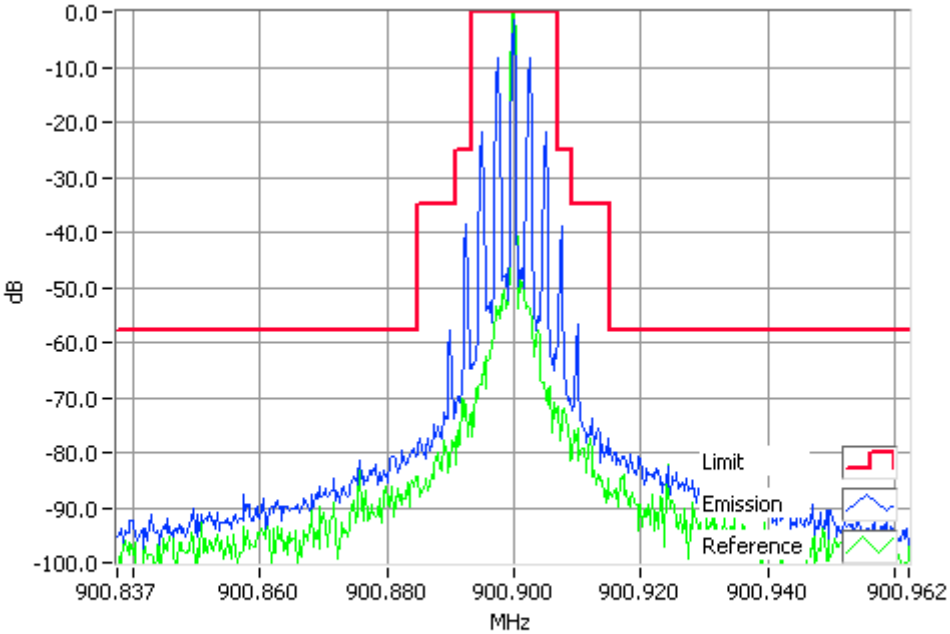
Analogue Modulation 896.1000MHz Mask I 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

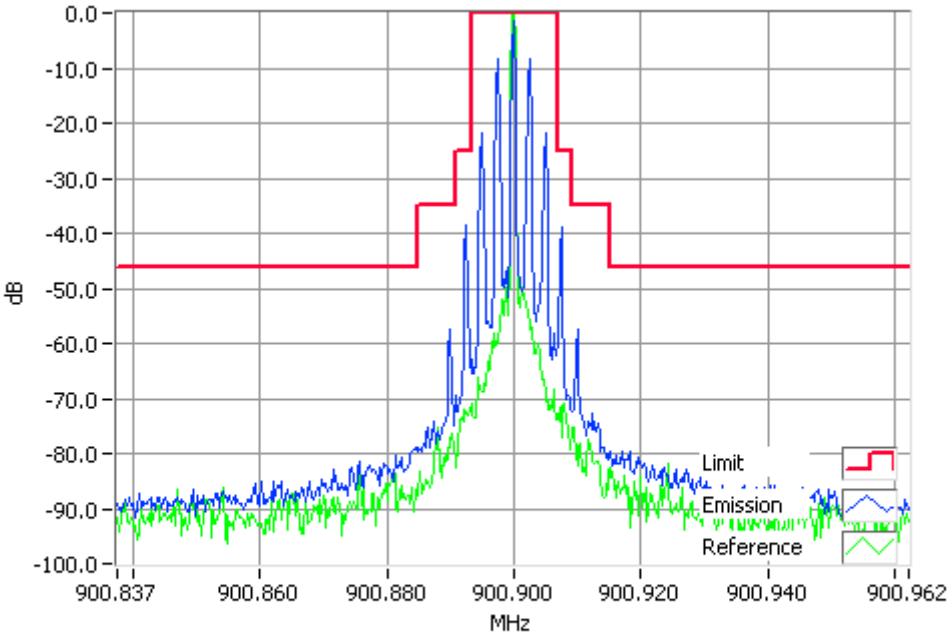
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 900.9 MHz 30 W 12.5 kHz Channel Spacing



Analogue Modulation 900.9000MHz Mask I 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 900.9 MHz 2 W 12.5 kHz Channel Spacing



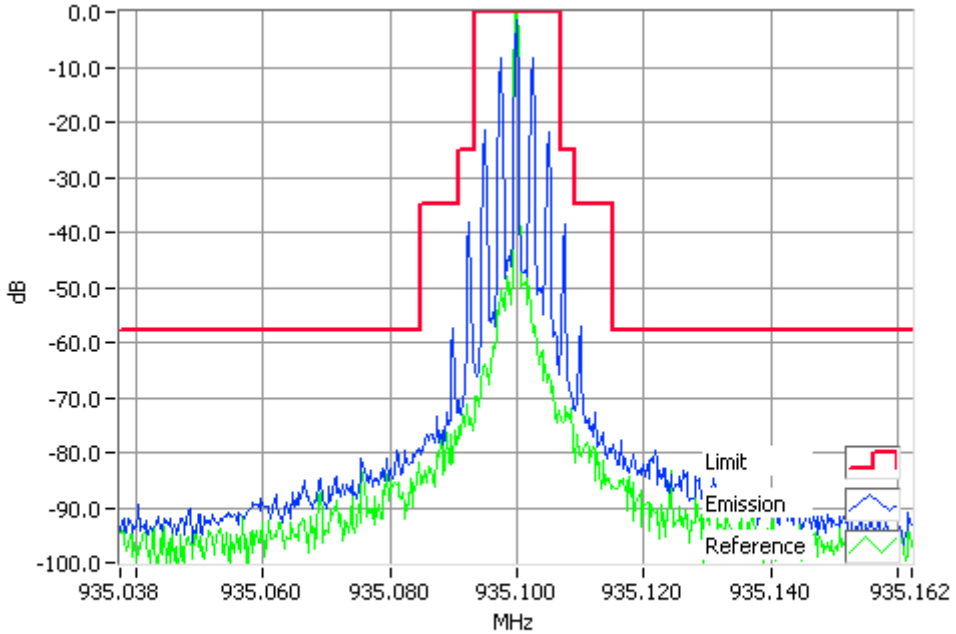
Analogue Modulation 900.9000MHz Mask I 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

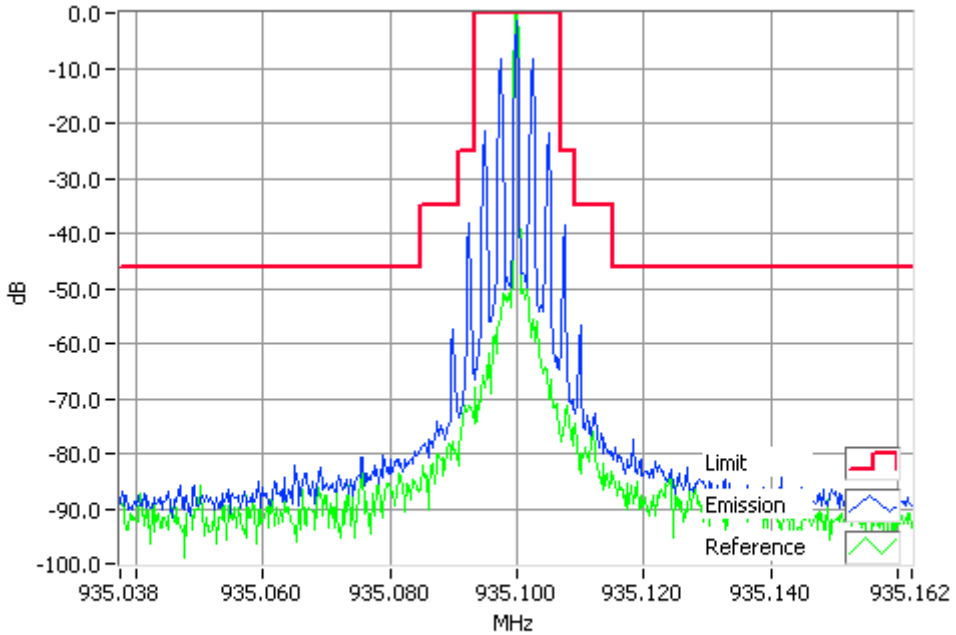
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 935.1 MHz 30 W 12.5 kHz Channel Spacing



Analogue Modulation 935.1000MHz Mask I 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 935.1 MHz 2 W 12.5 kHz Channel Spacing



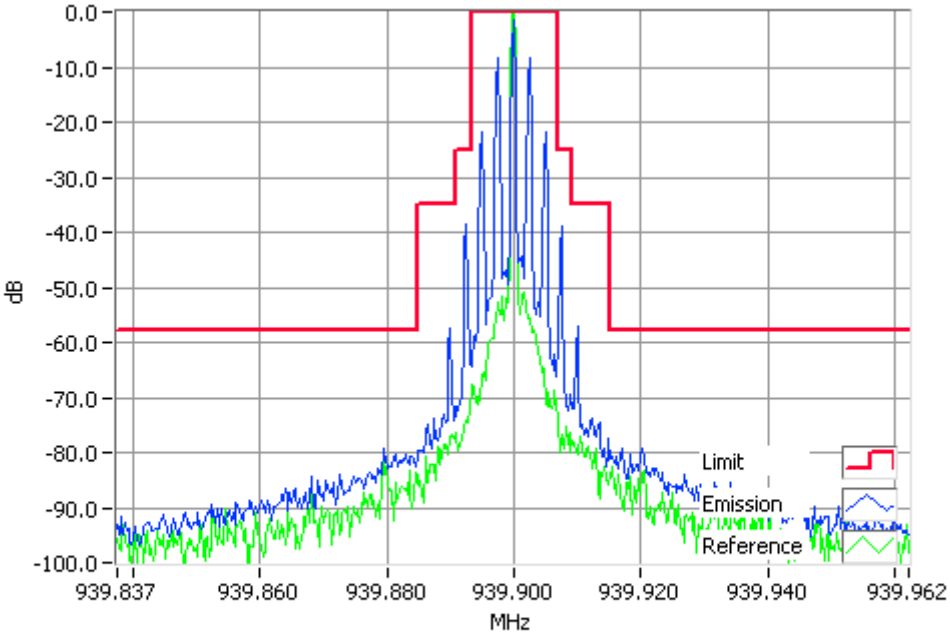
Analogue Modulation 935.1000MHz Mask I 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

ANALOG VOICE

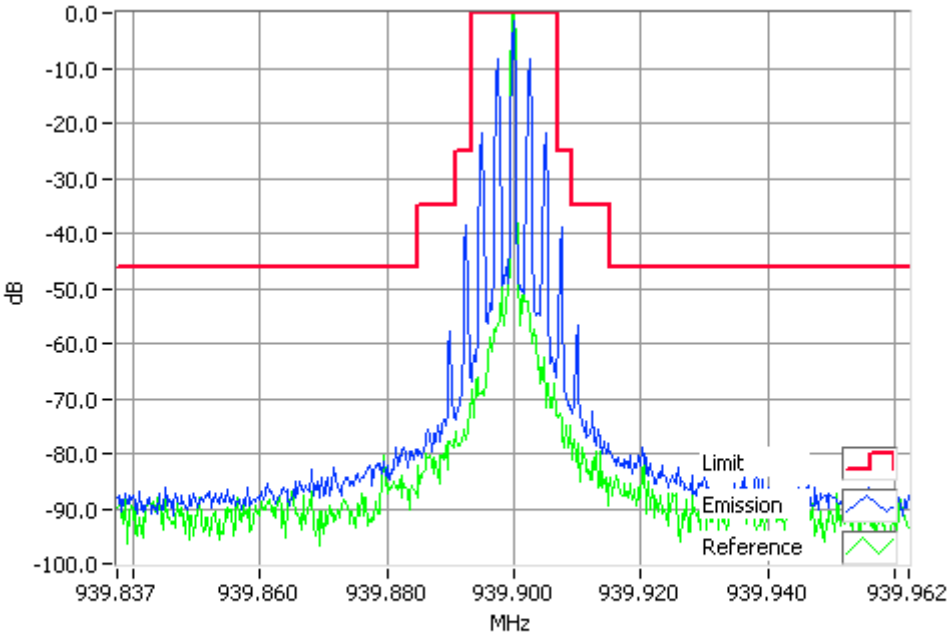
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 939.9 MHz 30 W 12.5 kHz Channel Spacing



Analogue Modulation 939.9000MHz Mask I 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 939.9 MHz 2 W 12.5 kHz Channel Spacing



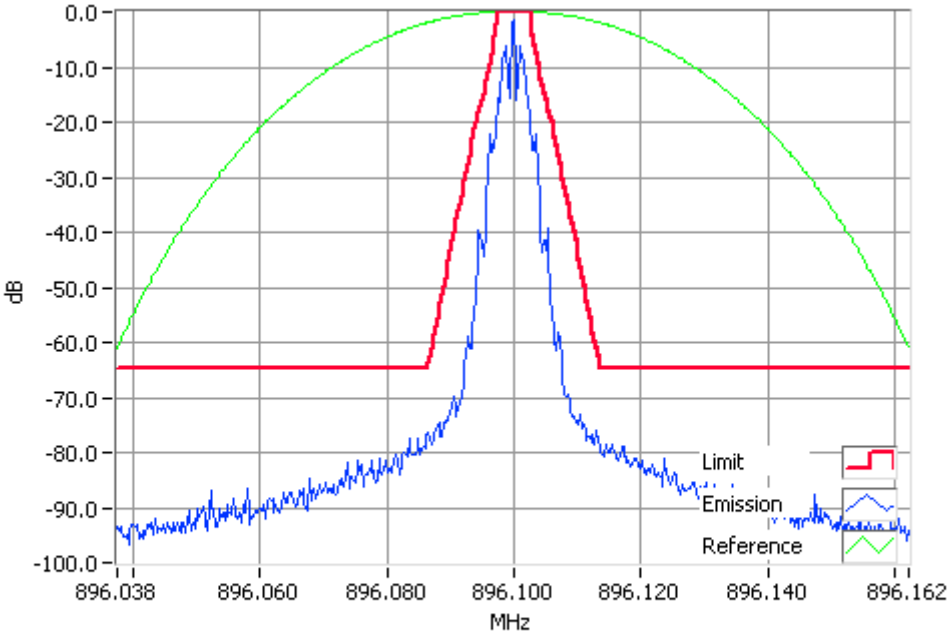
Analogue Modulation 939.9000MHz Mask I 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK 1200 bps

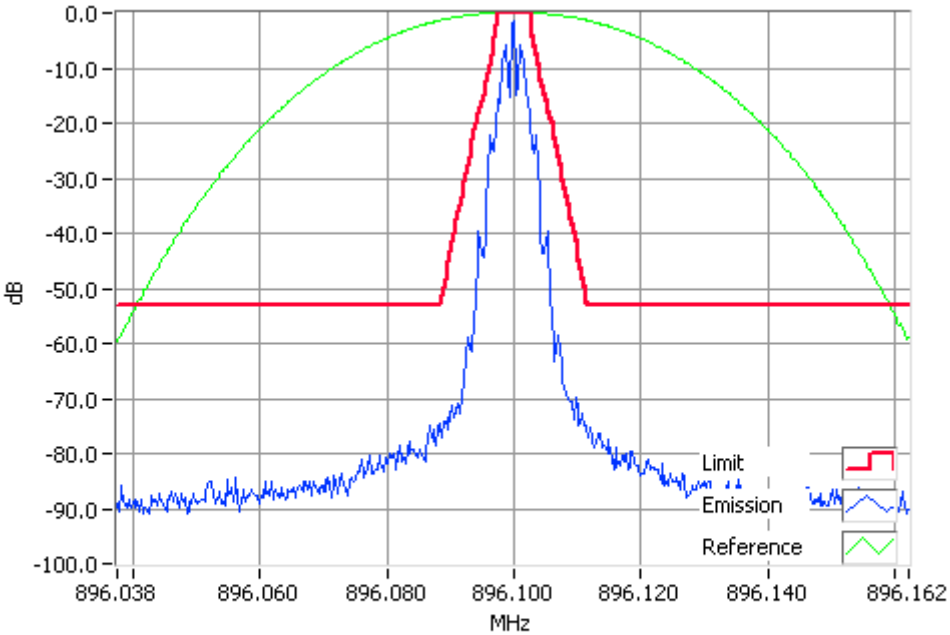
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 896.1 MHz 30 W 12.5 kHz Channel Spacing



FFSK1200 896.1000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 896.1 MHz 2 W 12.5 kHz Channel Spacing



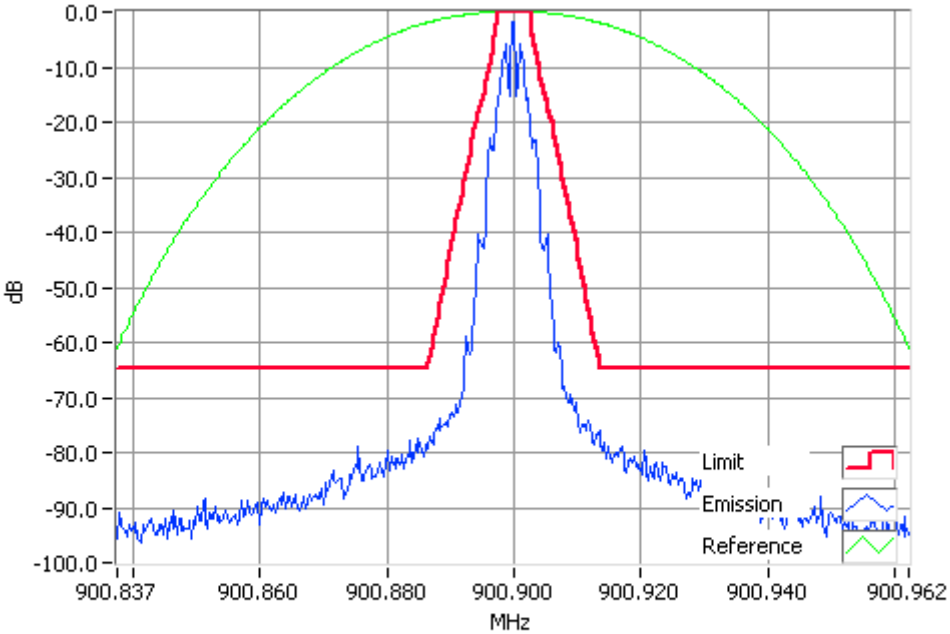
FFSK1200 896.1000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK 1200 bps

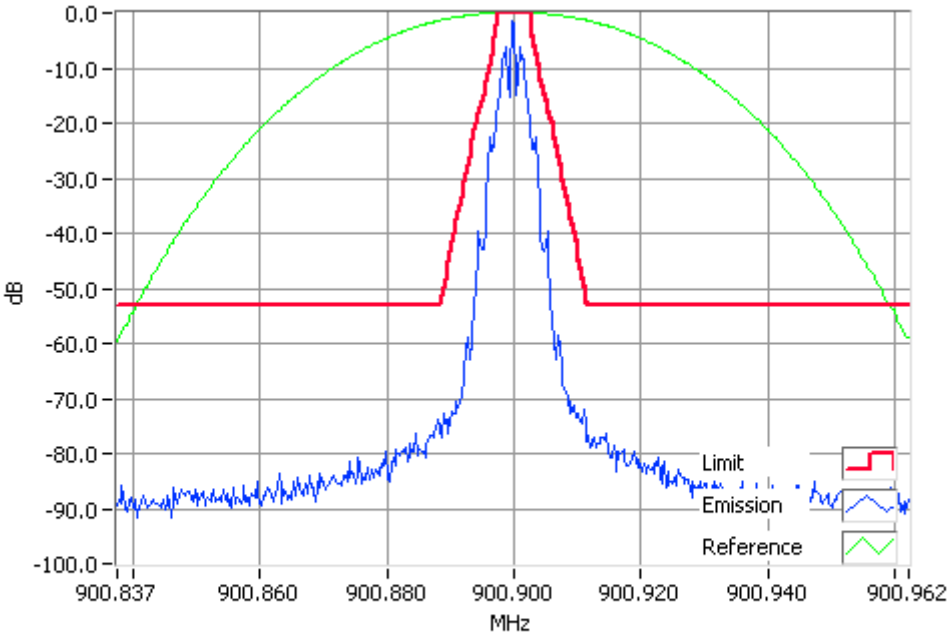
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 900.9 MHz 30 W 12.5 kHz Channel Spacing



FFSK1200 900.9000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 900.9 MHz 2 W 12.5 kHz Channel Spacing



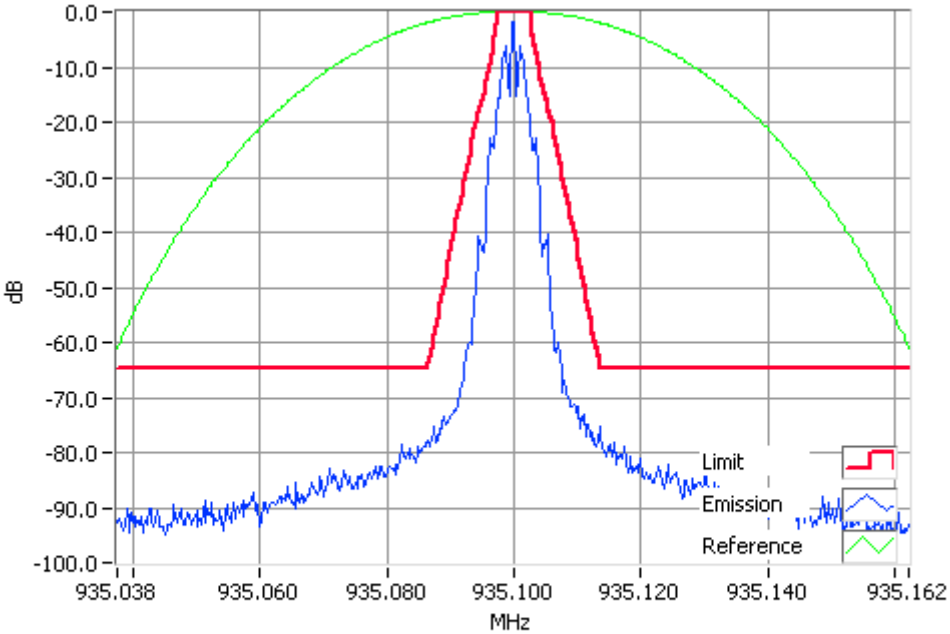
FFSK1200 900.9000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK 1200 bps

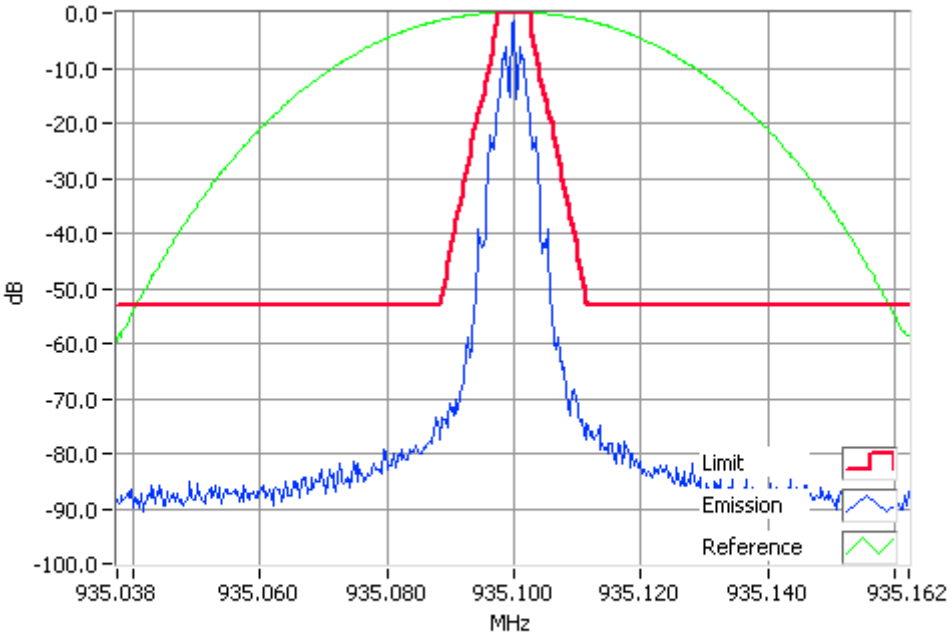
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 935.1 MHz 30 W 12.5 kHz Channel Spacing



FFSK1200 935.1000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 935.1 MHz 2 W 12.5 kHz Channel Spacing



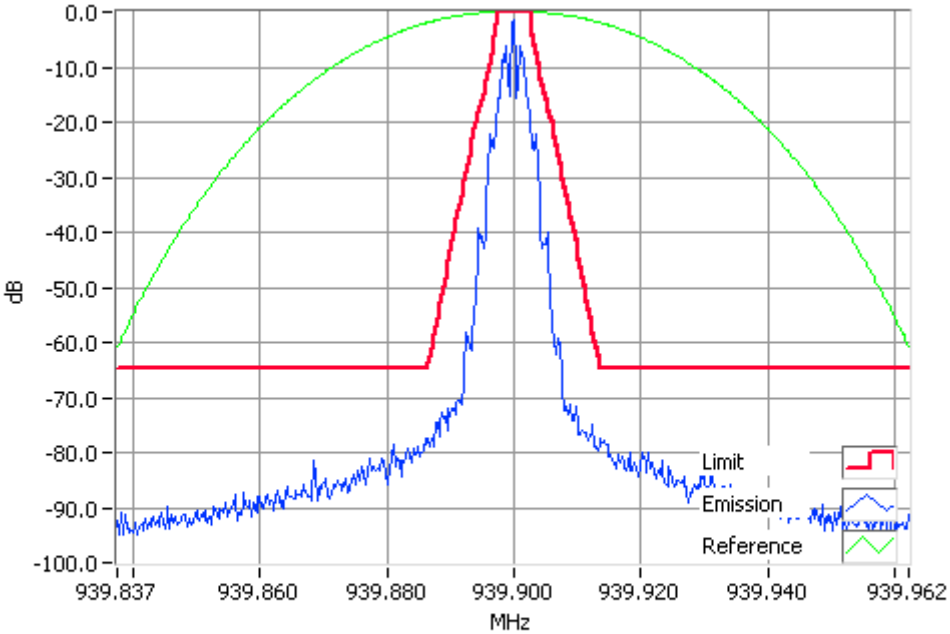
FFSK1200 935.1000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK 1200 bps

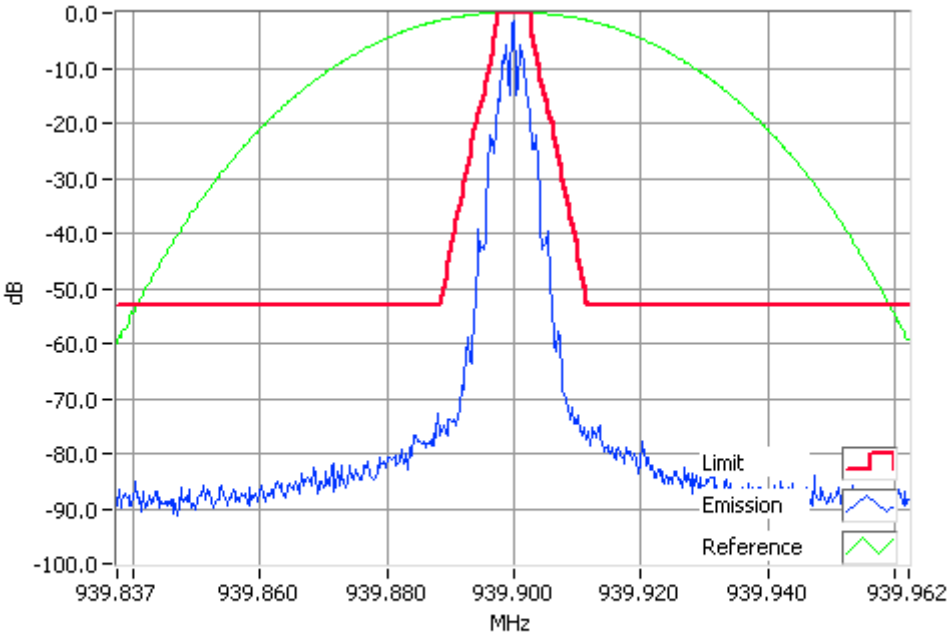
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 939.9 MHz 30 W 12.5 kHz Channel Spacing



FFSK1200 939.9000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 939.9 MHz 2 W 12.5 kHz Channel Spacing



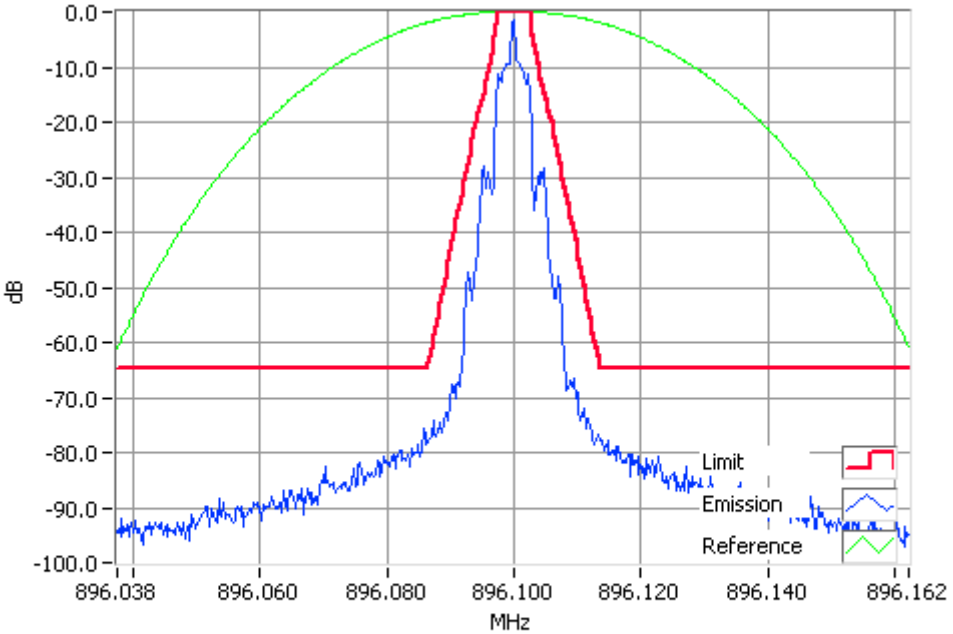
FFSK1200 939.9000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK 2400 bps

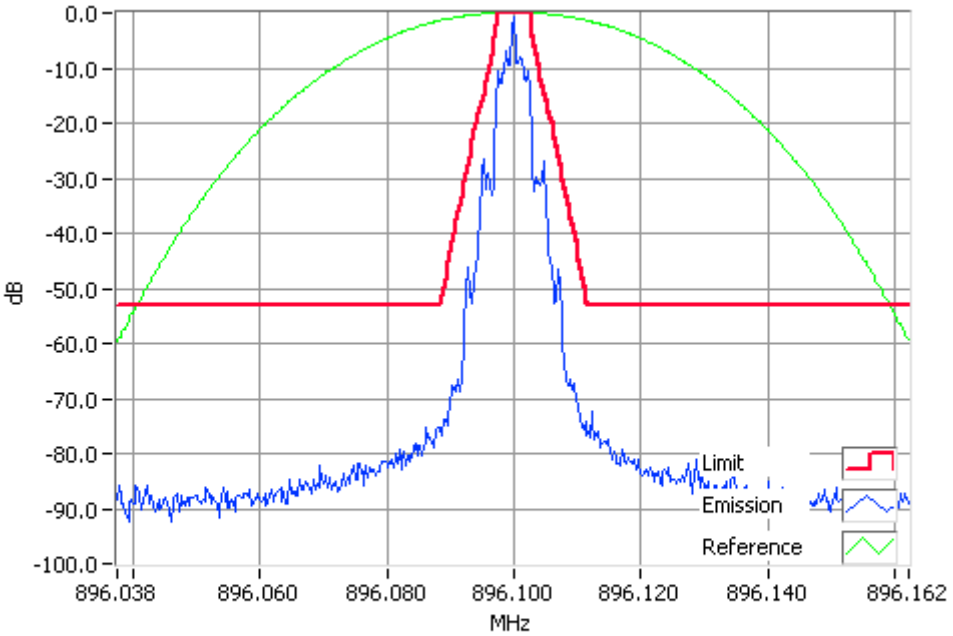
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 896.1 MHz 30 W 12.5 kHz Channel Spacing



FFSK2400 896.1000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 896.1 MHz 2 W 12.5 kHz Channel Spacing



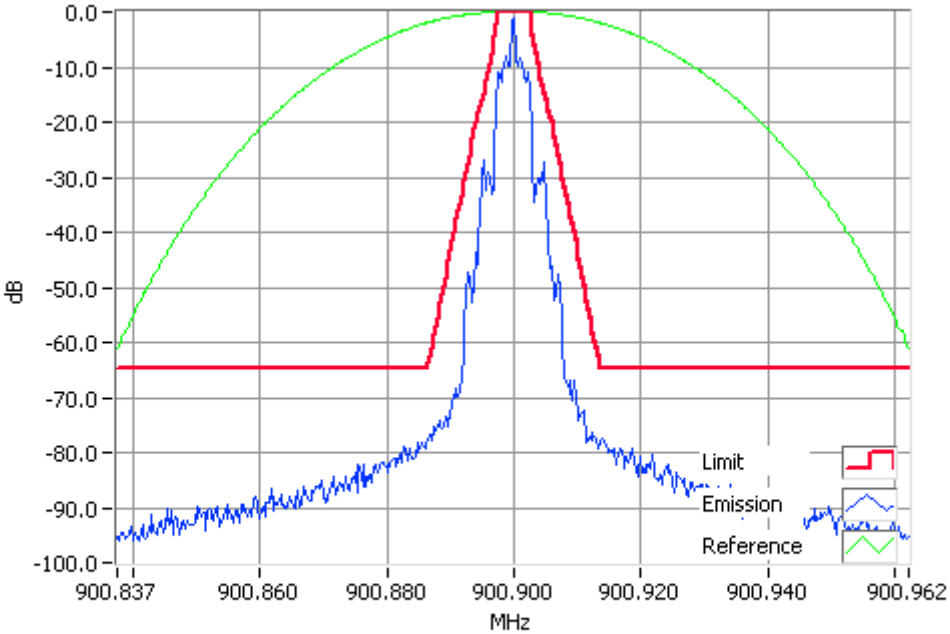
FFSK2400 896.1000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK 2400 bps

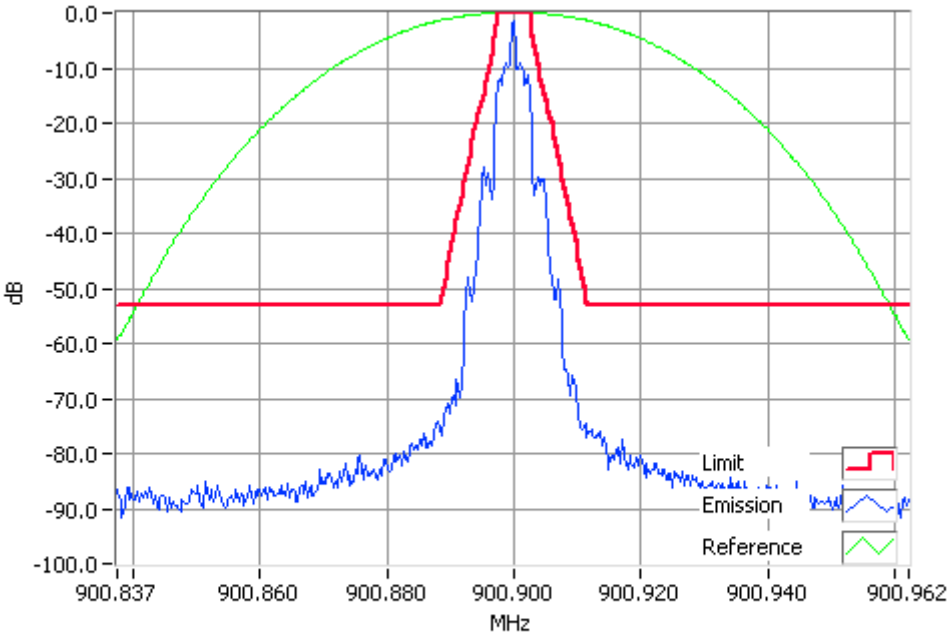
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 900.9 MHz 30 W 12.5 kHz Channel Spacing



FFSK2400 900.9000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 900.9 MHz 2 W 12.5 kHz Channel Spacing



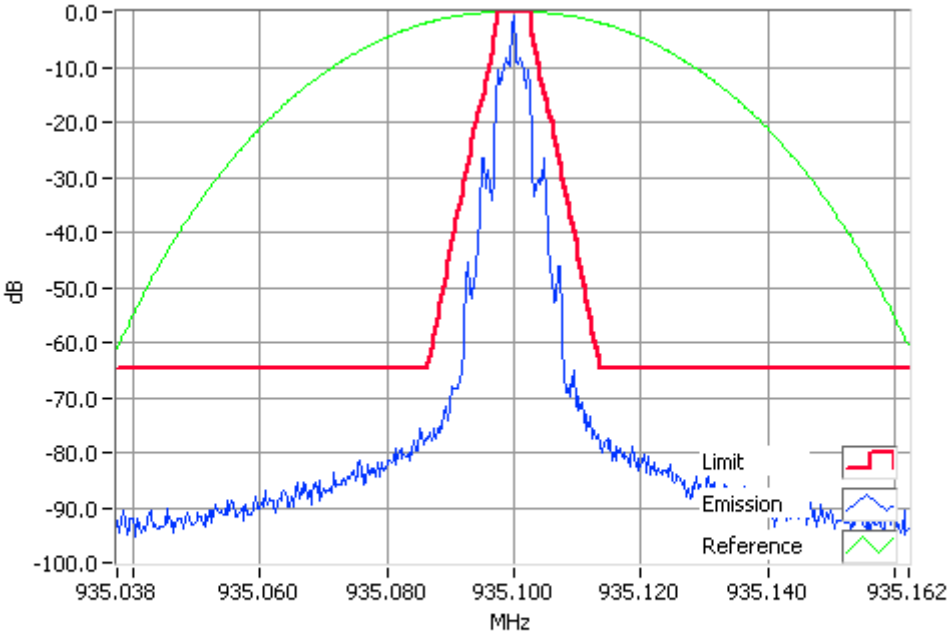
FFSK2400 900.9000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK 2400 bps

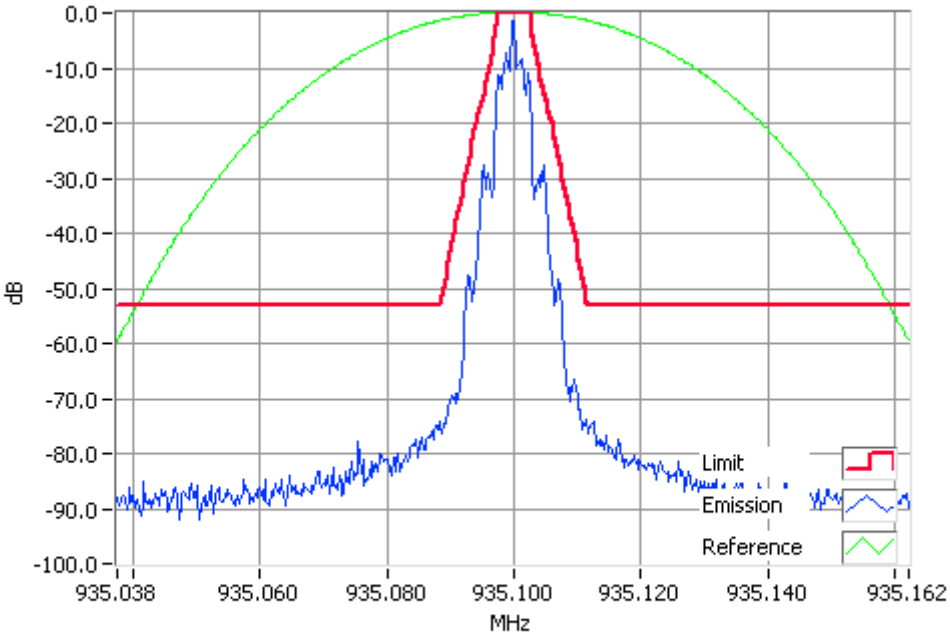
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 935.1 MHz 30 W 12.5 kHz Channel Spacing



FFSK2400 935.1000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 935.1 MHz 2 W 12.5 kHz Channel Spacing



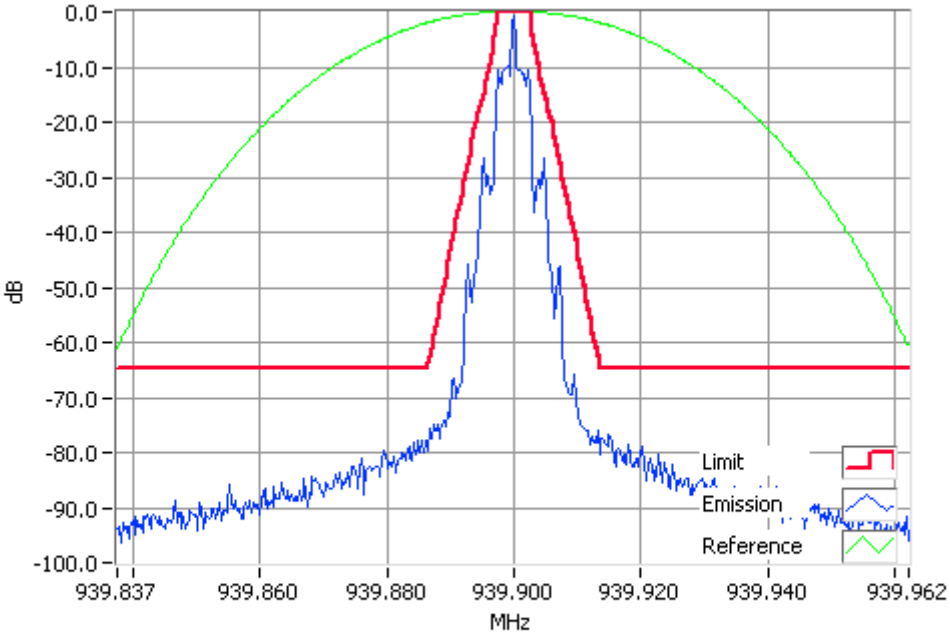
FFSK2400 935.1000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

FFSK 2400 bps

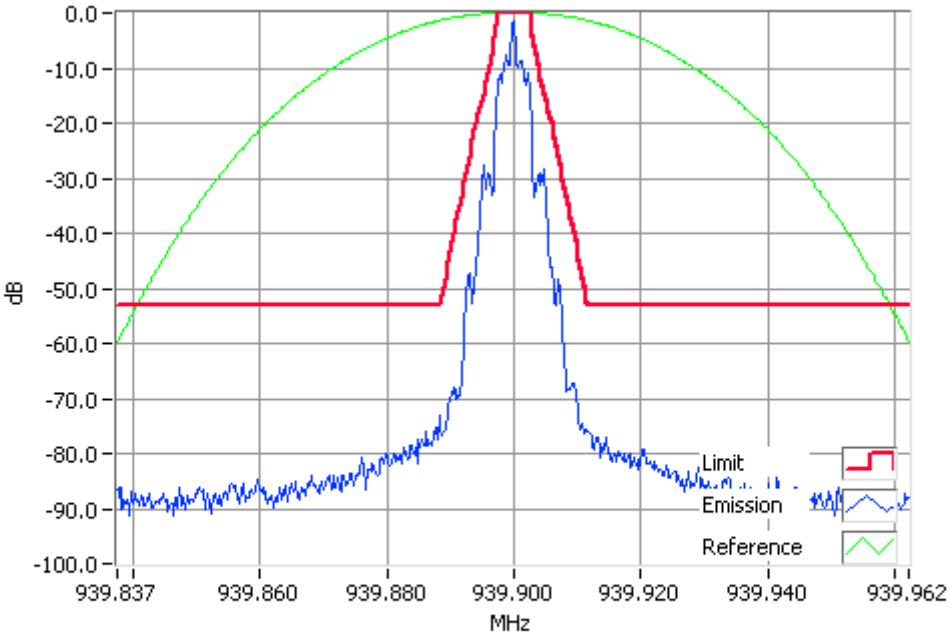
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 939.9 MHz 30 W 12.5 kHz Channel Spacing



FFSK2400 939.9000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 939.9 MHz 2 W 12.5 kHz Channel Spacing



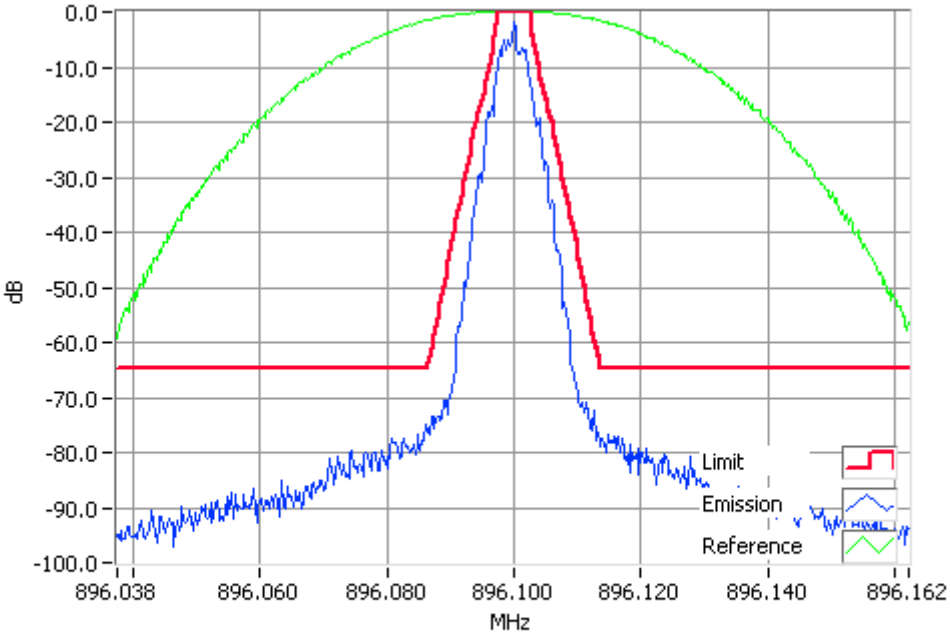
FFSK2400 939.9000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

DMR

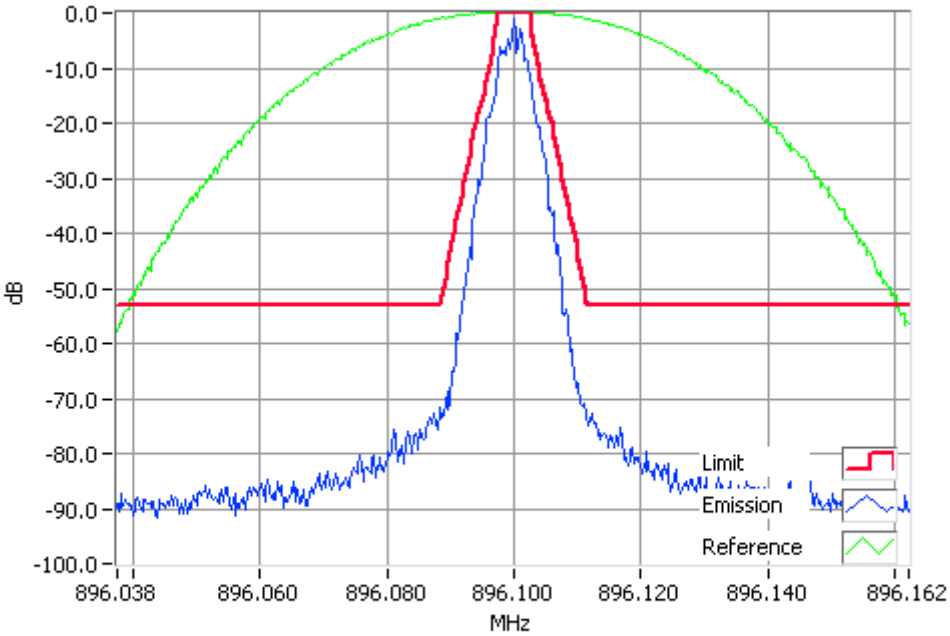
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 896.1 MHz 30 W 12.5 kHz Channel Spacing



DMR 896.1000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 896.1 MHz 2 W 12.5 kHz Channel Spacing



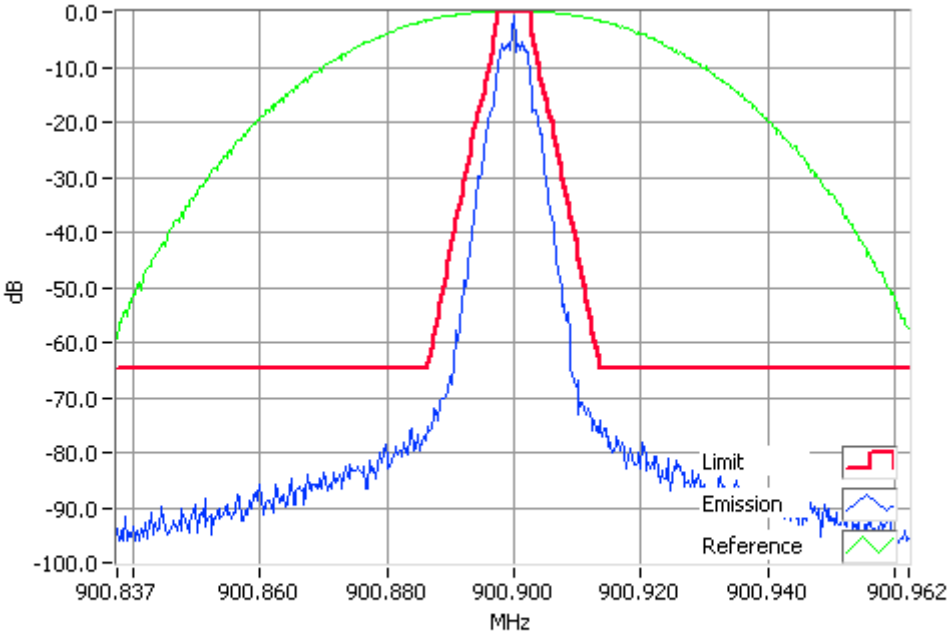
DMR 896.1000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

DMR

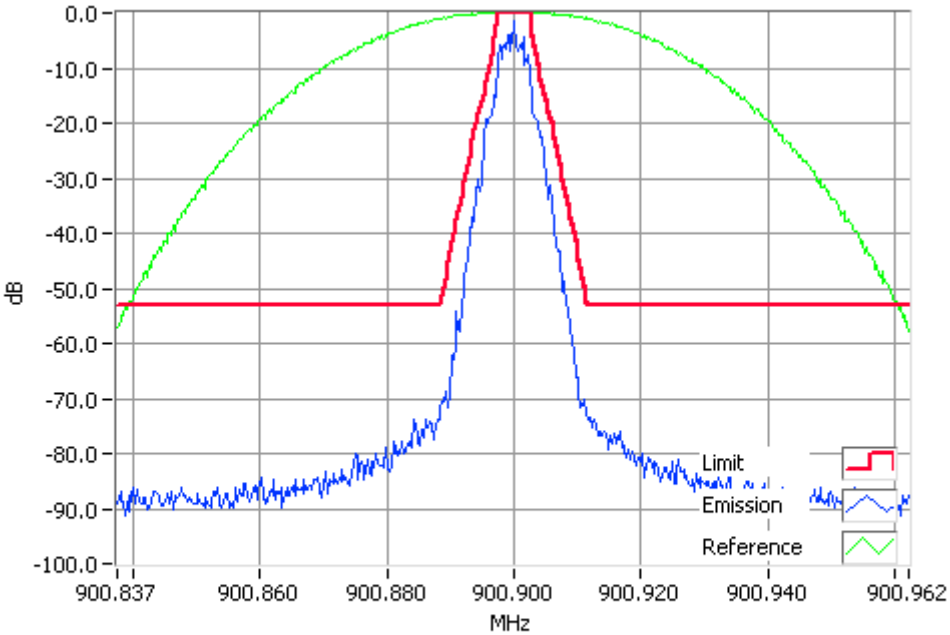
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 900.9 MHz 30 W 12.5 kHz Channel Spacing



DMR 900.9000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 900.9 MHz 2 W 12.5 kHz Channel Spacing



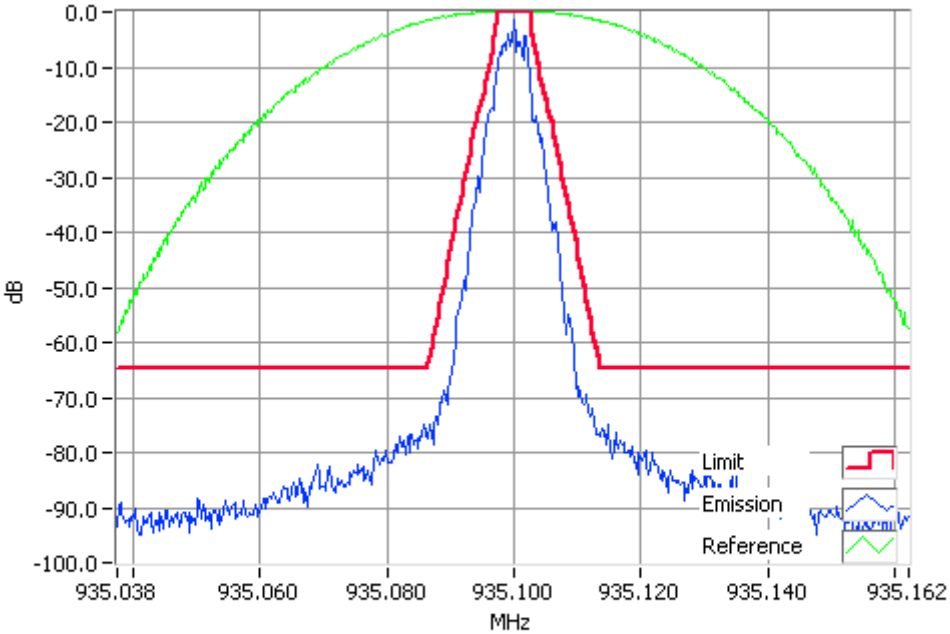
DMR 900.9000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

DMR

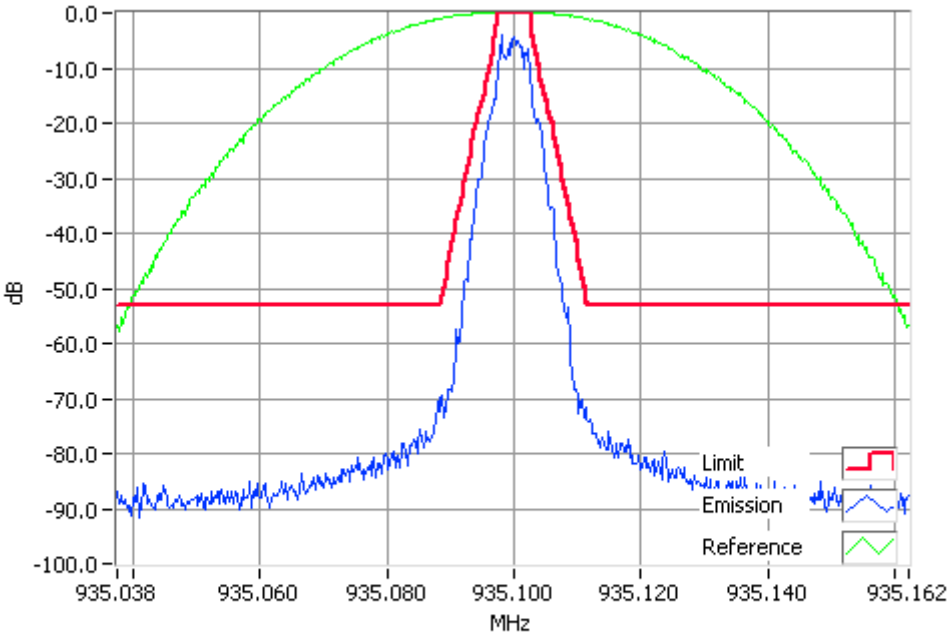
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 935.1 MHz 30 W 12.5 kHz Channel Spacing



DMR 935.1000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 935.1 MHz 2 W 12.5 kHz Channel Spacing



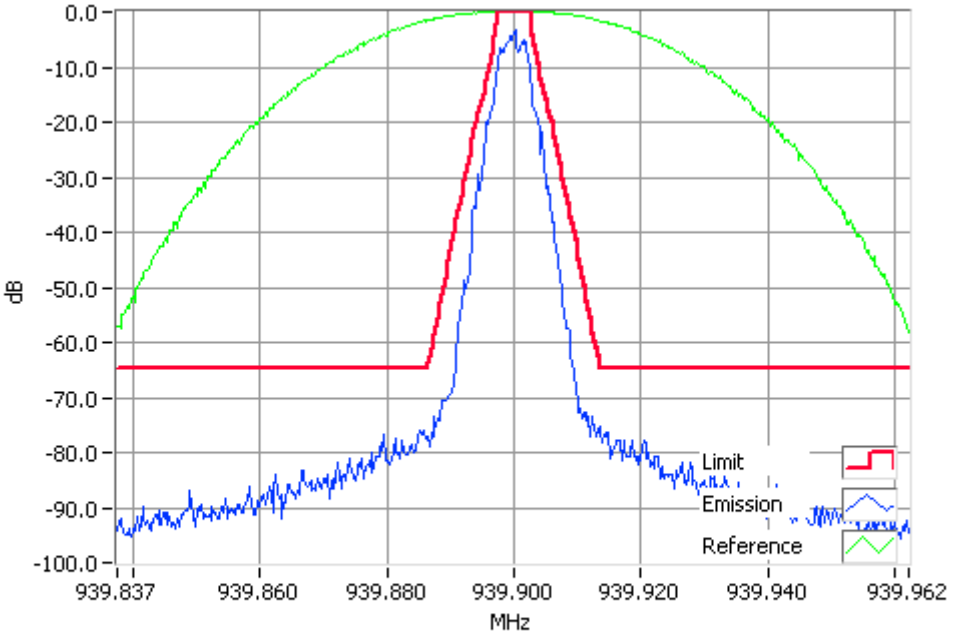
DMR 935.1000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

DMR

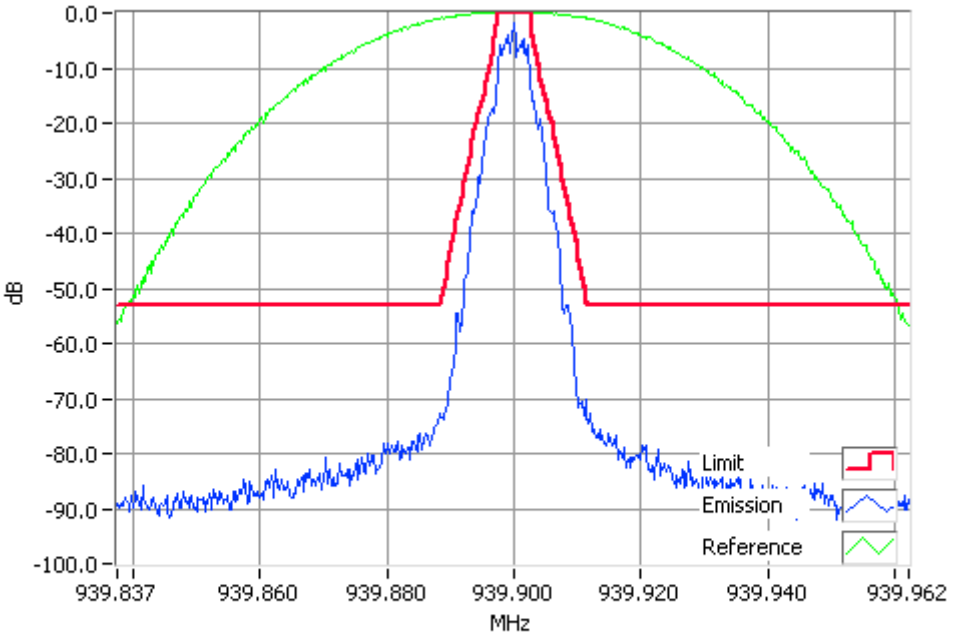
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 939.9 MHz 30 W 12.5 kHz Channel Spacing



DMR 939.9000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 939.9 MHz 2 W 12.5 kHz Channel Spacing



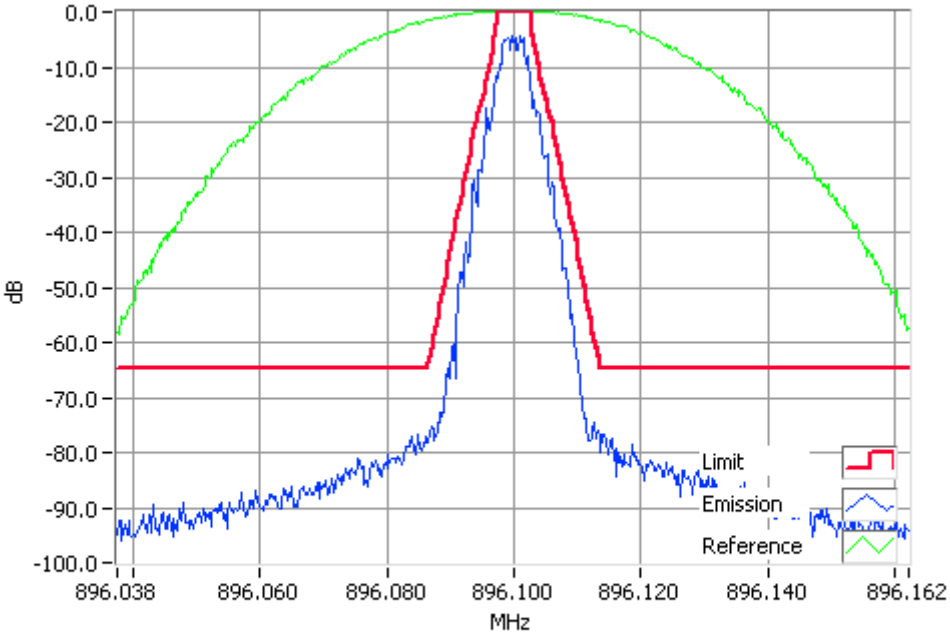
DMR 939.9000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase I

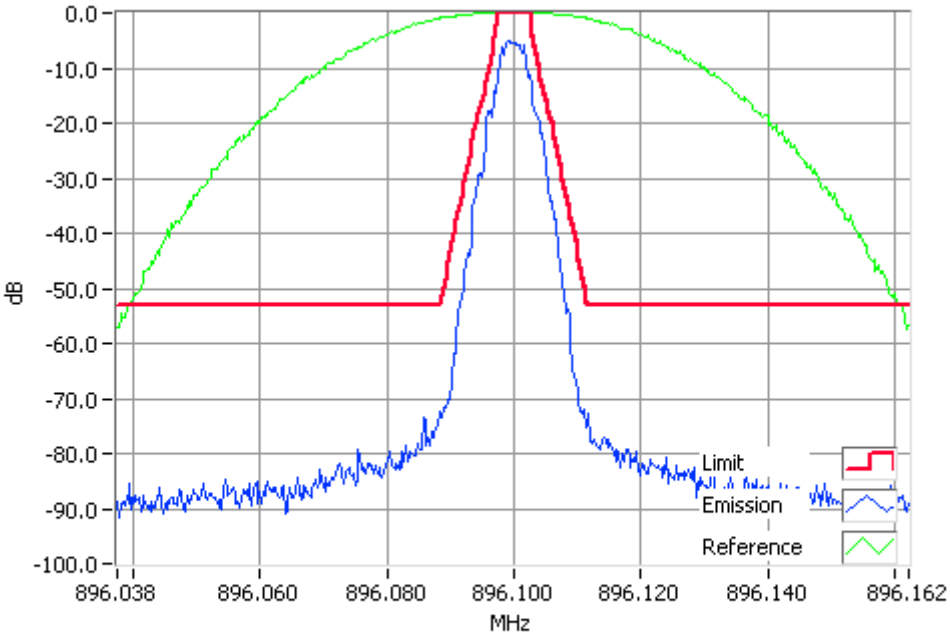
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 896.1 MHz 30 W 12.5 kHz Channel Spacing



P25I 896.1000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 896.1 MHz 2 W 12.5 kHz Channel Spacing



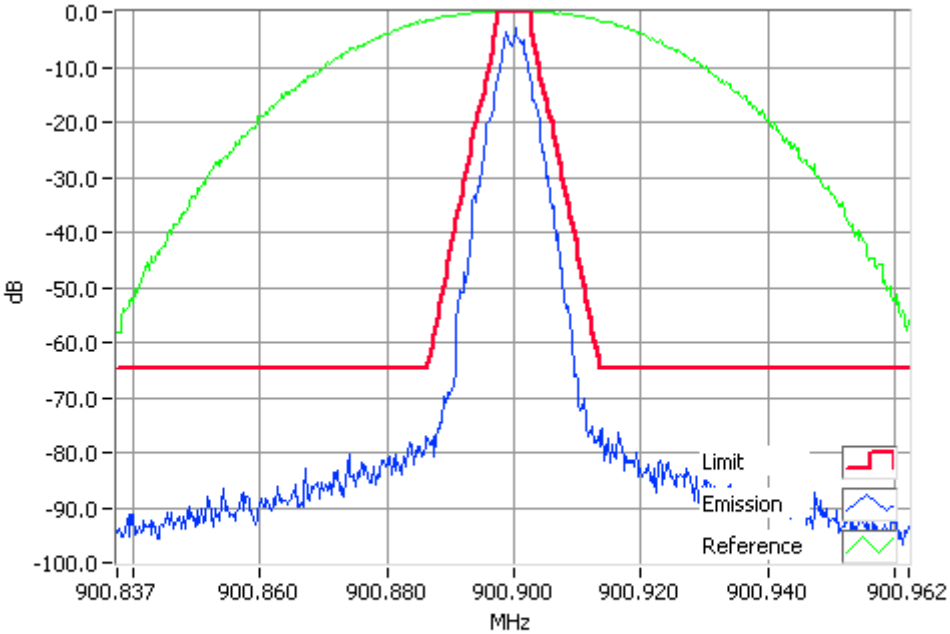
P25I 896.1000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase I

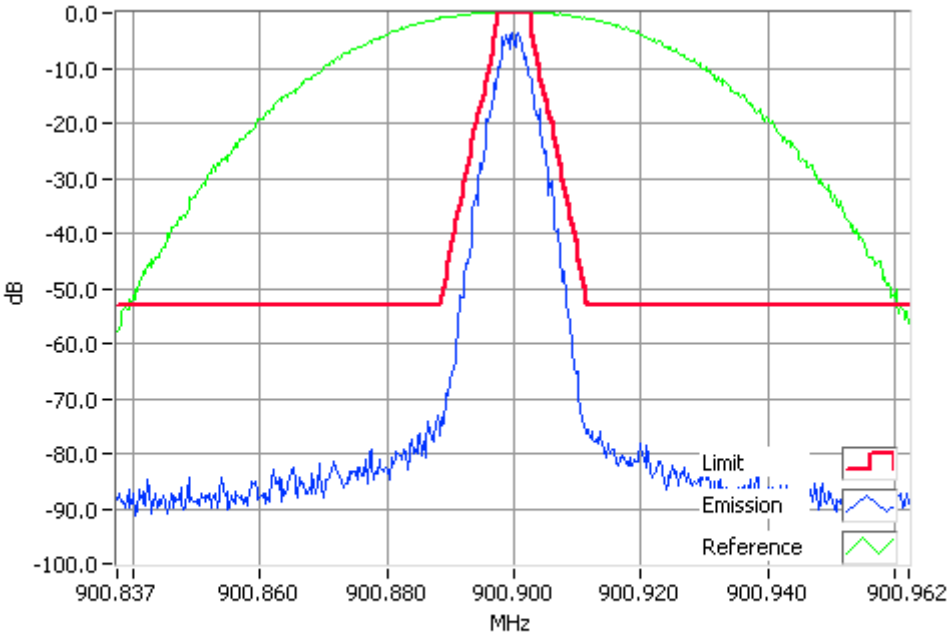
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 900.9 MHz 30 W 12.5 kHz Channel Spacing



P25I 900.9000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 900.9 MHz 2 W 12.5 kHz Channel Spacing



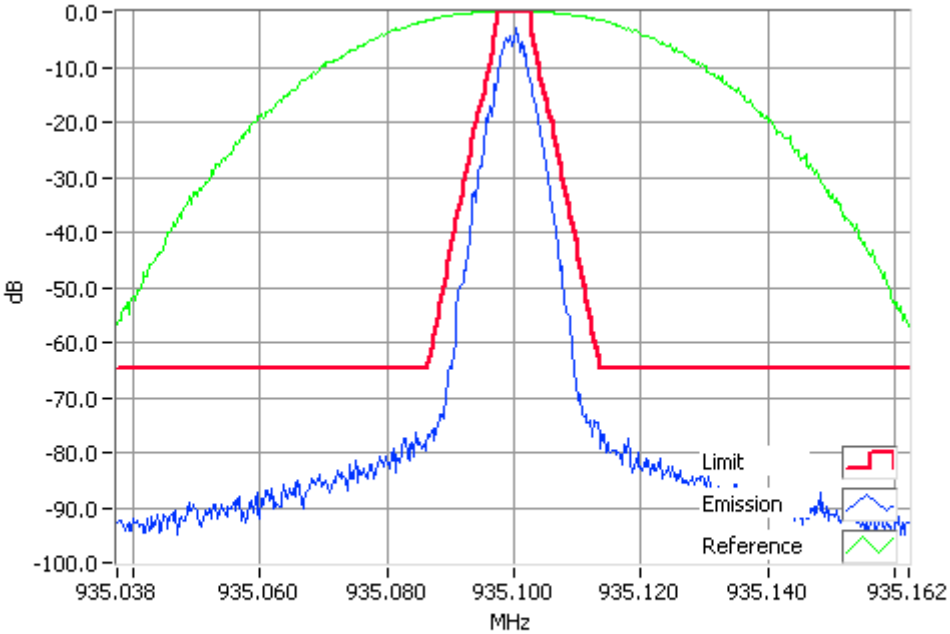
P25I 900.9000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase I

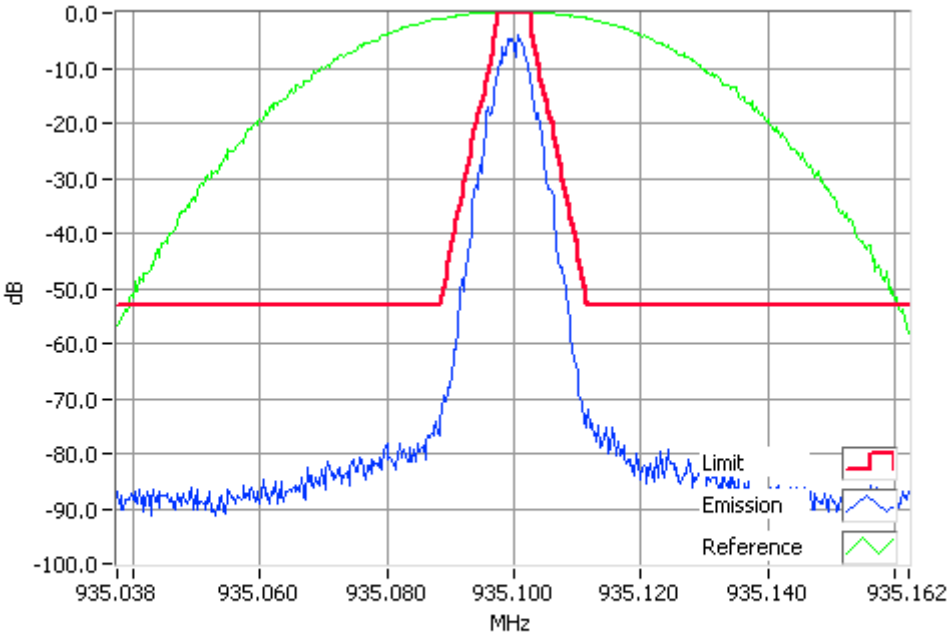
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 935.1 MHz 30 W 12.5 kHz Channel Spacing



P25I 935.1000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 935.1 MHz 2 W 12.5 kHz Channel Spacing



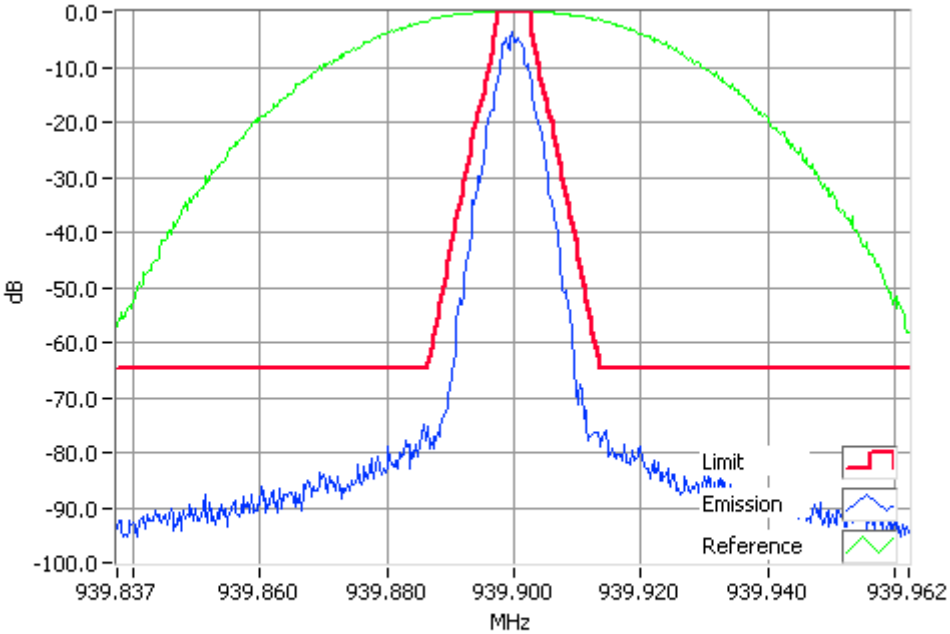
P25I 935.1000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase I

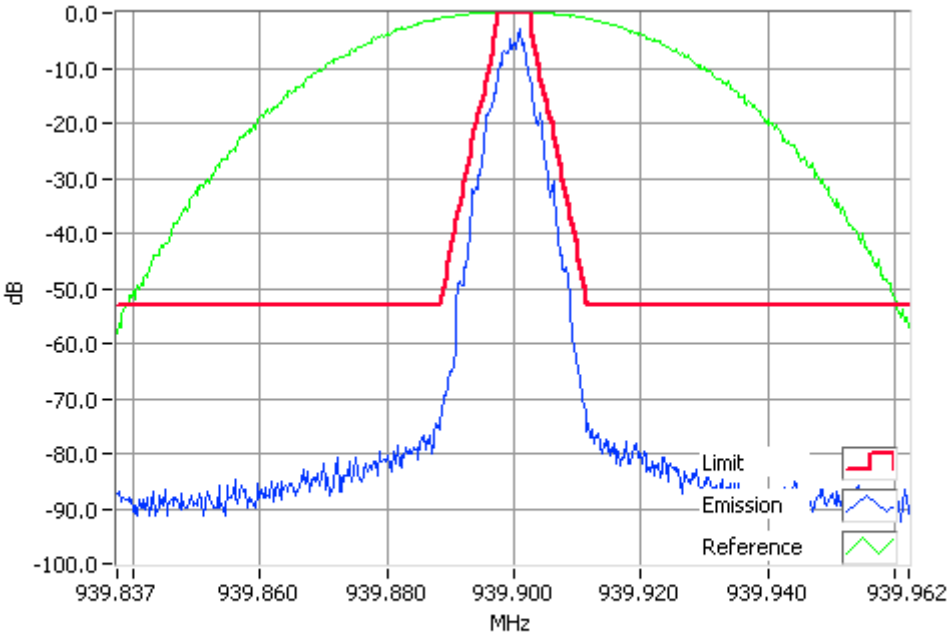
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 939.9 MHz 30 W 12.5 kHz Channel Spacing



P25I 939.9000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 939.9 MHz 2 W 12.5 kHz Channel Spacing



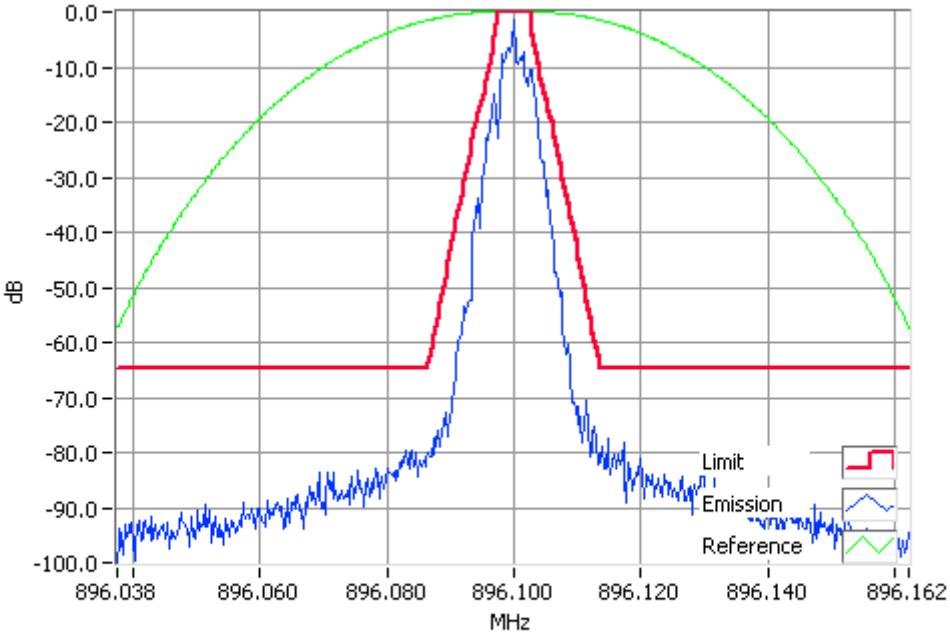
P25I 939.9000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase II

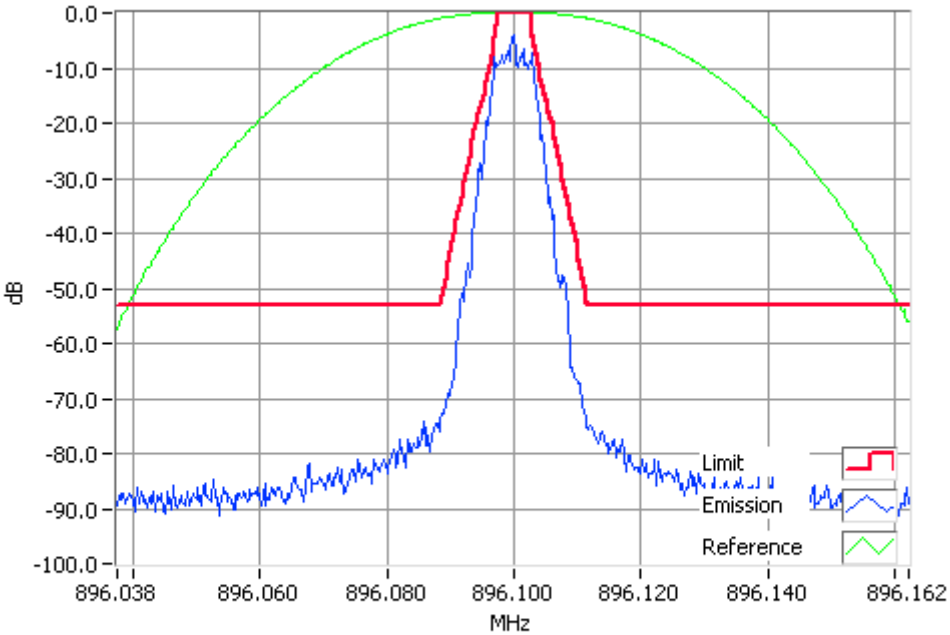
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 896.1 MHz 30 W 12.5 kHz Channel Spacing



P25II 896.1000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 896.1 MHz 2 W 12.5 kHz Channel Spacing



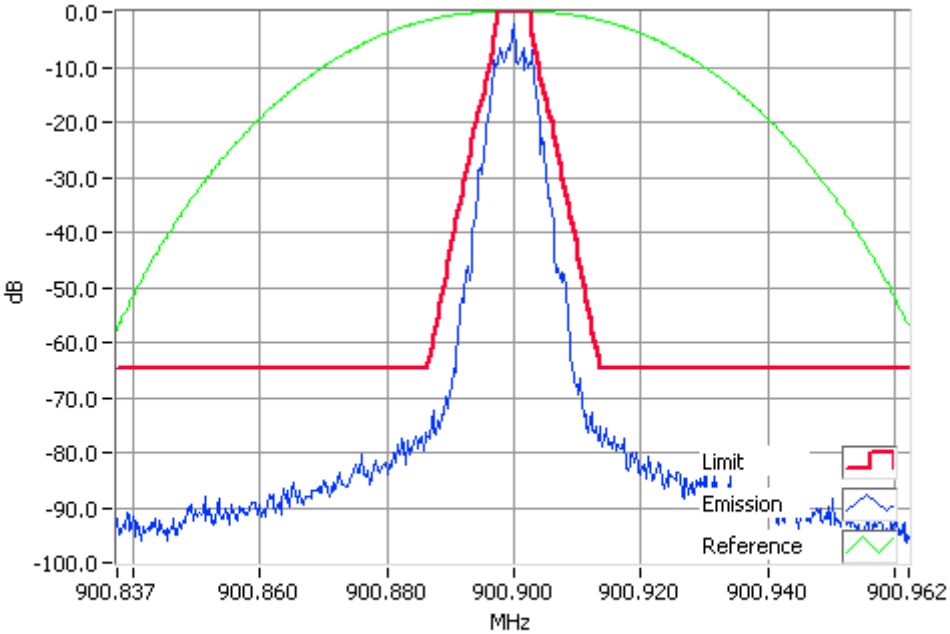
P25II 896.1000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase II

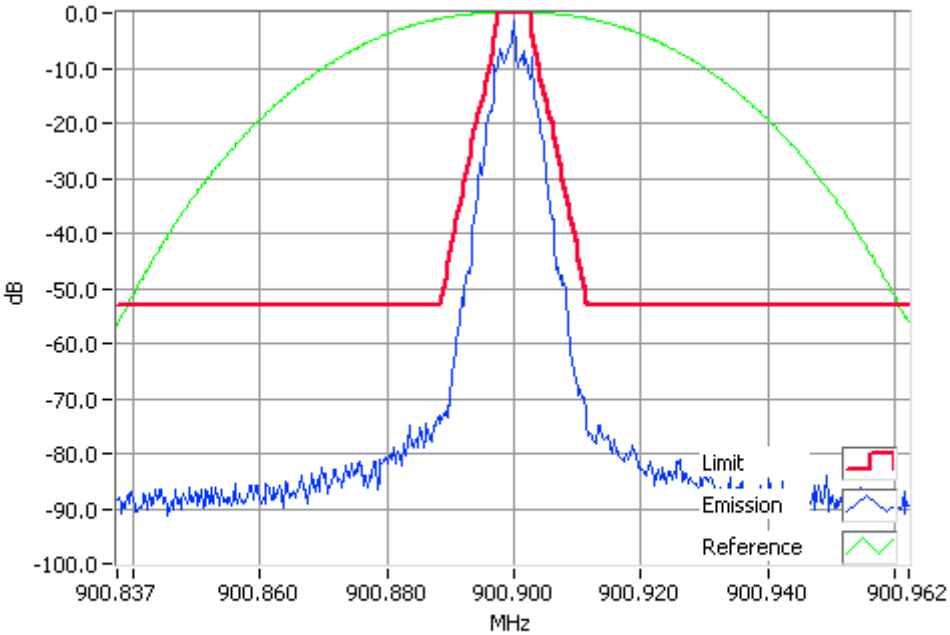
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 900.9 MHz 30 W 12.5 kHz Channel Spacing



P25II 900.9000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 900.9 MHz 2 W 12.5 kHz Channel Spacing



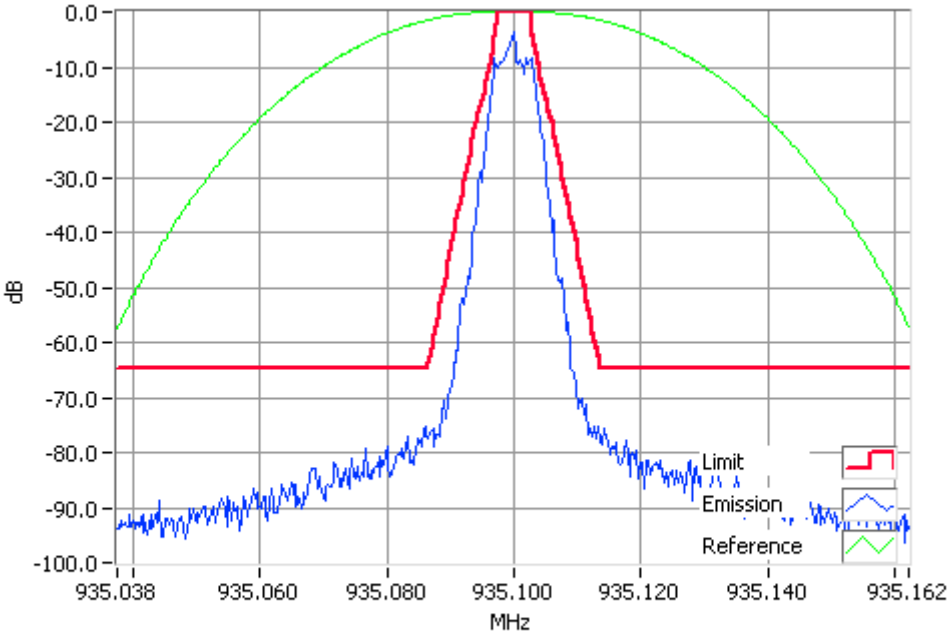
P25II 900.9000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase II

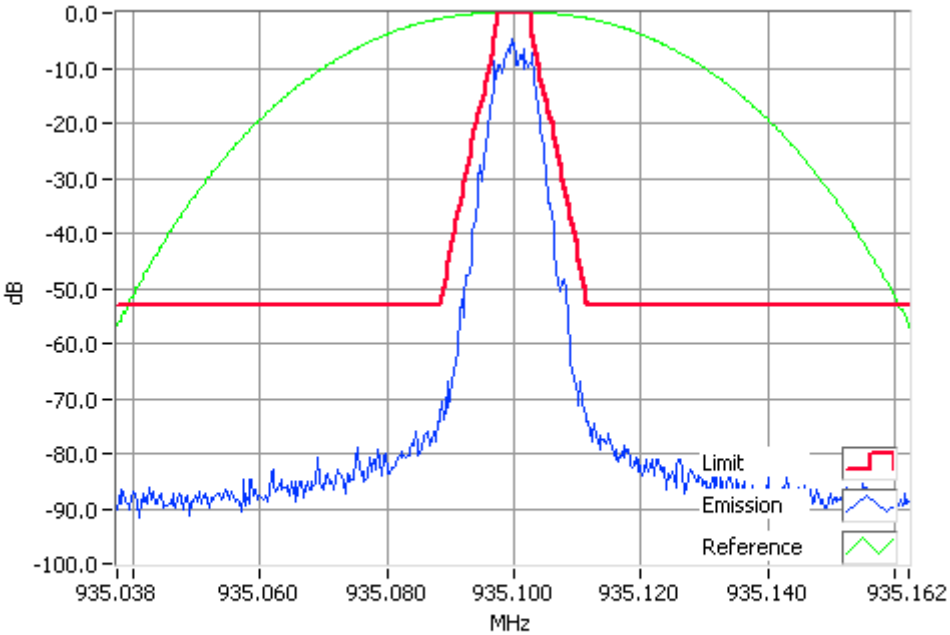
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 935.1 MHz 30 W 12.5 kHz Channel Spacing



P25II 935.1000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 935.1 MHz 2 W 12.5 kHz Channel Spacing



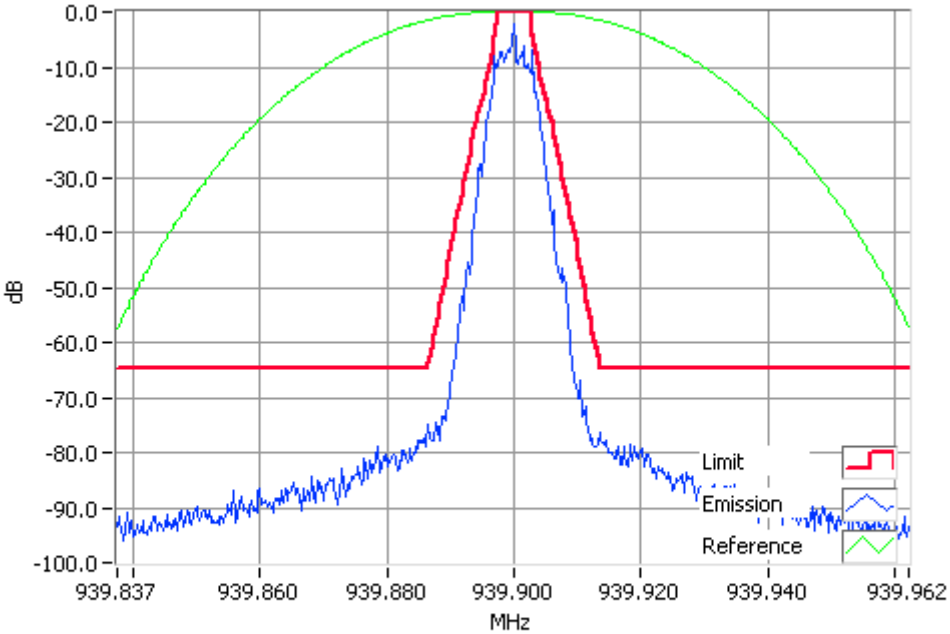
P25II 935.1000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Occupied Bandwidth and Spectrum Masks

P25 Phase II

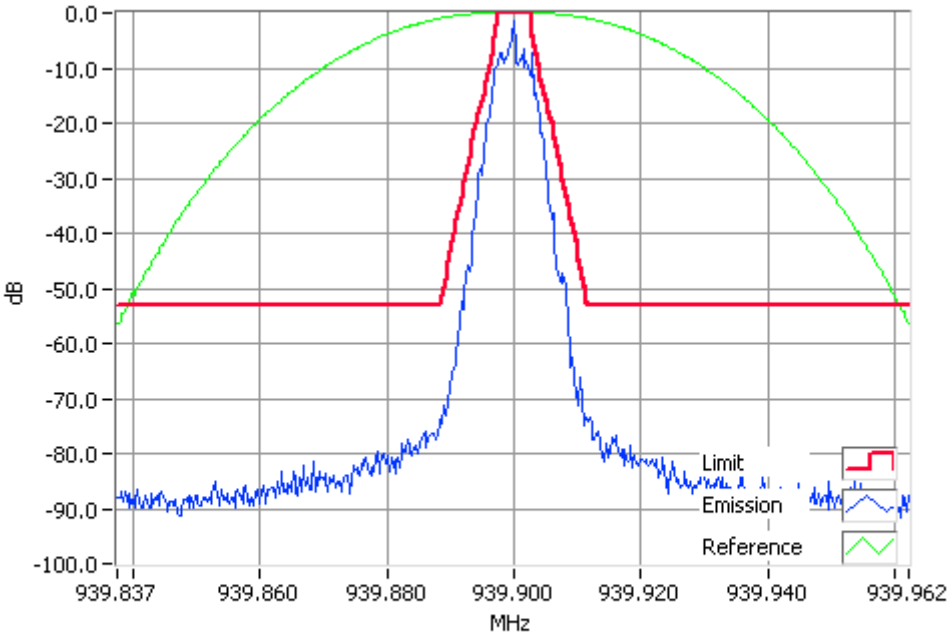
SPECIFICATION: FCC CFR 2.1049 (c) RSS-119 5.5

Tx FREQUENCY: 939.9 MHz 30 W 12.5 kHz Channel Spacing



P25II 939.9000MHz Mask J 30W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

Tx FREQUENCY: 939.9 MHz 2 W 12.5 kHz Channel Spacing



P25II 939.9000MHz Mask J 2W
RBW=300Hz, VBW=3000Hz, Detector Mode=Peak
Result=Pass

TRANSMITTER SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATIONS: FCC 47 CFR 2.1051 RSS-119 5.8

GUIDE: TIA/EIA-603D 2.2.13

MEASUREMENT PROCEDURE:
1. Refer Annex A for equipment set up.
2. The frequency range examined was from the lowest frequency generated within the EUT, to a frequency higher than the 10th Harmonic: 100 kHz to Fc-BW
   Fc+ BW to 10Fc GHz
3. A Pre-scan is performed with a resolution bandwidth of 1 kHz, and a video bandwidth of 3 kHz. If any emissions are found to be within 20 dB of the limit a second measurement is made with the carrier modulated, and a resolution bandwidth of 10 kHz, and a video bandwidth of 30 kHz.

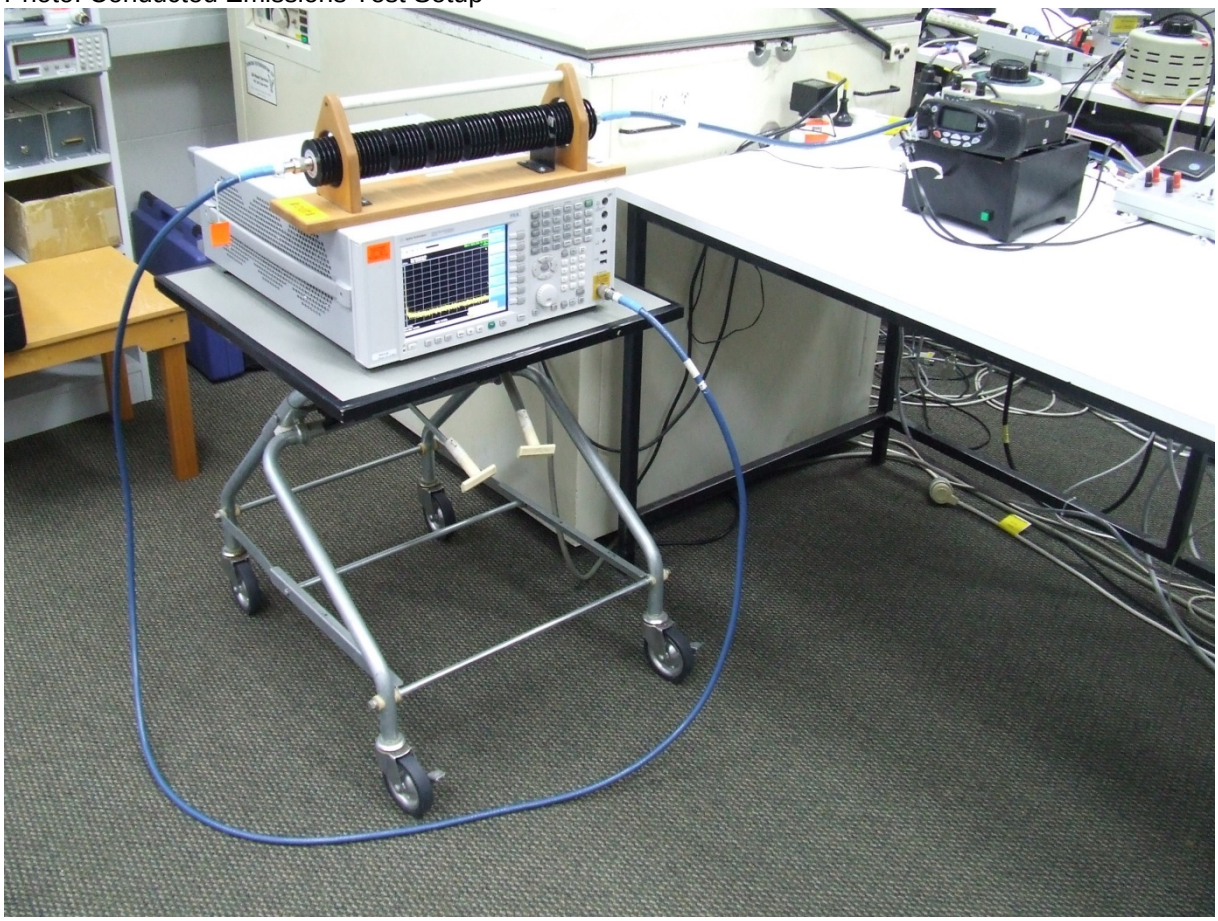
Spurious emissions which were attenuated by more than 20 dB below the limit were not recorded.

A photograph of the test set-up is included below.

MEASUREMENT RESULTS:
See the tables and plots on the following pages for 12.5 kHz channel spacing.

LIMIT CLAUSES: FCC 47 CFR 90.210 RSS-119 5.8

Photo: Conducted Emissions Test Setup



Spurious Emissions (Tx Conducted)

SPECIFICATION: FCC CFR 2.1051 RSS-119 5.8

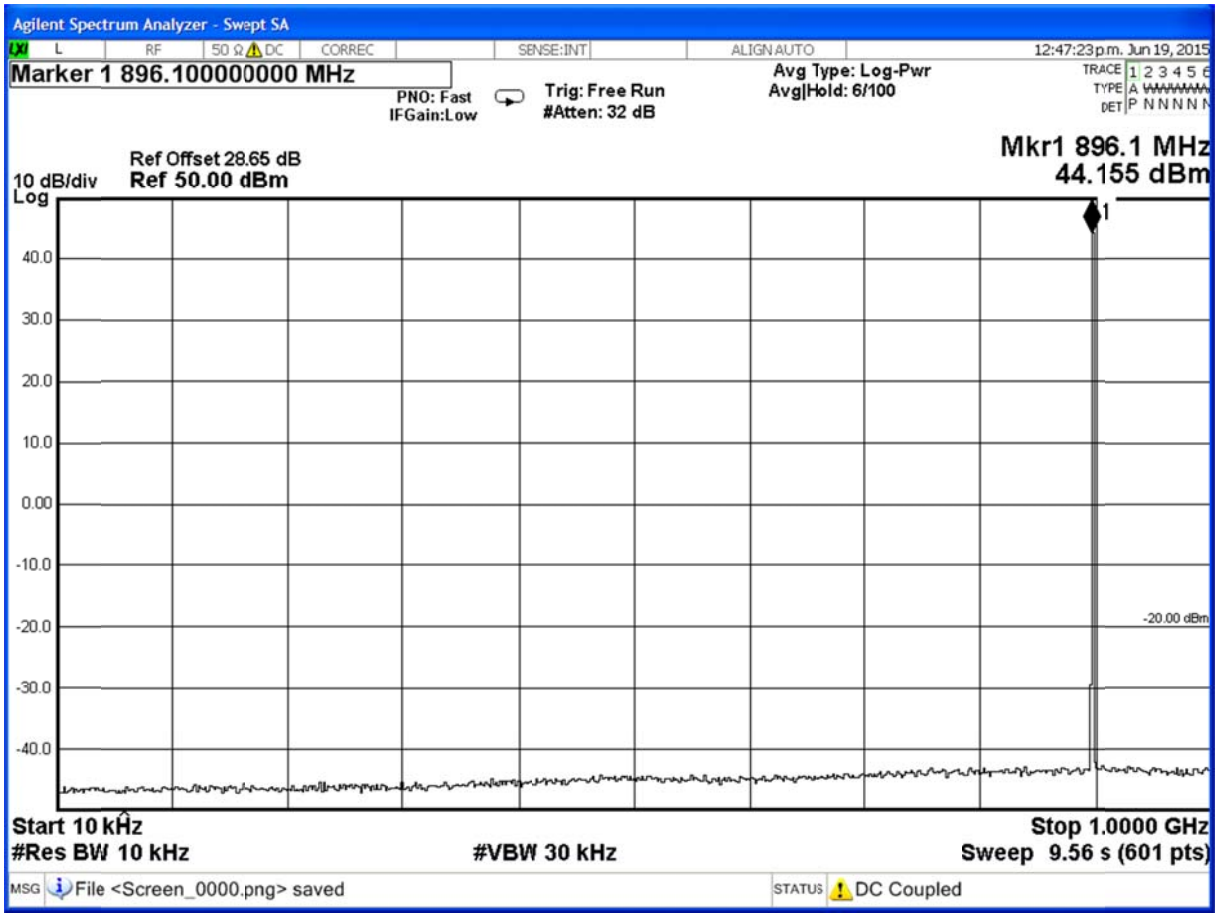
12.5 kHz Channel Spacing 896.1 MHz @ 30 W Emission Mask I

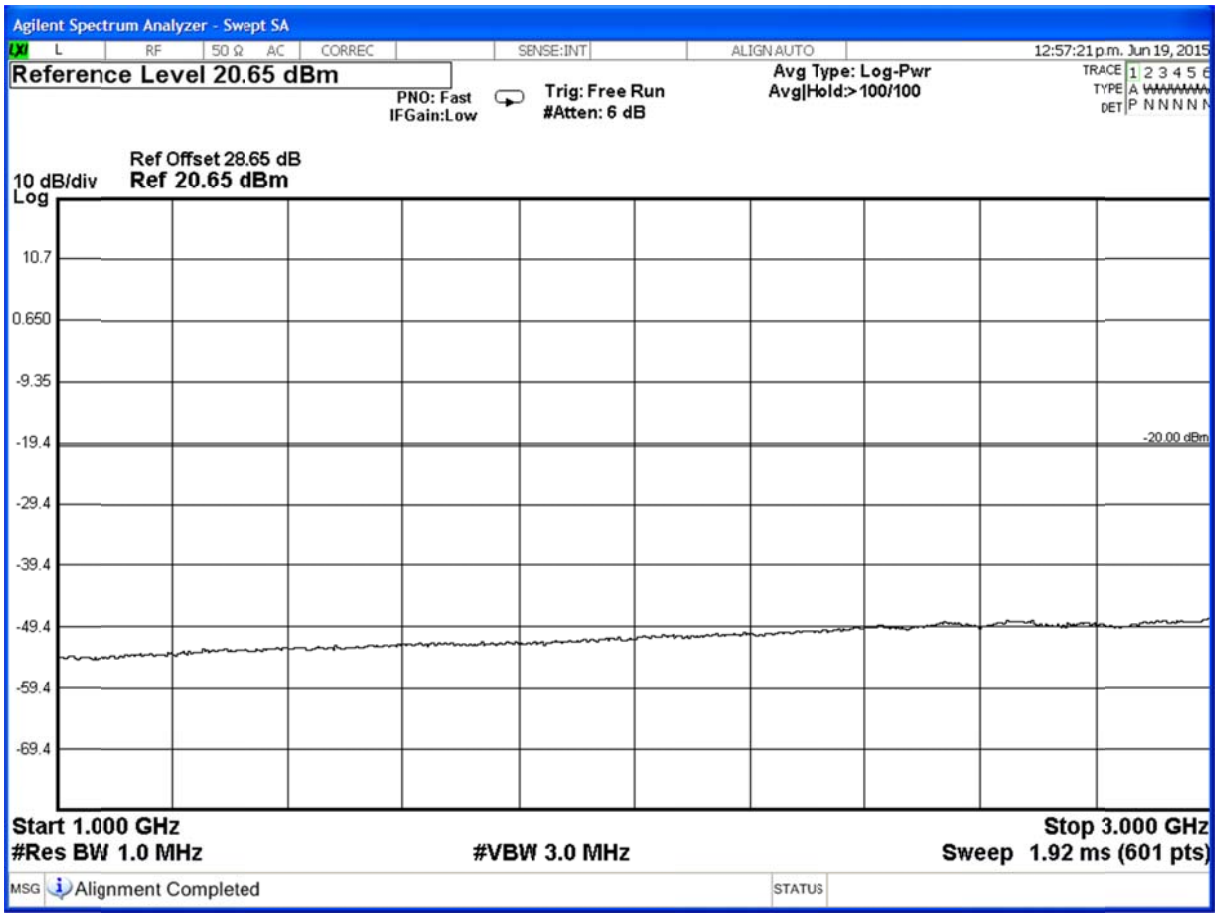
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3584.4002	-38.1	-82.9
8064.9004	-30.1	-74.9
No other emissions were detected at a level greater than 20 dB below the limit.		

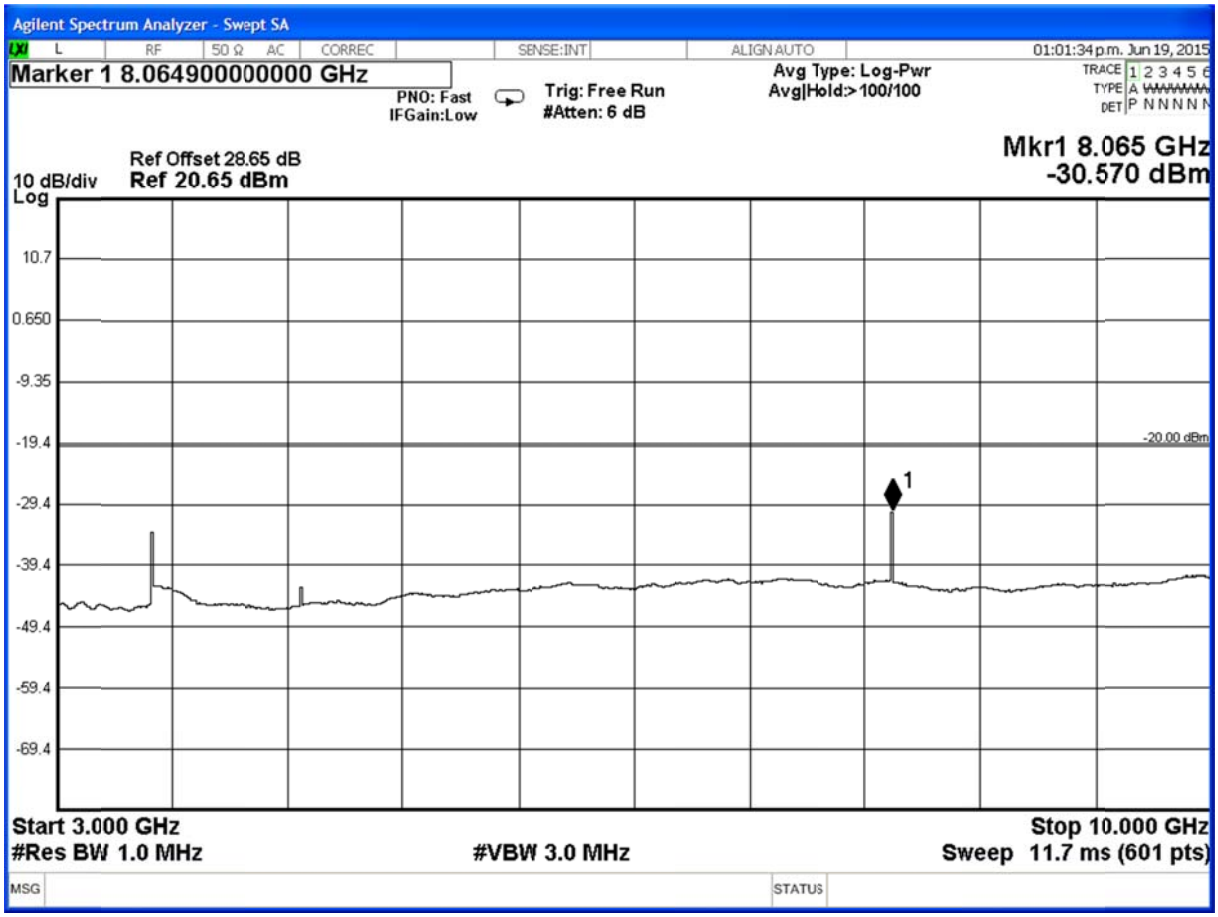
12.5 kHz Channel Spacing 896.1 MHz @ 2 W Emission Mask I

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

Plots for 896.1 MHz 30 W




Agilent Spectrum Analyzer - Swept SA
L
RF
50 Ω AC
CORREC
SENSE:INT
ALIGN AUTO
12:57:21 p.m. Jun 19, 2015
Reference Level 20.65 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE A
DET P N N N N N
Ref Offset 28.65 dB
10 dB/div
Ref 20.65 dBm
Log
10.7
0.650
-9.35
-19.4
-20.00 dBm
-29.4
-39.4
-49.4
-59.4
-69.4
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 3.000 GHz
Sweep 1.92 ms (601 pts)
MSG
Alignment Completed
STATUS


Agilent Spectrum Analyzer - Swept SA
L
RF
50 Ω AC
CORREC
SENSE:INT
ALIGN AUTO
01:01:34 p.m. Jun 19, 2015
Marker 1 8.064900000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE A
DET P N N N N N
Mkr1 8.065 GHz
-30.570 dBm
Ref Offset 28.65 dB
10 dB/div
Ref 20.65 dBm
Log
10.7
0.650
-9.35
-19.4
-20.00 dBm
1
-29.4
-39.4
-49.4
-59.4
-69.4
Start 3.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 10.000 GHz
Sweep 11.7 ms (601 pts)
MSG
STATUS

Spurious Emissions (Tx Conducted)

SPECIFICATION: FCC CFR 2.1051 RSS-119 5.8

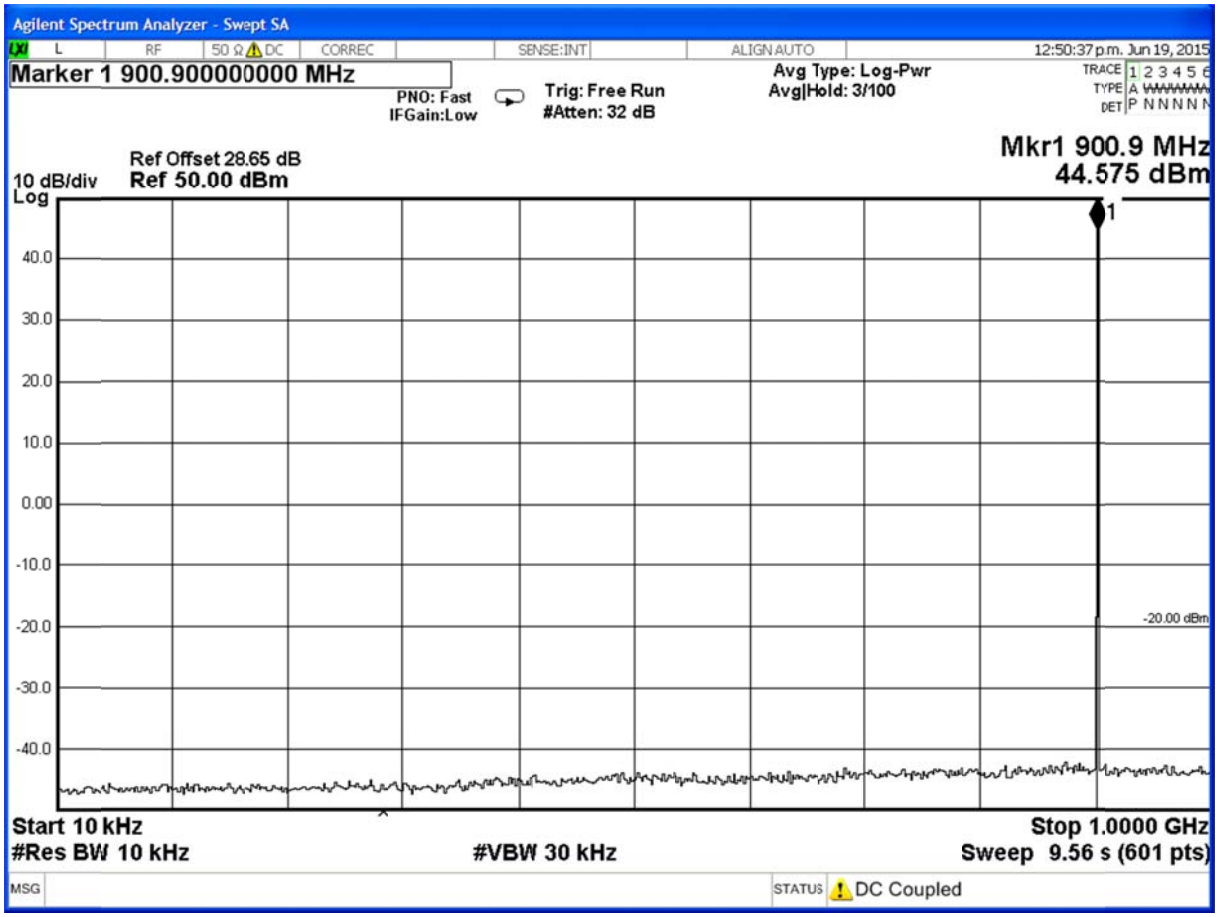
12.5 kHz Channel Spacing 900.9 MHz @ 30 W Emission Mask I

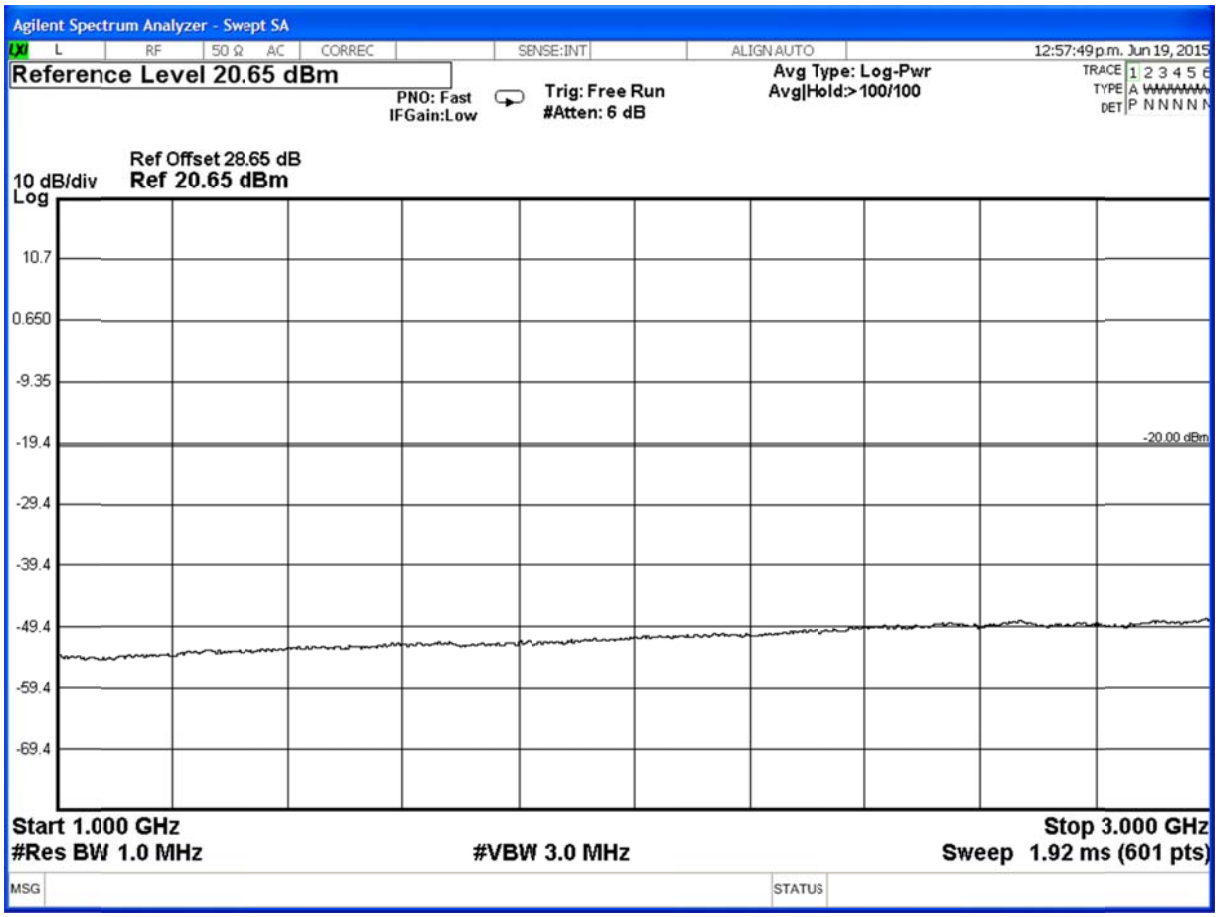
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
3603.6003	-38.6	-83.4
8108.1006	-28.8	-73.6
No other emissions were detected at a level greater than 20 dB below the limit.		

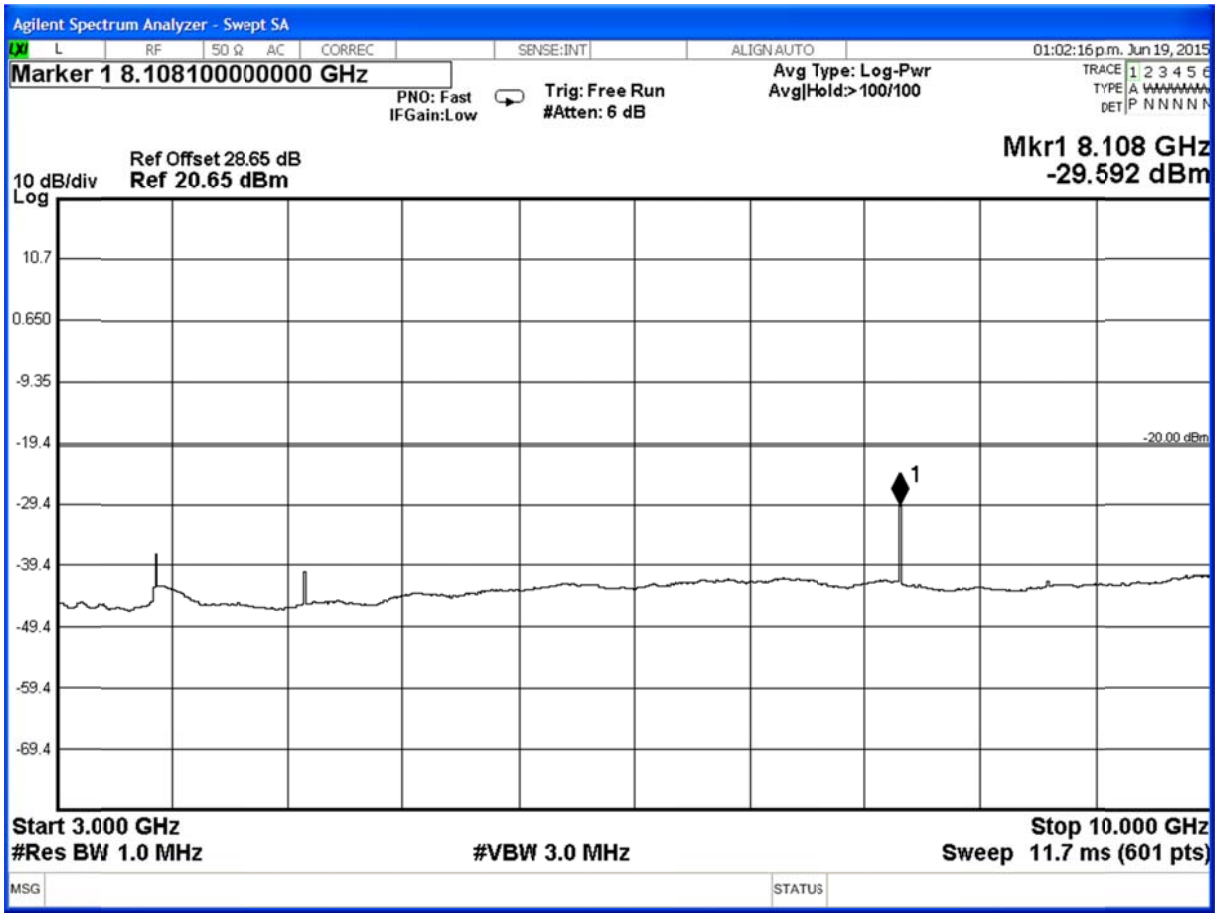
12.5 kHz Channel Spacing 900.9 MHz @ 2 W Emission Mask I

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

Plots for 900.9 MHz 30 W




Agilent Spectrum Analyzer - Swept SA
L
RF
50 Ω AC
CORREC
SENSE:INT
ALIGN AUTO
12:57:49 p.m. Jun 19, 2015
Reference Level 20.65 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE A
DET P N N N N N
Ref Offset 28.65 dB
10 dB/div
Ref 20.65 dBm
Log
10.7
0.650
-9.35
-19.4
-20.00 dBm
-29.4
-39.4
-49.4
-59.4
-69.4
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 3.000 GHz
Sweep 1.92 ms (601 pts)
MSG
STATUS


Agilent Spectrum Analyzer - Swept SA
L
RF
50 Ω AC
CORREC
SENSE:INT
ALIGN AUTO
01:02:16 p.m. Jun 19, 2015
Marker 1 8.108100000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE A
DET P N N N N N
Mkr1 8.108 GHz
-29.592 dBm
Ref Offset 28.65 dB
10 dB/div
Ref 20.65 dBm
Log
10.7
0.650
-9.35
-19.4
-20.00 dBm
1
-29.4
-39.4
-49.4
-59.4
-69.4
Start 3.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 10.000 GHz
Sweep 11.7 ms (601 pts)
MSG
STATUS

Spurious Emissions (Tx Conducted)

SPECIFICATION: FCC CFR 2.1051 RSS-119 5.8

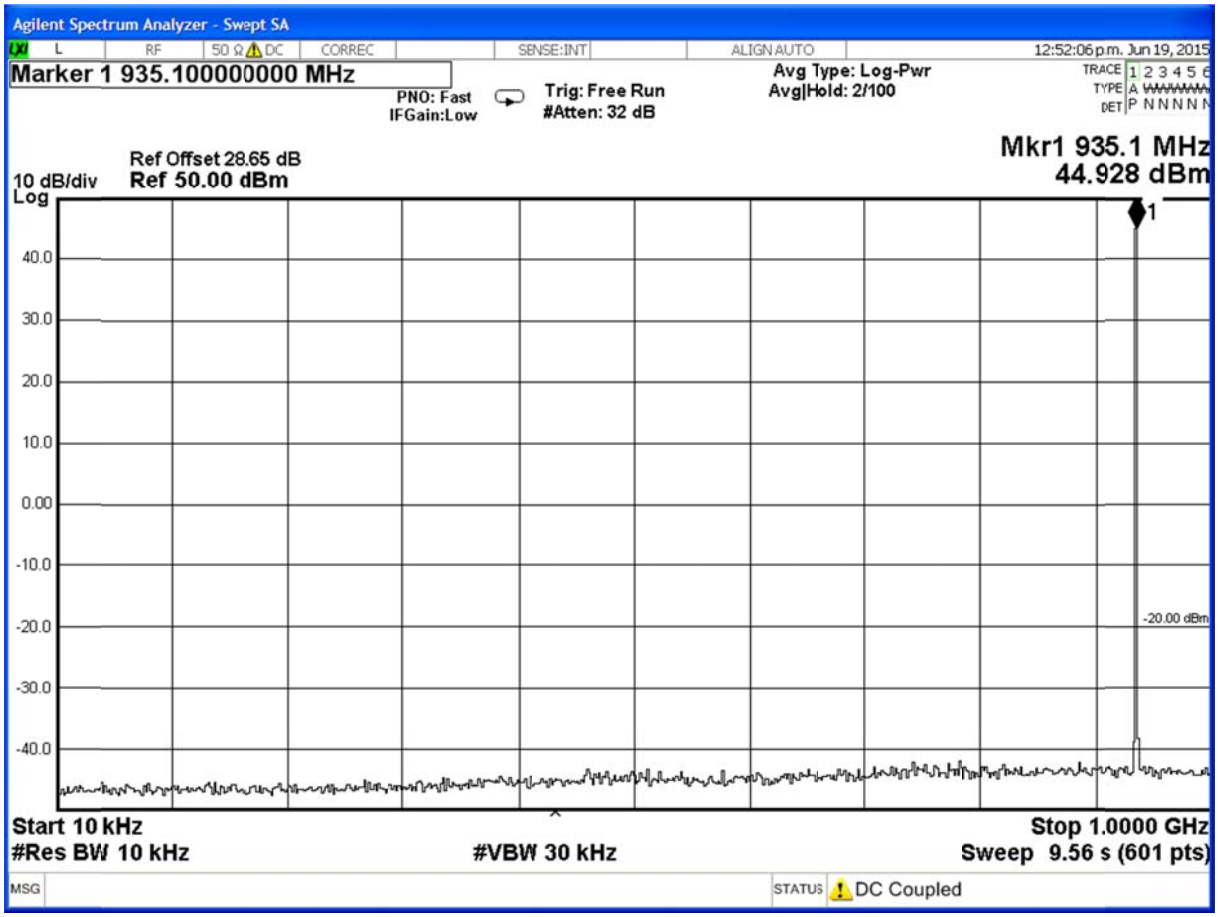
12.5 kHz Channel Spacing 935.1 MHz @ 30 W Emission Mask I

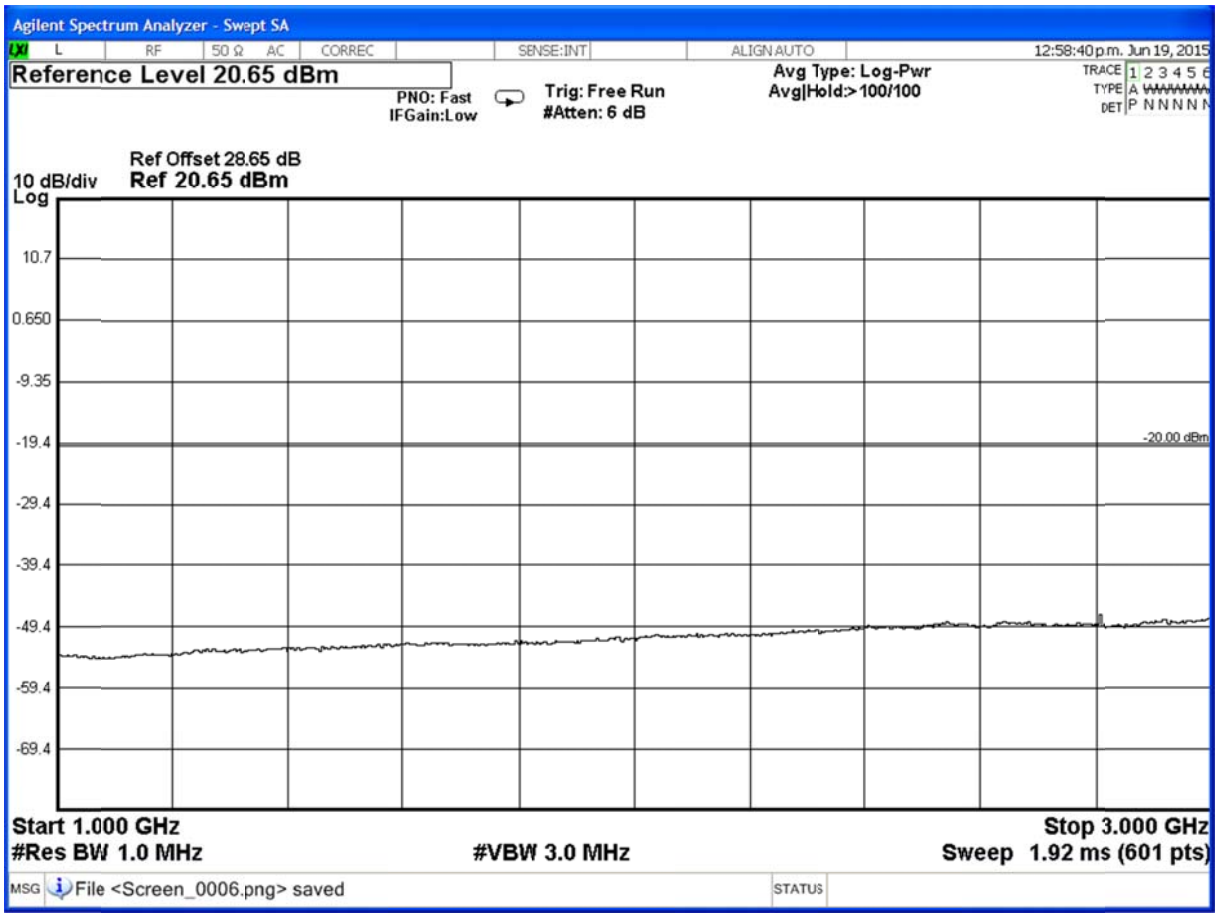
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
4675.5004	-35.2	-80.0
8415.9007	-34.7	-79.5
9351.0008	-39.4	-84.2
No other emissions were detected at a level greater than 20 dB below the limit.		

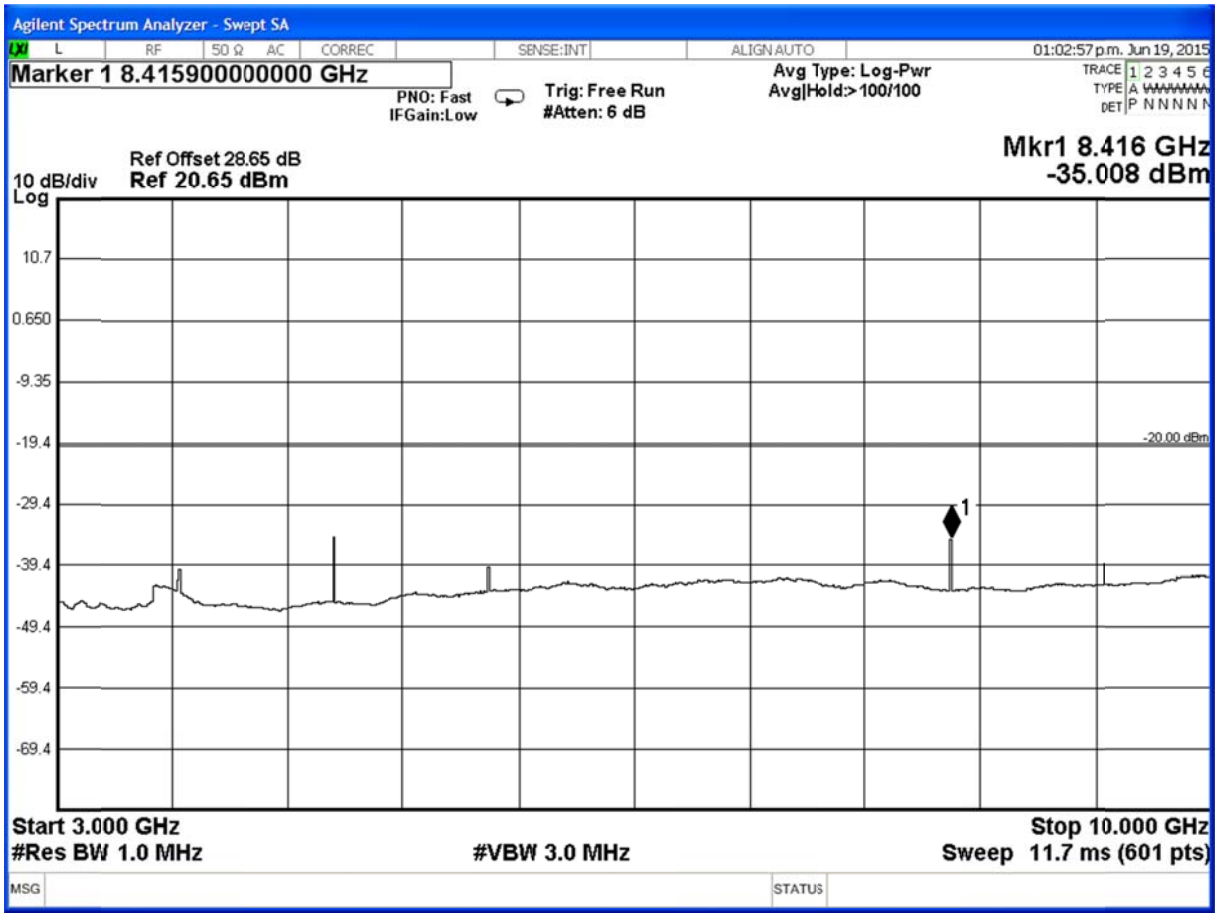
12.5 kHz Channel Spacing 935.1 MHz @ 2 W Emission Mask I

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

Plots for 935.1 MHz 30 W




Agilent Spectrum Analyzer - Swept SA
Reference Level 20.65 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
12:58:40 p.m. Jun 19, 2015
Ref Offset 28.65 dB
10 dB/div
Ref 20.65 dBm
Log
10.7
0.650
-9.35
-19.4
-29.4
-39.4
-49.4
-59.4
-69.4
-20.00 dBm
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 3.000 GHz
Sweep 1.92 ms (601 pts)
File <Screen_0006.png> saved


Agilent Spectrum Analyzer - Swept SA
Marker 1 8.415900000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
01:02:57 p.m. Jun 19, 2015
Mkr1 8.416 GHz
-35.008 dBm
Ref Offset 28.65 dB
10 dB/div
Ref 20.65 dBm
Log
10.7
0.650
-9.35
-19.4
-29.4
-39.4
-49.4
-59.4
-69.4
-20.00 dBm
Start 3.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 10.000 GHz
Sweep 11.7 ms (601 pts)

Spurious Emissions (Tx Conducted)

SPECIFICATION: FCC CFR 2.1051 RSS-119 5.8

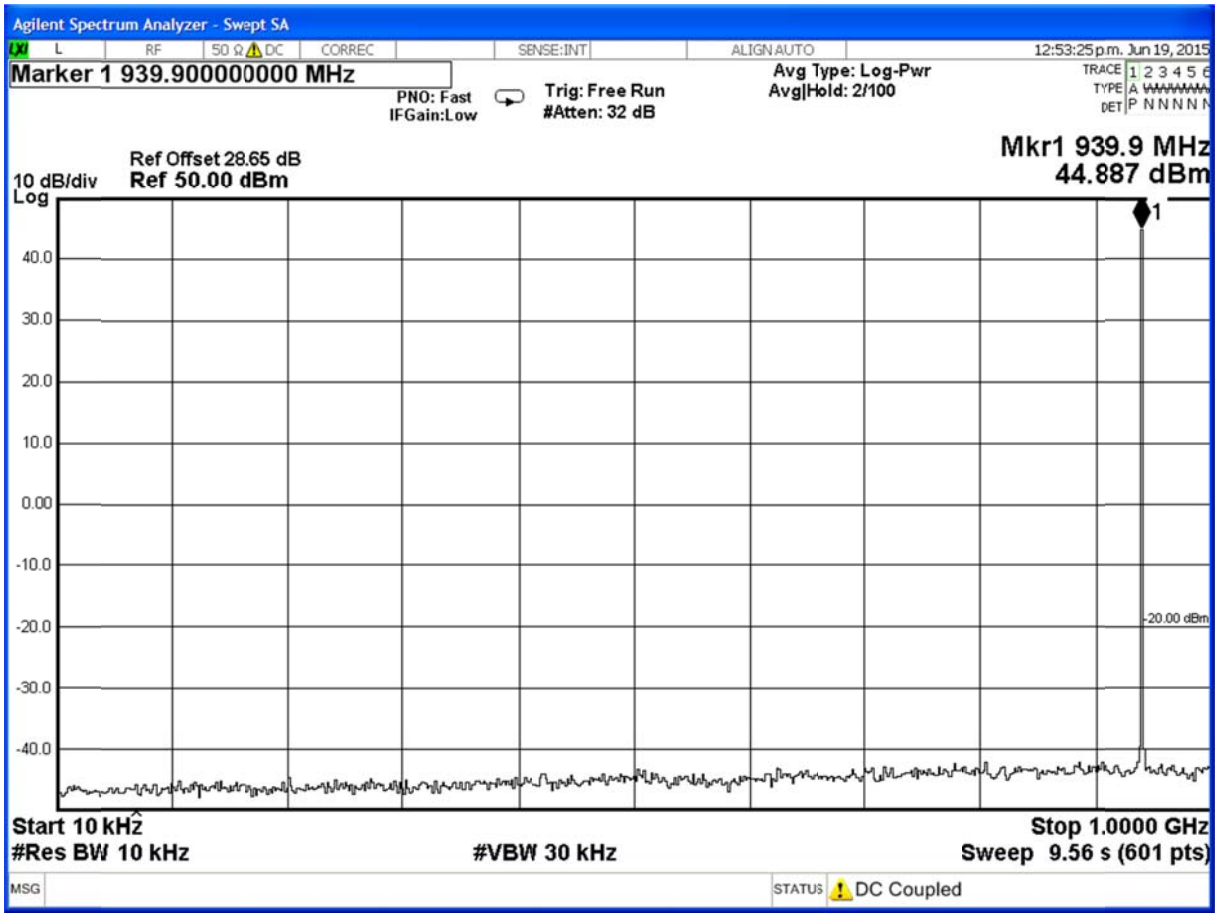
12.5 kHz Channel Spacing 939.9 MHz @ 30 W Emission Mask I

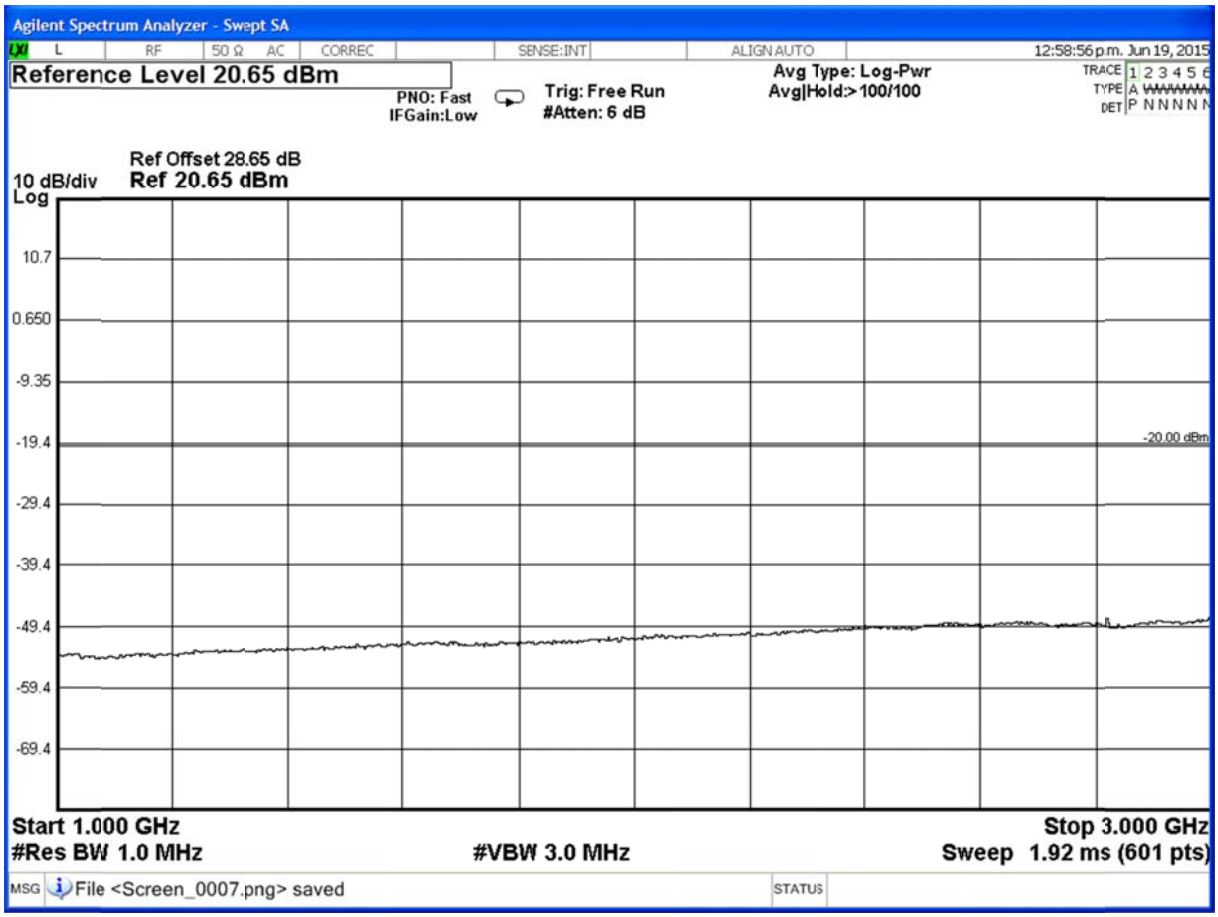
Emission Frequency (MHz)	Level (dBm)	Level (dBc)
4699.5004	-33.5	-78.3
8459.1008	-35.5	-80.3
9399.0008	-38.4	-83.2
No other emissions were detected at a level greater than 20 dB below the limit.		

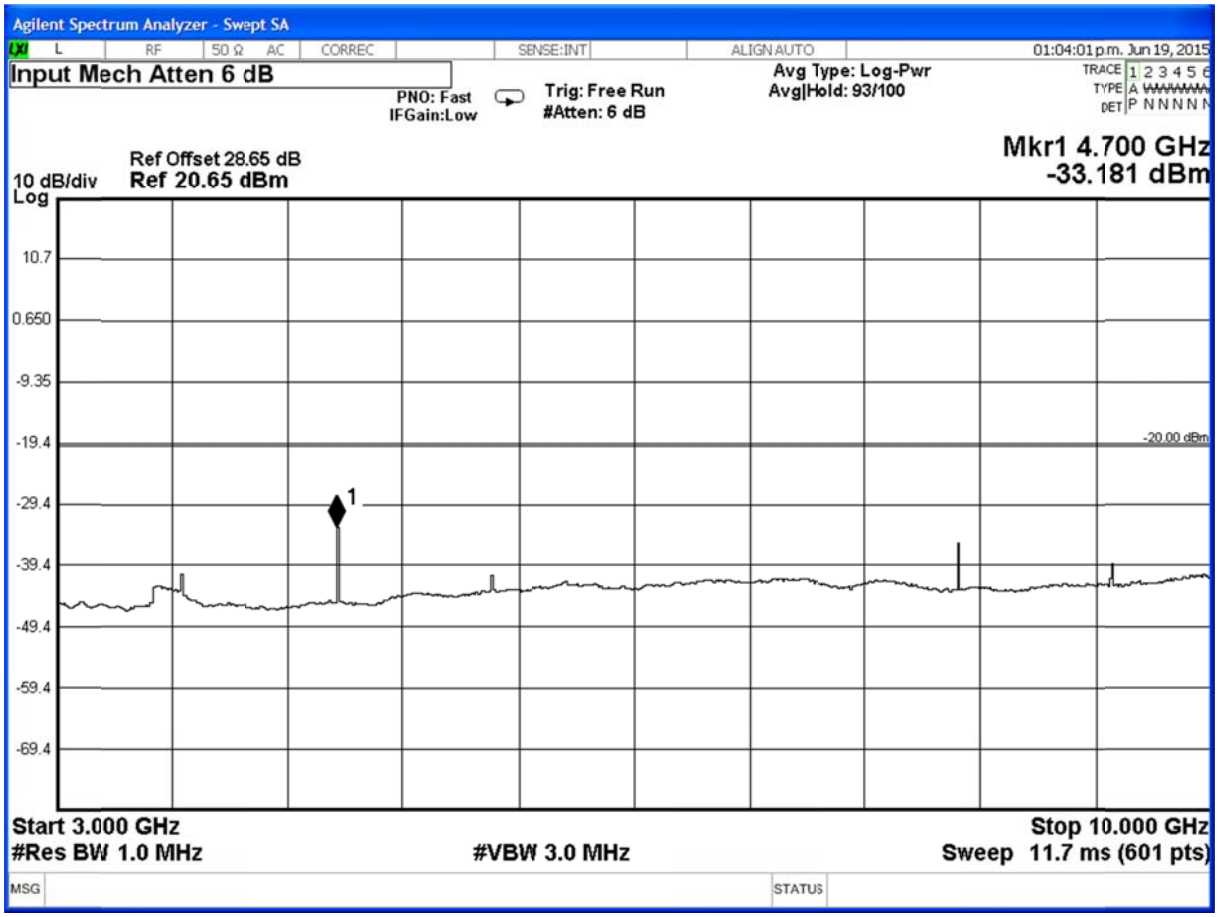
12.5 kHz Channel Spacing 939.9 MHz @ 2 W Emission Mask I

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

Plots for 939.9 MHz 30 W




Agilent Spectrum Analyzer - Swept SA
Reference Level 20.65 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
12:58:56 p.m. Jun 19, 2015
Ref Offset 28.65 dB
10 dB/div
Ref 20.65 dBm
Log
10.7
0.650
-9.35
-19.4
-29.4
-39.4
-49.4
-59.4
-69.4
-20.00 dBm
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 3.000 GHz
Sweep 1.92 ms (601 pts)
File <Screen_0007.png> saved


Agilent Spectrum Analyzer - Swept SA
Input Mech Atten 6 dB
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 6 dB
Avg Type: Log-Pwr
Avg|Hold: 93/100
01:04:01 p.m. Jun 19, 2015
Mkr1 4.700 GHz
-33.181 dBm
Ref Offset 28.65 dB
10 dB/div
Ref 20.65 dBm
Log
10.7
0.650
-9.35
-19.4
-29.4
-39.4
-49.4
-59.4
-69.4
-20.00 dBm
1
Start 3.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 10.000 GHz
Sweep 11.7 ms (601 pts)

Spurious Emissions (Tx Conducted)

SPECIFICATION: FCC CFR 2.1051 RSS-119 5.8

LIMITS: FCC 47 CFR 90.210 RSS-119 5.8

Carrier Output Power	Emission Mask I 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{Watts})$	
30 W	-20 dBm	-65 dBc
2 W	-20 dBm	-53 dBc

TRANSMITTER SPURIOUS EMISSIONS (RADIATED)

SPECIFICATION: FCC 47 CFR 2.1053

GUIDE: TIA/EIA-603D 2.2.12

MEASUREMENT PROCEDURE:
Initial Scan:

1. The EUT is placed in the S-Line TEM cell and emissions are measured from 30 MHz to 1000 MHz. Any emission within 20 dB of the limit is then re-tested on the OATS along with measurements from 1000 MHz to the 10th harmonic of the fundamental frequency.
2. The EUT is placed in the reverberation chamber and emissions are measured from 800 MHz to the upper frequency required. Any emission within 20 dB of the limit is then re-tested on the OATS.
3. The harmonics emissions up to the 6th harmonic of the fundamental frequency are measured on the OATS

OATS Measurement:

1. The EUT is placed on a wooden turntable at a distance of three metres from the test antenna. The output terminal is connected to an RF dummy load.
2. The test antenna is raised from 1 m to 4 m to obtain a maximum reading; the turntable is then rotated through 360° to obtain the maximum response of each spurious emission. Valid emissions are determined by switching the EUT on and off.
3. The EUT is then replaced by a signal generator and substitution antenna to make measurements by the substitution method.

MEASUREMENT RESULTS:
See the tables on the following pages

LIMIT CLAUSE: FCC 47 CFR 90.210

Spurious Emissions (Tx Radiated)

SPECIFICATION: FCC CFR 2.1053

12.5 kHz Channel Spacing 896.1 MHz @ 30 W Emission Mask I

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 896.1 MHz @ 2 W Emission Mask I

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 900.9 MHz @ 30 W Emission Mask I

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 900.9 MHz @ 2 W Emission Mask I

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 935.1 MHz @ 30 W Emission Mask I

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
5610.6000	-34.87	-79.64
No other emissions were detected at a level greater than 20 dB below the limit.		

Tx Radiated Emissions – Continued

12.5 kHz Channel Spacing 935.1 MHz @ 2 W Emission Mask I

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 939.9 MHz @ 30 W Emission Mask I

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
5639.4000	-36.37	-81.14
No other emissions were detected at a level greater than 20 dB below the limit.		

12.5 kHz Channel Spacing 939.9 MHz @ 2 W Emission Mask I

Emission Frequency (MHz)	Level (dBm)	Level (dBc)
~	~	~
No emissions were detected at a level greater than 20 dB below the limit.		

LIMITS: FCC CFR 2.1053

Carrier Output Power	Emission Mask I 12.5 kHz Channel Spacing $50 + 10 \text{ Log}_{10} (P_{Watts})$	
30 W	-20 dBm	-65 dBc
2 W	-20 dBm	-53 dBc

Tx Radiated Emissions - Continued

Open Area Test Site Results:

12.5 kHz Channel Spacing 900.9 MHz @ 30 W Emission Mask I

Harmonics Emission Frequency (MHz)	Level (dBm)	Level (dBc)
1801.8000	-55.67	-100.44
2702.7000	-42.94	-87.71
3603.6000	-58.06	-102.83
4504.5000	-47.68	-92.45
5405.4000	-41.68	-86.45
6306.3000	-53.21	-97.98

Photo: OATS Setup

TRANSMITTER FREQUENCY STABILITY - TEMPERATURE

SPECIFICATION: FCC 47 CFR 2.1055 (a) (1) RSS-119 5.3

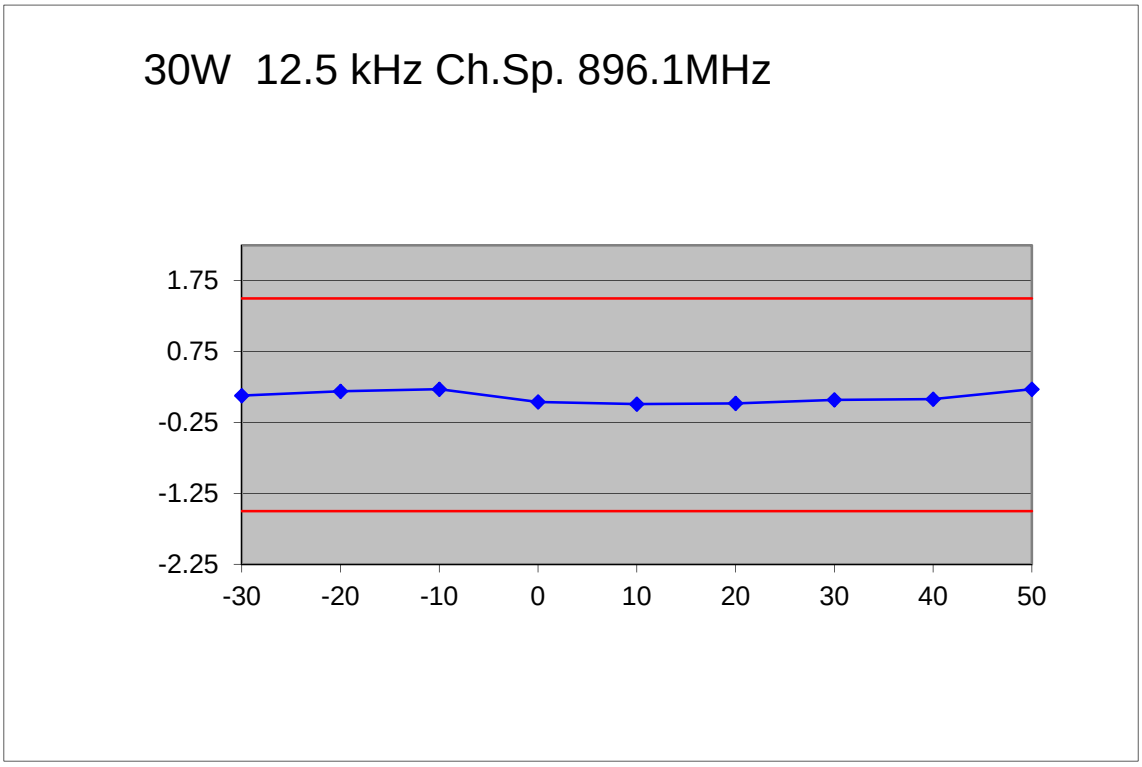
GUIDE: TIA/EIA-603D 2.2.2

MEASUREMENT PROCEDURE:
1. Refer Annex A for equipment set up.
2. The EUT was tested for frequency error from –30° C to +50° C in 10° C increments
3. The frequency error was recorded in parts per million (ppm).

MEASUREMENT RESULTS:
See the plots on the following pages for 12.5 kHz channel spacing.

896.1 MHz

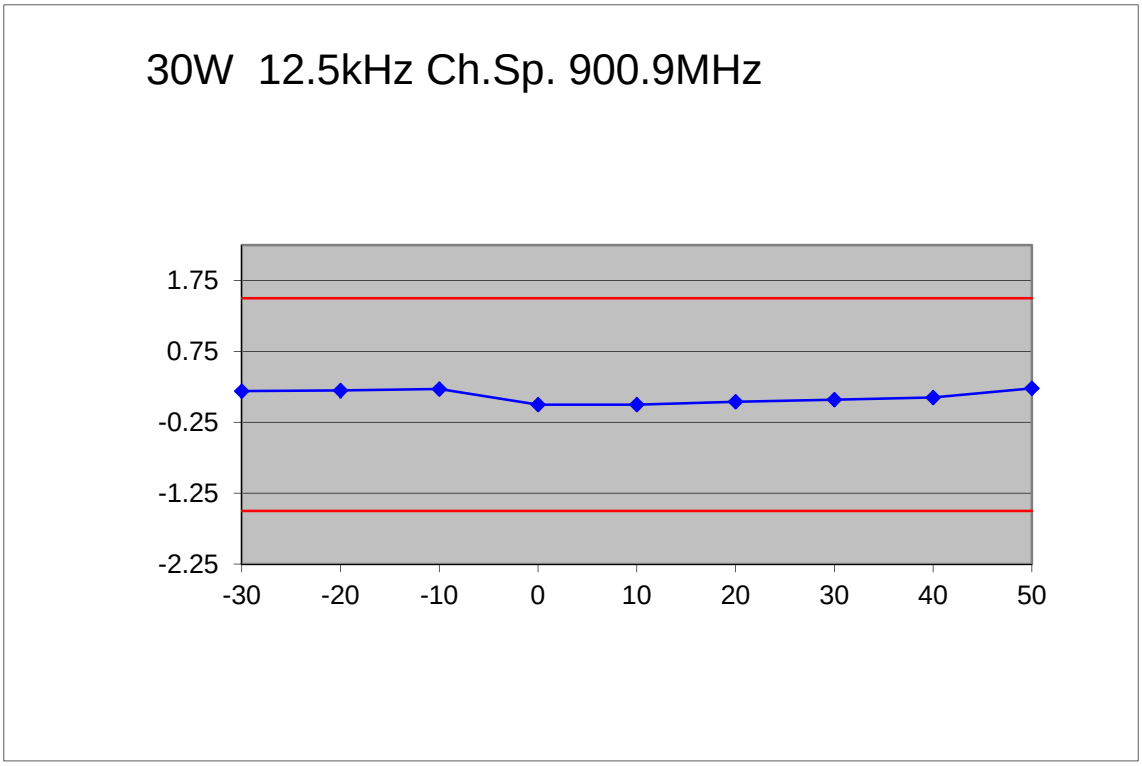
Temperature (ºC)	Frequency (MHz)	Error (ppm)
-30	119	0.13
-20	166	0.19
-10	193	0.22
0	33	0.04
10	7	0.01
20	22	0.02
30	59	0.07
40	76	0.08
50	201	0.22



Transmitter Frequency Stability - Temperature

900.9 MHz

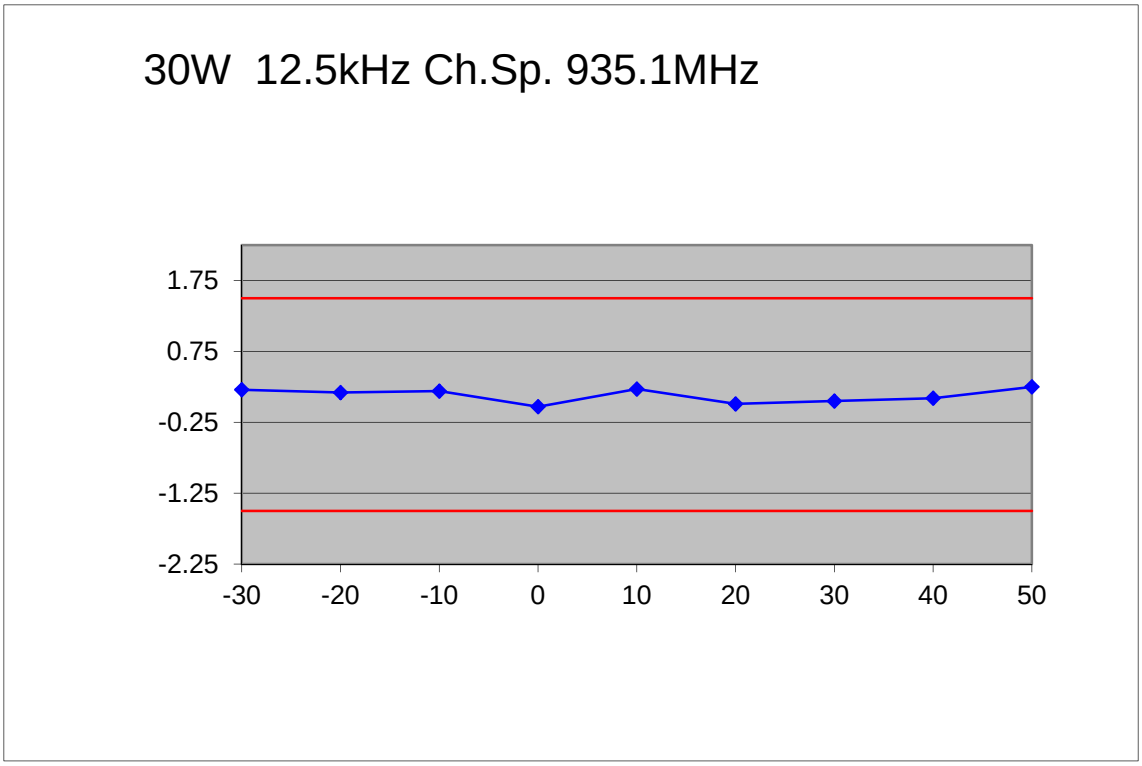
Temperature (ºC)	Frequency (MHz)	Error (ppm)
-30	167	0.19
-20	176	0.2
-10	197	0.22
0	2	0
10	3	0
20	35	0.04
30	61	0.07
40	88	0.1
50	205	0.23



Transmitter Frequency Stability - Temperature

935.1 MHz

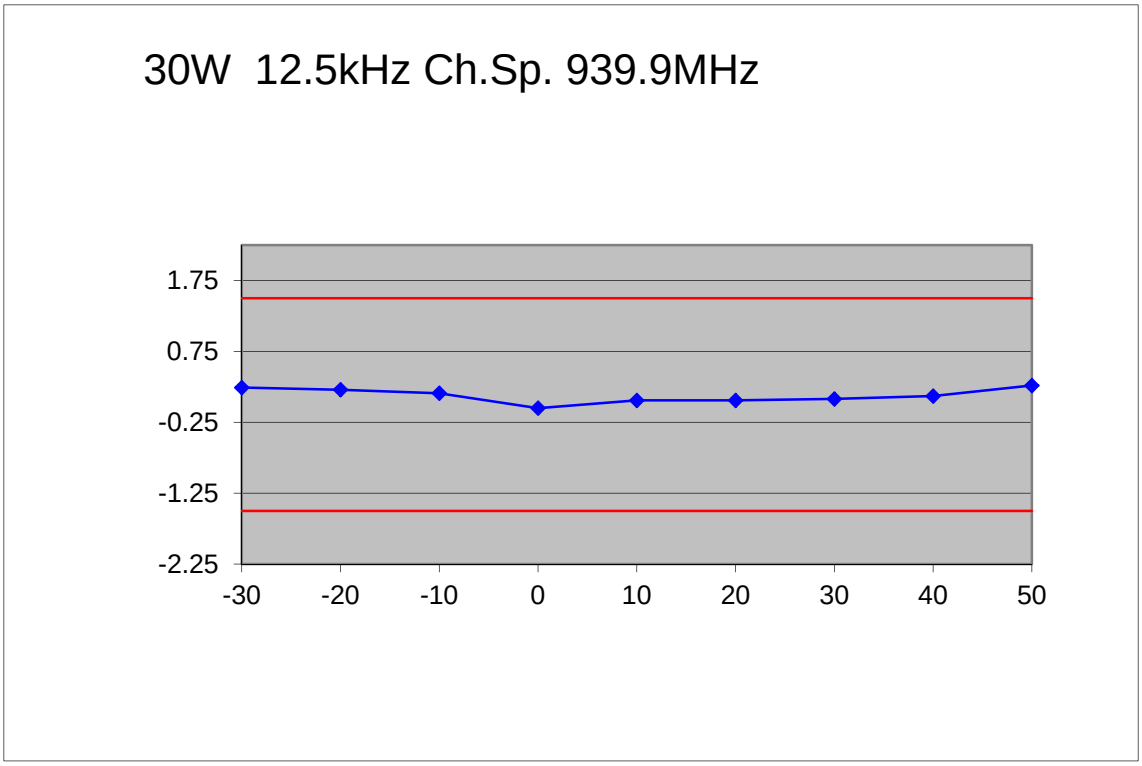
Temperature (ºC)	Frequency (MHz)	Error (ppm)
-30	192	0.21
-20	156	0.17
-10	173	0.19
0	-32	-0.03
10	208	0.22
20	5	0.01
30	44	0.05
40	85	0.09
50	232	0.25



Transmitter Frequency Stability - Temperature

939.9 MHz

Temperature (ºC)	Frequency (MHz)	Error (ppm)
-30	221	0.24
-20	198	0.21
-10	155	0.16
0	-45	-0.05
10	56	0.06
20	55	0.06
30	72	0.08
40	117	0.12
50	253	0.27



LIMIT: FCC 47 CFR 90.213 RSS-119 5.3

Channel Spacing (kHz)	Frequency Error (ppm)
12.5	1.5

TRANSMITTER FREQUENCY STABILITY - VOLTAGE

SPECIFICATION: FCC 47 CFR 2.1055 (d) (1) RSS-119 5.3

GUIDE: TIA/EIA-603D 2.2.2

MEASUREMENT PROCEDURE:
1. Refer Annex A for equipment set up.
2. The EUT was tested for frequency error at an input voltage to the radio of 85% to 115%.
3. The frequency error was recorded in parts per million (ppm).

MEASUREMENT RESULTS:

Voltage	FREQUENCY ERROR (ppm) for 12.5 kHz			
	896.1 MHz	900.9 MHz	935.1 MHz	939.9 MHz
13.8 V_{DC}	-0.03	0.00	-0.03	0.01
11.7 V_{DC}	-0.01	0.00	-0.04	0.01
15.9 V_{DC}	0.00	0.00	-0.04	0.00

LIMIT CLAUSES: FCC 47 CFR 90.213 RSS-119 5.3

Channel Spacing (kHz)	Frequency Error (ppm)
12.5	1.5

RECEIVER SPURIOUS EMISSIONS (CONDUCTED)

SPECIFICATION: RSS-119 5.11

GUIDE: TIA/EIA-603D 2.1.2

MEASUREMENT PROCEDURE:
1. Refer Annex A for Equipment set up diagram.
2. The frequency range examined was from 30 MHz to 3 times highest tunable frequency.
3. Spurious emissions which were attenuated more than 20 dB below the limit were not recorded.

935.1 MHz Receive		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

939.9 MHz Receive		
Emission Frequency (MHz)	Level (nW)	Level (dBm)
~	~	~
No emissions were detected within 20 dB of Limit.		

LIMIT CLAUSE: RSS-Gen 6(b)

LIMIT	30 → 1000 MHz	2 nW	- 57 dBm
	> 1000 MHz	5 nW	- 53 dBm

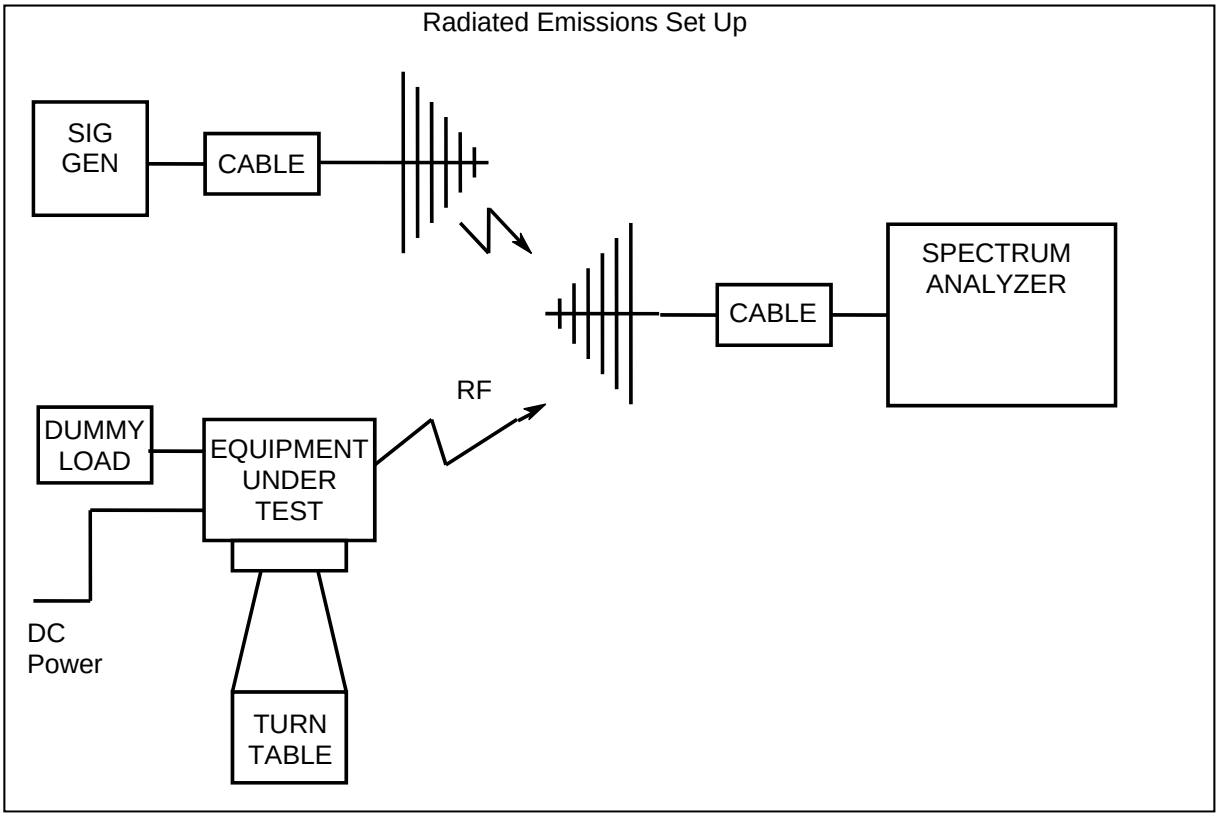
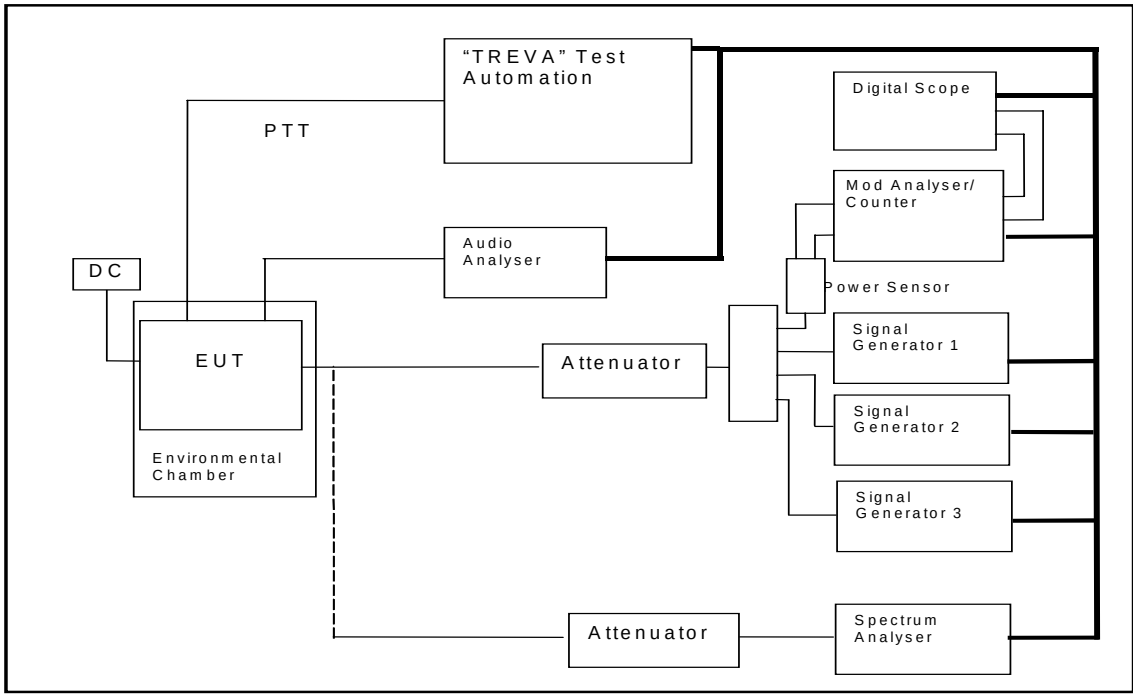
TEST EQUIPMENT LIST

Equipment Type	***Information***	***Manufacturer***	***Model No***	***Serial No#***	***Tait ID***	***Cal Due***
Antenna	18GHz DRG	Emco	DRG3115	9512-4638	E3560	6-Mar-16
Antenna	18GHz DRG	Emco	DRG3115	2084	E3076	6-Mar-16
Antenna	Reverb - 1-18GHz DRG	Schwarzbeck	BBHA 9120 D	9120D-885	E4857	
Antenna	Reverb - 1-18GHz DRG	Schwarzbeck	BBHA 9120 D	9120D-884	E4858	
Audio Analyser	TREVA2	Hewlett Packard	HP8903B	2818A04275	E3710	16-Oct-15
Coax Cable	2m Black	Suhner	RG214HF/Nm/ Nm/2000	TeltestBlack2	E4623	14-Oct-15
Coax Cable	2m Black	Suhner	RG214HF/Nm/ Nm/2000	TeltestBlack3	E4624	15-Oct-15
Coax Cable	3m Blue	Suhner	Sucoflex 104A	44611/4A	E4620	16-Oct-15
Coax Cable	OATS Turntable Cable 1	Intelcom	RG214	OATS1	E4621	23-Oct-15
Coax Cable	OATS Tower Cable	Intelcom	RG214	OATS2	E4622	23-Oct-15
Coax Cable	Reverb - 4.5m Multiflex 141	TeltestBlue6	MF 141	TeltestBlue6	E4843	13-Oct-16
Coax Cable	Reverb - 2m Multiflex 141	TeltestBlue5	MF 141	TeltestBlue5	E4844	14-Oct-15
Coax Cable	Reverb - 2m Multiflex 141	TeltestBlue4	MF 141	TeltestBlue4	E4845	14-Oct-15
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue3	MF 141	TeltestBlue3	E4846	14-Oct-15
Coax Cable	Reverb - 1m Multiflex 141	TeltestBlue1	MF 141	TeltestBlue1	E4848	14-Oct-15
Coax Cable	2.5m Blue	Suhner	Sucoflex 104A	33449/4PEA	E4997	8-Apr-16
Coax Cable	OATS Turntable Cable 2	Intelcom	RG215	OATS3	E4995	23-Oct-15
Environ. Chamber	Chest	Contherm	Chest	E3397	E3397	2-Aug-15
Field Strength Meter	10kHz 9.25GHz RF Field Probe	NARDA	EP601	401WX01247	E4856	21-Apr-16
Modulation Analyser	TREVA2	Hewlett Packard	HP8901B (Opt 002)	3704A05837	E3786	18-Oct-15
Multimeter		Fluke	77	35069359	E3237	15-Oct-15
OATS	NSA	Tait				9-Jun-16
OATS	Antenna Tower	Electrometrics	EM-4720-2	112	E4447	
OATS	Controller	Electrometrics	EM-4700	119	E4445	
OATS	Turntable	Electrometrics	EM-4704A	105	E4446	
OATS	FCC Listing Registration			837095		12-May-16
Oscilloscope	100MHz Digital	Tektronics	TDS340	B013611	E3585	16-Oct-15
Power Meter	TREVA2 Power Head for HP8901	Hewlett Packard	HP11722A	2716A02037	1575	18-Oct-15
Power Supply	TREVA2 60V/25A	Agilent	N5767A	US09F4901H	E4656	16-Oct-15
Power Supply	60V/50A/1000W	Hewlett Packard	HP6012B	2524A00616	E3712	16-Oct-15
Power Supply	60V/25A	Agilent	N5767A	3111A05573	E4979	21-Oct-15
RF Amplifier	+21.7 dB 1GHz	Tait	ZFL-1000LN	E3660	E3360	19-Jan-16
RF Amplifier	Pre-amplifier	Agilent	87405C	MY47010688	E4941	16-Oct-15
RF Attenuator	30dB 350W	Weinschel	67-30-33	BR0531	E4280	18-Oct-15

Equipment Type	***Information***	***Manufacturer***	***Model No***	***Serial No#***	***Tait ID***	***Cal Due***
RF Chamber	Reverb - Stirrer controller for reverb chamber	Teseq	Stirrer Controller	29765.1	E4854	
RF Chamber	Reverb - 0.5 - 18GHz Reverberation Chamber	Teseq	RVC XS	29765	E4855	
RF Combiner	TREVA2	Minicircuits	ZFSC-4-1	-	E4084	
RF Load	150W	Bird	8166	524	E3625	17-Oct-15
Signal Generator	Analog 4GHz	Agilent	E4422B	GB40050320	E3788	18-Oct-15
Signal Generator	Analog 3.2GHz	Hewlett Packard	HP8648C	3443U00543	E3558	20-Oct-15
Signal Generator	TREVA2 Analog 3.3GHz	Rohde & Schwarz	SML03 1090.3000.13	100597	E4050	24-Oct-15
Spectrum Analyser	26.5GHz	Agilent	PXA N9030A	MY49432161	E4907	6-Jul-16
Spectrum Analyser	13.2GHz	Hewlett Packard	HP8562E	3821A00779	E3715	22-Oct-15
Spectrum Analyser	13.2GHz	Agilent	E4445A	MY42510072	E4139	22-Oct-16
Temp & Humidity datalogger		Hobo	U21-011	10134275	E4980	30-Jun-15

NOTE: Items without calibration dates are calibrated immediately before use, or set using calibrated instruments.

ANNEX A – TEST SETUP DETAILS



All other testing is performed using the **T**eltest **R**adio **EVA**luation system (TREVA), which is configured as shown below. The Spectrum Analyser is connected to the EUT via the attenuator network for Conducted Emissions testing, and Occupied Bandwidth.