Advanced Compliance

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Hillsborough, NJ 08844
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Electromagnetic Emission Compliance Test Report

Equipment Under Test (EUT)	Indoor Repeater R4-30-S8
Applicant	Shyam Telecom Inc.
In Accordance With	FCC Part 90, Subpart I
Test by	Advanced Compliance Laboratory, Inc. 6 Randolph Way Hillsborough, New Jersey 08844
Authorized by	Wei Li Lab Manager Signature
Date	July 27, 2007
AC Lab Report Number	0048-070615-01

NVLAP®
Lab Code:200101-0

The test result in this report is supported and covered by the NVLAP accreditation.

Index

Section 1. Summary of Test Results

Manufacturer:	Shyam Telecom Inc.
Model No.:	Indoor Repeater R4-30-S8
Sample No.:	R33ICG011

General: **All measurements are traceable to national standards**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 90, Subpart I.

☒New Submission ☐Production Unit

☐Class II Permissive Change ☒Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

"See Summary of Test Data"

NVLAP LAB CODE: 200101-0

Summary of Test Data

RF Power Output	2.1046 90.205(a)	500W ERP 100W EIRP	Complies
Occupied Bandwidth (Voice & SAT)	2.1049(i)	Mask	N/A*
Occupies Bandwidth (Wideband Data)	2.1049(i)	Mask	N/A*
Occupied Bandwidth (Digital)	2.1049(i) 90.210	Mask	Complies
Spurious Emissions at Antenna Terminals	2.1051	-20 dBm	Complies
Field Strength of Spurious Emissions	2.1053 90.210	-20 dBm E.I.R.P.	Complies
Frequency Stability	2.1055 90.213	1.0/1.5 ppm	N/A*

* These items are NOT applied to the EUT.

The estimated uncertainty of the test result is given as following. The method of uncertainty calculation is provided in Advanced Compliance Lab. Doc. No. 0048-01-01.

	Prob. Dist.	Uncertainty(dB)	Uncertainty(dB)	Uncertainty(dB)
		30-1000MHz	1-6.5GHz	Conducted
Combined Std. Uncertainty u_c	norm.	±2.36	±2.99	±1.83

Wei Li
Lab Manager
Advanced Compliance Lab

Date: July 27, 2007

Section 2. General Equipment Specification

<table>
<tr><td>Supply Voltage</td><td></td><td colspan="5">100-240VAC, 47-63Hz</td></tr>
<tr><td rowspan="3">Frequency Range</td><td>Band I</td><td colspan="5">UL/806-824MHz; DL/851-869MHz</td></tr>
<tr><td></td><td colspan="5"></td></tr>
<tr><td>Modulation</td><td>CDMA (F9W) ☐</td><td>iDEN (GXW) ☒</td><td>EDGE (G7W) ☐</td><td>CDPD (F9W) ☐</td><td>APCO25 (F8W, F1D) ☒</td></tr>
<tr><td>Rated Power Output</td><td></td><td colspan="5">+30dBm each port (DL& UL)
Gain tolerance over the band: ±2dB.</td></tr>
<tr><td>Output Impedance</td><td></td><td colspan="5">50ohm</td></tr>
<tr><td rowspan="2">Frequency Translation</td><td rowspan="2"></td><td colspan="2">F1-F1 ☒</td><td colspan="2">F1-F2 ☐</td><td>N/A ☐</td></tr>
<tr><td colspan="2">Software ☐</td><td colspan="2">Duplexer Change ☐</td><td>Full Band Coverage ☒</td></tr>
</table>

DC voltages and DC currents per 2.1033(c)(8)

The input supply to the transmitter was set at 27 Volts DC. The RF power output was measured with the indicated voltage and current applied into the final RF amplifying device(s).

SMR 800 MHz Repeater

RF Output, DC Current and RF Input Power are all average values.
Measured Maximum RF output(Rated): 30 dBm
Measured DC voltage: 27V
Measured DC current: 1.3A
Measured Minimum RF output: -11 dBm
Measured DC voltage: 27V
Measured DC current: 0.7A

Tune-up procedure per 2.1033(c) (9)

There are no user accessible adjustments or tuning in this transceiver. All necessary adjustments and tuning are performed during manufacture of the product. Any adjustments or tuning after service or repair are done as part of that process as special equipment is required to perform such adjustments.

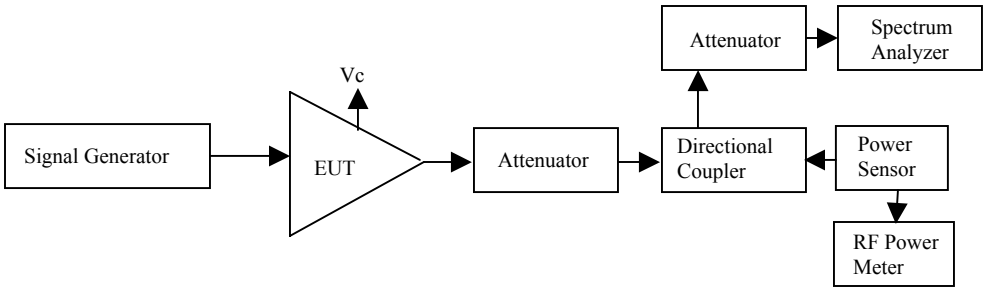
Description of Operation

This device is a dual band repeater operating in both downlink and uplink spectrums of 800MHz bands.

System Diagram

See Attachment.

General EUT Setup



Testing Frequency/Channel/Port Selection:

Band I: L(owest), M(iddle), H(ighest) of UL & DL bands

Section 3. RF Output Power

Name of Test:	*RF Output Power*	Test Standard:	*2.1046* *90.205(a)*
Tested By:	WEI LI	Test Date:	07/10/2007-07/26/2007

Minimum Standard: Para. No. 90.205& 635. The maximum effective radiated power (ERP) of base station transmitters and repeaters must not exceed 500 Watts (57dBm).

Method of Measurement: *Detachable Antenna:*
The average/peak power at antenna terminals is measured using power meter. The peak power at antenna terminals can be also measured using spectrum analyzer with proper setting (alternate).

Integral Antenna:
If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation

$$\frac{GP}{4\pi R^2} = \frac{E^2}{120\pi}$$

and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,
P = the equivalent isotropic radiated power in watts
E = the maximum measured field strength in V/m
R = the measurement range (3 meters)
G = the numeric gain of the transmit antenna in relation to an isotropic radiator

Test Result: **Complies**

Test Data:

Band I	Channel	Modulation	Power Output (dBm)	Rated Power (dBm)	Margin
Uplink	Hi	APCO25	27.8	30	-2.2
	Mid	APCO25	29.2	30	-0.8
	Low	APCO25	29.3	30	-0.7
	Hi	IDEN	28.7	30	-1.3
	Mid	IDEN	30.5	30	0.5
	Low	IDEN	30.4	30	0.4
Downlink	Hi	APCO25	28.6	30	-1.4
	Mid	APCO25	29.6	30	-0.4
	Low	APCO25	28.2	30	-1.8
	Hi	IDEN	29.8	30	-0.2
	Mid	IDEN	30.4	30	0.4
	Low	IDEN	30.1	30	0.1
Input Power (dBm)	≥-55 (for maximum output)				
Ref Offset	Ref offset=Cable Factor +Attenuation=10.1dB				

Section 4. Occupied Bandwidth

Name of Test:	*Occupied Bandwidth*	Test Standard:	*2.1049(i)* *90.210*
Tested By:	WEI LI	Test Date:	07/10/2007-07/26/2007

Minimum Standard: Not defined by FCC. Input vs. Output.

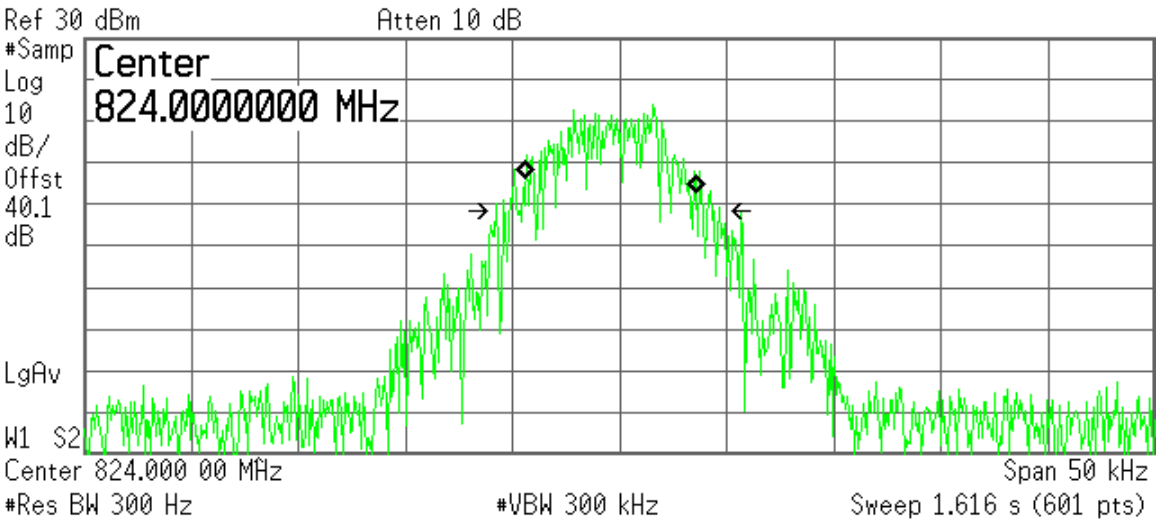
Method of Measurement: Spectrum Analyzer Settings:
RBW: CDMA (30 kHz), GSM (3kHz), EDGE (3KHz),NADC (1 kHz) and CDPD (1 kHz), iDEN(QAM) &APCO25(FSK): 300Hz
VBW: ≥RBW
Span: As required
Sweep: Auto
Input Signal Characteristics:
RF level: Maximum recommended by manufacturer

Test Result: **Complies**

Test Data: Attached Plots

Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Occupied Bandwidth: Band I Bands**
Plot Name:	**Uplink, Hi-Channel, APCO25 Modulation**
Configuration:	SG Input: -60dBm, Output Port: EUT BTS



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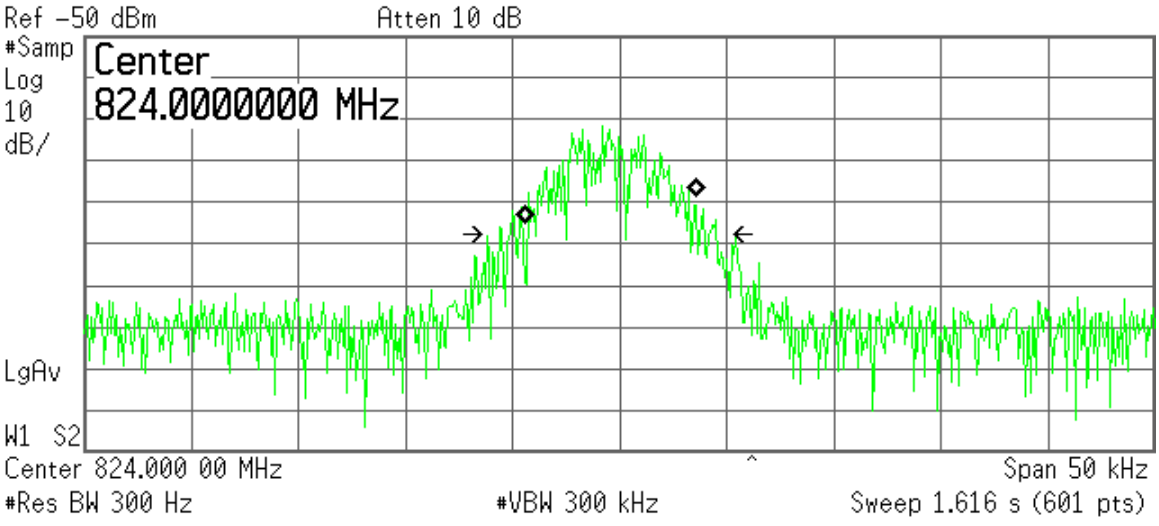

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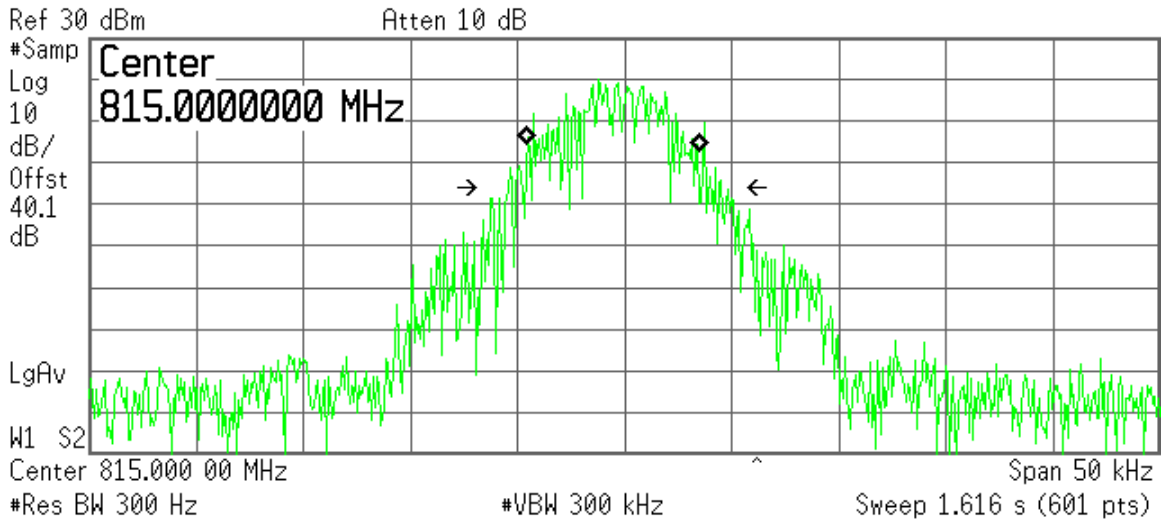

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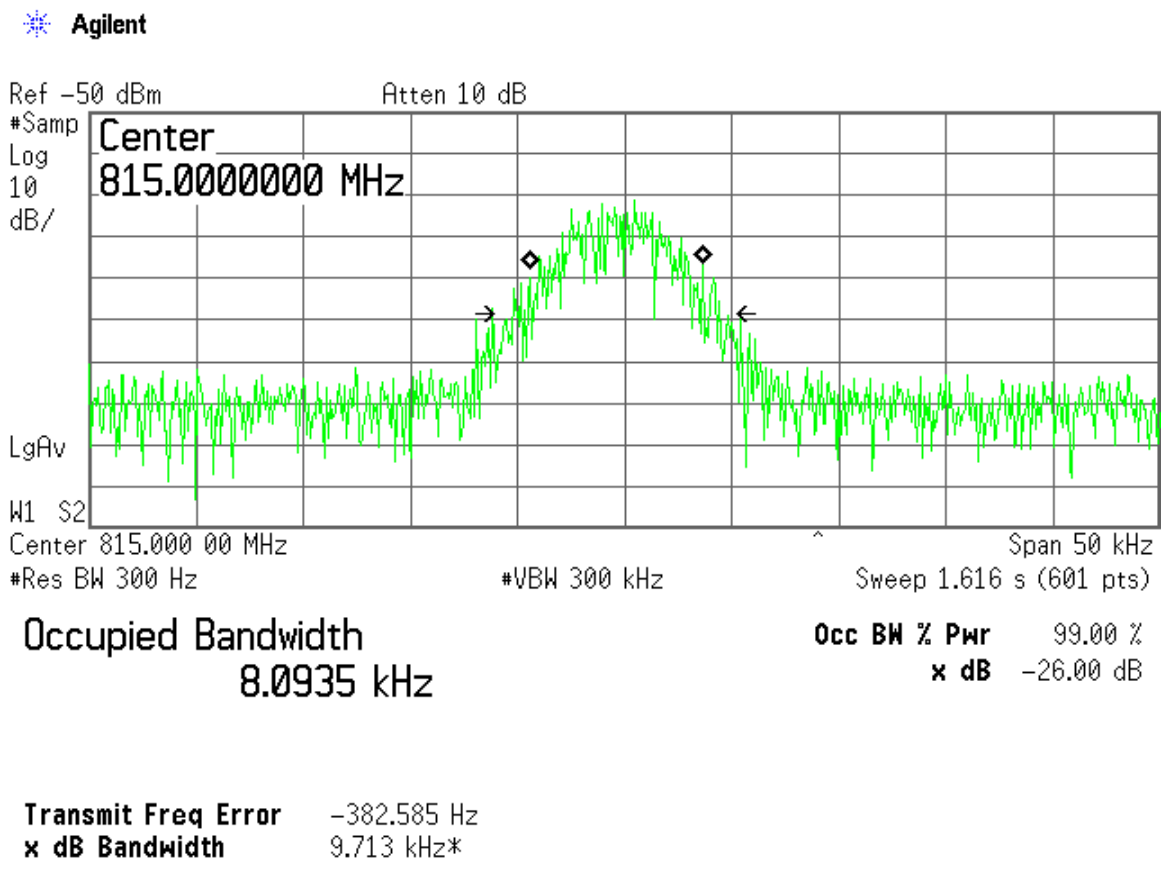

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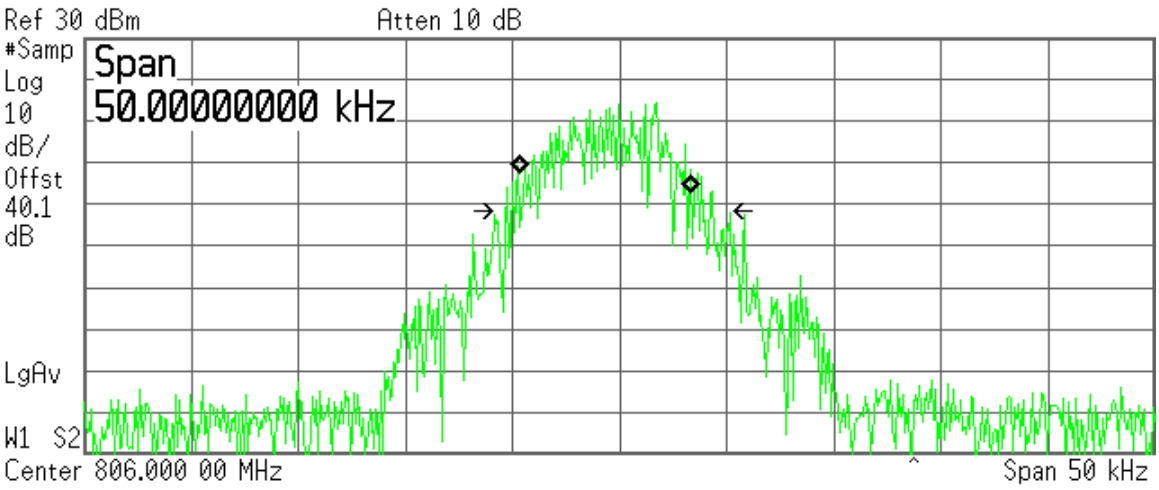

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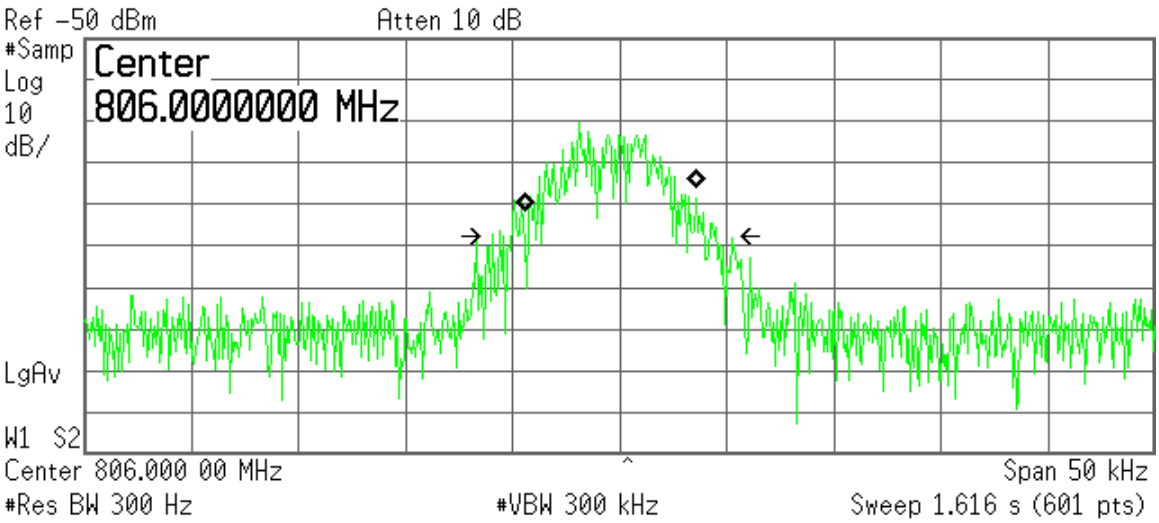

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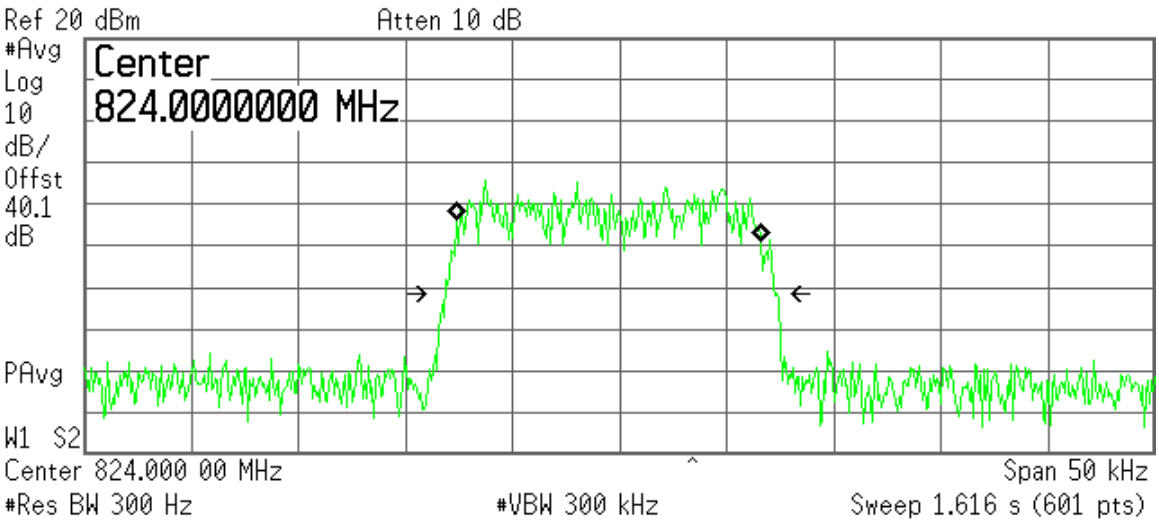

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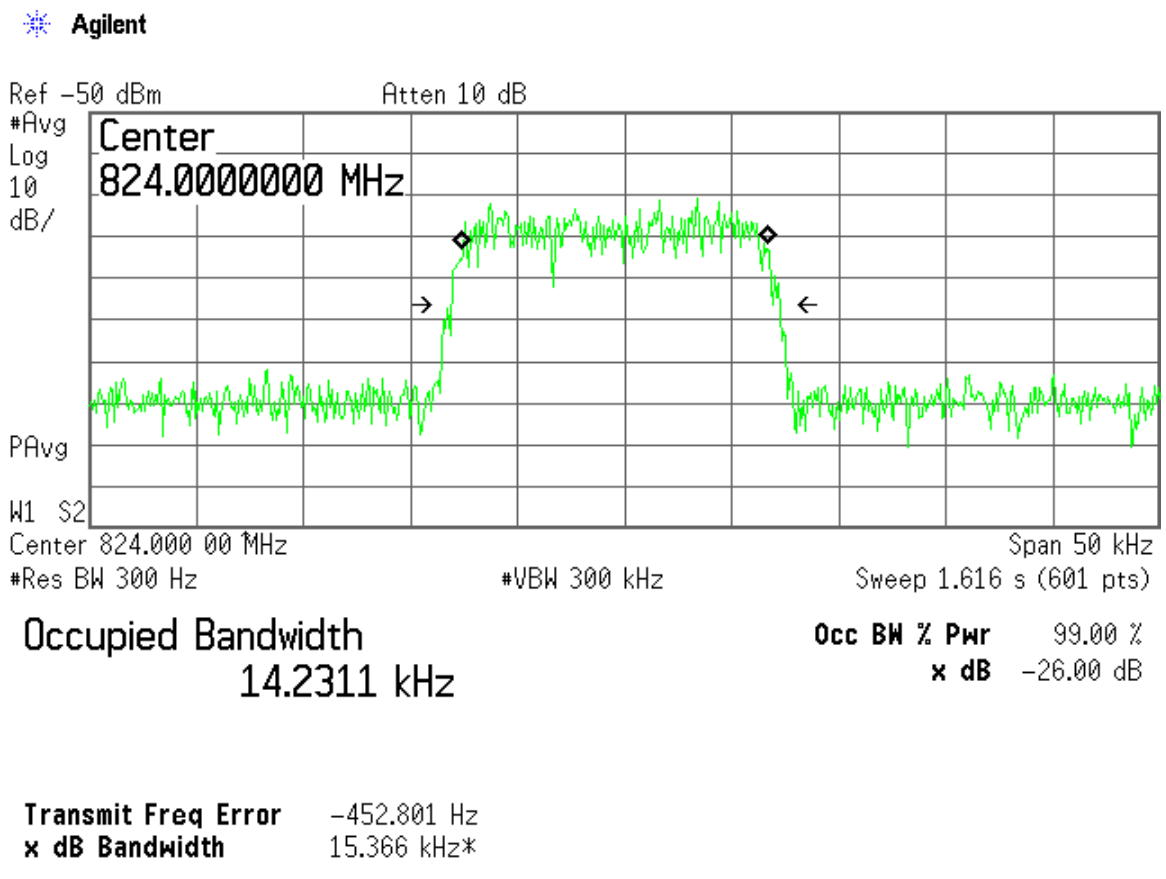

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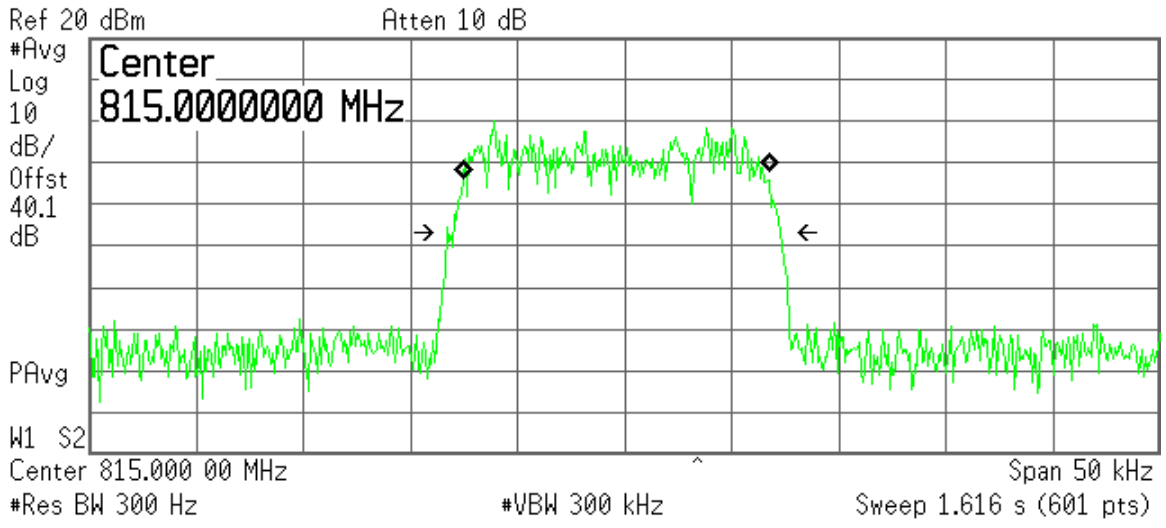
Section:	**Occupied Bandwidth: Band I Bands**
Plot Name:	**Uplink, Mid-Channel, IDEN Modulation**
Configuration:	SG Input: -60dBm, Output Port: EUT BTS



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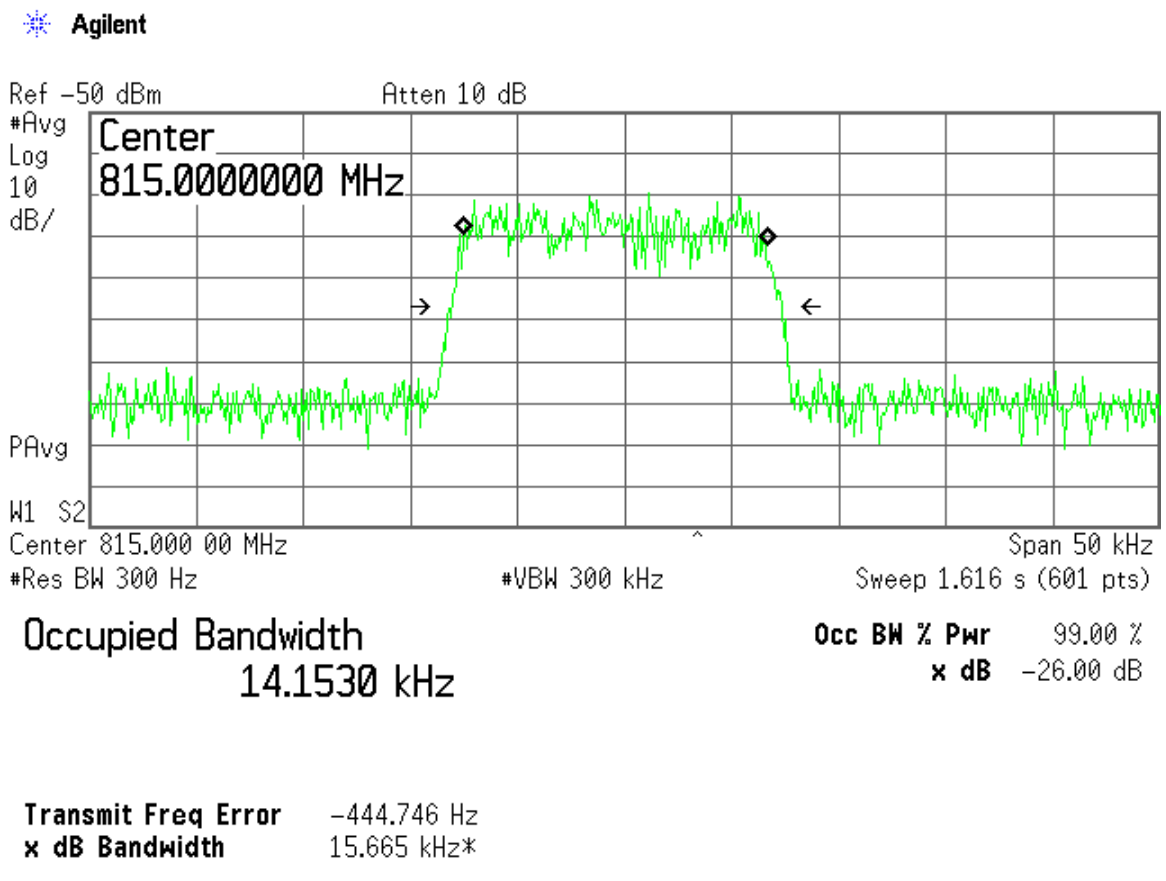

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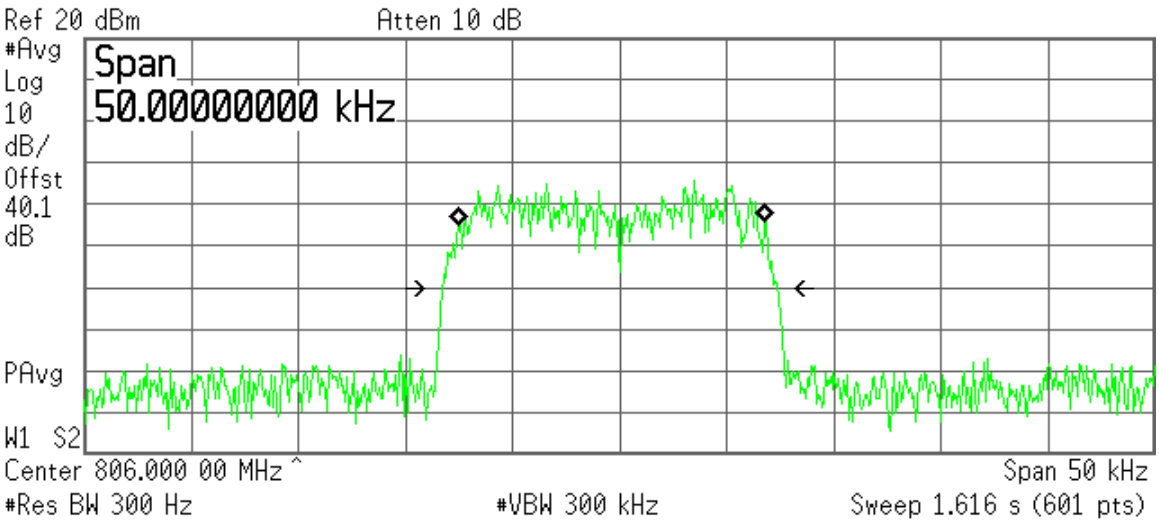
Section:	**Occupied Bandwidth: Band I Bands**
Plot Name:	**Uplink, Low-Channel, IDEN Modulation**
Configuration:	SG Input: -60dBm, Output Port: EUT BTS



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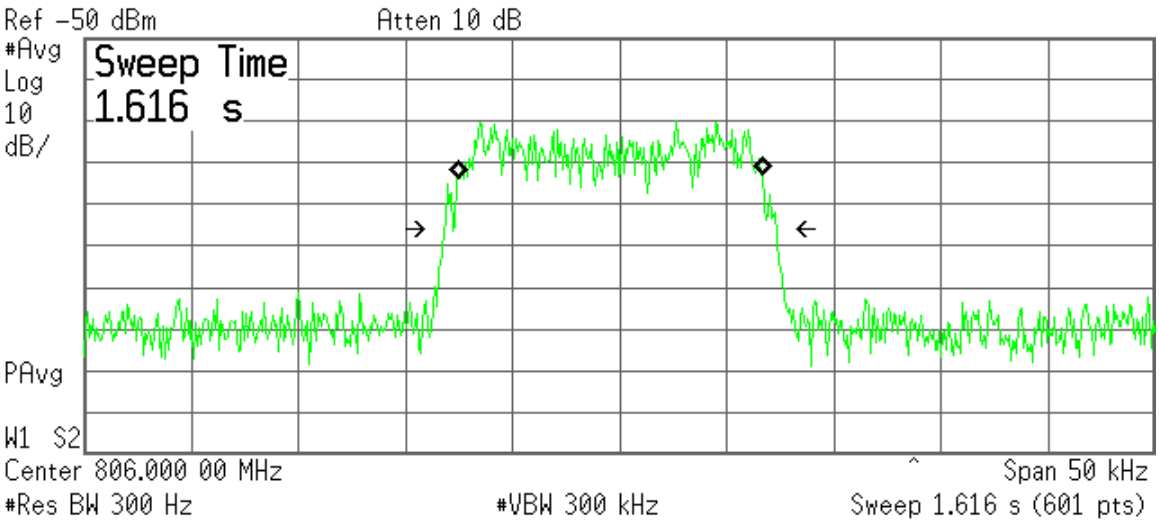

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Plot Name:	**Downlink, Hi-Channel, APCO25 Modulation**
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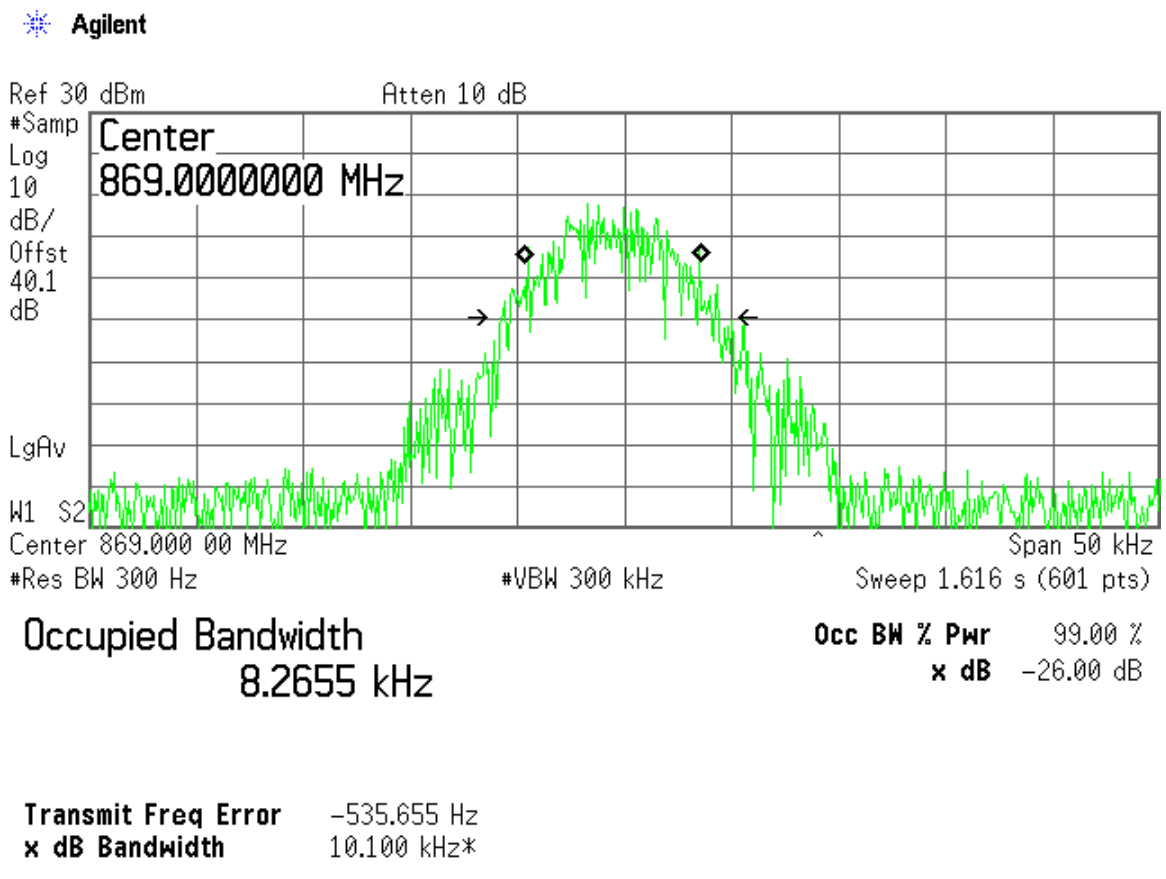

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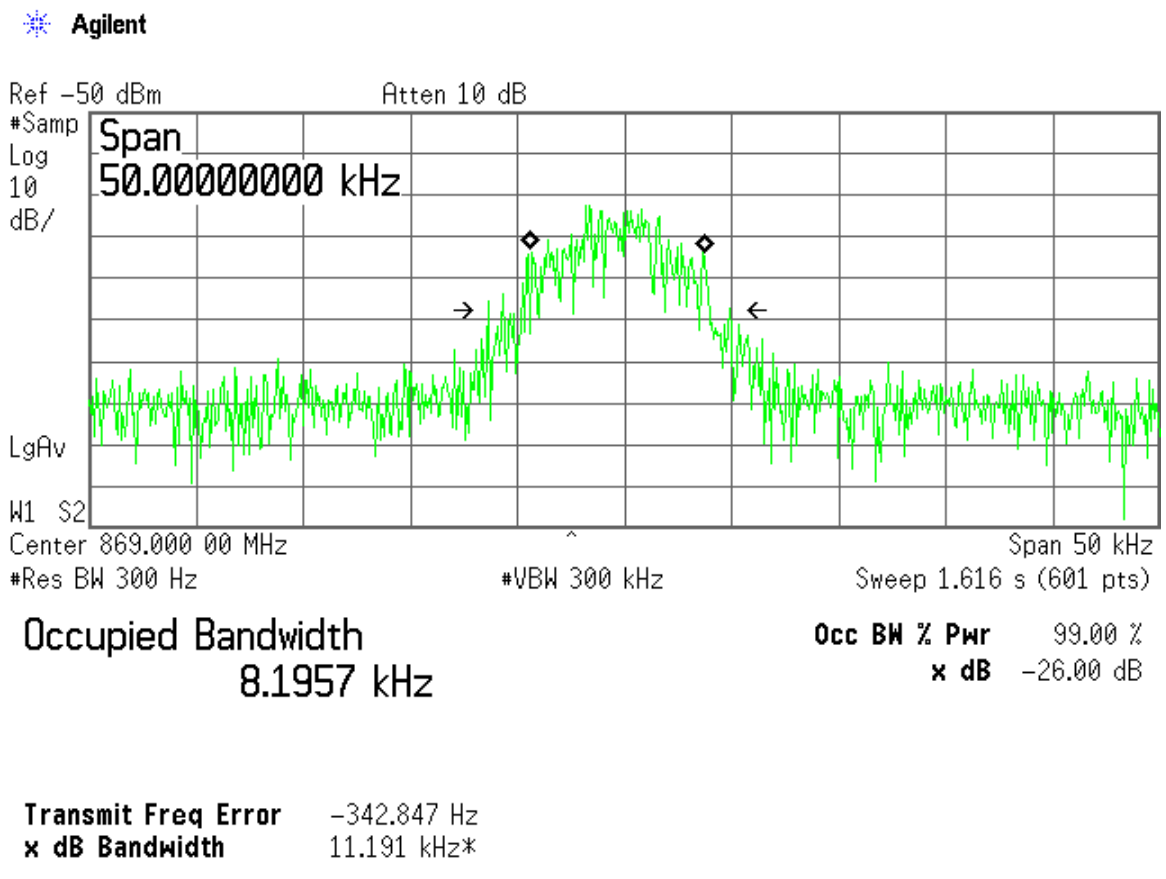

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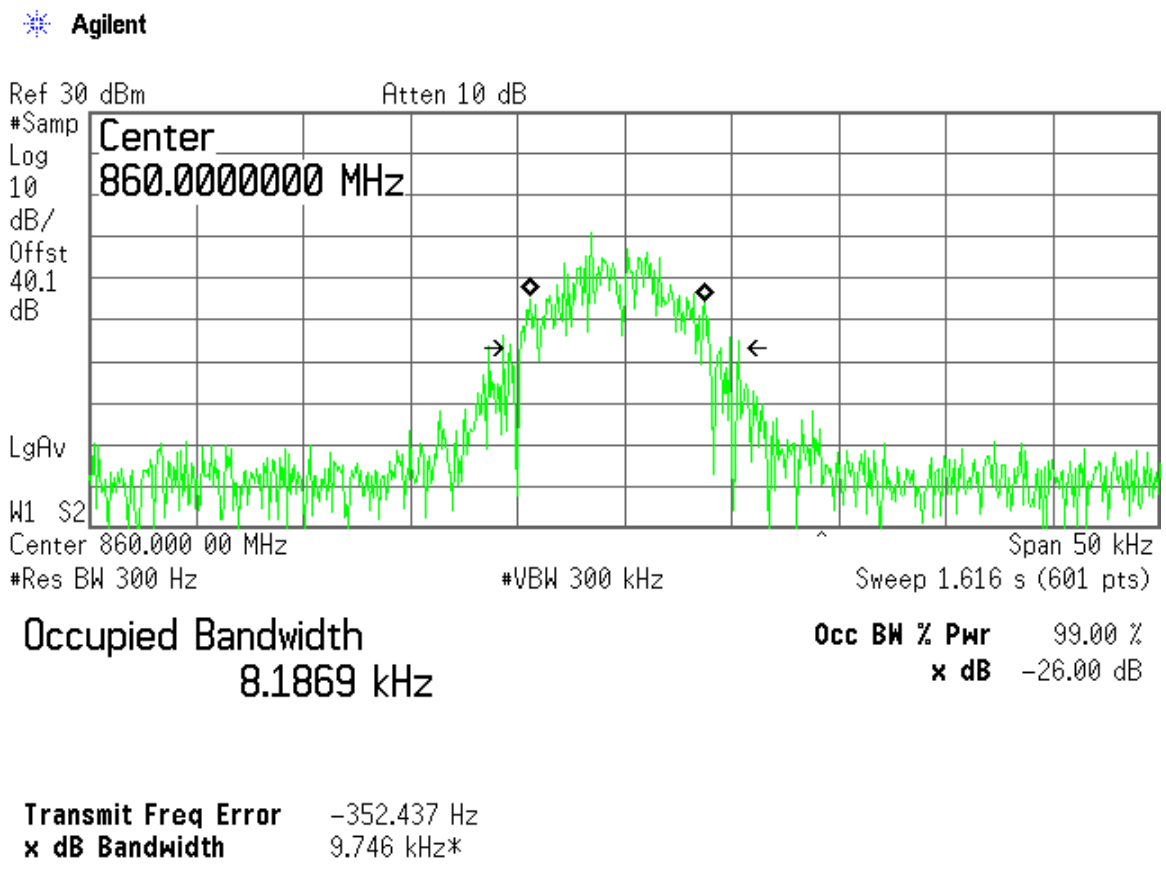

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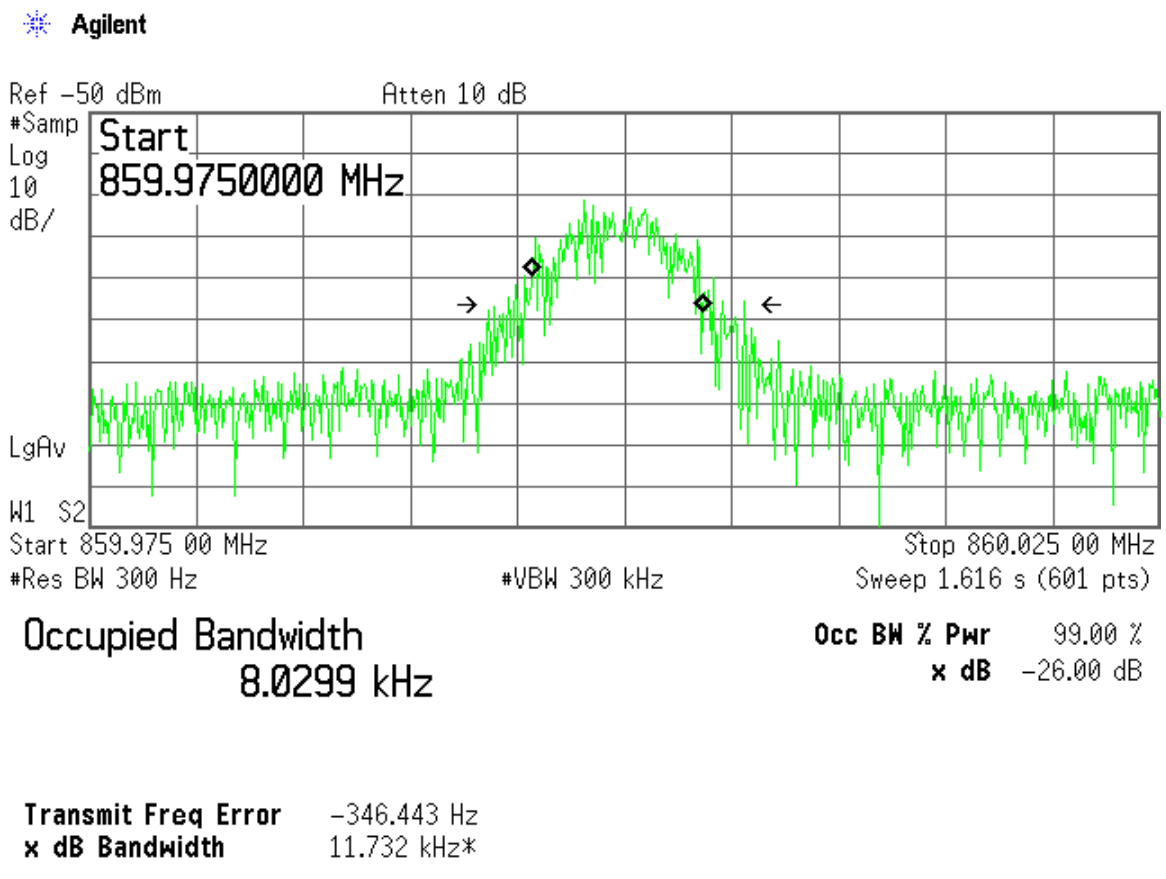

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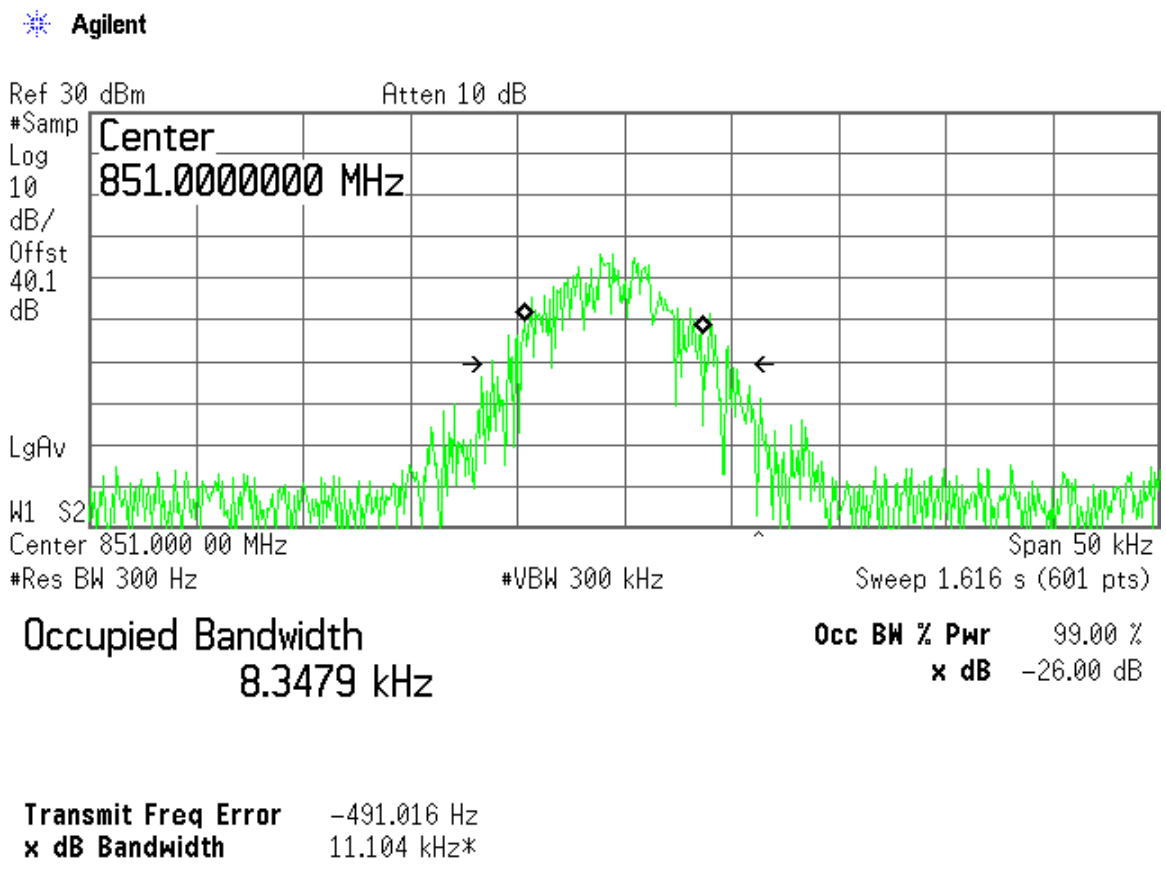

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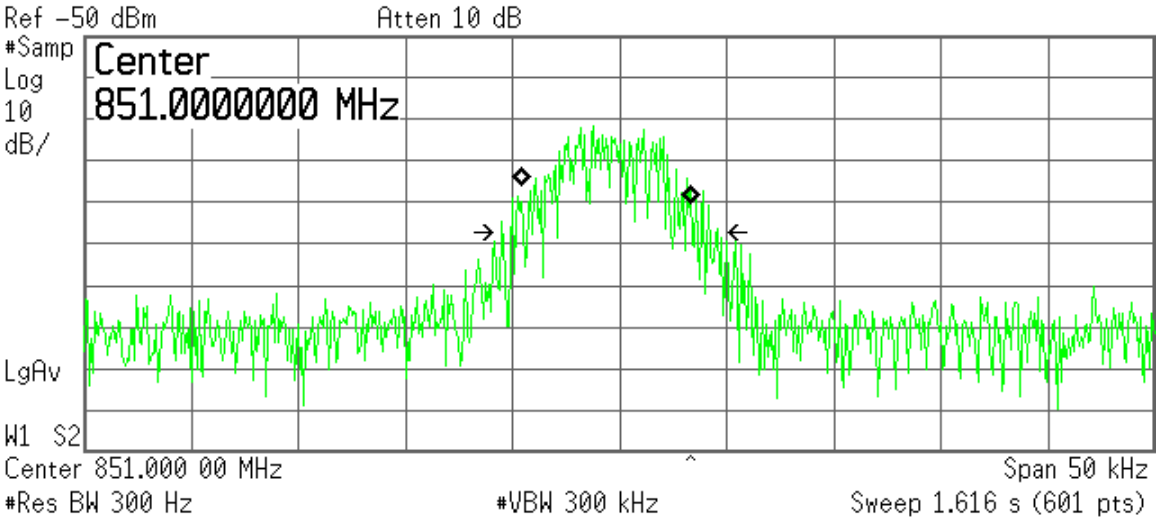

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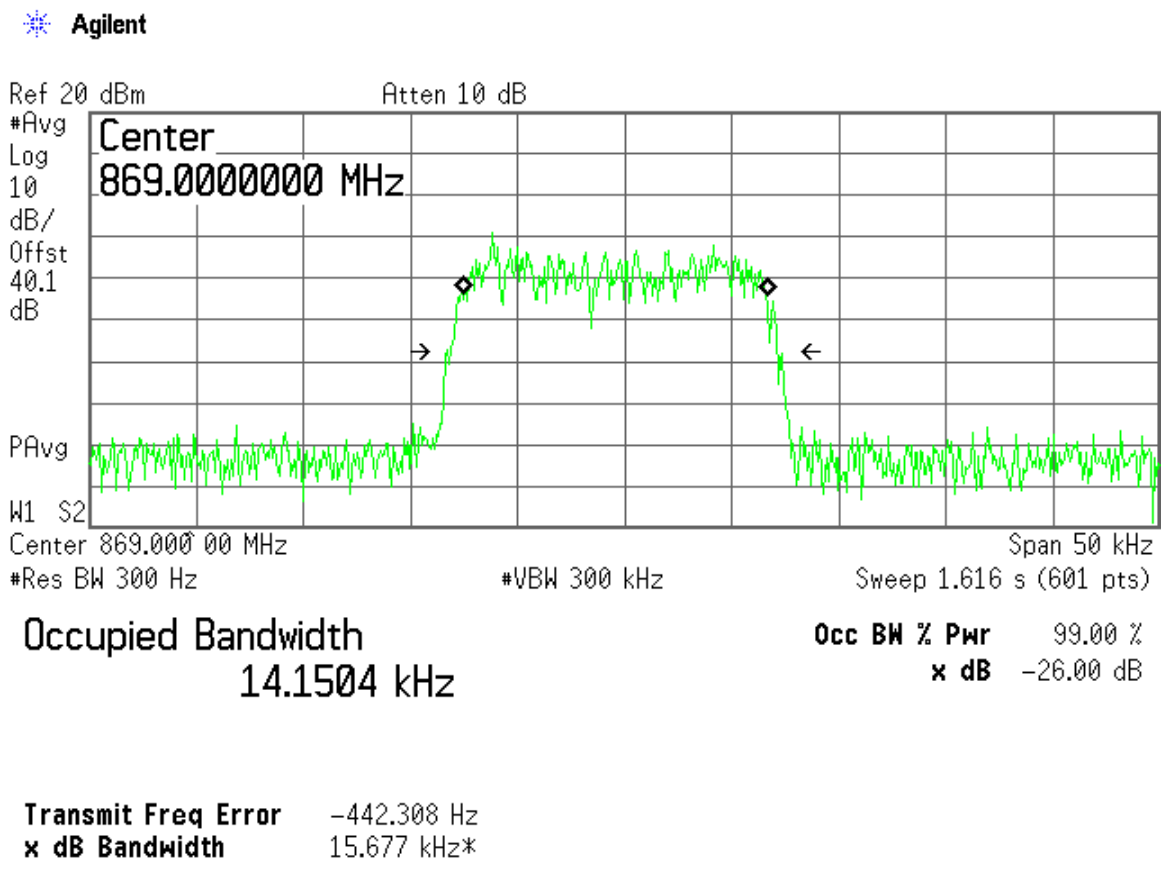

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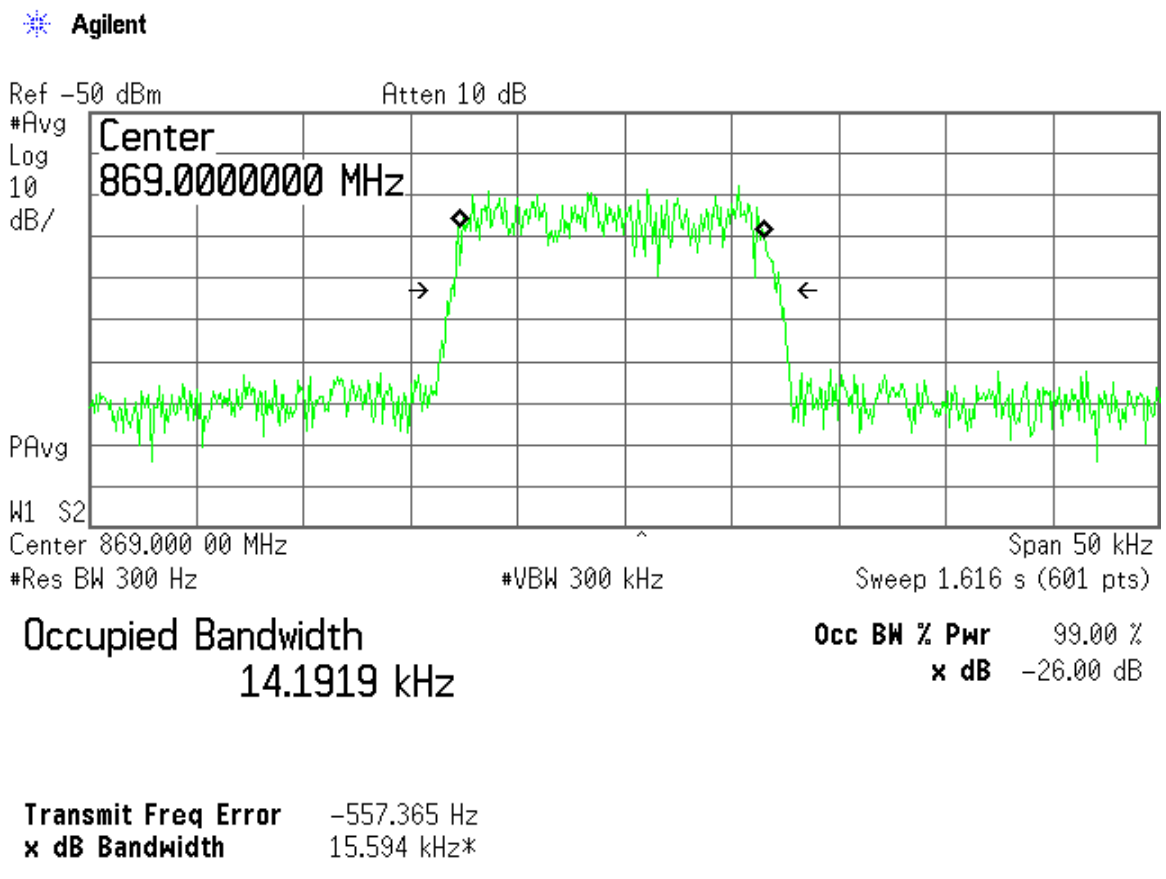

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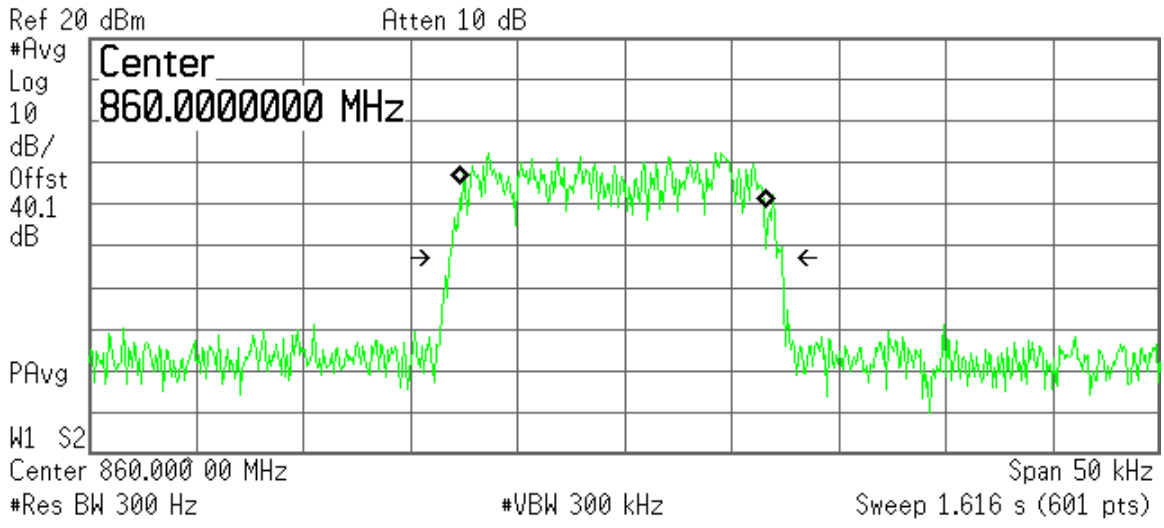

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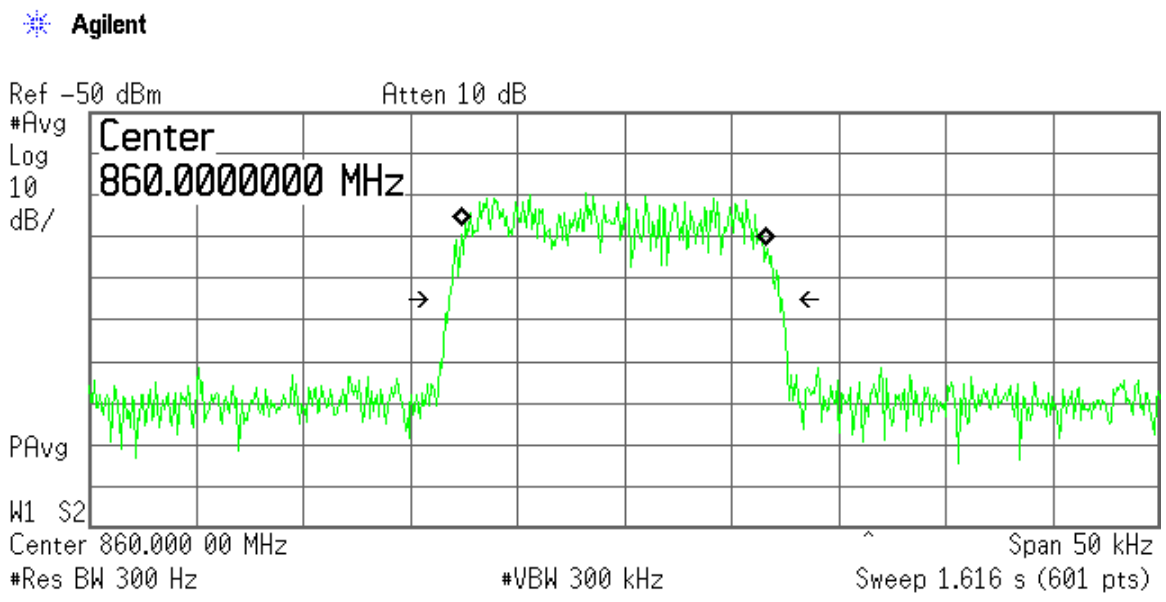

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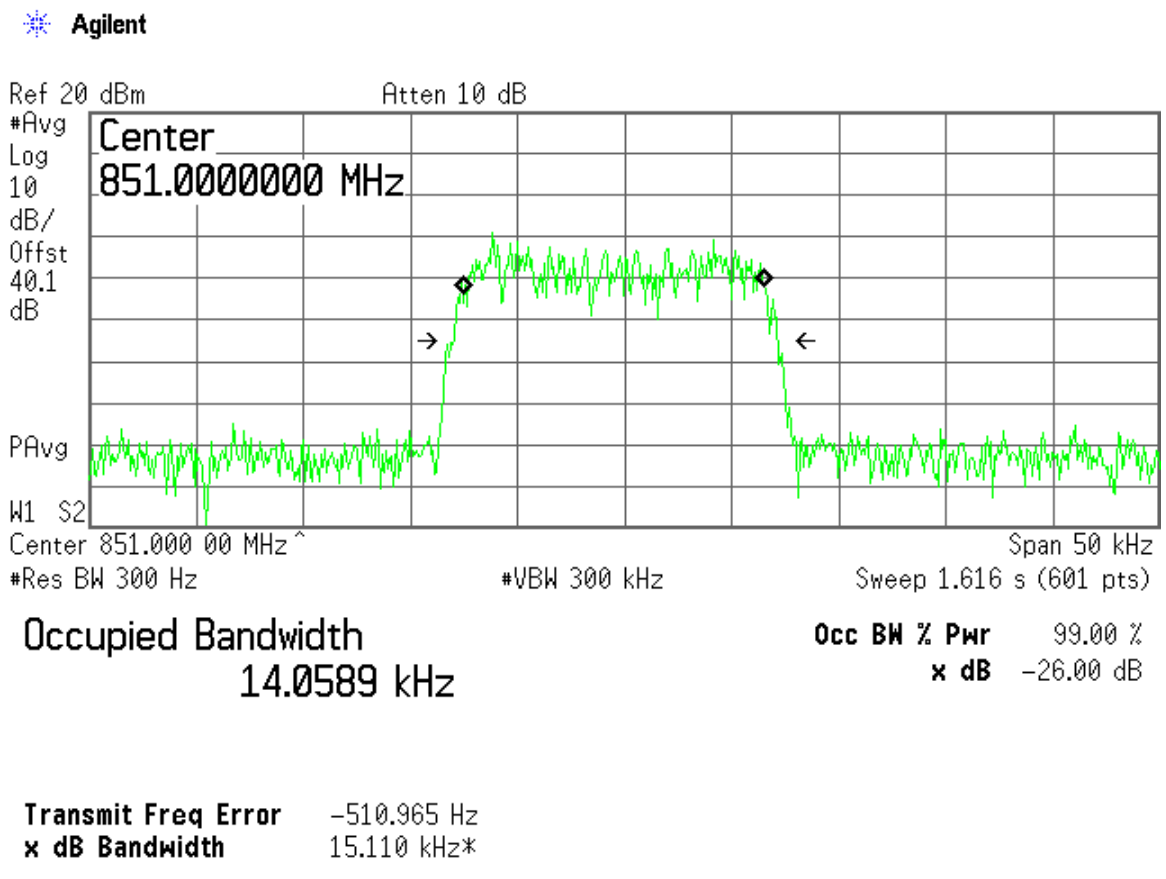
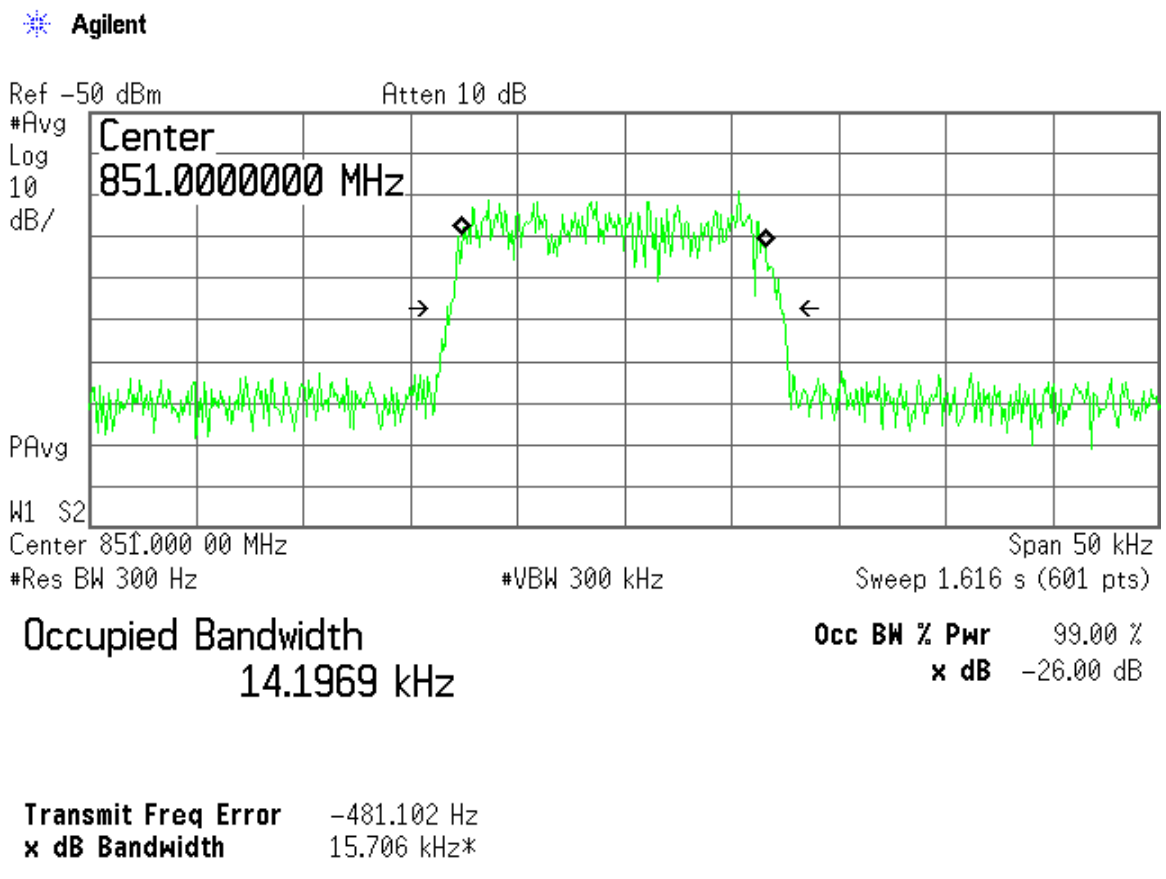
Section:	**Occupied Bandwidth: Band I Bands**
Plot Name:	**Downlink, Low-Channel, IDEN Modulation**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Occupied Bandwidth: Band I Bands**
Plot Name:	**Downlink, Low-Channel, IDEN Modulation**
Configuration:	SG Input: -60dBm, Output Port: SG



Section 5. Spurious Emissions at Antenna Terminals

Name of Test:	*Spurious Emissions at Antenna Terminals*	Test Standard:	*2.1051*
Tested By:	WEI LI EDWARD LEE	Test Date:	07/10/2007-07/26/2007

Minimum Standard: -20dBm

Method of Measurement: Spectrum Analyzer Settings:
RBW: 100 kHz&1MHz. As required for digital modulations.
VBW:>=RBW
Start Frequency: 0 MHz or lowest EUT clock frequency.
Stop Frequency: 13 GHz
Sweep: Auto

For Inter-modulation measurement: Two RF signals set as inputs. The frequencies of both RF signals shall be within the repeater's operating band. The spacing between both RF signals shall be the minimum possible spacing applied in a network. The level of both RF input signals shall be increased, until the maximum rated output power per channel, as declared by the manufacturer, is reached.

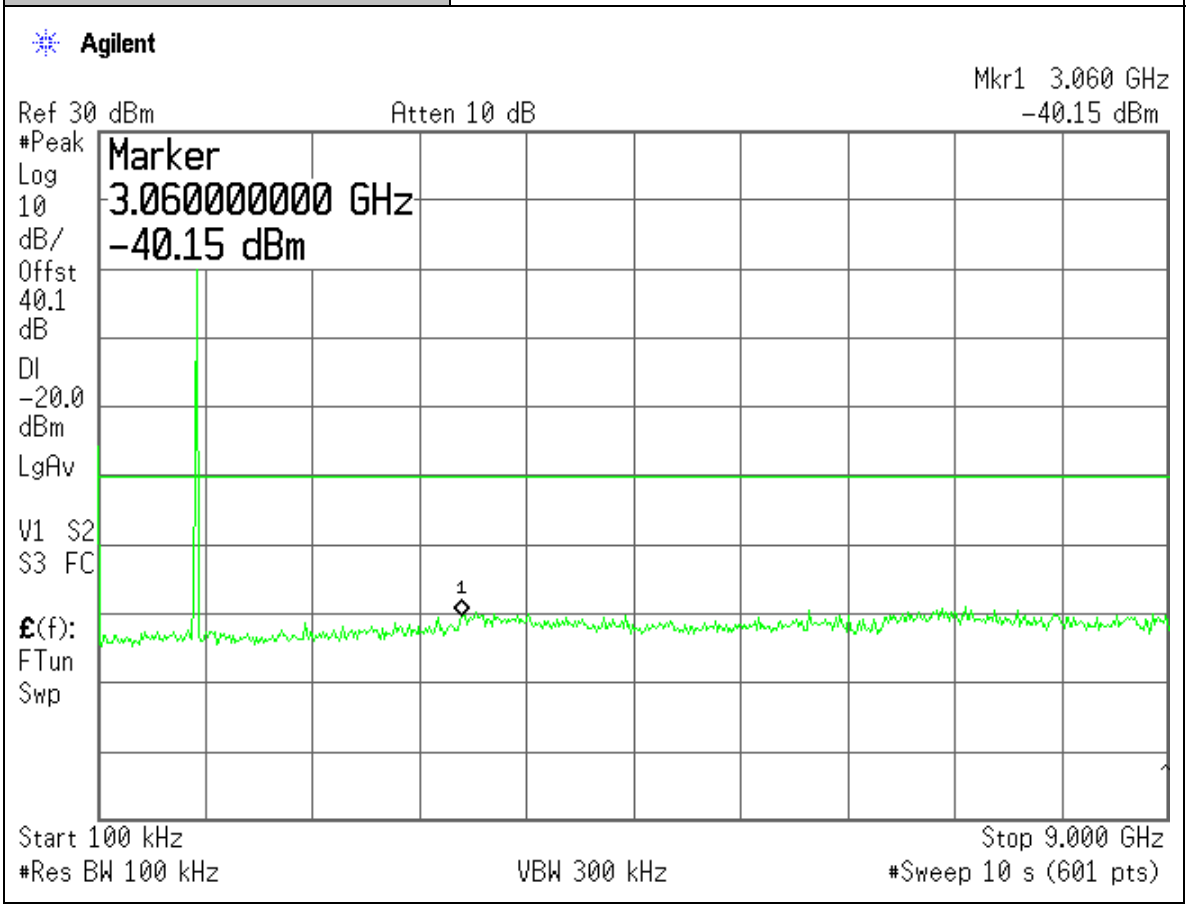
Frequencies: $f1=F_{(\text{Low CH/Mid CH/High CH})}$, $f2=f1\pm\Delta$
Min. spacing Δ=2.5MHz for APCO25 and 600KHz for IDEN&EDGE (including iDEN&APCO25)
Each RF Input Level:
about -3dB comparing to the max. input level of single RF Input test

Test Result: **Complies**

Test Data: Attached Plots

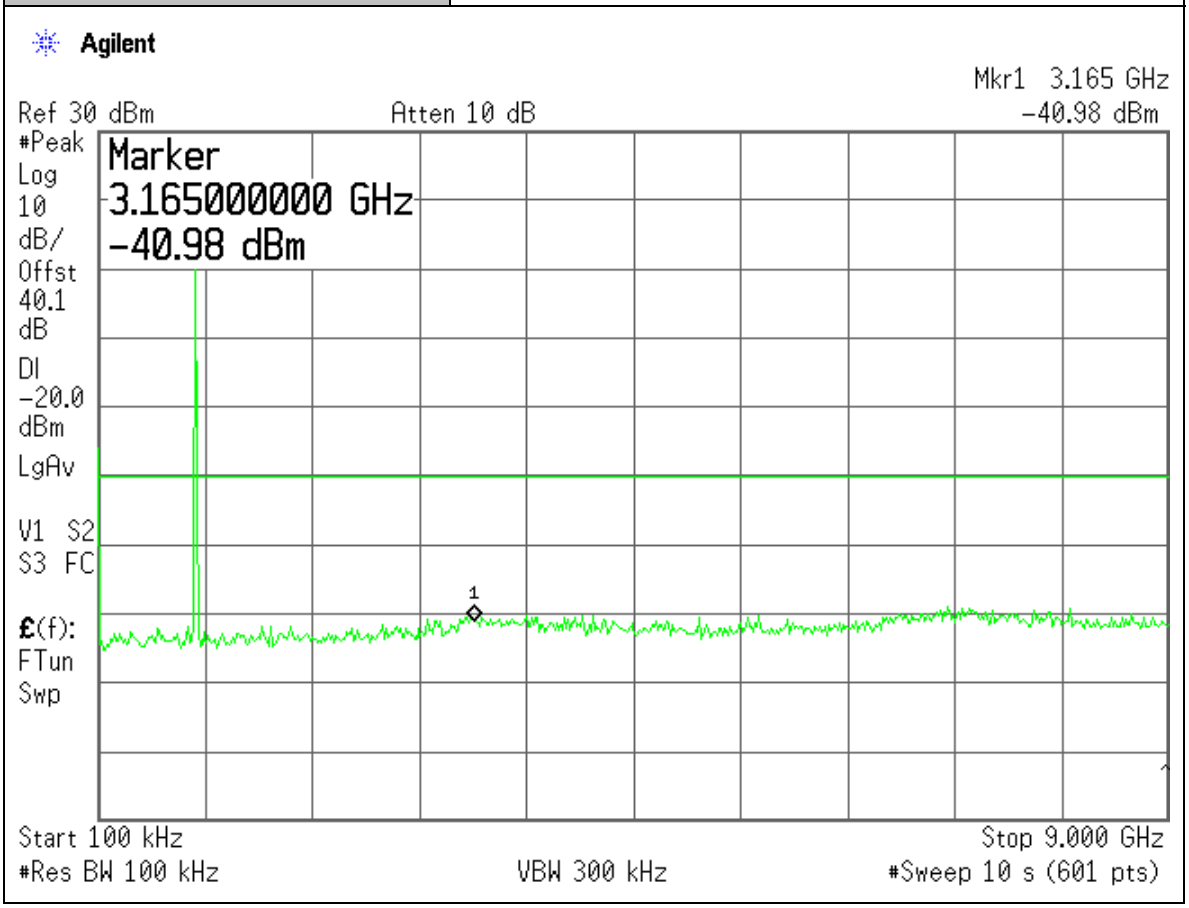
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**Uplink, Hi-Channel**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



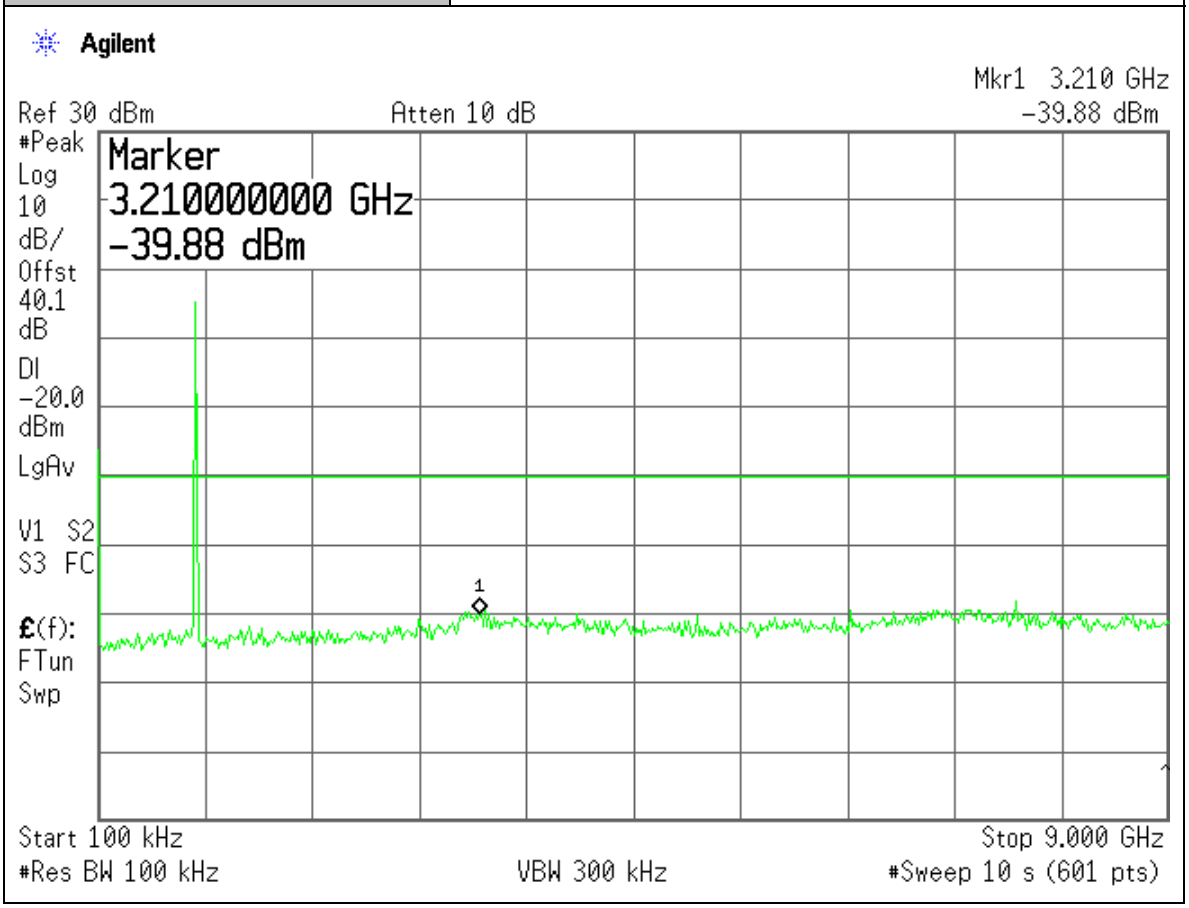
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**Uplink, Mid-Channel**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



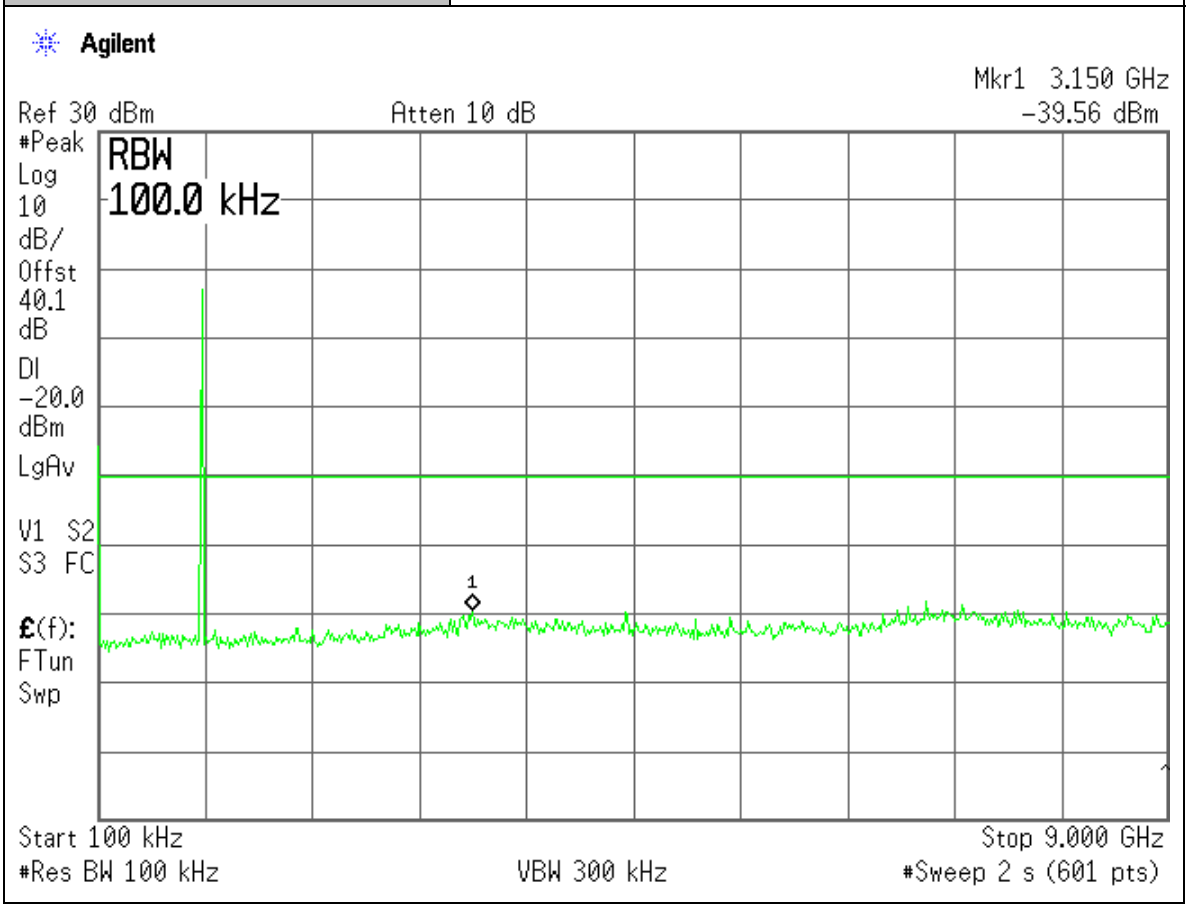
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**Uplink, Low-Channel**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



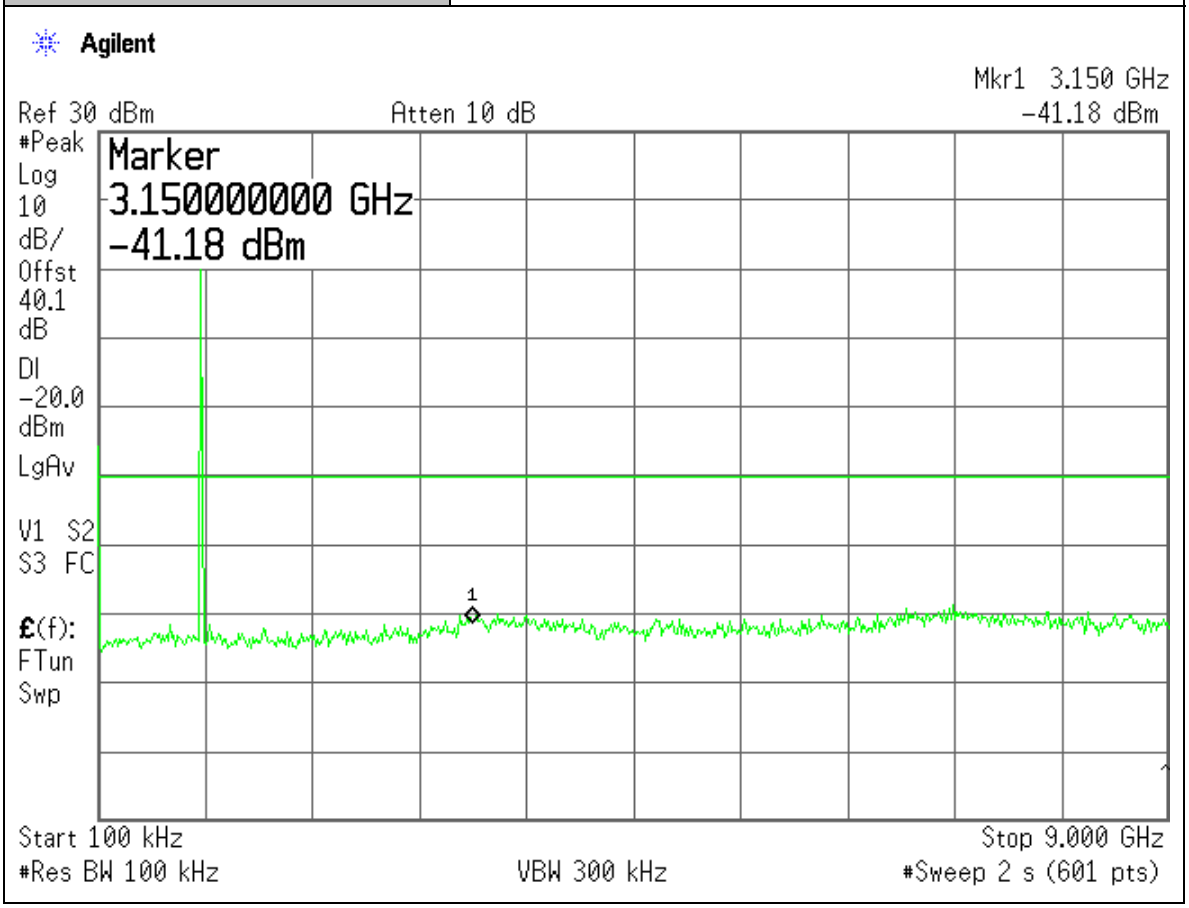
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**Downlink, Hi-Channel**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



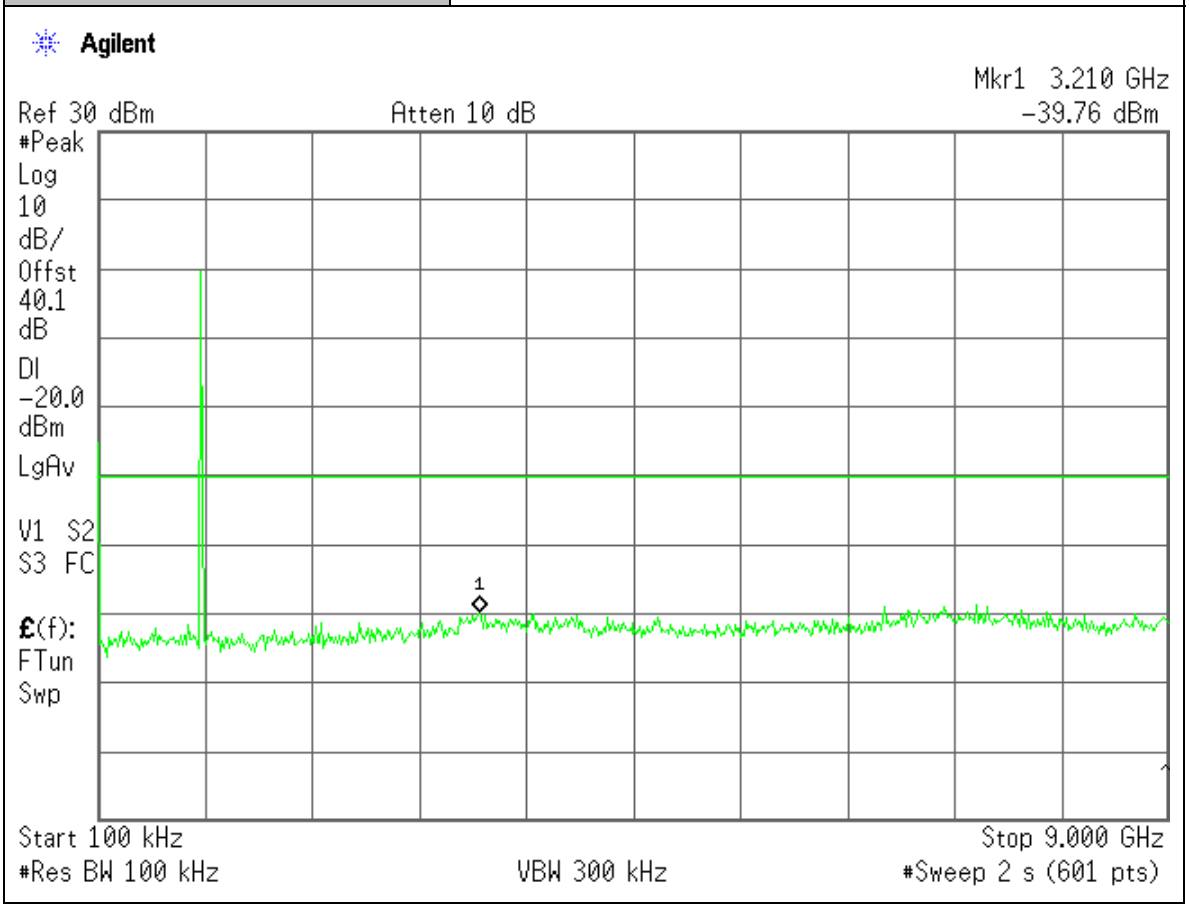
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**Downlink, Mid-Channel**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



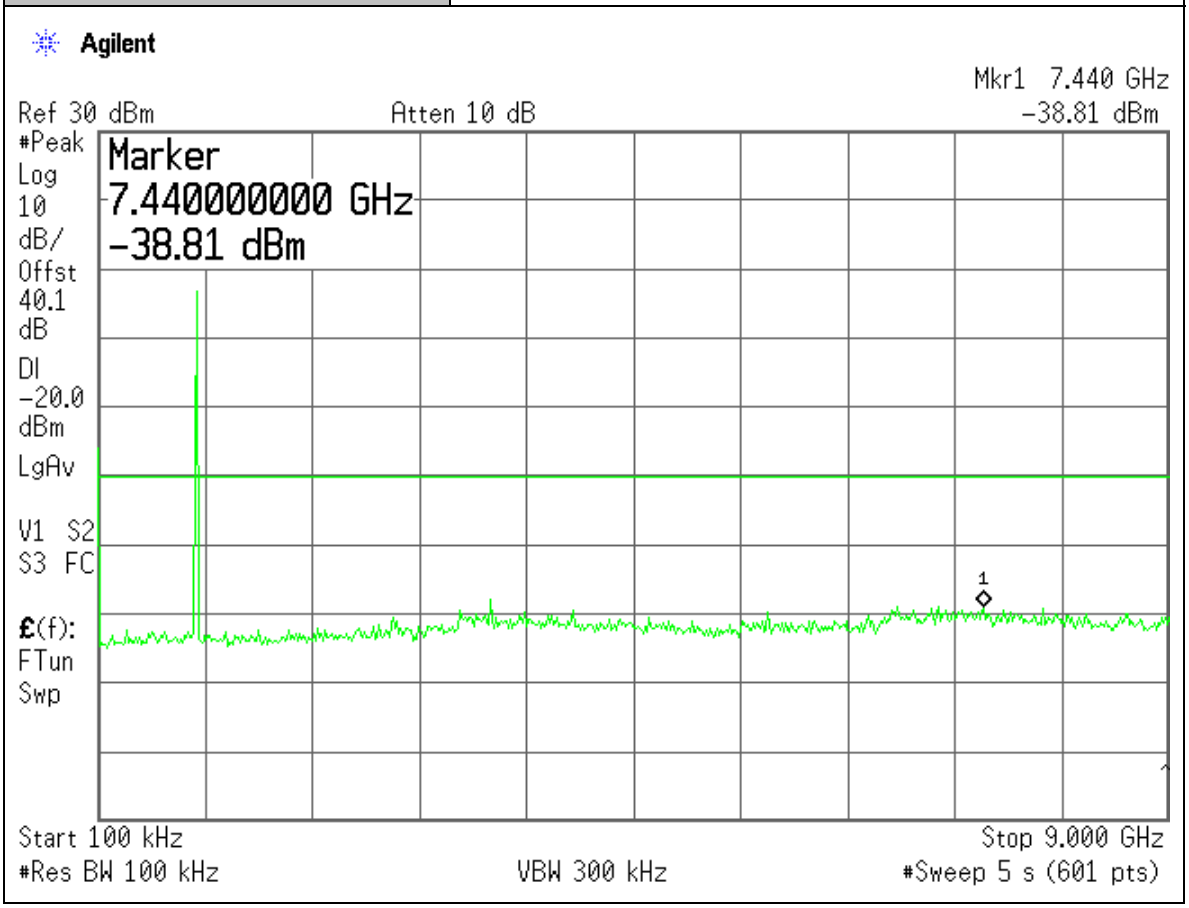
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**Downlink, Low-Channel**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



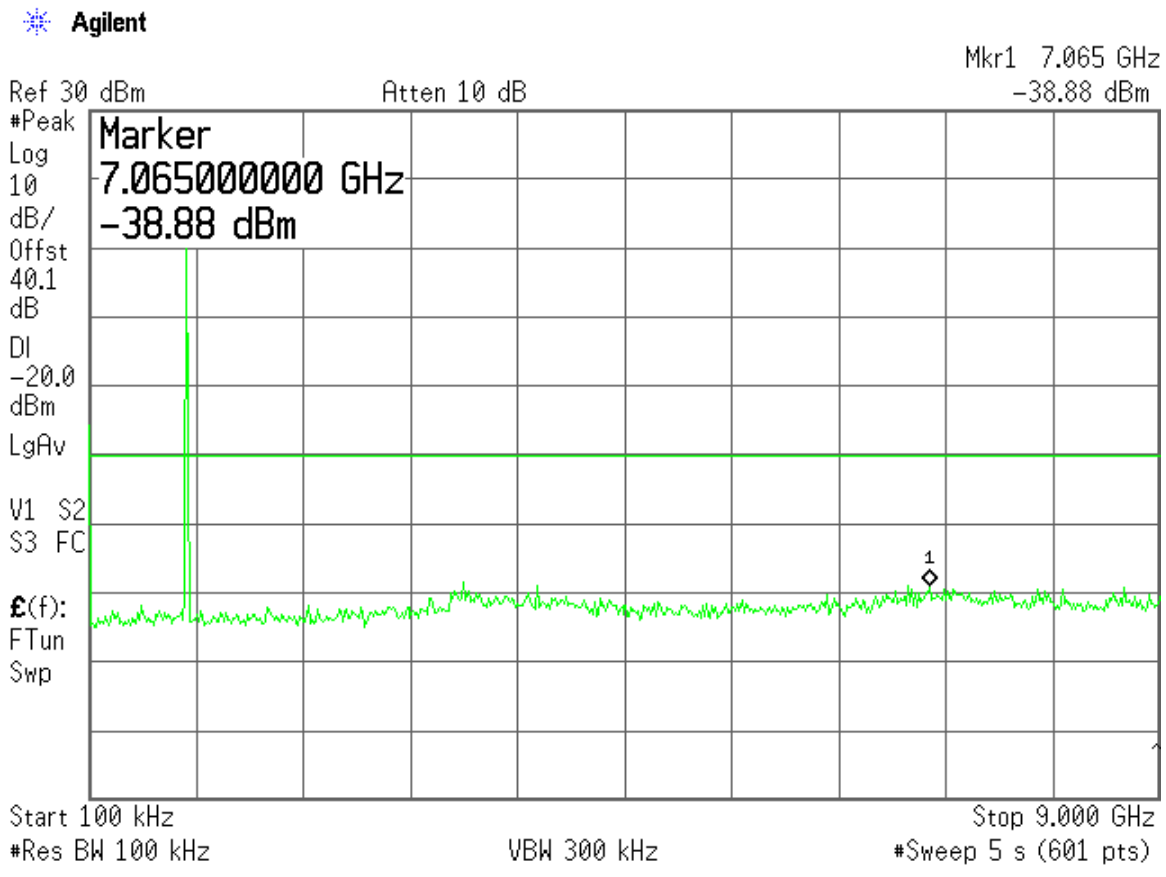
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**Uplink, Hi-Channel**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



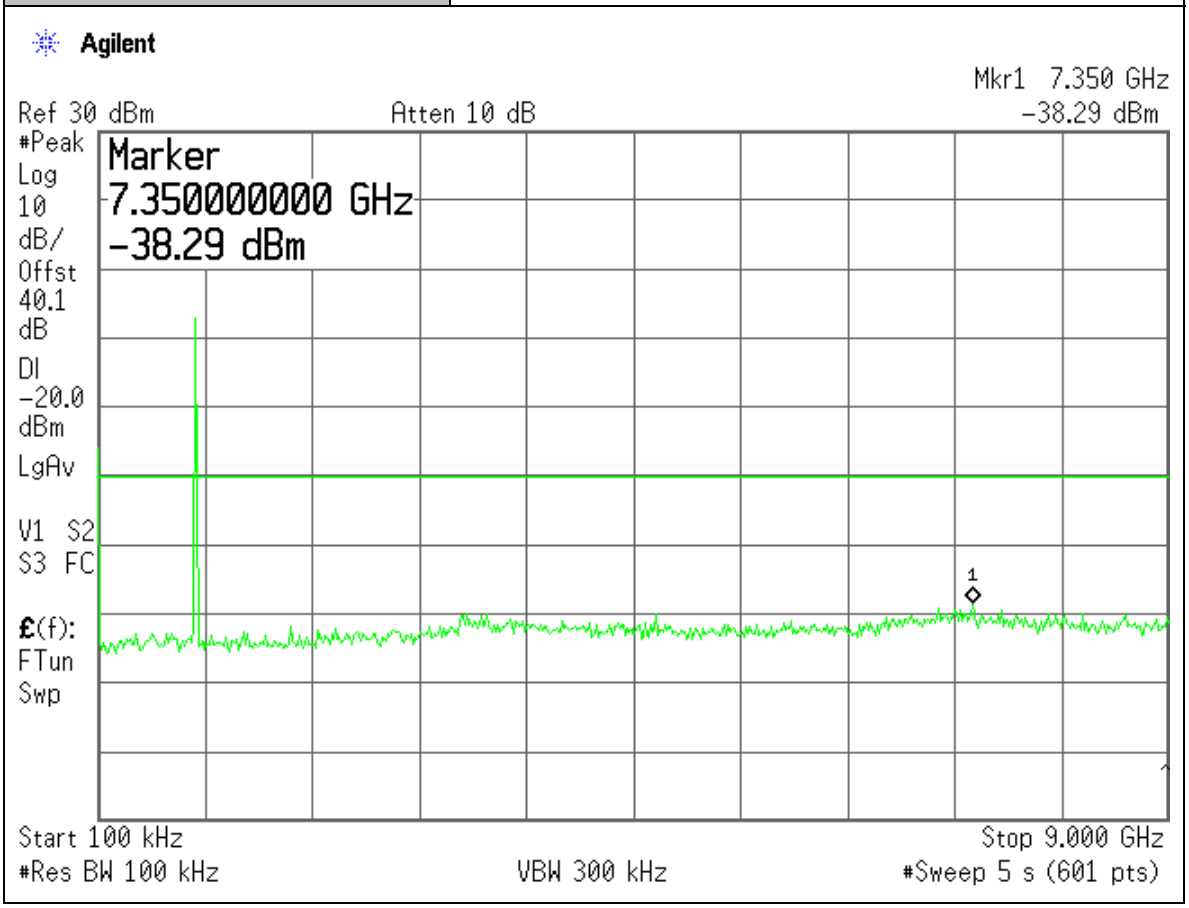
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**Uplink, Mid-Channel**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



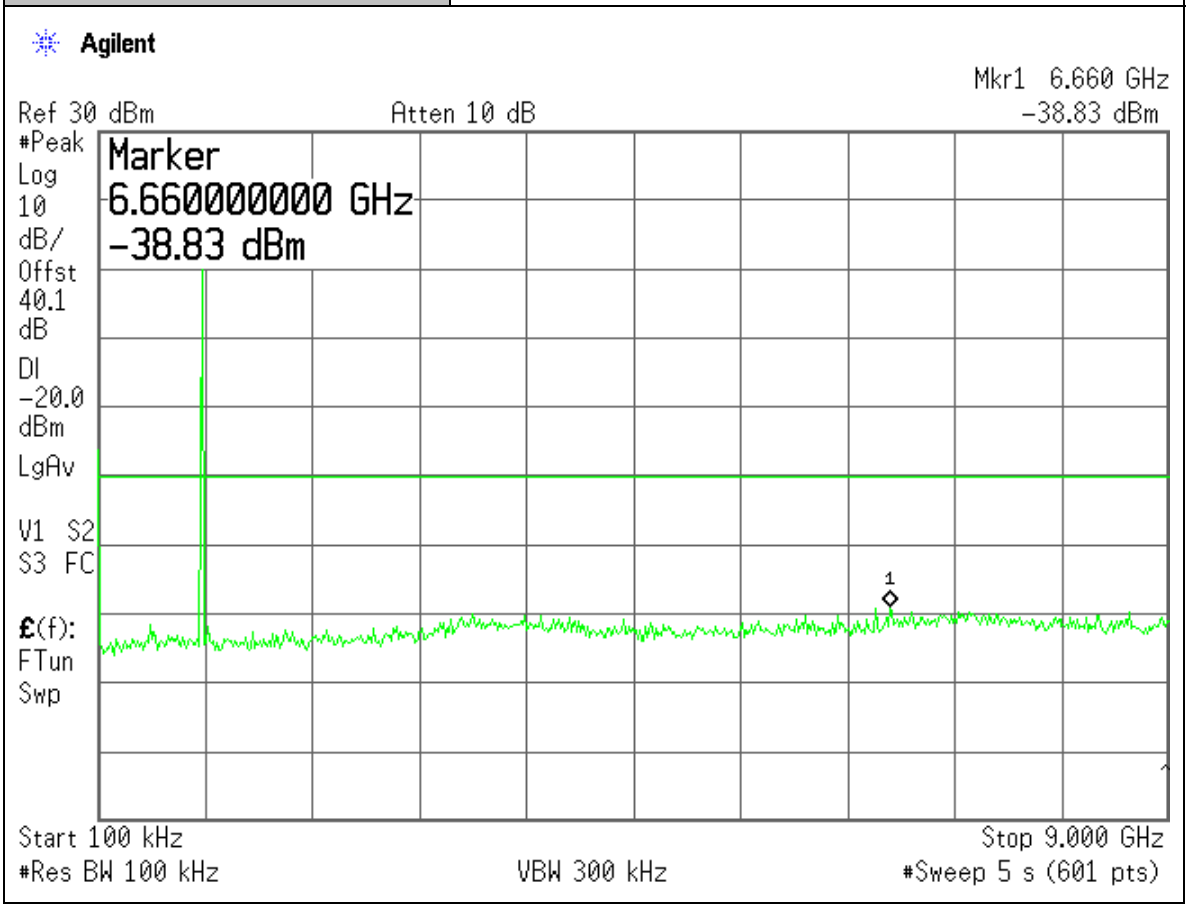
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**Uplink, Low-Channel**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



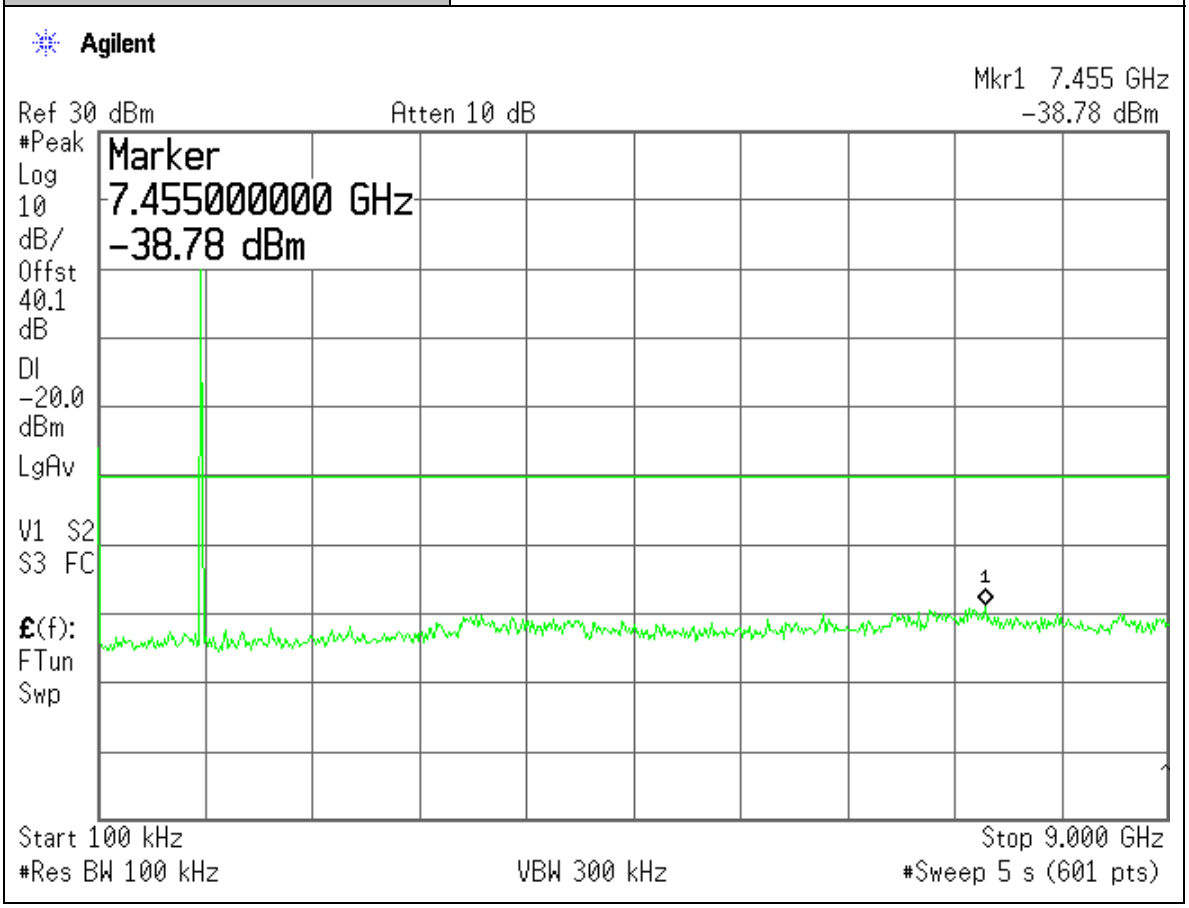
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**Downlink, Hi-Channel**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



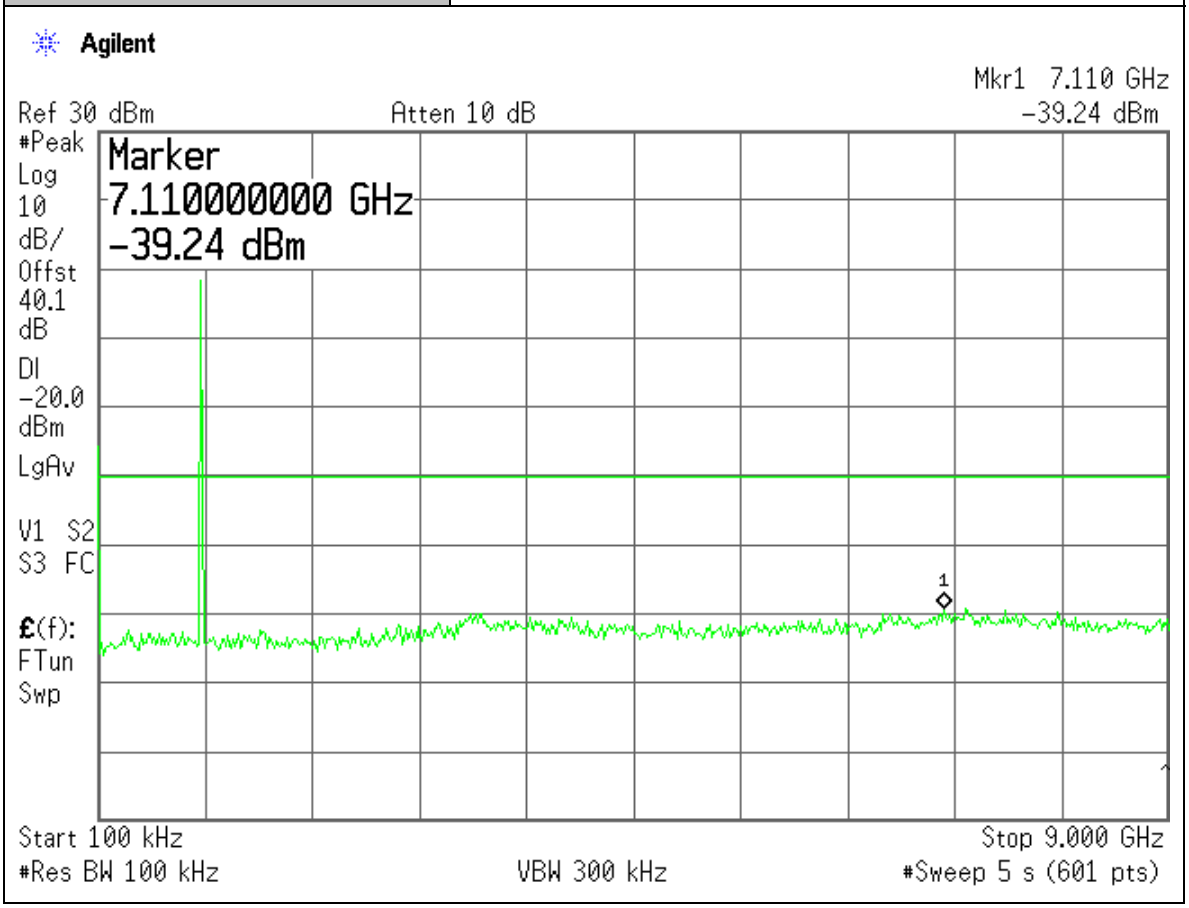
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**Downlink, Mid-Channel**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



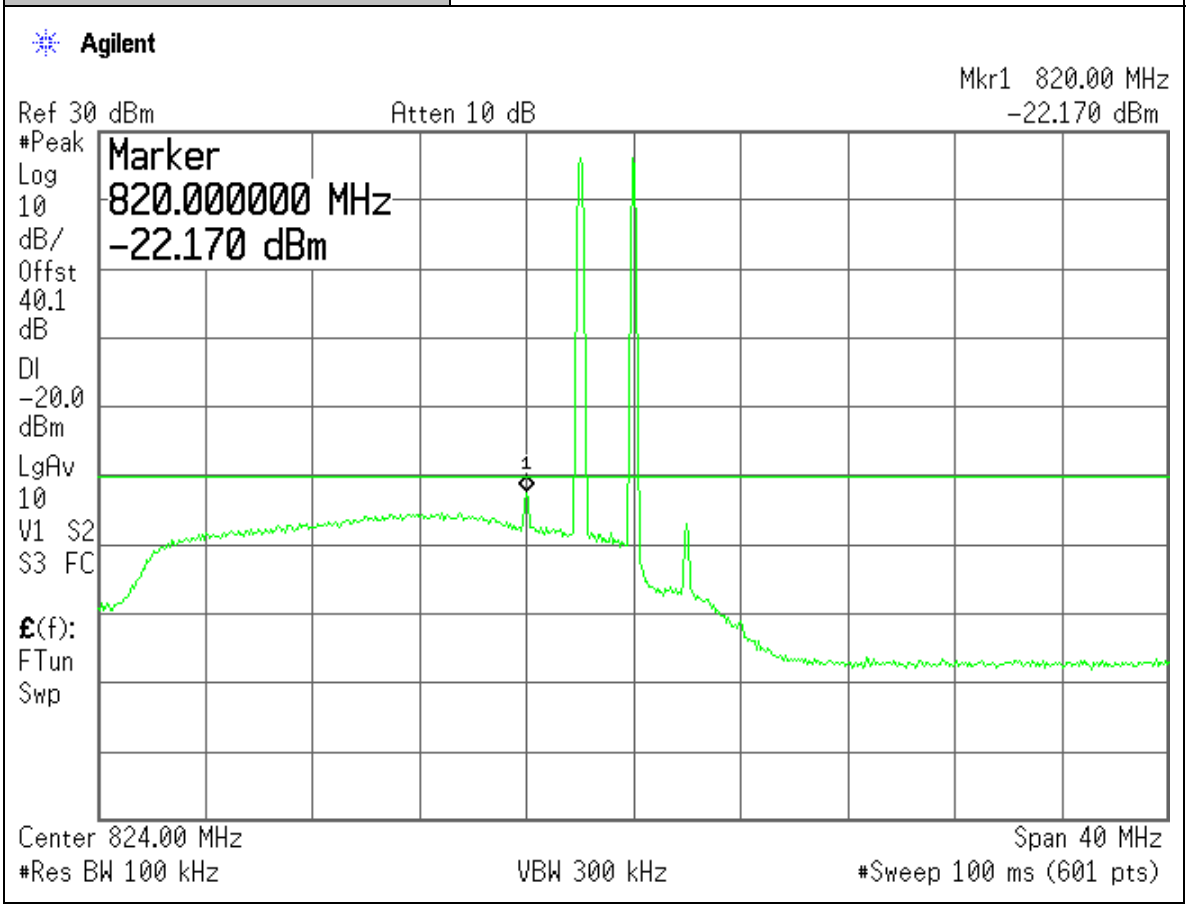
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**Downlink, Low-Channel**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



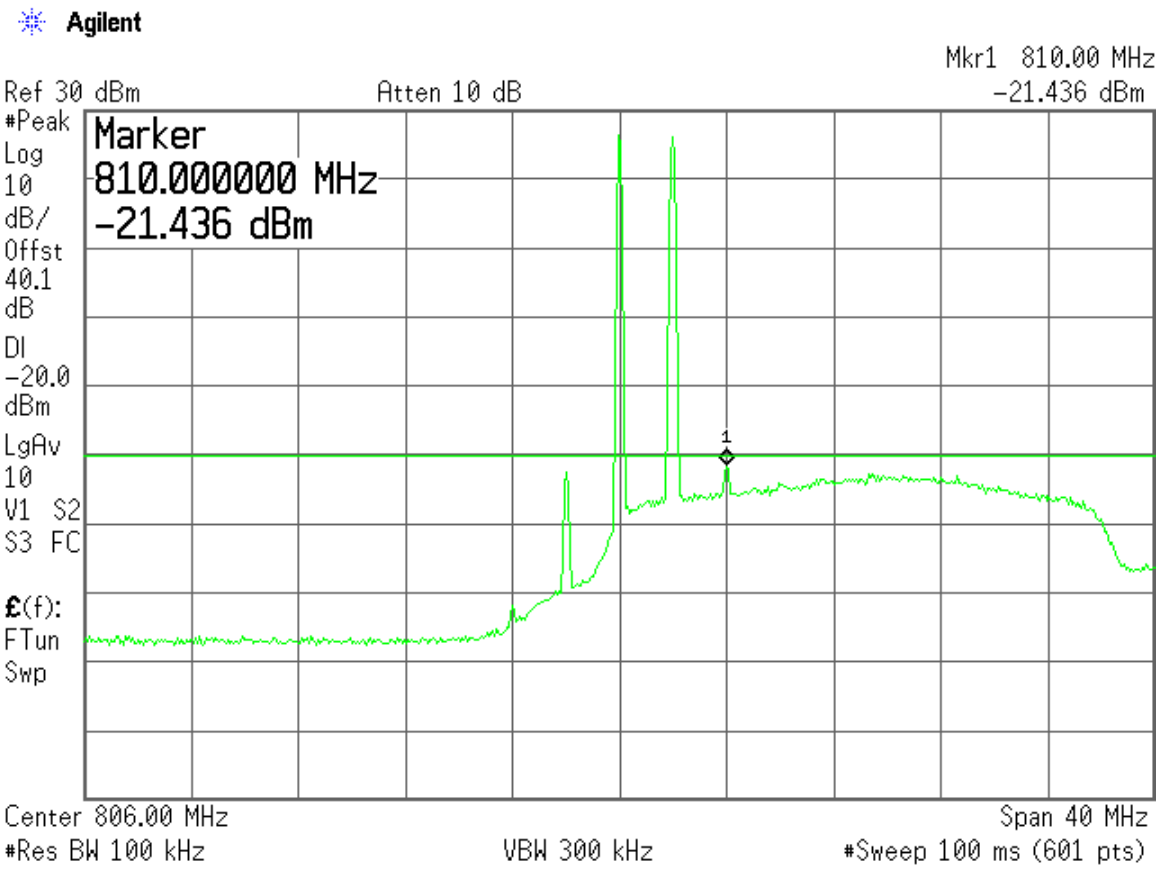
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**UL, Hi-Chn, Intermodulation, Upper Bandedge**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



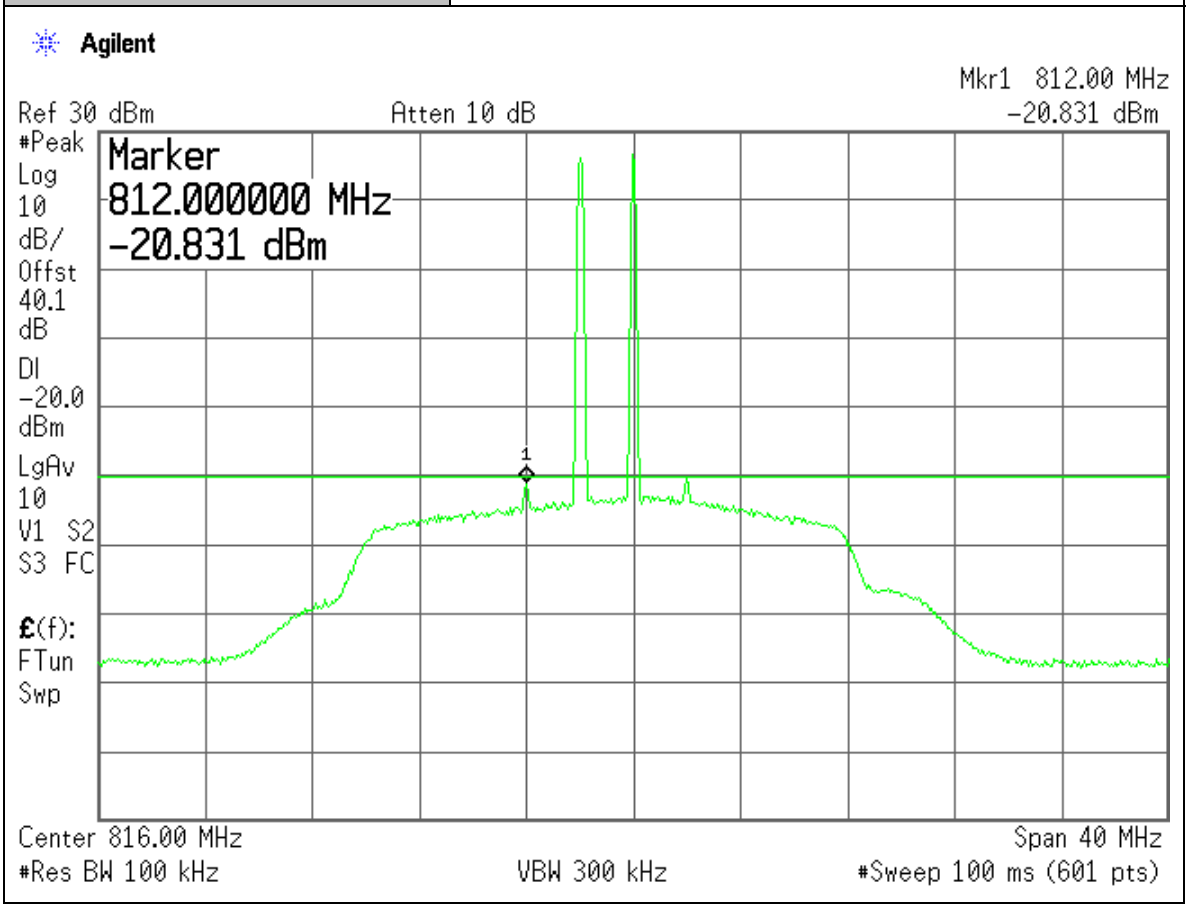
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**UL, Low-Chn, Intermodulation, Lower Bandedge**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



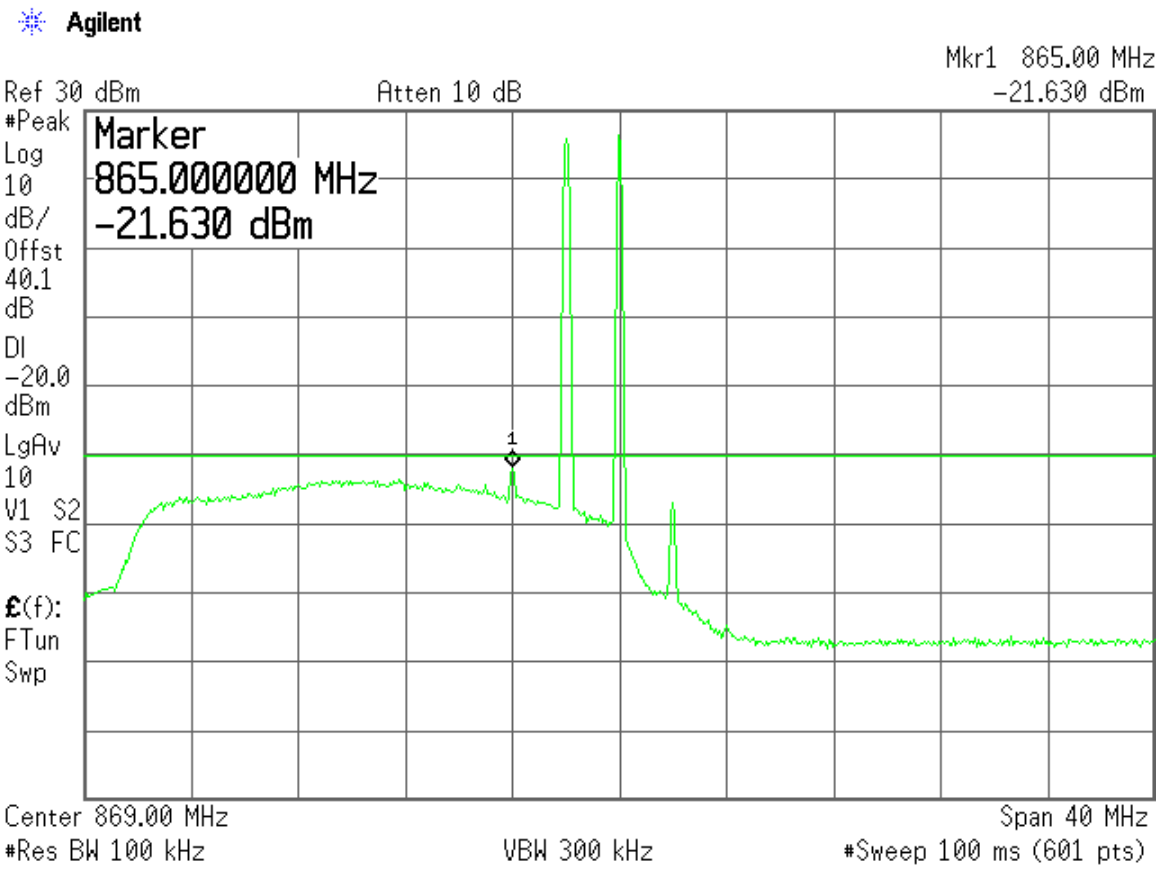
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**Uplink, Mid-Chn, Intermodulation**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



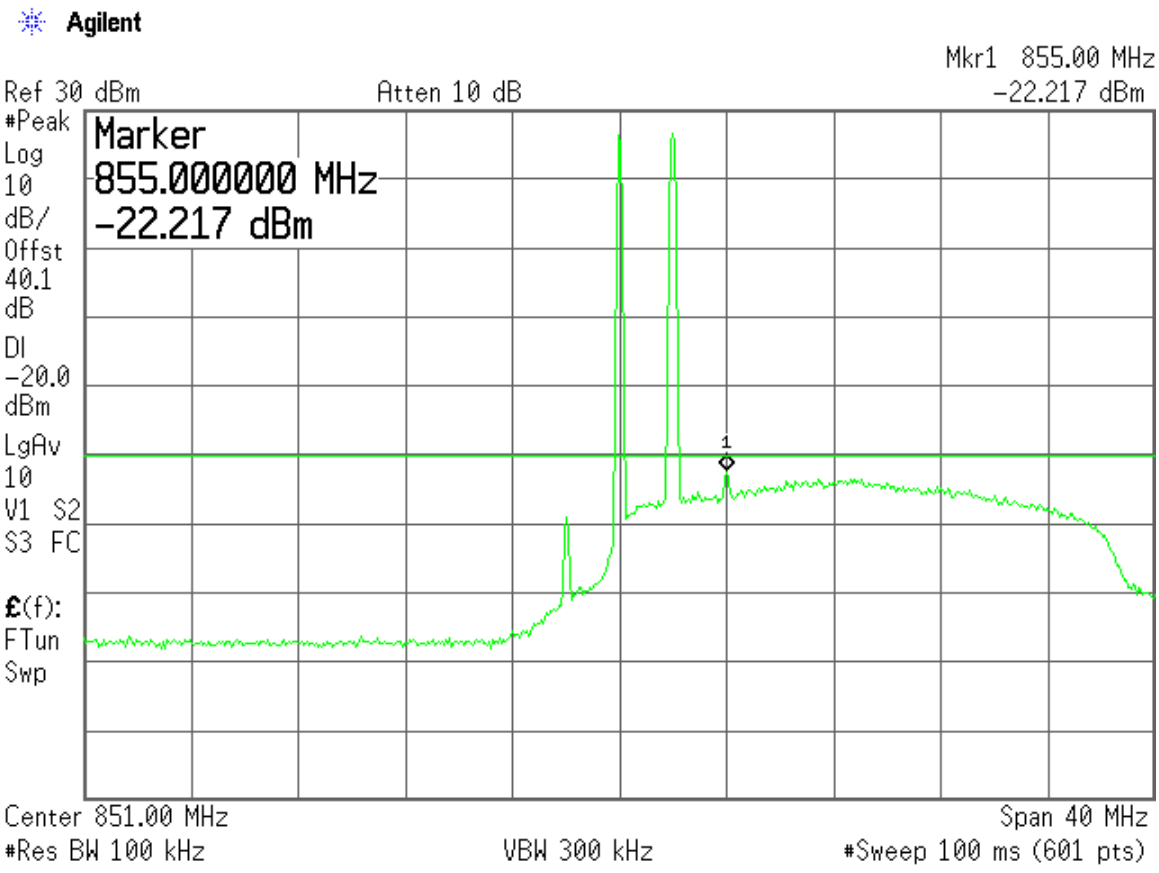
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**DL, High-Chn, Intermodulation, Upper Bandedge**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



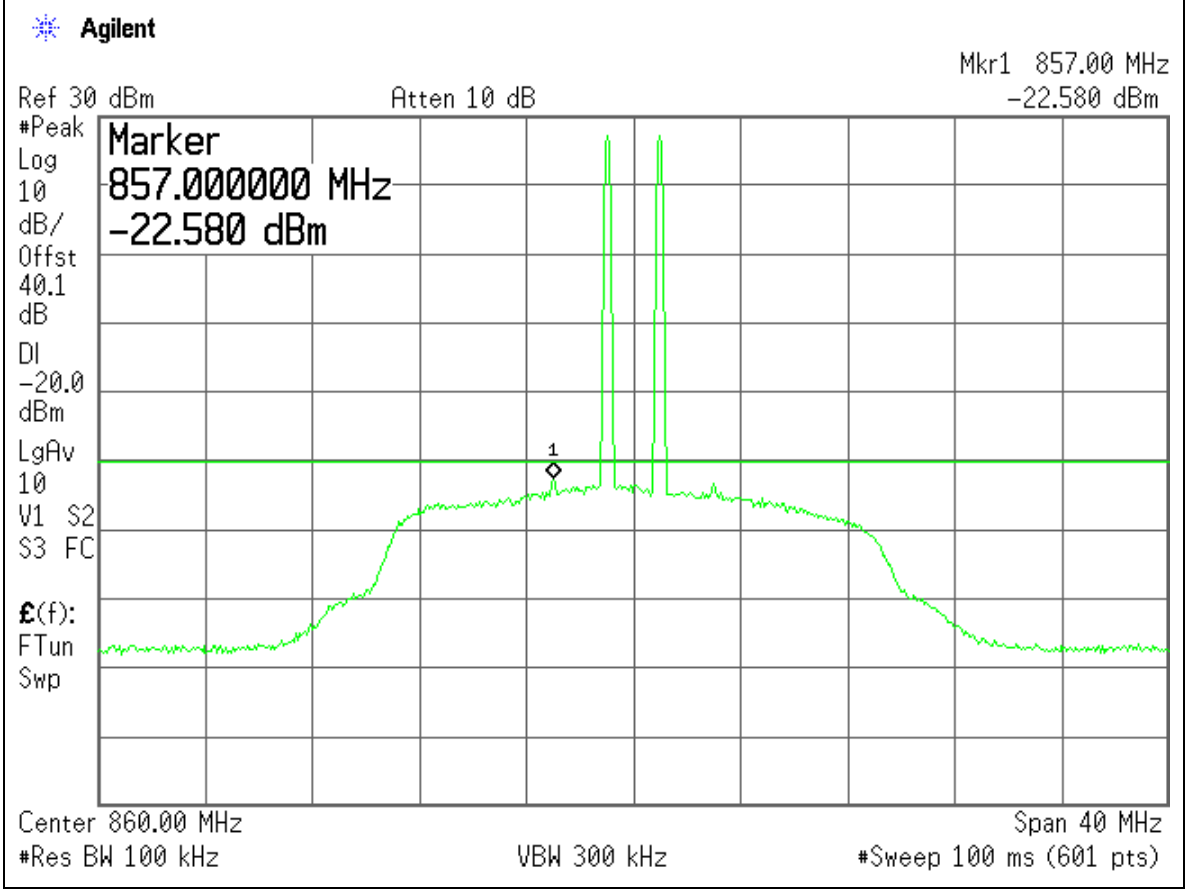
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**DL, Low-Chn, Intermodulation, Lower Bandedge**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



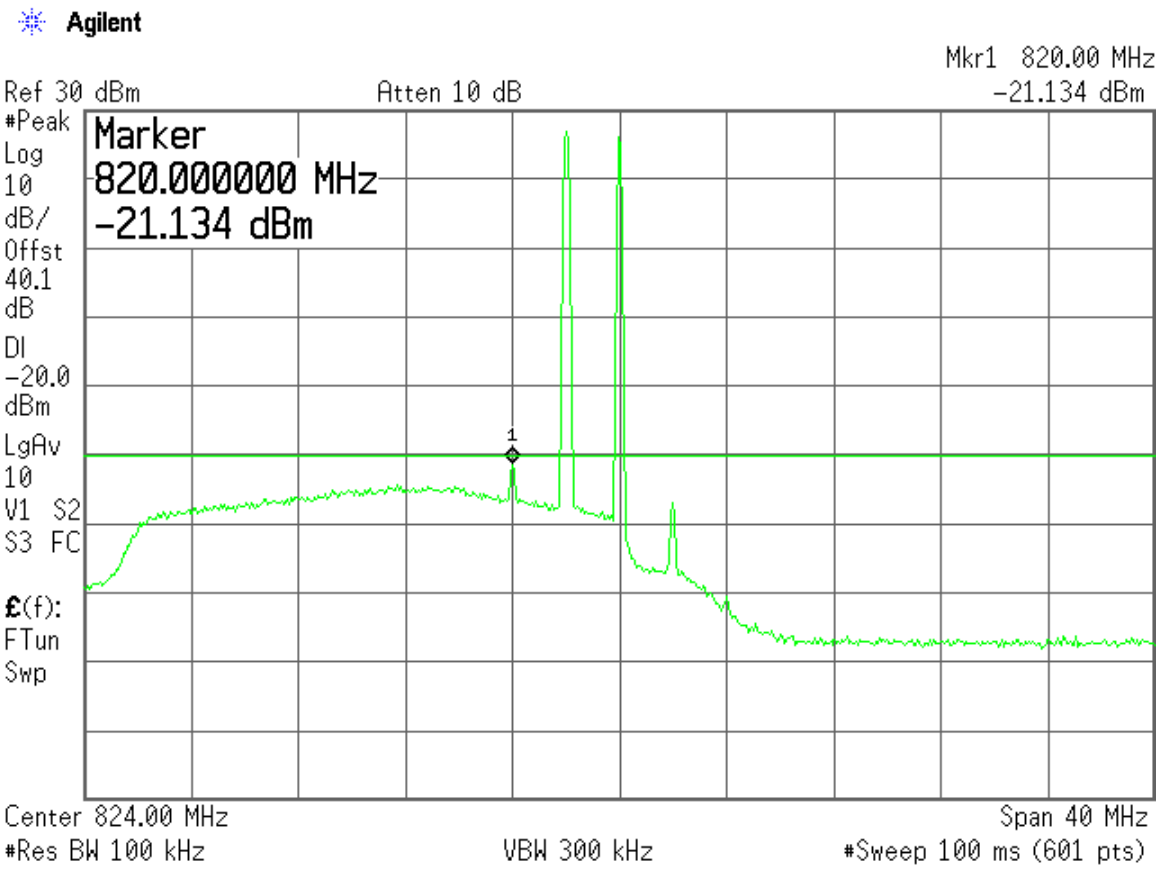
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**Downlink, Mid-Chn, Intermodulation**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



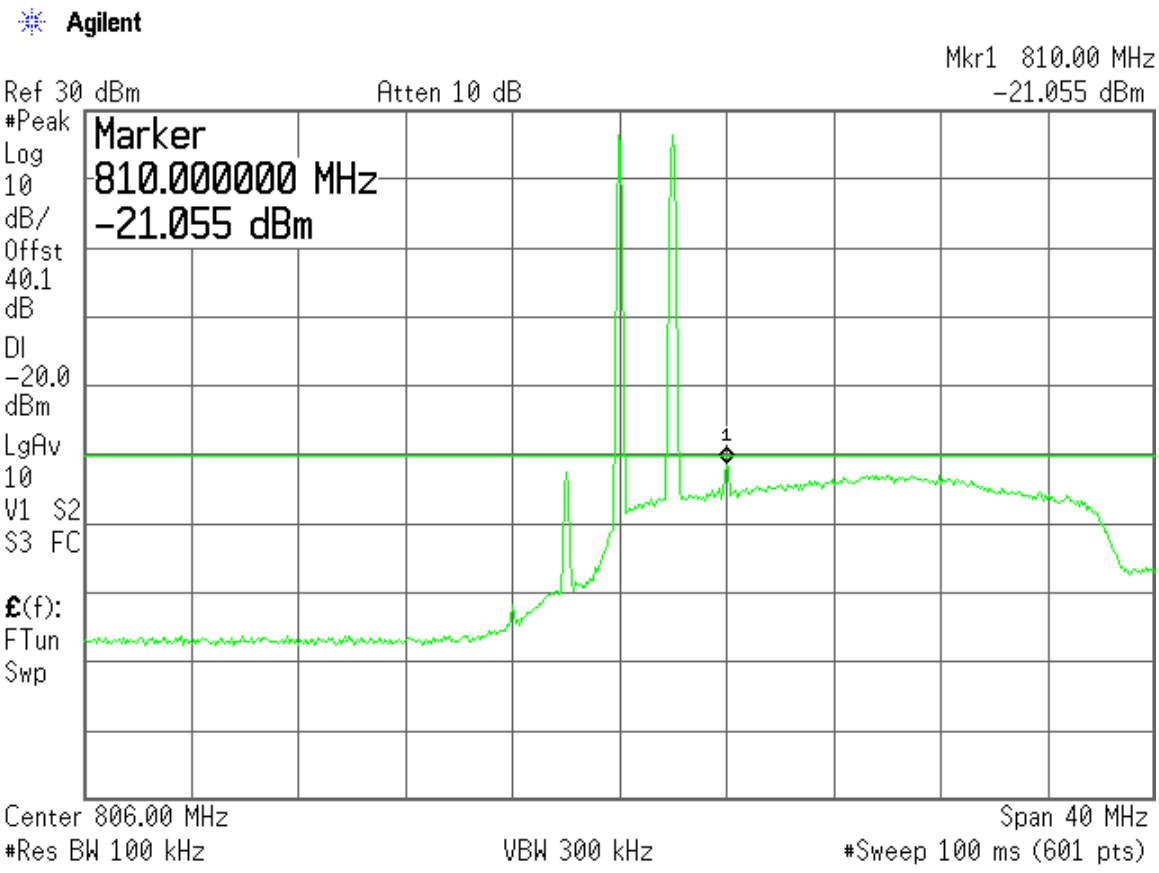
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**UL, Hi-Chn, Intermodulation , Upper Bandedge**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



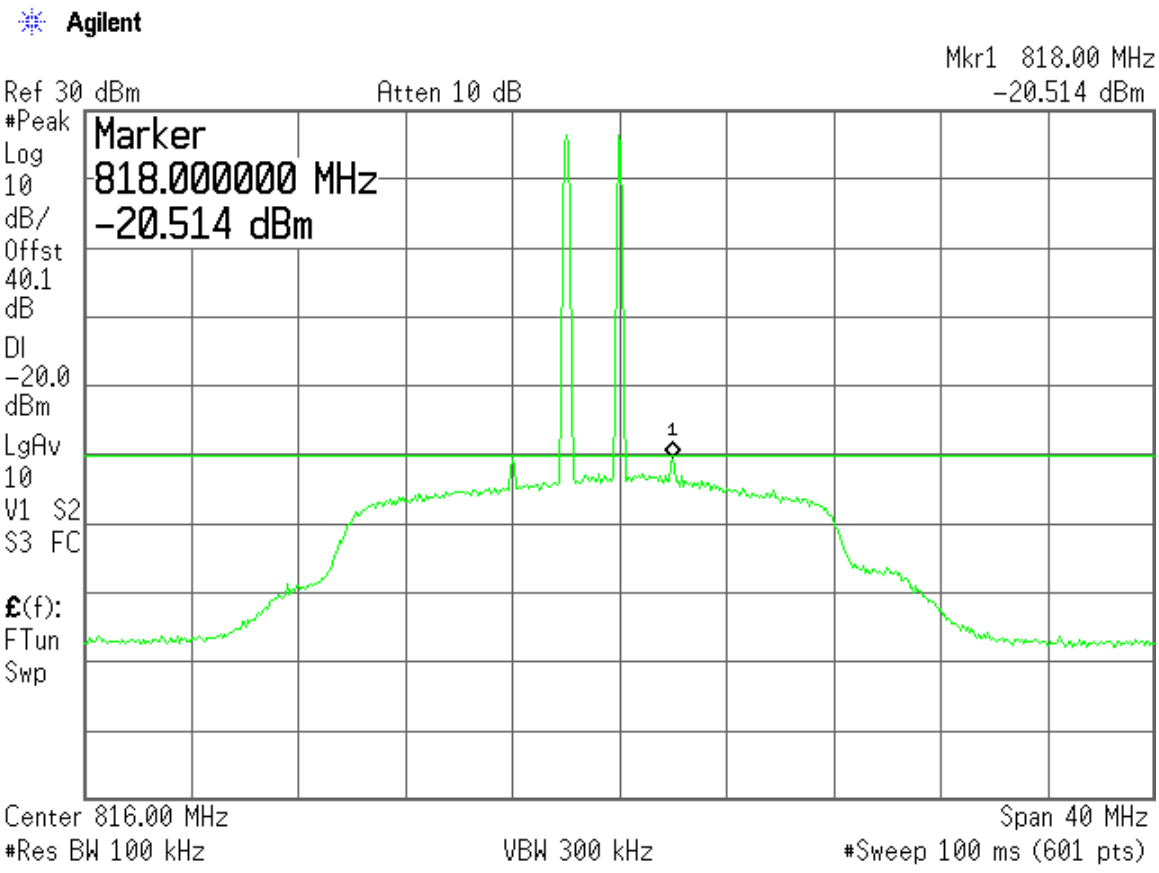
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70°F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**UL, Low-Chn, Intermodulation , Lower Bandedge**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



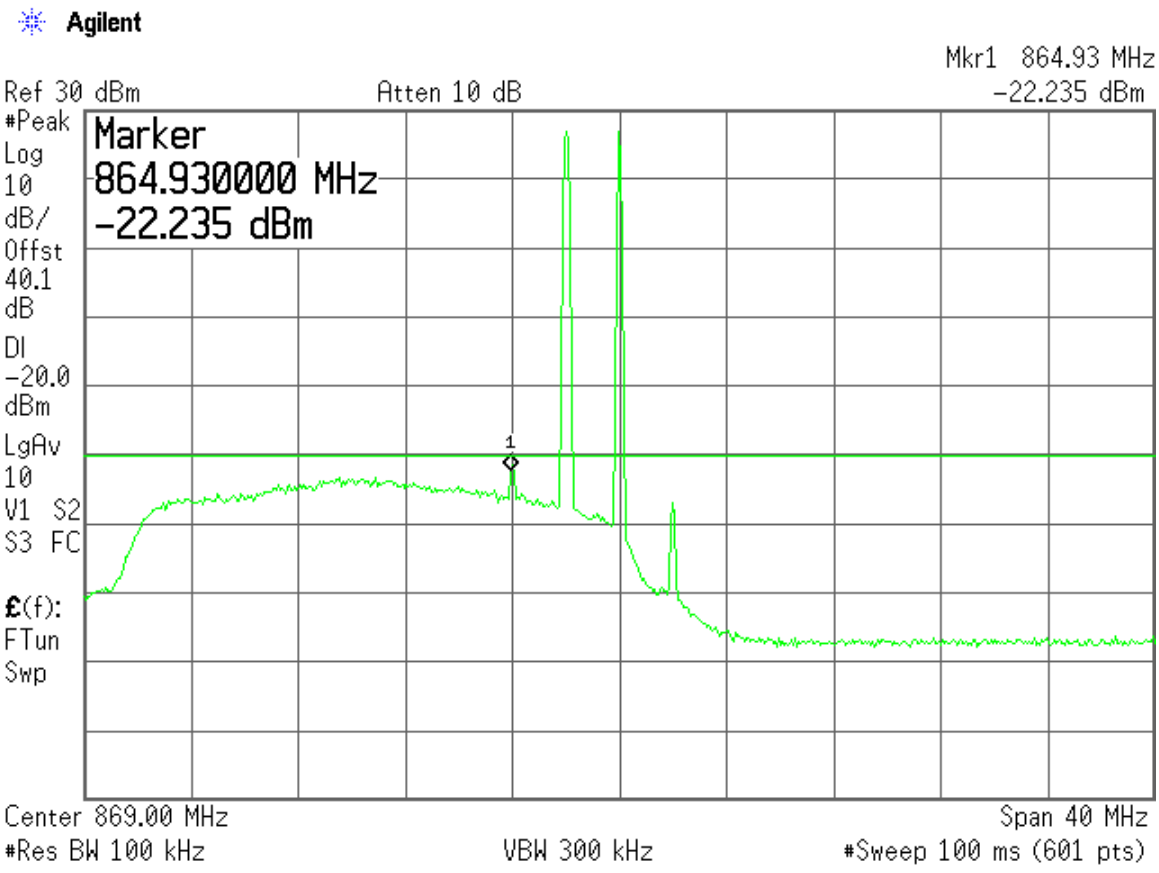
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**Uplink, Mid-Chn, Intermodulation**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



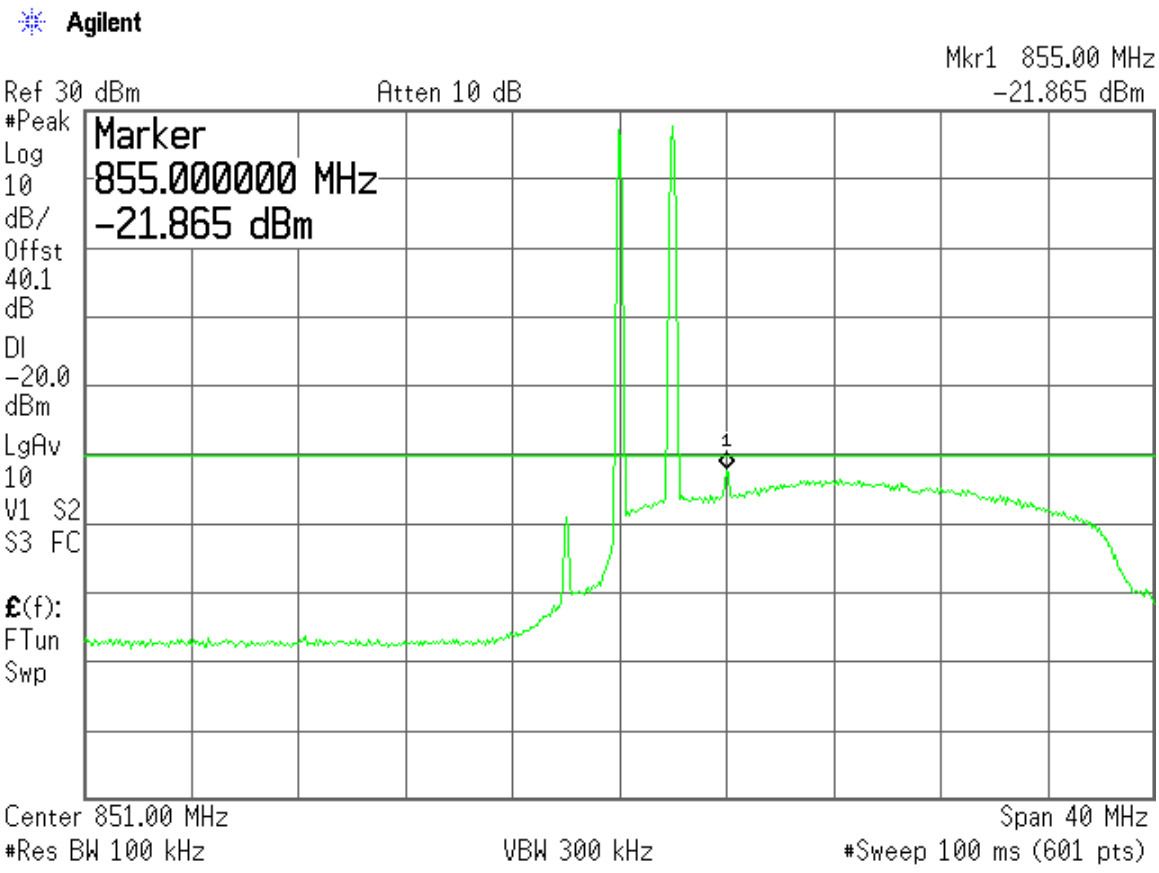
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**Downlink, Hi-Chn, Intermodulation , Upper Bandedge**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



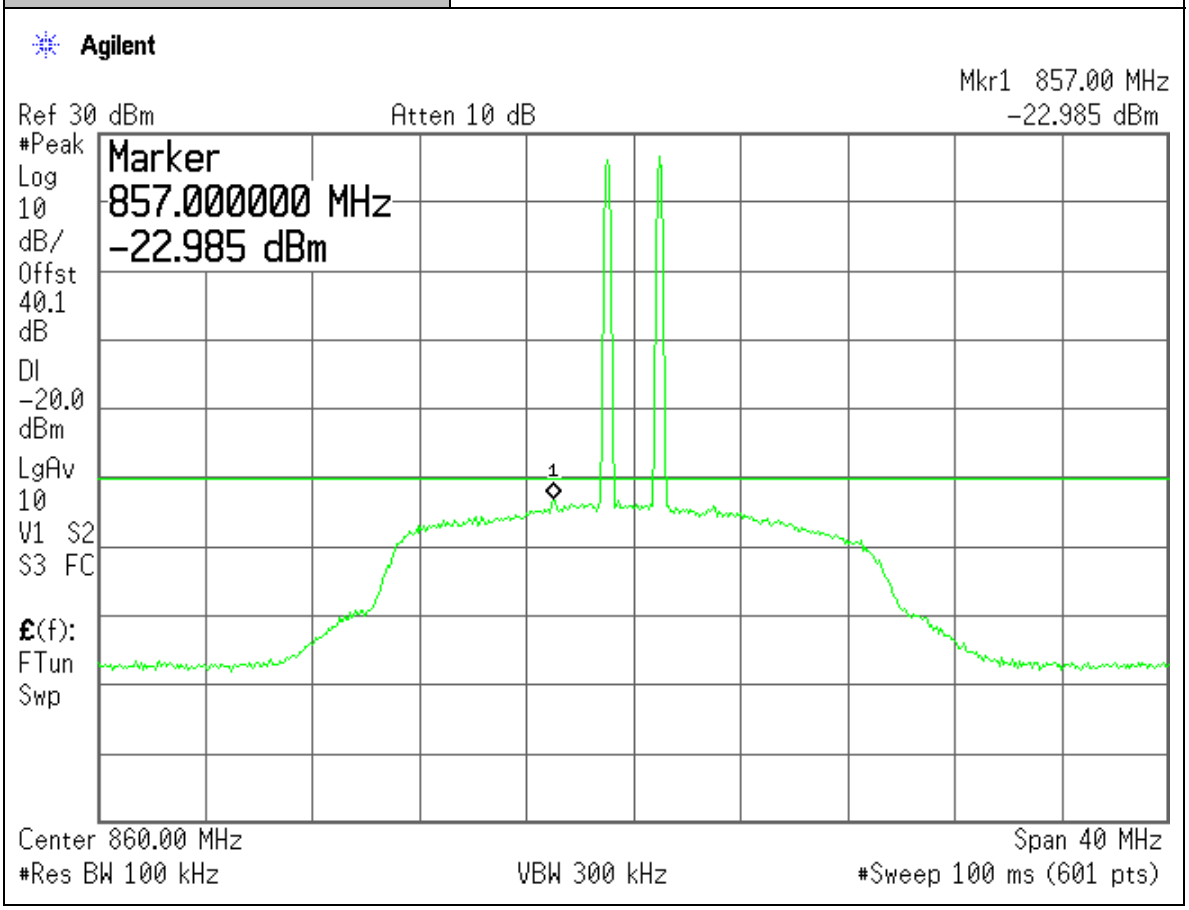
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**Downlink, Low-Chn, Intermodulation , Lower Bandedge**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



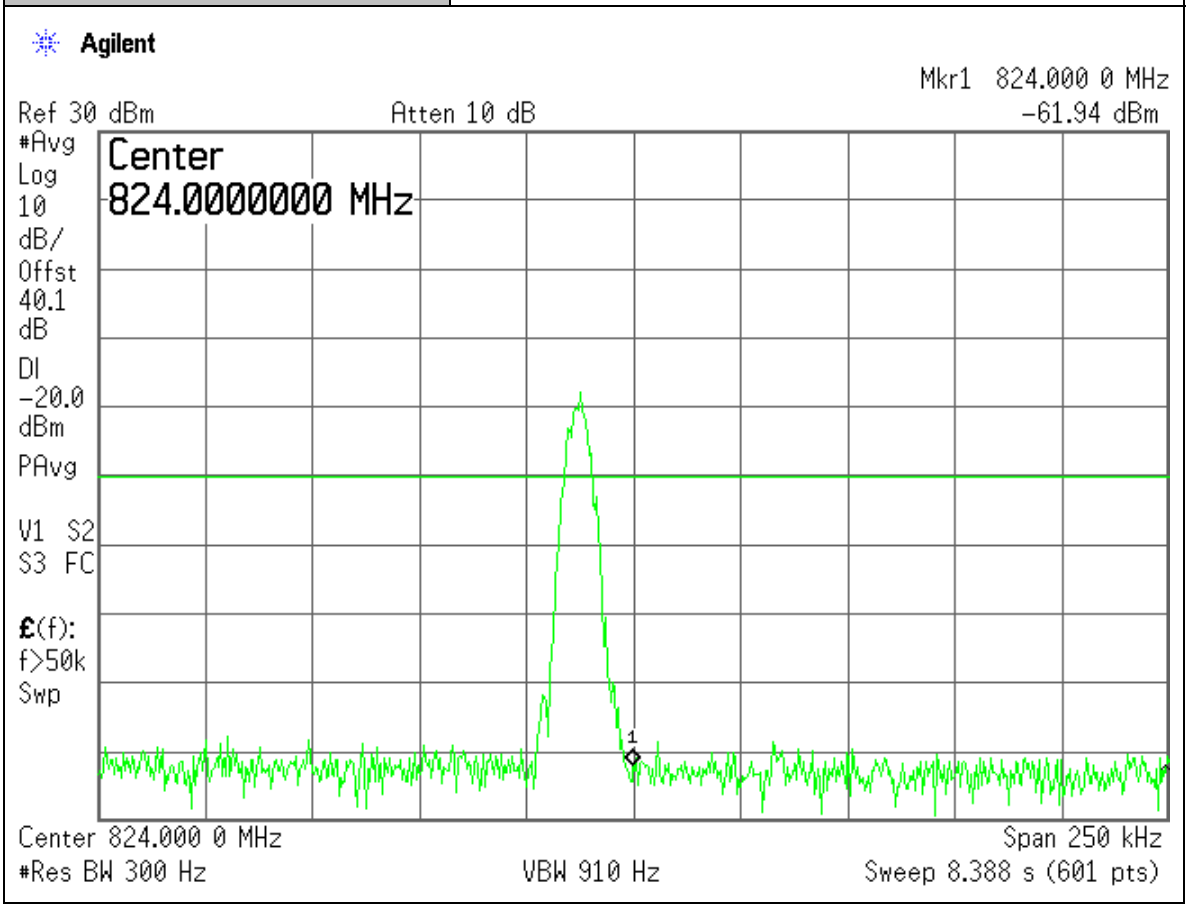
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**Downlink, Mid-Chn, Intermodulation**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



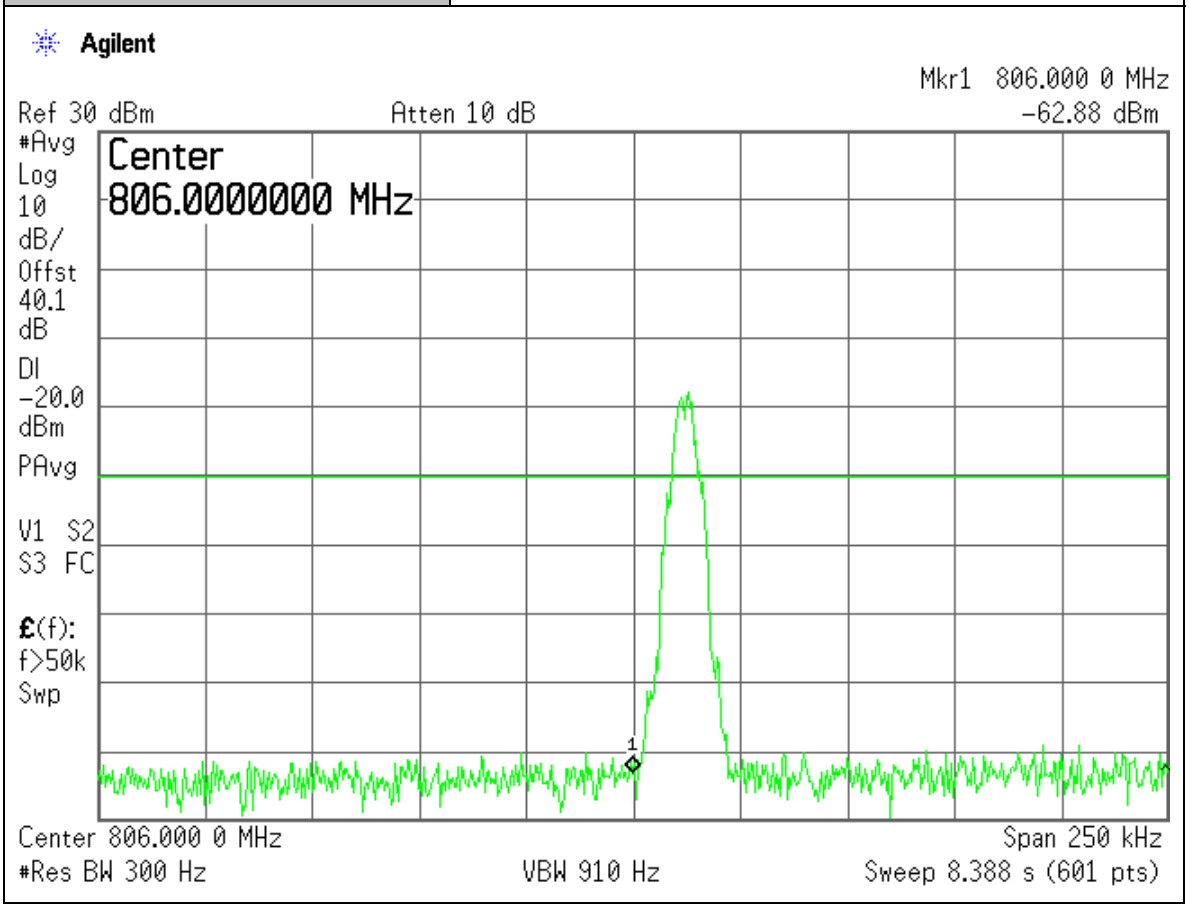
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**UL, Hi-Chn, Upper Band Edge+1MHz**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



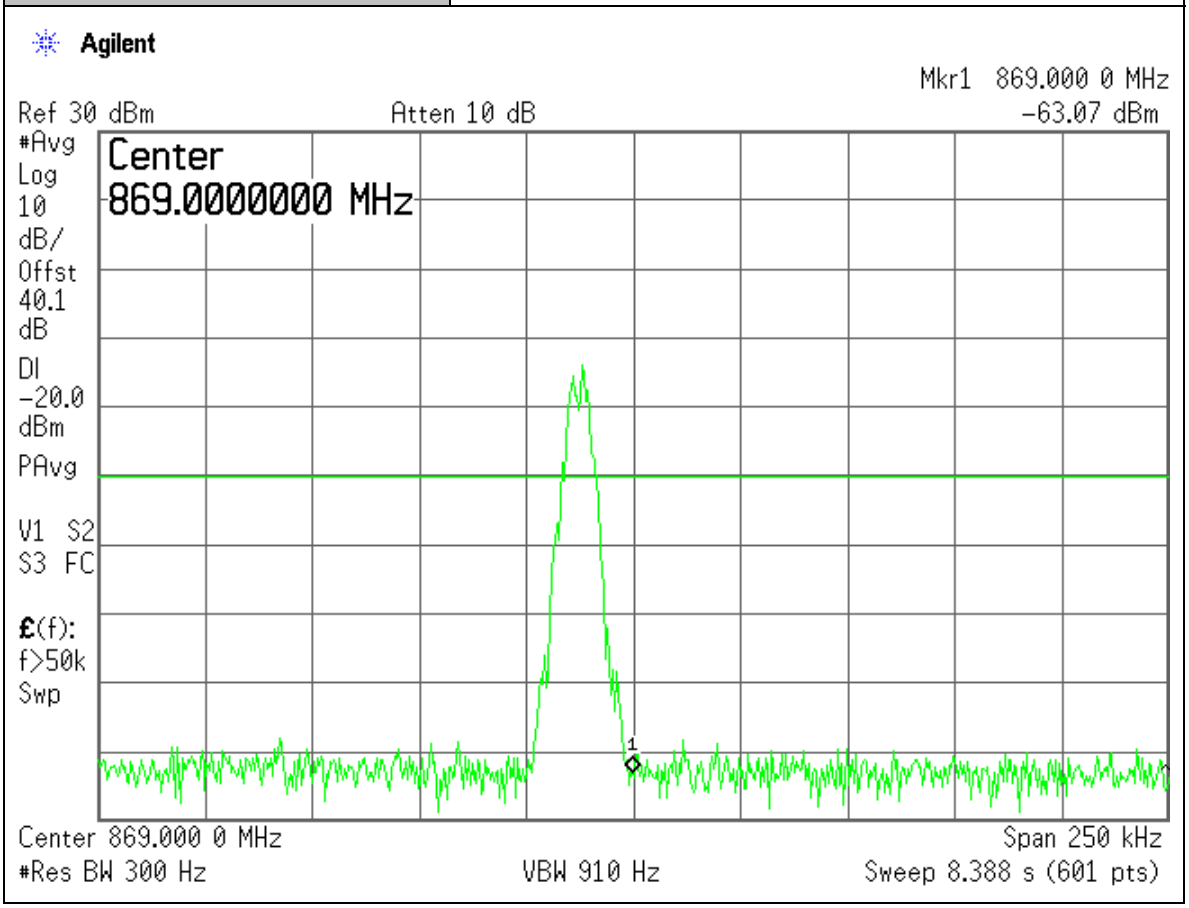
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**UL, Low-Chn, Lower Band Edge -1MHz**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



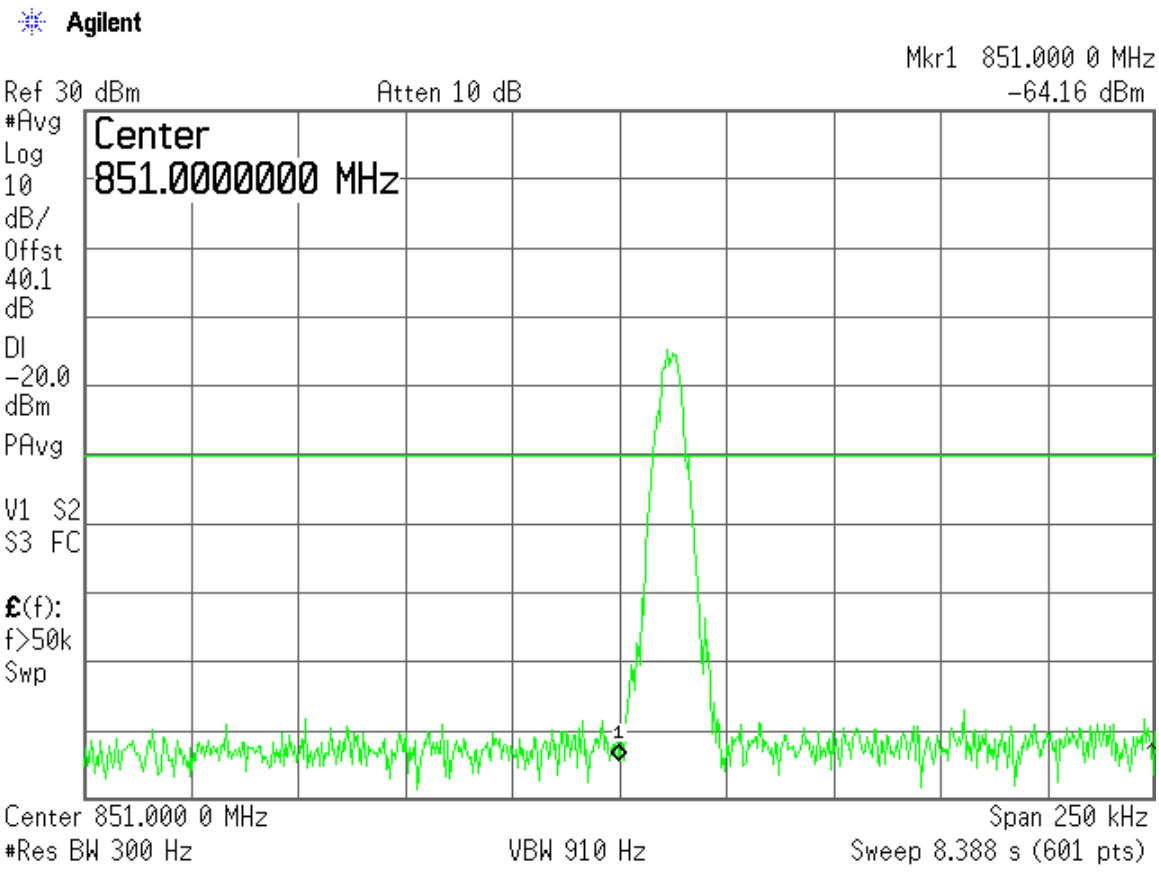
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**DL, Hi-Chn, Upper Band Edge+1MHz**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



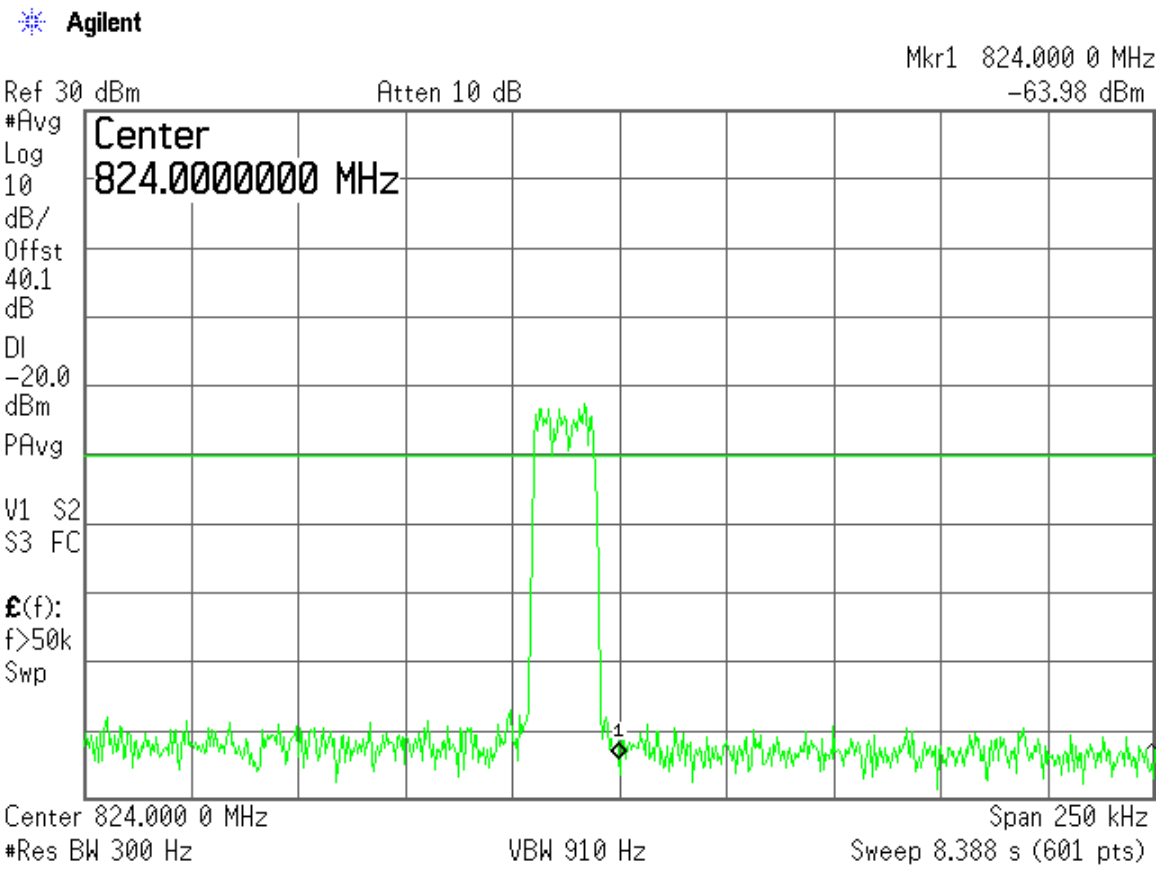
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / APCO25 Modulation**
Plot Name:	**DL, Low-Chn, Lower Band Edge -1MHz**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



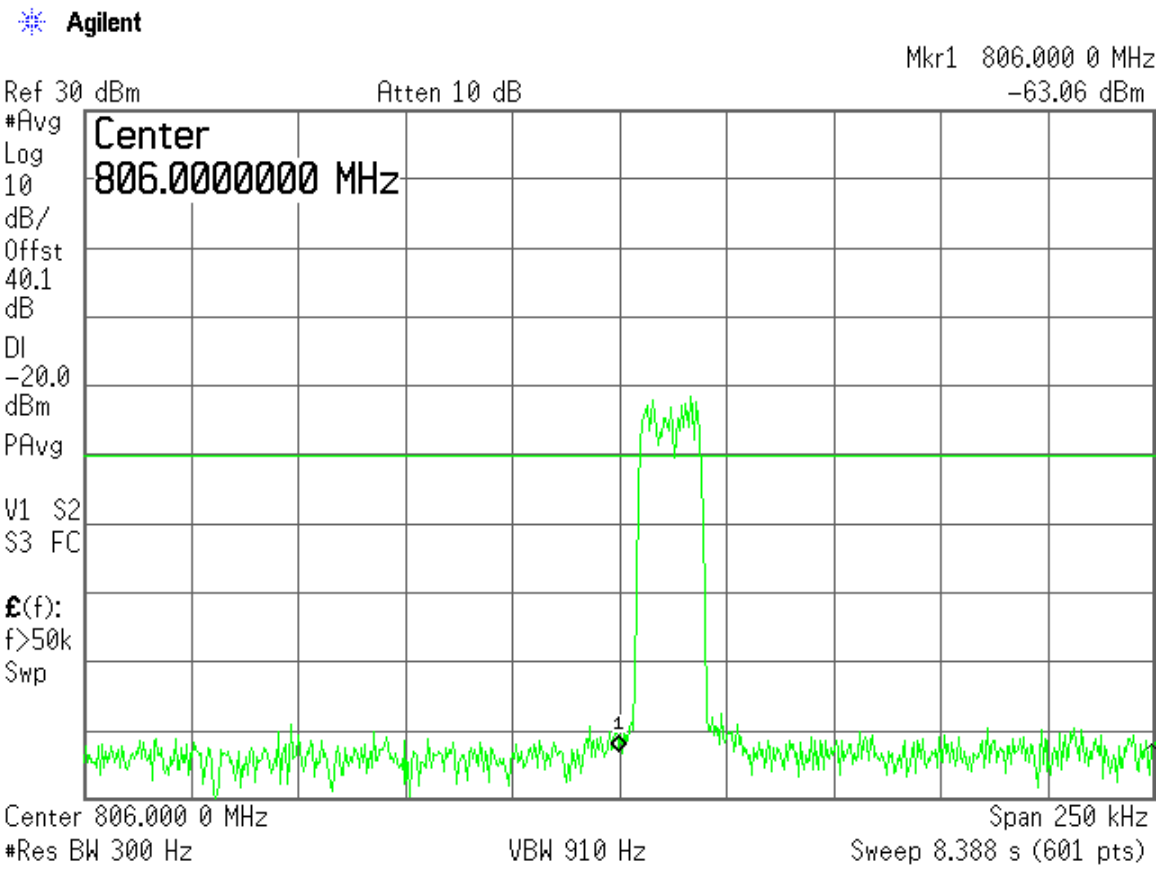
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**UL, Hi-Chn, Upper Band Edge+1MHz**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



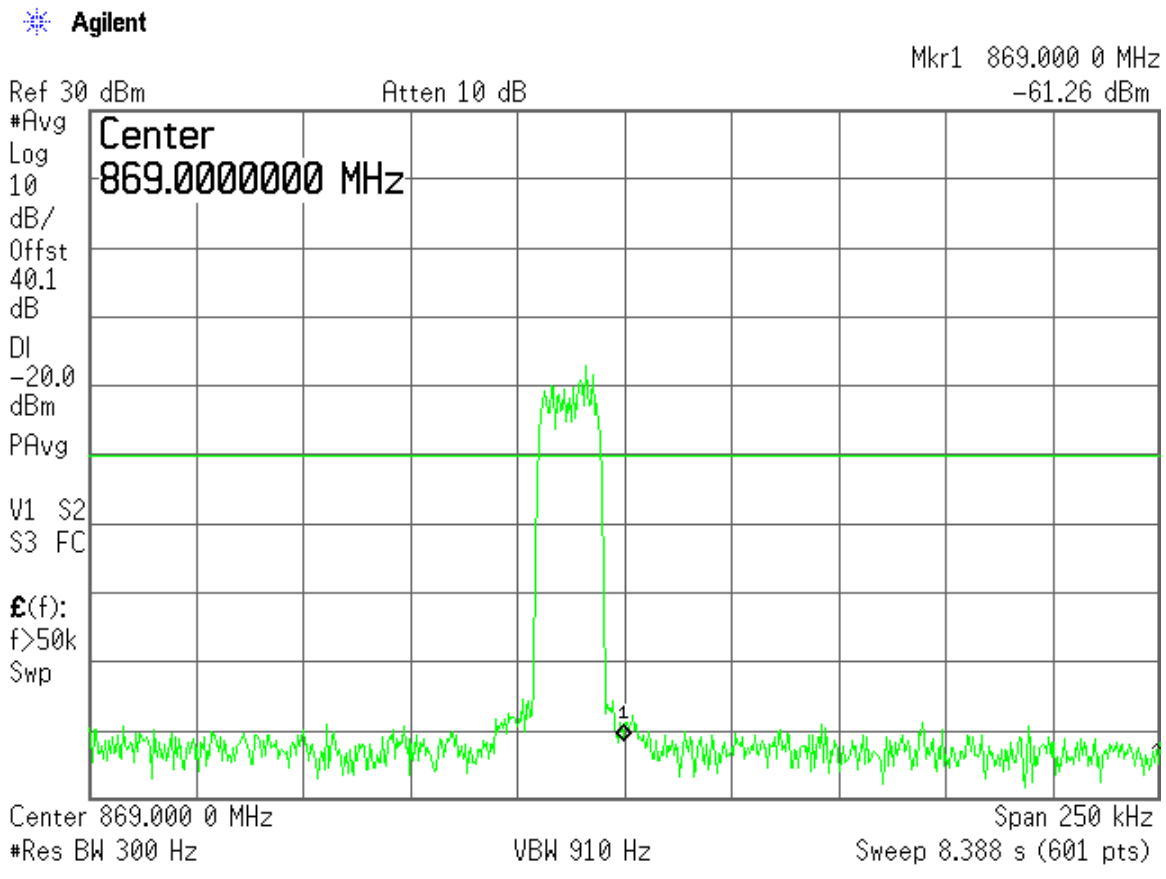
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**UL, Low-Chn, Lower Band Edge -1MHz**
Configuration:	SG Input: -50dBm, Output Port: EUT BTS



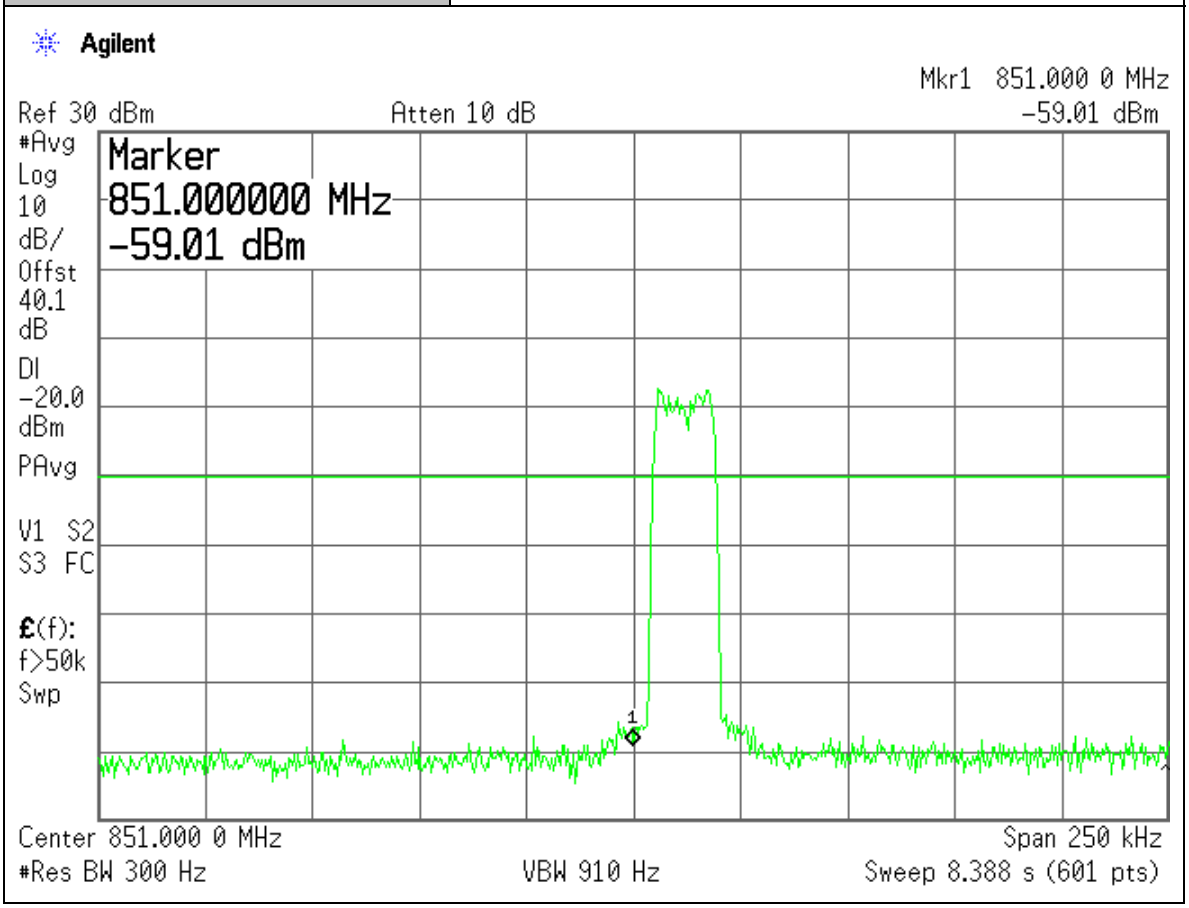
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**DL, Hi-Chn, Upper Band Edge+1MHz**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Tested By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Spurious Emissions at Antenna Terminals: Band I Bands / IDEN Modulation**
Plot Name:	**DL, Low-Chn, Lower Band Edge+1MHz**
Configuration:	SG Input: -60dBm, Output Port: EUT MOBILE



Section 6. Field Strength of Spurious

Name of Test:	*Field Strength of Spurious*	Test Standard:	*2.1053 90.210*
Tested By:	EDWARD LEE	Test Date:	07/10/2007-07/26/2007

Minimum Standard: -20dBm

Method of Measurement: TIA/EIA-603, 2003.
The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting ERP is the signal level fed to the reference antenna corrected for gain referenced to a dipole.

Emissions at Low, Middle, High (L,M,H) channels in each DL/UL band were investigated and the worst cases were recorded.

Two RF signals set as inputs. The frequencies of both RF signals shall be within the repeater's operating band. The spacing between both RF signals shall be the minimum possible spacing applied in a network. The level of both RF input signals shall be increased, until the maximum rated output power per channel, as declared by the manufacturer, is reached.

Applied to this application:
Per FCC Requirements, the antenna substitution method can be replaced by using following calculation to yield the required limit criteria WHEN the max. level of measured spurious emissions is 30dB below the limit.

Calculation for Required Emission Limit Per 2.1053

With the repeater RF output level set to 1 watts (30 dBm), Radiated Emissions between 10 MHz and 10 GHz shall be observed. The "Low, Mid, and High" frequencies shall be used for this test.

The Emission Limits and measuring instrumentation settings established in FCC Part 2& Part 90 shall be followed. Emissions shall be less than 43 + 10 log (P) dBc. Per FCC Part 2.1053(a), "Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter *(amplifier)*, assuming all emissions are radiated from half-wave dipole antennas." The following relationships yield the required limit criteria.

For a half-wave dipole antenna in free space:

$E = (49.2 * P)^{1/2} / R$ [2.34V/m]

Where:

E = Field intensity in Volts/meter of carrier
P = transmitted power in Watts (1W)
R = Distance from antenna to UUT in meters (3 meters)

Conversion of E, Volts/meter to dBuV/m:

$20 \log (E * 10^6)$ $[2.34 \times 10^6]$

Attenuation requirement (Atten): 43 + 10 log P [43dBc]

Thus, the required limit:

$E_{lim} = E - Atten$ dBuV/m

For repeater:

E = 127.38dBuV/m (at 3 meters)
Atten = 43dBc

Then, **E_{lim} = 84.38 dBuV/m**

Note: Emissions less than 64.38 dBuV/m (84.38 - 20 dB) may not be reported.

Test Result: **Complies**

Test Data: See Attached Table(s)

Configuration	SMR800 w/ RF Output Port Terminated
Band	SMR800 Downlink & Uplink
Channel	Low /Mid / High (worst case)

Frequency (MHz) U/L or D/L	Polarity (H or V)	Antenna Height (m)	Azimuth (Degree)	Value at 3m (dBuV/m)	FCC 3m Limit (dBuV/m)	Difference (dBuV/m)
807 U/L	V	1.3	45	36.5	84.4	-47.9
1614 U/L	V	1.3	45	35.7	84.4	-48.7
2421 U/L	V	1.3	45	36.9	84.4	-47.5
815 U/L	V	1.2	45	44.6	84.4	-39.8
1630 U/L	V	1.2	45	35.1	84.4	-49.3
2445 U/L	V	1.2	45	36.7	84.4	-47.7
823 U/L	V	1.2	45	43.7	84.4	-40.7
1646 U/L	V	1.2	45	35.5	84.4	-48.9
2469 U/L	V	1.2	45	36.9	84.4	-47.5
852 D/L	V	1.2	60	37.7	84.4	-46.7
1704 D/L	V	1.2	60	34.6	84.4	-49.8
2556 D/L	V	1.2	60	37.1	84.4	-47.3
860 D/L	V	1.2	60	37.3	84.4	-47.1
1720 D/L	V	1.2	60	34.7	84.4	-49.7
2580 D/L	V	1.2	60	37.7	84.4	-46.7
868 D/L	V	1.2	60	32.4	84.4	-52
1736 D/L	V	1.2	60	34.4	84.4	-50
2604 D/L	V	1.2	60	37.4	84.4	-47

Section 7. Frequency Stability

Name of Test:	*Frequency Stability*	Test Standard:	*2.1055* *90.213*
Tested By:	WEI LI	Test Date:	07/10/2007-07/26/2007

Minimum Standard: Part 2.1055/Part 90.213:

806–809 ..... 141 .0 1 .5 1 .5 (Fixed-BTS / Mobile>2W/Mobile<2W)
809–824 ..... 141 .5 2 .5 2 .5
851–854 ..... 1 .0 1 .5 1 .5
854–869 ..... 1 .5 2.5 2.5

(unit: ppm)

Method of Measurement: Frequency Stability With Voltage Variation:
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. Set SA resolution bandwidth low enough (30Hz) to obtain the desired frequency resolution. (Using frequency counter method: The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10MHz ref, in of the signal generator). With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation:
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

Test Result: **Complies**

Test Data: See Attached Table(s)

Not Applicable

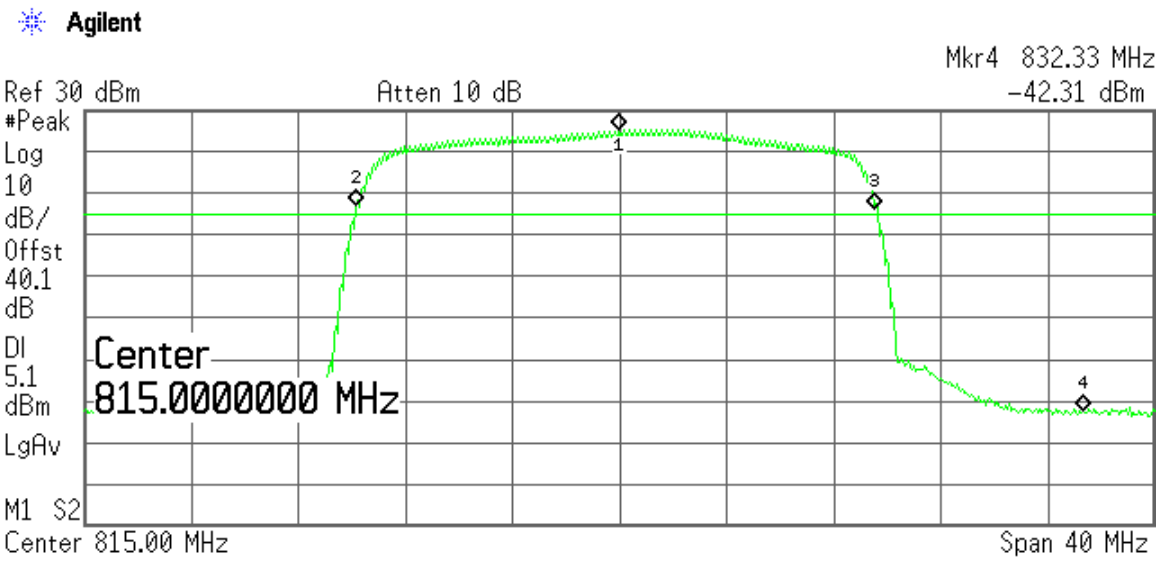
Section 8. Out of Band Rejection

Name of Test:	*Out of Band Rejection*	Test Standard:	*EAB/RF-2-11-04*
Tested By:	Edward Lee	Test Date:	07/10/2007-07/26/2007

Minimum Standard:	The passband gain shall not exceed the nominal gain by more than 1.0 dB. The 20 dB bandwidth shall not exceed the nominal bandwidth that is stated by the manufacturer. Outside of the 20 dB bandwidth, the gain shall not exceed the gain at the 20 dB point.
Method of Measurement:	Adjust the internal gain control of the equipment under test to the nominal gain for which equipment certification is sought. With the aid of a signal generator and spectrum analyzer, measure the 20 dB bandwidth of the amplifier (i.e. at the point where the gain has fallen by 20 dB). Measure the gain-versus-frequency response of the amplifier from the midband frequency f_0 of the passband up to at least $f_0 \pm 250\%$ of the 20 dB bandwidth.
Test Result:	**Complies**
Test Data:	See Attached Table(s)

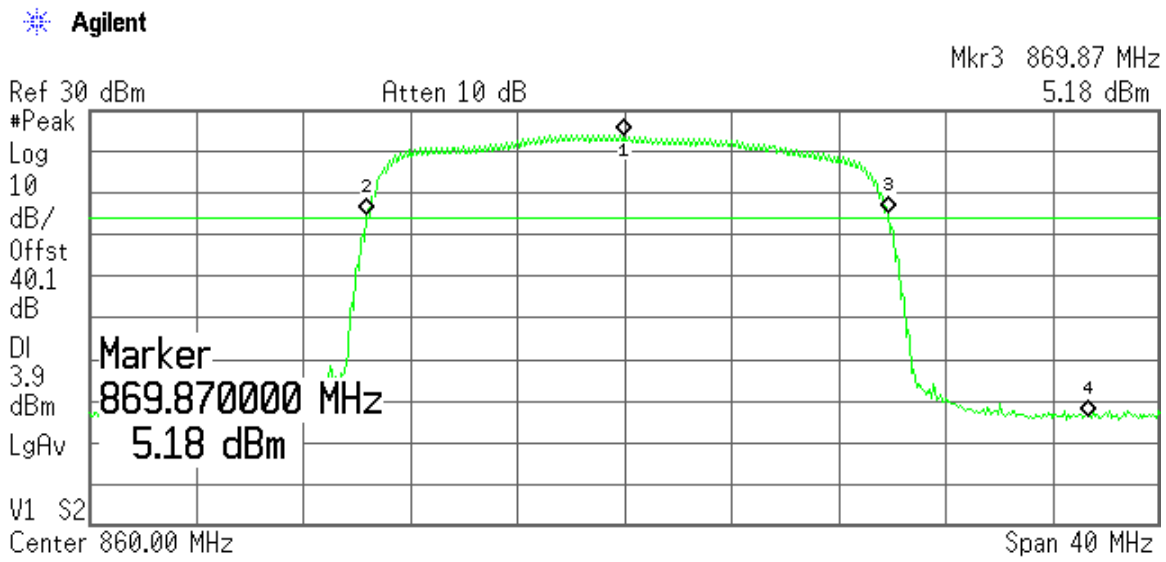
Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Test By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Pass Band Gain & 20dB Bandwidth**
Plot Name:	**800 Band I Uplink Full Band Span**
Configuration:	Server Antenna Connector was connected to SG. Input: -60dBm



Project Number:	0048-070615-01
EUT:	Shyam Indoor Repeater R4-30-S8
SN:	R33ICG011
Test By:	Edward Lee
Temperature:	70˚F
Humidity:	30%

Section:	**Pass Band Gain & 20dB Bandwidth**
Plot Name:	**800 Band I Downlink Full Band Span**
Configuration:	Donor Antenna Connector was connected to SG. Input: -60dBm



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	860.00 MHz	23.90 dBm
2	(1)	Freq	850.33 MHz	4.72 dBm
3	(1)	Freq	869.87 MHz	5.18 dBm
4	(1)	Freq	877.33 MHz	-43.52 dBm

Section 9. Test Equipment List

Manufacture	Model	Serial No.	Description	Last Cal dd/mm/yy	Cal Due dd/mm/yy
HP	HP8546A	3448A00290	EMI Receiver	12/01/07	12/01/08
HP	E4432B	US38220355	250K-3GHz Signal Generator	17/09/06	17/09/07
Agilent	E4440A	US40420700	3Hz-26.5GHz Spec. Analyzer	12/05/07	12/05/08
R &S	ESPI7	6001	9KHz-7GHz EMI Receiver	11/06/07	11/06/08
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	12/02/07	12/02/08
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	09/02/07	09/02/08
Fischer Custom	LISN-2	900-4-0008	Line Impedance Stabilization Networks	23/08/06	23/08/07
Fischer Custom	LISN-2	900-4-0009	Line Impedance Stabilization Networks	23/08/06	23/08/07
EMCO	6502	2665	10KHz-30MHz Active Loop Antenna	27/02/07	27/02/08
EMCO	3115	4945	Double Ridge Guide Horn Antenna	11/08/06	11/08/07
HP	8569B	2607A02802	1GHz-22GHz Spectrum Analyzer	10/02/07	10/02/08
Advantest	R3271	5003583	100Hz-26.5GHz Spectrum Analyzer	30/04/07	30/04/08
HP	E8254A	US42110367	Signal Generator	23/03/07	23/03/08
HP	4419A	US37292112	RF Power Meter w/ Sensor Probe	20/06/07	20/07/07
EMCO	3116	4943	Double Ridge Guide Horn Antenna	11/01/07	11/01/08
Scientific-Atlanta	12A-18	441	Wave Guide Horn Antenna	04/08/06	04/08/07