

**Test report no. : 89270-7**

**Item tested : Cluster Link Board (CLB)**

**Type of equipment : UHF Radio**  
(Part of Obstacle Collision Avoidance System)

**FCC ID : VE8142006**

**Client : OCAS AS**

**FCC Part 90**

DSC Security/UHF cluster link radio

**RSS-119 Issue 9**

Land Mobile and Fixed Radio Transmitters and Receivers

**26 February 2008**

**Authorized by :**

A blue ink signature of Frode Sveinsen, written in a cursive style.

Frode Sveinsen  
Technical Verificator

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## 1 GENERAL INFORMATION

### 1.1 Testhouse Info

Name : Nemko Comlab  
Address : Gåsevikveien 8, Box 96  
N-2027 Kjeller, NORWAY  
Telephone : +47 64 84 57 00  
Fax : +47 64 84 57 05  
E-mail: post@comlab.no  
FCC test firm registration # : 994405  
IC OATS registration # : 4443  
Total Number of Pages: 43

### 1.2 Client Information

Name : OCAS AS  
Address : Post box 434 Økern, N-0513 Oslo, Norway  
Telephone : +47 22 071 000  
Fax : +47 22 071 009

#### **Contact:**

Name : Jostein Sund Jensen  
e-mail: jostein.sund.jensen@ocas-as.no

#### **1.2.1 Manufacturer**

Name : Kitron  
Address : Tangen alle 39, 4817 His, Norway  
Address : Serviceboks 500, 4809 Arendal, Norway  
Telephone : +47 37071300  
Fax : -

## 2 Test Information

### 2.1 Test Item

Name :	OCAS Cluster Link Board (CLB)
Model/version :	142006 CLB (Part of 141001 CM)
Serial number :	CLB: 001012 , (CM: W007310040002 Rev. 11)
Hardware identity and/or version:	V2.0
Software identity and/or version :	APPSW142006 CLB_0_0_34, BL142006 CLB_0_0_5 and FPGA FW142006 CLB_0_0_25
Frequency Range :	450 - 470 MHz
Tunable Bands :	None
Emission designator:	8K40G2D
Number of Channels :	3
Operating Modes :	TX & RX (For RX see FCC part 15B Test report)
Channel separation:	12.5kHz
Type of Modulation :	GFSK
User Frequency Adjustment :	NO
Rated Output Power (TX) :	+20 dBm (100mW) @50ohm connector
Type of Power Supply :	13 Vdc
Antenna gain:	+3.5dBi
Antenna Connector :	50 Ohm QMA - connector

### **Description of Test Item**

This UHF unit is a part of a system called Obstacle Collision Avoiding System (OCAS). The OCAS is a warning system for traffic obstacles for aircrafts. The radar placed near the obstacle detects aircrafts with course towards the obstacle. A configurable set of rules is applied to define whether the aircraft must be alarmed or not, select warning signals, light and audio, depending on time-to-impact with obstacle(s) speed, course, and altitude. The main units of the OCAS system are: Radar unit for detecting aero planes, Warning devices VHF radio and Strobe lights, Control unit and power supply unit.

The system can consist of several Strobe lights if there are several obstacles on the site that has to be marked. The Cluster Link Board / UHF radio is used to communication between the Radar Unit and the stand alone Strobe Lights. This communication link is used to initiate the light warning, status reporting and SW upgrading of the stand alone Strobe Lights.

### **Theory of Operation**

The CLB is used for wireless data communication. It operates in the UHF frequency range using a TDMA scheme. A master radio in the cluster transmits a frame synchronization pattern that defines the slot timing for all radios within the cluster. Pre-defined access tables define receive and transmit access rights for all radios within the cluster. Data received at the RS-422 interface is transmitted in the first available slot according to the routing table. Data received at the air interface is transmitted to the RS-422 interface immediately. The Cluster Link Radio acts as a wireless cable and higher-level protocols have to be handled by the data equipment in the end-nodes.

The transmitter is based on a quadrature digital upconverter, with an output IF of 72MHz. The IF is filtered and upconverted to the desired RF frequency (from 450MHz to 470MHz). The RF is then filtered and amplified to the desired output level. An integrated synthesizer/VCO is used for a fixed LO for both transmit and receive signal (from 378MHz to 398MHz). The receive signal is amplified, filtered and downconverted to an IF frequency of 72MHz. The IF is then filtered and amplified to the desired level for the AD converter. A RF switch is used to switch both the LO and the RF signal when switching between receive and transmit.

Power-save functionality is implemented for idle mode. Power supply to RX and TX circuits is shut down, together with power supply to the FPGA.

## **2.2 Test Environment**

### **2.2.1 Normal test condition**

Temperature: 20 - 24 °C

Relative humidity: 20 - 50 %

Normal test voltage: 13.9 V DC

The values are the limit registered during the test period.

## **2.3 Test Period**

Item received date: 2007-08-30

Test period : from 2007-08-30 to 2007-10-05 & 2008-02-19

### 3 TEST REPORT SUMMARY

#### 3.1 General

Manufacturer: OCAS AS  
Model No.: 142006 CLB (Part of 141001 CM)  
Serial No.: CLB: 001012 , (CM: W007310040002 Rev. 11)

All measurements are traceable to national standards.

The tests were conducted for the purpose of demonstrating compliance with FCC Part 90, Subpart I, paragraph 90.217.

Radiated tests were conducted in accordance with ANSI C63.4-2003. The radiated tests were made in a semi-anechoic chamber at measuring distances of 3 and 10metres.

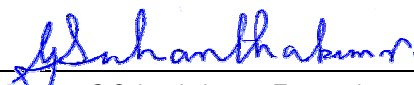
<input checked="" type="checkbox"/> New Submission	<input checked="" type="checkbox"/> Production Unit
<input type="checkbox"/> Class II Permissive Change	<input type="checkbox"/> Pre-production Unit
<b>TNB</b> Equipment Code	<input type="checkbox"/> Family Listing

**THIS TEST REPORT RELATES ONLY TO THE ITEMS AND CONFIGURATIONS TESTED.**

Deviations from, additions to, or exclusions from the test specifications are described in "Summary of Test Data".



**TEST REPORT #: 89270/7**

TESTED BY:   
G.Suwanthakumar, Test engineer

DATE: 20.02.2008

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### 3.2 Test Summary

Name of test	FCC Parts 2 and 90 reference	RSS-119 Issue 9 reference	Result
RF Power Output	2.1046, 90.205	5.4	Complies
Modulation Characteristics, - Audio Frequency Response - Audio Low Pass Filter - Modulation Limiting	2.1047	N/A	N/A <sup>1</sup>
Occupied Bandwidth	2.1049, 90.209	5.5	Complies
Spurious Emissions at antenna terminals	2.1051, 2.1057, 90.210	5.8	Complies
Field Strength of Transmitter Spurious Radiations	2.1053, 2.1057, 90.210	5.8	Complies
Frequency Stability	2.1055, 90.213	5.3	Complies
Transient Frequency Behavior	90.214	5.9	Complies
Exemption from technical standards	90.217(b)	5.10	N/A
Receiver Spurious Emissions	*	5.11*	Complies

<sup>1</sup> The tested equipment transmits data only.

<sup>2</sup> The antenna connector is a QMA connector.

<sup>3</sup> The manufacturer specified voltage range is 13.9V DC

\* Please see Part 15B/RSS-Gen test report for receiver.

### 3.3 Description of modification for Modification Filing

Not applicable.

### 3.4 Comments

Power Management Board (PMB), Uses to power management including distribution of DC power to VWB and CLB:

The PMB will cut the supply current to the CLB(cluster Link Board) and VWB (VHF Warning Board) on different input voltages depending on for instance input voltage to PMB, calculated battery capacity and temperature (battery). The actual operating voltages for CLB and VWB measured at PMB input could be from 11.8V to 15V.

### 3.5 Family List Rational

Not Applicable.



## 4 TEST RESULTS

### 4.1 RF Output Power, Conducted

Para. No.: 2.1046, 90.205

Test Performed By: G.Suwanthakumar

Date of Test: 19-02-08

Test Results: Complies

#### Measurement Data:

Frequency (MHz)	Conducted power (mW)	ERP (mW)	Calculated antenna gain (dBi)
450.000	85.1	64.6	-1.2
460.000	100.2	69.2	-1.6
470.000	79.4	25.7	-4.9
Rated Power Level	100	-	-
Largest deviation from Rated Power	-1dB	-	-

The EUT has only one power level setting . The rated out-put power at 50 ohm is +20 dBm(100mW)

The ERP is measured with modulation. The given antenna gain is +3.5dBi

This ERP was performed with a RBW of 100 kHz and Peak Detector using a spectrum analyzer.

A substitution method is used.

#### Requirements:

FCC 90.205(h):

The maximum RF output power (ERP) must be between 2 and 500 Watts.

RSS 119 section 5.4:

The maximum conducted RF output power must not exceed 30 Watts, and must be within  $\pm 1$  dB of the manufacturers rated output power.

## 4.2 Modulation Characteristics

### 4.2.1 Audio Frequency Response, Audio LP filter & Modulation limiting

Para. No.: 2.1047

Test Performed By: -	Date of Test: -
----------------------	-----------------

Test Results: N/A

Measurement Data:

Data transmission only

Requirements:

None.

### 4.3 Occupied bandwidth

Para. No.: 2.1049, 90.209, 90.217

Test Results: Complies

Test Performed By: G.Suwanthakumar	Date of Test: 02.10.07
------------------------------------	------------------------

The EUT is designed to operate with a 12.5kHz channel bandwidth. The measured emissions at  $\pm 25$ kHz from assigned frequency is 50 dB below the unmodulated carrier.

$$B_n = 2M + 2DK$$

Where:  $B_n$  = Necessary Bandwidth

$M$  = Maximum modulation frequency

For Data transmission,  $M = B/2$ , Where:  $B$  = Modulation rate in Baud

$D$  = Peak deviation,  $K$  = Constant, For Data transmission this is typically 1.2

**12.5kHz:**

FSK, 2400bps with 2,5 kHz deviation

We have  $B=9.6$ ,  $D=2.5$ ,  $K=1.2$  and

$$B_n = 2,4 + 2 \times 2,5 \times 1,2 = 8,4 \text{ kHz}$$

see attached graphs.

The measurements are performed with voltages minimum (10Vdc). Nominal (13.9Vdc) and maximum (15V DC). The temperature from -30 ° C to +50 ° C, with 10 ° C step.

**Requirement:**

90.209(b)(5) and RSS 119, section 5.5:

Bandwidth Limitations: maximum authorized bandwidth = 20 kHz for 25 kHz channels and 11.25 kHz for 12.5 kHz channels.

For equipment designed to operate with a 12.5 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 25 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

## 4.4 Frequency Stability

**Para. No.: 90.217(b)**

**Test Results: Complies**

**Test Performed By: G.Suwanthakumar**

**Date of Test: 02.10.07**

The maximum frequency drift is 730 Hz. This is 1.553 ppm.

**Test Data:**

Test Condition	Frequency (450MHz)	Frequency Drift (Hz)	Frequency (460MHz)	Frequency Drift (Hz)	Frequency (470MHz)	Frequency Drift (Hz)
50°C	450.00063	630	460.00068	680	470.00073	730
40°C	450.00049	490	460.00050	500	470.00050	500
30°C	450.00035	350	460.00035	350	470.00036	360
20°C, 10 V DC	450.00034	340	460.00037	370	470.00020	200
20°C, 15 V DC	450.00034	340	460.00037	370	470.00020	200
20°C	450.00034	340	460.00037	370	470.00020	200
10°C	450.00025	250	460.00027	270	470.00028	280
0°C	449.99999	-10	459.99998	-20	469.99996	-40
-10°C	449.99990	100	459.99990	100	469.99990	100
-20°C	450.00007	70	460.00006	60	470.00002	20
-30°C	450.00016	160	460.00015	150	470.00016	160
Maximum frequency drift (Hz)	630		680		730	

ppm error = ( (Measured carrier frequency in MHz/Assigned carrier frequency in MHz) – 1) \* 10<sup>6</sup>

e.g.: ppm = ((470.00073/470)-1) \* 10<sup>6</sup> = 1.553

The measurements are performed with voltages minimum (10V DC). Nominal (13.9V DC) and maximum (15V DC). The temperature from -30 °C to +50 °C , with 10 °C step.

The instrument used here is a frequency counter. (An external reference frequency of 10MHz is used.)

**Requirement:**

**Less than or equal to 2.5 ppm.**

## 4.5 Spurious emissions - conducted

Para. No.: 2.1053, 2.1057, 90.210, 90.217

Test Performed By: G.Suwanthakumar

Date of Test: 01.10.2007

Test Results: Complies

### Measurement Data:

The measured 2nd and 3rd harmonics are greater than 40 dB below the output power.

No other spurious emissions detected between 9 kHz and 5GHz.

The measurements are done on 450, 460 & 470 MHz.

Test Data: See attached graphs.

TX 450MHz, +20dBm

Frequency of Emission (MHz)	Measured Emission Level (dBm)	Limit (dBm)	Margin (dB)
900	-65.4	-13	52.4
1349	-49.7	-13	36.7

TX 460MHz, +20dBm

Frequency of Emission (MHz)	Measured Emission Level (dBm)	Limit (dBm)	Margin (dB)
920	-59.9	-13	46.9
1380	-46.5	-13	33.5

TX 470MHz, +20dBm

Frequency of Emission (MHz)	Measured Emission Level (dBm)	Limit (dBm)	Margin (dB)
939.9	-59.3	-13	46.3
1410	-42.2	-13	29.2

### Requirements:

Out of band emission shall be less than -13 dBm.

#### **4.6 Spurious Emissions at the Antenna Terminal, Emission Masks**

**Para. No.: 2.1053, 2.1057, 90.210, 90.217**

<b>Test Performed By: G.Suwanthakumar</b>
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<b>Date of Test: 06-02-08</b>
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**Test Results: Complies**

**Measurement Data:**

See attached graphs

**Requirements:**

FCC 90.210(d) for 12.5 kHz channels, 11.25 kHz authorized bandwidth

RSS-119 section 5.8.3 for 12.5 kHz channels, 11.25 kHz authorized bandwidth

#### 4.7 Spurious emissions radiated – 50 ohm load

Para. No.: 2.1053, 2.1057, 90.210, 90.217

Test Performed By: G.Suhandhakumar

Date of Test: 01.10.2007

Test Results: Complies

##### Measurement Data:

The spectrum was searched from 30 to 5000 MHz.

The RF ports were terminated with 50 ohm load and all ports were terminated with respective loads.

The frequency band below 1 GHz is measured with 100 kHz and Peak Detector; the frequencies from 1 to 5 GHz were measured with 1 MHz RBW and Peak Detector.

The measurement was performed at 10m below 1 GHz and at 3m above 1 GHz.

The EUT was rotated in 3 planes for this test.

The measured values are ERP below 1 GHz and EIRP above 1 GHz.

##### Test Data:

The maximum emission is observed at Vertical polarization.

Frequency of Emission (MHz)	Measured Emission Level (dBm)	Limit (dBm)	Margin (dB)
50	-60.5	-13	47.5
96,05	-63	-13	50
120	-52	-13	39
144	-69	-13	56
160	-70	-13	57
174	-70	-13	57
200	-69	-13	56
125	-55	-13	42

Please see the attached graphs.

##### Requirements:

Out of band emission shall be less than -13 dBm

## **4.8 Transient Frequency Behaviour**

**Para. No.: 2.1055, 80.209, 90.213, 90.217(b)**

<b>Test Performed By: G.Suwanthakumar</b>
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<b>Date of Test: 05-02-08</b>
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**Test Results: Complies**

**Measurement Data:**

See attached graphs.

Measurement method according to ANSI/TIA/EIA-603-B-2002 with Frequency Domain Analyzer.

Comment: /

**Requirements:**

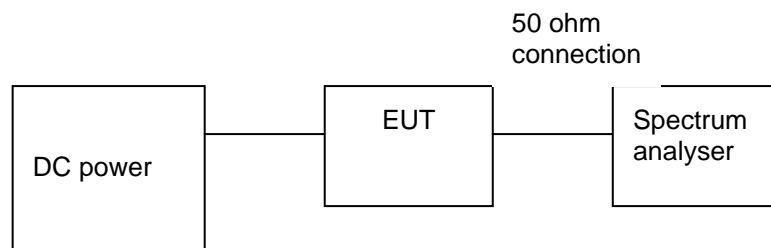
FCC 90.214

RSS 119 Section 5.9

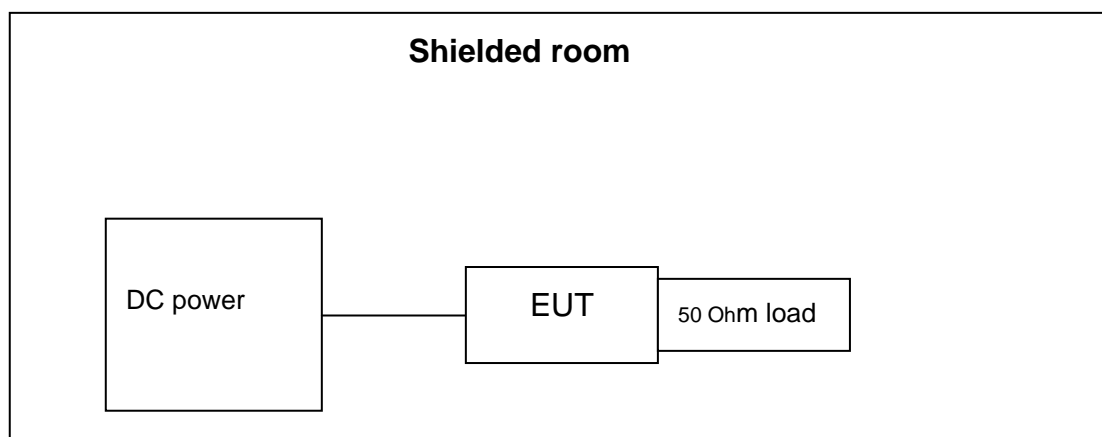


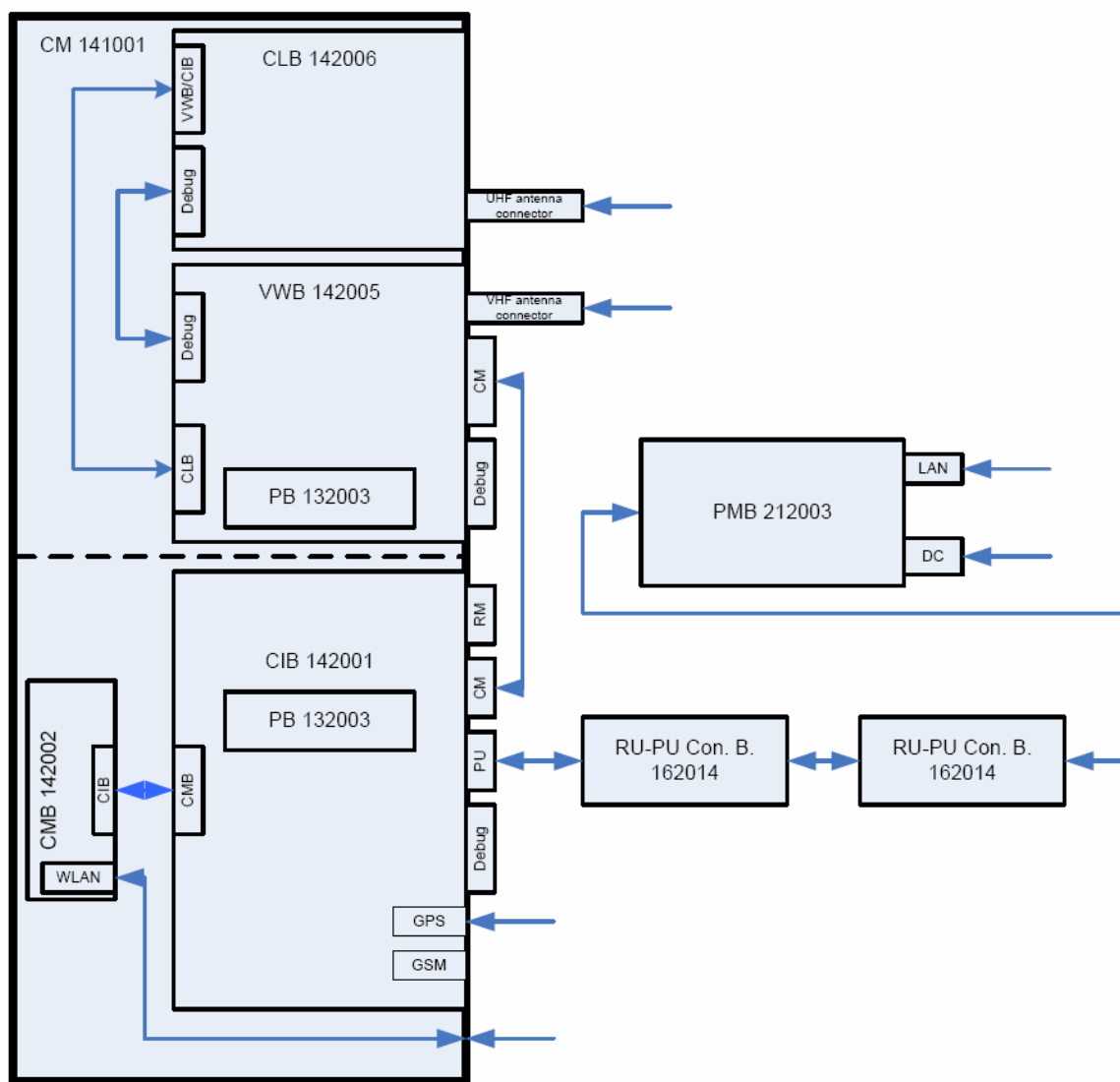
## 5 BLOCK DIAGRAM

### 5.1 System set up (Conducted measurements)



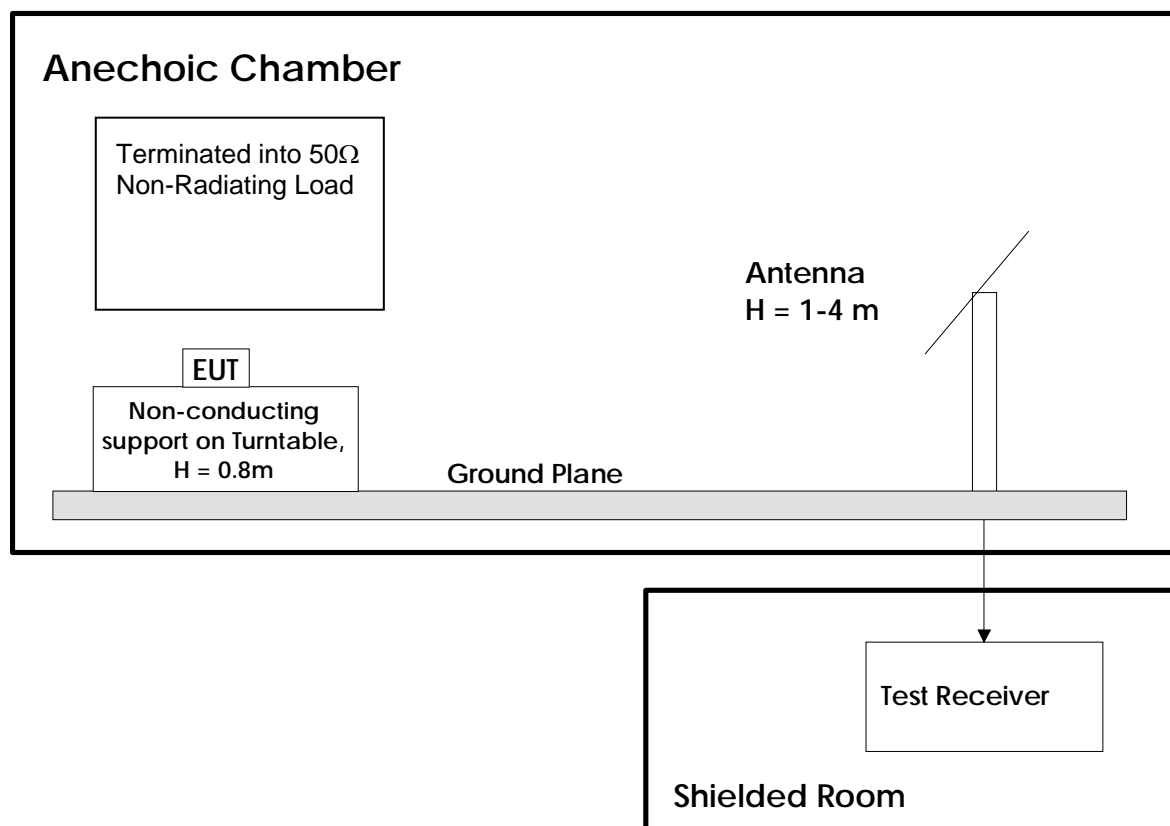
### 5.2 Radiated Emissions (with 50 ohm load)





Block diagram of the System set-up

### 5.3 Test Site Radiated Emission



Emission levels are measured in terms of ERP. All emissions within 20 dB of the specification limit are maximized along 360° azimuth and further maximized by raising and lowering the search antenna from 1 to 4 m. The transmitter under test is replaced with a dipole antenna and calibrated signal generator. The level and frequency of the signal generator are adjusted in order to reproduce the previously detected emission and maximized by varying the height of the search antenna. This procedure is performed both horizontal and vertical polarization of the detected signal.

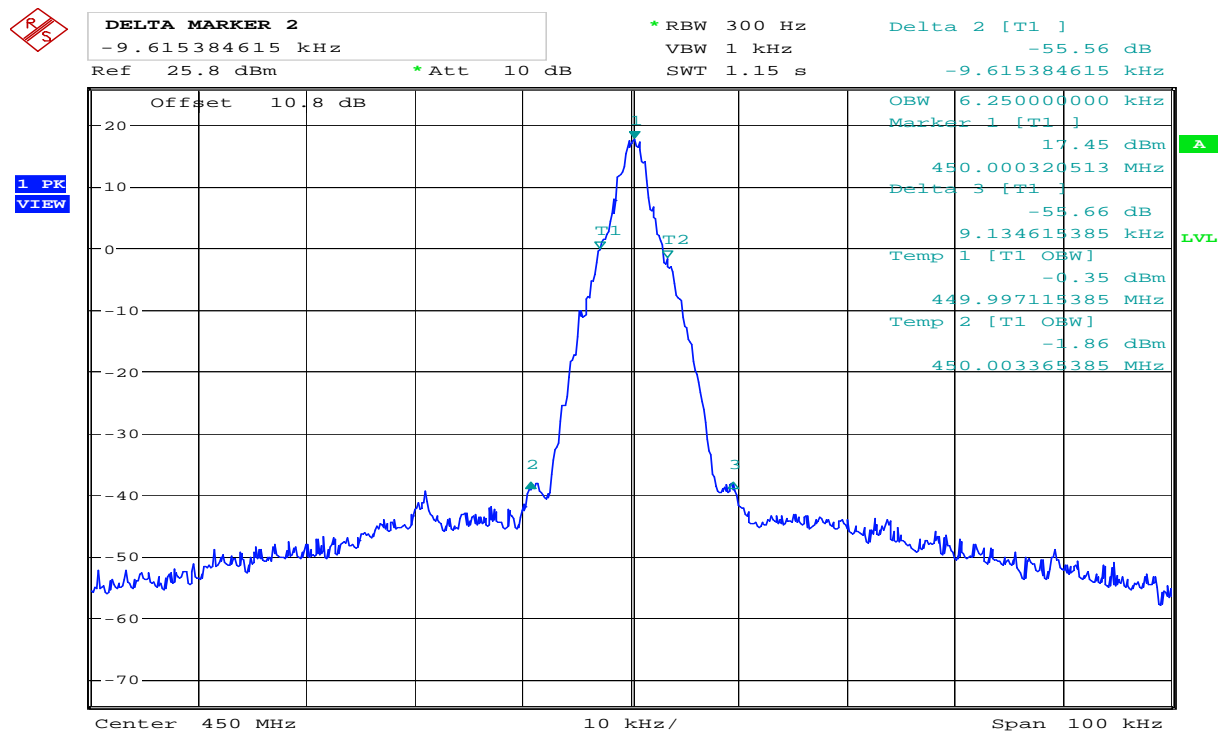
#### **Radiated spurious emissions**

## 6 LIST OF TEST EQUIPMENT

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Test Laboratory.

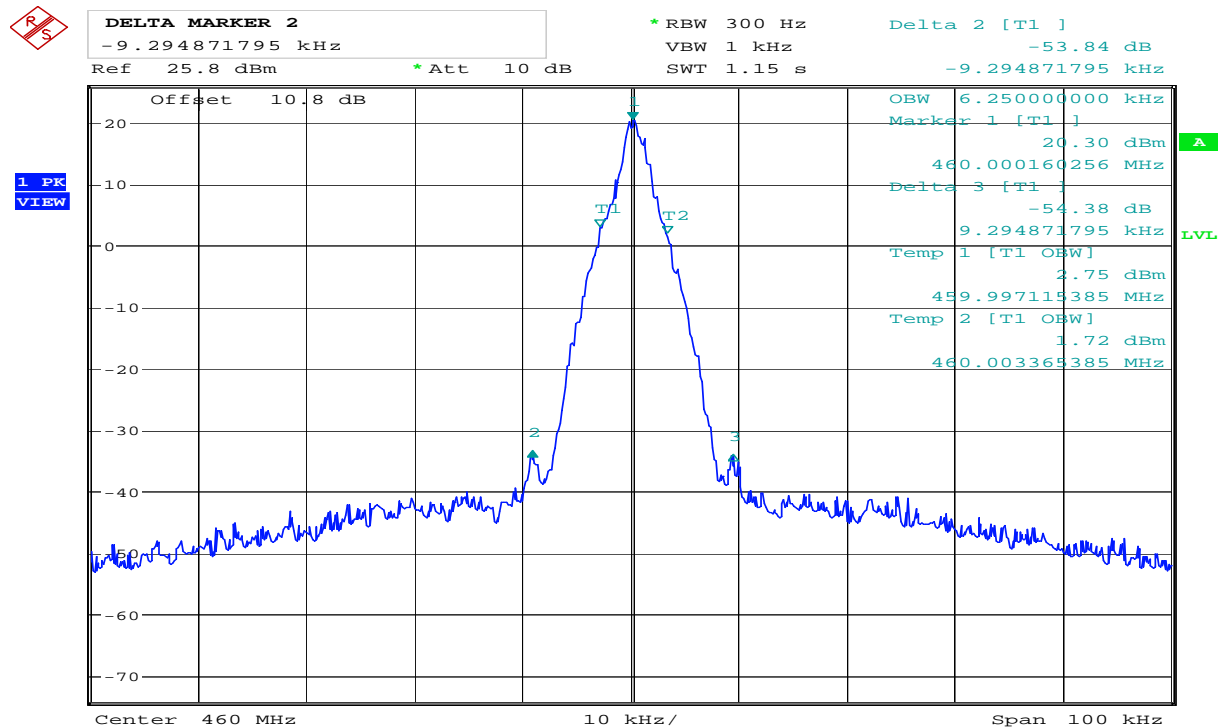
No	Description	Manufacturer	Type
1101	EMI-Receiver	R&S	ESVS30
1261	Antenna Log-periodic	R&S	HL 223
1410	Shielded room	ETS Euroshield	Semi-anechoic
61	Attenuator	Bird	8321
1087	Radiocomm Analyzer	R&S	CMTA 54
1079	Generator, AF/./UHF	R&S	SMHU56
1337	Spektrum Analyzer	R&S	FSEK 1088,3494,30
1336	Generator, RF	R&S	SMP04 1035,5005,04
1260	Antenna, Biconical	R&S	HK 116
1338	Probe, RF	HP	8481H
181	Power meter	HP	436A
1014	Counter Freq	HP	5386A
1195	Attenuator	Narda	768-30
1007	Attenuator	Narda	765-10
1020	Multimeter, Digital	Fluke	87
257	Hybrid	Anzac	H-9
1504	EMI Receiver	R&S	FSU26
1167	Filter Band Pass	Trilithic	5VF95/190
46	Filter Band Pass	Texscan	5VF190/375
1169	Filter Band Pass	Trilithic	5VF250/500
1173	Filter Band Pass	Trilithic	5VF24/48
1174	Filter Band Pass	Trilithic	5VF1000/2000
5099	Spektrum Analyzer	HP	3588A
1083	Climatic chamber	ACS	TY80

## 7 GRAPHS



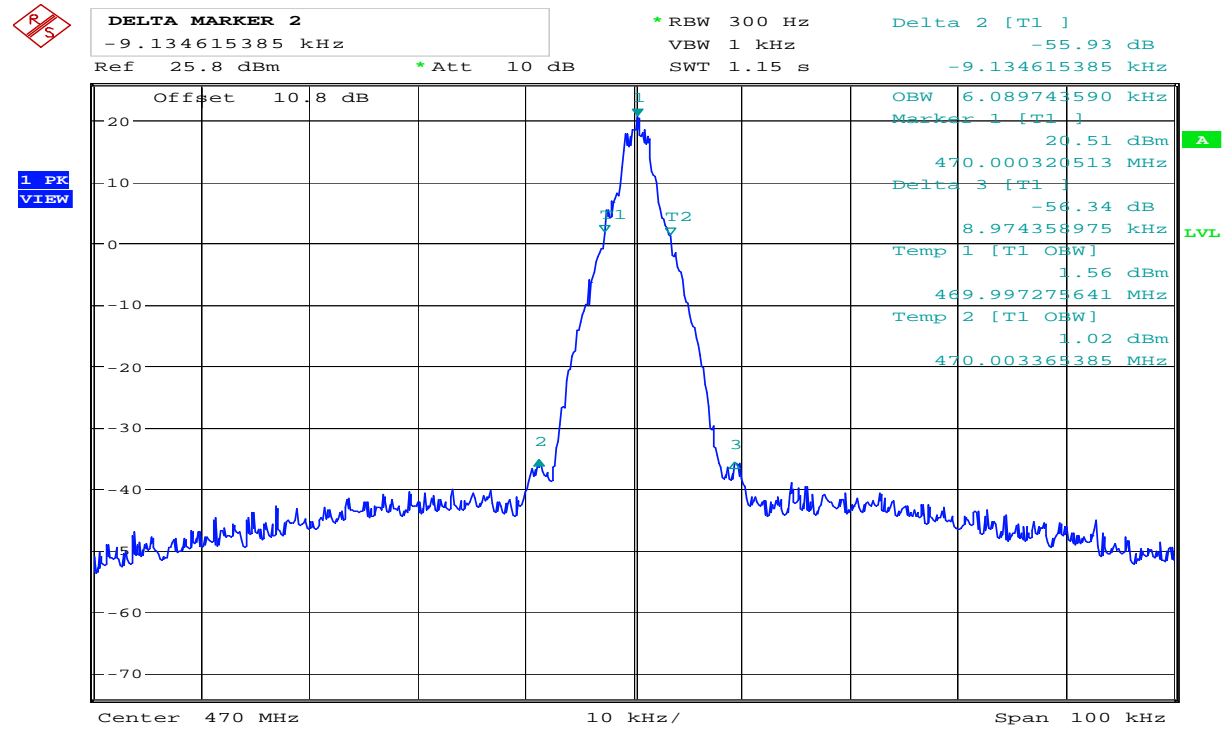
Date: 3.OCT.2007 13:30:26

### Occupied Bandwidth – 450MHz – -30° C



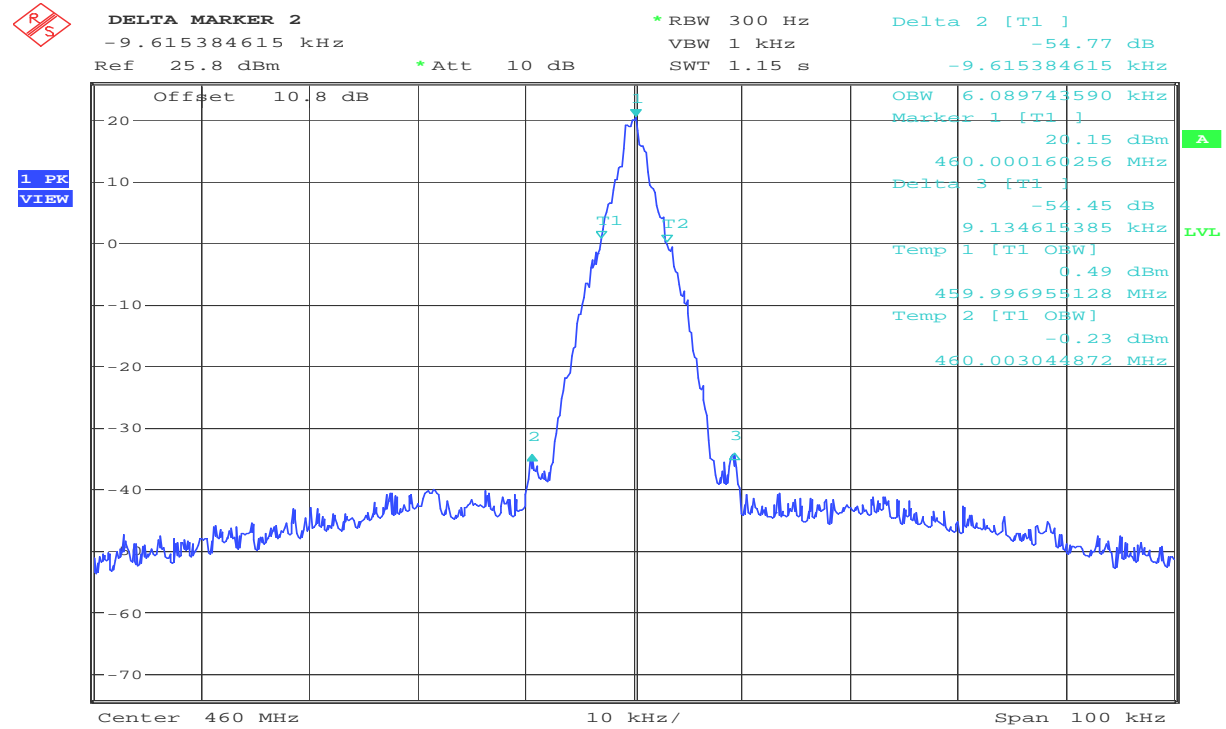
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### Occupied Bandwidth – 460MHz – -30° C



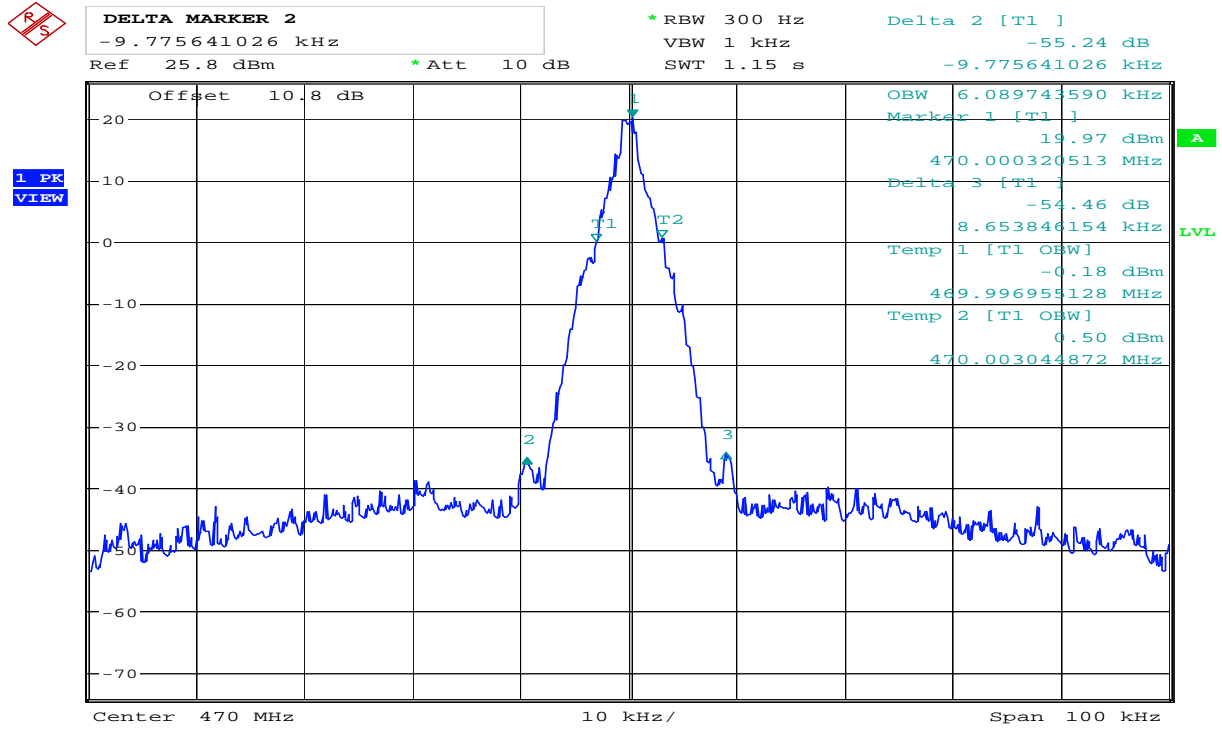
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**Occupied Bandwidth – 470MHz – -30° C**



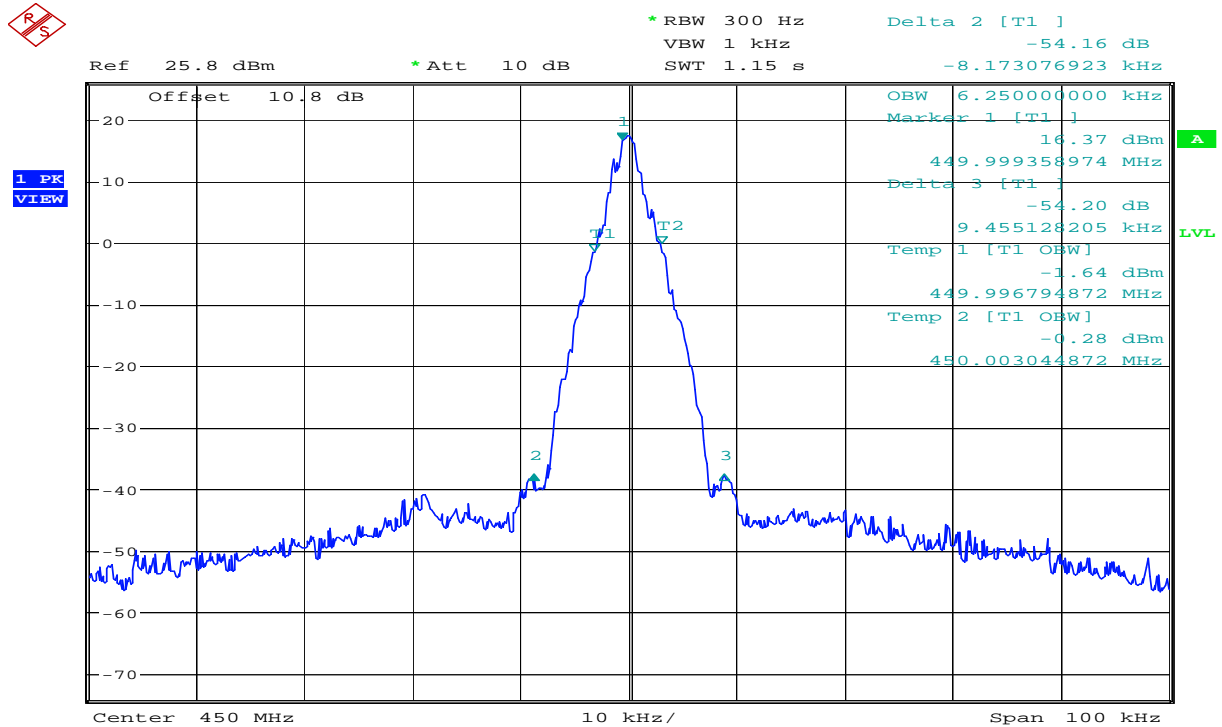
Date: 3.OCT.2007 11:52:02

**Occupied Bandwidth – 460MHz – -20° C**



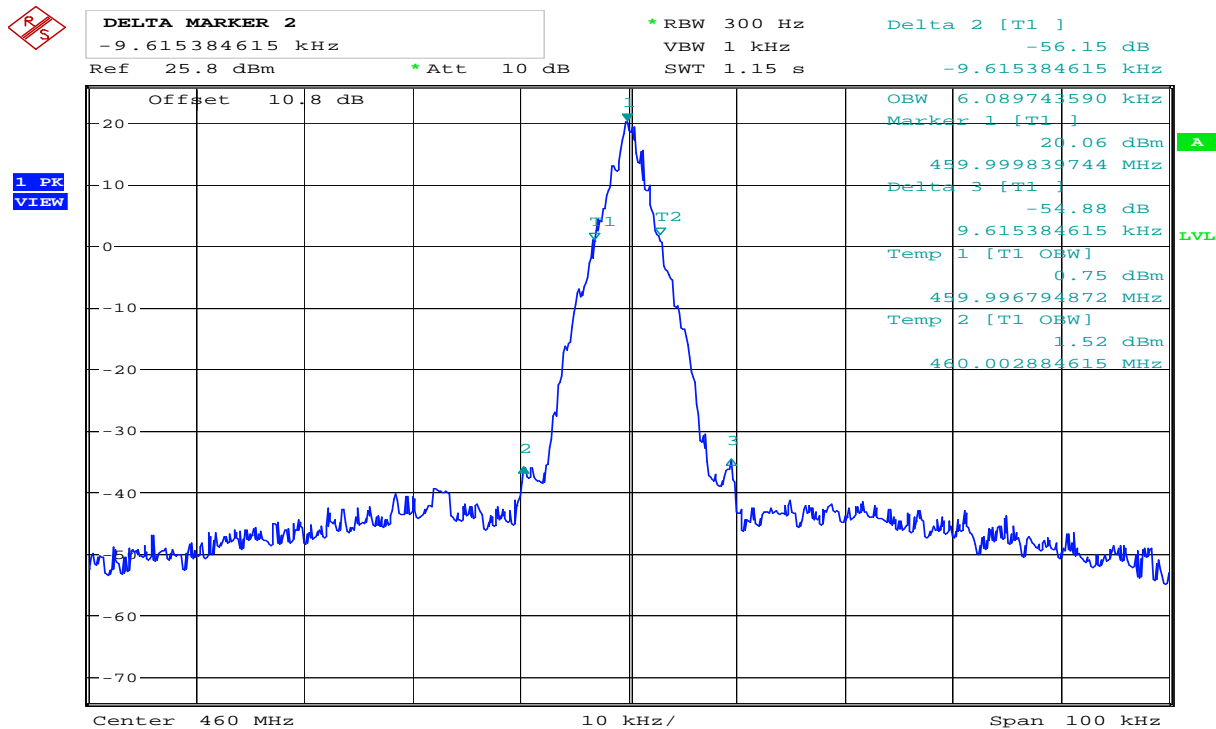
Date: 3.OCT.2007 11:53:15

### Occupied Bandwidth – 470MHz – -20° C



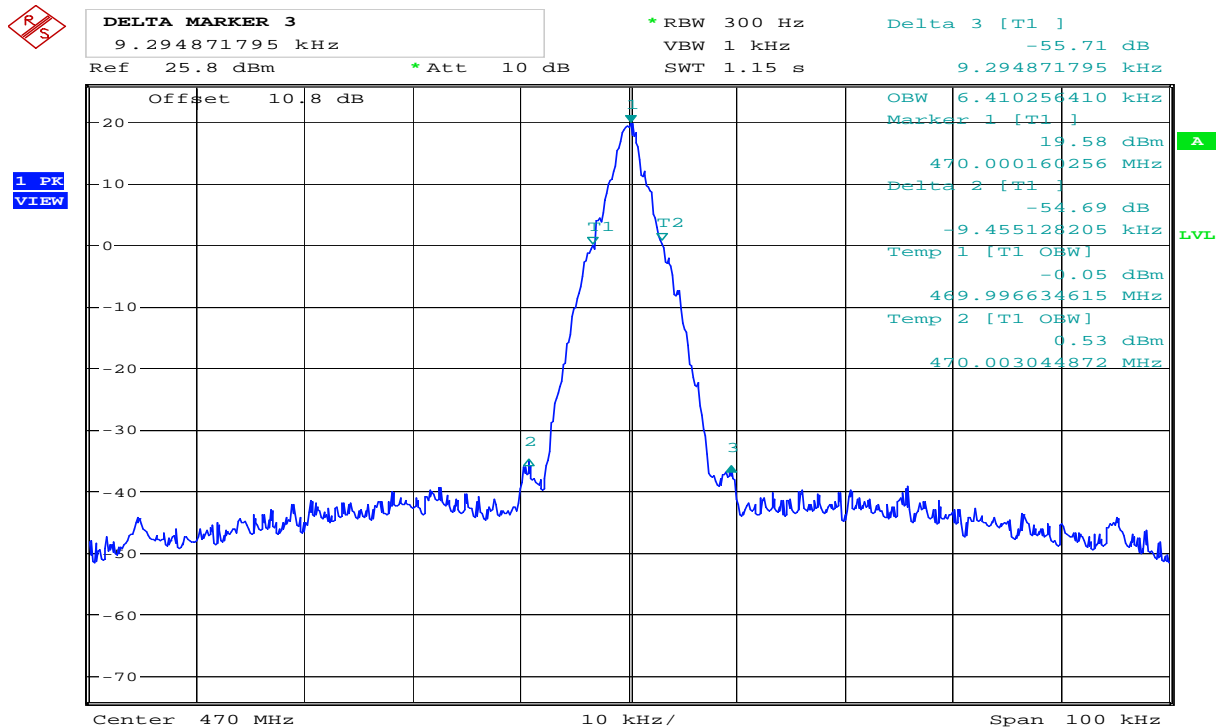
Date: 3.OCT.2007 10:25:50

### Occupied Bandwidth – 450MHz – -10° C



Date: 3.OCT.2007 10:27:23

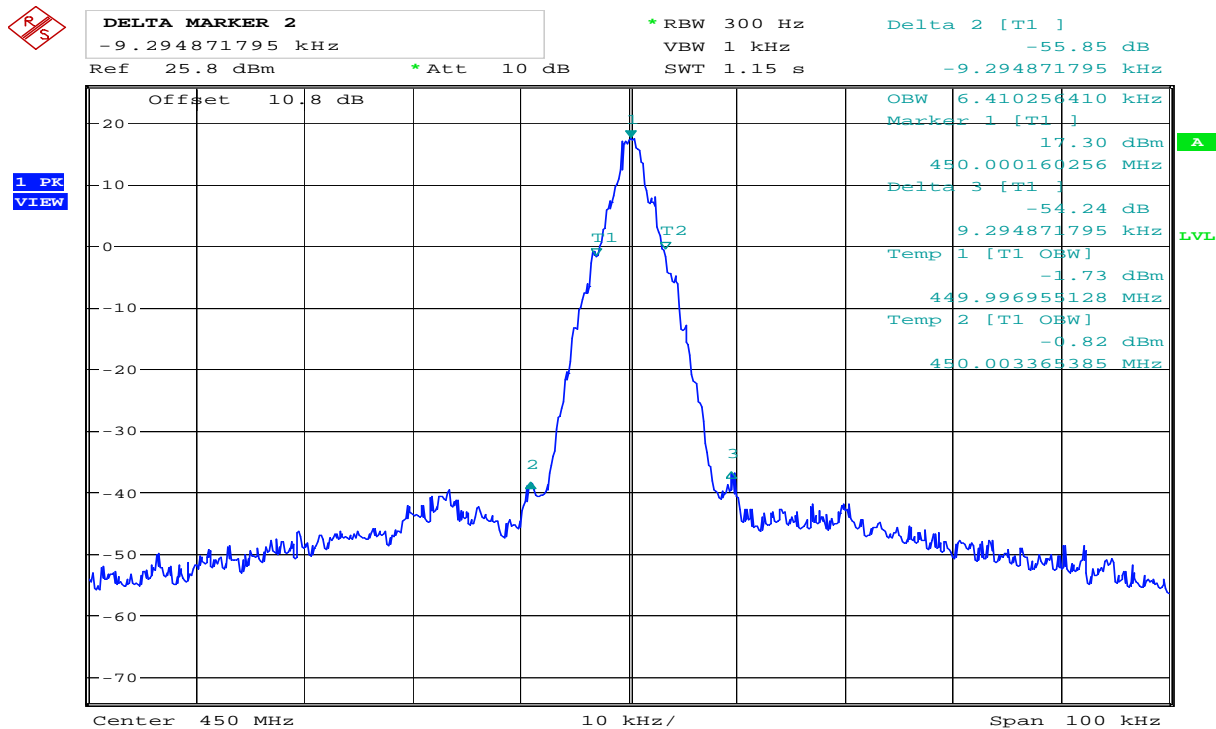
### Occupied Bandwidth – 460MHz – -10° C



Date: 3.OCT.2007 10:29:00

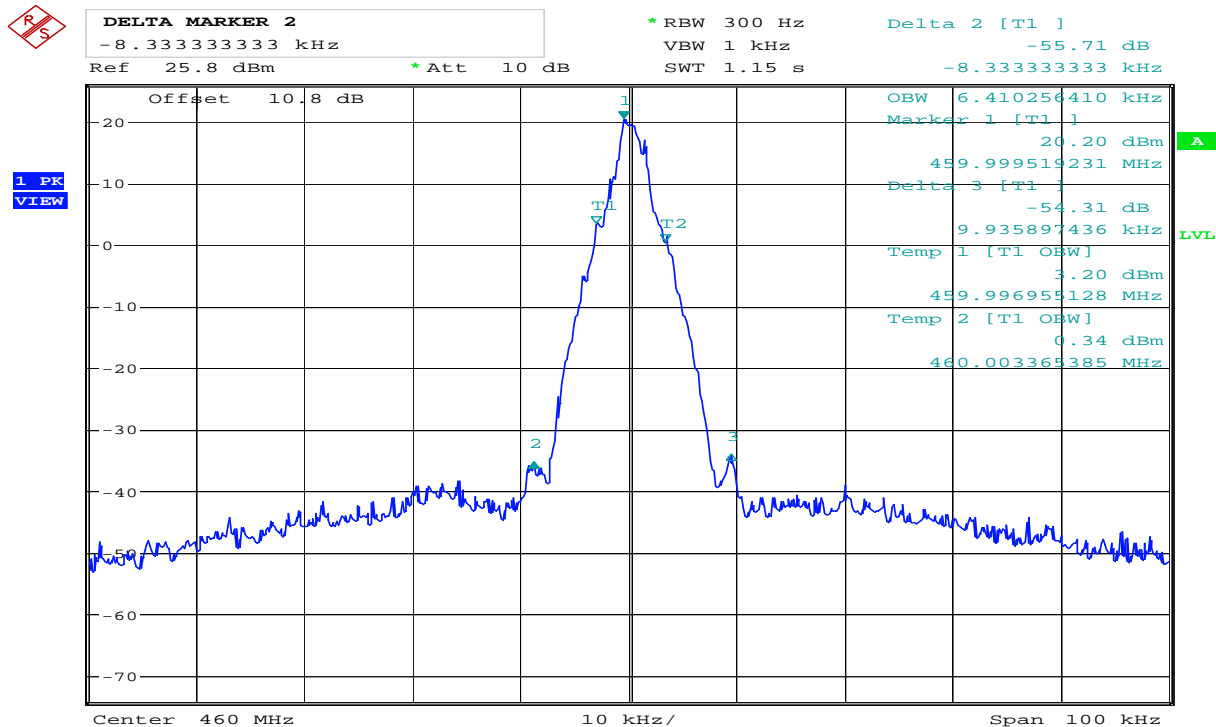
### Occupied Bandwidth – 470MHz – -10° C





Date: 3.OCT.2007 09:35:07

**Occupied Bandwidth – 450MHz – 0° C**



Date: 3.OCT.2007 09:32:52

**Occupied Bandwidth – 460MHz – 0° C**

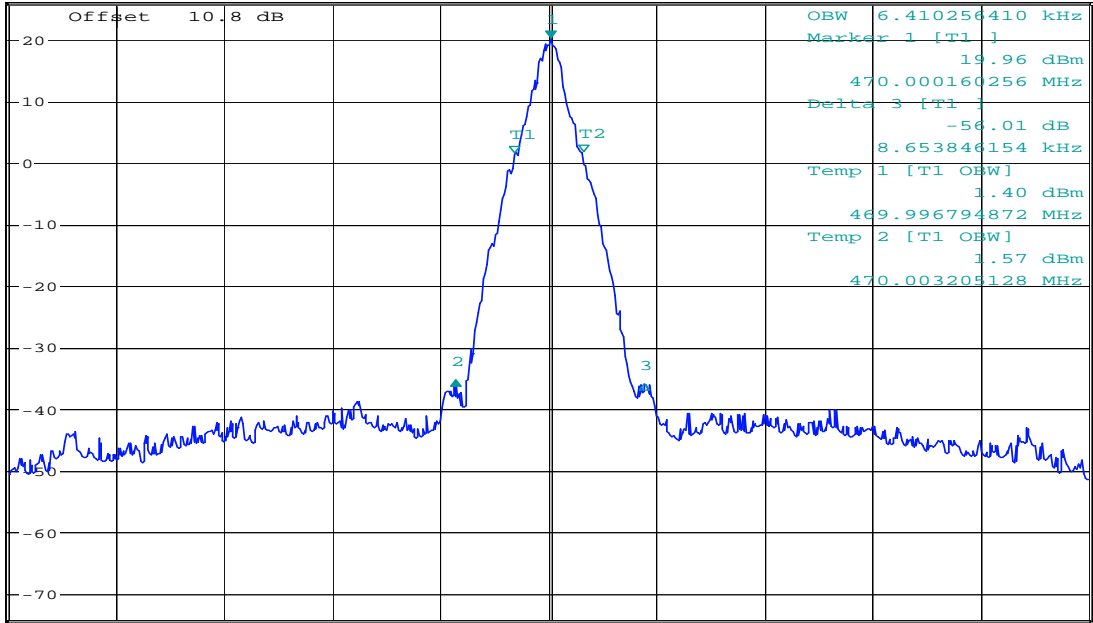


**DELTA MARKER 2**  
-8.814102564 kHz  
Ref 25.8 dBm \* Att 10 dB

\* RBW 300 Hz  
VBW 1 kHz  
SWT 1.15 s

Delta 2 [T1 ]  
-55.42 dB  
-8.814102564 kHz

1 PK  
VIEW



Center 470 MHz 10 kHz/ Span 100 kHz

Date: 3.OCT.2007 09:26:37

### Occupied Bandwidth – 470MHz – 0° C

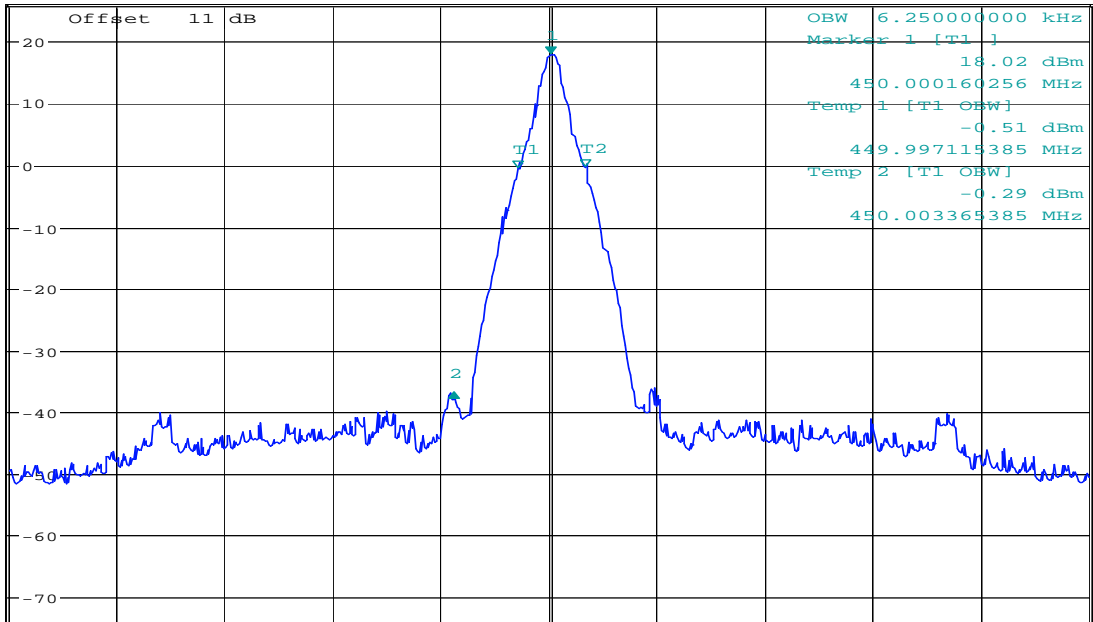


Ref 26 dBm \* Att 10 dB

\* RBW 300 Hz  
VBW 1 kHz  
SWT 1.15 s

Delta 2 [T1 ]  
-54.97 dB  
-8.974358974 kHz

1 PK  
VIEW



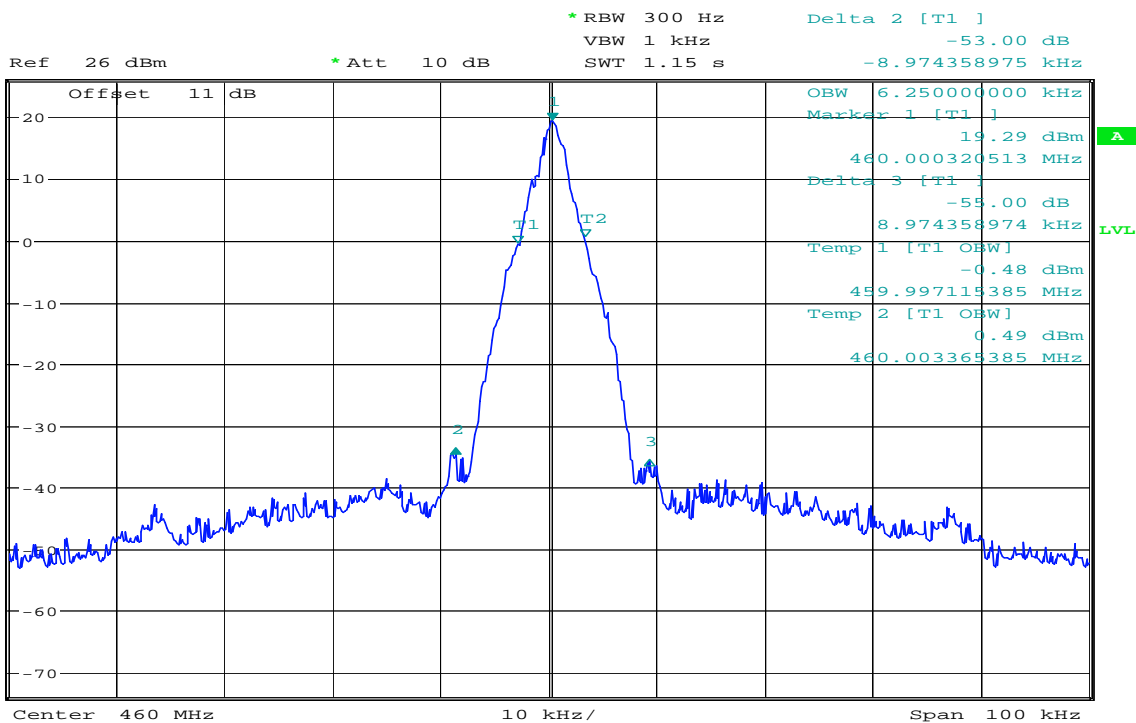
Center 450 MHz 10 kHz/ Span 100 kHz

Date: 2.OCT.2007 09:24:45

### Occupied Bandwidth – 450MHz – +20° C



1 PK  
VIEW

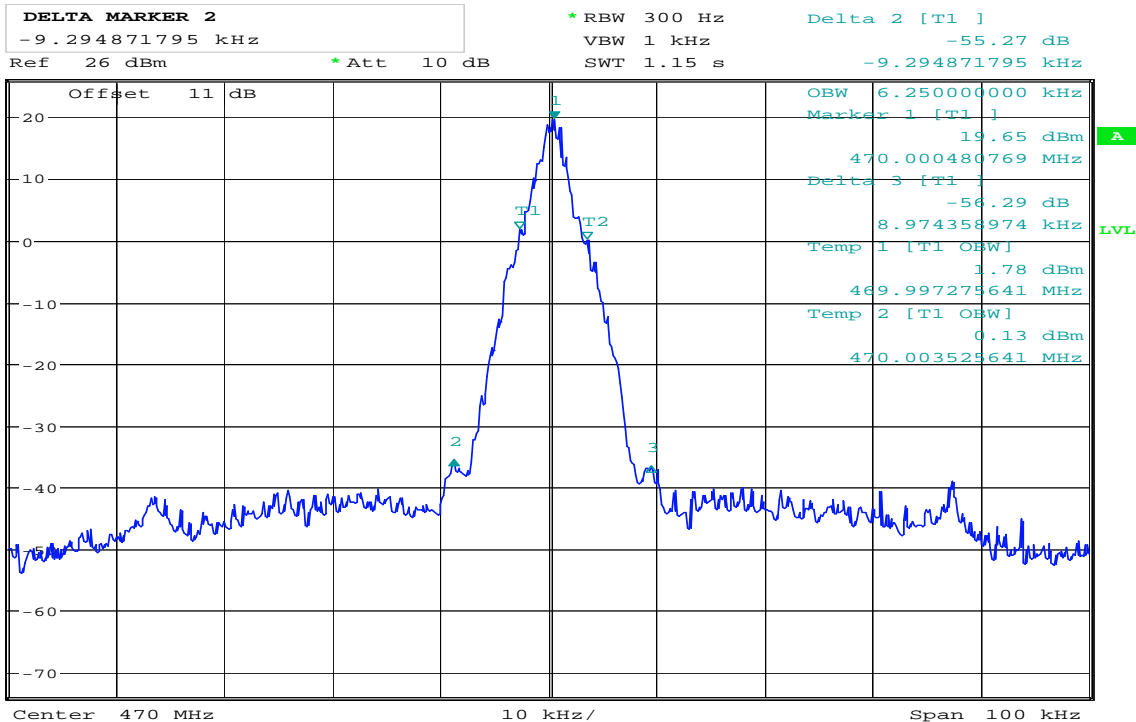


Date: 2.OCT.2007 10:14:13

**Occupied Bandwidth – 460MHz – +20° C**



1 PK  
VIEW



Date: 2.OCT.2007 10:15:44

**Occupied Bandwidth – 470MHz – +20° C**

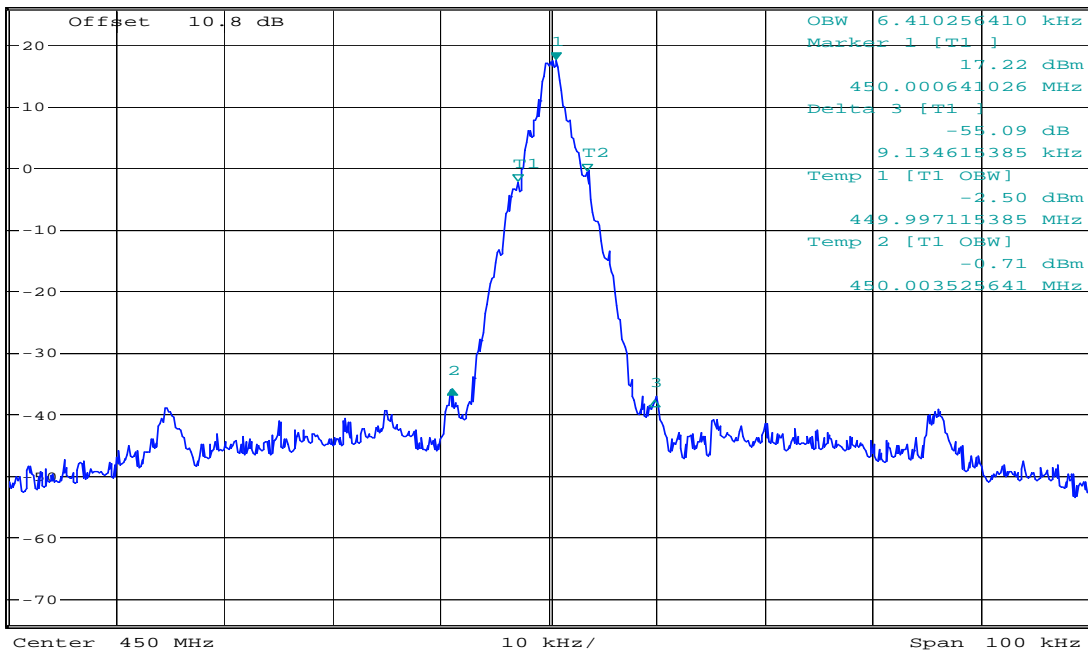


**DELTA MARKER 2**  
-9.615384615 kHz  
Ref 25.8 dBm \* Att 15 dB

\* RBW 300 Hz  
VBW 1 kHz  
SWT 1.15 s

Delta 2 [T1]  
-53.24 dB  
-9.615384615 kHz

1 PK  
VIEW



Date: 2.OCT.2007 12:42:01

### Occupied Bandwidth – 450MHz – +30° C

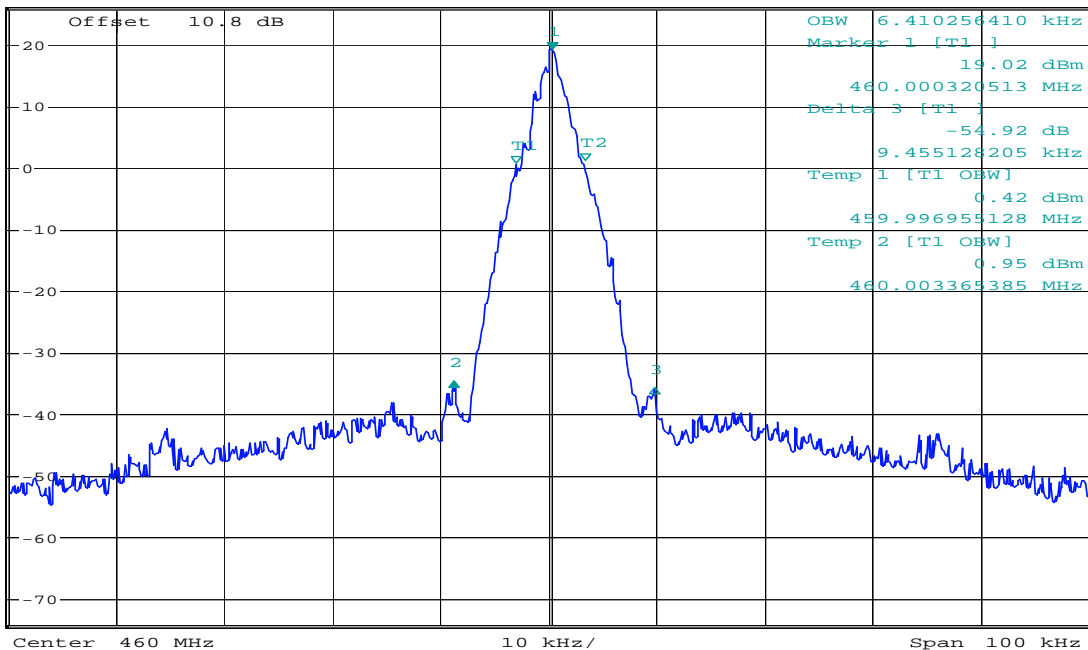


**DELTA MARKER 2**  
-9.134615385 kHz  
Ref 25.8 dBm \* Att 15 dB

\* RBW 300 Hz  
VBW 1 kHz  
SWT 1.15 s

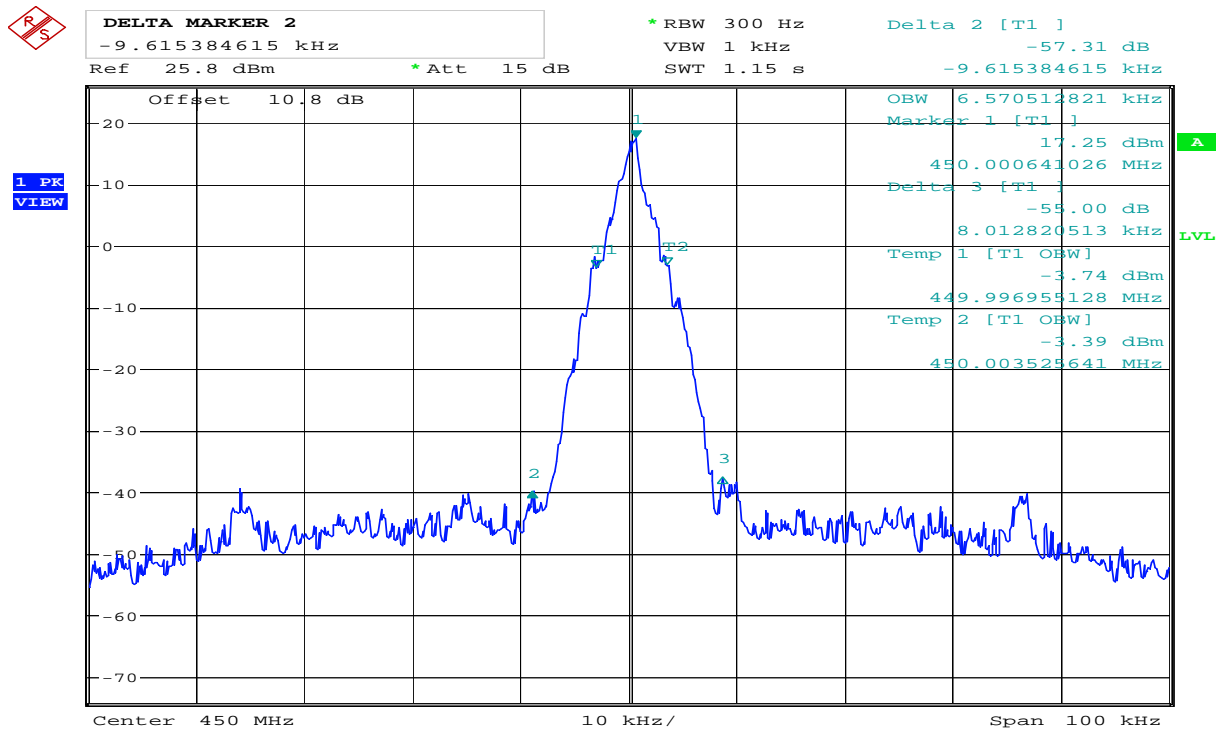
Delta 2 [T1]  
-53.88 dB  
-9.134615385 kHz

1 PK  
VIEW



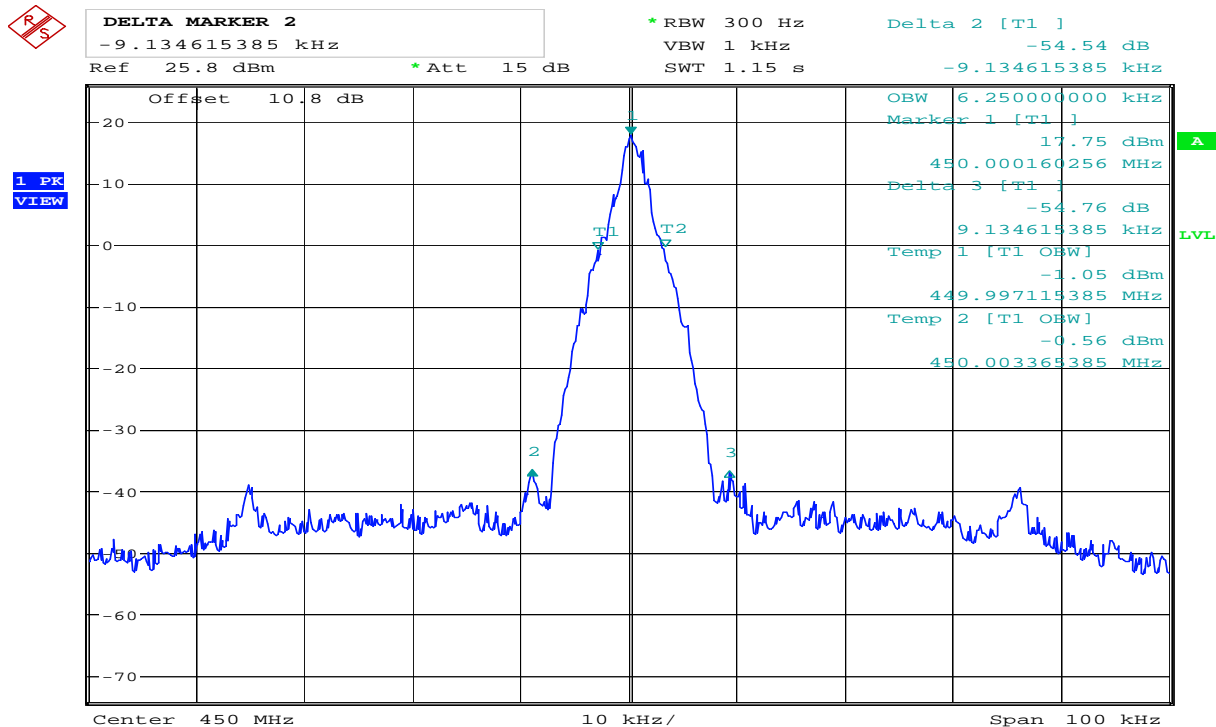
Date: 2.OCT.2007 12:33:30

### Occupied Bandwidth – 460MHz – +30° C



Date: 2.OCT.2007 12:31:53

**Occupied Bandwidth – 470MHz – +30° C**



Date: 2.OCT.2007 13:38:52

**Occupied Bandwidth – 450MHz – +40° C**

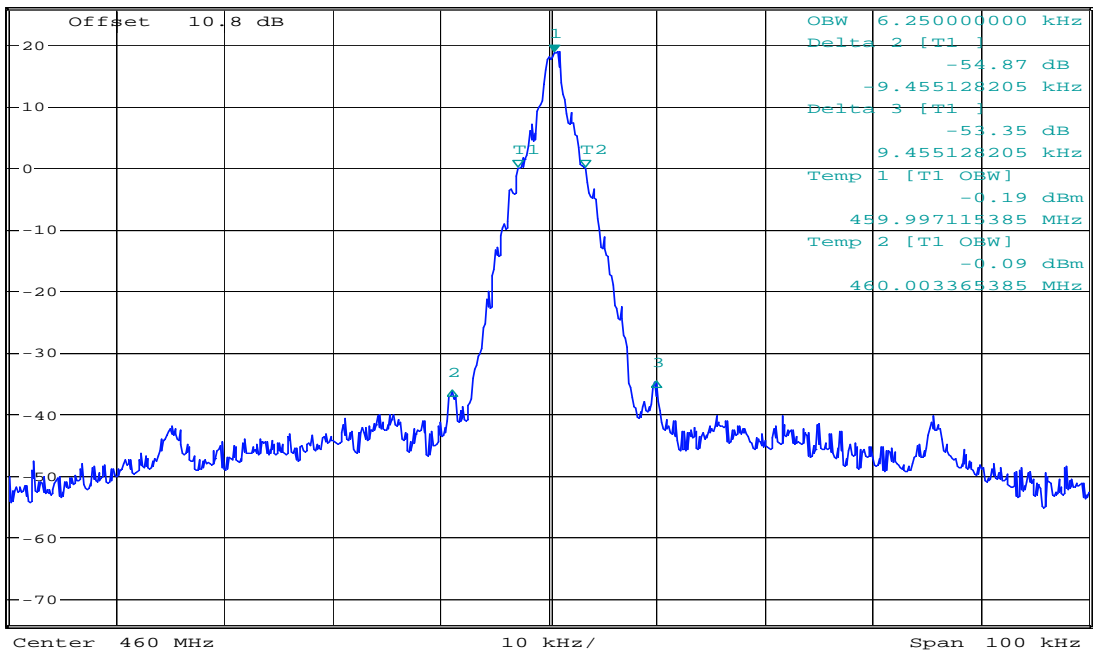


**MARKER 1**  
 460.0004808 MHz  
 Ref 25.8 dBm \* Att 15 dB

\* RBW 300 Hz  
 VBW 1 kHz  
 SWT 1.15 s

Marker 1 [T1]  
 18.57 dBm  
 460.000480769 MHz

1 PK  
 VIEW



Date: 2.OCT.2007 13:40:19

### Occupied Bandwidth – 460MHz – +40° C

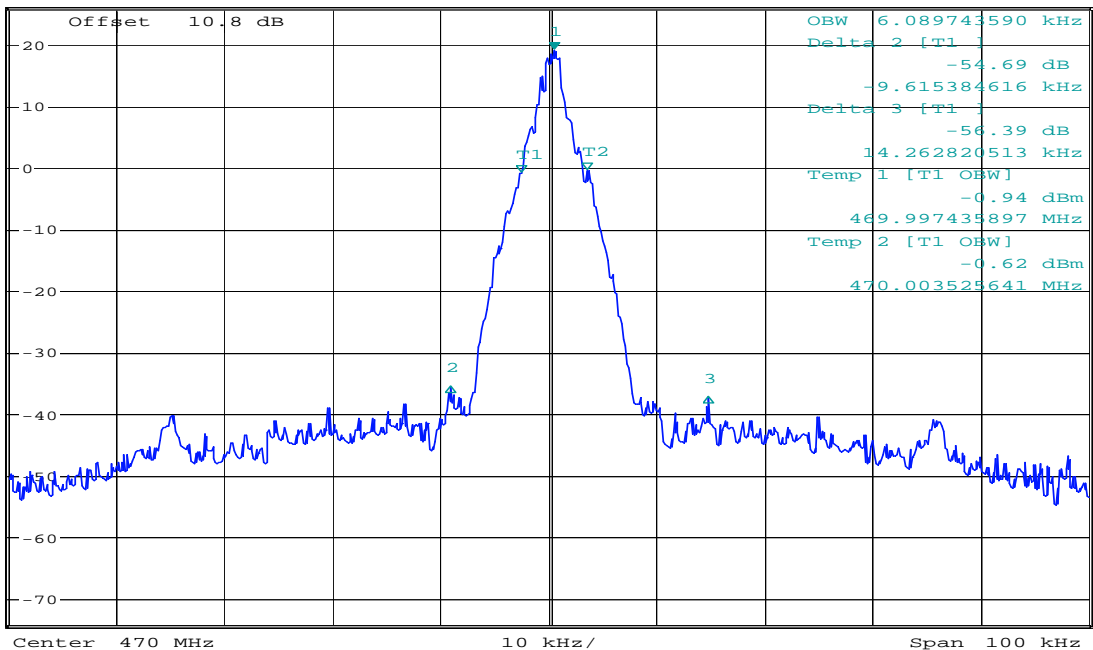


**MARKER 1**  
 470.0004808 MHz  
 Ref 25.8 dBm \* Att 15 dB

\* RBW 300 Hz  
 VBW 1 kHz  
 SWT 1.15 s

Marker 1 [T1]  
 18.99 dBm  
 470.000480769 MHz

1 PK  
 VIEW



Date: 2.OCT.2007 13:41:29

### Occupied Bandwidth – 470MHz – +40° C

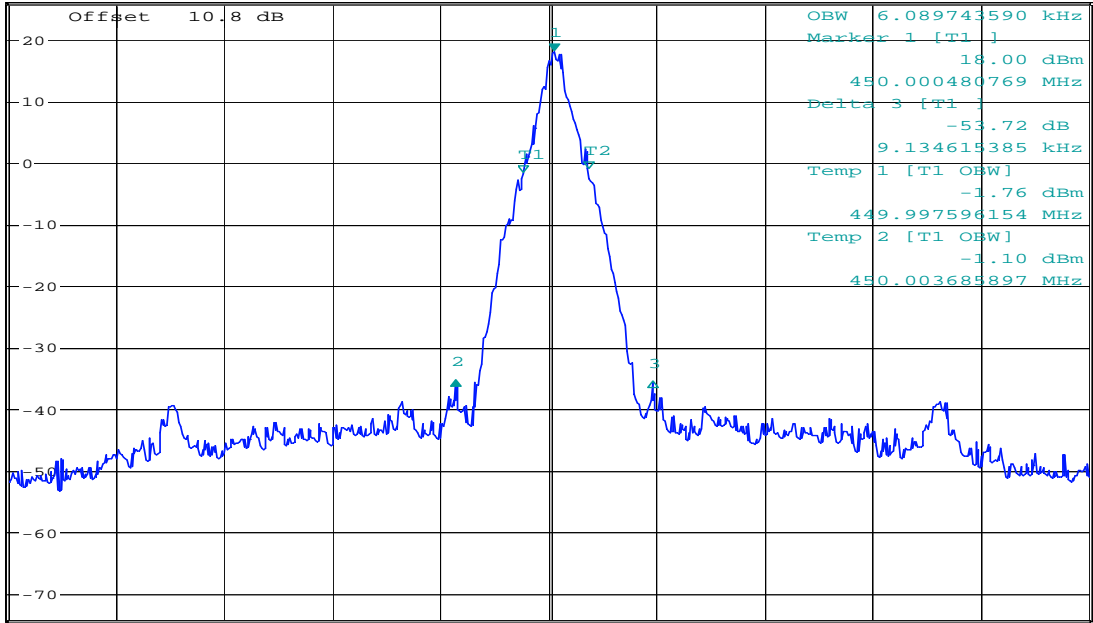


**DELTA MARKER 2**  
-9.134615385 kHz  
Ref 25.8 dBm \* Att 10 dB

\* RBW 300 Hz  
VBW 1 kHz  
SWT 1.15 s

Delta 2 [T1]  
-53.48 dB  
-9.134615385 kHz

1 PK  
VIEW



Center 450 MHz 10 kHz/ Span 100 kHz

Date: 3.OCT.2007 14:42:56

### Occupied Bandwidth – 450MHz – +50° C

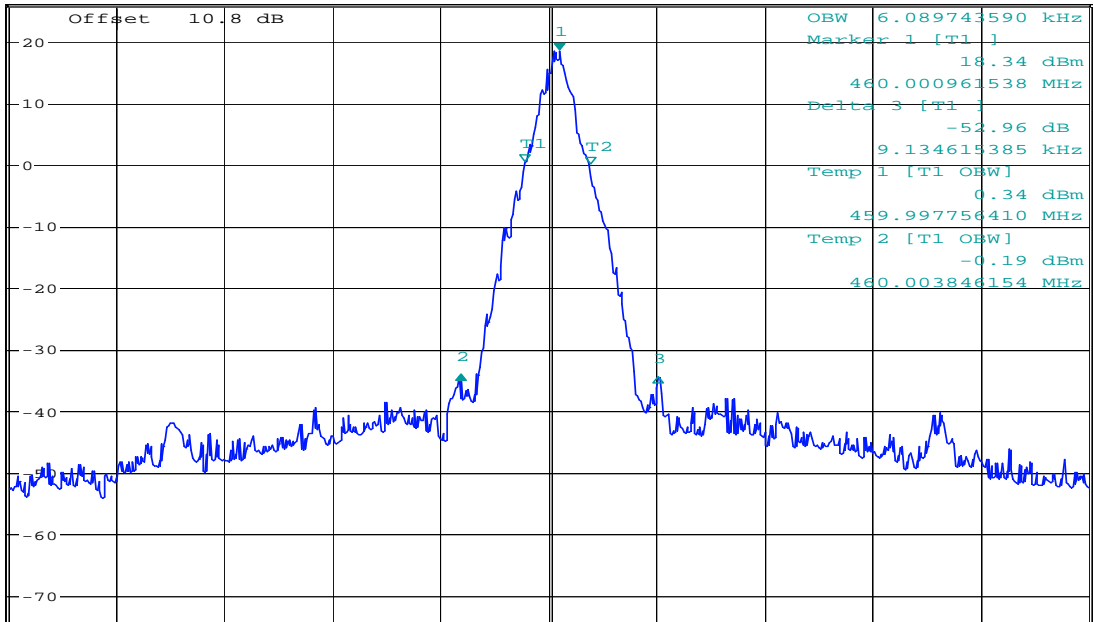


**DELTA MARKER 2**  
-9.134615385 kHz  
Ref 25.8 dBm \* Att 10 dB

\* RBW 300 Hz  
VBW 1 kHz  
SWT 1.15 s

Delta 2 [T1]  
-52.53 dB  
-9.134615385 kHz

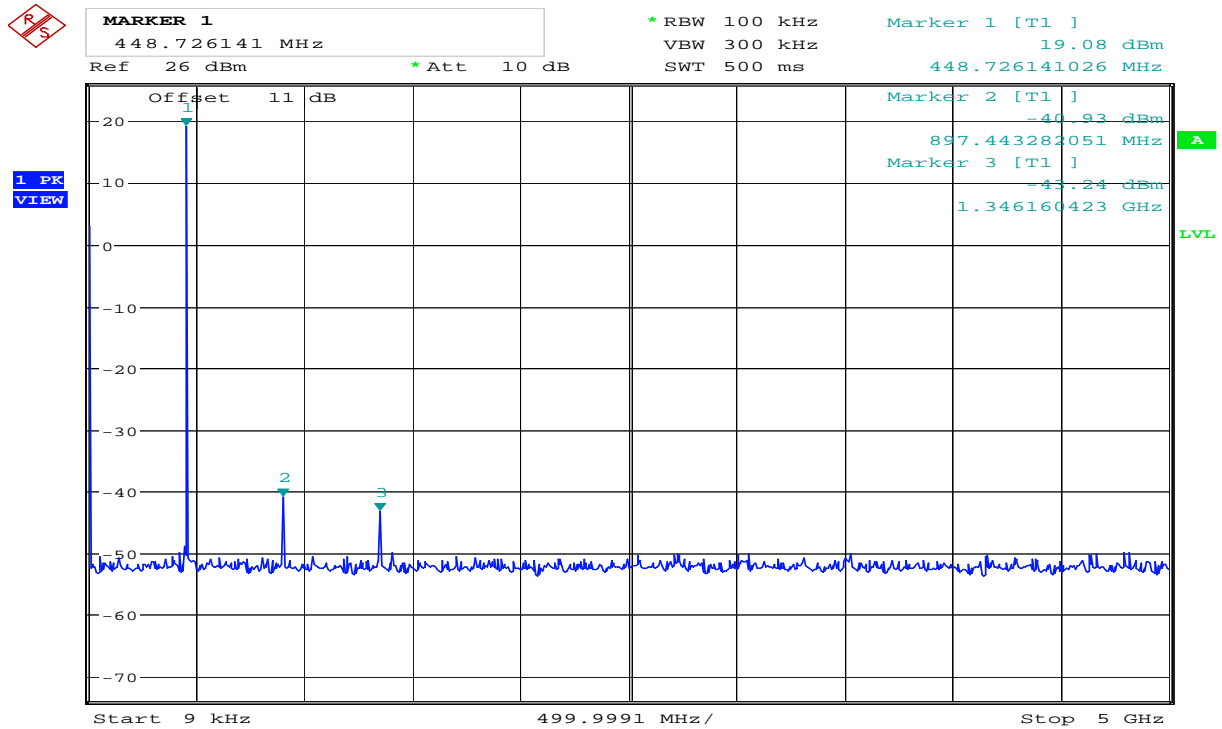
1 PK  
VIEW



Center 460 MHz 10 kHz/ Span 100 kHz

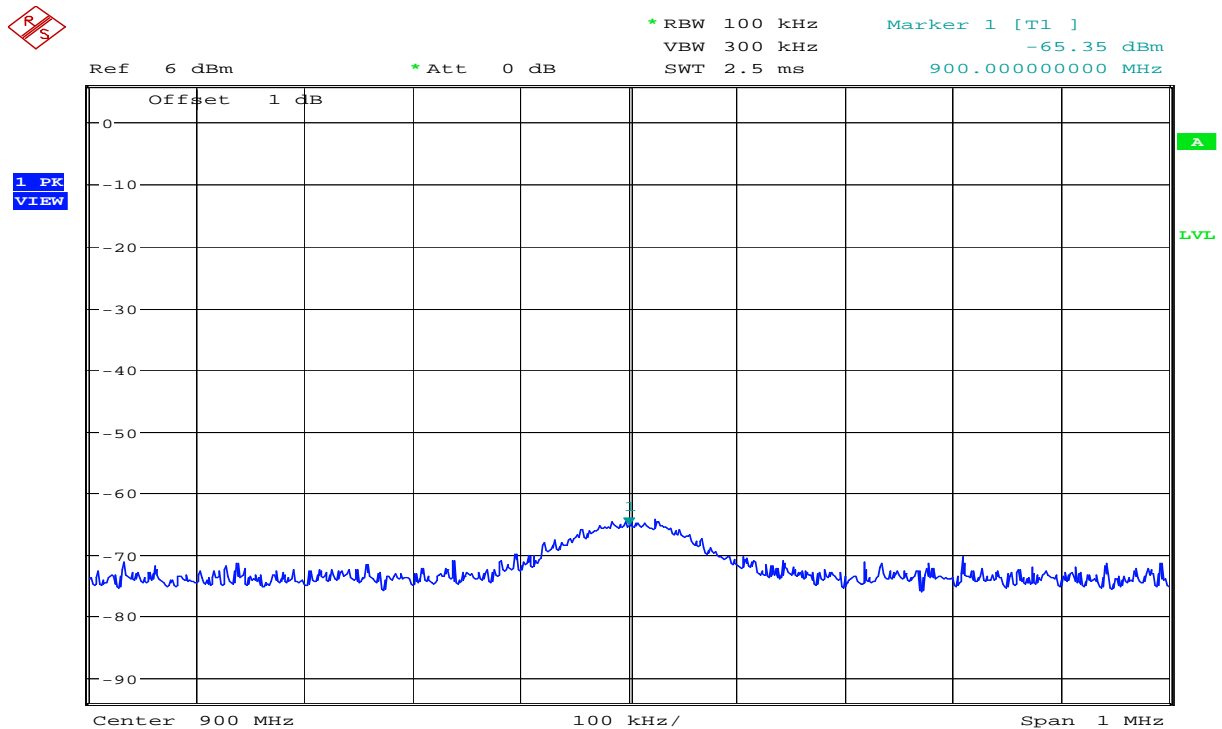
Date: 3.OCT.2007 14:44:16

### Occupied Bandwidth – 470MHz – +50° C



Date: 28.SEP.2007 08:40:32

### 450 MHz – Conducted spurious Emission – 9kHz – 5000MHz



Date: 28.SEP.2007 09:07:10

### 450 MHz – Conducted spurious Emission – 2<sup>nd</sup> harmonic

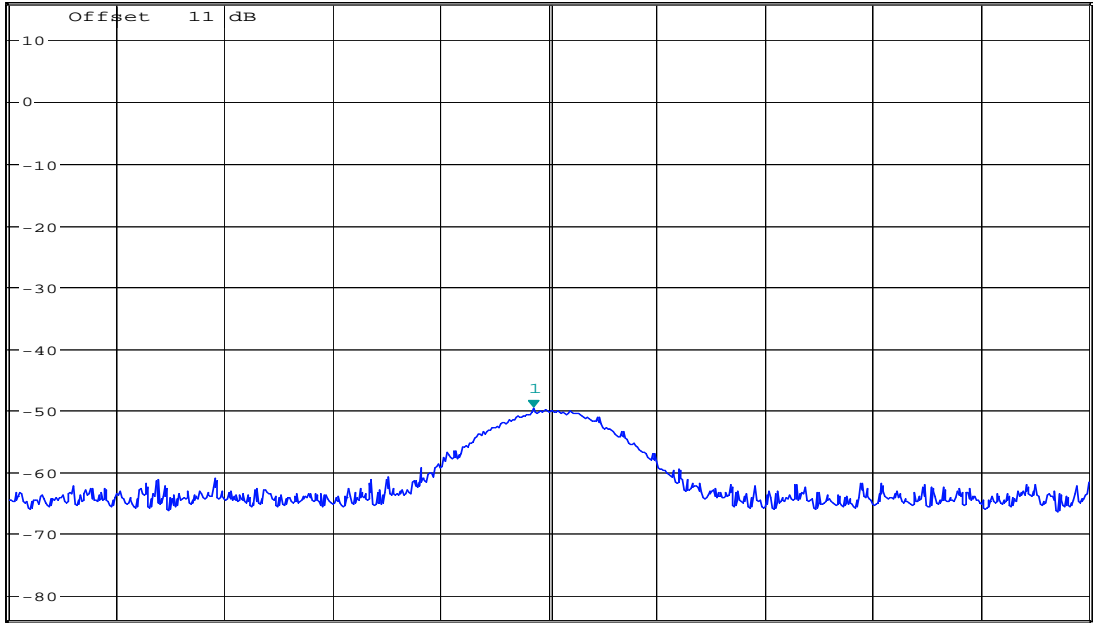




**MARKER 1**  
1.349985577 GHz  
Ref 16 dBm \* Att 0 dB

\* RBW 100 kHz Marker 1 [T1 ]  
VBW 300 kHz -49.71 dBm  
SWT 2.5 ms 1.349985577 GHz

1 PK  
VIEW



Date: 28.SEP.2007 09:00:42

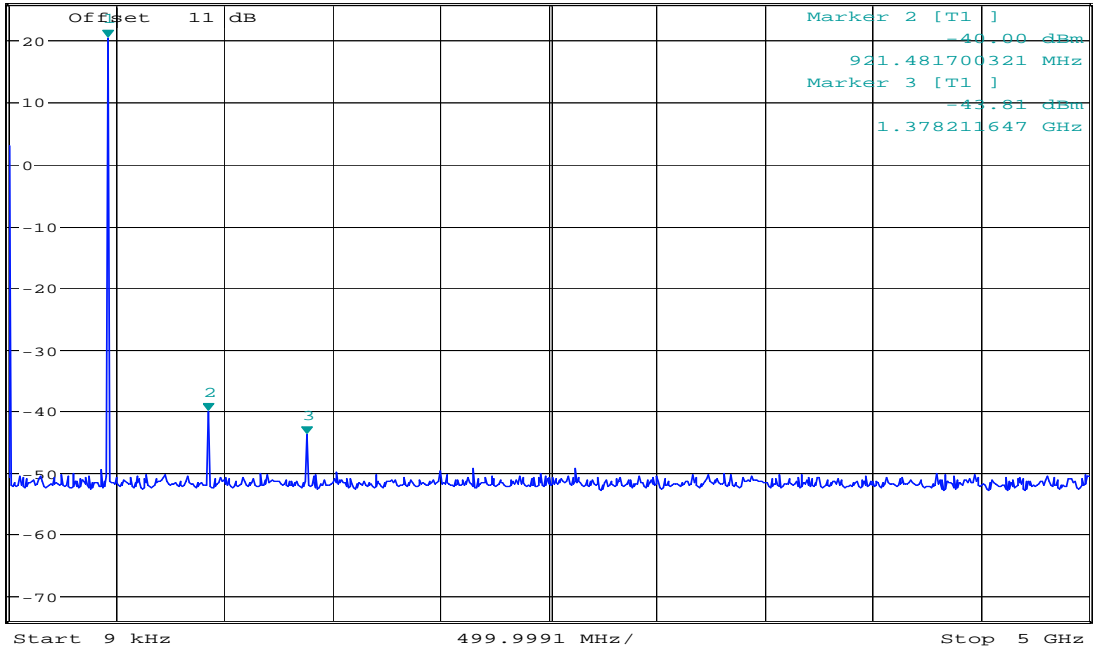
### 450 MHz – Conducted spurious Emission – 3<sup>rd</sup> harmonic



Ref 26 dBm \* Att 10 dB

\* RBW 100 kHz Marker 1 [T1 ]  
VBW 300 kHz 20.51 dBm  
SWT 500 ms 456.738947115 MHz

1 PK  
VIEW

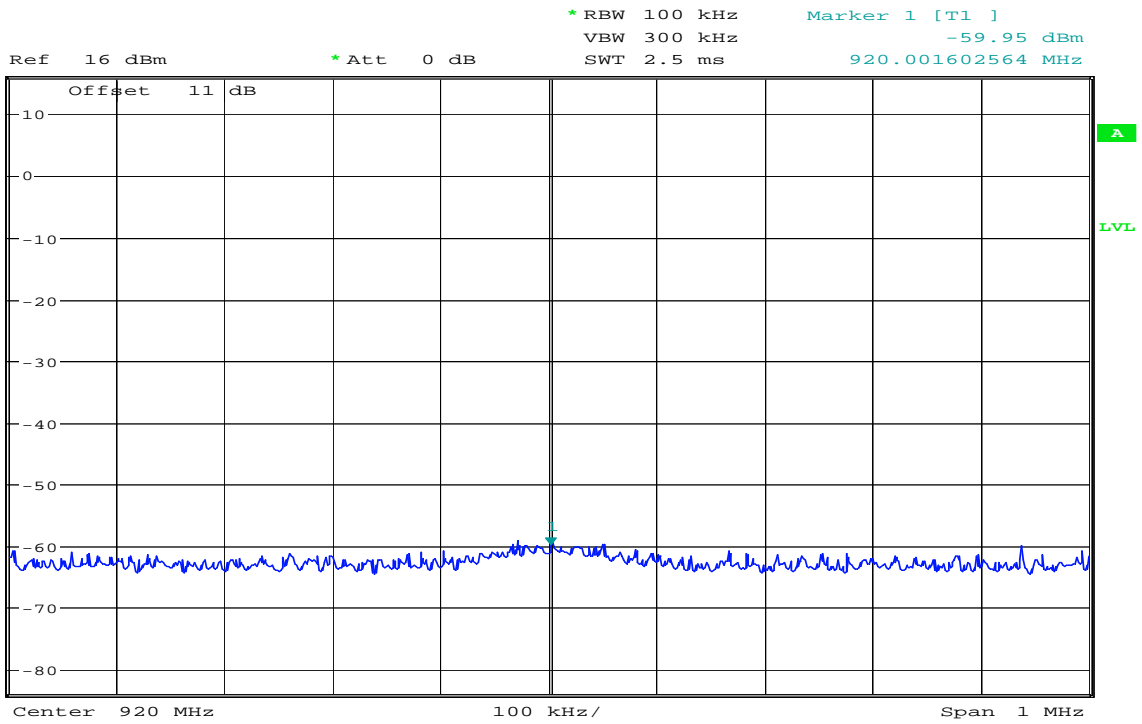


Date: 28.SEP.2007 08:41:53

### 460 MHz – Conducted spurious Emission – 9kHz – 5000MHz



1 PK  
VIEW

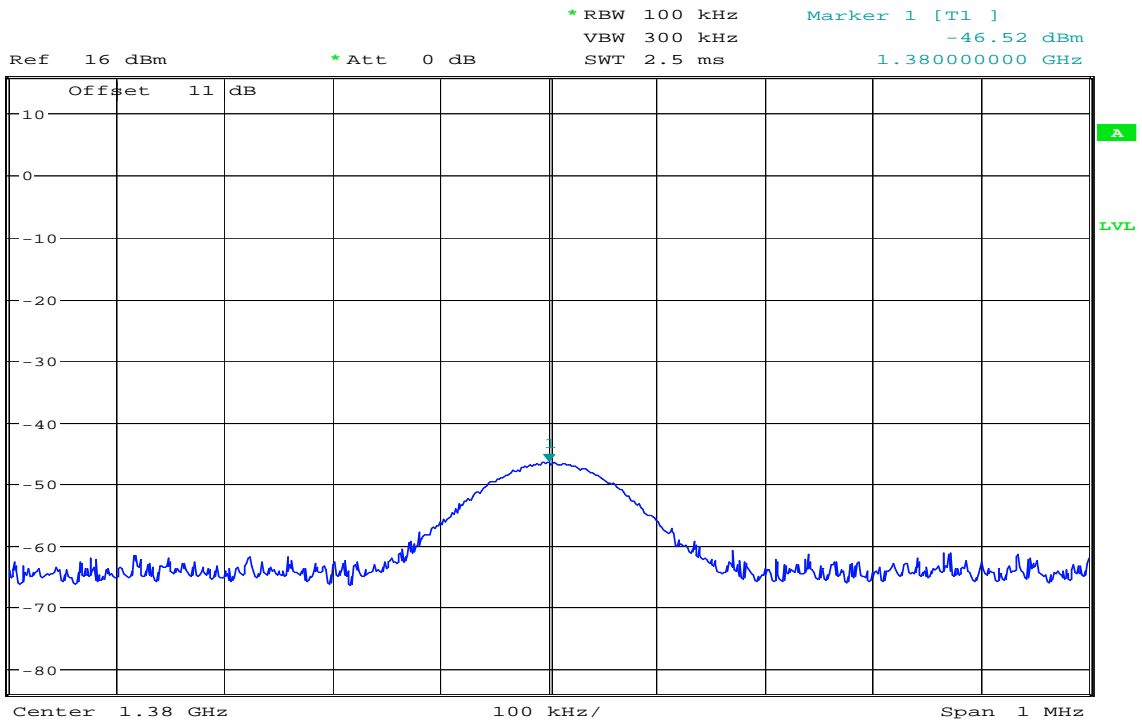


Date: 28.SEP.2007 09:09:48

### 460 MHz – Conducted spurious Emission – 2<sup>nd</sup> harmonic

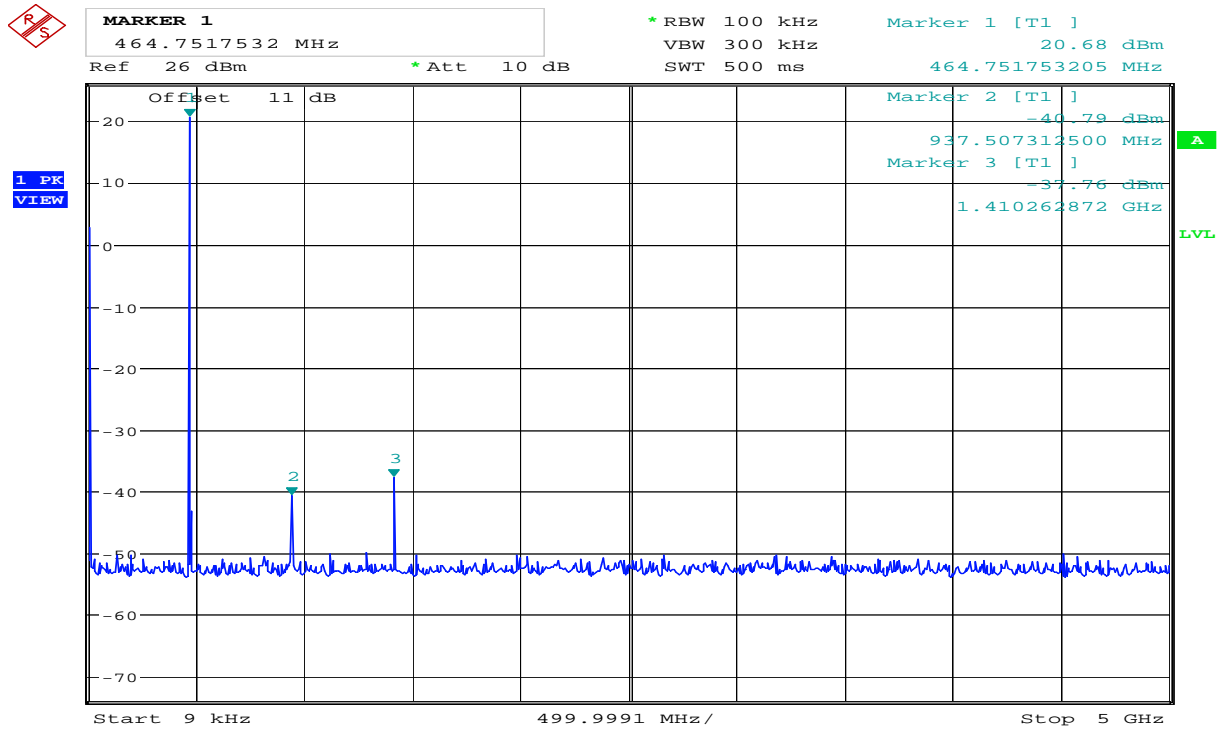


1 PK  
VIEW



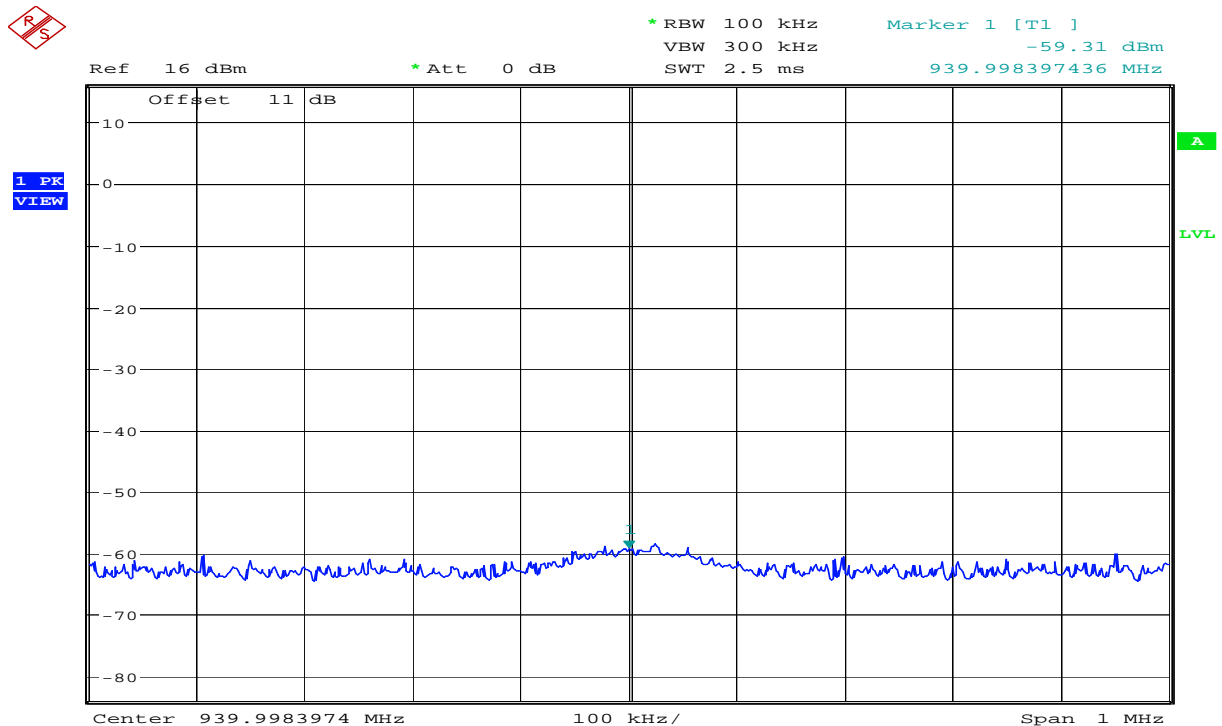
Date: 28.SEP.2007 08:58:01

### 460 MHz – Conducted spurious Emission – 3<sup>rd</sup> harmonic



Date: 28.SEP.2007 08:54:09

### 470 MHz – Conducted spurious Emission – 9kHz – 5000MHz

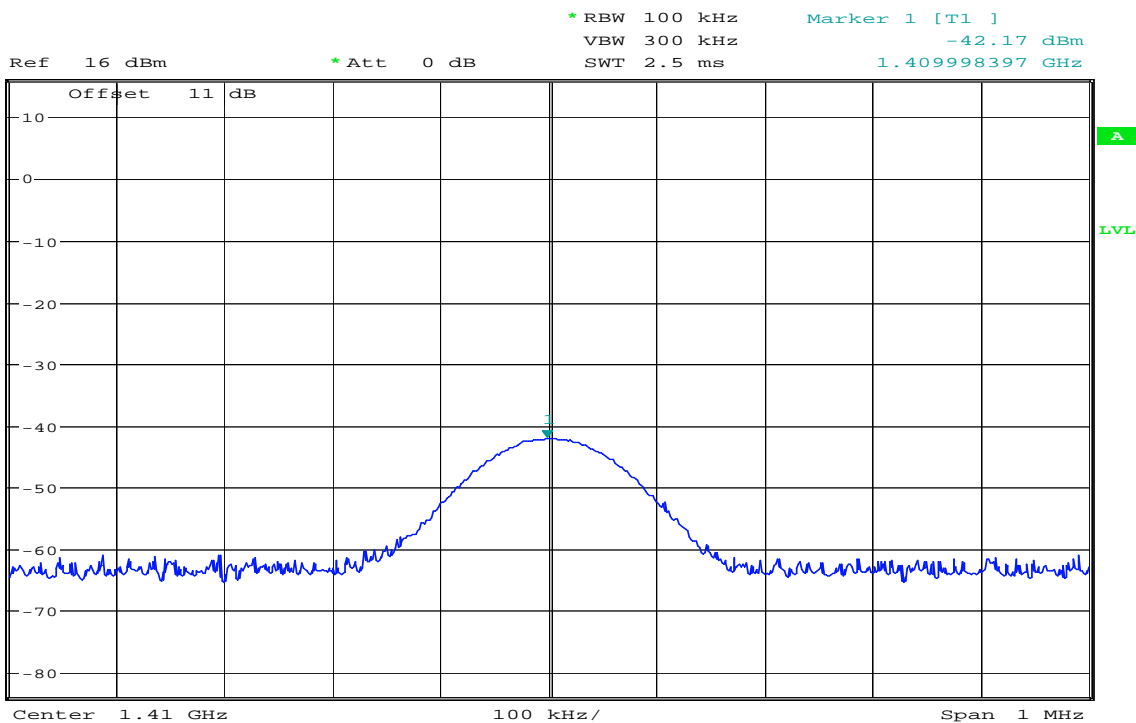


Date: 28.SEP.2007 08:34:26

### 470 MHz – Conducted spurious Emission – 2<sup>nd</sup> harmonic



1 PK  
VIEW

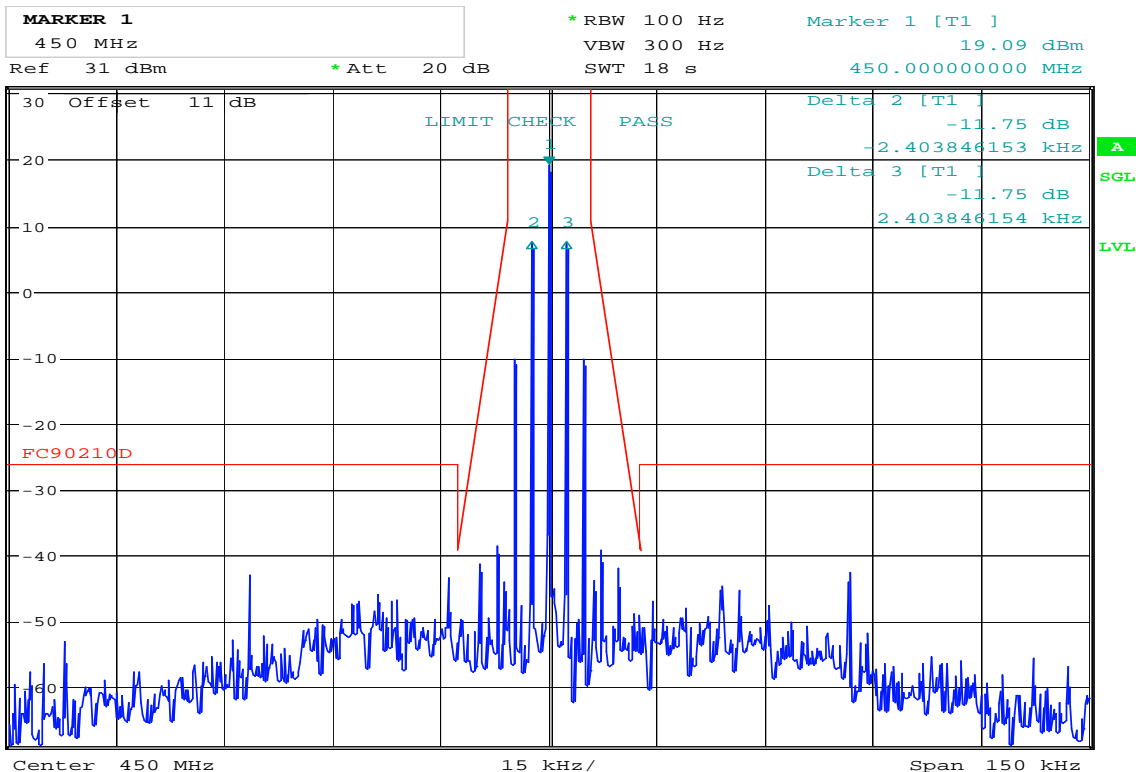


Date: 28.SEP.2007 08:37:14

### 470 MHz – Conducted spurious Emission – 3<sup>rd</sup> harmonic



1 PK  
MAXH



Date: 7.FEB.2008 08:57:26

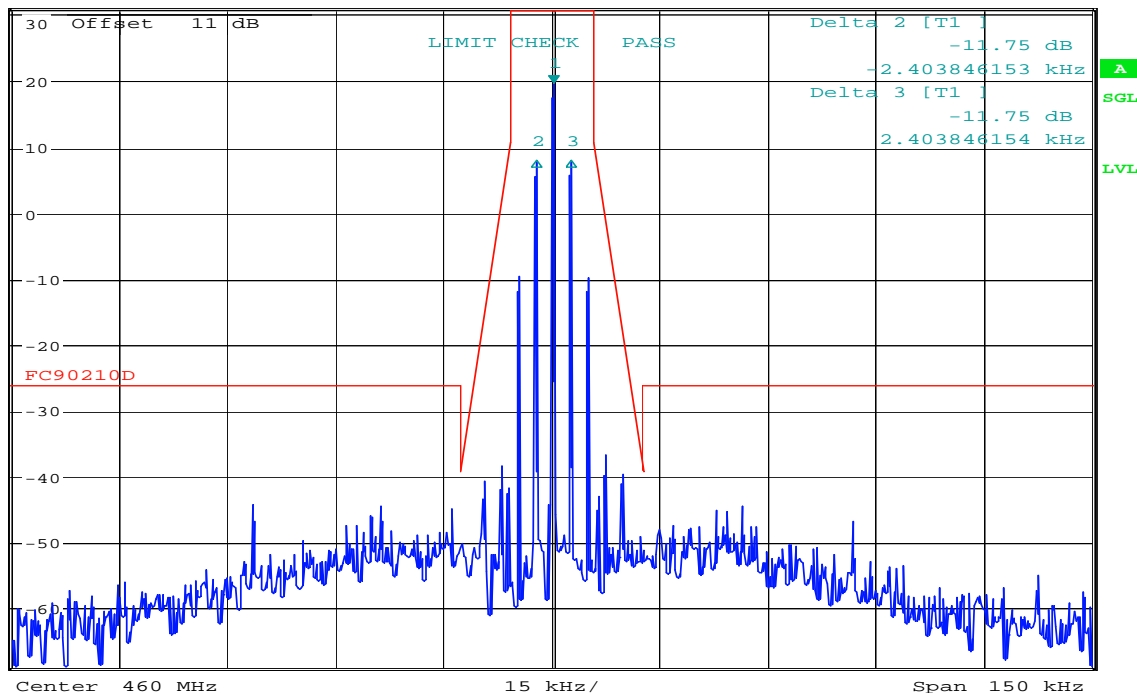
### Emission Mask, FCC 90.210(d), RSS 119 mask D – 450MHz



**MARKER 1**  
 460.0002404 MHz  
 Ref 31 dBm \* Att 20 dB

\* RBW 100 Hz  
 VBW 300 Hz  
 SWT 18 s  
 Marker 1 [T1 ]  
 19.62 dBm  
 460.000240385 MHz

1 PK  
 MAXH



Date: 7.FEB.2008 08:58:31

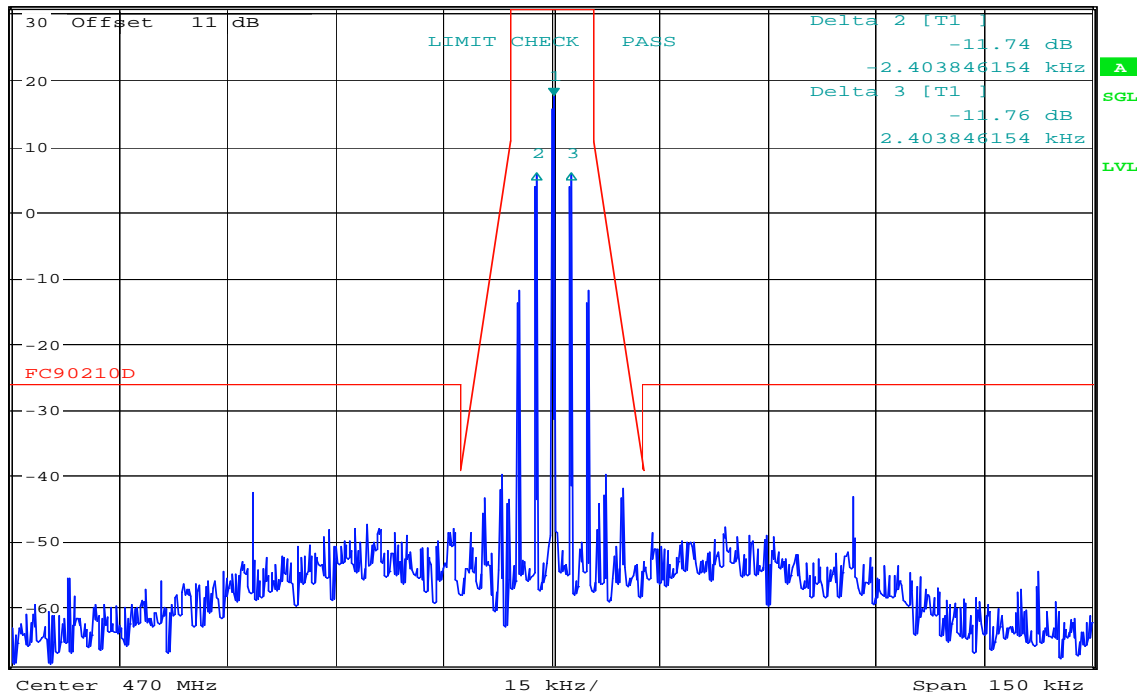
**Emission Mask, FCC 90.210(d), RSS 119 mask D – 460MHz**



**MARKER 1**  
 470.0002404 MHz  
 Ref 31 dBm \* Att 20 dB

\* RBW 100 Hz  
 VBW 300 Hz  
 SWT 18 s  
 Marker 1 [T1 ]  
 17.50 dBm  
 470.000240385 MHz

1 PK  
 MAXH



Date: 7.FEB.2008 08:59:56

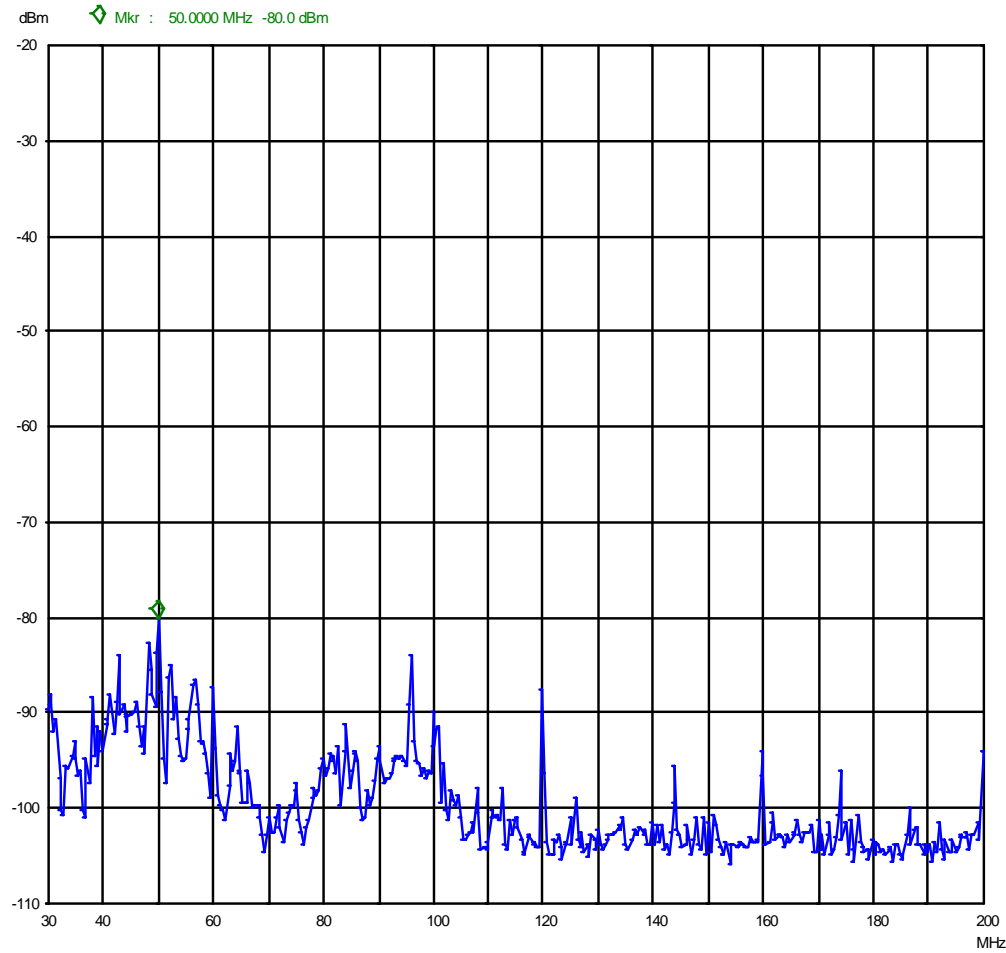
**Emission Mask, FCC 90.210(d), RSS 119 mask D – 470MHz**

Nemko Comlab  
PK

01. Oct 07 08:18

EUT: PMR OCAS Bá  
Manuf: OCAS AS  
Op Cond: 1m vp  
Operator: gns  
Test Spec: FCC 90  
Comment: TX active

Scan Settings (1 Range)  
----- Frequencies -----|----- Receiver Settings -----|  
Start Stop Step IF BW Detector M-Time Atten Preamp OpRge  
30M 200M 50k 120k PK 50ms 0dB LN ON 60dB



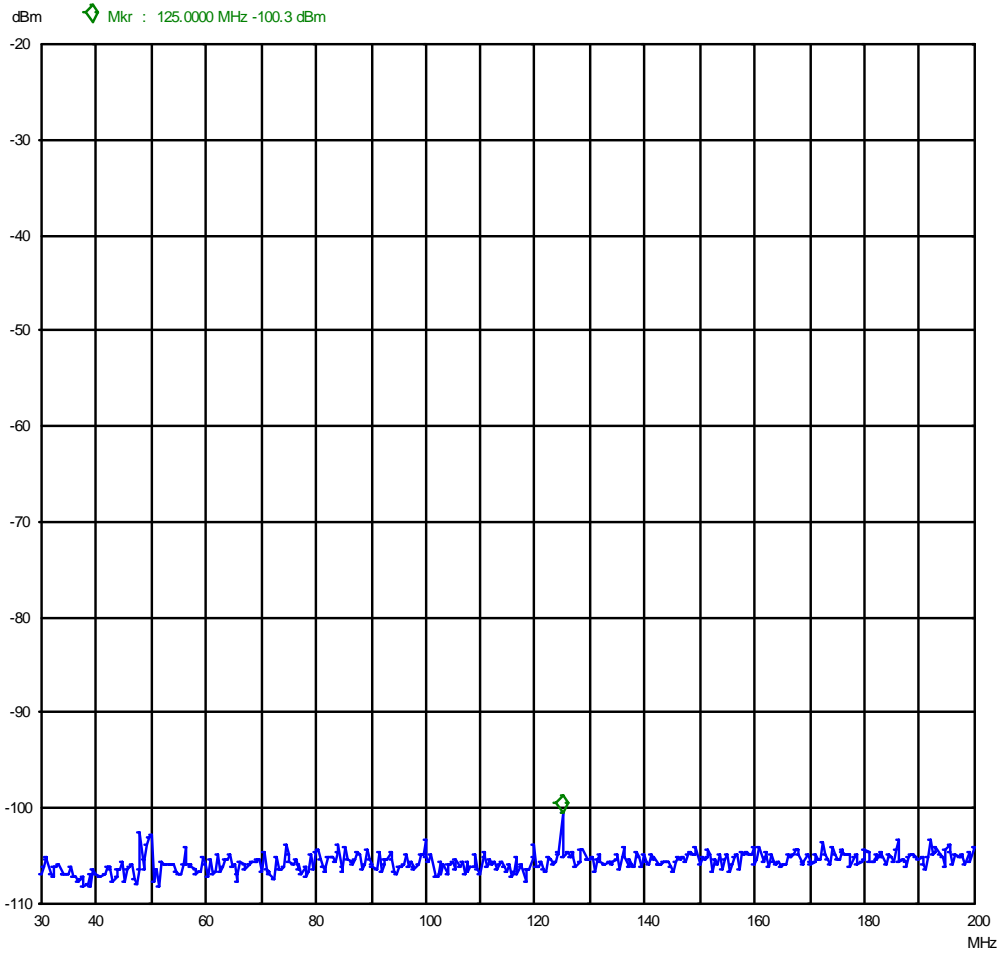
**Radiated Spurious Emissions, VP, 30 - 200MHz (50 Ohm load)**

Nemko Comlab  
PK

01. Oct 07 08:33

EUT: PMR OCAS Bá  
Manuf: OCAS AS  
Op Cond: 4m hp  
Operator: gns  
Test Spec: FCC 90  
Comment: TX active

Scan Settings (1 Range)  
----- Frequencies -----|----- Receiver Settings -----|  
Start Stop Step IF BW Detector M-Time Atten Preamp OpRge  
30M 200M 50k 120k PK 50ms 0dBLN ON 60dB



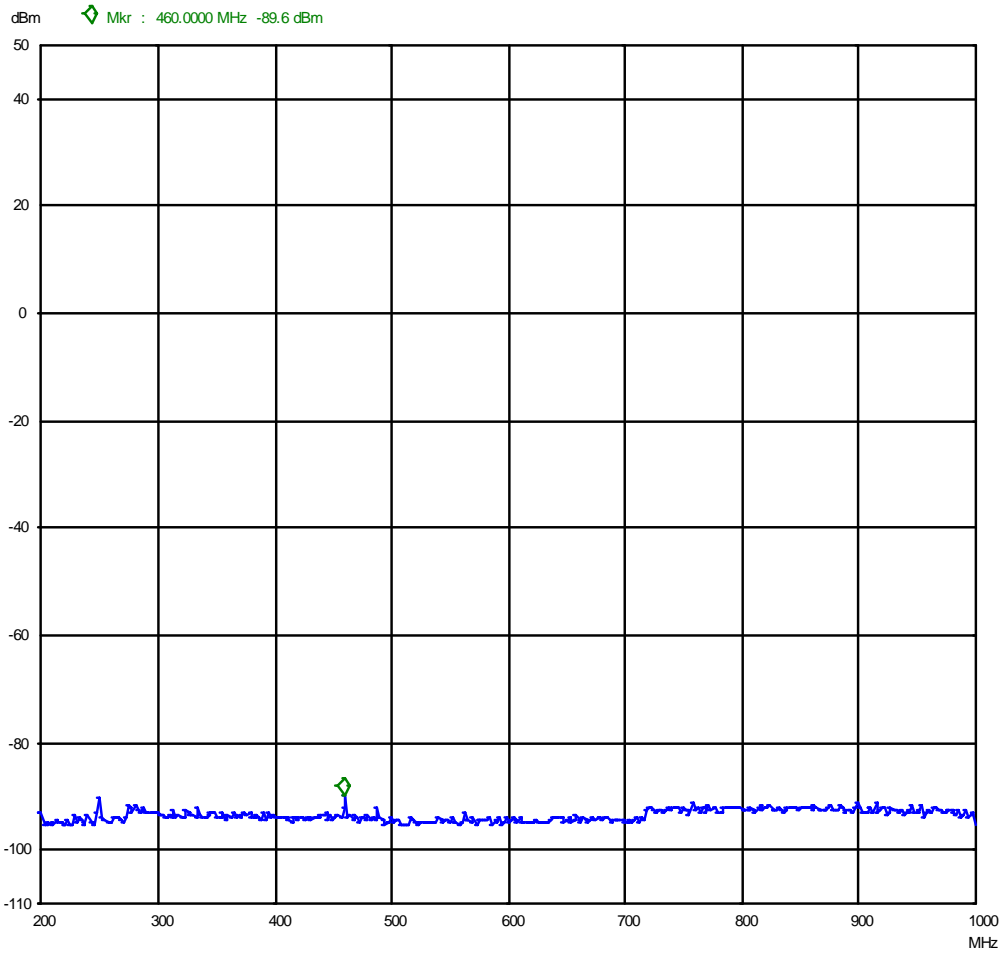
**Radiated Spurious Emissions, HP, 30 - 200MHz (50 ohm load)**

Nemko Comlab  
PK

01. Oct 07 09:43

EUT: PMR OCAS Bá  
Manuf: OCAS AS  
Op Cond: 1m vp  
Operator: gns  
Test Spec: FCC 90  
Comment: tx active

Scan Settings (1 Range)  
|----- Frequencies -----| |----- Receiver Settings -----|  
Start Stop Step IF BW Detector M-Time Atten Preamp OpRge  
200M 1000M 50k 120k PK 50ms AUTO LN ON 60dB



**Radiated Spurious Emissions, VP, 200 - 1000 MHz (50 ohm load)**

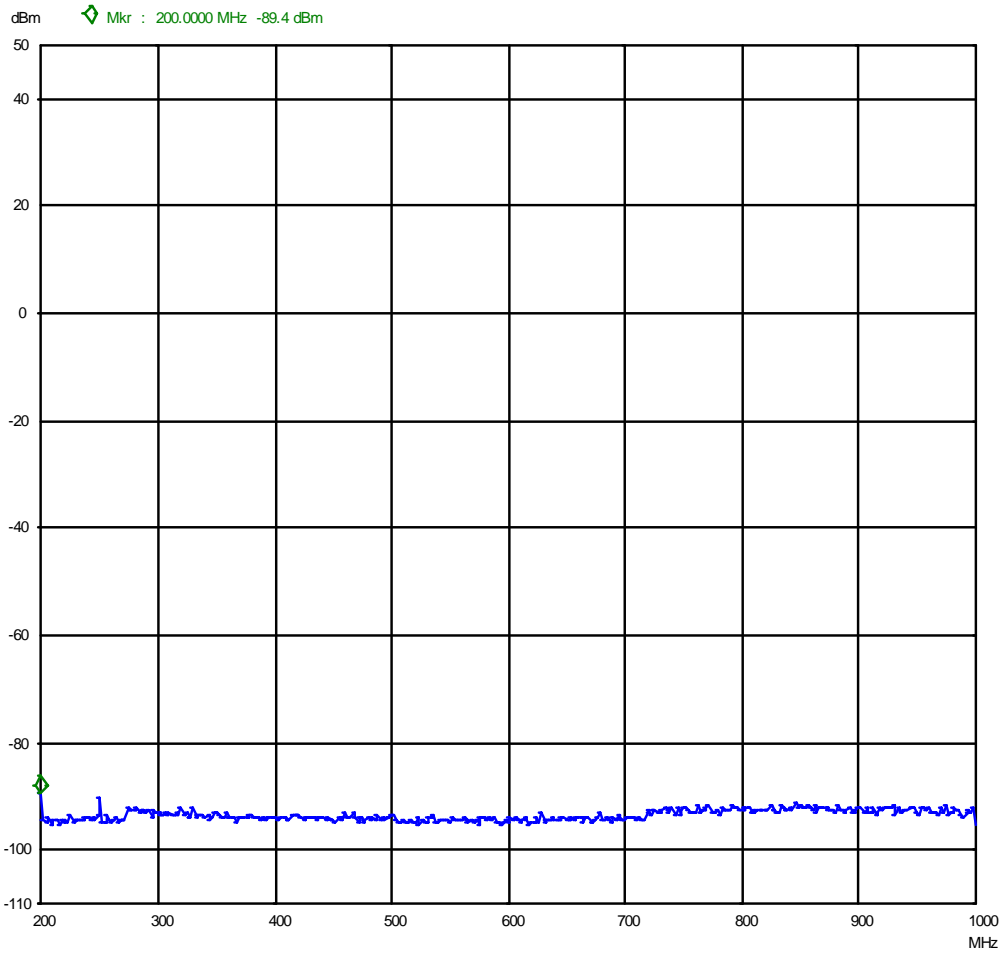


Nemko Comlab  
PK

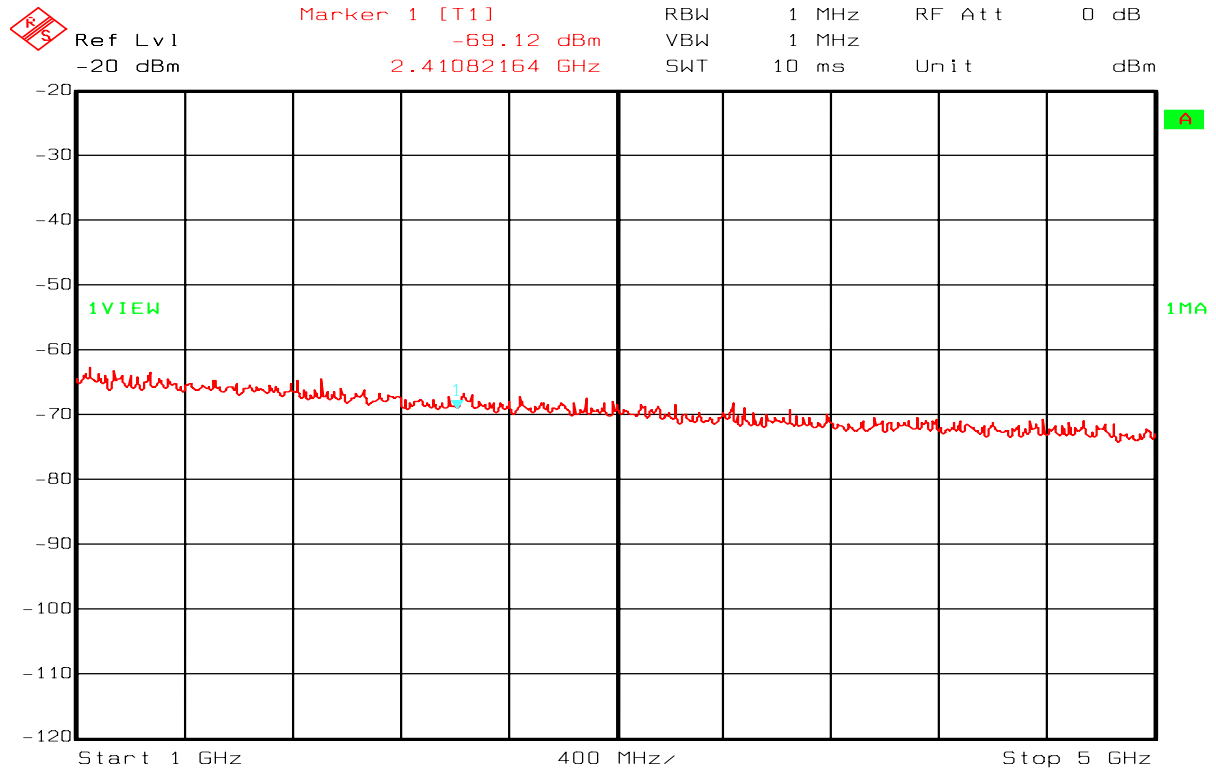
01. Oct 07 10:11

EUT: PMR OCAS Bá  
Manuf: OCAS AS  
Op Cond: 4m hp  
Operator: gns  
Test Spec: FCC 90  
Comment: tx active

Scan Settings (1 Range)  
|----- Frequencies -----| |----- Receiver Settings -----|  
Start Stop Step IF BW Detector M-Time Atten Preamp OpRge  
200M 1000M 50k 120k PK 50ms AUTO LN ON 60dB

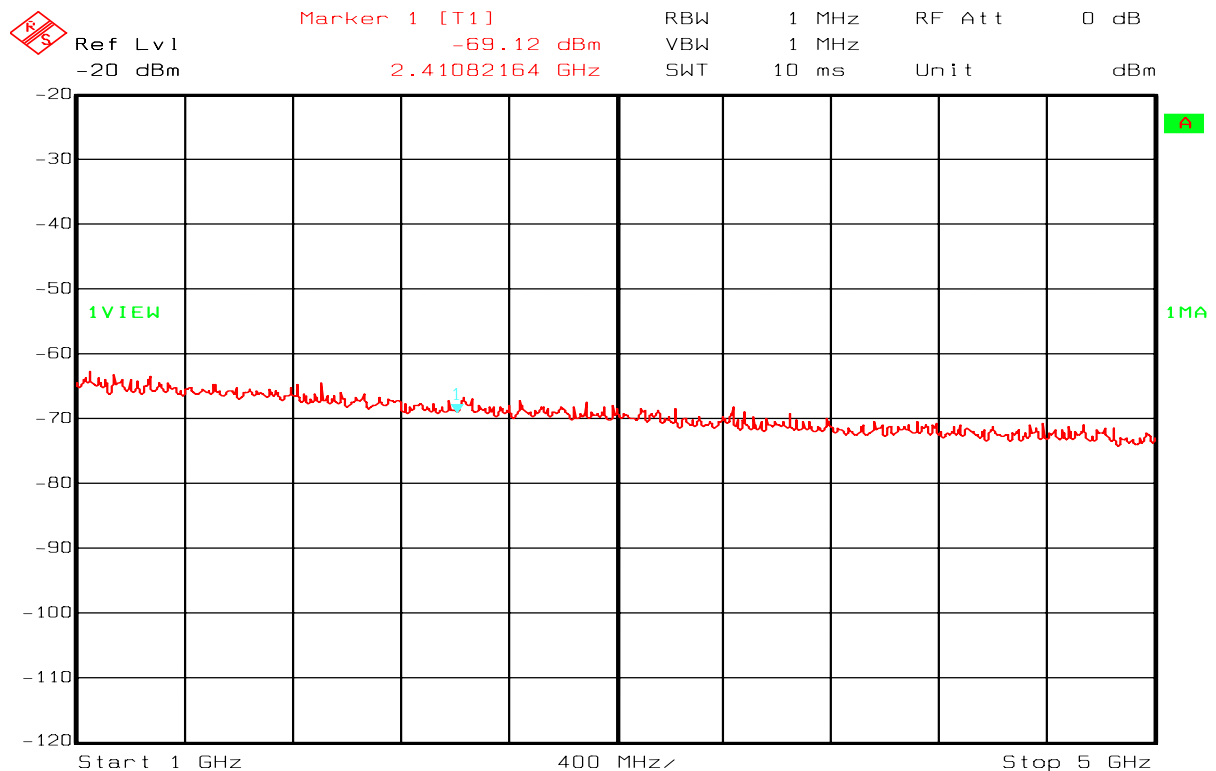


**Radiated Spurious Emissions, HP, 200 - 1000 MHz (50 ohm load)**



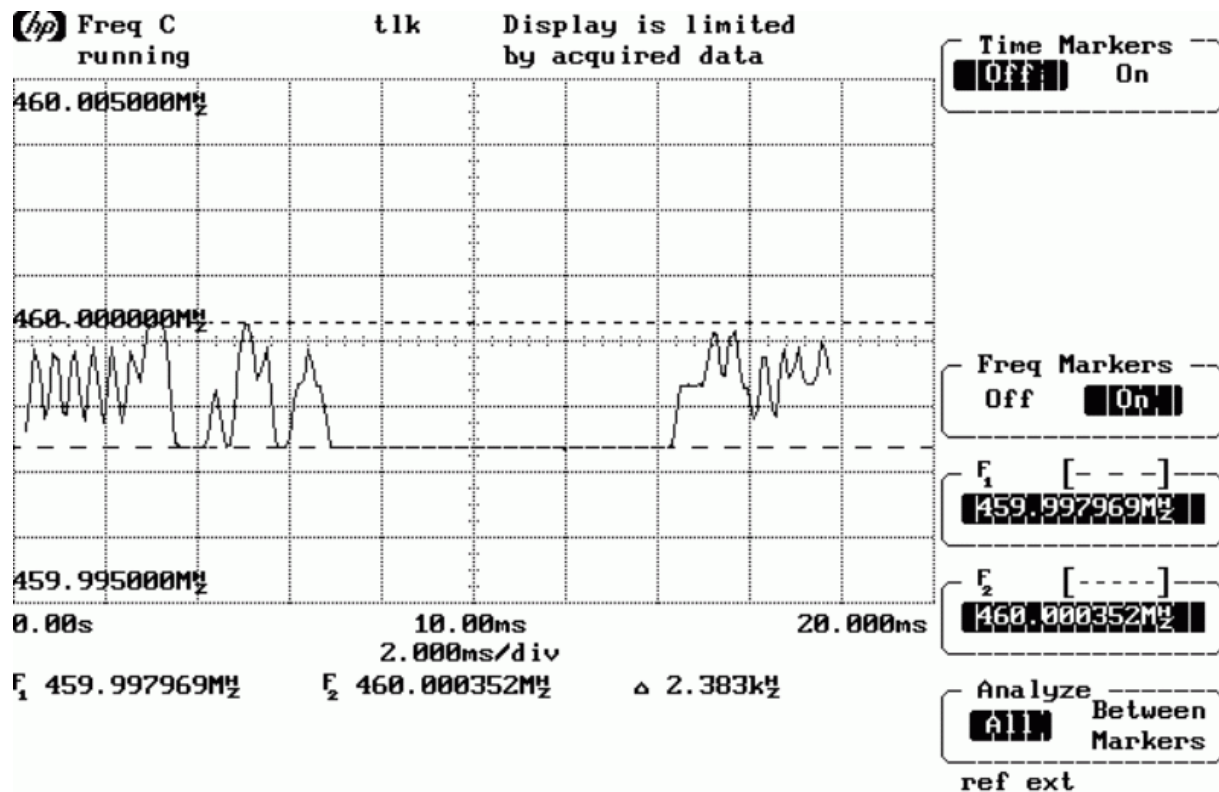
Date: 1.OCT.2007 12:02:57

**Radiated Spurious Emissions, VP, 1 - 5 GHz (50 ohm load)**



Date: 1.OCT.2007 12:02:57

**Radiated Spurious Emissions, HP, 1 - 5 GHz (50 ohm load)**



### Transient Behavior - 12.5kHz channel spacing