
DOCUMENTO TÉCNICO INGENIERÍA / TECHNICAL DOCUMENTATION

PARA/TO:

DE/FROM:

OMB

ORGANIZACIÓN/ORGANIZATION:

FECHA/DATE:

June 16 2006

NÚMERO DE FAX/FAX NUMBER:

Nº DE REFERENCIA DEL REMITENTE/OUR REF. NUMBER:

IT-04050601

ASUNTO/SUBJECT:

SU Nº DE REFERENCIA/YOUR REF. NUMBER:

EM100Dig Measurements

Measurements for type certification of FM transmitters.

- All the measurements done are valid for the unit tested identified with the serial number noted in the identification section, this unit was randomly selected. The results are valid also for the general and particular conditions specified.
- All the measurements are done in the OMB laboratory except the measurements for cabinet radiation, which was done in the external laboratory of *Ministerio de industria, turismo y comercio de España; Dirección general de telecomunicaciones y tecnologías de la información; Radiofrequency Laboratory*

- IDENTIFICATION.

Class:	FM transmitter
Model:	EM100DIG
Nominal power:	100W (Adjustable from 0 to 100W)
Manufacturer:	OMB Sistemas Electrónicos, S.A.
Country of manufacturing:	Spain
Address:	Avda. San Antonio 41, 50410 Cuarte de Huerva, Zaragoza, Spain.

EQUIPMENT UNDER TEST (EUT)= EM100DIG

SERIAL NUMBER 60157



- LIST OF TEST INSTRUMENTS USED FOR THE MEASUREMENTS DONE IN THE OMB LABORATORY (EXCLUDES CABINET RADIATION TEST):

Equipment	Manufacturer	Model	Serial Number
Wattmeter	Bird	4391	2442
Spectrum Analyzer	Advantest	R3131	J003753
Modulation Analyzer	HP	8901B	3226A04087
Audio Analyzer	HP	8903B	2910A06154
Dynamic Signal Analyzer	HP	3562A	2502A01080
RF Coupler	Bird	CU-2340/SRC	A1240
Thermal Chamber	ACS (Angelantoni Centro-Sud)	UY-300	1940/B/7
Dummy Load	LSI (Lear Siegler Inc)	160B600X	1499
Multimeter	Fluke	27/FM	6625-00-165-6001

- INDEX

• Identification.	1
• List of test instruments used for the measurements done in the OMB laboratory (excludes cabinet radiation test):	2
• Index	2
• Authorized Emission	3
• General conditions (Modified by particular conditions)	3
• Power Output Measurements	3
• Frequency stability	5
• Conducted radiation	7
• Cabinet Radiation	46
• Preemphasis (75µs)	48
• Stereo transmission compliance	50
• Voltage And Current of final amplifiers	51
• Subcarrier technical requirements	51
• Conclusion:	52

- AUTHORIZED EMISSION

This equipment is able to be used in monophonic and stereophonic operation.

- For **monophonic** operation the emission designator is **180KF3E**
- For **stereophonic** operation the emission designator is **300KF8E**

- GENERAL CONDITIONS (MODIFIED BY PARTICULAR CONDITIONS)

Ambient Temperature: Between 17 and 25°C

Power supply (Nominal): 220VAC

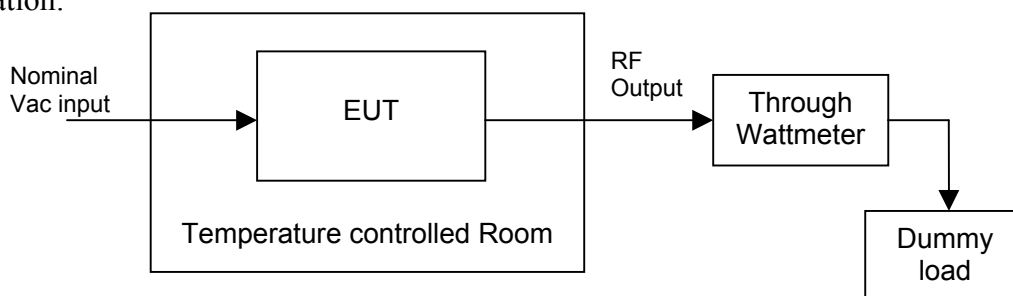
RF output of the equipment connected to a dummy load.

- POWER OUTPUT MEASUREMENTS

Particular Conditions:

- Without modulation input.
- Temperature varied between –10 and 45°C
- Measures done at 100%, 105% and 25% of nominal power.
- Acceptable limits: Between 90 and 105% of the adjusted level.
- Measurements done at 98MHz, 88.1MHz and 107.9MHz

Configuration:



Frequency (MHz)	Temperature (°C)	Power adjusted (nominal) (W)	Power reading (Wattmeter) (W)	Range (min/Max) (90/105%) (W)	Result (Pass/ Not Pass)
98	-10	100 (100%)	101	90/105	Pass
98	0	100 (100%)	99	90/105	Pass
98	10	100 (100%)	98	90/105	Pass
98	20	100 (100%)	96	90/105	Pass
98	30	100 (100%)	94	90/105	Pass
98	40	100 (100%)	93	90/105	Pass
98	45	100 (100%)	93	90/105	Pass
88.1	-10	100 (100%)	104	90/105	Pass
88.1	0	100 (100%)	104	90/105	Pass

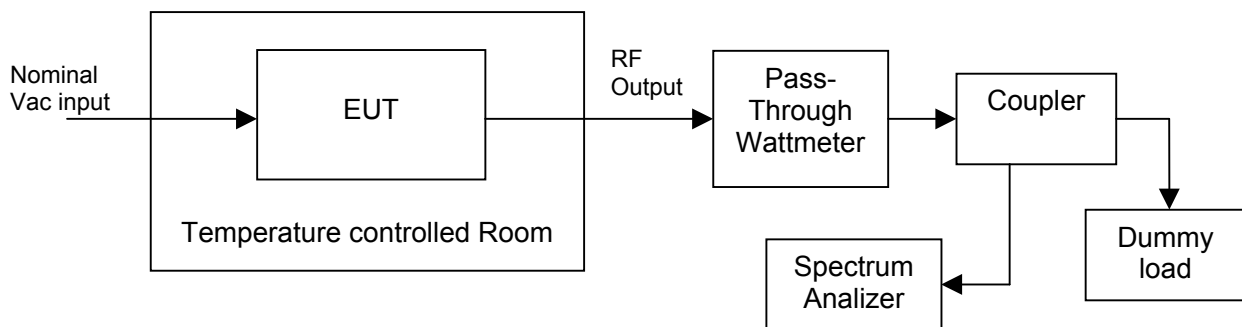
88.1	10	100 (100%)	104	90/105	Pass
88.1	20	100 (100%)	102	90/105	Pass
88.1	30	100 (100%)	101	90/105	Pass
88.1	40	100 (100%)	100	90/105	Pass
88.1	45	100 (100%)	99	90/105	Pass
107.9	-10	100 (100%)	101	90/105	Pass
107.9	0	100 (100%)	99	90/105	Pass
107.9	10	100 (100%)	96	90/105	Pass
107.9	20	100 (100%)	95	90/105	Pass
107.9	30	100 (100%)	93	90/105	Pass
107.9	40	100 (100%)	93	90/105	Pass
107.9	45	100 (100%)	92	90/105	Pass
98	-10	25 (25%)	25,5	22,5/26,25	Pass
98	0	25 (25%)	25,2	22,5/26,25	Pass
98	10	25 (25%)	24,4	22,5/26,25	Pass
98	20	25 (25%)	24,4	22,5/26,25	Pass
98	30	25 (25%)	23,4	22,5/26,25	Pass
98	40	25 (25%)	23,0	22,5/26,25	Pass
98	45	25 (25%)	22,7	22,5/26,25	Pass
88.1	-10	25 (25%)	26,1	22,5/26,25	Pass
88.1	0	25 (25%)	25,4	22,5/26,25	Pass
88.1	10	25 (25%)	25,0	22,5/26,25	Pass
88.1	20	25 (25%)	24,4	22,5/26,25	Pass
88.1	30	25 (25%)	23,9	22,5/26,25	Pass
88.1	40	25 (25%)	23,2	22,5/26,25	Pass
88.1	45	25 (25%)	23,2	22,5/26,25	Pass
107.9	-10	25 (25%)	25,3	22,5/26,25	Pass
107.9	0	25 (25%)	24,8	22,5/26,25	Pass
107.9	10	25 (25%)	24,3	22,5/26,25	Pass
107.9	20	25 (25%)	23,8	22,5/26,25	Pass
107.9	30	25 (25%)	23,2	22,5/26,25	Pass
107.9	40	25 (25%)	22,6	22,5/26,25	Pass
107.9	45	25 (25%)	22,6	22,5/26,25	Pass
98	-10	105 (105%)	101	94,5/110,25	Pass
98	0	105 (105%)	99	94,5/110,25	Pass
98	10	105 (105%)	98	94,5/110,25	Pass
98	20	105 (105%)	96	94,5/110,25	Pass
98	30	105 (105%)	94	94,5/110,25	Pass
98	40	105 (105%)	93	94,5/110,25	Pass
98	45	105 (105%)	93	94,5/110,25	Pass
88.1	-10	105 (105%)	104	94,5/110,25	Pass
88.1	0	105 (105%)	104	94,5/110,25	Pass
88.1	10	105 (105%)	104	94,5/110,25	Pass
88.1	20	105 (105%)	102	94,5/110,25	Pass
88.1	30	105 (105%)	101	94,5/110,25	Pass
88.1	40	105 (105%)	100	94,5/110,25	Pass
88.1	45	105 (105%)	99	94,5/110,25	Pass
107.9	-10	105 (105%)	101	94,5/110,25	Pass
107.9	0	105 (105%)	99	94,5/110,25	Pass
107.9	10	105 (105%)	96	94,5/110,25	Pass
107.9	20	105 (105%)	95	94,5/110,25	Pass
107.9	30	105 (105%)	93	94,5/110,25	Pass
107.9	40	105 (105%)	93	94,5/110,25	Pass
107.9	45	105 (105%)	92	94,5/110,25	Pass

- FREQUENCY STABILITY

A) Particular Conditions:

- Tested at nominal Output Power
- Temperature varied between -10 and 45°C
- Nominal AC voltage input
- Without modulation input.
- Acceptable limits: $\pm 2\text{KHz}$.
- Measurements done at 98MHz , 88.1MHz and 107.9MHz

Configuration:

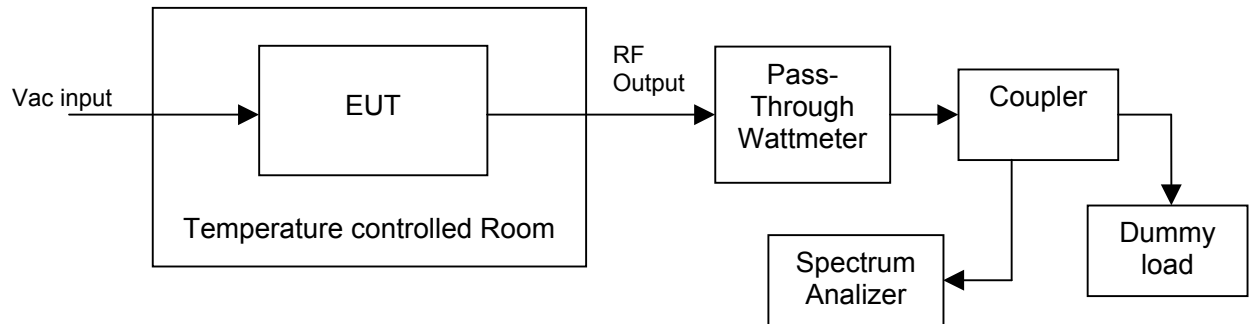


Temperature	Frequency	Frequency error	Range ($\pm 2\text{KHz}$)	Pass / No Pass
-10°C	88.1MHz	$-0,021\text{KHz}$	$\pm 2\text{KHz}$	Pass
0°C	88.1MHz	$-0,047\text{KHz}$	$\pm 2\text{KHz}$	Pass
10°C	88.1MHz	$-0,189\text{KHz}$	$\pm 2\text{KHz}$	Pass
20°C	88.1MHz	$-0,071\text{KHz}$	$\pm 2\text{KHz}$	Pass
30°C	88.1MHz	$0,098\text{KHz}$	$\pm 2\text{KHz}$	Pass
40°C	88.1MHz	$0,167\text{KHz}$	$\pm 2\text{KHz}$	Pass
45°C	88.1MHz	$0,211\text{KHz}$	$\pm 2\text{KHz}$	Pass
-10°C	98 MHz	$0,021\text{KHz}$	$\pm 2\text{KHz}$	Pass
0°C	98 MHz	$-0,029\text{KHz}$	$\pm 2\text{KHz}$	Pass
10°C	98 MHz	$-0,175\text{KHz}$	$\pm 2\text{KHz}$	Pass
20°C	98 MHz	$-0,026\text{KHz}$	$\pm 2\text{KHz}$	Pass
30°C	98 MHz	$0,131\text{KHz}$	$\pm 2\text{KHz}$	Pass
40°C	98 MHz	$0,233\text{KHz}$	$\pm 2\text{KHz}$	Pass
45°C	98 MHz	$0,294\text{KHz}$	$\pm 2\text{KHz}$	Pass
-10°C	107.9 MHz	$0,052\text{KHz}$	$\pm 2\text{KHz}$	Pass
0°C	107.9 MHz	$0,055\text{KHz}$	$\pm 2\text{KHz}$	Pass
10°C	107.9 MHz	$-0,213\text{KHz}$	$\pm 2\text{KHz}$	Pass
20°C	107.9 MHz	$-0,050\text{KHz}$	$\pm 2\text{KHz}$	Pass
30°C	107.9 MHz	$0,107\text{KHz}$	$\pm 2\text{KHz}$	Pass
40°C	107.9 MHz	$0,231\text{KHz}$	$\pm 2\text{KHz}$	Pass
45°C	107.9 MHz	$0,284\text{KHz}$	$\pm 2\text{KHz}$	Pass

B) Particular Conditions:

- Tested at 21°C
- 98MHz output
- Measures done at 100%, 105% and 25% of nominal power.
- Varying AC voltage input
- Acceptable limits: $\pm 2\text{KHz}$.

Configuration:



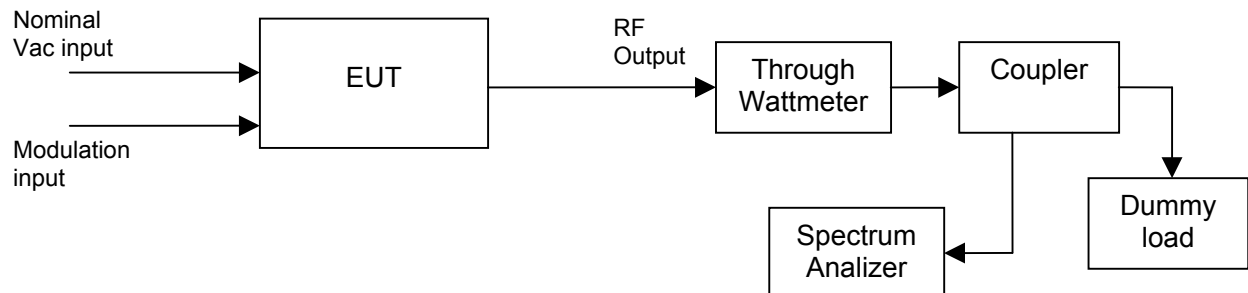
Power	Input AC voltage	Freq. error	Range ($\pm 2\text{KHz}$)	Pass/Not Pass
100W (100%)	90V	-0.078KHz	$\pm 2\text{KHz}$	Pass
100W (100%)	132.5V	-0.088KHz	$\pm 2\text{KHz}$	Pass
100W (100%)	195.5V	-0.120KHz	$\pm 2\text{KHz}$	Pass
100W (100%)	260V	-0.183KHz	$\pm 2\text{KHz}$	Pass
105W (105%)	90V	-0.059KHz	$\pm 2\text{KHz}$	Pass
105W (105%)	132.5V	-0.066KHz	$\pm 2\text{KHz}$	Pass
105W (105%)	195.5V	-0.101KHz	$\pm 2\text{KHz}$	Pass
105W (105%)	260V	-0.197KHz	$\pm 2\text{KHz}$	Pass
25W (25%)	90V	-0.073KHz	$\pm 2\text{KHz}$	Pass
25W (25%)	132.5V	-0.086KHz	$\pm 2\text{KHz}$	Pass
25W (25%)	195.5V	-0.112KHz	$\pm 2\text{KHz}$	Pass
25W (25%)	260V	-0.053KHz	$\pm 2\text{KHz}$	Pass

- CONDUCTED RADIATION

Particular Conditions:

- With modulation input. As in *CFR Title 47 Chapter 1 Part 2. 1049*
 - _ Mono (85% deviation)
 - _ Mono + Subcarrier (85% deviation)
 - _ Stereo (85% deviation)
- Temperature 25°C
- Measures done at 100%, 105% and 25% of nominal power.
- Measurements done at 98MHz, 88.1MHz and 107.9MHz
- Nominal AC voltage input
- Acceptable limits: As in *CFR Title 47 Chapter 1 Part 73. 317*
 - _ In frequencies between 120 and 240KHz away from carrier:
Below **25dBc** of the unmodulated carrier.
 - _ In frequencies between 240 and 600KHz away from carrier:
Below **35dBc** of the unmodulated carrier.
 - _ In frequencies more than 600KHz away from carrier:
Below $(43 + 10\log(P)) = \mathbf{63dBc}$ of the unmodulated carrier.

Configuration:



Procedure:

1. Without modulation, adjust the level of the signal to be the reference of the spectrum analyzer display. Take a plot
2. Set the display frequency start and stop to be able to watch the harmonics and spurious signals far from 600KHz out of the carrier. Take a plot
3. With the proper modulation (defined in CFR Title 47 Chapter 1 Part 2. 1049) take plots showing the levels in the points required by CFR Title 47 Chapter 1 Part 73. 317

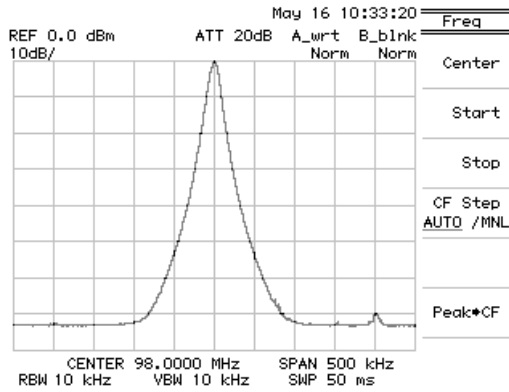
•	Conducted radiation	7
A.	98MHz	10
A.a.	Nominal power (100W = 100% power) 98MHz	10
A.a.1.	Carrier whitout modulation (reference)	10
A.a.2.	Out of 600KHz from carrier.	10
A.a.3.	Mono (15KHz, 85% modulation=63.75KHz)	11
A.a.4.	Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)	12
A.a.5.	Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)	13
A.b.	Nominal power (105W = 105% power) 98MHz	14
A.b.1.	Carrier whitout modulation (reference)	14
A.b.2.	Out of 600KHz from carrier.	14
A.b.3.	Mono (15KHz, 85% modulation=63.75KHz)	15
A.b.4.	Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)	16
A.b.5.	Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)	17
A.c.	Nominal power (25W = 25% power) 98MHz	18
A.c.1.	Carrier whitout modulation (reference)	18
A.c.2.	Out of 600KHz from carrier.	18
A.c.3.	Mono (15KHz, 85% modulation=63.75KHz)	19
A.c.4.	Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)	20
A.c.5.	Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)	21
B.	88.1MHz	22
B.a.	Nominal power (100W = 100% power) 88.1MHz	22
B.a.1.	Carrier whitout modulation (reference)	22
B.a.2.	Out of 600KHz from carrier.	22
B.a.3.	Mono (15KHz, 85% modulation=63.75KHz)	23
B.a.4.	Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)	24
B.a.5.	Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)	25
B.b.	Nominal power (105W = 105% power) 88.1MHz	26
B.b.1.	Carrier whitout modulation (reference)	26
B.b.2.	Out of 600KHz from carrier.	26
B.b.3.	Mono (15KHz, 85% modulation=63.75KHz)	27
B.b.4.	Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)	28
B.b.5.	Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)	29
B.c.	Nominal power (25W = 25% power) 88.1MHz	30
B.c.1.	Carrier whitout modulation (reference)	30
B.c.2.	Out of 600KHz from carrier.	30
B.c.3.	Mono (15KHz, 85% modulation=63.75KHz)	31
B.c.4.	Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)	32
B.c.5.	Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)	33
C.	107.9MHz	34
C.a.	Nominal power (100W = 100% power) 107.9MHz	34
C.a.1.	Carrier whitout modulation (reference)	34
C.a.2.	Out of 600KHz from carrier.	34
C.a.3.	Mono (15KHz, 85% modulation=63.75KHz)	35
C.a.4.	Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)	36

C.a.5.	Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)	37
C.b.	Nominal power (105W = 105% power) 107.9MHz	38
C.b.1.	Carrier whitout modulation (reference)	38
C.b.2.	Out of 600KHz from carrier.	38
C.b.3.	Mono (15KHz, 85% modulation=63.75KHz)	39
C.b.4.	Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)	40
C.b.5.	Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)	41
C.c.	Nominal power (25W = 25% power) 107.9MHz	42
C.c.1.	Carrier whitout modulation (reference)	42
C.c.2.	Out of 600KHz from carrier.	42
C.c.3.	Mono (15KHz, 85% modulation=63.75KHz)	43
C.c.4.	Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)	44
C.c.5.	Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)	45

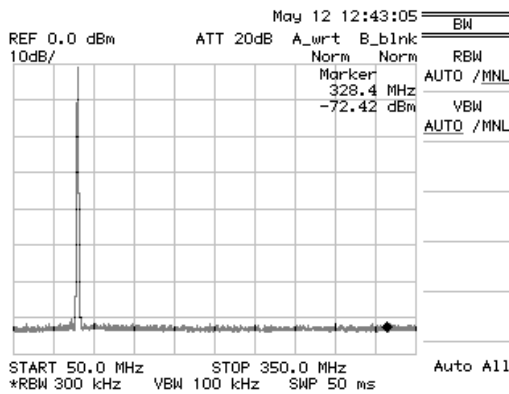
A. 98MHz

A.a. Nominal power (100W = 100% power) 98MHz

A.a.1. Carrier whitout modulation (reference)

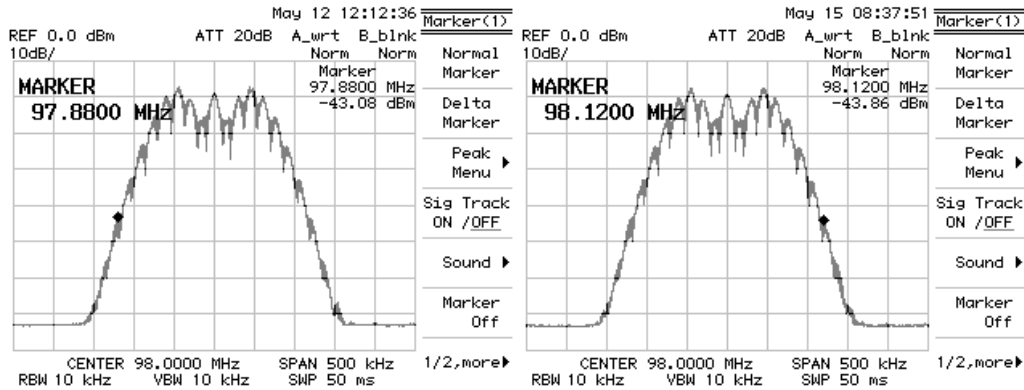


A.a.2. Out of 600KHz from carrier.

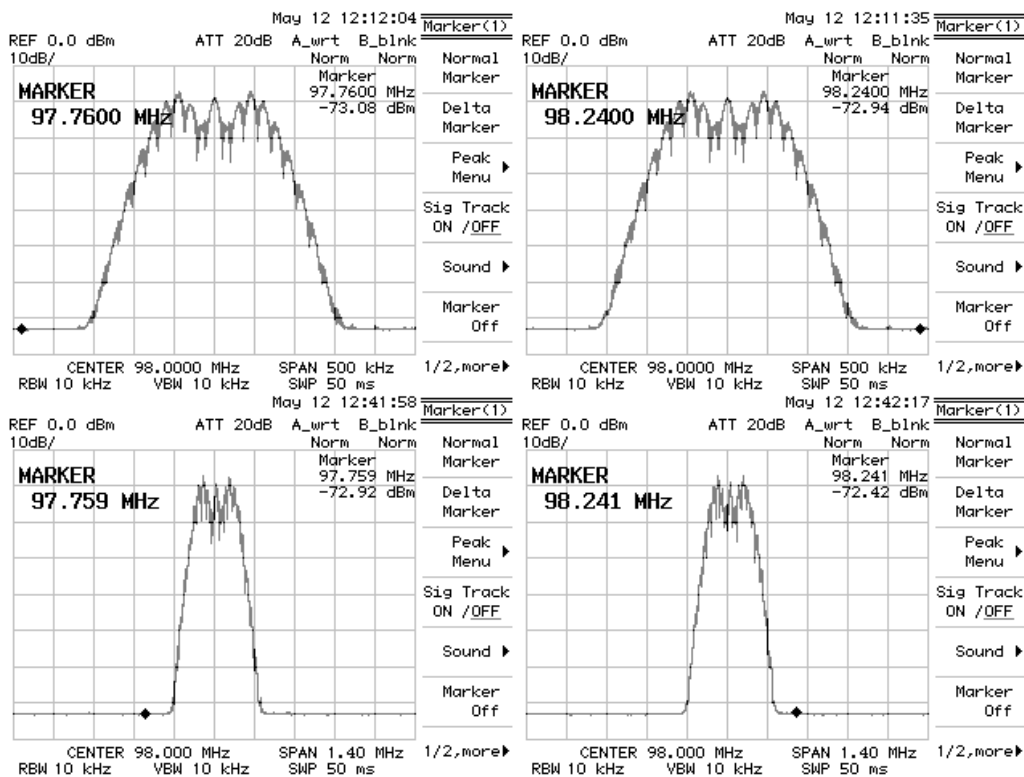


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=63\text{dBc}$ => **Pass**

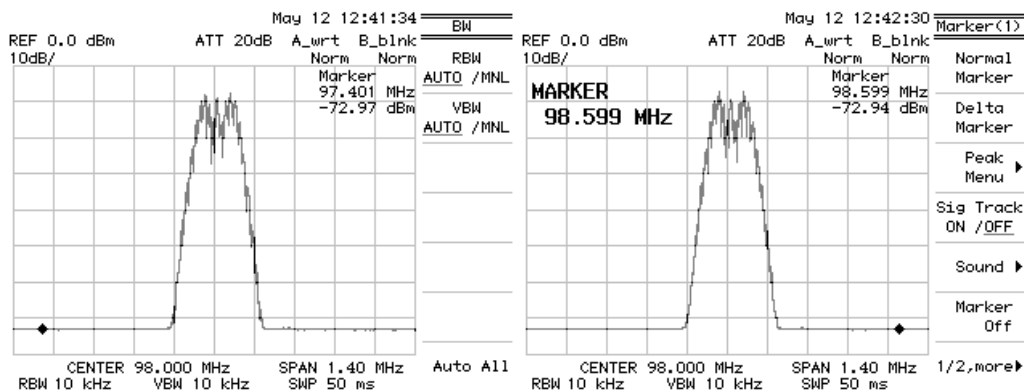
A.a.3. Mono (15KHz, 85% modulation=63.75KHz)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

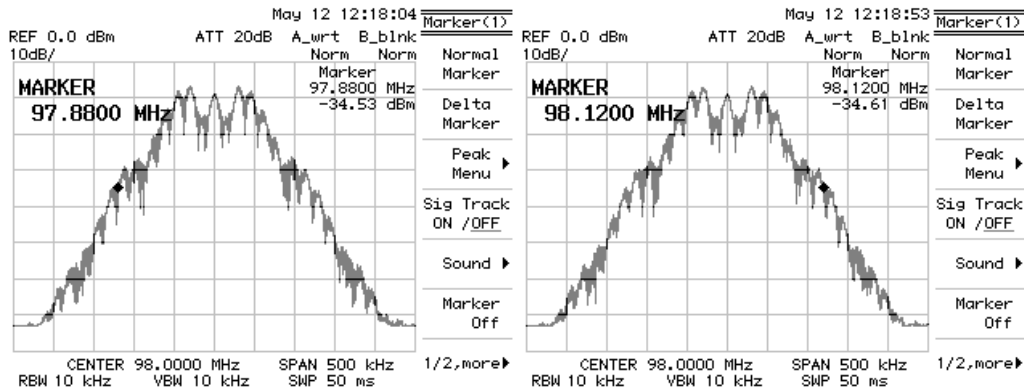


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

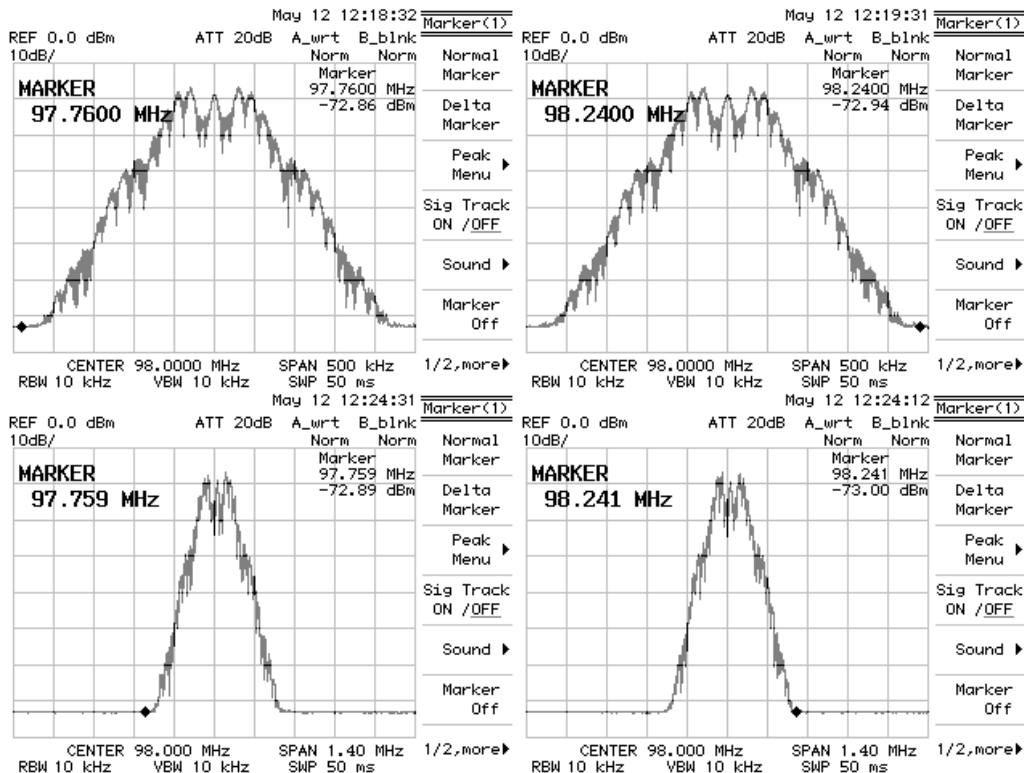


Markers at 600KHz from the carrier. Below $(43 + 10\log(P)) = 63\text{dBc}$ => **Pass**

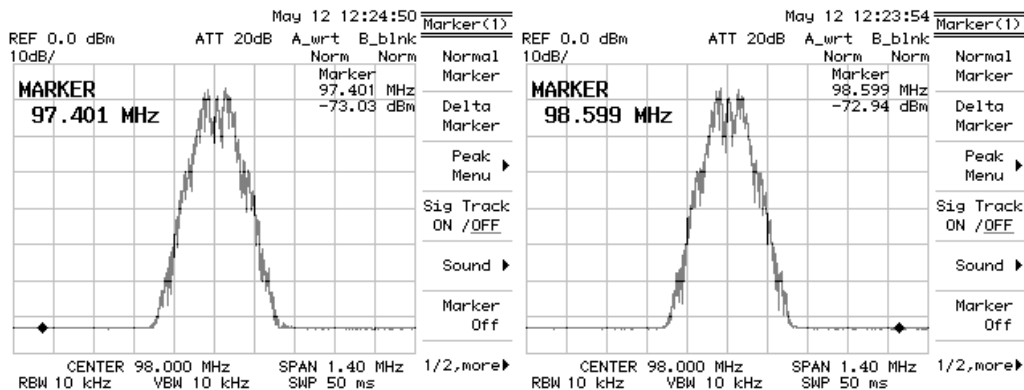
A.a.4. Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

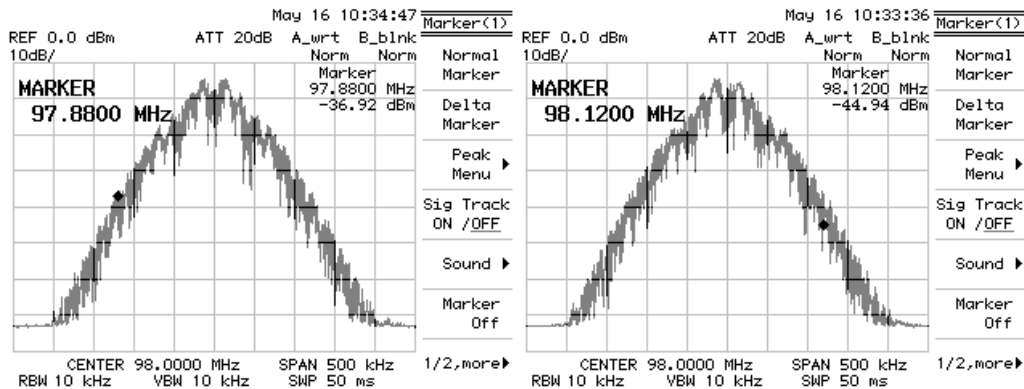


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

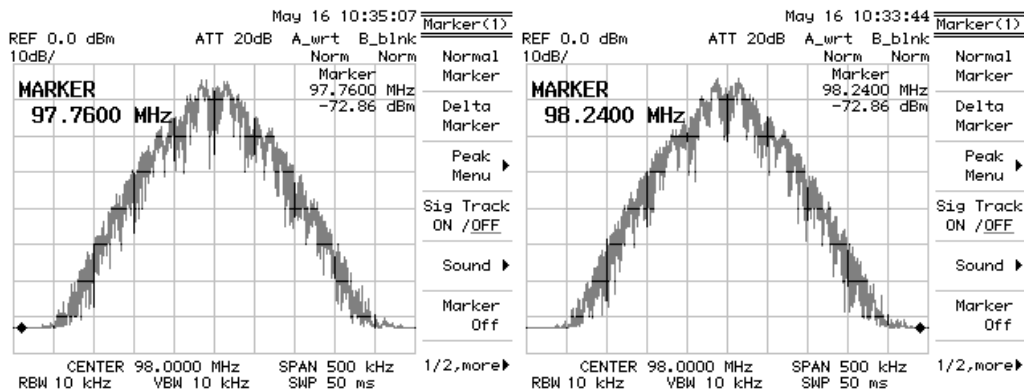


Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63\text{dBc}$ => **Pass**

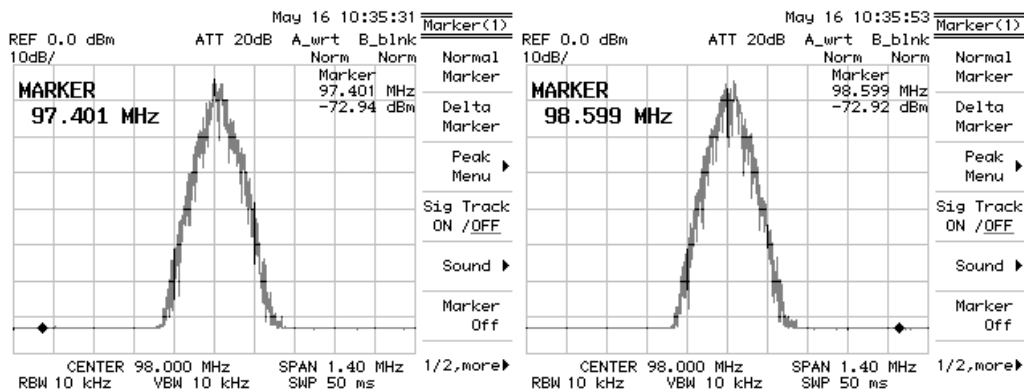
A.a.5. Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**



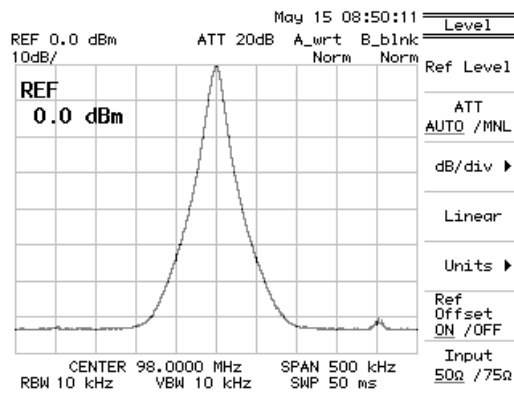
Markers at 240KHz from the carrier. Below 35dBc => **Pass**



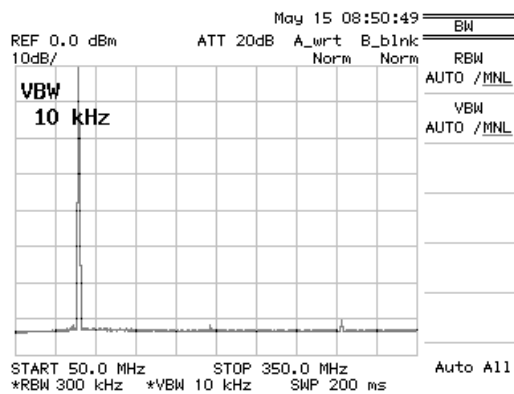
Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63\text{dBc}$ => **Pass**

A.b. Nominal power (105W = 105% power) 98MHz

A.b.1. Carrier without modulation (reference)

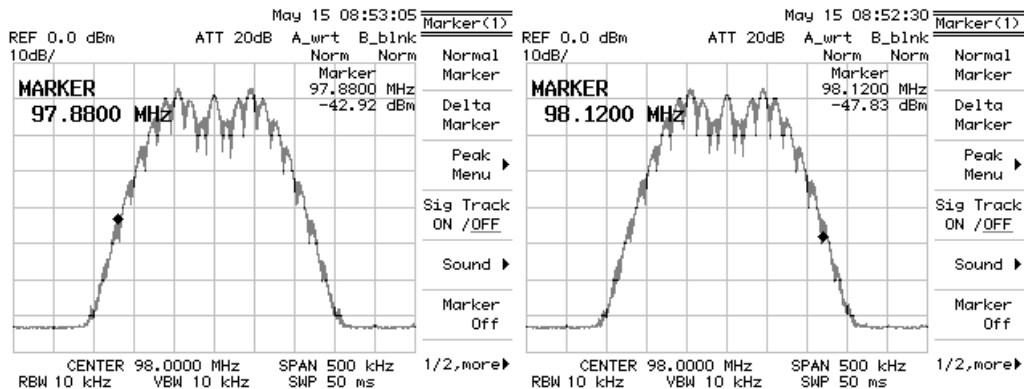


A.b.2. Out of 600KHz from carrier.

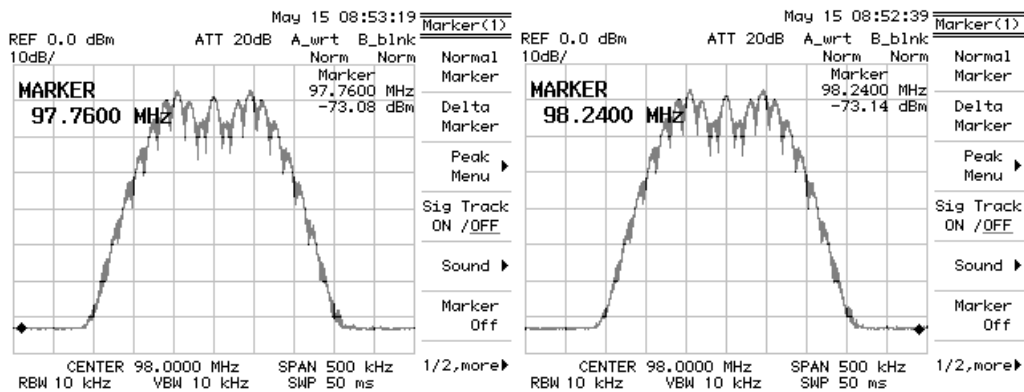


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=63.21\text{dBc}$ => **Pass**

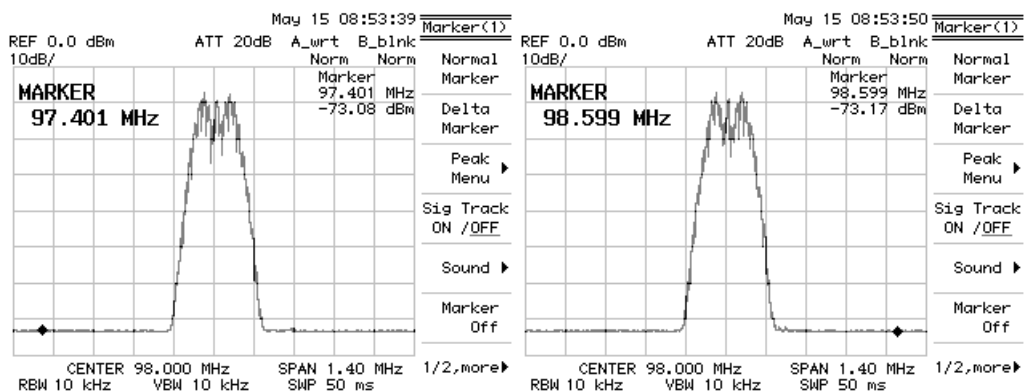
A.b.3. Mono (15KHz, 85% modulation=63.75KHz)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

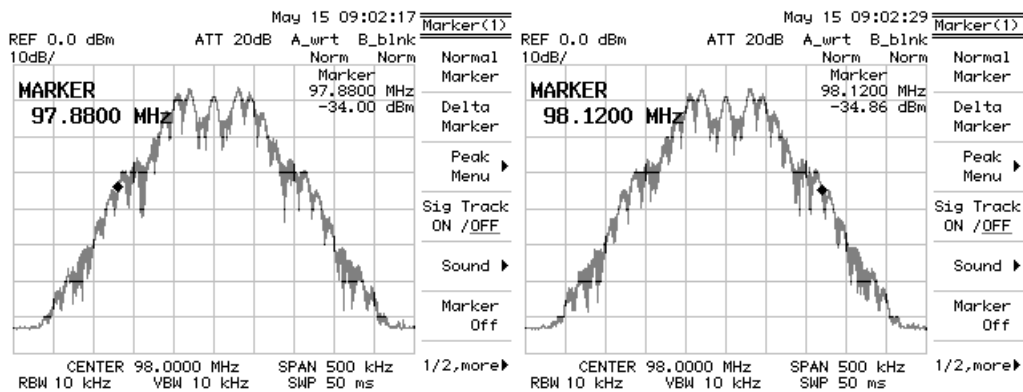


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

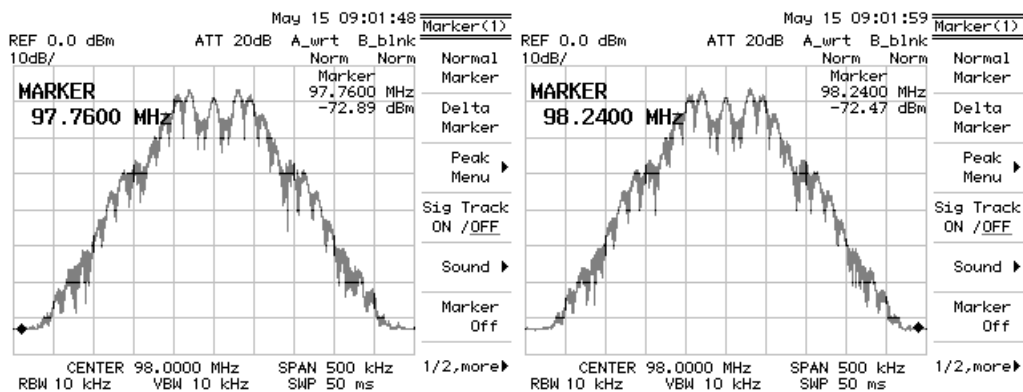


Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63.21\text{dBc}$ => **Pass**

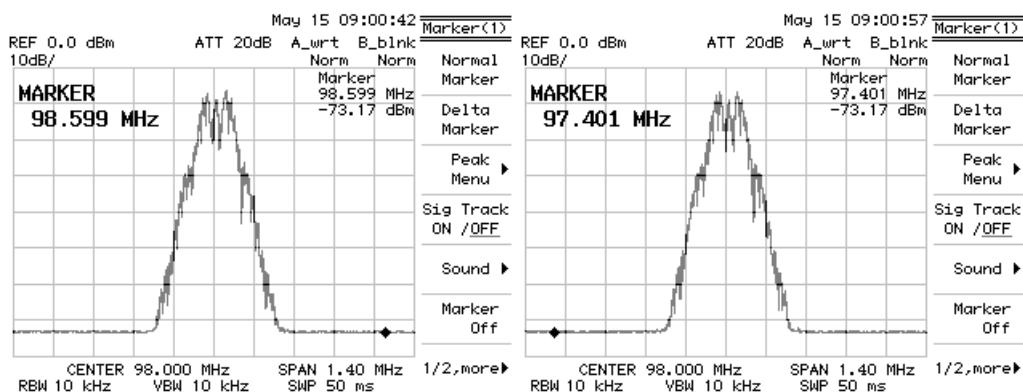
A.b.4. Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

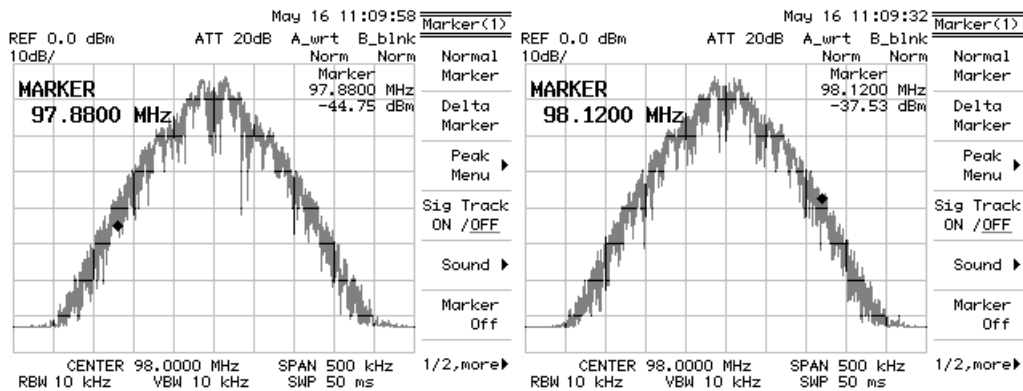


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

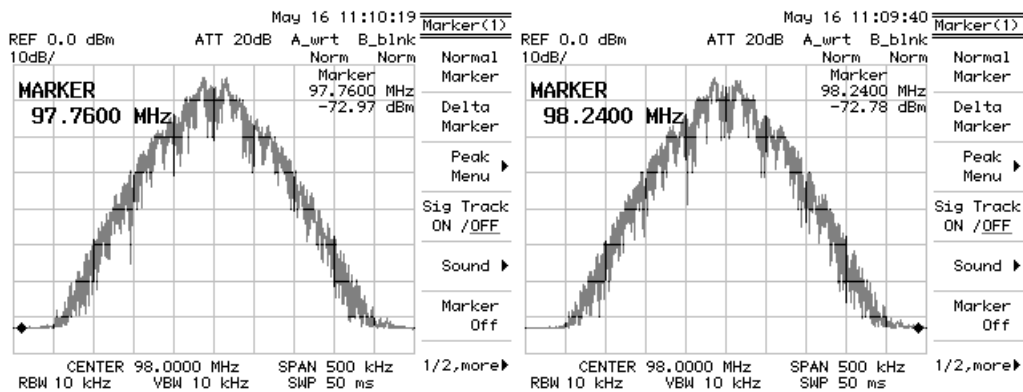


Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63.21\text{dBc}$ => **Pass**

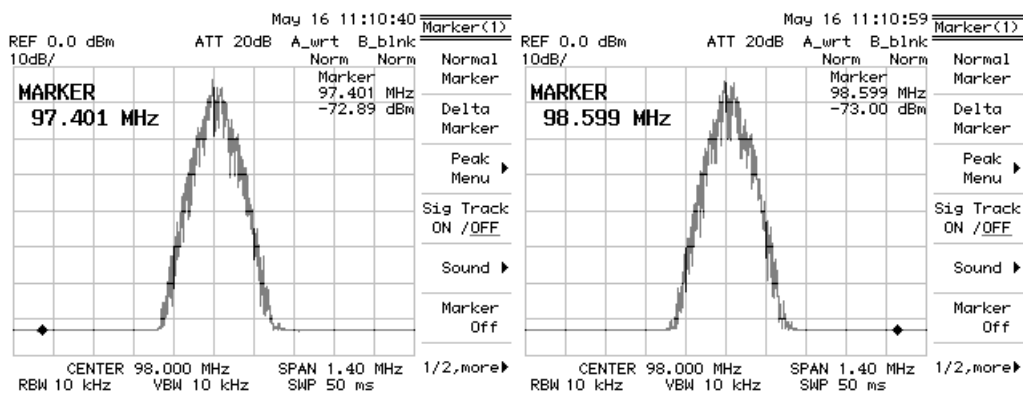
A.b.5. Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz
 stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9%
 modulation=6.75KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**



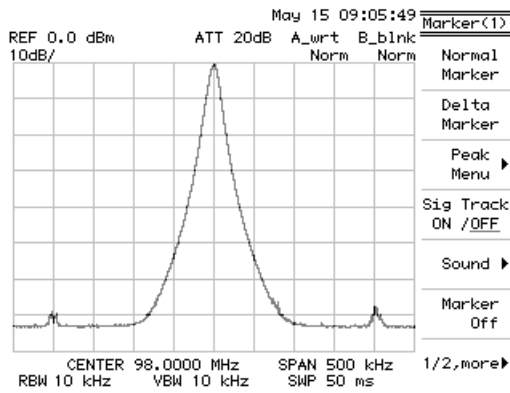
Markers at 240KHz from the carrier. Below 35dBc => **Pass**



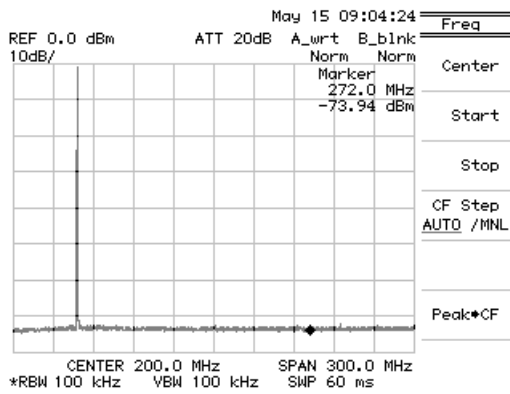
Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63.21\text{dBc}$ => **Pass**

A.c. Nominal power (25W = 25% power) 98MHz

A.c.1. Carrier whitout modulation (reference)

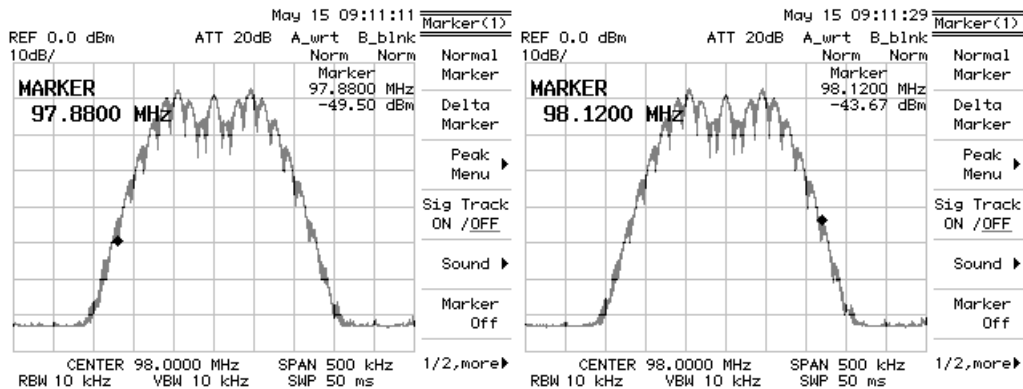


A.c.2. Out of 600KHz from carrier.

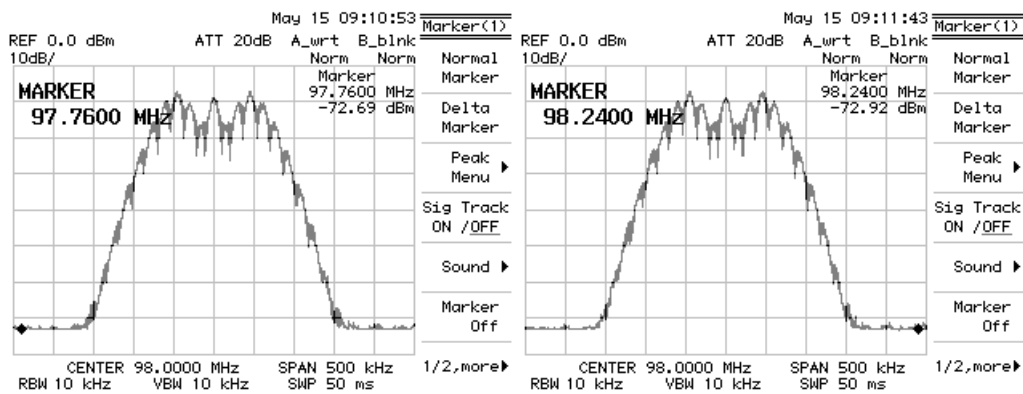


More than 600KHz away from the carrier. Below $(43 + 10\log(P)) = 56.98\text{dBc} \Rightarrow$ **Pass**

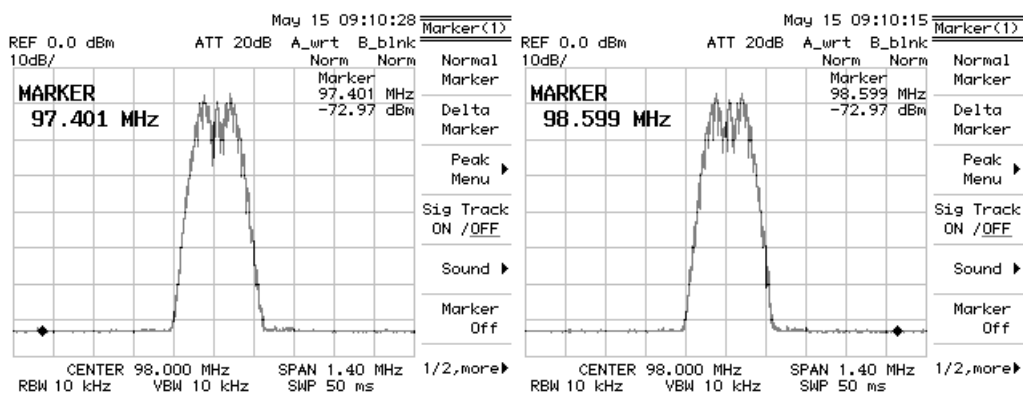
A.c.3. Mono (15KHz, 85% modulation=63.75KHz)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

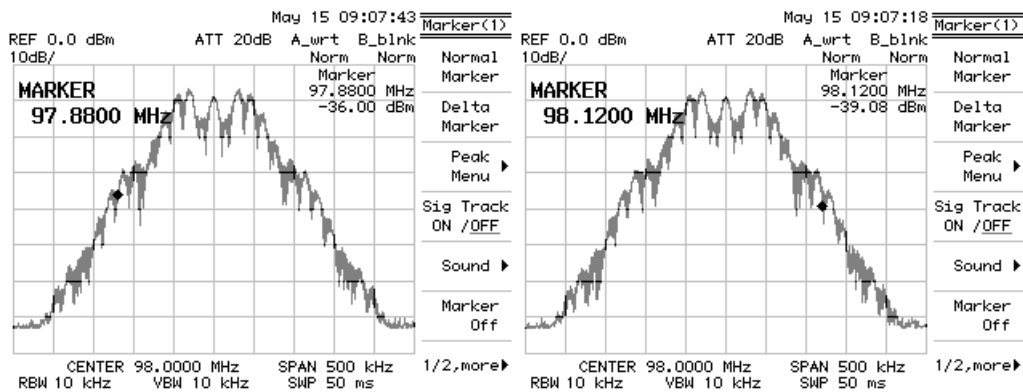


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

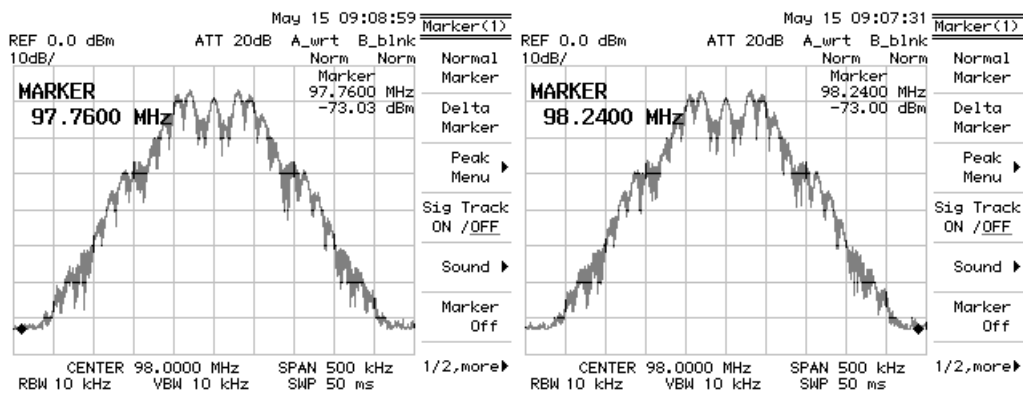


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=56.98\text{dBc}$ => **Pass**

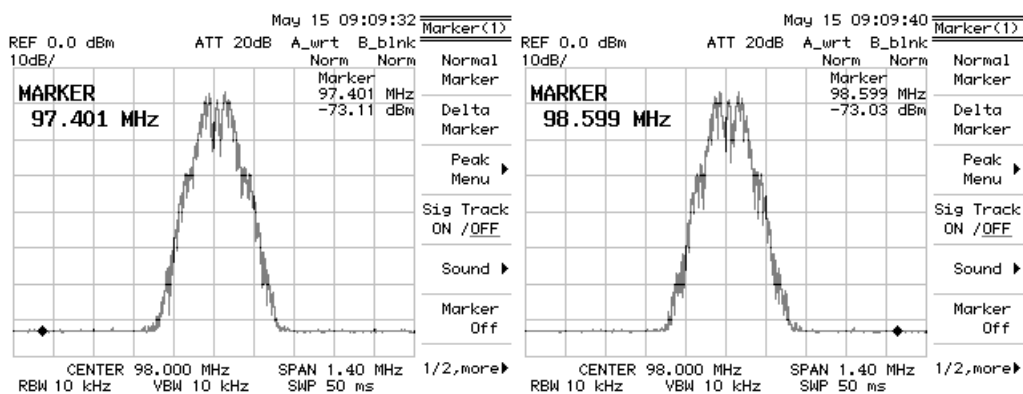
A.c.4. Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

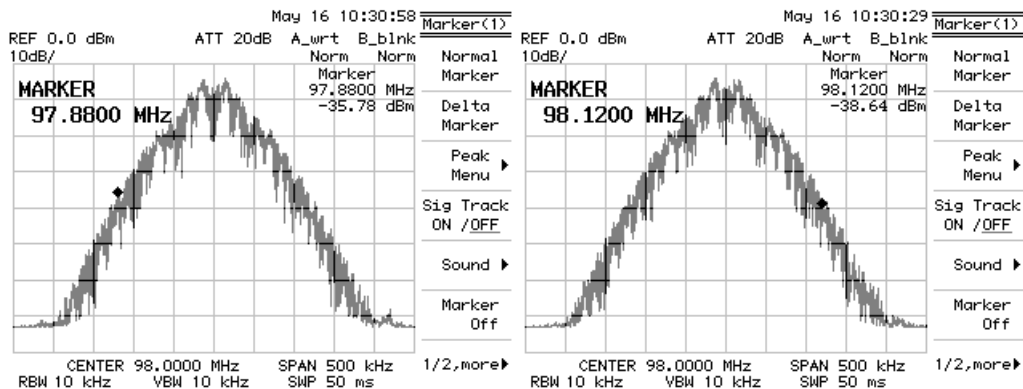


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

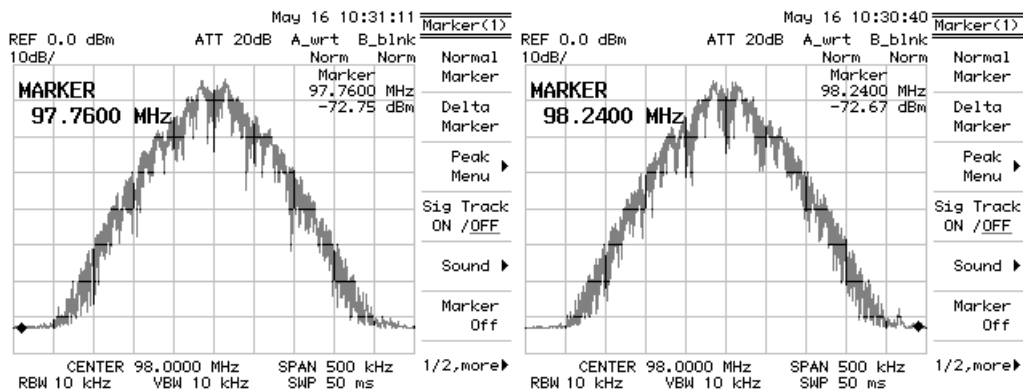


More than 600KHz away from the carrier. Below $(43 + 10\log(P)) = 56.98\text{dBc}$ => **Pass**

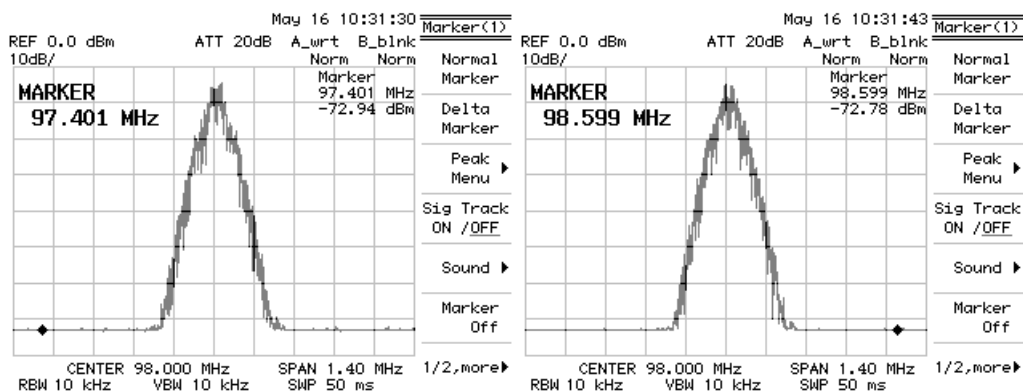
A.c.5. Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz
 stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9%
 modulation=6.75KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**



Markers at 240KHz from the carrier. Below 35dBc => **Pass**

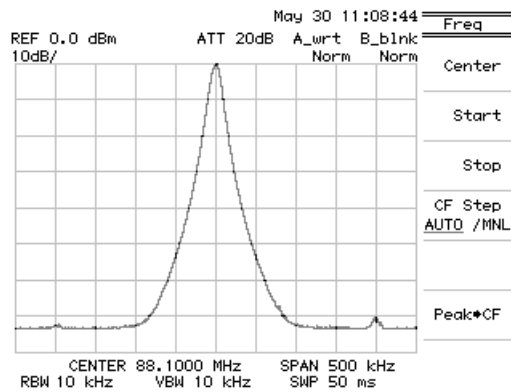


More than 600KHz away from the carrier. Below $(43 + 10\log(P)) = 56.98\text{dBc}$ => **Pass**

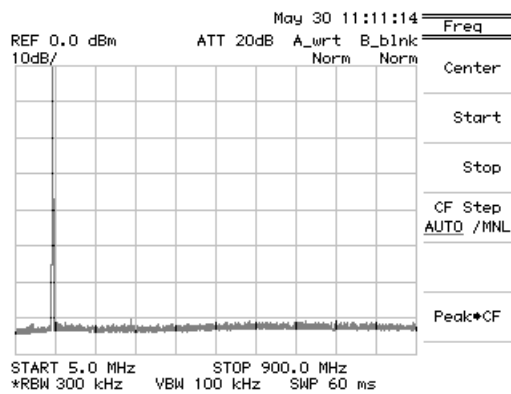
B. 88.1MHz

B.a. Nominal power (100W = 100% power) 88.1MHz

B.a.1. Carrier whitout modulation (reference)

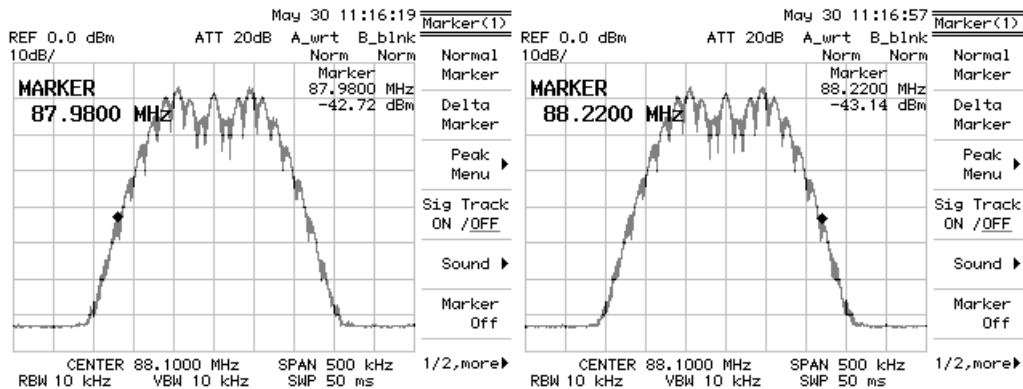


B.a.2. Out of 600KHz from carrier.

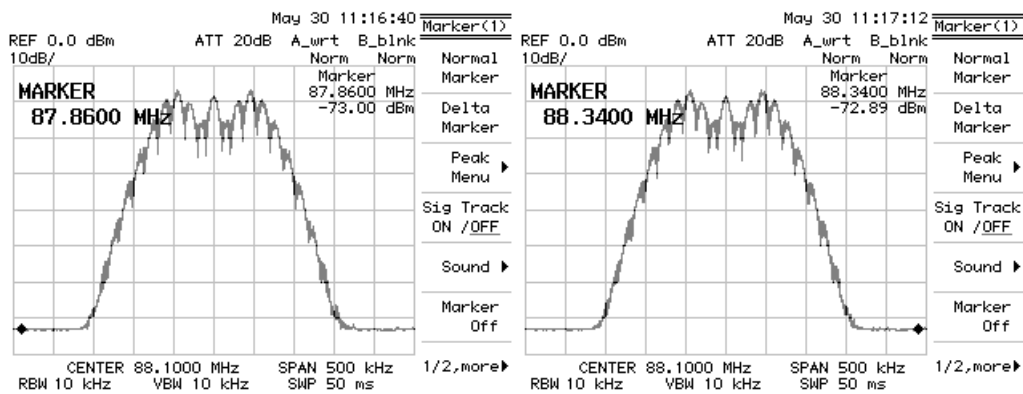


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=63\text{dBc}$ => **Pass**

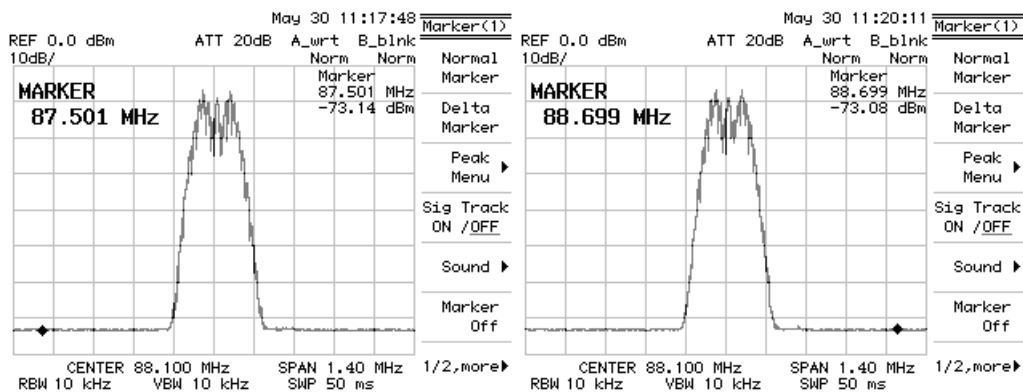
B.a.3. Mono (15KHz, 85% modulation=63.75KHz)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

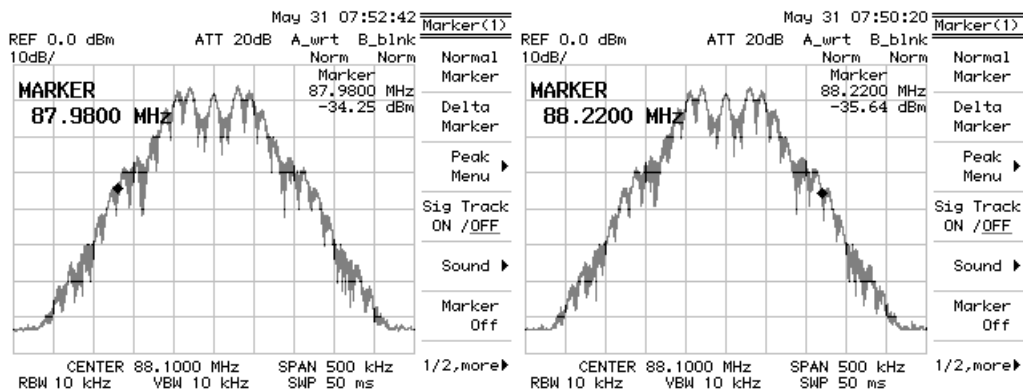


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

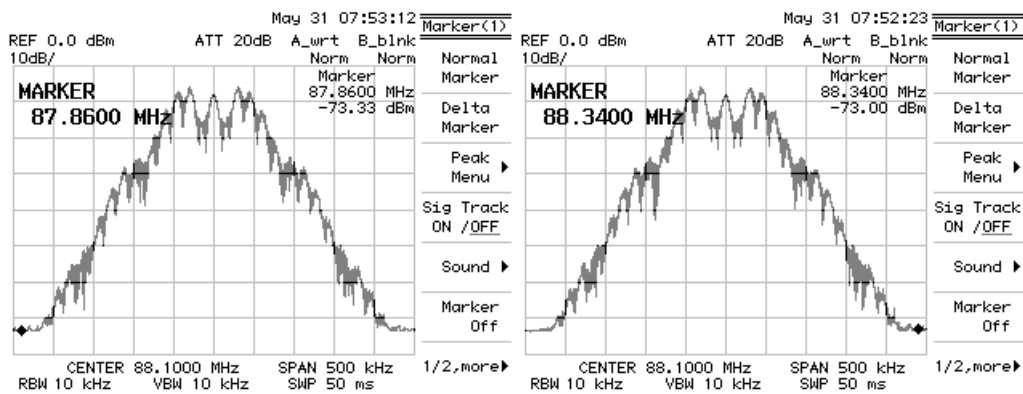


Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63\text{dBc}$ => **Pass**

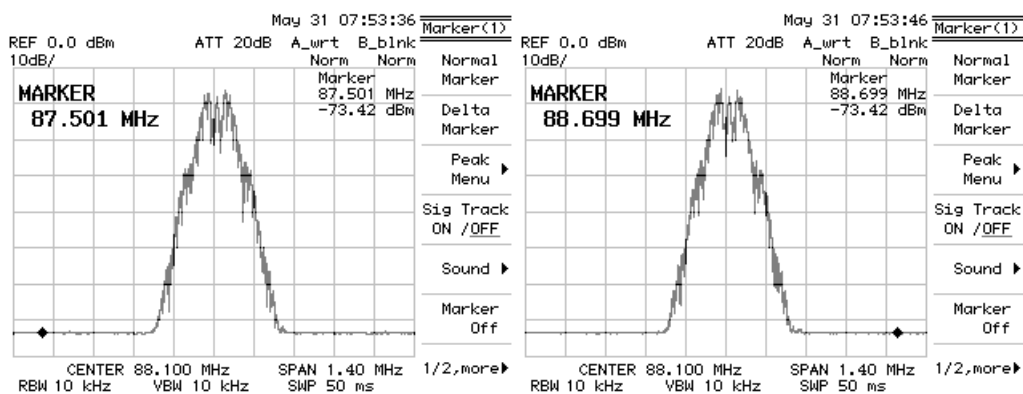
B.a.4. Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

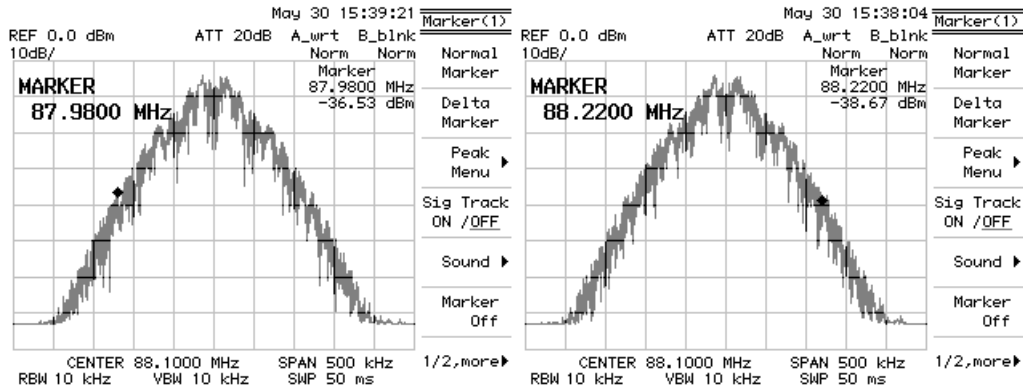


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

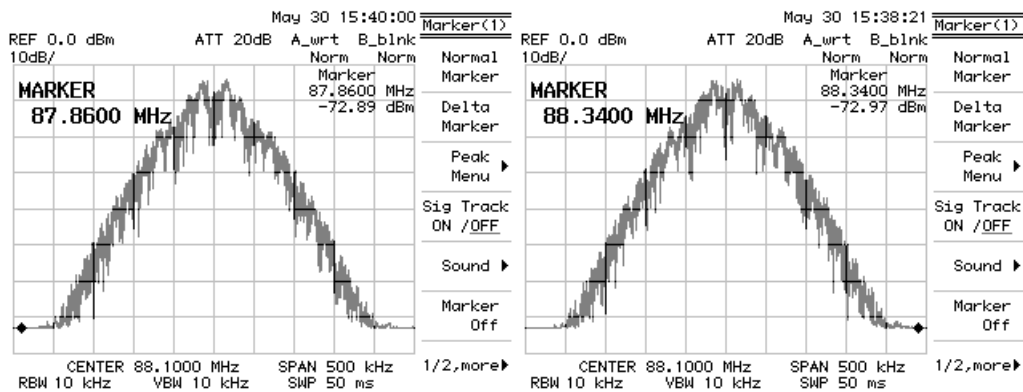


Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63\text{dBc}$ => **Pass**

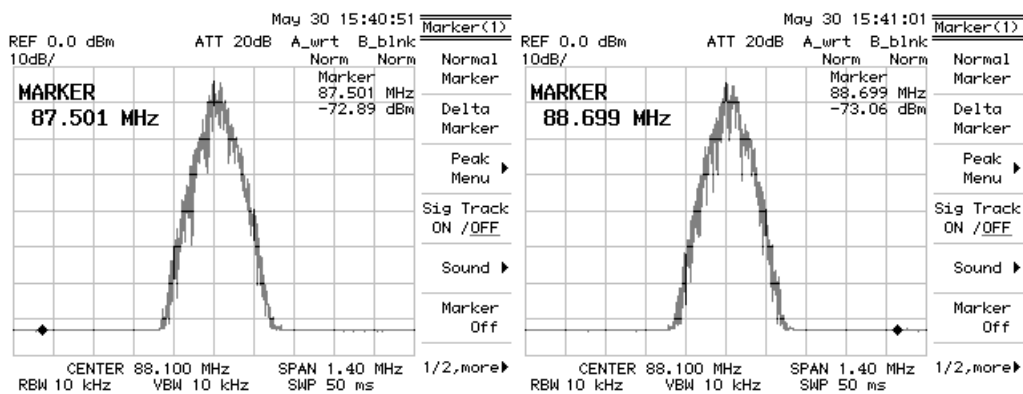
B.a.5. Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**



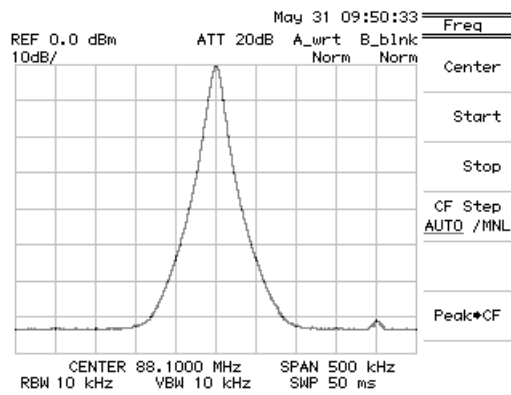
Markers at 240KHz from the carrier. Below 35dBc => **Pass**



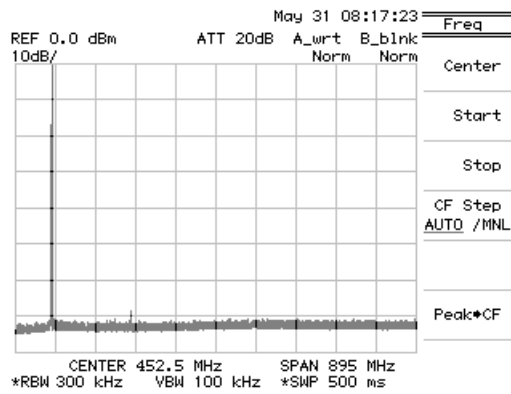
Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63\text{dBc}$ => **Pass**

B.b. Nominal power (105W = 105% power) 88.1MHz

B.b.1. Carrier whitout modulation (reference)

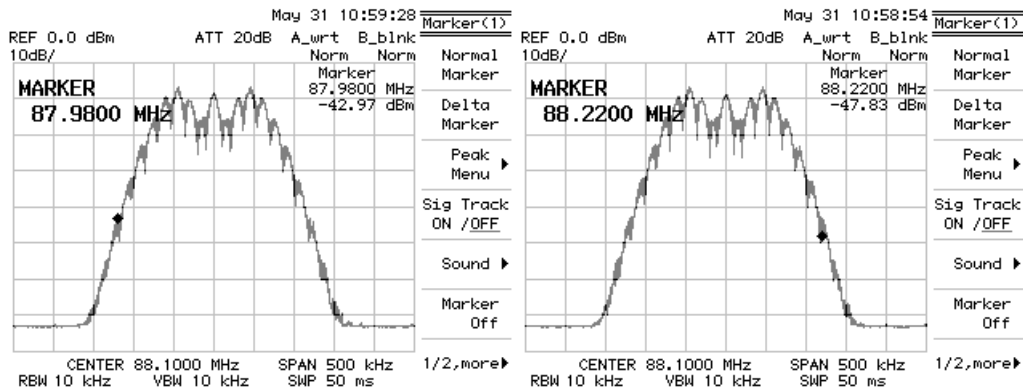


B.b.2. Out of 600KHz from carrier.

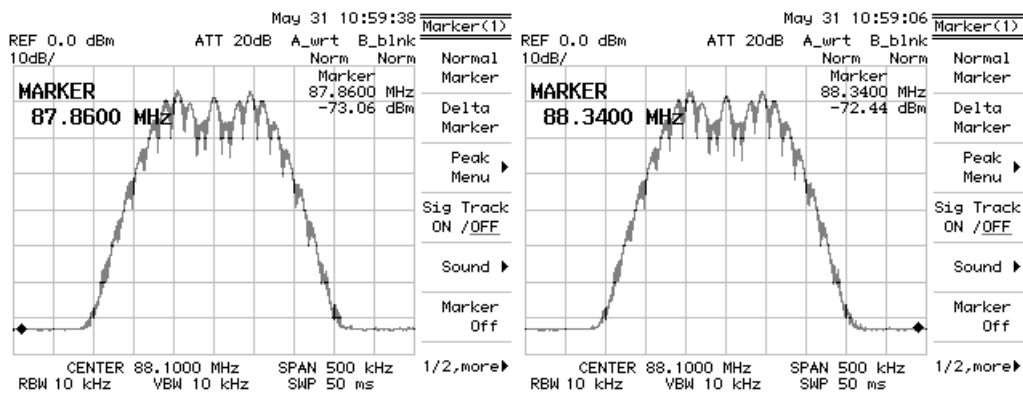


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=63.21\text{dBc}$ => **Pass**

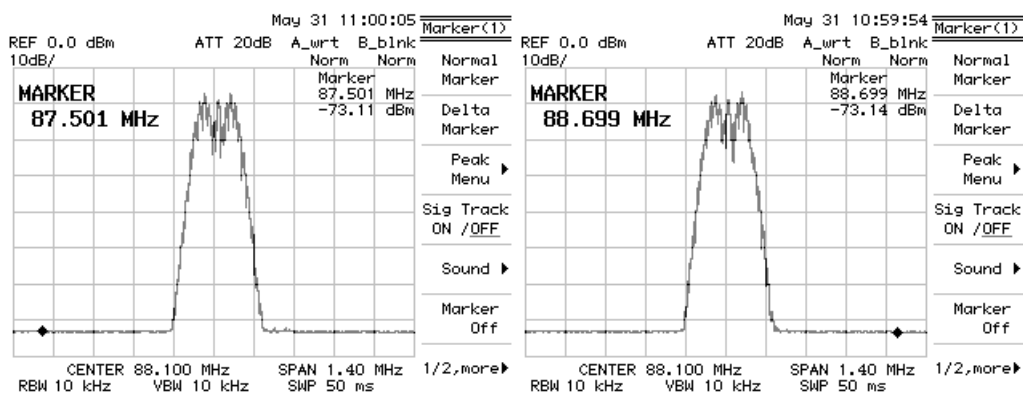
B.b.3. Mono (15KHz, 85% modulation=63.75KHz)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

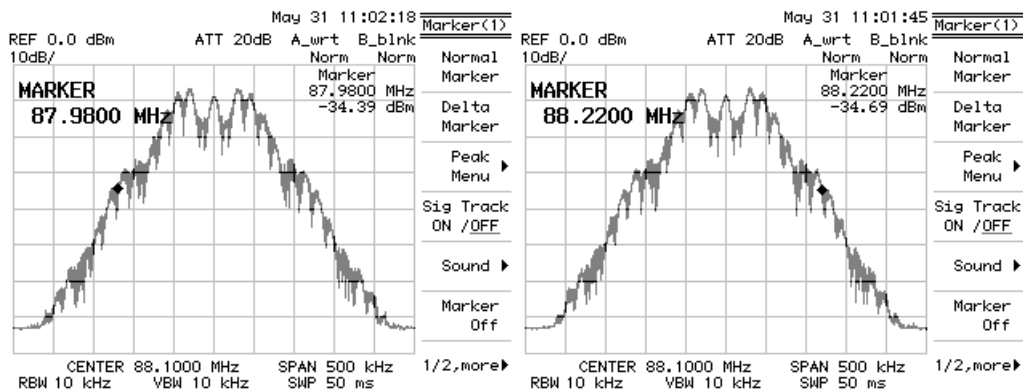


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

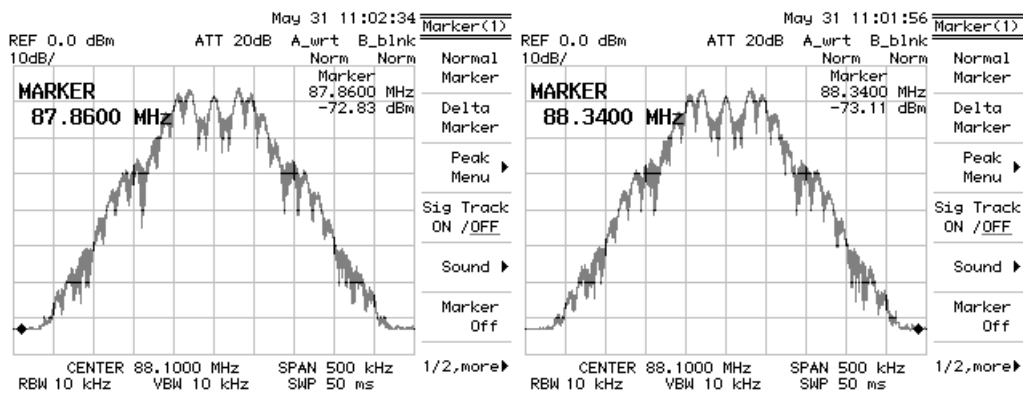


Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63.21\text{dBc}$ => **Pass**

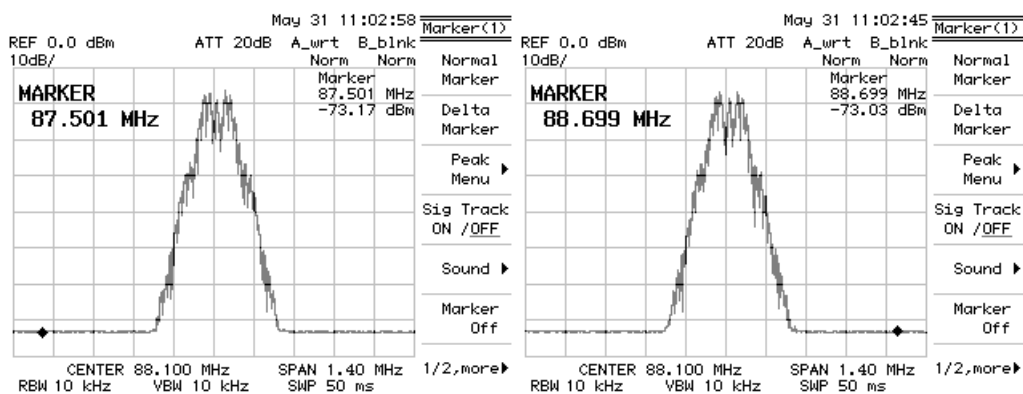
B.b.4. Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

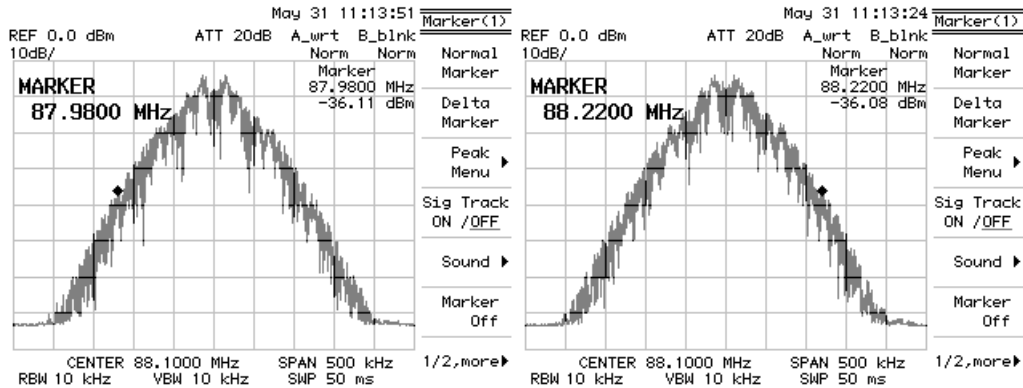


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

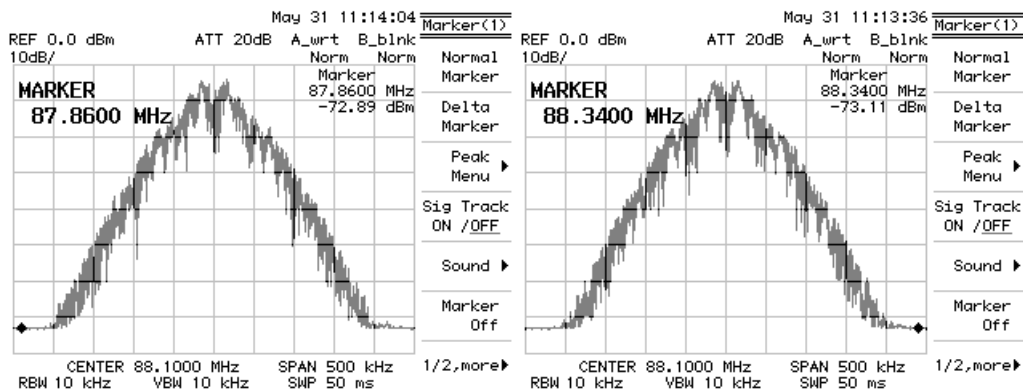


Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63.21\text{dBc}$ => **Pass**

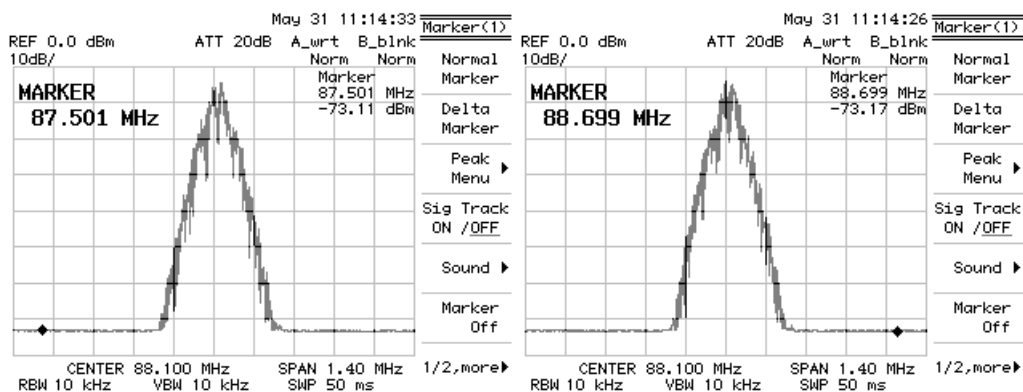
B.b.5. Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**



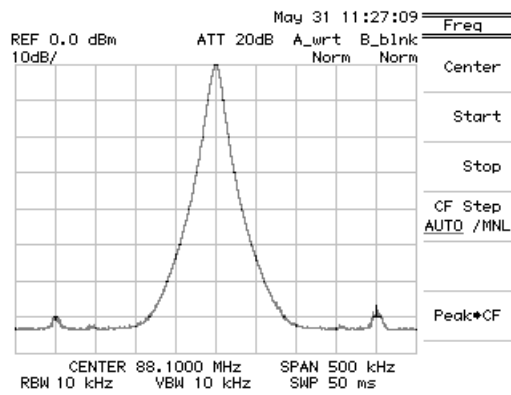
Markers at 240KHz from the carrier. Below 35dBc => **Pass**



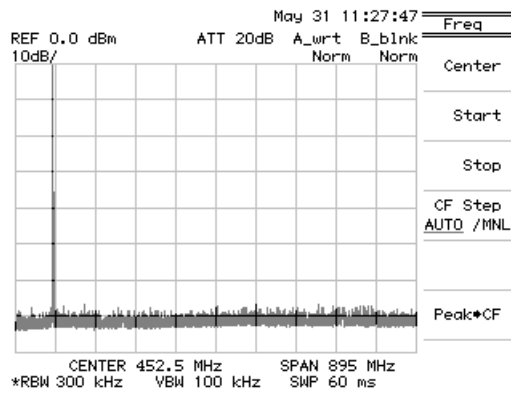
Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63.21\text{dBc}$ => **Pass**

B.c. Nominal power (25W = 25% power) 88.1MHz

B.c.1. Carrier whitout modulation (reference)

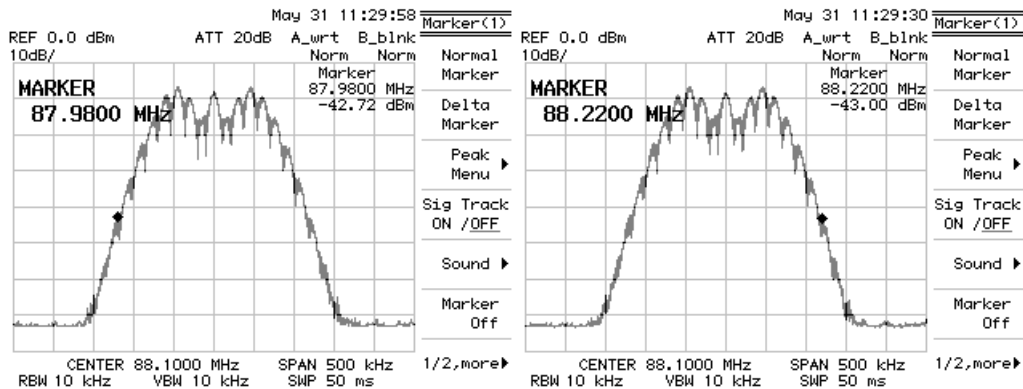


B.c.2. Out of 600KHz from carrier.

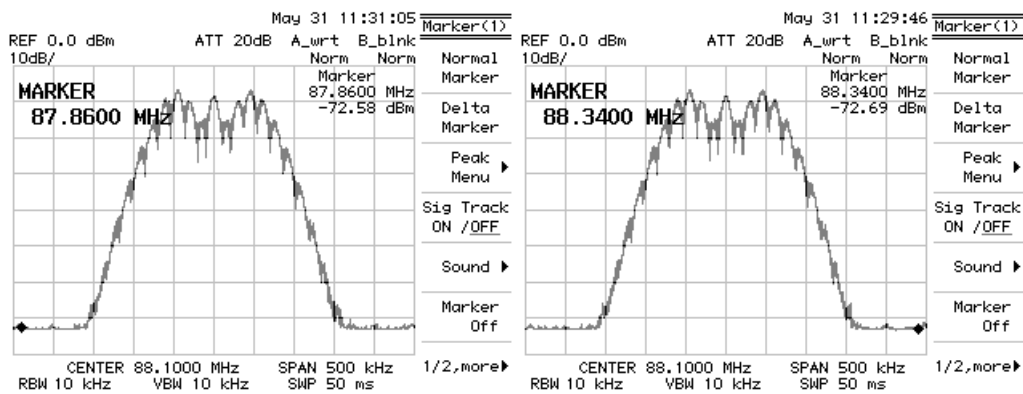


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=56.98\text{dBc}$ => **Pass**

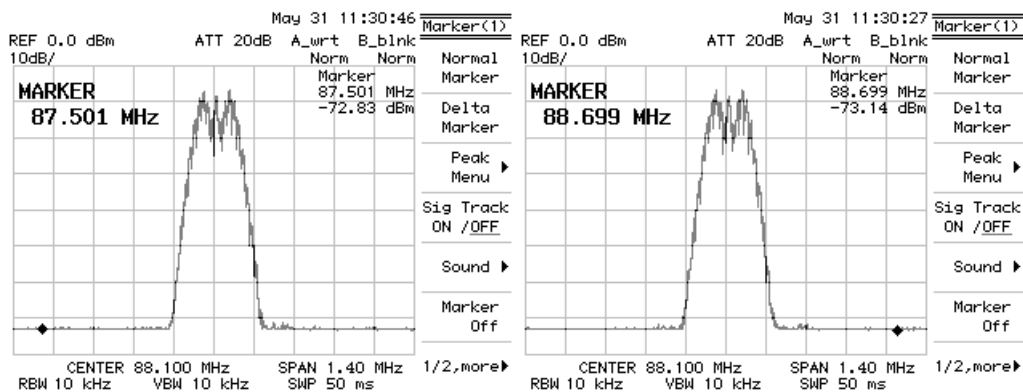
B.c.3. Mono (15KHz, 85% modulation=63.75KHz)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

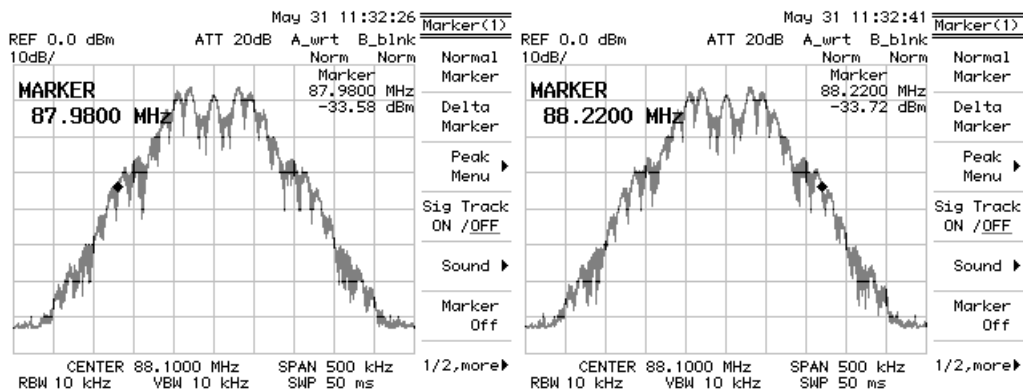


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

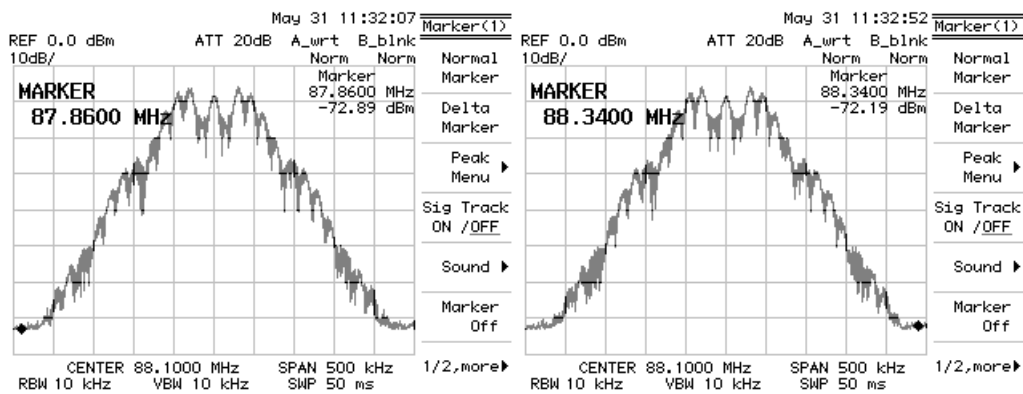


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=56.98\text{dBc}$ => **Pass**

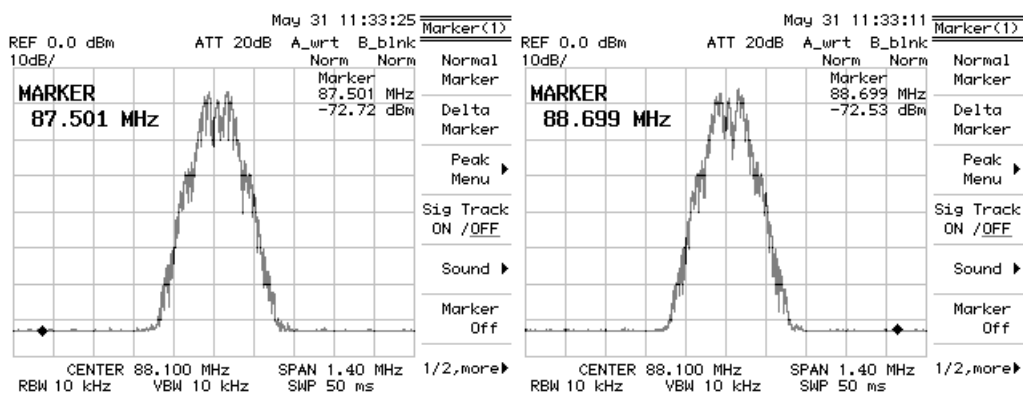
B.c.4. Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

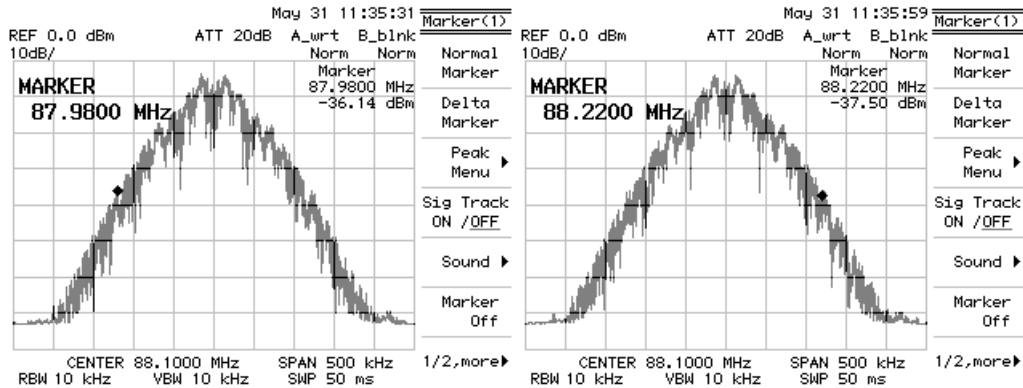


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

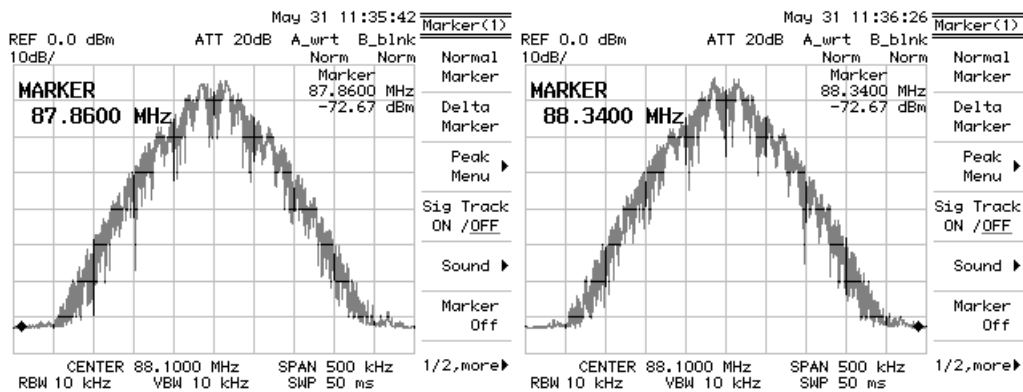


More than 600KHz away from the carrier. Below $(43 + 10\log(P)) = 56.98\text{dBc}$ => **Pass**

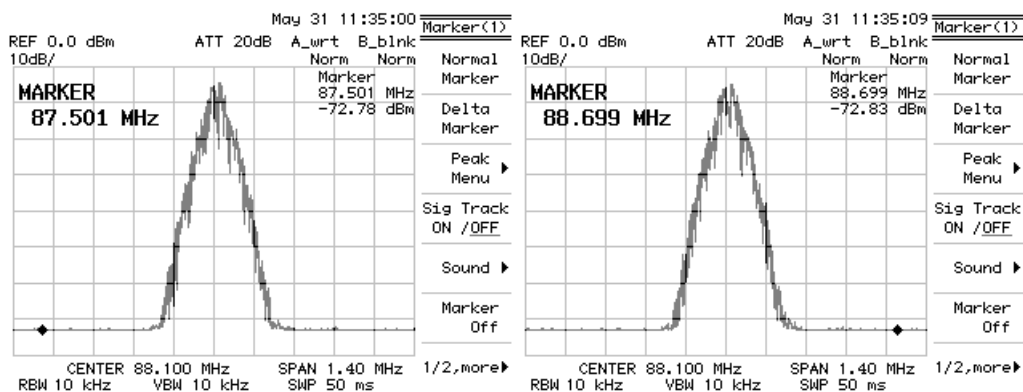
B.c.5. Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**



Markers at 240KHz from the carrier. Below 35dBc => **Pass**

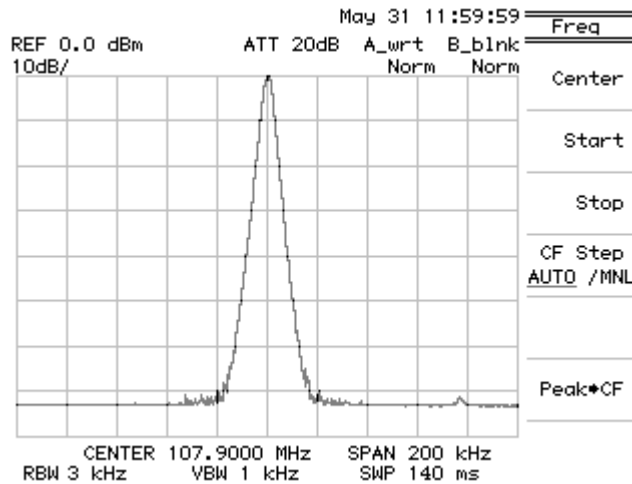


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=56.98\text{dBc}$ => **Pass**

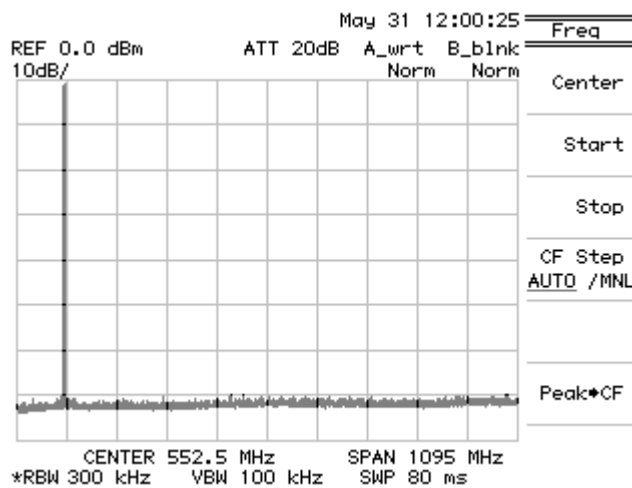
C. 107.9MHz

C.a. Nominal power (100W = 100% power) 107.9MHz

C.a.1. Carrier whitout modulation (reference)

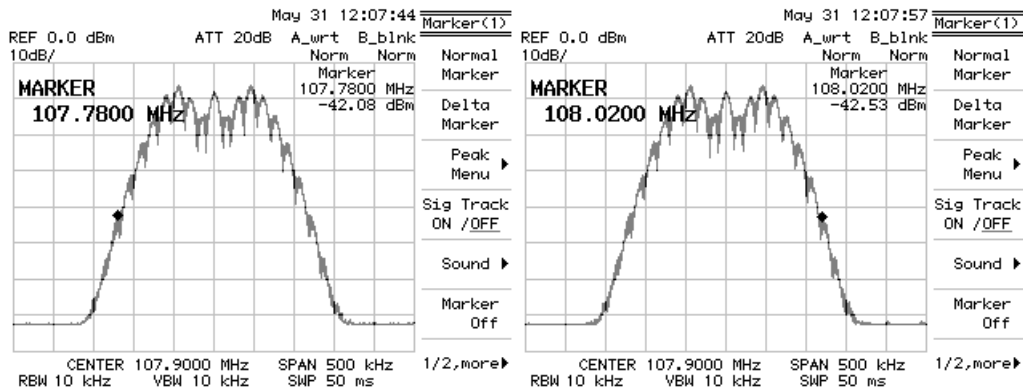


C.a.2. Out of 600KHz from carrier.

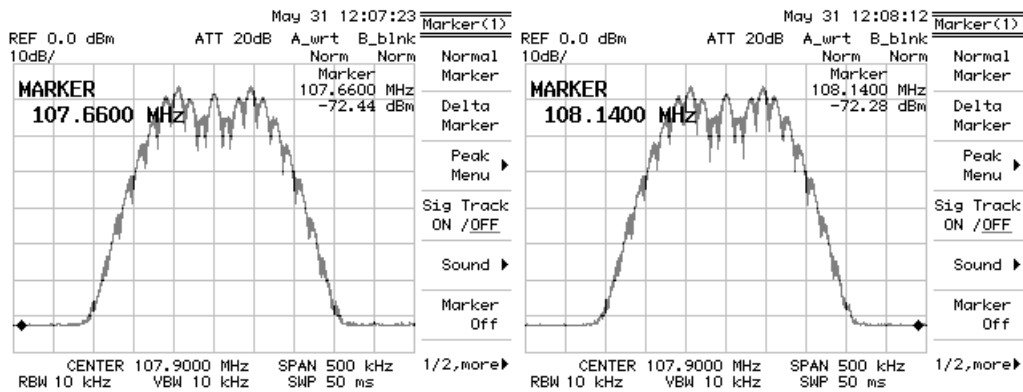


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=63\text{dBc}$ => **Pass**

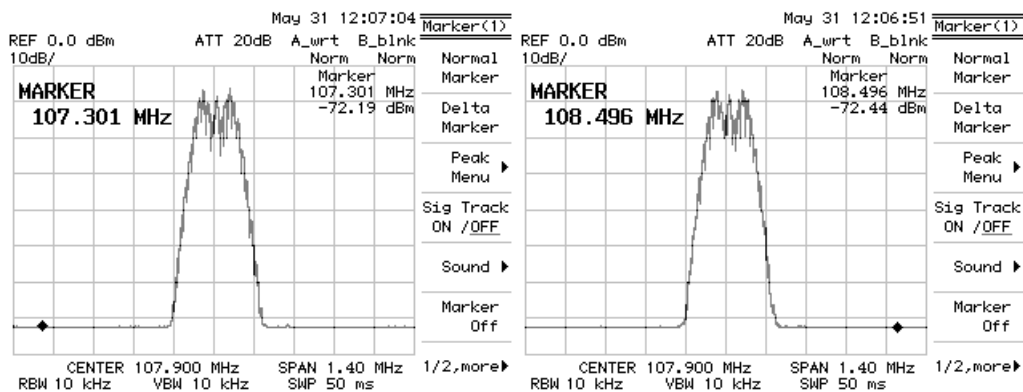
C.a.3. Mono (15KHz, 85% modulation=63.75KHz)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

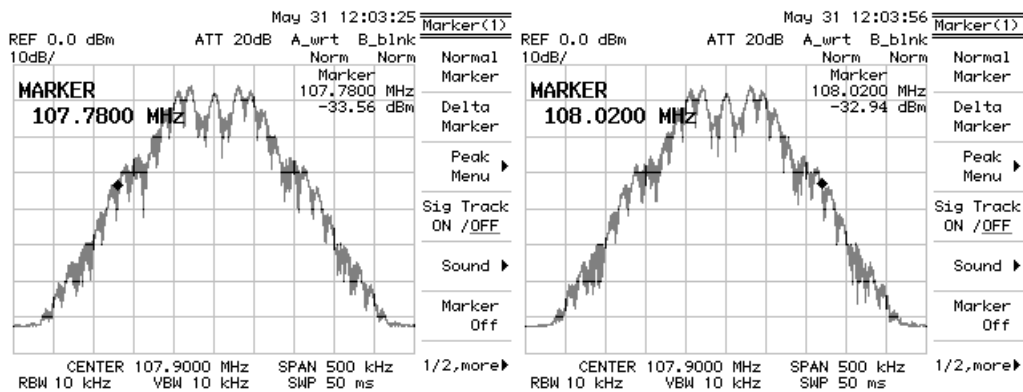


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

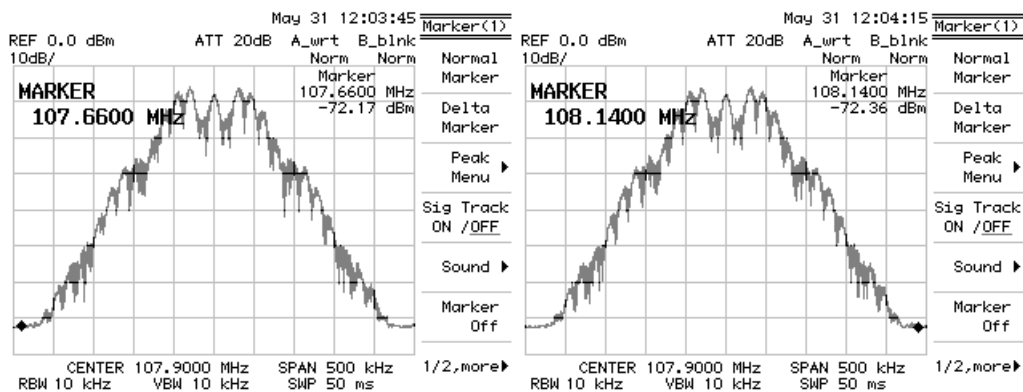


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=63\text{dBc}$ => **Pass**

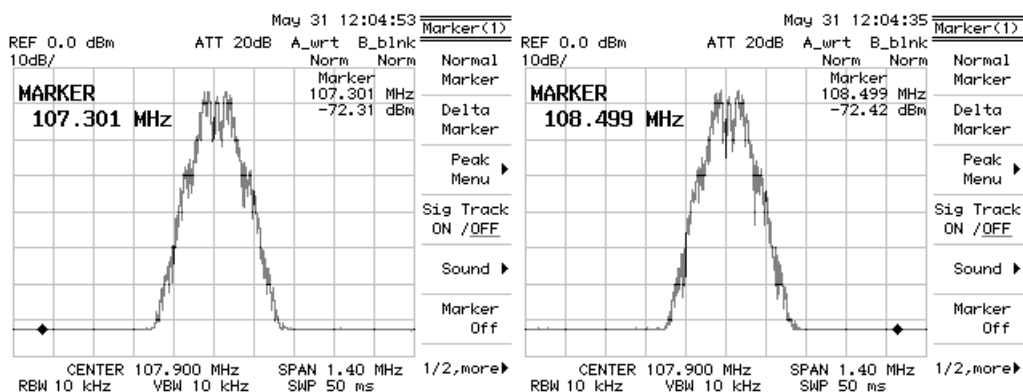
C.a.4. Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

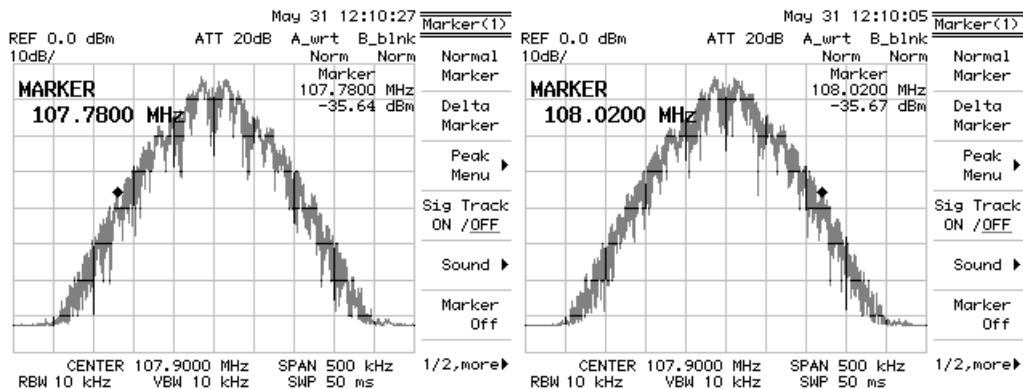


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

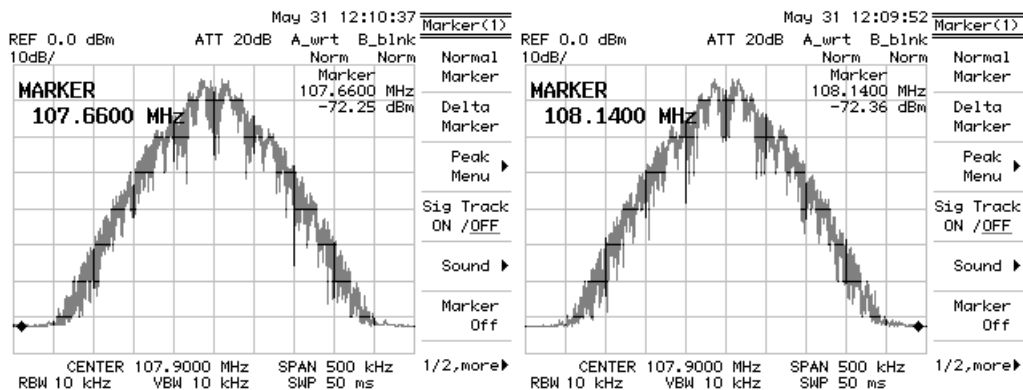


Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63\text{dBc}$ => **Pass**

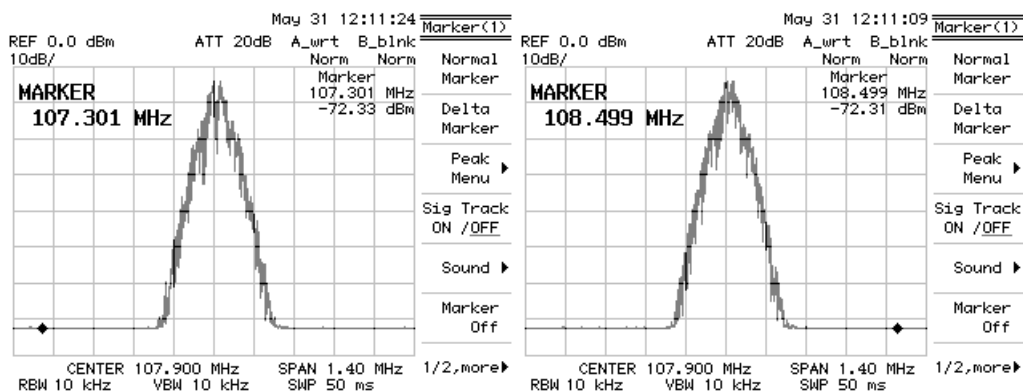
C.a.5. Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**



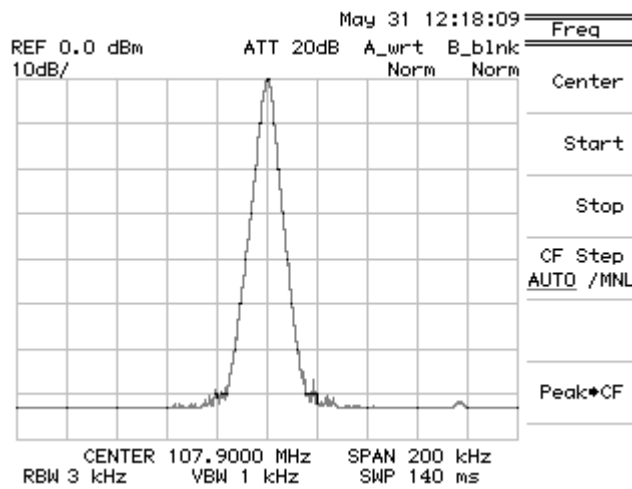
Markers at 240KHz from the carrier. Below 35dBc => **Pass**



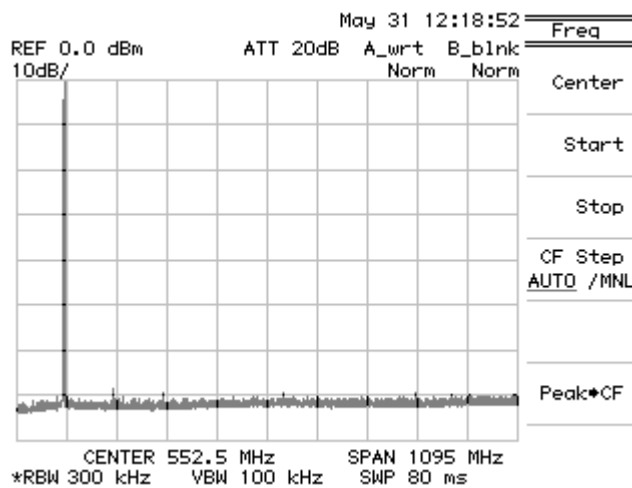
Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63\text{dBc}$ => **Pass**

C.b. Nominal power (105W = 105% power) 107.9MHz

C.b.1. Carrier whitout modulation (reference)

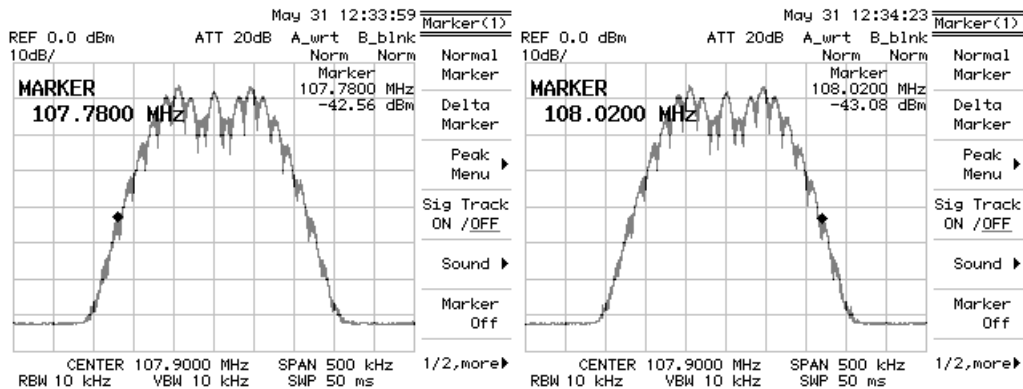


C.b.2. Out of 600KHz from carrier.

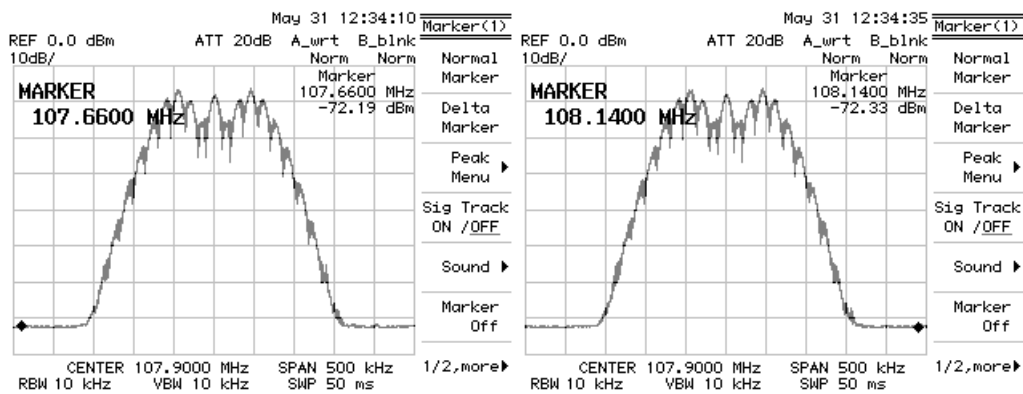


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=63.21\text{dBc}$ => **Pass**

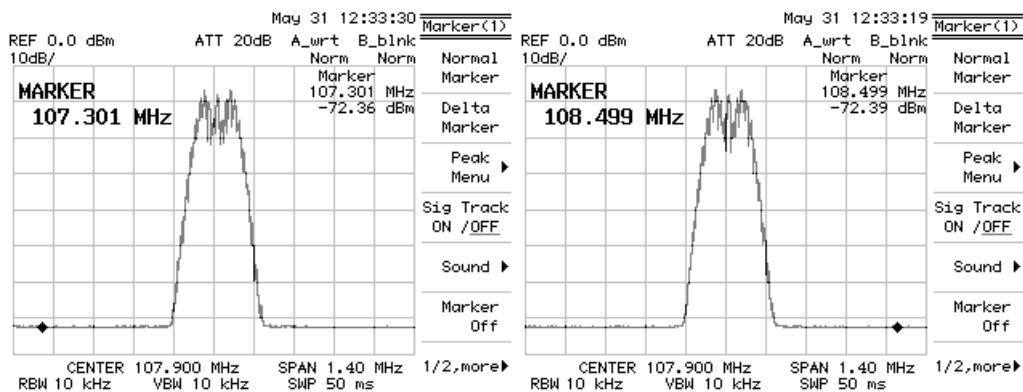
C.b.3. Mono (15KHz, 85% modulation=63.75KHz)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

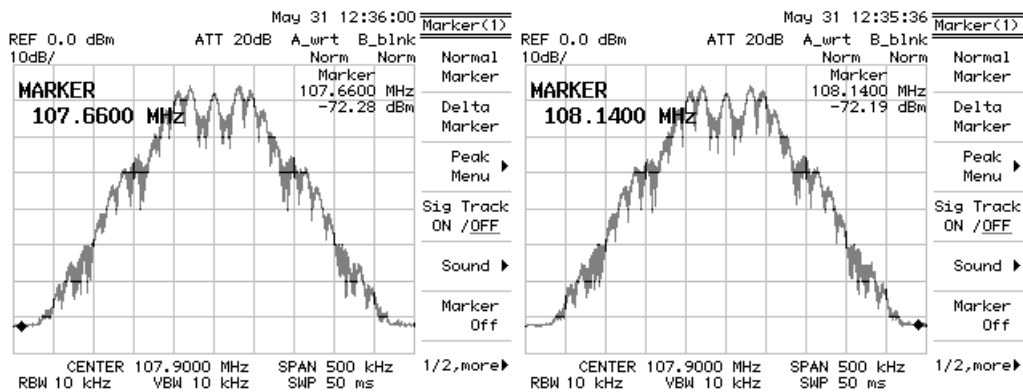


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

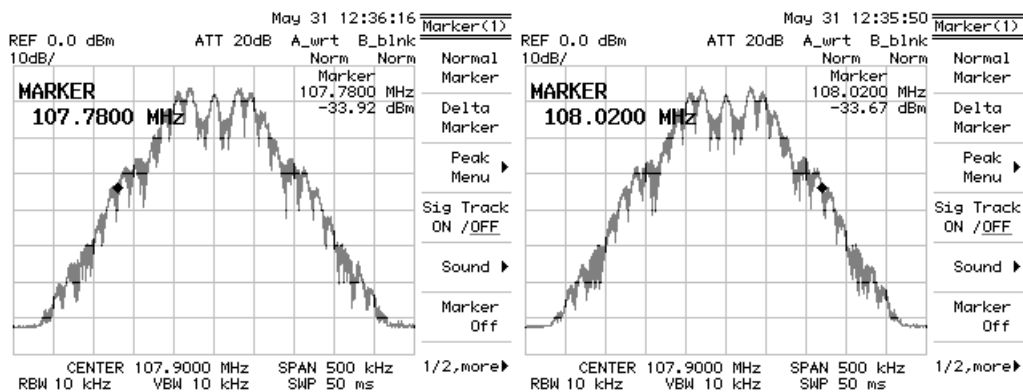


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=63.21\text{dBc}$ => **Pass**

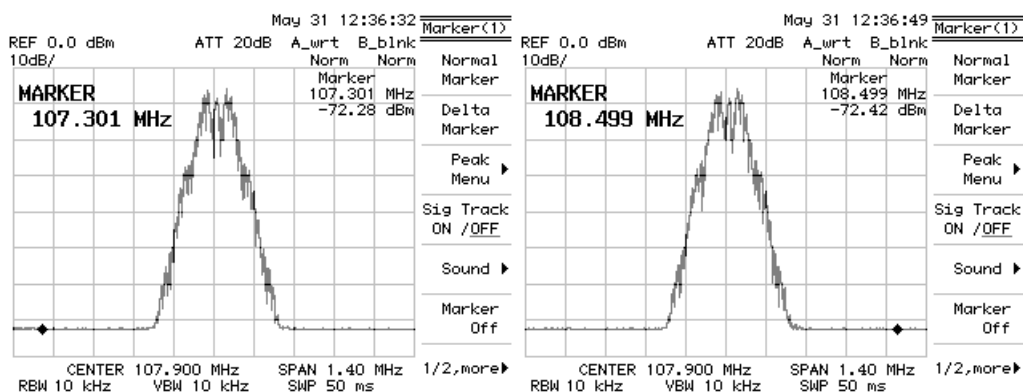
C.b.4. Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

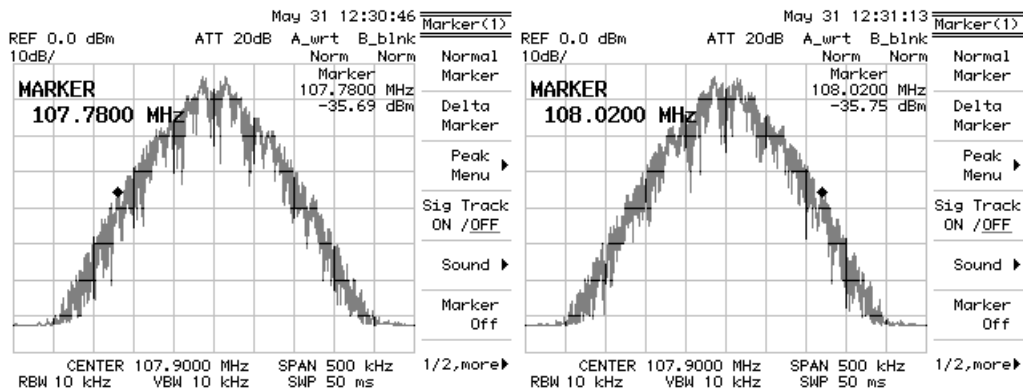


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

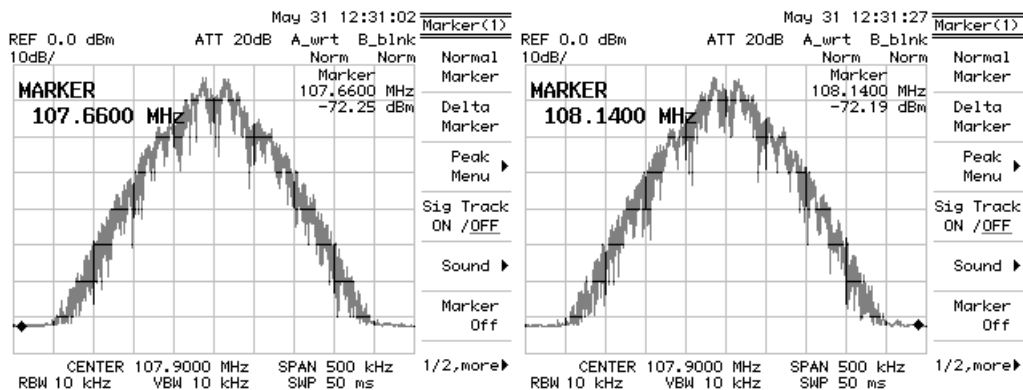


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=63.21\text{dBc}$ => **Pass**

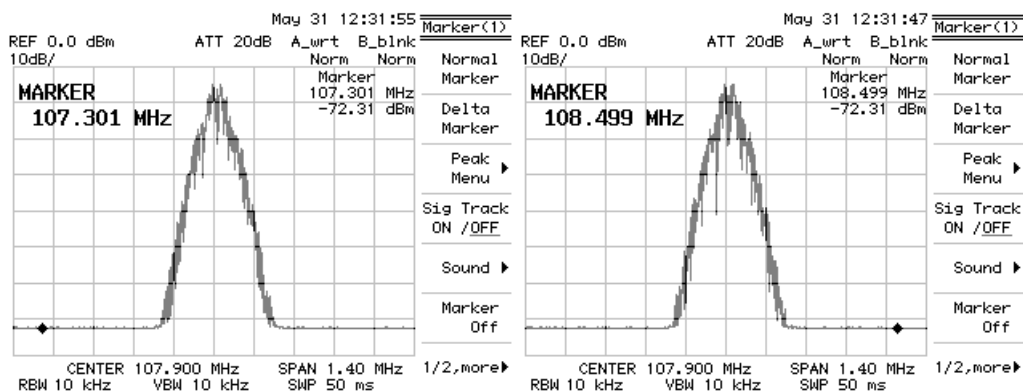
C.b.5. Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**



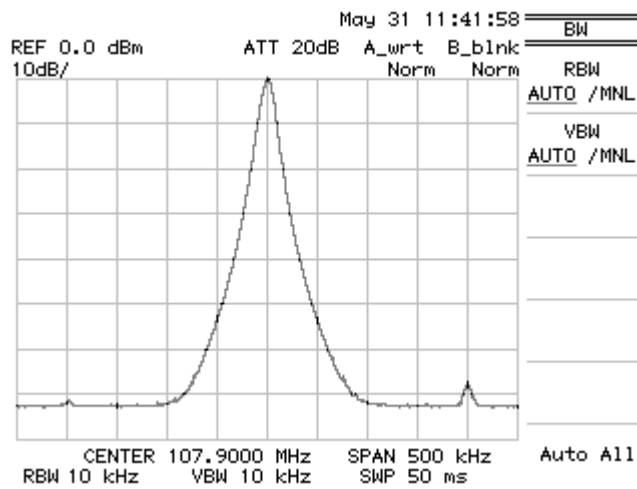
Markers at 240KHz from the carrier. Below 35dBc => **Pass**



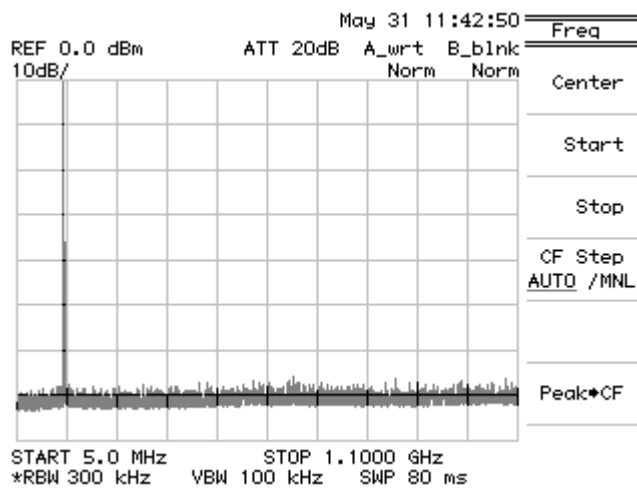
Markers at 600KHz from the carrier. Below $(43 + 10\log(P))=63.21\text{dBc}$ => **Pass**

C.c. Nominal power (25W = 25% power) 107.9MHz

C.c.1. Carrier whitout modulation (reference)

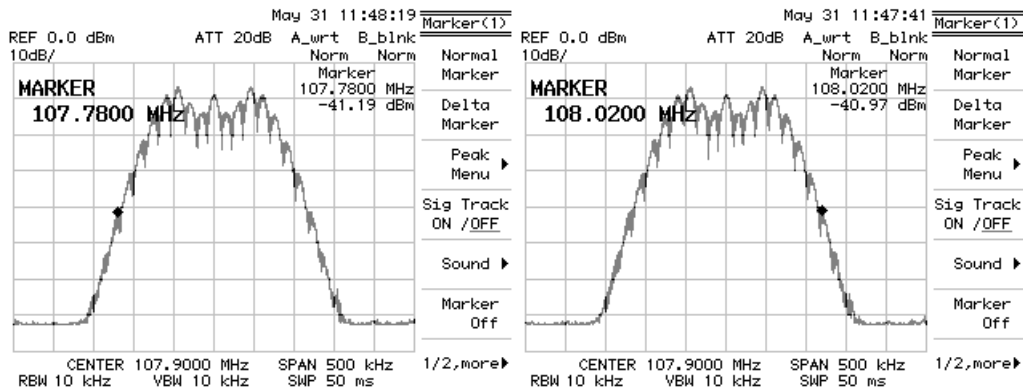


C.c.2. Out of 600KHz from carrier.

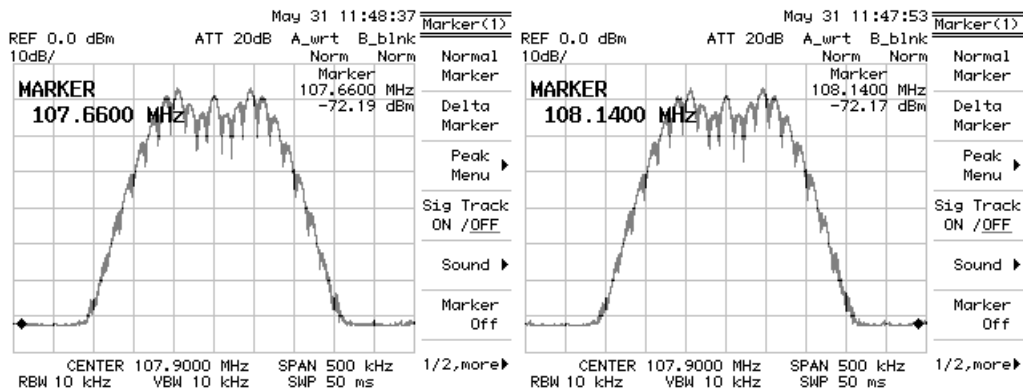


More than 600KHz away from the carrier. Below $(43 + 10\log(P))=56.98\text{dBc}$ => **Pass**

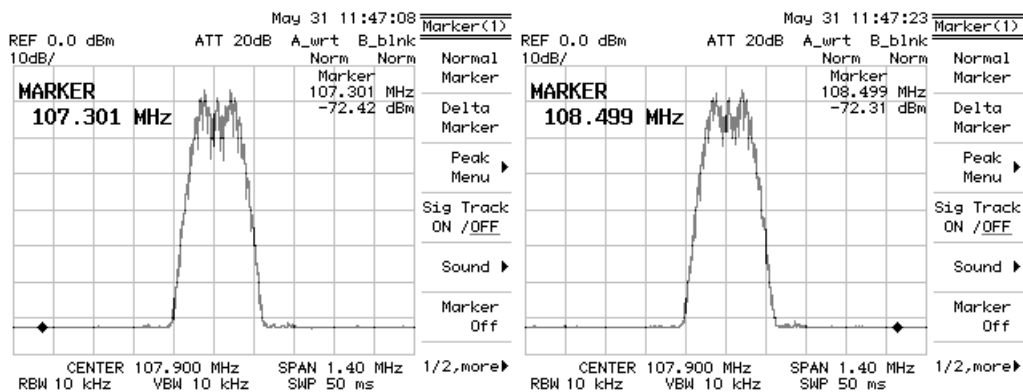
C.c.3. Mono (15KHz, 85% modulation=63.75KHz)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

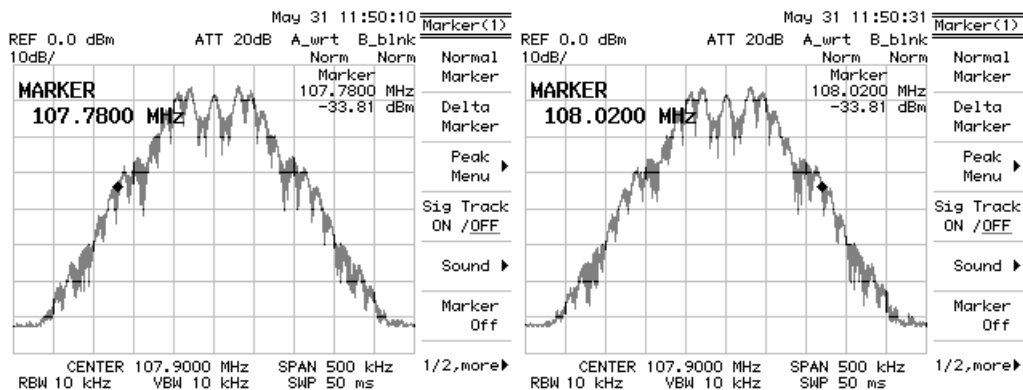


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

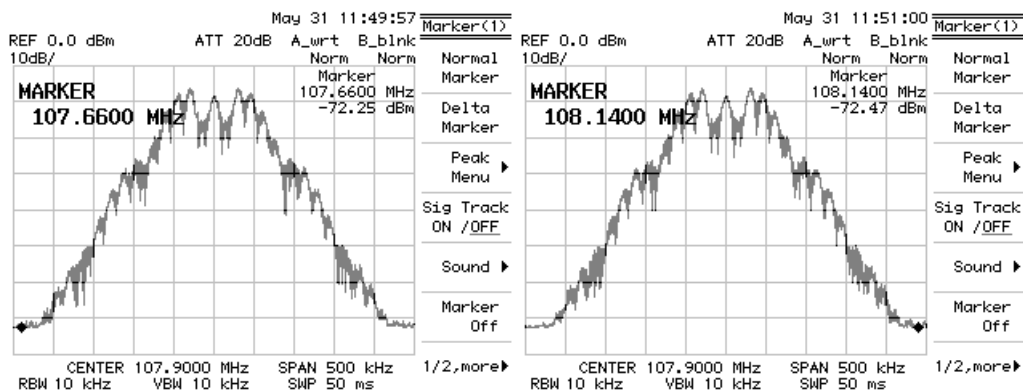


More than 600KHz away from the carrier. Below $(43 + 10\log(P)) = 56.98\text{dBc}$ => **Pass**

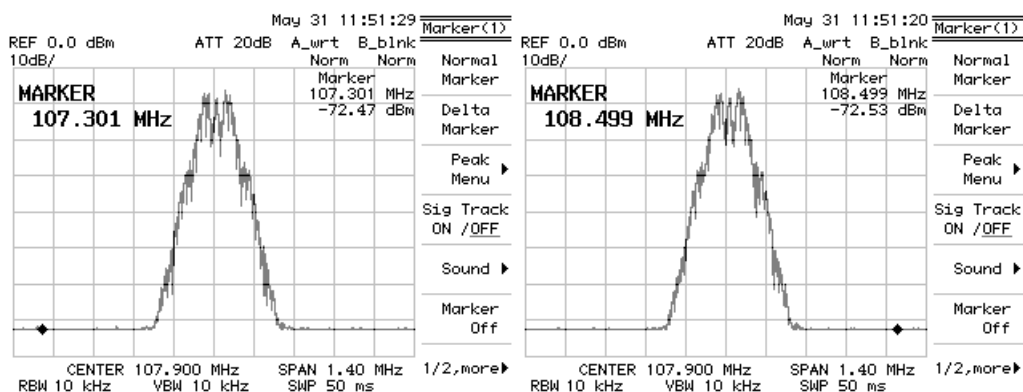
C.c.4. Mono + Subcarrier (15KHz 70% modulation =52.5KHz + 67KHz 15% modulation =11.25KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**

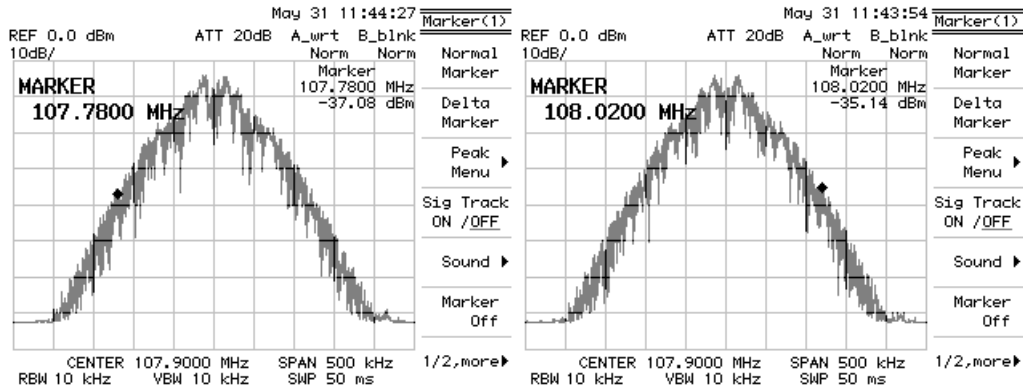


Markers at 240KHz from the carrier. Below 35dBc => **Pass**

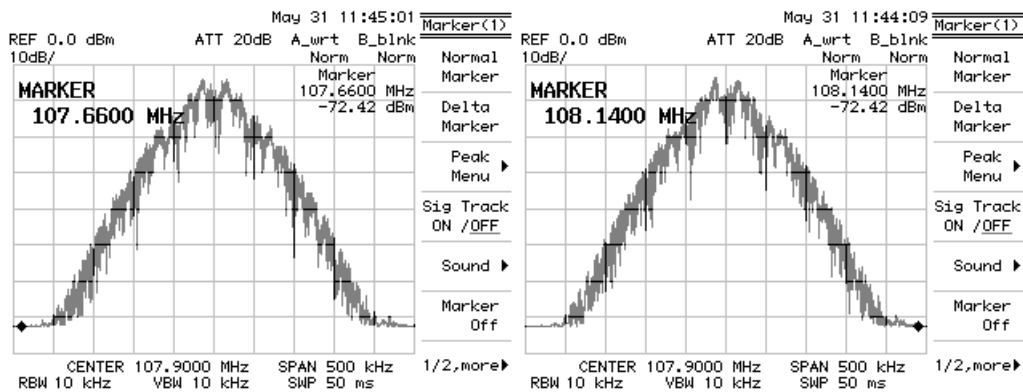


More than 600KHz away from the carrier. Below $(43 + 10\log(P)) = 56.98\text{dBc}$ => **Pass**

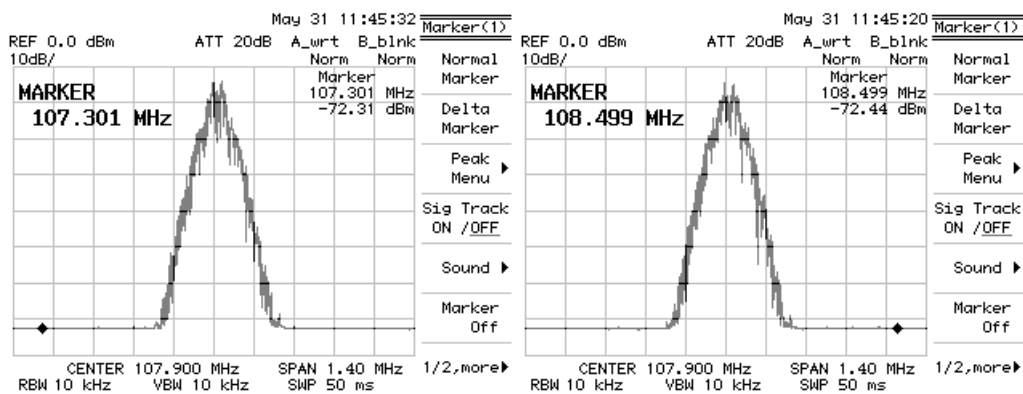
C.c.5. Stereo (15KHz main subchannel at 38% modulation=28.5KHz + 15KHz stereo subchannel at 38% modulation=28.5KHz + Pilot tone 19KHz at 9% modulation=6.75KHz. Total modulation=85%)



Markers at 120KHz from the carrier. Below 25dBc => **Pass**



Markers at 240KHz from the carrier. Below 35dBc => **Pass**



More than 600KHz away from the carrier. Below $(43 + 10\log(P))=56.98\text{dBc}$ => **Pass**

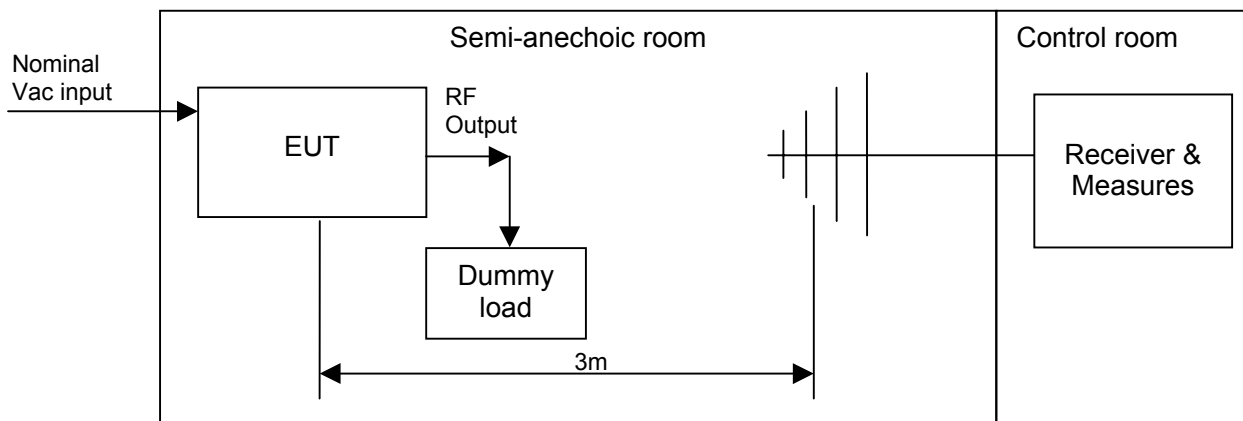
- CABINET RADIATION

Particular Conditions:

- Without modulation input.
- Temperature 17°C
- Measures done at 100% of nominal power.
- Measurements done at 98MHz
- Nominal AC voltage input
- Acceptable limits: -60dBc
- This test has been done in an external laboratory (Ministerio de industria, turismo y comercio de España; Dirección general de telecomunicaciones y tecnologías de la información; Radiofrequency Laboratory) in the following conditions and with the following instruments:

Equipment	Manufacturer	Model	Serial Number
Receiver	Rodhe&Schwarz	ESIB 26	834000/003
Measurement Software	Rodhe&Schwarz	ES-K1	2526
Biconic Antenna (20-200MHz)	EMCO	3104	3210
Log-periodic Antenna (200-1000 MHz)	ETS	3148	35962
Mast position Controller	EMCO	3146	8905-1356
Table position Controller	EMCO	1051	1097
Semi-anechoic Room	IRSA	CSA 3m	-
Control Room	IRSA	-	-
Cable	Shuner	RG214	CA1
Cable	Shuner	RG214	CA2
Cable	Shuner	RG214	SC1
Cable	Shuner	SF106	SC4
Cable	Shuner	SF106	A1
Cable	Shuner	RG214	B1
Cable	Shuner	SF104	CA9
Cable	Shuner	MF141	CA8
Cable	Shuner	MF141	CA10

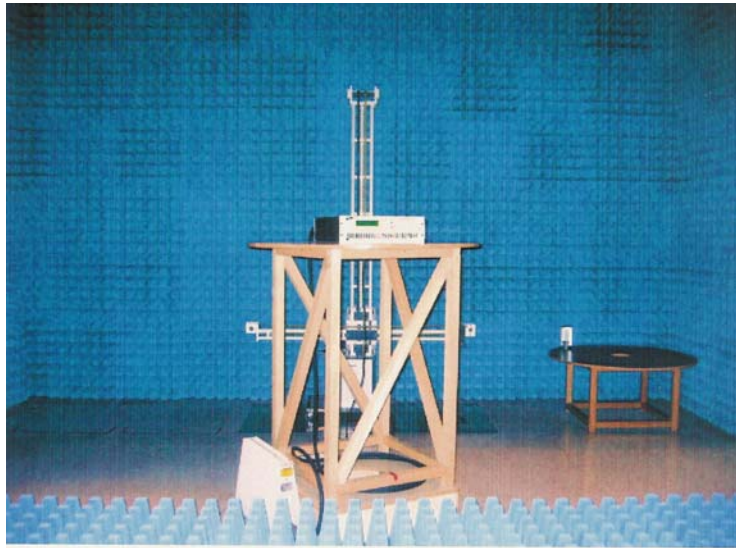
Configuration:



Procedure:

- 1) The transmitter is energized at nominal output power over a dummy load.
- 2) For every harmonic or spurious signal the receiving antenna is adjusted to have maximum signal rotating the antenna horizontally and adjusting polarization.
- 3) Repeat at the main 4 directions every 90° of the equipment under test.
- 4) Measure until the 10th harmonic.

Results:



Results:

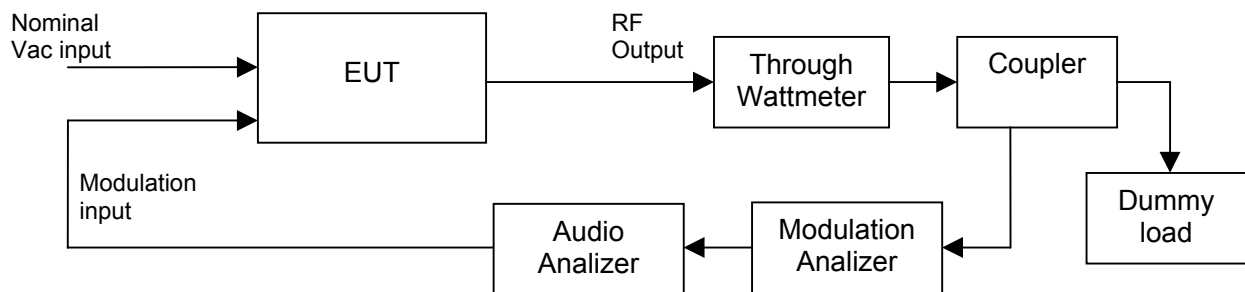
For 100W of RF power the corresponding level at -60dB is of -10dBm. Every signal appearing is below this limit, therefore the result is: **Pass**

- PREEMPHASIS (75μs)

Particular Conditions:

- With modulation input.
- Temperature 25°C
- Measures done at 100% of nominal power.
- Measurements done at 98MHz
- Nominal AC voltage input
- Acceptable limits: As in figure 2 of 73.333 of the 47 CFR Ch1

Configuration:



Procedure:

1. With mono modulation input, adjust the level of the audio input signal (400Hz tone) to modulate 75KHz (100%), this level value is taken as reference (0dB)
2. The frequency of the input signal is varied from 30Hz to 15KHz adjusting the level of the audio signal to keep 75KHz deviation. These levels are tabulated and verified with the limits of Figure 2 CFR Title 47 Ch73.373
3. The attenuation of the audio input signal is normalized to the reference level of 400Hz 75KHz deviation.
4. The result is compared to the figure 2 of 73.333 of the 47 CFR Ch1

Results:

Frequency (Hz)	Attenuation (dBm) Normalized	Pass / Not Pass
30	-0,15	Pass
100	-0,1	Pass
200	-0,1	Pass
300	-0,05	Pass
400	0	Pass
600	0,18	Pass
1000	0,72	Pass
1500	1,62	Pass
2000	2,65	Pass
3000	4,65	Pass
4000	6,45	Pass
5000	8,1	Pass
6000	9,46	Pass
7000	10,7	Pass

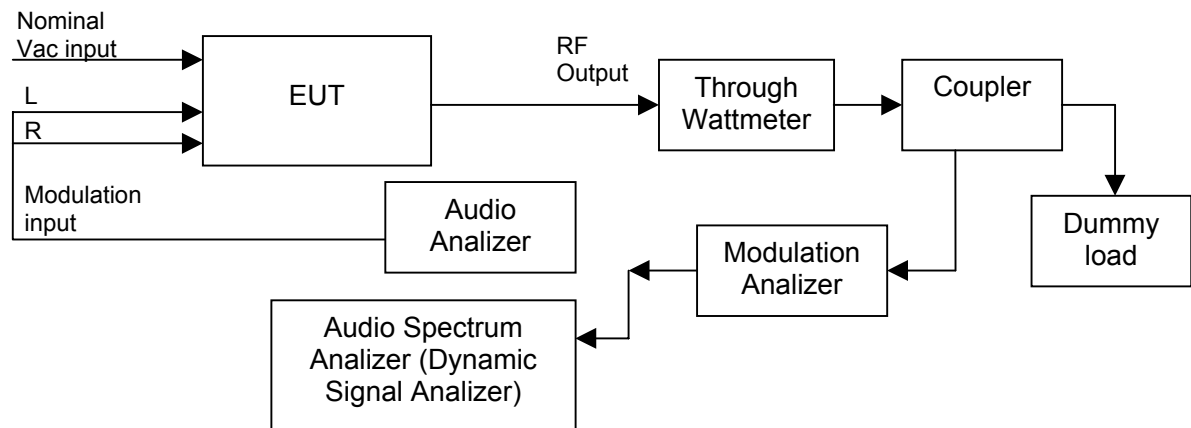
10000	13,55	Pass
12000	15,07	Pass
15000	16,94	Pass

- STEREO TRANSMISSION COMPLIANCE

Particular Conditions:

- With modulation input.
- Temperature 25°C
- Measures done at 100% of nominal power.
- Measurements done at 98MHz
- Nominal AC voltage input

Configuration:



Results:

- | | | |
|---|-----------------------------|-------------|
| a) Pilot Subcarrier Frequency =19.0KHz | Limits 19KHz $\pm$ 2KHz | Pass |
| b) Stereo Subcarrier Frequency=38.0KHz | Limits 38KHz $\pm$ 4KHz | Pass |
| c) Pilot Subcarrier Amplitude (Deviation)=7.4KHz | Limits 6KHz – 7,5KHz(8-10%) | Pass |
| d) Stereo Subcarrier Amplitude (Deviation)=0.180KHz | Limit 0.75KHz (1%) | Pass |
| e) Stereo coding | | |

Procedure for stereo coding:

1. Apply input to the Left channel, 1KHz tone modulating 100%
2. With a pilot subcarrier of 10% =7,5KHz measure the levels of the signals in the Audio Spectrum Analyzer (Dynamic Signal Analyzer)
3. The tone in the subband between 50Hz & 15KHz must be 6dB upper than both tones appearing in the subband between 23KHz and 53KHz. These last two tones must be of the same level.
4. Change the input from Left to Right

Between 50Hz & 15KHz of the baseband	Limit 45% modulation	Pass
--------------------------------------	----------------------	-------------

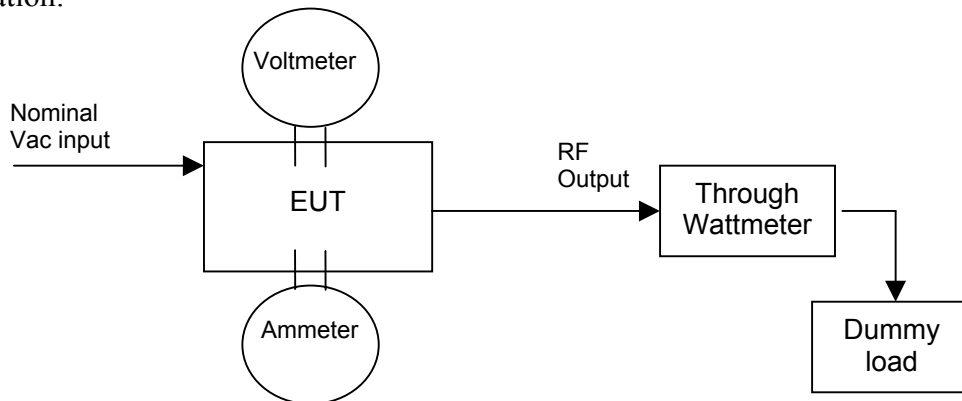
Between 23KHz and 53KHz of the baseband	Limit 45% modulation	Pass
---	----------------------	-------------

- VOLTAGE AND CURRENT OF FINAL AMPLIFIERS

Particular Conditions:

- Without modulation input.
- Temperature 25°C
- Measures done at 100% and 25% of nominal power.
- Measurements done at 98MHz
- Nominal AC voltage input

Configuration:



Results:

- | | |
|----------------------------|--|
| a) Nominal Power 100% 100W | Power Amplifier Current=4,15A; Voltage=32V |
| b) Power 25% 25W | Power Amplifier Current=1,85A; Voltage=32V |

- SUBCARRIER TECHNICAL REQUIREMENTS

This test is not applicable because the equipment under test has not internal Subcarrier generator.

- CONCLUSION:

All the test done over this equipment have been passed.

TEST	RESULT
Power Output	Pass
Frequency stability	Pass
Conducted radiation	Pass
Cabinet radiation	Pass
Preemphasis	Pass
Stereo transmission	Pass
Voltage & Current	Pass

Responsible of the execution of the test:

OMB Engineering Department.
José Luis Rueda.

June 16 2006