

## Anhang E: Intermodulationsmessungen

### 1 "B1 Interference" (3<sup>rd</sup> order intermodulation) to VOR reception

Wanted: **VOR**  
 Frequency: 108,2 MHz  
 Level: **-79 dBm** at Rx

Unwanted F1: (variable)  
 Level: 2 dBm

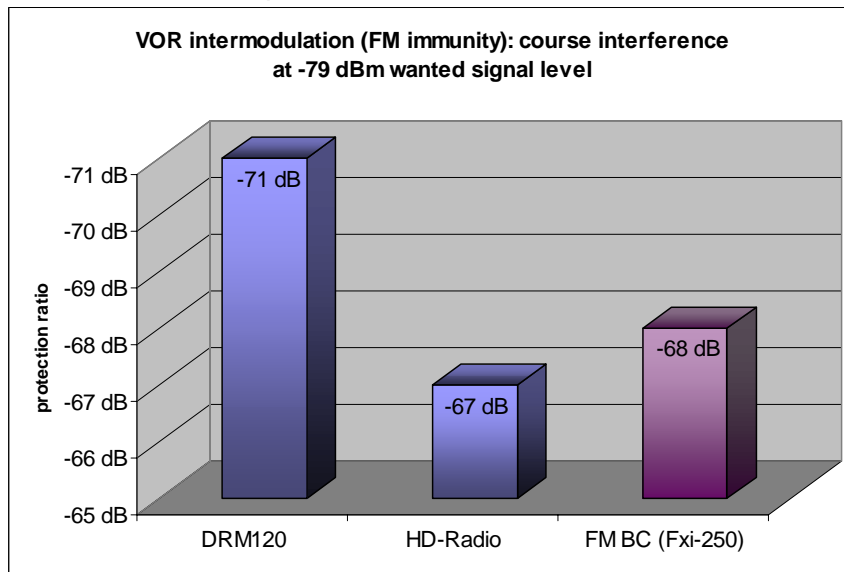
Unwanted F2: NON  
 Level: 2 dBm

Unwanted F3: NON  
 Level: 2 dBm

Total level unwanted: 7 dBm at 0 dB atten.

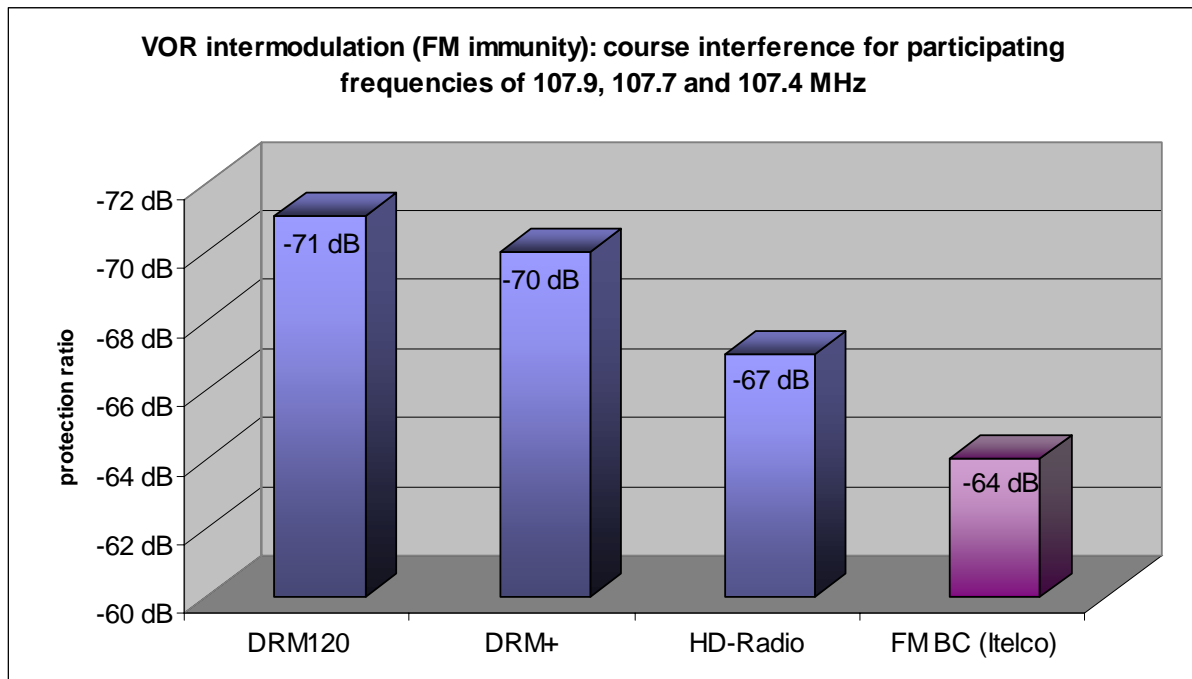
Unwanted	F1	F2	F3	Course Interference		Flag Interference	
				Level	Prot. Ratio	Level	Prot. Ratio
DRM120	107,9 MHz	107,7 MHz	107,4 MHz	-8 dBm	-71 dB	-4 dBm	-75 dB
DRM120	106,5 MHz	105,3 MHz	103,6 MHz	4 dBm	-83 dB	> 7 dBm	< -86 dB
DRM+	107,9 MHz	107,7 MHz	107,4 MHz	-9 dBm	-70 dB	-4 dBm	-75 dB
DRM+	106,5 MHz	105,3 MHz	103,6 MHz	not m.	not m.	not m.	not m.
HD-Radio	107,9 MHz	107,7 MHz	107,4 MHz	-12 dBm	-67 dB	-5 dBm	-74 dB
HD-Radio	106,5 MHz	105,3 MHz	103,6 MHz	-2 dBm	-77 dB	> 7 dBm	< -86 dB
FM Broadcast (Fxi-250)	107,9 MHz	107,7 MHz	107,4 MHz	-11 dBm	-68 dB	-5 dBm	-74 dB
FM Broadcast (Fxi-250)	106,5 MHz	105,3 MHz	103,6 MHz	-2 dBm	-77 dB	> 7 dBm	< -86 dB

Remarks: The FM broadcast signal on the Fxi-250 transmitter was modulated according to ITU-R BS.641 and operated in Mono mode.



Unwanted	F1 Frequency	F1 Offset	Course Interference		Flag Interference	
			Level	Prot. Ratio	Level	Prot. Ratio
DRM120	107,900 MHz	0 kHz	-8 dBm	-71 dB	-4 dBm	-75 dB
DRM120	107,870 MHz	30 kHz	not measured		not measured	
DRM120	107,850 MHz	50 kHz	not measured		not measured	
HD-Radio	107,900 MHz	0 kHz	-12 dBm	-67 dB	-5 dBm	-74 dB
HD-Radio	107,870 MHz	30 kHz	not measured		not measured	
HD-Radio	107,850 MHz	50 kHz	not measured		not measured	
FM BC (Itelco)	107,900 MHz	0 kHz	-15 dBm	-64 dB	-6 dBm	-73 dB
FM BC (Itelco)	107,875 MHz	25 kHz	-9 dBm	-70 dB	-2 dBm	-77 dB
FM BC (Itelco)	107,850 MHz	50 kHz	-6 dBm	-73 dB	2 dBm	-81 dB
FM BC (Itelco)	107,825 MHz	75 kHz	-6 dBm	-73 dB	1 dBm	-80 dB
FM BC (Fxi-250)	107,900 MHz	0 kHz	-11 dBm	-68 dB	-5 dBm	-74 dB
FMEExtra	107,900 MHz	0 kHz	-15 dBm	-64 dB	-5 dBm	-74 dB
FMEExtra	107,875 MHz	25 kHz	-9 dBm	-70 dB	-2 dBm	-77 dB
FMEExtra	107,850 MHz	50 kHz	-6 dBm	-73 dB	2 dBm	-81 dB
FMEExtra	107,825 MHz	75 kHz	-7 dBm	-72 dB	1 dBm	-80 dB
DRM+	107,900 MHz	0 kHz	-9 dBm	-70 dB	-4 dBm	-75 dB
DRM+	107,870 MHz	30 kHz	-9 dBm	-70 dB	-4 dBm	-75 dB
DRM+	107,850 MHz	50 kHz	-7 dBm	-72 dB	-3 dBm	-76 dB
DRM+	107,825 MHz	75 kHz	-1 dBm	-78 dB	5 dBm	-84 dB
DRM+	107,800 MHz	100 kHz	<b>-6 dBm</b>	<b>-73 dB</b>	<b>2 dBm</b>	<b>-81 dB</b>

Remarks: The FM broadcast signal on the Fxi-250 transmitter was modulated according to ITU-R BS.641 and operated in Mono mode, the signal on the Itelco transmitter was modulated according to ITU-R IS.1140 and operated in stereo mode.



**Wanted:** **VOR**  
 Frequency: 108,2 MHz  
 Level: **-63 dBm** at Rx

**Unwanted F1:** (variable)  
 Level: 2 dBm

**Unwanted F2:** NON  
 Level: 2 dBm

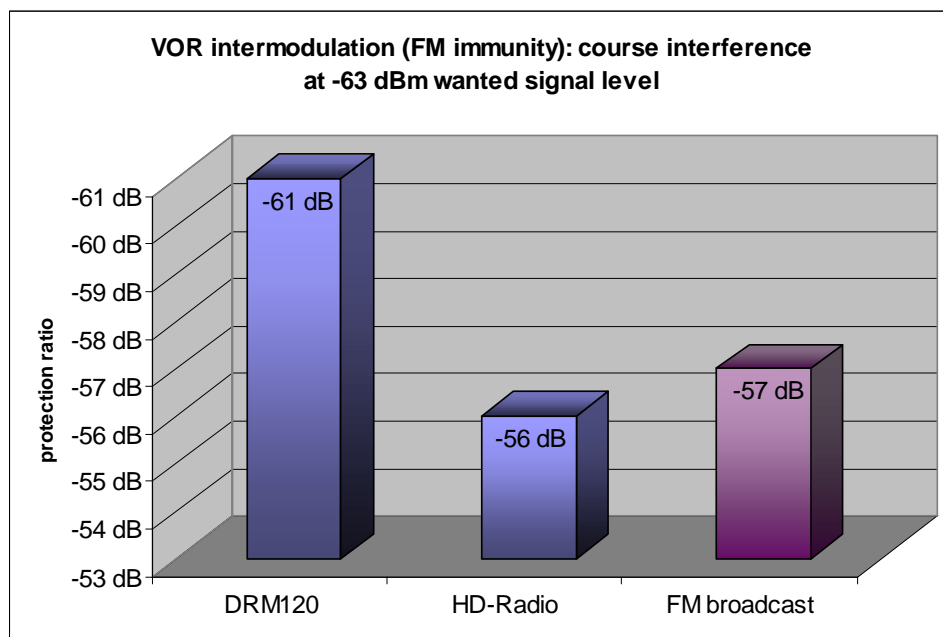
**Unwanted F3:** NON  
 Level: 2 dBm

Total level unwanted: 7 dBm at 0 dB atten.

Unwanted	F1	F2	F3	Course interference		Flag interference	
				Level	Prot. Ratio	Level	Prot. Ratio
DRM120	107,9 MHz	107,7 MHz	107,4 MHz	-2 dBm	-61 dB	1 dBm	-64 dB
DRM120	106,5 MHz	105,3 MHz	103,6 MHz	> 7 dBm	< -70 dB	> 7 dBm	< -70 dB
HD-Radio	107,9 MHz	107,7 MHz	107,4 MHz	-7 dBm	-56 dB	0 dBm	-63 dB
HD-Radio	106,5 MHz	105,3 MHz	103,6 MHz	> 7 dBm	< -70 dB	> 7 dBm	< -70 dB
FM Broadcast (Fxi-250)	107,9 MHz	107,7 MHz	107,4 MHz	-6 dBm	-57 dB	0 dBm	-63 dB
FM Broadcast (Fxi-250)	106,5 MHz	105,3 MHz	103,6 MHz	> 7 dBm	< -70 dB	> 7 dBm	< -70 dB
DRM+	107,9 MHz	107,7 MHz	107,4 MHz	Not measured		Not measured	
DRM+	106,5 MHz	105,3 MHz	103,6 MHz	Not measured		Not measured	

**Additional test:**

Shifting the DRM120 frequency by 0 - 20 kHz showed no difference in protection ratio. This proves that there is no dependency on the exact frequencies of the DRM subcarriers.



## 2 “B1 Interference” (3<sup>rd</sup> order intermodulation) to ILS reception

Wanted: **ILS**  
 Frequency: 108,1 MHz  
 Level: **-86 dBm** at Rx

Unwanted F1: (variable)  
 Level: 2 dBm

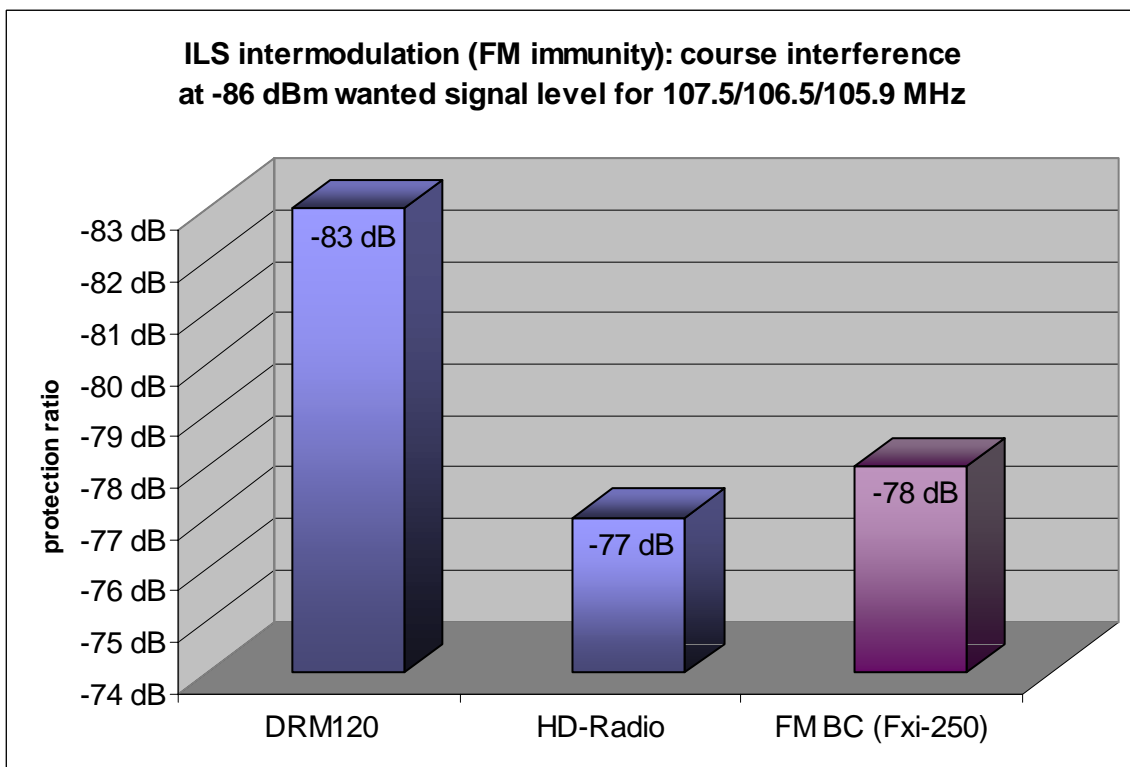
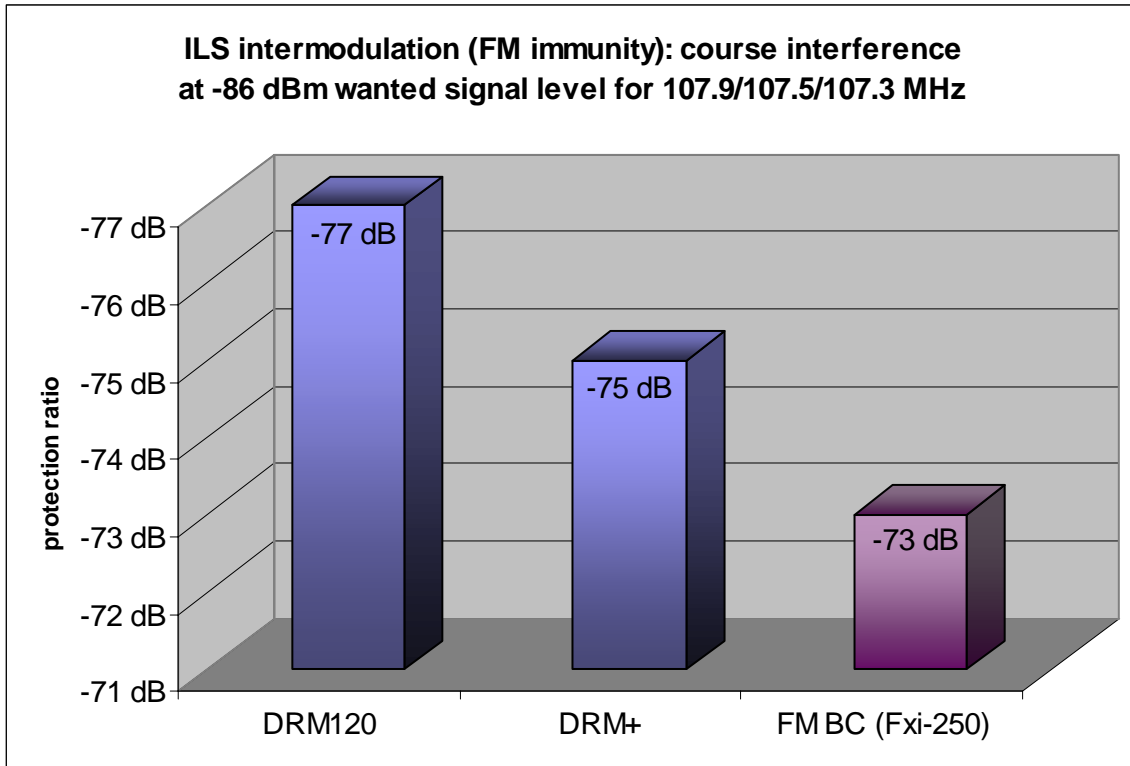
Unwanted F2: N0N  
 Level: 2 dBm

Unwanted F3: N0N  
 Level: 2 dBm

Total level unwanted: 7 dBm at 0 dB atten.

Unwanted	F1	F2	F3	Course Interference		Flag Interference	
				Level	Prot. Ratio	Level	Prot. Ratio
DRM120	107,9 MHz	107,5 MHz	107,3 MHz	-9 dBm	-77 dB	-4 dBm	-82 dB
DRM120	107,5 MHz	106,5 MHz	105,9 MHz	-3 dBm	-83 dB	1 dBm	-87 dB
DRM120	106,5 MHz	104,5 MHz	102,9 MHz	3 dBm	-89 dB	7 dBm	-93 dB
HD-Radio	107,9 MHz	107,5 MHz	107,3 MHz	not meas.	not meas.	not meas.	not meas.
HD-Radio	107,5 MHz	106,5 MHz	105,9 MHz	-9 dBm	-77 dB	0 dBm	-86 dB
HD-Radio	106,5 MHz	104,5 MHz	102,9 MHz	-3 dBm	-83 dB	5 dBm	-91 dB
FM broadc. (Fxi-250)	107,9 MHz	107,5 MHz	107,3 MHz	-13 dBm	-73 dB	-4 dBm	-82 dB
FM broadc. (Fxi-250)	107,5 MHz	106,5 MHz	105,9 MHz	-8 dBm	-78 dB	0 dBm	-86 dB
FM broadc. (Fxi-250)	106,5 MHz	104,5 MHz	102,9 MHz	-3 dBm	-83 dB	5 dBm	-91 dB
DRM+	107,9 MHz	107,5 MHz	107,3 MHz	-11 dBm	-75 dB	-5 dBm	-81 dB
DRM+	107,5 MHz	106,5 MHz	105,9 MHz	Not measured		Not measured	
DRM+	106,5 MHz	104,5 MHz	102,9 MHz	Not measured		Not measured	

Remarks: The FM broadcast signal on the Fxi-250 transmitter was modulated according to ITU-R BS.641 and operated in Mono mode.



Wanted: **ILS**  
 Frequency: 108,1 MHz  
 Level: **-70 dBm** at Rx

Unwanted F1: (variable)  
 Level: 2 dBm

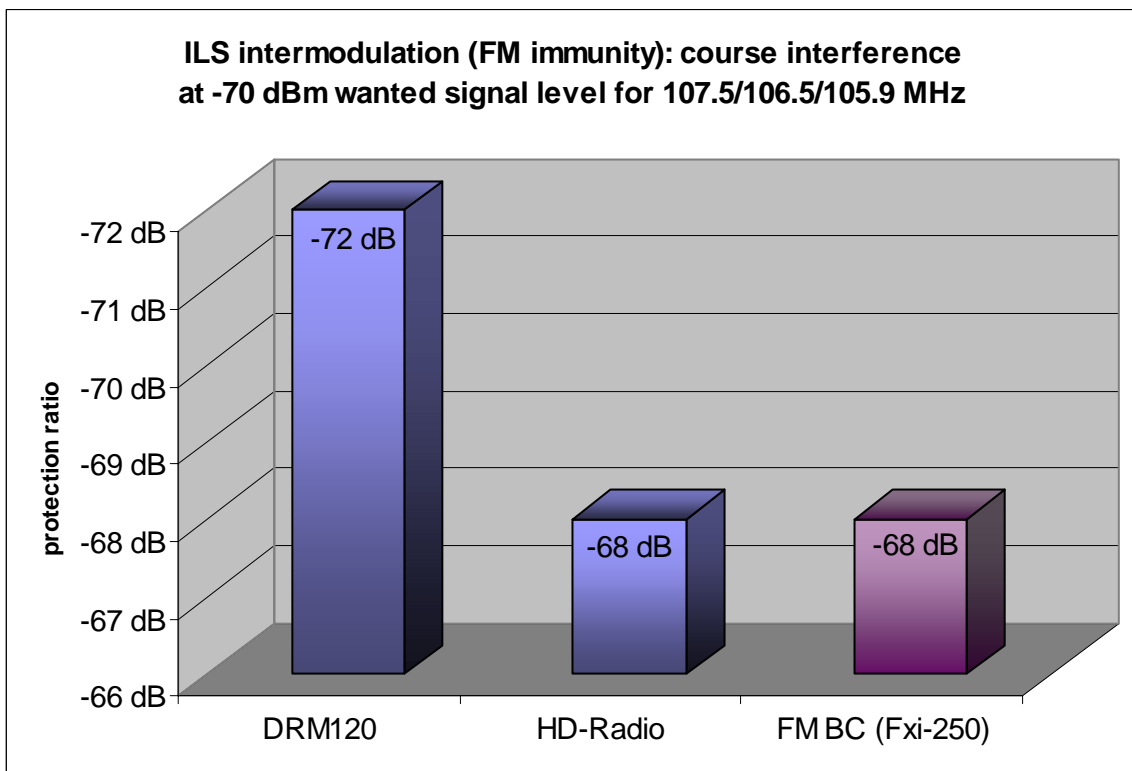
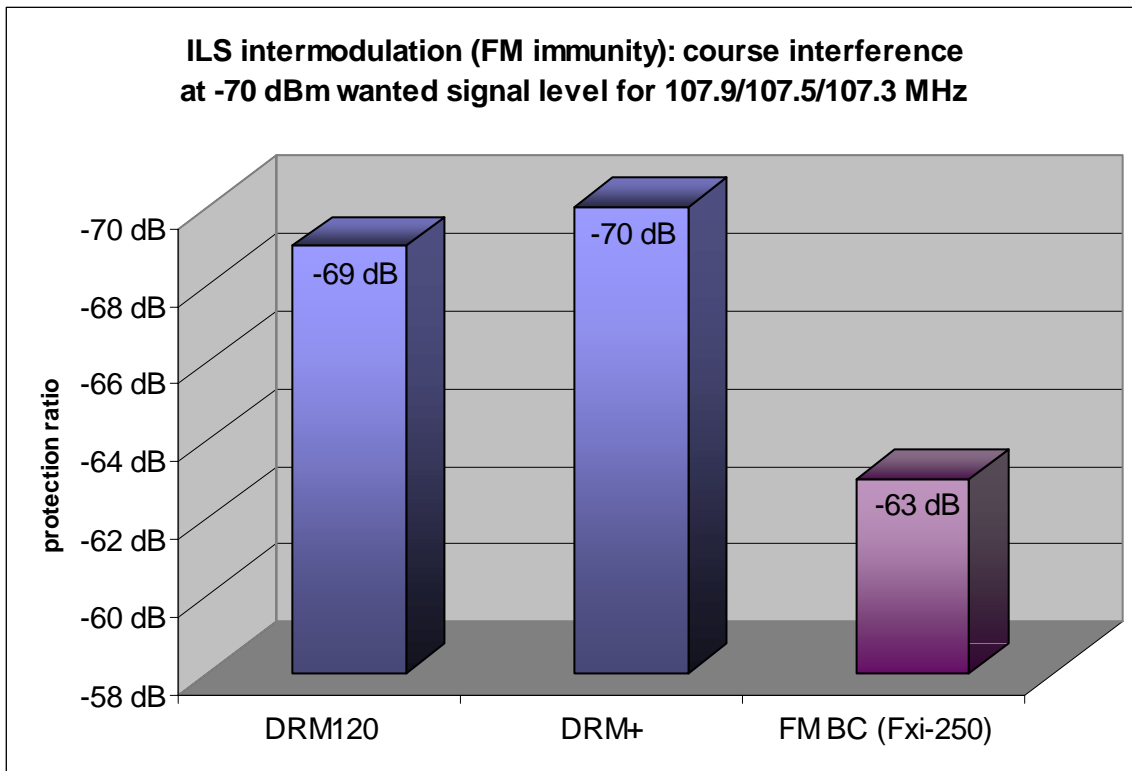
Unwanted F2: NON  
 Level: 2 dBm

Unwanted F3: NON  
 Level: 2 dBm

Total level unwanted: 7 dBm at 0 dB atten.

Unwanted	F1	F2	F3	Course interference		Flag interference	
				Level	Prot. Ratio	Level	Prot. Ratio
DRM120	107,9 MHz	107,5 MHz	107,3 MHz	-1 dBm	-69 dB	2 dBm	-72 dB
DRM120	107,5 MHz	106,5 MHz	105,9 MHz	2 dBm	-72 dB	6 dBm	-76 dB
DRM120	106,5 MHz	104,5 MHz	102,9 MHz	> 7 dBm	< -77 dB	> 7 dBm	< -77 dB
HD-Radio	107,9 MHz	107,5 MHz	107,3 MHz	not meas.	not meas.	not meas.	not meas.
HD-Radio	107,5 MHz	106,5 MHz	105,9 MHz	-2 dBm	-68 dB	5 dBm	-75 dB
HD-Radio	106,5 MHz	104,5 MHz	102,9 MHz	4 dBm	-74 dB	> 7 dBm	< -77 dB
FM broadc. (Fxi-250)	107,9 MHz	107,5 MHz	107,3 MHz	-7 dBm	-63 dB	1 dBm	-71 dB
FM broadc. (Su155)	107,5 MHz	106,5 MHz	105,9 MHz	-2 dBm	-68 dB	5 dBm	-75 dB
FM broadc. (Fxi-250)	106,5 MHz	104,5 MHz	102,9 MHz	4 dBm	-74 dB	> 7 dBm	< -77 dB
DRM+	107,9 MHz	107,5 MHz	107,3 MHz		-70 dB		-70 dB
DRM+	107,5 MHz	106,5 MHz	105,9 MHz		-70 dB		-70 dB
DRM+	106,5 MHz	104,5 MHz	102,9 MHz		-70 dB		-70 dB

Remarks: The FM broadcast signal on the Fxi-250 transmitter was modulated according to ITU-R BS.641 and operated in Mono mode.



Unwanted	F1 Frequency	F1 Offset	Course Interference		Flag Interference	
			Level	Prot. Ratio	Level	Prot. Ratio
DRM120	107,900 MHz	0 kHz	-9 dBm	-77 dB	-4 dBm	-82 dB
DRM120	107,870 MHz	30 kHz	not measured		not measured	
DRM120	107,850 MHz	50 kHz	not measured		not measured	
HD-Radio	107,900 MHz	0 kHz	not measured		not measured	
HD-Radio	107,870 MHz	30 kHz	not measured		not measured	
HD-Radio	107,850 MHz	50 kHz	not measured		not measured	
FM BC (Itelco)	107,900 MHz	0 kHz	-15 dBm	-71 dB	-7 dBm	-79 dB
FM BC (Itelco)	107,875 MHz	25 kHz	-9 dBm	-77 dB	-3 dBm	-83 dB
FM BC (Itelco)	107,850 MHz	50 kHz	-7 dBm	-79 dB	-1 dBm	-85 dB
FM BC (Itelco)	107,825 MHz	75 kHz	-10 dBm	-76 dB	-3 dBm	-83 dB
DRM+	107,900 MHz	0 kHz	-11 dBm	-75 dB	-5 dBm	-81 dB
DRM+	107,870 MHz	30 kHz	-10 dBm	-76 dB	-4 dBm	-82 dB
DRM+	107,850 MHz	50 kHz	-7 dBm	-79 dB	-3 dBm	-83 dB
DRM+	107,825 MHz	75 kHz	-6 dBm	-80 dB	2 dBm	-88 dB
DRM+	107,800 MHz	100 kHz	<i>-7 dBm</i>	<i>-79 dB</i>	<i>-1 dBm</i>	<i>-85 dB</i>

Remarks: The FM broadcast signal on the Itelco transmitter was modulated according to ITU-R IS.1140 and operated in stereo mode.

