NAVIGATOR MODULATION ANALYZER

TEST AND MEASUREMENT EQUIPMENT

TECHNICAL SPECIFICATIONS

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CONTENT

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1. MEASUREMENT SPECIFICATIONS ON THE RF INPUT

Optimal specifications are guaranteed for a ambient temperature range from +20°C to +30°C (68°F to 86°F), with a warm-up time of: 15 minutes

1.1. RF

	Min.	***Typ.***	***Max.***	***Unit***
Frequency range (Tuning: manual)	87,5		108	MHz
Input impedance (BNC connector)		50		Ω
Frequency measurement: • RF level range: -25 dBm to +10 dBm.		 ± 70	 ± 100	 Hz
Frequency resolution			1	Hz
Power measurement • -40 dBm to+10 dBm • -50 dBm to-40 dBm		 ± 0.2 ± 0.8	 ± 0.4 ± 0.5	dB
RF level for best precision on demodulated signals	-25/+10	-30/+15		dBm

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1.2. Demodulated signals

1.2.1. MPX

	Min.	Typ.	Max.	Unit
Frequency range	0.01		90	kHz
Measurable deviation			±150	kHz
Absolute deviation measurement precision (F_{af}=1kHz) • Deviation between±500 Hz and ±2 kHz • Deviation between± 2 kHz and ±80 kHz • Deviation between± 80 kHz and ±150 kHz		 ± 0.5 ± 0.2 ± 0.5	 ± 1.0 ± 0.5 ± 1.0	%

1.2.2. Pilot

	Min.	Typ.	Max.	Unit
Bandpass filter frequency		19		kHz
Rejection • 15 kHz • 23 kHz		>70		dB
Measurable deviation			± 15.0	KHz
Absolute pilot deviation measurement precision • Measurement range: 0.1 to ±15 kHz		± 0.8	± 1.0	%
Pilot frequency resolution			0.1	Hz
Pilot Frequency measurement precision • Measurement range: 1 to ±15 kHz		± 0.3	± 0.5	Hz

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1.2.3. RDS

	Min.	*Typ.*	*Max.*	*Unit*
Bandpass filter bandwidth (-3dB)	54.3		59.7	kHz
Rejection (compared to F_0) • 53 kHz • 61 kHz		 >70		dB
Ripple within the band from 55 kHz to 59 kHz		<0,3		dB
Measurable deviation			± 10.0	KHz
Absolute RDS deviation measurement precision - Sine wave • Deviation between±1 kHz and ±2 kHz • Deviation between±2 kHz and ±10 kHz		 ± 1.2 ± 0.5	 ± 1.5 ± 0.8	%
Absolute RDS deviation measurement precision - Data • Deviation between±1 kHz and ±2 kHz • Deviation between±2 kHz and ±10 kHz		 ± 0.8 ± 0.6	 ± 1.2 ± 1.0	%

1.2.4. DARC (76 kHz)

	Min.	*Typ.*	*Max.*	*Unit*
Bandpass filter bandwidth (-3dB)	62,4		89,6	kHz
Rejection (compared to F_0) • 60 kHz • 93 kHz		 >50		dB
Ripple within the band from 64 kHz to 88 kHz		<0,4		dB
Measurable deviation			± 15.0	KHz
76 kHz deviation measurement precision– Sine wave • Deviation between±1 kHz and ±2 kHz • Deviation between±2 kHz and ±15 kHz		± 2.0 ± 1.2	± 3.0 ± 1.5	%
76 kHz deviation measurement precision – Data • Deviation between±1 kHz and ±2 kHz • Deviation between±2 kHz and ±15 kHz		± 3.0 ± 1.3	± 3.5 ± 1.6	%

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1.2.5. Power measurement for the MPX channel

	Min.	***Typ.***	***Max.***	***Unit***
Frequency range	0.01		90	kHz
Max error • With sine wave signal @ 1 kHz for -10 dBr < P < 9dB • With random signal @ 1 kHz for -10 dBr < P < 9dB		±0,08 ±0,30	±0,10 ±0,50	dB

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1.3. Outputs

1.3.1. Composite MPX /AUX output

	Possible output signals
A	No signal
B	MPX base band
C	Pilot signal
D	RDS subcarrier signal
E	Sine wave 1 generator signal
F	Sine wave 2 generator signal

Connector	BNC
Type	unbalanced – chassis ground

	Min.	***Typ.***	***Max.***	***Unit***
Frequency range	0.01		90	kHz
Max error @ +12 dBvcc @ 1 kHz		±0,3	±0,5	dB
MPX signal response curve (reference 1 kHz @ ±75 kHz deviation) • 10 Hz with 53 kHz @ 12 dBvcc • 53 kHz with 90 kHz @ 12 dBvcc		 ±0,1 +0/-0,2	 ±0,15 +0/-0,3	dB
Stereo separation (Reference L=R @ ±75 kHz of deviation, without filter, without de-emphasis , RMS detection) : • F_{mod} = 1 kHz • 20 Hz < F_{mod} < 15 kHz		 >67 >52	 >65 >50	dB

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1.3.2. AES output

	Signals that can be assigned to channel 1 and 2
A	No signal
B	L channel signal without de-emphasis
C	R channel signal without de-emphasis
D	M channel signal
E	S channel signal
F	L channel signal with de-emphasis
G	R channel signal with de-emphasis
H	Sine wave 1 generator signal
I	Sine wave 2 generator signal

Connector	XLR 3 male
Type	Balanced

	Min.	*Typ.*	*Max.*	*Unit*
Frequency range	0.01		15	kHz
Max error for the output level @ +12 dBu @ 1 kHz		±0,2	±0,3	dB
Max variation between L and R channels		<±0,07	<±0,1	dB
Response curve @ +12 dBu • 10 Hz – 15 kHz		±0,10	±0,20	dB
Distortion (THD + N). Reference L=R @ ±75 kHz deviation, without filter, without de-emphasis: • within the band 10 Hz – 2 kHz • within the band 2 kHz – 15 kHz		<0,09 <0,06	<0,1 <0,07	%
Signal/Noise (reference 0 dBFS with F_{mod} = 500 Hz @ ±75 kHz deviation, de-emphasis = 50 µs / Level RF = 0 dBm) : • Mono signal, RMS, without filter • Mono signal, weighted CCIR quasi-peak • Stereo signal, RMS, without filter • Stereo signal, weighted CCIR quasi-peak		> 95 > 88 > 92 > 83	> 93 > 85 > 90 > 80	dB
Stereo separation (L/ R & R/L), Reference L=R @ ±75 kHz deviation, without filter, without de-emphasis , RMS detection • 20 Hz < F_{mod} < 15 kHz		>63	>60	dB

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1.3.3. L and R analog outputs

	Signals that can be assigned to channel 1 and 2
A	No signal
B	L channel signal without de-emphasis
C	R channel signal without de-emphasis
D	M channel signal
E	S channel signal
F	L channel signal with de-emphasis
G	R channel signal with de-emphasis
H	Sine wave 1 generator signal
I	Sine wave 2 generator signal

Connector	XLR 3 male
Type	Balanced

	Min.	***Typ.***	***Max.***	***Unit***
Frequency range	0.01		15	kHz
Max error for the output level @ +12 dBu @ 1 kHz		±0,2	±0,3	dB
Max variation between L and R channels		<±0,07	<±0,1	dB
Response curve @ +12 dBu • 10 Hz – 15 kHz		±0,10	±0,20	dB
Distortion (THD + N). Reference L=R @ ±75 kHz deviation, without filter, without de-emphasis: • within the band 10 Hz – 2 kHz • within the band 2 kHz – 15 kHz		<0,09 <0,06	<0,1 <0,07	%
Signal/Noise (reference 0 dBFS with F_{mod} = 500 Hz @ ±75 kHz deviation, de-emphasis = 50 µs / Level RF = 0 dBm) : • Mono signal, RMS, without filter • Mono signal, weighted CCIR quasi-peak • Stereo signal, RMS, without filter • Stereo signal, weighted CCIR quasi-peak		> 89 > 80 > 88 > 78	> 86 > 77 > 85 > 75	dB
Stereo separation (L/ R & R/L), Reference L=R @ ±75 kHz deviation, without filter, without de-emphasis , RMS detection • 20 Hz < F_{mod} < 15 kHz		>63	>60	dB

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1.3.4. Headphone outputs

Output signal: dependant on equipment settings:

	Channel 1	Channel 2
A	L channel signal without de-emphasis	R channel signal without de-emphasis
B	M channel signal	S channel signal
C	M channel signal	M channel signal
D	L channel signal with de-emphasis	R channel signal with de-emphasis
E	Sine wave 1 generator signal	Sine wave 1 generator signal
F	Sine wave 2 generator signal	Sine wave 2 generator signal

Connector	Jack 6.35mm (1/4”) female
Type	Unbalanced, floating ground
Output level	Adjustable by the user on the front panel

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1.4. Multiplex decoder / AF stereo signals specifications

	Min.	*Typ.*	*Max.*	*Unit*
Frequency range	0.01		15	kHz
Max error with a mono or stereo L=R or stereo L=-R signal @ 1 kHz		>50		dB
Max error with a mono or stereo L=R or stereo L=-R signal • 1 kHz @ 0 dBu • 10 Hz – 15 kHz @ 0 dBu		 ±0,05 ±0,1	 ±0,03 +0,08/ -0,05	dB
Variation between L and R channels		<±0,02	<±0,03	dB

1.5. Distortion tool

Measurement types	THD, THD+N
Harmonics displayed	F2, F3, F4, F5

	Min.	*Typ.*	*Max.*	*Unit*
Frequency range	0.01		15	kHz
Measurement range	0,01		100	%
Max signal deviation for an internal distortion rate < 0,5 %		±180		kHz
Residual THD in the equipment from 10 Hz – 15 kHz @ ±75 kHz of deviation		<0,005		%
Frequency resolution		0,1		Hz

1.6. L&R channel noise measurements

	Min.	*Typ.*	*Max.*	*Unit*
Frequency range	0.01		15	kHz
Measurement range	-80		+6	dBu
Equipment residual noise rate (reference 0 dBFS with F_{mod} = 500 Hz @ ±75 kHz of deviation, de-emphasis = 50 µs / RF level = 0 dBm) : • Mono signal, RMS, without filter • Mono signal, weighted CCIR quasi-peak • Stereo signal, RMS, without filter • Stereo signal, weighted CCIR quasi-peak		 > 95 > 88 > 92 > 83	 > 93 > 85 > 90 > 80	dB

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1.7. De-emphasis filters

Type	0 µs, 50 µs, 75 µs

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2. INTERNAL GENERATOR SPECIFICATIONS

	Min.	***Typ.***	***Max.***	***Unit***
Frequency range	0.01		90[1]	kHz
Frequency step		0.1		Hz

[1] 90k in the case of composite and AUX MPX outputs; 24kHz in the case of audio outputs

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