

# HD Radio™ | MSG-3101

## VECTOR SIGNAL GENERATOR



※ 本器は DTS 社が運用する HD Radio™ Alliance に加入したユーザーのみに販売いたします。

\* MSG-3101 is sold to only users who joined HD Radio™ Alliance which DTS, INC. apply.



## 概要 Description

MSG-3101はHD Radio™向けVector Signal Generatorです。HD Radio™の試験に必要とされるテストベクタは、本器内蔵のフラッシュメモリに保存されLANで接続されたコンピュータから書き換えが可能です。

The MSG-3101 is a Vector Signal Generator designed for tests of AM/FM radio receivers for HD Radio™ technologies. The test vectors required for testing the AM/FM radio receivers for HD Radio are written into the built-in FLASH memory; they can be rewritten by computer being connected by LAN.

## 特長 Features

1. HD Radio™のテストベクタ全てに対応可能です。
2. アプリケーションは、テストベクタの変換、テストベクタの書き換え、各種設定変更の操作ごとにウインドウが分かれており、作業が容易でスピーディーな操作が可能です。
3. テストベクタの書き換えが可能です。
4. 本器内蔵のフラッシュメモリに書き込まれたテストベクタは、容量の制限なしに送信が可能です。

1. This unit responds to all test vectors of Radio™.
2. For the application software, windows are prepared for conversion of test vector, rewrite of test vector and various setting change separately, works are easy, speedy operation is realized.
3. Rewrite of test vector is possible.
4. Test vectors written into the built-in FLASH memory of this unit can be transmitted without limitations of the capacity size.

## 基本仕様 Specification

### 1. RF

Frequency Range	周波数範囲	100kHz to 170MHz
Frequency Step	周波数分解能	100Hz
Frequency Accuracy	周波数精度	$\pm 1 \times 10^{-6}$
Output Level Range*1	出力レベル範囲*2	-20dBμV to +126dBμV (EMF) At modulation FM: -20dBμV to +126dBμV (EMF) AM (except MA3): -20dBμV to +126dBμV (EMF) AM (MA3): -20dBμV to +116dBμV (EMF)
Output Level Step	出力レベル分解能	0.1dB
Output Accuracy	出力レベル精度	$\pm 1$ dB @CW90MHz
Frequency Flatness	レベル周波数平坦度	$1\text{MHz} \leq f \pm 1\text{dB}$ , $f < 1\text{MHz} \pm 1.5\text{dB}$
Spurious Harmonics	スプリアス 高調波	< -30dB (CW)
Non Harmonic	非高調波	< -50dB (CW)
Output Impedance	出力インピーダンス	50Ω
VSWR	VSWR	Typ. < 1.2
Output Connector	出力端子	BNC
Range Out	Range Out	
Frequency Range	切替周波数 任意設定	0 to 170MHz : By setting
Output	出力	DC 5V Max. 50mA
Output terminal	出力端子	RCA Pin Jack

### 2. Orthogonal Modulation

I & Q Quantization bits	I・Q量子化数	16bit
I & Q Sampling Frequency	I・Q標準化周波数	2.97675MHz

### 3. Data

Application Sampling Frequency	対応標準化周波数	16bit
TestVector Store Capacity	保存容量	AM:46.5117kHz,FM:744.1875kHz 8GB(32GB Option)

### 4. Interface

インターフェース	USB, RS-232C, GP-IB
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### 5. General Data

Power Requirements	電源電圧	AC 90 to 240 V 50/60Hz,45VA
Dimensions	外形寸法 (突起物含まず)	Approx. 240(W) x 100(H) x 350(D) mm
Weight	重量	Approx. 4kg
Operating Temperature Range	動作温度範囲	0 to +40°C
Guarantee Temperature Range	性能保証温度範囲	10 to +35°C

\*1 Output level is based on DTS' s measurement specifications. Regarding FM test vector modulation, it is adjusted to channel power. Regarding AM test vector modulation, it is adjusted to peak value of the center spectrum.

\*2 出力レベルは DTS 社の測定仕様に基づき、FM テストベクター変調時はチャンネルパワー、AM テストベクター変調時はセンタースペクトラムのピーク値に合わせて調整してあります。

## Configuration example



## Test Vector List

The screenshot shows the Test Vector List software interface. It displays a list of test vector files with columns for File Name, Size (MB), and Mode. The files include AM and FM test vectors. A selected test vector code is highlighted, and the details for that code are shown in the right-hand pane. The details include the file name, size, and mode, as well as a comment and test description.



AM						
No.	Disc No.	Vector Name	File Size [Mbytes]	Mode	Test Description	
1	#1.e1	IB_AMr208a_e1awfb00	A601	4.42	MA1	analog source is pulsed USASI NOISE, digital source is BER test pattern,
2	#2.e1	IB_AMr208_e1awfb00	A600	2.21	MA1	clean channelstereo digital / mono analog, pulsed 125-Hz tone (active 0.37 seconds, off
3	#1.e1	IB_AMr208_e1awfb01	A602	4.42	MA3	BER test pattern, clean channel
4	#1.e1	IB_AMr208_e1awfb02	A603	11.06	MA1	BER test pattern, GCS (triple highway overpass, 15S under I70), field recording, 65 MPH vehicle speed
5	#1.e1	IB_AMr208_e1awfb03	A604	11.06	MA1	test pattern, GCS (double highway overpass, Alt 40W under I70), field recording, 35 MPH vehicle speed
6	#1.e1	IB_AMr208_e1awfb04	A605	11.06	MA3	BER test pattern, GCS (double highway overpass, 27N under I70), field recording, 35 MPH vehicle speed
7	#2.e1	IB_AMr208_e1awfb04	A606	2.21	MA1	stereo digital / mono analog, 2.5-kHz bi-level tone with calibrated analog and digital time alignment, clean channel
8	#1.e1	IB_AMr208_e1awfb05	A607	11.06	MA3	BER test pattern, GCS (highway overpass, sign, and power lines, I70E under Sandville Road), field recording, 60 MPH vehicle speed
9	#2.e1	IB_AMr208_e1awfb06	A608	2.21	MA1	stereo music, clean channel
10	#2.e1	IB_AMr208_e1awfb08	A609	2.21	MA1	stereo digital / mono analog, 1-kHz tone with calibrated analog and digital audio levels, clean channel
11	#1.e1	IB_AMr208_e1awfa10	A611	90.69	MA1	AWGN audio source, clean channel
12	#2.e1	IB_AMr208_e1awfc10	A610	2.21	MA1	1-kHz tone (left channel only), clean channel
13	#2.e1	IB_AMr208_e1awfc11	A612	2.21	MA1	1-kHz tone (right channel only), clean channel
14	#2.e1	IB_AMr208_e1awfc19	A613	2.21	MA1	analog audio is silence, digital audio is 1-kHz tone (right and left), clean channel
15	#2.e1	IB_AMr208_e1awfc20	A614	2.21	MA3	All Digital, 1-kHz tone (left and right)
16	#2.e1	IB_AMr208_e1awfc23	A615	2.21	Analog	AM only, music, clean channel
17	#2.e1	IB_AMr208_e1awfc24	A616	2.21	MA1	digital audio is 1-kHz tone (left only), analog audio is silence, C/No = 79 dB-Hz
18	#2.e1	IB_AMr208_e1awfc26	A617	2.21	Analog	AM only, continuous 1-kHz tone, clean channel
19	#2.e1	IB_AMr208_e1awfc27	A618	2.21	MA1	stereo digital / mono analog, 1-kHz tone with calibrated analog and digital audio levels, clean channel, TX Gain = +7 dB
20	#2.e1	IB_AMr220_e1awfc28	A619	2.21	MA1	stereo digital / mono analog, 1-kHz tone with calibrated analog and digital audio levels, clean channel, TX Gain = -8 dB
21	#2.e1	IB_AMr208_e1awfc29	A620	2.21	MA1	digital audio is 1-kHz tone (left only), analog audio is silence, C/No = 76 dB-Hz
22	#2.e1	IB_AMr208_e1awfc30	A621	2.21	MA3	digital audio is 1-kHz tone (left and right), C/No = 61 dB-Hz
23	#2.e1	IB_AMr208_e1awfc31	A622	2.21	MA3	digital audio is 1-kHz tone (left and right), C/No = 65 dB-Hz
24	#2.e1	IB_AMr208_e1awfc32	A623	2.21	MA3	digital audio is 1-kHz tone (left and right), C/No = 76 dB-Hz
25	#2.e1	IB_AMr208a_e1awfc33	A624	2.21	MA1	stereo digital (left only) / mono analog, 4-kHz tone, clean channel
26	#2.e1	IB_AMr208a_e1awfc34	A625	2.21	MA1	stereo digital (right only) / mono analog, 4-kHz tone, clean channel
27	#2.e1	IB_AMr201_e1awfc52	A626	35.39	MA1	music, blend control bits change from 01bin to 10bin
28	#2.e1	IB_AMr230b_e1awfc102	A627	2.77	MA1	analog 1-kHz HD left 400 Hz HD right 2 kHz
29	#2.e1	IB_AMr230a_e1awfr1001	A628	2.21	MA3	1-kHz tone in left channel, silence in right channel
30	#2.e1	IB_AMr230a_e1awfr1002	A629	2.21	MA1	1-kHz tone (left channel and right channel) AWGN such that C/No = 67 dB-Hz Analog audio is silence
Total Volume			228.34			

FM						
No.	Disc No.	Vector Name	File Size [Mbytes]	Mode	Test Description	
1	#4.e1	IB_FMr208c_e1wfc00	F600	35.39	MP1	stereo pulsed 125-Hz tone (active 0.37 seconds, off 11.51 seconds) with calibrated analog and digital time alignment, clean channel
2	#4.e1	IB_FMr208c_e1wfc03	F601	35.39	MP1	stereo 4-kHz bi-level tone with calibrated analog and digital time alignment, clean channel
3	#4.e1	IB_FMr208c_e1wfc08	F602	17.7	MP1	stereo 1-kHz tone with calibrated analog and digital audio levels, clean channel
4	#4.e1	IB_FMr208c_e1wfc09	F603	17.7	MP1	1-kHz tone (left channel only), clean channel
5	#4.e1	IB_FMr208c_e1wfc10	F604	17.7	MP1	1-kHz tone (right channel only), clean channel
6	#4.e1	IB_FMr208e_e1wfc12	F605	17.7	MP1	8-kHz tone (left channel only), clean channel
7	#4.e1	IB_FMr208e_e1wfc13	F606	17.7	MP1	8-kHz tone (right channel only), clean channel
8	#4.e1	IB_FMr230_e1wfc14	F607	17.7	MP3	contains reserved Service ID/Session Types in PSD, clean channel
9	#4.e1	IB_FMr208c_e1wfc27	F608	17.7	MP1	stereo 1-kHz tone with calibrated analog and digital audio levels, clean channel, TX Gain = +7 dB
10	#4.e1	IB_FMr208c_e1wfc28	F609	17.7	MP1	stereo 1-kHz tone with calibrated analog and digital audio levels, clean channel, TX Gain = -8 dB
11	#4.e1	IB_FMr208c_e1wfc30	F610	17.7	MP1	analog audio is silence, digital audio is 1 kHz tone (right and left), clean channel
12	#4.e1	IB_FMr208j_e1wfc31	F611	123.87	MP1	AWGN audio source, clean channel
13	#4.e1	IB_FMr208c_e1wfc46	F612	17.7	MP6	BER test pattern, clean channel
14	#5.e1	IB_FMr208j_e1wfc89	F613	123.87	MP1	digital audio is 1-kHz stereo tone, analog audio is silence, Cd/No = 58 dB-Hz
15	#3.e1	IB_FMr208c_e1wfa98	F614	17.7	Analog	FM only, continuous stereo 1-kHz tone, clean channel
16	#5.e1	IB_FMr220a_e1wfc100	F615	17.7	MP3	3 programs analog 1-kHz tone; Prog 1: 1-kHz tone; Prog 4: 1-kHz tone; Prog 6: 1-kHz tone; (all level aligned), clean channel
17	#5.e1	IB_FMr220a_e1wfc101	F616	17.7	MP3	3 programs analog 1-kHz tone; Prog 1: 2-kHz tone; Prog 4: 400-Hz tone; Prog 6: 4-kHz tone, clean channel
19	#5.e1	IB_FMr230a_e1wfc102	F617	106.17	MP1	analog 1-kHz HD left 400 Hz HD right 2 kHz Clean channel
20	#5.e1	IB_FMr208c_e1wfc204	F618	17.7	MP1	analog source is audio mix, BER test pattern, clean channel
21	#9.e1	IB_FMr230c_e1wfr1032	F619	17.7	MP5	Vector with 1-kHz tone in left and right, clean channel with SIS and PSD Used for All Digital Max Power and All Digital Sensitivity
22	#9.e1	IB_FMr230a_e1wfr1037	F620	17.7	MP1	Analog source is stereo 1-kHz tone with calibrated analog and digital audio levels Clean channel
Total Volume			707.89			

- 本器は HD Radio™ 製品の生産用計測器として DTS 社より認証を受けております。
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