iSEMcon®

ACOUSTICS & VIBRATION DIVISION

NEW

MATCHED PAIRS
TRIPLES, QUADS

see page 2

AT A GLANCE

The EMX-7150 is a ¼" microphone made from stainless steel and using state of the art water tight Neutrik*3 connectors have a very accurate frequency response combined with the capability to measure high sound pressure levels up to 145dBspl.
It is a low impedance measurement microphone that can be operated from 12…52 V Phantom Power which is available on most professional microphone preamplifiers and professional computer interfaces. With its mechanically robust design it is well suited for harsh environment use such as open air sound reinforcement measurements. Its class 1 frequency response *(NOTE: NOT A CLASS 1 MICROPHONE)*1 makes it predestined for room acoustics analysis including recording studios and home theaters. It can normally be used without the included freefield calibration data file for compensation. In this case take the individual calibration data as proof of its superb performance.

TYPICAL APPLICATIONS

- ✓ Sound-power and sound-field analysis
- ✓ Industrial Acoustics
- ✓ Room acoustics analysis
- ✓ Sound reinforcement
- ✓ Real time analyzers

FEATURES

- ✓ Frequency range **10Hz…20kHz**
- ✓ Sensitivity **6mV/Pa** typ.
- ✓ Dynamic range ~30… >140dBspl
- ✓ 3% distortion limits >**143dBspl** typ.
- ✓ **Calibration** chart and calibration data files included on
- ✓ **IEC 61672 class 1** frequency response*1
- ✓ Dimensions: acoustic port dia. **¼" (7mm)**
  Microphone body **0.75" (**19mm)
  Overall length 6**" (152mm)**
- ✓ Weight **0.3oz (75 grams)**

ACTUAL SIZE

VALUE ADD PRODUCT 2013

- **Individually compensated**
- **for linear frequency response**
- **Temperature drift < 0.015dB/K**
- **Lower selfnoise**
- **High noise immunity**
- **Matched pairs, triples, quads**

**1: Class 1 Freq.Response unter limited conditions (23°C ± 3°C, 1013 mbar ± 30mbar)*
**2: approximated by 90deg incidence response*
**3 The corporate names and names of the products stated in this brochure are trademarks or registered trademarks of the respective companies.*

CONTACT

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NEW MATCHING MICROPHONES

iSEMcon now offers matching stereo pairs as well as matching triples and quads within a consistent tolerance. While matching microphones , it is crucial to ensure that the frequency response and sensitivity is identical within a specified tolerance . Some of our competitors state that their microphones are matching or sell matching pairs and you are not informed about how those microphones might be different in frequency response and microphone sensitivity.

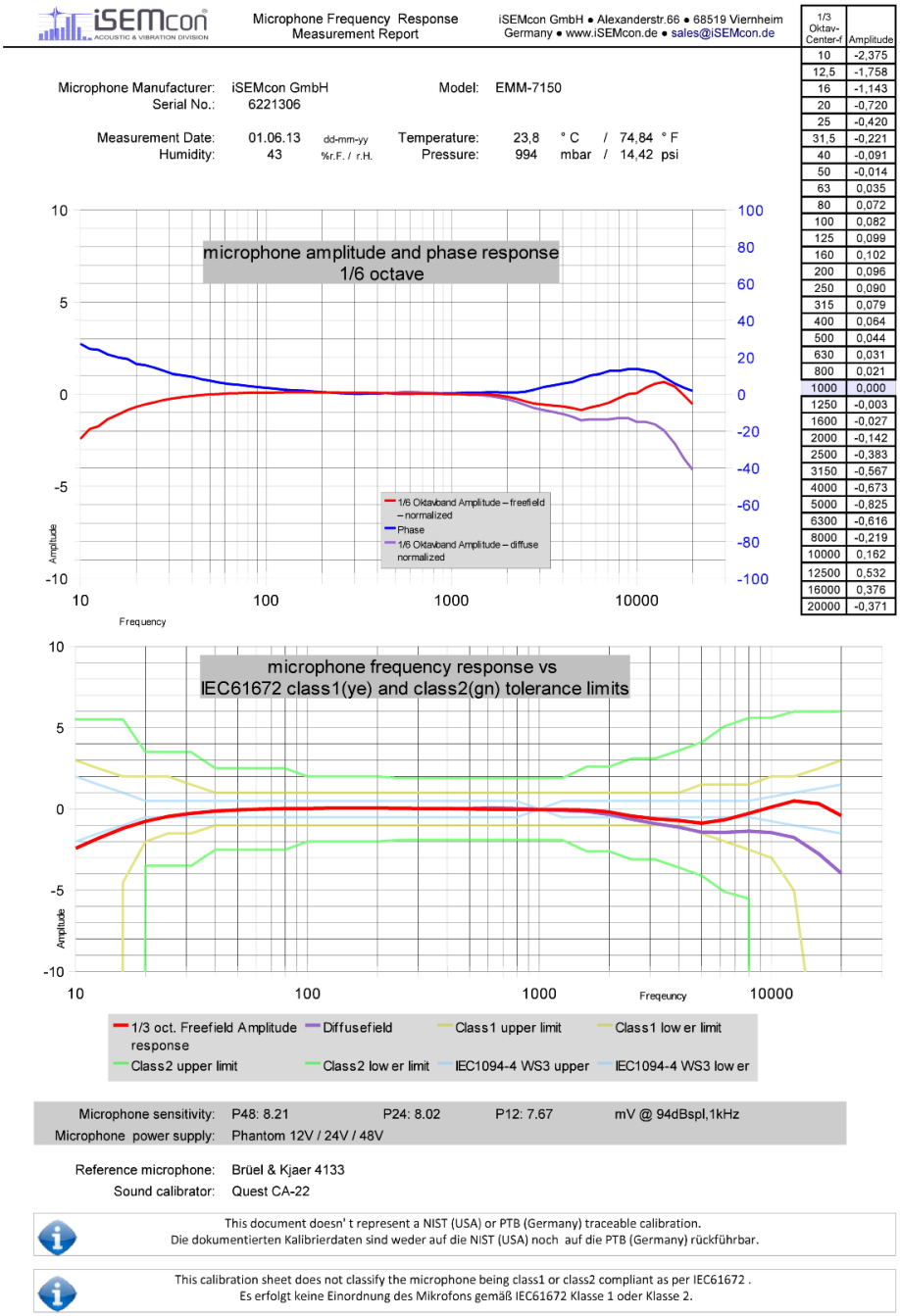
Not with us!

iSEMcon's matching tolerance

To ensure realistic sound field measurement and multi channel audio experience, each microphone is individually calibrated and selected to meet our standard matching tolerance. The matching tolerance is applicable within the microphone's entire frequency range.

For the EMX-7150 the matching tolerance on frequency response is +/- 0.5dB and 1mV on microphone sensitivity.

Matching microphones are supplied not only with the individual calibration data (print and calibration-file) but also with the matching curve(s) for those bundled microphones.



iSEMcon ACOUSTIC & VIBRATION DIVISION

Microphone Frequency Response Measurement Report

iSEMcon GmbH • Alexanderstr.66 • 68519 Viernheim
Germany • www.iSEMcon.de • sales@iSEMcon.de

Microphone Manufacturer: iSEMcon GmbH
Serial No.: 6221306
Model: EMM-7150

Measurement Date: 01.06.13 dd-mm-yy
Humidity: 43 %r.F. / r.H.
Temperature: 23,8 ° C / 74,84 ° F
Pressure: 994 mbar / 14,42 psi

1/3 Oktav-Center-f	Amplitude
10	-2,375
12,5	-1,758
16	-1,143
20	-0,720
25	-0,420
31,5	-0,221
40	-0,091
50	-0,014
63	0,035
80	0,072
100	0,082
125	0,099
160	0,102
200	0,096
250	0,090
315	0,079
400	0,064
500	0,044
630	0,031
800	0,021
1000	0,000
1250	-0,003
1600	-0,027
2000	-0,142
2500	-0,383
3150	-0,567
4000	-0,673
5000	-0,825
6300	-0,616
8000	-0,219
10000	0,162
12500	0,532
16000	0,376
20000	-0,371

Microphone sensitivity: P48: 8.21 P24: 8.02 P12: 7.67 mV @ 94dBspl,1kHz
Microphone power supply: Phantom 12V / 24V / 48V

Reference microphone: Brüel & Kjaer 4133
Sound calibrator: Quest CA-22

This document doesn' t represent a NIST (USA) or PTB (Germany) traceable calibration.
Die dokumentierten Kalibrierdaten sind weder auf die NIST (USA) noch auf die PTB (Germany) rückführbar.

This calibration sheet does not classify the microphone being class1 or class2 compliant as per IEC61672 .
Es erfolgt keine Einordnung des Mikrofons gemäß IEC61672 Klasse 1 oder Klasse 2.

Single microphone freefield and diffusefield response vs class 1 / 2 tolerance limit supplied with each microphone.

For Matched pairs , triples, quads we also include tolerance data that PROOF for the matching.

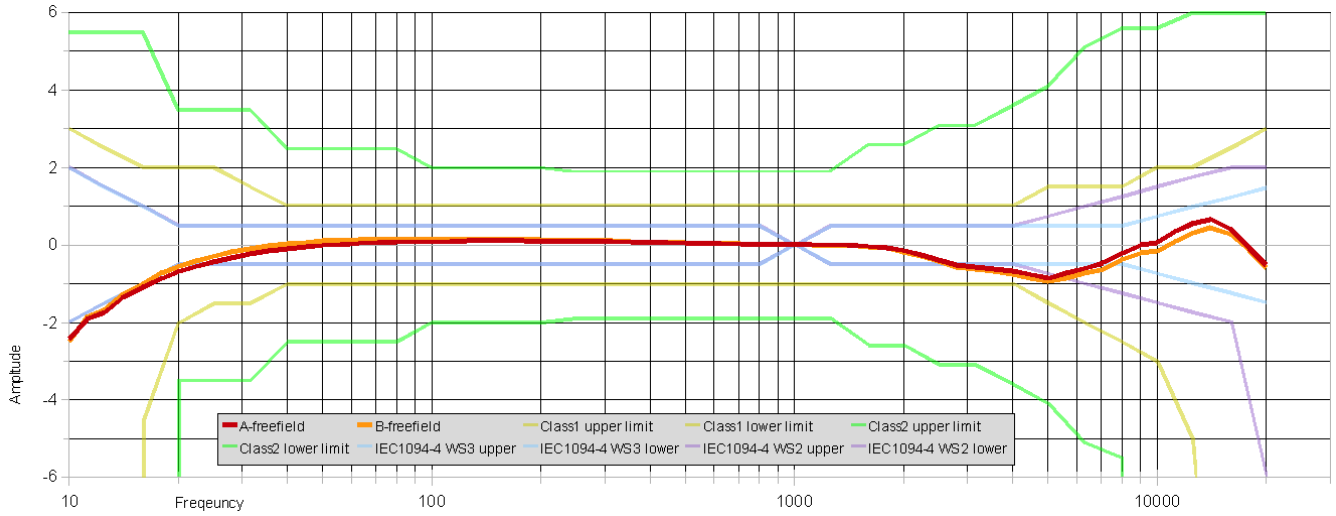
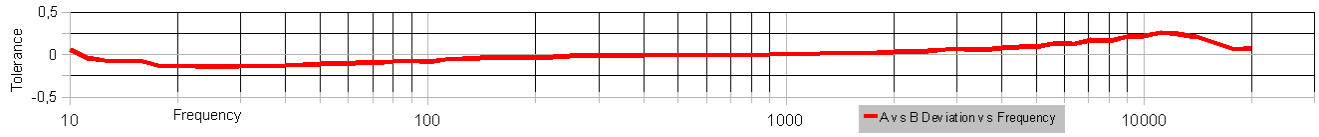


Diagram A vs B vs class 1 and class tolerances



Matching curve for a EMX-7150 pair

Matching Quads – sample sheet:

iSEMcon Microphone
MATCHED PAIR DATASHEET ADDITIONS

iSEMcon GmbH • Alexanderstr.66 • 68519 Viernheim Germany • www.iSEMcon.de • sales@iSEMcon.de

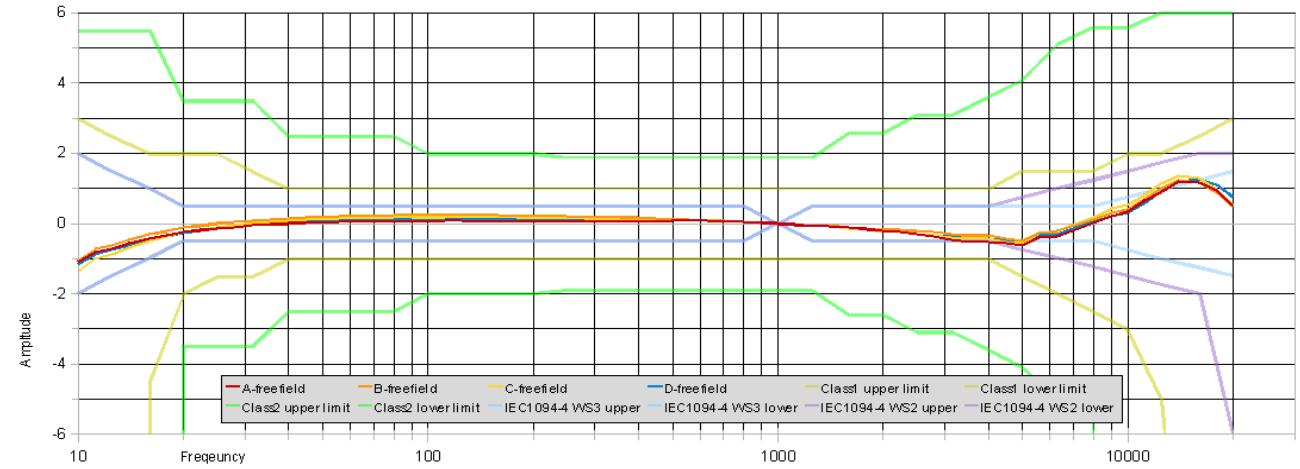
IDENTIFICATION

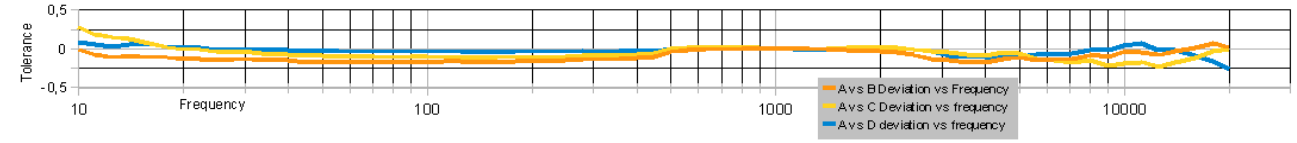
			Phantom Power 48V	24V	mV @ 94dBspl, 1kHz 12V
A	Serial No.:	2231301	7,71	7,48	7,26
B	Serial No.:	2231303	7,52	7,24	6,93
C	Serial No.:	2231307	7,54	7,26	6,98
D	Serial No.:	2231308	7,33	7,12	6,86
	Sensitivty deviation		0,38	0,36	0,4

STATISTICS

Reference information freefield – MATCHED PAIR
A vs B linearity: +/- **0.5dB**
A vs B sensitivty: **1mV** @ 94dBspl, 1kHz
Tolerance bands shown are for freefield frequency response as per the standard.

Max Freq response Deviation:	**0,29** dB	@	10Hz
Avg Freq response Deviation:	**0,14** dB		





The matching process (1-4):

- The first stage of testing begins with the selection of microphone capsules. We filter capsules being close in their overall performance (frequency and sensitivity).
- The second stage is the microphone manufacture using those filtered capsules.
- The third stage focuses on final testing of each microphone. This includes the calibration procedure (individual frequency response measurement) as well as sensitivity measurement at 12V, 24V and 48V Phantom power.
- Finally we are selecting one reference microphone (A) and compare the overall frequency responses of its potential partners.

FOH: You measure and optimize the acoustical sound field for the audience together with SPL or better say Leq monitoring….. Why not use one matched pair for stereo recording?

Matching pairs in stereo recording:

Matched sensitivity is important when you want center instruments to be heard from the center between your stereo speakers, rather than shifted slightly left or right of center. A level mismatch also can change the musical balance between orchestral instrumentation. Of course, you can compensate for microphone sensitivity differences with your recorder's level controls or mixer's pan pots but not for frequency response mismatch.

Matched frequency response is important for the sharpest possible imaging. The more closely the stereo microphones are matched in frequency response, the better the image focus and localization. For example: Suppose the left microphone is 3 dB off at 200 Hz relative to the right microphone. For an instrument in the center of the musical ensemble, its reproduced low frequencies will shift toward the left, while mid frequencies will remain in the center . Localization for this instrument will spread or will cause blurring between the real (mid frequency) image and the phantom (low frequency) image.

ORDERING INFORMATION

No	Name	Description
150010	EMX-7150	**Bulk version:** EMX-7150 Microphone + WS-7XL Windscreen + clamp w/ adapter screw+ Data-CD, Mic in tube, Polybag
800060	EMX-7150-CF1	EMX-7150 microphone + clamp w/ adapter screw + WS-7XL windscreen + 1/4" to IEC 1/2" (13,2mm) calibrator adapter + Calibration data on USB stick - Pouch
800070	EMX-7150-CF2	EMX-7150 microphone + Shockmount w/ adapter screw + WS-7XL windscreen+ 1/4" to IEC 1/2" (13,2mm) calibrator adapter + Calibration data on USB stick - Pouch
800080	EMX-7150-CF/MP	2x EMX-7150 microphone (MATCHED PAIR) + clamp w/ adapter screw + WS-7XL windscreen , 1X 1/4" to IEC 1/2" (13,2mm) calibrator adapter + Calibration data on USB stick - Pouch
800081	EMX-7150-CF/MT	3x EMX-7150 microphone (MATCHED TRIPLE) + clamp w/ adapter screw + WS-7XL windscreen , 1X 1/4" to IEC 1/2" (13,2mm) calibrator adapter + Calibration data on USB stick - Pouch
800082	EMX-7150-CF/MQ	4x EMX-7150 microphone (MATCHED QUAD) + clamp w/ adapter screw + WS-7XL windscreen , 1X 1/4" to IEC 1/2" (13,2mm) calibrator adapter + Calibration data on USB stick - Pouch

SPECIFICATIONS

Values for 23° Celsius and 48V Phantom Power

PERFORMANCE

Frequency Response characteristic	Free-Field
Polarization Voltage	Prepolarized
Nominal Sensitivity @1kHz	6mV/Pa
Sensitivity temeperature drift	<0.015dB/K
Microphone Polarity	Non-Inverting
Frequency Response calibrated	10…20.000 Hz
Frequency Response IEC61672 *1	class 1
Inherent Noise100-10000 Hz	<30dB typ.
Inherent Noise 1/3 Oct.	<15dB typ.
Max. SPL. (3% distortion limit)	> 141dBspl
Max. SPL. (3% distortion) typ.	=143 dBspl
Max. SPL. (3% THD) @ 12V Phantom	>140 dBspl
Max. Acoustic Input without clipping	>150dBspl

ENVIRONMENTAL

Operating Temperature range	-10…+55°
Storage Temperature Range	-20…+70°
Operating Humidity Range	0…90%r.H.
Axial Vibration Sensitivity	~ 50dB

ELECTRICAL

Output Impedance	< 200 Ω
Phantom Power	12…52Vdc

PHYSICAL

Housing Material	Stainless Steel
Sealing	O-ring/Polyurethane/Epoxy
Output Connector	XLR male
Dimensions	Ø ¼“(7mm) x 6“(152mm)
Weight	0.3 oz (75g)

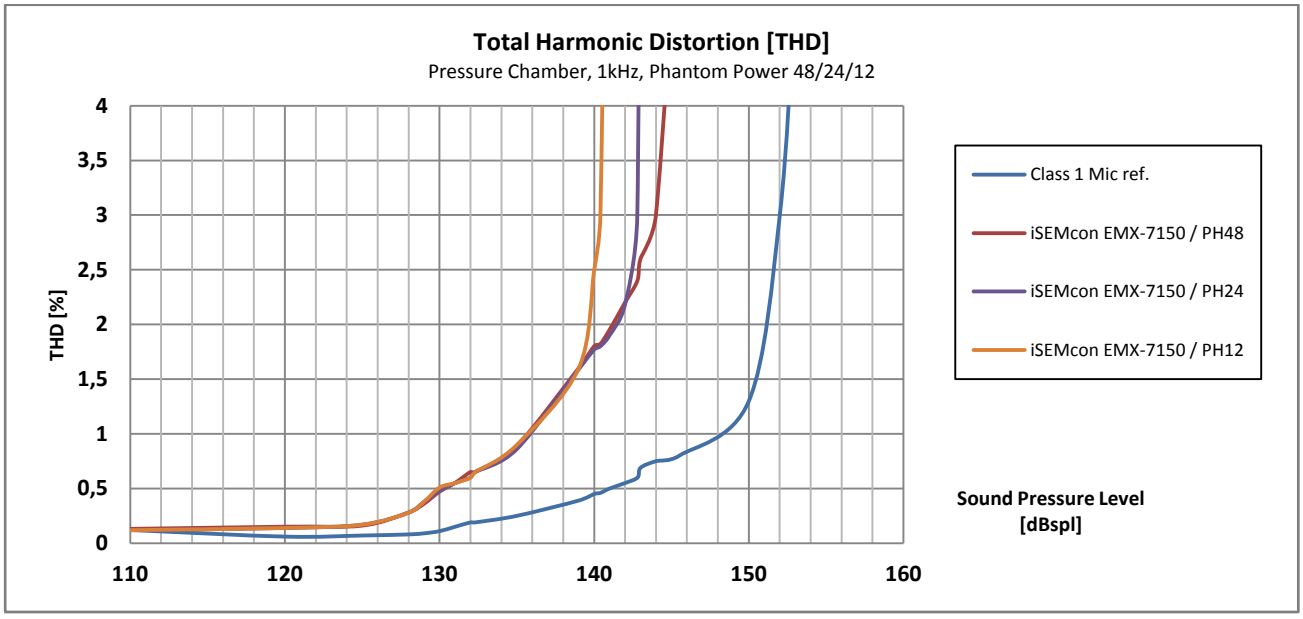
CONFORMITY

IEC 61000-6-1;
IEC 61010-1

SPECIAL FUNCTIONALITY

Voltage surge protection	✓
EMC noise filter	✓

THD , ref 1kHz



CALIBRATION DATA FILE FORMAT

Human readable ASCII file: 1/12 octave

www.iSEMcon.com freefield
Sensitivity 5.88 mV/Pa @1kHz
10.00 -0.02
11.26 0.10
…….
19992.19 0.93
^ frequency (Hz) ^amplitude response (dB

Coming soon:

Calibration file converter software.

FREQUENCY RESPONSE (Calibration Chart)

iSEMcon

Microphone Frequency Response Measurement Report

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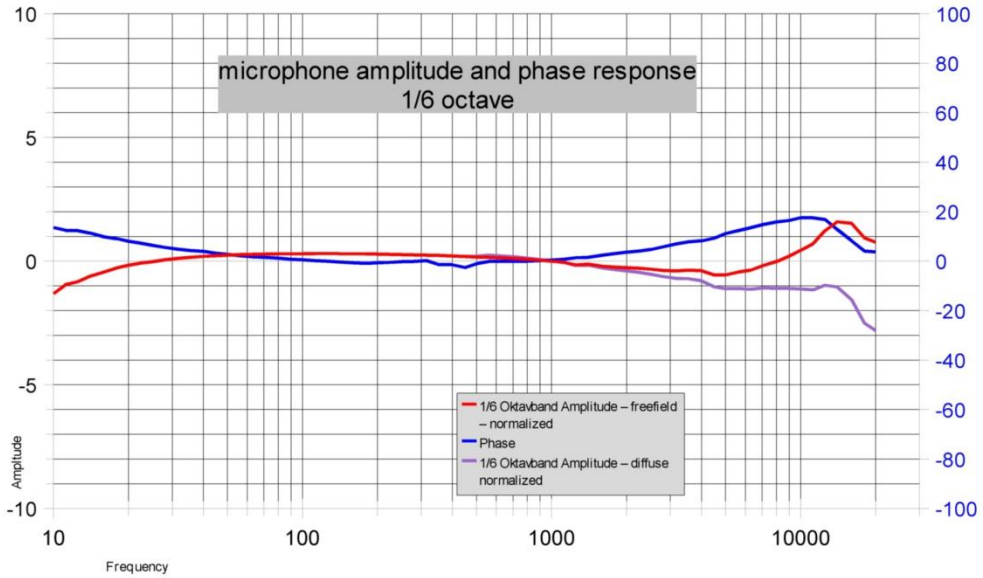
Germany ● www.iSEMcon.de ● sales@iSEMcon.de

Microphone Manufacturer:	iSEMcon GmbH		Model:	EMM-7150	
Serial No.:	2131301				
Measurement Date:	26.03.13	dd-mm-yy	Temperature:	21,9 ° C	/ 71,42 ° F
Humidity:	32	%r.F. / r.H.	Pressure:	998 mbar	/ 14,47 psi



1/3 Oktav-Center-f	Amplitude
10	-1,254
12,5	-0,849
16	-0,441
20	-0,169
25	0,013
31,5	0,133
40	0,213
50	0,259
63	0,291
80	0,308
100	0,316
125	0,319
160	0,312
200	0,301
250	0,283
315	0,259
400	0,223
500	0,184
630	0,149
800	0,105
1000	0,000
1250	-0,081
1600	-0,184
2000	-0,244
2500	-0,308
3150	-0,372
4000	-0,401
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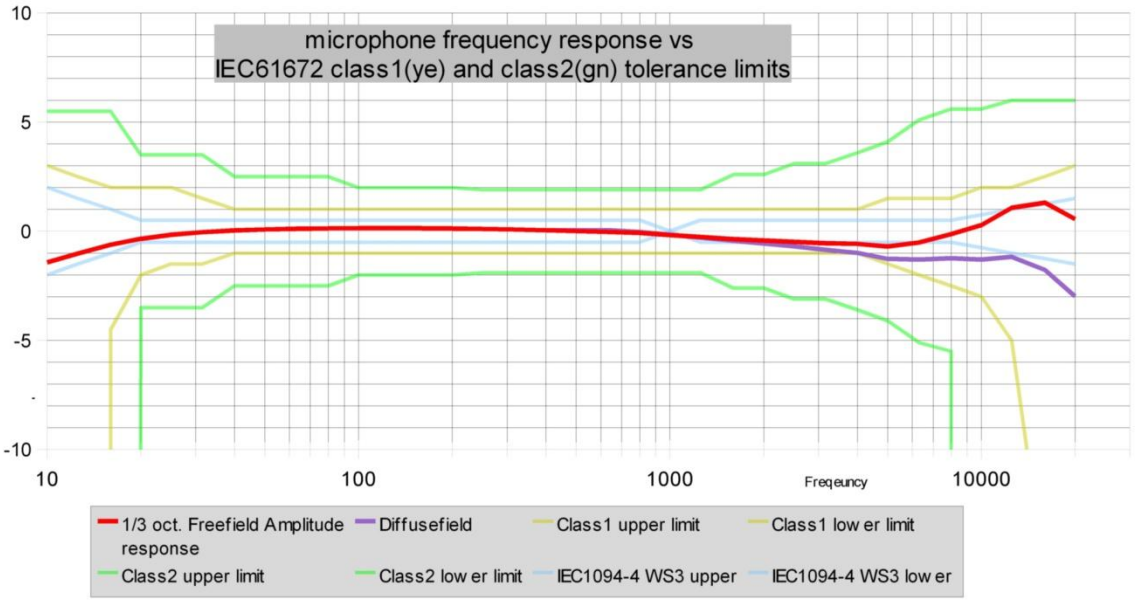
6300	-0,339
8000	0,042
10000	0,455
12500	1,248
16000	1,485
20000	0,734



Microphone sensitivity:	P48: 6.71	P24: 6.48	P12: 6.21	mV @ 94dBspl,1kHz
Microphone power supply:	Phantom 12V / 24V / 48V			

Reference microphone: Brüel & Kjaer 4133
Sound calibrator: Quest CA-22

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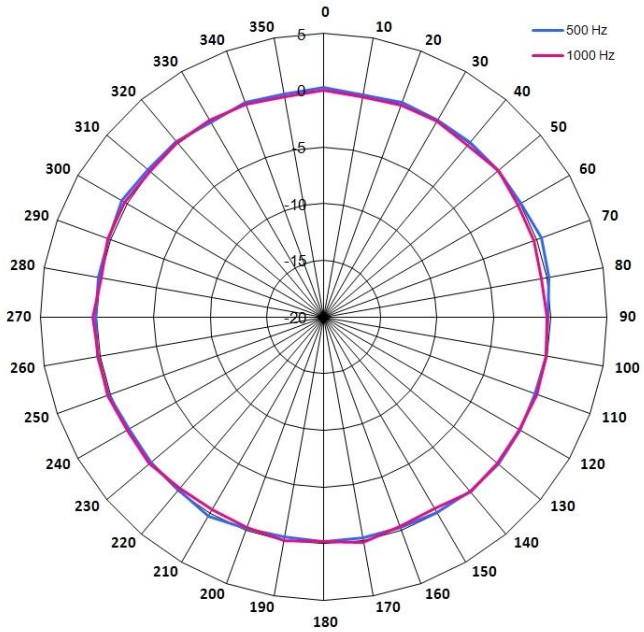
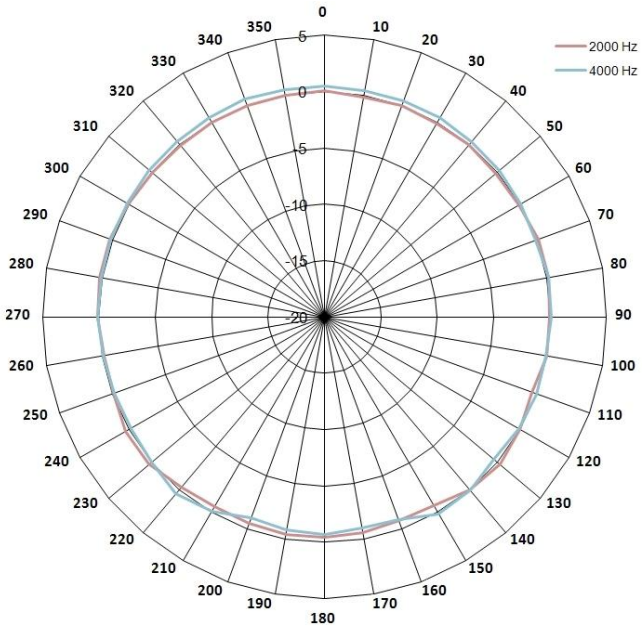
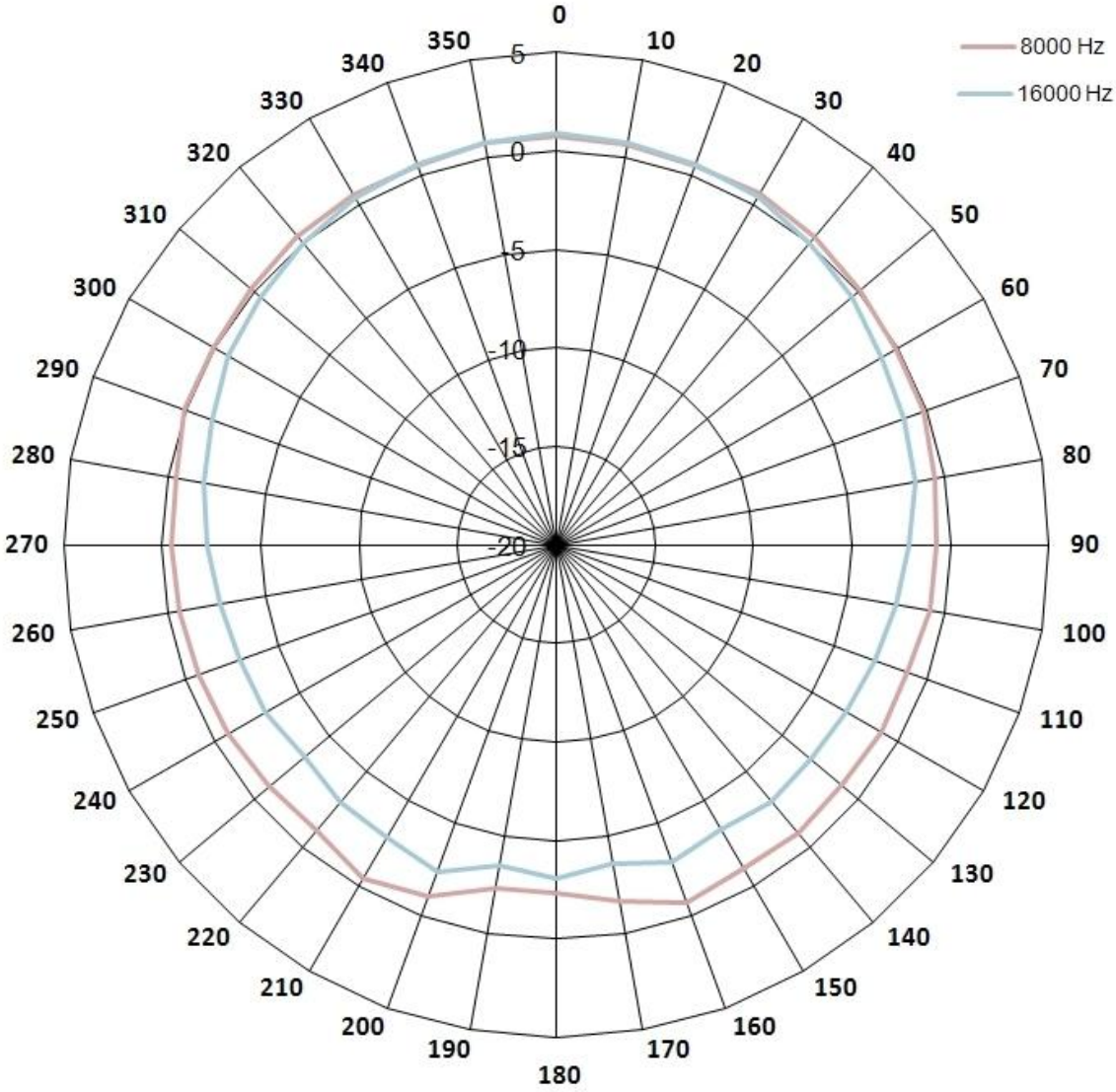
POLAR PATTERNS, typical







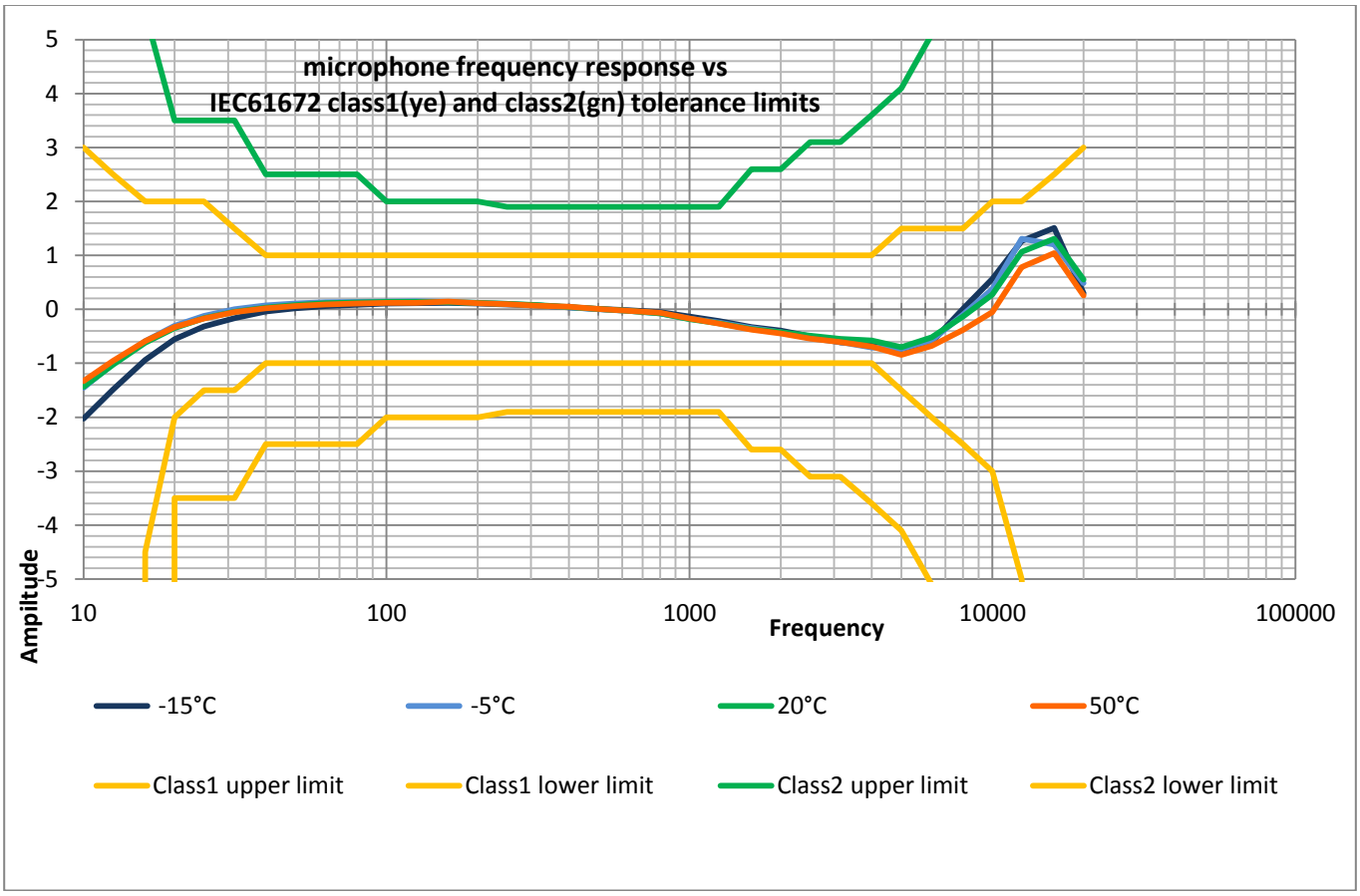
TEMPERATURE STABILITY

The temperature characteristics of the sensitivity of an electret condenser microphone depends on the electrical characteristics of the microphone capsule built-in impedance converter and signal conversion circuitry as well as the acousto-mechanical characteristics of the diaphragm equivalent stiffness. iSEMcon is one of the first microphone manufacturers disclosing the secret about the temperature behavior of electrets based measurement microphones.

The range for the measurement was set at -20 to 65 C which is more than iSEMcon microphones are normally used at. The most important temperatures are 10 °C up to about 55°C which covers indoor as well as open air use. It will give you a good predictable performance whether it is used in a cold autumn night or if the hot summer sun “burns” microphone body.

		1kHz
Temperature	-20°C	6,92
	0°C	6,83
	10°C	6,71
	20°C	6,62
	35°C	6,60
	45°C	6,57
	55°C	6,50

The right table shows the microphone sensitivity change 1kHz. The diagram on next page shows how temperature affects the frequency response behavior of an EMX-7150 microphone. The microphone capsule itself is the part being responsible for most of the temperaturechange. *(see also: Temperature characteristics of electret condenser microphones Acoust. Sci. & Tech. 27, 4 (2006))*



SUPPLIED ACCESSORIES

Small windshield	Universal holding clamp		
			

OPTIONAL ACCESSORIES

MH-SH19 Shockmount	SWS-7 windshield	MB-230-BOX	SOUND CALIBRATOR SC-1
Features Shock absorbent. For use with our EMX-7150 microphone. Use from diameter 19…22 mm	Metal grid guard covered from impregnated foam. Protects microphone port from spraying water. Slide on retainer with O-ring prevents from trickle water	O-Ring seal Water protection Dust protection **Dimensions [mm]** 210 x 167 x 90	94dBspl and 110dBspl switchable. Standard and custom size adapters. Calibration data included (includes individual pressure chart)
			

**1: Class 1 Frequency Response under limited conditions only (23°C ± 3°C, 1013 mbar ± 30mbar). It does not meet the IEC 61672 over pressure, temp and long term stability.*

APPLICATION NOTE: FREEFIELD vs. DIFFUSEFIELD USE

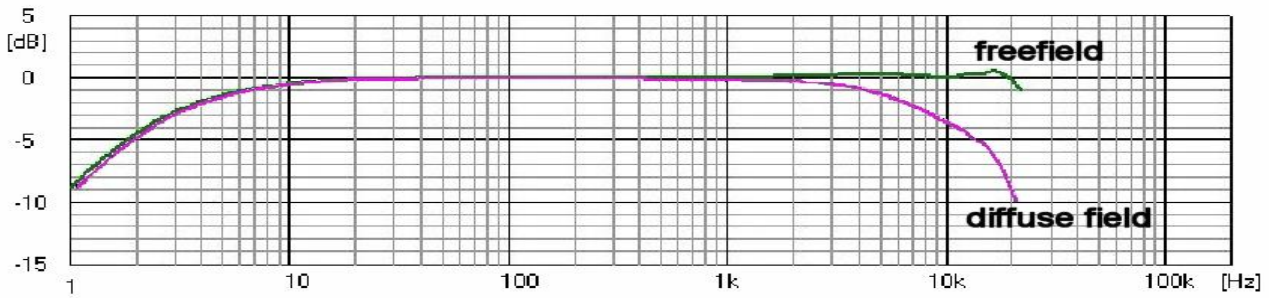
Only a small percentage of all acoustical measurements are performed in a well defined and/or well controlled environment of an e.g. acoustical laboratory – on the contrary most acoustical measurements are done under not really controlled conditions. Here are some hints on how to use our microphone.

Sound Fields:

Free field: There are no reflecting objects, only the microphone disturbs the sound field.
Diffuse field: There are many reflecting surfaces or sound sources so that the sound waves arrive from all directions.
Pressure field: This is found in small confined spaces like sound calibrators.

Depending on the nature of the sound field an appropriate microphone, which is optimized for the sound field could be selected. Unfortunately there are many practical situations where the sound field is not really of a well defined type. This application note should give you an idea on how to measure with a free field response microphone.

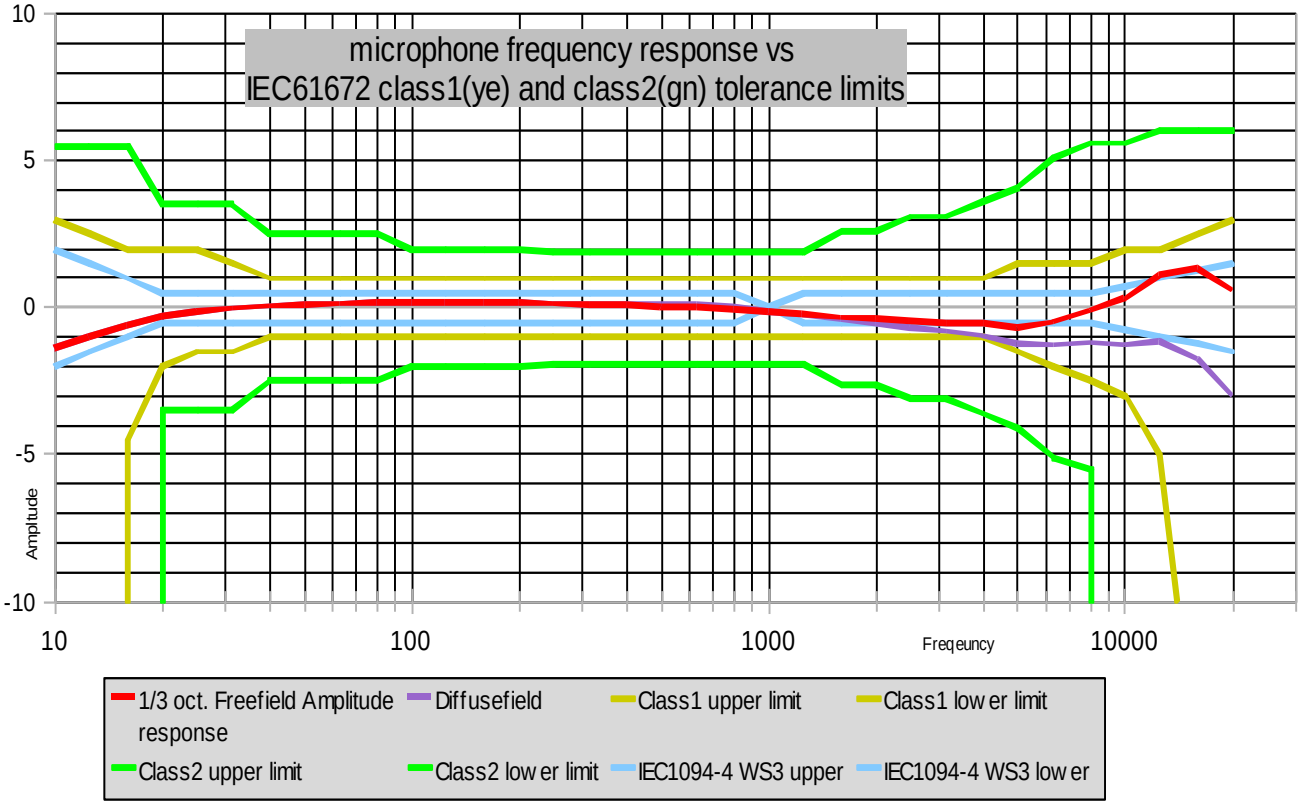
The free field microphone is the most common in use, chosen on tradition but we should know about the sound field. The following picture shows both the free field and the diffuse field response of a free field microphone.



The diffuse field response is not easy to measure, because it is not easy to generate a truly diffuse sound field over a wide frequency range but there is a known procedure to estimate the diffuse frequency behavior of a free field microphone.

From literature we know, that a microphone's random (diffuse) incidence response can be approximated by measuring the 90 deg incidence response relative to a single sound source.

While it is an approximation only iSEMcon has measured the 90deg response of many EMX-7150 microphones and used the averaged data to generate a 19th order polynomial. This is now used to approximate the "diffuse field" response from the microphones free field response data.



Typical freefield measurement:

Speaker measurement. The microphone should target to the sound source (speaker)

Typical diffusefield measurements:

Concert SPL monitoring (normally at FOH), Room Acoustics measurement (RT60): the microphone should not target to the sound source. Let it target to the ceiling. This is the most practical way.

Picture left shows EMX-7150 microphone together with shockmount and floor-stand.

ATTENTION

The EMX-7150 should not be plugged or unplugged into a mixer console or PA system unless the input channel is muted. If the system does not have a muting option the volume should be turned off. This avoids loud popping noise that can cause damage in speakers and/or affect your hearing.