

PRODUCT DATA

Mouth Simulator Types 4227 and 4227-A

Mouth Simulator Types 4227 and 4227-A are high-performance artificial mouths conforming to ITU-T Rec. P.51 and designed for accurate and repeatable electroacoustic measurements.

The mouth simulators produce a guaranteed minimum continuous output of 110 dB SPL (200 Hz to 2 kHz) at a distance of 25 mm from the lip ring. A sound pressure level of more than 120 dB is possible with pulsed operation. A built-in overload-protection circuit minimizes the risk of accidental damage to the loudspeaker.

A microphone can be fitted at the mouth opening for use in a compressor loop to give constant sound pressure output. Accurate calibration is facilitated by a calibration jig provided with the simulator.

Type 4227-A contains a built-in Class-D amplifier.



Uses and Features

Uses

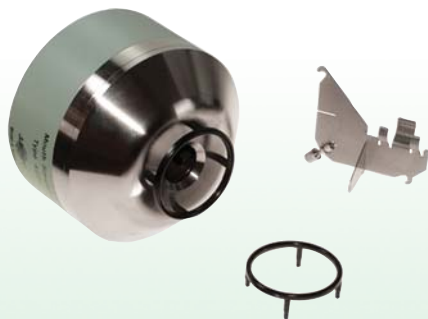
- Quality control testing of frequency response and distortion of telephone transmitters and close-talking microphones
- Sound source for acoustic measurements

Features

- Accurate and very consistent simulation of human voice field
- Built-in Class-D amplifier (Type 4227-A only)
- Continuous SPL of 110 dB at 25 mm from lip ring
- Low distortion
- Built-in overload protection circuit
- Optional regulating microphone for very accurate frequency response control
- Calibration Jig included
- Conforms to standards: IEEE-269, IEEE 661 and ITU-T Rec. P.51
- Low sensitivity to temperature and humidity changes

Description

Fig. 1
Type 4227 with included parts:
Mouthpiece with two Lip Rings and a Calibration Jig



The mouth simulators are high-performance, low-distortion sound sources used for testing acoustic transducers. They consist of a high-quality loudspeaker mounted in a specially shaped housing. A lip ring is mounted on the upper surface of the unit, providing a convenient reference plane for measurements. Type 4227-A also has a built-in Class-D amplifier. This simplifies setup, and the use of a Class-D design minimizes thermal output, allowing use of the mouth simulator in small test chamber installations while avoiding heating of tested components.

Fig. 2 Mouth simulator shown with free-field Microphone Type 4191 in jig for calibration according to IEEE 269 (0° incidence)



Fig. 3 Mouth simulator shown with pressure-field Microphone Type 4192 in jig for calibration according to ITU-T Rec. P.51 (90° incidence)



When testing telephone transmitters and close talking microphones it is required that the sound field closely replicates the sound field generated by the human mouth, as specified in IEEE 269 and fulfilled by Types 4227 and 4227-A. Calibration of the mouth simulator can be made with the aid of the Calibration Jig UA-0901 provided. The jig is designed to hold a ½" measuring microphone at a distance of 25 mm from the lip ring (see Fig. 2). It consists of two interlocking plates which can be fitted together in two ways enabling the microphone to be held with its axis at either 0° (free-field microphone, Fig. 2) or 90° (pressure-field microphone Fig. 3) to the mouth axis.

The mouth simulators consist of a high-quality loudspeaker mounted in a specially shaped housing. A lip ring is mounted on the upper surface of the unit, providing a convenient reference plane for measurements. A Brüel & Kjær ¼" microphone with ¼" preamplifier can be fitted in the mouth opening to monitor the acoustic output level (Fig. 5). The use of such a microphone is strongly recommended whenever an extremely stable system with a flat frequency response is required without sacrificing ease of operation. The simulator is fitted with a removable plastic dummy ¼" microphone in the mouth opening. This ensures that the mouth simulator has the same acoustic characteristics whether a monitoring microphone is installed or not.

Frequency Response

A typical frequency response without equalization is shown in Fig. 4. A frequency response with less than ±1 dB deviation over the frequency range (100 Hz to 10 kHz) at 25 mm distance from the lip ring can easily be obtained with the aid of an equalizing arrangement comprising a ¼" microphone, inserted in the mouth opening of the simulator, measuring the reference sound pressure (Fig. 5). The mouth simulators are delivered with a calibration chart giving the frequency response measured at a distance of 25 mm from the lip ring.

Fig. 4
Typical frequency response of Type 4227 and Type 4227-A at lip ring without equalization

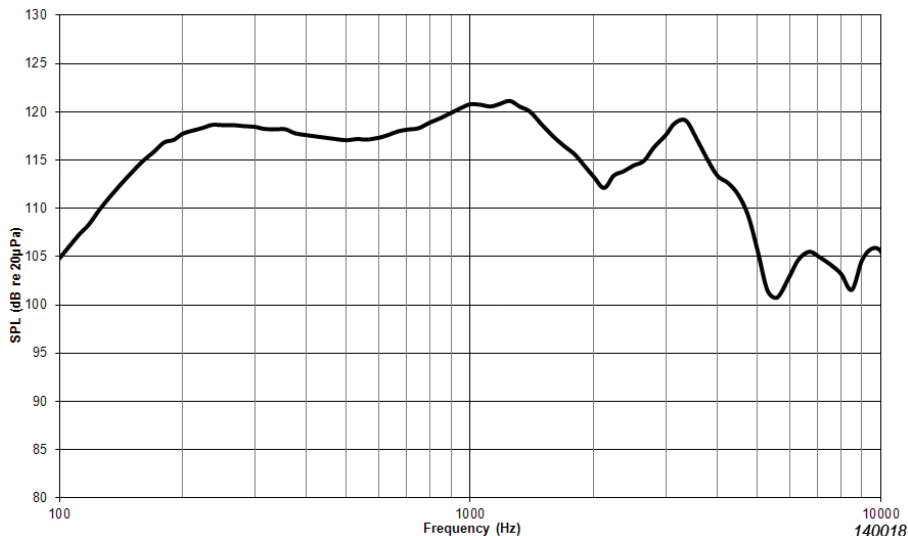


Fig. 5
Left: Mouth simulator shown with a 1/4" reference Microphone Type 4938 positioned in the mouth opening
Right: Type 4227 has dual banana input connectors, Type 4227-A has a BNC input and a power supply connector



Output SPL

Type 4227 can produce a minimum SPL of 110 dB in the frequency range 200 Hz to 2 kHz and 100 dB in the range 100 Hz to 8 kHz, at a distance of 25 mm from the lip ring. This is achieved with the maximum continuous power consumption of 10 W. The Mouth Simulator can be operated at higher power levels for short periods. Power levels of up to 50 W can be safely used for periods of less than 2 s (with 20 s pulse intervals), producing a corresponding SPL of 120 dB, 25 mm from the lip ring.

Type 4227-A can produce a minimum SPL of 110 dB in the frequency range 200 Hz to 2 kHz and 100 dB in the range 100 Hz to 10 kHz, at a distance of 25 mm from the lip ring. This is achieved with the maximum continuous input voltage of 0.8 V_{rms}. The Mouth Simulator can be operated at higher input levels for short periods. Input levels of up to 1.5 V_{rms} can be safely used for periods of less than 2 s. If voltage is exceeding this time frame, the amplifying module will go into protection mode (muting the loudspeaker) for 2 s.

Applications

Testing of telephone handsets is facilitated with Telephone Test Head Type 4602. This permits the accurate mounting of the handset relative to the mouth simulator and can also hold various types of artificial ear assemblies. Accurate automated quality control checks of audio communication transducers can be made with a PULSE™ Electroacoustics Type 7797 or 7907 test system. See Fig. 6 or Fig. 7 for an example of a microphone test system overview.

Fig. 6
 Microphone testing using: PULSE™ Basic Electroacoustics Type 7797, Power Amplifier Type 2735, Mouth Simulator Type 4227, and LAN-XI Module Type 3160-A-042 for data acquisition

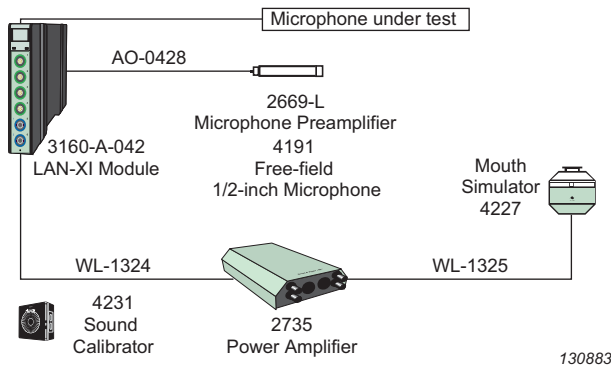
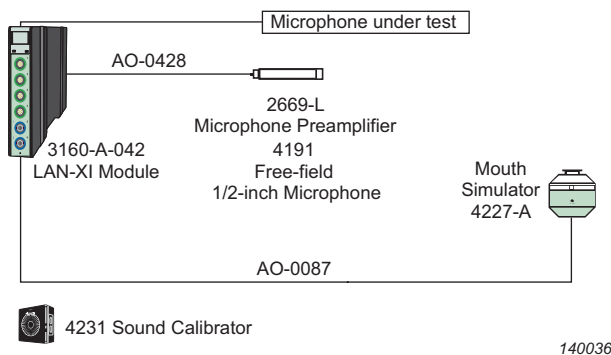






Fig. 7
 Microphone testing using: PULSE™ Basic Electroacoustics Type 7797, Mouth Simulator Type 4227-A and LAN-XI Module Type 3160-A-042 for data acquisition



Compliance with Standards

   	<p>The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EU directives. RCM mark indicates compliance with applicable ACMA technical standards – that is, for telecommunications, radio communications, EMC and EME.</p> <p>China RoHS mark indicates compliance with administrative measures on the control of pollution caused by electronic information products according to the Ministry of Information Industries of the People's Republic of China.</p> <p>WEEE mark indicates compliance with the EU WEEE Directive.</p>
Safety	EN/IEC 61010-1, ANSI/UL 61010-1 and CSAC22.2 No.1010.1: Safety requirements for electrical equipment for measurement, control and laboratory use.
EMC Emission	EN/IEC 61000-6-3: Generic emission standard for residential, commercial and light industrial environments. EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements.
EMC Immunity	EN/IEC 61000-6-2: Generic standards – Immunity for industrial environments. EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements. Note: The above is only guaranteed using accessories listed in this Product Data sheet.
Temperature	IEC 60068-2-1 & IEC 60068-2-2: Environmental Testing. Cold and Dry Heat. Operating Temperature: -10 to +55°C (14 to 131°F) Storage Temperature: -25 to +70°C (-13 to 158°F)
Humidity	IEC 60068-2-78: Damp Heat: 90% RH (non-condensing at 40°C (104°F)).
Mechanical	Non-operating: IEC 60068-2-6: Vibration: 0.3 mm, 20 m/s ² , 10–500 Hz IEC 60068-2-27: Shock: 1000 m/s ² IEC 60068-2-29: Bump: 3000 bumps at 250 m/s ²

Specifications – Mouth Simulator Types 4227, 4227-A

CONTINUOUS OUTPUT LEVEL

Min. 110 dB SPL, 200 Hz to 2 kHz
Min. 100 dB SPL, 100 Hz to 8 kHz
Measured 25 mm from lip ring.
(see Fig. 4 for SPL range)

DISTORTION (harmonic components up to 8 kHz)

at 94 dB SPL, 25 mm from lip ring
<2%, 200 Hz to 250 Hz
<1% >250 Hz

TYPE 4227

Max. Average Power: 10 W at 20°C (68°F)
Max. Pulsed Power: 50 W for 2 seconds
Impedance: 4 Ω
Loudspeaker Diameter: 88 mm (3.5")
Typical Sensitivity at 1 kHz: 80 dB SPL @ 2 V/500 mm

TYPE 4227-A

Max. Average Input Voltage: 0.8 V_{rms}
Max. Pulsed Input Voltage: 1.5 V_{rms} for 2 seconds

MOUTH OPENING

Diameter: 20 mm (0.8")

LIP RING

Position: 10 mm (0.4") from mouthpiece
Outer Diameter: 48 mm (1.9")

DIMENSIONS

Height: 104 mm (4.1") to top of lip ring
Diameter: 104 mm (4.1")

WEIGHT

2.2 kg (4.85 lb)

Ordering Information

Type 4227 and 4227-A Mouth Simulator

include the following accessories:

- UA-0901: Calibration Jig
- SO-0005: 2 x Lip Ring
- DA-0150: ¼" Plastic Microphone Dummy
- ZG-0426: Power Supply 100 – 240 V AC (Type 4227-A only)

OPTIONAL ACCESSORIES

Type 2669 ½" Microphone Preamplifier
Type 2670 ¼" Microphone Preamplifier
Type 4191 Free-field Microphone for calibration
Type 4192 Pressure-field Microphone for calibration

Type 4938 ¼" Pressure-field Condenser Microphone (for monitoring acoustic output level)
Type 4939 ¼" Free-field Condenser Microphone (for monitoring acoustic output level)
UA-0899 Mouthpiece with Lip Ring (for simulating sound field of earlier Type 4219)

ACCREDITED CALIBRATION

4227-CAF Accredited Calibration

TRACEABLE CALIBRATION

4227-CFF Factory Standard Calibration (included with delivery)

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