

TEDS Microphones

A TEDS (Transducer Electronic Data Sheet) microphone is a cartridge and a preamplifier assembled and sealed in a clean environment. The assembly has one type and serial number. Individual TEDS microphone information is programmed in a data chip inside the preamplifier. TEDS microphones are available with CCLD as well as classical preamplifiers. TEDS is standardized in compliance with IEEE 1454.4.



Uses and Features

Uses

- General sound measurements
- Measurement of dynamic pressure fluctuations

Features

- Plug-and-play
- Frequency: 1 Hz to 180 kHz
- Dynamic Range: 6.5 dB to 192 dB

Brüel & Kjær's TEDS Microphones

TEDS Microphone Benefits

The most important benefit of a TEDS microphone is that the actual identity and loaded sensitivity of the cartridge are programmed in the TEDS and thereby readily available for documentation and application purposes. For many Brüel & Kjær TEDS microphones, the individual frequency response is stored on a mini-CD under the S/N ratio of the microphone. During the manufacturing process the unit is sealed in a clean environment, thus eliminating contamination that could later result in reduced performance.

TEDS Templates

All Brüel & Kjær TEDS microphones, except Types 4957, 4958 and 4959, use a template that complies with IEEE P1454.4 V 0.9. A mapping that complies with IEEE 1454.4 V 1.0 is available free of charge for new TEDS microphones.

Data Transmission

Generally, there are two ways that data from the TEDS chip can be transmitted to the analyzer. The simpler way, class 2, uses a separate wire to transmit the data. For classical, LEMO type TEDS preamplifiers, pin 5 is often used for TEDS data transmission. In single-wire systems, like that used with CCLD, the same conductor is used both for signal and data transmission. This is made possible by using an electronic switch to control the mode of the wire (TEDS data or signal mode).

Selecting the Right TEDS Microphone

Brüel & Kjær offers a wide range of TEDS microphones, most of which are based on combined cartridges and preamplifiers that are available as individual units. The first selection criterion is often determined by the front-end input type: classical or CCLD. The second criterion can be the type of sound field for which the microphone is optimized.

Customer-specific TEDS Microphones

Customer-specific solutions can be made, so if you do not see what you are looking for please ask your local Brüel & Kjær sales office for a quote on a customized solution.

Common Specifications

The following pages contain short-form data for the TEDS microphones offered by Brüel & Kjær. For detailed specifications, please see the individual Product Data. Unless otherwise stated all specifications in this Product Data are valid under the following conditions:

CCLD Input Types	24 V compliance voltage
Classical Input Types	120 V _{DC} supply
Dynamic Range Low Limit	Noise floor dB A
Dynamic Range High Limit	3% distortion limit in dB SPL RMS rounded to nearest integer The undistorted peak level will normally be 3 dB higher
Cartridge Sensitivity	Nominal
TEDS Microphone Sensitivity	Stated as the nominal cartridge sensitivity except for small cartridges where the loaded sensitivity differs considerably from the open-circuit sensitivity

Most microphones come with an individual data CD and a calibration chart that includes the typical frequency response. Any microphones that do not include a CD and/or frequency response graph are noted below under each table.

Temperature Range

The read/write temperature range of the TEDS chip is guaranteed by the chip manufacturer up to 85 °C (185 °F) only, but the TEDS chip will survive the full specified temperature range of the TEDS microphone/preamplifier without any damage.

Standard preamplifier Types 2669, 2670, 2671 and 2699 go to 80 °C (176 °F). High-temperature preamplifier Type 1706 goes to 125 °C (257 °F). Remember also to use cables with the correct temperature range.

Cable Length

TEDS will normally work with cables up to 100 m (328 ft).

Sound Field

In the sections that follow, the microphone specifications are organized by the type of sound field that the microphones are designed to measure.

Free-field TEDS Microphones

Free-field microphones are designed to have a flat frequency response in a free field. At higher frequencies, reflections and diffractions cause a pressure increase in front of the diaphragm. If not corrected for, this would result in an increased output voltage from the microphone. Free-field optimization means that the frequency response of the microphone has been designed in such a way that a flat free-field frequency response at 0° angle of incidence is achieved.

Free-field microphones are commonly used for sound measurement in an anechoic chamber or far away from reflecting buildings, etc. Another application area for free-field microphones is general electroacoustic purposes, like loudspeaker and microphone measurements.

Table 1 Free-field TEDS microphones with Type 4188 ½" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
Classical	Type 4188-C/L-001	Type 2669-C/L	31.6	-30	8 to 12.5 k	15.8 to 146
CCLD	Type 4188-A-021	Type 2671	31.6	-30	20 to 12.5 k	19 to 138

Type 4188 is suited for free-field measurements where an extra-robust prepolarized microphone with medium sensitivity is required
Type 4188 TEDS microphones do not come with a data CD nor with typical frequency response on the calibration chart

Table 2 Free-field TEDS microphones with Type 4189 ½" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
Classical	Type 4189-B/C/L-001	Type 2669-B/C/L	50	-26	6.3 to 20 k	15.2 to 146
CCLD	Type 4189-A-021	Type 2671	50	-26	20 to 20 k	16.5 to 134
CCLD	Type 4189-A-031	Type 2699	50	-26	A-weighted*	18 to 131
CCLD	Type 4189-W-003	Type 2671-W-001	50	-26	6.3 to 20 k	16.5 to 134
CCLD	Type 4189-H-041	Type 1706	50	-26	6.3 to 20 k	16.5 to 134

Type 4189 is suited for free-field measurements where a high-sensitivity prepolarized microphone with full 20 kHz bandwidth is preferred
*For more information on A-weighting, see Type 2699 Product Data BP2009

Table 3 Free-field TEDS microphones with Type 4190 ½" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
Classical	Type 4190-B/C/L-001	Type 2669-B/C/L	50	-26	3.15 to 20 k	15 to 148

Type 4190 is designed for free-field measurements where a high-sensitivity externally polarized microphone with full 20 kHz bandwidth is preferred

Table 4 Free-field TEDS microphones with Type 4191 ½" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
Classical	Type 4191-B/C/L-001	Type 2669-B/C/L	12.5	-38	3.15 to 40 k	21.4 to 162

Type 4191 is designed for free-field measurements where a wideband externally polarized microphone is required

Table 5 Free-field TEDS microphones with Type 4939 ¼" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
Classical	Type 4939-A-011	Type 2670	4	-48	4 to 100 k	35 to 164
Classical	Type 4939-C/L-002	Type 2669-C/L with UA-0035	3.5	-49	4 to 100 k	35 to 164

Type 4939 is designed for free-field measurements where a high-frequency, high-level externally polarized microphone is required

Table 6 Free-field TEDS microphones with Type 4954 ¼" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
Classical	Type 4954-A-011	Type 2670	2.8	–51	3 to 80 k	34 to 164
CCLD	Type 4954-A	Integral with SMB	2.8	–51	16 to 80 k	40 to 159
CCLD	Type 4954-B	Integral with 10–32 UNF	2.8	–51	16 to 80 k	40 to 159

Type 4954 is designed for free-field measurements where a high-frequency, high-level prepolarized microphone is required

Table 7 Free-field TEDS microphones with Type 4966 ½" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
CCLD	Type 4966-H-041	Type 1706	50	–26	6.3 to 20 k	16.5 to 134

Type 4966 is suited for free-field measurements where a high-sensitivity prepolarized microphone with full 20 kHz bandwidth is preferred

Pressure-field TEDS Microphones

Pressure-field microphones are optimized to have a flat frequency response in a pressure field. They are used for measurements in small, closed couplers or close to hard, reflective surfaces.

Table 8 Pressure-field TEDS microphones with Type 4192 ½" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
Classical	Type 4192-B/C/L-001	Type 2669-B/C/L	12.5	–38	3.15 to 20 k	20.7 to 162

Type 4192 is designed for pressure-field measurements where a high-sensitivity externally polarized microphone with full 20 kHz bandwidth is preferred

Table 9 Prepolarized pressure-field TEDS microphones with Type 4956 ½" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
CCLD	Type 4956-W-001	Type 2671-W-001	12.5	–38	3.5 to 20 k	26.5 to 135

Type 4956 is designed for pressure-field measurements where a high-frequency, high-level externally polarized microphone is required

Table 10 Pressure-field TEDS microphones with Type 4938 ¼" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
Classical	Type 4938-A-011	Type 2670	1.4	–57	4 to 70 k	42 to 172
Classical	Type 4938-B/C/L-002	Type 2669-B/C/L with UA-0035	1.4	–57	4 to 70 k	42 to 172

Type 4938 is designed for pressure-field measurements where a high-frequency, high-level externally polarized microphone is required

Table 11 Pressure-field TEDS microphones with Type 4944 ¼" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
Classical	Type 4944-A	Integral with SMB	0.9	–61	16 to 70 k	48 to 169
Classical	Type 4944-B	Integral with 10–32 UNF	0.9	–61	16 to 70 k	48 to 169

Type 4944 is designed for pressure-field measurements where a high-frequency, high-level prepolarized microphone is required

Table 12 Pressure-field TEDS microphones with Type 4138 1/8" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
Classical	Type 4138-A-015	Type 2670 with UA-0160	0.56	-65	6.5 to 140 k	52.2 to 168
Classical	Type 4138-B/C/L-006	Type 2669-B/C/L with UA-0036	0.8	-62	6.5 to 140 k	52.2 to 168

Type 4138 is designed for pressure-field measurements where an absolute maximal frequency range is required. This microphone is externally polarized. Type 4138 TEDS microphones do not come with a data CD nor with typical frequency response on the calibration chart.

Diffuse-field TEDS Microphones

Diffuse-field microphones, also called random-incidence microphones, are designed to have a flat response to signals arriving simultaneously from all directions – that is, a random or diffuse field. They should be used in all situations where the sound field is diffuse, and where several sources contribute to the sound pressure at the measurement position. Applications include indoor measurements where the sound is reflected by walls, ceilings and objects in the room, including in reverberation chambers, and in-cabin measurements.

Table 13 Diffuse-field TEDS microphones with Type 4942 1/2" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
Classical	Type 4942-B/C/L-001	Type 2669-B/C/L	50	-26	6.3 to 16 k	15.2 to 146
CCLD	Type 4942-A-021	Type 2671	50	-26	20 to 16 k	18 to 134
CCLD	Type 4942-A-031	Type 2699	50	-26	A-weighted	18 to 131
CCLD	Type 4942-H-041	Type 1706	50	-26	6.3 to 20 k	18 to 134

Type 4942 is designed for diffuse-field measurements where a high-sensitivity prepolarized microphone with wide bandwidth is preferred.

Table 14 Diffuse-field TEDS microphones with Type 4943 1/2" cartridge

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
Classical	Type 4943-B/C/L-001	Type 2669-B/C/L	50	-26	3.15 to 10 k	15.9 to 148

Type 4943 is designed for diffuse-field measurements where a high-sensitivity externally polarized microphone is preferred.

Special TEDS Microphones

A number of special TEDS microphones are available:

- Infrasound Microphone Type 4193
- High-intensity Pressure-field Microphones Type 4941
- Aerospace Surface Microphone Type 4948
- Automotive Surface Microphone Type 4949
- Low-noise Free-field Microphone Type 4955
- Low-noise Free-field Microphone Type 4955-A, for hand-held analyzers such as Type 2250/2270
- 10 kHz Array Microphone Type 4957
- 20 kHz Array Microphone Type 4958
- Short 20 kHz Array Microphone Type 4959
- Multi-field Microphone Type 4961

Table 15 Special TEDS Microphones

Input	Microphone	Preamplifier	mV/Pa	dB re 1 V/Pa	±2 dB Frequency Range (Hz)	Dynamic Range (dB)
Classical	Type 4193-B/C/L-004	Type 2669-B/C/L with UC-0211	2	-54	0.1 to 20 k	29 to 148
Classical	Type 4941-A-011	Type 2670	0.08	-82	4 to 20 k	73.5 to 184
Classical	Type 4941-C-002	Type 2669-C with UA-0035	0.08	-82	4 to 20 k	75.8 to 184
Classical	Type 4955	Integral	1100	0.8	10 to 16 k	6.5 to 110
Classical	Type 4955-A	Integral	1100	0.8	10 to 16 k	6.5 to 110
CCLD	Type 4948	Integral	1.4	-57	5 to 20 k*	55 to 160
CCLD	Type 4949	Integral	11.2	-39	5 to 20 k*	30 to 140
CCLD	Type 4957	Integral	11.2	-39	50 to 10 k	32 to 134
CCLD	Type 4958	Integral	11.2	-39	10 to 20 k	28 to 140
CCLD	Type 4959	Integral	11.2	-39	50 to 20 k	32 to 134
CCLD	Type 4961	Integral	60	-24.5	12 to 20 k	20 to 130

* ±3 dB pressure response limits

Types 4941, 4957, 4958 and 4959 microphones do not come with an individual data CD nor with typical frequency response on the calibration chart

Ordering Information

If you do not see what you are looking for, please ask your local Brüel & Kjær sales office for a quote on a customized solution.

Order No.	Mini CD Incl.	Description
Type 4101-A	No	Binaural Microphone
Type 4138-A-015	No	Pressure-field 1/8" Mic. Type 4138, Preamp. Type 2670, Adaptor UA-0160
Type 4138-B-006*	No	Pressure-field 1/8" Mic. Type 4138, Preamp. Type 2669-B, Adaptor UA-0036
Type 4138-C-006	No	Pressure-field 1/8" Mic. Type 4138, Preamp. Type 2669-C, Adaptor UA-0036
Type 4138-L-006	No	Pressure-field 1/8" Mic. Type 4138, Preamp. Type 2669-L, Adaptor UA-0036
Type 4188-C-001	No	Prepolarized Free-field 1/2" Mic. Type 4188, Preamp. Type 2669-C
Type 4188-L-001	No	Prepolarized Free-field 1/2" Mic. Type 4188, Preamp. Type 2669-L
Type 4188-A-021	No	Prepolarized Free-field 1/2" Mic. Type 4188, Preamp. Type 2671
Type 4189-B-001*	Yes	Prepolarized Free-field 1/2" Mic. Type 4189, Preamp. Type 2669-B
Type 4189-C-001	Yes	Prepolarized Free-field 1/2" Mic. Type 4189, Preamp. Type 2669-C
Type 4189-L-001*	Yes	Prepolarized Free-field 1/2" Mic. Type 4189, Preamp. Type 2669-L
Type 4189-A-021	Yes	Prepolarized Free-field 1/2" Mic. Type 4189, Preamp. Type 2671
Type 4189-A-031	Yes	Prepolarized Free-field 1/2" Mic. Type 4189, Preamp. Type 2699
Type 4189-H-041	Yes	Prepolarized Free-field 1/2" Mic. Type 4189, Preamp. Type 1706
Type 4189-W-003	Yes	Prepolarized Free-field 1/2" Mic. Type 4189, Preamp. Type 2671-W-001
Type 4190-B-001*	Yes	Free-field 1/2" Mic. Type 4190, Preamp. Type 2669-B
Type 4190-C-001	Yes	Free-field 1/2" Mic. Type 4190, Preamp. Type 2669-C
Type 4190-L-001	Yes	Free-field 1/2" Mic. Type 4190, Preamp. Type 2669-L
Type 4190-L-002	Yes	Free-field 1/2" Mic. Type 4190, Preamp. Type 2669-L, Adaptor UA-1260
Type 4191-B-001*	Yes	Free-field 1/2" Mic. Type 4191, Preamp. Type 2669-B
Type 4191-C-001	Yes	Free-field 1/2" Mic. Type 4191, Preamp. Type 2669-C
Type 4191-L-001	Yes	Free-field 1/2" Mic. Type 4191, Preamp. Type 2669-L
Type 4192-B-001*	Yes	Pressure-field 1/2" Mic. Type 4192, Preamp. Type 2669-B
Type 4192-C-001	Yes	Pressure-field 1/2" Mic. Type 4192, Preamp. Type 2669-C
Type 4192-L-001	Yes	Pressure-field 1/2" Mic. Type 4192, Preamp. Type 2669-L
Type 4193-B-004*	Yes	Pressure-field 1/2" Mic. Type 4193, Preamp. Type 2669-B, Adaptor UC-0211
Type 4193-C-004	Yes	Pressure-field 1/2" Mic. Type 4193, Preamp. Type 2669-C, Adaptor UC-0211
Type 4193-L-004	Yes	Pressure-field 1/2" Mic. Type 4193, Preamp. Type 2669-L, Adaptor UC-0211
Type 4938-A-011	Yes	Pressure-field 1/4" Mic. Type 4938, Preamp. Type 2670
Type 4938-C-002	Yes	Pressure-field 1/4" Mic. Type 4938, Preamp. Type 2669-C, Adaptor UA-0035
Type 4938-L-002	Yes	Pressure-field 1/4" Mic. Type 4938, Preamp. Type 2669-L, Adaptor UA-0035
Type 4939-A-011	Yes	Free-field 1/4" Mic. Type 4939, Preamp. Type 2670
Type 4939-C-002	Yes	Free-field 1/4" Mic. Type 4939, Preamp. Type 2669-C, Adaptor UA-0035
Type 4939-L-002	Yes	Free-field 1/4" Mic. Type 4939, Preamp. Type 2669-L, Adaptor UA-0035
Type 4941-A-011	No	High-level Pressure-field 1/4" Mic. Type 4941, Preamp. Type 2670
Type 4941-C-002	No	High-level Pressure-field 1/4" Mic. Type 4941, Preamp. Type 2669-C, Adaptor UA-0035
Type 4942-B-001*	Yes	Prepolarized Diffuse-field 1/2" Mic. Type 4942, Preamp. Type 2669-B
Type 4942-C-001	Yes	Prepolarized Diffuse-field 1/2" Mic. Type 4942, Preamp. Type 2669-C
Type 4942-L-001	Yes	Prepolarized Diffuse-field 1/2" Mic. Type 4942, Preamp. Type 2669-L
Type 4942-A-021	Yes	Prepolarized Diffuse-field 1/2" Mic. Type 4942, Preamp. Type 2671
Type 4942-A-031	Yes	Prepolarized Diffuse-field 1/2" Mic. Type 4942, Preamp. Type 2699
Type 4942-H-041	Yes	Prepolarized Diffuse-field 1/2" Mic. Type 4942, Preamp. 1706

Order No.	Mini CD Incl.	Description
Type 4943-B-001*	Yes	Diffuse-field 1/2" Mic. Type 4943, Preamp. Type 2669-B
Type 4943-C-001	Yes	Diffuse-field 1/2" Mic. Type 4943, Preamp. Type 2669-C
Type 4943-L-001	Yes	Diffuse-field 1/2" Mic. Type 4943, Preamp. Type 2669-L
Type 4944-A	No	Pressure-field 1/4" Mic. Type 4944 with SMB socket
Type 4944-B	No	Pressure-field 1/4" Mic. Type 4944 with 10–32 UNF socket
Type 4948	No	Aerospace Surface Microphone
Type 4949	No	Automotive Surface Microphone
Type 4954-A	No	Free-field 1/4" Mic. Type 4954 with SMB socket
Type 4954-B	No	Free-field 1/4" Mic. Type 4954 with 10–32 UNF socket
Type 4954-A-011	Yes	1/4" Prepolarized Free-field Mic. Type 4954, Preamp. Type 2670
Type 4955	Yes	1/2" Low-noise Free-field Microphone
Type 4955-A	Yes	1/2" Low-noise Free-field Microphone for hand-held analyzers such as Type 2250/2270
Type 4956-W-001	Yes	Prepolarized Pressure-field 1/2" Mic. Type 4956 with Preamp. Type 2671-W-001
Type 4957†	No	10 kHz Array Microphone
Type 4958‡	No	20 kHz Precision Array Microphone
Type 4959	No	Short 20 kHz Array Microphone
Type 4966-H-041	Yes	Prepolarized Free-field 1/2" Mic. Type 4966 with Preamp. Type 1706
Other TEDS Related Equipment		
BZ-5294	–	TEDS Editor Kit
ZZ-0245	–	In-line TEDS Adaptor for CCLD Transducer without TEDS
Type 2467-A	–	1 mV/pC Charge to CCLD Converter with TEDS
Type 2647-B	–	10 mV/pC Charge to CCLD Converter with TEDS
Type 2647-C	–	0.1 mV/pC Charge to CCLD Converter with TEDS

* These types are delivered with a LEMO to Brüel & Kjær cable AO-0428. This cable does **NOT** support TEDS

† TEDS to IEEE 1454.4, V1.0, UDID No. 127–0–0–0U

‡ TEDS to IEEE 1454.4, V1.0, UDID No. 127–0–0–1 U with complex transfer function

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