



INFRARED WIRELESS CLASSROOM SYSTEM



COOKBOOK

Description

The IR-802 System features the world's first ceiling-speaker with built-in infrared (IR) receiver and amplifier. The IR-802 is designed to enhance educational performance and simplify installation in a typical 30' x 30' classroom setting. It provides greater speech intelligibility, which studies have shown, help boost student achievement in primary school education.

The system's integrated wide-dispersion speaker (with a built-in Class D Amplifier) distributes uniform, quality sound throughout the classroom, without the inconsistency or "dead spots" associated with multispeaker systems.

The light-weight IR wireless Teacher's microphone help reduce physical & vocal fatigue during classes.

A compact, yet flexible IR Tuner / Mixer allows two IR Wireless Microphones to be used simultaneously in a given classroom, while remaining totally isolated from other IR microphones used in adjacent classrooms. The transmission is immune to eavesdropping and interference from broadcast signals (such as digital television and dispatch radio) that can be frequently experienced with RF transmission.

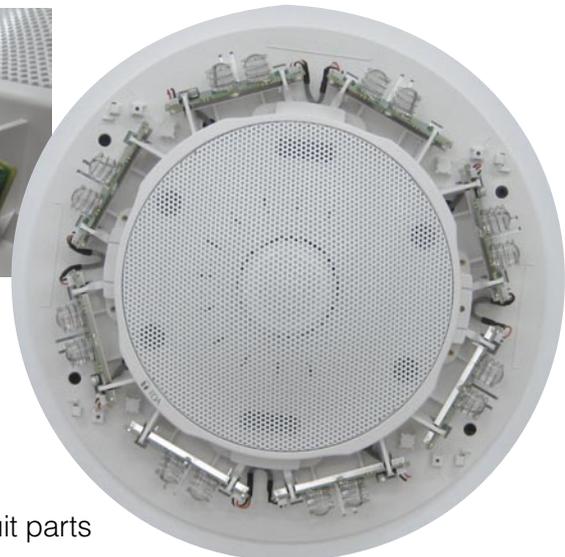
The mixer also provides inputs for audio sources, such as DVD Players, PC audio & MP3 players and also has an adjustable output for connection to other systems such as Assisted Listening, Recording & Remote classroom. A Mute Input is provided for override of classroom audio from school-wide priority paging signal. The IR-802T is compact enough to mount on a wall for convenient access or under the teacher's desk for greater security (mount kit optional).

The Speaker/Amplifier/IR Sensor connects to the Tuner/Amplifier via a single CAT5 cable, so installation and setup are fast and simple, greatly reducing install labor costs.

The IR-802 system is UL 2043 –rated for installation in air-handling plenum spaces.

Stable Transmission

Precisely calculated receiver circuit parts arrangement provides 30 ft x 30 ft reception coverage.



A total of 16 infrared receiver circuit parts

Description

The IR-802 System Kit includes the following components:

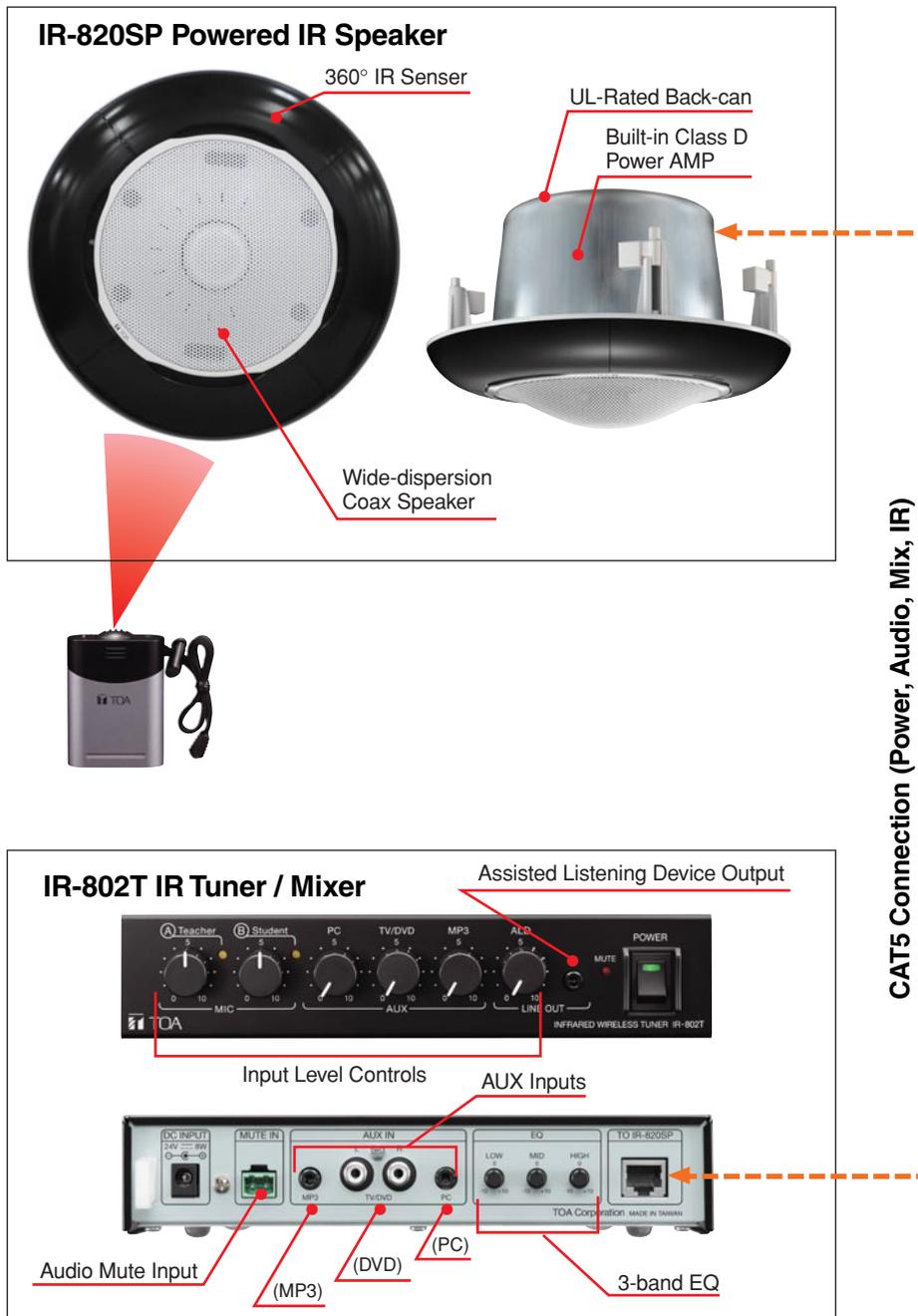
IR-802T – IR Tuner / Mixer

IR-820SP – Amplified Speaker /IR Sensor

IR-300M – IR Wireless Pendant (Teacher's) Microphone

IR-200BT-2 – 2 x Rechargeable NiMH AA batteries (for IR-300M)

IR-200BC – Dual Mic Charging Station



IR Wireless Tuner. Speaker, Microphone

IR-802T IR Wireless Tuner / Mixer

- Integrated 2-channel IR Tuner for use with two IR Wireless Mic Transmitters
- 5-input mixer (2 IR Mics, 3 x AUX in for PC, DVD Player & MP3 Player) w/ independent volume adjustment
- ALD (Assisted Listening Device) Output with level control, provides audio feed to external systems
- 3-Band EQ for tonal adjustment to suit different class environment or to compensate for feedback.
- Mute Input allows connection of school paging signal for priority override of classroom audio
- Simple CAT5 connection to Speaker/Amp/IR Sensor unit (IR-820SP) for fast, easy installation.
- Compact size allows convenient placement on wall, under teacher's desk or in standard EIA rack (w/optional mount kit)
- Supplied security knobs (x6) prevents tampering with level adjustments



IR-820SP Powered In-Ceiling Speaker / IR Sensor

- Integrated speaker/Amplifier & IR sensor allows simply connection and easy installation with a single CAT5 cable
- Incorporates a highly efficient 20W Class D amplifier for compact size, minimal power consumption and low heat
- 360° IR sensor has extremely wide pickup area for reliable reception
- Ultra wide-dispersion (170°) 5' coax speaker provides even coverage and intelligible sound throughout the room, without dead spots or poor coverage common with multi-speaker systems. A single speaker can perform the job of a typical 4-speaker setup.
- Easy In-ceiling mounting with supplied reinforcement ring on on-ceiling with optional back can
- UL-2043 rated for plenum installation



IR-300M Infrared Wireless Microphone for Teacher (Hands-free)

- Easy-to-wear, neck-suspended design means unit can be ready for use quickly.
- Can be used with a built in mic or external mic.
- An external MIC input level adjustment function allows sensitivity adjustment if the connected external microphone has a different sensitivity.
- PLL synthesized.
- Infrared light emission intensity is adjustable at 2 levels (High/Normal).
- Low battery indicator



Proper positioning of Teacher's Pendent Microphone

* Note: The IR pendent mic cannot be worn on a belt or placed in a pocket. It must be "visible" to the IR sensors on the speaker housing, so it should be as line-of-sight as possible.



Battery Charger / Battery / Optional

IR-200BC Battery Charger

- Capable of charging up to 2 microphones
- (both hand-held and hands-free types) at time.
- Equipped with protective features for safety considerations (detection of battery irregularities and temperature monitoring for protection against overcharging).
- With rapid charging feature, up to 2 infrared microphones can be simultaneously charged in 3 hours (maximum).

Note: Can charge only IR-200M and IR-300M with IR-200BT-2



IR-200BT-2 2 x Rechargeable NiMH Batteries

- Batteries for IR-200M and IR-300M
- Ni-MH rechargeable battery (containing 2 pieces)
- 2300mAh (min)



Optional

IR-200M Infrared Wireless Microphone for Student (Hand-held)

- Hand-held microphone for speech use.
- PLL synthesized.
- Infrared light emission intensity is adjustable at 2 levels (High/Normal).
- Low battery indicator

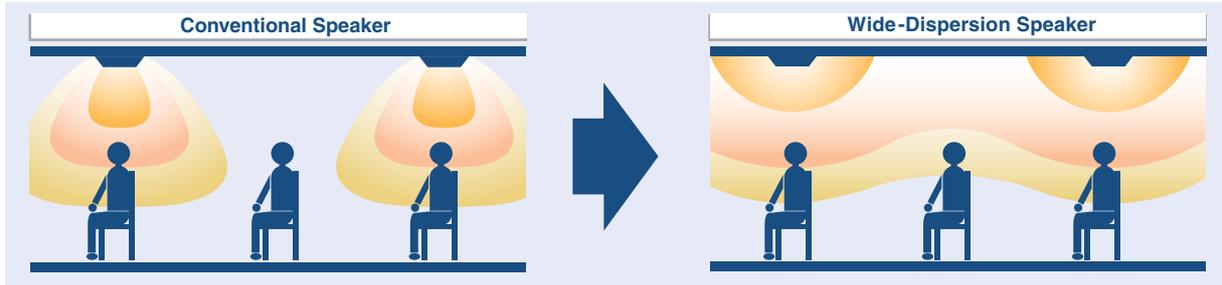


Options include:

- IR-200WB Wall-Bracket kit
- HY-TB1 Tile Support Rails
- YP-101 Omni-Directional Lavalier Mic (for Teacher's Hands-free microphone)
- Q-EM-77 Headset Condenser Mic (for Teacher's Hands-free microphone)

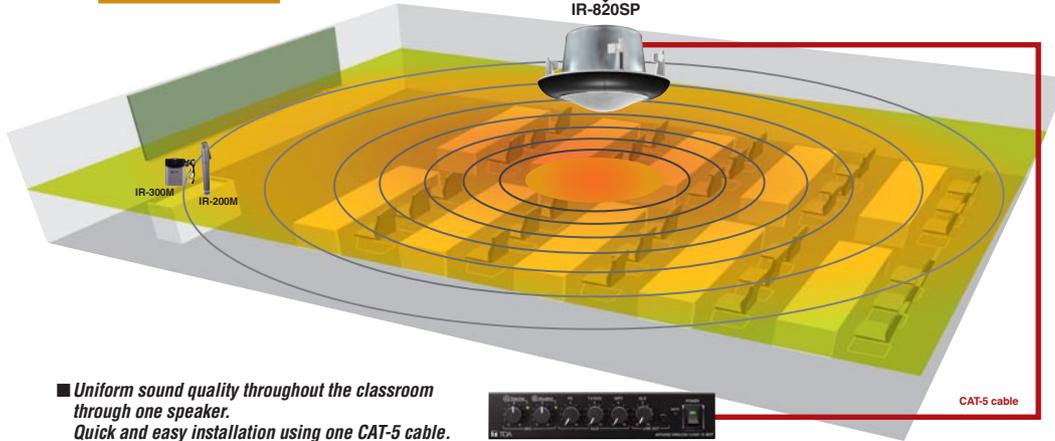
Wide dispersion Speaker Technology

Expanded listening area coverage thanks to the extra-wide dispersion characteristics of TOA's ceiling speakers makes it possible to utilize **only one speaker** to cover 30ft x 30 ft area, allowing more cost-effective installations.



TOA IR Classroom System
Simple and easy

Digital Amplifier (Class D)
+ Receiver
+ Wide-dispersion ceiling speaker
IR-820SP

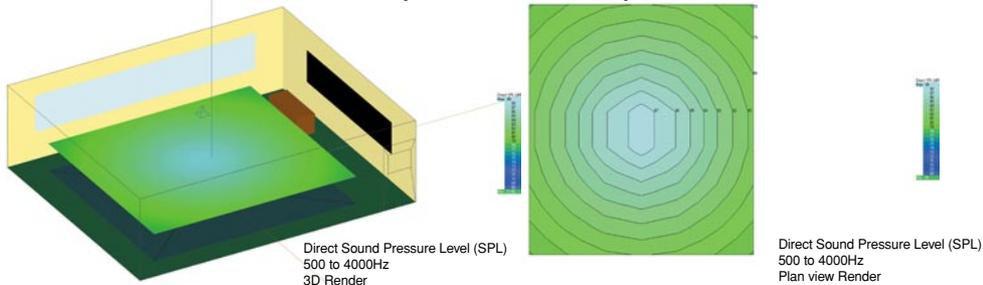


■ Uniform sound quality throughout the classroom through one speaker. Quick and easy installation using one CAT-5 cable.

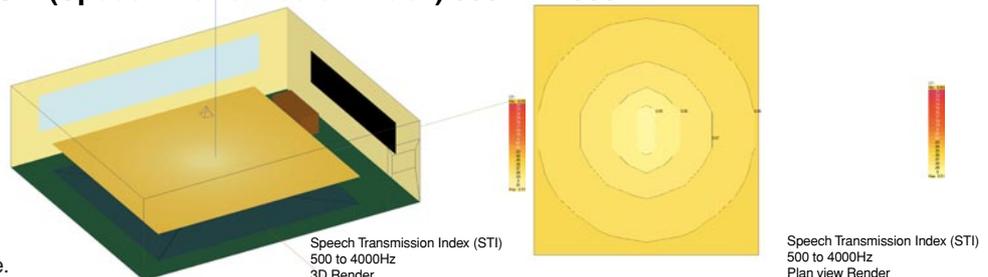
IR-802T (Built-in Preamp)

Demonstration of Performance with EASE Models

Direct Sound Pressure Level (500Hz – 4000Hz)



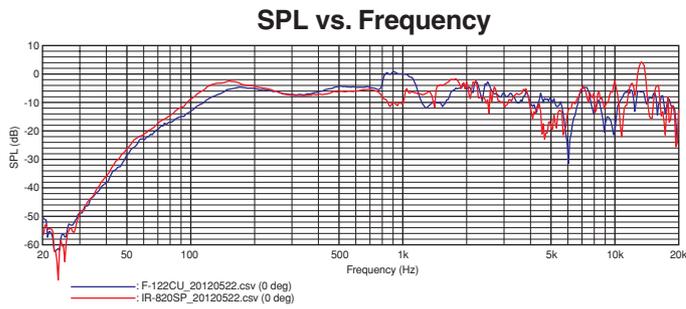
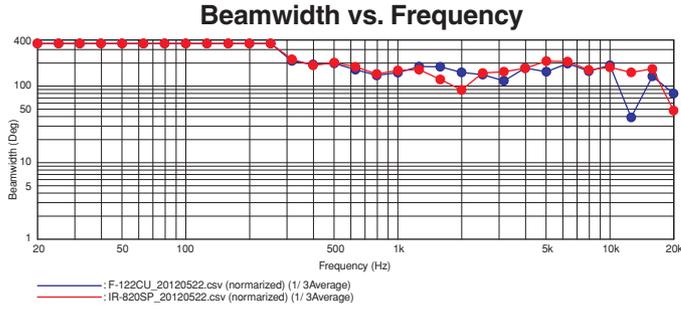
STI (Speech Transmission Index) 500Hz -4000Hz



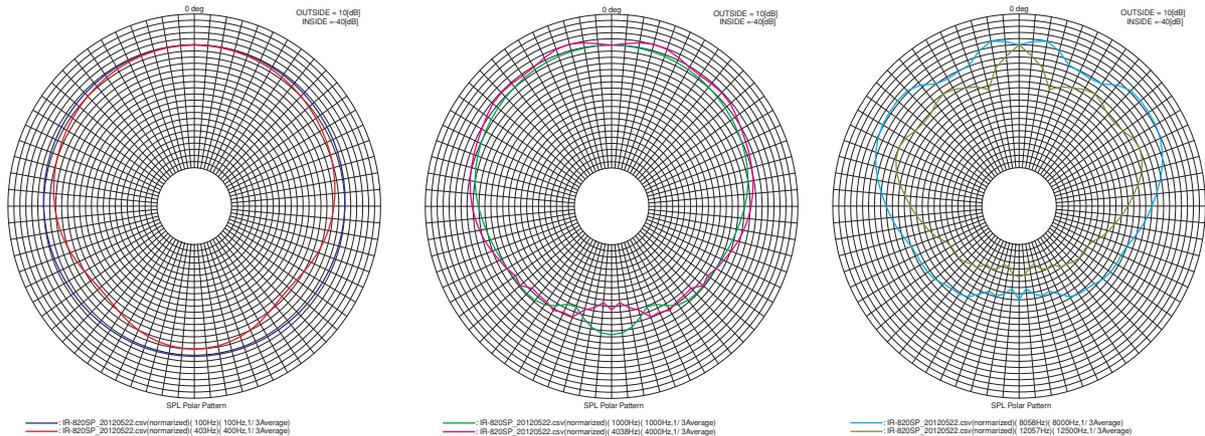
* For reference. This is a similar product, F-122CU's simulation image.

Wide dispersion Speaker Technology

Characteristics Diagrams



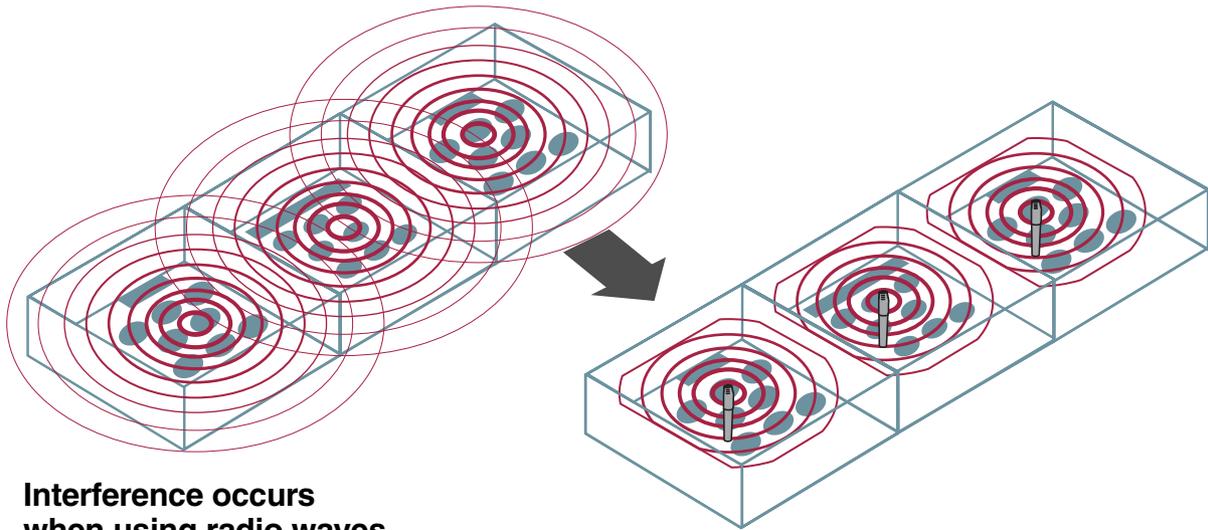
Polar Response



Infrared System Advantage

Repeated use in Adjacent Rooms

With walls providing a shield, microphones can be used without the worry of interference from adjacent rooms. For example, setting microphones for use on the same channel makes it possible for a single microphone to be used in any room at all.

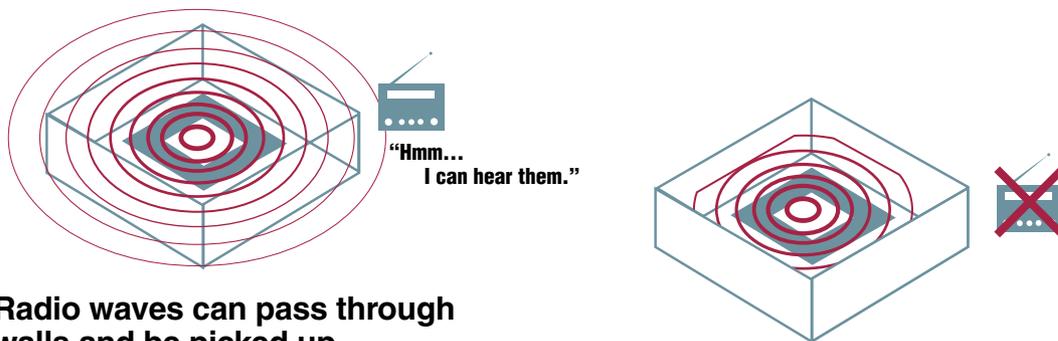


Interference occurs when using radio waves

No interference occurs when using infrared

Prevents Close Vicinity Information Leaks

Unlike wireless microphones that use radio waves, there is no careless leaking of conferences or conversations, so the system can be used with peace of mind. It's perfect for such places as courts, police affairs, executive boardrooms or places where important conferences are held.



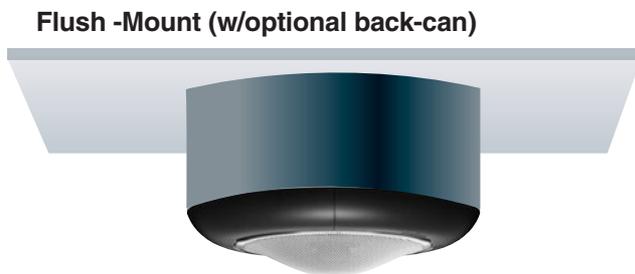
Radio waves can pass through walls and be picked up

With infrared, transmission is blocked by walls and cannot leak outside

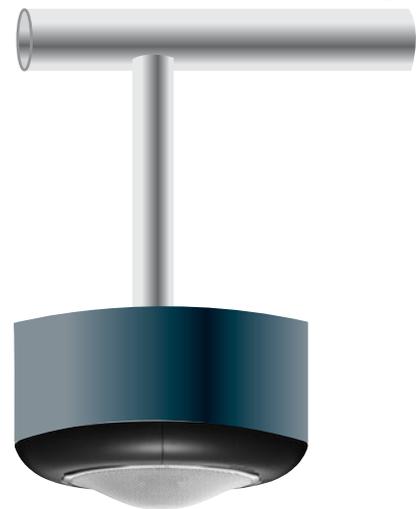
Speaker Installation

Installation

The IR-820SP is designed for installation in plenum ceilings and is UL-2043 rated. The integrated backcan may be mounted directly in the ceiling cut-out. A supplied reinforcement trim ring is used to brace the speaker in the cut-out. An optional tile bridge (HY-TB1) may be required for installations in ceiling tiles. The mounting clamps may be adjusted to fit the mounting ring (supplied) snugly. For surface mounting, or situations where the speaker cannot be placed “in-ceiling”, a surface back-can should be used.



Surface mount in open ceilings

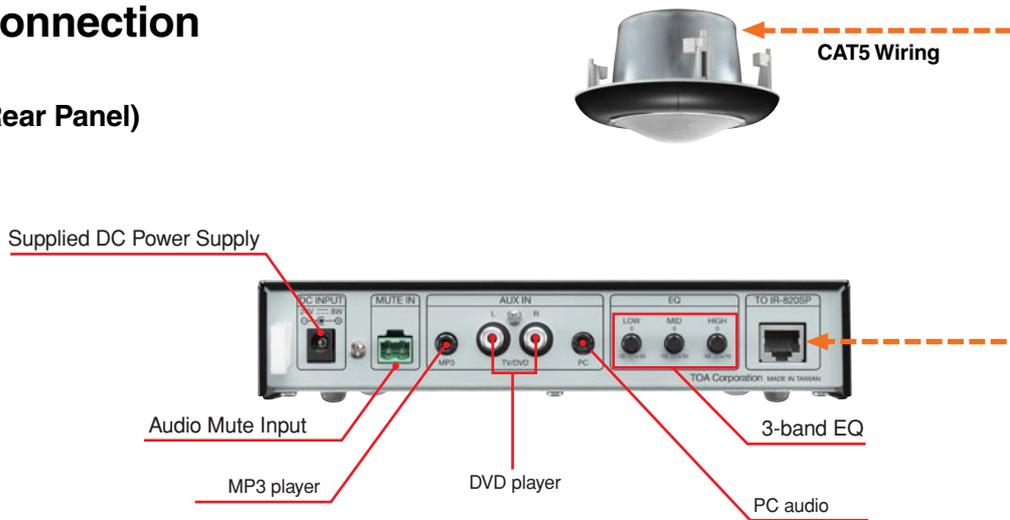


CAT 5 (plenum-rated) w/RJ-45 termination

Connection/Operation

Connection

(Rear Panel)



(Front Panel)



* MUTE override is VOX signal (not contact closure) and will mute the main output as well as the ALD output

Operation

Recharging: When used with the rechargeable NiHM batteries, at the end of the day, the mics can be inserted directly into the charging cradle and be fully charged and ready for use the next day.



Tuning: Mics/Tuner can be set to either of two Infra-red frequencies.

The teacher may move from classroom to classroom (each equipped with a similar system) without having to reset the mic or tuner and without the need for coordinating frequencies



Precautions Regarding the Installation Environment

This system uses infrared transmissions and will not operate properly in an environment where external factors that obstruct infrared transmissions exist. The following are some examples of the external factors that may obstruct infrared transmissions.

a. Plasma Displays (PDP)

When PDP screens emit light, they release extremely large amounts of infrared rays. When using an infrared microphone system in the same place as a PDP, the infrared wireless receiver may pick up the rays and not operate correctly.

For this reason, avoid using the system in conjunction with a PDP.

Note: LCD displays do not affect performance.

b. Parallel Use With Other Infrared Systems

Do not use this system at the same time as other equipment systems using similar infrared transmissions that regularly emit powerful infrared rays.

Such examples include

infrared simultaneous translation systems,

infrared hearing aid systems and

infrared wireless LAN systems.

Note: Infrared remote controls barely affect performance.

c. Sunlight

Correct performance of the system cannot be guaranteed in the event of it being exposed to direct sunlight. For that reason, the system cannot be used outdoors.

Follow construction precautions correctly when installing receivers indoors, and indirect sunlight should not affect their performance.

d. Lighting Equipment

Incandescent lighting (such as halogen lamps) emits components of near infrared rays.

Therefore, if powerful spotlights or down lights directly reflect on a receiver, it may adversely affect transmission performance.

In environments such as large halls where large amounts of incandescent lighting is used and powerful rays emitted, it may affect the performance in such ways as shortening transmittable distances.

Note: Lighting forms such as fluorescent lights or mercury lamps have almost no effect on performance.

e. Specific Blackboard

The system may be unstable depending on blackboard types. Specific blackboard cannot reflect infrared rays.

Therefore, the demonstration will be necessary when installing the system in a room with blackboard.

IR-802T Infrared Wireless Tuner

Power Source	120 V AC, 50/60 Hz (supplied AC adapter must be used)
Power Consumption	8 W (based on UL standards) Max. 40.8 W (rated output of IR-820SP)
Receiving Frequency	Teacher (Channel A): 3.100 MHz Student (Channel B): 3.350 MHz
Receiver Sensitivity	50 dB or more, Signal-to-noise ratio (40 dB μ V input, 1 kHz modulation, \pm 4.8 kHz deviation)
S/N Ratio	Tuner: 60 dB or more (60 dB μ V input, 1 kHz modulation, \pm 4.8 kHz deviation, A-weighted, Equalization: Centered) AUX: 75 dB or more (A-weighted, Equalization: Centered)
Tone Squelch Frequency	32.768 kHz
Input	AUX PC: line, -10 dB*, 10 k Ω , unbalanced, stereo mini jack (internal mixing) AUX DVD/TV: line, -10 dB*, 10 k Ω , unbalanced, 2P RCA jack (internal mixing) AUX MP3: line, -10 dB*, 10 k Ω , unbalanced, stereo mini jack (internal mixing) Mute: 25 V line signals of telephone paging from a school intercom system
Output	ALD (Assistive Listening Device): line, -10 dB*, 10 k Ω , unbalanced, monaural mini jack Speaker: RJ45 (dedicated terminal for IR-820SP connection)
Equalization	High: \pm 10 dB at 10 kHz/Mid: \pm 10 dB at 1.3 kHz/Low: \pm 10 dB at 100 Hz
Mute Function	Muted by 25 V line signals
LED Indicator	Power (green) \times 1, Infrared reception (yellow) \times 2, Mute (red) \times 1
Operating Temperature	14°F to 122°F (-10°C to 50°C)
Operating Humidity	90%RH or less (no condensation)
Finish	Panel: Aluminium, black/Case: Steel plate, black
Dimensions	8.27" (W) \times 1.81" (H) \times 12.28" (D)
Weight	3.97 lb
Accessories	AC adapter(DC cord length:5.91 ft) \times 1, AC power cord (6.56 ft) \times 1 Volume control cover \times 6, Removable terminal plug (2 pins) \times 1
Option	Half-width blank panel: MB-15B-BK

*0 dB = 1V

IR-820SP Infrared Speaker

Power Source	24 V DC (supplied from IR-802T)
Power Consumption	4.4 W (based on UL standard)
Rated Output	20 W
Frequency Response	100 Hz – 20 kHz (-10 dB) at installation in 1/2 free sound field (Measured by installing the unit in the center of a ceiling.)
Amplification System	Class D
Distortion	5% or less (rated output, A-weighted)
Speaker Component	12 cm (4.72") cone-type
Infrared Wireless Receiver	
Wavelength	870 nm
Carrier Frequency	Teacher (Channel A) : 3.100 MHz Student (Channel B) : 3.350 MHz
Reception Angle	360° (Horizontal)

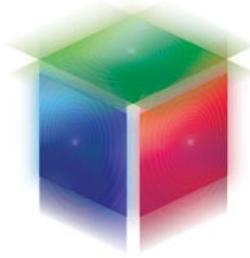
Connection Terminal	RJ-45
LED Indicator	Power (green) × 1
Mounting Hole	ø11.81"
Connection Cable	CAT-5 UTP
Operating Temperature	14°F to 122°F (-10°C to 50°C)
Operating Humidity	90% RH or less (no condensation)
Finish	Enclosure : Steel plate, plating Baffle : Fire-resistant ABS resin (resin material grade: UL94V-0), white Punched net : Steel plate, white Filter section : Polycarbonate, optical cut filter
Dimensions	ø12.6" × 8.07" (D)
Weight	7.5 lb
Accessories	Safety wire × 1, Ceiling reinforcement ring × 1, Trim ring × 1, Paper pattern × 1
Option	Tile bar bridge: HY-TB1

*0 dB = 1V

SPECIFICATIONS

IR-200M Hand-held Microphone IR-300M Hands-free Microphone

	IR-200M	IR-300M
Batteries	IR-200BT-2 rechargeable batteries for the infrared wireless microphone (option) or AA alkaline dry cell batteries (2 pieces)	
Current Consumption	typ.250 mA (2.4 V, Power selector switch: N)/ typ.340 mA (2.4 V, Power selector switch: H)	
Infrared Emitter Wavelength Modulation Method Carrier Frequency Transmission Distance	870 nm (AM: Brightness modulation) Frequency modulation Channel A: 3.100 MHz/Channel B: 3.350 MHz Approx. 65 ft (Power selector switch: H; In an unobstructed space)/ Approx. 50 ft (Power selector switch: N; In an unobstructed space)	
Tone Signal	32.768 kHz	
Modulation Sensitivity	±4.8 kHz (1 kHz, when SPL of 84 dB is input)	
Maximum Input Sound Pressure	120 dB SPL	
Input Sensitivity Adjustment	—	Adjustment range: -9 dB to 0dB (factory-preset: 0 dB)
Microphone Unit	Unidirectional electret condenser microphone	
Frequency Response	100 Hz – 12 kHz	
Preemphasis	300 μs	
Input	—	External microphone input (ø3.5 monaural mini jack)
Battery Operation Time	Approx. 8 hours (when IR-200BT-2 rechargeable batteries for the infrared wireless microphone are used; Power selector switch: N) Approx. 6 hours (when alkaline batteries are used; Power selector switch: N)	
Operating Temperature	32°F to 104°F	
Operating Humidity	30% to 85% RH	
Finish	Control Section: ABS resin, metallic gray, 50% gloss, paint/ Filter Section: Polycarbonate, optical cut filter	
Dimensions	ø1.46" × 9.52"	2.52" (W) × 3.59" (H) × 1.07" (D)
Weight	0.37 lb (with batteries)	0.29 lb (with batteries and strap)
Accessories	Screw driver (for setting) × 1, Color label (6 colors) × 1	



**Human Society with
Sound & Communication**

TOA Corporation