

# SMA/E01 Series

## TECHNICAL DATA

### Digital Hybrid Wireless® Super-Miniature UHF Transmitters SMA, SMDa, RM

- Miniature splash-proof housing and panel
- Membrane switches and LCD interface
- Servo bias input preamp for any microphone
- Superhard corrosion-resistant finish
- Digital Hybrid and analog compatibility
- Audio tone remote-controlled setup
- GORE-TEX® vent equalizes internal and external temperature\*



The SM Series family brings Digital Hybrid Wireless® technology to miniature transmitters in several different configurations for essentially any wireless microphone application with a lavalier microphone. The tiny size of the single battery SMA model makes concealment easy, yet with a full 50 mW output, it does not sacrifice performance. The dual battery SMDa model doubles the battery life of the SMA with the same feature set, and the unique RM provides audio coupled remote control for both models. Switching power supplies throughout the design allow long battery life with NiMH batteries.

**Digital Hybrid Wireless®** is a revolutionary design that combines digital audio with an analog FM radio link to provide both outstanding audio quality and exemplary, noise-free RF performance.

Using a patented algorithm to encode 24-bit digital audio information in the transmitter into an analog format, the encoded signal is then transmitted over an analog FM wireless link.

At the receiver, the signal is then decoded to restore the original digital audio. This process eliminates compander artifacts and produces an audio frequency response flat to 20 kHz.

(US Patent 7,225,135)

Membrane switches and an LCD interface make setup quick and simple. Multiple functions are clearly marked on the panel, with on-screen prompts as reminders when another switch must be held or the selection is locked.

The innovative Servo Bias input provides a programmable, regulated voltage to accommodate a wide variety of electret microphones. It is no longer necessary to install resistive pads for some mics to prevent overload of the input stage, divide the bias voltage down for some low voltage mics, or reduce the limiter range at minimum gain settings. To simplify wiring connectors, a single configuration for all microphones is now available for Servo Bias inputs, and an alternate wiring configuration works well with Servo Bias and all other 5-pin inputs on LECTROSONICS transmitters. Two bicolor LEDs make adjusting input levels for proper modulation easy and accurate.

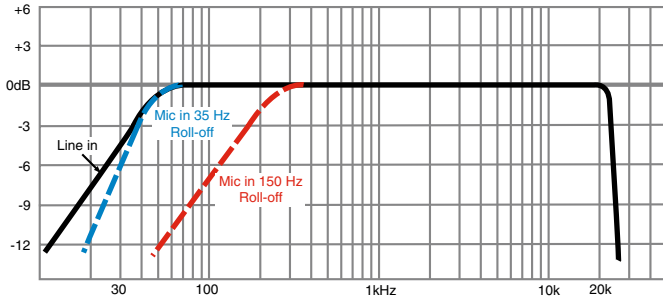
The splash-proof housings are machined out of solid aluminum, which is then plated with a superhard, non-corrosive coating. The units are equally at home in theatre, television and film where temperature and environmental extremes require superior performance under the most demanding conditions.



\*GORE-TEX® is a registered trademark of W. L. Gore & Associates

## Adjustable Low Frequency Roll-off

The low frequency roll-off can be set for 3 dB down points of 35, 50, 70, 100, 120 or 150 Hz to control subsonic and very low frequency audio content. With microphones the roll-off can be set to begin at a higher frequency and more gradual slope, or at a lower frequency and steeper slope. A fixed corner point and slope are provided for line level input.



## DSP-Based Pilot Tone & Compatibility

The DSP generated pilot tone eliminates the need for fragile crystals and allows a different pilot tone frequency for each of the 256 carrier frequencies in the tuning range of the wireless system. Individual pilot tones significantly reduce squelch problems in multichannel systems where a pilot tone signal can appear in the wrong receiver via intermodulation products.

## DSP Compatibility Mode

A DSP algorithm emulates allows the SM Series transmitters to be used with the Lectrosonics analog IFB system, which is convenient for monitoring or diagnostics.

## Input Limiter

A DSP-controlled analog audio limiter is employed before the analog-to-digital converter. The limiter has a range of more than 30 dB for excellent overload protection. A dual release envelope makes the limiter acoustically transparent while maintaining low distortion. The limiter recovers quickly from brief transients, so that its action is hidden from the listener, but recovers slowly from sustained high levels, to keep audio distortion low and preserve short term dynamic changes.

The bicolor LEDs indicate limiter activity accurately to assist in setting the input gain for optimal signal to noise ratio and dynamic range.

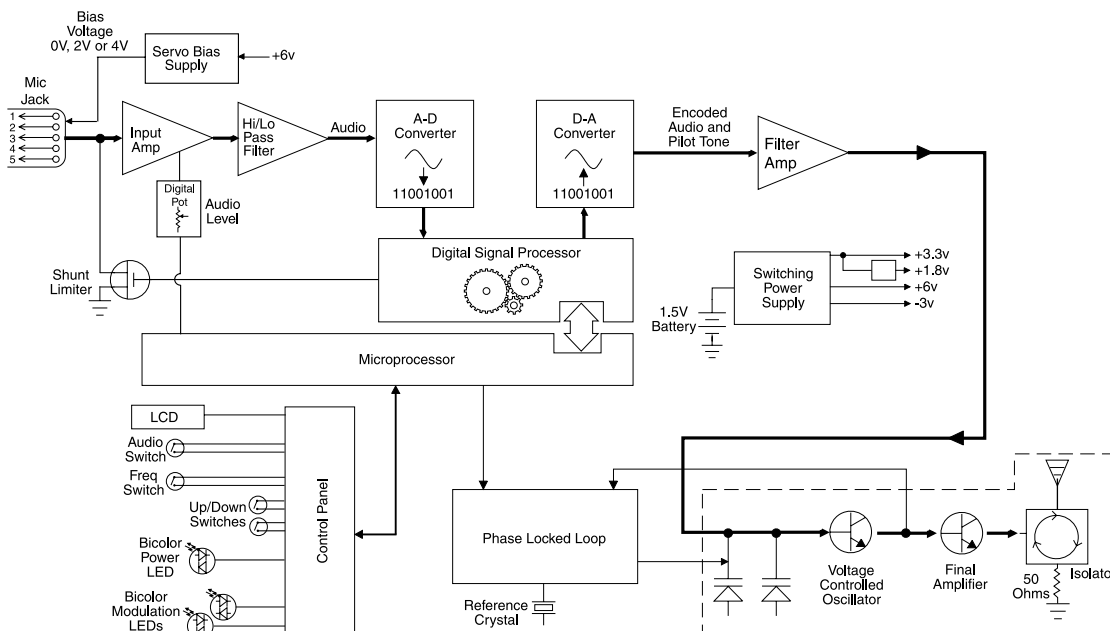
## Circulator/Isolator

The transmitter RF output circuit includes a specialized RF device called a "circulator/isolator" or simply "isolator" using a magnetically polarized ferrite to allow RF signals to pass through to the antenna, but block them from coming backward into the transmitter output section. This greatly reduces RF intermodulation produced in the transmitter output stages when multiple units are used in close proximity (a few feet apart). The isolator also helps protect the output stage from electrostatic shock delivered to the antenna. Isolators are common in broadcast and commercial applications, but because of their high cost it is unusual to find them in wireless microphone systems.

## GORE-TEX® Vent

In special circumstances it is possible for moisture to be pulled into the housing when a unit is moved from a warm, damp operating environment, turned off and stored in a cool place. As the warm air inside the unit cools a vacuum is created, pulling air in past the exterior of the housing, bringing moisture with it. A special vent in the battery door prevents a vacuum from being created by allowing air to pass but blocking the passage of water.

## Block Diagram



# RM/E Remote Control for SMa Series Transmitters



The RM/E remote control delivers an audible tone to the microphone to set operating parameters on the wireless transmitter. A “dweedle” tone will play from the speaker on the remote into the microphone and the parameter on the transmitter will be set immediately. Adjustments can be made to set:

- Audio input gain
- Frequency
- Lock or Unlock Modes
- Sleep Mode ON/OFF



The “dweedle” tones used to signal the transmitter are complex and can be detected in the midst of noise, yet they cannot be mistaken for the natural sound entering the microphone.

A single RM/E is capable of controlling any SM Series transmitter in any frequency block. Since it can simultaneously control multiple transmitters, the loudness of the tone is adjustable to suit different situations. With the volume turned up, changes can be made at a distance of up to 6 feet from the microphone. The volume can also be turned down so that only microphones within a few inches of the speaker will pick up the tone.

The RM/E eliminates the need to disturb wardrobe or talent other than to make a quick, hands-free pause to send the dweedle tone into the microphone. Since the microphone is always positioned to pick up sound from the talker's voice, it is always accessible for setup changes using the remote control. Even with the microphone concealed under fabric, the tone will still reach the microphone. A remote control system using an IR (infrared) signal would require a line of sight between remote module and transmitter.

**Input gain** is adjusted by setting the desired value on the LCD on the remote in the same manner as it is adjusted on the transmitter. A single pushbutton press and a brief tone burst then transfers the setting to the transmitter. **Frequency** is adjusted in the same manner, with the options of setting it directly by hex switch code or adjusting it by block and frequency in MHz.

**Lock and Unlock** is used to safeguard the settings and prevent accidental adjustment. When Lock mode is enabled, the switches on the transmitter control panel will not operate. The only way to unlock the controls with the transmitter itself is to remove the battery.

The **Sleep** mode on the transmitters extends battery life during idle conditions. This is very useful when lengthy preparations are necessary, such as when extensive costuming is required before a production. The transmitter and microphone can be placed and concealed early in the process and the transmitter then put to sleep with the remote control, which reduces power consumption by a factor of 5. When the production is ready to start, a quick dweedle tone wakes up the transmitter and normal operation resumes.

The life of the single AA battery that powers the RM/E itself is extremely long. A lithium AA battery may run the unit for several years depending upon how often the unit is used, how loud the tone is played and storage conditions.

The RM/E is packaged in a machined aluminum housing with a rugged corrosion-resistant finish like the transmitters. A membrane switch panel helps protect the LCD and internal circuits from moisture and dust.



*The RM/E is supplied with a quick-release lanyard.*

## Frequency Tuning Range

RF-intense multichannel and mobile venues must have a broad selection of frequencies available to alleviate interference problems, especially with the emergence of DTV telecasts. 256 frequencies are selectable in 100kHz steps across the 25.6MHz tuning range of each frequency block. Nine different blocks are available.

## Battery Compartment

AA battery technology has advanced significantly in recent years, with a variety of high capacity dry cell and rechargeable formats. SMA Series transmitters and the RM/E remote control are designed to take advantage of this new technology and provide extended operating times at high RF power.

## Specifications

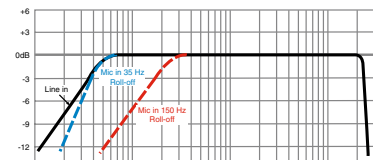
Note: Some specifications apply only when the transmitter is operating in the Digital Hybrid mode.

<b>Operating Frequencies (MHz):</b>	Block 470 470.100 - 495.600 Block 19 486.400 - 511.900 Block 20 512.000 - 537.500 Block 21 537.600 - 563.100 Block 22 563.200 - 588.700 Block 23 588.800 - 614.300 Block 24 614.400 - 639.900 Block 25 640.000 - 665.500 Block 26 665.600 - 691.100 Block 27 691.200 - 716.700 Block 28 716.800 - 742.300 Block 29 742.400 - 767.900 Block 30 768.000 - 793.500 Block 31 793.600 - 819.100 Block 32 819.200 - 844.700 Block 33 844.800 - 861.900
<b>Frequency Range:</b>	256 frequencies in 100kHz steps for each 25.5MHz wide block
<b>Channel Spacing:</b>	100 kHz
<b>RF Power output:</b>	SMA: 50mW (nominal) SMDa: 50mW (nominal)
<b>Pilot tone:</b>	25 to 32kHz; 3kHz deviation; unique pilot tone frequency for each selected carrier frequency (400 Series mode)
<b>Frequency stability:</b>	± 0.001%
<b>Deviation:</b>	± 50kHz (max) (400 Series mode)
<b>Spurious radiation:</b>	60dB below carrier
<b>Operating temperature range:</b>	-30° C to +60° C
<b>Equivalent input noise:</b>	-125dBV, A-weighted
<b>Input level:</b>	
If wired for dynamic mic:	0.5mV to 50mV before limiting. Greater than 1V with limiting
If wired for electret lavalier:	1.7uA to 170uA before limiting. Greater than 5000uA (5mA) with limiting
<b>Line Level Input:</b>	17mV to 1.7V before limiting. Greater than 50V with limiting
<b>Input impedance:</b>	
Dynamic Mic:	300 Ohms
Electret Lavalier:	Virtual ground with servo-adjusted constant voltage bias

The battery door rotates to open and close on both single and dual battery models. A knurled knob is tightened to maintain pressure on the battery contacts.



<b>Line Level:</b>	2.7k Ohms
<b>Bias Voltages:</b>	• Fixed 5V at up to 5mA (pin 2) • Selectable 2V or 4V (pin 3) for any electret lavalier microphone using jumpers in the connector
<b>Input limiter:</b>	Soft limiter; 30dB range
<b>Gain control range:</b>	40dB; panel mounted membrane switches
<b>Modulation indicators:</b>	Dual bicolor LEDs indicate modulation of -20, -10, 0, +10dB referenced to full modulation.



**Audio Frequency Response:** 32 Hz to 20 kHz +/- 1 dB The low frequency roll-off is adjustable (see graph above).

<b>Signal to Noise Ratio (dB):</b> (Overall System 400 Series Mode)	SmartNR	No Limiting	w/Limiting
OFF	103.5	108.0	
NORMAL	107.0	111.5	
FULL	108.5	113.0	

Note: The dual envelope "soft" limiter provides exceptionally good handling of transients using variable attack and release time constants. Once activated, the limiter compresses 30+ dB of transmitter input range into 4.5dB of receiver output range, thus reducing the measured figure for SNR without limiting by 4.5dB.

<b>THD:</b>	0.2% (typical), (400 Series mode)
<b>Audio Input Jack:</b>	Switchcraft 5-pin locking (TA5)
<b>Antenna:</b>	Flexible, removable, unbreakable steel cable
<b>Battery:</b>	1.5 Volt AA lithium or rechargeable NiMH recommended
<b>Battery Life:</b>	SMA: 1.5 hours (alkaline); 5.5 hours (lithium), 4.5 hours with 2500mAh NiMH SMDa: 5.75 hours (alkaline); 14.25 hours (lithium), 8.5 hours with 2500mAh NiMH
<b>Weight:</b>	RMa: 2.3 oz.. (65.8 grams) with lithium battery SMA: 2.7 oz.. (75.9 grams) with lithium battery SMDa: 3.7 oz.. (105 grams) with lithium batteries
<b>Overall Dimensions:</b>	SMA/RM: 2.3 x 1.8 x 0.64 inches (not including microphone/lanyard) 58 x 46 x 16 mm (not including microphone/lanyard) SMDa: 2.3 x 2.4 x 0.64 inches (not including microphone) 58 x 60 x 16 mm (not including microphone)



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