

Digital voice recorders of EM CARD 16

Operation manual

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1. Purpose

The recorders of the EM-Card series are professional devices intended for making high quality record of voice messages onto microSD memory card in wav format. The format is supported by all flash players on the PC and any other playback devices.

2. Main Features

- long record duration. Up to 1088 hours depending on the capacity of memory card in use
- the option to enable recording automatically according to sound activation
- long record duration in sound activation mode (up to 1 year)
- built-in clock and calendar, the option to enable recording at the preset time using time
- due to the absence of removable elements the Recorder is operational under wide temperature ranges when shaking or dusted

3. Overlook

The Recorder is designed for high-quality audio recording . The device is powered by a built-in rechargeable battery, with microSD card as data carrier. During recording, the files are saved on the microSD card in WAV format. The Recorder features a built-in real-time clock and 4 timers to automatically enable recording. It also has the option of recording according to voice activation, SD card formatting, remaining battery charge display, and the option to disable LED indication. To diagnose potential problems, there is an error code output function, during which the indicator is flashing and an error log is recorded onto the SD card. Real-time clock automatically takes into account leap years and various number of days within months. There is a configuration file on the memory card to configure Recorder's functions. Its contents can be changed on the PC using any word processor.

LED indicator is used for indication, its color being green, orange or red. Green color indicates, the operation has been successfully completed; and the red one indicates, an error has occurred. The Recorder has a Switch, its position being either ON or OFF. When the Switch is in OFF position, all the functions of the Recorder are off. After the Switch has been shifted to OFF position, the Recorder may need some time to complete current functions and switch to the «off» state. Card formatting takes up to 30s, completion of the file recording takes up to 3s. A disabled indicator states shows the Recorder has switched to OFF position.

4. Technical Characteristics

Signal-to-noise ratio: 68 dB

Dynamic range: 96 dB

Record mode: mono

Sampling rate: 8/16 kHz

Frequency band: from 100 to 10 000 Hz

ADC bitrate: 8/12 bit

Current consumption in record mode:

8kHz 8 bit: 1.7 mA

16kHz 8 bit: 2.1 mA

8kHz 16 bit: 2.1 mA

16kHz 16 bit: 2.8mA

Current consumption in Sound Check Mode: 270 μ A

Current consumption in OFF state: 6 μ A

Current consumption when memory card formatting: 33 mA

5. Recording Duration

Recording time depending on the recording format and memory card capacity, without taking into account resource batteries.

	1Gb	2 Gb	4 Gb	8 Gb	16 Gb	32 Gb
8 bit, 16kHz	34h	68h	136h	272h	544h	1088h
8 bit, 8kHz	17h	34h	68h	136h	272h	544h
16 bit, 8 kHz	17h	34h	68h	136h	272h	544h
16bit, 16 kHz	8h	17h	34h	68h	136h	272h

6. Recorder's Battery Life

Recorder's battery life is determined by the charge level of the rechargeable battery, recording quality selected, and memory card capacity. For memory cards with capacity of at least 16 Gb, continuous record duration is determined by the battery's charge level only. For record mode 16 bit 16 kHz it amounts 100 hours, for record mode 8 bit 8 kHz 180 hours.

7. Operating the Recorder

Recording

The Recorder switches to operation mode after the Switch has been shifted from OFF to ON. After it has switched to record mode, green LED of the Recorder makes two series of flashes. During recording, the series of flashes are repeated at regular intervals; the second series follows the first one in 4s, then comes the first in 8s again. If the transition to operation mode is not possible, the Recorder's red indicator is flashing.

3 red flashes indicate depleted battery

3 series of 3 red flashes state, microSD card is full, microSD can't be read, or there is no microSD card.

The first series of LED flashes correspond to battery charge level:

1 flash - charge level is close to maximum

2 flashes - charge level is enough to continue operation

3 flashes - low charge level, rechargeable battery needs charging.

Second series of green flashes correspond to free memory capacity on the microSD card:

1 flash states for 100-76%,

2 flashes - 75-51% ,

3 flashes - 50-26%,

4 flashes - 25 -1%.

If while recording, microSD is full and the option of circular recording is off, the Recorder stops recording and quits record mode. If during recording, battery charge level is too low, the Recorder stops recording and quits record mode. Shifting Switch from On to Off is used to stop recording (if any) and quit record mode, which is in all cases indicated by a green LED flash 3s long.

Each time the recording is activated, a new file is created. It closes after recording stops. Both record start time and stop time can be viewed on the PC in the properties of the file.

Before removing battery or microSD card, shift the toggle switch to OFF position and wait till green LED flashes once, which means recording has stopped and the Recorder quitted record mode. Failure to do so can lead to abnormal termination of recording and loss of all the data on the memory card.

8. Readiness Test

If the Recorder is off, which means the Switch is in OFF position, the Recorder's readiness to start operating is checked by a fast toggling of Switch to On and back. As a response, green LED of the Recorder flashes to indicate battery charge level and free memory capacity. For detailed interpretation of flashing see Section 7.

9. Record Playback

To playback records use any player on the PC, for example Windows Media Player. To transfer records to the PC, remove memory card from the Recorder and install it into the card reader of the PC.

10. Use of Timers and Voice Activation

10.1 If there is at least one of the timers active, as well as voice activation option being off, after the Recorder switches to record mode, it begins to compare the timer's time with the time of the built-in clock. When the time set in one of the active timers coincides with the one of the Recorder' clock, the Recorder starts recording, which continues for the time specified in the timer settings. If recording periods of several active timers overlap, the Recorder records until recording periods of all timers expire. In timer control mode, the Recorder can autonomously work up to 1 year.

10.2 If in the Recorder settings, voice activation is active and all the timers are off, after the Recorder switches to operation mode, it starts sound level testing. As soon as the sound level is beyond the one specified in the settings, recording starts. It lasts for the time specified in the mode settings. If during recording, sound level is beyond the one specified in the settings again, recording timing is newly activated. In other words, in case of constant loud sound, recording won't stop.

10.3 If in the Recorder settings, there is voice activation being active and at least one of the timers on, it begins to compare the timer's time with the time of the built-in clock, which is described in Section 10.1. As soon as the time set in one of the active timers coincides with the time of the Recorder, the Recorder does not start recording, but switches to voice activation mode, described in Section 10.2 . When the recording period specified in the timer settings expires, the Recorder stops recording (if any) and quits voice activation mode. In other words, timers make it possible to set voice activation mode at the preset time for the period specified.

11. Configuring Voice Activation

Sensitivity determines sound level to initiate recording. Sensitivity of 1 % means, recording starts at loud sound. Sensitivity of 100 % means, recording starts at quiet sound. It is recommended to use some intermediate value. Once the value has been set, it is recommended to test the Recorder in order to prove the choice is correct, and the Recorder starts and stops recording appropriately.

12. Setting Circular Recording

If circular recording is on, and memory capacity is full, the oldest data are deleted to record new one. If circular recording is off, and there is no more memory capacity, further recording is unavailable.

If together with circular recording, there are restrictions of maximum and minimum file size, the size of file being recorded during circular recording is equal to maximum file

size specified. At each deleting old files, the Recorder frees space in the amount at least to record one file of the maximum size specified. If the restrictions of maximum and minimum file size are off, while circular recording, the size of the file being recorded equals 100 Mb.

13. Setting File Size Restrictions

If during recording, file size exceeds maximum permitted size, the file is closed and recording continues in a new file. If at the end of recording, the recorded file is less than the minimum allowable size, it is deleted. Minimum and maximum file size can be set in the range of 1-2000 MB. Restrictions are valid, as long as they are active. If the restrictions are off, files of any small size are not deleted. Files of maximum size are closed and recording continues in a new file only in case of file size approaching maximum permissible level of 2GB.

14. Setting Time and Date

Time and date need to be set correctly for appropriate circular recording and proper timer operation. The Recorder automatically takes into account leap years and various number of days within months of the year. For smooth operation of the Recorder, the date should be specified exactly as it is stated in calendar. In order to set new time, specify time and date values in the corresponding fields of the configuration file and permit time update. After configuration file has been processed, updating is not available in the newly recorded file on the memory card. The newly saved configuration file contains Recorder's actual time, i.e. that of its internal clock at the time configuration file was processed.

15. Changing Settings using Configuration File

All the Recorder's settings are made using the CONFIG.INI configuration file. This is a text configuration file, which the Recorder can automatically save in the memory card. Any word processor on your PC can be used to open the CONFIG.INI file, make changes to it and save it and then, having inserted memory card into the Recorder, you can start processing the configuration file, and the settings specified in the file will be saved by the Recorder.

Processing of configuration file is available while the Recorder is off. It starts by toggling the Switch from OFF to ON and back. After processing, the indicator makes one green flash 3s long, if processing was completed successfully; or one red flash 3s long, if the settings have not been specified correctly. If the battery charge is not enough, or the battery is not installed or memory card is full or cannot be read, the Recorder makes red flashes to indicate it, as described in Section 7.

After configuration file processing has been enabled, the program first searches for an existing configuration file on the Recorder's memory card. If the file is found, its contents are being processed, and if there are no errors, the Recorder's settings will be updated. After that, regardless of search results and file processing, a new CONFIG.INI file is written (old file, if any, is replaced by a new one). The newly recorded file contains Recorder settings and time of the built-in clock. Thus, configuration file makes it possible to not only update settings and time of the Recorder, but also find out the Recorder's settings in time.

16. Battery Charging

Connect USB cable to the Recorder and the PC. During charging, red LED is flashing. The green LED starts flashing in 2-2,5 hours, which means the battery is charged.

17. Card Formatting

Card formatting is carried out, when the Recorder is off. To format card, perform the following operations:

- 1) Make sure, the Switch is in OFF position.
- 2) Make 3 toggle switches from the OFF position:
OFF→ON→OFF, OFF→ON→OFF, OFF→ON→OFF.
After that, the green LED starts flashing to indicate, the command has been adopted and the Recorder is waiting for it to be confirmed.
- 3) To confirm formatting while green LED is flashing, make 3 toggle switches again OFF→ON→OFF, OFF→ON→OFF, OFF→ON→OFF.
Formatting starts. While formatting, orange LED is on. If three toggle switches to confirm formatting haven't been made, the indicator will continue flashing green for 3s, after that the Recorder switches to the off state.
- 4) Wait until the indicator turns off.
After formatting has been completed, green LED flashes once. If battery charge is not enough, or memory card is full, not installed or cannot be read, the Recorder makes red flashes, as described in Section 7.

18. Technical Support

Technical support is available by e-mail: support@ts-market.com We are constantly working to improve the software and documentation. You can always download the latest version of the software for free and get information on products on our website: <http://www.ts-market.com>.