Digital voice recorders of EM CARD 16

Full operation manual

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Description

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 timer
- 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. 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 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:	8/16 bit
Current consumption in record mode	
8kHz 8 bit:	2.6 mA
16kHz 8 bit:	3.2 mA
8kHz 16 bit:	3.2 mA
16kHz 16 bit:	3.8mA
Current consumption in Sound Check Mode	
When continuous checking	1.7 mA
When checking periodicity of 30 s	0.28 mA
When checking periodicity of 60 s	0.15 mA
When checking periodicity of 120 s	0.08 mA
in OFF state:	6 µA
when memory card formatting:	33 mA

The measurements were carried out with Transcend microSD card of 4 Gb. Current may be 10% greater when using other cards of Transcend manufacturer. Current may be 2 times greater when using cards of other manufacturers.

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, 8kHz	34h	68h	136h	272h	544h	1088h
8 bit, 16kHz	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.

Operating the Recorder

7. Battery Charging

Before operation, charge the rechargeable battery. For that: remove microSD card from the recorder and insert cable for battery charging (from the delivery set) to memory card slot. Then, connect USB cable to PC or other power supply unit with 5 V USB socket and current of at least 500 mA. Red LED will light up, indicating battery charging, which lasts 3-4 hours. Charging is finished when green LED lights up. Disconnect cable from the PC or power supply, *then carefully press to the cable in memory card slot and remove cable from recorder.*

<u>Attention!</u> Careless cable pulling out of recorder may cause slot damage, which is not covered by warranty.

8. Recording

The Recorder switches to operation mode after the Switch has been shifted from OFF to ON. If the VAS mode is activated, recorder starts/stops to record automatically only with the appearance/absence of sound when switching to ON.

After it has switched to record mode, green LED of the Recorder makes two series of flashes. The number of flashes indicates free memory capacity on the microSD and battery charge level. 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, or microSD can't be read, or there is no microSD card.

Number of flashes	Battery charge level (1st series)	Free memory capacity (2d series)
1	80-100%	75-100%
2	20-80%	50-75%
3	2-20%	25-50%
4		1-25%

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.

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.

9. 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 8.

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10.   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.

More functions

11. Timer Recording

Timers enabling and setting are made via configuration file (CONFIG.INI). If there is at least one of the timers is active, the Recorder switches to record mode automatically from the OFF state (when switch is in OFF position). If recording periods of several active timers overlap, the Recorder records until recording periods of all timers expire. Regardless of timers setting recording can be turned on manually by switching from OFF to ON. Timer settings do not interrupt or influence the recording. To remove microSD card from operating by timer Recorder, turn the Recorder to Sleep Mode by fast toggling OFF-ON-OFF.

12. Voice Activation Recording

Voice Activation System (VAS) enabling and setting are made via configuration file (CONFIG.INI). If voice activation is active, after the Recorder switches to operation mode, it does not record immediately but starts sound level checking. As soon as the sound level is beyond the preset threshold, recording starts. When time of sound absence exceeds the time specified in settings, Recorder stops recording. Sound level checking can be done continuously or periodically. During periodically checking, current consumption is lower, however sounds between checks are not recorded. During recording Recorder continuously checks sound level, regardless of setting checking frequency.

13. Timer and Voice Activation Recording

Timer setting described in Section 11. VAS setting described in Section 12. If voice activation and timer recording are simultaneously active, when it's time to record by timer the Recorder starts sound level checking during the whole period of the timer. The Recorder starts recording by sound and stops when sound is absent. In other words, timers make it possible to set voice activation mode at the preset time for the period specified.

14. Circular Recording

Circular recording enabling and setting are made via configuration file (CONFIG.INI). If circular recording is on, and memory capacity is full, the oldest data are deleted to record new one. The oldest file is a file with the minimum sequence number. If circular recoding 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.

15. Recording with AGC

The recorder provides the option to set Automatic Gain Control (AGC). AGC enables it to automatically adjust amplification according to the sound level. That makes it possible to perfectly record very loud sounds and amplify silent ones.

16. Setting File Size Restrictions

Size restrictions setting is made via configuration file (CONFIG.INI). 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. 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.

17. Setting Time and Date

Time and date setting is made via configuration file (CONFIG.INI). Time and date need to be set correctly for proper timers operation. The Recorder automatically takes into account leap years and various number of days within months of the year. In order to set new time, specify time and date values in the corresponding fields of the configuration file and permit time update, insert memory card to the Recorder and carry out configuration file processing. The newly saved configuration file contains Recorder's actual time i.e. that of its internal clock at the time configuration file was processed.

18. 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 (OFF-ON-OFF-ON-OFF). 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 8.

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.

19. New Memory Card Preparation

In the initial position (battery is charged, switch is in OFF position) insert new memory card and press Reset button (green LED flashes once), then start card formatting. For that make 3 toggle switches from OFF to ON position and back (OFF→ON→OFF, OFF →ON→OFF, OFF →ON→OFF). After that, while green LED is flashing make 3 toggle switches again as formatting confirmation (OFF→ON→OFF, OFF →ON→OFF, OFF →ON→OFF). While formatting, green LED is on. After the green LED is off make 2 toggle switches from OFF to ON and back to OFF (OFF →ON→OFF, OFF →ON→OFF). Green LED is on for 2-3s. After formatting has been completed, memory card will contain two files: CONFIG.INI (recorder's configuration file) and EVENTS.TXT (events/actions file). New memory card is ready to operate.

20. 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→ON→OFF→ON→OFF.
       After that, the green LED starts flashing to indicate, the command has been adopted and the Recorder is waiting for formatting confirmation.
    3) To confirm formatting while green LED is flashing, make 3 toggle switches

again OFF→ON→OFF→ON→OFF→ON→OFF.
Formatting starts. While formatting, green LED is on. If three toggle switches to confirm formatting haven't been made, the indicator will continue flashing green for 5s, 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 8.

21. Reset
Reset of all settings to factory is carried out using configuration file. After reset, all the active timers, VAS and size restrictions are disabled. Recorder with factory settings can be turned on only manually by switching from OFF to ON, and turned off by switching back to OFF position.

22. System Event Log
The Recorder automatically saves to memory card file EVENTS.TXT, which contains all information about recorder's operation: information about switching ON and OFF, timers operation, sound level checking and etc.

23. 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.