



SD Logger4 Instruction Manual

ESD-CS4A
ESD-CC4A
ESD-BS4A
ESD-BC4A



【Cased (Case Type)】



【PCB (PCB Type)】

- The contents of this instruction manual are subject to change without notice for improvement.
- Please check our website for the latest information.

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I Overview • Specification

1. Overview

【Script version】

The SD logger “script version” is a device whose basic function is to save data received from serial communication (RS-232C) to an SD card.

Data stored on the card can be read out on a PC using a commercially available card reader.

In addition to basic functions, functions can be expanded by writing scripts in their own scripting language.

It is possible to send a specific command at regular intervals, or send specific data in response to some reception. A simple communication protocol can be realized.

It also has a date / time function. The script can write the date and time to the log file.

Part of the written script can be simulated on a personal computer using the free software "CMLogger" provided by our company.

After confirming the operation on the personal computer, it can be implemented in the SD logger “script version”.

Please refer to the following documents for the script language specifications.

「SD logger script language reference format (X507018)」

「SD logger script language tutorial format (X507019)」

【Command version】

The SD logger “Command Version” is a device that can read and write SD card file data by exchanging commands via serial communication (RS-232C).

Card data can be read and written by a personal computer using a commercially available card reader.

Refer to the following document for command specifications.

「SD logger (command version) Command communication specification (X507016)」

「SD logger (command version) command reference (X507017)」

「Date / Time Command Reference (X519005)」

※The SD logger can be switched between “script version” and “command version” by changing the setting in “configuration mode”.

※Free software provided by our company can be downloaded from our website.

2. Variation

This instruction manual explains the following models of the SD logger.

<i>Model</i>	<i>Name</i>	<i>Factory function</i>	<i>Exterior</i>
(Basic version)			
ESD-CS4A	SDlogger4	Script version	Case
ESD-CC4A	SDlogger4	Command version	Case
ESD-BS4A	SDlogger4	Script version	PCB
ESD-BC4A	SDlogger4	Command version	PCB

※The “script version” includes the functions of the original “normal version”.

3. Setting change by configuration mode

In the logger, the setting can be changed in "Configuration Mode". The items that can be changed are as follows.

<i>Item</i>	<i>Contents</i>
Function	Script version
	Command version
Data bit ※1	8 [Bit]
	7 [Bit]
Stop bit ※1	1 [Bit]
	2 [Bit]
Bit rate ※2	300 [bps]
	1,200 [bps]
	2,400 [bps]
	4,800 [bps]
	9,600 [bps]
	19,200 [bps]
	38,400 [bps]
	57,600 [bps]
	115,200 [bps]
Flow control	No flow control by RTS (DISABLE)。
	Perform flow control by RTS (ENABLE)。
Auto clear	Do not automatically clear communication errors.
	Automatically clears communication errors.

※1: When DIP switch 6 is ON

※2: When DIP switches 1 to 3 are all ON

Please refer to the following documents for how to change the settings.

「How to use ESDHost (X519006)」

4. Specification

<i>Item</i>	<i>Contents</i>	<i>Remarks</i>
Baud rate (bps)	300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	
Data bit	7bit / 8bit	※1
Stop bit	1bit / 2bit	Refer to Chapter IV-4
Parity	None/Odd/ Even number	
File system	FAT16, FAT32	Refer to Chapter V-1
Card	SD card (Compatible with SDHC)	※2
RS-232C	D-SUB 9pin male connector	Fixed screw : Inch(#4-40UNC)
Power supply	DC 8V~12V	
Current consumption	Standard 100mA, maximum 150mA	
Operating temperature range	0°C~60°C	
Time accuracy	±0.01%	Script WAIT TIME
Built-in clock accuracy	Within ± 60 seconds per month	@25°C
Built-in clock battery	CR2032	Standard battery life 7 years ※3

(注) Memory card and connection cable are not included.

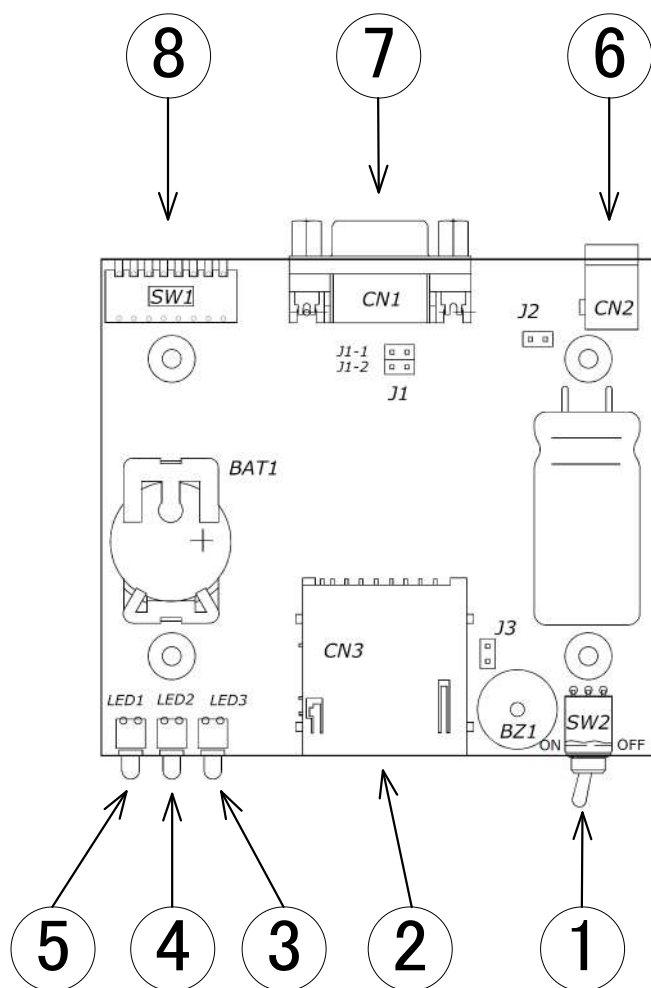
※1 Only 8 bit can be used in configuration mode and update mode.

※2 SDXC cards are not supported.

※3 Batteries installed at the time of product shipment do not guarantee a battery life of 7 years from the time of purchase.

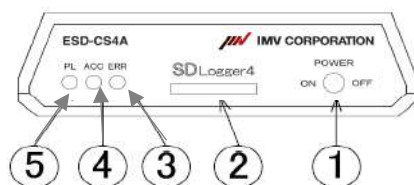
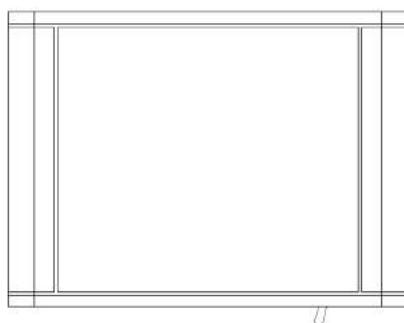
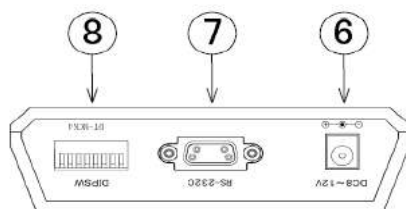
5. Name of each part

[PCB type]



No.	Symbol	Contents
①	SW2	Power switch
②	CN3	Connector for memory card
③	LED3	Red LED (Error)
④	LED2	Yellow LED (Access)
⑤	LED1	Green LED (Pilot)
⑥	CN2	DC Power connector (DC jack)
⑦	CN1	RS-232C Connector (D-Sub 9pin male) Fixed screw: Inch (#4-40UNC)
⑧	SW1	Dip switch for baud rate and other settings

【Case type】



No.	Symbol	Contents
①	POWER	Power switch
②		Connector for memory card
③	ERR	Red LED (Error)
④	ACC	Yellow LED (Access)
⑤	PL	Green LED (Pilot)
⑥	DC8~12V	DC power connector (DC jack)
⑦	RS-232C	RS-232C Connector (D-Sub 9pin male) Fixed screw: Inch(#4-40UNC)
⑧	DIPSW	Dip switch for baud rate and other settings

II Setting

1. DIP switch setting and configuration setting

SD Logger 4 has a function that can be switched by DIP switch setting and a function that can be switched by configuration setting.

Configuration settings are made by connecting to a PC.

For configuration settings, refer to “Chapter I-3”. For details, refer to 「the way of using ESDHost (X519006)」.

Item	Dip Switch	Configuration	Remark
Bit rate			
300 [bps]	×	○	
1,200 [bps]	×	○	
2,400 [bps]	◎	○	
4,800 [bps]	◎	○	
9,600 [bps]	◎	○	
19,200 [bps]	◎	○	
38,400 [bps]	◎	○	
57,600 [bps]	◎	○	
115,200 [bps]	◎	○	
Parity			
None	○	×	
Odd number	○	×	
Even number	○	×	
Data bit			
8bit	◎	○	
7bit	×	○	
Stop bit			
1bit	◎	○	
2bit	×	○	※1
Flow control			
Not performed	△	○	
Do	×	○	

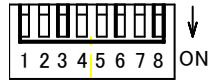
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(Continued)

Item	Dip Switch	Configuration	Remark
Automatic clear of communication error			
Don't do	×	○	
Do	△	○	
Function			
Script version	×	○	
Command version	×	○	
◎ Can be set. Dip switch settings can be prioritized.			
○ Can be set.			
× Cannot be set.			
△ Default setting. What has been changed in the configuration settings cannot be changed with the DIP switch.			
※1 It can also be set with a script.			

2. Dip switch

Dip switch [DIPSW(SW1)]



The switches are [1] to [8] from the left. The switch is OFF at the top and ON at the bottom.

(Setting Example)

Contents	9600bps, Data 8 bits, 1 stop bit, no parity (all OFF)							
No.	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Setting	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

1-1) Bit rate setting

The bit rate is set by operating dip switches [1] to [3].

The correspondence between switch ON / OFF and bit rate is shown in the table below.

No.								Bit rate [bps]
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	
OFF	OFF	OFF	—	—	—	—	—	9,600
ON	OFF	OFF	—	—	—	—	—	19,200
OFF	ON	OFF	—	—	—	—	—	38,400
ON	ON	OFF	—	—	—	—	—	57,600
OFF	OFF	ON	—	—	—	—	—	115,200
ON	OFF	ON	—	—	—	—	—	2,400
OFF	ON	ON	—	—	—	—	—	4,800
ON	ON	ON	—	—	—	—	—	Follow configuration settings.

1-2) Parity

The parity is set by operating the DIP switches [4] and [5].

The correspondence between switch ON / OFF and parity is shown in the table below.

No.								Parity
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	
—	—	—	OFF	OFF	—	—	—	None
—	—	—	ON	OFF	—	—	—	Odd number
—	—	—	OFF	ON	—	—	—	Even number
—	—	—	ON	ON	—	—	—	None (for future expansion)

1-3) Data bit / stop bit

Data bits and stop bits are set by operating DIP switch [6].

The correspondence between switch ON / OFF and data bit / stop bit is shown in the table below.

No.								Data bit / stop bit
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	
—	—	—	—	—	OFF	—	—	8 data bits and 1 stop bit
—	—	—	—	—	ON	—	—	Follow configuration settings.

※In configuration mode and update mode, even if data bit 7 is set in configuration settings, data bit 8 operates.

1-4) Mode

The mode is set by operating DIP switches [7] and [8].

The correspondence between the switch ON and OFF and the mode is as shown in the table below.

No.								Mode
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	
—	—	—	—	—	—	OFF	OFF	Normal
—	—	—	—	—	—	ON	OFF	Configuration mode
—	—	—	—	—	—	OFF	ON	Status display (maintenance) mode
—	—	—	—	—	—	ON	ON	Update (programming) mode

※The maintenance mode is for checking maintenance information and for maintenance. Normally, use it in non-maintenance mode.

※If a card is installed, it will not be in configuration mode or update mode.

Remove the card to use in configuration mode or update mode.

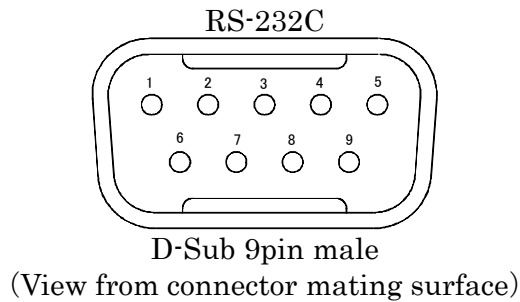
※Do not use a mechanical pencil for dip switch operation.

Mixing the core powder into the inside may cause malfunction.

III Connection

1. RS-232C cable connection

Check each signal so that there is no mistake in the connection of the RS-232C connector. The connector pin assignments are as follows.



Pin No.	Name	Contents	Signal direction	
1	NC	Not connected (Note 1)		Logger Side
2	RXD	Received data	→	
3	TXD	Send data	←	
4	DTR	Data terminal ready, connected to pin 6	←	
5	GND	Signal ground		
6	DSR	Data set ready, connected to pin 4 (Note 1)	→	
7	RTS	Transmission request (usually high level, Note 3)	←	
8	CTS	Transmission permission (not used, note 4)	→	
9		Unused (Note 2)		

(Use a cross cable when connecting to RS-232C on a PC.)

(For flow control using 7-pin RTS, refer to 「VII Other functions / 3. Flow control」.)

(Note 1) Can be used as a terminal to turn the power on and off from the outside by jumper settings. See 「VII Other functions 2. Jumper switches」.

(Note 2) It can be used as a terminal to supply power from outside by jumper setting. See 「VII Other functions 2. Jumper switches」.

(Note 3) Can be controlled by script language.

(Note 4) Can be used to control the script language.

2. Power supply

Supply DC power (DC8V to 12V) from the DC power connector (DC jack, CN2 for board).

Use a compatible DC plug with an inner diameter of $\phi 2.1$ and an outer diameter of $\phi 5.5$.

When using an AC adapter, select a suitable DC plug.

When using an AC adapter, the switching regulator type is recommended.
(Center is a plus)



IV Usage procedure

1. Usage procedure

Procedure 1. Insert memory card

Insert a memory card into the logger.

Procedure 2. Power switch (POWER/SW2) ON

Turn the power switch to the [ON] side to turn on the power.

Setting the power switch to the [ON] side is expressed as 「Turn the power switch ON」.

If the green LED (PL / LED1) turns on and the yellow LED (ACC / LED2) turns off, the preparation is complete.

Procedure 3. Power switch (POWER/SW2) OFF

To finish the work after receiving data and exchanging commands, set the power switch to the [OFF] side.

Setting the power switch to the [OFF] side is expressed as 「Turning the power switch off」. The power turns off automatically after closing the open file.

* It is possible to remove the memory card.

If the card is being accessed, it may take some time before the power is actually turned off even if the power switch is turned off.

Check the card access with the yellow LED display.

Check that all LEDs are off before inserting or removing the card.

2. LED display / buzzer sound

The LED is displayed as follows.

Pilot lamp (Green) ● PL/LED1	Lighting	Power is on.
Access lamp (Yellow) ● ACC/LED2	Lighting	Accessing the memory card. Holding data in the buffer.
	Flashing	In configuration mode.
Error lamp (red) ● ERR/LED3	Flashes once	The card is not installed.
	Flashes twice	Error in card access.
	Flashes 3 times	Data communication error.
	Flashing	In update mode.

The buzzer sounds as follows.

Buzzer	When the access lamp (Yellow, ●) starts to light, it sounds briefly. ※Does not sound when the configuration mode is blinking.
	Sounds the same as the blinking error lamp (Red, ●) ※Does not sound when flashing in update mode.

The buzzer can be stopped by removing the jumper switch, J3. See section 「VII.2」 for how to remove the jumper switch.

V File

1. File control system

Logger uses the FatFs file system created by ChaN. I would like to thank and thank Mr. ChaN for providing a competent file system.

Long file names are not supported.

2. Logging file *[Script version]*

File name [4-digit hexadecimal number]. LOG

(Example)

0000.LOG

0001.LOG

0002.LOG

The logging file has a name that does not overlap with an existing file.

Search for the existence of the file from "0000.LOG" to "FFFF.LOG", and the name of the first non-existent file found is used as the logging file name.

※The extension can be changed by script.

3. Subdirectory

In the case of "script version", the following subdirectory function works.

If a directory called 「LOGDATA」 exists in the root directory, a logging file will be created under that directory.

If there is no "LOGDATA" directory, the logging file will be created in the root directory.

The "command version" does not have a subdirectory function.

4. Maximum number of files

The maximum number of files that can be logged by the logger is 65536 [* 1].

However, in general, only 512 [* 2] files can be created in the FAT16 root directory, so the logger also conforms to this restriction.

It seems that the maximum number of files that can be created in a subdirectory is generally limited to 65534 [* 2], but the logger can create more than 65535 [* 2] files.

And in our verification, the 65535th and 65536th files created by the logger can also be read on a personal computer.

[*1] The maximum number of logging files created by the logger.

[*2] This is the maximum number including files other than logging files.

Start-up time

If there are many files on the card, it takes time to start up, which is not practical.

The following table gives an estimate of the startup time for the number of files under certain conditions.

Number of files	512pcs	1,024pcs	4,096pcs	10,000pcs
Start-up time	1.3seconds	2.1 seconds	16.9 seconds	1minutes 29.6 seconds

※It is a reference value , not a guaranteed value.

5. Command version file specification *【Command version】*

File name 8 single-byte alphanumeric characters + 3 character extension
(Long file names are not supported)

For details on the file names that can be handled by the command version,
See「Command Communication Specifications」.

The subdirectory function cannot be used in the command version.

6. Script file *【Script version】*

In the case of “script version”, if there is a file named 「SCRIPT.TXT」 or 「SCRIPT.SCR」 on the installed memory card, it will be read as a script file.

The script file is read and executed when the power switch is turned on and the power is turned on.

Script files are read from the root directory even if the directory “LOGDATA” exists.

In the script file, LF (0x0A) is judged as the end of the line.

CR (0x0D) appearing in the script file is ignored.

7. Writing speed

As the amount of data in the card increases, the writing speed decreases, which is not practical. If writing speed is required, it is recommended that you use a card that has just been formatted or has not recorded much data.

Consider using flow control for use with large amounts of data. In the command version, check the response firmly (it takes longer time to get a response).

Notes

If it takes time to write 1 byte, the power will not be turned off immediately even if the power switch is turned off.

Depending on the situation, the power may not be turned off for more than 1 minute even if the power switch is turned off.

In such a case, please wait for the card to be inserted or removed or the main power supply to be shut off until all LEDs turn off even if the power switch is turned off.

VI Response to power shutdown

1. Auto sync function

When data is lost for 3 seconds, the data remaining in the buffer is written to the card and the consistency of the file structure is restored.

As a result, data received more than 3 seconds ago will not be lost even if the power is suddenly shut down.

In addition, even if the power supply is cut off without receiving data for more than 3 seconds, the file structure will not be damaged.

2. Capacitor backup

Even if the external power supply is cut off, the internal power supply is secured by the capacitor.

Even if the power supply (main power supply) to the DC power connector is cut off while the power switch is ON, the power is supplied from the backup capacitor and the shutdown process is performed.

When the shutdown process is completed, the logger will cut off the power supply to itself.

Power is supplied from the backup capacitor for a short time during the shutdown process.

Even if the external power supply is suddenly cut off due to auto sync and capacitor backup, the possibility of damaging the file structure is low.

Notes

The time required for the shutdown process varies depending on the usage conditions of the card used.

On the other hand, the backup time with a capacitor is limited.

Please fully verify the effectiveness under the conditions of use.

VII Other functions

1. Date / time setting

To set the date and time, connect the logger to a PC and execute the PC dedicated software (SDLG4_TADJ).

For details, please refer to the separate document 「Date / Time Setting Instruction Manual <X520012>」.

Check the date and time settings after purchase and before use.

2. Jumper switch

To set this up, remove the screw on the back of the case and remove the top cover.

Please refer to the numbers of switches and connectors silk-printed on the board and the photos on the next page.

(In addition to the buzzer, this product does not come with a short-circuit jumper socket.)

J1 : Power control from outside

By short-circuiting J1-1 or J1-2, the board power switch can be turned ON / OFF via the CN1 D-sub connector.

Jumper shorting	External power control terminal
J1-1	CN1 D-Sub No.1 pin
J1-2	CN1 D-Sub No.6 pin

The board switches on at +2.5 to +15V and switches off at -15V to +0.8V, so it can be controlled at the RS-232C level or at the C-MOS level of +3.3V to +5V.

To use this function, turn off the power switch (POWER / SW2).

※ D-sub pin 6 is looped back to No.4 pin on the unit. When controlling the power supply of the board with D-sub No.6 pin, make sure that the handshake line of the connected device is not affected.

J2 : To external (or from external) power supply.

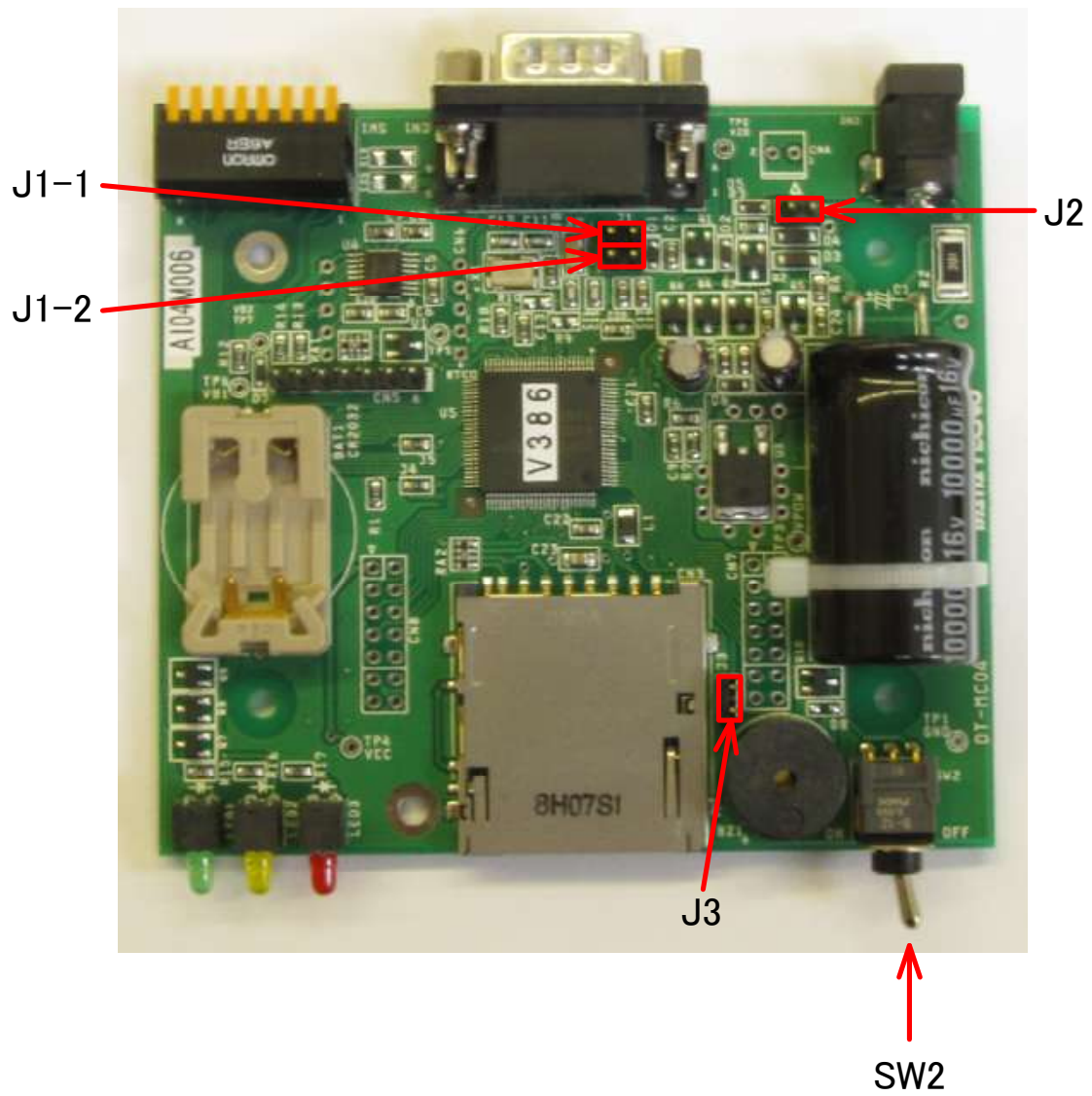
When J2 is short-circuited, the No.9 pin of CN1 D-sub is connected to the + pin of CN2 DC jack, so power (8V to 12V DC) can be supplied through this pin instead of using the AC adapter.

(Caution)When using the functions of J1 and J2, be sure to fully understand and make sure that the wiring is correct.

J3 : Stop the buzzer.

Remove J3 (open) to stop the buzzer.

Picture of jumper switches and power switches



3. Flow control

By enabling the setting by changing the setting in the configuration mode, flow control using the RTS signal can be performed.

When the flow control is enabled, the RTS signal is turned off when the reception buffer in the logger is running low, and is turned on when the remaining capacity is high.

Depending on the arrangement of the data on the card, it may take some time to record the data.

In such a situation, if a large amount of data is received at high speed, the receive buffer may overflow.

If the receive buffer overflows, consider using flow control.

The receive buffer capacity and flow control thresholds are as follows.

	Capacity[bytes]	
	Script version	Command version
Receive buffer capacity	4096	4096
RTS ON threshold	768	768
RTS OFF threshold	512	512

Conflict with script function

Even if flow control is enabled, RTS control in the script language will work.

Please note that if you control the RTS signal with the script language, you will not be able to perform correct flow control.

4. Maintenance information

When the maintenance mode is set with the DIP switch and the power switch is turned ON, the following maintenance information is transmitted.

Connect the RS-232C connector (CN1) to a PC with an RS-232C cross cable and use the terminal software to check the status of the logger.

Maintenance information (Example)

DT-MC04 Basic V385 (2018-08-27)	← Firmware version etc.
dipsw:01	← Dip switch status
Model:0412	
script model	
fatfs	
rts disable	
Remain MemPool:031A	

※This is an example. Actually, it is displayed according to the firmware version and usage status.

VIII Enhanced function • Difference from logger 3

SD logger 4 has the following enhanced functions compared to conventional SD logger 3.

1. A fast bit rate has been added.

A bit rate of 115200 (bps) has been added.

2. Status file

When the power is turned on, the status of the logger is written to the following status file.

It is possible to check the setting status and operation status by importing the status file to a personal computer and viewing it with an editor.

•Status file

File name	STATUS.TXT
Folder	Root folder

•Status file format

Item	Example
Name / Version	DT-MC04 V400
Start-up time	2018/02/15 12:57:34
Model	script
Communication setting	9,600bps 8bits 1stop parity:non
Flow control	rts-control:disable
Communication error automatic clear	comm-error:auto-clear

The status file is rewritten every time the power is turned on, and the status at the time of the last startup can be checked.

However, if the status file is set to the write-protected attribute, it cannot be rewritten.

Even if an error occurs when writing the status file, the LED does not blink or the buzzer does not sound, and the subsequent operations continue as they are.

3. Update from card

By placing special files on the SD card to be installed, you can update your own internal programs.

To perform the update, rename the update module file provided by our company (such as "DTMC04_X_VXXX_UDM.fu2") to the file name "UPDATE.FU2" and copy it to the root folder of the card.

Then, turn on the power switch of the logger.

When the power switch of the logger is turned on and the file "UPDATE.FU2" is found, the update of the internal program starts.

When the update starts, the red LED starts blinking, the yellow LED lights, and the buzzer sounds shortly.

The update is completed in a few seconds and the yellow LED turns off.

After the update, the red LED keeps blinking and you can only turn off the power switch.

Make sure that the yellow LED turns off, then turn off the power switch.

The next time the power switch is turned on, the updated internal program will be executed.

If the update is successful, the update module file will be renamed to "UPDATE.OK".

You only need to update once, and the same update will not be repeated.

4. Synchronize script and incoming data

In MC04, the execution of the script and the log of the received data are synchronized, and even when the data is received at high speed, the logging performed by the script using the 「#LOG」 statement and the logging of the received data are performed. In the meantime, no gap has occurred.

5. Automatic clear of communication error

If the communication error is automatically cleared (default), the LED display and buzzer sound due to a communication error will be cleared the next time a normal reception is received.

Even if the automatic clear is performed for a short time after an error occurs, it will blink and sound at least three times.

6. Strengthen short-term power-off response

The conventional product could not operate continuously when the power supply was shut off for a short time. However, when the power switch is turned off or the power supply voltage is cut off, the power recovery is now detected without waiting for the power supply voltage to be completely cut off.

This function is supported from internal program version V390X.

7. Other enhancements

The command version "Delete all files (E: *.*)" Command can be used even with FatFs (FAT32 compatible file system).
(SD Flogger 3 only allowed FATSYS (conventional FAT16 file system))

Reading is now possible even when the write-protect tab is set to the write-protected position.
(SD logger 3 could not read if it was write protected.)

In the case of the command version, date / time acquisition and setting are possible even in the configuration mode.
(In SD Logger 3, it was not possible unless it was in the configuration mode.)

8. Main differences from Logger 3

The assignment of DIP switch settings has changed.
Some settings have been changed to be done in configuration mode.

FATSYS (conventional FAT16 file system) has been abolished, and now only FatFs (FAT32 compatible file system)

FatFs (FAT32 compatible file system) can also use FAT16 cards.

The watch battery has been changed from CR1220 to CR2032.

IX Functions enhanced after V394X

1. Script log start / stop function

A log start / stop function has been added to the script.

Logging (recording on SD card) can be stopped or restarted in the middle (all data received in the conventional product was logged).

For example, you can log only the data received from 9:00 am to 5:00 pm, or you can log the data from receiving some data to receiving some data.

For more information about this feature, or about the script in general, see the following documents

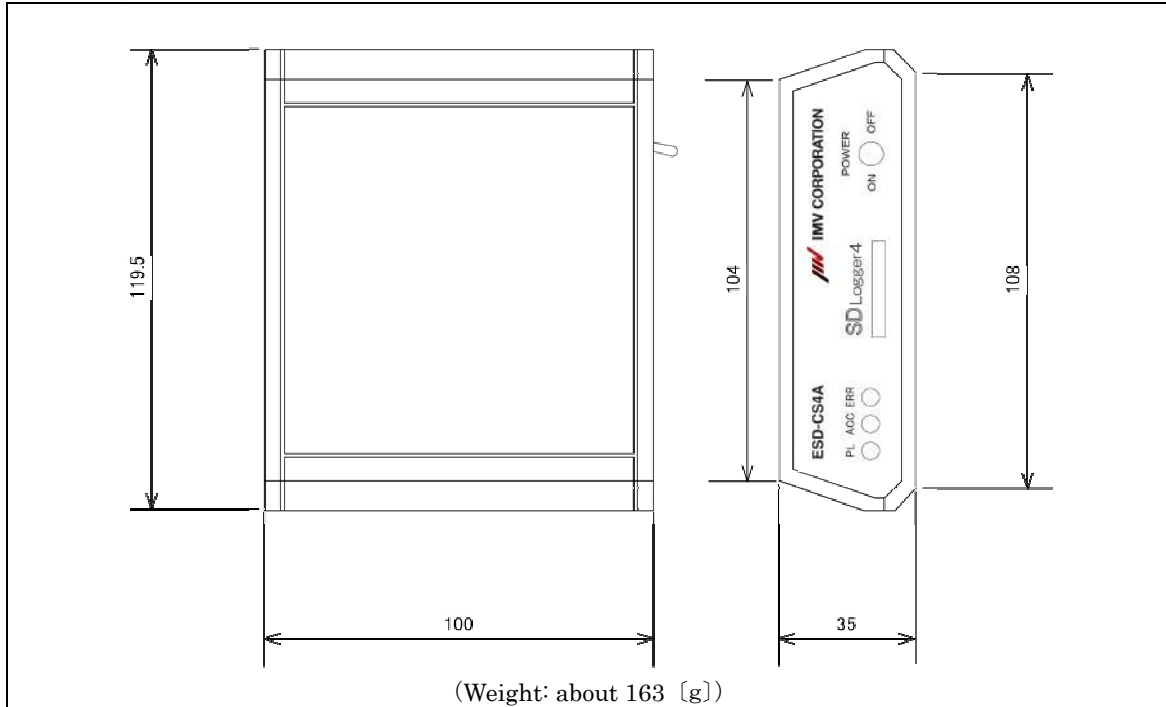
「[Script] log start / stop function (X520001)」

「SD logger script language reference format (X507018)」

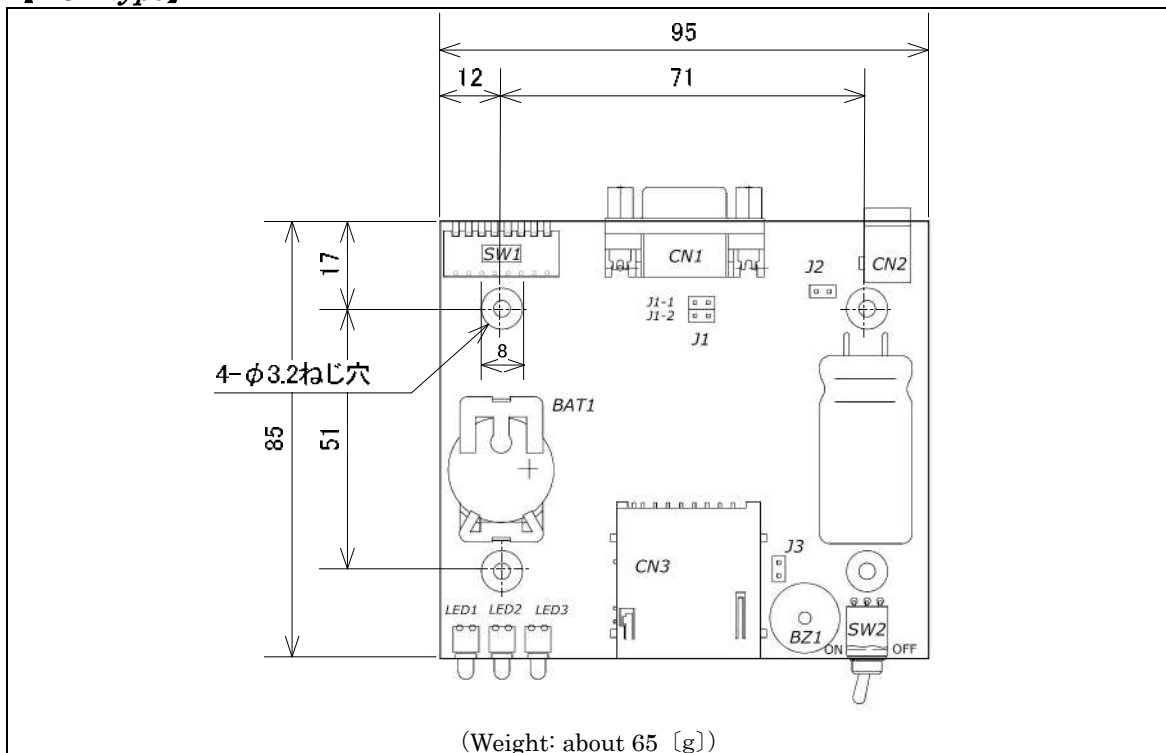
「SD logger script language tutorial format (X507019)」

X External dimensions

【Case type】



【PCB type】



XI Notes / Others

1. Card Insertion and removal

Turn off the power switch before inserting or removing a card, and make sure that all the LEDs are off.

2. Warranty

The warranty period is one year after shipment.

If the product breaks down under the correct usage conditions, the product will be repaired free of charge in accordance with the terms of this warranty.

However, in the following cases, repairs will be charged even during the warranty period.

- (1) Due to incorrect use.
- (2) Incorrect connection.
- (3) Due to wrong power supply.
- (4) Modified or repaired by the customer.
- (5) Fire, earthquake, storm and flood damage, lightning and other natural disasters, pollution, salt damage, gas damage (such as sulfide gas).
- (6) Due to wear.
- (7) Due to falling.
- (8) Damaged by external force.

3. Return repair

The defective product will be returned to our company and will be returned to the customer after repair. A separate estimate will be submitted for the repair cost in the case of a fee.

4. Disclaimer

Although we endeavor to improve reliability, we cannot be held liable for any damage caused by using this product.

This product is not intended for use in highly reliable applications.