MODEL500 SERIES APPENDIX 1 eMMC Setup Manual

Revision Records	
Sept. 29, 2016	Rev. 1
May 09,2018	Rev. 2
Sept. 26,2018	Rev. 3
Mar. 04,2019	Rev. 4
Apr. 08,2019	Rev. 5



CONTENTS Table of Contents

TABLE OF CONTENTS	2
FOREWORD	3
1. STARTUP AND CLOSE OF CONFIGURATION DIALOG	4
2. WRITE RANGE SETTING (PARTITIONING SETUP)	6
3. ECSD SETTING	11
4. DATA GENERATION	14
5. DATA CONVERSION	17
6. TRANSMISSION RATE SETTING	19
7. FAQ	20
REVISION RECORDS	21



Foreword

eMMC, relying on large data storage space, can conduct startup operation and data storage space allocation through a variety of settings. For more efficient data write-in, the device should be set properly.

The Manual presented the setting method for necessary items required at data write-in to eMMC.



1. Startup and close of configuration dialog

After selecting eMMC, start up the configuration dialog at (Access method) of the



Fig. 1 Configuration dialog X # H26M64103EMR [32Gx8] Data preparation DATA Mapping Data mapping OK Cancel >> ○ IMAGE ● EXTRA ITEM PROFILE Partial Addressing 512x\$3A40000+4Mx2+4M MMC **ByteAddress** ✓ eCSD 8Mx\$748 Hexadecimal value VersionCheck 10 steps/16 steps RESET MMC eCSD VersionCheck Labels and interfaces switching USER=61079552, B1=8192, B2=8192, GP1=0, GP2=0, GP3=0, GP4=0 MAP MODE BEGIN DATASZ . 0000000000 - 0747FFFFF USER 0 61079552 0000000000 - 0747FFFFF TOTAL [1] 61079552 E ÷

DataMapping IMAGE:All dataEXTRA:Only applicable to write-in data (system default)PartialAddressing:Expresses partial address. It is not reflected herein.Hexadecimal value:Decimal/hexadecimal switching



- The following differences exist between IMAGE data and EXTRA data.
- (1) IMAGE data Refer to the data within all specified scopes and after COPY, including the data not required to write in and blank data.
- 2 EXTRA data

It is only composed by the data to be written in.

If the device memory is at the three districts to be written in and to be divided, IMAGE data form is composed of all data in the equipment, IMAGE data form is composed of all data of the equipment, and IMAGE data form is only composed of all data in the area to be written in.

If the device memory is at the three districts to be written in and to be divided, IMAGE data form is composed of all data in the equipment, IMAGE data form is composed of all data of the equipment, and EXTRA data form is only composed of all data in the area to be written in.

Eauipment	IMAGE data		EXTRA data
Area 1	Data of Area 1		Area 1
Unnecessary	Data	of	Area 2
Area 2	Data of Area 2		Area 3
Unnecessary	Data	of	
Area 3	Data of Area 3		

	IMAGE data	EXTRA data
Advantages	The data configuration shall match with the equipment.	The data can be decreased. Filesum shall be consistent with
		checksum.
Disadvantages	The data is bigger.	Configuration information is
	Filesum may be inconsistent	required.
	with checksum.	

Click OK at completing the setting.

Click OK to complete the setting. The settings will be reflected.In addition, while performing data generation, data transmitting will be performed simultaneously.

If different data sizes are specified with current data size, SUM will re-calculate the inquiry dialog box. If use current data, clicking "Yes". If read the data later, click "No".

シデータが更新され	れています!
の阿恒を計算します	<i>D</i> [*] <i>C</i>
50여엔전리 유 0 문 9	λ) ζ



2. Write range setting (partitioning setup)

Select MMC label to enter scope setting (partitioning setup) interface.

The following memory blocks exist in eMMC.

- USER
- BOOT1
- BOOT2
- RPBM (※ Incompatible at present)

In Addition, the size of original state is 0. Divide memory blocks of USER area by setting. (X Partition shall be performed through eCSD setting)

- GPP1
- GPP2
- GPP3
- GPP4

The above areas start from sector 0.

For the above areas, assign initial address to write in and testing areas. Assign data size with sector unit. (It is possible to set the scope setting as partition.)

The system default is specified as USER district.

MAP: Express the data with byte address. [Exclusive use]

MODE: Assign the areas to be written in.

BEGIN: Assign the initial address of write-in scope with section.

DATASZ: Specify the read-in data size with section size.

Fig. 2 Partitioning setup

MMC eCSD				RESET
Sector information				
USER=15269888, B1=8192,	B2=8192,	GP1=0, GP2=0,	GP3=0, GP4=	=0
MAP	MODE	BEGIN	DATASZ	
0000000000 - 0003FFFFFF	USER	0	131072	USER specified in th
0000000000 - 0003FFFFFF	TOTAL	[1]	131072	
		Total	Assigned tot	al



If express all areas of the equipment with sector, the following example will appear. (The size will be different for different equipment)



All areas start from sector 0.

Scope setting (partition) Assign the initial offset and size of each area with sector unit.

The scope setting (partition) shall be added through adding lines.

Scope setting can be specified under the status unrelated to sequence.

Perform multiple scopes setting within the same area (only limited to no-repeat)

After showing Hexadecimal value option box, the value shall be expressed with hexadecimal system. Fig. 3 Partition setting (expressed with hexadecimal system)

			RESET
2=2000, GP1=	0, GP2=0, GF	23=0, GP4=0	
MODE	BEGIN	DATASZ	
USER	0	20000	
TOTAL	[1]	20000	
			E
	2=2000, GP1= MODE USER TOTAL	2=2000, GP1=0, GP2=0, GF MODE BEGIN USER 0 TOTAL [1]	2=2000, GP1=0, GP2=0, GP3=0, GP4=0 MODE BEGIN DATASZ USER 0 20000 TOTAL [1] 20000

Add and delete lines through clicking the right key on the list.

			RESET
2000, GP1=	0, GP2=0, (3P3=0, GP4=0	
MODE	BEGIN	DATASZ	
USER			
TOTAL	[1	Insert	
		Delete	E
	2000, GP1= MODE USER TOTAL	2000, GP1=0, GP2=0, C MODE BEGIN USER TOTAL [1	2000, GP1=0, GP2=0, GP3=0, GP4=0 MODE BEGIN DATASZ USER TOTAL [1 Delete



2. Write range setting (partitioning setup)

Assign partition in MODE. Select from the drop down list after double-click.

MMC eCSD				RESET
USER=E90000, B1=2000, E	2=2000, GP1=	0, GP2=0, G	P3=0, GP4=0	
MAP	MODE	BEGIN	DATASZ	
0000000000 - 0003FFFFFF	USER 💌	0	20000	
0000000000 - 0003FFFFF	USER BOOT1 BOOT2 GPP1 GPP2 GPP3 GPP4	[1]	20000	E

While changing BEGIN/DATASZ, double click the mouse in the box to enter editing mode. Move the cursor to line I, and input the value.

Fig.	6	Value	input	

MMC ecsD				RESET
USER=E90000, B1=2000, B2	2=2000, GP1=	0, GP2=0, GF	23=0, GP4=0	
MAP	MODE	BEGIN	DATASZ	
0000000000 - 0003FFFFFF	USER	1	20000	
0000000000 - 0003FFFFFF	TOTAL	[1]	20000	
				E
				10

Fig. 7 Value input

			RESET
2=2000, GP1=	0, GP2=0, GI	P3=0, GP4=0	
MODE	BEGIN	DATASZ	
USER	0	20000	
TOTAL	[1]	20000	
			E
	2=2000, GP1= MODE USER TOTAL	2=2000, GP1=0, GP2=0, GI MODE BEGIN USER 0 TOTAL [1]	2=2000, GP1=0, GP2=0, GP3=0, GP4=0 MODE BEGIN DATASZ USER 0 20000 TOTAL [1] 20000



After adding all partitions, the following interface will be shown.

MMC eCSD				RESET
USER=E90000, B1=2000, B2	2=2000, GP	1=0, GP2=0,	GP3=0, GP4=0	
MAP	MODE	BEGIN	DATASZ	*
0000000000 - 01CFFFFFF	USER	0	E80000	
01D0000000 - 01D03FFFFF	B00T1	0	2000	
01D0400000 - 01D07FFFFF	B00T2	0	2000	E
0000000000 - 01D07FFFFF	TOTAL	[3]	E84000	
]				Ψ.

The setting range and repeated or assigned partitioning will become red.

Fig. 9 Partition repeats

MMC eCSD				RESET
USER=E90000, B1=2000, B2	2=2000, GP1:	=0, GP2=0, G	P3=0, GP4=0	
MAP	MODE	BEGIN	DATASZ	
0000000000 - 00001FFFFF	USER	0	1000	
0000200000 - 000031FFFF	USER	1000	900	 It shall be 1900.
0000320000 - 000035FFFF	USER	1800	200	E
0000360000 - 000037FFFF	USER	2000	100	
0000000000 - 000037FFFF	TOTAL	[4]	1C00	

Dragging and dropping can be performed. The selected parts can be dragged and moved to bold line part.

MINATO ADVANCED TECHNOLOGIES INC.

Fig. 10 Dragging

MMC eCSD				RESET
USER=E90000, B1=2000, B2	=2000, GP1=	0, GP2=0, GF	3=0, GP4=0	
MAP	MODE	BEGIN	DATASZ	
0000000000 - 00001FFFFF	USER	0	1000	
0000200000 - 000031FFFF	USER	1000	900	
0000320890 - 000935FFFF	USER	1800	200	=
0000360000 - 000037FFFF	USER	2000	100	
000000000 - 00003	000 - 000	USSERi <mark>a]</mark>	1000	
				*

2. Write range setting (partitioning setup)

Multiple lines can be selected.

Continuous multiple lines can be selected by pressing SHIFT key. Press CTRL key to select multiple consecutive lines.

Adding, deletion and moving operation can be performed under selected state.

Fig. 11 Multiple lines selection

MMC eCSD				RESET
USER=E90000, B1=2000, B2	:=2000, GP1=	0, GP2=0, GF	23=0, GP4=0	
MAP	MODE	BEGIN	DATASZ	
0000000000 - 00001FFFFF	USER	0	1000	
0000200000 - 000031FFFF	USER	1000	900	
0000320000 - 000035FFFF	USER	1800	200	E
0000360000 - 000037FFFF	USER	2000	100	
0000000000 - 000037FFFF	TOTAL	[4]	1000	
				*



3. eCSD setting

Select eCSD label to enter scope setting (partitioning setup) interface.

Click in the CheckBox to enable corresponding BOOT/RESET/EHNANCED and PARTITION items. Confirm and calibrate the values of the items.

Please refer to the specifications breakdown or equipment data sheet after JEDEC STANDERD JESD84-A441 related to running and setting value of all items. (*XJEDEC* homepage https://www.jedec.org/)

BOOT setting

Start up running setting group at specified power-on status.

RESET setting

Set the reset terminal of the equipment.

ENHANCEDandPARTITION setting

Assign the GPP blocks divided and enhanced (simulation SLC) setting.

Others setting

- Do ERASE when EnhState changed Specify whether delete partitions while modifying the enhanced settings and partition settings.
- Do PRE_SOLDERING_WRITES PSA(ProductStateAwareness) added after corresponding to eMMC v5.0. Specify corresponding modes in NO/AUTO/MANUAL.

Fig. 12 eCSD setting interface

MMC eCSD	RESET	
🗖 ВООТ		^
PARTITION_CONFIG [179]	00	
BOOT_CONFIG_PROT [178]	00	
BOOT_BUS_WIDTH [177]	00	
ERESET		
RST_n_FUNCTION [162]	00	
ENHANCED and PARTITION		
PARTITION_ATTRIBUTE [156]	00	
GP_SIZE_MULT1 [145143]	000000	
GP_SIZE_MULT2 [148146]	000000	
GP_SIZE_MULT3 [151149]	000000	
GP_SIZE_MULT4 [154152]	000000	
ENH_SIZE_MULT [142140]	000000	
ENH_START_ADDRESS [139136]	0000000	
others		
Do ERASE when EnhState changed	YES	
Do PRE_SOLDERING_WRITES	NO	
		-

Please note that

While perform equipment copy, the values of copy equipment is reflected. However, the click will not be reflected. Therefore, attention shall be paid.

Please confirm if it is clicked before write in.



3. eCSD setting

Set the following equipment as an example.

SEC_COUN	$SEC_COUNT = E90000h(7456MB)$					
HC_ERASE	_GRP_SIZ	ZE = 8, HC_WP_GRP_SIZE=2, MAX_ENH_SIZ_MUL	T=1D2h			
Block size =	HC_ERA	SE_GRP_SIZE x HC_WP_GRP_SIZE x 512KB = 8MB				
System	USER	MLC	7456MB			
default GPP1 0MB						
	GPP2	0MB				

Case 1 Change the whole area of USER to simulation SLC.

Setting	PARTITION_ATTRIBUTE=1					
	ENH_SI	ENH_SIZE_MULT=FFFFFh				
	(ENH_S	(ENH_SIZE_MULT = MAX_ENH_SIZ_MULT at operation)				
	Or ENH	I_SIZE_MULT=1D2h				
After	USER	Simulation SLC 3728MB				
PROGRAM						

Case 2 Change the part area of USER (1024MB/SLC) to simulation SLC.

Setting	PARTITION_ATTRIBUTE=1					
	ENH_SIZE_MULT=80h (1024MB/8MB=128)					
After	USER	Simulation	MLC	6432MB		
PROGRAM	SLC 5408MB					
		1024MB				

Case 3 Change 2048MB of the area of USER to MLC. Change the remaining to simulation SLC.

Setting	PARTITION_ATTRIBUTE=1				
	ENH_START_ADDRESS =400000h				
	(2048MB/512B=4194304: sector address)				
	ENH_SIZE_MULT=152h ((7456MB-2048MB)/2/8MB=338)				
After	USER MLC Simulation SLC 4752MB				
PROGRAM		2048MB	5408MB/2=2704MB		

Case 4 Divide one part of USER area to GPP1(2048MB) and GPP2(1024MB)

Setting	PARTIT	TION_ATTRIBUTE=0					
	GP_SIZ	P_SIZE_MULT1=80h (2048MB/8MB/2=128)					
	GP_SIZ	IZE_MULT2=40h (1024MB/8MB/2=64)					
After	USER	MLC	MLC 4384MB				
PROGRAM	GPP1	MLC 2048MB					
	GPP2	MLC 1024MB					



Case 5 Divide one part of USER area to GPP1(1024MB/SLC) and GPP2(1024MB)

Setting	PARTIT	RTITION_ATTRIBUTE=0			
	GP_SIZ	E_MULT1=80	0h (2048MB/8MB/2=128)		
	GP_SIZ	GP_SIZE_MULT2=40h (1024MB/8MB/2=64)			
After	USER	MLC		4384MB	
PROGRAM	GPP1	Simulation	1024MB		
		SLC			
	GPP2	MLC	1024MB		

Please note that

The setting of ENHANCED and PARTITION is OneTime. It cannot be changed after setting.



4. Data generation

4. Data generation

When specify files or constitute data through specified format in each partition, the data will be integrated. Therefore, model reconstruction data shall be generated.

Through clicking the key on the upper right of the dialog box, move it to data generation mode.
At the ending, please move to setting mode through key.
By clicking and OK, transmit the generated data to the encoder.

Fig. 13 Data generation mode

DATA Mapping IMAGE © EXTRA Partial Addressing ByteAddress Hexadecimal value			Car	ncel OK <	Load Setup	Save Setup .
		ITEM PROFILE ✓ MMC 512x\$E90000+4Mx2+512K ✓ eCSD 8Mx\$1D2		Start data DataConvert DataScan	DataCreate	
MMC ecsD						RESE
USER=E90000, B1=2000, B2	:=2000, G	P1=0, GP2=0, GP	3=0, GP4=	0		ScanData
USER=E90000, B1=2000, B2 MAP	=2000, G MODE	P1=0, GP2=0, GP BEGIN	3=0, GP4= DATASZ	D FILE		ScanData
USER=E90000, B1=2000, B2 MAP 0000000000 - 0003FFFFFF	=2000, G MODE USER	P1=0, GP2=0, GP BEGIN 0	3=0, GP4= DATASZ 20000	D FILE		ScanData
USER=E90000, B1=2000, B2 MAP 0000000000 - 0003FFFFFF 00000000000 - 0003FFFFFF	=2000, G MODE USER TOTAL	P1=0, GP2=0, GP BEGIN 0 [1]	3=0, GP4=1 DATASZ 20000 20000) FILE Specified		ScanData

	Return data generation mode to setting mode. *The generated data of the data generation mode will be transmitted to encoder after completing.
Load Setup	Read setting (m5i document/text)
Save Setup	Save settings (m5i document/text)
DataCreate	Data generation
DataConvert	Startup data conversion at data generation
DataScan 📃 💌	Conversion tools selection
Infomation	Description of conversion tools selection
ScanData	Scan the data and perform reconstruction tools for slightly consecutive blank
\mathbf{n}	value



File assignment

Double click the mouse at document assigning point..... Direct input area will display and select and input the file reference key.

Fig. 14 File assignment point

MMC eCSD					RESET
USER=E90000, B1=2000,	B2=2000, GP1=	0, GP2=0, G	₩P3=0, GP4=0	i	ScanData
MAP	MODE	BEGIN	DATASZ	FILE	*
0000000000 - 01D1FFFFFF	USER	0	E90000		
0000000000 - 01D1FFFFFF	TOTAL	[1]	E90000		
					E
					1

Key in drive into file name: folder name $\/$ file name/blank value (00h/FFh) [| offset (hex system)] Read the data of assigned size from the file at data generation. In addition, assign the file size. Fill up blank value after file data.

Consecutive data

Key in "*" at file specified position. The specified data can be continuously used. In addition, key in offset at the specified file point to use the data of any place of the file.

Fig. 15 Continuous data key in

MMC eCSD	·			RE	SET
USER=E90000, B1=2000, B	2=2000, GP	1=0, GP2=0,	GP3=0, GP4=0) ScanD	ata
MAP	MODE	BEGIN	DATASZ	FILE	
0000000000 - 003FFFFFFF	USER	0	200000	E:¥programmer¥M500¥support¥data¥m500_20151208_01.bin/00h	
0040000000 - 007FFFFFFF	USER	200000	200000	*	
0080000000 - 00BFFFFFFF	USER	400000	200000	E:¥programmer¥M500¥support¥data¥m500_20151208_02.bin/00h	1
0000000000 - 00BFFFFFF	TOTAL	[3]	600000		
					-



4. Data generation

Assign write in size from file assignment. While selecting FitSize at file assignment by clicking the right key, the partition of file size can be reflected on DATASZ.

Fig. 16 Refresh of data size

GP3=0, GP4=0	0	S	canData
DATASZ	FILE		
200000	E:¥program	mer¥M500¥support¥data¥m500_20151208_01.bin/0	0h 📄
Te	a aut		
In	isert	¥M500¥support¥data¥m500_20151208_02.bin/0	Oh 🗏
De	elete		
Fi	tSize		
	DATASZ 200000 Ir D Fi	DATASZ FILE 200000 E:¥program Insert Delete FitSize	DATASZ FILE 200000 E:¥programmer¥M500¥support¥data¥m500_20151208_01.bin/0 Insert Delete FitSize

After completing assignment of data files of each scope (partition), perform data generation. Click DataCreate ...

key to start data generation.

After confirming the files, open the DataCreate dialog window, assign the files to be stored.

Fig. 17 DataCreate dialog window

MAP	POS	MODIFY	FILE		
0000000000 - 007FFFFFF 0080000000 - 00BFFFFFFF	MMC®0 MMC®4194304		E:¥programmer¥M500¥support¥data¥m500_20151208 E:¥programmer¥M500¥support¥data¥m500_20151208		
	0%		Cancel MakeFile		

At the ending, please click key to move to setting mode.	
Through And OK to transmit the generated data to the encoder.	
The document name registered in a universal encoder will be changed to the generated file name.	
	1



5. Data conversion

Support data conversion tools of specific functions at data generation.

Select data conversion tools through clicking DataConvert. Convert at data generation.





A type of converter supported currently.

Name of the	Function
converter	
DataScan@MMC	Written scope optimization tool used by SD/MMC
	skip over the currently setting data and delete the consecutive blank area.
	Through reducing the write in range, it is aimed to shorten the write in time.
	There are two Skip over methods
	MinimunLength to Skip: Skip over the blank of specified size.
	UnitSize to Skip: Skip over the blank cell of specified unit.



6. Version Check6. Version Check

Additional specific information of device can be cheked.

Fig.19 Version check Setting screen shot

MMC eCSD VersionCheck	RESET	
ProductRevision CID[55:48]	00	
DEVICE		
DEVICE_VERSION eCSD[263:262]	0000	=
FIRMWARE		
FIRMWARE_VERSION(H) eCSD[261:258]	0000000	
FIRMWARE_VERSION(L) eCSD[257:254]	0000000	
		*

Additional verification can be done to select with check box of left side of setting item.

- Product Revision
- DEVICE VERSION
- FIRMWARE VERSION

Fig.20 Setting of expecting value

MMC eCSD VersionCheck		RESET
PRODUCT		
ProductRevision CID[55:48]	00	
DEVICE		
DEVICE_VERSION eCSD[263:262]	0000	-
FIRMWARE		-
FIRMWARE_VERSION(H) eCSD[261:258]	0000000	
FIRMWARE_VERSION(L) eCSD[257:254]	0000000	
		*

Expecting value can be edit in selected items.Click the column and input expecting value. When contents of device is copied to buffer, these value is affected by device information.



7. Transmission rate setting

In order to improve the determination and calibration time of eMMC, multiple transmission rates are prepared. Set the most suitable according to different devices.

Fig.	196	. Transmission	rate	setting	interface
· -					

	Inserti	on test —	
Contact	check		
ID che	zk		
Contac	c check	STOP set	
ID che	k STOP	set	
Co	ommand e	execution	
BLANK	pefore I	PROGRAM	
ERASE 1	pefore I	PROGRAM	
BLANK	after <mark>I</mark>	ERASE	
VERIFY	after 1	PROGRAM	
VERIFY	after (COPY	
	Operati	on Mode —	_
High spee	d mode:	SDR50	-
	OK	SDR25 SDR50	
	-	DDR37.5	

Select the most suitable transmission rates through Operation Mode of Device operation options interface, and confirm through clicking OK key.

Select the following transmission rates according to different devices.

- SDR25 transmission rate is 25MB/s.
- SDR50 transmission rate is 50MB/s.
- SDR75 transmission rate is 75MB/s.
- DDR37.5 transmission rate is 75MB/s.

Note:

If the equipment still doesn't support after selecting high speed, the equipment shall run at an optional rate. DDR37.5 parameter is for test purpose. Do not select it.



BOOT cannot be copied and start up.

The system default partitioning is USER. Please add BOOT area at partitioning setup before copying.

MMC ecsD				RESET
USER=E90000, B1=2000, B2	=2000, GP1:	=0, GP2=0, GF	3=0, GP4=0	
MAP	MODE	BEGIN	DATASZ	
0000000000 - 01CFFFFFFF	USER	0	E80000	
01D0000000 - 01D03FFFFF	BOOT1	0	2000	
01D0400000 - 01D07FFFFF	BOOT2	0	2000	E
0000000000 - 01D07FFFFF	TOTAL	[3]	E84000	

In addition, eCSD project only performs value duplication at duplication phase. Therefore, it cannot be directly reflected (display as gray).

MMC eCSD		RESET
Боот		^
PARTITION_CONFIG [179]	00	
BOOT_CONFIG_PROT [178]	00	
BOOT_BUS_WIDTH [177]	00	
ESET		
RST_n_FUNCTION [162]	00	
ENHANCED and PARTITION		
PARTITION_ATTRIBUTE [156]	00	
GP_SIZE_MULT1 [145143]	000000	-
GP_SIZE_MULT2 [148146]	000000	
GP_SIZE_MULT3 [151149]	000000	
GP_SIZE_MULT4 [154152]	000000	
ENH_SIZE_MULT [142140]	000000	
ENH_START_ADDRESS [139136]	00000000	
others		
Do ERASE when EnhState changed	YES	
Do PRE_SOLDERING_WRITES	NO	
		-

Since write in is started at areas with a value other than 0 in the project, please click all the areas.



Revision	Preparation date	Contents
Rev. 1	Sept. 29, 2016	Initial revision
Rev. 2	May 07,2018	Add note to Transfer rate setting. Add version check setting.
Rev. 3	Sept. 26, 2018	Modify company name
Rev. 4	Mar. 04,2019	Correct setup file name.
Rev. 5	Apr. 08,2019	Correct errors and add notice.



21 M400-020A, K1_APPENDIX 2