User's Manual

HDMI-CEC Demonstration Board

CEC-78K0/KF2A

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CAUTION

- Do not give any physical damage to this equipment such as dropping
- Do not superimpose voltage to this equipment.
- • Do not use this equipment with the temperature below 0°C or over 40°C.
- · Make sure the USB cables are properly connected.
- Do not bend or stretch the USB cables.
- •Keep this equipment away from water.
- • Take extra care to electric shock.
- This equipment should be handled like a CMOS semiconductor device. The user must take all precautions to
 avoid build-up of static electricity while working with this equipment.
- •All test and measurement tool including the workbench must be grounded.
- • The user/operator must be grounded using the wrist strap.
- • The connectors and/or device pins should not be touched with bare hands.

INTRODUCTION

CEC-78K0/KF2A is designed for users who wish to evaluate HDMI-CEC features with 8-bit microcontroller 78K0/Kx2 series from Renesas Electronics.

It is assumed that the readers have been familiar with basics of HDMI and CEC. The overview and terms are available at "High-Definition Multimedia Interface Specification" in the following web site. <u>http://www.hdmi.org/manufacturer/specification.aspx</u>

Please use the system with all necessary tests. Tessera Technology Inc. assumes no responsibility for any losses from the use of CEC-78K0/KF2A.

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1. CEC-78K0/KF2A

In this chapter, feathers and hardware specifications of CEC-78K0/KF2A, 8-bit microcontroller 78K0/Kx2 series from Renesas Electronics, are described.

1.1 Features

CEC-78K0/KF2A has following feathers.

- 2 HDMI channels
- 10 general purpose key inputs (AD input)
- Infrared remote control function
- MINICUBE2 connection (on-chip debug, writing on flash memory)
- USB connection with PC
- 17segLED
- 15x6 holes universal area

1.2 Hardware Structure

CEC-78K0/KF2A is a combined product of TK-78K0/KF2A and HDMI-CEC Demonstration Board.



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•The oscillator is exchanged from 20MHz to 10MHz. •Following connectors are mounted.





HDMI-CEC Demonstration Board

1.3 Hardware Specifications

CPU	uPD78F0547DA (78K0/KF2)	
Clock Main system clock: 10MHz, Sub system clock: 32.768		
Interface	HDMI connector 2ch	
	MINICUBE2 connector (16pin)	
	USB (mini B connector)	
Operating Voltage	3.3V (DC 12V input)	



1.4 Layout of Hardware Functions

1.5 Hardware Functions

1.5.1 HDMI-CEC Demonstration Board

- HDMI1, HDMI3 They are HDMI connectors. All the pins of HDMI1 and HDMI3 are connected.

- JK1

JK1 is a connector for AC adapter. Connect the bundled AC adapter here.

- SW1

SW1 is the power switch. Power on when you shift it to ON and then LED1 is lighted.

- LED1

LED1 is Power LED. It is lighted when the power is on.

- LED2-LED9

These are LED that are connected to P7 of CPU. They are lighted when they output Low.

- SSW1-SSW13, 20, 25 All those 15 switches must be set to "78K0" side. (default setting)
- SSW14

Set this when you connect MINICUBE2 to WRITE1 connector.

[DBG] To start the debugger ID78K0-QB

[PROG] To start the flash programmer QB-Programmer

This setting does not affect anything when you do not connect MINICUBE2.

- SSW15-SSW18, 24 Not is use.
- SSW19

This must be set to "K0&K0R/KG3&K0R/KG3-C CECIN/OUT" side. (default setting)

- SSW21-SSW23

These are extended switched for HPD and DDC. Switch them with "Source" or "Sink".

- > Set it to "Source" when you use as Monitor mode.
- > Set it to "Sink" when you use as Pseudo TV mode.
- > Set it to "Source" when you use as Pseudo DVR mode.

- TSW1-TSW10

These are use as inputs for general purpose switches. They are connected to A/D conversion ports.

Switch	CPU Pin	CPU Input Voltage	Switch	CPU Pin	CPU Input Voltage
TSW1	ANI2	0V	TSW6	ANI3	0V
TSW2	ANI2	0.51V	TSW7	ANI3	0.51V
TSW3	ANI2	0.96V	TSW8	ANI3	0.96V
TSW4	ANI2	1.41V	TSW9	ANI3	1.41V
TSW5	ANI2	1.88V	TSW10	ANI3	1.88V

By pressing the switches, following voltages are input.

- WRITER1

This is MINICUBE2 connector.

- REM1

This is the light receiving element for infrared remote control function.

1.5.2 TK-78K0/KF2A Board

In this section, the hardware functions are briefly described. For details, refer to "TK-78K0/KF2A User's Manual".

- CN3

This is a connector for AC adapter, but not in use. Use the JK1 AC adapter connector on HDMI-CEC Demonstration Board.

- SW2

SW2 is a push-switch that is connected to P30. However, it cannot be used as it is connected to infrared remote control function. Do not touch when application is running.

- SW3

SW3 is a push-switch that is connected to P120. However, it cannot be used as it is connected to infrared CEC control function. Do not touch when application is running.

- U2

This is 7segLED. U2 is connected to P5.

- JP1

JP1 sets the CPU power selection. Set this as open. (default setting)

- USB1

This is a USB connector. Use bundled USB cable.

- SW1-1-SW1-5, SW4

These are used as setting the operation mode.

Switch		MINICUBE2 i	s in Use	Bundled with TK-78K0/KF2A	
		ID78K0-QB is in Use CEC Viewer is in Use (default setting)	QB-Programmer is in Use	Flash Programmer WriteEZ5 is in Use	Debugger ID78K0-QB is in Use
	1	OFF	OFF	ON	ON
	2	OFF	OFF	ON	ON
SW1	3	OFF	OFF	ON	ON
	4	OFF	OFF	OFF	ON
	5	OFF	OFF	OFF	OFF
SW4		UART	Center	UART	OCD

※ To use the debugger ID78K0-QB(MINICUBE2)

- Set SSW14 to [DBG]
- Connect 78K0-OCD board that is bundled with MINICUBE2
- · Set the switches for MINICUBE2 to "M2" and "T"
- ※ To use the flash programmer QB-Programmer
 - Set SSW14 to [PROG]
 - Disconnect 78K0-OCD board that is bundled with MINICUBE2
 - Set the switches for MINICUBE2 to "M2" and "T"
- Set QB-Programmer settings as "Port: UART-Ext-OSC" and "Frequency: 10.00"
- SW1-6 SW1-8

These are connected to P45, 46, 47 of CPU.

- SW5

This is the CPU reset switch.

- Y1

This is the CPU operation clock. Do not change this from default setting, 10MHz. The sample program will not work if it is changed.

1.6 Pin Function List

CN1	Pin Name	Used For
1	AVREF	
2	GND	
3	P33	
4	P16	Connect to Over Current(+5V)
5	VDD	
6	P130	
7	NC	
8	FLMD0	Connect to WRITE1 Connector(16Pin)
9	VDD	3.3V
10	(+12V)	
11	GND	GND
12	(+12V)	
13	VDD	3.3V
14	RESET	Connect to WRITE1 Connector(16Pin)
15	VDD	3.3V
16	(+12V)	
17	P124	
18	P30	Connect to Remote Control Module
19	P31	Connect to WRITE1 Connector(16Pin)
20	P32	Connect to WRITE1 Connector(16Pin)
21	P141	
22	P11	
23	P12	
24	P10	
25	P13	Connect to WRITE1 Connector(16Pin)
26	P14	Connect to WRITE1 Connector(16Pin)
27	P123	
28	P15	
29	P06	
30	P140	CEC-OUT Output
31	P60	DDC(CLK)
32	P61	DDC(DATA)
33	GND	GND
34	EVDD	
35	P62	HPD
36	P63	
37	P /0	
38	P/1	
39	P /2	
40	P /3	
41	<u>P /4</u>	LED6
42	P 75	LED7
43	P /6	
44		
45	P121	
46	P122	Connect to WRITE1 Connector(16Pin)
4/	P142	
48	P143	
49	P144	
50	P145	

CN2	Pin Name	Used For
1	P00	
2	P01	
3	P02	
4	P03	
5	P04	
6	P05	
7	P17	
8	P120	CFC-IN input
9	P50	7 segl ED
10	P51	7segl ED
11	P52	7 segl ED
12	P53	
13	P54	
14	P55	
15	P56	
16	P 50	
10		
1/		
10		
19		GND
20	EVDD	
21	P40	
22	P41	
23	P42	
24	P43	
25	P44	
26	P45	DipSW(SW1-6)
27	P46	DipSW(SW1-7)
28	P47	DipSW(SW1-8)
29	NC	
30	NC	
31	NC	
32	NC	
33	NC	
34	NC	
35	NC	
36	NC	
37	P64	
38	P65	
39	P66	
40	P67	
41	NC	
42	NC	
43	P27	
44	P26	
45	P25	
46	P24	
47	P23	KEY input (KEY6~10)
48	P22	KEY input (KEY1~5)
49	P21	
50	P20	

1.7 Circuit Diagram

Please refer to product version CD.

Please refer to product version CD.

2. Settings for Sample Demonstration Program

2.1 KEY Settings

ŀ	IDMI			HDMI	
AC Adapter				LED	
		TK Boai	ď		
KEY1 Power	KEY2 Rec	KEY3 Rec Stop	KEY4 Mode	KEY5	
KEY6 Play	KEY7 Revers	KEY8 Forward	KEY9 Stop	KEY10	

KEY	Used For
KEY1	Power
KEY2	Record
KEY3	Record Stop
	Mode Change (Monitor Mode at startup)
	Push to change the mode, "Pseudo TV"(LED9 light), "Pseudo DVR"(LED8 light),
KEY4	"Pseudo TV"(LED9 blinking), "Pseudo DVR"(LED8 blinking), "Monitor".
	Please evaluate it by the combination in blinking in lighting when evaluating it
	with the board.
KEY5	(Not in use)
KEY6	Play
KEY7	Rewind
KEY8	Fast-forward
KEY9	Stop
KEY10	Select Remote Controller Display (Remote Controller Code / Key Name)

2.2 LED Settings

	HDMI		HDMI	
AC Adapter		LED8 LED7 LED6 LED5 LED4		ED1
		TK Board		
		KEY		

LED	Used For
LED1(green)	Lighted when the board power is on.
LED2(red)	Pseudo device power
LED3(red)	Playing
LED4(red)	Fast-forwarding
LED5(red)	Reversing
LED6(red)	Recording
LED7(red)	
LED8(red)	Pseudo DVR mode
LED9(red)	Pseudo TV mode
LED Scroll	Monitor mode

3. GUI

In this chapter, GUI to control CEC of HDMI from PC (CEC Viewer) is described.

- The sample program (78K0_Kx2.hex) is pre-installed on the TK-78K0/KF2A.
 - If you wrote other programs on the system, you can write the sample program (78K0_Kx2.hex) again by using following tools.
 - Flash memory programmer "WruteEZ5" that you can find in bundled CD-ROM.
 - Flash memory programmer for MINICUBE2 "QB-Programmer" or debugger "ID78K0-QB".
- This sample program works only if 10MHz oscillator is mounted on Y1 socket of TK-78K0/KF2A board.
- The remote control receiving function of this sample program (78K0_Kx2.hex) supports only NEC format.
- CEC Viewer works with Microsoft Excel. (operation check has been done on Excel 2000 and Excel 2003)

3.1 CEC Viewer Functions

CEC Viewer has following functions.

- Monitor sending/receiving CEC data
- Send specific commands from user input
- Pre-set command data, 20 KEY
- Output log data with Excel format
- Reproducing function by loading log data with Excel format

3.2 CEC Viewer Files

File	Description
CECViewer.exe	Start CEC Viewer by executing this file.
command.xls	CEC command (Opcode) data file. With using this file, you can add new Opcode. Since the program retrieves the command data from this file, do not close this file while CEC Viewer is running.
cecviewer.ini	Pre-set key data that is registered with GUI is stored in this file.

3.3 Connection Example

Connection examples of the board for using CEC Viewer are described.

3.3.1 Example 1: Monitor Mode

You can monitor the data communication between devices by connecting the devices through the board. Following figure shows the connection example to monitor the communication between TV and recording device.



3.3.2 Example 2: Pseudo DVR Mode / Pseudo TV Mode

To operate the board as a pseudo DVR or TV, you need to connect the board to board together. You can reproduce functions, such as turning on the power of pseudo TV automatically by turning on the power of pseudo DVR, and turning off the power of pseudo DVR automatically by turning off the power of pseudo TV.



CEC-78K0/KF2A Board (Pseudo TV Mode: LED9 ON)

CEC-78K0/KF2A Board (Pseudo DVR Mode: LED8 ON)

3.4 CEC Viewer Window

In this section, CEC Viewer window is explained.

3.4.1 Window Overview



CEC Communication Data

No	Communication orders
Remocon	Remote controller code or remote controller code name
Initiator	Initiator Address name *
Destination	Destination Address name *
Opcode	Opcode name and its operand structure *
	Frame communication result
Data	It displays data on odd byte and EOM+ACK on even byte.
Dala	It displays "e" when it has EOM, otherwise "-".
	It displays "a" when it has ACK, otherwise "n".
Inton/ol[mo]	Interval time between CEC communication (or DDC communication
Interval[IIIS]	offered as optional function)
Date & Time Date and time when it gets the frame data	

* It gets the information from "command.xls". If you close this file, it will not be able to display the logical address and Opcode.

3.4.2 "File" Menu

(File(E) Menu Log New(<u>N</u>) Log Open(Q) Log Save(S) End(Q)	u(M) Debus) Help(H) - D - Replay										
	Monitor(1)	Replay(2)	e	1ŀ	St	15			ec	J	ron	I CS	
	TV_OFF	KEY2	KEY3	KEY4	KEY5	KEY6	KEY7	KEY8	KEY9	KEY10	1		
1	Y11	KEY12	KEY13	KEY14	KEY15	KEY16	KEY17	KEY18	KEY19	KEY20	SET(Z)		
- >	Rem	ocon Initiat	tor Des	tination Op	Code			Dat	3		Interval[ms]	Date&Time	CEC Error
	3	DVR	TV	<p< td=""><td>olling Messag</td><td>e> [None]</td><td></td><td>10 -</td><td>'n</td><td></td><td>35</td><td>14:15:00 2010/06/15</td><td></td></p<>	olling Messag	e> [None]		10 -	'n		35	14:15:00 2010/06/15	
		DVR	TV I	< P	olling Messag	e> [None]		10 -	'n		37	14:15:00 2010/06/15	
		DVR	TV	<p< td=""><td>olling Messag</td><td>e> [None]</td><td></td><td>10 -</td><td>'n</td><td></td><td>24441</td><td>14:15:24 2010/06/15</td><td></td></p<>	olling Messag	e> [None]		10 -	'n		24441	14:15:24 2010/06/15	
/		DVR	TV	< P	olling Messag	e> [None]		10 -	n i		37	14:15:24 2010/06/15	
+ 11		DVR	TV	<p< td=""><td>'olling Messag</td><td>e> [None]</td><td></td><td>10 -</td><td>n</td><td></td><td>35</td><td>14:15:24 2010/06/15</td><td></td></p<>	'olling Messag	e> [None]		10 -	n		35	14:15:24 2010/06/15	
		DVR	TV	<p< td=""><td>olling Messag</td><td>e> [None]</td><td></td><td>10 -</td><td>'n</td><td></td><td>37</td><td>14:15:24 2010/06/15</td><td></td></p<>	olling Messag	e> [None]		10 -	'n		37	14:15:24 2010/06/15	
		DVR	I TV	<p< td=""><td>olling Messag</td><td>e> [None]</td><td></td><td>10 -</td><td>'n</td><td></td><td>155517</td><td>14:18:00 2010/06/15</td><td></td></p<>	olling Messag	e> [None]		10 -	'n		155517	14:18:00 2010/06/15	
		DVR	TV	< P	olling Messag	e> [None]		10 -	'n		34	14:18:00 2010/06/15	
		DVR	TV	<p< td=""><td>olling Messag</td><td>e> [None]</td><td></td><td>10 -</td><td>'n</td><td></td><td>41</td><td>14:18:00 2010/06/15</td><td></td></p<>	olling Messag	e> [None]		10 -	'n		41	14:18:00 2010/06/15	
		DVR	TV	<p< td=""><td>olling Messag</td><td>e> [None]</td><td></td><td>10 -</td><td>'n</td><td></td><td>30</td><td>14:18:00 2010/06/15</td><td></td></p<>	olling Messag	e> [None]		10 -	'n		30	14:18:00 2010/06/15	
		DVR	IV IV	<p (f<="" td=""><td>olling Messag</td><td>e> [None]</td><td></td><td>10 -</td><td>'n</td><td></td><td>1077</td><td>14:18:01 2010/06/15</td><td>-</td></p>	olling Messag	e> [None]		10 -	'n		1077	14:18:01 2010/06/15	-
		DVR	I IV	<p (f<="" td=""><td>olling Messag</td><td>e> [None]</td><td></td><td>10 -</td><td>'n</td><td></td><td>34</td><td>14:18:01 2010/06/15</td><td>-</td></p>	olling Messag	e> [None]		10 -	'n		34	14:18:01 2010/06/15	-
		DVR		<p< td=""><td>olling Messag</td><td>e> [None]</td><td></td><td>10 -</td><td>'n</td><td></td><td>30</td><td>14:18:01 2010/06/15</td><td></td></p<>	olling Messag	e> [None]		10 -	'n		30	14:18:01 2010/06/15	
		DVR			olling Messag	e> [None]		10 -	-		675	14:16:01 2010/00/15	
		DVP		10	olling Messag	e> [None]		10 -			26	14-19-02 2010/00/10	-
		DVB	TV	(F	olling Messag	e> [None]		10 -	n n		37	14:18:02 2010/06/15	
-		D)/B1	T/	(F	olling Messag	e> [None]		10 -	'n		36	141802 2010/06/15	
		DVB	TV	(5	tandby> [None	al		10 -	-a 36 ea		13073	14:18:15 2010/06/15	
		DVB	TV	(5	itandby> [None	4		10 -	a 36 ea		4413	14:18:19 2010/06/15	
<u> </u>	His	DVR	TV	<p< td=""><td>olling Messag</td><td>e> [None]</td><td></td><td>10 -</td><td>n</td><td></td><td>5941</td><td>14:18:25 2010/06/15</td><td></td></p<>	olling Messag	e> [None]		10 -	n		5941	14:18:25 2010/06/15	
t		DVR	TV	<p< td=""><td>olling Messag</td><td>e> [None]</td><td></td><td>10 -</td><td>'n</td><td></td><td>36</td><td>14:18:25 2010/06/15</td><td></td></p<>	olling Messag	e> [None]		10 -	'n		36	14:18:25 2010/06/15	
fic	T1 5	DVR	TV	<p< td=""><td>olling Messag</td><td>e> [None]</td><td></td><td>10 -</td><td>m</td><td></td><td>37</td><td>14:18:25 2010/06/15</td><td></td></p<>	olling Messag	e> [None]		10 -	m		37	14:18:25 2010/06/15	
iic	26	DVR	TV	< P	olling Messag	e> [None]		10 -	n		36	14:18:25 2010/06/15	
	27	DVR	TV	<5	tandby> [None	-		10 -	a 36 ea		6944	14:18:32 2010/06/15	
	28	DVR	TV	<5	tandby> [None]		10 -	a 36 ea		2164	14:18:35 2010/06/15	1
							40.0						

	Clear log data displaying.
Log New	
	It is the same as the shortcut key New .
	This does not work with current version of CEC Viewer.
Log Open	
	It is the same as the shortcut key Open.
	Save the current log data with Excel format.
	It is the same as the shortcut key Save .
Log Save	*You can select specific rows by checking the check box.
	*You can select all rows by checking the check box above "No".
	Please select * on the No row again after clicking the area of * once
	when all not selecting it.
End	Close CEC Viewer.

3.4.3 "Menu" Menu

A SEC Viewer Verl.86b				
HerD Menu@l Debus@ Help()			1996	_
COM Conte (C)				-
ew Open Save Start Reply				
Manifar(1) Destu (0)				_
Monitor (1) [Kepidy(2)]				
TV_OFF KEY2 KEY3 KEY4 KEY5 KEY6 KEY7 KEY8 KEY9 KEY10	00000			
- KEY11 KEY12 KEY13 KEY14 KEY15 KEY26 KEY27 KEY20	serv			
No Banacco Initiatre Destination OnCode	[interval[me]]	DateSTime	OEC From	
COM Set	and raiging	Contracting	000 010	
COM Port(C): COM10				_
				_
Bitrate(B): 38400				
Data Bit(<u>D</u>): 8 💌				_
Parity(P): None <u></u>				_
Stop Bit(<u>5</u>):				_
OK Cancel				_
				_
				_
				-
				_
Ready				

COM Config (Settings for UART communication)

	Select the COM port that is assigned for TK-78K0/KF2A.
	(COM Port 1-19)
Pit rate	Select from 9600, 14400, 19200, 38400 (default), 57600, 115200,
Dit Tale	128000. (Select the default setting, 38400)
Data Bit	Fixed with 8 bit.
Parity	Fixed with None.
Stop Bit	Fixed with 1 bit.

3.4.4 "Debug" Menu

м	onitor (1) Rej	play(<u>2</u>)		68		5	E	e	CI		or		CS		
	TV_OF	F K	EY2	KEY3	KEY4	KEY5	KEY6	KEY7	KEY8	KEY9	KEY10	SETC	,			
No.	REYT	emocon	Initiat	tor D	KEY14	KEV15	KEA10	KEY17	Dati	KEY19	KEY20		terval[mc]	DateSTime	CEC Error	

	Start monitoring CEC.
	When it starts monitoring, the bottom of the window becomes red
	color to show RUN status.
	Communication results are displayed only when the status bar shows
	RUN.
Monitor Start	Select this menu when you wish to monitor communication between
	devices or to send commands from CEC Viewer.
	To stop monitoring, select this menu again. It toggles like RUN,
	STOP, and RUN.
	It is the same as the shortcut key Start .
	Replay the CEC communication based on log data saved with Excel
	format.
Doplay Start	Set replay tag properly and execute.
Replay Start	*For detail about replay function, refer to "3.6.4 Replay Function"
	D]
	It is the same as the shortcut key Replay .

3.5 Control From CEC Viewer

CEC data can be sent from CEC Viewer.

3.5.1 "Monitor" Tab

It sends user defined CEC data from preset keys.

		Sel	lect "Moni	tor(1)" Tal	b for KEY						
Mo	onitor(<u>1</u>)	Deplay(<u>2</u>)]								\frown
	KEY1	KEY2	KEY3	KEY4	KEY5	KEY6	KEY7	KEY8	KEY9	KEY10	SET(7)
пL	KEY11	KEY12	KEY13	KEY14	KEY15	KEY16	KEY17	KEY18	KEY19	KEY20	orig)

Following "Preset KEY Config" screen is displayed by clicking "SET" key.

	Gacion	- 10 8	Des	tinatio	n			Clas	5						Ope	ecode	-		
		-			-	Γ					-								-
Crea	te Com	mano	1	-				_		_		_			_	_	-		
	1	2	3	4	5	6	7	8	9	10) 11	1	2 13	14	15	16	17	Caption	
KEY1		-	1_	1	1	1		1	1	1	1	1	1		1	<u> 1</u>		KEY1	
KEY2				Γ														KEY2	
КЕҮЗ																		КЕҮЗ	
KEY4																		KEY4	
KEY5																		KEY5	
KEY6																		KEY6	
KEY7																		KEY7	
KEY8																		KEY8	
KEY9																		KEY9	
KEY10																		KEY10	

<KEY Setting>

Select Header and Opcode for the sending CEC data at combo box shown above red area. (You can also enter it at the KEY input area directly.)

- 1. Select sender's initiator address at "Initiation".
- 2. Select receiver's destination address at "Destination".
- 3. Select the class of sending Opcode at "Class".
- 4. Select Opcode at "Opcode"
- 5. Move the cursor at the first byte of specific KEY, and click "Create Command" key. Header and Opcode will be automatically set.
- 6. Enter Operand for Opcode at the KEY input area directory as needed.

Also, captions of KEY on CEC Viewer can be changed. Change the caption to "TV_OFF", then set the data [10] [36].

Preset I	KEY Con	fig																×
	<u>о</u> к		⊆an	ncel											₽r	ev	<u>N</u> e>	kt
In	itiation	Dest	inatio	n			Clas	s						Оре	code			
1: D	VR1 💌	0: TV		•	00:	One	Touch	Play /	Rout	DD:	<tex< td=""><td>t View</td><td>On>[</td><td>None]</td><td></td><td></td><td></td><td>-</td></tex<>	t View	On>[None]				-
Crea	te Comma	nd																
	1 2		4	5	6	7	8	9	10	11	12	13	14	15	16	17	Ception	
KEY1	10 36																TV_OFF	
KEY2			-	F	Ŧ	I	T	Ţ	T	F		-		F	-		KEY2	
		_			_								_					_

The caption of KEY1 is changed to "TV_OFF".

N	Aonitor(1)	Replay(2)]								
(TV_OFF	KEY2	KEY3	KEY4	KEY5	KEY6	KEY7	KEY8	KEY9	KEY10	
Г	KEY11	KEY12	KEY13	KEY14	KEY15	KEY16	KEY17	KEY18	KEY19	KEY20	SETQ

By clicking "TV_OFF" key, it outputs CEC data ([10][36]), then the log data is displayed.

k (CEC View	er Ver1.8	6b										
ile	(<u>F</u>) Menu(M) Debug((<u>D</u>) Help(<u>H</u>)	r.									
Vev) Dpen	Save S	tart Replay	,									
40	onitor(<u>1</u>)	Replay(2	2)										
	TV_OFF	KEY2	KEY3	KEY4	KEY5	KEY6	KEY7	KEY8	KEY9	KEY10	SET(7)		
	KEY11	KEY12	KEY13	KEY14	KEY15	KEY16	KEV17	KEV18	KEY19	KEY20	- CENE		
0	Remo	con Initia	ator Des	stination C	DpCode			D	ata		Interval[ms	s] Date&Time	CEO EM
ļ	1	DVF	t TV	<	(Standby> [Nor	ie]		10	I-a 36 ea		92656	15:06:21 2010/06/15	
-													

3.5.2 "Replay" Tab

It loads monitoring information, the board becomes a unit on the CEC, and then it replays the same CEC command communication. For detail, refer to "3.6.4 Replay Function".

3.6 Specific Usages

3.6.1 Switch Settings

Set the switches as shown below.



3.6.2 Use As Monitor

Ne	v Open	Save	Start Repla											
M														
M														
M				- 1	124									
1.1.1.1	onitor(1)	Ronlau	(2)				-						<u> </u>	
ſ	mort	Inceptay	L ron	1	vere	1	1 100	L KOM	-	1 roma	- 1			
1	IV_OFF	KEY2	KETS	KEY4	KEYD	S.ETD	KET/	KE18	KEYS	KEYIU	SET(Z)			
Γ.	KLYII	KEY12	KEY13	KEY14	KEYID	KEY16	KEY17	KEYIU	KLY19	KEY20				
No	Remo	con Ini	tiator De	stination Op	Code			Data	1		Interva	([ms] Date&Time	CEC Error	-

When CEC Viewer is just started, the color of status bar is white to show "Ready". At this status, it does not display any CEC data.

	1 220	n Save	518	rt F Ma	<u>17</u>			_	_						
						1.1									
М	lonitor (1) Rep	lay(2)	1											
1	TV_OF	F KE	12	KEY3	KEY4	KEY5	KEY6	KEY7	KEY8	KEY9	KEY10	SETTO			
F	KEY11	KE	Y12	KEY13	KEY14	KEY16	KEY16	KEY17	KEY18	KEY19	KEY20	Julie -			
No	Re	mocon	Initiate	y De	estination O	pCode			Dat	0		Interval[m:] Date&Time	CEC Error	T

Click "Start" button to start monitoring by CEC Viewer.

The status bar becomes red to show "Run" status.

With this status, CEC communication data between the boards will be displayed. Click "Start" button again to stop monitoring ("Ready" status).

3.6.3 Pseudo Device Sample Program

You just need to run CEC Viewer to use the Pseudo Device mode that is the same as Monitoring mode.

Click "TSW4(KEY4)" to select Pseudo Device (TV/DVR) mode. The multipurpose window displays the status of current pseudo device.

Nei) 🚅		Start Rej	រ] play										
Mo	onitor	ne dou)W(er	0	Ν							
	TV_OFF	KEY2	KEY3	KEY4	KEY5	KEYO	KE17	KET	8	KEY9	KEY10	0.000	.	
	KEY11	KEY12	KEY1	3 KEY14	KEY15	KEY16	KEY17	KEYI	18	KEY19	KEY20	SETQ	2	
lo	Remo	con Ini	tiator	Destination	OpCode				Data			In	iterval[ms]	Date&Time
io]	Remo	con Ini D\	tiator (Destination DVR1	OpCode <polling messa<="" td=""><td>ge> [None]</td><td></td><td></td><td>Data 11 en</td><td></td><td></td><td>In 2</td><td>iterval[ms] 29813</td><td>Date&Time 17:54:48 2008/12/</td></polling>	ge> [None]			Data 11 en			In 2	iterval[ms] 29813	Date&Time 17:54:48 2008/12/
6]	Remo	con Ini D\ D\	tiator /R1 /R1	Destination DVR1 TV	OpCode <polling messa<br=""><give device="" f<="" td=""><td>ge> [None] 'ower Status></td><td>[None]</td><td>1</td><td>Data 11 en 10 -a 8</td><td>8F ea</td><td></td><td>In 21 61</td><td>iterval[ms] 29813 2</td><td>Date&Time 17:54:48 2008/12/ 17:54:49 2008/12/</td></give></polling>	ge> [None] 'ower Status>	[None]	1	Data 11 en 10 -a 8	8F ea		In 21 61	iterval[ms] 29813 2	Date&Time 17:54:48 2008/12/ 17:54:49 2008/12/
	Remo	con Ini D\ D\ T\	tiator /R1 /R1	Destination DVR1 TV DVR1	OpCode <polling messa<br=""><give device="" f<br=""><report power<="" td=""><td>ge> [None] 'ower Status> Status> [Pow</td><td>[None] ver Status]</td><td>1</td><td>Data 11 en 10 -a 8 01 -a 9</td><td>8F ea 90 -a 01 ea</td><td>3</td><td>In 21 61 94</td><td>iterval[ms] 29813 2 4</td><td>Date&Time 1754:48 2008/12/ 17:54:49 2008/12/ 17:54:49 2008/12/</td></report></give></polling>	ge> [None] 'ower Status> Status> [Pow	[None] ver Status]	1	Data 11 en 10 -a 8 01 -a 9	8F ea 90 -a 01 ea	3	In 21 61 94	iterval[ms] 29813 2 4	Date&Time 1754:48 2008/12/ 17:54:49 2008/12/ 17:54:49 2008/12/
	Remo 1 2 3 4	con Ini D\ D\ T\ D\	tiator /R1 /R1 /R1 /R1	Destination DVR1 TV DVR1 TV	OpCode <polling messa<br=""><give device="" f<br=""><report power<br=""><user control<="" td=""><td>ge> [None] 'ower Status> Status> [Pow Pressed> [UI</td><td>·[None] ver Status] Command]</td><td></td><td>Data 11 en 10 -a 8 01 -a 9 10 -a 9</td><td>8Fea 90 -a 01 ea 44 -a 40 ea</td><td>3</td><td>In 21 61 94 71</td><td>iterval[ms] 29813 2 4 8</td><td>Date&Time 17:54:48 2008/12/ 17:54:49 2008/12/ 17:54:49 2008/12/ 17:54:49 2008/12/</td></user></report></give></polling>	ge> [None] 'ower Status> Status> [Pow Pressed> [UI	·[None] ver Status] Command]		Data 11 en 10 -a 8 01 -a 9 10 -a 9	8Fea 90 -a 01 ea 44 -a 40 ea	3	In 21 61 94 71	iterval[ms] 29813 2 4 8	Date&Time 17:54:48 2008/12/ 17:54:49 2008/12/ 17:54:49 2008/12/ 17:54:49 2008/12/
	Remo 1 2 3 4 5	con Ini D\ D\ T\ D\ D\	tiator /R1 /R1 /R1 /R1 /R1 /R1	Destination DVR1 TV DVR1 TV TV TV	OpCode <polling messa<br=""><give device="" f<br=""><report power<br=""><user control="" i<br=""><give device="" f<="" td=""><td>ge> [None] 'ower Status> Status> [Pow Pressed> [UI 'ower Status></td><td>[None] ver Status] Command] [None]</td><td></td><td>Data 11 en 10 -a 8 01 -a 9 10 -a 9 10 -a 9</td><td>8Fea 90 -a 01 ea 44 -a 40 ea 8Fea</td><td>3</td><td>In 2: 6: 94 71 3</td><td>iterval[ms] 29813 2 4 8 12</td><td>Date&Time 1754:48 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/</td></give></user></report></give></polling>	ge> [None] 'ower Status> Status> [Pow Pressed> [UI 'ower Status>	[None] ver Status] Command] [None]		Data 11 en 10 -a 8 01 -a 9 10 -a 9 10 -a 9	8Fea 90 -a 01 ea 44 -a 40 ea 8Fea	3	In 2: 6: 94 71 3	iterval[ms] 29813 2 4 8 12	Date&Time 1754:48 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/
	Remo 1 2 3 4 5 6	con Ini D\ D\ T\ D\ D\ D\ T\ D\	tiator //R1 //R1 / //R1 //R1 //R1	Destination DVR1 TV DVR1 TV TV TV DVR1	OpCode <polling messa<br=""><give device="" f<br=""><report power<br=""><user control<br=""><give device="" f<br=""><report power<="" td=""><td>ge> [None] 'ower Status> Status> [Pow Pressed> [UI 'ower Status> Status> [Pow</td><td>[None] ver Status] Command] ·[None] ver Status]</td><td></td><td>Data 11 en 10 -a 8 01 -a 9 10 -a 9 10 -a 9</td><td>8Fea 90 -a 01 ea 44 -a 40 ea 8Fea 90 -a 00 ea</td><td>3</td><td>In 2: 6: 9: 71 3: 9:</td><td>iterval[ms] 29813 2 4 8 8 12 4</td><td>Date&Time 1754:48 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/</td></report></give></user></report></give></polling>	ge> [None] 'ower Status> Status> [Pow Pressed> [UI 'ower Status> Status> [Pow	[None] ver Status] Command] ·[None] ver Status]		Data 11 en 10 -a 8 01 -a 9 10 -a 9 10 -a 9	8Fea 90 -a 01 ea 44 -a 40 ea 8Fea 90 -a 00 ea	3	In 2: 6: 9: 71 3: 9:	iterval[ms] 29813 2 4 8 8 12 4	Date&Time 1754:48 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/
	Remo 1 2 3 4 5 6 7	con Ini D D T D D T D T D D D D D	tiator //R1 //R1 //R1 //R1 //R1 //R1	Destination DVR1 TV DVR1 TV TV TV DVR1 TV	OpCode <polling messa<br=""><give device="" f<br=""><report power<br=""><user control="" i<br=""><give device="" f<br=""><report power<br=""><text oni<="" td="" view=""><td>ge> [None] 'ower Status> Status> [Pow Pressed> [UI 'ower Status> Status> [Pow > [None]</td><td>[None] ver Status] Command] [None] ver Status]</td><td></td><td>Data 11 en 10 -a 8 01 -a 9 10 -a 9 10 -a 9 01 -a 9</td><td>8Fea 90 -a 01 ea 44 -a 40 ea 8Fea 90 -a 00 ea</td><td>3</td><td>In 2: 6: 9- 7: 3: 9- 4: 4:</td><td>iterval[ms] 29813 2 4 8 8 12 4 7</td><td>Date&Time 1754:48 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/</td></text></report></give></user></report></give></polling>	ge> [None] 'ower Status> Status> [Pow Pressed> [UI 'ower Status> Status> [Pow > [None]	[None] ver Status] Command] [None] ver Status]		Data 11 en 10 -a 8 01 -a 9 10 -a 9 10 -a 9 01 -a 9	8Fea 90 -a 01 ea 44 -a 40 ea 8Fea 90 -a 00 ea	3	In 2: 6: 9- 7: 3: 9- 4: 4:	iterval[ms] 29813 2 4 8 8 12 4 7	Date&Time 1754:48 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/ 1754:49 2008/12/

This is the example when you press power key with pseudo DVR mode. The multipurpose window displays "Power ON" to show the pseudo DVR is turned up.

Mode	Multipurpose Window	Status						
	Power ON	Power ON						
Mode	Power OFF	Power OFF						
Mode	HDMI Input Change	TV input is switched to HDMI input						
	Power ON	Power ON						
	Power OFF	Power OFF						
	PLAY	Playing						
	STOP	Stopped						
	FORWARD	Fast-forwarding						
Pseudo DVR	REVERSE	Rewinding						
Mode	REC	Recording						
	REC STOP	Recording Stop						
	PLAY(Recording)	Playing While Recording						
	STOP(Recording)	Stopped While Recording						
	FORWARD(Recording)	Fast-forwarding While Recording						
	REVERSE(Recording)	Rewinding While Recording						

3.6.4 Replay Function

- 1. Monitor replaying communication. Operation mode should be monitor mode (LED is scroll status on the board).
- 2. Select the saving rows from monitoring CEC communication data and check the check boxes.

Then, click "Save" button to save the data in a file.

		& GEC View	er Ver1.8	6Ь											
		File® Menu	buer	D) Help(H	9										
			Save S	tart Repla	×										
Save Logs															
0			ni		S			Re		e {	S A	s E	lec		
		Monitor(1)	Replay(2	21											
		interiment (j)	Incebid / 2	21							,				
		TV_OFF	KEY2	KEY3	KEY4	KEY5	KEY6	KEY7	KEY8	KEY9	KEY10				
		KEY11	KEY12	KEY13	KEY14	KEY15	KEY16	KEY17	KEY10	KEY19	KEY20	SETCO			
														1.000.0	
		No Remo	con Initia	stor De	stination C	DpCode	. 61		Data			Interval[mi	Date&Time	CEC Error	^
		20	TV	AU	dio Sys. <	Polling Message	> [None]		05 er			31	151714 2010/06/15		
			TV TV	10	INER2	Polling Message	> [None]		06 er			97	15/17/14 2010/06/15		
			TV	70	NEP2	Polling Message	> [None]		06 er			31	151714 2010/06/15		
			TV	TI	INER2	Polling Message	> [None]		06 er			31	151714 2010/06/15		
			TV	TI	INERS ((Polling Mannage	Divoral		07 er			47	151714 2010/06/15		
			TV	TI	INER9 ((Polling Mannage	Divoral		07.00			47	151714 2010/06/15		
		27	TV	TI	INER3	Polling Message	> [None]		07.00			31	151714 2010/06/15		
		28	TV.	TI	INER3	Polling Message	> [None]		07 er			31	151714 2010/06/15		
			TV.	04	/02 (Polling Message	> [None]		08 er			47	151714 2010/06/15		
		30	TV	D/v	/02 4	Polling Message	> [None]		08 er			31	15/17/14 2010/06/15		
		31	TV	D/v	/02 <	Polling Message	> [None]		08 er			47	151715 2010/06/15		
		1 32	TV	D/v	/D2 <	Polling Message	> [None]		08 er			31	151715 2010/06/15		
			TV	D/	/R3 <	Polling Message	> [None]		09 er			47	151715 2010/06/15		
			TV	DV	/R3 <	Polling Message	> [None]		09 er			32	151715 2010/06/15		
			TV	D/v	/R3 <	Polling Message	> [None]		09 er			31	151715 2010/06/15		
			TV	DV	/R3 <	Polling Message	> [None]		09 er			47	151715 2010/06/15		
Chook		37	TV	TU	INER4 4	Polling Message	> [None]		0A er	1		47	15/17/15 2010/06/15		
CHECK		1 1 38	TV	TU	INER4 K	Polling Message	> [None]		0A er	1		31	15/17/15 2010/06/15		
		39	TV	TU	INER4 <	Polling Message	> [None]		0A er	1		31	15/17/15 2010/06/15		
		40	TV	TU	INER4 <	Polling Message	> [None]		0A er	1		31	15/17/15 2010/06/15		
		41	TV	D/v	/D3 <	Polling Message	> [None]		0B er	n		47	151715 2010/06/15		
		42	TV	D/v	/D3 <	Polling Message	> [None]		0B er	1		47	15/17/15 2010/06/15		
		🗖 🏓 43	TV	D/v	/D3 <	Polling Message	> [None]		0B er	1		31	151715 2010/06/15		
		44	TV	D/v	/D3 <	(Polling Message	> [None]		0B er	1		32	15:17:15 2010/06/15		
															~
	1	Ready						Monitor Mo	xde						

3. Next, replay the saved CEC communication data. Click "Open Script" button on "Replay" tab and select the log file that you have just saved before.

	tor() Replay(<u>2</u>))							
Replay Tab	Logical Address	1 💌	Open Script(§)						Load Log File
No	Remocon Initiator	Destination	OnCode		No Initiator	Destination	OnCode	Data	1
D 💆 2	10 TV	Audio Sys	<polling message=""> [None]</polling>						
U J 2	1 TV	TUNER2	<polling message=""> [None]</polling>						
	2 TV	TUNER2	<polling message=""> [None]</polling>						
I 🖉 📜 2	3 TV	TUNER2	<polling message=""> [None]</polling>						
☑	4 TV	TUNER2	<polling message=""> [None]</polling>						
Z J 2	5 TV	TUNER3	(Polling Message> [None]						
2 🖉 🖉 🖉	16 TV	TUNERS	<polling message=""> [None]</polling>						Loaded
	7 TV	TUNER3	<polling message=""> [None]</polling>						
	8 TV	TUNER3	(Polling Message) [None]						Loa
A otual	9 TV	DVD2	<polling message=""> [None]</polling>						3
Actual	0 TV	DVD2	<polling message=""> [None]</polling>						Data
Communication	1 TV	DVD2	<polling message=""> [None]</polling>						-
Communication	2 TV	DVD2	(Polling Message) [None]						-
Data 😽	8 17	DVR3	<poling message=""> [None]</poling>						-
Dala	94 TV	DVR3	<polling message=""> [None]</polling>						-
	8 TV	DVR3	<polling message=""> [None]</polling>						-
	8 IV	DVR3	(Polling Message) [None]						-
	17 19	TUNERA	Cholling Message> [None]						-
	0 70	TUNERA	(Polling Message/ [None]						-
	9 TV	TUNEP4	(Polling Message/ [None]						-
	10 10	TUNEP9	Cholling Message? [None]						-
	2 7/	0403	(Polling Message/ [None]						-
	1 TV	0403	(Polling Message) [None]						-
	11	0403	Croning Message/ (NONE)						
			CLOURS CONSIGN ENDING	2	4				5
Parts				Monitor Mode					-

4. Set the logical address to alternative address for the board. Specify the address at "My Logical Address".

File(E) Menu(M	Debug(D) H									411-1
		rlelp(H)							E	
New Open S	Save Start	D↓ Replay								
esa	as	E	ect	cro	ſ	i (S		Re	
Monitor(1)	Replay(2)									
Logical Add	dress 0: TV		Open Script 3							
Remo		(During the			No	Suitiator	Dectination	OrCode	Data	
20	TV	Audio Svs_	(Polling Message) [Non	w]	П 23	TV	TUNER2	(Polling Message) [None]	06 en	-
21	TV	TUNER2	(Polling Message) [Non	9] [4	H24	TV	TUNER2	(Polling Message) [None]	06 en	
22	TV	TUNER2	(Polling Message) [Non	w]	T125	TV	TUNER3	(Polling Message) [None]	07 en	
23	TV	TUNER2	<polling message=""> [Non</polling>	e]	126	TV	TUNER3	<polling message=""> [None]</polling>	07 en	
24	TV	TUNER2	<polling message=""> [Non</polling>	el	27	TV	TUNER3	(Polling Message) [None]	07 en	
25	TV	TUNERS	(Polling Message) [Non	el .	28	TV	TUNER3	(Polling Message) [None]	07 en	
26	TV	TUNER3	<polling message=""> [Non</polling>	el	29	TV	DVD2	<polling message=""> [None]</polling>	08 en	
27	TV	TUNER3	<polling message=""> [Non</polling>	e]	-					
28	TV	TUNER3	<polling message=""> [Non</polling>	e]						
29	TV	DVD2	(Polling Message) [Non	el						
D 1 30	TV	DVD2	(Polling Message) [Non	el 👘						
0 🗰 31	TV	DVD2	<polling message=""> [Non</polling>	e]						
0 9 32	TV	DVD2	<polling message=""> [Non-</polling>	e]						
33	TV	DVR3	(Polling Message) [Non-	.e]						
D 🔰 34	TV	DVR3	<polling message=""> [Non-</polling>	e]						
35	TV	DVR3	<polling message=""> [Non-</polling>	e]						
36	TV	DVR3	<polling message=""> [Non-</polling>	e]						
37	TV	TUNER4	<polling message=""> [Non-</polling>	e]						
38	TV	TUNER4	(Polling Message) [Non-	e]						
🗖 🔰 39	TV	TUNER4	<polling message=""> [Non-</polling>	e]						
40	TV	TUNER4	<polling message=""> [Non</polling>	e]						
41	TV	DVD3	<polling message=""> [Non</polling>	el						
42	TV	DVD3	(Polling Message) [Non-	e]						
43	TV	DVD3	<polling message=""> [Non-</polling>	e]						
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5. The preparation for the replay process is completed. Now, you can start the replay by clicking "Replay" button.

* The replay operation will be terminated when it received the data that is different from the log data. Use the replay function with the same environment as the one when you save the log data.

<Example>

When you replay the TV power operation, make sure the elapsed time after you turned off the TV power is the same as the time in the log file.

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