

SPEC No.   
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To ; \_\_\_\_\_

# SPECIFICATIONS

## PRELIMINARY

Product Type 8-BIT MICROCOMPUTER FOR DSP CAMERA SYSTEM

Model No. LU850420

※This specification contains XX pages including the cover and appendix.  
If you have any objections, please contact us before issuing purchasing order.

CUSTOMERS ACCEPTANCE

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    - Machine tools
    - Audiovisual equipment
    - Home appliances
    - Communication equipment other than for trunk lines
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    - Mainframe computers
    - Traffic control systems
    - Gas leak detectors and automatic cutoff devices
    - Rescue and security equipment
    - Other safety devices and safety equipment, etc.
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    - Communications equipment for trunk lines
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    - Medical equipment related to life support, etc.
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## 1. GENERAL

This is a 8-bit single-chip microcomputer for CCD digital camera system.  
The camera system comprises of CDS-AGC IC(IR3Y28M,IR3Y38M), DSP IC(LR38266),  
Timing IC (LR38277,LR38278) and this microcomputer IC.

### 1-1.FEATURES

- The process(structure) is CMOS.
- A P-type silicon circuit board is used.
- The package type is 100-pin QFP.
- The package material is plastic.
- Not designed or rated as radiation hardened.

### 1-2.FUNCTIONS

- Single +3.3V power supply
- Auto exposure control ( Electronic Exposure and Mechanical Exposure )
- Auto Carrier balance tuning
- Auto White Balance control
- By the combination with an external controller ( Personal Computer ),  
below functions on camera system can be controlled. See 3-2-4.(4)

#### ① Switchable : AGC → ON/OFF

Auto white balance → AUTO/PRESET

Aperture enhancement → ON/OFF

Backlight compensation → ON/OFF

GAMMA correction → ON/OFF

#### ② Electronic shutter speed choosing

: E/E ( 1/60(1/50)~1/33,000 sec. )

: 1/60(1/50),1/100(1/120),1/250,1/500,

1/1,000,1/5,000 and 1/10,000 sec.

( ): PAL MODE



## 2-2. PIN DIAGRAM

| Pin no. | Symbol   | I/O |
|---------|----------|-----|
| 1       | FLICKER  | I   |
| 2       | CDS SEL  | I   |
| 3       | TV MODE  | I   |
| 4       | MODEL    | I   |
| 5       | LENS SEL | I   |
| 6       | ADJ IN   | I   |
| 7       | AGC      | I   |
| 8       | ABLC     | I   |
| 9       | IRIS     | I   |
| 10      | GAMMA    | I   |
| 11      | UIN      | I   |
| 12      | UOUT     | O   |
| 13      | READY    | O   |
| 14      | NC       | I   |
| 15      | SOUT     | O   |
| 16      | SCK      | O   |
| 17      | SLDI     | O   |
| 18      | NC       | I   |
| 19      | DATA 0   | I   |
| 20      | DATA 1   | I   |
| 21      | DATA 2   | I   |
| 22      | DATA 3   | I   |
| 23      | DATA 4   | I   |
| 24      | DATA 5   | I   |
| 25      | DATA 6   | I   |
| 26      | DATA 7   | I   |
| 27      | ADD 0    | O   |
| 28      | ADD 1    | O   |
| 29      | ADD 2    | O   |
| 30      | ADD 3    | O   |
| 31      | ADD 4    | O   |
| 32      | ADD 5    | O   |
| 33      | ADD 6    | O   |
| 34      | NC       | O   |
| 35      | NC       | O   |
| 36      | XCK2     | I   |
| 37      | XCK1     | I   |
| 38      | GND      | —   |
| 39      | NC       | O   |
| 40      | NC       | O   |
| 41      | NC       | O   |
| 42      | NC       | O   |
| 43      | NC       | O   |
| 44      | NC       | O   |
| 45      | NC       | O   |
| 46      | AGND     | I   |
| 47      | SPD      | I   |
| 48      | WB       | I   |
| 49      | IWIND    | I   |
| 50      | NC       | I   |

| Pin no. | Symbol     | I/O |
|---------|------------|-----|
| 51      | NC         | I   |
| 52      | NC         | I   |
| 53      | R-Y        | I   |
| 54      | B-Y        | I   |
| 55      | VR         | I   |
| 56      | IRISSEL1   | I   |
| 57      | IRISSEL2   | I   |
| 58      | IRISSEL3   | I   |
| 59      | NC         | O   |
| 60      | IRIS OUT   | O   |
| 61      | VREF OUT   | O   |
| 62      | DAVR0      | O   |
| 63      | DAVR1      | O   |
| 64      | FI         | I   |
| 65      | VD         | I   |
| 66      | NC         | I   |
| 67      | NC         | I   |
| 68      | NC         | I   |
| 69      | NC         | I   |
| 70      | MCO        | I   |
| 71      | NC         | I   |
| 72      | EECLK      | O   |
| 73      | EEDATA     | O   |
| 74      | EESRB      | O   |
| 75      | N/P        | I   |
| 76      | NC         | I   |
| 77      | SCK        | O   |
| 78      | SDATA      | O   |
| 79      | NEGA CB    | I   |
| 80      | NC         | I   |
| 81      | NC         | I   |
| 82      | NC         | I   |
| 83      | NC         | I   |
| 84      | NC         | I   |
| 85      | RESET      | I   |
| 86      | OSCOut     | O   |
| 87      | OSCIIn     | I   |
| 88      | GND        | —   |
| 89      | VDD        | I   |
| 90      | TEST       | —   |
| 91      | ROMCLK     | O   |
| 92      | ROMDATA    | I/O |
| 93      | AEAWB LOCK | I   |
| 94      | NC         | I   |
| 95      | WBSEL1     | I   |
| 96      | WBSEL2     | I   |
| 97      | WBSEL3     | I   |
| 98      | NC         | I   |
| 99      | APT        | I   |
| 100     | NC         | O   |

## 3. PIN DESCRIPTION

## 3-1. PIN DESCRIPTION

| No. | Symbol   | Polarity                                                                            | I/O | Function                                                                                                                 |
|-----|----------|-------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------|
| 1   | FLICKER  | —                                                                                   | I   | Flicker less mode select.<br>H: Flicker less mode ON<br>L: Flicker less mode OFF                                         |
| 2   | CDS SEL  | —                                                                                   | I   | CDS/AGC ic select<br>L: IR3Y28M select<br>H: IR3Y38M select                                                              |
| 3   | TV MODE  | —                                                                                   | I   | TV standard/CCD select                                                                                                   |
| 4   | MODEL    | —                                                                                   | I   | pin 3      L      H      L      H<br>pin 4      L      L      H      H<br>CCD      270K      320K      410K      470K    |
| 5   | LENS SEL | —                                                                                   | I   | Out put of pin60 select (pin9 be input H level )<br>H: Auto IRIS Lens<br>L: Passive IRIS Lens                            |
| 6   | ADJIN    | —                                                                                   | I   | Adjustment select      H : Camera    L : Adjustment                                                                      |
| 7   | AGC SEL  | —                                                                                   | I   | AGC function select      H:ON    L:OFF                                                                                   |
| 8   | ABLC     | —                                                                                   | I   | Auto Backlight compensation select<br>L : ABLC    OFF<br>H : ABLC    ON                                                  |
| 9   | IRIS     | —                                                                                   | I   | IRIS mode select      H : Mechanical IRIS    L : EE                                                                      |
| 10  | GAMMA    | —                                                                                   | I   | $\gamma$ correction select      H : $\gamma = 1.0$ L: $\gamma = 0.45$                                                    |
| 11  | UIN      | —                                                                                   | I   | The serial data is fed from adjustment tool or PC.<br>Without input data, keep H level.<br>The detail is shown at 3-2-1. |
| 12  | UOUT     | —                                                                                   | O   | Output the serial data to adjustment tool or PC.<br><br>The detail is shown at 3-2-1.                                    |
| 13  | READY    |  | O   | Output High level while either the black level<br>of Nega mode is anstable or AE/AWB LOCK mode.                          |
| 14  | NC       | —                                                                                   | I   | Not used.    Connected to GND.                                                                                           |
| 15  | SOUT     | —                                                                                   | O   | Output the serial data to LR38266                                                                                        |
| 16  | SCK      | —                                                                                   | O   | Output the clock signal to LR38266                                                                                       |
| 17  | SLDI     | —                                                                                   | O   | Output the strobe signal to LR38266<br>LR38266 latches the serial data from pin15<br>of LU850420 by both SCK and SLDI    |
| 18  | NC       | —                                                                                   | I   | Not used.    Connected to GND.                                                                                           |
| 19  | DATA0    | —                                                                                   | I   | Input an image data from LR38266<br><br>DATA0 : LSB<br>DATA7 : MSB                                                       |
| 20  | DATA1    | —                                                                                   | I   |                                                                                                                          |
| 21  | DATA2    | —                                                                                   | I   |                                                                                                                          |
| 22  | DATA3    | —                                                                                   | I   |                                                                                                                          |
| 23  | DATA4    | —                                                                                   | I   |                                                                                                                          |
| 24  | DATA5    | —                                                                                   | I   |                                                                                                                          |
| 25  | DATA6    | —                                                                                   | I   |                                                                                                                          |

| No. | Symbol | Polarity | I/O | Function                                                                         |
|-----|--------|----------|-----|----------------------------------------------------------------------------------|
| 26  | DATA7  | —        | I   |                                                                                  |
| 27  | ADD0   | —        | O   | Output an address data to LR38266.<br>ADD0 : LSB<br>ADD6 : MSB                   |
| 28  | ADD1   | —        | O   |                                                                                  |
| 29  | ADD2   | —        | O   |                                                                                  |
| 30  | ADD3   | —        | O   |                                                                                  |
| 31  | ADD4   | —        | O   |                                                                                  |
| 32  | ADD5   | —        | O   |                                                                                  |
| 33  | ADD6   | —        | O   |                                                                                  |
| 34  | NC     | —        | O   | Not used. Not connected to anywhere.                                             |
| 35  | NC     | —        | O   | Not used. Not connected to anywhere.                                             |
| 36  | XCK2   | —        | O   | Master clock output                                                              |
| 37  | XCK1   | —        | I   | Master clock input (5.5MHz typ)                                                  |
| 38  | GND    | —        | —   | A grounding pin                                                                  |
| 39  | NC     | —        | O   | Not used. Not connected to anywhere.                                             |
| 40  | NC     | —        | O   | Not used. Not connected to anywhere.                                             |
| 41  | NC     | —        | O   | Not used. Not connected to anywhere.                                             |
| 42  | NC     | —        | O   | Not used. Not connected to anywhere.                                             |
| 43  | NC     | —        | O   | Not used. Not connected to anywhere.                                             |
| 44  | NC     | —        | O   | Not used. Not connected to anywhere.                                             |
| 45  | NC     | —        | O   | Not used. Not connected to anywhere.                                             |
| 46  | AGND   | —        | —   | A grounding pin for D/A output circuit                                           |
| 47  | SPD    | —        | I   | Input DC level to choose shutter speed<br>The detail is shown at 3-2-2.(2)       |
| 48  | WB     | —        | I   | Input DC level to choose white balance mode.<br>The detail is shown at 3-2-2.(1) |
| 49  | IWIND  | —        | I   | Input DC level to choose IRIS window.<br>The detail is shown at 3-2-2.(3)        |
| 50  | NC     | —        | I   | Not used. Connected to GND.                                                      |
| 51  | NC     | —        | I   | Not used. Connected to GND.                                                      |
| 52  | NC     | —        | I   | Not used. Connected to GND.                                                      |
| 53  | R-Y    | —        | I   | Input DC level to vary R-Y gain by manual.<br>The detail is shown at 3-2-2.(1)   |
| 54  | B-Y    | —        | I   | Input DC level to vary B-Y gain by manual.<br>The detail is shown at 3-2-2.(1)   |
| 55  | VR     | —        | I   | Input the reference DC voltage for built-in A/D.                                 |

| No. | Symbol   | Polarity                                                                            | I/O | Function                                                                                                                                |
|-----|----------|-------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------|
| 56  | IRISSEL1 | —                                                                                   | I   | Input the preset shutter speed mode 1.<br>(See 3-2-2.(2))                                                                               |
| 57  | IRISSEL2 | —                                                                                   | I   | Input the preset shutter speed mode 2.<br>(See 3-2-2.(2))                                                                               |
| 58  | IRISSEL3 | —                                                                                   | I   | Input the preset shutter speed mode 3.<br>(See 3-2-2.(2))                                                                               |
| 59  | NC       | —                                                                                   | I   | Not used. Connected to GND.                                                                                                             |
| 60  | IRIS OUT | —                                                                                   | O   | Output the analog signal to control Auto Mechanical IRIS Lens.                                                                          |
| 61  | VREF OUT | —                                                                                   | O   | Output the Vref DC to IR3Y38M.                                                                                                          |
| 62  | DAVR0    | —                                                                                   | I   | Input DC reference voltage for built-in D/A output of pin 60.                                                                           |
| 63  | DAVR1    | —                                                                                   | I   | Input DC reference voltage for built-in D/A output of pin 61.                                                                           |
| 64  | NC       | —                                                                                   | I   | Not used. Connected to GND.                                                                                                             |
| 65  | VD       | —                                                                                   | I   | Input VD signal from LR38266.                                                                                                           |
| 66  | NC       | —                                                                                   | I   | Not used. Connected to GND.                                                                                                             |
| 67  | NC       | —                                                                                   | I   | Not used. Connected to GND.                                                                                                             |
| 68  | NC       | —                                                                                   | I   | Not used. Connected to GND.                                                                                                             |
| 69  | NC       | —                                                                                   | I   | Not used. Connected to GND.                                                                                                             |
| 70  | MCO      |  | I   | Input MCO signal from LR38266.                                                                                                          |
| 71  | NC       | —                                                                                   | I   | Not used. Connected to GND.                                                                                                             |
| 72  | EECLK    | —                                                                                   | O   | Output the clock signal to LR38277/LR38278.                                                                                             |
| 73  | EEDATA   | —                                                                                   | O   | Output the data signal to LR38277/LR38278.                                                                                              |
| 74  | EESRB    | —                                                                                   | O   | Output the strobe signal to LR38277/LR38278.<br>This signal makes LR38277/LR38278 to latch the data of EEDATA(pin 73) by EECLK(pin 72). |
| 75  | N/P      | —                                                                                   | I   | Video mode select H : Negative L : Positive                                                                                             |
| 76  | NC       | —                                                                                   | O   | Not used. Not connected to anywhere.                                                                                                    |
| 77  | SCK      | —                                                                                   | O   | Output the clock signal to CDS/AGC(IR3Y28M/IR3Y38M).                                                                                    |
| 78  | SDATA    | —                                                                                   | O   | Output the serial data to CDS/AGC(IR3Y28M/IR3Y38M).                                                                                     |
| 79  | NEGA CB  | —                                                                                   | I   | Select the negative black level control.<br>(See 3-2-6) H:Normal L:NEGA black balance mode.                                             |
| 80  | NC       | —                                                                                   | I   | Not used. Connected to GND.                                                                                                             |
| 81  | NC       | —                                                                                   | I   | Not used. Connected to GND.                                                                                                             |
| 82  | NC       | —                                                                                   | I   | Not used. Connected to GND.                                                                                                             |
| 83  | NC       | —                                                                                   | I   | Not used. Connected to GND.                                                                                                             |
| 84  | NC       | —                                                                                   | I   | Not used. Connected to GND.                                                                                                             |

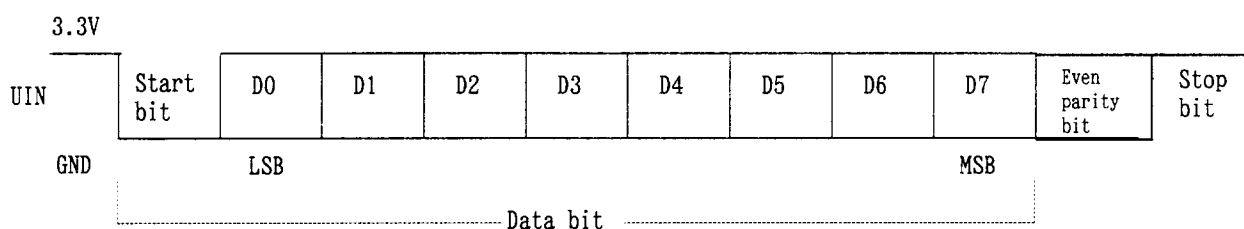
| No. | Symbol    | Polarity | I/O | Function                                                                               |
|-----|-----------|----------|-----|----------------------------------------------------------------------------------------|
| 85  | RESET     | —        | I   | Input the reset signal of LU850420.                                                    |
| 86  | OS Cout   | —        | O   | Not used. Not connected to anywhere.                                                   |
| 87  | OS Cin    | —        | I   | Not used. Connected to GND.                                                            |
| 88  | GND       | —        | —   | A grounding pin                                                                        |
| 89  | VDD       | —        | I   | Supply +3.3V power                                                                     |
| 90  | TEST      | —        | —   | Connected to GND.                                                                      |
| 91  | ROMCLK    | —        | O   | Output the clock to EEPROM.<br>The detail is shown at 3-3-1.                           |
| 92  | ROMDATA   | —        | I/O | Input the data from EEPROM/Output the data to EEPROM.<br>The detail is shown at 3-3-1. |
| 93  | AEAWBLOCK | —        | I   | AE,AWB Lock Select<br>H: AE,AWB Lock ON L:AE,AWB Lock OFF                              |
| 94  | NC        | —        | I   | Not used. Connected to GND.                                                            |
| 95  | WBSEL1    | —        | I   | White balance mode select<br>The detail is shown at 3-2-2.(1)                          |
| 96  | WBSEL2    | —        | I   | White balance mode select<br>The detail is shown at 3-2-2.(1)                          |
| 97  | WBSEL3    | —        | I   | White balance mode select<br>The detail is shown at 3-2-2.(1)                          |
| 98  | NC        | —        | I   | Not used. Connected to GND.                                                            |
| 99  | APT       | —        | I   | Aperture enhancement select H : ON L : OFF                                             |
| 100 | NC        | —        | I   | Not used. Connected to GND.                                                            |

### 3-2. EXPLANATION OF FUNCTIONS

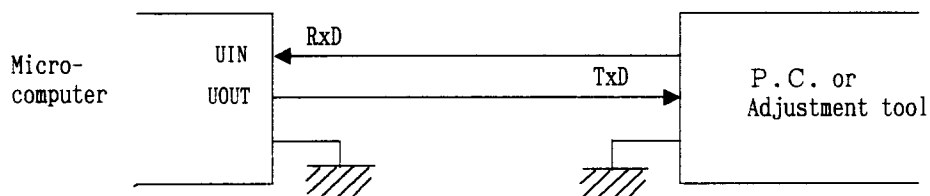
#### 3-2-1. SERIAL CONTROL INTERFACE ( For adjustment tool )

##### (1) Format of data transfers

- Format of transfers : Asynchronous (Based on RS-232C standard)
- Bit rate : 9600 bps
- Data length : 8 bit
- Parity check : 1 even parity bit
- Start bit : 1 bit
- Stop bit : 1 bit
- Signal voltage level (CMOS)



##### • Connection



##### (2) Adjustment mode

When the signal level of ADJIN (pin 6) is Low, the video quality adjustment by a PC or the adjustment tool is possible.

If you adjust the video quality by a PC, refer to the explanation of LU850420's adjustment commands and the explanation of LU850420's adjustment methods.

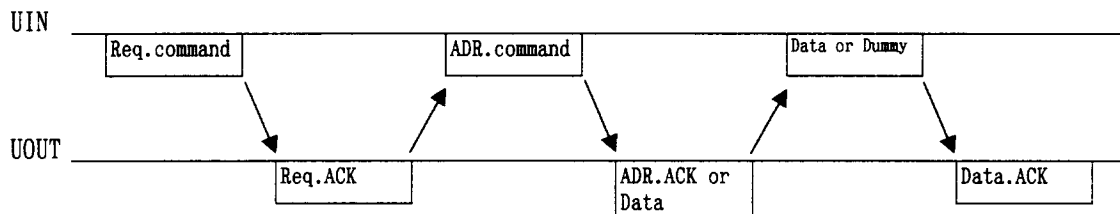
See (3) Adj command definition.

When the signal level of ADJIN (pin 6) is High, the micro-computer control by a PC.

See (4) Normal command definition.

## (3) Adj command definition

## ① Transfer format of 3 bytes command



All commands and data have to be send after acknowledge.

• Output the RAM data of LU850420

|     |     |                                                                                        |
|-----|-----|----------------------------------------------------------------------------------------|
| I   | 00h | Request to output the RAM data of LU850420 to UOUT, for the address designated by ADR. |
| II  | 01h | Acknowledge of Req.command.                                                            |
| III | xxh | Address of Output the RAM data.                                                        |
| IV  | xxh | Output RAM data.                                                                       |
| V   | ffh | Dummy code.                                                                            |
| VI  | 03h | Acknowledge of complete output the RAM data of LU850420.                               |

• Rewrite the data on RAM of LU850420

|     |     |                                                                                  |
|-----|-----|----------------------------------------------------------------------------------|
| I   | 05h | Request to rewrite the RAM data of LU850420 , for the address designated by ADR. |
| II  | 06h | Acknowledge of Req.command.                                                      |
| III | xxh | Address of rewrite the RAM data.                                                 |
| IV  | 07h | Acknowledge of ADR.command.                                                      |
| V   | xxh | Rewrite the RAM data.                                                            |
| VI  | 08h | Acknowledge of RAM data.                                                         |

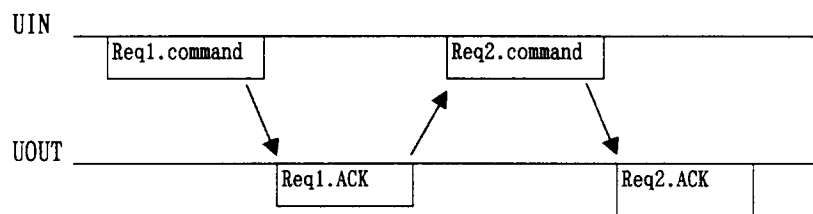
• Rewrite the data on both RAM and EEPROM of LU850420

|     |     |                                                                                                      |
|-----|-----|------------------------------------------------------------------------------------------------------|
| I   | 09h | Request to rewrite the RAM data and the EEPROM data of LU850420 , for the address designated by ADR. |
| II  | 0Ah | Acknowledge of Req.command.                                                                          |
| III | xxh | Address of rewrite the EEPROM data(RAM data).                                                        |
| IV  | 0Bh | Acknowledge of ADR.command.                                                                          |
| V   | xxh | Rewrite the EEPROM data(RAM data).                                                                   |
| VI  | 0Ch | Acknowledge of EEPROM data(RAM data).                                                                |

| ADR. command | Adjustment item                                     | Range of DATA           |
|--------------|-----------------------------------------------------|-------------------------|
| 60h          | DSP SET-UP level                                    | 01h~FEh                 |
| 15h          | Carrier balance R gain upper byte                   | 01h~FEh                 |
| 16h          | Carrier balance R gain lower byte                   | 01h~FEh                 |
| 17h          | Carrier balance B gain upper byte                   | 01h~FEh                 |
| 18h          | Carrier balance B gain lower byte                   | 01h~FEh                 |
| 3Bh          | E/E level                                           | 01h~FEh                 |
| 5Eh          | AGC gain                                            | 01h~7Fh                 |
| 22h          | Burst level1                                        | 00h~3Fh                 |
| 23h          | Burst level2                                        | 00h~3Fh                 |
| 1Ah          | R gain                                              | 00h~(ADR.3Ch)           |
| 1Ch          | B gain                                              | (ADR.3Dh)~FEh           |
| 1Fh          | R-Y gain                                            | 00h~3Fh                 |
| 20h          | B-Y gain                                            | 00h~3Fh                 |
| 1Dh          | R-Y matrix                                          | 00h~3Fh                 |
| 1Eh          | B-Y matrix                                          | 00h~3Fh                 |
| 3Ch          | R gain with the color-temperature conversion filter | (ADR.1Ah)~FEh           |
| 3Dh          | B gain with the color-temperature conversion filter | 00h~(ADR.1Ch)           |
| 90h          | Preset mode 1 R gain      See 3-2-2.                | *2) (ADR.1Ah)~(ADR.3Ch) |
| 91h          | Preset mode 1 B gain      See 3-2-2.                | *2) (ADR.3Dh)~(ADR.1Ch) |
| 92h          | Preset mode 2 R gain      See 3-2-2.                | *2) (ADR.1Ah)~(ADR.3Ch) |
| 93h          | Preset mode 2 B gain      See 3-2-2.                | *2) (ADR.3Dh)~(ADR.1Ch) |
| 94h          | Preset mode 3 R gain      See 3-2-2.                | *2) (ADR.1Ah)~(ADR.3Ch) |
| 95h          | Preset mode 3 B gain      See 3-2-2.                | *2) (ADR.3Dh)~(ADR.1Ch) |
| 96h          | Preset mode 4 R gain      See 3-2-2.                | *2) (ADR.1Ah)~(ADR.3Ch) |
| 97h          | Preset mode 4 B gain      See 3-2-2.                | *2) (ADR.3Dh)~(ADR.1Ch) |

\*2) Please be sure to set preset data which value is between the lowest color temperature data (ADR.1A,1Ch) and the highest color temperature data (ADR.3C,3Dh).  
See 3-2-2.

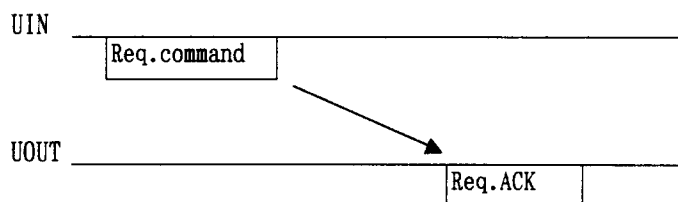
## ② Transfer format of shutter 1/60 and AGC fixed command



All commands and data have to be send after acknowledge.

|     |     |                                                                |
|-----|-----|----------------------------------------------------------------|
| I   | 12h | Request to set the shutter speed 1/60 and fixed AGC command 1. |
| II  | 13h | Acknowledge of Req 1.command.                                  |
| III | 16h | Request to set the shutter speed 1/60 and fixed AGC command 2. |
| IV  | 14h | Acknowledge of Req 2.command.                                  |

## ③ Transfer format of 1 bytes command



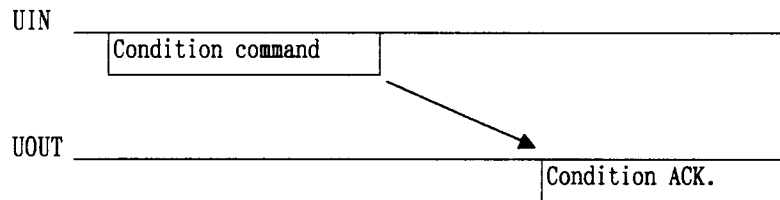
All commands and data have to be send after acknowledge.

| Req. command | Function                                                                                                                      |
|--------------|-------------------------------------------------------------------------------------------------------------------------------|
| 18h          | Set the initial data stored on ROM of LU850420 to ADR. 1Ah and 1Ch<br>(1Ah: White balance R-gain , 1Ch: White balance B-gain) |
| 19h          | Set the initial data stored on ROM of LU850420 to ADR. 3Ch and 3Dh<br>(3Ch: White balance R-gain , 3Dh: White balance B-gain) |
| 23h          | Set the initial data stored on ROM of LU850420 to ADR. 90h and 91h<br>(90h: White balance R-gain , 91h: White balance B-gain) |
| 24h          | Set the initial data stored on ROM of LU850420 to ADR. 92h and 93h<br>(92h: White balance R-gain , 93h: White balance B-gain) |
| 25h          | Set the initial data stored on ROM of LU850420 to ADR. 94h and 95h<br>(94h: White balance R-gain , 95h: White balance B-gain) |
| 26h          | Set the initial data stored on ROM of LU850420 to ADR. 96h and 97h<br>(96h: White balance R-gain , 97h: White balance B-gain) |
| 17h          | Clear the set of shutter 1/60 and AGC fixed.<br>See. ②Transfer format of shutter 1/60 and AGC fixed command                   |

| Req.ACK.command | Function                         |
|-----------------|----------------------------------|
| 20h             | Acknowledge of Req. command '18' |
| 21h             | Acknowledge of Req. command '19' |
| 27h             | Acknowledge of Req. command '23' |
| 28h             | Acknowledge of Req. command '24' |
| 29h             | Acknowledge of Req. command '25' |
| 2Ah             | Acknowledge of Req. command '26' |
| 1Fh             | Acknowledge of Req. command '17' |

## (4) Normal command definition

## ① Condition command



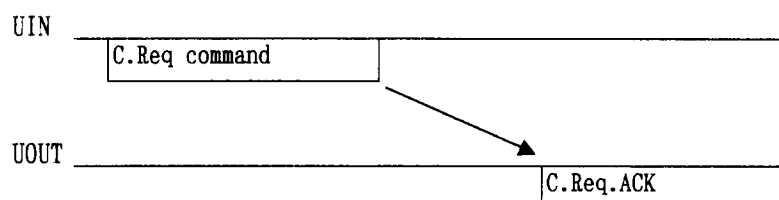
All commands and data have to be send after acknowledge.

| Condition. command | Function                                                                                                        |
|--------------------|-----------------------------------------------------------------------------------------------------------------|
| 4Fh                | Set the Hardware condition to control of Pin7,8,9,10,47,48<br>56,57,58,95,96,97. Default condition of Power ON. |
| 50h                | Set the Software condition to control of ② C.Reg.command.<br>See ② C.Reg.command.                               |

| Condition.ACK.command | Function                                |
|-----------------------|-----------------------------------------|
| 51h                   | Acknowledge of Condition. command '4Fh' |
| 52h                   | Acknowledge of Condition. command '50h' |

## ② C.Req command

Please send to C.Req command , After select of Software condition by ①Condition command.



All commands and data have to be send after acknowledge.

| C.Req. command | Function                                                                                                                                                                  |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 23h            | Set the initial data stored on ROM of LU850420 to ADR. 90h and 91h<br>(90h: White balance R-gain , 91h: White balance B-gain<br>the same mode of 3-2-2.(1) Preset MODE1 ) |
| 24h            | Set the initial data stored on ROM of LU850420 to ADR. 92h and 93h<br>(92h: White balance R-gain , 93h: White balance B-gain<br>the same mode of 3-2-2.(1) Preset MODE2 ) |
| 25h            | Set the initial data stored on ROM of LU850420 to ADR. 94h and 95h<br>(94h: White balance R-gain , 95h: White balance B-gain<br>the same mode of 3-2-2.(1) Preset MODE3 ) |
| 26h            | Set the initial data stored on ROM of LU850420 to ADR. 96h and 97h<br>(96h: White balance R-gain , 97h: White balance B-gain<br>the same mode of 3-2-2.(1) Preset MODE3 ) |
| 2Bh            | Set the Auto White Blance mode.<br>(Default of First Software mode after Power ON.)                                                                                       |
| 2Dh            | Request to shutter 1/60 fixed.                                                                                                                                            |
| 2Eh            | Request to shutter 1/100 fixed.                                                                                                                                           |
| 2Fh            | Request to shutter stored on ROM of LU850420 to ADR. F0h and F6h(0bit). (The same mode of 3-2-2.(2) Preset MODE1)                                                         |
| 30h            | Request to shutter stored on ROM of LU850420 to ADR. F1h and F6h(1bit). (The same mode of 3-2-2.(2) Preset MODE2)                                                         |
| 31h            | Request to shutter stored on ROM of LU850420 to ADR. F2h and F6h(2bit). (The same mode of 3-2-2.(2) Preset MODE3)                                                         |
| 32h            | Request to shutter stored on ROM of LU850420 to ADR. F3h and F6h(3bit). (The same mode of 3-2-2.(2) Preset MODE4)                                                         |
| 33h            | Request to shutter stored on ROM of LU850420 to ADR. F4h and F6h(4bit). (The same mode of 3-2-2.(2) Preset MODE5)                                                         |

| C.Reg. command | Function                                                                                          |
|----------------|---------------------------------------------------------------------------------------------------|
| 3Dh            | Request to Auto IRIS mode.<br>(Default of First Software mode after Power ON.)                    |
| 3Fh            | Request Aperture enhancement select ON.<br>(Default of First Software mode after Power ON.)       |
| 40h            | Request Aperture enhancement select OFF.                                                          |
| 43h            | Request to Backlight compensation select ON.                                                      |
| 44h            | Request to Backlight compensation select OFF.<br>(Default of First Software mode after Power ON.) |
| 47h            | Request to AGC function select ON.<br>(Default of First Software mode after Power ON.)            |
| 48h            | Request to AGC function select OFF.                                                               |
| 4Bh            | Request to $\gamma$ correction select '0.45'<br>(Default of First Software mode after Power ON.)  |
| 4Ch            | Request to $\gamma$ correction select '1.00'                                                      |

| C.Reg. ACK | Function                   |
|------------|----------------------------|
| 27h        | Acknowledge of C.Reg '23h' |
| 28h        | Acknowledge of C.Reg '24h' |
| 29h        | Acknowledge of C.Reg '25h' |
| 2Ah        | Acknowledge of C.Reg '26h' |
| 2Ch        | Acknowledge of C.Reg '2Bh' |
| 35h        | Acknowledge of C.Reg '2Dh' |
| 36h        | Acknowledge of C.Reg '2Eh' |
| 37h        | Acknowledge of C.Reg '2Fh' |
| 38h        | Acknowledge of C.Reg '30h' |
| 39h        | Acknowledge of C.Reg '31h' |
| 3Ah        | Acknowledge of C.Reg '32h' |
| 3Bh        | Acknowledge of C.Reg '33h' |
| 3Eh        | Acknowledge of C.Reg '3Dh' |
| 41h        | Acknowledge of C.Reg '3Fh' |
| 42h        | Acknowledge of C.Reg '40h' |
| 45h        | Acknowledge of C.Reg '43h' |
| 46h        | Acknowledge of C.Reg '44h' |
| 49h        | Acknowledge of C.Reg '47h' |
| 4Ah        | Acknowledge of C.Reg '48h' |
| 4Dh        | Acknowledge of C.Reg '4Bh' |
| 4Eh        | Acknowledge of C.Reg '4Ch' |

## 3-2-2. PRESET FUNCTION CONTROL

( by High/Low condition at inputs and by DC level of A/D inputs )

Below functions are available to be chosen under Low level of ADJIN (pin 6).

## (1) white balance

## (1-1) White balance mode choice by Digital input (pin95,96,97)

White balance mode is chosen by the combination of High/Low level at three pins under below table.

| WBSEL1<br>95 pin | WBSEL2<br>96 pin | WBSEL3<br>97 pin | White balance mode                                  |    |
|------------------|------------------|------------------|-----------------------------------------------------|----|
| L                | L                | L                | A/D input (pin 48) control is available. See (1-2). |    |
| H                | L                | L                | A/D input (pin 53 and 54) control is available.     |    |
| L                | H                | L                | Set the condition just before choosing this mode.   |    |
| H                | H                | L                | Auto white balance mode                             |    |
| L                | L                | H                | Preset MODE1                                        | *1 |
| H                | L                | H                | Preset MODE2                                        | *1 |
| L                | H                | H                | Preset MODE3                                        | *1 |
| H                | H                | H                | Preset MODE4                                        | *1 |

## (1-2) White balance mode choice by Analog input ( pin 48 )

White balance mode can be chosen by DC input level at pin 48 under the condition which all of above 95,96,97 pins are connected to Low.

| Voltage level (pin 48) | White balance mode                                 |    |
|------------------------|----------------------------------------------------|----|
| 0 ~ 0.47V              | Auto white balance.                                |    |
| 0.48 ~ 0.94V           | Set the condition just before feed this DC level.  |    |
| 0.95 ~ 1.41V           | Analog input (pin 53 and 54) control is available. |    |
| 1.42 ~ 1.88V           | Preset MODE1                                       | *1 |
| 1.89 ~ 2.35V           | Preset MODE2                                       | *1 |
| 2.36 ~ 2.82V           | Preset MODE3                                       | *1 |
| 2.83 ~ 3.3V            | Preset MODE4                                       | *1 |

\*1 All of above preset MODEs are optional and each MODE should be adjusted by serial transfer interface. The detail is shown at 3-2-1.

## (2) Electronic shutter speed control

## (2-1) Electronic shutter speed choosing by Digital input ( pin 56,57,58 )

An electronic shutter speed can be chosen by the combination of High/Low level at below three pins under the condition with High level of IRIS ( pin 9 ).

| IRISSEL1 | IRISSEL2 | IRISSEL3 | Shutter speed                                         |
|----------|----------|----------|-------------------------------------------------------|
| L        | L        | L        | A/D input (pin 47) control is available. See (2-2).   |
| H        | L        | L        | 1/60sec.(NTSC) , 1/50sec.(PAL)                        |
| L        | H        | L        | 1/100sec.(NTSC) , 1/120sec.(PAL) ( Flickerless mode ) |
| H        | H        | L        | Preset MODE1 *2                                       |
| L        | L        | H        | Preset MODE2 *2                                       |
| H        | L        | H        | Preset MODE3 *2                                       |
| L        | H        | H        | Preset MODE4 *2                                       |
| H        | H        | H        | Preset MODE5 *2                                       |

## (2-2) Electronic shutter speed choosing by A/D input ( pin 47 )

An electronic shutter speed can be chosen by DC input level of pin 47 under the condition which all of above three pins are connected to Low.

| Voltage level (pin 47) | Shutter speed                    |
|------------------------|----------------------------------|
| 0 ~ 0.41V              | 1/60sec.(NTSC) , 1/50sec.(PAL)   |
| 0.42 ~ 0.82V           | 1/100sec.(NTSC) , 1/120sec.(PAL) |
| 0.83 ~ 1.23V           | Preset MODE1 *2                  |
| 1.24 ~ 1.64V           | Preset MODE2 *2                  |
| 1.65 ~ 2.05V           | Preset MODE3 *2                  |
| 2.06 ~ 2.46V           | Preset MODE4 *2                  |
| 2.46 ~ 2.87V           | Preset MODE5 *2                  |
| 2.88 ~ 3.3V            | Preset MODE6 *2                  |

\*2 All of above preset MODEs are optional and each MODE should be adjusted by serial transfer interface (3-2-2.).

## (3) Window control for lighting emphasis range for E/E

| Input voltage (pin 47) | Range select |             |
|------------------------|--------------|-------------|
| 0 ~ 0.8V               | Preset1      | See fig.3-1 |
| 0.81 ~ 1.6V            | Preset2      | See fig.3-1 |
| 1.61 ~ 2.4V            | Preset3      | See fig.3-1 |
| 2.41 ~ 3.3V            | Whole range  |             |

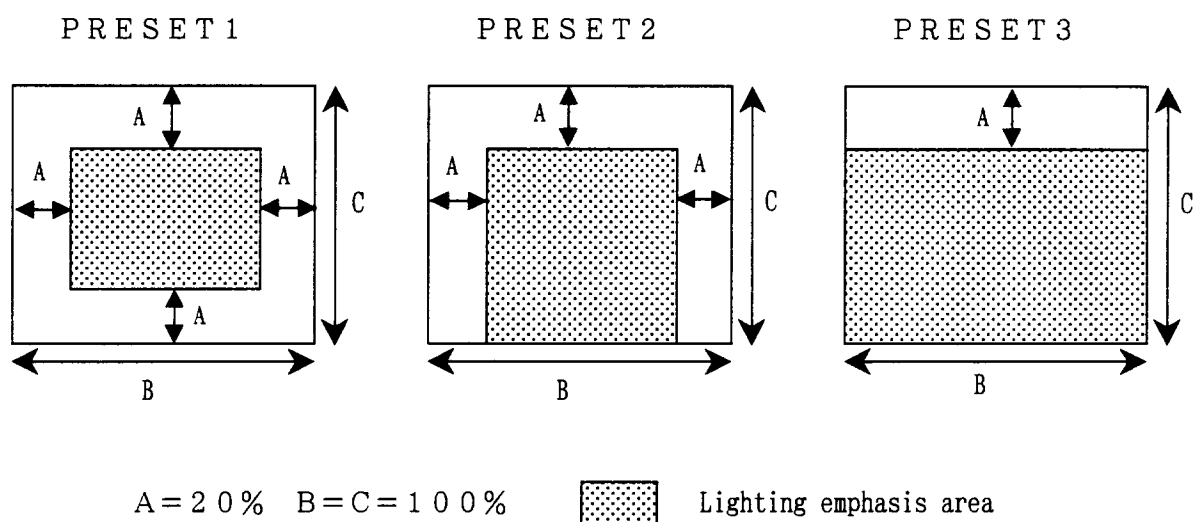


Fig.3-1 Lighting emphasis range

### 3-2-3. A E CONTROL

- AE control has following two functions.

- ① E/E(Electronic Exposure) function
- ② AGC(Automatic Gain Control) function

### 3-2-4. CARRIER BALANCE CONTROL

- Carrier balance control has following two functions.

- ① At power on, carrier balance is automatically tuned.
- ② Carrier balance is automatically tuned against AGC working.

### 3-2-5. AUTO WHITE BALANCE CONTROL

- Control method : A white color-temperature control sampled by I/Q conversion signal.
- By the reasoning of the video condition from I/Q, brightness, and other signal levels, white balance is controlled to keep the best condition.

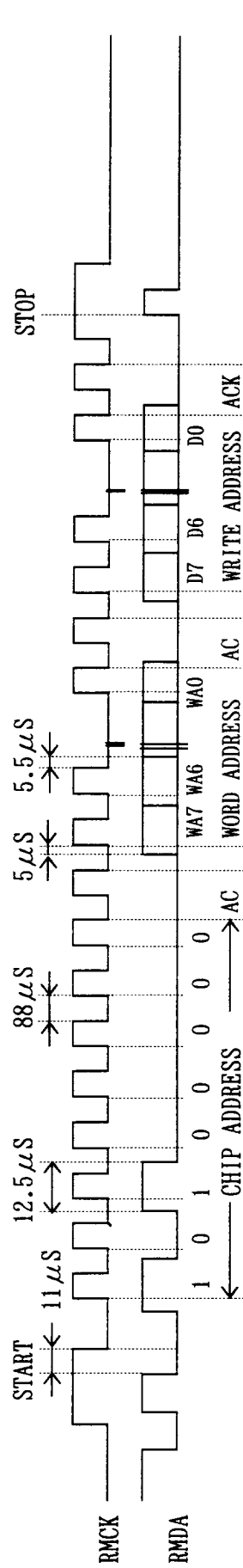
### 3-2-6. NEGATIVE/POSITIVE FUNCTION

- Pin 75 is Select Switch of Negative or Positive.
  - H : Negative mode
  - L : Positive mode or Normal camera mode
- Pin 79 is Black Blance mode Select Switch ,at Negative.
  - L : Black Blance Control Request mode.
  - H : Normal.

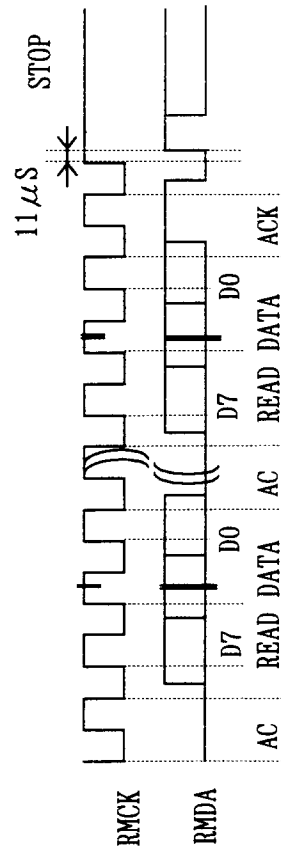
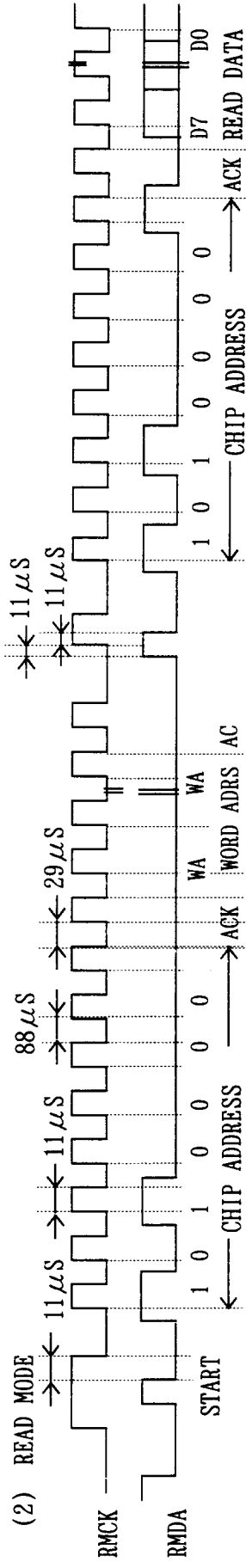
### 3-3. TIMING CHARTS

3-3-1. LU850420( $\mu$ COM)  $\longleftrightarrow$  BF24C04F/02F (EEPROM)

(1) WRITE MODE ( WRITING ONE DATA THAT IS SENTED FROM THE ADJUSTMENT TOOL TO EEPROM. )



(2) READ MODE

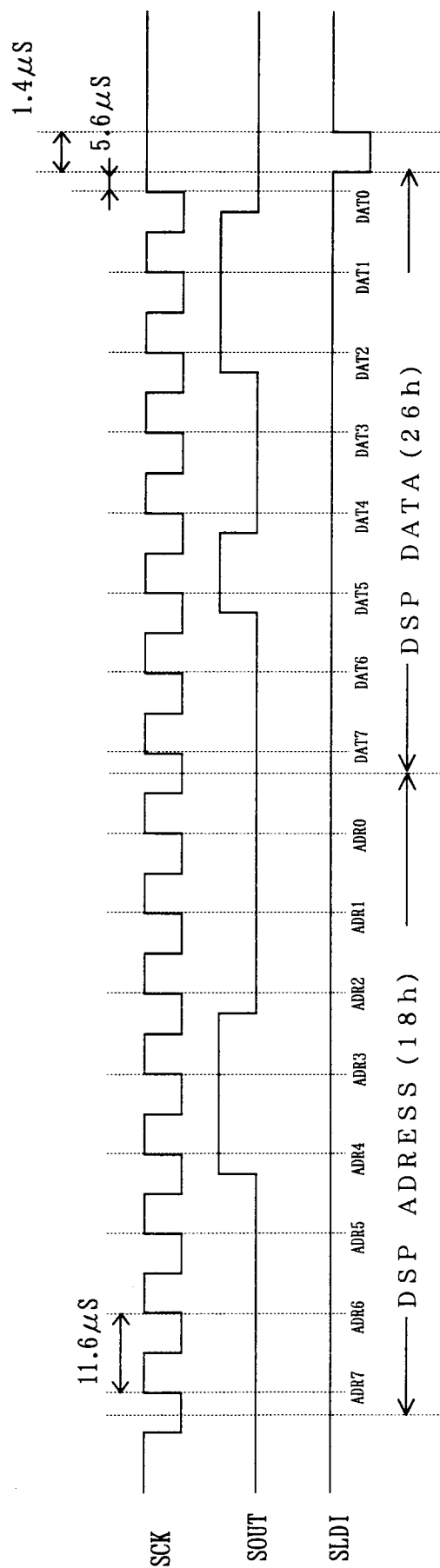


| EEPROM MAR | MINIMUM( $\mu$ SEC) |
|------------|---------------------|
| tHIGH      | 1 1                 |
| tLOW       | 8 8                 |
| tHD:STA    | 1 1                 |
| tSU:STA    | 1 1                 |
| tSU:STO    | 1 1                 |

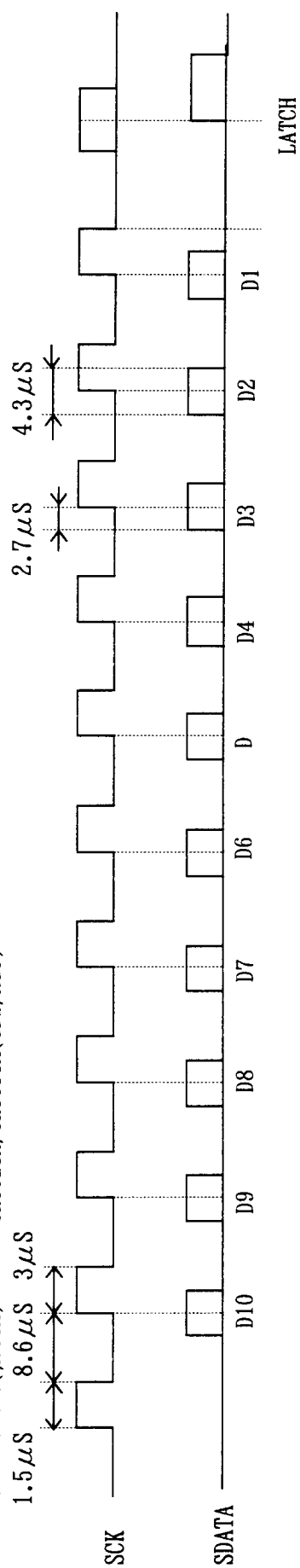
DATA 1  
ADR 1

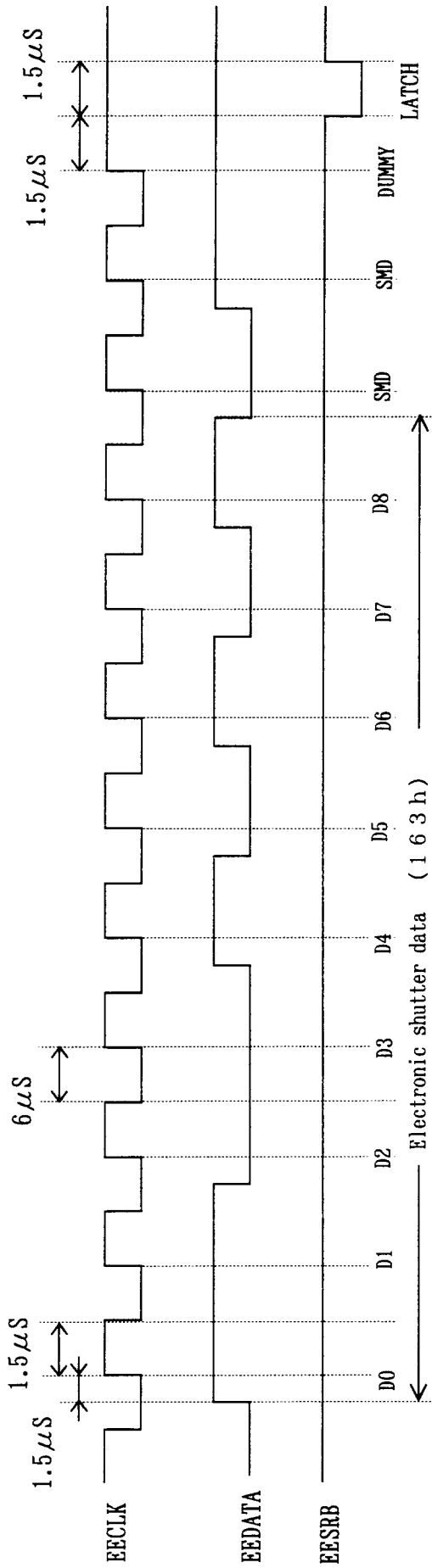
DATA 2 5 5  
ADR 2 5 5

3-3-2. LU850420( $\mu$ COM)  $\longleftrightarrow$  LR38266(DSP)



3-3-3. LU850420( $\mu$ COM)  $\longleftrightarrow$  IR3Y28M/IR3Y38M(CDS/AGC)



3-3-4. LU850420( $\mu$ COM)  $\longleftrightarrow$  LR38278(TIMING IC)

| AOR (A) | PORT      | LABEL    | CONTENTS           | D7 | D6 | D5 | D4 | D3 | D2 | D1 | DO | NT | H  | PAL | NT | I  | PAL |
|---------|-----------|----------|--------------------|----|----|----|----|----|----|----|----|----|----|-----|----|----|-----|
| 00h     | EPPROM    | PROM_SEL | EPPROM_CTL         | 1  | 1  | 1  |    |    | 1  | 1  | 01 | 01 | 01 | 01  | 01 | 01 | 01  |
| 01h     | DSP       | OMOD     | SELECT_CCD         | 1  | 2  |    |    |    | 1  | 2  | 1  | 06 | 0E | 02  | 0A | 0A | 0A  |
| 02h     | DSP       | MODE1    | MODE_1             | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 00 | 00 | 00 | 00  | 00 | 00 | 00  |
| 03h     | DSP       | MODE2    | MODE_2             |    |    |    | 1  | 1  | 1  | 1  | 00 | 00 | 00 | 00  | 00 | 00 | 00  |
| 04h     | DSP       | MODE3    | MODE_3             |    |    |    | 1  | 1  | 1  | 1  | 00 | 00 | 00 | 00  | 00 | 00 | 00  |
| 05h     | CDS/AGC_V | REF      | V_REF_DC           | 8  |    |    |    |    |    |    | FF | FF | FF | FF  | FF | FF | FF  |
| 06h     | DSP       | CSNVAR1  | TIMING_SYNC_PLUS   | 8  |    |    |    |    |    |    | 00 | 00 | 00 | 00  | 00 | 00 | 00  |
| 07h     | DSP_A.E   | CLKVARI  | TIM_CLK & A.E.SP   | 4  |    |    | 4  |    |    |    | 30 | 30 | 30 | 30  | 30 | 30 | 30  |
| 08h     | DSP       | CB_BFARI | BLANKING_TIME      | 2  | 2  |    | 2  |    | 2  |    | 00 | 00 | 00 | 00  | 00 | 00 | 00  |
| 09h     | A.E       | UWIRIS0  | A.E.WEIGHTING_1    | 8  |    |    |    |    |    |    | 00 | 00 | 00 | 00  | 00 | 00 | 00  |
| 0Ah     | A.E       | UWIRIS1  | A.E.WEIGHTING_2    | 8  |    |    |    |    |    |    | 00 | 00 | 00 | 00  | 00 | 00 | 00  |
| 0Bh     | A.E       | UWIRIS2  | A.E.WEIGHTING_3    | 8  |    |    |    |    |    |    | 20 | 20 | 20 | 20  | 20 | 20 | 20  |
| 0Ch     | A.E       | UWIRIS3  | A.E.WEIGHTING_4    | 8  |    |    |    |    |    |    | 20 | 20 | 20 | 20  | 20 | 20 | 20  |
| 0Dh     | A.E       | UWIRIS4  | A.E.WEIGHTING_5    | 8  |    |    |    |    |    |    | 20 | 20 | 20 | 20  | 20 | 20 | 20  |
| 0Eh     | A.E       | UWIRIS5  | A.E.WEIGHTING_6    | 8  |    |    |    |    |    |    | 21 | 21 | 21 | 21  | 21 | 21 | 21  |
| 0Fh     | A.E       | UWIRIS6  | A.E.WEIGHTING_7    | 8  |    |    |    |    |    |    | 34 | 34 | 34 | 34  | 34 | 34 | 34  |
| 10h     | A.E       | UWIRIS7  | A.E.WEIGHTING_8    | 8  |    |    |    |    |    |    | 38 | 38 | 38 | 38  | 38 | 38 | 38  |
| 11h     | DSP       | CSEP_R1  | R.COLOR_SEPLATE    | 8  |    |    |    |    |    |    | B0 | B0 | B0 | B0  | B0 | B0 | B0  |
| 12h     | DSP       | CSEP_B1  | B.COLOR_SEPLATE    | 8  |    |    |    |    |    |    | A8 | A8 | A8 | A8  | A8 | A8 | A8  |
| 13h     | DSP       | CSEP_R2  | R.COLOR_SEPLATE_2  | 7  |    |    |    |    |    |    | 40 | 40 | 40 | 40  | 40 | 40 | 40  |
| 14h     | DSP       | CSEP_B2  | B.COLOR_SEPLATE_2  | 7  |    |    |    |    |    |    | FE | FE | FE | FE  | FE | FE | FE  |
| 15h     | DSP       | CB_R1    | R.CARRIER_BALANCE1 | 8  |    |    |    |    |    |    | 00 | 00 | 00 | 00  | 00 | 00 | 00  |
| 16h     | DSP       | CB_R2    | R.CARRIER_BALANCE2 | 8  |    |    |    |    |    |    | 00 | 00 | 00 | 00  | 00 | 00 | 00  |
| 17h     | DSP       | CB_B1    | B.CARRIER_BALANCE1 | 8  |    |    |    |    |    |    | FE | FE | FE | FE  | FE | FE | FE  |
| 18h     | DSP       | CB_B2    | B.CARRIER_BALANCE2 | 8  |    |    |    |    |    |    | 00 | 00 | 00 | 00  | 00 | 00 | 00  |
| 19h     | CB        | WB_R1    | CB.COLLECT_DATA_R  | 1  | 6  |    |    |    |    |    | 7E | 7E | 7E | 7E  | 7E | 7E | 7E  |
| 1Ah     | DSP       | WB_R2    | R.WHITE_BALANCE2   | 8  |    |    |    |    |    |    | 40 | 40 | 40 | 40  | 40 | 40 | 40  |
| 1Bh     | CB        | WB_B1    | CB.COLLECT_DATA_B  | 1  | 6  |    |    |    |    |    | 7E | 7E | 7E | 7E  | 7E | 7E | 7E  |
| 1Ch     | DSP       | WB_B2    | B.WHITE_BALANCE2   | 8  |    |    |    |    |    |    | 80 | 80 | 80 | 80  | 80 | 80 | 80  |
| 1Dh     | DSP       | MAT_R_Y  | R-Y MATRIX         | 8  |    |    |    |    |    |    | 00 | 00 | 00 | 00  | 00 | 00 | 00  |
| 1Eh     | DSP       | MAT_B_Y  | B-Y MATRIX         | 8  |    |    |    |    |    |    | 00 | 00 | 00 | 00  | 00 | 00 | 00  |
| 1Fh     | DSP       | GA_R_Y   | R-Y GAIN           |    | 6  |    |    |    |    |    | 18 | 18 | 18 | 18  | 18 | 18 | 18  |
| 20h     | DSP       | GA_B_Y   | B-Y GAIN           |    | 6  |    |    |    |    |    | 18 | 18 | 18 | 18  | 18 | 18 | 18  |
| 21h     | DSP_WB    | ENC_MO   | ENCODER_MODE       | 4  |    |    | 1  | 1  | 1  | 1  | 40 | 42 | 40 | 42  | 40 | 42 | 40  |
| 22h     | DSP       | BAS_R_Y  | R-Y BURST_LEV      | 8  |    |    |    |    |    |    |    |    |    |     |    |    |     |

| ADR (h) | PORT     | LABEL     | CONTENTS                | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | NT | h  | Pal | NT | l         | Pal |
|---------|----------|-----------|-------------------------|----|----|----|----|----|----|----|----|----|----|-----|----|-----------|-----|
| 60h     | DSP      | SETUP     | SETUP LEVEL             |    |    |    | 6  |    |    |    |    | 09 | 09 | 09  | 09 | 48        | 48  |
| 61h     | DSP, AE  | APT HGA   | GAIN OF HORIZONTAL APT  | 3  | 5  |    |    |    |    |    |    | 46 | 46 | 46  | 46 | 78        | 78  |
| 62h     | DSP      | APT HCL   | OPPRESS OF HORIZONTAL   | 7  |    |    |    |    |    |    |    | 00 | 00 | 00  | 00 | 50        | 50  |
| 63h     | DSP, AGC | APT VCA   | GAIN OF VERTICAL APT    | 3  |    |    |    | 5  |    |    |    | 08 | 08 | 08  | 08 | 70        | 70  |
| 64h     | DSP      | APT VCL   | OPPRESS OF HORIZONTAL   | 7  |    |    |    |    |    |    |    | 00 | 00 | 00  | 00 | 58        | 58  |
| 65h     | A.E      | CIRIS     | RATIO OF CENTRAL A.E.W  | 8  |    |    |    |    |    |    |    | 60 | 60 | 60  | 60 | 68        | 68  |
| 66h     | DSP, WB  | VARI MASK | TIMING OF A.E MASK      | 4  |    |    |    | 4  |    |    |    | 20 | 20 | 20  | 20 | 60        | 60  |
| 67h     | DSP      | VARI Y    | TIMING OF Y SIGNAL      |    |    |    |    |    |    |    |    | 00 | 00 | 00  | 00 | 60        | 60  |
| 68h     | DSP, AGC | HVARI     | TIMING OF HORIZONTAL AP | 6  |    |    |    |    | 2  |    |    | 70 | 70 | 70  | 70 | 60        | 60  |
| 69h     | DSP, WB  | Y NE      | Y MODE CTL              |    |    |    |    | 1  | 1  | 1  |    | 20 | 20 | 20  | 20 | 05        | 05  |
| 6ah     | DSP      | Y NESFT   | Y SIGNAL SHIFT          | 8  |    |    |    |    |    |    |    | 00 | 00 | 00  | 00 | 10        | 10  |
| 6bh     | DSP      | Y NEAMP   | Y SIGNAL AMP GAIN       | 8  |    |    |    |    |    |    |    | 80 | 80 | 80  | 80 | 10        | 10  |
| 6ch     | DSP      | MASK NE   | MASK OF Y SIGNAL        | 8  |    |    |    |    |    |    |    | 00 | 00 | 00  | 00 | 40        | 40  |
| 6dh     | CB       | CB WBHCL  | CB LIMIT OF LIGHT       | 8  |    |    |    |    |    |    |    | 80 | 80 | 80  | 80 | 40        | 40  |
| 6eh     | A.E      | MECA DC   | MECA IRIS DC            | 8  |    |    |    |    |    |    |    | 40 | 40 | 40  | 40 | 34        | 34  |
| 6fh     | A.E      | MECA H    | MECA IRIS AMP           | 8  |    |    |    |    |    |    |    | 40 | 40 | 40  | 40 | 45        | 45  |
| 70h     | DSP      | YGAM A1   | Y Y X AREA1             | 8  |    |    |    |    |    |    |    | 10 | 10 | 10  | 10 | FF        | FF  |
| 71h     | DSP      | A2        | Y Y X AREA2             | 8  |    |    |    |    |    |    |    | 15 | 15 | 15  | 15 | 20        | 20  |
| 72h     | DSP      | A3        | Y Y X AREA3             | 8  |    |    |    |    |    |    |    | 18 | 18 | 18  | 18 | 40        | 40  |
| 73h     | DSP      | A4        | Y Y X AREA4             | 8  |    |    |    |    |    |    |    | 1D | 1D | 1D  | 1D | 2B        | 2B  |
| 74h     | DSP      | A5        | Y Y X AREA5             | 8  |    |    |    |    |    |    |    | 23 | 23 | 23  | 23 | 8E        | 8E  |
| 75h     | DSP      | A6        | Y Y X AREA6             | 8  |    |    |    |    |    |    |    | 2F | 2F | 2F  | 2F | 55        | 55  |
| 76h     | DSP      | A7        | Y Y X AREA7             | 8  |    |    |    |    |    |    |    | 3F | 3F | 3F  | 3F | 3C        | 3C  |
| 77h     | DSP      | A8        | Y Y X AREA8             | 8  |    |    |    |    |    |    |    | 5F | 5F | 5F  | 5F | 00        | 00  |
| 78h     | DSP      | A9        | Y Y X AREA9             | 8  |    |    |    |    |    |    |    | 8A | 8A | 8A  | 8A | 20        | 20  |
| 79h     | DSP      | YGAM P1   | Y Y Y AREA1             | 8  |    |    |    |    |    |    |    | 00 | 00 | 00  | 00 | FF        | FF  |
| 7ah     | DSP      | P2        | Y Y Y AREA2             | 8  |    |    |    |    |    |    |    | 10 | 10 | 10  | 10 | 03        | 03  |
| 7bh     | DSP      | P3        | Y Y Y AREA3             | 8  |    |    |    |    |    |    |    | 15 | 15 | 15  | 15 | 03        | 03  |
| 7ch     | DSP      | P4        | Y Y Y AREA4             | 8  |    |    |    |    |    |    |    | 2B | 2B | 2B  | 2B | FE        | FE  |
| 7dh     | DSP      | P5        | Y Y Y AREA5             | 8  |    |    |    |    |    |    |    | 43 | 43 | 43  | 43 | 40        | 40  |
| 7eh     | DSP      | P6        | Y Y Y AREA6             | 8  |    |    |    |    |    |    |    | 54 | 54 | 54  | 54 | 20        | 20  |
| 7fh     | DSP      | P7        | Y Y Y AREA7             | 8  |    |    |    |    |    |    |    | 69 | 69 | 69  | 69 | 70        | 70  |
| 80h     | DSP      | P8        | Y Y Y AREA8             | 8  |    |    |    |    |    |    |    | 83 | 83 | 83  | 83 | READ ONLY |     |
| 81h     | DSP      | P9        | Y Y Y AREA9             | 8  |    |    |    |    |    |    |    | A7 | A7 | A7  | A7 | READ ONLY |     |
| 82h     | DSP      | P10       | Y Y Y AREA10            | 8  |    |    |    |    |    |    |    | D5 | D5 | D5  | D5 | READ ONLY |     |
| 83h     | DSP, A.E | YGAM F    | Y Y MARK OF SLOPE       | 7  |    |    |    |    |    |    |    | 00 | 00 | 00  | 00 | READ ONLY |     |
| 84h     | DSP      | YGAM S1   | Y Y SLOPE DATA1         | 8  |    |    |    |    |    |    |    | 10 | 10 | 10  | 10 | READ ONLY |     |
| 85h     | DSP      | S2        | Y Y SLOPE DATA2         | 8  |    |    |    |    |    |    |    | 12 | 12 | 12  | 12 | READ ONLY |     |
| 86h     | DSP      | S3        | Y Y SLOPE DATA3         | 8  |    |    |    |    |    |    |    | 78 | 78 | 78  | 78 | READ ONLY |     |
| 87h     | DSP      | S4        | Y Y SLOPE DATA4         | 8  |    |    |    |    |    |    |    | 4B | 4B | 4B  | 4B | READ ONLY |     |
| 88h     | DSP      | S5        | Y Y SLOPE DATA5         | 8  |    |    |    |    |    |    |    | 2C | 2C | 2C  | 2C | READ ONLY |     |
| 89h     | DSP      | S6        | Y Y SLOPE DATA6         | 8  |    |    |    |    |    |    |    | 1B | 1B | 1B  | 1B | READ ONLY |     |
| 8ah     | DSP      | S7        | Y Y SLOPE DATA7         | 8  |    |    |    |    |    |    |    | 1B | 1B | 1B  | 1B | READ ONLY |     |
| 8bh     | DSP      | S8        | Y Y SLOPE DATA8         | 8  |    |    |    |    |    |    |    | 12 | 12 | 12  | 12 | READ ONLY |     |
| 8ch     | DSP      | S9        | Y Y SLOPE DATA9         | 8  |    |    |    |    |    |    |    | 11 | 11 | 11  | 11 | READ ONLY |     |
| 8dh     | DSP      | S10       | Y Y SLOPE DATA10        | 8  |    |    |    |    |    |    |    | 03 | 03 | 03  | 03 | READ ONLY |     |
| 8eh     | A.E      | DCIRIS H  | DC IRIS AMP             | 8  |    |    |    |    |    |    |    | 40 | 40 | 40  | 40 | READ ONLY |     |
| 8fh     | A.E      | DCIRIS DC | DC IRIS DC              | 8  |    |    |    |    |    |    |    | 40 | 40 | 40  | 40 | READ ONLY |     |

[illegible]

| ADR (h) | PORT   | LABEL    | CONTENTS                   | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | NT | h | Pal | NT | 1  | Pal | NT | 1  | Pal | NT | 1  | Pal |
|---------|--------|----------|----------------------------|----|----|----|----|----|----|----|----|----|---|-----|----|----|-----|----|----|-----|----|----|-----|
| 100h    | NEGDSP | N CG A1  | NEGATIVE C7 X AREA1        | 8  |    |    |    |    |    |    |    |    |   |     |    | 21 | 21  | 21 | 21 | 21  | 21 | 21 | 21  |
| 101h    | NEGDSP | A2       | NEGATIVE C7 X AREA2        | 8  |    |    |    |    |    |    |    |    |   |     |    | 3A | 3A  | 3A | 3A | 3A  | 3A | 3A | 3A  |
| 102h    | NEGDSP | A3       | NEGATIVE C7 X AREA3        | 8  |    |    |    |    |    |    |    |    |   |     |    | 50 | 50  | 50 | 50 | 50  | 50 | 50 | 50  |
| 103h    | NEGDSP | A4       | NEGATIVE C7 X AREA4        | 8  |    |    |    |    |    |    |    |    |   |     |    | 64 | 64  | 64 | 64 | 64  | 64 | 64 | 64  |
| 104h    | NEGDSP | A5       | NEGATIVE C7 X AREA5        | 8  |    |    |    |    |    |    |    |    |   |     |    | 76 | 76  | 76 | 76 | 76  | 76 | 76 | 76  |
| 105h    | NEGDSP | A6       | NEGATIVE C7 X AREA6        | 8  |    |    |    |    |    |    |    |    |   |     |    | 82 | 82  | 82 | 82 | 82  | 82 | 82 | 82  |
| 106h    | NEGDSP | A7       | NEGATIVE C7 X AREA7        | 8  |    |    |    |    |    |    |    |    |   |     |    | 8F | 8F  | 8F | 8F | 8F  | 8F | 8F | 8F  |
| 107h    | NEGDSP | A8       | NEGATIVE C7 X AREA8        | 8  |    |    |    |    |    |    |    |    |   |     |    | 9A | 9A  | 9A | 9A | 9A  | 9A | 9A | 9A  |
| 108h    | NEGDSP | A9       | NEGATIVE C7 X AREA9        | 8  |    |    |    |    |    |    |    |    |   |     |    | A5 | A5  | A5 | A5 | A5  | A5 | A5 | A5  |
| 109h    | NEGDSP | N CG P1  | NEGATIVE C7 Y AREA1        | 8  |    |    |    |    |    |    |    |    |   |     |    | 00 | 00  | 00 | 00 | 00  | 00 | 00 | 00  |
| 110h    | NEGDSP | P2       | NEGATIVE C7 Y AREA2        | 8  |    |    |    |    |    |    |    |    |   |     |    | 01 | 01  | 01 | 01 | 01  | 01 | 01 | 01  |
| 111h    | NEGDSP | P3       | NEGATIVE C7 Y AREA3        | 8  |    |    |    |    |    |    |    |    |   |     |    | 12 | 12  | 12 | 12 | 12  | 12 | 12 | 12  |
| 112h    | NEGDSP | P4       | NEGATIVE C7 Y AREA4        | 8  |    |    |    |    |    |    |    |    |   |     |    | 25 | 25  | 25 | 25 | 25  | 25 | 25 | 25  |
| 113h    | NEGDSP | P5       | NEGATIVE C7 Y AREA5        | 8  |    |    |    |    |    |    |    |    |   |     |    | 38 | 38  | 38 | 38 | 38  | 38 | 38 | 38  |
| 114h    | NEGDSP | P6       | NEGATIVE C7 Y AREA6        | 8  |    |    |    |    |    |    |    |    |   |     |    | 4E | 4E  | 4E | 4E | 4E  | 4E | 4E | 4E  |
| 115h    | NEGDSP | P7       | NEGATIVE C7 Y AREA7        | 8  |    |    |    |    |    |    |    |    |   |     |    | 60 | 60  | 60 | 60 | 60  | 60 | 60 | 60  |
| 116h    | NEGDSP | P8       | NEGATIVE C7 Y AREA8        | 8  |    |    |    |    |    |    |    |    |   |     |    | 78 | 78  | 78 | 78 | 78  | 78 | 78 | 78  |
| 117h    | NEGDSP | P9       | NEGATIVE C7 Y AREA9        | 8  |    |    |    |    |    |    |    |    |   |     |    | AF | AF  | AF | AF | AF  | AF | AF | AF  |
| 118h    | NEGDSP | P10      | NEGATIVE C7 Y AREA10       | 8  |    |    |    |    |    |    |    |    |   |     |    | FE | FE  | FE | FE | FE  | FE | FE | FE  |
| 119h    | NEGDSP | N CG F   | NEGATIVE C7 MARK OF SLOPE  | 8  |    |    |    |    |    |    |    |    |   |     |    | 00 | 00  | 00 | 00 | 00  | 00 | 00 | 00  |
| 120h    | NEGDSP | N CG S1  | NEGATIVE C7 SLOPE DATA1    | 8  |    |    |    |    |    |    |    |    |   |     |    | 00 | 00  | 00 | 00 | 00  | 00 | 00 | 00  |
| 121h    | NEGDSP | S2       | NEGATIVE C7 SLOPE DATA2    | 8  |    |    |    |    |    |    |    |    |   |     |    | 0B | 0B  | 0B | 0B | 0B  | 0B | 0B | 0B  |
| 122h    | NEGDSP | S3       | NEGATIVE C7 SLOPE DATA3    | 8  |    |    |    |    |    |    |    |    |   |     |    | 0F | 0F  | 0F | 0F | 0F  | 0F | 0F | 0F  |
| 123h    | NEGDSP | S4       | NEGATIVE C7 SLOPE DATA4    | 8  |    |    |    |    |    |    |    |    |   |     |    | 0F | 0F  | 0F | 0F | 0F  | 0F | 0F | 0F  |
| 124h    | NEGDSP | S5       | NEGATIVE C7 SLOPE DATA5    | 8  |    |    |    |    |    |    |    |    |   |     |    | 14 | 14  | 14 | 14 | 14  | 14 | 14 | 14  |
| 125h    | NEGDSP | S6       | NEGATIVE C7 SLOPE DATA6    | 8  |    |    |    |    |    |    |    |    |   |     |    | 18 | 18  | 18 | 18 | 18  | 18 | 18 | 18  |
| 126h    | NEGDSP | S7       | NEGATIVE C7 SLOPE DATA7    | 8  |    |    |    |    |    |    |    |    |   |     |    | 1E | 1E  | 1E | 1E | 1E  | 1E | 1E | 1E  |
| 127h    | NEGDSP | S8       | NEGATIVE C7 SLOPE DATA8    | 8  |    |    |    |    |    |    |    |    |   |     |    | 50 | 50  | 50 | 50 | 50  | 50 | 50 | 50  |
| 128h    | NEGDSP | S9       | NEGATIVE C7 SLOPE DATA9    | 8  |    |    |    |    |    |    |    |    |   |     |    | 73 | 73  | 73 | 73 | 73  | 73 | 73 | 73  |
| 129h    | NEGDSP | S10      | NEGATIVE C7 SLOPE DATA10   | 8  |    |    |    |    |    |    |    |    |   |     |    | 01 | 01  | 01 | 01 | 01  | 01 | 01 | 01  |
| 130h    | NEGDSP | NEGAA.E  | NEGATIVE A.E CTL           | 8  |    |    |    |    |    |    |    |    |   |     |    | 08 | 08  | 08 | 08 | 08  | 08 | 08 | 08  |
| 131h    | NEGDSP | NCKI_HCL | NEGATIVE HIGH LIMIT OF LIG | 8  |    |    |    |    |    |    |    |    |   |     |    | A0 | A0  | A0 | A0 | A0  | A0 | A0 | A0  |
| 132h    | NEGDSP | N_YG_A1  | NEGATIVE Y7 X AREA1        | 8  |    |    |    |    |    |    |    |    |   |     |    | 21 | 21  | 21 | 21 | 21  | 21 | 21 | 21  |
| 133h    | NEGDSP | A2       | NEGATIVE Y7 X AREA2        | 8  |    |    |    |    |    |    |    |    |   |     |    | 3A | 3A  | 3A | 3A | 3A  | 3A | 3A | 3A  |
| 134h    | NEGDSP | A3       | NEGATIVE Y7 X AREA3        | 8  |    |    |    |    |    |    |    |    |   |     |    | 50 | 50  | 50 | 50 | 50  | 50 | 50 | 50  |
| 135h    | NEGDSP | A4       | NEGATIVE Y7 X AREA4        | 8  |    |    |    |    |    |    |    |    |   |     |    | 64 | 64  | 64 | 64 | 64  | 64 | 64 | 64  |
| 136h    | NEGDSP | A5       | NEGATIVE Y7 X AREA5        | 8  |    |    |    |    |    |    |    |    |   |     |    | 76 | 76  | 76 | 76 | 76  | 76 | 76 | 76  |
| 137h    | NEGDSP | A6       | NEGATIVE Y7 X AREA6        | 8  |    |    |    |    |    |    |    |    |   |     |    | 82 | 82  | 82 | 82 | 82  | 82 | 82 | 82  |
| 138h    | NEGDSP | A7       | NEGATIVE Y7 X AREA7        | 8  |    |    |    |    |    |    |    |    |   |     |    | 8F | 8F  | 8F | 8F | 8F  | 8F | 8F | 8F  |
| 139h    | NEGDSP | A8       | NEGATIVE Y7 X AREA8        | 8  |    |    |    |    |    |    |    |    |   |     |    | 9A | 9A  | 9A | 9A | 9A  | 9A | 9A | 9A  |
| 140h    | NEGDSP | A9       | NEGATIVE Y7 X AREA9        | 8  |    |    |    |    |    |    |    |    |   |     |    | A5 | A5  | A5 | A5 | A5  | A5 | A5 | A5  |
| 141h    | NEGDSP | N_YG_P1  | NEGATIVE Y7 Y AREA1        | 8  |    |    |    |    |    |    |    |    |   |     |    | 00 | 00  | 00 | 00 | 00  | 00 | 00 | 00  |
| 142h    | NEGDSP | P2       | NEGATIVE Y7 Y AREA2        | 8  |    |    |    |    |    |    |    |    |   |     |    | 01 | 01  | 01 | 01 | 01  | 01 | 01 | 01  |
| 143h    | NEGDSP | P3       | NEGATIVE Y7 Y AREA3        | 8  |    |    |    |    |    |    |    |    |   |     |    | 12 | 12  | 12 | 12 | 12  | 12 | 12 | 12  |
| 144h    | NEGDSP | P4       | NEGATIVE Y7 Y AREA4        | 8  |    |    |    |    |    |    |    |    |   |     |    | 25 | 25  | 25 | 25 | 25  | 25 | 25 | 25  |
| 145h    | NEGDSP | P5       | NEGATIVE Y7 Y AREA5        | 8  |    |    |    |    |    |    |    |    |   |     |    | 38 | 38  | 38 | 38 | 38  | 38 | 38 | 38  |
| 146h    | NEGDSP | P6       | NEGATIVE Y7 Y AREA6        | 8  |    |    |    |    |    |    |    |    |   |     |    | 4E | 4E  | 4E | 4E | 4E  | 4E | 4E | 4E  |
| 147h    | NEGDSP | P7       | NEGATIVE Y7 Y AREA7        | 8  |    |    |    |    |    |    |    |    |   |     |    | 60 | 60  | 60 | 60 | 60  | 60 | 60 | 60  |
| 148h    | NEGDSP | P8       | NEGATIVE Y7 Y AREA8        | 8  |    |    |    |    |    |    |    |    |   |     |    | 78 | 78  | 78 | 78 | 78  | 78 | 78 | 78  |
| 149h    | NEGDSP | P9       | NEGATIVE Y7 Y AREA9        | 8  |    |    |    |    |    |    |    |    |   |     |    | AF | AF  | AF | AF | AF  | AF | AF | AF  |
| 150h    | NEGDSP | P10      | NEGATIVE Y7 Y AREA10       | 8  |    |    |    |    |    |    |    |    |   |     |    | FE | FE  | FE | FE | FE  | FE | FE | FE  |
| 151h    | NEGDSP | N CG F   | NEGATIVE C7 MARK OF SLOPE  | 8  |    |    |    |    |    |    |    |    |   |     |    | 00 | 00  | 00 | 00 | 00  | 00 | 00 | 00  |
| 152h    | NEGDSP | N CG S1  | NEGATIVE C7 SLOPE DATA1    | 8  |    |    |    |    |    |    |    |    |   |     |    | 00 | 00  | 00 | 00 | 00  | 00 | 00 | 00  |
| 153h    | NEGDSP | S2       | NEGATIVE C7 SLOPE DATA2    | 8  |    |    |    |    |    |    |    |    |   |     |    | 0B | 0B  | 0B | 0B | 0B  | 0B | 0B | 0B  |
| 154h    | NEGDSP | S3       | NEGATIVE C7 SLOPE DATA3    | 8  |    |    |    |    |    |    |    |    |   |     |    | 0F | 0F  | 0F | 0F | 0F  | 0F | 0F | 0F  |
| 155h    | NEGDSP | S4       | NEGATIVE C7 SLOPE DATA4    | 8  |    |    |    |    |    |    |    |    |   |     |    | 0F | 0F  | 0F | 0F | 0F  | 0F | 0F | 0F  |
| 156h    | NEGDSP | S5       | NEGATIVE C7 SLOPE DATA5    | 8  |    |    |    |    |    |    |    |    |   |     |    | 14 | 14  | 14 | 14 | 14  | 14 | 14 | 14  |
| 157h    | NEGDSP | S6       | NEGATIVE C7 SLOPE DATA6    | 8  |    |    |    |    |    |    |    |    |   |     |    | 18 | 18  | 18 | 18 | 18  | 18 | 18 | 18  |
| 158h    | NEGDSP | S7       | NEGATIVE C7 SLOPE DATA7    | 8  |    |    |    |    |    |    |    |    |   |     |    | 1E | 1E  | 1E | 1E | 1E  | 1E | 1E | 1E  |
| 159h    | NEGDSP | S8       | NEGATIVE C7 SLOPE DATA8    | 8  |    |    |    |    |    |    |    |    |   |     |    | 50 | 50  | 50 | 50 | 50  | 50 | 50 | 50  |
| 160h    | NEGDSP | S9       | NEGATIVE C7 SLOPE DATA9    | 8  |    |    |    |    |    |    |    |    |   |     |    | 73 | 73  | 73 | 73 | 73  | 73 | 73 | 73  |
| 161h    | NEGDSP | S10      | NEGATIVE C7 SLOPE DATA10   | 8  |    |    |    |    |    |    |    |    |   |     |    | 01 | 01  | 01 | 01 | 01  | 01 | 01 | 01  |
| 162h    | NEGDSP | NEGAA.E  | NEGATIVE A.E CTL           | 8  |    |    |    |    |    |    |    |    |   |     |    | 08 | 08  | 08 | 08 | 08  | 08 | 08 | 08  |
| 163h    | NEGDSP | NCKI_HCL | NEGATIVE HIGH LIMIT OF LIG | 8  |    |    |    |    |    |    |    |    |   |     |    | A0 | A0  | A0 | A0 | A0  | A0 | A0 | A0  |
| 164h    | NEGDSP | N_YG_A1  | NEGATIVE Y7 X AREA1        | 8  |    |    |    |    |    |    |    |    |   |     |    | 21 | 21  | 21 | 21 | 21  | 21 | 21 | 21  |
| 165h    | NEGDSP | A2       | NEGATIVE Y7 X AREA2        | 8  |    |    |    |    |    |    |    |    |   |     |    | 3A | 3A  | 3A | 3A | 3A  | 3A | 3A | 3A  |
| 166h    | NEGDSP | A3       | NEGATIVE Y7 X AREA3        | 8  |    |    |    |    |    |    |    |    |   |     |    | 50 | 50  | 50 | 50 | 50  | 50 | 50 | 50  |
| 167h    | NEGDSP | A4       | NEGATIVE Y7 X AREA4        | 8  |    |    |    |    |    |    |    |    |   |     |    | 64 | 64  | 64 | 64 | 64  | 64 | 64 | 64  |
| 168h    | NEGDSP | A5       | NEGATIVE Y7 X AREA5        | 8  |    |    |    |    |    |    |    |    |   |     |    | 76 | 76  | 76 | 76 | 76  | 76 | 76 | 76  |
| 169h    | NEGDSP | A6       | NEGATIVE Y7 X AREA6        | 8  |    |    |    |    |    |    |    |    |   |     |    | 82 | 82  | 82 | 82 | 82  | 82 | 82 | 82  |
| 170h    | NEGDSP | A7       | NEGATIVE Y7 X AREA7        | 8  |    |    |    |    |    |    |    |    |   |     |    | 8F | 8F  | 8F | 8F | 8F  | 8F | 8F | 8F  |
| 171h    | NEGDSP | A8       | NEGATIVE Y7 X AREA8        | 8  |    |    |    |    |    |    |    |    |   |     |    | 9A | 9A  | 9A | 9A | 9A  | 9A | 9A | 9A  |
| 172h    | NEGDSP | A9       | NEGATIVE Y7 X AREA9        | 8  |    |    |    |    |    |    |    |    |   |     |    | A5 | A5  | A5 | A5 | A5  | A5 | A5 | A5  |
| 173h    | NEGDSP | N_YG_P1  | NEGATIVE Y7 Y AREA1        | 8  |    |    |    |    |    |    |    |    |   |     |    | 00 | 00  | 00 | 00 | 00  | 00 | 00 | 00  |
| 174h    | NEGDSP | P2       | NEGATIVE Y7 Y AREA2        | 8  |    |    |    |    |    |    |    |    |   |     |    | 01 | 01  | 01 | 01 | 01  | 01 | 01 | 01  |
| 175h    | NEGDSP | P3       | NEGATIVE Y7 Y AREA3        | 8  |    |    |    |    |    |    |    |    |   |     |    | 12 | 12  | 12 | 12 | 12  | 12 | 12 | 12  |
| 176h    | NEGDSP | P4       | NEGATIVE Y7 Y AREA4        | 8  |    |    |    |    |    |    |    |    |   |     |    | 24 | 24  | 24 | 24 | 24  | 24 | 24 | 24  |
| 177h    | NEGDSP | P5       | NEGATIVE Y7 Y AREA5        | 8  |    |    |    |    |    |    |    |    |   |     |    | 37 | 37  | 37 | 37 | 37  | 37 | 37 | 37  |
| 178h    | NEGDSP | P6       | NEGATIVE Y7 Y AREA6        | 8  |    |    |    |    |    |    |    |    |   |     |    | 4D | 4D  | 4D | 4D | 4D  | 4D | 4D | 4D  |
| 179h    | NEGDSP | P7       | NEGATIVE Y7 Y AREA7        | 8  |    |    |    |    |    |    |    |    |   |     |    | 5F | 5F  | 5F | 5F | 5F  | 5F | 5F | 5F  |

| AOR (6) | PORT | LABEL   | CONTENTS                | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | H | PALHNT    | I | PAL |
|---------|------|---------|-------------------------|----|----|----|----|----|----|----|----|---|-----------|---|-----|
| 160h    | DSP  | WB1_1_1 | INPUT WB I DATA1        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 161h    | DSP  | WB1_1_2 | INPUT WB I DATA2        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 162h    | DSP  | WB1_1_3 | INPUT WB I DATA3        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 163h    | DSP  | WB1_1_4 | INPUT WB I DATA4        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 164h    | DSP  | WB1_2_1 | INPUT WB I DATA5        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 165h    | DSP  | WB1_2_2 | INPUT WB I DATA6        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 166h    | DSP  | WB1_2_3 | INPUT WB I DATA7        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 167h    | DSP  | WB1_2_4 | INPUT WB I DATA8        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 168h    | DSP  | WB1_3_1 | INPUT WB I DATA9        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 169h    | DSP  | WB1_3_2 | INPUT WB I DATA10       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 16Ah    | DSP  | WB1_3_3 | INPUT WB I DATA11       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 16Bh    | DSP  | WB1_3_4 | INPUT WB I DATA12       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 16Ch    | DSP  | WB1_4_1 | INPUT WB I DATA13       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 16Dh    | DSP  | WB1_4_2 | INPUT WB I DATA14       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 16Eh    | DSP  | WB1_4_3 | INPUT WB I DATA15       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 16Fh    | DSP  | WB1_4_4 | INPUT WB I DATA16       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 170h    | DSP  | WBQ_1_1 | QNPUT WB Q DATA1        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 171h    | DSP  | WBQ_1_2 | QNPUT WB Q DATA2        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 172h    | DSP  | WBQ_1_3 | QNPUT WB Q DATA3        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 173h    | DSP  | WBQ_1_4 | QNPUT WB Q DATA4        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 174h    | DSP  | WBQ_2_1 | QNPUT WB Q DATA5        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 175h    | DSP  | WBQ_2_2 | QNPUT WB Q DATA6        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 176h    | DSP  | WBQ_2_3 | QNPUT WB Q DATA7        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 177h    | DSP  | WBQ_2_4 | QNPUT WB Q DATA8        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 178h    | DSP  | WBQ_3_1 | QNPUT WB Q DATA9        | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 179h    | DSP  | WBQ_3_2 | QNPUT WB Q DATA10       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 17Ah    | DSP  | WBQ_3_3 | QNPUT WB Q DATA11       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 17Bh    | DSP  | WBQ_3_4 | QNPUT WB Q DATA12       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 17Ch    | DSP  | WBQ_4_1 | QNPUT WB Q DATA13       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 17Dh    | DSP  | WBQ_4_2 | QNPUT WB Q DATA14       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 17Eh    | DSP  | WBQ_4_3 | QNPUT WB Q DATA15       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 17Fh    | DSP  | WBQ_4_4 | QNPUT WB Q DATA16       | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 180h    | DSP  | H PEAK  | INPUT HIGH A.E PEAK DAT | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 181h    | DSP  | L PEAK  | INPUT LOW A.E PEAK DATA | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 182h    | DSP  | OB DATA | INPUT B-OB DATA         | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 183h    | DSP  | C1 OB R | INPUT B-OB DATA         | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |
| 184h    | DSP  | C1 OB B | INPUT B-OB DATA         | 8  |    |    |    |    |    |    |    |   | READ ONLY |   |     |

## 4. ELECTRICAL CHARACTERISTICS

### 4-1. ABSOLUTE MAXIMUM RATINGS

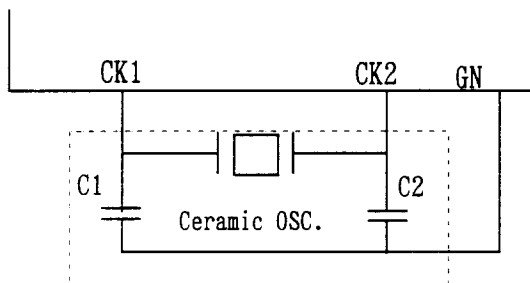
| Item                                   | Symbol             | Rating                   | Unit | Note |
|----------------------------------------|--------------------|--------------------------|------|------|
| Power supply voltage                   | V <sub>DD</sub>    | -0.3~+6.5                | V    |      |
| Input voltage                          | V <sub>I</sub>     | -0.3~V <sub>D</sub> +0.3 | V    |      |
| Output voltage                         | V <sub>O</sub>     | -0.3~V <sub>D</sub> +0.3 | V    |      |
| Maximum output current<br>(High level) | I <sub>OH</sub>    | - 4                      | mA   | 3    |
| Maximum output current<br>(Low level)  | I <sub>OL1</sub>   | + 30                     | mA   | 1    |
|                                        | I <sub>OL2</sub>   | + 4                      | mA   | 2    |
| All output current<br>(High level)     | Σ I <sub>OH</sub>  | - 20                     | mA   | 3    |
| All output current<br>(Low level)      | Σ I <sub>OL1</sub> | +100                     | mA   | 1    |
|                                        | Σ I <sub>OL2</sub> | + 20                     | mA   | 2    |
| Operating temperature                  | T <sub>OPR</sub>   | -10~+50                  | °C   |      |
| Storage temperature                    | T <sub>STG</sub>   | -55~+255                 | °C   |      |

- Notes 1. Apply to outputs. (Pin 27~34 and 39~45)  
 2. Apply to outputs. (Except pin 27~34 and 39~45)  
 3. Apply to all outputs.

### 4-2. OPERATING CONDITIONS

| Item                   | Symbol          | Min  | Typ. | Max  | Unit |
|------------------------|-----------------|------|------|------|------|
| Power supply voltage   | V <sub>DD</sub> | 2.7  | 3.3  | 3.6  | V    |
| System clock frequency | f <sub>CK</sub> | 5.25 | 5.5  | 5.75 | MHz  |

### 4-3. OSCILLATION CIRCUIT ( Example )



Oscillate frequency resister is contained within the LSI. (Recommendation)  
 Ceramic oscillator = PBRC5.50B  
 (KYOTO CERAMIC CO.LTD)  
 (PBRC5.50B is contained C1,C2)

\*) Don't put any signal line cross the oscillator circuit line.

## 4-4. DC CHARACTERISTICS

| Parameter           | Symbol            | Conditions                                               | Min.                | Tip..       | Max.                | Units | Note |
|---------------------|-------------------|----------------------------------------------------------|---------------------|-------------|---------------------|-------|------|
| Input voltage       | V <sub>IH1</sub>  |                                                          | $0.8 \times V_{DD}$ |             | $V_{DD}$            | V     | 1    |
|                     | V <sub>IL1</sub>  |                                                          | 0                   |             | $0.2 \times V_{DD}$ | V     | 1    |
|                     | V <sub>IH2</sub>  |                                                          | $V_{DD} - 0.3$      |             | $V_{DD}$            | V     | 2    |
|                     | V <sub>IL2</sub>  |                                                          | 0                   |             | 0.5                 | V     | 2    |
| Input current       | I <sub>IL</sub>   | V <sub>IL</sub> = 0V, V <sub>DD</sub> = 3V               | -5                  | -15         | -100                | μA    | 3    |
|                     | I <sub>IH</sub>   | V <sub>IH</sub> = 3V, V <sub>DD</sub> = 3V               | 5                   | 15          | 100                 | μA    | 4    |
|                     | I <sub>I</sub>    | V <sub>IN</sub> = V <sub>DD</sub> , V <sub>DD</sub> = 3V |                     |             | 10                  | μA    | 5    |
| Out put voltage     | V <sub>OH1</sub>  | I <sub>OH</sub> = -0.6mA, V <sub>DD</sub> = 3V           | $V_{DD} - 0.5$      |             |                     | V     | 6    |
|                     | V <sub>OL1</sub>  | I <sub>OL</sub> = 6mA, V <sub>DD</sub> = 3V              |                     |             | 2                   | V     | 6    |
|                     | V <sub>OH2</sub>  | I <sub>OH</sub> = -0.6mA, V <sub>DD</sub> = 3V           | $V_{DD} - 0.5$      |             |                     | V     | 7    |
|                     | V <sub>OL2</sub>  | I <sub>OL</sub> = 0.6mA, V <sub>DD</sub> = 3V            |                     |             | 0.5                 | V     | 7    |
| A/D                 | resolution        | V = V <sub>DD</sub> = 3V                                 |                     | 8           |                     | bits  |      |
|                     | accuracy          | fs=1MHz                                                  |                     |             | ±2.5                | LSB   |      |
| Zero cross voltage  |                   | fs=1MHz, V <sub>DD</sub> = 3V                            | $0.5V_{DD} - 0.1$   | $0.5V_{DD}$ | $0.5V_{DD} + 0.1$   | V     |      |
| Current consumption | I <sub>DD</sub>   | fs=1MHz                                                  |                     | 4           | 12                  | mA    | 8    |
|                     | I <sub>DDH</sub>  | fs=1MHz, HALT mode                                       |                     | 1           | 4                   | mA    | 8    |
|                     | I <sub>DDS1</sub> | oscillation, STOP mode                                   |                     | 20          | 60                  | μA    | 9    |
|                     | I <sub>DDS2</sub> | No oscillation                                           |                     | 1           | 10                  | μA    | 9    |

- Notes :1. Applied to pins (Pin 38~48, 2~8, 74~78, 24~28, 31~33, 11, 36, 15, 16 and 19)  
:2. // (Pin 12, 49, 24, 23 and 18)  
:3. // (Pin 18 and 12)  
:4. // (Pin 38~48, 23, 15~19, 24~28, 31~33 and 36)  
:5. // (Pin 5~8 and 74)  
:6. // (Pin 58, 59, 63~68 and 50~57)  
:7. // (Pin 38, 42~48, 15~19, 23, 10 and 35)  
:8. No load condition (V<sub>DD</sub> = 3V)  
:9. No load condition (V<sub>DD</sub> = 3V, OSCin=32.768KHz, VR=ground, Input signal is fixed.)  
:10.No load condition (V<sub>DD</sub> = 3V, OSCin=GND, VR=ground, Input signal is fixed.)

## 5 Package and packing specification

## 1. Package Outline Specification

Refer to drawing No. AA1058

## 2. Markings

## 2-1. Marking contents

(1) Product name : LU850420

(2) Company name : SHARP

(3) Date code

(Example) YY WW XXX

Indicates the product was manufactured in the WWth week of 19YY.

Denotes the production ref. code (1-3)

Denotes the production week. (01, 02, 03, . . . . 52, 53)

Denotes the production year. (Lower two digits of the year.)

(4) The marking of "JAPAN" indicates the country of origin.

## 2-2. Marking layout

Refer to drawing No. AA1058

(This layout does not define the dimensions of marking character and marking position.)

## 3. Packing Specification (Dry packing for surface mount packages)

Dry packing is used for the purpose of maintaining IC quality after mounting packages on the PCB (Printed Circuit Board).

When the epoxy resin which is used for plastic packages is stored at high humidity, it may absorb 0.15% or more of its weight in moisture. If the surface mount type package for a relatively large chip absorbs a large amount of moisture between the epoxy resin and insert material (e.g. chip, lead frame) this moisture may suddenly vaporize into steam when the entire package is heated during the soldering process (e.g. VPS). This causes expansion and results in separation between the resin and insert material, and sometimes cracking of the package. This dry packing is designed to prevent the above problem from occurring in surface mount packages.

## 3-1. Packing Materials

| Material Name          | Material Specificaiton              | Purpose                                                 |
|------------------------|-------------------------------------|---------------------------------------------------------|
| Tray                   | Conductive plastic (60devices/tray) | Fixing of device                                        |
| Upper cover tray       | Conductive plastic (1tray/case)     | Fixing of device                                        |
| Laminated aluminum bag | Aluminum polyethylene (1bag/case)   | Drying of device                                        |
| Desiccant              | Silica gel                          | Drying of device                                        |
| P P band               | Polypropylene (3pcs/case)           | Fixing of tray                                          |
| Inner case             | Card board (600devices/case)        | Packaging of device                                     |
| Label                  | Paper                               | Indicates part number, quantity and date of manufacture |
| Outer case             | Card board                          | Outer packing of tray                                   |

(Devices shall be placed into a tray in the same direction.)

## 5. Surface Mount Conditions

Please perform the following conditions when mounting ICs not to deteriorate IC quality.

## 5-1. Soldering conditions (The following conditions are valid only for one time soldering.)

| Mounting Method                      | Temperature and Duration                                                                                                                                                  | Measurement Point        |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Reflow soldering<br>(air)            | Peak temperature of 230°C or less,<br>duration of less than 15 seconds.<br>200°C or over, duration of less than 40 seconds.<br>Temperature increase rate of 1~4°C/second. | IC package<br>surface    |
| Vapor phase<br>soldering             | 215°C or less, duration of less<br>than 40 seconds above 200°C                                                                                                            | Steam                    |
| Manual soldering<br>(soldering iron) | 260°C or less, duration of less<br>than 10 seconds                                                                                                                        | IC outer<br>lead surface |

## 5-2. Conditions for removal of residual flux

- (1) Ultrasonic washing power : 25 Watts/liter or less
- (2) Washing time : Total 1 minute maximum
- (3) Solvent temperature : 15~40°C

- 3-2. Outline dimension of tray  
Refer to attached drawing.

#### 4. Storage and Opening of Dry Packing

- 4-1. Store under conditions shown below before opening the dry packing

- (1) Temperature range : 5~40°C  
(2) Humidity : 80% RH or less

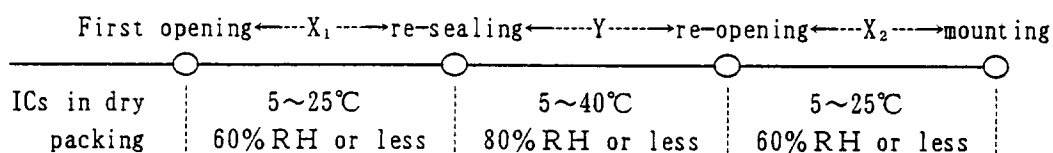
- 4-2. Notes on opening the dry packing

- (1) Before opening the dry packing, prepare a working table which is grounded against ESD and use a grounding strap.  
(2) The tray has been treated to be conductive or anti-static. If the device is transferred to another tray, use a equivalent tray.

- 4-3. Storage after opening the dry packing

Perform the following to prevent absorption of moisture after opening.

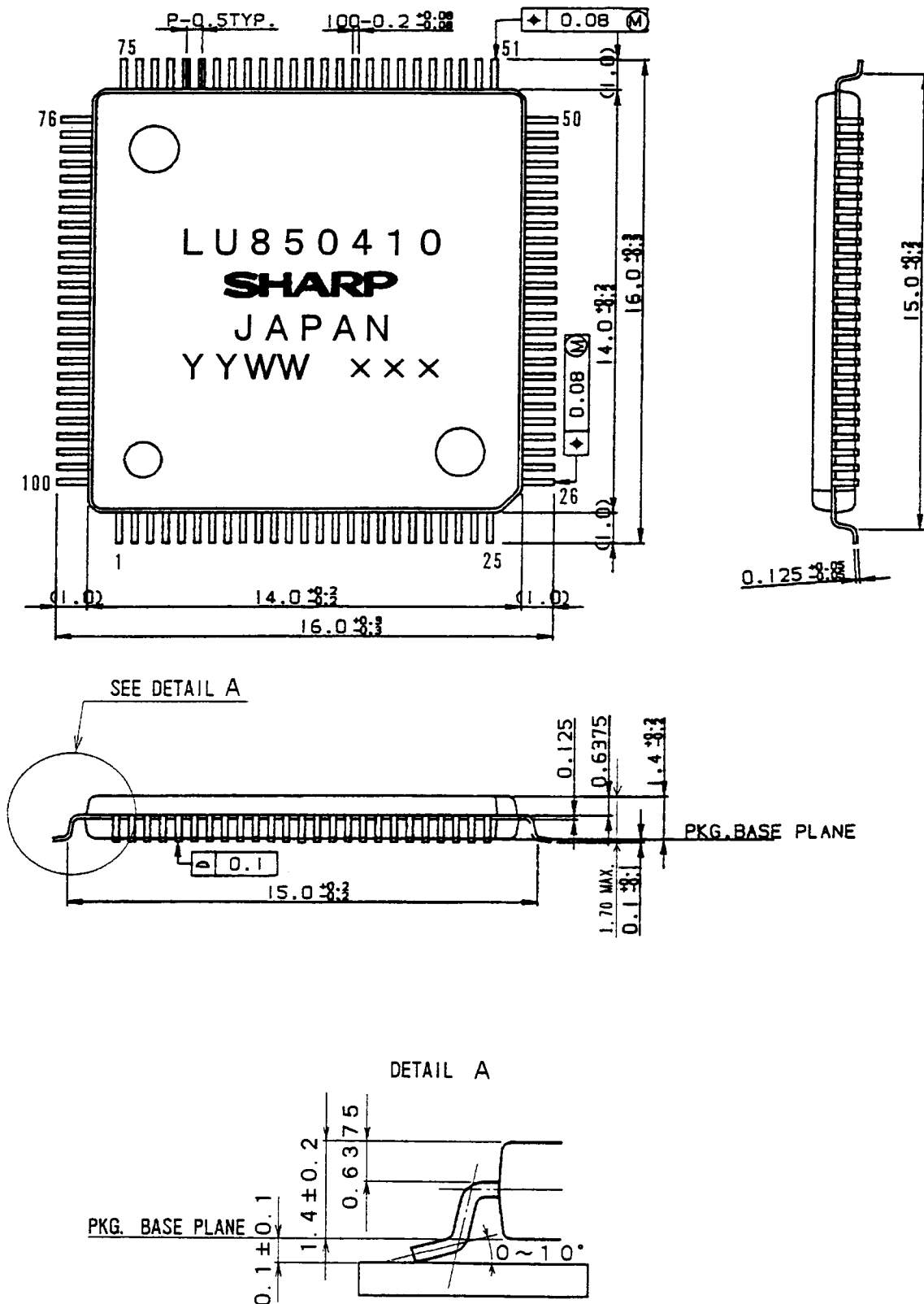
- (1) After opening the dry packing, store the ICs in an environment with a temperature of 5~25°C and a relative humidity of 60% or less and mount ICs within 4 days after opening dry packing.  
(2) To re-store the ICs for an extended period of time within 4 days after opening the dry packing, use a dry box or re-seal the ICs in the dry packing with desiccant (whoes indicator is blue), and store in an environment with a temperature of 5~40°C and a relative humidity of 80% or less, and mount ICs within 2 weeks.  
(3) Total period of storage after first opening and re-opening is within 4 days, and store the ICs in the same environment as section 4-3.(1).



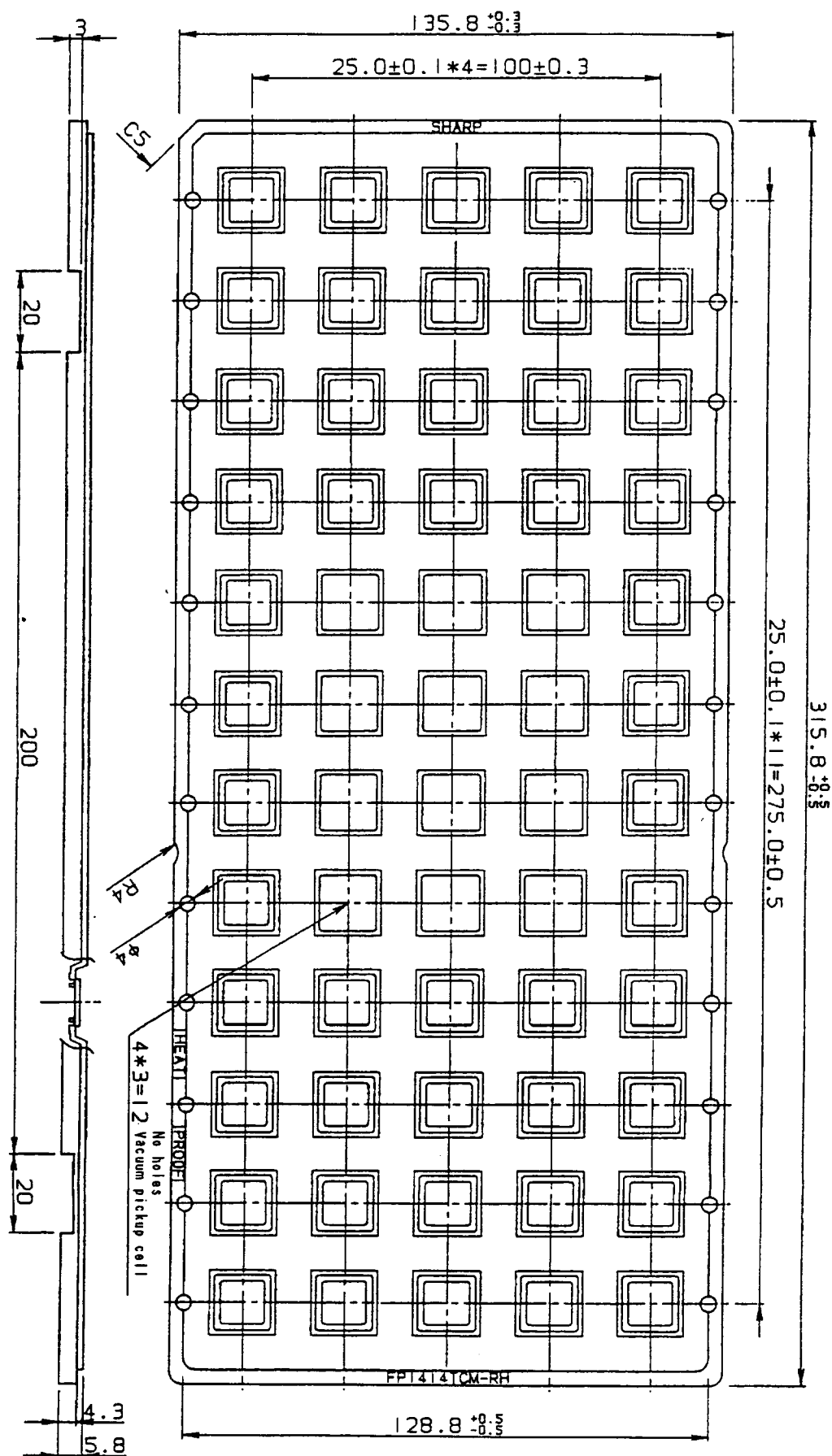
|                                                   |
|---------------------------------------------------|
| $X_1 + X_2$ : within 4 days<br>Y : within 2 weeks |
|---------------------------------------------------|

- 4-4. Baking (drying) before mounting

- (1) Baking is necessary  
(A) If the humidity indicator in the desiccant becomes pink  
(B) If the procedure in section 4-3 could not be performed  
(2) Recommended baking conditions  
If the above conditions (A) and (B) are applicable, bake it before mounting. The recommended conditions are 16~24 hours at 120°C.  
Heat resistance tray is used for shipping tray.  
(3) Storage after baking  
After baking ICs, store the ICs in the same environment as section 4-3.(1).



|             |             |          |                                                            |
|-------------|-------------|----------|------------------------------------------------------------|
| 名称          | リード仕上       | TIN-LEAD | 備考                                                         |
| NAME        | LEAD FINISH | PLATING  | プラスチックパッケージ外形寸法は、バリを含まないものとする。                             |
| DRAWING NO. | AA1058      | 単位       | NOTE Plastic body dimensions do not include burr of resin. |
|             |             | UNIT     | mm                                                         |

名称  
NAME

FP1414TCM-RH

備考  
NOTE

DRAWING NO.

CV557

単位  
UNIT

mm