SONY

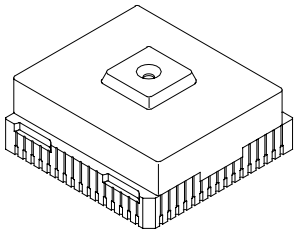
MCX18N00A/MCX18N00B

Micro Unit CCD

Description

The micro unit CCD is a CCD color camera unit with built-in CCD image sensor, drive system IC, sample-and-hold IC, signal processor IC and lens system.

64 pin QFN (Ceramic)



Features

- Ultra-compact size:
  MCX18N00A 18.3mm × 18.3mm × 8.4mm
  MCX18N00B 18.3mm × 18.3mm × 9.6mm
- Y/C analog output
- Employs a Type 1/5, 180,000-pixel color CCD image sensor
- Equipped with a fixed focus lens:
  MCX18N00A F2.8/f = 2.9mm
  MCX18N00B F2.8/f = 4.0mm

Peripheral ICs

- EVR: MB88347 (Fujitsu Limited.)
- EEPROM: AK6420 (Asahi Kasei Microsystems Co., Ltd.)

Applications

- TV conference cameras
- Image input cameras

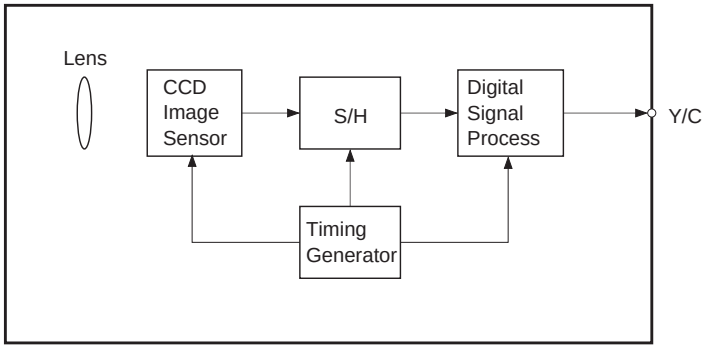
Absolute Maximum Ratings

• Supply voltage	V_H	+18	V
	$DV_{DD}1$, $DV_{DD}2$, $AV_{DD}6$	+7.0	V
	$AV_{DD}1$, $AV_{DD}2$, $AV_{DD}3$	+7.0	V
	$AV_{DD}4$, $AV_{DD}5$	+7.0	V
	V_{CC}	+14.0	V
	V_L	–17.5	V
• Input voltage	V_I	–0.5 to DV_{DD} + 0.5	V
• Operating temperature	Topr	0 to +40	°C
• Storage temperature	Tstg	–30 to +80	°C

Recommended Operating Conditions

• Supply voltage	V_H	14.25 to 15.75	V
	$DV_{DD}1$, $DV_{DD}2$, $AV_{DD}6$	3.0 to 3.6	V
	$AV_{DD}1$, $AV_{DD}2$, $AV_{DD}3$	4.75 to 5.25	V
	$AV_{DD}4$, $AV_{DD}5$	4.5 to 5.5	V
	V_{CC}	4.5 to 5.25	V
	V_L	–8.5 to –7.5	V
• Input voltage	V_{DCIN}	1.0 to 4.5	V
• Operating temperature	Topr	0 to +40	°C

Block Diagram



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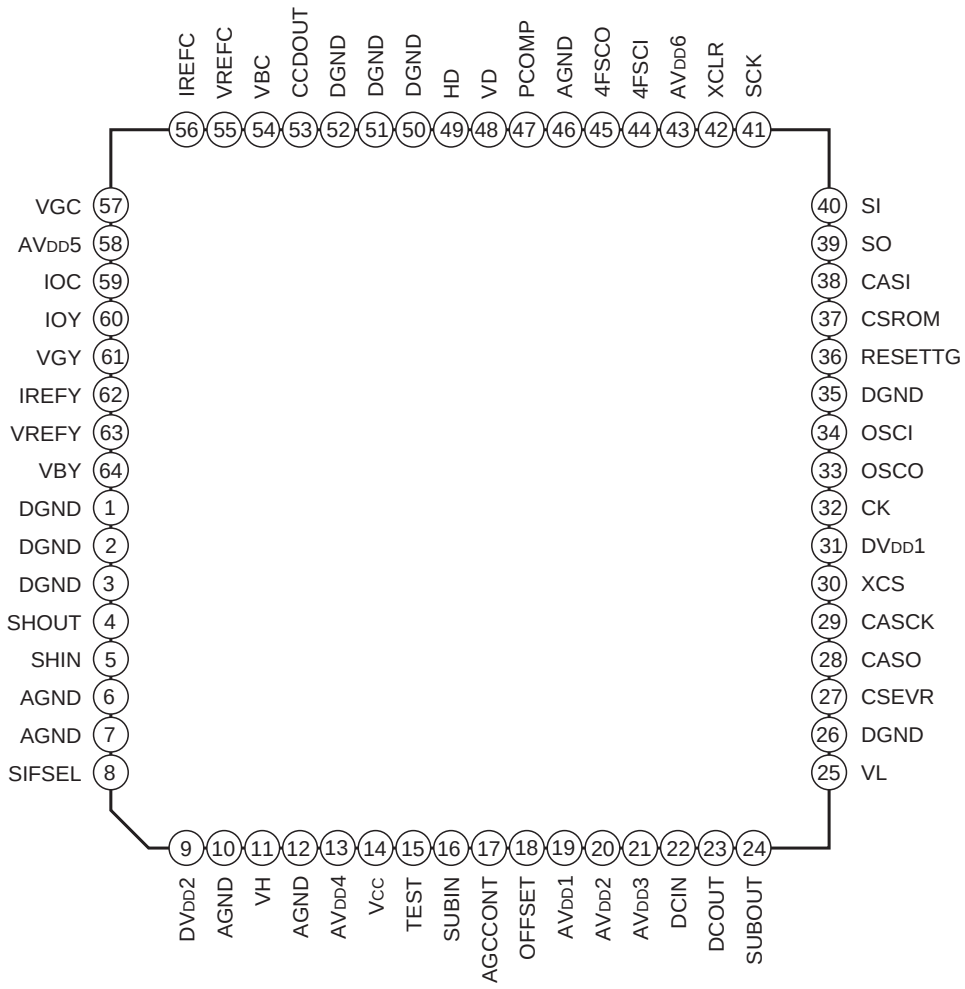
Pin Configuration



Pin Description

Pin No.	Symbol	I/O	Description
1	DGND	—	Digital GND
2	DGND	—	Digital GND
3	DGND	—	Digital GND
4	SHOUT	O	Sample-and-hold output. Connect directly to Pin 5.
5	SHIN	I	Sample-and-hold input.
6	AGND	—	Analog GND
7	AGND	I	Analog GND
8	SIFSEL	I	Serial communication mode selection: Microcomputer (low)/RS232C (high).
9	$DV_{DD}2$	—	+3.3V power supply for signal processing system.
10	AGND	—	Analog GND
11	VH	—	+15V power supply for CCD image sensor drive.
12	AGND	—	Analog GND
13	$AV_{DD}4$	—	+5V power supply for A/D converter.
14	V_{CC}	—	+5V power supply for sample-and-hold.
15	TEST	I	Test pin. Connect to V_{CC}.
16	SUBIN	I	CCD image sensor SUB voltage input.
17	AGCCONT	I	AGC control.
18	OFFSET	I	OFFSET control.
19	$AV_{DD}1$	—	+5V power supply for sample-and-hold pulse.
20	$AV_{DD}2$	—	+5V power supply for RG pulse.
21	$AV_{DD}3$	—	+5V power supply for H pulse.
22	DCIN	I	DC amplifier input.
23	DCOUT	O	DC amplifier output.
24	SUBOUT	O	SUB pulse output.
25	VL	—	–8V power supply for CCD image sensor drive.
26	DGND	—	Digital GND
27	CSEVR	O	EVR chip select.
28	CASO	O	Serial communication data output for peripheral ICs (EVR, EEPROM).
29	CASCK	O	Serial communication clock output for peripheral ICs (EVR, EEPROM).
30	XCS	I	Switched by the SIFSEL setting. Chip select during microcomputer mode. Baud rate setting (4800bps (low)/9600bps (high)) during RS232C mode.
31	$DV_{DD}1$	—	+3.3V power supply for timing generator.
32	CK	I	27MHz clock input.
33	OSCO	O	27MHz oscillator output.
34	OSCI	I	27MHz oscillator input.
35	DGND	—	Digital GND

Pin No.	Symbol	I/O	Description
36	RESETTG	I	Reset pin (active low) with pull-up resistor for timing generator.
37	CSROM	O	EEPROM chip select.
38	CASI	I	Serial communication data input for peripheral ICs (EVR, EEPROM).
39	SO	O	Serial communication data output.
40	SI	I	Serial communication data input.
41	SCK	I	Serial communication clock input.
42	XCLR	I	Initialization pin (active low). EEPROM re-read.
43	$AV_{DD}6$	—	+3.3V power supply for 4fsc oscillator.
44	4FSCI	I	4fsc oscillator input.
45	4FSCO	O	4fsc oscillator output.
46	AGND	—	Analog GND
47	PCOMP	O	Phase comparison output for PLL lock.
48	VD	O	Vertical sync output.
49	HD	O	Horizontal sync output.
50	DGND	—	Digital GND
51	DGND	—	Digital GND
52	DGND	—	Digital GND
53	CCDOUT	O	CCD image sensor buffer output.
54	VBC		D/A converter peripheral circuit connection pins for chroma signal.
55	VREFC	I	
56	IREFC		
57	VGC		
58	$AV_{DD}5$	—	+5V power supply for D/A converter.
59	IOC	O	Chroma signal output.
60	IOY	O	Luminance signal output.
61	VGY		D/A converter peripheral circuit connection pins for luminance signal.
62	IREFY		
63	VREFY	I	
64	VBY		

Electrical Characteristics

DC Characteristics

Item	Pins	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage		$DV_{DD}1$		3.0	3.3	3.6	V
		$DV_{DD}2$		3.0	3.3	3.6	V
		$AV_{DD}1$		4.75	5.00	5.25	V
		$AV_{DD}2$		4.75	5.00	5.25	V
		$AV_{DD}3$		4.75	5.00	5.25	V
		$AV_{DD}4$	A/D input amplitude = 2Vp-p	4.5	5.0	5.5	V
		$AV_{DD}5$	D/A output amplitude = 2Vp-p	4.5	5.0	5.5	V
		$AV_{DD}6$		3.0	3.3	3.6	V
		V_{CC}		4.5	5.0	5.25	V
		V_H		14.25	15.00	15.75	V
		V_L		–8.5	–8.0	–7.5	V
Operating current		$I_{DD}1$	$DV_{DD}1$ = 3.3V		7.2		mA
		$I_{DD}2$	$DV_{DD}2$ = 3.3V		36		mA
		$IA_{DD}1$	$AV_{DD}1$ = 5.0V		3.1		mA
		$IA_{DD}2$	$AV_{DD}2$ = 5.0V		1.0		mA
		$IA_{DD}3$	$AV_{DD}3$ = 5.0V		4.9		mA
		$IA_{DD}4$	$AV_{DD}4$ = 5.0V		15		mA
		$IA_{DD}5$	$AV_{DD}5$ = 5.0V		24		mA
		$IA_{DD}6$	$AV_{DD}6$ = 3.3V		1.0		mA
		I_{CC}	V_{CC} = 5.0V		54		mA
		I_H	V_H = 15.0V		6.9		mA
		I_L	V_L = –8.0V		1.4		mA
Input voltage 1	*5, *7	V_{T+} V_{T-}		$DV_{DD}2 \times 0.8$		$DV_{DD}2 \times 0.2$	V
Input voltage 2	*1, *6	$V_{IH}1$ $V_{IL}1$		$DV_{DD}1 \times 0.7$		$DV_{DD}1 \times 0.3$	V
Input voltage 3	DCIN	V_{DCIN}		1.0		4.5	V
Input voltage 4	SUBIN	V_{SUB}		Display value – 0.1	Display value	Display value + 0.1	V
Input voltage 5	4FSCI	$V_{IH}2$ $V_{IL}2$		$AV_{DD}4 \times 0.7$		$AV_{DD}4 \times 0.3$	V

Item	Pins	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output voltage 1	*2	$V_{OH}1$ $V_{OL}1$	$I_{OH}1$ = –1.2mA $I_{OL}1$ = 2.4mA	$DV_{DD}2$ – 0.8		0.4	V
Output voltage 2	*3	$V_{OH}2$ $V_{OL}2$	$I_{OH}2$ = –2.4mA $I_{OL}2$ = 4.8mA	$DV_{DD}2$ – 0.8		0.4	V
Output voltage 3	*4	$V_{OH}3$ $V_{OL}3$	$I_{OH}3$ = –8mA $I_{OL}3$ = 8mA	$DV_{DD}1/2$		$DV_{DD}1/2$	V
Output voltage 4	SUBOUT	$V_{OH}4$ $V_{OL}4$	$I_{OH}4$ = –4mA $I_{OL}4$ = 5.4mA	V_H – 0.25		V_L + 0.25	V
Output voltage 5	4FSCO	$V_{OH}5$ $V_{OL}5$	$I_{OH}5$ = –3mA $I_{OL}5$ = 3mA	$AV_{DD}4/2$		$AV_{DD}4/2$	V
Hysteresis 1	*7				0.5		V
Hysteresis 2	*5				0.6		V
Threshold value 1	TEST	$V_{TH}1$			1.35		V
Threshold value 2	*6	$V_{TH}2$			$DV_{DD}1/2$		V
Threshold value 3	4FSCI	$V_{TH}3$			$AV_{DD}4/2$		V
Feedback resistance 1	OSC	RFE1	OSCI = $DV_{DD}1$ or GND	500k	2M	5M	Ω
Feedback resistance 2	4FSC	RFE2	4FSCI = $AV_{DD}4$ or GND	250k	1M	2.5M	Ω
Input amplitude	OSC		50MHz sine wave	0.5			Vp-p
Pull-up resistance	*1	RPU		50k	100k	150k	Ω
DC amplifier gain		G			4.4		
Input leak current 1	SIFSEL	I_I3	VIN = $DV_{DD}2$	12	30	75	µA
Input leak current 2	*5	I_I2	VIN = GND or $DV_{DD}2$	–10		10	µA

*1 RESETTG
*2 CSEVR, CSROM, SO, PCOMP, VD, HD
*3 CASO, CASCK
*4 OSCO
*5 XCS, SI, SCK, XCLR, CASI
*6 OSCI, CK
*7 SIFSEL

Note) VSUB display value

The VSUB display value is displayed by a code on the rear surface of the MUC.

Symbol	—	=	0	1	2	3	4	6	7	8	9	A	C	D
Actual voltage (V)	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00	7.25	7.50	7.75	8.00	8.25

Symbol	E	f	G	h	J	K	L	m	N	P	R	S	U	V
Actual voltage (V)	8.50	8.75	9.00	9.25	9.50	9.75	10.00	10.25	10.50	10.75	11.00	11.25	11.50	11.75

Symbol	W	X	Y	Z
Actual voltage (V)	12.00	12.25	12.50	12.75

AC Characteristics

Classification	Item	Symbol	Min.	Typ.	Max.	Unit
XCLR	Minimum low interval	T_{W}CLR	500	—	—	ns
RESETTG	Minimum low interval	T_{W}RST	35	—	—	ns
Serial communication	SCK input pulse width (high interval)	T_{WH}SCK	430	—	—	ns
	SCK input pulse width (low interval)	T_{WL}SCK	430	—	—	ns
	XCS input setup time, activated by the falling edge of SCK	T_{SU}XCS	430	—	—	ns
	XCS input hold time, activated by the rising edge of SCK	T_{H}XCS	640	—	—	ns
	SI input setup time, activated by the rising edge of SCK	T_{SU}SI	140	—	—	ns
	SI input hold time, activated by the rising edge of SCK	T_{H}SI	140	—	—	ns
	SO output transition time (Hi-Z → Data active), activated by the falling edge of XCS	T_{ZD}SO	70	—	200	ns
	SO transition time (Data active → Hi-Z), activated by the rising edge of XCS	T_{DZ}SO	70	—	200	ns
	SO output delay time, activated by the falling edge of SCK	T_{PD}SO	70	—	240	ns

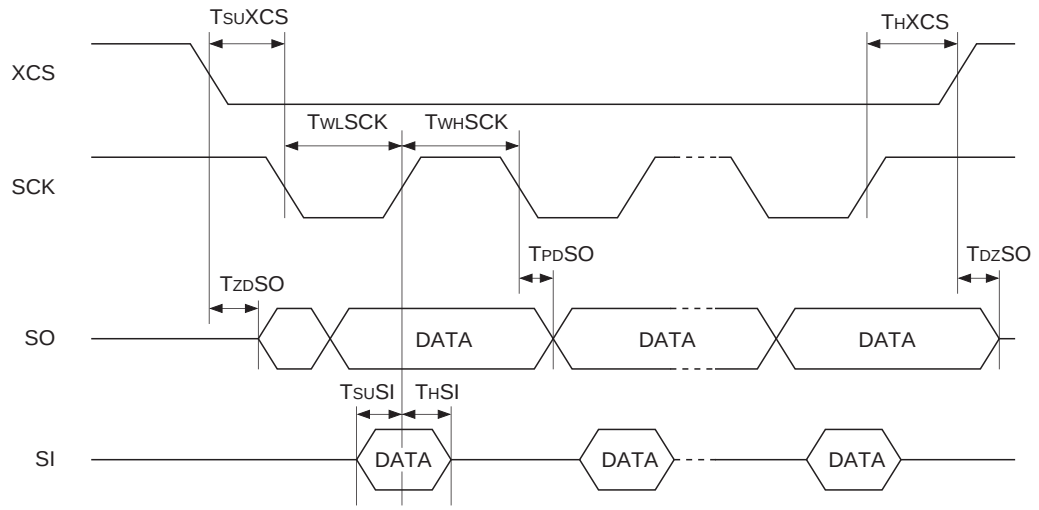
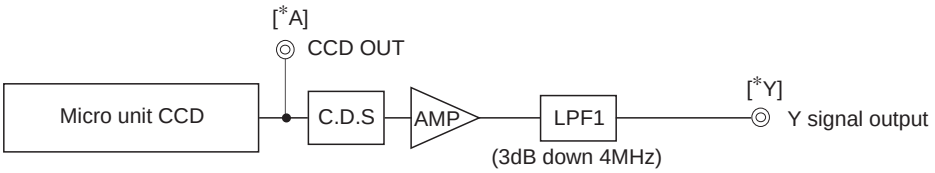


Image Sensor Characteristics (Ta = 25°C)

Item	Symbol	Min.	Typ.	Max.	Unit	Measure-ment method	Remarks
Sensitivity	S	285	360		mV	1	Center of screen
Saturation signal	Ysat	700			mV	2	Ta = 60°C, center of screen
Smear	Sm		0.007	0.012	%	3	
Dark signal	Ydt			2	mV	4	Ta = 60°C
Dark signal shading	ΔYdt			1	mV	5	Ta = 60°C

Measurement System



Note) Adjust the amplifier gain so that the gain between [*A] and [*Y] equals 1.

Image Sensor Characteristics Measurement Method

◎ **Measurement conditions**

(1) In the following measurements, each supply voltage is at the typical values.

(2) In the following measurements, spot blemishes are excluded and, unless otherwise specified, the optical black level (OB) is used as the reference for the signal output, which is taken as the value of Y signal output of the measurement system.

◎ **Definition of Standard Imaging Conditions**

1) Standard imaging condition I: Use a pattern box (luminance 706cd/m2, color temperature of 3200K halogen source) as a subject. (Pattern for evaluation is not applicable.) Use a ND2 filter and image at F5.6 or equivalent. The luminous intensity to the sensor receiving surface at this point is defined as the standard sensitivity testing luminous intensity.

2) Standard imaging condition II: Image a light source with a uniformity of brightness within 2% at all angles (color temperature of 3200K).

1. Sensitivity
   Set to standard imaging condition I. After selecting the electronic shutter mode with a shutter speed of 1/250s, measure the Y signal (Ys) at the center of the screen and substitute the values into the following formula.

   $$S = Ys \times \frac{250}{60} \text{ [mV]}$$

2. Saturation signal
   Set to standard imaging condition II. After adjusting the luminous intensity to 10 times the intensity applying with an average value of Y signal output, 200mV, measure the minimum value of the Y signal.

3. Smear
   Set to standard imaging condition II. With using ND2 filter and the lens diaphragm at F5.6 or equivalent, adjust the luminous intensity to 500 times the intensity applying with an average value of Y signal output, 200mV. When the readout clock is stopped and the charge drain is executed by the electronic shutter at the respective H blankings, measure the maximum value YSm [mV] of the Y signal output, and substitute the values into the following formula.

   $$Sm = \frac{YSm}{200} \times \frac{1}{500} \times \frac{1}{10} \times 100 \text{ [\%] (1/10V method conversion value)}$$

4. Dark signal
   Measure the average value of the Y signal output (Ydt [mV]) with the device ambient temperature of 60°C and the device in the light-obstructed state, using the horizontal idle transfer level as a reference.

5. Dark signal shading
   After measuring 4, measure the maximum (Ydmax [mV]) and minimum (Ydmin [mV]) values of the Y signal output, and substitute the values into the following formula.

   $$\Delta Ydt = Ydmax - Ydmin \text{ [mV]}$$

Optical Characteristics

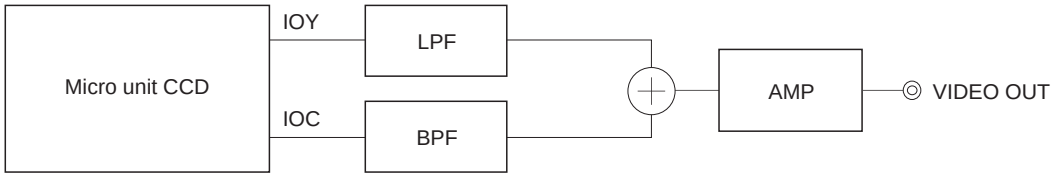
MCX18N00A

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Focus length	f		2.9			
Aperture	F		2.8			
Shading	SH			50	%	Horizontal
	SV			25	%	Vertical
Resolution	R		220		TV lines	Center of screen

MCX18N00B

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Focus length	f		4.0			
Aperture	F		2.8			
Shading	SH			30	%	Horizontal
	SV			15	%	Vertical
Resolution	R		220		TV lines	Center of screen

Measurement System



Communication Code Table

Cate-gory	Byte	Bit	Symbol	Description	Recommended value (H)	Initial value (H)	EEPROM Address (H)
1	1	0 to 7			00	00	01
1	2	0 to 7			01	01	02
1	3	0 to 3		Setup level	0	D	03
1	3	4 to 7			6	6	03
1	4	0 to 3			E	E	04
1	4	4 to 7	YDLY	Luminance signal delay adjustment	8	4	04
1	5	0 to 7			24	24	05
1	6	0 to 7			34	34	06
1	7	0 to 7			0B	0B	07
1	8	0 to 7	RMATY	Matrix coefficient	2A	32	08
1	9	0 to 7	RMATC	Matrix coefficient	12	F8	09
1	10	0 to 7	BMATY	Matrix coefficient	3E	32	0A
1	11	0 to 7	BMATC	Matrix coefficient	CA	D3	0B
1	12	0 to 7			0C	0C	0C
1	13	0 to 7			00	00	0D
1	14	0 to 7			FF	00	0E
2	1	0 to 7	YGAIN	Luminance signal gain	86	86	0F
2	2	0 to 7			AA	AA	10
2	3	0 to 7			26	26	11
2	4	0 to 7			84	84	12
2	5	0 to 7			04	04	13
2	6	0 to 7			FC	FC	14
2	7	0 to 3	RBQUAD	Linear matrix quadrant control	—	F	
2	7	4	CONGAIN	Linear matrix gain	—	1	
2	7	5	CONHUE	Linear matrix hue	—	1	
2	7	6 to 7			—	0	
2	8	0 to 7	RYGAIN	Linear matrix coefficient	Adjustment value	20	4F, 51, 53, 55
2	9	0 to 7	BYGAIN	Linear matrix coefficient	Adjustment value	11	50, 52, 54, 56
2	10	0 to 7	RYHUE	Linear matrix coefficient	Adjustment value	D0	57, 59, 5B, 5D
2	11	0 to 7	BYHUE	Linear matrix coefficient	Adjustment value	F8	58, 5A, 5C, 5E
3	1	0 to 7			00	00	15
3	2	0 to 7			00	00	16
3	3	0 to 7			00	00	17
3	4	0 to 7	SHOFST	Sample-and-hold output offset	3D	3D	18
3	5	0 to 7			89	89	19
3	6	0 to 7			00	00	1A

Cate-gory	Byte	Bit	Symbol	Description	Recommended value (H)	Initial value (H)	EEPROM Address (H)
3	7	0 to 7			00	00	1B
4	1	0 to 7	VREFY	VREFY adjustment	Adjustment value	70	1C
4	2	0 to 7	VREFC	VREFC adjustment	Adjustment value	66	1D
4	3	0 to 7	VSUB	VSUB adjustment	Adjustment value	80	1E
4	4	0 to 7			80	80	1F
5	1	0 to 7	AGCCONT	Gain control	1E	1E	20
5	2	0 to 7			FF	FF	21
5	3	0	SHTSPDM	Shutter speed (bit 8)	—	0	
5	3	1	SHTHL	Electronic shutter high speed/ low speed switching	—	0	
5	3	2	SHTON	Electronic shutter OFF/ON	—	0	
5	3	3 to 7			—	10	
5	4	0 to 7	SHTSPDL	Shutter speed (bit 0 to bit 7)	—	00	
5	5	0 to 7			—	00	
5	6	0 to 7			—	00	
5	7	0 to 7			—	00	
6	1	0 to 7	WBR	White balance control	3A	3A	22
6	2	0 to 7	WBG	White balance control	26	26	23
6	3	0 to 7	WBB	White balance control	48	48	24
6	4	0 to 7			—	D0	
6	5	0 to 7			—	04	
7	1	0 to 7			00	00	25
7	2	0 to 7			14	14	26
7	3	0 to 7			05	05	27
7	4	0 to 7			55	55	28
7	5	0 to 7			74	74	29
8	1	0 to 2			—	0	
8	1	3	AWB	AWB control	—	0	
8	1	4 to 6	AEADJUST	AE adjustment mode switching	—	0	
8	1	7	AE	AE control	—	0	
8	2	0	MCR	Microcontroller control	—	0	
8	2	1	SPRS	Suppress control	—	0	
8	2	2			—	0	
8	2	3	SW	External switch control	—	0	
8	2	4 to 7			—	0	
8	3	0 to 7			—	00	

Cate-gory	Byte	Bit	Symbol	Description	Recommended value (H)	Initial value (H)	EEPROM Address (H)
8	4	0	FLON	Flickerless ON/OFF	—	0	
8	4	1	BLCOF	Backlight compensation ON/OFF	—	0	
8	4	2 to 4			—	0	
8	4	5	AWB1	AWB mode selection	—	0	
8	4	6	AWB2	AWB mode selection	—	0	
8	4	7	AWB3	AWB mode selection	—	0	
8	5	0	E2WR	EEPROM write control	—	0	
8	5	1	E2WEN	EEPROM write enable transmit	—	0	
8	5	2			—	0	
8	5	3	E2RSW	EEPROM read control	—	0	
8	5	4	E2RAL1	EEPROM read range specification	—	0	
8	5	5	E2RAL2	EEPROM read range specification	—	0	
8	5	6	E2RAL3	EEPROM read range specification	—	0	
8	5	7	E2RAL4	EEPROM read range specification	—	0	
8	6	0 to 7	E2CODE	EEPROM control code	—	00	
8	7	0 to 7	E2ADRS	EEPROM address	—	00	
8	8	0 to 7	E2DATA	EEPROM data	—	00	
8	9	0 to 7	SPCODE	SPEC code	—	00	
8	10	0 to 7	SPCDAT	SPEC data	—	00	
8	11	0 to 7			—	00	
9	1	0 to 7			07	07	2A
9	2	0 to 7			00	00	2B
9	3	0 to 7			02	02	2C
9	4	0 to 7			00	00	2D
9	5	0 to 7			80	80	2E
10	1	0 to 7			—	00	
10	2	0 to 6	ADJSTH	Horizontal position specification	—	00	
10	2	7	ADJSTVL	Vertical position specification	—	0	
10	3	0 to 1	ADJSTVM	Vertical position specification	—	0	
10	3	2			—	0	
10	3	3			—	0	
10	3	4 to 7			—	0	
10	4	0	PGON1	Pattern generator ON/OFF	—	0	
10	4	1	PGON2	Pattern generator ON/OFF	—	0	
10	4	2			—	0	
10	4	3	PGON3	Pattern generator ON/OFF	—	0	

Cate-gory	Byte	Bit	Symbol	Description	Recommended value (H)	Initial value (H)	EEPROM Address (H)
10	4	4	PGCOLSEL	Color bar monochrome switching	—	0	
10	4	5 to 7	PGCOL	Color specification	—	0	
10	5	0	PGHV	Horizontal/vertical switching	—	0	
10	5	1	PGRSTR	Raster setting	—	0	
10	5	2 to 3	PGPTSL	Pattern switching	—	0	
10	5	4	PGON4	Pattern generator ON/OFF	—	0	
10	5	5			—	0	
10	5	6 to 7	PGGAIN	Output level	—	0	
10	6	0 to 7			—	00	
10	7	0 to 7			—	00	
10	8	0 to 7			—	00	
10	9	0 to 7			—	00	

SPEC Code Table

Code (H)	Symbol	Description	Recommended value (H)	Initial value (H)	Address (H)
1	[AE] SPD	AE response speed	08	08	2F
2			04	04	30
3	[AE] MAX	AE maximum gain	BB	BB	31
4	[AE] MIN	AE minimum gain	Adjustment value	11	32
5	[AE] LIM	AE shutter speed upper limit	07	07	33
6			EE	EE	34
7	[AE] BLC	Backlight compensation control	0C	0C	35
8	[AE] HIST	Histogram backlight compensation control	00	00	36
9			01	01	37
0A			01	01	38
0B			03	03	39
0C			03	03	3A
11	[AWB] SPD	AWB response speed	02	02	3B
12	[AWB] FRM	AWB detection window setting	12	00	3C
13	[AWB] RSFT		03	03	3D
14	[AWB] BSFT		02	02	3E
15	[AWB] USRR		4C	4C	3F
16	[AWB] USRB		58	58	40
17	[AWB] PRER		Adjustment value	3A	41
18	[AWB] PREB		Adjustment value	90	42
21			08	08	43
22			05	05	44
23			05	05	45
24			04	04	46
25			07	07	47
31			52	52	48
32			80	80	49
33			8A	8A	4A
34			3D	3D	4B
35			80	80	4C
36			00	00	4D

Notes on Handling

1) Static charge prevention
   Micro unit CCDs are easily damaged by static discharge. Before handling be sure to take the following protective measures.
   a) Either handle bare handed or use non-chargeable gloves, clothes or material.
      Also use conductive shoes.
   b) When handling directly use an earth band.
   c) Install a conductive mat on the floor or working table to prevent the generation of static electricity.
   d) Ionized air is recommended for discharge when handling micro unit CCDs.
   e) For the shipment of mounted substrates, use boxes treated for the prevention of static charges.

2) Please use IC socket for mounting of micro unit CCDs.
   IC socket : HS6401-K YAMATO SCIENTIFIC CO.,LTD.

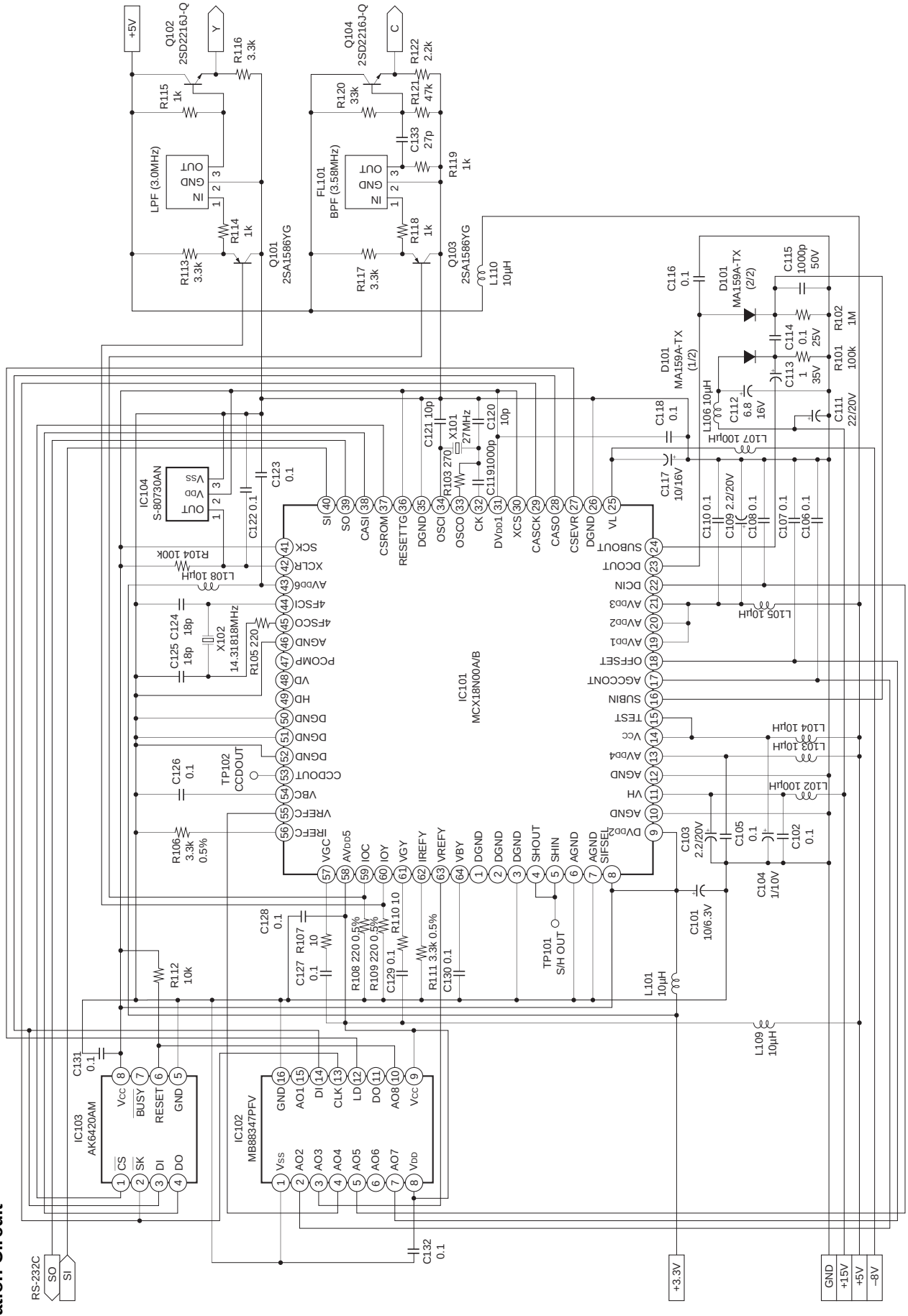
3) Dust and dirt protection
   a) Operate in clean environments.
   b) Do not either touch lens by hand or have any object come in contact with lens surfaces.
      Should dirt stick to a lens surface, blow it off with an air blower.
      (For dirt stuck through static electricity ionized air is recommended.)
   c) Clean with a cotton bud and ethyl alcohol if the grease stained. Be careful not to scratch the lens.
   d) Keep in a case to protect from dust and dirt. To prevent dew condensation, preheat or precool when moving to a room with great temperature differences.

4) Do not expose to strong light (sun rays) for long periods.

5) Exposure to high temperature or humidity will affect the characteristics.
   Accordingly avoid storage or usage in such conditions.

6) Micro unit CCDs are precise optical equipment that should not be subject to mechanical shocks.

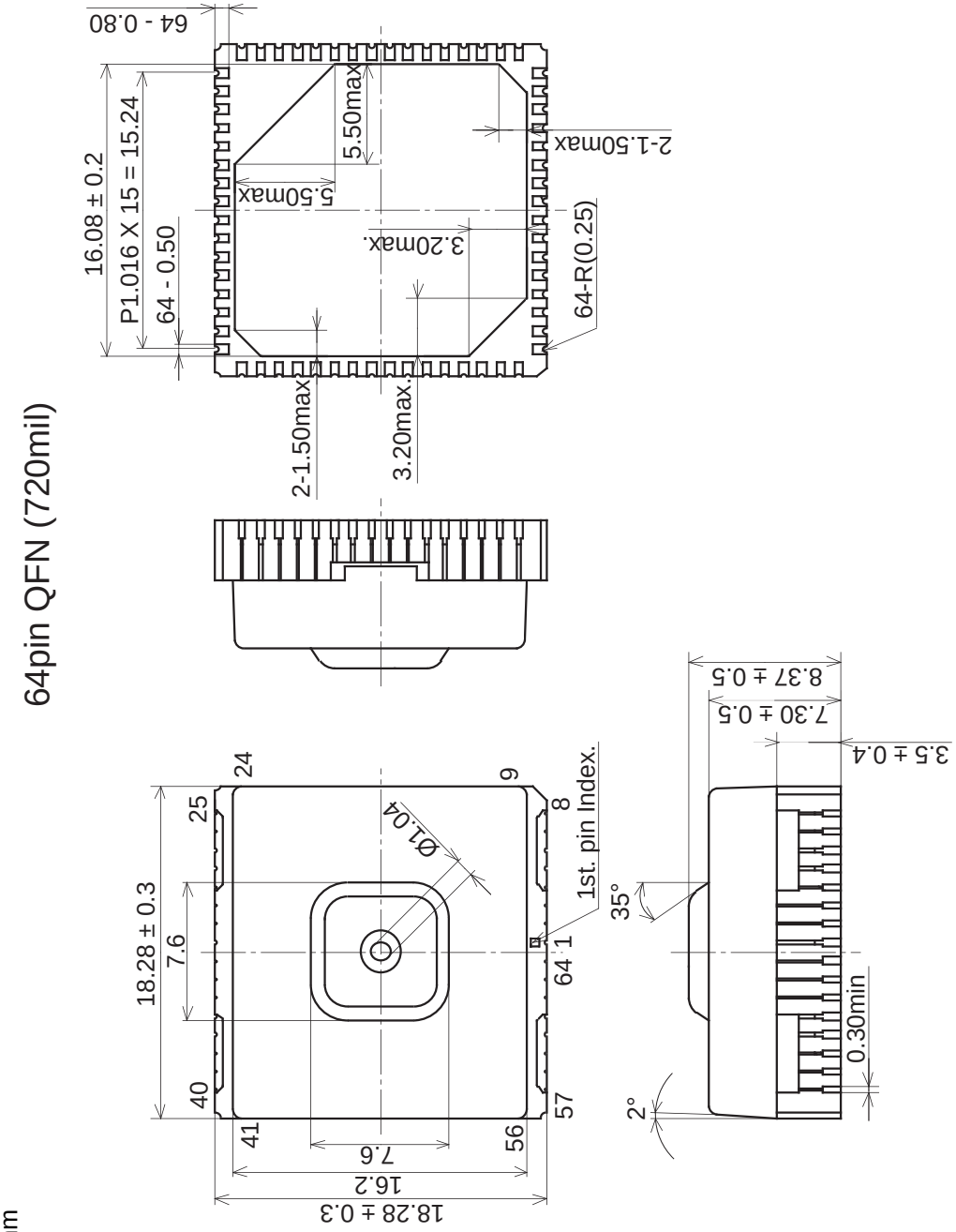
Application Circuit



Application circuits shown are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

Package Outline Unit: mm

MCX18N00A



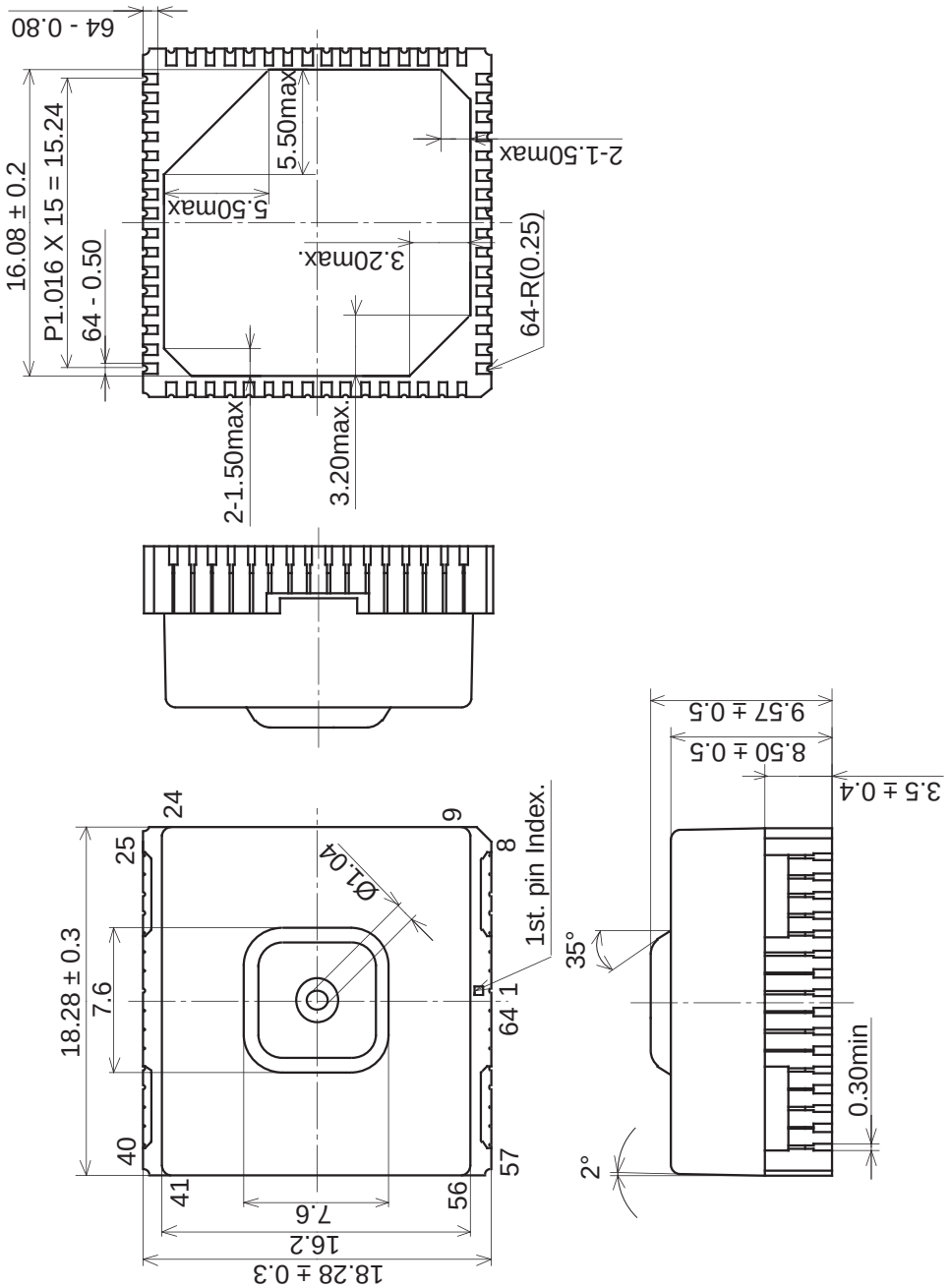
PACKAGE STRUCTURE

PACKAGE MATERIAL	ceramic
LEAD TREATMENT	Au
LEAD MATERIAL	———
PACKAGE WEIGHT	4.20g

Package Outline Unit: mm

MCX18N00B

64pin QFN (720mil)



PACKAGE STRUCTURE

PACKAGE MATERIAL	ceramic
LEAD TREATMENT	Au
LEAD MATERIAL	——
PACKAGE WEIGHT	4.20g