

CAMERA MODULE SPECIFICATION

CUSTOMER PRODUCT NAME:
SEASONS PRODUCT NAME: PBJ102123

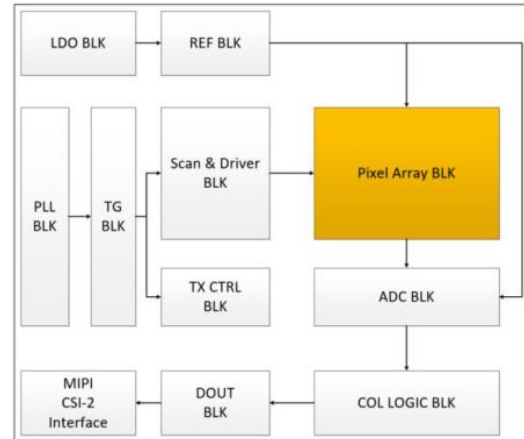
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客户名称 (Customer):		
研发 (R&D)	工程 (Engineering)	品质 (Quality)

NEW SEASONS		
批准 (Approved by)	审核 (Checked by)	拟制 (prepared by)

General description:

The OPN8008 Time-of-Fight (ToF) sensor for 3D sensing is one key product of OPNOUS ToF solutions, which offers 320×240 resolution data at frame rates up to 120 frames per second (fps). The device combines ToF sensing with an optimally-designed analog-to-digital converter (ADC) and a versatile, programmable timing generator (TG). OPN8008 is realized upon NIR wave length (850 nm and 940 nm) with an industry leading accuracy. The power consumption of OPN8008 achieves the lowest level in the industry, which will benefit many portable and energy saving applications. The device supports MIPI CSI-2 interface.



Features

- **Imaging Array**
 - 320 × 240 Array
 - Flexible ROI
 - 1/3 Optical Format
 - Pixel Pitch: 15 μm
 - Frame Rate: 5~120 fps
- **Interface**
 - Control Interface: CCI(I2C)
 - Data Interface: MIPI CSI-2
- **3.3V Single Power Supply**
- **Low Power Consumption with Scalability**
 - <100mW @ 30fps
- **Leading Accuracy in the Industry**
 - ≤ 1% of Distance (0.15m ~ 5m @ 30fps)
- **On-chip Timing Generator**
- **One System Clock for All Range Measurement with Wide Range Flexibility**
- **Multi-sensor Capability**
- **Micro Lens Availability with Advanced Optical System Solution Capability**
- **Operating Temperature: -10℃ ~ 60℃**

Specification

1. Camera Module Specification

OPN8008

Parameter		Typical value
Electrical characteristics	Sensor	OPN8008 QVGA 1/3
	Active array size	320H*240V
	Sensor Power supply	AVDD : 3.3V VCSEL_4V6 : 4.6V
	Output formats	Raw 12bit
	Input clock frequency	27 MHz
	frame rate	30fps@QVGA
Optical characteristics	EFL	3.739mm
	F/NO.	1.3
	FOV(Diagonal)	88°
	TV-Distortion	NA
Structure	Module Construction	61.9*21.2*6.35mm
	Module head size	9.5*21.2*6.35mm

2. Camera Module Electrical Specification

2.1 electrical characteristics

OPN8008

DC Specifications

Table 10 DC Specifications

Power Supplies	Symbol	MIN	TYP	MAX	Unit	Conditions
Total Power Consumption	Power		100		mW	
Power Supply	V ₃₃	3.15	3.30	3.45	V	
Ground	G ₃₃	0.0			V	
Pixel Voltage Reference	Symbol	MIN	TYP	MAX	Unit	Conditions
ToF Transfer Gate High Voltage	V _{H_TX}		2.5		V	MLCC 1.0uF ± 10%
ToF Discharge Gate High Voltage	V _{H_GD}		V ₃₃		V	
ToF Discharge Gate Low Voltage	V _{L_GD}		0.8		V	
ADC Voltage Reference	Symbol	MIN	TYP	MAX	Unit	Conditions
ADC Reference Voltage Positive	V _{REFP}		2.20		V	MLCC 1.0uF ± 10%
ADC Reference Voltage Negative	V _{REFN}		1.20		V	
ADC Common Voltage	V _{COM}		2.15		V	
Current Source	Symbol	MIN	TYP	MAX	Unit	Conditions
Reference Current Resister	R _{REF}		4.7		kΩ	Permissible Error ±2%
Digital Voltage	Symbol	MIN	TYP	MAX	Unit	Conditions
Input Logic High Voltage	V _{IH}	0.7×V ₃₃		4.0	V	
Input Logic Low Voltage	V _{IL}	-0.3		0.3	V	
Output High Voltage	V _{OH}	V ₃₃ -0.2			V	Drivability: 8.2mA (V ₃₃ = 3.3V)
Output Low Voltage	V _{OL}			0.2	V	
Low Level Output Current (V _{OL} = 0.2)	I _{OL}			-200	uA	
High Level Output Current (V _{OH} =V ₃₃ -0.2)	I _{OH}	200			uA	
MIPI D-PHY	Symbol	MIN	TYP	MAX	Unit	Conditions
HS Transmit Static Common-Mode Voltage	V _{CMTX}	0.15	0.2	0.25	V	HS-TX
V _{CMTX} Mismatch When Output is Differential-1 or Differential-0	ΔV _{CMTX(1,0)}	-	-	5	mV	
HS Transmit Differential Voltage	V _{OD}	0.14	0.2	0.27	V	
V _{OD} Mismatch When Output is Differential-1 or Differential-0	ΔV _{OD}	-	-	10	mV	
HS Output High Voltage	V _{OHHS}	-	-	0.36	V	
Single Ended Output Impedance	Z _{OS}	40	50	62.5	Ω	
Single Ended Output Impedance Mismatch	ΔZ _{OS}	-	-	10	%	
Thevenin Output High Level	V _{OH_MIPi}	1.1	1.2	1.3	V	LP-TX
Thevenin Output Low Level	V _{OL_MIPi}	-50	-	50	mV	
Output Impedance of LP Transmitter	Z _{OLP}	110	-	-	Ω	

2.2 Key Specifications

Items	Description	MIN	TYP	MAX	Unit	Conditions
Supply Voltage	V ₃₃	3.15	3.30	3.45	V	
Operation Temperature	T _a	-10		60	℃	
Serial Interface	CCI (I2C subset)	I2C Standard				
Input Frequency	F _{in}		27		MHz	
Dark Random Noise	D _n		4.0		LSBrms	
Fixed Pattern Noise	V _{FPN}		200		LSBrms	Before V _{FPN}
Line Noise	LD _n		1.3		LSBrms	D _n ×1/3
LED_DRV Pulse	T ₀		37		ns	
LED_DRV Period	T _{per}		294		ns	
LED_DRV Rising Time	T _{led_rise}		0.5		ns	10%-90%, 20pF Load
LED_DRV Falling Time	T _{led_fall}		0.5		ns	10%-90%, 20pF Load
Power Consumption	P _{opr}		100		mW	
Idling Power Consumption	P _s			36	uW	
Frame Rate	F _{ps}	5	30	120	fps	
Shutter Mode	-	Global Shutter			-	
Effective Pixel No.	-	320 x 240			pix	QVGA
Temperature Sensor Range	T _a	-20		85	℃	
Local Temperature Sensor Accuracy		5			℃	
SNR	SNR		54		dB	
ADC Resolution	-	12			Bits	
Range Accuracy	D ₀		1		mm	@1m
Maximum Range	D _{max}			5.00	m	@37ns
Multi Sensor Capability		Yes				
LED Driver Pulse Control/Output		Yes				
Chip Size		OPN8008D: 7.52 x 6.42 OPN8008Q: 10.00 x 10.00			mm x mm	
Pin No.		OPN8008D: 64 OPN8008Q: 88			pin	

3.Module Pin Description

1	AVDD_3V3	3.3V Power Supply
2	VCSEL_4V6	VCSEL Power Supply
3	AVDD_3V3	3.3V Power Supply
4	VCSEL_4V6	VCSEL Power Supply
5	DV33	3.3V Power Supply
6	VCSEL_4V6	VCSEL Power Supply
7	SLV_LSB	Sensor Address Select
8	GND	Ground
9	GND	Ground
10	SPI_MOSI	SPI Data In
11	MCLK	Reference Clock, 27MHz
12	SPI_MISO	SPI Data Out
13	GND	Ground
14	SPI_SCLK	SPI Clock
15	CSI_D0_P	CSI-2 non-inverting data output of data lane 0
16	SPI_nCS	SPI CS
17	CSI_D0_N	CSI-2 inverting data output of data lane 0
18	GND	Ground
19	GND	Ground
20	SYNC_IN	Sync input
21	CSI_CLK_P	CSI-2 non-inverting clock output
22	ERR	Error indicator
23	CSI_CLK_N	CSI-2 inverting clock output
24	I2C_SCL	CCI, Camera control interface
25	GND	Ground
26	I2C_SDA	CCI Camera control interface
27	CSI_D1_P	CSI-2 non-inverting data output of data lane 1
28	GND	Ground
29	CSI_D1_N	CSI-2 inverting data output of data lane 1
30	RESET_N	Reset (active low)

[illegible]