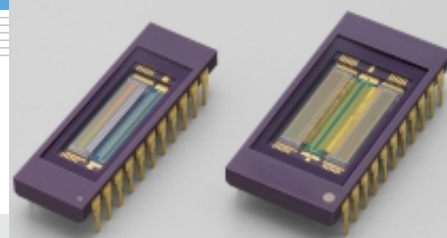


# InGaAs linear image sensor G9203-256D, G9204-512D

Near infrared (0.9 to 1.7  $\mu\text{m}$ ) image sensor



G9203-256D and G9204-512D are InGaAs linear image sensors that deliver high sensitivity and stability in the near infrared region. A charge amplifier array comprised of CMOS transistors, a shift register and a timing generator, etc. are assembled with an InGaAs photodiode array. Low cost is also achieved by using inexpensive ceramic packages. Feedback capacitance for the signal processing circuit formed on the CMOS chip can be selected from 10 pF or 0.5 pF by external voltage.

## Features

- Element pitch  
G9203-256D: 50  $\mu\text{m}$   
G9204-512D: 25  $\mu\text{m}$
- CMOS readout
- Low dark current
- Room temperature operation
- Selectable feedback capacitance (Cf): 10 pF or 0.5 pF

## Applications

- Near infrared spectroscopy
- Foreign matter detection monitors
- DWDM monitors

### Selection guide

Type No.	Cooling	Number of pixels	Pixel pitch ( $\mu\text{m}$ )	Pixel size [ $\mu\text{m}$ (H) $\times$ $\mu\text{m}$ (V)]	Spectral response range ( $\mu\text{m}$ )	Defective pixel
G9203-256D	Non-cooled	256	50	50 $\times$ 500	0.9 to 1.7 (25 $^{\circ}\text{C}$ )	0
G9204-512D		512	25	25 $\times$ 500		

### Absolute maximum ratings

Parameter	Symbol	Value	Unit
Clock pulse voltage	$V_{\phi\text{max}}$	5.5	V
Operating temperature *	$T_{\text{opr}}$	-40 to +70	$^{\circ}\text{C}$
Storage temperature *	$T_{\text{stg}}$	-40 to +85	$^{\circ}\text{C}$

\* Non condensation

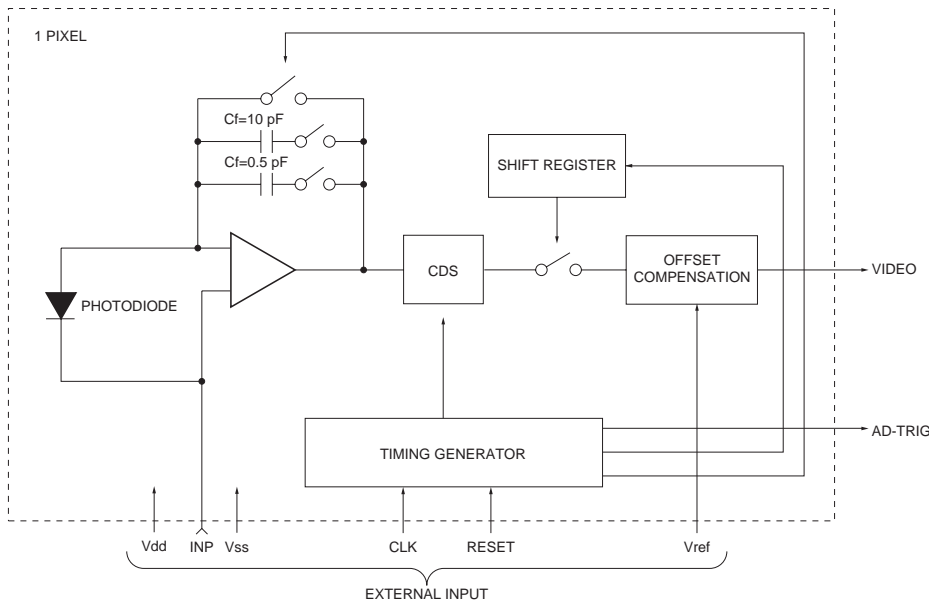
### Electrical characteristics ( $T_a=25^{\circ}\text{C}$ )

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	$V_{\text{dd}}$	4.9	5.0	5.1	V
Supply voltage	$V_{\text{ref}}$	-	1.26	-	V
Ground	$V_{\text{ss}}$	-	0	-	V
Element bias	INP	4.4	4.5	4.6	V
Clock frequency	f	0.01	-	4	MHz
Clock pulse voltage	High	4.5	5.0	5.5	V
	Low	-	-	0.4	
Clock pulse rise/fall times	$t_{r\phi}$	0	20	100	ns
	$t_{f\phi}$				
Clock pulse width	$t_{\text{pw}\phi}$	200	-	-	ns
Reset pulse voltage	High	4.5	5.0	5.5	V
	Low	-	-	0.4	
Reset pulse rise/fall times	$t_r(\text{RES})$	0	20	100	ns
	$t_f(\text{RES})$				
Reset pulse width	$t_{\text{pw}}(\text{RES})$	6000	-	-	ns
Video output voltage	High	$V_H$	4.4	INP	V
	Low	$V_L$	1.26	-	
Date rate	$f_V$	-	$f/8$	-	Hz

■ Specification (Ta=25 °C, Vdd=5 V, INP=4.5 V, Vref=1.26 V, Cf=10 pF, per 1 element)

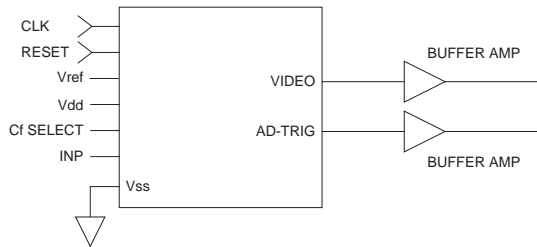
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Peak sensitivity wavelength	$\lambda_p$		-	1.55	-	$\mu\text{m}$
Saturation charge	Qsat	$V_{\phi}=5\text{ V}$	-	30	-	pC
Dark current	256 ch	ID		4	20	pA
	512 ch			1	5	
RMS noise voltage (readout noise)	N	Standard deviation Number of integration: 50	-	180	300	$\mu\text{Vrms}$
Saturation voltage	Vsat		3.0	3.2	-	V
Photo response non uniformity	PRNU	Integration time: 10 ms	-	-	$\pm 5$	%
Defective pixels	-		-	-	0	pixel

■ Equivalent circuit



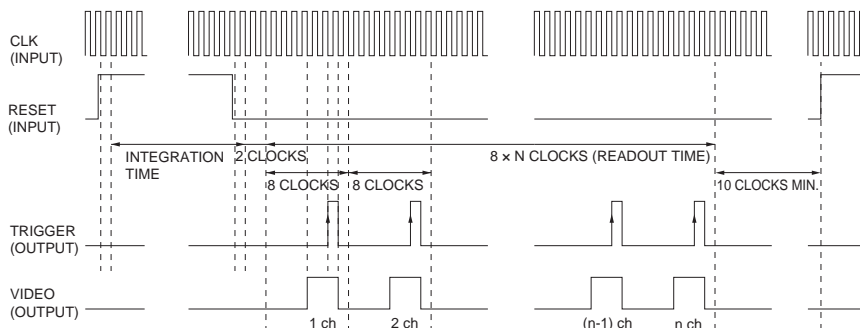
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■ Basic circuit connection



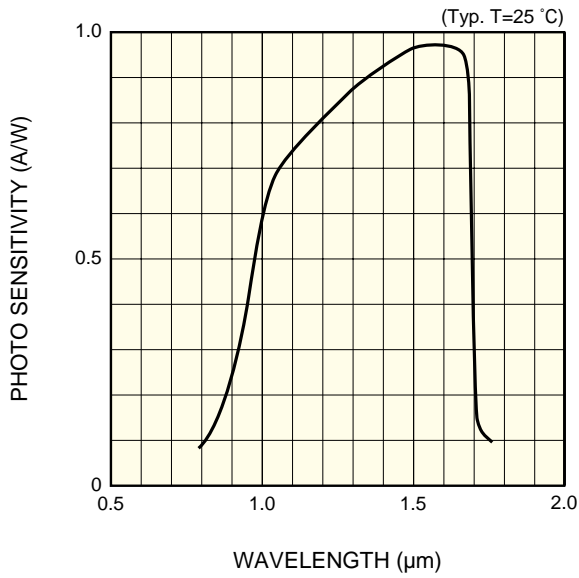
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■ Timing chart

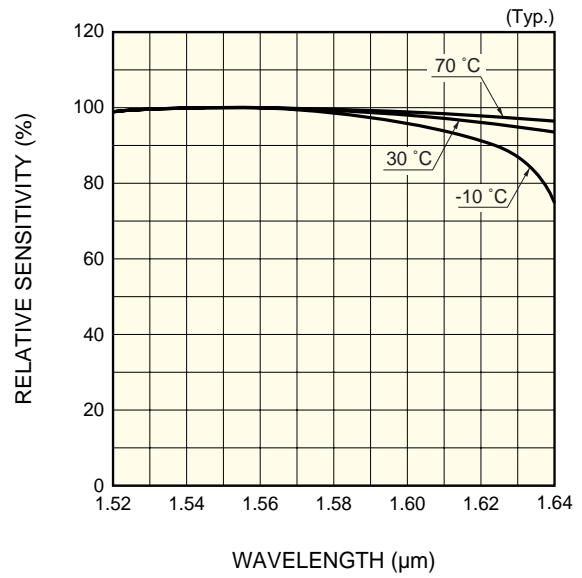


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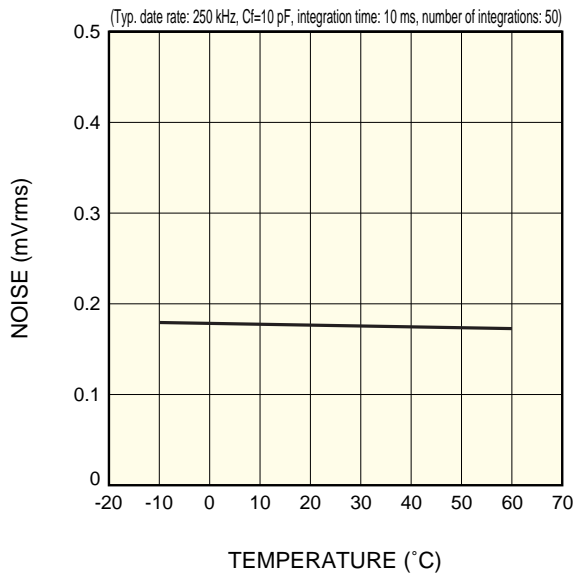
■ Spectral response



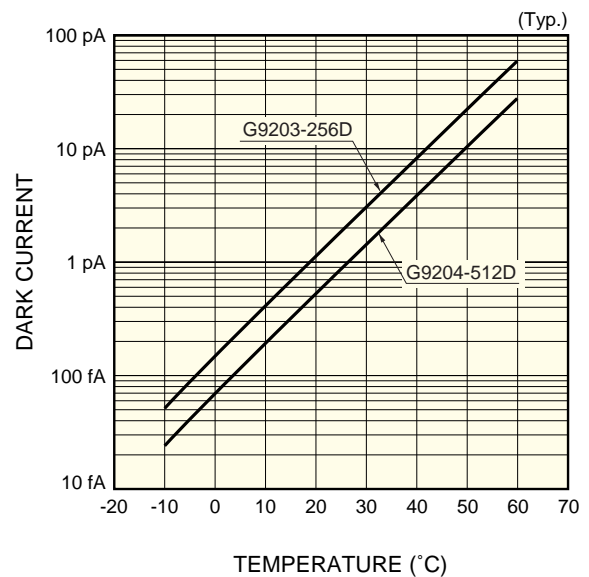
■ Photo sensitivity temperature characteristics



■ Noise vs. temperature

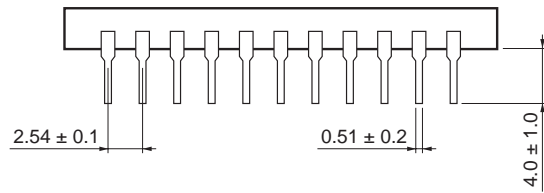
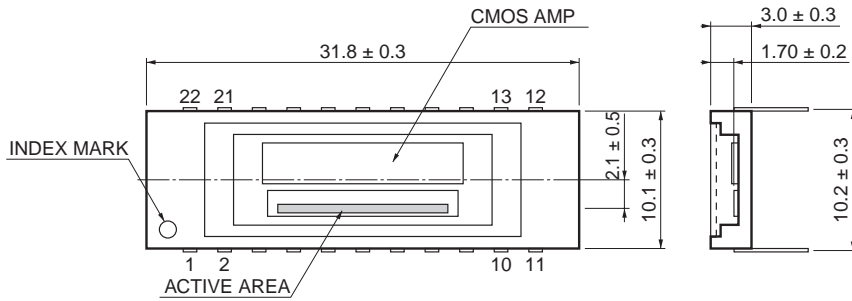


■ Dark current vs. temperature



■ Dimensional outlines (Unit: mm)

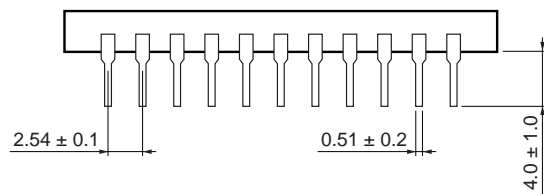
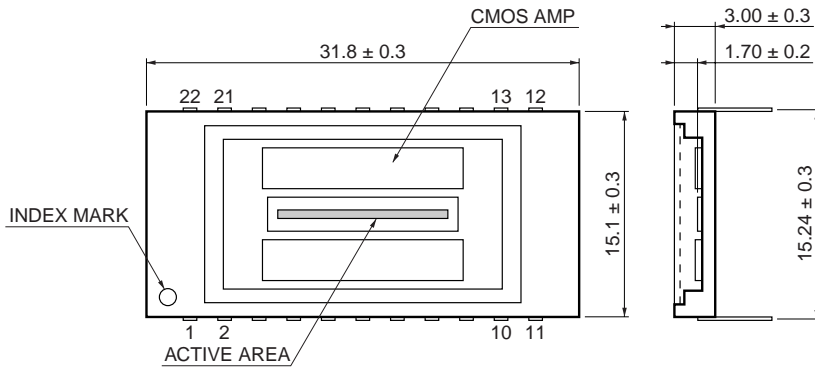
G9203-256D



Pin No.	Function	Pin No.	Function
1	NC	12	VIDEO
2	NC	13	Vref
3	NC	14	CLK
4	NC	15	NC
5	NC	16	INP
6	NC	17	Vss
7	NC	18	Vdd
8	NC	19	NC
9	NC	20	AD-TRIG
10	NC	21	RESET
11	NC	22	CI-SELECT

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G9204-512D



Pin No.	Function	Pin No.	Function
1	NC	12	VIDEO-ODD
2	RESET-EVEN	13	Vref
3	AD-TRIG-EVEN	14	CLK-ODD
4	NC	15	NC
5	NC	16	INP
6	NC	17	Vss
7	NC	18	Vdd
8	NC	19	NC
9	CLK-EVEN	20	AD-TRIG-ODD
10	NC	21	RESET-ODD
11	VIDEO-EVEN	22	CI-SELECT

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## ■ Pin connection

Terminal name	Input/Output	Function and recommended connection
CLK	Input (CMOS logic)	Clock pulse for operating the CMOS shift register
RESET	Input (CMOS logic)	Reset pulse for initializing the feedback capacitance in the charge amplifier formed on the CMOS chip. The width of the reset pulse determines integration time
Vdd	Input	Supply voltage for operating the signal processing circuit on the CMOS chip.
Vss	-	Ground for the signal processing circuit on the CMOS chip.
INP	Input	Reset voltage for the charge amplifier array on the CMOS chip.
Cf SELECT	Input	Voltage that determines the feedback capacitance (Cf) on the CMOS chip. Cf=10 pF at 0 V, and Cf=0.5 pF at 5 V.
Vref	Input	Reset voltage for the offset compensating circuit on the CMOS chip.
AD-TRIG	Output	Digital signal for AD conversion; positive polarity
VIDEO	Output	Analog video signal; positive polarity

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