

FEATURES

- 2048 x 2048 x 13.5 μm pixels
- Back Thinned for High Quantum Efficiency
- Low Noise Output Amplifiers
- Full-frame Architecture
- Dual Responsivity Output
- Gated Dump Drain on Output Register
- 42-pin PGA Package

GENERAL DATA

Format

Image area.....27.6 x 27.6 mm
 Active pixels: horizontal.....2048
 vertical.....2048 + 4
 serial overscan pixels50 at each end
 Pixel size:.....13.5 x 13.5 μm

Number of output amplifiers.....2

The device has a 100% fill factor for maximum sensitivity.

PERFORMANCE LIMITS

Parameter	Min	Typical	Max	Units	Notes
Peak charge storage	100k	150k	-	e^-/pixel	1
Peak output voltage (unbinned)	-	675	-	mV	
Dark signal at 293 K	-	20,000	45,000	$\text{e}^-/\text{pixel/s}$	2
Dark signal at 243 K	-	127	-	$\text{e}^-/\text{pixel/s}$	2
Charge transfer efficiency:					
parallel	99.999	99.9999	-	%	3
serial	99.999	99.9993	-	%	
Output amplifier responsivity (normal mode)	3.0	4.5	6	$\mu\text{V}/\text{e}^-$	
(high signal mode)	-	1.5	-		
Readout noise at 243 K	-	3.0	4.0	rms e^-	4
Readout frequency	-	20	3000	kHz	5
Line transfer period	10	20	-	μs	
Output node capacity	-	1,000,000	-	e^-	6

Spectral Response (at 243 K)

Wavelength (nm)	Basic process Midband AR coating		Basic process Broadband AR coating		Photo response non-uniformity	
	Minimum QE	Typical QE	Minimum QE	Typical QE	Maximum (1s)	Units
300	Not specified	Not specified	Not specified	Not specified	-	%
350	15	20	25	40	5	%
400	40	52	55	75	3	%
500	85	90	75	84	3	%
650	85	90	75	77	3	%
900	30	42	30	38	5	%

Spectral Response (at 243 K)

Wavelength (nm)	Enhanced process UV AR coating		Enhanced process Broadband AR coating		Photo response non-uniformity	
	Minimum QE	Typical QE	Minimum QE	Typical QE	Maximum (1s)	Units
300	45	63	Not specified	Not specified	-	%
350	45	55	50	67	5	%
400	55	57	80	89	3	%
500	60	65	80	87	3	%
650	60	66	75	79	3	%
900	30	36	30	33	5	%

A CCD with no coating is also available for soft X-ray and EUV applications.

NOTES

- Signal level at which resolution begins to degrade.
- The typical average (background) dark signal at any temperature T (kelvin) between 230 K and 300 K is given by: $Q_d/Q_{do} = 122T^3 e^{-6400/T}$ where Q_{do} is the dark current at 293 K. Note that this is typical performance and some variation may be seen between devices.
- CTE is measured for a complete 3-phase clock triplet.
- Measured using correlated double sampling. Noise specification applies at 20 kHz.
- Readout above 3000 kHz can be achieved but performance to the parameters given cannot be guaranteed.
- With output circuit configured in low responsivity/high capacity mode (OG2 high).

TYPICAL OPERATING CONDITIONS

Ref	Pin No.	Typ. Voltage
SS, LS	1, 8, 13, 28, 35, 40	9 V
IØ1	6, 39	10 V
IØ2	7, 34	10 V
IØ3	5, 38	10 V
RØ1(L)	20	11 V
RØ2(L)	19	11 V
RØ1(R)	23	11 V
RØ2(R)	22	11 V
RØ3	24	11 V
ØR(L)	18	12 V
ØR(R)	27	12 V
ØSW(L)	16	11 V
ØSW(R)	25	11 V
DG (see note 9)	26, 17	0 V
OG1(L)	15	3 V
OG1(R)	30	3 V
DD	32, 11	24 V
OG2(L)	14	see note 7
OG2(R)	29	see note 7
OD(L)	10	29 V
OD(R)	31	29 V
OS(L)	9	see note 8
OS(R)	36	see note 8
RD(L)	12	17 V
RD(R)	33	17 V
NC	2, 3, 4, 21, 37, 41, 42	

Nomenclature

SS	-	Substrate
LS	-	Local substrate (connect to SS)
IØ1/2/3	-	Image area clocks
RØ1/2/3	-	Serial register clocks
ØR	-	Reset clock
ØSW	-	Summing well
DG	-	Register dump gate
OG1, OG2	-	Output gates
DD	-	Dump drain
OD	-	Output drain
OS	-	Output source
RD	-	Reset drain
NC	-	Not connected

NOTES

- OG2 = OG1 + 1 V - normal low noise mode or OG2 = 20 V - low responsivity/increased charge handling mode.
- OS = 3 to 5 V below OD typically. Use 3 – 5 mA current source or 5 – 10 kΩ load.
- Non-charge dumping level is shown. For charge dumping DG should be pulsed to 12 ± 2 V
- Readout register clock pulse low levels + 1 V; other clock low levels 0 ± 0.5 V.
- With the RØ connections shown this device will operate through both outputs. In order to operate from the left-hand output only RØ1(R) and RØ2(R) should be reversed.

BLEMISH SPECIFICATION

Grade	0	1	2
Column defects	0	3	6
Black spots	100	150	250
Traps > 200e ⁻	10	20	30
White Spots	100	150	200

Grade 5 are functional devices for set-up purposes only.

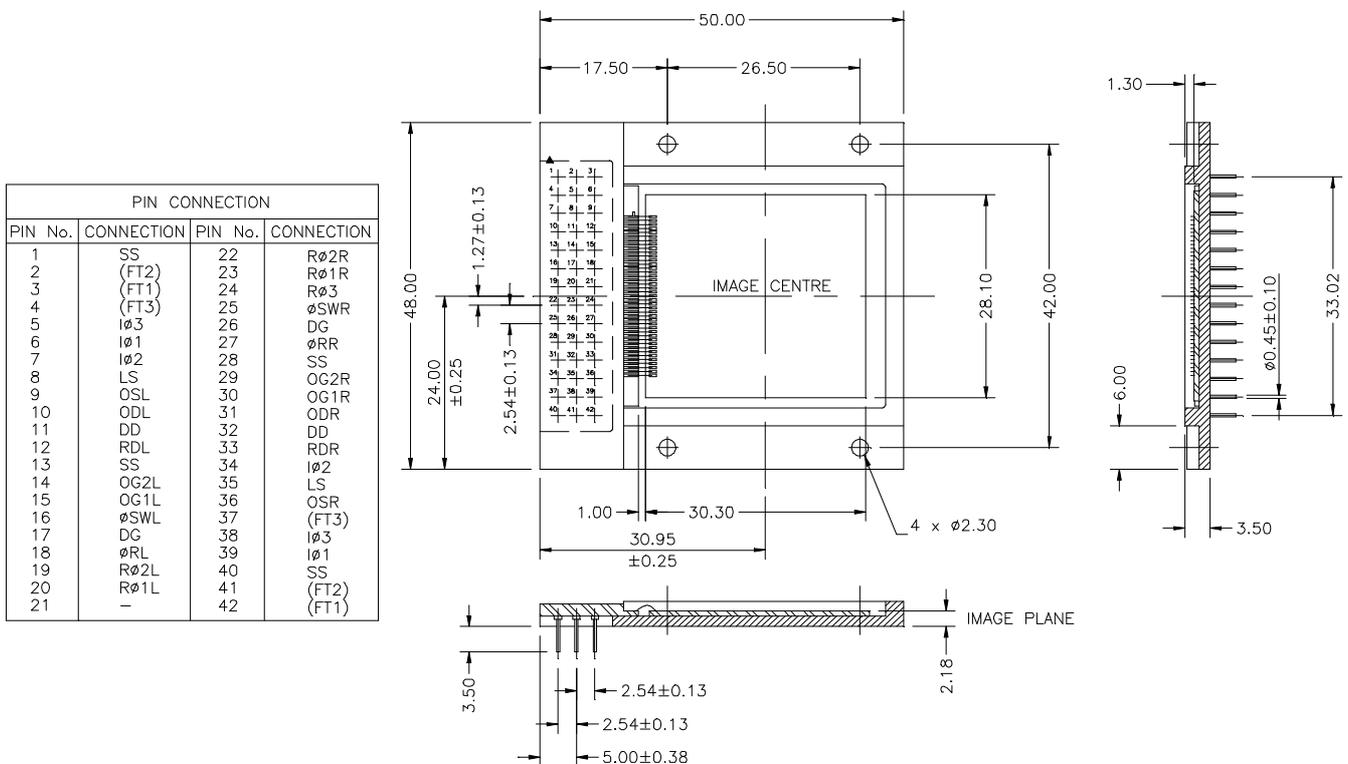
Traps Pixels where charge is temporarily held. Traps are counted if they have a capacity greater than 200 e⁻ at 243 K.

Part Reference:

CCD42-40*-___	*= grade,	NIMO, backside basic midband AR, non-buttable PGA-metal package. Ask for details.
CCD42-40*-___	*= grade,	NIMO, backside basic broadband UV AR, non-buttable PGA-metal package. Ask for details.
CCD42-40*-___	*= grade,	NIMO, backside basic no AR, non-buttable PGA-metal package. Ask for details.
CCD42-40*-310	*= grade,	NIMO, backside enhanced process broadband AR, non-buttable PGA-metal package.
CCD42-40*-___	*= grade,	NIMO, backside enhanced UV AR, non-buttable PGA-metal package. Ask for details.
CCD42-40*-___	*= grade,	NIMO, backside enhanced UV no AR, non-buttable PGA-metal package. Ask for details.

Other variants of the CCD42-40 available are front illuminated format and advanced inverted mode operation (AIMO). In common with all E2V Technologies CCD Sensors, the back illuminated CCD42-40 is available with a fibre-optic window or taper, or with a phosphor coating. Sensors are normally supplied with a temporary glass window. The CCD42-40 is also available in a compact ceramic pack or on a metal 3-side buttable package.

INTERFACE DETAILS



Note The Frame Transfer connections (FT) are not used in this version of the CCD42-40 (i.e. not connected).

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