

# Fairchild Imaging CCD 21241

## 24k x 64 Element, Time Delay Integration Sensor

### PRODUCT DESCRIPTION

The CCD 21241 is a high performance time-delay-integration (TDI) Focal Plane Array (FPA) designed for advanced imaging applications. The device provides an effective photosensitive area comprised of 24000 columns x 64 rows and consists of a pair of two identical CCD 11121 CCDs mounted end-to-end and staggered in a common package with a 160-pixel overlap region at the center of the focal plane assembly.

The key component of the focal plane array is the CCD 11121 TDI CCD which features 8.75  $\mu\text{m}$  square pixels, and consists of 12080 columns by 64 lines in TDI.

The device includes four selectable TDI stages: 1, 8, 32, 64. Each CCD 11121 imager contains eight output ports, each capable of providing more than 20 MHz data rate. The CCD features large full well capacity and built-in column level antiblooming protection. The FPA can accommodate 2x vertical binning for improved responsivity.

The CCD 21241 focal plane array is housed in a DIP package constructed of AlN for high thermal conductivity and well matched thermal coefficient of thermal expansion with silicon.



### FEATURES

- Large field of view
- Ultra-high resolution, 24000 pixels in length
- High sensitivity in TDI mode
- High data rate, up to 320 Mpixels/sec total data rate
- High dynamic range, 75 dB
- Optical filter spectral band 450-900nm
- Applications: Satellite earth observation

**TABLE 1. CCD 21241 CHARACTERISTICS, 25 °C**

PARAMETER	SPECIFICATION
Architecture	TDI charge-coupled device
Number of columns	24000
Number of TDI rows	64
Selectable TDI stages	1, 8, 32, 64
Number of outputs	16
Pixel size	8.75 x 8.75 $\mu\text{m}$
Full well capacity	400,000 e <sup>-</sup>
Quantum efficiency	40% peak
Output sensitivity	3-5 $\mu\text{V}/\text{e}^-$
Total noise	80 e <sup>-</sup> -rms
Dark current	<105e <sup>-</sup> @pix
Dark current double rate	7°C
Dynamic range	5000:1
Charge transfer efficiency	>.0999 in-scan >0.9999 in cross-scan
Blooming protection	Column
Maximum data rate	20 MHz per output
Chip dimensions	225 x 8 mm
Package	250 x 18 mm
Filter	1.5 mm glass filter

**TABLE 2. PERFORMANCE SPECIFICATIONS**

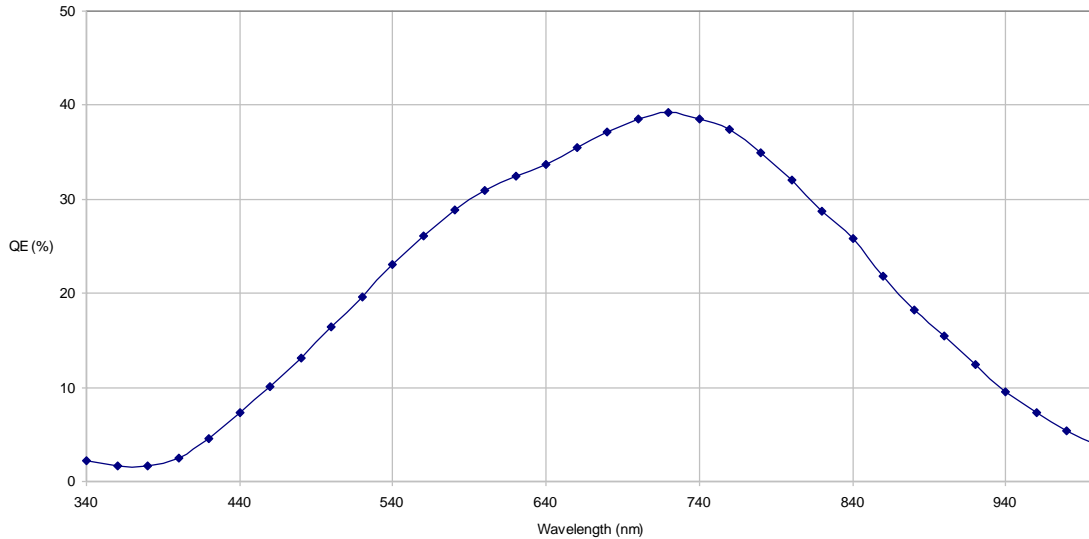
PARAMETER	MINIMUM	TYPICAL	MAXIMUM
Spectral bands in nm at 50% transmission – visible		450 – 900	
Active TDI columns		12080	
Pixel size, $\mu\text{m}$		8.75 x 8.75	
Maximum TDI lines (unaggregated)		64	
TDI operation		Unidirectional	
Selectable TDI stages (unaggregated)		1, 8, 32, 64	
Imaging array dimensions, mm		105.7 x 0.56	
Total die size, mm		TBD	
Number of output amplifiers		8	
Line rate, lines per sec	500		11000
Vertical prescan (opaque) lines		21	
Vertical CCD clock		3-phase	
Vertical full well, ke <sup>-</sup>	400		
Antiblooming protection		Column	
High speed vertical shift lines	1		
Vertical binning		Up to 2x	
Horizontal CCD clock		4-phase	
Horizontal full well, ke <sup>-</sup>	400		
Horizontal binning		Not supported	
Number of prescan elements per output port		4	
Output amplifier		Floating diffusion stage source follower	
Output conversion gain, uV/e	3	4	5
Charge transfer efficiency, TDI direction	0.999		
Charge transfer efficiency, cross-scan direction	0.9999		
Dark signal in e <sup>-</sup> per pixel at 25 °C, 10k line rate			105
DSNU in e <sup>-</sup> at 25 °C, 10k line rate			56
PRNU p-p at 70% full well, 10k line rate			10%
Total noise, e <sup>-</sup> rms at 15 MHz data rate, 25 °C			80
Quantum efficiency			
475 nm	0.10		
550 nm	0.20		
650 nm	0.30		
750 nm	0.35		
850 nm	0.30		
925 nm	0.15		
MTF at Nyquist – In-scan and Cross-scan – solar weighted spectral range (TBR)	> 55%		

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## QUANTUM EFFICIENCY

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QUANTUM EFFICIENCY  
Typical CCD21241



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## DEVICE HANDLING PRECAUTIONS

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Due to the negative bias conditions necessary for proper operation, the CCD11121 is not equipped with built-in ESD protection circuitry. Strict ESD procedures and proper handling precautions must be performed to avoid accidental damage to the devices. The warranty does not apply to ESD damaged devices.

- Always store the devices with the shorting pins that are shipped with the devices securely attached to all of the pins.
- Never insert or remove the device from a live socket or operating camera. Turn-off all electrical power first.
- Test stations must be specifically designed to minimize static charge build-up, including ionizing air blowers, and grounded floor mats.
- The relative humidity level in the working environment must be controlled between 40% - 60%.

- Never handle the devices without proper personal ESD protection items such as tested grounding straps, electrically conductive gloves or finger cots, ESD safe smocks, conductive shoe straps are also desirable.

### STORAGE AND OPERATING TEMPERATURE

Storage temperature range.....0 °C to +40 °C

Operating temperature range.....+10 °C to +30 °C

Non-operating temperature range...-20 °C to +60 °C

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## WARRANTY AND CERTIFICATION

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Within twelve months of delivery to the original customer, BAE Systems Imaging Solutions will repair or replace, at our option, any Fairchild Imaging components or camera products, if any part is found to be defective in materials or workmanship. Contact Customer Service for assignment of warranty return number and shipping instructions to ensure prompt repair or replacement.

BAE Systems Imaging Solutions certifies that its Fairchild Imaging products are fully inspected and tested at the factory prior to shipment, and that they conform to the stated specifications.

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## FOR MORE INFORMATION, CONTACT:

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