Gemini 16KTDI BSI TDI sCMOS Line-Scan Camera, 500 kHz at 16K, 100G CoF

Model Gemini 16KTDI · waveqvanta.com/products/gemini-16ktdi-tdi-line-scan-camera

A 16K TDI line-scan camera for wide-field, high-speed industrial inspection.



The Gemini 16KTDI uses a back-illuminated TDI sCMOS sensor with a 16416-pixel line of 5 µm pixels and up to 256 stages, running at 500 kHz over a 100G CoaXPress-over-Fiber link. Visible (94.2% QE at 460 nm) and UV (70.76% QE at 266 nm) sensor versions are available. TES or HEX cooling lets the camera use the host equipment's airflow, which simplifies integration and maintenance.

Key features

- Three models: G16KTDI-TES-100G and G16KTDI-HEX-100G with the visible sensor (300–1100 nm), and G16KTDI-UV-HEX-100G with the UV sensor (180–1100 nm)
- 16416-pixel line doubles the single-scan coverage of 8K platforms at the same 500 kHz line rate, reducing scan passes and stitching
- Up to 256 TDI stages (P1) or 32 stages (P2) for low-light inspection
- 100G CoF interface (QSFP28) with up to 100 Gbps on a single port
- TES or HEX cooling can be embedded in equipment and connected to internal air ducts or exhaust, without external cooling
- PRNU/DSNU correction with hundreds of parameters for scenario-based calibration
- Anti-blooming ≥ 50× and 16 ke$^-$ typical full-well capacity

Specifications

Sensor Type	BSI sCMOS TDI
Sensor	GLT5016BSI VIS (TES-100G, HEX-100G); GLT5016BSI UV (UV-HEX-100G)
Color / Mono	Mono
Peak QE	94.2% @ 460 nm (VIS); 70.76% @ 266 nm (UV), typical
Spectral Range	300 nm to 1100 nm (VIS); 180 nm to 1100 nm (UV)
Resolution	P1: 16416 pixels × 256 stages; P2: 16416 pixels × 32 stages
Pixel Size	5 µm × 5 µm
Array Diagonal	82 mm
Full-Well Capacity	16 ke$^-$ (typical)
Readout Noise	TES: 7.5 e$^-$ @ 12 bit; HEX: 12.1 e$^-$ @ 10 bit, 7.5 e$^-$ @ 12 bit (typical)
Dynamic Range	TES: 67 dB @ 12 bit; HEX: 63 dB @ 10 bit (typical)
Line Rate (TDI)	500 kHz @ 16K
TDI Stages	P1: 4, 32, 64, 128, 192, 224, 252, 256; P2: 2, 4, 8, 16, 24, 28, 30, 32
Operation Mode	TDI, area; scan direction forward, reverse or trigger-controlled
Binning	1 × 2, 2 × 2, 4 × 4, 8 × 8
ROI	Supported
Cooling Method	TES cooling (G16KTDI-TES-100G); HEX cooling (HEX-100G models)
Dark Current	TES: 2500 e$^-$/pixel/s @ 30°C; HEX: 540 e$^-$/pixel/s @ 10°C (corrected)
DSNU / PRNU	TES: 1.4 e$^-$ / 0.018% @ 12 bit; HEX: 6.5 e$^-$ / 0.15% @ 10 bit (corrected)
Data Interface	QSFP28 (100G CoaXPress-over-Fiber)

Trigger	Trigger input, scan direction input; strobe output (Hirose)
Optical Interface	M90 / M95; customization available
Power Supply	21 V to 27 V
Power Consumption	120 W
Dimensions	117.5 mm × 140 mm × 92 mm (H × W × L)
Weight	3300 g
Operating Environment	Working: 0°C to 40°C, 20–80% RH; storage: -20°C to 60°C; altitude up to 2000 m
Software / SDK	C/C++ SDK; Windows 10/11 (x64), Ubuntu 20.04/22.04

Typical applications

- Wafer and semiconductor inspection
- Advanced packaging inspection
- Mask inspection
- Flat-panel display (FPD) inspection
- Lithium battery and web inspection
- Gene sequencing