



# Genie™ Nano-CL Cameras

Smaller, faster, stronger, cheaper.

최상의 속도와 이미지 품질을 제공하는 초소형 Camera Link Camera

Genie Nano-CL은 Teledyne DALSA 제품군 중 가장 저렴하고 강력한 성능을 가진 Camera Link CMOS Area Scan 카메라입니다. Genie Nano는 업계 선도적인 CMOS 센서를 장착하였으며, 신뢰성 있는 카메라 기술을 통한 혁신적인 스피드, 혹독한 환경을 대비한 강건한 바디를 가졌습니다. 그리고 이 모든 것을 저렴한 가격에 제공합니다.



## 주요 특징

- SDR 커넥터 방식
- GenIcam GenCP 호환
- 현장에서 입증된 CamExpert 기반인 Sopera LT 소프트웨어로 간단한 설정
- 내구성이 강한 스크루 마운트 RJ-45 커넥터로 산업환경을 고려한 설계

## 품질 보증

- CE, FCC 및 RoHS, GenIcam, IP30, Camera Link 2.01

## 프로그램 가능성

- Partial 스캔 모드에서 더욱 빠른 프레임 속도
- 노출제어 기능을 탑재한 글로벌 셔터
- 다중 노출 가능
- 멀티 ROI 가능( 최대16 ROI)
- MetaData 지원
- IEEE1588 (네트워크 간 정확한 동기화 가능) 지원
- Binning
- Look-up table

## 안정성



- 내구성을 고려한 강건한 바디설계
- 3년의 보증기간
- 이미지 신뢰성 진단( Trigger to Image-Reliability) 프레임워크를 활용해 전송된 이미지에 대해 완벽한 시스템 수준의 모니터링과 제어, 진단 가능

## 대표 어플리케이션

- 반도체 웨이퍼 검사
  - surface, bump 검사
- 전자제품 제조
  - 3D SPI 검사
  - 포장 및 bump 검사
  - Automated Optical Inspection
- 태양광 패널 검사
- Aerial Imaging

# Nano-CL Specifications: M5100, C5100, M4090, C4090

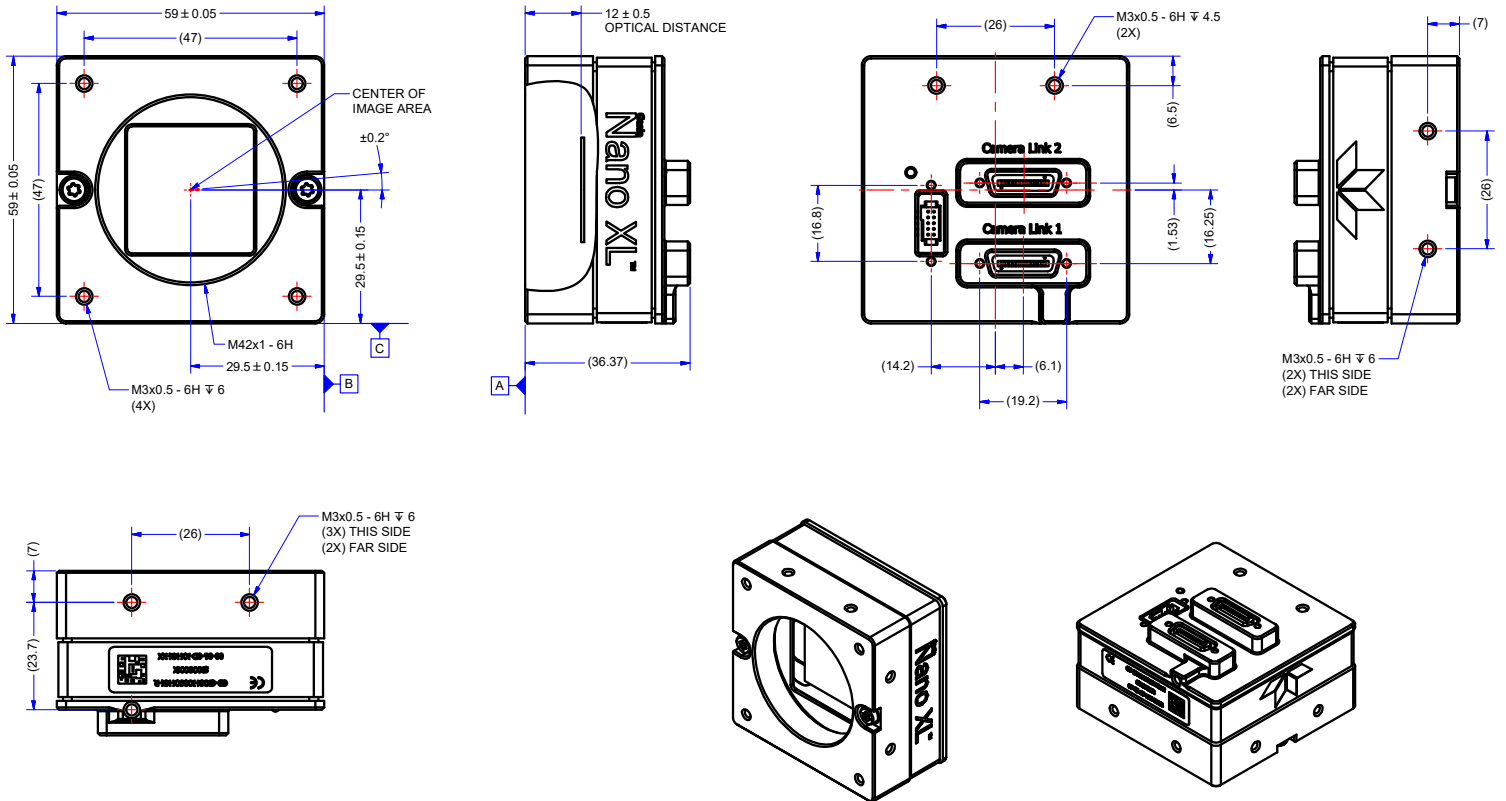
Model specific specifications and response graphics for the On-Semi Python (25K & 16K) series are provided here. The response curves describe the sensor, excluding lens and light source characteristics.

Supported Features	M5100 & C5100		M4090 & C4090	
Resolution	5120 x 5120		4096 x 4096	
Sensor	On-Semi Python25K (25M)		On-Semi Python16K (16M)	
Pixel Size	4.5 µm x 4.5 µm			
Shutter Type	Full frame electronic global shutter function			
Full Well charge	12ke (max)			
Firmware options (field programmable)	Standard Design 80-bits-8Tap Firmware	High Speed Design 80-bits-10Tap Firmware	Standard Design 80-bits-8Tap Firmware	High Speed Design 80-bits-10Tap Firmware
Maximum Frame Rate	25.5 fps	32.0 fps	36.0 fps	46.8 fps
Pixel Format (Mono) 	Mono 8 & 10 bit	Mono 8 bit	Mono 8 & 10 bit	Mono 8 bit
Pixel Format (Color) 	Bayer 8 & 10 bit	Bayer 8 bit	Bayer 8 & 10 bit	Bayer 8 bit
Trigger to Exposure Minimum delay ( <i>Synchronous Exposure</i> )	4 µs			
Trigger to Exposure Minimum delay ( <i>Reset Exposure</i> )	4 µs			
Trigger to Exposure Start jitter ( <i>Synchronous Exposure</i> )	Up to 1 line time			
Trigger to Exposure Start jitter ( <i>Reset Exposure</i> )	0 µs			
Exposure Time Minimum (see "exposureTimeActual" in <a href="#">Sensor Control</a> )	34 µs			
Horizontal Line Time: Normal Mode <b>⚡</b>	33.1 µs	16.55 µs	29.55 µs	14.78 µs
Horizontal Line Time: Fast Readout <b>⚡</b>	19.1 µs	9.56 µs	15.55 µs	7.78 µs
Min. Time from End of Exposure to Start of Next Exposure	Normal Readout: 120 us Fast Readout: 92 us	Normal Readout: 79 us Fast Readout: 65 us	Normal Readout: 120 us Fast Readout: 92 us	Normal Readout: 79 us Fast Readout: 65 us
Readout Time	(Horizontal Line Time * NB Lines) + ( 2 * Horizontal Line Time at Maximum Sensor Width ), in µs			
Auto-Brightness	No			
Black offset control	Yes (in DN)			
Gain Control	In-sensor Analog Gain (1.0x to 3.17x) in 4 steps (1.0x, 1.26x, 2.87x, 3.17x)			
Binning Support	No			
Decimation Support	No			
Defective Pixel Replacement	Yes			
Image Correction	Flat Line Correction (Mono Only - Factory and 4 User Defined entries) Lens Shading correction (Factory and 1 User Defined entry) Noise Reduction			
Image Flip support	No			

# - Genie Nano CL Series 상세 스펙

GENIE NANO CL (Medium Casing)		GENIE NANO CL (XL Casing)
Data Output Transfer	CameraLink (Deca Mode) 10-taps or (Base) 2 / 3-taps @ 85 Mhz configuration (model depended)	
Exposure Control	Automatic, programmable, or via external trigger	
I/O Ports	2 opto-isolated inputs, 2 opto-isolated outputs, 2 Camera Link CC lines (Camera Control)	2 Camera Link CC lines (Camera Control)
Lens Mount	C-Mount available	M42
Size (L x H x W) (C-mount option)	44 mm x 44 mm x 21 mm (without bar adapter and connectors) 44 mm x 44 mm x 39 mm (with lens adapter and connectors)	30 mm x 59 mm x 59 mm (no lens adapter or connectors)
Mass	~72 g	~163 g
Operating Temp	-20 to +60° C (housing temperature)	
Power Supply	+10 to +30 V or Power Camera Link (PoCL)	
Power Dissipation (model dependent)	6.5 W @ 24 Volt Aux.	6.5 W @ 24 Volt Aux.
Data Connector	For CameraLink Deca mode	
Power and I/O Connector	SAMTEC TFM-105 type	
Camera Specification	Camera Link v2.1, GeniCam GenCP compliant	
Software Platform	Teledyne DALSA Sopera LT 8.0 for Windows, or 3rd Party GeniCam GenCP compliant SDK	

## 도면



NOTES:  
 1. UNITS: MILLIMETERS.  
 2. IMAGE AREA IS ALIGNED TO DATUMS **A**, **B** & **C**.

## 세로 라인 별 최대 프레임 속도 예시 - Nano CL M/C 5100

### Using 10-Tap 8-bit Firmware

Vertical Lines Acquired (inc=16)	Internal Trigger / Minimum Exposure Python 25k sensor – model M5100	Internal Trigger / Minimum Exposure Python 25k sensor – model M5100 Fast Readout Mode Enabled
5120	23.4 fps	32.0 fps
3840	31.2 fps	42.7 fps
2560	46.8 fps	63.9 fps
1280	93.2 fps	127.2 fps
640	184.9 fps	251.5 fps
320	363.3 fps	492.1 fps
160	702.2 fps	943.3 fps
80	1315 fps	1739 fps
48	2020 fps	2631 fps
32	2762 fps	3533 fps
16	4366 fps	5376 fps

### Using 8-Tap 10-bit Firmware

Vertical Lines Acquired (inc=16)	Internal Trigger / Minimum Exposure Python 25k sensor – model M5100	Internal Trigger / Minimum Exposure Python 25k sensor – model M5100 Fast Readout Mode Enabled
5120	23.4 fps	25.5 fps
3840	31.2 fps	34.0 fps
2560	46.8 fps	50.9 fps
1280	93.3 fps	101.4 fps
640	185.0 fps	201.0 fps
320	364.0 fps	395.0 fps
160	704.7 fps	762.7 fps
80	1324 fps	1428 fps
48	2040 fps	2192 fps
32	2801 fps	2994 fps
16	4464 fps	4716 fps

## 세로 라인 별 최대 프레임 속도 예시 - Nano CL M/C 4090

### Using 10-Tap 8-bit Firmware

Vertical Lines Acquired	Internal Trigger / Minimum Exposure Python 16k sensor –model M4090	Internal Trigger / Minimum Exposure Python 16k sensor – model M4090 Fast Readout Mode Enabled
4096	32.8 fps	46.9 fps
3840	35.0 fps	50.0 fps
2560	52.4 fps	74.9 fps
1280	104.4 fps	148.8 fps
640	206.7 fps	293.7 fps
320	405.3 fps	572.4 fps
160	780.0 fps	1089 fps
80	1450 fps	1988 fps
48	2212 fps	2958 fps
32	3003 fps	3921 fps
16	4651 fps	5813 fps

### Using 8-Tap 10-bit Firmware

Vertical Lines Acquired	Internal Trigger / Minimum Exposure Python 16k sensor –model M4090	Internal Trigger / Minimum Exposure Python 16k sensor – model M4090 Fast Readout Mode Enabled
4096	32.8 fps	36.1 fps
3840	35.0 fps	38.5 fps
2560	52.4 fps	57.6 fps
1280	104.4 fps	114.7 fps
640	206.9 fps	227.1 fps
320	406.1 fps	445.2 fps
160	783.0 fps	856.1 fps
80	1461 fps	1589 fps
48	2237 fps	2421 fps
32	3048 fps	3278 fps
16	4761 fps	5076 fps

## GENIE NANO-CL INDIVIDUAL MODEL SPECIFICATIONS

### CAMERALINK (DECA MODE) 10-TAPS CONFIGURATION

	Active Resolution	Sensor Model	Frame Rate**	Pixel Size	Dynamic Range	Max. Image Circle	Data Format	Part Number
●● CL-M2450	2448 x 2048	Sony IMX250 (5.1M)	141 fps	3.45 μm	56.4 dB	2/3" Optical Format	8 or 10-Bit Mono	G3-CM30-M2450
●●● CL-C2450	2448 x 2048	Sony IMX250 (5.1M)	141 fps	3.45 μm	56.4 dB	2/3" Optical Format	8 or 10-Bit Bayer	G3-CC30-C2450, G3-CC30-C2450IF (with IR cut-off filter)
●● CL-M4060	4112 x 2176	Sony IMX255 (8.9M)	88 fps	3.45 μm	56.4 dB	1" Optical Format	8 or 10-Bit Mono	G3-CM30-M4060
●●● CL-C4060	4112 x 2176	Sony IMX255 (8.9M)	88 fps	3.45 μm	56.4 dB	1" Optical Format	8 or 10-Bit Bayer	G3-CC30-C4060, G3-CC30-C4060IF (with IR cut-off filter)
●● CL-M4040	4112 x 3012	Sony IMX253 (12M)	64 fps	3.45 μm	56.4 dB	1.1" Optical Format	8 or 10-Bit Mono	G3-CM30-M4040
●●● CL-C4040	4112 x 3012	Sony IMX253 (12M)	64 fps	3.45 μm	56.4 dB	1.1" Optical Format	8 or 10-Bit Bayer	G3-CC30-C4040, G3-CC30-C4040IF (with IR cut-off filter)
●● CL-M4160	4128 x 4128	Teledyne e2v Emerald EV2S16M (16M)	40 fps	2.8 μm	55 dB	1.1" Optical Format	8-Bit Mono	G3-CM30-M4160
●●● CL-C4160	4128 x 4128	Teledyne e2v Emerald EV2S16M (16M)	40 fps	2.8 μm	55 dB	1.1" Optical Format	8-Bit Mono	G3-CC30-C4160
●● CL-M4090	4096 x 4096	On-Semi Python 16K (16M)	45 fps	4.5 μm	55.2 dB	APS-H Optical Format	8 or 10-Bit Mono	G3-CM10-M4095
●● CL-M4090-NIR	4096 x 4096	On-Semi Python 16K (16M)	45 fps	4.5 μm	55.2 dB	APS-H Optical Format	8 or 10-Bit Mono	G3-CM12-M4095
●●● CL-C4090	4096 x 4096	On-Semi Python 16K (16M)	45 fps	4.5 μm	55.2 dB	APS-H Optical Format	8 or 10-Bit Bayer	G3-CC10-C4095
●● CL-M5100	5120 x 5120	On-Semi Python 25K (25M)	30 fps	4.5 μm	55.2 dB	APS-H Optical Format	8 or 10-Bit Mono	G3-CM10-M5105
●● CL-M5100-NIR	5120 x 5120	On-Semi Python 25K (25M)	30 fps	4.5 μm	55.2 dB	APS-H Optical Format	8 or 10-Bit Mono	G3-CM12-M5105
●●● CL-C5100	5120 x 5120	On-Semi Python 25K (25M)	30 fps	4.5 μm	55.2 dB	APS-H Optical Format	8 or 10-Bit Bayer	G3-CC10-C5105

\*\* Using 10-tap @ 8-bit configuration. Applicable for the Deca model models list only.

### CAMERALINK BASE CONFIGURATION

	Active Resolution	Sensor Model	Frame Rate***	Pixel Size	Dynamic Range	Max. Image Circle	Data Format	Part Number
●● CL-M2420	2448 x 2048	Sony IMX264 (5.1M)	35 fps	3.45 μm	56.4 dB	2/3" Optical Format	8 or 12-Bit Mono	G3-CM31-M2420
●●● CL-C2420	2448 x 2048	Sony IMX264 (5.1M)	35 fps	3.45 μm	56.4 dB	2/3" Optical Format	8 or 12-Bit Bayer	G3-CC31-C2420, G3-CC31-C2420IF (With IR cut-off filter)
●● CL-M4020	4112 x 3008	Sony IMX304 (12M)	20 fps	3.45 μm	56.4 dB	1.1" Optical Format	8 or 12-Bit Mono	G3-CM31-M4020
●●● CL-C4020	4112 x 3008	Sony IMX304 (12M)	20 fps	3.45 μm	56.4 dB	1.1" Optical Format	8 or 12-Bit Bayer	G3-CC31-C4020, G3-CC31-C4020IF (With IR cut-off filter)

\*\*\* Using 3-tap @ 8-bit configuration. Applicable for the Base CL model models list only.