

TIER IV

**AUTOMOTIVE
CAMERA
C1
SPECIFICATION**

V1.0



TIER IV

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Product Overview



The C1 camera is a GMSL (Gigabit Multimedia Serial Link) camera specifically designed for automotive applications. It has a resolution of 2.5 MP at 1920 x 1280 px.

Featuring Sony Semiconductor Solutions' ISX021 back-side illumination stacked CMOS image sensor SoC, this camera enables HDR imaging over 120dB, LED flicker mitigation (LFM), and motion artifact-free image capturing at a frame rate of up to 30fps.

With a variety of lens options available, the C1 camera can be adapted various applications. The lens undergoes a 6-axis active adjustment during installation, allowing it to achieve optimal sharpness even in harsh temperature environments.

The ISP (Image Signal Processor) built into the C1 camera's image sensor performs various image processing tasks, including lens distortion correction, to achieve optimal image quality for automotive applications. The C1 camera also supports an external triggering mechanism, which is essential to achieve capture synchronization with other sensor modalities such as LiDAR or RADAR, enabling sensor fusion.

Designed for automotive mass production, the C1 camera is ready-to-use. All key components comply with AEC-Q100 (Grade 2), Q101, and Q200 standards, and are designed to pass automotive-grade reliability tests.

C1カメラは2.5 MP, 1920 x 1280 pxの解像度を持つ車載アプリケーション向けGMSL (Gigabit Multimedia Serial Link)カメラです。

ソニーセミコンダクタソリューションズ製 ISX021 裏面照射型積層CMOSセンサを搭載し、120dB相当のダイナミックレンジ、LEDフリッカー低減、モーションアーティファクト低減を最高30fpsのフレームレートで実現することが可能です。

多彩なレンズのオプションにより、様々なアプリケーションを実現することができます。レンズは6軸アクティブアライメントを行い取り付けられるので、過酷な温度環境下でも最適なシャープネスを実現することができます。

イメージセンサに内蔵されたC1のISP (Image Signal Processor)はレンズ歪み補正を含む様々な画像処理を行い、車載アプリケーションに最適な画質を実現します。C1はLiDARやRADARといった他のセンサー類との同期を取るのに必須である外部トリガー機構をサポートし、センサーフュージョンを実現することも可能です。

C1は車載向けアプリケーションの量産にそのまま適用することが可能です。主要な半導体は車載向け半導体の信頼性要件であるAEC-Q100 Grade2, Q101およびQ200に準拠しており、車載グレードの信頼性試験をクリアするよう設計されています。

Product Features

Autoware Compatibility

Fully compatible with Autoware, the world's leading open-source software project for autonomous driving

Autoware対応

世界初の自動運転用オープンソースソフトウェア「Autoware」対応

High Dynamic Range

With a dynamic range of 120dB, it can capture scenes with a large difference in brightness without crushing shadows or overexposing highlights.

ハイダイミックスレンジ

120dB相当のハイダイナミックレンジで、明暗差の大きな場面でも白飛び・黒つぶれのない映像が撮影可能

High Sensitivity and Low Noise

It can suppress noise and capture high-quality images even in low-light environments.

高感度・低ノイズ

低照度環境でもノイズを抑制し、高画質な撮影が可能

LED Flicker Mitigation

Flickering from LED light sources such as traffic signs, headlights, and taillights can be mitigated.

LEDフリッカー抑制

信号機、標識、ヘッドランプ、テールランプ等のLEDを用いた光源によるチラつきを抑制

GMSL2 Interface

The GMSL2 interface allows for long-distance signal transmission and power supply over a single cable connection.

GMSL2インタフェース対応

長距離(15mまで)の信号転送と電源供給を1本のケーブル接続で実現可能

Automotive Quality

The camera is designed for the temperature range from -40°C to 85°C, using automotive-grade components.

車載品質

車載グレードの部品を使用し、-40°C~85°Cまでの温度範囲で動作可能

Standard Compliance

CE, FCC, RoHS certified

各種認証への対応

CE、FCC、RoHSに対応

Applications

Autonomous driving

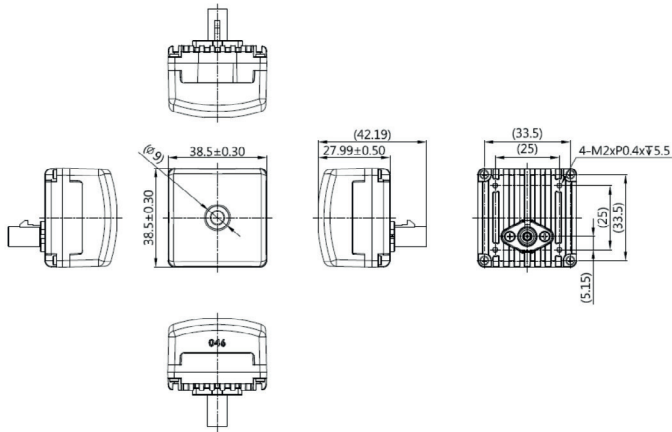
- Traffic light recognition
- Object recognition
- Remote monitoring
- Visual SLAM

Technical Specifications

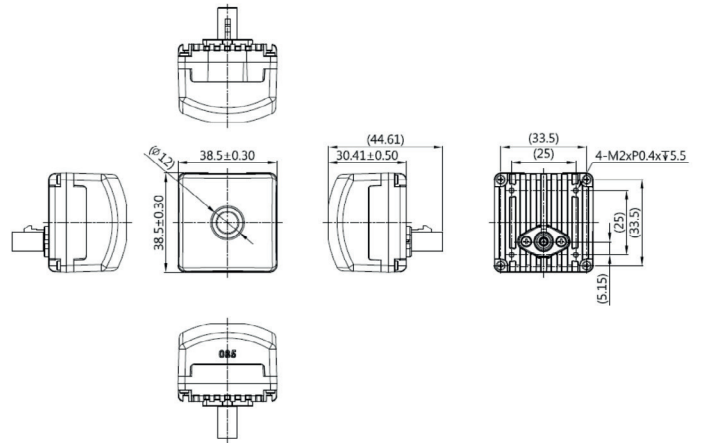
	C1-046	C1-085	C1-120	C1-198
Mechanical				
Camera Size	38.5mm X 38.5mm X 42.19mm	38.5mm x 38.5mm x 43.21mm	38.5mm x 38.5mm x 48.93mm	38.5mm x 38.5mm x 40.44mm
Connector	FAKRA Z code with metal shielding			
Lens				
Lens Mount	glued, active alignment applied			
Field Of View (FoV)	LDC off 46deg / 32deg on 46deg / 32deg	LDC off 85deg / 56deg on 78deg / 56deg	LDC off 120deg / 77deg on 111deg / 77deg	LDC off 198.6deg / 128.2deg on 162deg / 125deg
F#	2.2	1.7	1.8	2
TTL	14.9mm	18.59mm	21.01mm	15.79mm
Image Circle	Φ 7.942mm	Φ 7.84mm	> Φ 7.2mm	Φ 5.9mm Max
IRCF	650±10nm	648±10nm	650±15nm	650±10nm
Resolution (TV Line)	750TVL @ Center, 500TVL @ 70% Image Height	750TVL @ Center, 500TVL @ 70% Image height	750TVL @ Center, 500TVL @ 70% Image height	750TVL @ Center, 500TVL @ 70% Image height
Depth of Field	185cm - Infinity Focus peaking distance: 400cm	112cm - Infinity Focus peaking distance: 400cm	106.7cm - Infinity Focus peaking distance: 400cm	33cm - Infinity Focus peaking distance: 100cm
Power Supply				
Power Supply Method	Power Over Coax			
Power Supply Level	9-12V			
Power Consumption	1.7W @30fps			
Key Components				
Image Sensor	Sony Semiconductor Solutions ISX021			
Optical Format	Diagonal 6.99mm, Type 1/2.57			
Pixel Size	3.0um			
High Dynamic Range	Available			
LED Flicker Mitigation	Available			
Serializer	Analog Devices MAX9295A			
ISP	Integrated on Image Sensor			
Camera Function				
Output Interface	GMSL2, Up To 6Gbps			
Output Frame Rate	Up To 30fps			
Output Image Format	YUV422 8bit			
Output Image Size	1920 * 1280			
Shutter Type	Rolling Shutter			
Synchronization	HW/SW Triggering Over GMSL2			
ISP Function				
ISP Function	HDR Composition, Demosaicing, Auto Exposure, Auto White Balance, IQ Adjustment(Hue, Color Saturation, Brightness, Contrast, Sharpness)			
Manual Exposure/Gain Control	Available			
Environmental				
Operating Temperature	-40 - 85°C			
Storage Temperature	-40 - 105°C			
EMI	CE, FCC, CAN ICE-3, UKCA, RCM			
Vibration	ISO 16750-3 : 2012 : 4.1			
Shock	ISO 16750-3 : 2012 : 4.2.2			
Safety	LVD			
RoHS	Compliant			
Ingress Protection	IP69K			
Software Support				
Driver	V4L2 Driver, ROS/ROS2 Driver			

Mechanical Drawing

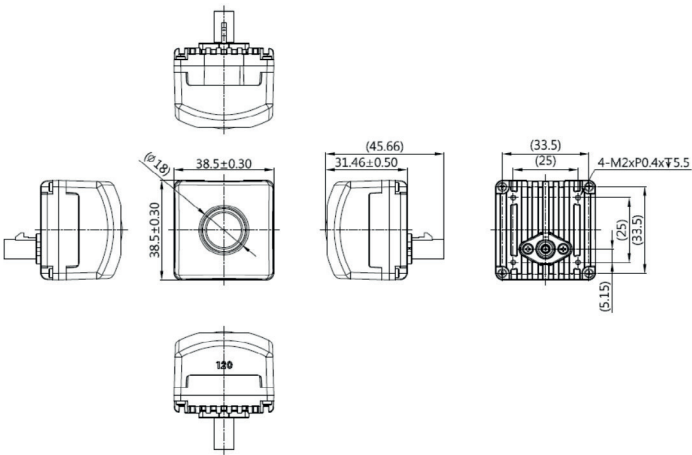
C1-046 (46deg)



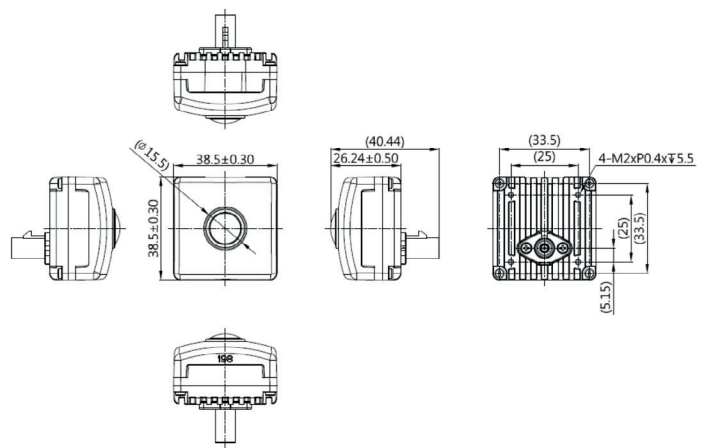
C1-085 (85deg)



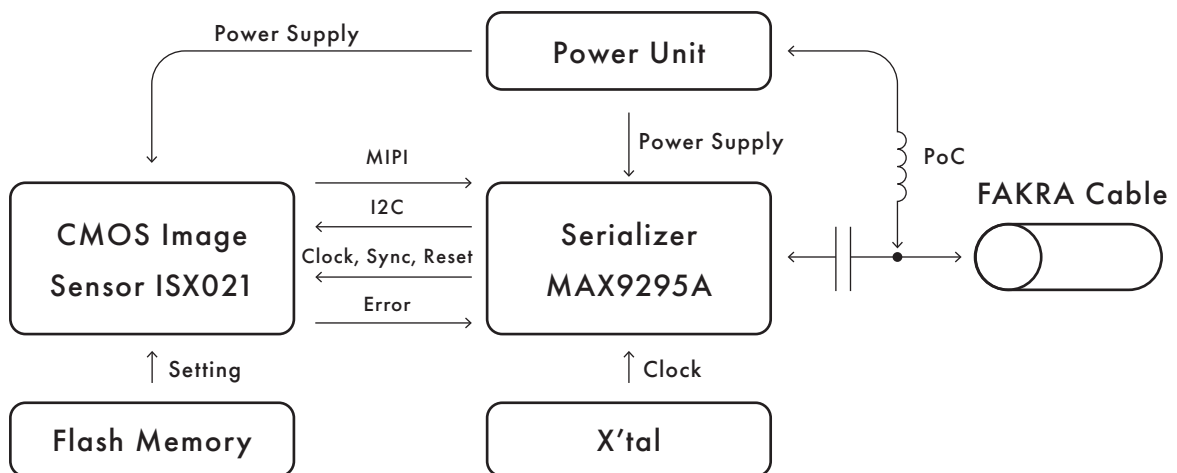
C1-120 (120deg)



C1-198 (198deg)



Block Diagram



Optional Accessories

GMSL2-USB3.0 Conversion Kit



Anti-Reflective & Anti-Condensation Housing

