

**seeingmachines****GUARDIAN**

## Guardian System LTE

*Technical system summary*

Model: G2-SY-CON2. Type: G2-SY-CON2-1002244

### 1 CONTROLLER

#### **PROCESSOR**

ATOM® x5- E3940 1.80GHz Quad Core, 2GB of DRAM, 8GB eMMC storage, 32GB internal SD Card

#### **OPERATING SYSTEM**

Yocto Linux

#### **CONNECTIVITY**

In-Cab Sensor, Forward-Facing Camera, Vibration Motor, Nano SIM, RS232, USB 3.0, USB 2.0 OTG, 1 x Relay output, 1 x General purpose input, Micro HDMI

#### **COMMUNICATIONS**

##### **Serial GPS**

Operating frequencies: 1575 MHz, Modulation type: BPSK, Bandwidth: 2MHz, Channel: 72 channels

##### **Bluetooth**

Operating frequencies: 2402–2480 MHz, Maximum transmit output power: 10.5dBm, Modulation type: FHSS/GFSK/DPSK/DQPSK, Bandwidth: 1MHz, Channel: 79 channels

##### **Global 4G**

Maximum transmit output power: WCDMA: 23dBm, LTE: 23dBm

Modulation type: WCDMA: QPSK/16-QAM/64-QAM, LTE: OFDMA

Bandwidth: 1.4/5/10/15/20MHz

## Channels

BAND	TRANSMIT	RECEIVE
GSM 850	824~849 MHz	869~894 MHz
EGSM 900	880~915 MHz	925~960 MHz
DCS1 800	1710~1785 MHz	1805~1880 MHz
PCS 1900	1850~1910 MHz	1930~1990 MHz
WCDMA B1	1920~1980 MHz	2110~2170 MHz
WCDMA B2	1850~1910 MHz	1930~1990 MHz
WCDMA B4	1710~1755 MHz	2110~2155 MHz
WCDMA B5	824~849 MHz	869~894 MHz
WCDMA B6	830~840 MHz	875~885 MHz
WCDMA B8	880~915 MHz	925~960 MHz
WCDMA B19	830~845 MHz	875~890 MHz
LTE-FDD B1	1920~1980 MHz	2110~2170 MHz
LTE-FDD B2	1850~1910 MHz	1930~1990 MHz
LTE-FDD B3	1710~1785 MHz	1805~1880 MHz
LTE-FDD B4	1710~1755 MHz	2110~2155 MHz
LTE-FDD B5	824~849 MHz	869~894 MHz
LTE-FDD B7	2500~2570 MHz	2620~2690 MHz
LTE-FDD B8	880~915 MHz	925~960 MHz
LTE-FDD B12	699~716 MHz	729~746 MHz
LTE-FDD B13	777~787 MHz	746~756 MHz
LTE-FDD B18	815~830 MHz	860~875 MHz
LTE-FDD B19	830~845 MHz	875~890 MHz
LTE-FDD B20	832~862 MHz	791~821 MHz
LTE-FDD B25	1850~1915 MHz	1930~1995 MHz
LTE-FDD B26	814~849 MHz	859~894 MHz
LTE-FDD B28	703~748 MHz	758~803 MHz
LTE-TDD B38	2570~2620 MHz	2570~2620 MHz
LTE-TDD B39	1880~1920 MHz	1880~1920 MHz
LTE-TDD B40	2300~2400 MHz	2300~2400 MHz

## PERIPHERALS

In-Cab Sensor, 3G/4G antenna, External GPS, Forward-Facing Camera (optional), Vibration Motor (Optional), Cruise Control Disable Cable

## ENVIRONMENTAL

Temperature -40 to 65° C

## DRIVER ALERTS

Audio alert (dual piezo buzzer), Haptic alert (vibration motor), Manual Record Button

## ELECTRICAL

Supply voltage: 10-30VDC, Power: 36W

## DIMENSIONS

Controller 182mm x 124mm x 43mm

Controller with mounting pan 218mm x 146mm x 54mm

## WEIGHT

Controller 620 g

Controller with mounting pan 830 g

## 2 IN-CAB SENSOR

### DIMENSIONS

200mm x 120mm x 145mm (With mounting arm and adhesive mount)

### WEIGHT

630g (including extension cable)

**ENVIRONMENTAL**

Temperature -40~85° C

**FEATURES**

H47° x V36° field of view, 54 frames per second, +135° ~ 45° camera angle rotation (8° increments with standard bracket), 940nm IR illumination, Ambient light sensor, Monochrome sensor, 1280 x 960p resolution, In-built inertial measurement unit (IMU), Adhesive or screw mounts provided.

### 3 FORWARD-FACING CAMERA

**DIMENSIONS**

72mm x 41mm x 40mm

**WEIGHT**

160g (including 7m cable)

**ENVIRONMENTAL**

Temperature -40~85° C

**FEATURES**

Colour sensor, H114° x V61° field of view, 71° camera angle rotation, 1280 x 800p\* resolution, up to 30 frames per second, VHB Foam Tape to Conform to Windscreen Curvature, Camera Angle Locking Screw, Status Light

\* Recorded resolution is lower to conserve storage space and increase duration of video data stored

### 4 VIBRATION MOTOR

**DIMENSIONS**

137mm x 55mm x 66mm

**WEIGHT**

685g (with 4m cable)

**FEATURES** Rugged design, 3900 RPM, install on round, square, flat bars or on flat surface using the screw mount

Further details in corresponding datasheets.


## 5 VALIDATION



Test Category	Test Name	Test Condition	Duration	Test standard	Controller	ICS	FFC	Package
<b>Temperature Tests</b>	Operating Temperature Cycling	-40°C to +65°C	105hrs	IEC 60068-2-1 Ae	Y			
		-40°C to +85°C		IEC 60068-2-2 Bd IEC 60068-2-14 Nb			Y	Y
	Non-Operating Temperature Cycling	-40°C to +65°C	105hrs	IEC 60068-2-1 Ab	Y			
		-40°C to +85°C		IEC 60068-2-2 Bb IEC 60068-2-14 Nb			Y	Y
	Power on/off Test	-40°C to +65°C	1000 power cycles (power on 2.5 minutes+ power off 30 seconds)	IEC 60068-2-1 Ae	Y			
		-40°C to +85°C		IEC 60068-2-2 Bd IEC 60068-2-14 Nb			Y	Y
High/Cold Temperature Start test	-40°C, +65°C (Min/Max voltage)	20 power cycles (Dwell 4 hours before the 1st test, then follow by one power up every 30 minutes)	IEC 60068-2-1 Ae	Y				
	-40°C, +85°C (Min/Max voltage)		IEC 60068-2-2 Bd IEC 60068-2-14 Nb			Y	Y	
<b>Thermal Shock</b>	Thermal Shock (Non-Operational)	-40°C to +85°C	10 hours (20 cycles)	IEC 60068-2-1 Ab IEC 60068-2-2 Bb IEC 60068-2-14 Nb	Y	Y	Y	
<b>Vibration</b>	HALT Combine temperature cycle and random Vibration in operation mode	Test Mode: Random wave Frequency: 10 ~ 5000Hz Direction: X, Y, Z axes PSD: Up to 40Grms Temperature cycle: -50°C to 90°C	2 hours 30 min	IPC 9592A	Y	Y	Y	
	Package Random Vibration	Test Mode: Random wave Frequency: 5 ~ 500 Hz Acceleration: 2 Grms Direction: X, Y, Z axes Duration: 60 min/ axis	60 min/ axis	IEC 60068-2-64				Y
<b>Shock</b>	Non-Operation Shock-75G Sawtooth shock	Test Mode: Sawtooth wave Pulse Duration: 6 ms Acceleration: 75G Direction: +Z Number of shock: 1 shock	1 shock	MIL-STD-810G Method 516.6 Procedure V		Y		
	Non-Operational Shock-20G/40G Half-sine shock	Test Mode: Half-Sine Pulse Duration: 11ms Acceleration: 20G, 40G Direction: ±X, ±Y and ±Z Number of shock: 3 shocks/axis	3 shocks/axis	MIL-STD-810G Method 516.6 Procedure V				Y
<b>Ingress</b>	Dust proof	Temperature: 15~35°C Relative Humidity: 25~75%. Atmospheric Pressure: 86~106 KPa (860~1,060 mbar)	N/A	IEC60529-IP50	Y	Y	Y	

<b>Humidity</b>	Operating Humidity Cycling Test	From 50%~90%RH @ 60°C to 90%RH @25C	64 hours	IEC 60068-2-30 Db	Y	Y	Y	
	Non-operating Humidity Cycling Test	From 50%~90%RH @ 65°C to 90%RH @25C		IEC 60068-2-30 Db	Y	Y	Y	
<b>Ultraviolet Testing</b>	Sun Light test	Narrowband irradiance 0.58W/(m <sup>2</sup> .nm) Exposure cycle: 20 hours dry, light on 4 hours dry, light off. Black panel: 65°C ±2°C	168 hours	IEC 60068-2-5	Y	Y	Y	
<b>Drop testing</b>	Package Drop	Drop Surface: Steel plate of 1 cm thickness  Drop Sequence: 1 corner, 3 edges and 6 faces	10 repetitions	ISTA-1A				Y
<b>Sound Pressure</b>	Acoustic noise test	Frequency range : 100 Hz to 20 KHz (Linear) Detector: RMS	N/A	N/A		Y		
<b>EMC (excluding country compliance)</b>	Bulk Current Injection	20-400 MHz @60mA, 1kHz AM 80%	N/A	ISO 11452-4	Y			
	Conducted Immunity	Transient immunity 12V and 24V Pulse types: 1, 2a, 2b, 3a, 3b, 4  Voltage Transient 12V: +75V, -100V 24V: +150V, -450V	N/A	ISO 7637-2	Y			
	Radiated Immunity	200-800 MHz @30V/m AM 1kHz 80% 800-2000 MHz @30V/m PM 577uS, Period 4600uS	N/A	ISO 11452-2	Y	Y	Y	
	Radiated Emission	Broad band reference limits 30-75MHz E=62-25.13 log(F/30) 75-400MHz E=52+15.13 log (F/75) 400-1000MHz E= 63  Narrow Band reference limits 30-75MHz E=52-25.13 log(F/30) 75-400MHz E=42+15.13 log (F/75) 400-1000MHz E= 53	N/A	CISPR 25	Y	Y	Y	
<b>Safety</b>	Photobiological safety	infrared illumination – Exempt class	N/A	IEC-62471		Y		
	low voltage directive safety		N/A	EN 62368-1	Y			

## 6 COUNTRY COMPLIANCE







Where required, compliance marks are located on Controller unit.








Type	Standard	Logo
FCC	<p><b>USA</b>  <i>Federal Communications Commission</i>            FCC ID: W5Y-1002244</p> <p>Manufacturer: ADLINK Technology Inc.            Address: 9F, No.166, Jian Yi Rd., Zhonghe Dist.,            New Taipei City, 235 Taiwan            Module: EG25-G MINIPCIE.            Module Brand: Quectel            Module TAC number: 86769804</p> <p>This device complies with FCC 47 CFR Part 15            Subpart B 15.109 Class A.</p> <p>This device complies with FCC 47 CFR Part 15            Subpart C.</p> <p>This device complies with FCC 47 CFR Part 22            Subpart H and Part 24 Subpart E.</p> <p>Operation is subject to the following two            conditions: (1) this device may not cause harmful            interference, and (2) this device must accept any            interference received, including interference that            may cause undesired operation.</p>	
ICES-003	<p><b>Canada</b>  <i>Interference Causing Equipment Standard</i></p> <p><i>-003: Information Technology Equipment (ITE)</i>            This device complies with            ISED ICES-003 Issue 6:2016 Class A            RSS-GEN Issue 5:2019            RSS-102 Issue 5:2015            RSS-130 Issue 2:2019            RSS-132 Issue 3:2013            RSS-133 Issue 6:2018            RSS-139 Issue 3:2015            RSS-199 Issue 3:2016            RSS-247 Issue 2:2017</p>	NO LOGO





CE	<p><b>Europe</b>  <i>Conformité Européenne</i>  <i>European Conformity</i></p> <p>This device complies with Radio Equipment Directive 2014/53/EU and Electromagnetic Compatibility Directive 2014/30/EU</p> <p><b>Safety - Article 3.1(a):</b>  IEC 62368-1:2014  EN 62368-1:2014 + A11:2017</p> <p><b>EMC - Article 3.1(b):</b>  Draft ETSI EN 301 489-17 V3.2.2: 2019-12  Using technical requirements of ETSI EN 301 489-1 V2.2.3:2019-11  ETSI EN 301 489-19 V2.1.1:2019-04  Draft ETSI EN 301 489-52 V1.1.0:2016-11  Using technical requirements of ETSI EN 301 489-1 V2.2.3:2019-11  EN 55032:2015/AC:2016  EN 55035:2017</p> <p><b>Radio - Article 3(2):</b>  ETSI EN 300 328 V2.1.1:2016  ETSI EN 303 413 V1.1.1:2017  ETSI EN 301 908-1 V11.1.1:2016-07</p>	
RCM	<p><b>Australia/New Zealand</b>  <i>Regulatory Compliance Mark</i></p> <p>Complies with the Australian regulatory compliance mark (RCM). This equipment is exempt from Electrical Equipment Safety System (EESS) as its maximum operating voltage is less than 120VDC.</p> <p>This device complies with AS/NZS CISPR 32:2015 (Ed 2.) / C1: 2016  This device complies with AS/CA S042:2018</p>	

MTC	<p><b>Peru</b>  <i>Ministerio de Transportes y Comunicaciones</i>  <i>Ministry of Transport and Communications</i></p> <p>MODEL: G2-SY-CON2          BRAND: GUARDIAN          FCC ID: W5Y-1002244          Product Description: GUARDIAN SYSTEM LTE</p> <p><b>Frequencies</b>          Bluetooth: 2402~2480MHz          GPS: 1575MHz          3G:              Band I: TX: 1922.4 ~1977.6 MHz                  RX: 2112.4 ~ 2167.6 MHz              Band V: TX: 824 ~ 849MHz                  RX: 869 ~ 894MHz              Band VIII: TX: 882.4 - 912.6MHz                  RX: 927.4 - 957.6 MHz</p> <p>LTE:              Band 1: UL: 1920 ~ 1980MHz, DL: 2110 ~ 2170MHz              Band 3: UL: 1710 ~ 1785MHz, DL: 1805 ~ 1880MHz              Band 7: UL: 2500 ~ 2570MHz, DL: 2620 ~ 2690MHz              Band 8: UL: 880 ~ 915MHz, DL: 925MHz ~ 960MHz              Band 20: UL: 832 ~ 862MHz, DL: 791MHz ~ 821MHz              Band 28: UL: 703 ~ 748MHz DL: 758 ~ 803MHz              Band 38: 2570MHz ~ 2620MHz</p> <p>Modulations: BT/GPS/3G/LTE          Manufacturer: ADLINK Technology Inc.          Address: 9F, No.166, Jian Yi Rd., Zhonghe Dist.,          New Taipei City, 235 Taiwan          Module: EG25-G MINIPCIE.          Module Brand: Quectel          Modules TAC number: 86769804</p> <p>No. TRFM46564</p>	
INDOTEL	<p><b>Dominican Republic</b>  <i>Instituto Dominicano de las Telecomunicaciones</i>  <i>Dominican Institute of Telecommunications</i></p> <p>Article 62 of the Ley General de          Telecomunicaciones, no. 153—98</p> <p>Approval reference DE-0000533-20</p>	



MCMC	<p><b>Malaysia</b>  <i>Malaysian Communications and Multimedia Commission</i></p> <p>SKMM WTS GSM-MT REV. 1.01:2007  MCMC MTSFB TC T015:2017</p>  <p>Approval No. RGIL/01A/0320/S(20-0740)</p>	
NTC	<p><b>Philippines</b>  <i>National Telecommunications Commission</i></p> <p>Conformity No. ESD-GEC-2005966</p>	
ANATEL	<p><b>Brazil</b>  <i>Agência Nacional de Telecomunicações  Federative Republic of Brazil  Telecommunications National Agency</i></p> <p>Acts: nº 1120/2019 nº 630/2019 / nº 458/2019 /  nº 950/2018 / nº 955/2018 / nº 14448/2017;  Resolutions: 680/2017 / 700/2019;  3GPP TS 51.010-1 V6.5.0 (2005-11);  ETSI TS 134 121-1 V9.1.0;  3GPP TS 36.521-1 V9.5.0 (2011-06);  3GPP TS 36.523-1 / RFC 2460 / ETSI TS 102  514</p> <p>Certificate of conformity No. 7638  Authorization No. 03589-20-12892</p>	
SDPPI	<p><b>Indonesia</b>  <i>Ministry of Communications and Information  Technology  Directorate General of Resources and  Equipment for Post and Information Technology</i></p>  <p>No. 67680/SDPPI/2020</p>	

SUBTEL	<b>Chile</b> <i>Subsecretaria de Telecomunicaciones de Chile</i> <i>Undersecretariat of Telecommunications of Chile</i>  SUBTEL entry No. 34769 of 02.03.2020 No. 3897/DO No. 63718/F23	
ZICTA	<b>Zambia</b> <i>Zambia Information and Communications Technology Authority</i>  No. ZMB/ZICTA/TA/2020/4/267	
ICTA/BTK	<b>Turkey</b> <i>Bilgi Teknolojileri ve İletişim Kurumu</i> <i>Information and Communication Technologies Authority</i>  No. 32423510-254.01-E.26655	
OFCA	<b>Hong Kong</b> <i>Office of the Communications Authority</i>  No. US0022000025	
NBTC	<b>Thailand</b> <i>National Broadcasting and Telecommunications Council Committee</i>  <i>เครื่องโทรคมนาคมและอุปกรณ์นี้</i> <i>มีความสอดคล้องตามมาตรฐานหรือข้อกำหนดทางเทคนิคของ กสทช.</i> (This telecommunication equipment conforms to the standard or technical requirements of NBTC)  Class B No. B38390-20-1624	
NYCE NOM/IFETEL	<b>Mexico</b> <i>Normalizacion Y Certificacion Electronica</i> <i>Electronic Standardization and Certification</i>  <i>Norma Oficial Mexicana</i> <i>Official Mexican Standard</i>  <i>Instituto Federal de Telecomunicaciones</i> <i>Federal Institute of Telecommunications</i>  IFETEL No. RTIGUG220-0884 NOM-218 No. NYCE/CT/0553/20/C0	
ICASA	<b>South Africa</b> <i>Independent Communication Authority of South Africa</i>  No. TA-2020/5818	

CRC	<b>Mongolia</b> <i>Communications Regulatory Commission of Mongolia</i>  No. A20000166	
TAS	<b>Suriname</b> <i>Telecommunicatie Autoriteit Suriname</i> <i>Telecommunication Authority Suriname</i>  No. T0049/17	
NCA	<b>Ghana</b> <i>National Communications Authority</i>  No. SRO-1M-7E4-25A	
NICTA	<b>Papua New Guinea</b> <i>National Information and Communication Technology Authority</i>  No. PNG20/1565	

<p>NCC</p>	<p><b>Taiwan</b> <i>National Communications Commission</i></p> <p>根據 NCC 低功率射頻器材技術規範 LP0002 第 3.8.2 節 規定</p> <p>In accordance with clause 3.8.2 of the NCC (National Communications Commission) LP0002 Technical Specifications for Low Power Radio Frequency Equipment Regulations:</p> <p>取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾</p> <p>Low-power radio frequency equipment that have passed the certification type cannot be altered by a company, a business or user without permission. This includes changing the frequency, increasing the power, or changing the characteristics and functions of the original design without authorization. The use of low-power radio frequency equipment must not affect flight safety or interfere with legal communications; if interference is identified, use of the equipment should be stopped immediately, and can only be used when there is no longer interference. The legal communications mentioned in the preceding paragraph refer to radio communications operated in accordance with the Telecommunications Law. Low-power radio frequency equipment must endure legal communications or industrial, scientific and medical radio wave radiation electrical equipment</p> <p>Attention: the 2G functions provided in this equipment have no longer been in use in Taiwan since the 2G mobile telephone service was discontinued in June 2017</p> <p><i>No. CCAM21Z10010T1</i></p>	
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Document revision Date	Changes
28 July 2020	First Release
28 Jan 2021	Added Note on Compliance label location Added EMC approvals to test table Added Mongolia Approval Added Suriname Approval Added Ghana Approval Added New Zealand to RCM Added Papua New Guinea Added Taiwan Approval