2022

TLG7921MV2

Product Specification

CHLOE SUN

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Version History

Version	Change Description	Owner	Release date
1.0	Initial Version	Chloe	2022/02/16
1.1	Fine-tune format and content. Added key component introduction, Chapter 5.4 .	Chloe	2022/

1 Overview

This document describes Gateway TLG7921MV2 architecture and requirements. This document covers HW, RF, ME and Software requirements.

2 Innovation

TLG7921MV2 is a high performance LoRaWAN™ gateway designed for outdoor application that supports LoRaWAN Class A/B/C. TLG7921MV2 is a gen-2 outdoor gateway in Kiwi, it stands on the TLG7921M series, keeps all the properties including support LoRaWAN Class A/B/C, IP67, and all popular network communication interfaces. It adopts the new generation LoRa chip SX1302 to reduce power consumption. Moreover, the 2Tx/2Rx characteristic offers a bigger throughput performance.

3 Introduction

TLG7921MV2 is defined an industrial base station and perform robust mechanical and IP67 waterproof design to provide the perfect solution to complex environments. The gateway integrates an industrial level CPU ARM Cortex-A8 core and two Semtech SX1302 to communicate with the LoRa nodes in the network that supports listening on 16 channels and channel accessing with Listen-before-Talk (LBT). The power supply is by POE (Power over Ethernet). TLG7921MV2 provide LTE 4G and Ethernet to connect the cloud server. LoRaWAN™ network uses ISM band and Kiwi-tec has already offered different bands for different regions. It's the cost-effective solution for long range, and low power WAN systems.

3.1 Features

- Long range transmission, could be almost 10Km (depends on the interference in the air)
- Frequency range: 920~928MHz
- High sensitivity: -137dBm@SF12
- TX Power: 24dBm (for Japan)
- 10/100Mbps Fast Ethernet
- Built-in splitter in system, and support POE (Power of Ethernet)
- MQTT protocol
- Web GUI for configuration and web management
- Friendly FW upgrade through Web GUI
- JavaScript programs plug-in by customers for special applications (customization)
- Built-in Node-RED application development environment
- Built-in LoRaWAN server support (Optional)

3.2 Application

- Smart city: smart campus, smart meter, smart parking lots and smart traffic monitoring
- Smart agriculture and animal husbandry
- Smart Industry: smart warehouse, smart transportation
- Smart sensor applications

4 Tech Inventory

4.1 TLG7921MV2 Overview

Product Information	
Name	TLG7921MV2
SoC	TI AM3352 (Cortex A8)
Operating Voltage	50V~54V POE (Power of Ethernet)
Operating System	Linux 4.1.6
Flash	256 MBytes (NAND Type)
Memory	512 MBytes (DDRIII)
Network Communication	
LoRa Module	Semtech SX1302
LoRa Frequency Range	920~928MHz for JPN
LoRa Data Rate	0.018~62.56Kbps
LoRa Transmit Power	+22 dBm
LoRa Sensitivity	-137 dBm@0.018Kbps
LTE Module	Quectel EC25 series
LTE Frequency Range	[Japan] LTE FDD: B1/B3/B8/B18/B19/B26 LTE TDD: B41 WCDMA: B1/B6/B8/B19
LTE Data Rate	Downlink/Uplink 14.4Mbps/ 5.76Mbps (Max.)
GNSS	GPS/GLONASS

Ethernet	10/100Mbps fast Ethernet
I/O	
Interface	N-Type connector x 4 (for LoRa antenna*2, GPS antenna*1 & LTE antenna*1 use) SIM card connector x 1 POE connector x 1
Power input	PoE (up to 57V) input
Mechanism	
Dimension	220 X 270 X 60 mm (without the connector)
Weight (w/o accessories)	2.4 KG
Accessories in package	6.5 KG
Environmental	
Operation Temperature	-40 ~ 70 °C
Storage Temperature	-40 ~ 80 °C
Certificate	TELEC / VCCI
Software Specification	
Administration Portal	Support Chrome or Firefox
Discovery Tool	Windows 7 or above
M2M Protocol	MQTT
Packet Forwarder	Compatible with ANNWS.01.2.1.W.SYS Gateway to Server Interface
Firmware Upgrading	Support Online Upgrading through Web browser
Network Configuration	Support DHCP, Static IP and DHCP Server

5 Key Component Introduction

5.1 AM3352

5.1.1 General Description

The AM335x microprocessors, based on the ARM Cortex-A8 processor, are enhanced with image, graphics processing, peripherals and industrial interface options such as EtherCAT and PROFIBUS. The devices support high-level operating systems (HLOS).

5.1.2 Feature Introduction

Processor	
CPU Model	AM3352(TI)
CPU	Up to 1-GHz Sitara™ ARM® Cortex®-A8 32‑Bit RISC Processor
CPU Frequency	1-GHz

5.1.3 Block Diagram

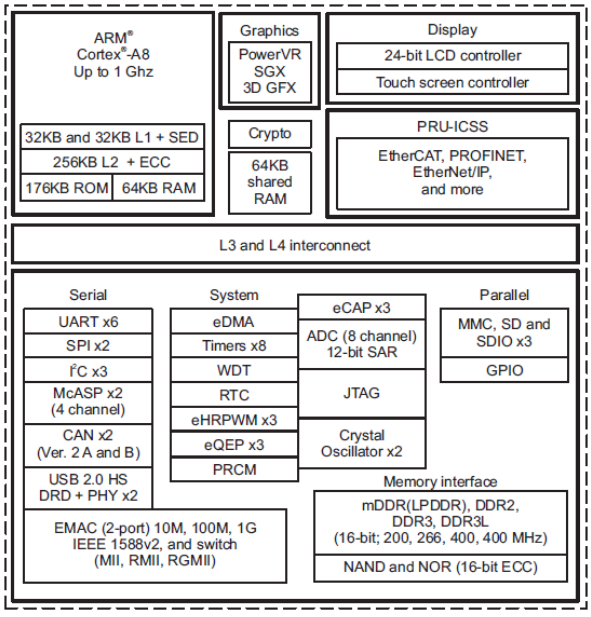

Figure 1 AM335x Functional Block Diagram

5.2 KIWI TLM992

5.2.1 General Description

Follow LoRa® Corecell gateway reference design is a complete gateway turnkey solution reference design provided for US, EU ISM bands. The reference design is based on SX1302 and SX1250 and dedicated to applications.

5.2.2 Feature Introduction

Key Feature	
Tx power	+27 dBm(maximum)
Data rate	0.292~21.875 kbps Receive 8 LoRa® channels multi-data rates (SF5 ~ SF12 / 125 Simultaneously kHz) + 2 mono-data rate (LoRa® 250 / 500 kHz and FSK 50 kbps)
Sensitivity	-127 dBm at SF7 BW 125 kHz -138 dBm at SF12 BW 125 kHz -111 dBm at FSK 50 kbps

Figure 2 KIWI TLM992 8CH LoRa Module

5.3 EC25 Series LTE Module

5.3.1 General Description

EC25 is a series of LTE-FDD/LTE-TDD/WCDMA/GSM wireless communication module with receive diversity. It provides data connectivity on LTE-FDD, LTE-TDD, DC-HSDPA, HSPA+, HSDPA, HSUPA, WCDMA, EDGE and GPRS networks. It also provides GNSS1) and voice functionality2) for customers' specific application. EC25 contains seven variants: EC25-E, EC25-A, EC25-V, EC25-J, EC25-AU, EC25-AUT, EC25-AF and EC25-AUTL. Customers can choose a dedicated type based on the region or operator.

5.3.2 Feature Introduction

Key Features	
Power Supply	Supply voltage: 3.3V~4.3V Typical supply voltage: 3.8V
Dimension	(29.0±0.15)mm × (32.0±0.15)mm × (2.4±0.2)mm
Weight (w/o accessories)	Approx. 4.9 G
LTE band*	Quectel EC25 series, default for JPN LTE FDD: B1/B3/B8/B18/B19/B26 LTE TDD: B41 WCDMA: B1/B6/B8/B19 LTE-M compatible (detail spec shall be updated)
RoHS	All hardware components are fully compliant with EU RoHS directive
Products type	Mini-PCIE

*Note: Customers can choose a dedicated type based on the region or operator.

Figure 3 EC25 Series LTE Module

5.4 NEO-M8Q-0

5.4.1 General Description

The NEO-M8 series utilizes concurrent reception of up to three GNSS systems (GPS/Galileo together with BeiDou or GLONASS), recognizes multiple constellations simultaneously and provides outstanding positioning accuracy in scenarios where urban canyon or weak signals are involved. For even better and faster positioning improvement, the NEO-M8 series supports augmentation of QZSS, GAGAN and IMES together with WAAS, EGNOS, and MSAS. The NEO-M8 series also supports message integrity protection, geofencing, and spoofing detection with configurable interface settings to easily fit to customer applications. The NEO form factor allows easy migration from previous NEO generations.

5.4.2 Feature Introduction

Key Features	
Power Supply	2.7V～3.6V
Interface	-UART -USB -SPI -DDC（I2C compliant）
Grade	Support AEC-Q100
Navigation Sensitivity	-167 dBm
Concurrent reception of up to 3 GNSS (GPS, Galileo, GLONASS, BeiDou)	
Security and integrity protection	
Supports all satellite augmentation systems	
Advanced jamming and spoofing detection	

Figure 4 NEO-M8Q-0 GPS Module

6 Power

6.1 POE Power Adapter

Key Features	
Model	POE29U-560-R
AC Characteristic	AC Input voltage rating: 100VAC to 240V / 47Hz to 63Hz Output Voltage: 56V DC +1V / -2V (54V to 57V Range)
Mechanical	5.51 inch (140 mm) length 2.55 inch (65 mm) width 1.42 inch (36 mm) height

7 Antenna

7.1 LoRa Antenna

7.1.1 Specification

Specification	
Model name	OMA-G01
Type	Omnidirectional
Frequency range	902 ~ 928 MHz
Peak Gain	8.0 dBi
Material of Radiator	Fiberglass
VSWR	1.5
Impedance	50 Ohms
Connector	N-type jack
Dimension	Length: 51.6” / 131 cm Phi: 1.5~2.0 cm

Wind Load	120 mph

7.2 LTE Antenna

7.2.1 Specification

Specification	
Model name	DR-OM18-05002
Type	Omnidirectional
Frequency range	698 ~ 960 MHz 1400~1500 MHz 1710 ~ 2690 MHz
Peak Gain	3.0 dBi
Material of Radiator	Fiberglass
VSWR	3
Impedance	50 Ohms
Connector	N plug
Dimension	Length: 235 mm Phi: 27 mm

7.3 GPS Antenna

7.3.1 Specification

Specification	
Model name	DS1600-0708WNM
Frequency range	1550~1650 MHz

Peak Gain	4.4 dBi
Material of Radiator	Fiberglass
VSWR	2
Impedance	50 Ohms
Connector	N Male
Dimension	Length: 300 mm Phi: 18 mm

8 Mechanical Design

8.1 Physical Appearance & I/O

1. 3G/4G Antenna
2. GPS Antenna
3. SIM Card Slot
4. LoRa Antenna
5. LoRa Antenna
6. PoE Connector

Figure 5 Physical Appearance & I/O

8.2 I/O Description

- N-Type connector x 4 (for LoRa antenna*2, GPS antenna*1 & LTE antenna*1 use)
- SIM card connector x 1
- POE connector x 1

8.3 Mechanism

Unit: mm

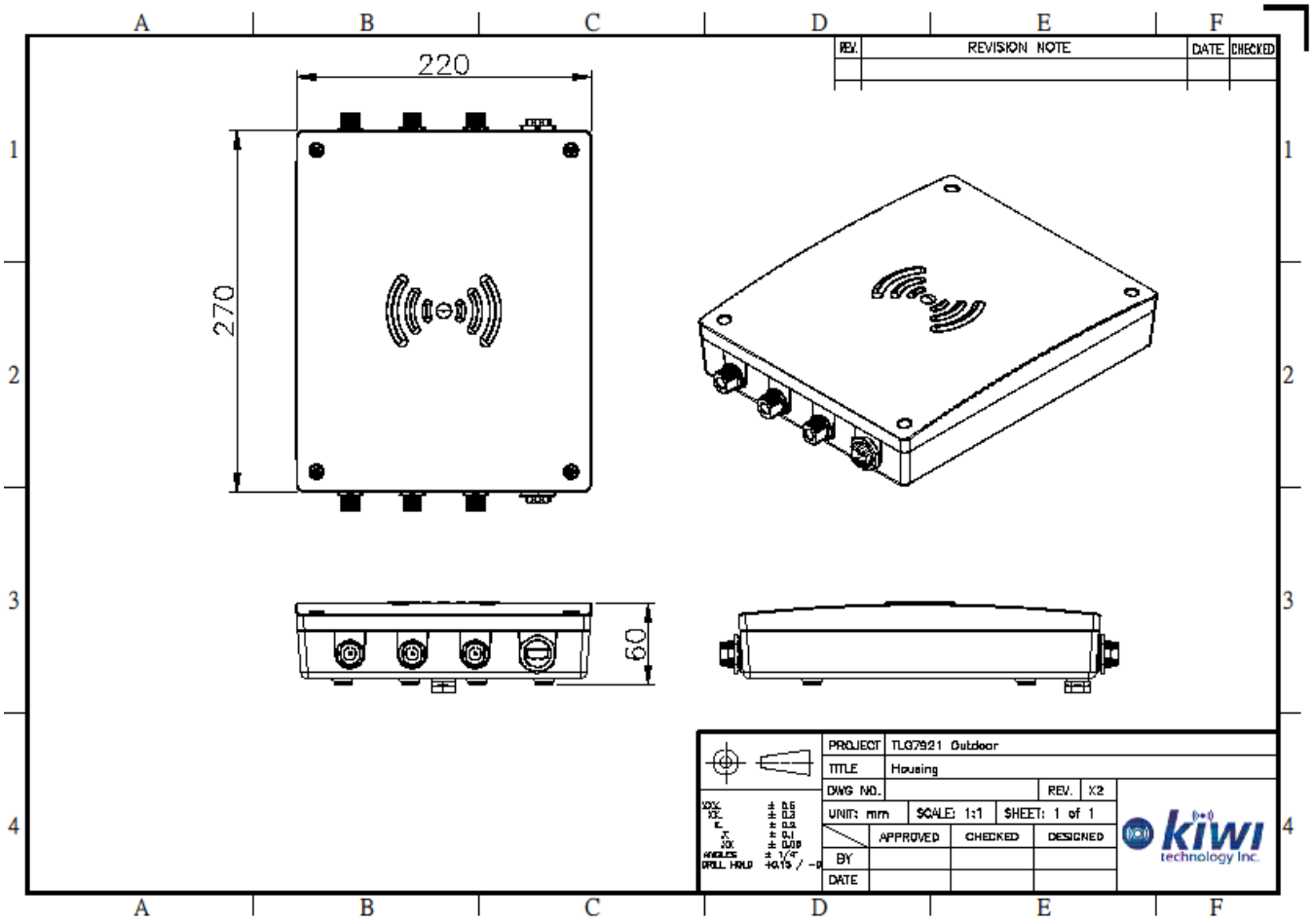

Figure 6 2D Drawing