ORG1511-MK05 EVK

Evaluation Kit (ORG1511-MK05-UAR)

Datasheet

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Ver. #	Description	Author/s	Date
1.0	First release	Orel Nimni	December 10, 2022

RELATED DOCUMENTATION

Ver. #	Description
1	ORG1511-MK05 Datasheet
2	MTK NMEA Packet User Manual

ABBREVIATIONS

Abbreviation	Description
BOM	Bill Of Materials
CS	Component Side
CTS	Clear to Send
DOK	Disk On Key
ESD	Electronic Sensitive Device
EVK	Evaluation Board
FW	Firmware
GLONASS	GLObal NAvigation Satellite System – Russian Satellite Positioning System
GND	Ground
GNSS	Global Navigation Satellite System
GPS	Global Positioning System – American Satellite Positioning System
IC	Integrated Circuit
IO	Input/Output
IOH	High Level of IO Value
IOL	Low Level of IO Value
LDO	Low Dropout Regulator
LGA	Low Gain Amplifier
LVTTL	Low voltage Transistor–transistor Logic
NFZ	Noise Free Zone
NMEA	National Marine Electronics Association Protocol
PC	Personal Computer
PCB	Printed Circuit Board
PCN	Pseudo-Random Noise
PS	Printed Side
QZSS	Quasi-Zenith Satellite System - Japanese satellite positioning system
RF	Radio Frequency
RTS	Ready To Send
RXD	Receive Data
SBAS	Satellite-based Augmentation Systems

Abbreviation	Description
SiP	System In Package
SMT	Surface-Mount Technology
SoC	System on Chip
TAMB	temperature for Absolute Maximum
TTFF	Time To First Fix
TTL	Transistor–Transistor Logic
TTM	Time-to-Market
TXD	Transmit Data
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus
Vbat	Battery Voltage
Vcc	Common Collector Voltage
VBUS	Bus Voltage
VHYST	Hysteresis Voltage
VIN	Input Voltage
VOH	High level Output Voltage
VOL	Low level Output Voltage

Scope

This document describes the features and specifications of the evaluation kit of the ORG1511-Mk05 module.

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Disposal Information

This product must not be treated as household waste.

For more detailed information about recycling electronic components, contact your local waste-management authority.

Contact Information

contactus@origingps.com www.origingps.com

1. About The Hornet Family

OriginGPS GNSS receiver modules have been designed to address markets where size, weight, stand-alone operation, highest level of integration, power consumption and design flexibility - all are very important.

The OriginGPS' Hornet family breaks the size barrier, offering the industry's smallest fully integrated, highly sensitive GPS and GNSS modules with integrated antennas or on-board RF connectors.

Hornet family modules feature OriginGPS' proprietary NFZ™ technology for high sensitivity and noise immunity even under marginal signal condition, commonly found in urban canyons, under dense foliage or when the receiver's position in space rapidly changes.

Hornet modules enable the shortest TTM (Time-To-Market) with minimal design risks, you just need to connect a power supply to a single layer PCB.

2. About The ORG1511-MK05 Module

The ORG1511MK-05 module is a complete SiP featuring miniature LGA SMT footprint designed to commit unique integration features for high volume cost sensitive applications.

Designed to support compact and traditional applications such as smart watches, wearable devices, asset trackers, the ORG1511MK-05 module is a miniature multi-channel GPS, GLONASS, GALILEO, SBAS, QZSS and other regional overlay systems receiver that continuously tracks all satellites in view, providing real-time positioning data in industry's standard NMEA format.

The module offers superior sensitivity and outstanding performance, achieving rapid TTFF in less than one second, accuracy of approximately two meters, and tracking sensitivity of -165dBm.

Sized only 10mm x 10mm, it is industry's small sized, record-breaking solution.

The ORG1511MK-05 module integrates OriginGPS proprietary on-board GNSS antenna, dual-stage LNA, RF LDO, SAW filter, TCXO, RTC crystal and RF shield with market-leading MT3333 GNSS SoC.

The ORG1511MK-05 module is introducing industry's lowest energy per fix ratio, unparalleled accuracy and extremely fast fixes even under challenging signal conditions, such as in built-up urban areas, dense foliage or even indoors.

Integrated GNSS SoC incorporating high-performance microprocessor and sophisticated firmware keeps positioning payload off the host, allowing integration in embedded solutions with low computing resources.

Innovative architecture can detect changes in context, temperature, and satellite signals to achieve a state of near continuous availability by maintaining and opportunistically updating its internal fine time, frequency, and satellite ephemeris data while consuming mere microwatts of battery power.

3. ABOUT ORIGINGPS

OriginGPS develops, manufactures and supplies the world's smallest GNSS and cellular IoT solutions.

Our high-performance miniature GNSS products provide multiple constellation support to help you track everything valuable to you and your business. The OriginIoT™ makes IoT-enabling devices affordable and accessible by eliminating the need for additional embedded software and RF engineering knowhow. The low power cellular IoT system reduces project costs and dramatically shortens time-to-market when you develop cellular IoT devices.

OriginGPS miniature products are ideal for market verticals, such as asset tracking, fleet management, industrial IoT, law enforcement, pet/people tracking, precision agriculture, smart cities, sports and wearables.

4. DEFAULT EVK STATE

4.1. ORG1511-MK05 Evaluation Kit OVERVIEW

The Following section introduces the main elements of the evaluation kit and describes how they work together.

- J8 - VCC connected to an internal LDO 3.3V.
- J10 - Force_On connected to GND to enable Backup mode.
- J9 – J9.10 connected to J9.9, creates connection between V_Backup to VCC.
- J26 - Enables switching UART to an FTDI cable or micro-USB connector. The “Up” position, shown in the below figure depicts a state using the micro-USB cable.
- J29 - J29.2 connected to J29.3 by this connection, TX connected without level shifter to J26.

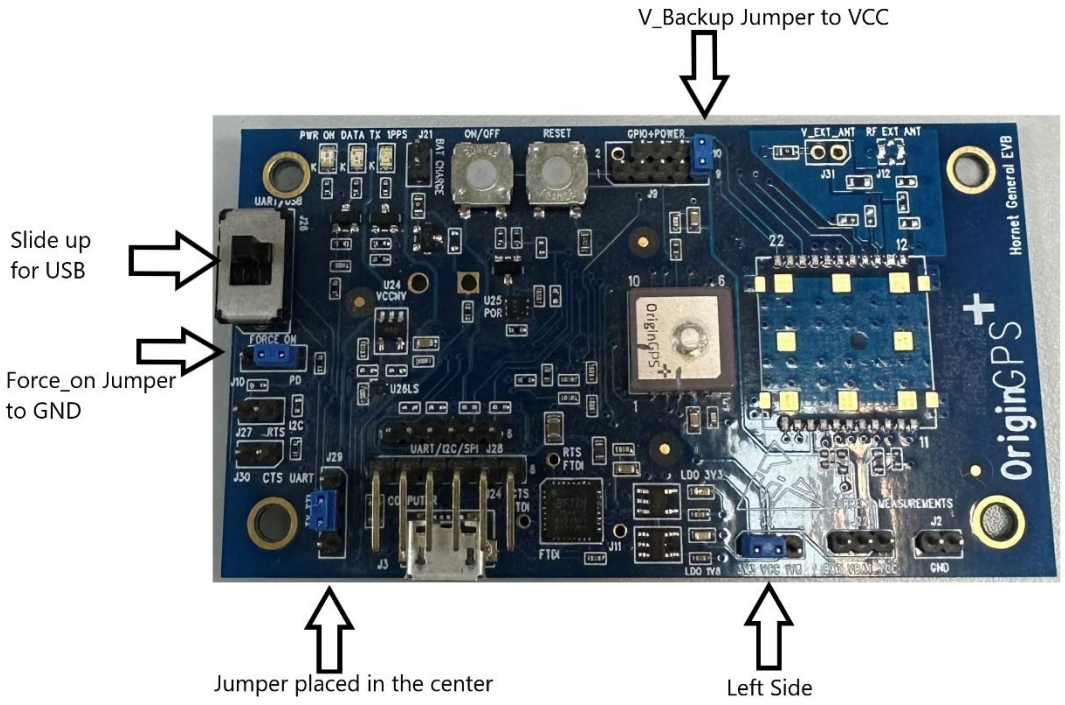

Figure 1. Default EVK State And Configuration

4.2. PCB View

The picture below describes all the functionality of the board. The purpose of this view is user-friendly for understanding the board by the silk on it.

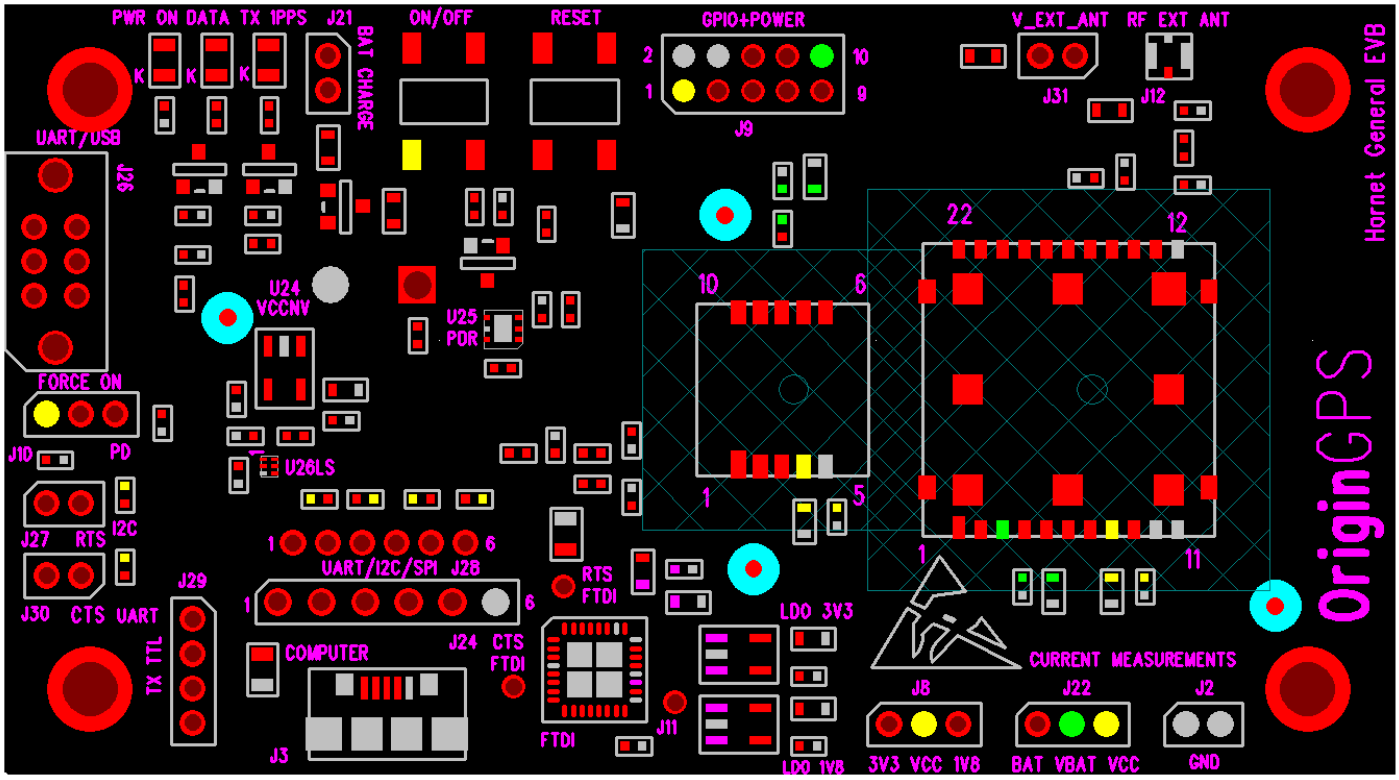

Figure 2. EVK PCB

4.3. Power Supply View

The below Figure depicts the functionality of the board, specifically relating to the power source components. The diagram enables viewing the power supply components, the connectors, and the toggle options to control the OriginGPS Evaluation Kit.

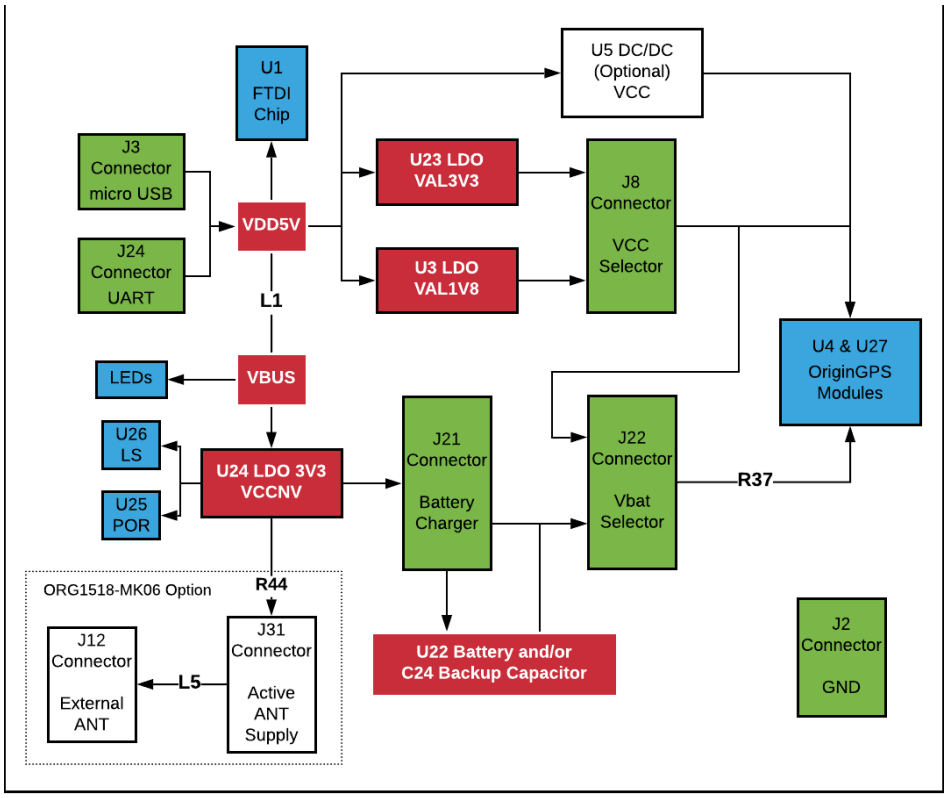

Figure 3. Flow Chart – Power Supply Components

4.4. Interface View

The Block Diagram below describes all the functionality of the board regarding the Interfaces inside the board. The purpose of this view is user-friendly for understanding the board, each connector inside the board and all the options for manual control of the OriginGPS EVK.

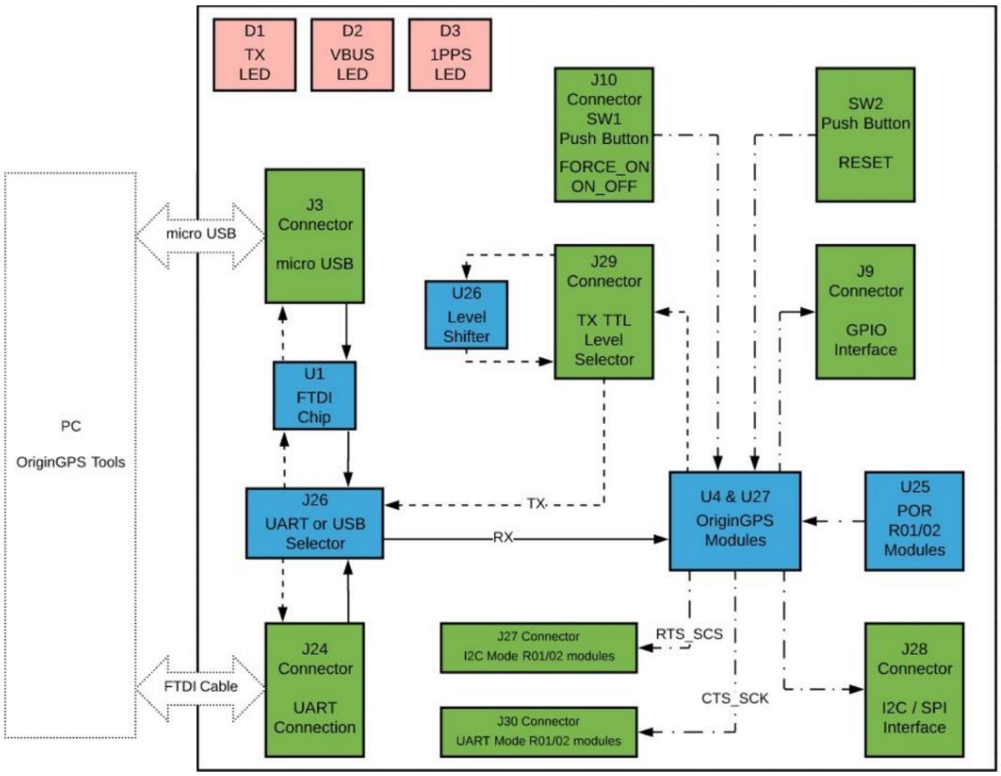

Figure 4. Flow Chart – Interfaces

5. SCHEMATICS

The Evaluation Kit of the ORG1511-MK05 can be used for OriginGPS Spider and Hornet modules. Therefore, while the schematics will include all the components in all the modules, the BOM lists the components for the ORG1511-MK05.

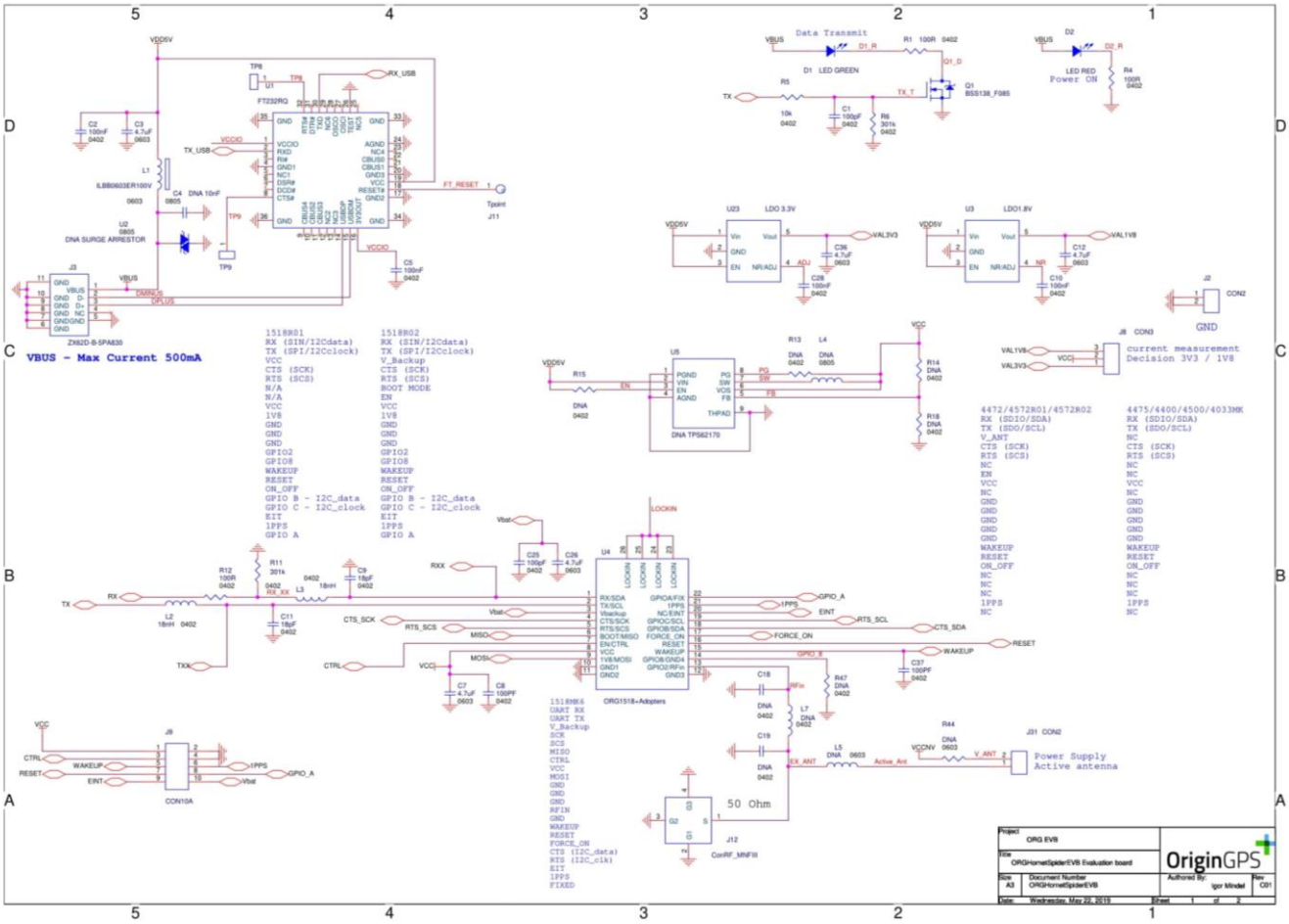

Figure 5. Schematics Page 1

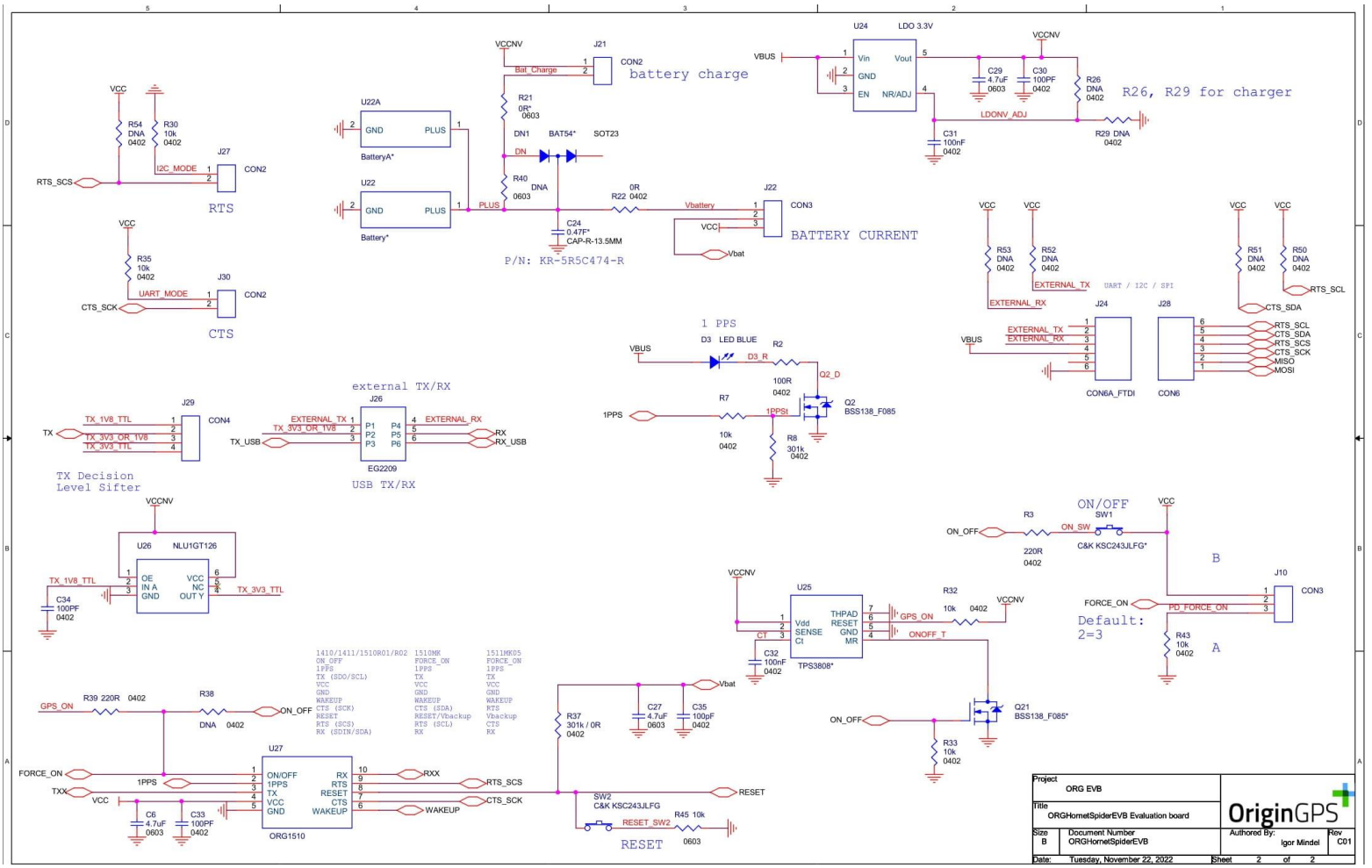

Figure 6. Schematics Page 2

5.1. Bill of Materials

5.1.1. Main Board Bill of Materials

Reference	Value	Description	P/N	MFG
R22, R37	0Ω	RES SMT 0402 0Ω ±5%	CRCW04020000Z0ED	VISHAY
R5, R7, R30, R32, R33, R35, R43	10kΩ	RES SMT 0402 10K ±1%	CRCW040210K0FKED	VISHAY
C9, C11	18pF	CAP SMT 0402 18pF ±5% 50V COG	GRM1555C1H180JA01D	MURATA
C2, C5, C10, C28, C31, C32	0.1uF	CAP SMT 0402 100nF ±10% 16V X7R	GRM155R71C104KA88D	MURATA
U3	LDO	LDO 1.8V	TLV70018DDCT	Texas Instruments
U23, U24	LDO	LDO 3.3V	TLV70033DDCT	Texas Instruments
C1, C30, C33, C34, C35	100pF	CAP SMT 0402 100pF ±5% 50V COG	GRM1555C1H101JA01D	MURATA
L2, L3	18nH	CHIP EMIFIL INDUCTOR 18nH 5%	LQG15HS18NJ02D	MURATA
C3, C6, C12, C27, C29, C36	4.7uF	CAP SMT 0603 4.7uF ±10% 6.3V X5R	GRM188R60J475KE19D	MURATA
R6, R8, R11	301kΩ	RES SMT 0402 301KΩ ±1%	CRCW 0402 -301K	VISHAY
U26	SB3S	Single Buffer 3 STATE	NLU1GT126CMUTCG	ON Semiconductor
U25	POR	LOW IQ POR SUPERVISOR W. MAN. RST	TPS3808G18DRVR	Texas Instruments
R1, R2, R4, R12	100Ω	RES SMT 0402 100Ω ±1%	RM04FTN1000	TA-I
R21 ,R44	0Ω	RES SMT 0603 0Ω ±5%	CRCW06030000Z0EA	VISHAY
SW1, SW2	SW	SMD TACT SWITCH	TJ-532-V-T/R	DIPTRONICS
Q1, Q2, Q21	Transistor	BSS138_F085	BSS138_F085	ON Semiconductor
J3	u-USB	microUSB	ZX65D-B-5PA830	Hirose Connector
R3	220Ω	RES SMT 0402 220Ω ±5%	RM04F2200CT	TA-I
L1	10R	10R 25% FERRITE BEADS 0603	ILBB0603ER100V	VISHAY
D3	LED	LED Blue SMT 0805 20mA	APT2012QBC/D	Kingbright
D1	LED	LED Green Water Clear SMT 0805 20mA	APT2012SGC	Kingbright
D2	LED	LED RED Water Clear SMT 0805 20mA	APT2012SRCPRV	Kingbright
U1	Convertor	FT232R Single Ch FTDI USB Interface IC	FT232RQ-TRAY	FTDI
R45	10kΩ	RES SMT 0603 10K ±1%	CRCW060310K0FKEAC	VISHAY
DN1	schottky diode	30V 200mA Fairchild SchoTtky Diodes & Rectifiers	BAT54S	VISHAY
C4	10nF	CAP SMT 0805 10nF ±15% 50V X8R	GCM219R91H103KA37D	MURATA
U2	Zener diode	ESD Suppressors / TVS Diodes WE-VE ESD 0805 12V 56pF	82350120560	WURTH
U27	GNSS module	ORG1511-MK05		OriginGPS
J2,J21,J27,J30	Jumper	CON2	M22-2510205	Harwin
J8,J10,J22	Jumper	CON3	M22-2510305	Harwin
J29	Jumper	CON4	M22-2510405	Harwin
J28	HDR	COM6	M22-2510605	Harwin
J26	ESW	12VDC 0.1 AMP E-SWITCH Slide Switches	EG2209	E-SWITCH
J9	HDR	CON9A(Without Pad 2)	M22-2510505	Harwin
J24	HDR	CON6A_FTDI	2211S-06G-F1	NELTRON
J9.1-J9.9	Wire	Connection between VCC and V_Backup	-	-

Table 1. Main Bill of Materials

6. ASSEMBLY AND LAYOUT

6.1. Main Board PCB

Main Board for the ORG1511-MK-05 GNSSS Antenna Module is 2 layers 1.6mm thickness FR4 PCB.

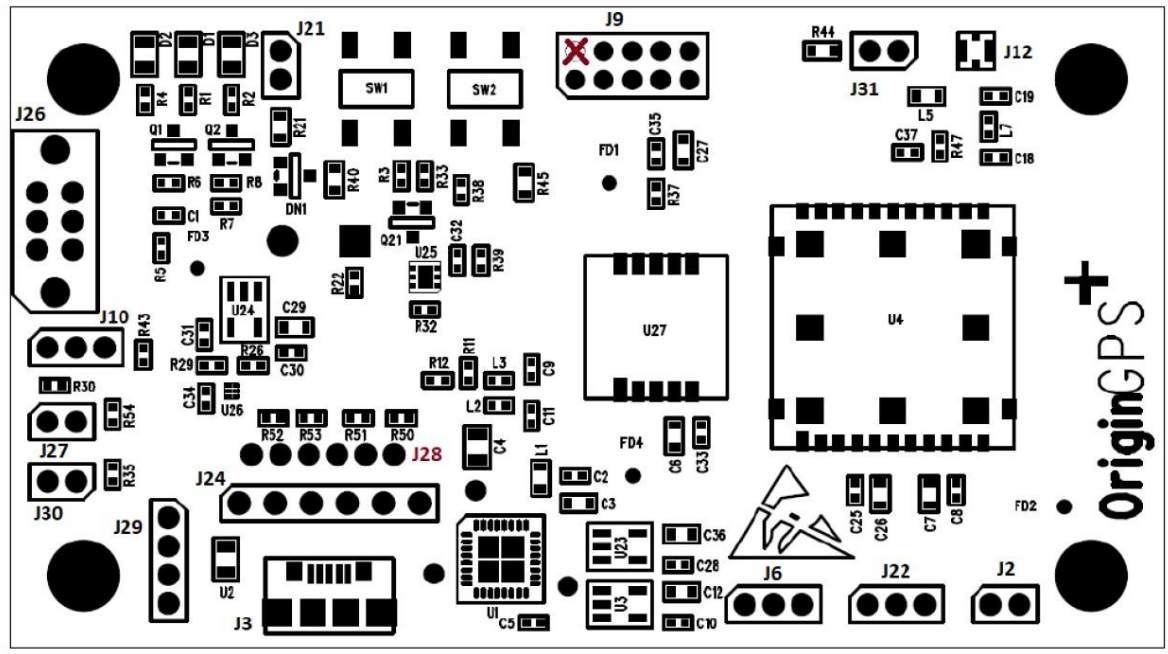

Figure 7. Main Board Component Placement (Top Side)

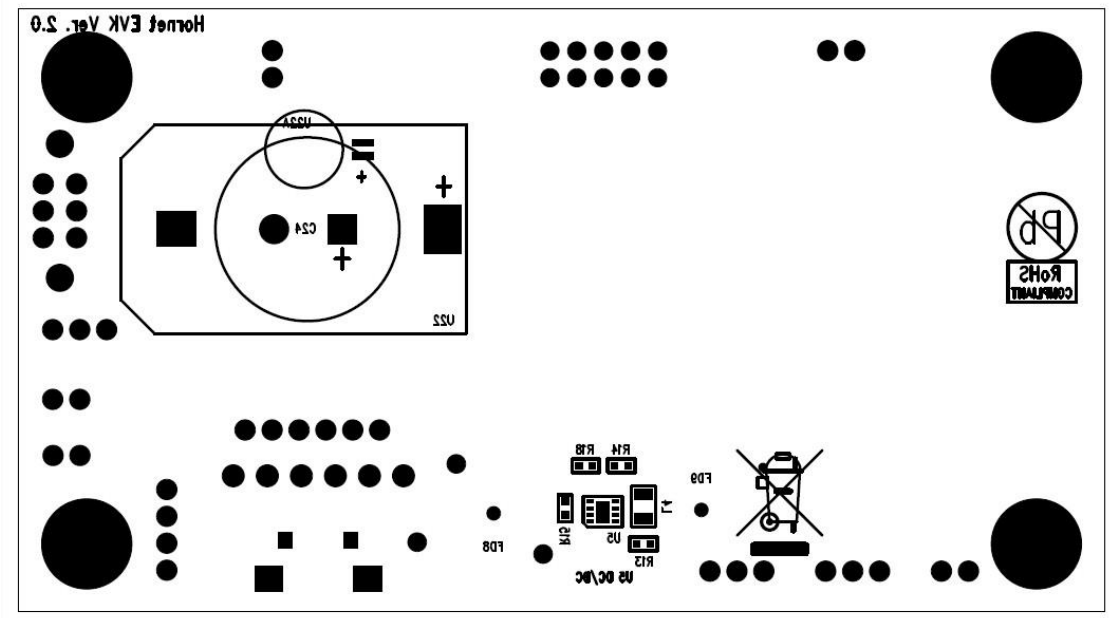

Figure 8. Main Board Component Placement (Bottom Side)

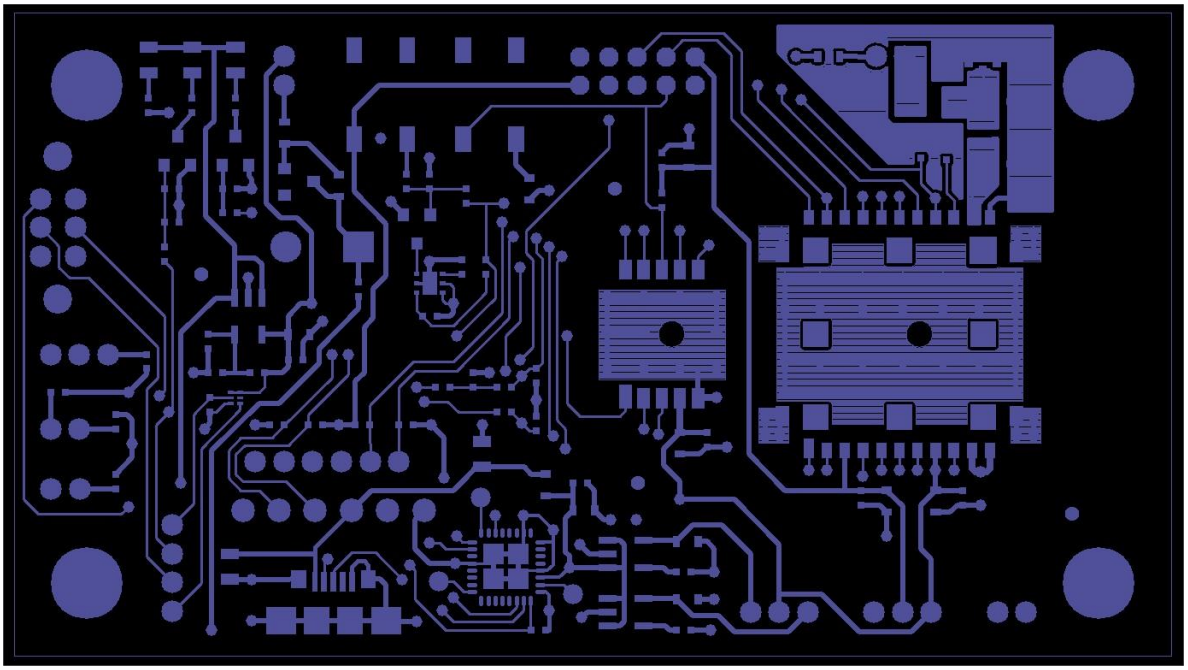

Figure 9. Gerber Top Side CS Layer

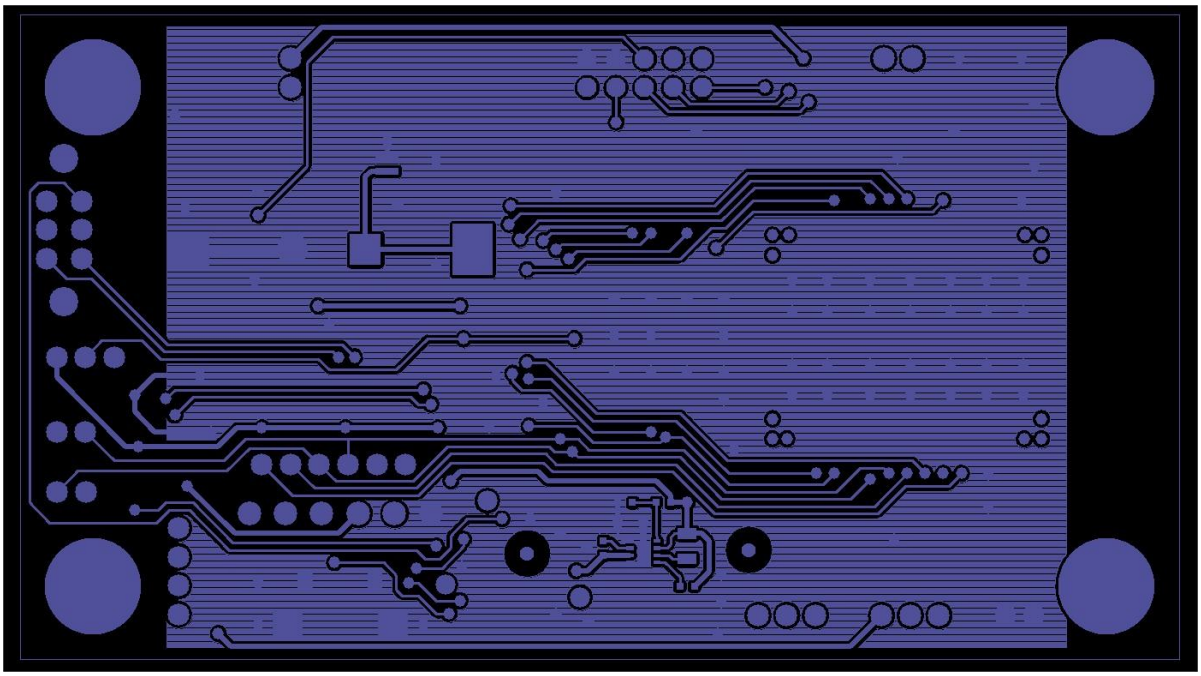

Figure 10. Gerber Bottom Side PS Layer

7. ORDERING INFORMATION

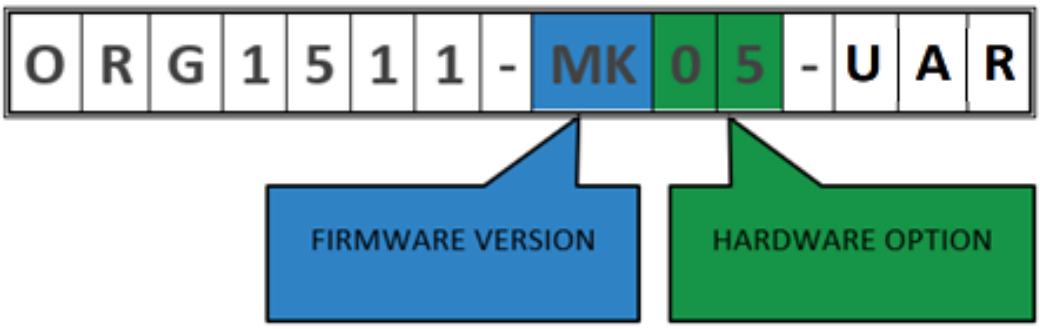

Figure 11. Ordering Options

Part Number	FW Version	HW Option	VCC Range	Description	SPQ
ORG1511-MK05-UAR	MK	05	5V USB	Evaluation Kit	1

Table 2.Orderable Devices