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Satellite Things to no micro Ji

VK2828U7G5LF

V1.0

G-MOUSE

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**VK2828U7G5LF**

**G-MOUSE**

**Data Sheet** **v1.0**

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Highlights

- Qie Industry Standard 25 * 25 * 4MM high sensitivity GPS antenna
- UART / TTL, 232 optional interface
- KDS 0.5PPM using high-precision TCXO
- Built SQI Flash, free rich configuration parameters
- Built-in RTC Crystal and capacitance of the skin faster Mai Qie hot start
- Built-LNA, a low noise amplifier
- 1-10Hz position update rate
- Support AssistNow Online and AssistNow Offline A-GPS services, etc.
- GPS, GLONASS, GALILEO, SBAS (WAAS, EGNOS, MSAS, GAGAN) hybrid engine

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**1. Product description**

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The main chip: UBX-G7020-KT

C / A code, 1. 0 2 3 MH z stream Reception band: L 1 [. 1 5 7 5 4 2 MH z]

Receive Channel: 56CH

S11 SWR: ≤1.3 S22 SWR: ≤1.3

S21 Log Mag: ≥ 20.0dB S11 Smith: 50Ω ± 5%

**Location Performance**

Horizontal position accuracy: <2.5m [Autonomous] [50%] <2m [SBAS]

(CEP, 50%, 24 static, signal strength -130 dBm, about six satellites available)

| | |
|---|---|
| Rate: <0.1m / s | Directions: <0.5Degrees |
| Timing accuracy: 30ns | The reference coordinate system: WGS-84 |
| Maximum altitude: 50000m | Maximum speed: 500m / s |
| Acceleration: ≤4g | |
| **Electrical properties:** | **Other parameters** |
| Tracking Sensitivity: -162dBm | Standard clock pulse: 0.25Hz1KHz |
| Acquisition sensitivity: -160dBm | Position update rate: 1Hz10Hz (default 1 H z) |
| Mai cold start sensitivity: - 1 4 8 d B m | UART / TTL port interface [default] |
| Mai Kai heat sensitivity: - 1 4 8 d B m | RS232 port interface [optional] |
| Mai Kai heat sensitivity: - 1 5 6 d B m | Built SQI Flash |

Cold Start Mai Time: 29s [average]

Mai Kai Wen Time: 28 s [average]

Mai hot start time: 1s [average]

AGPS [network auxiliary inferior ephemeris data]: 3s [average]

Data Rate (UART / TTL): 9600bps (default) [software configurable: 4800, 19200, 38400, 57600,

115200, 230400, 460800,921600]

Output statement: NMEA 0183 V3.0 (GGA, GSA, GSV, RMC, VTG, GLL) protocol data, customizable output statements combination

Operating temperature: - 4 0 °C to + 8 5 °C



**Dimensions (Unit: mm): 28 * 28 * 8.6mm**

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EN GND RX TX VCC PPS

1.25mm pitch 6PIN
Connector plug

PPS indicator
(Not locate former PPS indication Ji Liang,
After successful positioning green LED flashes)

Power Indicator

Shield cover

After normal power bright red lights

PIN foot function

| Name | Description |
|---|---|
| PPS | Time standard pulse output |
| VCC | System main power supply voltage is + 3.3V + 5V, 25mA current consumption during operation |
| TX | UART / TTL interface and optional RS232_TXD |
| RX | UART / TTL interface and optional RS232_RXD |
| GND | Ground |
| EN | Power Enable, high / floating modules work, low module close |



**2. Working conditions**

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Normal operating conditions

| Parameters | Least | Standard | Maximum | Unit |
|---|---|---|---|---|
| voltage | 3.3 | 5 | 5.5 | V |
| Operating temperature | -40 | ?? | +85 | °C |
| Working current | 25 | 30 | 35 | mA |
| Storage temperature | -40 | ?? | +85 | °C |

RTC Power qualified [RTC power supply module self, life time of about 2Hour]

| Parameters | Least | Standard | Maximum | Unit |
|---|---|---|---|---|
| RTC Supply Voltage | 1.8 | 3.0 | 3.6 | V |
| Current consumption (operating) | ?? | Fifteen | ?? | uA |

Digital interface level condition

| Parameters | Least | Standard | Maximum | Unit |
|---|---|---|---|---|
| Input High | 2.0 | 2.8 | 3.3 | V |
| Input Low | ?? | ?? | 0.8 | V |
| Output high | twenty four | 2.8 | 3.3 | V |
| Output Low | ?? | ?? | 0.4 | V |

Power-instantaneous current curve

**3. The test pattern signal, and RF Figure**

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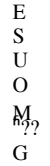
1. signal test pattern:




2.RF RF properties:

**4.NMEA0183 agreement**

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NMEA 0183 output

GGA: time, location, location type

GLL: latitude, longitude, UTC time

GSA: GPS receiver operating mode, positioning using Qie satellite, DOP value

GSV: visible GPS satellite information, elevation, azimuth, signal to noise ratio (SNR)

RMC: time, date, location, velocity

VTG: Ground speed information

MSS: signal strength

Note: The output Qie information about the frequency is not set

Sample data:

$ GPGGA, 060826.00,2236.91284, N, 11403.24705, E, 2,08,1.03,107.8, M, -2.4, M ,, 0000 * 4A

$ GPGSA, A, 3,24,22,14,12,15,25,18,42 ,,,,, 2.20,1.03,1.95 * 01

$ GPGSV, 3,1,11,12,31,117,47,14,30,290,46,15,19,060,42,18,70,010,45 * 78

$ GPGSV, 3,2,11,21,47,207,, 22,40,326,43,24,44,036,43,25,24,159,42 * 70

$ GPGSV, 3,3,11,31,03,218,, 42,51,128,35,50,46,122,45 * 4E

$ GPGLL, 2236.91284, N, 11403.24705, E, 060826.00, A, D * 66

$ GPRMC, 060827.00, A, 2236.91267, N, 11403.24701, E, 0.001,, 130214 ,,, D * 79

$ GPVTG ,, T ,, M, 0.029, N, 0.054, K, D * 2C

**4.1 GGA**

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Sample data:

$ GPGGA, 060826.00,2236.91284, N, 11403.24705, E, 2,08,1.03,107.8, M, -2.4, M ,, 0000 * 4A

| No. | Name | Sample | Unit | Description |
|---|---|---|---|---|
| 0 | Message ID | $ GPGGA | | GGA protocol header |
| 1 | UTC time | 060,826.00 | | hhmmss.ss |
| 2 | Latitude | 2236.91284 | | ddmm.mmmmm |
| 3 | N / S instructions | N | | N = North, S = South |
| 4 | Longitude | 11403.24705 | | dddmm.mmmmm |
| 5 | E / W indication | E | | W = West, E = east |
| 6 | Positioning instructions | 2 | | 0: No Location<br>1: SPS mode, locate valid<br>2: Differential, SPS mode, locate valid<br>3: PPS model, positioning and effective |
| 7 | The number of satellites | 08 | | Range 0-12 |
| 8 | HDOP | 1.03 | | Horizontal accuracy |
| 9 | MSL margin | 107.8 | Meter | MSL |
| 10 | Unit | M | Meter | Unit: m |
| 11 | Earth | -twenty four | Meter | Mean Sea Level |
| 12 | Unit | M | | Unit: m |
| 13 | Difference Time | | second | When no DGPS, invalid |
| 14 | Differential ID | 0000 | | When no DGPS, invalid |
| Fifteen | Checksum | * 4A | | All characters between ASCII code is not * $␦checksum |
| 16 | <CR> <LF> | | | End message |





**4.2 GSA**

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Sample data:

$ GPGSA, A, 3,24,22,14,12,15,25,18,42 ,,,,, 2.20,1.03,1.95 * 01

| No. | Name | Sample | Unit | Description |
|---|---|---|---|---|
| 0 | Message ID | $ GPGSA | | GSA protocol header |
| 1 | Mode 1 | A | | M =-Manual (forced operation in 2D or 3D mode), A = self Mai |
| 2 | Mode 2 | 3 | | 1: Positioning invalid 2: 2D positioning 3: 3D positioning |
| 3 | Satellites | twenty four | | Channel 1 |
| 4 | Satellites | twenty two | | Channel 2 |
| 5 | Satellites | 14 | | Channel 3 |
| 6 | Satellites | 12 | | Channel 4 |
| 7 | Satellites | Fifteen | | Channel 5 |
| 8 | Satellites | 25 | | Channel 6 |
| 9 | Satellites | 18 | | Channel 7 |
| 10 | Satellites | 42 | | Channel 8 |
| 11 | ?? | ?? | ?? | ?? |
| 12 | Satellites | | | Channel 12 |
| 13 | PDOP | 2.20 | | Location Accuracy |
| 14 | HDOP | 1.03 | | Horizontal accuracy |
| Fifteen | VDOP | 1.95 | | Vertical accuracy |
| 16 | Checksum | * 01 | | All characters between ASCII code is not * $ checksum |
| 17 | <CR> <LF> | | | End message |



**4.3 GSV**

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Sample data:

$ GPGSV, 3,1,11,12,31,117,47,14,30,290,46,15,19,060,42,18,70,010,45 * 78

$ GPGSV, 3,2,11,21,47,207,, 22,40,326,43,24,44,036,43,25,24,159,42 * 70

$ GPGSV, 3,3,11,31,03,218,, 42,51,128,35,50,46,122,45 * 4E

| No. | Name | Sample | Unit | Description |
|---|---|---|---|---|
| 0 | Message ID | $ GPGSV | | GSV protocol header |
| 1 | The number of messages | 3 | | The range of 1-3 |
| 2 | Message number | 1 | | The range of 1-3 |

| | | | | |
|---|---|---|---|---|
| 3 | The number of satellites | 11 | | Satellite number乩 |
| 4 | Satellite ID | 12 | | Satellite ID |
| 5 | Elevation | 31 | Degree | Elevation (range 0 ° to 90 °) |
| 6 | Azimuth | 117 | Degree | Azimuth angle (range 0 ° to 359 °) |
| 7 | Carrier to noise ratio (C/No) | 47 | dBHz | When the signal strength (range 0-99) no trace is empty |
| 8 | Satellite ID | 14 | | Satellite ID |
| 9 | Elevation | 30 | Degree | Elevation (range 0 ° to 90 °) |
| 10 | Azimuth | 290 | Degree | Azimuth angle (range 0 ° to 359 °) |
| 11 | Carrier to noise ratio (C/No) | 46 | dBHz | When the signal strength (range 0-99) no trace is empty |
| 12 | Satellite ID | Fifteen | | Satellite ID |
| 13 | Elevation | 19 | Degree | Elevation (range 0 ° to 90 °) |
| 14 | Azimuth | 060 | Degree | Azimuth angle (range 0 ° to 359 °) |
| Fifteen | Carrier to noise ratio (C/No) | 42 | dBHz | When the signal strength (range 0-99) no trace is empty |
| 16 | ĥ?? | ĥ?? | ĥ?? | ĥ?? |
| 17 | Checksum | * 78 | | All characters between ASCII code is not * $乩checksum |
| 18 | <CR> <LF> | | | End message |



**4.4 GLL**

Sample data: $ GPGLL, 2236.91284, N, 11403.24705, E, 060826.00, A, D * 66

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| No. | Name | Sample | Unit | Description |
|---|---|---|---|---|
| 0 | Message ID | $ GPGLL | | GLL protocol header |
| 1 | Latitude | 2236.91284 | | ddmm.mmmmm |
| 2 | N / S instructions | N | | N = North, S = South |
| 3 | Longitude | 11403.24705 | | dddmm.mmmmm |
| 4 | E / W indication | E | | W = West, E = east |
| 5 | UTC position | 060,826.00 | | hhmm.mmmm |
| 6 | Status | A | | A = data valid; V = data invalid |
| 7 | Mode indication | D | | A = autonomous positioning, D = Difference, E = estimate, N = Data not valid |
| 8 | Checksum | * 18 | | All characters between ASCII code is not * $乩checksum |
| 9 | <CR> <LF> | | | End message |

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**4.5 RMC**

Sample data: $ GPRMC, 060827.00, A, 2236.91267, N, 11403.24701, E, 0.001,, 130214 ,,, D * 79

| No. | Name | Sample | Unit | Description |
|---|---|---|---|---|
| 0 | Message ID | $ GPRMC | | RMC protocol header |
| 1 | UTC time | 060,827.00 | | hhmmss.ss |
| 2 | Status | A | | A = data valid; V = data invalid |
| 3 | Latitude | 2236.91267 | | ddmm.mmmmm |
| 4 | N / S instructions | N | | N = North, S = South |
| 5 | Longitude | 11403.24701 | | dddmm.mmmmm |
| 6 | E / W indication | E | | W = West, E = east |
| 7 | Ground speed | 0.001 | Knot (section) | ground speed |
| 8 | Bearing | | Degree | Ground routes |
| 9 | Date | 130214 | | Day, month, year date format Qie |
| 10 | Magnetic variables | | | Magnetic field changes (blank - Ji support) |
| 11 | Mode indication | D | | A = autonomous positioning, D = Difference, E = estimate, N = Data not valid |
| 12 | Checksum | * 79 | | All characters between ASCII code is not * $ checksum |
| 13 | <CR> <LF> | | | End message |



**4.6 VTG**

Sample data: $ GPVTG ,, T ,, M, 0.029, N, 0.001, K, D * 2C

| No. | Name | Sample | Unit | Description |
|---|---|---|---|---|
| 0 | Message ID | $ GPVTG | | VTG protocol header |
| 1 | Bearing | | Degree | Ground routes |
| 2 | Reference | T | | True North |
| 3 | Reference | | ?? | Course over ground (magnetic Qie), Ji output |
| 4 | Reference | M | | Magnetic |
| 5 | Speed | 0.029 | Knots (section) | ground speed |
| 6 | Unit | N | | Fixed byte |
| 7 | Speed | 0.001 | Km / h | Ground speed |
| 8 | Unit | K | | Km / h |
| 9 | Mode indication | D | | A = autonomous positioning, D = Difference, E = estimate, N = Data not valid |
| 10 | Checksum | * 2C | | All characters between ASCII code is not * $ checksum |
| 11 | <CR> <LF> | | | End message |

**5.GPS / GLONASS protocol switching**

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Qie is a GPS module default output protocol data can be tested software or serial command, modify switching PS / GLONASS protocol data.

1, by testing software GLONASS protocol data set, as shown:

According to FIG. ①②③ Step operation

Or send GLONASS protocol data switching function commands through the serial port:

B5 62 06 3E 24 00 00 00 16 04 00 04 FF 00 00 00 00 00 01 01 03 00 00 00 00 00 05 00 03 00 00 00 00 00 06 08 FF 00 01 00 00 00 A0 D9 B5 62 06 3E 00 00 42 D2

After setting Figure: Output北begins with $ GL北GLONASS protocol data.

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2. Restore the GPS protocol data

To switch to GPS protocol data can be sent to restore GPS protocol via the serial data commands:

B5 62 06 09 0D 00 FF FF 00 00 00 00 00 00 FF FF 00 00 07 1F 9E

**6. Coordinates Converter**

$ GPRMC, 060556.00, A, 2236.9141, N, 11403.2466, E, 0.034,, 130214 ,,, D * 7F

The results were converted to Qie: 22.615236,114.054112 via Google Earth Search, displays the current actual position Qie

Set (Note: to Tx through a browser or Google Maps Baidu map will have deviation):



**7.UBLOX used to set parameters agreement**

ublox can modify parameters through the serial port to send commands, if you use computer software to send the serial port settings when needed option HE

On ublox module power initialization needs 300ms, 300ms UBLOX after power modules from the CPU via the serial port to send the following sixteen

Hex configuration commands:
7.1. Close the output command

24 45 49 47 50 51 2c 44 54 4d 2a 33 42 0d 0a b5 62 06 01 03 00 f0 0a 00 04 23 -> Close GPDTM statement
24 45 49 47 50 51 2c 47 42 53 2a 33 30 0d 0a b5 62 06 01 03 00 f0 09 00 03 21 -> Close GPGBS statement
24 45 49 47 50 51 2c 47 47 41 2a 32 37 0d 0a b5 62 06 01 03 00 f0 00 00 fa 0f -> Close GPGGA statement
24 45 49 47 50 51 2c 47 4c 4c 2a 32 31 0d 0a b5 62 06 01 03 00 f0 01 00 fb 11 -> Close GPGLL statement
24 45 49 47 50 51 2c 47 52 53 2a 32 30 0d 0a b5 62 06 01 03 00 f0 06 00 00 1b -> Close GPGRS statement
24 45 49 47 50 51 2c 47 53 41 2a 33 33 0d 0a b5 62 06 01 03 00 f0 02 00 fc 13 -> Close GPGSA statement
24 45 49 47 50 51 2c 47 53 54 2a 32 36 0d 0a b5 62 06 01 03 00 f0 07 00 01 1d -> Close GPGST statement
24 45 49 47 50 51 2c 47 53 56 2a 32 34 0d 0a b5 62 06 01 03 00 f0 03 00 fd 15 -> Close GPGSV statement
24 45 49 47 50 51 2c 52 4d 43 2a 33 41 0d 0a b5 62 06 01 03 00 f0 04 00 fe 17 -> Close GPRMC statement
24 45 49 47 50 51 2c 56 54 47 2a 32 33 0d 0a b5 62 06 01 03 00 f0 05 00 ff 19 -> Close GPVTG statement
24 45 49 47 50 51 2c 5a 44 41 2a 33 39 0d 0a b5 62 06 01 03 00 f0 08 00 02 1f -> Close GPZDA statement

7.2. Open the output command

24 45 49 47 50 51 2c 44 54 4d 2a 33 42 0d 0a b5 62 06 01 03 00 f0 0a 01 05 24 -> Open GPDTM statement
24 45 49 47 50 51 2c 47 42 53 2a 33 30 0d 0a b5 62 06 01 03 00 f0 09 01 04 22 -> Open GPGBS statement
24 45 49 47 50 51 2c 47 47 41 2a 32 37 0d 0a b5 62 06 01 03 00 f0 00 01 fb 10 -> Open GPGGA statement
24 45 49 47 50 51 2c 47 4c 4c 2a 32 31 0d 0a b5 62 06 01 03 00 f0 01 01 fc 12 -> Open GPGLL statement
24 45 49 47 50 51 2c 47 52 53 2a 32 30 0d 0a b5 62 06 01 03 00 f0 06 01 01 1c -> Open GPGRS statement
24 45 49 47 50 51 2c 47 53 41 2a 33 33 0d 0a b5 62 06 01 03 00 f0 02 01 fd 14 -> Open GPGSA statement
24 45 49 47 50 51 2c 47 53 54 2a 32 36 0d 0a b5 62 06 01 03 00 f0 07 01 02 1e -> Open GPGST statement
24 45 49 47 50 51 2c 47 53 56 2a 32 34 0d 0a b5 62 06 01 03 00 f0 03 01 fe 16 -> Open GPGSV statement
24 45 49 47 50 51 2c 52 4d 43 2a 33 41 0d 0a b5 62 06 01 03 00 f0 04 01 ff 18 -> Open GPRMC statement
24 45 49 47 50 51 2c 56 54 47 2a 32 33 0d 0a b5 62 06 01 03 00 f0 05 01 00 1a -> Open GPVTG statement
24 45 49 47 50 51 2c 5a 44 41 2a 33 39 0d 0a b5 62 06 01 03 00 f0 08 01 03 20 -> Open GPZDA statement

7.3. Baud Rate Setting

Set at 4800 baud

b5 62 06 00 14 00 01 00 00 00 d0 08 00 00 c0 12 00 00 07 00 07 00 00 00 00 00 d3 fc b5 62 06 00 01 00 01 08 22

Set 9600 baud

b5 62 06 00 14 00 01 00 00 00 d0 08 00 00 80 25 00 00 07 00 07 00 00 00 00 00 a6 cd b5 62 06 00 01 00 01 08 22



38400 baud rate settings

b5 62 06 00 14 00 01 00 00 00 d0 08 00 00 00 96 00 00 07 00 07 00 00 00 00 00 97 a8

115200 baud rate settings

b5 62 06 00 14 00 01 00 00 00 d0 08 00 00 00 c2 01 00 07 00 07 00 00 00 00 00 c4 96 b5 62 06 00 01 00 01 08 22

7.4 The output rate setting

1Hz mode (one second output data 1)
B5 62 06 08 06 00 E8 03 01 00 01 00 01 39

5Hz mode (one second output data 5)
B5 62 06 08 06 00 C8 00 01 00 01 00 DE 6A B5 62 06 08 00 00 0E 30

10Hz mode (one second output data 10 times)
B5 62 06 08 06 00 64 00 01 00 01 00 7A 12 B5 62 06 08 00 00 0E 30

0.33Hz mode (three seconds output 1 data)
B5 62 06 08 06 00 B8 0B 01 00 01 00 D9 41 B5 62 06 08 00 00 0E 30

0.2Hz mode (five seconds of data output 1)
B5 62 06 08 06 00 88 13 01 00 01 00 B1 49 B5 62 06 08 00 00 0E 30

0.1Hz mode (10 seconds data output 1)
B5 62 06 08 06 00 10 27 01 00 01 00 4D DD B5 62 06 08 00 00 0E 30

0.05Hz mode (20 seconds data output 1)
B5 62 06 08 06 00 20 4E 01 00 01 00 84 00 B5 62 06 08 00 00 0E 30

7.5 Other commonly used settings

Reset

B5 62 06 04 04 00 FF 87 01 00 95 F7

Cold Start Mai

B5 62 06 04 04 00 FF FF 02 00 0E 61

Hot start Mai

B5 62 06 04 04 00 00 00 02 00 10 68

Restore Factory Settings

B5 62 06 09 0D 00 FF FF 00 00 00 00 00 00 FF FF 00 00 07 1F 9E

Into low power mode (low-power mode state Ji output data, but held in position. To return to normal mode, enter the command Mai warm start)

B5 62 06 04 04 00 00 00 08 00 16 74

Save Settings

B5 62 06 09 0D 00 00 00 00 00 FF FF 00 00 00 00 00 00 17 31 BF



**8. Product Packaging**

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☐ pallet sizes: 40cm (length) × 23cm (width) × 2cm (high)

☐ 1 layer tray 50PCS