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# GPS2020 Module Specifications


*(Preliminary)*

Version 3.6

*Confidential Information*

# *Technical Specifications*

**Table 1 Absolute Maximum Ratings**

| Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Power Supply Voltage (VCC) | | -0.3 | | 3.6 | V |
| Power Supply to RF (VCCRF) | | -0.3 | | 3.6 | V |
| Power Supply to RTC (VDDRTC) | | -0.3 | | 3.6 | V |
| Voltage on Any Pin | | GND-0.3 | | Vcc+0.3 | V |
| Input RF Power | | | | -30 | dBm |

**Table 2 Operating Conditions**

| Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Frequency Range | | | 1.57542 | | GHz |
| RF Receiver Reference Clock | +/-15ppm | | 24.5535 | | MHz |
| Real Time Clock | +/-20ppm | | 32768 | | Hz |
| Power Supply Voltage (VCC) | | 3.0 | 3.3 | 3.6 | V |
| Power Supply to RF (VCCRF) | | 2.85 | 3.0 | 3.6 | V |
| Power Supply to RTC (VDDRTC) | | 1.85 | 3.0 | 3.6 | V |
| Antenna Input Impedance | | | 50 | | Ohm |
| Logical Input | - High | 0.7xVCC | | | V |
| | - Low | | | 0.3xVCC | V |
| Logical Output | - High (Ioh = 2.0mA for TXB, TXA TIMEMARK, SO, SK, GPIO) | 2.4 | | | V |
| | - Low (Iol = 2.0mA for TXB, TXA TIMEMARK, SO, SK, GPIO) | | | 0.4 | V |
| Input Leakage Current | | | | 2 | µA |
| Input Capacitance (Digital Pins) | | | | 3 | pF |
| Output Capacitance (Digital Pins) | | | | 3 | pF |
| Bi-directional Buffer Capacitance | | | | 3 | pF |

**Table 3 Temperature Operating Conditions**

| Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Temperature | | -40 | +25 | +85 | $^{o}$C |

**Table 4 GPS Architecture Performance**

| Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Channels | | | 12 | | |
| Max. Solution Update Rate | | | 1 | | per sec |
| Cold Start | Average* | | 45 | | sec. |
| Warm Start | Average* | | 38 | | sec. |
| Hot Start | Average* | | 8 | | sec. |
| Minimal Signal Tracked | | | -140 | | dBm |
| Maximum Altitude | | | | 18300 | m |
| Maximum Velocity | | | | 1852 | km/h |
| Position Accuracy | 24hr stationary test** | | 3 | | m |

*** At least 100 starts for cold, warm and hot start.**

**** Dynamic test results will vary according to environmental conditions**

**Table 5 Receiver Performance**

| Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Input RF Level | | | | -120 | dBm |
| Input impedance | | | 50 | | Ohm |

**Table 6 Trickle Power Timing**

| Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Tracking Time | | 200 | | 900 | ms |
| Duty Cycle | | 1 | | 4 | sec. |

**Table 7 Trickle Power Current Consumption**

| Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Trickle State | | | 1 | | mA |
| CPU State | | | 30 | | mA |
| Tracking State (Full Power) | | | 145 | | mA |

**Table 8 Physical Dimensions**

| Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Length | | | 13 | | mm |
| Width | | | 15 | | mm |
| Thickness* | | | 3.75 | | mm |

**Notes**

- Specifications are subject to change without notice
- Specifications are measured at room temperature
- GPS2020 is SiRFStarII powered

* Thickness as measured after mounting.

The table below provides electrical specifications associated with the back-up battery.

**Table 9 Back-up Battery Conditions**

| Parameter | Symbol | Min | Typical | Max |
|---|---|---|---|---|
| RTC Power | VDDRTC | 1.85V | | 3.6V |
| Supply Current | IDDRTC | | 10µA | |

**Note:** The back up battery is used to store the receiver configuration (startup mode, protocol output, etc.), last position. Furthermore, this battery retains the RTC clock parameters as well as low power mode configuration.

## *Pin-out Definitions*

The table below provides GPS module pin-out matrix and pin definitions.

**Table 10 GPS2020 Pin Layout (Top View)**

| | ***1*** | ***2*** | ***3*** | ***4*** | ***5*** | ***6*** | ***7*** | ***8*** | ***9*** | ***10*** | ***11*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***A*** | EA45 | EA21 | EA8 | EA11 | EA12 | EA27 | EA31 | EA32 | EA3 | EA41 | EA23 |
| ***B*** | EA39 | EA44 | | | | | | | | EA43 | EA24 |
| ***C*** | EA25 | EA14 | | | | | | | | EA2 | EA16 |
| ***D*** | EA26 | EA13 | | | | | | | | EA4 | EA17 |
| ***E*** | EA7 | EA34 | | | | | | | | EA1 | EA5 |
| ***F*** | EA19 | EA35 | | | | | | | | EA46 | EA6 |
| ***G*** | EA9 | EA33 | | | | | | | | EA42 | EA40 |
| ***H*** | EA22 | EA36 | EA29 | EA15 | EA30 | EA28 | EA38 | EA18 | EA37 | EA10 | EA20 |

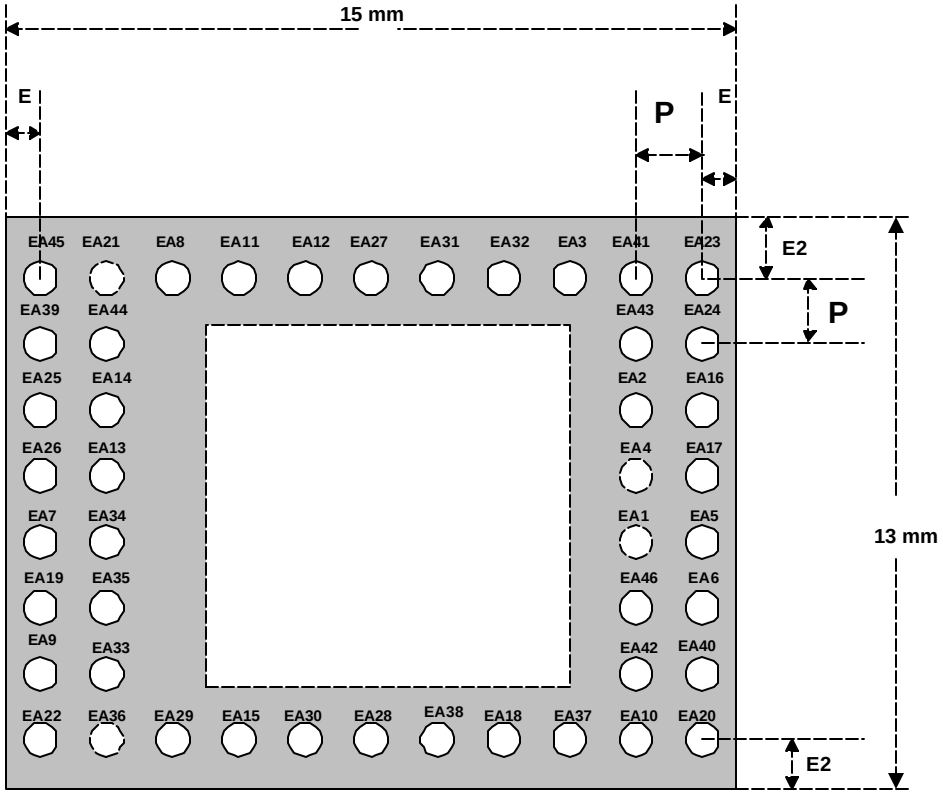
**Table 11 Pin Definitions**

| NAME | BUMP | TYP | SIGNAL | DESCRIPTION |
|---|---|---|---|---|
| EA1 | E10 | I | SRESET | SYSTEM RESET |
| EA2 | C10 | I | VDDRTC | REAL TIME CLOCK POWER |
| EA3 | A9 | O | JTDO | JTAG INTERFACE |
| EA4 | D10 | I | JTCK | JTAG INTERFACE |
| EA5 | E11 | I | JTMS | JTAG INTERFACE |
| EA6 | F11 | I | JTDI | JTAG INTERFACE |
| EA7 | E1 | O | TIMEMARK | 1 PPS TIME MARK OUTPUT |
| EA8 | A3 | I | ECLK | EXTERNAL CLOCK SOURCE |
| EA9 | G1 | O | RFPC0 | POWER MODE CONTROL |
| EA10 | H10 | O | RFPC1 | POWER MODE CONTROL |
| EA11 | A4 | O | TXDA | SERIAL DATA OUTPUT A * |
| EA12 | A5 | I | RXDA | SERIAL DATA INPUT A * |
| EA13 | D2 | O | TXDB | SERIAL DATA OUTPUT B |
| EA14 | C2 | I | RXDB | SERIAL DATA INPUT B |
| EA15 | H4 | I | BOOTSEL | PERMITS PROGRAMMING OF FLASH |
| EA16 | C11 | O | RTCOUT | REAL TIME CLOCK OUTPUT |
| EA17 | D11 | I | RTCIN | REAL TIME CLOCK INPUT |
| EA18 | H8 | I/O | GPIO A | GENERAL PURPOSE I/O |
| EA19 | F1 | I | VCC | DC POWER |
| EA20 | H11 | I | VCC | DC POWER |
| EA21 | A2 | | GND | GROUNDING |
| EA22 | H1 | | GND | GROUNDING |
| EA23 | A11 | | GND | GROUNDING |
| EA24 | B11 | O | RFPC1 | POWER MODE CONTROL |
| EA25 | C1 | I | VCCRF | DC POWER |
| EA26 | D1 | I/O | GPIO15 | GENERAL PURPOSE I/O |
| EA27 | A6 | I/O | GPIO13 | GENERAL PURPOSE I/O |
| EA28 | H6 | I/O | GPIO14 | GENERAL PURPOSE I/O |
| EA29 | H3 | I/O | GPIO16 | GENERAL PURPOSE I/O |
| EA30 | H5 | I/O | GPIO10 | GENERAL PURPOSE I/O |
| EA31 | A7 | I/O | GPIO17 | GENERAL PURPOSE I/O |
| EA32 | A8 | I/O | GPIO18 | GENERAL PURPOSE I/O |
| EA33 | G2 | I/O | SK | MBUS CLOCK |
| EA34 | E2 | O | SO | SERIAL INTERFACE SYNCHRONOUS OUT |
| EA35 | F2 | I | SI | SERIAL INTERFACE SYNCHRONOUS IN |
| EA36 | H2 | I/O | GPIO11 | GENERAL PURPOSE I/O |
| EA37 | H9 | I/O | GPIO12 | GENERAL PURPOSE I/O |
| EA38 | H7 | I/O | GPIO44 | GENERAL PURPOSE I/O |
| EA39 | B1 | | GND | GROUNDING |
| EA40 | G11 | | GND | GROUNDING |
| EA41 | A10 | | GND | GROUNDING |
| EA42 | G10 | | GND | GROUNDING |
| EA43 | B10 | | GND | GROUNDING |
| EA44 | B2 | | GND | GROUNDING |
| EA45 | A1 | I | ANT | ANTENNA INPUT |
| EA46 | F10 | O | GPS CLK | GPS CLOCK OUTPUT |

Note: Serial port A is used for normal operations. For enhanced versions (i.e. DGPS etc) use Serial port B.

## *Foot Print Dimensions*

**Top View**



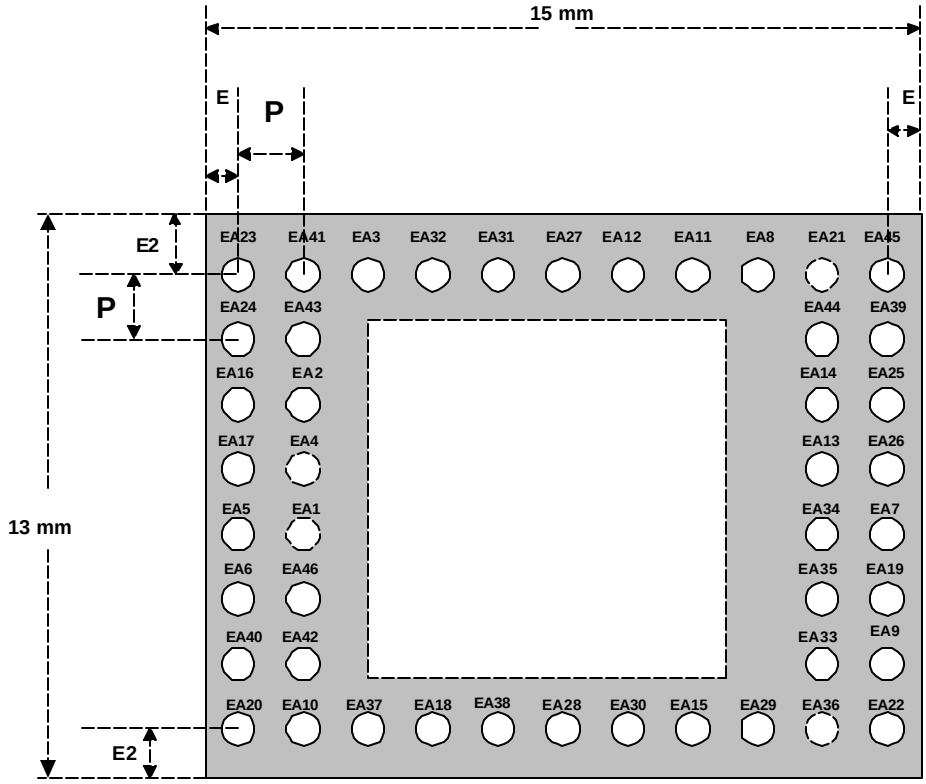

**Typical Dimension Figures**

**E2 = 2.055 mm**

**E = 1.15 mm**

**P = 1.27 mm**

## Bottom View

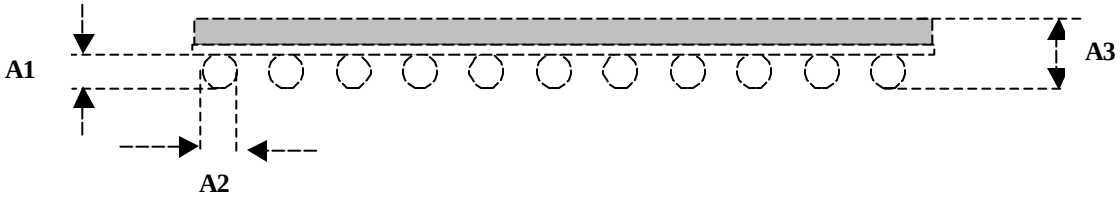



## Typical Dimension figures

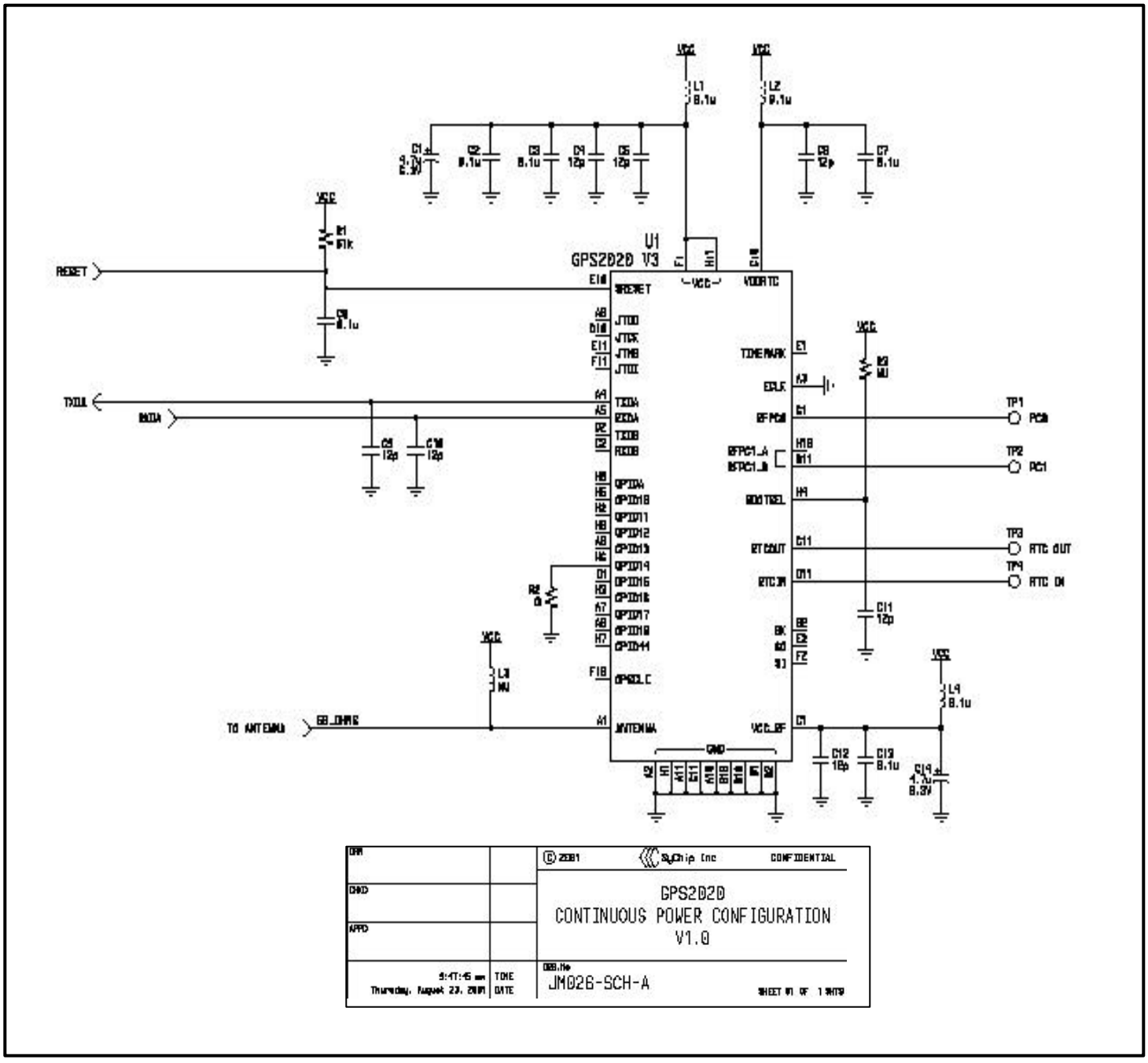
| | |
|---|---|
| E2 = 2.055 mm | A1 = 0.889mm * |
| E = 1.15 mm | A2 = 0.889mm * |
| P = 1.27 mm | A3 = 3.75mm * |

* Nominal Figures

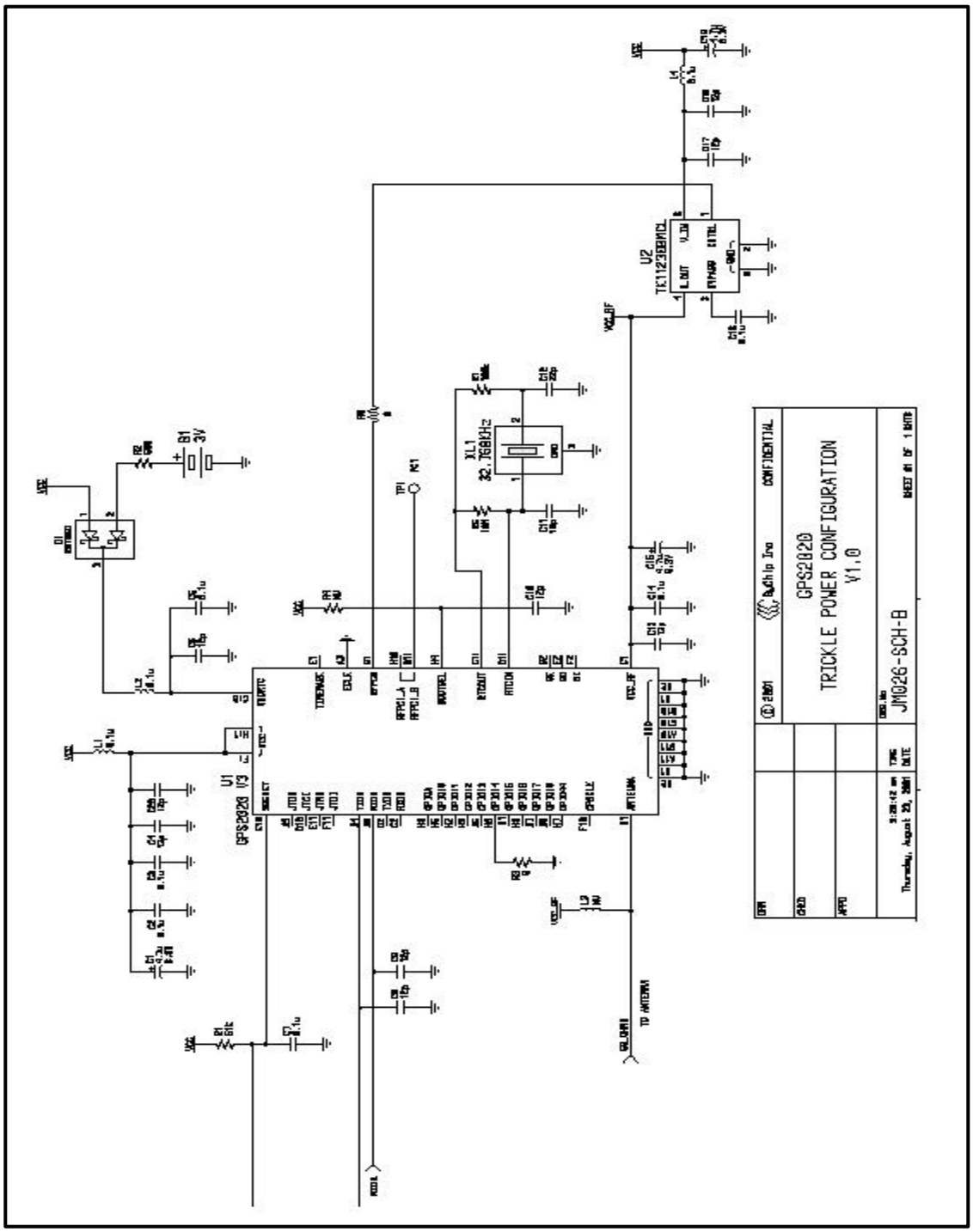
## Side View



## *Schematic for Continuous Power Operation*



## *Schematic for Trickle Power Operation*



## *Order Information*

For sales inquiry, please send an email to: sales@sychip.com

GPS module can be ordered with the following part number and description.

| ***Part Number*** | ***Description*** |
|---|---|
| GPS2020M01-T1 | GPS Receiver System – Module |
| GPS2020S01-TY1 | GPS2020 Sample Pack – 5 Modules |
| GPS2020E01 | GPS2020 Evaluation Kit |

For more information on SyChip, visit www.sychip.com

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