VENUS822A GPS / GNSS Baseband Processor – Flash Version

FEATURES

- Support GPS, Beidou, QZSS, SBAS
- Support GPS, GLONASS, QZSS, SBAS
- Ultra fast signal acquisition and TTFF speed
- Perform 16 million time-frequency hypothesis testing per second
- Signal detection better than -165dBm
- Reacquisition sensitivity –157dBm
- Open sky hot start 1 second
- Open sky cold start 29 seconds
- Accuracy 2.5m CEP
- Multipath detection and suppression
- Jamming detection and mitigation
- Supports AGPS
- Tracking 15mA @ 3.3V
- 7mm x 7mm QFN56, RoHS compliant

The Venus822A is a high-performance GPS / GNSS baseband processor intended for GPS / Beidou or GPS / GLONASS applications. It contains all the baseband function required for GPS / Beidou and GPS / GLONASS signal acquisition, tracking, and navigation solution. The Venus822A is designed to allow easy integration of GPS / Beidou or GPS / GLONASS into application systems.

A dedicated massive-correlator signal parameter search engine enables rapid search of all available satellites and acquisition of very weak signals. An advanced track engine allows weak signal tracking and positioning in severe environments such as urban canyons and under deep foliage.

A complete low-cost high-performance GPS / Beidou or GPS / GLONASS receiver can be built with Venus822A, a compatible GPS / Beidou or GPS / GLONASS RF front-end, and a small number of external components.

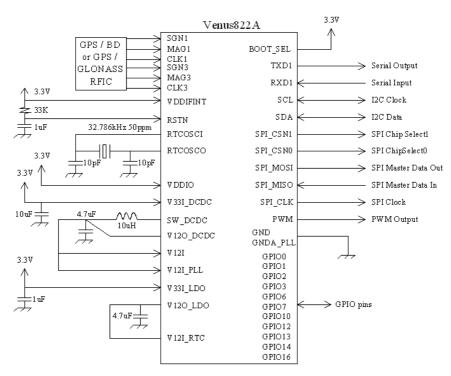


Figure-1 GPS/Beidou or GPS/GLONASS Receiver based on Venus822A

FUNCTIONAL DESCRIPTION

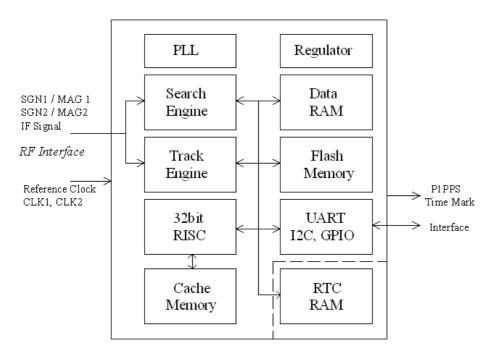


Figure-2 Baseband Processor Functional Diagram

The Venus822A implements all the needed function for GPS/Beidou and GPS/GLONASS signal acquisition, tracking, decoding, and navigation solution. It is optimized for GPS/Beidou or GPS/GLONASS applications requiring high performance. Major blocks within the chip are: GPS/GNSS signal processing engine, 32bit RISC processor, peripheral interface, and memory.

RF Interface

The RF interface supports single-ended IF signal in sign/magnitude format and sampling frequency of 16.367667MHz with +/-0.5ppm accuracy for GPS/Beidou, and 24.552MHz with +/-0.5ppm accuracy for GPS/GLONASS.

GPS/GNSS Signal Processing Engine

The signal-processing engine comprise of a signal parameter search engine and a track engine. Both implement carrier frequency wipe-off, pseudorandom code removal, plus coherent and incoherent integration required for indoors high-sensitivity signal processing.

The signal parameter search engine can be configured to search full code space and several frequencies simultaneously, or full code space of all satellites simultaneously. Massive correlator design allows extremely high signal acquisitions speed and high sensitivity performance.

32bit RISC

The internal 32bit RISC is a 7-stage pipelined processor. The processor handles all time-critical GPS/GNSS related functions, management controls, and navigation solutions.

Cache Memory

Cache memory subsystem consists of 16Kbyte I-cache, and 2Kbyte D-cache.

Battery-Backed RTC and RAM

The real-time clock circuitry and a small block of SRAM is included on-chip to retain time and the necessary GPS/GNSS data for rapid warm start and hot-start operation.

Data RAM

The chip contains SRAM needed for stand-alone operation. The on-chip SRAM is designed for low-power and high-speed single cycle access.

Program ROM

The chip implements program ROM on-chip.

UART

2 sets of UART is supported for Venus822A in QFN56 package.

I₂C

1 set of I2C is supported for Venus822A in QFN56 package.

SPI

SPI with 2 chip-select is supported for Venus822A in QFN56 package.

Regulator

3.3V to 1.2V LDO regulator and 3.3V to 1.2V DC/DC switching regulator is implemented on-chip for powering the RTC & Backup SRAM region (V12I_RTC) and the core logic (V12I).

PLL

The signal parameter search engine requires a high frequency clock. It is generated from the GPS reference clock through the on-chip PLL. A divided-down PLL clock is selected to clock the 32bit RISC.

POWER SUPPLIES

The system is partitioned into the following power supply domains:

VDDIO: Digital supply voltage for the I/O interface, supporting 3.3V I/O, 2.97V ~ 3.63V.

V12I: 1.08V ~ 1.32V, the main digital supply voltage for the core logic. It is typically derived from the on-chip 1.2V DC/DC switching regulator or can be provided from an external supply source.

V12I_PLL: 1.08V ~ 1.32V, the analog supply voltage for the internal PLL.

V12I_RTC: 1.08V ~ 1.32V, the digital supply voltage for the battery backed-up RTC and SRAM. Current consumption ~7uA when main chip is inactive, ~1mA when main chip is active.

VDDIFINT: Digital supply voltage for RFIC interface pins (CLK / SGN / MAG), supporting 3.3V I/O or 1.8V I/O. 2.97V ~ 3.63V for 3.3V I/O. 1.62V ~ 1.98V for 1.8V I/O.

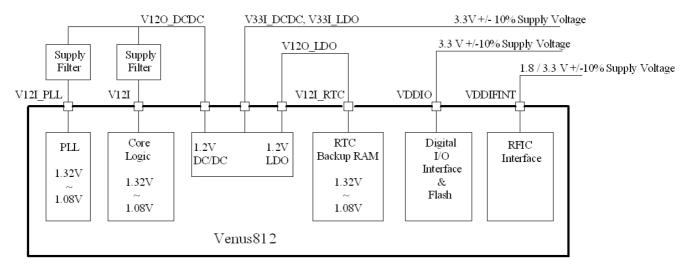


Figure-3 System Power

PIN CONFIGURATION

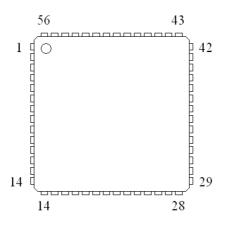


Figure-4 Pin-Out QFN56 (Top-View)

Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name		
1	MAG3	15	V12I_RTC	29	SPI_MOSI	43	GPIO6		
2	SGN3	16	V12I_RTC	30	V12I	44	GPIO10		
3	GNDA_PLL	17	V12I	31	SPI_CSN0	45	VDDIO		
4	V12I_PLL	18	RTCOSCI	32	SPI_CSN1	46	NC		
5	V12I_PLL	19	RTCOSCO	33	SDA	47	GND		
6	V12I	20	V12I_RTC	34	BOOT_SEL	48	GND		
7	VDDIO	21	V12O_DCDC	35	VDDIO	49	GND		
8	RSTN	22	V33I_DCDC	36	V12I	50	GND		
9	GPIO12	23	SW_DCDC	37	GPIO0	51	CLK1		
10	GPIO13	24	GPIO1	38	RXD1	52	SGN1		
11	SPI_CLK	25	GPIO2	39	PWM	53	MAG1		
12	SCL	26	GPIO3	40	TXD1	54	VDDIFINT		
13	V12O_LDO	27	GPIO14	41	GPIO7	55	V12I		
14	V33I_LDO	28	SPI_MISO	42	GPIO16	56	CLK3		

Center pad on bottom of the chip is digital ground of the entire chip; other GND pins are unused functions grounded.

SIGNAL DESCRIPTION

Table-2 Venus822A Signal Description

Supply Instruction VDDIO Power II/O supply voltage input 3.37 V121_RTC Power 1.2V backup voltage input VI21_RTC V121_RTC Power 1.2V PLL voltage input VI21_RTC V121_PLL Power 1.3V supply input to the 1.2V LDO regulator V31_DCDC Power Regulated output of the 1.2V LDO regulator, max current 24mA. Must not use it to drive baseband core V121 input V320_DCDC Power Regulated output of the 1.2V Switching regulator, max current 100mA WW_DCDC Power Switchin, connect to inductor V120_DCDC Power Switching, nonnect to inductor V121_Power I.2V core voltage supply input Voltage input for RFIC interface (CLK, SGN, MAG), 1.8V or CPU Interface General purpose I/O #1, 3.3V I/O Alternative function is UART RXD2 GPI00 Bidir General purpose I/O #3, 3.3V I/O GPI02 Bidir General purpose I/O #3, 3.3V I/O GPI03 Bidir General purpose I/O #3, 3.3V I/O GPI04 Bidir General purpose I/O #1, 3.3V I/O GPI010 Bidir General pur	Signals	Туре	Description
VDDIO Power I/O supply voltage input. 3.3V V121_RTC Power 1.2V blck voltage input V121_PLL Power 1.2V PLL voltage input V31_LDO Power 1.2V PLL voltage input Tot VLD regulator 3.3V supply input to the 1.2V LDO regulator V31_LDO Power Regulated output of the 1.2V LDO regulator, max current 24mA. V120_LDO Power Regulated output of the 1.2V switching regulator V33_DCDC Power Regulated output of the 1.2V switching regulator, max current 100mA SW_DCDC Power Regulated output of the 1.2V switching regulator, max current 100mA SW_DCDC Power I.2V core voltage supply input VDDIFINT Power I.2V core voltage supply input VDDIFINT Power I.2V core voltage supply input VDIENT Power I.2V core voltage supply input VDIENT Power I.2V core voltage supply input VDIENT Power I/O supply voltage input frage 3.0V /O GPIO1 Bidir General purpose I/O #1, 3.3V I/O GPIO2 Bidir General purpose I/O #7, 3.3V I/O	Supply		· ·
Y121_RTC Power 1.2V backup voltage input Y121_PLL Power 1.2V PLL voltage input Y121_PLL Power 3.3V supply input to the 1.2V LDO regulator Voltage input range 2.SV ~ 3.6V, DC current ~30uA Y120_LDO Power Regulated output of the 1.2V LDO regulator, max current 24mA. Must not use it to drive baseband core V121 input Y131_DCDC Power Regulated output of the 1.2V switching regulator, max current 100mA WU DCDC Power Regulated output of the 1.2V switching regulator, max current 100mA WD DCDC Power Regulated output of the 1.2V switching regulator, max current 100mA WD DCDC Power Switching, nonnect to inductor Y120_DCDC Power Switching, nonnect to inductor Y121 Power 1.2V core voltage supply input YDDIFINT Power 1.2V core voltage supply input YDDIFINT Power 1.2V core voltage supply input GPI00 Bidir General purpose 1/0 #1, 3.3V 1/O GPI01 Bidir General purpose 1/0 #3, 3.3V 1/O GPI02 Bidir General purpose 1/0 #3, 3.3V 1/O GPI03 Bidir General purpose 1/0 #1, 3.3V 1/O GPI010		Power	I/O supply voltage input, 3.3V
Y121_PLL Power 3.2V Supply input to the 1.2V LDO regulator Y331_LDO Power 3.3V Supply input to the 1.2V LDO regulator V120_LDO Power Regulated output of the 1.2V LDO regulator, max current 24mA. Must not use it to drive baseband core V121 input Y331_DCDC Y33_DCDC Power Regulated output of the 1.2V switching regulator, max current 100mA Y120_DCDC Power Regulated output of the 1.2V switching regulator, max current 100mA SW_DCDC Power Regulated output of the 1.2V switching regulator, max current 100mA SW_DCDC Power 1.2V core voltage supply input V120_DCDC Power 1.2V core voltage supply input VDDFINT Power 1.2V core voltage supply input VDDFINT Power 1.2V core voltage supply input VDDFINT Power 1.2V core voltage supply input GPI00 Bidir General purpose 1/0 #1, 3.3V 1/O GPI01 Bidir General purpose 1/0 #1, 3.3V 1/O GPI03 Bidir General purpose 1/O #1, 3.3V 1/O GPI04 Bidir General purpose 1/O #10, 3.3V 1/O GPI012 Bidir General purpose 1/O #10, 3.3V 1/O			
V33_LDO Power 3.37 supply input to the 1.27 LDO regulator Voltage input range 2.5V ~ 3.6V, DC current ~30uA V120_LDO Power Regulated output of the 1.2V LDO regulator, max current 24mA. Must not use it to drive baseband core V121 input V33LDCDC Power 8.37 supply input to the 1.2V switching regulator Voltage input range 3.0V ~ 3.6V V120_DCDC Power Regulated output of the 1.2V switching regulator, max current 100mA SW_DCDC Power Brower Switching regulator, max current 100mA V120_DCDC Power Switching, nonnect to inductor V120_DEDC Power Switching, nonnect to inductor V121 Power I/2V core voltage supply input to status LED indicator V121 Power I/2V core voltage supply input status LED indicator GPI01 Bidir General purpose I/0 #2, 33V I/O Alternative function is UART TXD2 GPI02 Bidir General purpose I/O #3, 33V I/O Alternative function is P1PPS GPI03 GPI03 Bidir General purpose I/O #7, 33V I/O GPI04 Bidir General purpose I/O #7, 33V I/O GPI010 Bidir General purpos			
Voltage input range 2.5V ~ 3.6V, DC current ~30uA V120_LDO Power Regulated output of the 1.2V LDO regulator, max current 24mA. Must not use it to drive baseband core V12I input V31_DCDC Power 3.3V supply input to the 1.2V switching regulator Voltage input range 3.0V ~ 3.6V V120_DCDC Power Regulated output of the 1.2V switching regulator, max current 100mA SW_DCDC Power Regulated output of the 1.2V switching regulator, max current 100mA SW_DCDC Power 1.2V core, contage supply input VDDIFINT Power 1.2V core voltage input for RFIC interface (CLK, SGN, MAG), 1.8V or CPU Interface GPI00 Bidir General purpose I/O #1, 3.3V I/O GPI02 Bidir General purpose I/O #1, 3.3V I/O GPI03 Bidir General purpose I/O #2, 3.3V I/O GPI04 Bidir General purpose I/O #7, 3.3V I/O GPI05 Bidir General purpose I/O #10, 3.3V I/O GPI06 Bidir General purpose I/O #10, 3.3V I/O GPI01 Bidir General purpose I/O #10, 3.3V I/O GPI010 Bidir General purpose I/O #10, 3.3V I/O GPI012 Bidir General purp			
V120_LDO Power Regulated output of the 1.2V LDO regulator, max current 24mA. Must not use it to drive baseband core V12I input V33_DCDC Power 3.3V supply input to the 1.2V switching regulator Voltage input range 3.0V ~ 3.6V V120_DCDC Power Regulated output of the 1.2V switching regulator, max current 100mA SW_DCDC Power Switch pin, connect to inductor V121 Power I.2V core voltage supply input VDDIFINT Power I/O supply voltage input for RFIC interface (CLK, SGN, MAG), 1.8V or CPU Interface General purpose I/O #0, 3.3V I/O GPI00 Bidir General purpose I/O #1, 3.3V I/O Atternative function is UART RXD2 GPI02 Bidir General purpose I/O #2, 3.3V I/O GPI03 Bidir General purpose I/O #3, 3.3V I/O GPI04 Bidir General purpose I/O #3, 3.3V I/O GPI05 Bidir General purpose I/O #1, 3.3V I/O GPI01 Bidir General purpose I/O #1, 3.3V I/O GPI01 Bidir General purpose I/O #1, 3.3V I/O GPI01 Bidir General purpose I/O #13, 3.3V I/O GPI010 Bidir General purpose I/O #13, 3.3V I/O <tr< td=""><td>1001_220</td><td>1 01101</td><td></td></tr<>	1001_220	1 01101	
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GPI00 Bidir General purpose I/O #0, 3.3V I/O Alternative function position fix status LED indicator GPI01 Bidir General purpose I/O #1, 3.3V I/O GPI02 Bidir General purpose I/O #2, 3.3V I/O GPI03 Bidir General purpose I/O #3, 3.3V I/O GPI04 Bidir General purpose I/O #3, 3.3V I/O GPI05 Bidir General purpose I/O #3, 3.3V I/O GPI06 Bidir General purpose I/O #7, 3.3V I/O GPI010 Bidir General purpose I/O #7, 3.3V I/O GPI012 Bidir General purpose I/O #10, 3.3V I/O GPI012 Bidir General purpose I/O #11, 3.3V I/O GPI013 Bidir General purpose I/O #14, 3.3V I/O GPI014 Bidir General purpose I/O #14, 3.3V I/O GPI015 Bidir General purpose I/O #14, 3.3V I/O GPI016 Bidir General purpose I/O #14, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SCL Bidir General purpose I/O #2, 3.3V I/O SPI_CSN1 Bidir General purpose I/O #		1 Ower	
Alternative function position fix status LED indicator GPI01 Bidir General purpose I/O #1, 3.3V I/O GPI02 Bidir General purpose I/O #2, 3.3V I/O GPI03 Bidir General purpose I/O #3, 3.3V I/O GPI06 Bidir General purpose I/O #3, 3.3V I/O GPI07 Bidir General purpose I/O #6, 3.3V I/O GPI010 Bidir General purpose I/O #10, 3.3V I/O GPI012 Bidir General purpose I/O #10, 3.3V I/O GPI013 Bidir General purpose I/O #12, 3.3V I/O GPI014 Bidir General purpose I/O #13, 3.3V I/O GPI016 Bidir General purpose I/O #14, 3.3V I/O GPI016 Bidir General purpose I/O #14, 3.3V I/O RXD1 Input UART mupt, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O Alternative function is 12C clock SDA SPI_CSN1 Bidir General purpose I/O #2, 3.3V I/O Altern		Bidir	$G_{aparal purposa} I/0 \#0.2.2 V/I/0$
GPI01 Bidir General purpose I/O #1, 3.3V I/O Alternative function is UART RXD2 General purpose I/O #2, 3.3V I/O GPI02 Bidir General purpose I/O #3, 3.3V I/O GPI03 Bidir General purpose I/O #3, 3.3V I/O GPI06 Bidir General purpose I/O #6, 3.3V I/O GPI07 Bidir General purpose I/O #10, 3.3V I/O GPI010 Bidir General purpose I/O #12, 3.3V I/O GPI012 Bidir General purpose I/O #13, 3.3V I/O GPI013 Bidir General purpose I/O #13, 3.3V I/O GPI014 Bidir General purpose I/O #13, 3.3V I/O GPI015 Bidir General purpose I/O #14, 3.3V I/O GPI014 Bidir General purpose I/O #13, 3.3V I/O GPI016 Bidir General purpose I/O #14, 3.3V I/O RXD1 Input UART output, 3.3V I/O SCL Bidir General purpose I/O #5, 3.3V I/O SCL Bidir General purpose I/O #5, 3.3V I/O Alternative function is 12C clock SDA SPI_CSN1 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #1	GFIOU	Didii	
GN101 Diski Alternative function is UART RXD2 GPI02 Bidir General purpose I/O #2, 3.3V I/O Alternative function is UART TXD2 GPI03 Bidir GPI03 Bidir General purpose I/O #3, 3.3V I/O Alternative function is P1PPS GPI06 Bidir General purpose I/O #6, 3.3V I/O GPI010 Bidir General purpose I/O #10, 3.3V I/O GPI012 GPI012 Bidir General purpose I/O #12, 3.3V I/O GPI013 Bidir General purpose I/O #13, 3.3V I/O GPI014 Bidir General purpose I/O #14, 3.3V I/O GPI016 Bidir General purpose I/O #14, 3.3V I/O RXD1 Input UART input, 3.3V I/O RXD1 UART output, 3.3V I/O SCL Bidir General purpose I/O #12, 3.3V I/O Atternative function is 12C clock SDA SDA Bidir General purpose I/O #5, 3.3V I/O Atternative function is SPI master chip select #1 SPI_CSN1 Bidir General purpose I/O #28, 3.3V I/O Atternative function is SPI master chip select #0 Atternative function is SPI master chip select #1 SPI_CSN0 Bi			
GPIO2 Bidir General purpose I/O #2, 3.3V I/O Alternative function is UART TXD2 GPIO3 Bidir General purpose I/O #3, 3.3V I/O Alternative function is P1PPS GPIO6 Bidir General purpose I/O #7, 3.3V I/O GPIO7 Bidir General purpose I/O #7, 3.3V I/O GPI010 Bidir General purpose I/O #10, 3.3V I/O GPI012 Bidir General purpose I/O #13, 3.3V I/O GPI014 Bidir General purpose I/O #13, 3.3V I/O GPI015 Bidir General purpose I/O #14, 3.3V I/O GPI014 Bidir General purpose I/O #14, 3.3V I/O GPI015 Bidir General purpose I/O #14, 3.3V I/O GPI016 Bidir General purpose I/O #4, 3.3V I/O RXD1 Input UART input, 3.3V I/O TXD1 Output UART output, 3.3V I/O SCL Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C clock SDA SPI_CSN1 Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_MOSI SPI_MOSI Bidir General purpose I	GPIO1	Bidir	
GP102 Bidir Alternative function is UART TXD2 GP103 Bidir General purpose I/O #3, 3.3V I/O Alternative function is P1PPS GP106 Bidir General purpose I/O #6, 3.3V I/O GP107 Bidir General purpose I/O #10, 3.3V I/O GP1010 Bidir General purpose I/O #12, 3.3V I/O GP1012 Bidir General purpose I/O #12, 3.3V I/O GP1013 Bidir General purpose I/O #14, 3.3V I/O GP1014 Bidir General purpose I/O #14, 3.3V I/O GP1016 Bidir General purpose I/O #14, 3.3V I/O GP1016 Bidir General purpose I/O #14, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O Alternative function is I2C clock SDA SPI_CSN1 Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 SPI_MOSI Bidir General purpose I/O #33, 3.3V I/O <t< td=""><td></td><td></td><td></td></t<>			
GPI03 Bidir General purpose I/O #3, 3.3V I/O Alternative function is P1PPS GPI06 Bidir General purpose I/O #6, 3.3V I/O GPI07 Bidir General purpose I/O #7, 3.3V I/O GPI010 Bidir General purpose I/O #7, 3.3V I/O GPI012 Bidir General purpose I/O #10, 3.3V I/O GPI013 Bidir General purpose I/O #13, 3.3V I/O GPI014 Bidir General purpose I/O #14, 3.3V I/O GPI016 Bidir General purpose I/O #14, 3.3V I/O RXD1 Input UART input, 3.3V I/O SCL Bidir General purpose I/O #14, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O Alternative function is 12C clock SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is 12C clock SDA Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MISO Bidir General purpose I/O #31, 3.3V I/O	GPIO2	Bidir	
Alternative function is P1PPS GPI06 Bidir General purpose I/0 #6, 3.3V I/O GPI07 Bidir General purpose I/0 #7, 3.3V I/O GPI010 Bidir General purpose I/0 #12, 3.3V I/O GPI012 Bidir General purpose I/O #12, 3.3V I/O GPI013 Bidir General purpose I/O #13, 3.3V I/O GPI014 Bidir General purpose I/O #14, 3.3V I/O GPI016 Bidir General purpose I/O #14, 3.3V I/O RXD1 Input UART input, 3.3V I/O TXD1 Output UART output, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O Atternative function is 12C clock SDA SDA Bidir General purpose I/O #2, 3.3V I/O Atternative function is S12 data SPI_CSN0 Bidir General purpose I/O #22, 3.3V I/O Atternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #30, 3.3V I/O Atternative function is SPI master data out SPI_MISO Bidir General purpose I/O #30, 3.3V I/O Atternative function is SPI master data in SPI_CL		Didir	
GPIO6 Bidir General purpose I/O #6, 3.3V I/O GPIO7 Bidir General purpose I/O #7, 3.3V I/O GPIO10 Bidir General purpose I/O #10, 3.3V I/O GPI012 Bidir General purpose I/O #112, 3.3V I/O GPI013 Bidir General purpose I/O #13, 3.3V I/O GPI014 Bidir General purpose I/O #14, 3.3V I/O GPI016 Bidir General purpose I/O #14, 3.3V I/O RXD1 Input UART input, 3.3V I/O TXD1 Output UART output, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O Alternative function is I2C clock SDA SDA Bidir General purpose I/O #2, 3.3V I/O Alternative function is I2C data SPI_CSN1 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI maste	GFIUS	DIUII	
GPIO7 Bidir General purpose I/O #7, 3.3V I/O GPI010 Bidir General purpose I/O #10, 3.3V I/O GPI012 Bidir General purpose I/O #12, 3.3V I/O GPI013 Bidir General purpose I/O #13, 3.3V I/O GPI014 Bidir General purpose I/O #13, 3.3V I/O GPI016 Bidir General purpose I/O #14, 3.3V I/O RXD1 Input UART input, 3.3V I/O TXD1 Output UART output, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O Alternative function is I2C clock Bodir General purpose I/O #5, 3.3V I/O Alternative function is I2C clock SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C clock SPI_CSN1 Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #0 General purpose I/O #30, 3.3V I/O SPI_MISO Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master data out SPI master data out SPI_CLK <		Didir	
GPI010 Bidir General purpose I/O #10, 3.3V I/O GPI012 Bidir General purpose I/O #12, 3.3V I/O GPI013 Bidir General purpose I/O #13, 3.3V I/O GPI014 Bidir General purpose I/O #14, 3.3V I/O GPI016 Bidir General purpose I/O #14, 3.3V I/O RXD1 Input UART input, 3.3V I/O TXD1 Output UART output, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O Alternative function is I2C clock SDA SDA Bidir General purpose I/O #4, 3.3V I/O Alternative function is I2C clock SDA SPI_CSN1 Bidir General purpose I/O #2, 3.3V I/O Alternative function is I2C data General purpose I/O #23, 3.3V I/O SPI_CSN0 Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master chip select #1 General purpose I/O #30, 3.3V I/O SPI_MOSI Bidir General purpose I/O #31, 3.3V I/O SPI_CLK Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master data out SPI_DLK			
GPI012 Bidir General purpose I/O #12, 3.3V I/O GPI013 Bidir General purpose I/O #13, 3.3V I/O GPI014 Bidir General purpose I/O #14, 3.3V I/O GPI016 Bidir General purpose I/O #14, 3.3V I/O RXD1 Input UART input, 3.3V I/O TXD1 Output UART output, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C clock SDA SPI_CSN1 Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_MOSI Bidir General purpose I/O #31, 3.3V I/O Alternative function is SPI master data out SPI_CLK Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master data in General purpose I/O #29, 3.3V I/O SPI_CLK Bidir General purpose I/			
GPI013 Bidir General purpose I/O #13, 3.3V I/O GPI014 Bidir General purpose I/O #14, 3.3V I/O GPI016 Bidir General purpose I/O #16, 3.3V I/O RXD1 Input UART input, 3.3V I/O TXD1 Output UART output, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O Alternative function is I2C clock SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C clock SPI_CSN1 Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_CLK Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master data in SPI_CLK Bidir General purpose I/O #20, 3.3V I/O Alternative function is SPI master clock			
GPI014 Bidir General purpose I/O #14, 3.3V I/O GPI016 Bidir General purpose I/O #16, 3.3V I/O RXD1 Input UART input, 3.3V I/O TXD1 Output UART output, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SDA Bidir General purpose I/O #4, 3.3V I/O Alternative function is I2C clock General purpose I/O #5, 3.3V I/O SPI_CSN1 Bidir General purpose I/O #2, 3.3V I/O Alternative function is I2C data General purpose I/O #28, 3.3V I/O SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_CLK Bidir General purpose I/O #31, 3.3V I/O Alternative function is SPI master data in General purpose I/O #20, 3.3V I/O Alternative function is SPI master clock Maternative function is SPI master clock PWM Bidir General purpose I/O #20, 3.3V I/O <td></td> <td></td> <td></td>			
GPIO16 Bidir General purpose I/O #16, 3.3V I/O RXD1 Input UART input, 3.3V I/O TXD1 Output UART output, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C clock SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C data SPI_CSN1 Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_MISO Bidir General purpose I/O #31, 3.3V I/O Alternative function is SPI master data in SPI_CLK Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master clock PWM Bidir General purpose I/O #20, 3.3V I/O Alternative function is PWM RF Front-End <td< td=""><td></td><td>Bidir</td><td></td></td<>		Bidir	
GPI016 Bidir General purpose I/O #16, 3.3V I/O RXD1 Input UART input, 3.3V I/O TXD1 Output UART output, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C clock SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C data General purpose I/O #22, 3.3V I/O SPI_CSN1 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_MISO Bidir General purpose I/O #31, 3.3V I/O Alternative function is SPI master data in SPI_CLK Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master clock Maternative function is SPI master clock PWM Bidir General purpose I/O #20, 3.3V I/O Alternative function is PVMM Bidir General purpos	GPIO14	Bidir	General purpose I/O #14, 3.3V I/O
RXD1 Input UART input, 3.3V I/O TXD1 Output UART output, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C clock SDA SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C data SPI_CSN1 Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_MISO Bidir General purpose I/O #31, 3.3V I/O Alternative function is SPI master data in SPI_CLK Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master clock PWM Bidir General purpose I/O #20, 3.3V I/O Alternative function is PV master clock PWM Bidir General purpose I/O #20, 3.3V I/O			Gaparal purposa 1/0 #16.3.2 V 1/0
TXD1 Output UART output, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C clock SDA Bidir General purpose I/O #2, 3.3V I/O Alternative function is I2C data General purpose I/O #22, 3.3V I/O SPI_CSN1 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #1 General purpose I/O #30, 3.3V I/O SPI_CSN0 Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_MISO Bidir General purpose I/O #31, 3.3V I/O Alternative function is SPI master data in SPI_CLK Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master clock PWM Bidir General purpose I/O #20, 3.3V I/O Alternative function is SPI master clock PWM Bidir General purpose I/O #20, 3.3V I/O Alternative function is PWM Alternative function is PWM RF Fr	GFIOTO	Bidir	
TXD1 Output UART output, 3.3V I/O SCL Bidir General purpose I/O #4, 3.3V I/O Alternative function is I2C clock SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C data SPI_CSN1 Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #0 SPI_CSN0 Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_MISO Bidir General purpose I/O #31, 3.3V I/O Alternative function is SPI master data in SPI_CLK Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master clock PWM Bidir General purpose I/O #20, 3.3V I/O Alternative function is PWM RF Front-End Encore function is PWM Interface	RXD1	Input	UART input, 3.3V I/O
SCL Bidir General purpose I/O #4, 3.3V I/O Alternative function is I2C clock SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C data SPI_CSN1 Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_MISO Bidir General purpose I/O #31, 3.3V I/O Alternative function is SPI master data in SPI_CLK Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master clock PWM Bidir General purpose I/O #20, 3.3V I/O Alternative function is SPI master clock PWM Bidir General purpose I/O #20, 3.3V I/O Alternative function is SPI master clock RF Front-End Interface BEIC OPD reference clock is PWM	TVD4		
Alternative function is I2C clock SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C data SPI_CSN1 Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_MISO Bidir General purpose I/O #31, 3.3V I/O Alternative function is SPI master data in SPI_CLK Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master clock PWM Bidir General purpose I/O #20, 3.3V I/O Alternative function is PVM RF Front-End Interface Cliffd DEIO ODC reference clock instruct 4.9V or 3.2V//O depending on V/DD			
SDA Bidir General purpose I/O #5, 3.3V I/O Alternative function is I2C data SPI_CSN1 Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #0 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_MISO Bidir General purpose I/O #31, 3.3V I/O Alternative function is SPI master data in SPI_CLK Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master clock PWM Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master clock RF Front-End Bidir General purpose I/O #20, 3.3V I/O Alternative function is PWM	SCL	Bidir	
SPI_CSN1 Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_MISO Bidir General purpose I/O #31, 3.3V I/O Alternative function is SPI master data in SPI_CLK Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master clock PWM Bidir General purpose I/O #20, 3.3V I/O Alternative function is SPI master clock RF Front-End Interface DEIO OD2 reference clock is pwt 4 0V or 2 2V I/O depending on V/DD			
SPI_CSN1 Bidir General purpose I/O #22, 3.3V I/O Alternative function is SPI master chip select #1 SPI_CSN0 Bidir General purpose I/O #28, 3.3V I/O Alternative function is SPI master chip select #0 SPI_MOSI Bidir General purpose I/O #30, 3.3V I/O Alternative function is SPI master data out SPI_MISO Bidir General purpose I/O #31, 3.3V I/O Alternative function is SPI master data out SPI_CLK Bidir General purpose I/O #31, 3.3V I/O Alternative function is SPI master data in SPI_CLK Bidir General purpose I/O #29, 3.3V I/O Alternative function is SPI master clock PWM Bidir General purpose I/O #20, 3.3V I/O Alternative function is SPI master clock RF Front-End Interface DEI/O OD2 reference algebric purpose I/O #20, 3.3V I/O Alternative function is PWM	SDA	Bidir	
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Alternative function is PWM RF Front-End Interface DELC OPC reference cleck input 1 0V or 2 0V/VO depending on VDD			
RF Front-End Interface DEIC ODC reference cleck input: 1.0V/or 3.0V/V/O depending on V/DD	FVVIVI	Bidir	
Interface			AITERNATIVE TUNCTION IS PWW
CLK4 DEIC CDC reference cleak input 4.0V or 2.0V//O depending on VDD			
ICLIK 1 IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII			
	CLK1	Input	RFIC GPS reference clock input, 1.8V or 3.3V I/O depending on VDDIFINT

	-					
SGN1	Input	RFIC GPS sign input, 1.8V or 3.3V I/O depending on VDDIFINT				
MAG1	Input	RFIC GPS magnitude input, 1.8V or 3.3V I/O depending on VDDIFINT				
CLK3 Input		RFIC Beidou or GLONASS reference clock input				
	•	1.8V or 3.3V I/O depending on VDDIFINT				
SGN3	Input	RFIC Beidou or GLONASS sign input				
		1.8V or 3.3V I/O depending on VDDIFINT				
MAG3	Input	RFIC Beidou or GLONASS magnitude input				
		1.8V or 3.3V I/O depending on VDDIFINT				
RTC Interface						
RTCOSCI	Input	RTC crystal oscillator input				
RTCOSCO	Output	RTC crystal oscillator output				
Reset						
RSTN	Input	Active low reset Input, 3.3V I/O				
Misc						
BOOT_SEL	Input	Tie to VDDIO to run from internal Flash.				
		Tie to ground or leave NC to run from internal ROM.				
		When running from internal ROM, GPIO[5:4] setting at end of power on reset				
		determines NMEA UART transmission baud rate.				
		2'b01: 4800 baud				
		2'b00: 9600 baud				
		2'b10: 38400 baud				
		2'b11: 115200 baud				

EXTERNAL CONNECTION FOR A WORKING SYSTEM

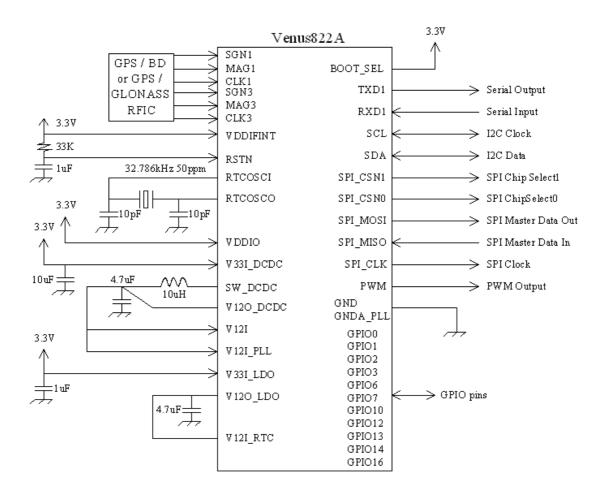


Figure-5 Minimal System for Venus822A GPS/Beidou or GPS/GLONASS Receiver

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min.	Max.	Unit
Operating Temperature		-40	+85	°C
Storage Temperature		-40	+150	°C

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Minimum	Typical	Maximum	Units
Core Supply Voltage	V12I	1.08	1.2	1.32	Volt
RTC Supply Voltage	V12I_RTC	1.08	1.2	1.32	Volt
PLL Supply Voltage	V12I_PLL	1.08	1.2	1.32	Volt
Supply Voltage for I/O Interface at 3.3V	VDDIO, VDDIFINT	2.97	3.3	3.63	Volt
Supply Voltage for I/O Interface at 1.8V	VDDIFINT	1.62	1.8	1.98	Volt
Junction Operating Temperature	Tj	-40	25	125	°C

DC CHARACTERISTICS OF I/O INTERFACE AT 3.3V

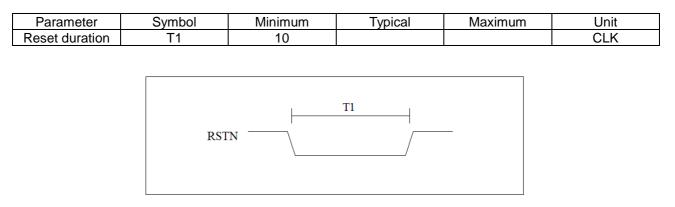
Parameter	Symbol	Min.	Тур.	Max.	Condition	Units
Input Low Voltage	V _{IL}	-0.3		0.8	LVTTL	Volt
Input High Voltage	V _{IH}	2.0		VDDIO+0.3	LVTTL	Volt
				VDDIFINT+0.3		
Output Low Voltage, IoI = 4mA	V _{OL}			0.4		Volt
Output High Voltage, Ioh = 4mA	V _{OH}	2.4				Volt
Input Pull-Up Resistance	R _{PU}	33	41	62		K-Ohm
Input Pull-Down Resistance	R _{PD}	33	42	68		K-Ohm
Input Leakage Current	I _{IN}			+/-10		uA

DC CHARACTERISTICS OF I/O INTERFACE AT 1.8V

Parameter	Symbol	Min.	Тур.	Max.	Condition	Units
Input Low Voltage	VIL	-0.3		0.35*VDDIO	LVTTL	Volt
				0.35*VDDIFINT		
Input High Voltage	V _{IH}	0.55*VDDIO		VDDIO+0.3	LVTTL	Volt
		0.55*VDDIFINT		VDDIFINT+0.3		
Output Low Voltage, Iol = 4mA	V _{OL}			0.45		Volt
Output High Voltage, Ioh = 4mA	V _{OH}	VDDIO-0.45				Volt
	-	VDDIFINT-0.45				
Input Pull-Up Resistance	R _{PU}	67	93	152		K-Ohm
Input Pull-Down Resistance	R _{PD}	64	92	170		K-Ohm
Input Leakage Current	I _{IN}			+/-10		uA

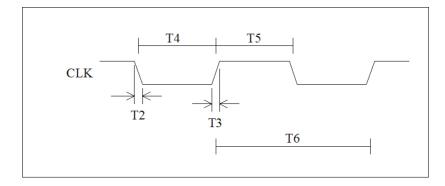
AC CHARACTERISTICS

Reset Timing

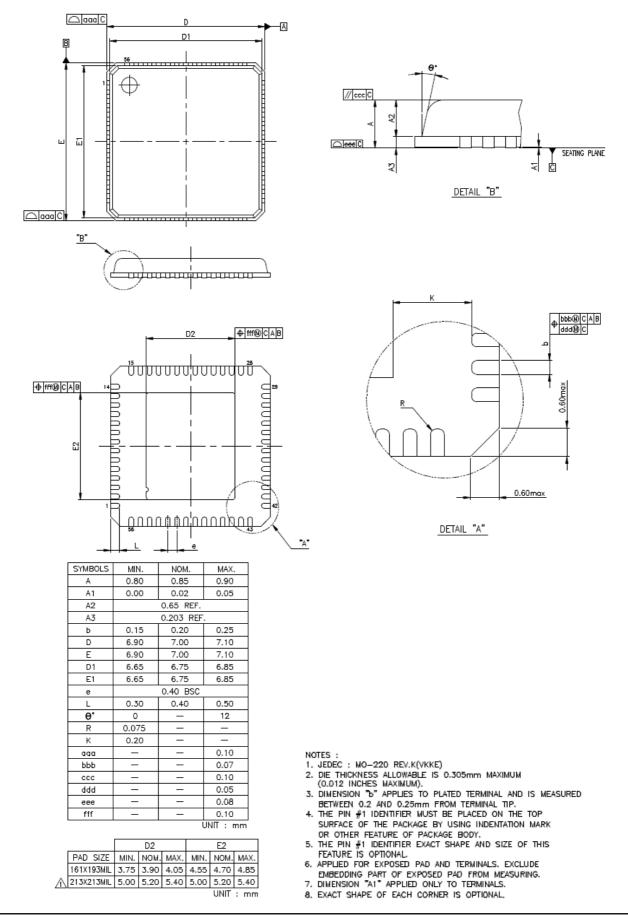


CLK Timing

Parameter	Symbol	Minimum	Typical	Maximum	Unit
Fall Time	T2		4.5		ns
Rise Time	Т3		4.5		ns
Clock Pulse Width Low	T4	12			ns
Clock Pulse Width High	T5	12			ns
Clock Period	T6	25			ns



MECHANICAL SPECIFICATIONS



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MARKING INFORMATION



1320: date code

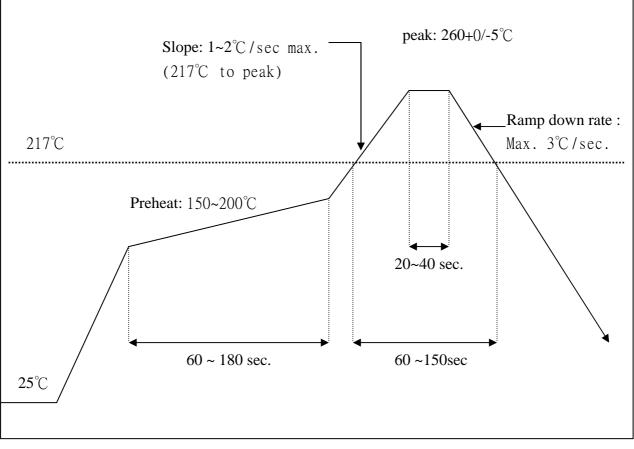
GK: internal code

RECOMMANDED REFLOW PROFILE FOR LEAD-FREE SOLDER PASTE

Follow: IPC/JEDEC J-STD-020 C

Condition:

Average ramp-up rate (217°C to peak): $1\sim2°C$ /sec max. Preheat : $150\sim200C \\ 60\sim180$ seconds Temperature maintained above 217°C : $60\sim150$ seconds Time within 5°C of actual peak temperature: $20 \\ 40$ sec. Peak temperature : 260+0/-5°CRamp-down rate : 3°C/sec. max. Time 25°C to peak temperature : 8 minutes max. Cycle interval : 5 minutes



Time (sec)

ORDERING INFORMATION

Part Number	Description
Venus822A	GNSS Baseband, 56 pin, QFN, Flash version

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Change Log

Version 0.2, March 28, 2014

1. Updated figure-1, figure-5 RF interface signal names

Version 0.1, March 10, 2014

1. Initial release