

| 1 REVISION HISTORY |               |               |           |                                                                                                                                                                      |
|--------------------|---------------|---------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Version            | Revision      | Date          | Author    | comment                                                                                                                                                              |
| V1.0               | Primary       | Apr 9 2020    | M.Heinzel | Primary version                                                                                                                                                      |
| V1.1               | Primary       | Oct 12 2020   | M.Heinzel | Chapt.3.1 updated configuration table                                                                                                                                |
| V1.2               | Beta Release  | Nov 17, 2021  | M.Heinzel | Chapt. 15 Extended CPN & MPN definition<br>Chapt. 6.1 description for TP_6E corrected<br>Heading and name adapted from<br>GNS7000 / GNS7040 to GNS7000 series module |
| V1.3               | Beta Release  | Feb 4 , 2022  | M.Heinzel | GNS7040 corrected CPN to GNS 7040-BABUR                                                                                                                              |
| V1.4               | Beta Release  | Mar 30 , 2022 | M.Heinzel | New variant GNS7000-AABUR added                                                                                                                                      |
| V1.5               | Alpha Release | Okt 14 , 2022 | M.Heinzel | Chapt. 3.1 : Corrections<br>Chapt. 18 : Additional related documents available.                                                                                      |
| V1.6               | Alpha Release | Okt 18 , 2022 | M.Heinzel | Chapt. 3.1 : Wrong example corrected                                                                                                                                 |
|                    |               |               |           |                                                                                                                                                                      |

## Document status

|                     |                                                                                                                               |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Primary:            | Primary version, document content for design purpose, informal release                                                        |
| Alpha release:      | Key customer preview version, document content has been preliminarily tested and verified, indicators may be fine-tuned later |
| Beta release:       | Document content is verified by complete product testing and content indicators                                               |
| Production release: | The document is complete and final                                                                                            |

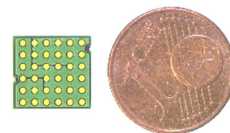
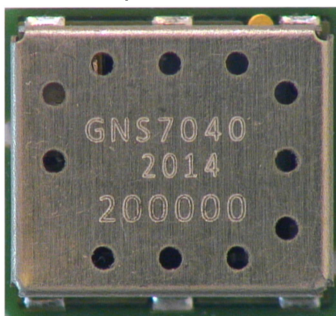
## 2 CONTENTS

|                                                       |    |
|-------------------------------------------------------|----|
| 1 REVISION HISTORY-----                               | 1  |
| 2 CONTENTS -----                                      | 2  |
| 3 INTRODUCTION -----                                  | 3  |
| 3.1 Overview -----                                    | 3  |
| 3.2 Key Features -----                                | 4  |
| 3.3 Block diagram-----                                | 5  |
| 4 ELECTRICAL SPECIFICATION-----                       | 6  |
| 4.1 Absolute Maximum Ratings -----                    | 6  |
| 4.2 Recommended Operating Conditions-----             | 6  |
| 4.3 RF Parameters -----                               | 6  |
| 4.4 DC Characteristics Digital IO-----                | 6  |
| 4.5 Analog Parameters -----                           | 7  |
| 4.6 Current consumption -----                         | 7  |
| 5 TYPICAL APPLICATION BLOCK DIAGRAM -----             | 7  |
| 6 DEVICE PINOUT DIAGRAM -----                         | 8  |
| 6.1 Pin Description -----                             | 9  |
| 7 HARDWARE HOST INTERFACE -----                       | 10 |
| 7.1 GPS UART Interface details -----                  | 10 |
| 7.2 GPS UART AC characteristics -----                 | 10 |
| 8 NMEA DATA -----                                     | 11 |
| 9 PHYSICAL DIMENSIONS -----                           | 12 |
| 10 RECOMMENDED PAD LAYOUT-----                        | 13 |
| 11 MATERIAL INFORMATION -----                         | 13 |
| 11.1 Shield Material Information -----                | 13 |
| 12 RECOMMENDED SOLDERING REFLOW PROFILE -----         | 14 |
| 13 TAPE INFORMATION -----                             | 15 |
| 14 REEL INFORMATION -----                             | 16 |
| 15 ORDERING INFORMATION -----                         | 17 |
| 15.1 GNS7000 series module product variants-----      | 17 |
| 15.2 GNS7000 series module ordering information ----- | 17 |
| 16 ENVIRONMENTAL INFORMATION -----                    | 18 |
| 16.1 Quality and Environmental Specifications-----    | 18 |
| 17 PACKAGING-----                                     | 19 |
| 18 RELATED DOCUMENTS -----                            | 20 |

### 3 INTRODUCTION

#### 3.1 Overview

**GNS7000 series** modules provide a high performance and low power multi-GNSS solution in a small form factor enabling RF to NMEA solutions that minimize the load on the host processor.



Original size

Modules of the GNS7000 series are available in numerous variants, differing in protocol type, NMEA settings, I/O voltage, etc. The following table gives an overview of possible variants.

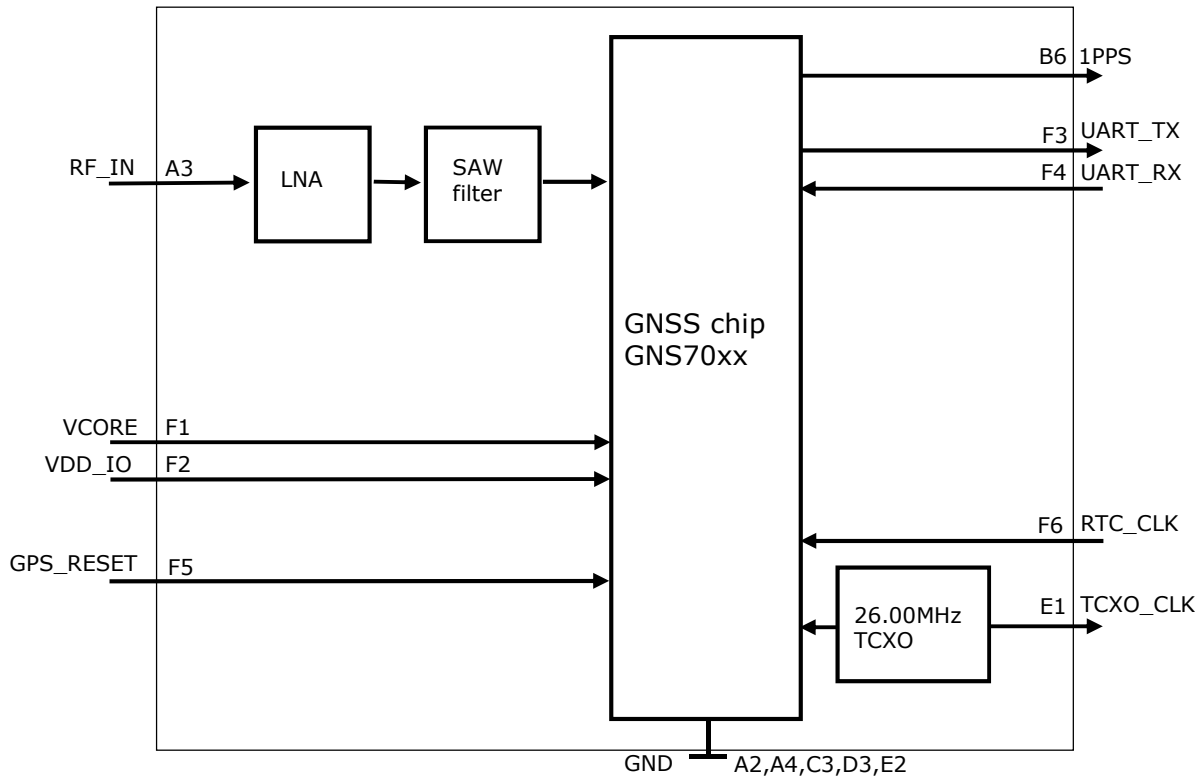
| G           | N | S | 7 | 0 | 0 | 0 | - | A | A | B | Y | R |                |   |   |                                                                                       |  |  |  |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|----------------|---|---|---------------------------------------------------------------------------------------|--|--|--|
| designation |   |   |   |   |   |   |   |   |   |   |   |   | variants       |   |   | meaning                                                                               |  |  |  |
| G           | N | S | 7 | 0 |   |   |   |   |   |   |   |   | product series |   |   | GNS7000 GNSS receiver series                                                          |  |  |  |
|             |   |   |   |   |   |   |   |   |   |   |   |   | 0              | 4 |   | 0 : 1.8V<br>4 : 3.3V                                                                  |  |  |  |
|             |   |   |   |   |   |   |   |   |   |   |   |   | 0              |   |   | 0 : UART                                                                              |  |  |  |
|             |   |   |   |   |   |   |   |   |   |   |   |   | A              | B | C | A : GPS only<br>B : GPS + GLONASS + GALLILEO<br>C : GPS + BEIDOU                      |  |  |  |
|             |   |   |   |   |   |   |   |   |   |   |   |   | A              |   |   | A : RMC + GGA + GLL + GSA + GSV + VTG @ 9600 bps                                      |  |  |  |
|             |   |   |   |   |   |   |   |   |   |   |   |   | B              | C | D | B : GNS7000_V1.01<br>C : GNS7000_2G_V1<br>D : GNS7000_6228CI_V1<br>E : RFU<br>F : RFU |  |  |  |
|             |   |   |   |   |   |   |   |   |   |   |   |   | Y              | U |   | GNS intern                                                                            |  |  |  |
|             |   |   |   |   |   |   |   |   |   |   |   |   | R              | T |   | R : Reel, 2000 pcs.<br>T : Tape, smaller quantities available on request              |  |  |  |

Example: GNS7000-AABYR -> I/O voltage = 1.8V, GPS only, h/w release 'B', shipped on reel (2000 pc.)  
 GNS7000-BABUR -> I/O voltage = 1.8V, GPS+GLO+GAL only, h/w release 'B', shipped on reel (2000 pc.)  
 GNS7040-BABUR -> I/O voltage = 3.6V, GPS+GLO+GAL only, h/w release 'B', shipped on reel (2000 pc.)

### 3.2 Key Features

| 3.2 Key Features        |                 |                                          |                                  |                       |          |
|-------------------------|-----------------|------------------------------------------|----------------------------------|-----------------------|----------|
| Power                   |                 |                                          |                                  |                       |          |
| VCore                   |                 | 1.8V                                     |                                  |                       |          |
| VDD_IO                  | GNS7000-xxxxx   | 1.8V                                     |                                  |                       |          |
|                         | GNS7040-xxxxx   | 3.3V                                     |                                  |                       |          |
| Power Consumption       |                 | 63mW                                     |                                  |                       |          |
| RF Input                |                 |                                          |                                  |                       |          |
| Input VSWR              |                 | < 1.5                                    |                                  |                       |          |
| Input Impedance         |                 | 50Ω                                      |                                  |                       |          |
| Antenna Gain            |                 | 15 – 30 dB                               |                                  |                       |          |
| Physical Characters     |                 |                                          |                                  |                       |          |
| Dimension               |                 | 9.3mm x 10.0mm                           |                                  |                       |          |
| Environment             |                 |                                          |                                  |                       |          |
| Operating Temperature   |                 | -45°C ~ +85°C                            |                                  |                       |          |
| Storage Temperature     |                 | -45°C ~ +90°C                            |                                  |                       |          |
| RoHS                    |                 | Accord                                   |                                  |                       |          |
| Data Interface          |                 |                                          |                                  |                       |          |
| UART                    |                 | 1 UART, LVTTTL. Baud rate 4800-115200bps |                                  |                       |          |
| GNSS Performance        |                 |                                          |                                  |                       |          |
| Frequency               | GPS L1 :        |                                          | 1575.42 MHz                      |                       |          |
|                         | GLONASS L1 :    |                                          | 1602.5625 MHz                    |                       |          |
|                         | BEIDOU B1 :     |                                          | 1561.089 MHz                     |                       |          |
| TTFF                    | Cold Start :    |                                          | 30 s                             |                       |          |
|                         | Hot Start :     |                                          | 1 s                              |                       |          |
|                         | Reacquisition : |                                          | 1 s                              |                       |          |
| Positioning Accuracy    | 2.0m CEP        |                                          | dual-system horizontal, open sky |                       |          |
|                         | 3.5m CEP        |                                          | dual-system vertical, open sky   |                       |          |
| Velocity Accuracy (RMS) |                 | 0.1m/s                                   |                                  | dual-system, open sky |          |
| Sensitivity             |                 |                                          | GPS                              | GLONASS               | BEIDOU   |
|                         | Tracking        |                                          | -160 dBm                         | -161 dBm              | -161 dBm |
|                         | Acquisition     |                                          | -146 dBm                         | -146 dBm              | -145 dBm |
|                         | Hot start       |                                          | -152 dBm                         | -151 dBm              | -147 dBm |
|                         | Reacquisition   |                                          | -157 dBm                         | -157 dBm              | -157 dBm |
| 1PPS accuracy (RMS)     |                 | 20ns                                     |                                  |                       |          |
| Data updating rate      |                 | 1 Hz                                     |                                  |                       |          |
| Data output             |                 | NMEA 0183                                |                                  |                       |          |
|                         |                 |                                          |                                  |                       |          |

### 3.3 Block diagram



#### 3.3.1 UART

GNS7000 series module supports data transfer and firmware upgrade, the signal input/output level is VDD\_IO. The default baud rate is 9600bps, and is adjustable, can be configured up to 115200bps.

#### 3.3.2 1PPS

GNS7000 series module outputs 1PPS with adjustable pulse width and polarity.

#### 3.3.3 RTC\_CLK

The RTC is driven internally by a 32768 Hz oscillator, which makes use of an external 32768Hz crystal. Besides that, the RTC can also be derived from the 26 MHz clock, which saves the external 32768Hz crystal.

#### 3.3.4 VCore

The core voltage is 1.8V for all GNS7000 series modules.

#### 3.3.5 VDD\_IO

The IO voltage is 1.8V (GNS7000-xxxxx) & 3.3V (GNS7040-xxxxx).

### 4 ELECTRICAL SPECIFICATION

#### 4.1 Absolute Maximum Ratings

| Item                  |               | Min.  | Typ. | Max. | Unit | Remarks |
|-----------------------|---------------|-------|------|------|------|---------|
| VCORE voltage         | GNS7000-xxxxx | -0.20 |      | 1.98 | V    |         |
|                       | GNS7040-xxxxx | -0.20 |      | 1.98 | V    |         |
| VDD_IO voltage        | GNS7000-xxxxx | -0.20 |      | 3.60 | V    |         |
|                       | GNS7040-xxxxx | -0.20 |      | 3.60 | V    |         |
| RF_IN input power     |               |       |      | +15  | dBm  |         |
| Digital input voltage |               | -0.20 |      | 3.60 | V    |         |
| RTC_CLK input voltage |               | -0.20 |      | 1.10 | V    |         |
| Storage temperature   |               | -50   |      | 150  | °C   |         |
|                       |               |       |      |      |      |         |

#### 4.2 Recommended Operating Conditions

| Item                    |               | Min. | Typ. | Max. | Unit | Remarks |
|-------------------------|---------------|------|------|------|------|---------|
| VCORE voltage           |               | 1.20 | 1.20 | 1.98 | V    |         |
| VDD_IO voltage          | GNS7000-xxxxx | 1.70 | 1.80 | 1.90 | V    |         |
|                         | GNS7040-xxxxx | 2.80 | 3.30 | 3.60 | V    |         |
| Environment temperature |               | -40  | 25   | 85   | °C   |         |
|                         |               |      |      |      |      |         |

#### 4.3 RF Parameters

| Item                     | Symbol    | Min. | Typ.    | Max. | Unit | Remarks |
|--------------------------|-----------|------|---------|------|------|---------|
| Receiver input frequency | Fin       | 1550 | 1575.42 | 1620 | MHz  |         |
| LNA input impedance      | LNA_IN    |      | 50      |      | Ω    |         |
| TCXO frequency           | TCXO_Freq |      | 26      |      | MHz  |         |
|                          |           |      |         |      |      |         |

#### 4.4 DC Characteristics Digital IO

| Item          |               |         | Symbol          | Min.  | Typ. | Max. | Unit | Remarks |
|---------------|---------------|---------|-----------------|-------|------|------|------|---------|
| Input voltage | GNS7000-xxxxx | H level | V <sub>IH</sub> | 1.20  |      | 1.90 | V    |         |
|               |               | L level | V <sub>IL</sub> | -0.20 |      | 0.60 | V    |         |
|               | GNS7040-xxxxx | H level | V <sub>IH</sub> | 1.20  |      | 3.60 | V    |         |
|               |               | L level | V <sub>IL</sub> | -0.20 |      | 0.70 | V    |         |
|               |               |         |                 |       |      |      |      |         |

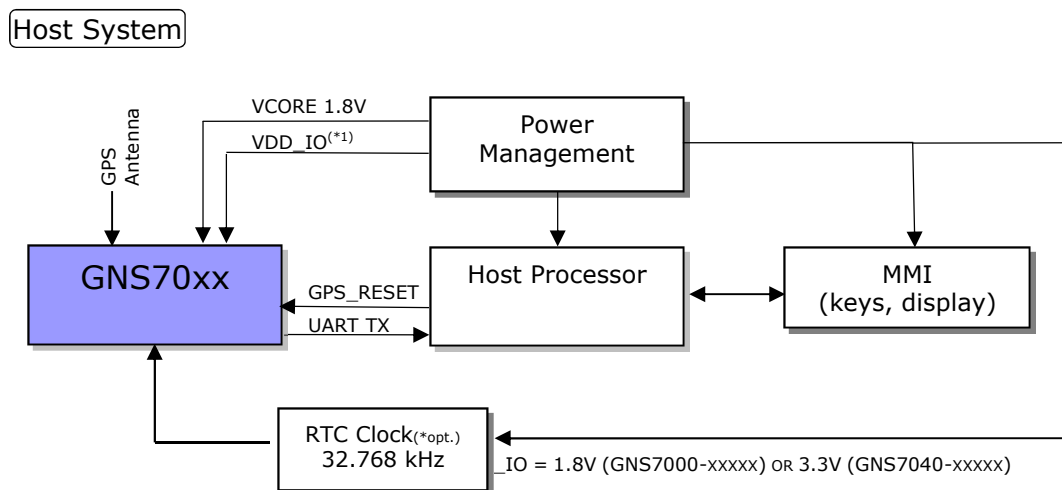
### 4.5 Analog Parameters

| Item                         | Symbol      | Min. | Typ.  | Max. | Unit | Remarks |
|------------------------------|-------------|------|-------|------|------|---------|
| RTC_CLK frequency            | RTC_Fxtal   |      | 32768 |      | Hz   |         |
| RTC_CLK startup time         | RTC_T_start | 0.2  | 1     | 2    | s    |         |
| RTC_CLK oscillator amplitude | RTC_Amp     | 50   |       | 350  | mVpp |         |
|                              |             |      |       |      |      |         |

### 4.6 Current consumption

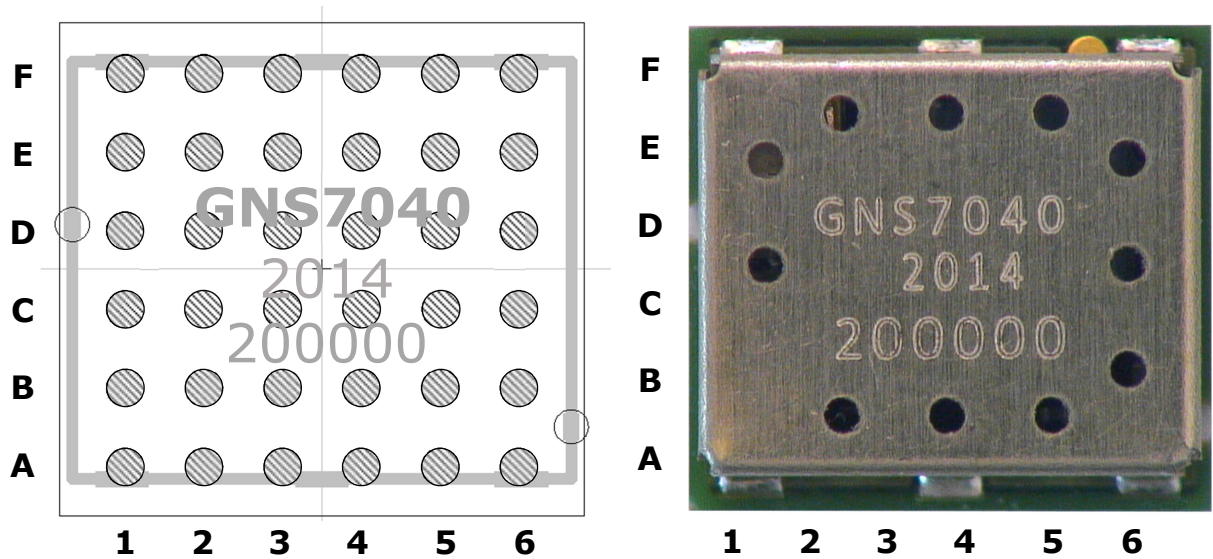
| Parameter                | Min | Typ | Max | Unit | Condition |
|--------------------------|-----|-----|-----|------|-----------|
| Peak current             |     |     | 37  | mA   | T.B.D.    |
| Tracking average current | 19  | 20  | 21  | mA   | T.B.D.    |
|                          |     |     |     |      |           |

## 5 TYPICAL APPLICATION BLOCK DIAGRAM



### 6 DEVICE PINOUT DIAGRAM

TOP VIEW



|          |           |        |          |         |        |          |
|----------|-----------|--------|----------|---------|--------|----------|
| <b>F</b> | VCORE     | VDD_IO | UART_TX  | UART_RX | NRESET | RTC_CLKI |
| <b>E</b> | TCXO_CLKO | GND    | UART_CTS | NU_4E   | NU_5E  | TP_6E    |
| <b>D</b> | NU_1D     | NU_2D  | GND      | NU_4D   | NU_5D  | NU_6D    |
| <b>C</b> | NU_1C     | NU_2C  | GND      | NU_4C   | NU_5C  | NU_6C    |
| <b>B</b> | NU_1B     | NU_2B  | NU_3B    | NU_4B   | NU_5B  | 1PPS_OUT |
| <b>A</b> | NU_1A     | RF_GND | RF_IN    | RF_GND  | NU_5A  | NU_6A    |



### 6.1 Pin Description

| NO                              | NAME      | TYPE <sup>1</sup> | DESCRIPTION                                                                                                                                                                                                                |
|---------------------------------|-----------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Power-Management Signals</b> |           |                   |                                                                                                                                                                                                                            |
| 2F                              | VDD_IO    | P                 | GNS7000 : 1.8V I/O power supply voltage                                                                                                                                                                                    |
|                                 |           |                   | GNS7040 : 3.3V I/O power supply voltage                                                                                                                                                                                    |
| 1F                              | VCORE     | P                 | 1.8V main power supply voltage (GNSS core voltage)                                                                                                                                                                         |
| 3D                              | GND       | P                 | Common Ground                                                                                                                                                                                                              |
| 2E                              | GND       | P                 | Common Ground                                                                                                                                                                                                              |
| 3C                              | GND       | P                 | Common Ground                                                                                                                                                                                                              |
| <b>Clock Signals</b>            |           |                   |                                                                                                                                                                                                                            |
| 1E                              | TCXO_CLKO | O2                | TCXO_CLK signal output. This Pin delivers the high stable TCXO frequency of 26.000 MHz for external components. Although the output is buffered, do not load this pin below 20kOhms // 10pF (TBD). Leave open if not used. |
| 6F                              | RTC_CLKI  | I1                | Clock input: 32.768 kHz. External input for internal RC oscillator. The RTC_CLKI should be tied with GND if an external RTC clock isn't used.                                                                              |
| <b>GPS Signals</b>              |           |                   |                                                                                                                                                                                                                            |
| 3A                              | RF_IN     | ANA               | GNSS RF Input, direct connection of passive or active GNSS antenna                                                                                                                                                         |
| 2A                              | RF_GND    | ANA               | GNSS RF Ground                                                                                                                                                                                                             |
| 4A                              | RF_GND    | ANA               | GNSS RF Ground                                                                                                                                                                                                             |
| 6B                              | 1PPS_OUT  | O1                | This output delivers a high-precision pulse-per-second signal that is synchronized to the GNSS time reference. The pulse precision is better than $1 \cdot 10^{-7}$ seconds. Leave open if not used.                       |
| 5F                              | NRESET    | I1                | Reset input, LOW active. Pull up (or leave open) during operation.                                                                                                                                                         |
| 6E                              | TP_6E     |                   | Test point, pull up (or leave open) during operation.                                                                                                                                                                      |
| <b>UART</b>                     |           |                   |                                                                                                                                                                                                                            |
| 3F                              | UART_TX   | O1                | Main UART TX.                                                                                                                                                                                                              |
| 4F                              | UART_RX   | I1                | Main UART RX.                                                                                                                                                                                                              |
| 3E                              | UART_CTS  | I1                | Main UART CTS.                                                                                                                                                                                                             |
| <b>NOT USED PINS</b>            |           |                   |                                                                                                                                                                                                                            |
| 1A                              | NU_1A     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 1B                              | NU_1B     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 1C                              | NU_1C     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 1D                              | NU_1D     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 2B                              | NU_2B     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 2C                              | NU_2C     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 2D                              | NU_2D     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 3B                              | NU_3B     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 4B                              | NU_4B     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 4C                              | NU_4C     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 4D                              | NU_4D     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 4E                              | NU_4E     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 5A                              | NU_5A     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 5B                              | NU_5B     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 5C                              | NU_5C     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 5D                              | NU_5D     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 5E                              | NU_5E     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 6A                              | NU_6A     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 6C                              | NU_6C     |                   | Not used , internally not connected                                                                                                                                                                                        |
| 6D                              | NU_6D     |                   | Not used , internally not connected                                                                                                                                                                                        |

- (1) I1 = INPUT (VDD\_IO DOMAIN); I2 = INPUT (VCORE DOMAIN);  
 O1 = OUTPUT (VDD\_IO DOMAIN); O2 = OUTPUT (VCORE DOMAIN);  
 P = POWER PIN; ANA = ANALOG PIN.

### 7 HARDWARE HOST INTERFACE

GNS7000 series modules are connected to the host system via a UART. NMEA data but also commands and responses are transmitted via this interface.  
The interface voltage domain is VDD\_IO.

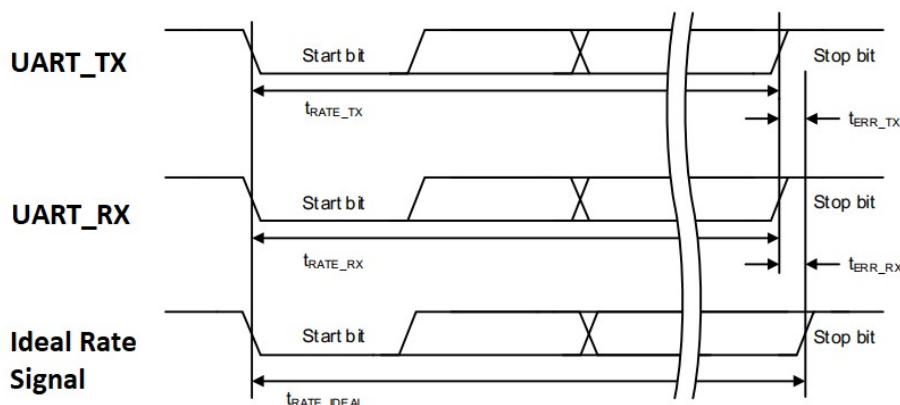
The idle state of the lines is positive voltage. To interface a standard RS232 UART (e.g. a PC serial interface), please add an inverting level shifter. To interface processors that have a different interfacing voltage level, level shifters are required.

#### 7.1 GPS UART Interface details

- The UART interface is used to send NMEA messages and control data.
- The default baud rate is 9600, other baud rates can be selected by ordering option.

| GPS UART Default Settings |        |
|---------------------------|--------|
| Parameter                 | Value  |
| Baud rate                 | 9600   |
| Data length               | 8 bits |
| Stop bit                  | 1      |
| Parity                    | None   |

#### 7.2 GPS UART AC characteristics



| GPS UART Error Tolerance |                      |      |      |     |      |                                               |
|--------------------------|----------------------|------|------|-----|------|-----------------------------------------------|
| Item                     | Symbol               | Min. | Typ. | Max | Unit | Remarks                                       |
| UART Error Rate          | R <sub>BRT_ERR</sub> | -1   |      | 1   | %    | T <sub>err_TX</sub> / t <sub>rate_ideal</sub> |

### 8 NMEA DATA

The GNS7000 series module outputs below sentences of NMEA0183 compliant sentences.  
All active NMEA sentences are sent at the selected rate.

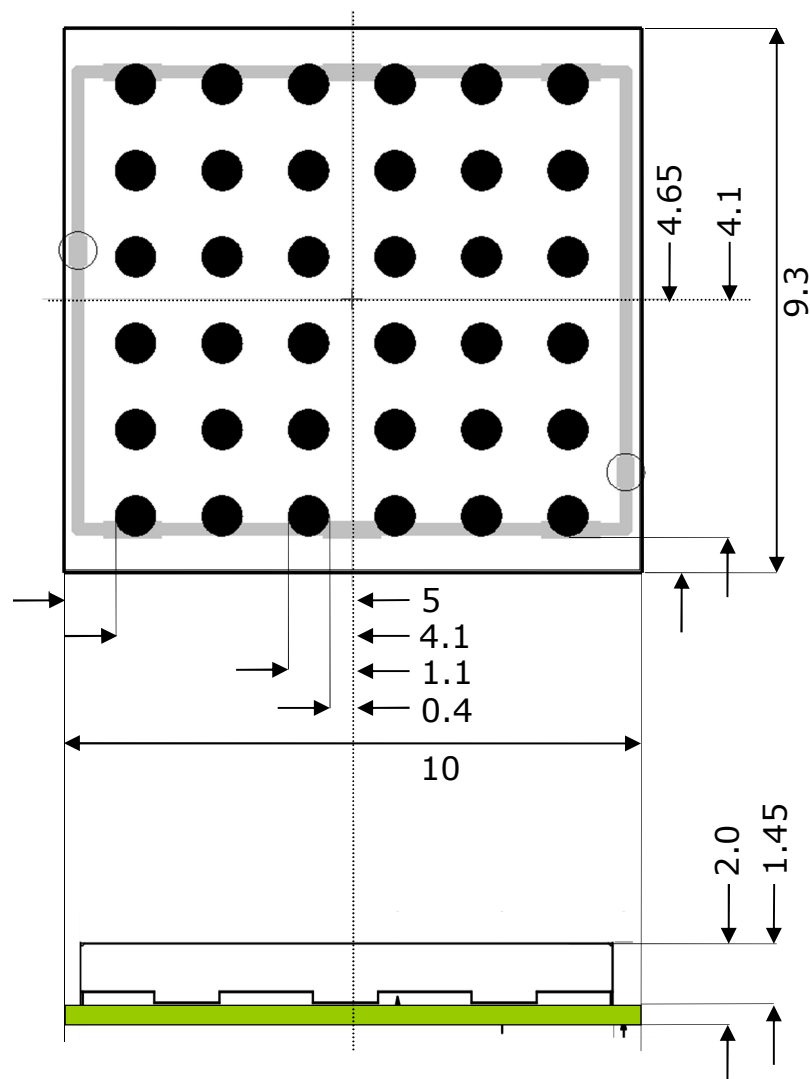
| NMEA available sentences |                                                                                                                                                                                                                          |      |                                                                                            |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------|
| Header                   | Talker ID <sup>*Note1</sup>                                                                                                                                                                                              | Type | Content <sup>*Note2</sup>                                                                  |
| \$                       | GP : Using only GPS for positioning<br>GL : Using only GLONASS for positioning<br>BD : Using only BeiDou for positioning<br>GQ : Using only QZS for positioning<br>GN : Using combined satellite systems for positioning | RMC  | Recommended Minimum Navigation Information                                                 |
|                          | GP                                                                                                                                                                                                                       | GGA  | Global Positioning System Fix Data, Time, Position and fix related data for a GPS receiver |
|                          | GP : Using only GPS for positioning<br>GL : Using only GLONASS for positioning<br>BD : Using only BeiDou for positioning<br>GQ : Using only QZS for positioning                                                          | GSV  | Satellites in view                                                                         |
|                          | GP : Using only GPS for positioning<br>GL : Using only GLONASS for positioning<br>BD : Using only BeiDou for positioning<br>GQ : Using only QZS for positioning<br>GN : Using combined satellite systems for positioning | GLL  | Geographic Position - Latitude/Longitude                                                   |
|                          | GP : Using only GPS for positioning<br>GL : Using only GLONASS for positioning<br>BD : Using only BeiDou for positioning<br>GQ : Using only QZS for positioning<br>GN : Using combined satellite systems for positioning | GSA  | GPS DOP and active satellites                                                              |
|                          | GP : Using only GPS for positioning<br>GL : Using only GLONASS for positioning<br>BD : Using only BeiDou for positioning<br>GQ : Using only QZS for positioning<br>GN : Using combined satellite systems for positioning | VTG  | Track made good and Ground speed                                                           |

**Note1: The Talker ID depends on the preset and currently receivable satellite systems.**

**Note2: For more detailed information on the individual sentences please refer to the NMEA specification.**

## 9 PHYSICAL DIMENSIONS

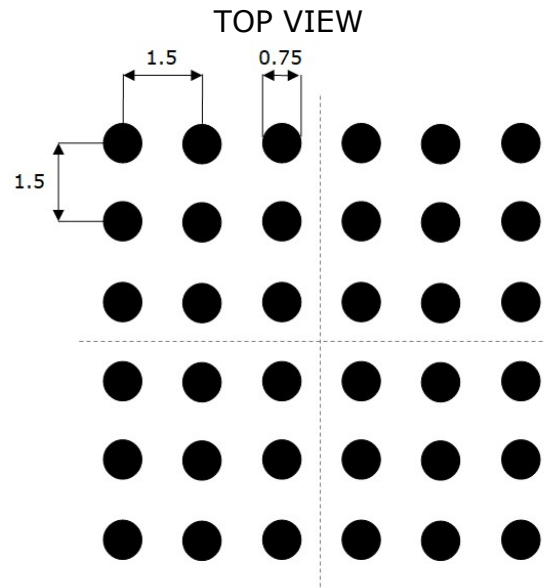
TOP VIEW



all units in mm

tolerance :  $\pm 0.1\text{mm}$  for  $< 5\text{mm}$ ,  $\pm 0.2\text{mm}$  for  $\geq 5\text{mm}$

## 10 RECOMMENDED PAD LAYOUT



all units in mm

## 11 MATERIAL INFORMATION

Contact surface : gold over nickel

### 11.1 Shield Material Information

"German Silver " , CuNi18Zn27

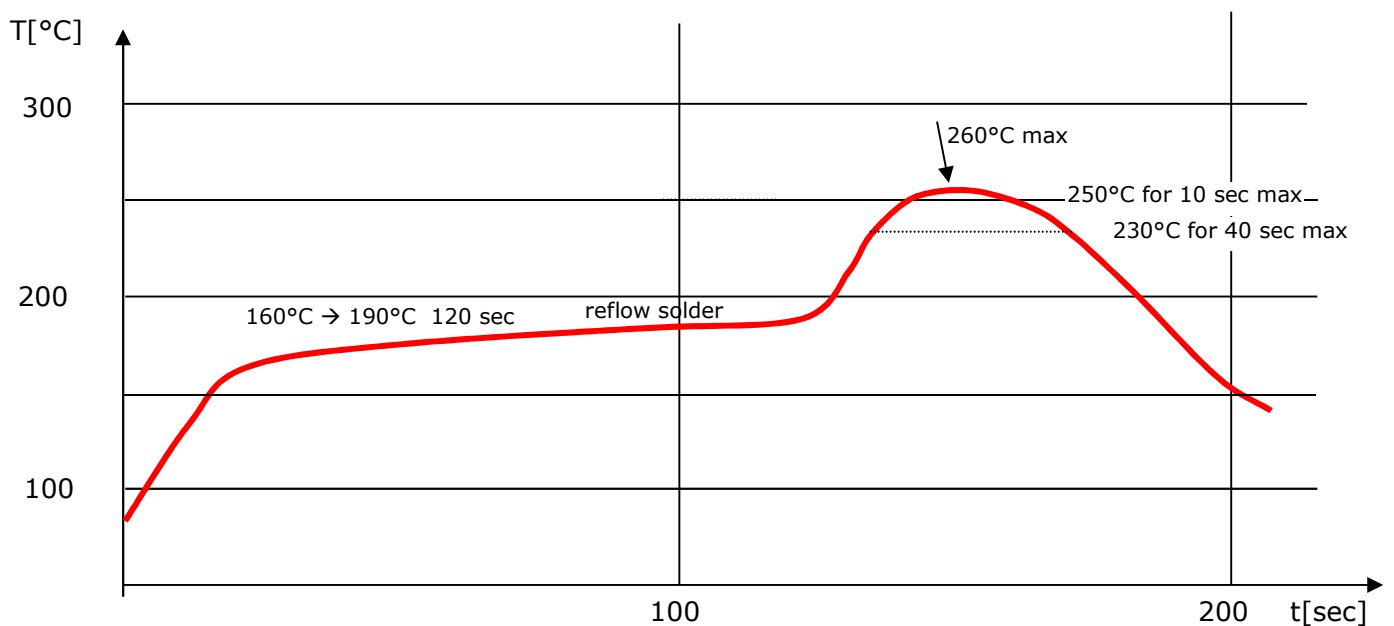
Cu: 53.5..56.5%

Ni : 16.5..19.5%

Zn : 24..30%

thickness :0.2mm

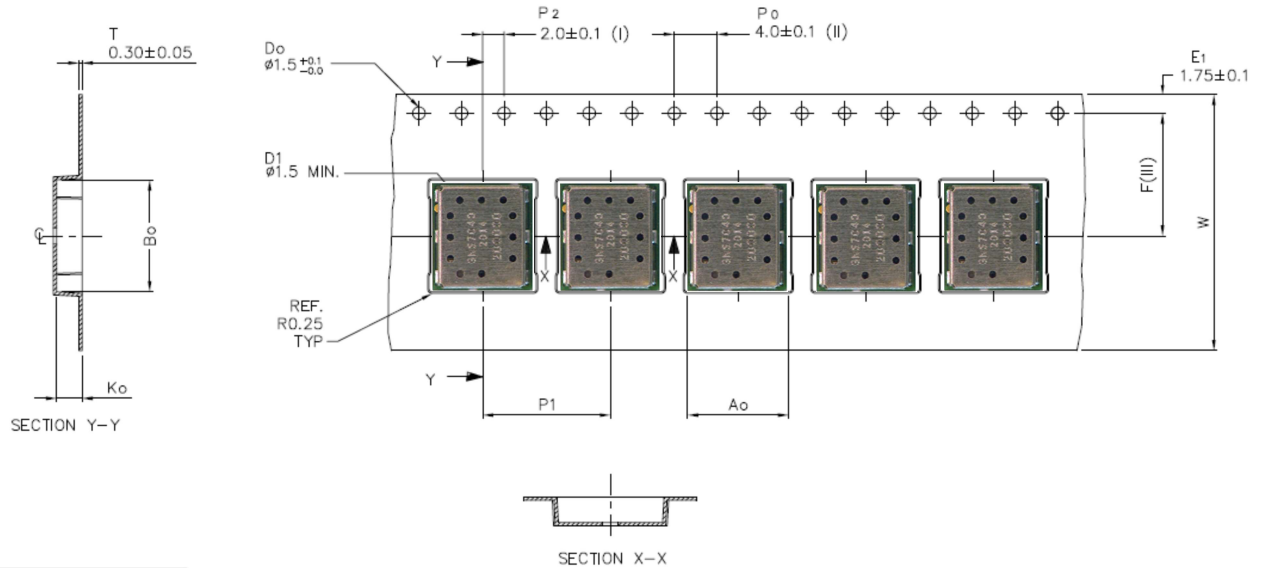
## 12 RECOMMENDED SOLDERING REFLOW PROFILE



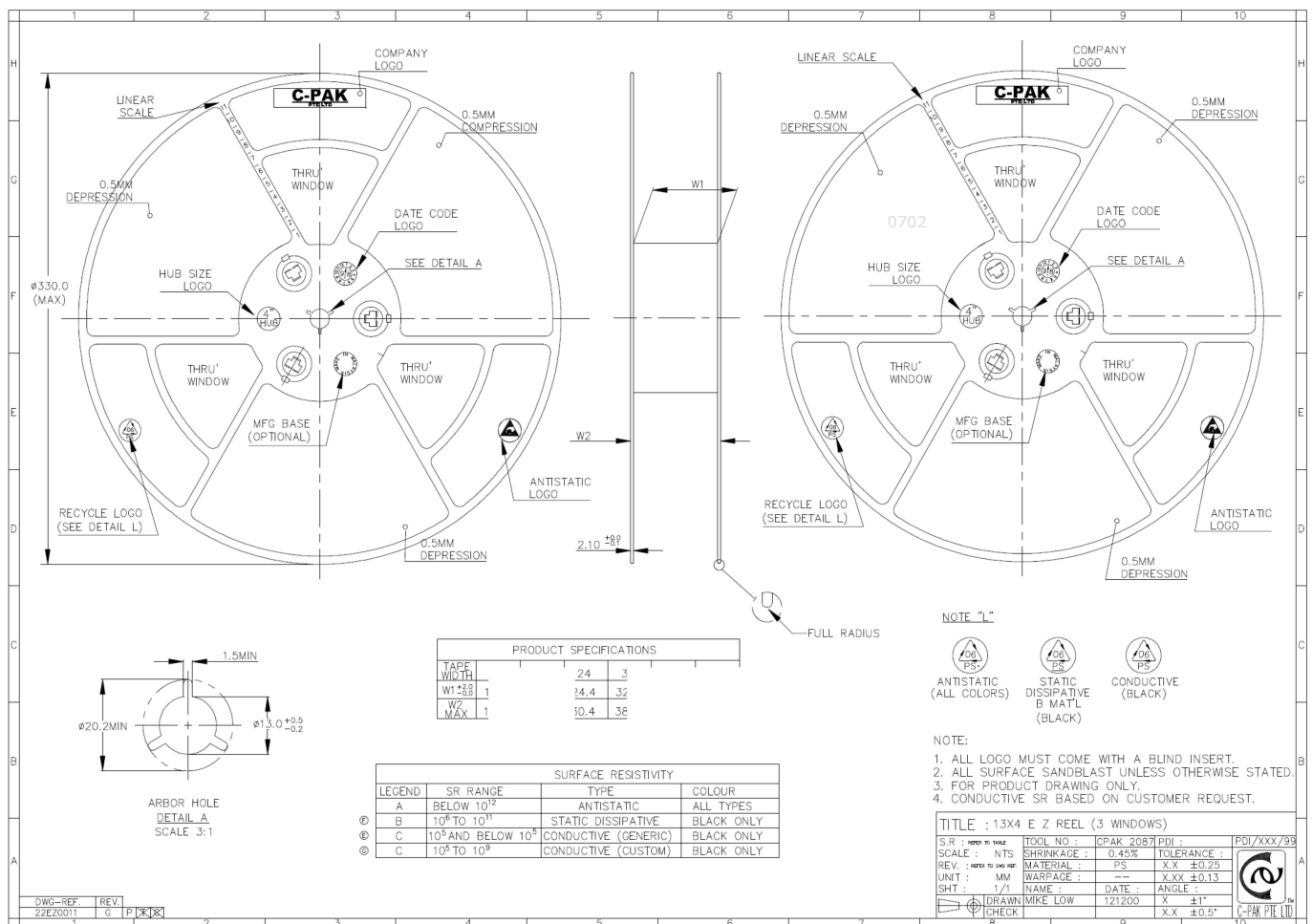
### Notes:

1. GNS7000 series module should be soldered in upright soldering position. In case of head-over soldering, please prevent shielding / module from falling down.
2. Do never exceed maximum peak temperature
3. Reflow cycles allowed: 1 time
4. Do not solder with PB-Sn or other solder containing lead (PB)
5. This device is not applicable for flow solder processing
6. This device is not applicable for solder iron process

### 13 TAPE INFORMATION



### 14 REEL INFORMATION



no. of devices : 2000 pcs / reel



### 15 ORDERING INFORMATION

Modules of the GNS7000 series are available in numerous variants, differing in protocol type, NMEA settings, I/O voltage, etc. Each of these variants is assigned a unique MPN and CPN. The following table gives an overview of possible variants.

| 15.1 GNS7000 series module product variants |   |    |   |   |   |   |   |                   |          |   |   |  |                                                                                                                         |             |
|---------------------------------------------|---|----|---|---|---|---|---|-------------------|----------|---|---|--|-------------------------------------------------------------------------------------------------------------------------|-------------|
| GNS70                                       | 0 | 0- | x | x | x | x | x | designation       | variants |   |   |  |                                                                                                                         | description |
| GNS70                                       |   |    |   |   |   |   |   | product series    |          |   |   |  | GNS7000 GNSS receiver series                                                                                            |             |
|                                             | 0 |    |   |   |   |   |   | I/O voltage       | 0        | 4 |   |  | 0 : 1.8V<br>4 : 3.3V                                                                                                    |             |
|                                             |   | 0- |   |   |   |   |   | protocol type     | 0        |   |   |  | 0 : UART                                                                                                                |             |
|                                             |   |    | x |   |   |   |   | function features | A        | B |   |  | A : GPS only<br>B : GPS + GLO + GAL<br>Other function features are available                                            |             |
|                                             |   |    |   | x |   |   |   | NMEA settings     | A        |   |   |  | A : RMC + GGA + GLL + GSA + GSV + VTG @ 9600 bps<br>Other NMEA settings are available                                   |             |
|                                             |   |    |   |   | x |   |   | h/w release       | B        |   |   |  | B : GNS7000_V1.01                                                                                                       |             |
|                                             |   |    |   |   |   | x |   | GNS intern        | Y        | U |   |  |                                                                                                                         |             |
|                                             |   |    |   |   |   |   | x | packing           | R        | T | S |  | R : Reel, 2000 pcs.<br>T : Tape, smaller quantities available on request<br>S : Single quantities, available on request |             |

| 15.2 GNS7000 series module ordering information |               |                                    |                                                                         |
|-------------------------------------------------|---------------|------------------------------------|-------------------------------------------------------------------------|
| Type (CPN)                                      | Part# (MPN)   | Laser marking                      | Description                                                             |
| GNS 7000-AABYR                                  | 4037735106505 | GNS7000<br>AABY yy cw<br><serial#> | GNSS Module (I/O voltage = 1.8V)<br>with standard options. Reel packing |
| GNS 7000-AABYT                                  | 4037735106512 | GNS7000<br>AABY yy cw<br><serial#> | GNSS Module (I/O voltage = 1.8V)<br>with standard options. Tape packing |
| GNS 7040-BABUR                                  | 4037735106338 | GNS7040<br>BABU yy cw<br><serial#> | GNSS Module (I/O voltage = 3.3V)<br>with standard options               |
| GNS 7000-AABUR                                  | 4037735106598 | GNS7000<br>AABU yy cw<br><serial#> | GNSS Module (I/O voltage = 1.8V)<br>with standard options               |
|                                                 |               |                                    |                                                                         |
|                                                 |               |                                    |                                                                         |
|                                                 |               |                                    |                                                                         |

Note: other variants are available on request

### 16 ENVIRONMENTAL INFORMATION

This product is free of environmental hazardous substances and complies to 2015/863/EU. (RoHS 3 directive).

**RoHS 3**  
COMPLIANT  
2015/863/EU

#### 16.1 Quality and Environmental Specifications

| Test                        | Standard                                                                                                                                             | Parameters                                                                                                |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| PCB Inspection              | IPC-6012B, Class 2. Qualification and Performance Specification for Rigid Printed Boards - Jan 2007                                                  |                                                                                                           |
| Assembly Inspection         | IPC-A-610-D, Class 2 "Acceptability of electronic assemblies"                                                                                        |                                                                                                           |
| Temperature Range           | ETSI EN 300 019-2-7 specification T 7.3                                                                                                              | -30 °C, +25 °C, +85 °C, operating                                                                         |
| Damp Heat                   | ETSI EN 300 019-2-7 specification T 7.3                                                                                                              | +70 °C, 80% RH, 96 hrs, non-operating                                                                     |
| Thermal Shock               | ETSI EN 300 019-2-7 specification T 7.3 E                                                                                                            | -40 °C ... +85 °C, 200 cycles                                                                             |
| Vibration                   | ISO16750-3                                                                                                                                           | Random vibration, 10~1000Hz, 27.8m/s <sup>2</sup> , 8hrs/axis, X, Y, Z 8hrs for each 3 axis non-operating |
| Shock                       | ISO16750-3                                                                                                                                           | Half-sinusoidal 50g, 6ms, 10time/face, ±X, ±Y and ±Z non-operating                                        |
| ESD Sensitivity             | JEDEC, JESD22-A114 ESD Sensitivity Testing Human Body Model (HBM), Class 2<br>JEDEC, JESD22-A115 ESD Sensitivity Testing Machine Model (MM), Class B | +2000V - Human hand assembly<br>+250V - Machine automatic final assembly                                  |
| Moisture/Reflow Sensitivity | IPC/JEDEC J-STD-020                                                                                                                                  | MSL3                                                                                                      |
| Storage (Dry Pack)          | IPC/JEDEC J-STD-033C                                                                                                                                 | MSL3                                                                                                      |
| Solderability               | EN/IEC 60068-2-58 Test Td                                                                                                                            | More than 90% of the electrode should be covered by solder. Solder temperature 245 °C ± 5 °C              |

#### Moisture Sensitivity

GNS ships all devices dry packed in tape on reel with desiccant and moisture level indicator sealed in an airtight package. If on receiving the goods the moisture indicator is pink in color or a puncture of the airtight seal packaging is observed, then follow J-STD-033 "Handling and Use of Moisture/Reflow Sensitive Surface Mount Devices".

#### Storage (Out of Bag)

The GNS7000 series modules meet MSL Level 3 of the JEDEC specification J-STD-020D – 168 hours Floor Life (out of bag) ≤30 °C/60% RH. If the stated floor life expires prior to reflow process then follow J-STD-033 "Handling and Use of Moisture/Reflow Sensitive Surface Mount Devices".

### 17 PACKAGING

|                             |                                  |                             |
|-----------------------------|----------------------------------|-----------------------------|
| <b>1 reel</b>               |                                  |                             |
| contents                    | 2,000pcs                         |                             |
| GNS part#                   | 2 x 6550000003<br>1 x 6550000011 |                             |
| dimensions                  | dia: 330mm thickness:30.4mm      |                             |
| gross weight                | 1.195 Kg                         | with full contents          |
| net weight                  | 0.246 Kg                         |                             |
| <b>2 vacuum bag</b>         |                                  |                             |
| GNS part#                   | 6550000006                       |                             |
| dimensions                  | 400mm x 480mm                    |                             |
| gross weight                | 1.321 kg                         | with full contents          |
| net weight                  | 0.068 Kg                         |                             |
| air pressure level          | <30mbar                          |                             |
| <b>3 moisture indicator</b> |                                  |                             |
| GNS part#                   | 6550000008                       |                             |
| dimensions                  | 76mm x 51mm                      |                             |
| weight                      | 0.001 Kg                         |                             |
| <b>4 dry pack</b>           |                                  |                             |
| GNS part#                   | 6550000007                       |                             |
| dimensions                  | 145mm x 140mm                    |                             |
| weight                      | 0.068 Kg                         |                             |
| <b>5 Box for reel</b>       |                                  |                             |
| GNS part#                   | 6550000012                       |                             |
| dimensions                  | 350 mm x 350mm x 47mm            |                             |
| gross weight                | 1.5357 kg                        | with full contents          |
| net weight                  | 0.184 kg                         |                             |
| <b>6 Outer box</b>          |                                  |                             |
| contents                    | max 7 box for reel               | (14,000 pcs GNS70xx-xxxxx ) |
| dimensions                  | 400mm x 370mm x 360mm            |                             |
| gross weight                | 11.6 kg                          | with full contents          |
| net weight                  | 0.85 kg                          |                             |

### 18 RELATED DOCUMENTS

| Type                                              | description                                                                                 | Available from                               |
|---------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------|
| <i>GNS 70x0 StarterKit UserManual Quick Guide</i> | <i>A short summary of the most important features of the GNS 7000 / GNS 7040 StarterKit</i> | GNS Electronics GmbH                         |
| <i>GNS7000 design guide</i>                       | <i>Contains information about implementation of the module and antenna design</i>           | The document is currently not yet available. |
| <i>GNS70x0_StarterKit_UserManual</i>              | <i>Hardware manual for the GNS Starter Kit</i>                                              | GNS Electronics GmbH                         |
| <i>GNS70x0_CommandInterface_manual</i>            | <i>Command description for GNS70x0 series module</i>                                        | GNS Electronics GmbH                         |
|                                                   |                                                                                             |                                              |
|                                                   |                                                                                             |                                              |
|                                                   |                                                                                             |                                              |
|                                                   |                                                                                             |                                              |

© GNS-ELECTRONICS GMBH 2022

THE INFORMATION IN THIS DOCUMENTATION DOES NOT FORM ANY QUOTATION OR CONTRACT. TECHNICAL DATA ARE DUE TO BE CHANGED WITHOUT NOTICE.

NO LIABILITY WILL BE ACCEPTED BY THE PUBLISHER FOR ANY CONSEQUENCE OF THIS DOCUMENT'S USE.

REPRODUCTION IN WHOLE OR IN PART IS PROHIBITED WITHOUT THE PRIOR WRITTEN CONSENT OF THE COPYRIGHT OWNER