NGR-531(SirfStarIII,Singlechip) Specification

2006. 1

1.Introduction

NGR-531 is NAVIUS GPS Module.
It consists of SiRF Star III technology.(INTERNAL 4Mbit FLASH)
NGR-531 contains LNA, SAW Filter, Reset IC, RTC X-tal, TCXO and Regulator.

Please refer to the section for more information.

2. Product Features

* Fully self-contained GPS receiver.

* Fully shield.

* Full implement of SiRFstarIII™ GPS architecture.

▶ GSC3f (A Highly Integrated GPS RF + GPS Engine with integrated Processor and Flash)

▶ Low noise amplifier

▶ SAW filter

▶ TCXO

▶ 32.768KHz RTC X-tal

▶ Reset & Regulator, etc.

* GPS receiver in a micro-component package

▶ Postage stamp type package

▶ Fully automatic assembly: Reflow solderable

* Fast time-to-first-fix

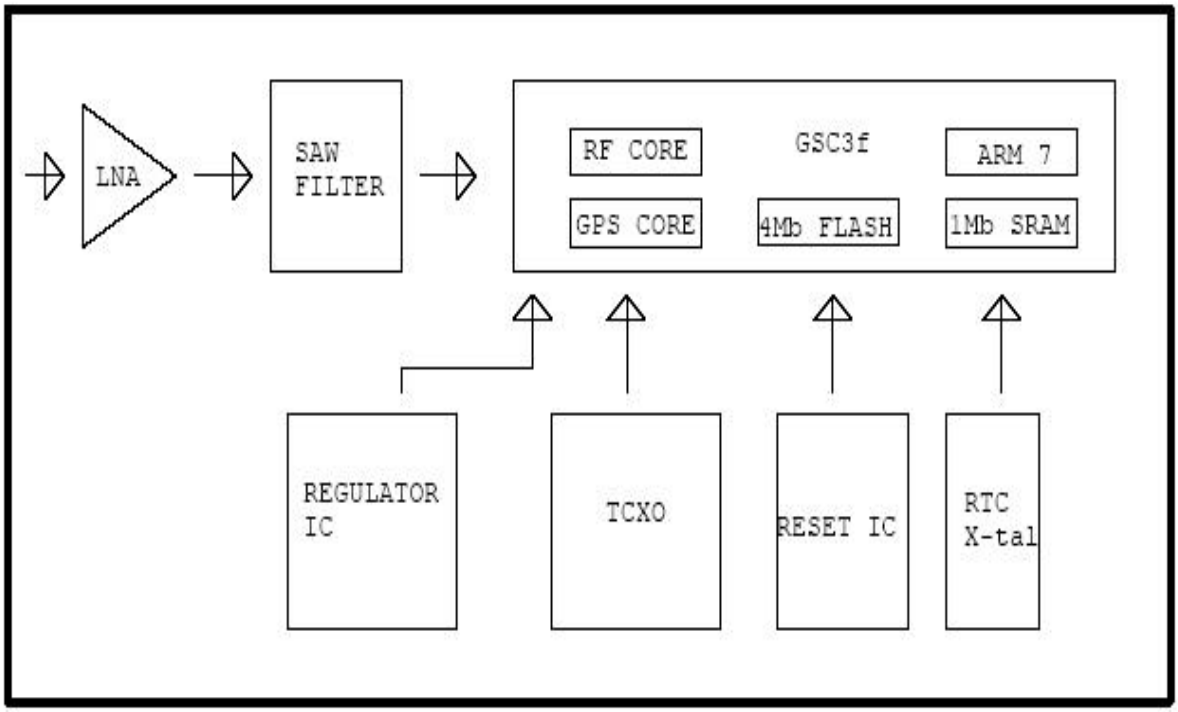
* Userable I/O port : Six GPIO port

* Advanced low power mode

3. Product applications

- ▶ Automotive applications
- ▶ Personal positioning and navigation
- ▶ Mobile and PDA applications, etc

4. Block diagram



5. Technique specifications

Model: NGR-531
Receiver type: L1 frequency , C/A Code, 20-channel
Max up-date rate: 1Hz
Accuraccy(SA off): Position < 10M 2DRMS
Tracking Sensitivity: -155dBm (at the receiver input)
Operational Limits: Altitude < 18,000m(60,000ft)
velocity < 515m/s(1,000knots)
Time To First Fix(TTFF)

a) Cold start 42sec(typical)

In Cold start scenario, the receiver has no knowledge on last position, approximate time or satellite constellation. The receiver starts to search for signals blindly. Cold start time is the longest startup time for NGR-531.

b) Warm start 38sec(typical)

In Warm Start scenario, the receiver knows -due to a backup battery- his last position, approximate time and almanac. Thanks to this it can quickly acquire satellites and get a position fix faster than in cold start mode.

c) Hot Start < 8sec(typical)

In Hot Start scenario, the receiver was off for less than 2 hours. It uses its last Ephemeris data to calculate a position fix.

Re-acquisition Time 3sec. typical (within 5sec. Block out)
5sec typical (within 60sec block out)

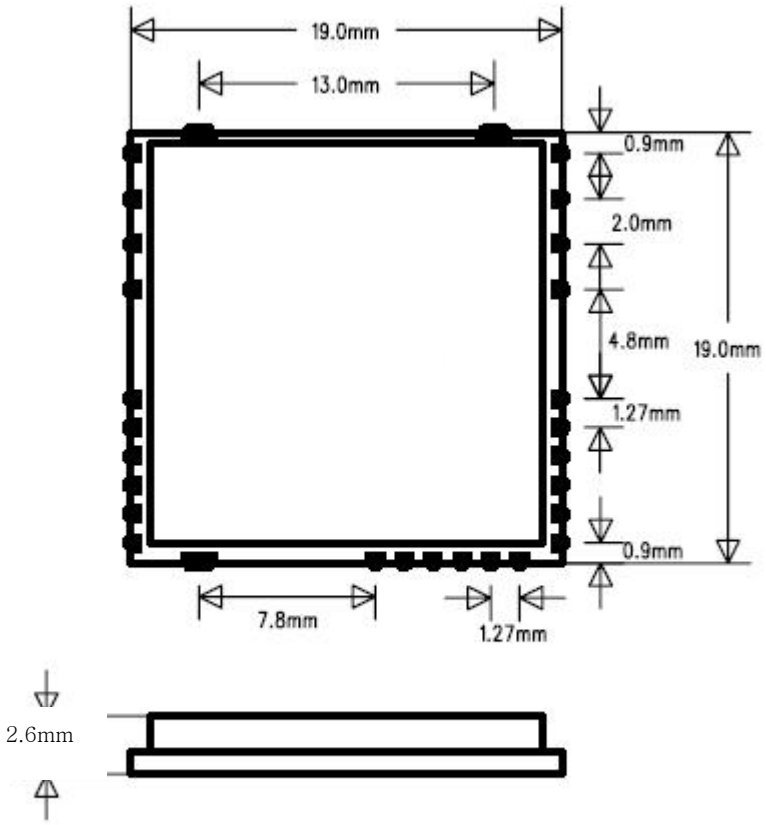
Protocol NMEA 0183 (Default)
activated message : GLL, GGA, RMC, VTG, GSV, GSA all with checksum enabled

SiRF Binary

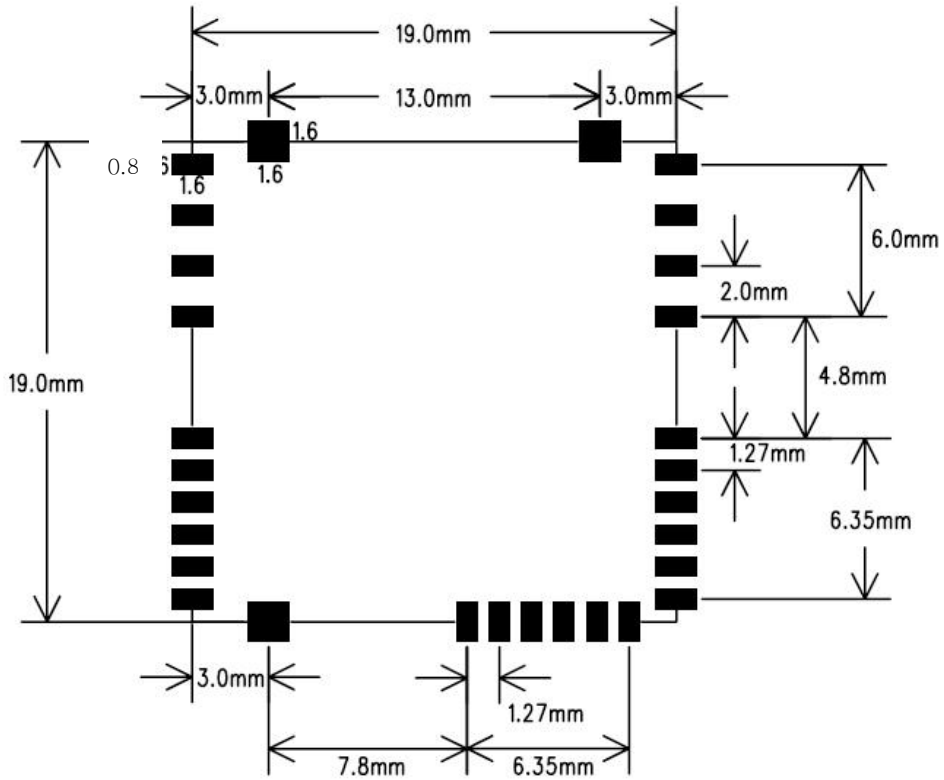
Size	19.0mm x 19.0mm(max.19.7mm) x 2.6mm
Weight	1g

6. Mechanical Layout

1) DIMENSION



2) Recommend PCB Layout

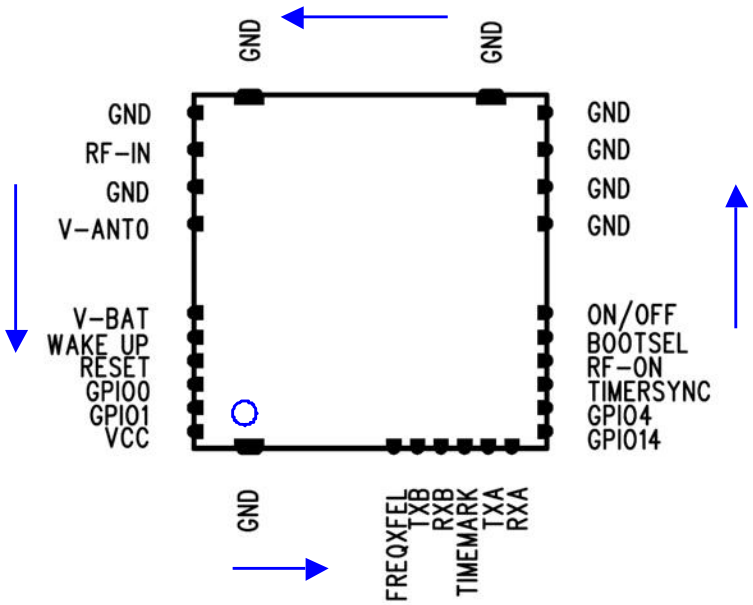


3) Sticker Design

7. Hardware interface

Pin No	Signal name	I/O	Description	Note
1	VCC	I	Supply Voltage	
2	GND			
3	FREQXFEL	I	External CMOS clock source	
4	TXB	O	Serial outputs for channel B	
5	RXB	I	Serial inputs for channel B	
6	TIMEMARK	I	1 pps timemark output	
7	TXA	I/O O	Serial outputs for channel A	
8	RXA	I	Serial inputs for channel A	
9	GPIO 14	I/O		Leave unconnected if not used
10	GPIO 4	I/O		Leave unconnected if not used
11	AMP-INTR	I		Alternate functions are CS3 and GPIO15
12	RF-ON	I	Power control of RF chip.	Leave unconnected if not used
13	Bootsel	I	Module boots into special debug mode if VCC during reset	Leave unconnected if not used
14	GND			
15	GND			
16	GND			
17	GND			
18	GND			
19	GND			
20	GND			
21	GND			
22	RF IN	I	GPSsignal from antenna	50Ω (1.57542GHz)
23	GND			
24	V-ANT0	O	Power supply out of Active antenna	

25	V-BAT	I	BackupVoltage supply for RTC and SRAM	Leave unconnected if not used
26	PWR-CTRL	OD	Wake up from RTC (Open Drain)	Leave unconnected if not used
27	RESET	I/O	Active low reset	Leave unconnected if not used
28	GPIO0	I/O		Leave unconnected if not used
29	GPIO1	I/O		Leave unconnected if not used



RESET

An external reset is initiated by pulling RESET low for at least 1 μs. If not used, RESET can be left unconnected since there is an internal 10k pull-up resistor. RESET is also used in Push-to-Fix mode in order to wake up the unit and request a position fix. Minimum pulse width is 1 μs.

BOOTSEL

The boot signal BOOTSEL forces special debug mode when restarted with a reset signal or power-up. If not used, BOOTSEL can be left unconnected since there is an internal 100k pull-down resistor.

RF IN

The line on the PCB from the antenna (or antenna connector) has to be a controlled impedance line (Microstrip at 50Ω).

VBAT

This is the battery backup supply that powers the SRAM and RTC when power is removed. Without an external backup battery or on board battery, engine board will execute a cold start after every turn on. To achieve the faster start-up offered by a hot or warm start, either a backup battery must be connected or battery installed on board.

TIMEMARK

This pin provides one pulse per second output from the engine board which is synchronized to within one microsecond of GPS time. The output is TTL negative level signal with negative logic.

8. Serial Interface

The NGR-531 GPS receivers provide two serial ports. All serial interface signals (Port A:TxA RxA Port B:TxB RxB operate on 3V CMOS)

Baud Rate	Comments
1200	NMEA,suitable for RMC message only
2400	NMEA,suitable for RMC message only
4800	Must deactivate some messages to avoid communication bottleneck and loss of information,e.g.NMEA:RMC and ZDA only
9600	Minimum recommended baud rate for NMEA output in standard Configuration
19200	Minimum recommended baud rate for SiRF Binary Protocol output
38400	Minimum recommended baud rate for SiRF Binary Protocol output including development data and raw tracking data.
57600	Minimum recommended baud rate for SiRF Binary Protocol output including development data and raw tracking data.
115200	Minimum recommended baud rate for SiRF Binary Protocol output including development data and raw tracking data.

9. Electrical Specification

Absolute Maximum Ratings

Parameter	Min	Max	Unit
Power supply voltage(VCC,VCC-RF)		3.15	V
Input/Output Pin voltage		5.25	V
RTC Voltage		2.0	V
Latch-up Current		±200	mA
Storage temperature	-65	150	℃

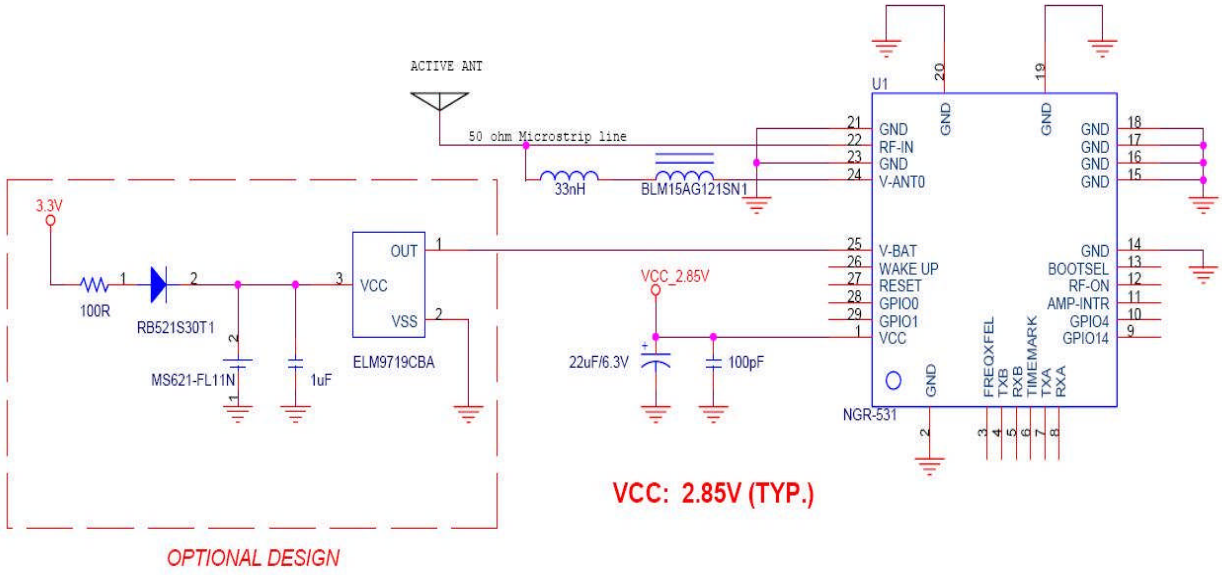
Warning - Stressing the device beyond the "Absolute Maximum Ratings" may cause permanent damage. These are stress ratings only. Operation beyond "Operating conditions" is not recommended and extended exposure beyond the "Operating condition" may affect device reliability. This module is not protected against over voltage, reversed voltage or short current of RF_IN port.

10. Operating Conditions

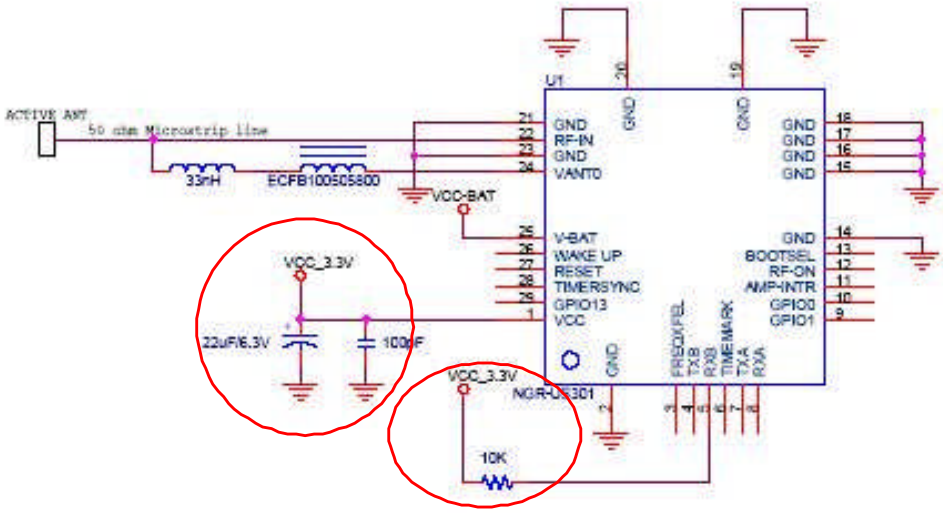
(Test Temperature : 25℃)

Parameter	Condition	Min	Typ	Max	Unit
Operating supply voltage	VCC	2.7	2.85	3.0	V
Operating supply ripple voltage				50	mV
Backup battery input voltage	V_BAT	1.9		3.0	V
I/O input low level				0.3xVCC	V
I/O input high level		0.7xVCC			V
I/O output high level	Ioh=2mA	2.4	2.8		V
I/O output low level	Iol=2mA		0.2	0.4	V
Antenna input voltage	V_ANT	2.7	2.8	3.0	V
Sustained supply current	VCC=2.8V		70		mA
Peak supply current	VCC=2.8V		87		mA
Operating temperature	VCC=2.8V	-40	25	+85	℃

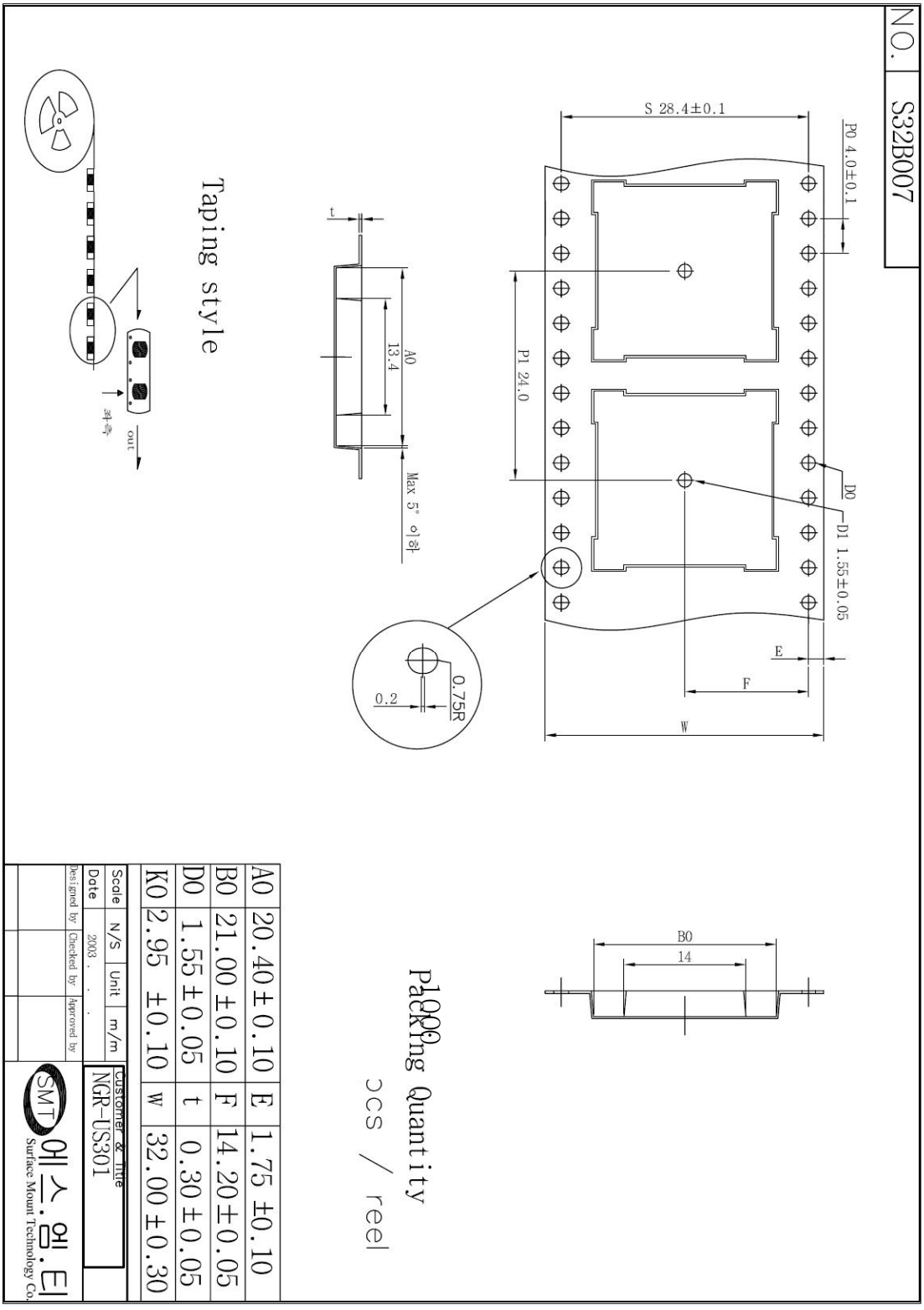
11. Application Schematic(for Active Ant.)



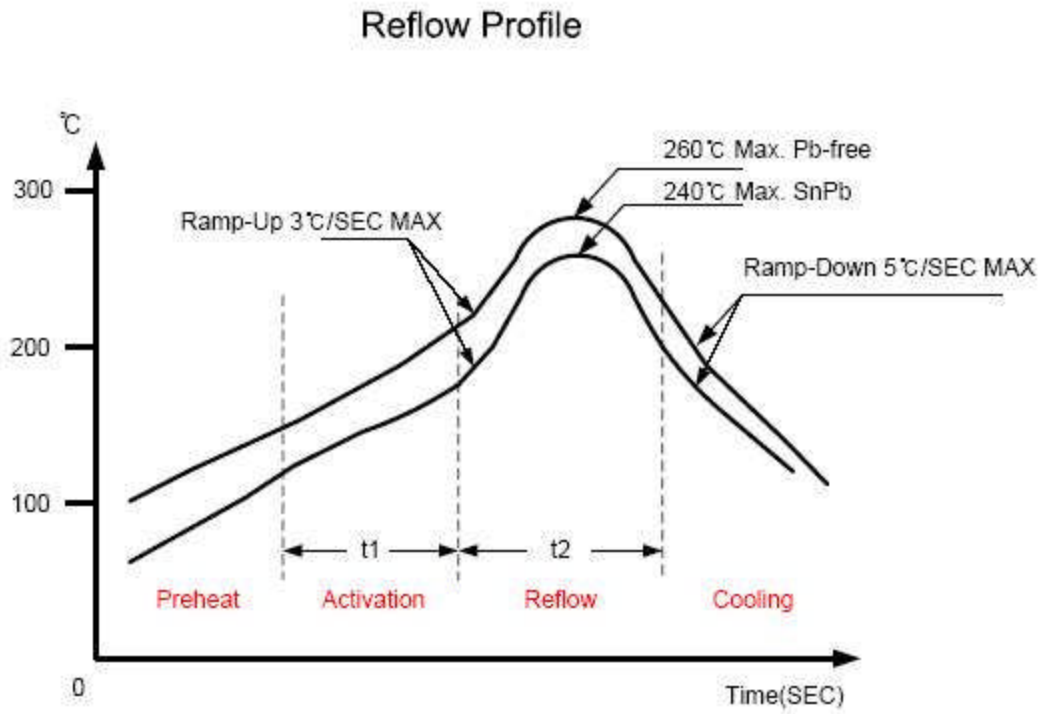
※ COMPARE WITH NGR-US301(Sirf III, TWO CHIP)
NGR-531: VCC: 2.85V(TYP)±2%, RXA (INTERNAL PULL-UP RESISTOR)
NGR-US301: VCC: 3.3V, RXA (EXTERNAL PULL-UP RESISTOR)



12. Reel Taping Specification



13. Reflow Profile



Note : The lower line is for 225℃~240℃, SnPb solders. The Upper line is for 245℃~260℃, Pb-free solders, such as SnAgCu.

- Preheat State

Initial heating of component leads and balls. Residual humidity will be dired out. Please note that this preheat phase will not replace prior baking procedures.

Temperature rise time : MAX 3℃/sec

Reach : 100~110℃(SnPb), 150~160℃(Pb-Free)

State	Symbol	Time(Units: SEC)		Temperature(Units:℃)		Condition
		Minimum	Maximum	Minimum	Maximum	
Activation	t1	60	180	150	200	Pb-Free
		60	120	100	150	SnPb
Reflow	t2	90	150	245	260	Pb-Free
		90	150	225	240	SnPb

- Cooling State

A controlled cooling avoids negative metallurgical effects (solder becomes more brittle) of the solder and possible mechanical tensions in the products. Controlled cooling helps to achieve bright solder fillets with a good shape and low contact angle.

Temperature fall time: MAX 5℃/sec

Contact

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