

**Hardware Specifications
for
GPS receiver**

Model: GT-8031

Chapter 1. Outline

1. Model

1.1. Model name

GT-8031□

└─ Software/Hardware version (Alphabet)
(The 1st version is blank.)

1.2 Outer looking

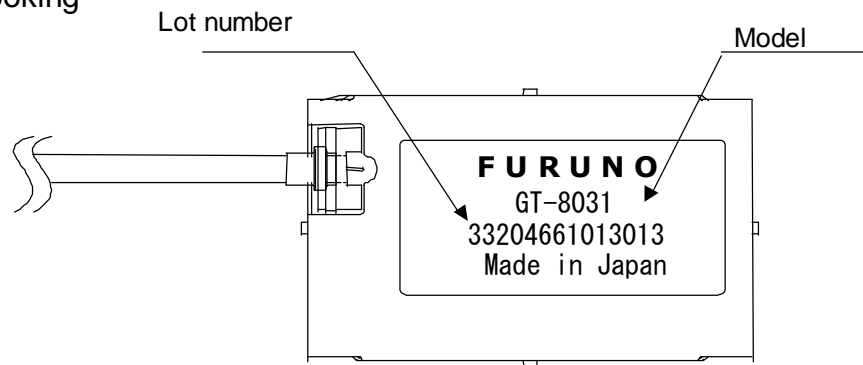
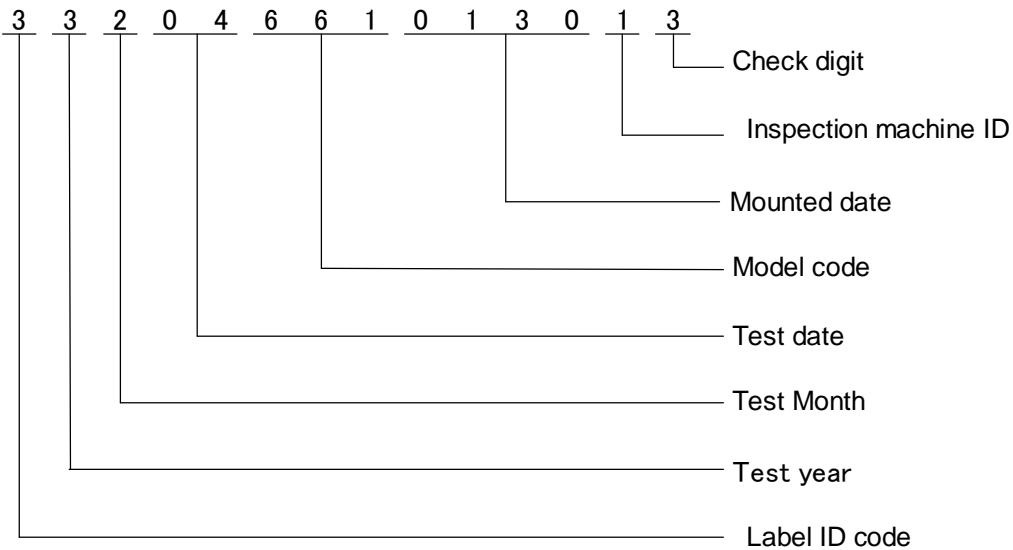


Fig.1.1 Outer looking

1.3 Lot number

Example



Chapter 2. SPECIFICATIONS

2-1. OVERALL SPECIFICATIONS

A. General Specifications

#	ITEM	SPECIFICATION	NOTE
1	Receiving Frequency	1575.42 MHz	
2	Position-fixing System	All-in-view SPS position-fixing (DGPS RTCM-SC104)	
3	WAAS Support	1 channel	Uses DGPS and the function to deselect unhealthy satellites.
4	GPS-fix Data Renewal Rate	1 sec	
5	1PPS Output	UTC-synchronized. (1 pulse per second)	
6	Max. Number of Satellites Tracked	GPS12ch + SBAS 2ch	Out of SBAS 2ch, only one channel decodes messages.
7	Number of Channels	16	
8	Number of Parallel Searches	16	
9	Protocol	NMEA like	

B. Acquisition/Tracking Specifications

#	ITEM	MIN	TYP	MAX	UNIT	CONDITIONS	NOTE
1	Initial acquisition time (Hot start)	-	8.4	-	sec	Open sky	Based on averaged data for 24 hours measured in Nishinomiya, Japan in April 2003
2	Initial acquisition time (Warm start)	-	36.0	-	sec	- DITTO -	
3	Initial acquisition time (Cold start)	-	44.9	-	sec	- DITTO -	
4	Re-acquisition Time	-	-	2	sec	-127 dBm or stronger signal is interrupted for 10 sec or less.	
5	Horizontal accuracy (2 drms)	-	5.6 (2σ)	-	m		Based on averaged data for 24 hours measured in Nishinomiya, Japan in April 2003
6	Vertical accuracy (2 drms)	-	7.3 (2σ)	-	m	- DITTO -	

#	ITEM	MIN	TYP	MAX	UNIT	CONDITIONS	NOTE
7	Trackable acceleration	1.2	-	-	G	- DITTO -	
8	Acquisition sensitivity	-	-130	-	dBm		
9	Tracking sensitivity	-	-138	-	dBm	Fixed position	
10	Time Accuracy (2σ)	-	30	-	ns	- DITTO -	Based on averaged data for 24 hours measured in Nishinomiya, Japan in April 2003

C. Power Dissipation

ITEM	CONDITION 1	CONDITION 2	MIN	TYP	MAX	UNIT	NOTE
Current draw	Acquisition	With mask ROM only. 16 MHz operating frequency.	-	78	-	mA	Current for the antenna preamplifier is not included. (This specification subject to change.)
		With flash memory. 32 MHz operating frequency.	-	90	-	mA	
	Tracking	With mask ROM only. 16 MHz operating frequency.	-	58	-	mA	
		With flash memory. 32 MHz operating frequency.	-	70	-	mA	

2-2. ELECTRONICAL SPECIFICATIONS

2.2.1. Antenna connector

2.2.1.1 Pin assignment

Pin	Signal	Function
Center contact	SIG	<ul style="list-style-type: none"> ● Input of receiving signal ● Signal is super-imposed (biased) on this DC voltage.
Outer contact	GND	Antenna ground

2.2.1.2. Absolute Maximum Rating

Signal input power : -12dBm (max) at Temperature Ta=-30 to +80°C

2.2.1.3. Rating

SIGNAL	REQUIRED ITEM	CONDITION	MIN	TYP	MAX	UNIT
Antenna preamplifier power supply	Voltage	VANT=5.0V i=20mA Current detection resistor :15 ohms(+/-1%)	4.6	-	-	V
		VANT=5.0V i=40mA Current detection resistor :15 ohms(+/-1%)	4.3	-	-	V
	Antenna open detection current	VANT=4.5 to 5V	0		10	mA
	Antenna short detection current		40			mA

SIGNAL	REQUIRED ITEM	CONDITION	MIN	TYP	MAX	UNIT	NOTE
ANTSIG	Center frequency		-	1.57542	-	GHz	
	Impedance		-	50	-	Ω	
	Receiving sensitivity	At fixed position using matching antenna at Ta=25°C	-138				dBm

2.2.1.4 Antenna Pre-amplifier Output

Equivalent circuit diagram for the antenna-connection detector circuit is given below.

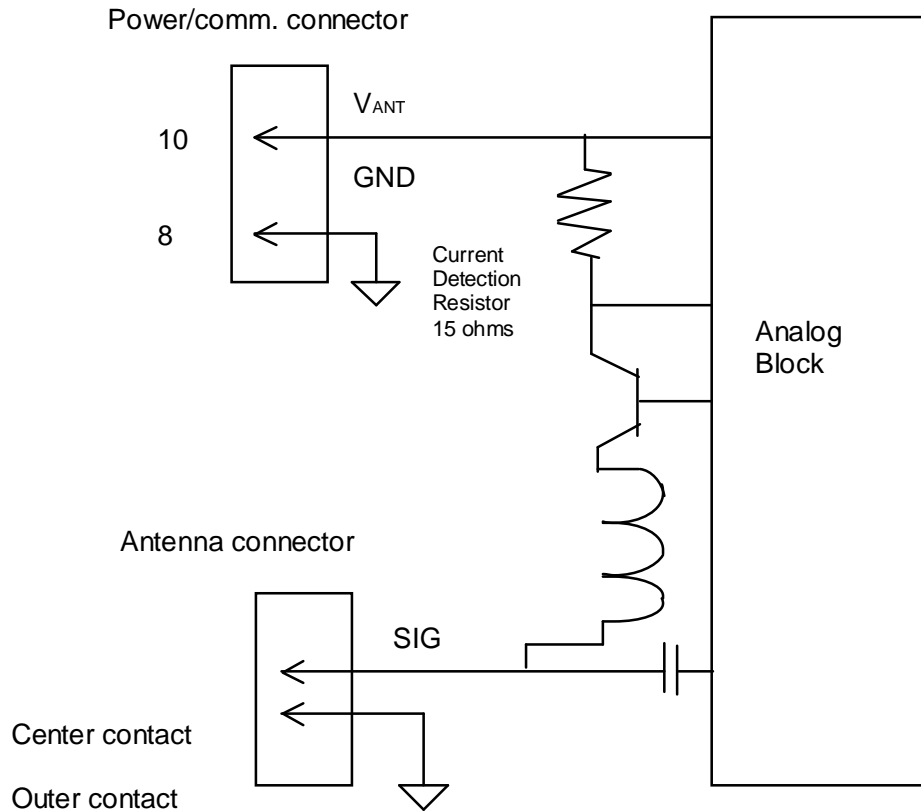


Fig. 2.2.1.4 Antenna Interface Equivalent Circuit

2.2.1.5. Antenna Specification Requirements

ITEM	MIN	TYP	MAX	UNIT	CONDITIONS	NOTE
Preamplifier gain	15	-	35	dB	Cable loss included.	
Preamplifier noise figure	-	2	3	dB		
Impedance	-	50	-	Ω		

Temperature at -30 to $+80^{\circ}\text{C}$

2.2.2 Communications and Power Supply

2.2.2.1 Pin assignment

PIN	SIGNAL	I/O	FUNCTION	NOTE
1	TEST	I		No connection
2	MODE	I	Control signal for flash memory writing L: Normal mode H: Flash memory write	Valid when ASIC on flash memory is built in.
3	TD	O	Asynchronous serial transmission data	
4	RD	I	Asynchronous serial reception data	
5	1PPS	O	UTC-synchronized clock pulse (One pulse per second)	
6	RST_N	I	Module reset signal L: Reset H: Run (Reset is removed.)	
7	VBCK	I	3.3 VDC backup power supply	
8	GND	-	Ground	
9	VCC	I	3.3 VDC module power supply	
10	VANT	I	5 VDC antenna-preamplifier power supply	

2.2.2.2 Absolute Maximum Ratings

SIGNAL	DESCRIPTIONS	CONDITION	MIN	TYP	MAX	UNIT	NOTE
RD	DC input voltage	-	-0.3	-	VCC+0.3	V	
RST_N							
MODE							
TEST							
TD	DC output current	2mA buffer	-8	-	8	mA	
1PPS							
VCC	Module power supply	-	-0.3	-	4.5	V	
VBCK	SRAM backup power supply	-	-0.3	-	4.5	V	
VANT	Antenna preamplifier power supply	-	-0.3	-	5.5	V	

2.2.2.3. DC Characteristics and Power specification

SIGNAL	ITEM	DESCRIPTION	CONDITION	MIN	TYP	MAX	UNIT	NOTE
RST_N	V _{IH}	High-level LVTTTL	V _{CC} =3.0V to 3.6V	2	-	V _{CC}	V	Pulled down. Positive sign of current means current flow direction into the module.
	V _{IL}	Low-level LVTTTL	V _{CC} =3.0V to 3.6V	0	-	0.8	V	
	I _H	Output leak current when input is H	V _i =V _{CC}	-	-	+80	μA	
	I _L	Output leak current when input is L	V _i =0.8V	-	-	-20	μA	
MODE	V _{IH}	High-level LVTTTL	V _{CC} =3.0V to 3.6V	2	-	V _{CC}	V	Pulled down. Positive sign of current means current flow direction into the module.
	V _{IL}	Low-level LVTTTL	V _{CC} =3.0V to 3.6V	0	-	0.8	V	
	I _H	Output leak current when input is H	V _i =V _{CC}	-	-	+80	μA	
	I _L	Output leak current when input is L	V _i =0.8V	-	-	-20	μA	
RD	V _{IH}	High-level LVTTTL	V _{CC} =3.0V to 3.6V-	2	-	V _{CC}	V	Pulled up. Positive sign of current means current flow direction into the module.
	V _{IL}	Low-level LVTTTL	V _{CC} =3.0V to 3.6V	0	-	0.8	V	
	I _H	Output leak current when input is H	V _i =V _{CC}	-	-	+20	μA	
	I _L	Output leak current when input is L	V _i =0V	-	-	-80	μA	
TD	V _{OH}	3.3V high-level output	I _{OH} =-2mA V _{CC} =3.3V	2.4	-	-	V	
	V _{OL}	3.3V low-level output	I _{OL} =2mA	-	-	0.4	V	
1PPS	V _{OH}	3.3V high-level output	I _{OH} =-2mA V _{CC} =3.3V	2.4	-	-	V	
	V _{OL}	3.3V low-level output	I _{OL} =2mA	-	-	0.4	V	
VCC	V _{CC}	3.3V supply	I _{CC} =80mA	3.0	3.3	3.6	V	
	I _{CC}	3.3V supply current	V _{CC} =3.6V (Flash ROM version)	-	-	72	mA	
VBCK	VBCK	Backup power supply	Normal	2.1	3.3	3.6	V	
			Backup	2.1	3.3	3.6	V	
	IBCK	Backup current	Normal V _{CC} =3.6V	-	174	200	μA	
			Backup V _{CC} =0V	-	3	10	μA	
VANT	VANT-	Antenna preamplifier power supply	-	4.5	5	5.3	V	

- Temperature at 30 to +80°C
- Power supply current for V_{CC} and V_{BCK} : at 25°C

2.2.2.4. AC Electronic Characteristics

a) Time chart

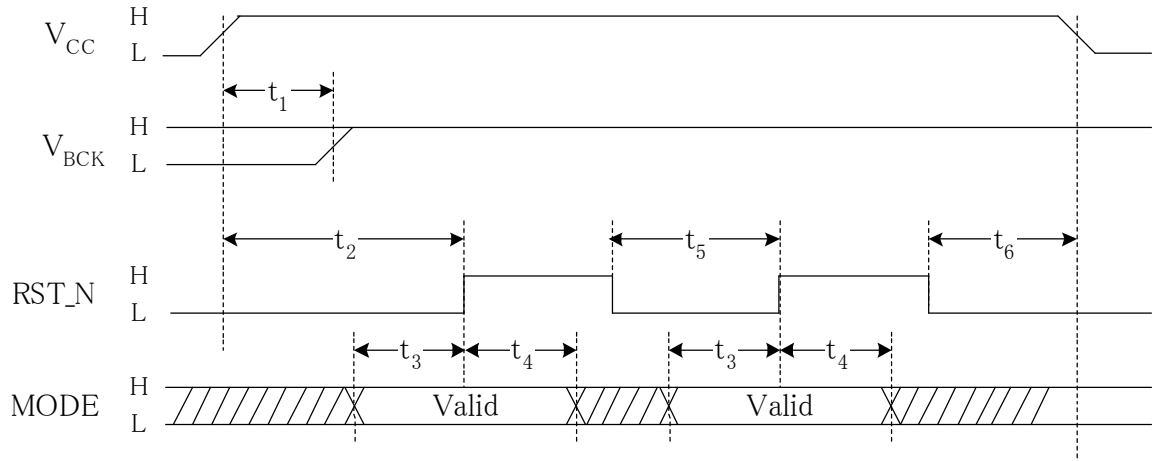
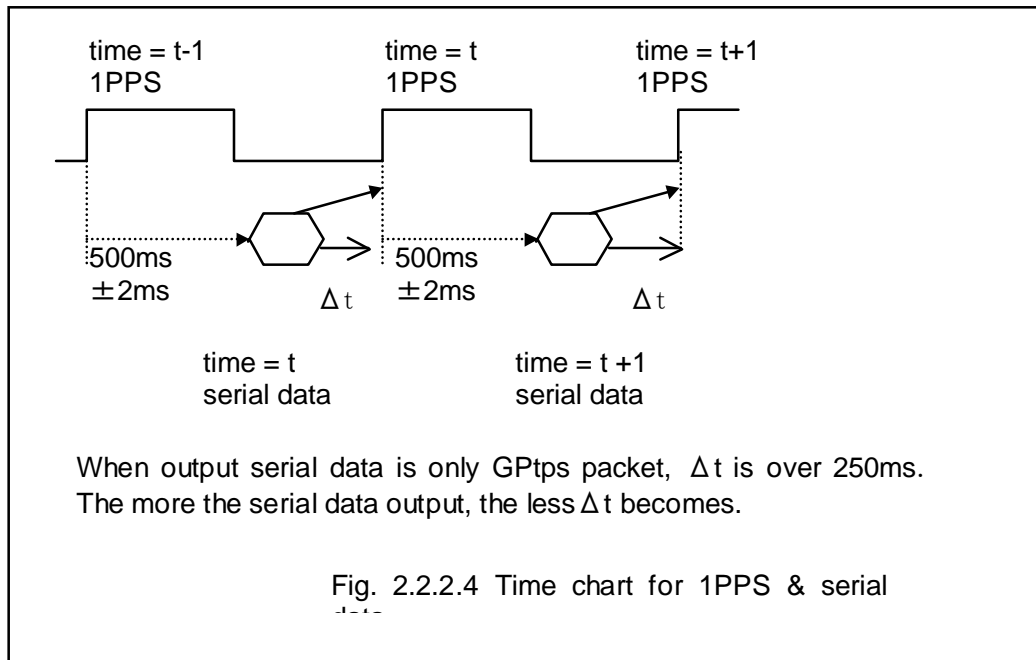


Fig. 2.2.2.4.(a) TIME CHART FOR RESET, VBCK AND VCC VOLTAGES

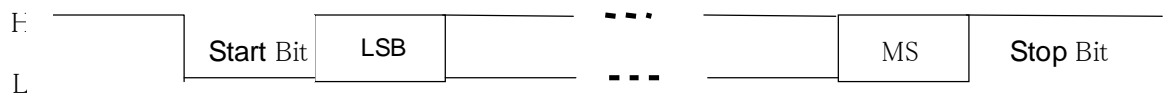
SIGNAL	DESCRIPTIONS	MIN	MAX	UNIT	NOTE
t1	Time allowed to make V_{BCK} recommended operational level after V_{CC} reaches recommended operational level.		5-	sec	If V_{BCK} goes High after this time and the reset is already released, the system operation may fail. If this time is not secured, it is necessary to start through reset.
t2	Time necessary to keep before RST_N goes "H" after V_{CC} reaches recommended operational level	20	-	ms	
t3	Time to fix the $MODE$ level to be used before RST_N goes "H"	0		ms	
t4	Time necessary to hold the level to be used after RST_N goes "H"	1		ms	
t5	Time to hold RST_N "L" in order to control reset	1		μs	
t6	Time necessary to keep before V_{CC} goes "L" after RST_N goes "L"	0		ms	

(b) 1PPS and serial data



2.2.2.5. Communication Specifications

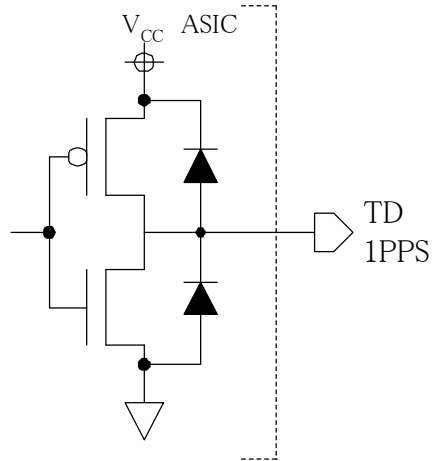
9600 BPS



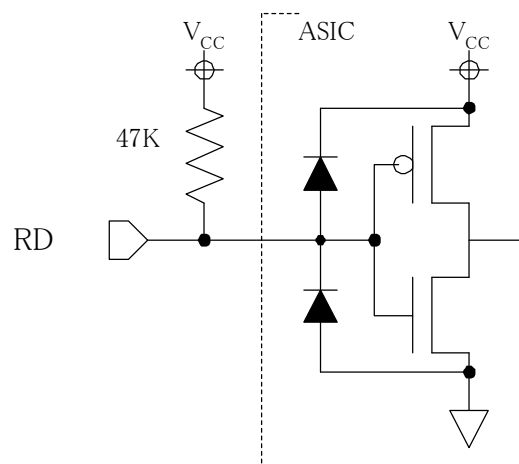
LOGIC FOR TD AND RD SIGNALS

2.2.2.6 I/O Port Equivalent Circuits

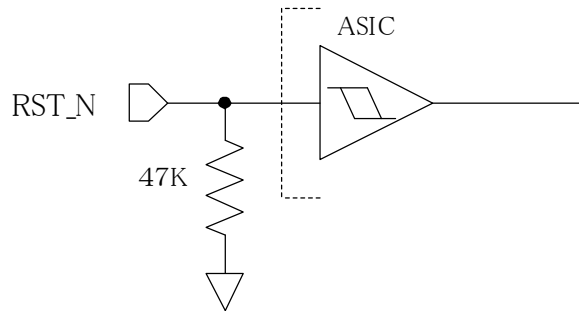
a) TD, 1PPS output equivalent circuits



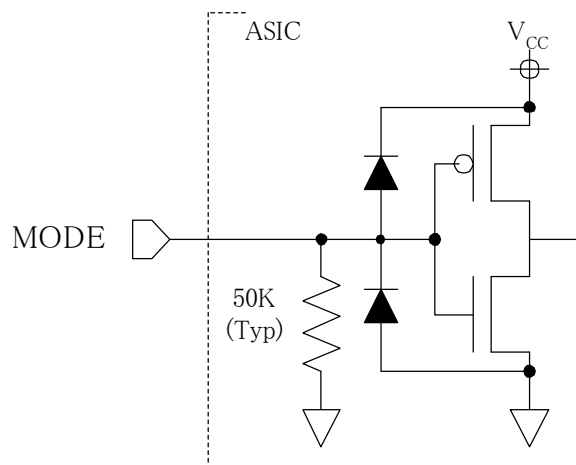
b) RD input equivalent circuit



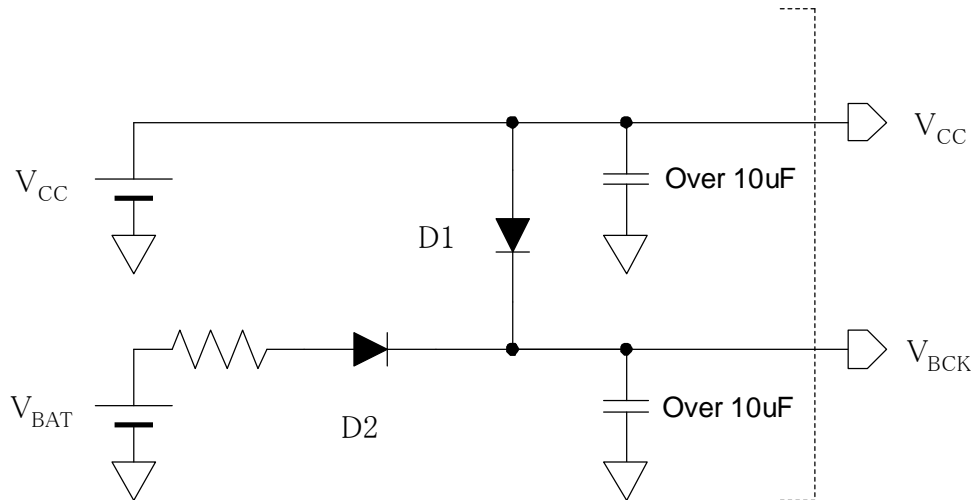
c) RST_N input equivalent circuit



d) Mode input equivalent circuit



2.2.2.7 Recommended Extrnal Power supply circuit



In normal operation, the back-up current (IBCK) runs about 100 μ A or over. In order to relieve battery consumption and avoid breaking the specification of V_{BCK}, supply the current from V_{CC} keeping the following conditions when you use battery power supply.

$$V_{BCK}(\text{Min}) + V_{f2}(\text{Max}) < V_{BAT} < V_{CC}(\text{Min}) - V_{f1}(\text{Max})$$

With regards to the rating of V_{CC}, V_{BCK}, and I_{BCK}, please refer to the DC characteristics and Power supply rating specification.

2.2.3 Environmental Specification

#	ITEM	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
1	Operating temperature		-30	-	80	°C	.
2	Storage temperature		-40	-	85	°C	
3	Operating humidity	Ambient temperature of 60°C without condensing	-	-	90	%RH	
		Ambient temperature of 55°C without condensing			95	%RH	
4	Vibration	10-200Hz		-	43.1	m/s ²	