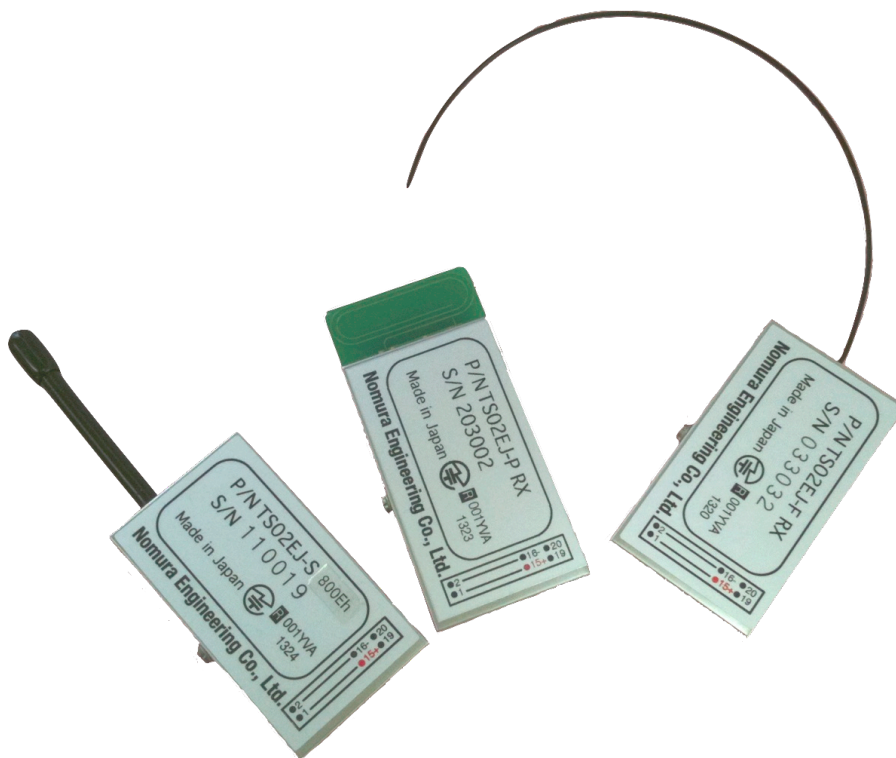


429MHz low power radio module TS02EJ hardware specifications



Nomura Engineering Co., Ltd.
Since 1997

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Introduction

TS02EJ is a radio module operated in the 429 MHz ISM band. This transceiver module consists of microcontroller, receiver and transmitter sections, all in one package. Equipped with an antenna(choose from 3types) and 20-pin interface connector, it can be easily integrated into a compact case.

In accordance with ARIB STD-T67, technical regulation conformity certification has been acquired in a module simple substance.

The license application is unnecessary. You can use it immediately.

There are Standard Mode and LDM(Long Distance Mode) .

Standard Mode has communication distance about 700m (LDM : 2km or more).

This module is applicable to various wireless systems like remote control, telemetry, data transfer, security and so forth.

Various kinds of firmware are available to meet your demand.

Features

- 6.5mm Low-profile
- Low voltage operation down to 2.1V DC
- Low power consumption
- Wide operating range from -20 to 70 degree C
- Pre-programmed 40 channels
- Selectable firmware and antenna
- Easy detachable hardware design

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Electrical Characteristic

Oscillation system	PLL frequency synthesizer according to reference crystal clock
Communication	Half-duplex
Transmitter frequency	429.2500 MHz ~ 429.7375 MHz
Number of channel	40
Channel step	12.5 kHz
Frequency stability	± 3.5 ppm以内 (-20 to + 70 °C)
Data rate	1800 bps / 100~200 bps @LDM
Supply voltage	2.1 - 7.0 V DC
Consumption current	
shutdown	<1 uA at 2.1 - 7.0 V DC
sleep mode	20 uA at 2.1 - 7.0 V DC
standby mode	1.5mA at 2.1 - 7.0 V DC
RX	15 mA at 2.1 - 7.0 V DC
LDM RX	18 mA at 2.1 - 7.0 V DC
TX	26 mA at 2.1 - 7.0 V DC
Dimension	53 x 30 x 6.5 mm
Weight	15g
Operating temperature range	-20 to + 70 °C
Storage temperature range	-30 to + 80 °C

Transmitter

RF output power	10 mW +10/-30 %
Start up time	40 ms (from power off or sleep mode) 15 ms (from standby mode or RX)
Deviation	< ±2.5 kHz
Spuious emission	< -54 dBm (47-74 M, 87.5-118 M, 470-862 M)* < -36 dBm (others below 1 GHz)* < -30 dBm (> 1 GHz)*
Adjacent channel power	< -37 dBm

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Receiver

Receiver system	Double superheterodyne
Receiver sensitivity	Typ. -120 dBm (12 dB SINAD AF at CCITT 1 kHz filter on) Typ. -116 dBm (BER 1×10^{-2}) Typ. -122 dBm (BER 1×10^{-2} at LDM)
Carrier sense level	< -97dBm
Spurious response	> 60 dB
Adjacent channel selectivity	> 60 dB (± 12.5 kHz)
Blocking	> 80 dB
Spurious radiation	< -60 dBm @ < 1GHz {< -57 dBm} < -50 dBm @ > 1GHz {< -47dBm}

LDM (Long distance mode)

There are Standard Mode and LDM(Long Distance Mode) .

Standard Mode has communication distance about 700m (LDM : 2km or more).

Firmware

- Telecontrol(On/Off control)

This standard 8 switch mode firmware can control up to 8 RX output.

- Modem(data transfer)

An external microcomputer and a module are connected by the serial communication of a RS232C format. Data communications are carried out according to directions of an external microcomputer.

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Frequency Table

This frequency channel table is for Japan.

ch #	Frq. (MHz)	ch #	Frq. (MHz)
1	429.2500	21	429.5000
2	429.2625	22	429.5125
3	429.2750	23	429.5250
4	429.2875	24	429.5375
5	429.3000	25	429.5500
6	429.3125	26	429.5625
7	429.3250	27	429.5750
8	429.3375	28	429.5875
9	429.3500	29	429.6000
10	429.3625	30	429.6125
11	429.3750	31	429.6250
12	429.3875	32	429.6375
13	429.4000	33	429.6500
14	429.4125	34	429.6625
15	429.4250	35	429.6750
16	429.4375	36	429.6875
17	429.4500	37	429.7000
18	429.4625	38	429.7125
19	429.4750	39	429.7250
20	429.4875	40	429.7375

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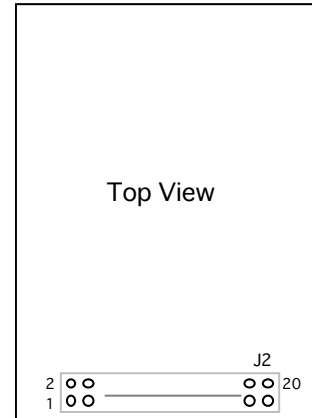
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Names and functions of 20-pin connector

Figure is viewed from above a module. It is the names and functions of 20-pin connector (J2 pin).

This feature is standard firmware 8sw typical (8 switch on / off control).

J2	Pin name	Function
1	IO1	IO1 : input/output
2	IO2	IO2 : input/output
3	IO3	IO3 : input/output
4	IO4	IO4 : input/output
5	IO5	IO5 : input/output
6	IO6	IO6 : input/output
7	IO7	IO7 : input/output
8	IO8	IO8 : input/output
9	PWR off	PWRoff、 active Low、 open when not in use : input
10	RX audio	RXaudio、 Received audio signal、 open when not in use : output
11	CNT1	input/output control 1 : input/output
12	CNT2	input/output control 2 : input/output
13	Vdd in	CPU power supply : 2.0V~3.6V : input
14	Vdd out	Power output 2.0V : output
15	B+	Power input : 2.1V ~ 7.0V ★Do not reverse connection. : input
16	GND	ground
17	SET1	SET1、 active Low : input
18	SET2	SET2、 active Low : input
19	SET3	SET 3、 active Low : input
20	SYS	open ★disabled



Connect the DIP switches to SET1/2/3. Use the various settings.

PWR off will be able to shut down the power to the module. Consumption current at this time is the number uA or less.

It becomes the L level when you shut down. Power will be turned ON or open B+.

Logic voltage of J2-1~8、 J2-11, 12、 J2-17~19 are :

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L : 0 ~ 0.3V

H : $0.9 \cdot V_{dd\ in} \sim V_{dd\ in}$ @ $V_{dd\ in} = 2.0V \sim 2.4V$

$0.8 \cdot V_{dd\ in} \sim V_{dd\ in}$ @ $V_{dd\ in} = 2.4V \sim 3.6V$

Power supply(2.0V) which is regulated in Vdd out can be used on the outside.

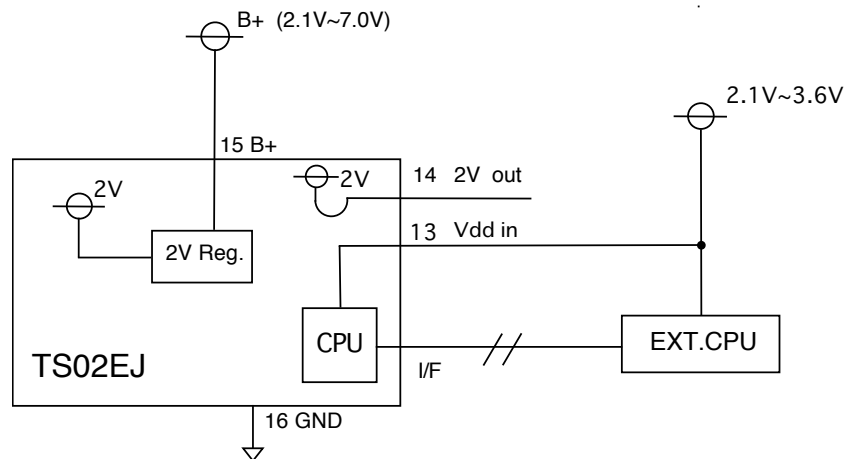
Because Vdd in is connected to the power supply of the CPU, you can adjust voltage for interface.

Connect the external CPU and interface of TS02EJ

I will explain how to connect the external CPU and interface of TS02EJ directly and to configure the level conversion circuit.

When you want to operate external CPU at 3V, by using 3V to Vdd in, you can take a direct interface with CMOS logic in 3V system.

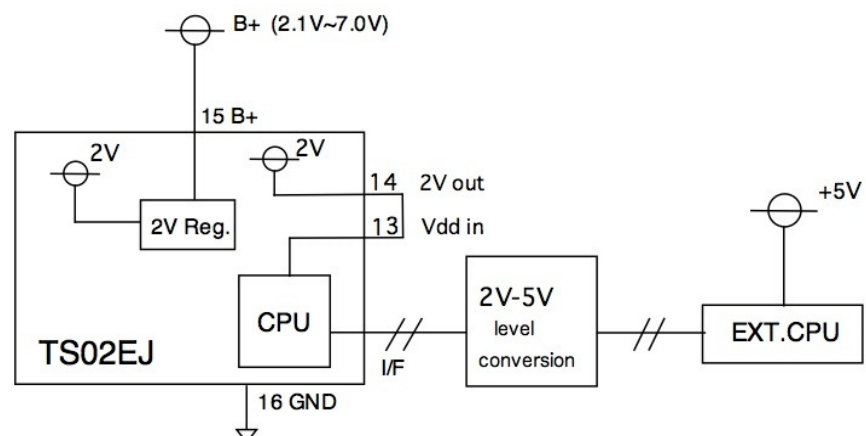
See figure at right.



When you want to operate with a 5V external CPU, you will need to level conversion.

When operating in the 2V logic, the internal CPU operates at 2V by connecting Vdd out(14) with Vdd in (13).

See figure at right.



Attention ;

Don't do the reverse connection and supply voltage of more than 7.0V to 15-pin B +.

Don't supply voltage of more than 3.6V to 13-pin Vdd in.

Don't use the 20-pin.

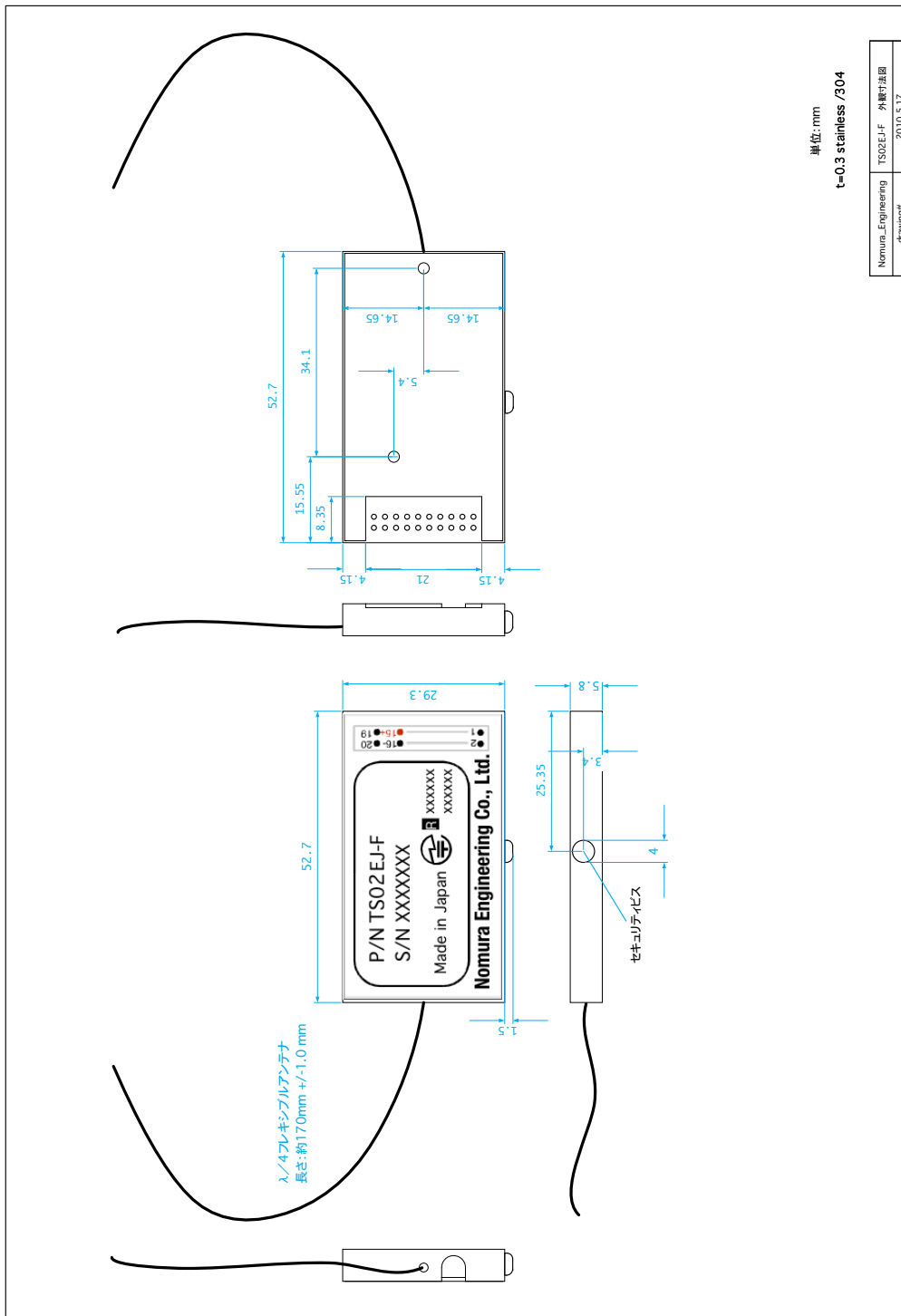
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Dimensions

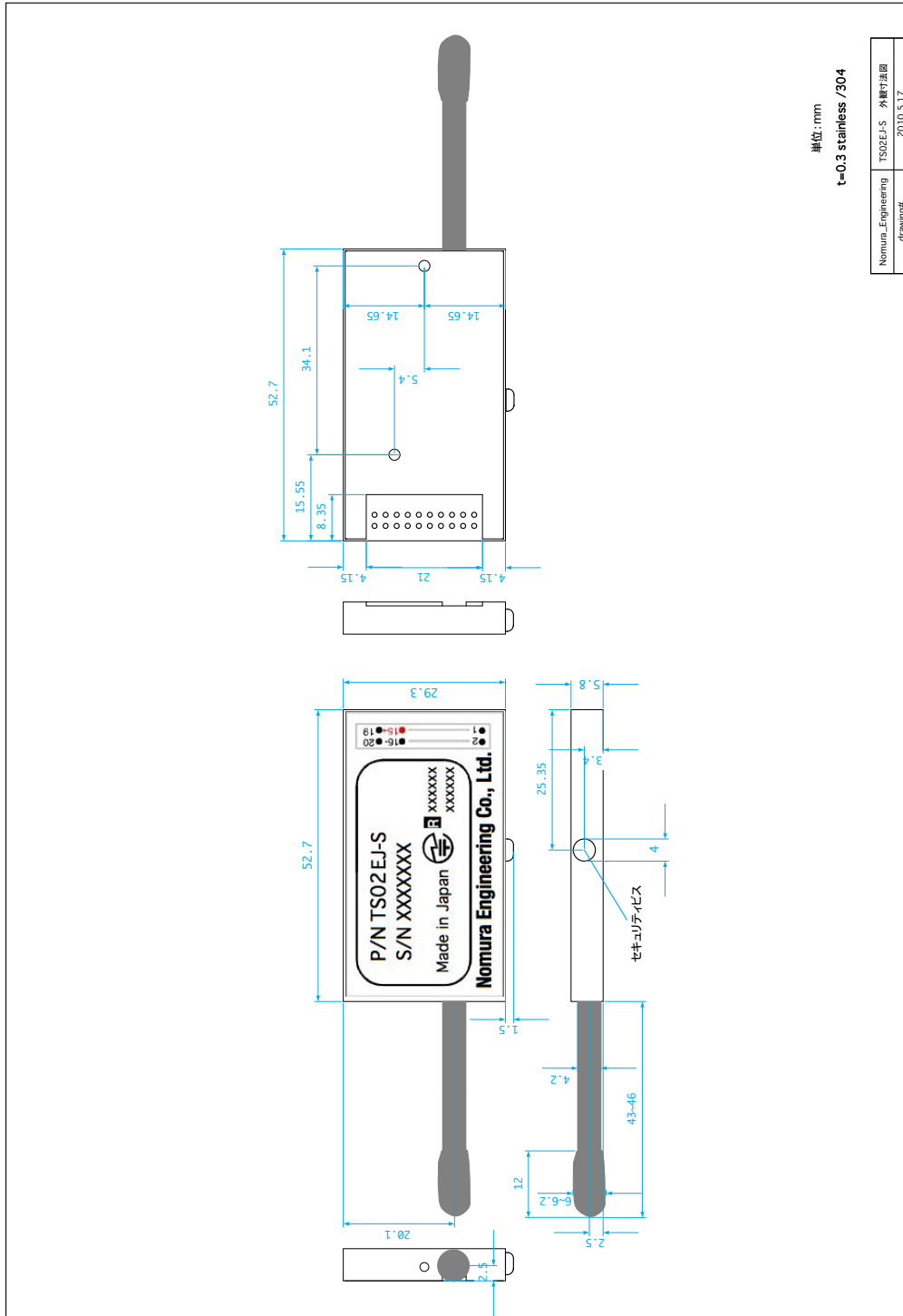
TS02EJ-F



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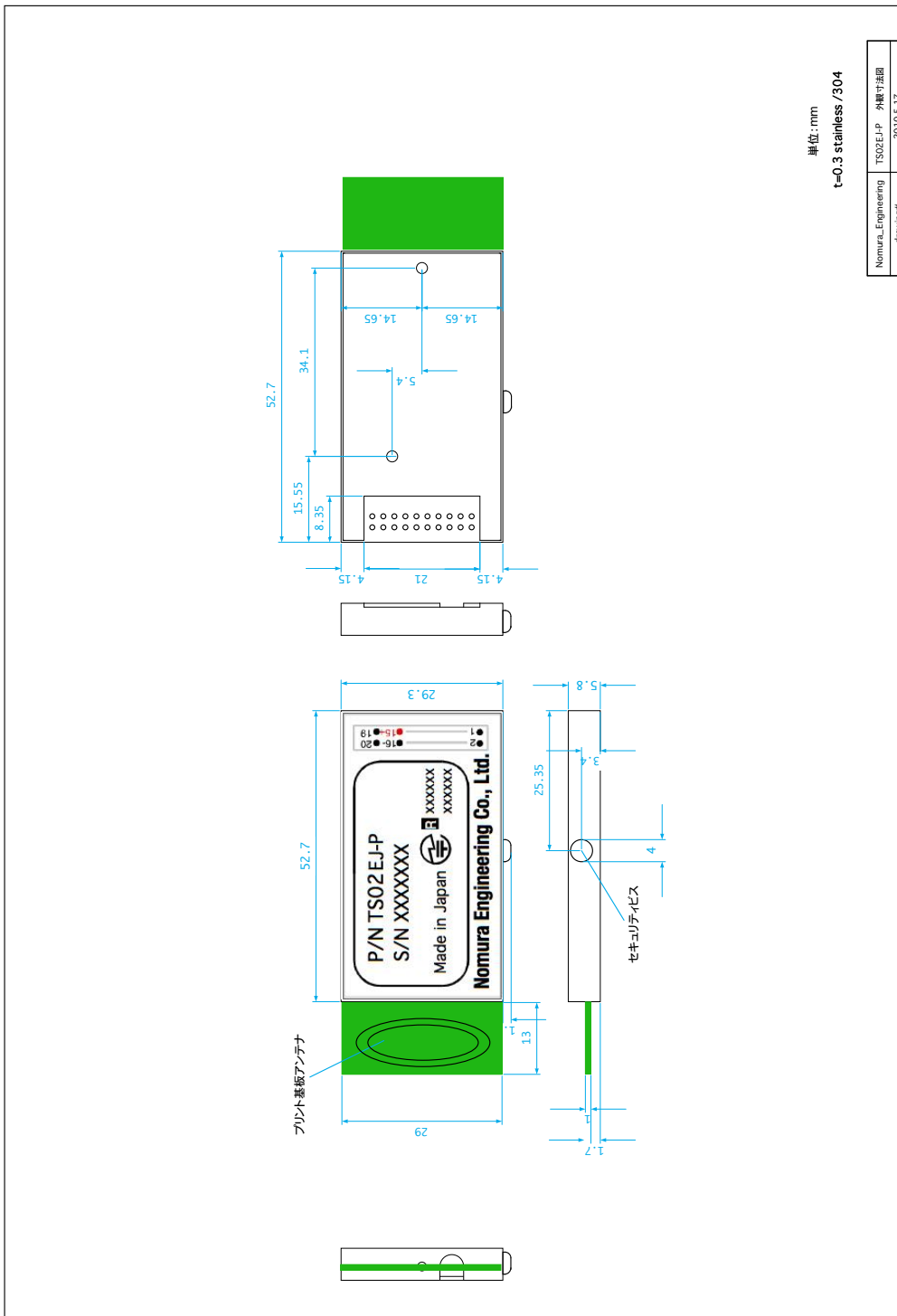
TS02EJ-S



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TS02EJ-P(H)



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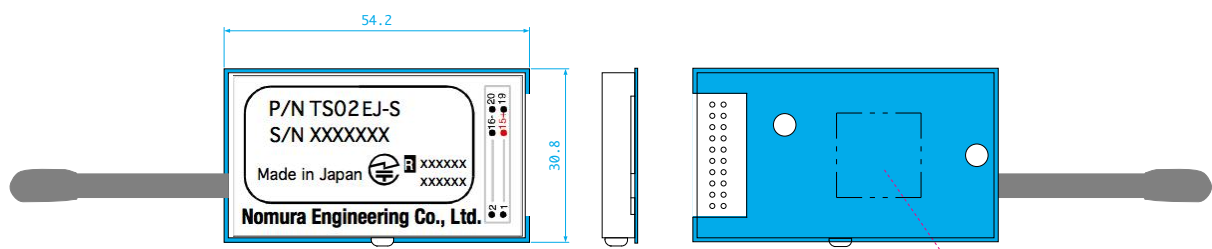
Attachments for a module :

two screws and insulating sheet of PET material of thickness $t = 0.5\text{mm}$ and header pin connector on the motherboard side.

Please select from the header pin connector "CON20-2.0-M-LD" or header pin connector "CON20-2.0-M-SMT-E" type of SMT. A standard type is "CON20-2.0-M-SMT-E."

Attach the insulation sheet without fail.

How to attach the insulation sheet



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