

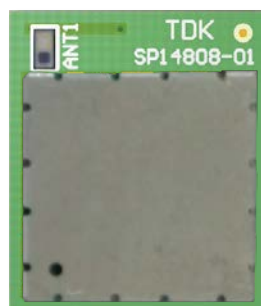


**THE DATASHEET OF
SP14808ST**



SP14808 Bluetooth Module User's Guide

An Integrated 2.4GHz Bluetooth SMART Compliant Transceiver Module



TDK Corporation

Thin Film Device Center

SESUB BU

Revision FC

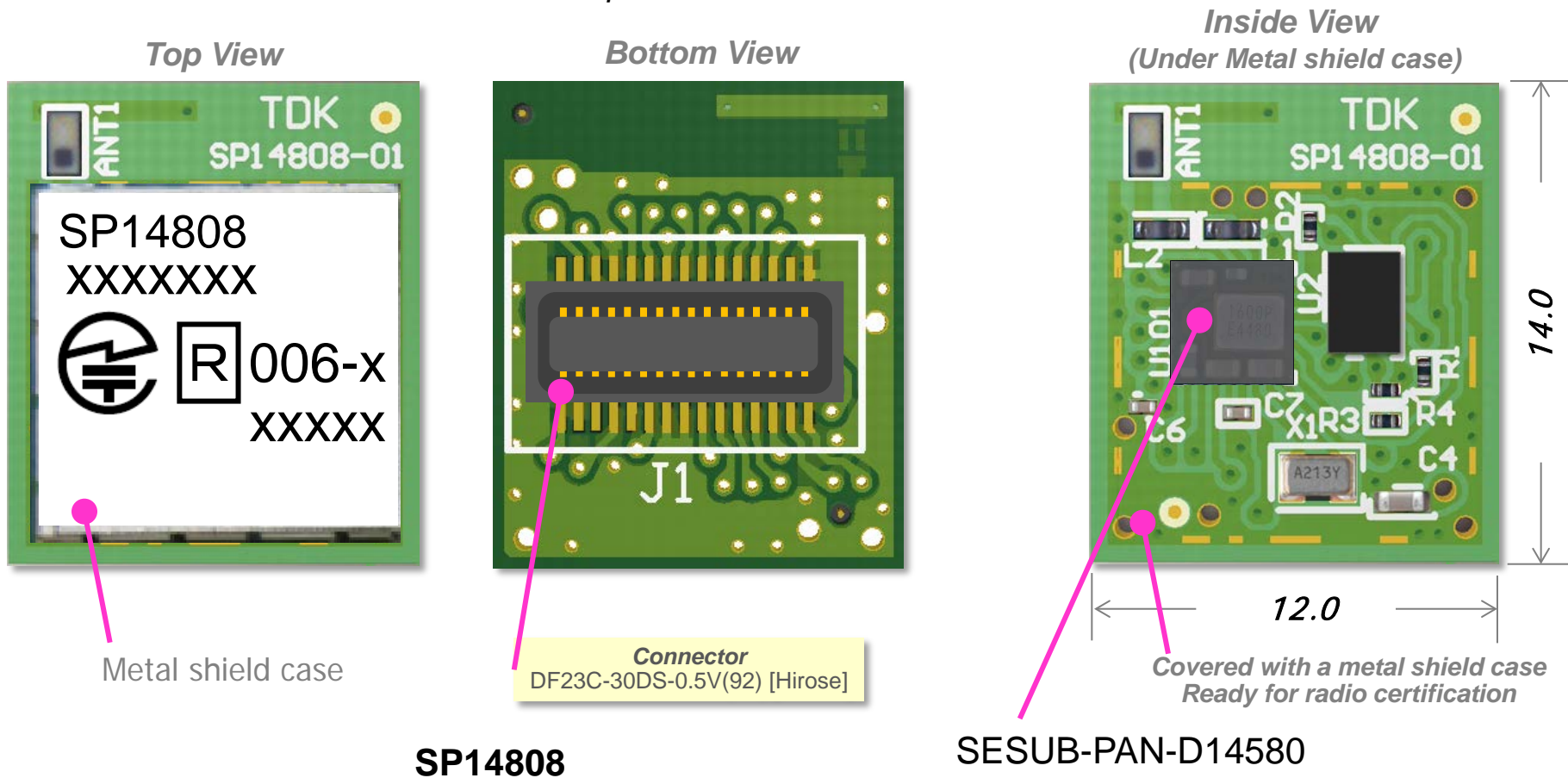
2015.1.1

All specifications are subject to change without notice.

SP14808 Bluetooth Module

SP14808 is a Bluetooth Smart compliant Module which is composed by world smallest size of TDK module SESUB-PAN-D14580 and Chip Antenna.

SP14808 equips a 2.4GHz band chip antenna, a 32.768kHz sleep clock resonator. It is covered with a metal shield case on top.



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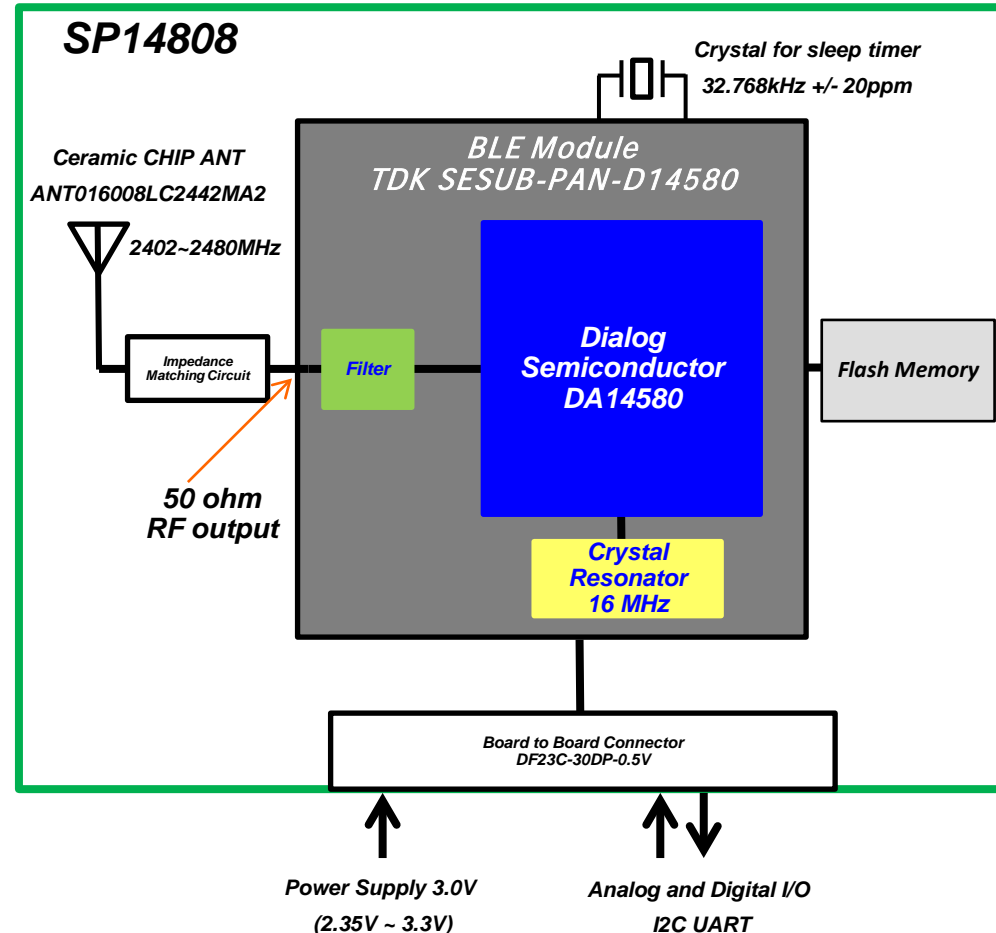
SP14808 Bluetooth Module

SP14808 is composed by BLE Module (SESUB-PAN-D14580), Flash Memory, Antenna, Crystal, and some more passive components (Capacitors, Inductors, Connector).

SESUB-PAN-D14580 is BLE Module from TDK and it contains Dialog Semiconductor BLE IC (DA14580) inside.

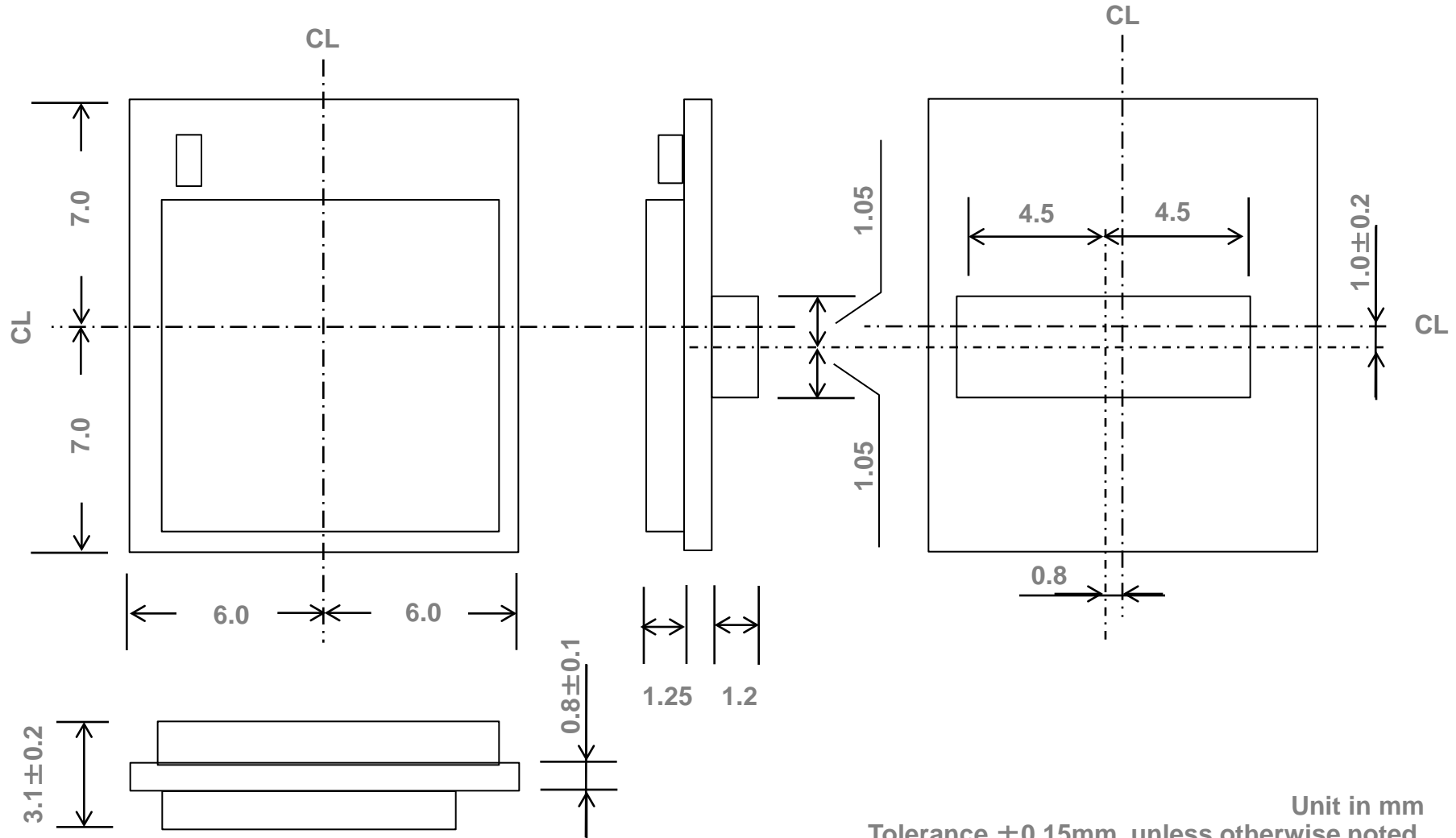
SESUB-PAN-D14580 has a 50 ohm RF output. On the SP14808, this RF output is connected to a Ceramic CHIP antenna.

System Block Diagram



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SP14808 Mechanical Dimensions



Unit in mm
Tolerance ± 0.15 mm unless otherwise noted.

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General Requirement under Operation

Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted)

| Item | Min | Max | Unit |
|----------------------------|------|------|------|
| Supply voltage range | -0.1 | 3.6 | V |
| Storage temperature range | -40 | +85 | °C |
| ESD (charged Device Model) | - | 500 | V |
| ESD (Human Body Model) | - | 1000 | V |

Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

| Nr | Item | Min | Max | Unit |
|----|---|------|-----|------|
| 1 | Operating supply voltage range | 2.35 | 3.3 | V |
| 2 | Operating ambient temperature range, Ta | -20 | +70 | °C |

General Performance

Electrical Characteristics

Measured on SP14801 EM board with the condition of $T_a=25^{\circ}\text{C}/\pm 10^{\circ}\text{C}$ and $V_{BAT} = 3.0\text{V}$

| Item | Condition | Value | | | Unit |
|--------------------|------------------------------|-------|-----|-----|---------------|
| | | Min | Typ | Max | |
| Rx mode Current | DCDC converter assumed ideal | | 5.0 | | mA |
| Tx mode Current | DCDC converter assumed ideal | | 5.0 | | mA |
| Deep sleep current | 8kB retention RAM active | | 0.9 | | μA |

General RF Characteristics

Measured on SP14801 EM board with the condition of $T_a=25^{\circ}\text{C}/\pm 10^{\circ}\text{C}$ and $V_{BAT} = 3.0\text{V}$

| Item | Condition | Value | | | Unit |
|-----------------------------|-----------|-------|-----|------|------|
| | | Min | Typ | Max | |
| Operational frequency range | | 2402 | | 2480 | MHz |
| Channel spacing | | | 2 | | MHz |
| Number of RF Channels | | | 40 | | Ch |
| RF Port impedance | | | 50 | | Ohm |

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General Performance

RF Characteristics

Measured on SP14801 EM board with the condition of $T_a=25^{\circ}\text{C}\pm 10^{\circ}\text{C}$ and $V_{DD} = 3.0\text{V}$, $f_c=2440\text{MHz}$

| Item | Condition | Value | | | Unit |
|---|-----------------------------------|-------|-----|------|------|
| | | Min | Typ | Max | |
| Tx Output power | Maximum output power setting | | 0 | - | dBm |
| Tx Frequency accuracy | Maximum output power setting | -150 | 0 | +150 | kHz |
| Tx modulation characteristics | | | | | |
| Delta F1 | | 225 | | 275 | kHz |
| Receiver sensitivity level [measured by Packet Error Rate] | Packet error rate : $\leq 30.8\%$ | | | -70 | dBm |

SP14808 PCB Connector Pin Assignment

| Pin # | Description | Pin # | Description |
|-------|-------------|-------|-------------|
| A01 | VBAT3V | B01 | GND |
| A02 | VCC M | B02 | P0_7 |
| A03 | P0_1 | B03 | WP# |
| A04 | P0_2 | B04 | P0_5 |
| A05 | GND | B05 | GND |
| A06 | P0_6 | B06 | P0_3 |
| A07 | HOLD# | B07 | GND |
| A08 | P0_0 | B08 | GND |
| A09 | P0_4 | B09 | SW CLK |
| A10 | VPP | B10 | SWDIO |
| A11 | GND | B11 | P1_1 |
| A12 | GND | B12 | P1_0 |
| A13 | GND | B13 | RST |
| A14 | P1_2 | B14 | VDCDC |
| A15 | P1_3 | B15 | VBAT1V |

All specifications are subject to change without notice.

SP14808 Bill Of Materials

| SMD | Side | Remarks | Description | Designator | Quantity |
|-------|--------|--|--|------------|----------|
| Mount | Top | 1608 Size Chip Antenna/0.15mm min pitch land | ANT016008LCS2442MA2 | ANT 1 | 1 |
| Mount | Top | 0603 Size Ceramic Capacitor 1uF | Ceramic Capacitor 1uF 0603/C0603X5R0J105M030BC | C7 | 1 |
| Mount | Bottom | 30pins 0.5mm pich Hirose Connector/DF23 2x15 | DF23C-30DP-0.5V | J1 | 1 |
| Mount | Top | 1005 Size Inductor 1.6nH | 1005 Size 1.6nH Inductor MHQ1005P1N6BT | L1, L2 | 2 |
| Mount | Top | 0603 Size Resistor 10K | 10K:RK73B1HTTC103J | R1, R2 | 2 |
| Mount | Top | 0603 Size Resistor 10K | 10K:RK73B1HTTC103J | R3 | 1 |
| Mount | Bottom | 1005 Size Resistor 0 | 0:RK73Z1ETTP | R7 | 1 |
| Mount | Bottom | 1005 Size Resistor 0 | 0:RK73Z1ETTP | R8 | 1 |
| Mount | Top | 2x3mm Size 8pin MXIC IC/MO-252 USON 8L 0.5mm pitch | Flash Memory : MX25V1006E-USON | U2 | 1 |
| Mount | Top | 3.5x3.5mm Size Module/0.4mm pad pitch,0.2mm pad | SESUB-PAN-D14580 | U1 | 1 |
| Mount | Top | 2012 Size 2pin Epson Toyocom Xtal/2.05x1.2mm | FC-12M 32.768KHZ 7.0 +20.0/-20.0 | X1 | 1 |
| Mount | Top | P01C-1111-06 SHIELD CASE | P01C-1111-06 SHIELD CASE | S1 | 1 |

Reference Information

1. **Bluetooth Core Technical Specification document, version 4.1**
<https://www.bluetooth.org/en-us/specification/adopted-specifications>
https://www.bluetooth.org/DocMan/handlers/DownloadDoc.ashx?doc_id=282159
2. **Dialog Semiconductor DA14580 Low Power Bluetooth Smart System-on-Chip Datasheet**
3. **Dialog Semiconductor DA14580 Software Development Guide (UM-B-003)**
4. **Dialog Semiconductor DA14580 Peripheral Drivers User manual (UM-B-004)**
5. **Dialog Semiconductor DA14580 Bluetooth Low Energy Software Development Kit (SDK)**
6. **Dialog Semiconductor DA14580 End product testing and programming guidelines (AN-B-020)**
7. **Dialog Semiconductor DA14580 supply current measurements (AN-B-015)**
8. **Keil Embedded Workbench for ARM Cortex-M series devices programming**
<http://www.keil.com>
9. **For all other related technical documents, visit Texas Instruments Low-Power RF web site.**
<http://support.dialog-semiconductor.com/>

Certain Instructions.

User shall operate SP14808 within TDK's recommended specifications and environmental considerations per the user's guide, accompanying documentation, and any other applicable requirements. Exceeding the specified ratings (including but not limited to input and output voltage, current, power, and environmental ranges) for SP14808 may cause property damage, personal injury or death.

If there are questions concerning these ratings, user should contact a TDK field representative prior to connecting interface electronics including input power and intended loads.

Any loads applied outside of the specified output range may result in unintended and/or inaccurate operation and/or possible permanent damage to the SP14808 and/or interface electronics.

Please consult the applicable user's guide prior to connecting any load to the SP14808 output. If there is uncertainty as to the load specification, please contact a TDK field representative.

Agreement to Defend, Indemnify and Hold Harmless.

User agrees to defend, indemnify, and hold TDK, its directors, officers, employees, agents, representatives, affiliates, licensors and their representatives harmless from and against any and all claims, damages, losses, expenses, costs and liabilities (collectively, "Claims") arising out of, or in connection with, any handling and/or use of SP14808.

User's indemnity shall apply whether Claims arise under law of tort or contract or any other legal theory, and even if SP14808 fail to perform as described or expected.

Safety-Critical or Life-Critical Applications.

User agrees that SP14808 shall not be used as, or incorporated into, all or any part of safety critical applications (such as life support), and a failure of a TDK product considered for purchase by user for use in user's product would reasonably be expected to cause severe personal injury or death such as devices which are classified as FDA Class III or similar classification.

REGULATORY COMPLIANCE INFORMATION

Caution

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radio-Frequency Exposure and Approval Conditions:

1. This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must not be collocated or operating in conjunction with any other antenna or transmitter within a host device, except in accordance with FCC multi-transmitter product procedures..
2. The regulatory label on the final system must include the statement: "Contains FCC ID:2ACNB14808" or using electronic labeling method as documented in KDB784748.
3. The final system integrator must ensure there is no instruction provided in the user manual or customer documentation indicating how to install or remove the transmitter module except such device has implemented two-ways authentication between module and the host system.



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