DESCRIPTION

SIT1042(4) and SIT1051(7) are interface chips designed to connect CAN protocol controllers with the physical bus. They are suitable for applications in automotive and industrial control fields, supporting 5Mbps flexible data-rate CAN FD. These chips enable differential signal transmission between the bus and the CAN protocol controller, and are fully compliant with the "ISO 11898" standard.

TYPICAL APPLICATIONS

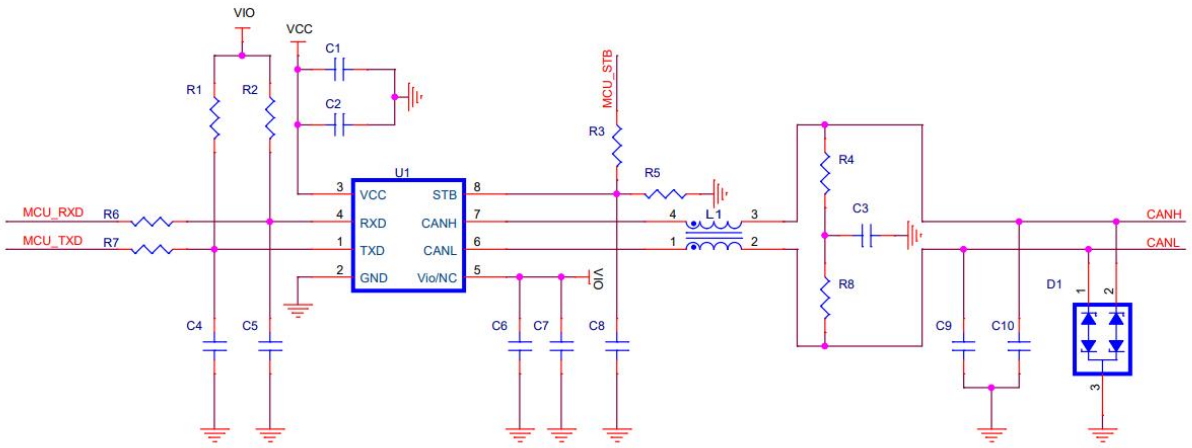

Figure 1-1

The peripheral circuit design for SIT1042(4) and SIT1051(7) is shown in Figure 1-1.

1. VCC is the input source; a 10μF capacitor (C1) is used to smooth voltage fluctuations, and a 100nF capacitor (C2) helps filter out high-frequency noise in the line. These capacitors should be placed close to the chip pins.

2. VIO is the input source; a 1μF capacitor (C7) is used to smooth voltage fluctuations, and a 100nF capacitor (C6) helps filter out high-frequency noise in the line. These capacitors should also be placed close to the chip pins.

3. Bus Termination: Figure 1-1 shows a split termination configuration. Split resistors R4 and R8 form the termination, with their midpoint connected to ground through capacitor C3. The split termination provides common-mode filtering for the bus. When an ECU acts as a bus termination node and is actively participating on the bus, extra care must be taken to ensure that the termination node is not removed from the bus, preventing the loss of termination.

4. S/STB is the mode control pin. If the transceiver operates exclusively in normal mode, resistor R3 can be omitted. Resistor R5 should connect the S/STB pin to ground with a 10Ω~1kΩ resistor. Optionally, a series resistor R3 (10Ω~1kΩ) can be added to limit current on the digital control line during overvoltage events, enhancing fault tolerance. A grounding capacitor C8 (100nF~1μF), placed close to the S/STB input pin, helps filter noise and stabilize the mode control signal.

5. Pin RXD. An external pull-up resistor R2 (2.4kΩ~10kΩ) is recommended to ensure a defined logic high level when the bus is idle. To protect against overvoltage, a series resistor R6 (10Ω~1kΩ) should be placed in line with the RXD pin to limit input current into the controller.

6. TXD pin is the input signal from the controller to the transceiver. An external pull-up resistor (R1) is recommended with a value between 2.4kΩ and 10kΩ. Additionally, a series resistor (R7) of 10Ω to 1kΩ can be placed to limit the input current to the transceiver during overvoltage conditions.

7. Transient protection and filtering components must be placed as close as possible to the bus connector to effectively suppress transients, ESD and electromagnetic interference. As illustrated in Figure 1-1, Transient Voltage Suppressors (TVS) D1 safeguard the bus from voltage spikes. Bus filter capacitors C9 and C10 help reduce high-frequency noise. A common-mode choke L1 is used to suppress common-mode noise, significantly improving EMC performance.

TVS Selection Guidelines:

1） ESD protection capability must meet the required level;

2） Maximum reverse working voltage (V_{RWM}) is 24V;

3） Junction capacitance (C_j) must comply with the signal transmission rate requirements of the system.

Recommended models for CAN communication rates of 250kbps and 500kbps: SITNE24V2BNQ-3/TR (SOT-23);

Recommended models for CAN communication rates of 2Mbps and 5Mbps: SITSE24V2BNQ-3/TR, SITLE24V2BNQ-3/TR (SOT-23).

Recommended value for bus filter capacitors: 10pF to 100pF.

Recommended models for common-mode choke (CMC):

For CAN communication rates of 250kbps and 500kbps: ACT45B-101-2P;

For CAN communication rates of 2Mbps and 5Mbps: ACT1210R-101-2P.

PCB LAYOUT

To ensure optimal performance when applying the SIT1042(4) and SIT1051(7), the following PCB layout guidelines should be observed:

- The length of the bus signal traces should not exceed 10cm.
- ESD protection devices should be placed close to the bus connection terminals of the ECU connector.
- Place decoupling capacitors for VCC, VIO, STB (S pin for SIT1057), TXD, and RXD as close as possible to the transceiver pins, minimizing trace length.
- The routing distance between the communication controller and the transceiver should be minimized.
- At least two vias should be used for decoupling capacitors and chip ground connections to reduce trace and via inductance.
- Do not place filtering components between the grounds of the communication controller and the transceiver; their ground references must be the same.
- Avoid routing other signal lines parallel to CANH and CANL to prevent noise coupling into the CAN bus, which may disrupt communication.

Note: This application note applies to the following products: SIT044, SIT1044A, SIT1044G, SIT1042, SIT1042A, SIT1042G, SIT1051, SIT1051G, SIT1057, SIT1057G.

REVISION HISTORY

Version Number	Revision Content	Revision Date
V1.0	Initial version.	February 2026