

TJA1051

High-speed CAN transceiver

Rev. 04 — 20 October 2009

Product data sheet

1. General description

The TJA1051 is a high-speed CAN transceiver that provides an interface between a Controller Area Network (CAN) protocol controller and the physical two-wire CAN bus. The transceiver is designed for high-speed (up to 1 Mbit/s) CAN applications in the automotive industry, providing differential transmit and receive capability to (a microcontroller with) a CAN protocol controller.

The TJA1051 is an upgrade from the TJA1050 high-speed CAN transceiver. It offers improved ElectroMagnetic Compatibility (EMC) and ElectroStatic Discharge (ESD) performance, and also features:

- Ideal passive behavior to the CAN bus when the supply voltage is off
- TJA1051T/3 and TJA1051TK/3 can be interfaced directly to microcontrollers with supply voltages from 3 V to 5 V

These features make the TJA1051 an excellent choice for all types of HS-CAN networks, in nodes that do not require a standby mode with wake-up capability via the bus.

2. Features

2.1 General

- Fully ISO 11898-2 compliant
- Suitable for 12 V and 24 V systems
- Low ElectroMagnetic Emission (EME) and high ElectroMagnetic Immunity (EMI)
- V_{IO} input on TJA1051T/3 and TJA1051TK/3 allows for direct interfacing with 3 V to 5 V microcontrollers (available in SO8 and very small HVSON8 packages respectively)

2.2 Low-power management

- Functional behavior predictable under all supply conditions
- Transceiver disengages from the bus when not powered up (zero load)

2.3 Protection

- High ElectroStatic Discharge (ESD) handling capability on the bus pins
- Bus pins protected against transients in automotive environments
- Transmit Data (TXD) dominant time-out function
- Undervoltage detection on pins V_{CC} and V_{IO}
- Thermally protected

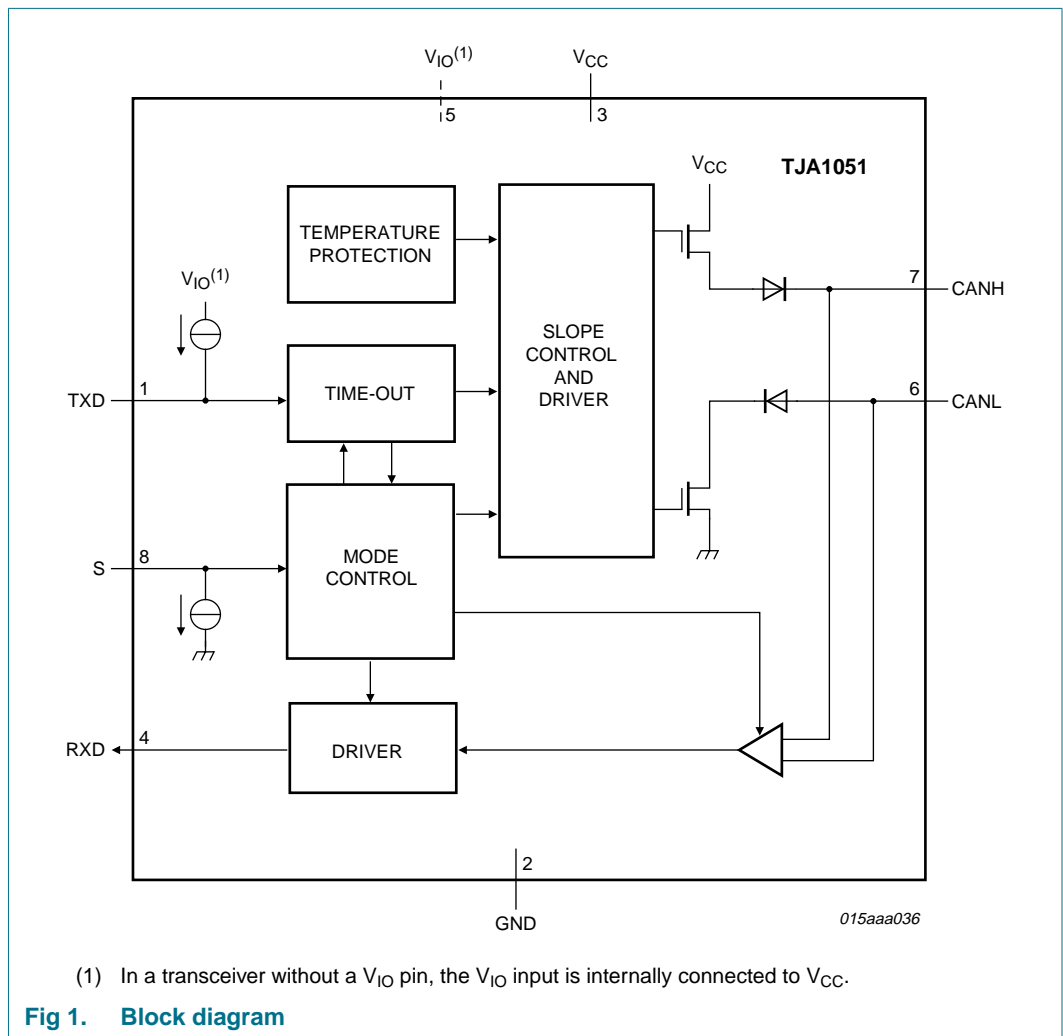
3. Ordering information

Table 1. Ordering information

| Type number | Package | | Version |
|----------------------------|---------|---|----------|
| | Name | Description | |
| TJA1051T | SO8 | plastic small outline package; 8 leads; body width 3.9 mm | SOT96-1 |
| TJA1051T/3 ^[1] | SO8 | plastic small outline package; 8 leads; body width 3.9 mm | SOT96-1 |
| TJA1051TK/3 ^[1] | HVSON8 | plastic thermal enhanced very thin small outline package; no leads; 8 terminals; body 3 x 3 x 0.85 mm | SOT782-1 |

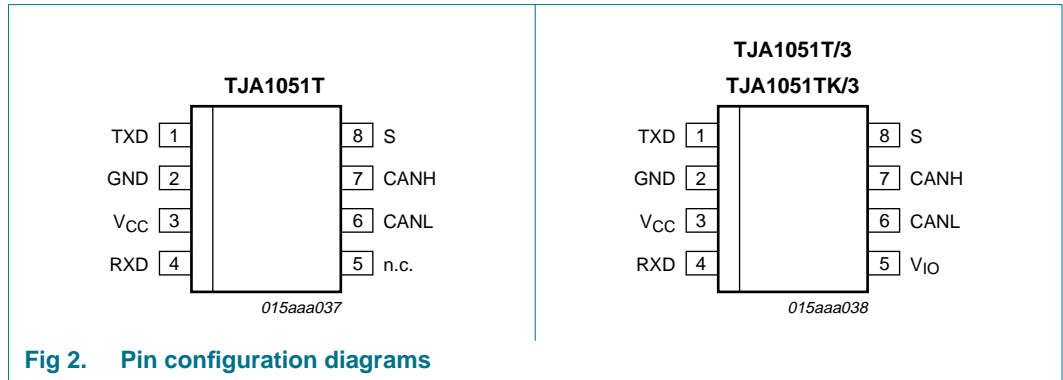
[1] TJA1051T/3 and TJA1051TK/3 with V_{IO} pin.

4. Block diagram



5. Pinning information

5.1 Pinning



5.2 Pin description

Table 2. Pin description

| Symbol | Pin | Description |
|-----------------|-----|---|
| TXD | 1 | transmit data input |
| GND | 2 | ground supply |
| V _{CC} | 3 | supply voltage |
| RXD | 4 | receive data output; reads out data from the bus lines |
| n.c. | 5 | not connected; in TJA1051T version only |
| V _{IO} | 5 | supply voltage for I/O level adapter; in TJA1051T/3 and TJA1051TK/3 versions only |
| CANL | 6 | LOW-level CAN bus line |
| CANH | 7 | HIGH-level CAN bus line |
| S | 8 | Silent mode control input |

6. Functional description

The TJA1051 is a high-speed CAN stand-alone transceiver with Silent mode. It combines the functionality of the TJA1050 transceiver with improved EMC and ESD handling capability. Improved slope control and high DC handling capability on the bus pins provides additional application flexibility.

The TJA1051 is available in two versions, distinguished only by the function of pin 5:

- The TJA1051T is 100 % backwards compatible with the TJA1050
- The TJA1051T/3 and TJA1051TK/3 allow for direct interfacing to microcontrollers with supply voltages down to 3 V

6.1 Operating modes

The TJA1051 supports two operating modes, Normal and Silent, which are selectable via pin S. See [Table 3](#) for a description of the operating modes under normal supply conditions.

Table 3. Operating modes

| Mode | Inputs | | Outputs | |
|--------|--------|------------------|------------|-----------------------|
| | Pin S | Pin TXD | CAN driver | Pin RXD |
| Normal | LOW | LOW | dominant | active ^[1] |
| | LOW | HIGH | recessive | active ^[1] |
| Silent | HIGH | X ^[2] | recessive | active ^[1] |

[1] LOW if the CAN bus is dominant, HIGH if the CAN bus is recessive.

[2] X = don't care

6.1.1 Normal mode

A LOW level on pin S selects Normal mode. In this mode, the transceiver is able to transmit and receive data via the bus lines CANH and CANL (see [Figure 1](#) for the block diagram). The differential receiver converts the analog data on the bus lines into digital data which is output to pin RXD. The slope of the output signals on the bus lines is controlled and optimized in a way that guarantees the lowest possible ElectroMagnetic Emission (EME).

6.1.2 Silent mode

A HIGH level on pin S selects Silent mode. In Silent mode the transmitter is disabled, releasing the bus pins to recessive state. All other IC functions, including the receiver, continue to operate as in Normal mode. Silent mode can be used to prevent a faulty CAN controller from disrupting all network communications.

6.2 Fail-safe features

6.2.1 TXD dominant time-out function

A 'TXD dominant time-out' timer is started when pin TXD is set LOW. If the LOW state on pin TXD persists for longer than $t_{to(dom)TXD}$, the transmitter is disabled, releasing the bus lines to recessive state. This function prevents a hardware and/or software application

failure from driving the bus lines to a permanent dominant state (blocking all network communications). The TXD dominant time-out timer is reset when pin TXD is set HIGH. The TXD dominant time-out time also defines the minimum possible bit rate of 40 kbit/s.

6.2.2 Internal biasing of TXD and S input pins

Pin TXD has an internal pull-up to V_{IO} and pin S has an internal pull-down to GND. This ensures a safe, defined state in case one or both of these pins are left floating.

6.2.3 Undervoltage detection on pins V_{CC} and V_{IO}

Should V_{CC} or V_{IO} drop below their respective undervoltage detection levels ($V_{uvd(VCC)}$ and $V_{uvd(VIO)}$; see [Table 6](#)), the transceiver will switch off and disengage from the bus (zero load) until V_{CC} and V_{IO} have recovered.

6.2.4 Over-temperature protection

The output drivers are protected against over-temperature conditions. If the virtual junction temperature exceeds the shutdown junction temperature, $T_{j(sd)}$, the output drivers will be disabled until the virtual junction temperature falls below $T_{j(sd)}$ and TXD becomes recessive again. Including the TXD condition ensures that output driver oscillations due to temperature drift are avoided.

6.3 V_{IO} supply pin

Two versions of the TJA1051 are available, only differing in the function of a single pin. Pin 5 is either not connected or is a V_{IO} supply pin.

Pin V_{IO} on the TJA1051T/3 and TJA1051TK/3 should be connected to the microcontroller supply voltage (see [Figure 3](#)). This will adjust the signal levels of pins TXD, RXD and S to the I/O levels of the microcontroller. For versions of the TJA1051 without a V_{IO} pin, the V_{IO} input is internally connected to V_{CC} . This sets the signal levels of pins TXD, RXD and S to levels compatible with 5 V microcontrollers.

7. Application design-in information

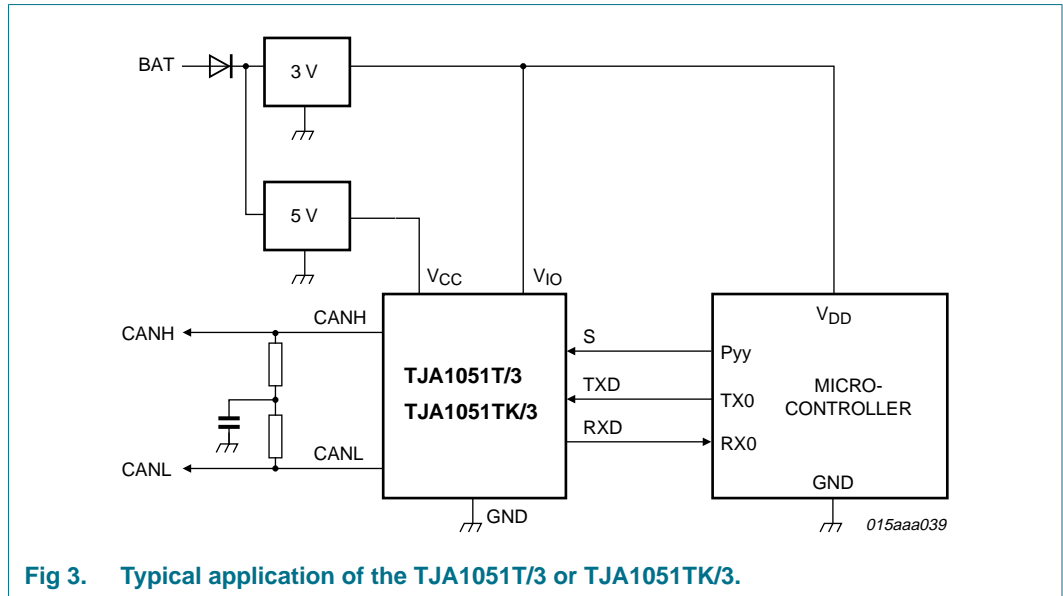


Fig 3. Typical application of the TJA1051T/3 or TJA1051TK/3.

8. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). All voltages are referenced to GND.

| Symbol | Parameter | Conditions | Min | Max | Unit | |
|-----------|---------------------------------|-------------------------|------|------|------|----|
| V_x | voltage on pin x | no time limit; DC value | | | | |
| | | on pins CANH and CANL | -58 | +58 | V | |
| | | on any other pin | -0.3 | +7 | V | |
| V_{trt} | transient voltage | on pins CANH and CANL | [1] | -150 | +100 | V |
| V_{ESD} | electrostatic discharge voltage | IEC 61000-4-2 | [2] | | | |
| | | at pins CANH and CANL | [3] | -8 | +8 | kV |
| | | HBM | [4] | | | |
| | | at pins CANH and CANL | | -8 | +8 | kV |
| | | at any other pin | | -4 | +4 | kV |
| | | MM | [5] | | | |
| | | at any pin | | -300 | +300 | V |
| | | CDM | [6] | | | |
| | | at corner pins | | -750 | +750 | V |
| | | at any pin | | -500 | +500 | V |
| T_{vj} | virtual junction temperature | | [7] | -40 | +150 | °C |
| T_{stg} | storage temperature | | | -55 | +150 | °C |
| T_{amb} | ambient temperature | | | -40 | +125 | °C |

[1] Verified by an external test house to ensure pins CANH and CANL can withstand ISO 7637 part 3 automotive transient test pulses 1, 2a, 3a and 3b.

[2] IEC 61000-4-2 (150 pF, 330 Ω).

- [3] ESD performance of pins CANH and CANL according to IEC 61000-4-2 (150 pF, 330 Ω) has been verified by an external test house. The result is equal to or better than ±8 kV (unaided).
- [4] Human Body Model (HBM): according to AEC-Q100-002 (100 pF, 1.5 kΩ).
- [5] Machine Model (MM): according to AEC-Q100-003 (200 pF, 0.75 μH, 10 Ω).
- [6] Charged Device Model (CDM): according to AEC-Q100-011 (field induced charge; 4 pF). The classification level is C5 (> 1000 V).
- [7] In accordance with IEC 60747-1. An alternative definition of virtual junction temperature is: $T_{vj} = T_{amb} + P \times R_{th(vj-a)}$, where $R_{th(vj-a)}$ is a fixed value to be used for the calculation of T_{vj} . The rating for T_{vj} limits the allowable combinations of power dissipation (P) and ambient temperature (T_{amb}).

9. Thermal characteristics

Table 5. Thermal characteristics

According to IEC 60747-1.

| Symbol | Parameter | Conditions | Value | Unit |
|----------------|---|-----------------------------|-------|------|
| $R_{th(vj-a)}$ | thermal resistance from virtual junction to ambient | SO8 package; in free air | 155 | K/W |
| | | HVSON8 package; in free air | 55 | K/W |

10. Static characteristics

Table 6. Static characteristics

$T_{vj} = -40\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$; $V_{CC} = 4.5\text{ V}$ to 5.5 V ; $V_{IO} = 2.8\text{ V}$ to 5.5 V ^[1]; $R_L = 60\text{ }\Omega$ unless specified otherwise; All voltages are defined with respect to ground; Positive currents flow into the IC^[2].

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--|--|----------------------------------|-------------|-----|----------------|------|
| Supply; pin V_{CC} | | | | | | |
| V_{CC} | supply voltage | | 4.5 | - | 5.5 | V |
| I_{CC} | supply current | Silent mode | 0.1 | 1 | 2.5 | mA |
| | | Normal mode | | | | |
| | | recessive; $V_{TXD} = V_{IO}$ | 2.5 | 5 | 10 | mA |
| | | dominant; $V_{TXD} = 0\text{ V}$ | 20 | 50 | 70 | mA |
| $V_{uvd(VCC)}$ | undervoltage detection voltage on pin V_{CC} | | 3.5 | - | 4.5 | V |
| I/O level adapter supply; pin V_{IO} ^[1] | | | | | | |
| V_{IO} | supply voltage on pin V_{IO} | | 2.8 | - | 5.5 | V |
| I_{IO} | supply current on pin V_{IO} | Normal and Silent modes | | | | |
| | | recessive; $V_{TXD} = V_{IO}$ | 10 | 80 | 250 | μA |
| | | dominant; $V_{TXD} = 0\text{ V}$ | 50 | 350 | 500 | μA |
| $V_{uvd(VIO)}$ | undervoltage detection voltage on pin V_{IO} | | 1.3 | - | 2.7 | V |
| Mode control input; pin S | | | | | | |
| V_{IH} | HIGH-level input voltage | | $0.7V_{IO}$ | - | $V_{IO} + 0.3$ | V |
| V_{IL} | LOW-level input voltage | | -0.3 | - | $0.3V_{IO}$ | V |
| I_{IH} | HIGH-level input current | $V_S = V_{IO}$ | 1 | 4 | 10 | μA |
| I_{IL} | LOW-level input current | $V_S = 0\text{ V}$ | -1 | 0 | +1 | μA |
| CAN transmit data input; pin TXD | | | | | | |
| V_{IH} | HIGH-level input voltage | | $0.7V_{IO}$ | - | $V_{IO} + 0.3$ | V |
| V_{IL} | LOW-level input voltage | | -0.3 | - | $0.3V_{IO}$ | V |

Table 6. Static characteristics ...continued

$T_{vj} = -40\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$; $V_{CC} = 4.5\text{ V}$ to 5.5 V ; $V_{IO} = 2.8\text{ V}$ to 5.5 V ^[1]; $R_L = 60\text{ }\Omega$ unless specified otherwise; All voltages are defined with respect to ground; Positive currents flow into the IC^[2].

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|--|---|------------------|-------------|------|--------------------|
| I_{IH} | HIGH-level input current | $V_{TXD} = V_{IO}$ | -5 | 0 | +5 | μA |
| I_{IL} | LOW-level input current | Normal mode; $V_{TXD} = 0\text{ V}$ | -260 | -150 | -30 | μA |
| C_i | input capacitance | | ^[3] - | 5 | 10 | pF |
| CAN receive data output; pin RXD | | | | | | |
| I_{OH} | HIGH-level output current | $V_{RXD} = V_{IO} - 0.4\text{ V}$; $V_{IO} = V_{CC}$ | -8 | -3 | -1 | mA |
| I_{OL} | LOW-level output current | $V_{RXD} = 0.4\text{ V}$; bus dominant | 2 | 5 | 12 | mA |
| Bus lines; pins CANH and CANL | | | | | | |
| $V_{O(\text{dom})}$ | dominant output voltage | $V_{TXD} = 0\text{ V}$; $t < t_{to(\text{dom})TXD}$ | | | | |
| | | pin CANH | 2.75 | 3.5 | 4.5 | V |
| | | pin CANL | 0.5 | 1.5 | 2.25 | V |
| $V_{\text{dom}(\text{TX})\text{sym}}$ | transmitter dominant voltage symmetry | $V_{\text{dom}(\text{TX})\text{sym}} = V_{CC} - V_{\text{CANH}} - V_{\text{CANL}}$ | -400 | 0 | +400 | mV |
| $V_{O(\text{dif})\text{bus}}$ | bus differential output voltage | $V_{TXD} = 0\text{ V}$; $t < t_{to(\text{dom})TXD}$ $R_L = 45\text{ }\Omega$ to $65\text{ }\Omega$ | 1.5 | - | 3 | V |
| | | $V_{TXD} = V_{IO}$; recessive; no load | -50 | - | +50 | mV |
| $V_{O(\text{rec})}$ | recessive output voltage | Normal and Silent modes; $V_{TXD} = V_{IO}$; no load | 2 | $0.5V_{CC}$ | 3 | V |
| $V_{\text{th}(\text{RX})\text{dif}}$ | differential receiver threshold voltage | Normal and Silent modes $V_{\text{cm}(\text{CAN})}$ ^[4] = -30 V to $+30\text{ V}$ | 0.5 | 0.7 | 0.9 | V |
| $V_{\text{hys}(\text{RX})\text{dif}}$ | differential receiver hysteresis voltage | Normal and Silent modes $V_{\text{cm}(\text{CAN})} = -30\text{ V}$ to $+30\text{ V}$ | 50 | 120 | 200 | mV |
| $I_{O(\text{dom})}$ | dominant output current | $V_{TXD} = 0\text{ V}$; $t < t_{to(\text{dom})TXD}$; $V_{CC} = 5\text{ V}$ | | | | |
| | | pin CANH; $V_{\text{CANH}} = 0\text{ V}$ | -100 | -70 | -40 | mA |
| | | pin CANL; $V_{\text{CANL}} = 5\text{ V} / 40\text{ V}$ | 40 | 70 | 100 | mA |
| $I_{O(\text{rec})}$ | recessive output current | Normal and Silent modes; $V_{TXD} = V_{IO}$ $V_{\text{CANH}} = V_{\text{CANL}} = -27\text{ V}$ to $+32\text{ V}$ | -5 | - | +5 | mA |
| I_L | leakage current | $V_{CC} = V_{IO} = 0\text{ V}$; $V_{\text{CANH}} = V_{\text{CANL}} = 5\text{ V}$ | -5 | 0 | +5 | μA |
| R_i | input resistance | | 9 | 15 | 28 | k Ω |
| ΔR_i | input resistance deviation | between V_{CANH} and V_{CANL} | -1 | 0 | +1 | % |
| $R_{i(\text{dif})}$ | differential input resistance | | 19 | 30 | 52 | k Ω |
| $C_{i(\text{cm})}$ | common-mode input capacitance | | ^[3] - | - | 20 | pF |
| $C_{i(\text{dif})}$ | differential input capacitance | | ^[3] - | - | 10 | pF |
| Temperature protection | | | | | | |
| $T_{j(\text{sd})}$ | shutdown junction temperature | | ^[3] - | 190 | - | $^{\circ}\text{C}$ |

[1] Only TJA1051T/3 and TJA1051TK/3 have a V_{IO} pin. In transceivers without a V_{IO} pin, the V_{IO} input is internally connected to V_{CC} .

[2] All parameters are guaranteed over the virtual junction temperature range by design. Products are 100 % tested at 125 $^{\circ}\text{C}$ ambient temperature (wafer level pretesting), and 100 % tested at 25 $^{\circ}\text{C}$ ambient temperature (final testing). Both pretesting and final testing use correlated test conditions to cover the specified temperature and power supply voltage range.

[3] Not tested in production.

[4] $V_{cm(CAN)}$ is the common mode voltage of CANH and CANL.

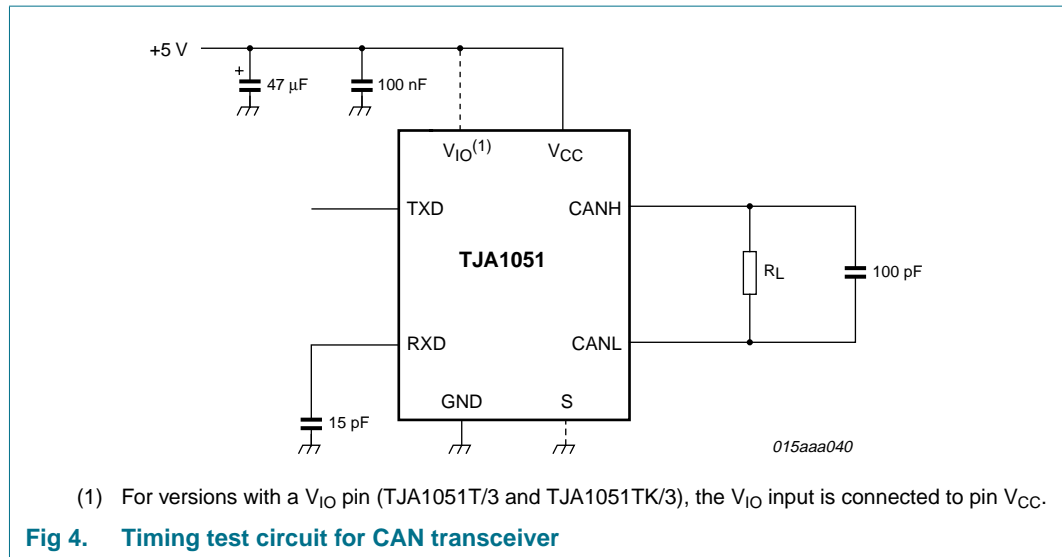
11. Dynamic characteristics

Table 7. Dynamic characteristics

$T_{vj} = -40\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$; $V_{CC} = 4.5\text{ V}$ to 5.5 V ; $V_{IO} = 2.8\text{ V}$ to 5.5 V ^[1]; $R_L = 60\text{ }\Omega$ unless specified otherwise. All voltages are defined with respect to ground. Positive currents flow into the IC.^[2]

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--|--------------------------------------|--------------------------------------|-----|-----|-----|------|
| Transceiver timing; pins CANH, CANL, TXD and RXD; see Figure 4 and Figure 5 | | | | | | |
| $t_{d(TXD-busdom)}$ | delay time from TXD to bus dominant | Normal mode | - | 65 | - | ns |
| $t_{d(TXD-busrec)}$ | delay time from TXD to bus recessive | Normal mode | - | 90 | - | ns |
| $t_{d(busdom-RXD)}$ | delay time from bus dominant to RXD | Normal and Silent modes | - | 60 | - | ns |
| $t_{d(busrec-RXD)}$ | delay time from bus recessive to RXD | Normal and Silent modes | - | 65 | - | ns |
| $t_{PD(TXD-RXD)}$ | propagation delay from TXD to RXD | versions with pin 5 n.c. | 40 | - | 220 | ns |
| | | versions with V_{IO} pin | 40 | - | 250 | ns |
| $t_{to(dom)TXD}$ | TXD dominant time-out time | $V_{TXD} = 0\text{ V}$; Normal mode | 0.3 | 1 | 12 | ms |

- [1] Only TJA1051T/3 and TJA1051TK/3 have a V_{IO} pin. In transceivers without a V_{IO} pin, the V_{IO} input is internally connected to V_{CC} .
- [2] All parameters are guaranteed over the virtual junction temperature range by design. Products are 100 % tested at 125 °C ambient temperature (wafer level pretesting), and 100 % tested at 25 °C ambient temperature (final testing). Both pretesting and final testing use correlated test conditions to cover the specified temperature and power supply voltage range.



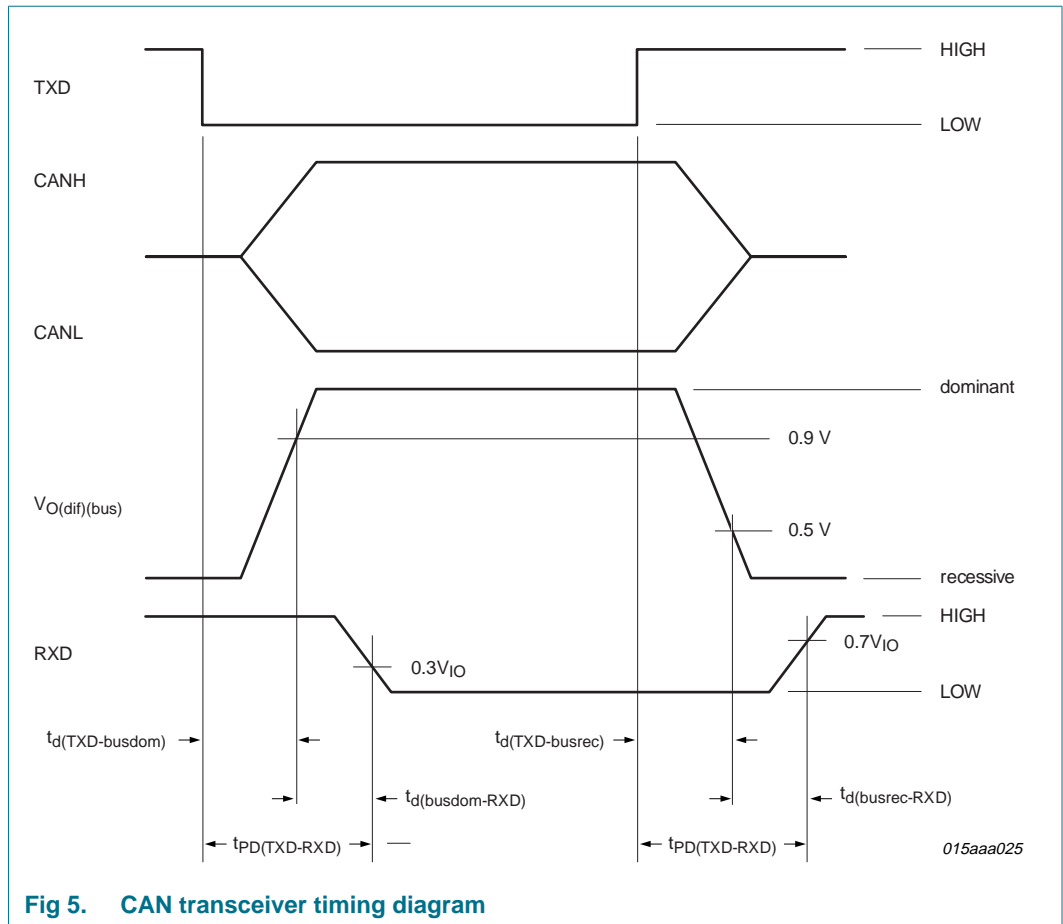


Fig 5. CAN transceiver timing diagram

12. Test information

12.1 Quality information

This product has been qualified to the appropriate Automotive Electronics Council (AEC) standard Q100 or Q101 and is suitable for use in automotive applications.

13. Package outline

SO8: plastic small outline package; 8 leads; body width 3.9 mm

SOT96-1

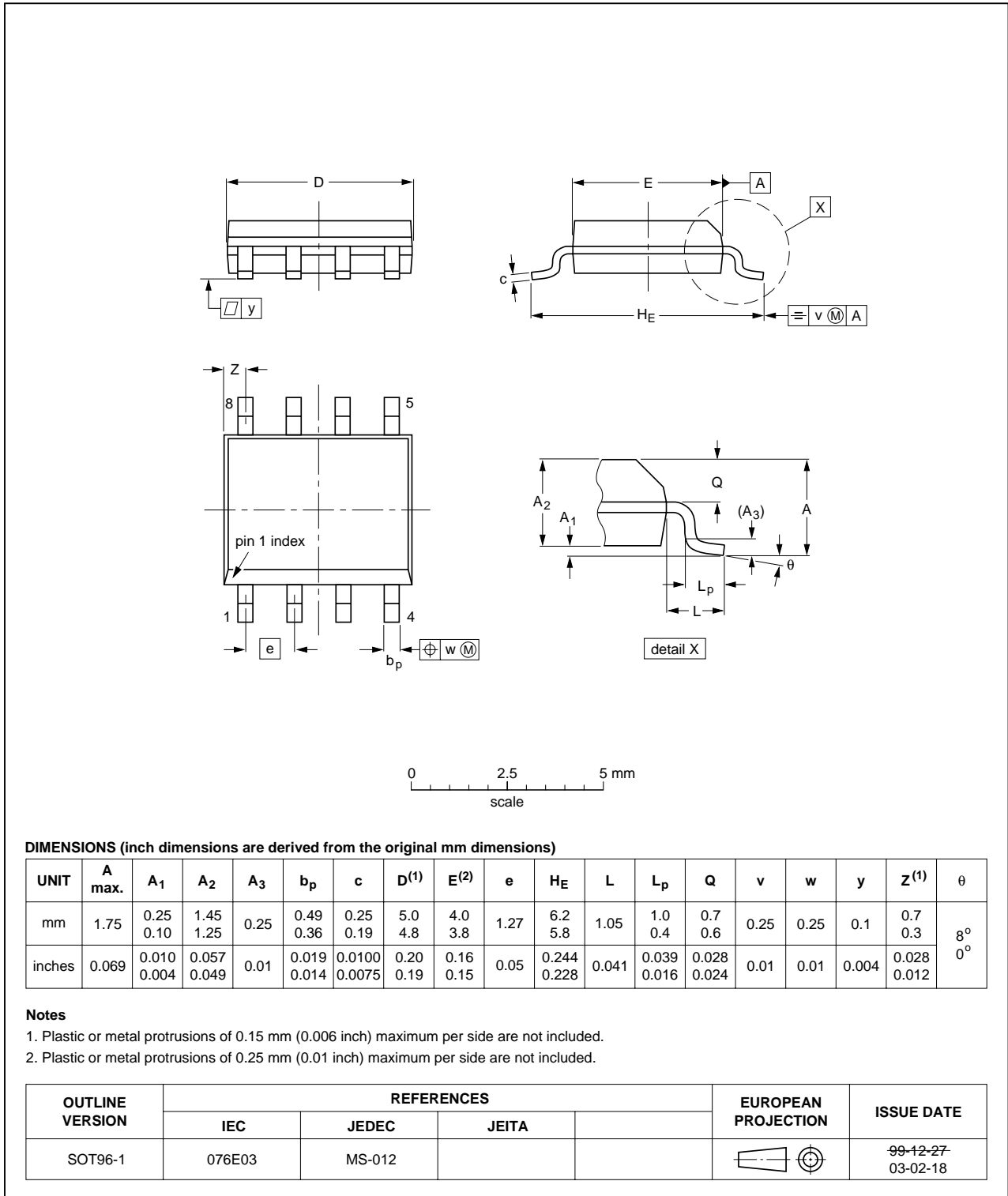


Fig 6. Package outline SOT96-1 (SO8)

HVSON8: plastic thermal enhanced very thin small outline package; no leads;
8 terminals; body 3 x 3 x 0.85 mm

SOT782-1

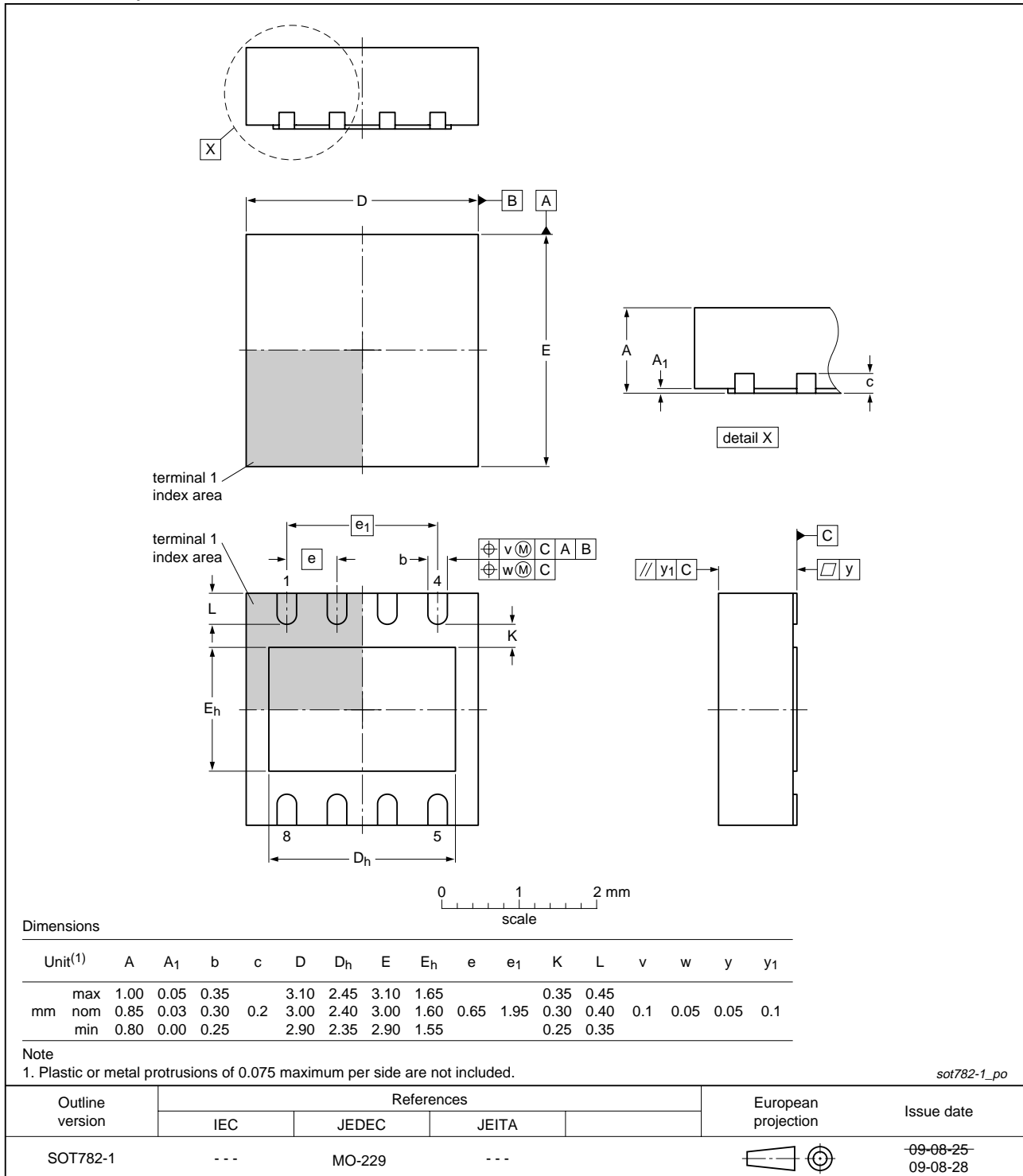


Fig 7. Package outline SOT782-1 (HVSON8)

14. Soldering of SMD packages

This text provides a very brief insight into a complex technology. A more in-depth account of soldering ICs can be found in Application Note *AN10365 "Surface mount reflow soldering description"*.

14.1 Introduction to soldering

Soldering is one of the most common methods through which packages are attached to Printed Circuit Boards (PCBs), to form electrical circuits. The soldered joint provides both the mechanical and the electrical connection. There is no single soldering method that is ideal for all IC packages. Wave soldering is often preferred when through-hole and Surface Mount Devices (SMDs) are mixed on one printed wiring board; however, it is not suitable for fine pitch SMDs. Reflow soldering is ideal for the small pitches and high densities that come with increased miniaturization.

14.2 Wave and reflow soldering

Wave soldering is a joining technology in which the joints are made by solder coming from a standing wave of liquid solder. The wave soldering process is suitable for the following:

- Through-hole components
- Leaded or leadless SMDs, which are glued to the surface of the printed circuit board

Not all SMDs can be wave soldered. Packages with solder balls, and some leadless packages which have solder lands underneath the body, cannot be wave soldered. Also, leaded SMDs with leads having a pitch smaller than ~0.6 mm cannot be wave soldered, due to an increased probability of bridging.

The reflow soldering process involves applying solder paste to a board, followed by component placement and exposure to a temperature profile. Leaded packages, packages with solder balls, and leadless packages are all reflow solderable.

Key characteristics in both wave and reflow soldering are:

- Board specifications, including the board finish, solder masks and vias
- Package footprints, including solder thieves and orientation
- The moisture sensitivity level of the packages
- Package placement
- Inspection and repair
- Lead-free soldering versus SnPb soldering

14.3 Wave soldering

Key characteristics in wave soldering are:

- Process issues, such as application of adhesive and flux, clinching of leads, board transport, the solder wave parameters, and the time during which components are exposed to the wave
- Solder bath specifications, including temperature and impurities

14.4 Reflow soldering

Key characteristics in reflow soldering are:

- Lead-free versus SnPb soldering; note that a lead-free reflow process usually leads to higher minimum peak temperatures (see [Figure 8](#)) than a SnPb process, thus reducing the process window
- Solder paste printing issues including smearing, release, and adjusting the process window for a mix of large and small components on one board
- Reflow temperature profile; this profile includes preheat, reflow (in which the board is heated to the peak temperature) and cooling down. It is imperative that the peak temperature is high enough for the solder to make reliable solder joints (a solder paste characteristic). In addition, the peak temperature must be low enough that the packages and/or boards are not damaged. The peak temperature of the package depends on package thickness and volume and is classified in accordance with [Table 8](#) and [9](#)

Table 8. SnPb eutectic process (from J-STD-020C)

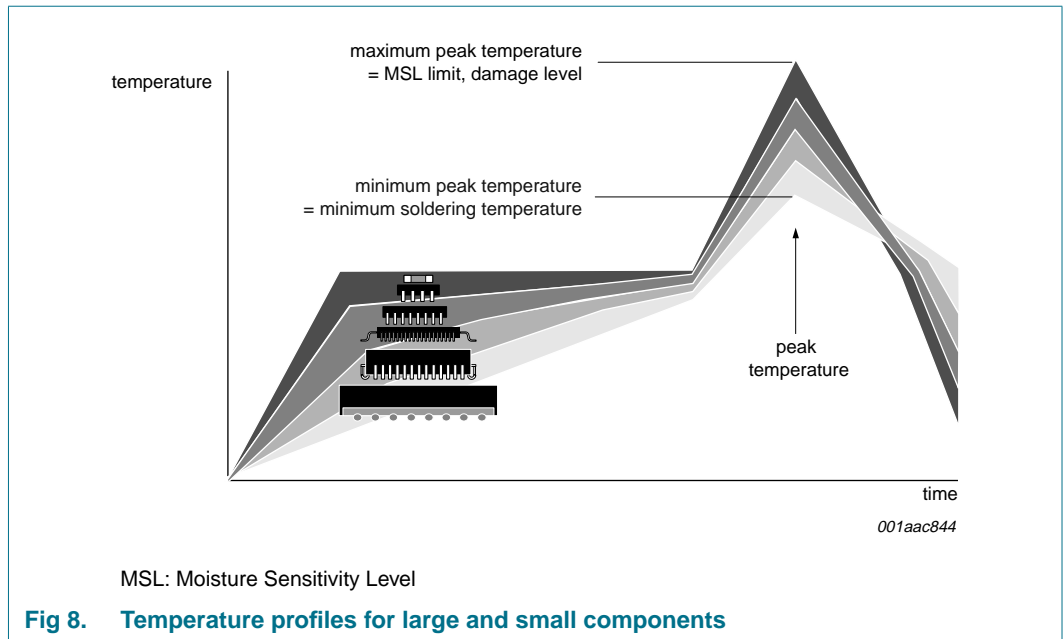
| Package thickness (mm) | Package reflow temperature (°C) | |
|------------------------|---------------------------------|-------|
| | Volume (mm ³) | |
| | < 350 | ≥ 350 |
| < 2.5 | 235 | 220 |
| ≥ 2.5 | 220 | 220 |

Table 9. Lead-free process (from J-STD-020C)

| Package thickness (mm) | Package reflow temperature (°C) | | |
|------------------------|---------------------------------|-------------|--------|
| | Volume (mm ³) | | |
| | < 350 | 350 to 2000 | > 2000 |
| < 1.6 | 260 | 260 | 260 |
| 1.6 to 2.5 | 260 | 250 | 245 |
| > 2.5 | 250 | 245 | 245 |

Moisture sensitivity precautions, as indicated on the packing, must be respected at all times.

Studies have shown that small packages reach higher temperatures during reflow soldering, see [Figure 8](#).



For further information on temperature profiles, refer to Application Note AN10365 "Surface mount reflow soldering description".

15. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|--------------|--------------------|---------------|------------|
| TJA1051_4 | 20091020 | Product data sheet | - | TJA1051_3 |
| Modifications | | | | |
| • Revised parameter values in Table 4 (V_{ESD}) | | | | |
| TJA1051_3 | 20090825 | Product data sheet | - | TJA1051_2 |
| TJA1051_2 | 20090701 | Product data sheet | - | TJA1051_1 |
| TJA1051_1 | 20090309 | Product data sheet | - | - |

16. Legal information

16.1 Data sheet status

| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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