

# NCV7340

## High Speed Low Power CAN Transceiver

### Description

The NCV7340 CAN transceiver is the interface between a controller area network (CAN) protocol controller and the physical bus and may be used in both 12 V and 24 V systems. The transceiver provides differential transmit capability to the bus and differential receive capability to the CAN controller.

The NCV7340 is a new addition to the CAN high-speed transceiver family and is an improved drop-in replacement for the AMIS-42665.

Due to the wide common-mode voltage range of the receiver inputs, the NCV7340 is able to reach outstanding levels of electromagnetic susceptibility (EMS). Similarly, extremely low electromagnetic emission (EME) is achieved by the excellent matching of the output signals.

### Features

- Compatible with the ISO 11898 Standard (ISO 11898-2, ISO 11898-5 and SAE J2284)
- Low Quiescent Current
- High Speed (up to 1 Mbps)
- Ideally Suited for 12 V and 24 V Industrial and Automotive Applications
- Extremely Low Current Standby Mode with Wakeup via the Bus
- Low EME Common-Mode Choke is No Longer Required
- Voltage Source via  $V_{SPLIT}$  Pin for Stabilizing the Recessive Bus Level (Further EMC Improvement)
- No Disturbance of the Bus Lines with an Un-powered Node
- Transmit Data (TxD) Dominant Time-out Function
- Thermal Protection
- Bus Pins Protected Against Transients in an Automotive Environment
- Bus and  $V_{SPLIT}$  Pins Short-Circuit Proof to Supply Voltage and Ground
- Logic Level Inputs Compatible with 3.3 V Devices
- Up to 110 Nodes can be Connected to the Same Bus in Function of Topology
- NCV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These are Pb-Free Devices

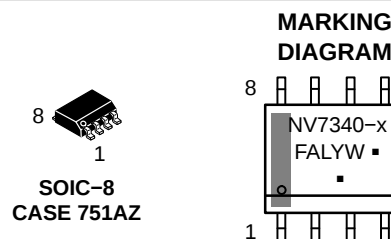
### Typical Applications

- Automotive
- Industrial Networks

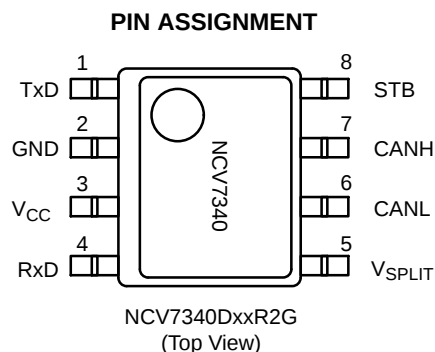


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NV7340- = Specific Device Code  
x = 3 (NCV7340D13R2G)  
= 2 (NCV7340D12R2G)  
= 4 (NCV7340D14R2G)  
F = Fab Location Code\*  
\*For NCV7340D14R2G only  
A = Assembly Location  
L = Wafer Lot  
Y = Year  
W = Work Week  
▪ = Pb-Free Package



### ORDERING INFORMATION

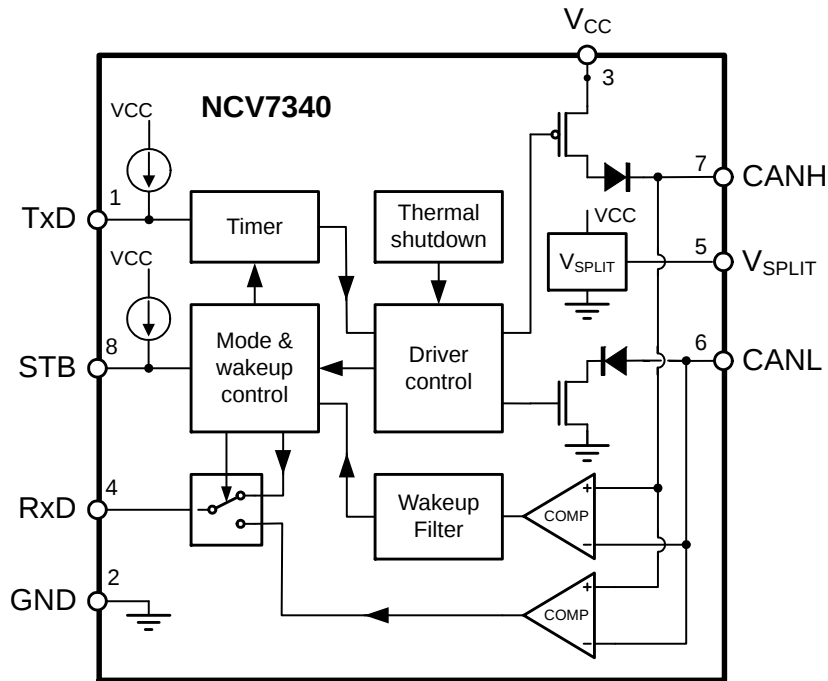
See detailed ordering and shipping information in the package dimensions section on page 9 of this data sheet.

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**Table 1. KEY TECHNICAL CHARACTERISTICS AND OPERATING RANGES**

| Symbol                 | Parameter                                         | Conditions                                                     | Min  | Max      | Unit |
|------------------------|---------------------------------------------------|----------------------------------------------------------------|------|----------|------|
| $V_{CC}$               | Power supply voltage                              |                                                                | 4.75 | 5.25     | V    |
| $V_{STB}$              | DC voltage at pin STB                             |                                                                | 0    | $V_{CC}$ | V    |
| $V_{TxD}$              | DC voltage at pin TxD                             |                                                                | 0    | $V_{CC}$ | V    |
| $V_{RxD}$              | DC voltage at pin RxD                             |                                                                | 0    | $V_{CC}$ | V    |
| $V_{CANH}$             | DC voltage at pin CANH                            | $0 < V_{CC} < 5.25$ V; no time limit                           | -50  | +50      | V    |
| $V_{CANL}$             | DC voltage at pin CANL                            | $0 < V_{CC} < 5.25$ V; no time limit                           | -50  | +50      | V    |
| $V_{SPLIT}$            | DC voltage at pin $V_{SPLIT}$                     | $0 < V_{CC} < 5.25$ V; no time limit                           | -40  | +40      | V    |
| $V_{O(dif)(bus\_dom)}$ | Differential bus output voltage in dominant state | $42.5\ \Omega < R_{LT} < 60\ \Omega$                           | 1.5  | 3        | V    |
| CM-range               | Input common-mode range for comparator            | Guaranteed differential receiver threshold and leakage current | -35  | +35      | V    |
| $C_{load}$             | Load capacitance on IC outputs                    |                                                                |      | 15       | pF   |
| $t_{pd(rec-dom)}$      | Propagation delay TxD to RxD                      | See Figure 7                                                   | 60   | 230      | ns   |
| $t_{pd(dom-rec)}$      | Propagation delay TxD to RxD                      | See Figure 7                                                   | 60   | 245      | ns   |
| $T_J$                  | Junction temperature                              |                                                                | -40  | 150      | °C   |

## BLOCK DIAGRAM



**Figure 1. Block Diagram**

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## TYPICAL APPLICATION

### Application Schematics

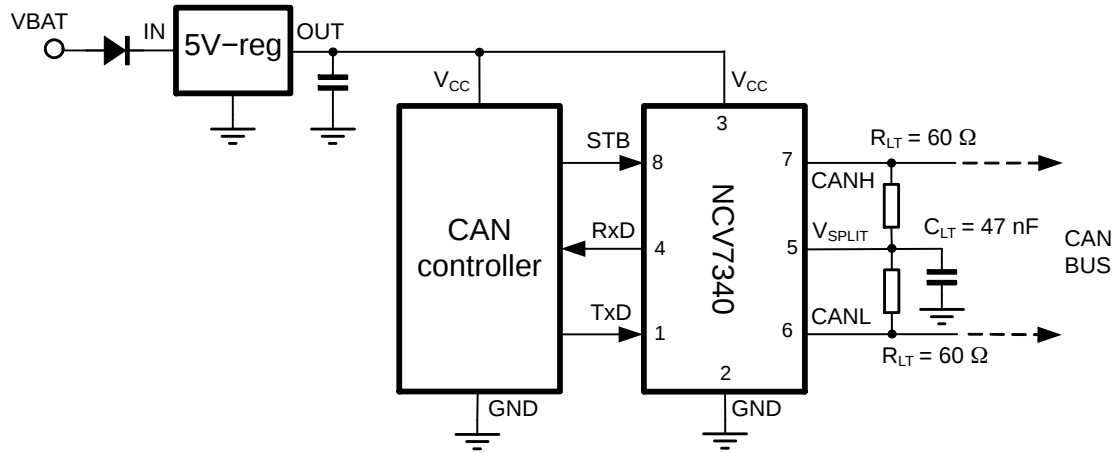


Figure 2. Application Diagram

### Pin Description

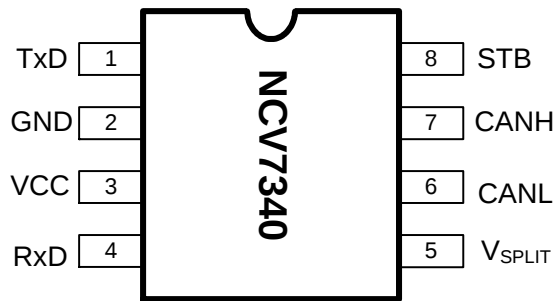


Figure 3. NCV7340 Pin Assignment

Table 2. PIN FUNCTION DESCRIPTION

| Pin | Name        | Description                                                               |
|-----|-------------|---------------------------------------------------------------------------|
| 1   | TxD         | Transmit data input; low input → dominant driver; internal pullup current |
| 2   | GND         | Ground                                                                    |
| 3   | VCC         | Supply voltage                                                            |
| 4   | RxD         | Receive data output; dominant transmitter → low output                    |
| 5   | $V_{SPLIT}$ | Common-mode stabilization output                                          |
| 6   | CANL        | Low-level CAN bus line (low in dominant mode)                             |
| 7   | CANH        | High-level CAN bus line (high in dominant mode)                           |
| 8   | STB         | Standby mode control input                                                |

## FUNCTIONAL DESCRIPTION

## Operating Modes

NCV7340 provides two modes of operation as illustrated in Table 3. These modes are selectable through pin STB.

Table 3. OPERATING MODES

| Pin STB | Mode    | Pin RXD                 |                            |
|---------|---------|-------------------------|----------------------------|
|         |         | Low                     | High                       |
| Low     | Normal  | Bus dominant            | Bus recessive              |
| High    | Standby | Wakeup request detected | No wakeup request detected |

## Normal Mode

In the normal mode, the transceiver is able to communicate via the bus lines. The signals are transmitted and received to the CAN controller via the pins TxD and RxD. The slopes on the bus lines outputs are optimized to give extremely low EME.

## Standby Mode

In standby mode both the transmitter and receiver are disabled and a very low-power differential receiver monitors the bus lines for CAN bus activity. The bus lines are terminated to ground and supply current is reduced to a minimum, typically 10  $\mu$ A. When a wake-up request is detected by the low-power differential receiver, the signal is first filtered and then verified as a valid wake signal after a time period of  $t_{dwakerd}$ , the RxD pin is driven low by the transceiver to inform the controller of the wake-up request.

## Split Circuit

The  $V_{SPLIT}$  pin is operational only in normal mode. In standby mode this pin is floating. The  $V_{SPLIT}$  can be connected as shown in Figure 2 or, if it's not used, can be left floating. Its purpose is to provide a stabilized DC voltage of  $0.5 \times V_{CC}$  to the bus avoiding possible steps in the common-mode signal therefore reducing EME. These unwanted steps could be caused by an un-powered node on the network with excessive leakage current from the bus that shifts the recessive voltage from its nominal  $0.5 \times V_{CC}$  voltage.

## Wakeup

When a valid wakeup (dominant state longer than  $t_{Wake}$ ) is received during the standby mode the RxD pin is driven low. The wakeup detection is not latched: RxD returns to High state after  $t_{wakedr}$  when the bus signal is released back to recessive – see Figure 4. Wake-up behavior in case of a permanent dominant – due to, for example, a bus short – represents the only difference between the circuit functional sub-versions listed in the Ordering Information table. When the standby mode is entered while a dominant is present on the bus, the “unconditioned bus wake-up” versions will signal a bus-wakeup immediately after the state transition (signal RxD1 in Figure 4). The other version will signal bus-wakeup only after the initial dominant is released (signal RxD2 in Figure 4). In this way it's ensured, that a CAN bus can be put to a low-power mode even if the nodes have a level sensitivity to RxD pin and a permanent dominant is present on the bus.

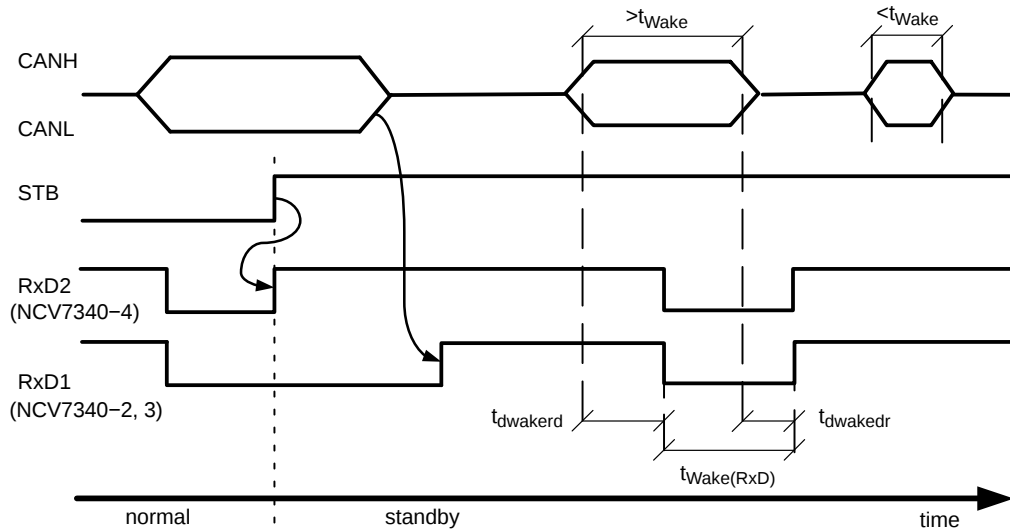


Figure 4. NCV7340 Wakeup Behavior

## Overtemperature Detection

A thermal protection circuit protects the IC from damage by switching off the transmitter if the junction temperature exceeds a value of approximately 160°C. Because the transmitter dissipates most of the power, the power

dissipation and temperature of the IC is reduced. All other IC functions continue to operate. The transmitter off-state resets when the temperature decreases below the shutdown threshold and pin TxD goes high. The thermal protection circuit is particularly needed when a bus line short circuits.

**TxD Dominant Time-out Function**

A TxD dominant time-out timer circuit prevents the bus lines being driven to a permanent dominant state (blocking all network communication) if pin TxD is forced permanently low by a hardware and/or software application failure. The timer is triggered by a negative edge on pin TxD. If the duration of the low-level on pin TxD exceeds the internal timer value  $t_{\text{dom}}(\text{TxD})$ , the transmitter is disabled, driving the bus into a recessive state. The timer is reset by a positive edge on pin TxD.

This TxD dominant time-out time ( $t_{\text{dom}}(\text{TxD})$ ) defines the minimum possible bit rate to 40 kbps.

**Fail Safe Features**

A current-limiting circuit protects the transmitter output stage from damage caused by accidental short circuit to either positive or negative supply voltage, although power dissipation increases during this fault condition.

The pins CANH and CANL are protected from automotive electrical transients (according to ISO 7637; see Figure 5). Pins TxD and STB are pulled high internally should the input become disconnected. Pins TxD, STB and RxD will be floating, preventing reverse supply should the  $V_{\text{CC}}$  supply be removed.

**ELECTRICAL CHARACTERISTICS****Definitions**

All voltages are referenced to GND (Pin 2). Positive currents flow into the IC. Sinking current means the current is flowing into the pin; sourcing current means the current is flowing out of the pin.

**Table 4. ABSOLUTE MAXIMUM RATINGS**

| Symbol              | Parameter                                             | Conditions                                           | Min        | Max      | Unit    |
|---------------------|-------------------------------------------------------|------------------------------------------------------|------------|----------|---------|
| $V_{\text{CC}}$     | Supply voltage                                        |                                                      | -0.3       | +6       | V       |
| $V_{\text{CANH}}$   | DC voltage at pin CANH                                | $0 < V_{\text{CC}} < 5.25 \text{ V}$ ; no time limit | -50        | +50      | V       |
| $V_{\text{CANL}}$   | DC voltage at pin CANL                                | $0 < V_{\text{CC}} < 5.25 \text{ V}$ ; no time limit | -50        | +50      | V       |
| $V_{\text{SPLIT}}$  | DC voltage at pin $V_{\text{SPLIT}}$                  | $0 < V_{\text{CC}} < 5.25 \text{ V}$ ; no time limit | -40        | +40      | V       |
| $V_{\text{TxD}}$    | DC voltage at pin TxD                                 |                                                      | -0.3       | 6        | V       |
| $V_{\text{RxD}}$    | DC voltage at pin RxD                                 |                                                      | -0.3       | 6        | V       |
| $V_{\text{STB}}$    | DC voltage at pin STB                                 |                                                      | -0.3       | 6        | V       |
| $V_{\text{esd}}$    | Electrostatic discharge voltage at all pins           | Note 1<br>Note 2                                     | -6<br>-500 | 6<br>500 | kV<br>V |
|                     | Electrostatic discharge voltage at CANH and CANL pins | Note 3                                               | -12        | 12       | kV      |
| $V_{\text{schaff}}$ | Transient voltage, see Figure 5                       | Note 5                                               | -150       | 100      | V       |
| Latchup             | Static latchup at all pins                            | Note 4                                               |            | 120      | mA      |
| $T_{\text{stg}}$    | Storage temperature                                   |                                                      | -55        | +150     | °C      |
| $T_{\text{A}}$      | Ambient temperature                                   |                                                      | -40        | +125     | °C      |
| $T_{\text{J}}$      | Maximum junction temperature                          |                                                      | -40        | +170     | °C      |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Standardized human body model electrostatic discharge (ESD) pulses in accordance to EIA-JESD22. Equivalent to discharging a 100 pF capacitor through a 1.5 k $\Omega$  resistor.
2. Standardized charged device model ESD pulses when tested according to ESD-STM5.3.1-1999.
3. System human body model electrostatic discharge (ESD) pulses. Equivalent to discharging a 150 pF capacitor through a 330  $\Omega$  resistor.
4. Static latchup immunity: Static latchup protection level when tested according to EIA/JESD78.
5. Pulses 1, 2a, 3a and 3b according to ISO 7637 part 3. Verification by external test house.

**Table 5. THERMAL CHARACTERISTICS**

| Symbol                  | Parameter                                             | Conditions | Value | Unit |
|-------------------------|-------------------------------------------------------|------------|-------|------|
| $R_{\theta\text{JA}_1}$ | Thermal Resistance Junction-to-Air, 1S0P PCB (Note 6) | Free air   | 125   | K/W  |
| $R_{\theta\text{JA}_2}$ | Thermal Resistance Junction-to-Air, 2S2P PCB (Note 7) | Free air   | 75    | K/W  |

6. Test board according to EIA/JEDEC Standard JESD51-3, signal layer with 10% trace coverage.
7. Test board according to EIA/JEDEC Standard JESD51-7, signal layers with 10% trace coverage.

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**Table 6. CHARACTERISTICS**  $V_{CC} = 4.75 \text{ V to } 5.25 \text{ V}$ ;  $T_J = -40 \text{ to } +150^\circ\text{C}$ ;  $R_{LT} = 60 \Omega$  unless specified otherwise.

| Symbol                                                          | Parameter                                                                           | Conditions                                                                              | Min            | Typ            | Max            | Unit          |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|----------------|----------------|----------------|---------------|
| <b>SUPPLY (Pin <math>V_{CC}</math>)</b>                         |                                                                                     |                                                                                         |                |                |                |               |
| $I_{CC}$                                                        | Supply current in normal mode                                                       | Dominant; $V_{TXD} = 0 \text{ V}$<br>Recessive; $V_{TXD} = V_{CC}$                      |                | 57<br>7.5      | 75<br>10       | mA            |
| $I_{CCS}$                                                       | Supply current in standby mode                                                      | $T_{J,max} = 100^\circ\text{C}$                                                         |                | 10             | 15             | $\mu\text{A}$ |
| <b>TRANSMITTER DATA INPUT (Pin <math>TxD</math>)</b>            |                                                                                     |                                                                                         |                |                |                |               |
| $V_{IH}$                                                        | High-level input voltage                                                            | Output recessive                                                                        | 2.0            | –              | $V_{CC}$       | V             |
| $V_{IL}$                                                        | Low-level input voltage                                                             | Output dominant                                                                         | –0.3           | –              | +0.8           | V             |
| $I_{IH}$                                                        | High-level input current                                                            | $V_{TXD} = V_{CC}$                                                                      | –5             | 0              | +5             | $\mu\text{A}$ |
| $I_{IL}$                                                        | Low-level input current                                                             | $V_{TXD} = 0 \text{ V}$                                                                 | –350           | –200           | –75            | $\mu\text{A}$ |
| $C_i$                                                           | Input capacitance                                                                   | Not tested                                                                              | –              | 5.0            | 10             | pF            |
| <b>TRANSMITTER MODE SELECT (Pin <math>STB</math>)</b>           |                                                                                     |                                                                                         |                |                |                |               |
| $V_{IH}$                                                        | High-level input voltage                                                            | Standby mode                                                                            | 2.0            | –              | $V_{CC}$       | V             |
| $V_{IL}$                                                        | Low-level input voltage                                                             | Normal mode                                                                             | –0.3           | –              | +0.8           | V             |
| $I_{IH}$                                                        | High-level input current                                                            | $V_{STB} = V_{CC}$                                                                      | –5             | 0              | +5             | $\mu\text{A}$ |
| $I_{IL}$                                                        | Low-level input current                                                             | $V_{STB} = 0 \text{ V}$                                                                 | –10            | –4             | –1             | $\mu\text{A}$ |
| $C_i$                                                           | Input capacitance                                                                   | Not tested                                                                              | –              | 5.0            | 10             | pF            |
| <b>RECEIVER DATA OUTPUT (Pin <math>RxD</math>)</b>              |                                                                                     |                                                                                         |                |                |                |               |
| $I_{oh}$                                                        | High-level output current                                                           | normal mode<br>$V_{RxD} = V_{CC} - 0.4 \text{ V}$                                       | –1             | –0.4           | –0.1           | mA            |
| $I_{ol}$                                                        | Low-level output current                                                            | $V_{RxD} = 0.4 \text{ V}$                                                               | 2              | 6              | 12             | mA            |
| $V_{oh}$                                                        | High-level output voltage                                                           | standby mode<br>$I_{RxD} = -100 \mu\text{A}$                                            | $V_{CC} - 1.1$ | $V_{CC} - 0.7$ | $V_{CC} - 0.4$ | V             |
| <b>BUS LINES (Pins <math>CANH</math> and <math>CANL</math>)</b> |                                                                                     |                                                                                         |                |                |                |               |
| $V_{o(reces)} (norm)$                                           | Recessive bus voltage on pins $CANH$ and $CANL$                                     | $V_{TXD} = V_{CC}$ ; no load<br>normal mode                                             | 2.0            | 2.5            | 3.0            | V             |
| $V_{o(reces)} (stby)$                                           | Recessive bus voltage on pins $CANH$ and $CANL$                                     | $V_{TXD} = V_{CC}$ ; no load<br>standby mode                                            | –100           | 0              | 100            | mV            |
| $I_{o(reces)} (CANH)$                                           | Recessive output current at pin $CANH$                                              | $-35 \text{ V} < V_{CANH} < +35 \text{ V}$ ;<br>$0 \text{ V} < V_{CC} < 5.25 \text{ V}$ | –2.5           | –              | +2.5           | mA            |
| $I_{o(reces)} (CANL)$                                           | Recessive output current at pin $CANL$                                              | $-35 \text{ V} < V_{CANL} < +35 \text{ V}$ ;<br>$0 \text{ V} < V_{CC} < 5.25 \text{ V}$ | –2.5           | –              | +2.5           | mA            |
| $I_{LI}(CANH)$                                                  | Input leakage current to pin $CANH$                                                 | $V_{CC} = 0 \text{ V}$<br>$V_{CANL} = V_{CANH} = 5 \text{ V}$                           | –10            | 0              | 10             | $\mu\text{A}$ |
| $I_{LI}(CANL)$                                                  | Input leakage current to pin $CANL$                                                 | $V_{CC} = 0 \text{ V}$<br>$V_{CANL} = V_{CANH} = 5 \text{ V}$                           | –10            | 0              | 10             | $\mu\text{A}$ |
| $V_{o(dom)} (CANH)$                                             | Dominant output voltage at pin $CANH$                                               | $V_{TXD} = 0 \text{ V}$                                                                 | 3.0            | 3.6            | 4.25           | V             |
| $V_{o(dom)} (CANL)$                                             | Dominant output voltage at pin $CANL$                                               | $V_{TXD} = 0 \text{ V}$                                                                 | 0.5            | 1.4            | 1.75           | V             |
| $V_{o(dif)} (bus\_dom)$                                         | Differential bus output voltage ( $V_{CANH} - V_{CANL}$ )                           | $V_{TXD} = 0 \text{ V}$ ; dominant;<br>$42.5 \Omega < R_{LT} < 60 \Omega$               | 1.5            | 2.25           | 3.0            | V             |
| $V_{o(dif)} (bus\_rec)$                                         | Differential bus output voltage ( $V_{CANH} - V_{CANL}$ )                           | $V_{TXD} = V_{CC}$ ; recessive; no<br>load                                              | –120           | 0              | +50            | mV            |
| $I_{o(sc)} (CANH)$                                              | Short circuit output current at pin $CANH$ for<br>the NCV7340D13(R2)G               | $V_{CANH} = 0 \text{ V}$ ; $V_{TXD} = 0 \text{ V}$                                      | –100           | –70            | –45            | mA            |
|                                                                 | Short circuit output current at pin $CANH$ for<br>NCV7340D12(R2)G & NCV7340D14(R2)G | $V_{CANH} = 0 \text{ V}$ ; $V_{TXD} = 0 \text{ V}$                                      | –120           | –70            | –45            | mA            |

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**Table 6. CHARACTERISTICS**  $V_{CC} = 4.75 \text{ V to } 5.25 \text{ V}$ ;  $T_J = -40 \text{ to } +150^\circ\text{C}$ ;  $R_{LT} = 60 \Omega$  unless specified otherwise.

| Symbol                                                        | Parameter                                                                         | Conditions                                                                                   | Min                 | Typ  | Max                 | Unit             |
|---------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------------|------|---------------------|------------------|
| <b>BUS LINES (Pins CANH and CANL)</b>                         |                                                                                   |                                                                                              |                     |      |                     |                  |
| $I_{O(SC)} \text{ (CANL)}$                                    | Short circuit output current at pin CANL for the NCV7340D13(R2)G                  | $V_{CANL} = 36 \text{ V}$ ; $V_{TXD} = 0 \text{ V}$                                          | 45                  | 70   | 100                 | mA               |
|                                                               | Short circuit output current at pin CANL for NCV7340D12(R2)G & NCV7340D14(R2)G    | $V_{CANL} = 36 \text{ V}$ ; $V_{TXD} = 0 \text{ V}$                                          | 45                  | 70   | 120                 | mA               |
| $V_{I(DIF)} \text{ (th)}$                                     | Differential receiver threshold voltage (see Figure 6)                            | $-5 \text{ V} < V_{CANL} < +12 \text{ V}$ ;<br>$-5 \text{ V} < V_{CANH} < +12 \text{ V}$ ;   | 0.5                 | 0.7  | 0.9                 | V                |
| $V_{IHC(DIF)} \text{ (th)}$                                   | Differential receiver threshold voltage for high common-mode (see Figure 6)       | $-35 \text{ V} < V_{CANL} < +35 \text{ V}$ ;<br>$-35 \text{ V} < V_{CANH} < +35 \text{ V}$ ; | 0.40                | 0.7  | 1.0                 | V                |
| $V_{I(DIF)} \text{ (th)}_{STDBY}$                             | Differential receiver threshold voltage in standby mode (see Figure 6)            | $-12 \text{ V} < V_{CANL} < +12 \text{ V}$ ;<br>$-12 \text{ V} < V_{CANH} < +12 \text{ V}$ ; | 0.4                 | 0.8  | 1.15                | V                |
| $R_{I(CM)} \text{ (CANH)}$                                    | Common-mode input resistance at pin CANH                                          |                                                                                              | 15                  | 26   | 37                  | k $\Omega$       |
| $R_{I(CM)} \text{ (CANL)}$                                    | Common-mode input resistance at pin CANL                                          |                                                                                              | 15                  | 26   | 37                  | k $\Omega$       |
| $R_{I(CM)} \text{ (m)}$                                       | Matching between pin CANH and pin CANL common mode input resistance               | $V_{CANH} = V_{CANL}$                                                                        | -0.8                | 0    | +0.8                | %                |
| $R_{I(DIF)}$                                                  | Differential input resistance                                                     |                                                                                              | 25                  | 50   | 75                  | k $\Omega$       |
| $C_{I(CANH)}$                                                 | Input capacitance at pin CANH                                                     | $V_{TXD} = V_{CC}$ ; not tested                                                              |                     | 7.5  | 20                  | pF               |
| $C_{I(CANL)}$                                                 | Input capacitance at pin CANL                                                     | $V_{TXD} = V_{CC}$ ; not tested                                                              |                     | 7.5  | 20                  | pF               |
| $C_{I(DIF)}$                                                  | Differential input capacitance                                                    | $V_{TXD} = V_{CC}$ ; not tested                                                              |                     | 3.75 | 10                  | pF               |
| <b>COMMON-MODE STABILIZATION (Pin <math>V_{SPLIT}</math>)</b> |                                                                                   |                                                                                              |                     |      |                     |                  |
| $V_{SPLIT}$                                                   | Reference output voltage at pin $V_{SPLIT}$                                       | Normal mode;<br>$-500 \mu\text{A} < I_{SPLIT} < 500 \mu\text{A}$                             | $0.3 \times V_{CC}$ | -    | $0.7 \times V_{CC}$ |                  |
| $I_{SPLIT(I)}$                                                | $V_{SPLIT}$ leakage current                                                       | Standby mode                                                                                 | -5                  |      | +5                  | $\mu\text{A}$    |
| $I_{SPLIT(lim)}$                                              | $V_{SPLIT}$ limitation current                                                    | Normal mode                                                                                  | 1.3                 |      | 5.0                 | mA               |
| <b>THERMAL SHUTDOWN</b>                                       |                                                                                   |                                                                                              |                     |      |                     |                  |
| $T_{J(sd)}$                                                   | Shutdown junction temperature                                                     | junction temperature rising                                                                  | 150                 | 160  | 185                 | $^\circ\text{C}$ |
| <b>TIMING CHARACTERISTICS (see Figures 7 and 8)</b>           |                                                                                   |                                                                                              |                     |      |                     |                  |
| $t_{d(TxD-BUSon)}$                                            | Delay TxD to bus active                                                           | $C_1 = 100 \text{ pF}$ between CANH to CANL                                                  | 20                  | 85   | 135                 | ns               |
| $t_{d(TxD-BUSoff)}$                                           | Delay TxD to bus inactive                                                         | $C_1 = 100 \text{ pF}$ between CANH to CANL                                                  | 5.0                 | 60   | 105                 | ns               |
| $t_{d(BUSon-RxD)}$                                            | Delay bus active to RxD                                                           | $C_{RxD} = 15 \text{ pF}$                                                                    | 25                  | 55   | 105                 | ns               |
| $t_{d(BUSoff-RxD)}$                                           | Delay bus inactive to RxD                                                         | $C_{RxD} = 15 \text{ pF}$                                                                    | 30                  | 100  | 105                 | ns               |
| $t_{pd(rec-dom)}$                                             | Propagation delay TxD to RxD from recessive to dominant                           | $C_1 = 100 \text{ pF}$ between CANH to CANL                                                  | 60                  |      | 230                 | ns               |
| $t_{d(dom-rec)}$                                              | Propagation delay TxD to RxD from dominant to recessive                           | $C_1 = 100 \text{ pF}$ between CANH to CANL                                                  | 60                  |      | 245                 | ns               |
| $t_{d(stb-nm)}$                                               | Delay standby mode to normal mode                                                 |                                                                                              | 5.0                 | 7.5  | 10                  | $\mu\text{s}$    |
| $t_{Wake}$                                                    | Dominant time for wake-up via bus                                                 | $V_{dif(dom)} > 1.4 \text{ V}$                                                               | 0.75                | 2.5  | 5.0                 | $\mu\text{s}$    |
|                                                               |                                                                                   | $V_{dif(dom)} > 1.2 \text{ V}$                                                               | 0.75                | 3    | 5.8                 | $\mu\text{s}$    |
| $t_{dwakerd}$                                                 | Delay to flag wake event (recessive to dominant transitions) (See Figure 4)       | Valid bus wake up event,<br>$C_{RxD} = 15 \text{ pF}$                                        | 1.0                 | 3.4  | 10                  | $\mu\text{s}$    |
| $t_{dwakedr}$                                                 | Delay to flag end of wake event (dominant to recessive transition) (See Figure 4) | Valid bus wake up event,<br>$C_{RxD} = 15 \text{ pF}$                                        | 0.5                 | 2.9  | 6.0                 | $\mu\text{s}$    |
| $t_{Wake(RxD)}$                                               | Minimum pulse width on RxD (See Figure 4)                                         | $5 \mu\text{s } t_{wake}$ , $C_{RxD} = 15 \text{ pF}$                                        | 0.5                 |      |                     | $\mu\text{s}$    |
| $t_{dom(TxD)}$                                                | TxD dominant time for time out                                                    | $V_{TXD} = 0 \text{ V}$                                                                      | 300                 | 650  | 1000                | $\mu\text{s}$    |

# NCV7340

## MEASUREMENT SETUPS AND DEFINITIONS

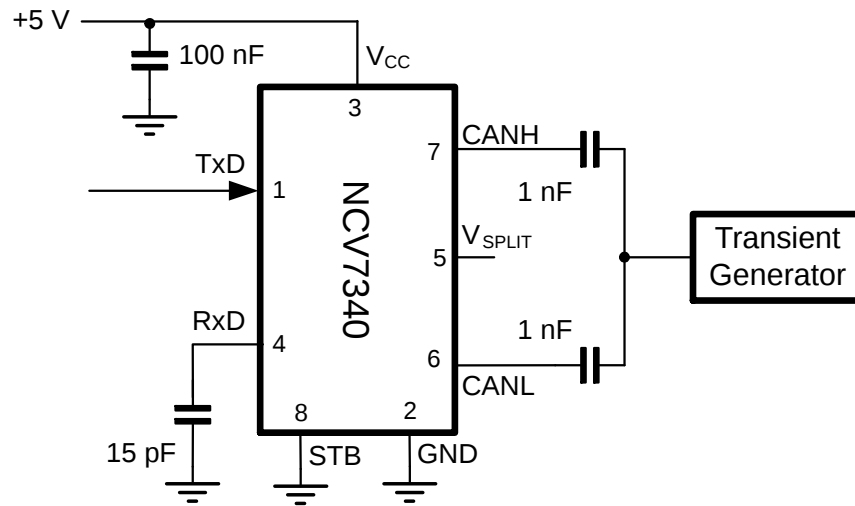


Figure 5. Test Circuit for Automotive Transients

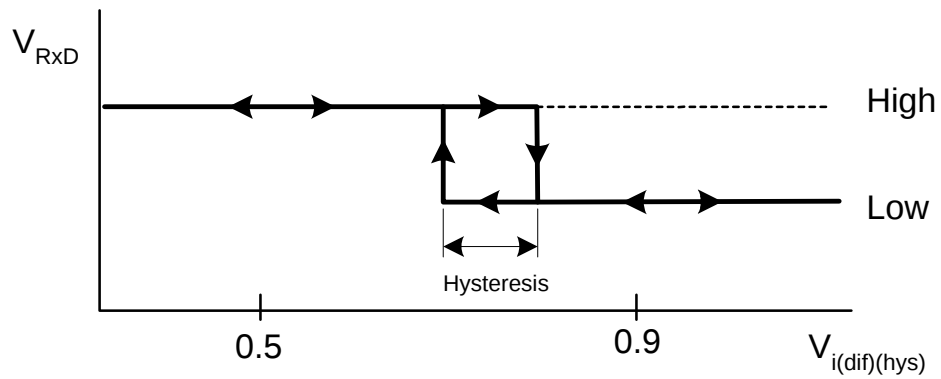


Figure 6. Hysteresis of the Receiver

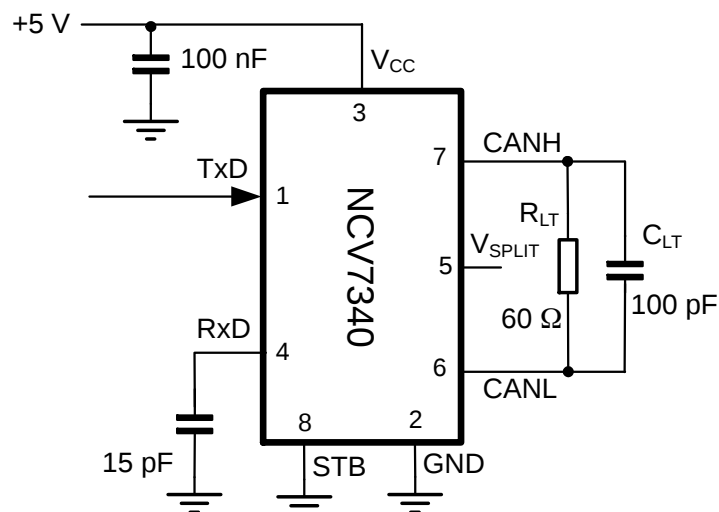
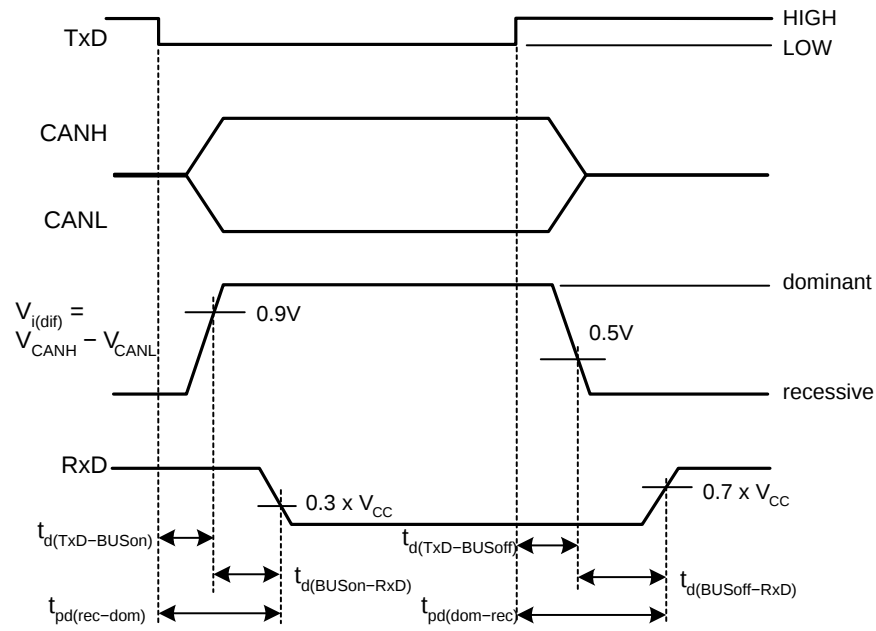


Figure 7. Test Circuit for Timing Characteristics

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**Figure 8. Timing Diagram for AC Characteristics**

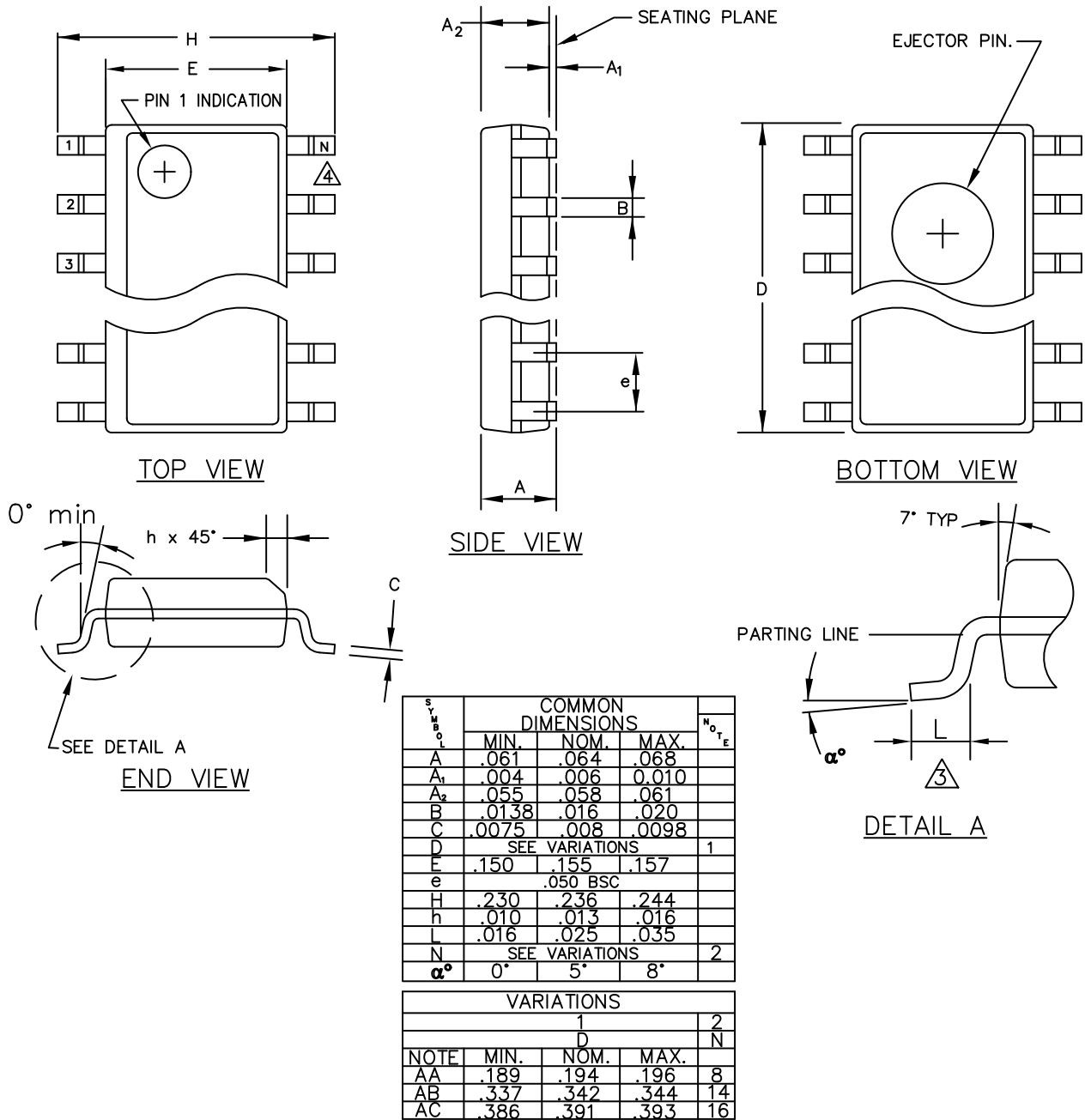
## DEVICE ORDERING INFORMATION

| Part Number   | Description                                                            | Temperature Range | Package Type                                    | Shipping <sup>†</sup> |
|---------------|------------------------------------------------------------------------|-------------------|-------------------------------------------------|-----------------------|
| NCV7340D12G   | HS LP CAN Transceiver<br>(Unconditioned Bus Wakeup)                    | -40°C to +125°C   | SOIC 150 8 (Mate Sn, JEDEC MS-012)<br>(Pb-Free) | 96 Tube / Tray        |
| NCV7340D12R2G |                                                                        |                   |                                                 | 3000 / Tape & Reel    |
| NCV7340D13G   | EMC Improved<br>HS LP CAN Transceiver<br>(Unconditioned Bus Wakeup)    |                   |                                                 | 96 Tube / Tray        |
| NCV7340D13R2G |                                                                        |                   |                                                 | 3000 / Tape & Reel    |
| NCV7340D14G   | HS LP CAN Transceiver<br>(Bus Wakeup Inactive in<br>Case of Bus Fault) |                   |                                                 | 96 Tube / Tray        |
| NCV7340D14R2G |                                                                        |                   |                                                 | 3000 / Tape & Reel    |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PACKAGE DIMENSIONS

SOIC 8  
CASE 751AZ  
ISSUE O



1. ALL DIMENSIONS ARE IN MILLIMETERS.

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