High-speed CAN transceivers

As the leading supplier of CAN solutions, Philips continues to raise the performance level of this popular in-vehicle networking standard. Our HS-CAN transceiver portfolio addresses a variety of application and network topologies. With advanced functionality such as failure management and power saving, Philips' drop-in upgrades and innovative new products deliver the performance needed by all high-speed CAN applications.

Key features

- All Philips HS-CAN transceivers are fully ISO 11898-2 compliant
  - Qualified for automotive applications
  - Meet ISO standard over the full voltage and temperature range
- Philips transceivers offer additional features to support the specific needs of automotive HS-CAN applications
  - Fail-safe features and power saving modes help contain network failures and reduce power consumption
- Philips HS-CAN transceivers are found in every type of automotive HS-CAN network in use today
- Philips continues to innovate, based on our vast experience with CAN for automotive applications worldwide

Philips HS-CAN transceiver portfolio

- PCA82C250 and PCA82C251
  - The most widely used HS-CAN transceivers in the world
- TJA1050
  - Ideal for nodes not requiring a low-power mode
  - Vastly improved EMC and power-off behavior
- TJA1040
  - The best choice transceiver for key-on nodes in partial networks
  - Very low standby current (10 µA with wake-up via the bus)
- TJA1041 and TJA1041A
  - The best choice transceivers for continuously powered nodes
  - Very low sleep mode current (20 µA for the whole node)

Enhanced functionality and performance

Semiconductors

At first only used for engine management networks, High-speed CAN is now commonly used throughout the car, including body and comfort and backbone applications. Addressing the specific requirements of larger and more complicated automotive CAN networks through continuous innovation, functionality such as failure management and low-power modes are a now a key component of Philips HS-CAN transceiver family.

Following on from the PCA82C250 Philips offers a choice of stand-alone transceivers fully pin-compatible with their predecessor, that address the additional needs of today's HS-CAN automotive networks. Each provides a combination of power modes and protective features to suit specific applications and network topologies throughout the car. And with our unique SOI process, EMC performance is greatly improved – in some designs completely eliminating the need for choke suppresser coils.

TJA1041 / 1041A – flagship solutions

Philips' most advanced stand-alone HS-CAN transceivers, both the TJA1041 and TJA1041A feature a sleep mode with inhibit output in addition to a standby mode, providing power supply control for the entire node. This results in a node with extremely low standby current, yet is still capable of waking up via the bus. An extended feature set includes fail-safe features, network diagnostics, local / remote wake-up source recognition and a logic level shifter to interface with microcontrollers between 2.8 and 5 V. Combined, these features make the TJA1041(A) the best choice for permanently connected nodes and partial networks.

TJA1040 – remote wake-up and 'invisible' nodes

The TJA1040 transceiver offers the functionality of the TJA1050, plus a very low power standby mode with remote wake-up capability via the bus. Bus reverse current is zero when power to the TJA1040 is off, so unpowered nodes do not affect the rest of the network – effectively it is invisible. This makes the TJA1040 ideal for the key-on nodes in partial networks and being fully pin-compatible with the PCA82C250 / 251 and TJA1050, provides a simple migration path for automotive designers.

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TJA1050 – the efficient HS-CAN transceiver

Compared to the PCA82C250 / 251, the TJA1050 operates with very low bus reverse currents, ensuring unpowered nodes have a minimal effect on the rest of the network. Fail-safe features also prevent nodes from locking into a dominant state and blocking network communication. The TJA1050 helps simplify design-in and reduces overall system costs, allowing manufacturers to offer enhanced functionality in lower model ranges. It is particularly suited to key-on applications or nodes, where a standby mode is not needed.

PCA82C250 / 251 – popular worldwide standard

Philips continues to build on the success of the PCA82C250, which set the worldwide standard for automotive grade HS-CAN transceivers. With over 250 million units sold it is the most widely used HS-CAN transceiver and is still an excellent choice for key-on HS-CAN networks today, as is the PCA82C251 – a 24 V version for trucks and buses. Originally intended for engine management networks, these devices are now found in every type of in-vehicle HS-CAN network.

Portfolio overview

	PCA82C250 / 251	TJA1050	TJA1040	TJA1041 / 1041A
ISO 11898-2 compliant	Yes	Yes	Yes	Yes
Standby mode with remote wake-up	Yes	No	Yes	Yes
Sleep mode with remote wake-up	No	No	No	Yes [1]
Local wake-up	Yes	-	Yes	Yes
Power consumption in standby/sleep mode	100 µA	(5 mA)	10 µA	20 µA (for the entire node)
Invisible when unpowered	No	Approx	Yes	Approx
Listen-only mode	No	Yes	No	Yes
TXD dominant timer	No	Yes	Yes	Yes
Enhanced bus clamping protection (RXD failures)	No	No	No	Yes
Bus failure diagnostics	No	No	No	Yes
Overload protected	Yes	Yes	Yes	Yes
Split termination output pin	No	No	Yes	Yes
µC compatibility	5 V	3.0 V to 5 V [2]	3.0 V to 5 V [2]	2.8 V to 5 V
Package options	DIL8, SO8, bare die	SO8, HVSON8, bare die	SO8, bare die	SO14, bare die
Main application areas	Key-on nodes, or in permanently powered networks [3]	Key-on nodes in larger networks, no standby	Partial network key-on nodes or permanently powered nodes	Permanently powered nodes and in partial networks [4]

[1] TJA1041 wakes up with the first positive dominant state on the bus, TJA1041A wakes up after two dominant cycles on the bus
[2] The µC needs to be tolerant of 5 V input voltages (RXD).
[3] Not recommended for key-on nodes in partial networks, to avoid bus loading issues.
[4] TJA1041A is preferred in large networks, for extra robustness against unwanted wake-ups.

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