TC4016

ECU simulation node based on SENT and PSI5 protocols

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Classic Application:

- CAN FD Simulation and Testing
- Supports receiving SENT and PSI5 signals
- Hardware-in-the-Loop (HIL) Testing for ECU
- Multi-channel I/O Control Scenarios
- Integration with Laboratory and Production Line Test Platfom

Feature Overview

The TC4016 is an ECU (Electronic Control Unit) simulation node designed to receive sensor signals based on the SENT (Single Edge Nibble Transmission) and PSI5 (Peripheral Sensor Interface 5) protocols.

It does not generate or simulate SENT/PSI5 signals, but it can acquire and process incoming sensor data from various SENT and PSI5 devices.

The TC4016 integrates 2 channels of CAN/CAN FD, 4 channels of Digital Input/Output (DIDO), and 3 channels of Analog Input/Output (AIAO).

When connected to a PC via Ethernet, the TC4016 enables real-time monitoring, analysis, and CAN/CAN FD simulation, providing a reliable data environment for R&D and testing. This significantly accelerates ECU development cycles.

Characteristics

- µs (microsecond) level hardware message timestamps to meet advanced requirements
- Driver-free design for Windows, ensuring excellent compatibility
- 20 SENT channels, with the first 10 channels supporting SPC mode
- 16 PSI5 channels
- 2 CAN/CAN FD channels
- Supports 4 Digital I/O (DIDO) and 3 Analog I/O (AIAO) channels
- Configurable CAN bit rate from 125 Kbps to 1 Mbps; CAN FD supports up to 8 Mbps
- Software-configurable 120Ω termination resistors for CAN channels
- Self-ACK (Self-Acknowledgment) support for CAN communication
- Hardware time synchronization across multiple devices
- Example project and API interfaces provided, simplifying secondary development

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Channel	2 x CAN/CAN FD / 4 x DIDO / 16 x PSI5 3 x AIAO / 20 x SENT (the first 10 channels supporting SPC mode)
PC Interface	Gigabit Ethernet
Driver	Driver-free for Windows
Timestamp Accuracy	Built in 120 ohm terminal resistor, software configurable
Terminal Resistor	1 μs, hardware message timestamp
Isolation (CAN)	CAN channels support DC 2500V galvanic isolation; ESD protectioncompliant with ±8 KV contact discharge, ±15 KV air discharge
DIDO	Digital Input (DI) voltage range: 0 ~ 39.5 V DI threshold adjustable via built-in hysteresis comparator andconfigurable Vref (0 ~ 3.28 V) DI Threshold Calculations: High-level threshold (VAH): (330 + 499 × Vref) / 1098 Low-level threshold (VAL): 0.455 × Vref Digital Output (DO) levels: Low = 0 V, High = 5 V or 12 V (DO does not support direct load driving)
AIAO	Analog Input (AI) voltage range: 0 ~ 39.5 VAnalog Output (AO) voltage range: 0 ~ 29.5 V(AO does not support direct load driving)
SENT	Idle polarity: High Tick time range: 3 ~ 50 μsNibble count: 0 ~ 8 Data types supported: Fast Channel and Slow Channel
PSI5	Channel modes: Synchronous / AsynchronousBus sustaining voltage: 5.15 V / 6.65 V / 7.70 VComparator threshold current: 13 mA / 26 mABaud rates: 125 Kbps / 189 Kbps Max. slot length: 33 bitsSlot time range: 0 ~ 480 μs Checksum types: Parity / CRC
Power Supply	DC 9 ~ 32 V
Power Consumption	5 W (without external sensor connection)
Case Material	Aluminum alloy enclosure
Dimensions	Approx. 110 x 70 x 36 mm
Weight	Net weight: approx. 150 g ; Gross weight: approx. 368 g
Operating Temperature	-40°C ~ 80°C
Operating Humidity	10% ~ 90% (non-condensing)
Operating Environment	Keep away from corrosive gases

Ordering information

Product Name	Model Number	Function Description
Network Device	TC4016	ECU simulation node based on SENT and PSI5 protocols

Shipping list

- TC4016 device
- DC 12 V 2 A power adapter
- Cat 6 Gigabit Ethernet cable
- Time Sync box harness
- DB9 female to dual male signal cable
- DB9 male connector
- Custom harness - SENT/PSI5 (Pending details)

12 V 2 A power adapter

Cat 6 Gigabit Ethernet cable

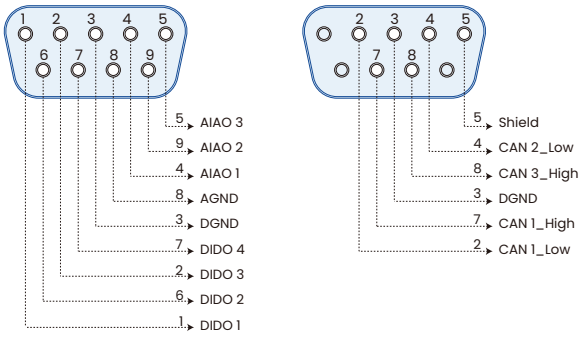
DB9 connector

Time Sync box harness

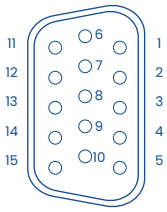
DB9 adapter cable (CAN)

Pin definition

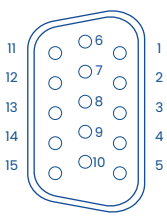
- Left: I/O
- Right: CAN FD 1/2



- PSI5 1 / 8

DB15 PIN	PIN Number	Definition	PIN Number	Definition	PIN Number	Definition
	PIN 1	PSI5_1	PIN 2	DGND	PIN 3	DGND
	PIN 4	DGND	PIN 5	PSI5_5	PIN 6	PSI5_2
	PIN 7	DGND	PIN 8	DGND	PIN 9	DGND
	PIN 10	PSI5_6	PIN 11	PSI5_3	PIN 12	PSI5_4
	PIN 13	DGND	PIN 14	PSI5_8	PIN 15	PSI5_7

- PSI5 9 / 16

DB15 PIN	PIN Number	Definition	PIN Number	Definition	PIN Number	Definition
	PIN 1	PSI5_9	PIN 2	DGND	PIN 3	DGND
	PIN 4	DGND	PIN 5	PSI5_13	PIN 6	PSI5_10
	PIN 7	DGND	PIN 8	DGND	PIN 9	DGND
	PIN 10	PSI5_14	PIN 11	PSI5_11	PIN 12	PSI5_12
	PIN 13	DGND	PIN 14	PSI5_15	PIN 15	PSI5_16

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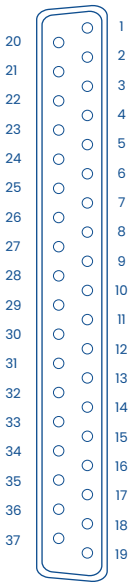
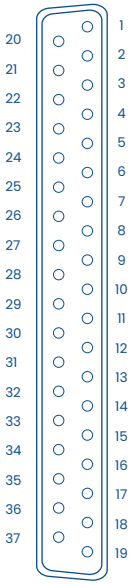
• SENT 1/10

DB15 PIN	PIN Number	Definition	PIN Number	Definition	PIN Number	Definition
	PIN 1	SENT 1	PIN 2	GND	PIN 3	VCC_5 V
	PIN 4	SENT 3	PIN 5	GND	PIN 6	VCC_5 V
	PIN 7	SENT 5	PIN 8	GND	PIN 9	VCC_5 V
	PIN 10	SENT 7	PIN 11	GND	PIN 12	VCC_5 V
	PIN 13	SENT 9	PIN 14	GND	PIN 15	VCC_5 V
	PIN 16	NULL	PIN 17	NULL	PIN 18	NULL
	PIN 19	NULL	PIN 20	VCC_5 V	PIN 21	SENT 2
	PIN 22	GND	PIN 23	VCC_5 V	PIN 24	SENT 4
	PIN 25	GND	PIN 26	VCC_5 V	PIN 27	SENT 6
	PIN 28	GND	PIN 29	VCC_5 V	PIN 30	SENT 8
	PIN 31	GND	PIN 32	VCC_5 V	PIN 33	SENT 10
	PIN 34	GND	PIN 35	NULL	PIN 36	NULL
	PIN 37	NULL				

• SENT 11/20

DB15 PIN	PIN Number	Definition	PIN Number	Definition	PIN Number	Definition
	PIN 1	SENT 11	PIN 2	GND	PIN 3	VCC_5 V
	PIN 4	SENT 13	PIN 5	GND	PIN 6	VCC_5 V
	PIN 7	SENT 15	PIN 8	GND	PIN 9	VCC_5 V
	PIN 10	SENT 17	PIN 11	GND	PIN 12	VCC_5 V
	PIN 13	SENT 19	PIN 14	GND	PIN 15	VCC_5 V
	PIN 16	NULL	PIN 17	NULL	PIN 18	NULL
	PIN 19	NULL	PIN 20	VCC_5 V	PIN 21	SENT 12
	PIN 22	GND	PIN 23	VCC_5 V	PIN 24	SENT 14
	PIN 25	GND	PIN 26	VCC_5 V	PIN 27	SENT 16
	PIN 28	GND	PIN 29	VCC_5 V	PIN 30	SENT 18
	PIN 31	GND	PIN 32	VCC_5 V	PIN 33	SENT 20
	PIN 34	GND	PIN 35	NULL	PIN 36	NULL
	PIN 37	NULL				