TTS Series Products
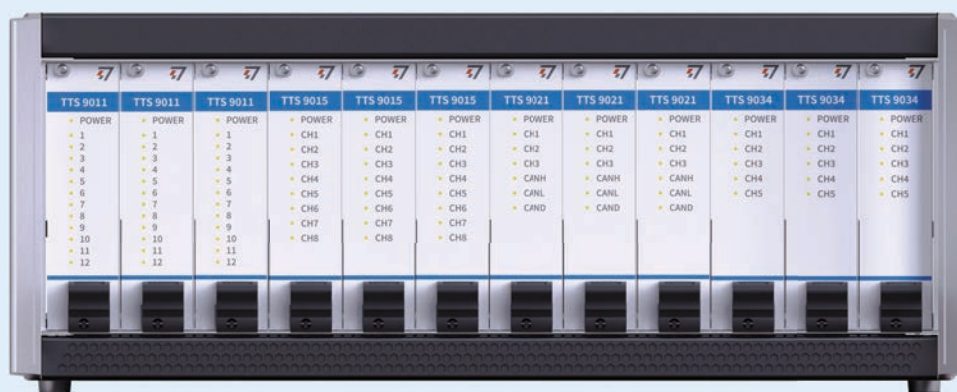
Feature Overview

To achieve comprehensive testing of an ECU, engineers need to connect both the communication network and the I/O interface to the test system. TOSUN's TTS test system includes all the necessary cards for testing, integrated into a single, easy-to-use chassis. This advanced integration significantly simplifies the setup of test benches and Hardware-in-the-Loop (HIL) test systems, enhancing both the efficiency and effectiveness of setup and testing processes.

The TTS series offers a variety of boards for digital, analog, fault injection, bus communication, and power management. The 9000 series boards focus on providing specific functionalities: for instance, the 9011 offers digital signal acquisition/output capabilities, the 9015 offers analog signal acquisition/output capabilities, the 9021 offers fault injection capabilities, and the 9036 offers analog resistance capabilities. Conversely, the 8000 series combines multiple functionalities, such as the 8516, which provides digital and analog signal acquisition/output as well as fault injection capabilities.

The TTS system operates on TSMaster, integrating the TTS chassis, associated instruments, diagnostics, and calibration into one software platform. This enables a single system to cover testing requirements for developing in-vehicle ECUs. In contrast, conventional systems often require components from multiple providers—one for test scheduling, another for diagnostics, another for calibration, and another for board capabilities. Compared to these, TTS offers simpler system development, more stable operation, and more cost-effective solutions.

To seamlessly integrate with the TTS system, TSMaster provides a graphical programming language, and further supports development through an Excel-to-graphical language conversion method. Users can edit the test process in Excel following a fixed procedure, load it into TSMaster to control the test system, and customize test report templates. After executing tests, TSMaster automatically generates the test reports.

TTS Features

- All in one design:
  CAN FD / CAN / In-vehicle Ethernet / FlexRay / LIN
  communication boards
  Digital input/output boards
  Analog input/output boards
  Relay, fault injection boards, etc
  Resistors for simulating sensors
- Minimal wiring work for test setup
- Voltage range suitable for automotive applications
- Seamless integration into TSMaster

Application Areas

- Dedicated test system for a single ECU
- General-purpose functional tester for ECU
- Flexible test hardware for developer workstations
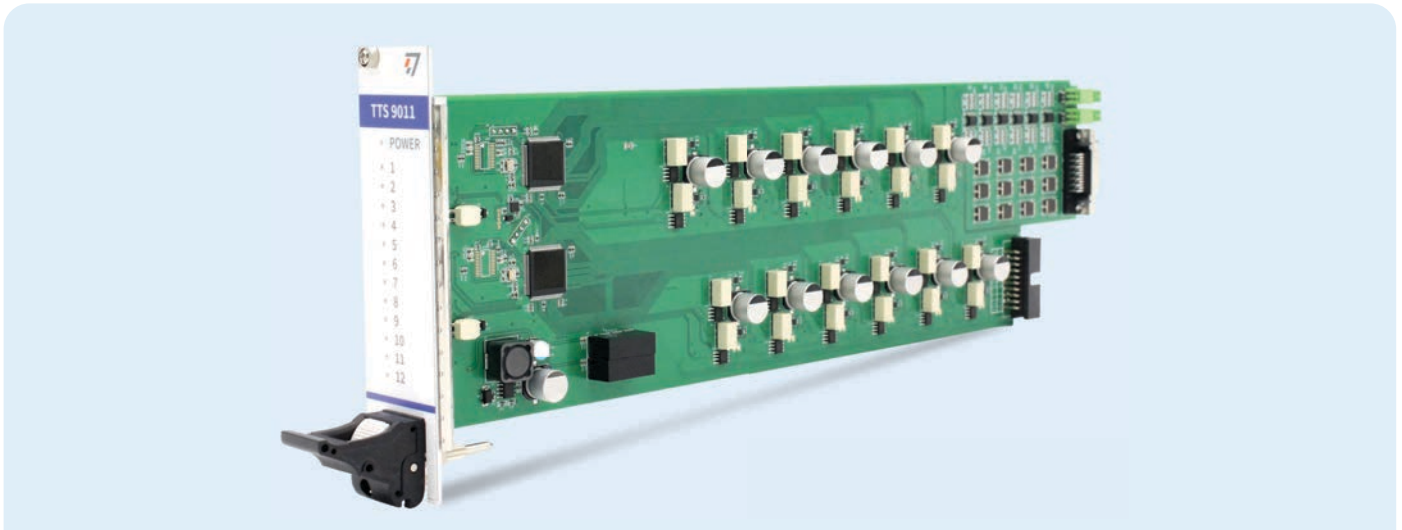- Desktop-level network automation test system

Ordering information

TTS0001	Chassis with 12 slots
TTS9011	12 channels digital input/output board, CAN communication
TTS9021	3 channels digital CAN bus fault injection board, CAN communication
TTS9015	8 channels analog input/output board, CAN communication
TTS9036	5 channels programmable resistor (1 Ω step, 1 Ω ~ 4194303 Ω (4M)), CAN communication
TTS9045 [1]	16 channels relay board, CAN communication
TTS1018 [2]	11 channels CAN FD/CAN bus board, USB control
TTS1026P [2]	6 channels LIN, 1 channel CAN FD/CAN bus board, USB control
TTS1034 [2]	2 channels FlexRay, 1 channel CAN FD/CAN bus board, USB control

1: Parameters to be added
2: Parameters consistent with TC1018, TC1026P, TC1034

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1. Digital I/O Board TTS9011

Feature Overview

TTS9011 is a 12 channel digital input/output board based on the TTS chassis, specifically designed for integration with the TTS chassis. Each channel supports high and low level output and acquisition, PWM output and acquisition, and when operating in output mode, it also supports output feedback functionality. This board is controlled via CAN bus messages, with a bus rate of 1 Mbps. It supports secondary program development on Windows and Linux systems. The API interface allows for easy integration of the device into other equipment or software systems.

Specification

Basic Parameters

Channel	12 channels (shared input/output)
Operating Voltage / Power Consumption	12V / 2W
Operating Temperature	-20ºC to +70ºC
Operating Humidity	10% to 90% (non-condensing)
Communication Control	CAN 1 Mbit/s
Installation Method	TTS chassis rail
Dimensional	100 mm x 420 mm
Indicator Lights	12V power indicator, channel operational indicators x 12

Input Function Parameters

Channel	12 channels
Input Voltage Range	0 ~ 60V; Input threshold voltage threshold; 0 ~ 60V (globally adjustable)
Input Impedance	≥ 200KΩ
Input Signal Type	Level / PWM
PWM Measurement	Frequency: 0.03Hz ~ 250KHz; Duty Cycle: 0% ~ 100%
Accuracy	100kHz ~ 200kHz, relative error ≤ ±5%; 0.03Hz ~ 100kHz, relative error ≤ ±2.5%
Voltage Level Measurement	Determined by input threshold voltage threshold

Output Function Parameters

Channel	12 channels (shared input/output)
Output Voltage Range	0 ~ 60V (external power supply, adjustable)
Output Current Range	0mA ~ 1A
PWM Output	Frequency range: 0.03Hz ~ 200kHz; Duty cycle range: 0% ~ 100%
Push-Pull Output Accuracy Requirements	Accuracy at 100kHz ~ 200kHz: ≤ ±2%; Accuracy at 0.03Hz ~ 100kHz: ≤ ±1%
High/Low Level Output	High-level voltage can be adjusted by external reference voltage
Output Format	Push / Pull / Push + Pull (adjustable)

*Single: PWM output rising and falling edge time is 680ns.

2. Resistor Board TTS9036

Feature Overview

TTS9036 is a 5 channel resistor matrix board based on the TTS chassis, specifically designed for integration with the TTS chassis. It is controlled via CAN bus messages with a bus rate of 1 Mbps. The board supports secondary program development on Windows and Linux systems. The API interface allows for easy integration of the device into other equipment or software systems.

Specification

Basic Parameters

Channels	5 channels
Operating Voltage/ Power Consumption	12V / 2W
Operating Temperature	-20°C to +70°C
Operating Humidity	10% to 90% (non-condensing)
Communication Control	CAN 1 Mbit/s
Mounting Method	TTS chassis rail
Dimensions	100 mm x 420 mm
Indicator Lights	12V power indicator, channel operational indicators x 12

Resistance Output Range	1Ω~4194303Ω
Step Value	1Ω
Resistance Accuracy (% of Value + Offset)	1Ω~127Ω, ±2Ω
	127Ω~1023Ω, ±1%
	1023Ω~4194303Ω, ±0.1%
Channel Voltage	-40V~40V
Protection Range	
Current Range	-100mA~100mA
Resistance Power	1/4W

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3. Fault Injection Board TTS9021

Feature Overview

The TTS9021 is a 3 channel digital I/O + 1 channel CAN bus fault injection board based on the TTS chassis, designed for integration with the TTS chassis. It operates on CAN bus message control at a bus rate of 1 Mbps. The board supports secondary program development on Windows and Linux systems. Its API interface facilitates easy integration of the device into other equipment or software systems.

Specification

Basic Parameters

|	
Channel	3 + 1 channels
Operating Voltage / Power Consumption	12V / 0.8W
Operating Temperature	–20℃ to +70℃
Operating Humidity	10% to 90% (non-condensing)
Communication Control	CAN 1 Mbit/s
Installation Method	TTS chassis rail
Dimensions	100mm x 420mm
Indicator Lights	12V power indicator, channel operational indicators x 6

Fault Function Parameters

Normal Channel (X1-Y1, X2-Y2, X3-Y3)	Short circuit to power supply Vbat
	Short circuit to ground VGND
	Short circuit between channels
	Open circuit in channels
CAN Channel (CANH, CANL, CAN, GND)	Short circuit to power supply Vbat
	Short circuit to ground VGND
	Short circuit between channels
	Open circuit in channels
	CAN signal with load resistor

Fault Power Supply Parameters

Input Channel	2 channels
Input Voltage/ Current Range	0 ~ 24V / 0 ~ 6A (external power)

4. Analog Board TTS9015
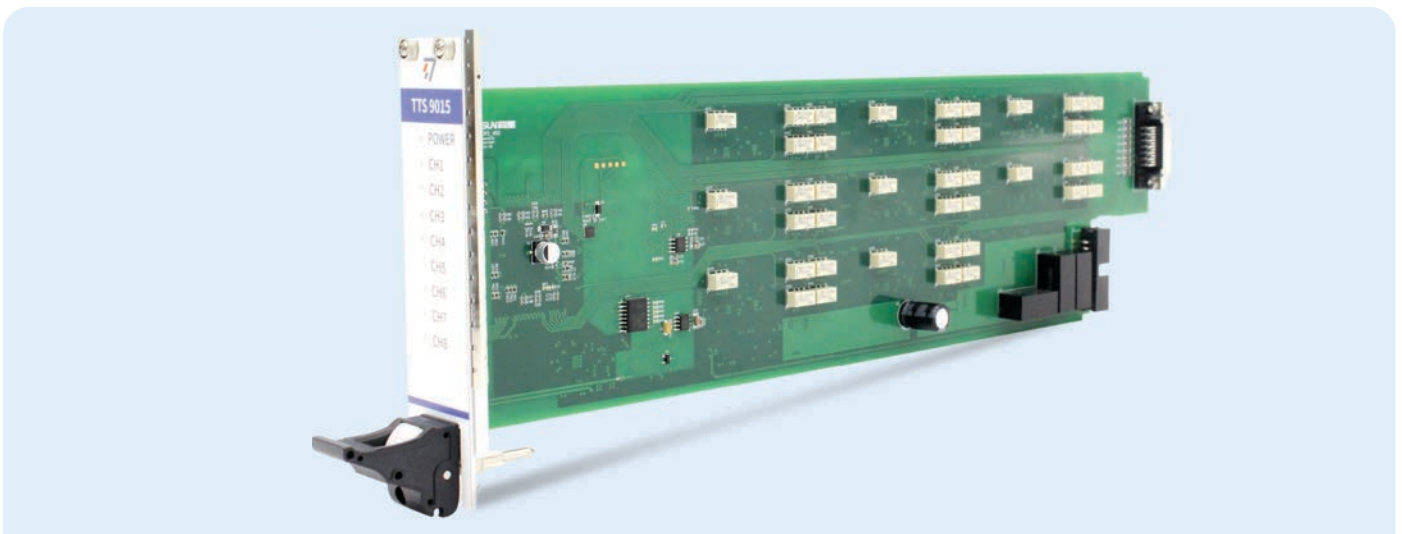
Feature Overview

TTS9015 AIAO board is a versatile analog input/output acquisition board designed for integration into TTS chassis. It utilizes CAN bus communication, enabling seamless integration with other devices or software systems. The board features 8 independent channels, each supporting voltage input, voltage output, current input, and current output functionalities. In voltage output mode, it also supports voltage sourcing functionality.

Specification

Basic Parameters

Power Supply	12V / 6W (idle)
Communication Interface	CAN 1 Mbit/s
Indicator Lights	Power indicator light, channel operational indicator lights x 8

Current Sensing

Channel	8 Channels
Measurement Range	0mA ~ 25mA
Sampling Rate	250Hz
Reporting Rate	1 KHz
Accurac	± 1 mA

Current Output

Channels	8 Channels
Output Range	0mA ~ 25mA
Accuracy	± 1 mA

Voltage Sensing

Channel	8 Channels
Measurement Range	−60V ~ + 60V , 0V ~ + 60V
Sampling Rate / ADC	250KHz
Resolution	20 bit
Accuracy	± (0.4% + 60mV)
Input Impedance	300KΩ

Voltage Output

Channel	8 channels
Output Range	0V ~ +60V
DAC Resolution	16-bit
Accuracy	± (0.4% + 60mV)

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