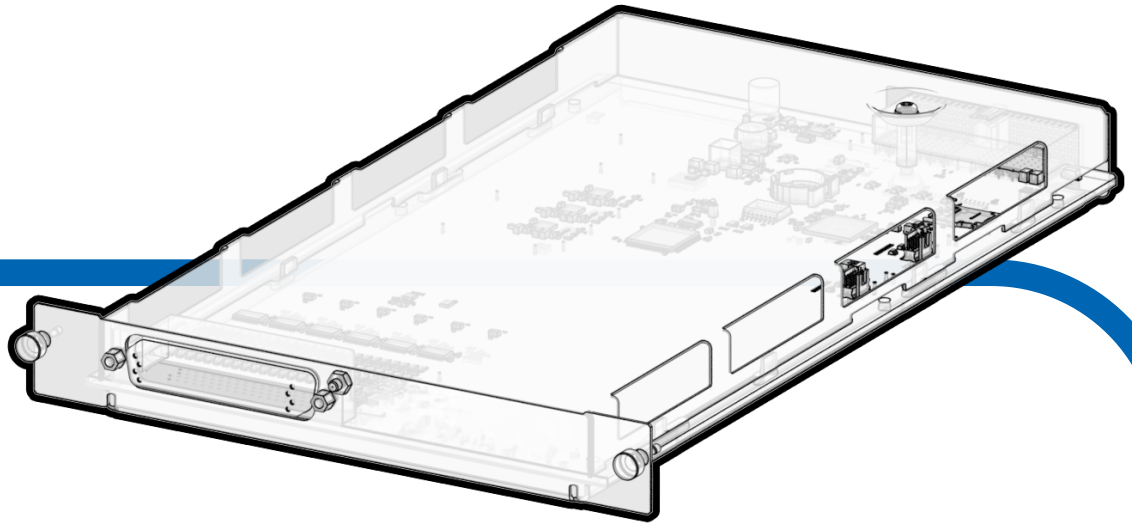
Datasheet



DE2111

Digital I/O Module

48 Bit

DEICO

www.deico.com.tr

Contents

1. Description

DE2111 is a high-density, fully integrated digital I/O system designed for demanding test and control applications. This system provides 48 bidirectional digital I/O channels, which are routed to the rear panel through a single high-density DB-78 connector. The module's core feature is its flexible digital interface, which supports multiple logic families through programmable voltage thresholds on all channels.

1.1. Key Features

Connectivity

- Standard 10/100 base-t ethernet interface
- USB 1.1 full-speed interface (12 Mb/s)

Robustness and Reliability

- Fully protected digital I/O lines
- MTBF (Mean Time Between Failures) exceeding 150,000 hours
- ESD (Electrostatic Discharge) protection up to 7 kV

Operational Flexibility

- Supports PC-based, standalone, or embedded controller operation
- LXI Class C compliant for seamless system integration

Standards and Compliance

- The DE2111 is fully compliant with the following standards for safety, emissions, and immunity:
  - Environmental: IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-27, IEC 60068-2-64, IEC 60068-2-78
  - EMC/EMI: EN 61326, EN 55011 (CISPR 11), AS/NZS CISPR 11, FCC 47 CFR Part 15B, ICES-001

Typical Applications

The DE2111 is ideal for a wide range of demanding applications, including:

- Automated Test Equipment (ATE)
- Hardware-in-the-Loop (HIL) simulation
- Functional test systems
- Digital pattern generation and response capture
- Process control and industrial automation

1.1.1. Digital I/O

Features a high-speed, flexible digital I/O system designed for hardware-timed control and digital device testing.

Performance

- Data rate: up to 420 Mb/s
- Timing: precision hardware-timed control

Architecture

- Provides 6 bidirectional digital channels, with each channel consisting of 8 bit (48 bit total).
- Each channel's direction (input or output) is independently configurable.

Programmable Logic Levels:

- The core feature is the programmable voltage thresholds, adjustable from 1.1 V to 5.25 V.
- This allows the module to directly interface with various logic families (e.g., TTL, CMOS, LVCMOS) without external level-shifting circuitry.
- Enables precise characterization of a Device Under Test's (DUT) input voltage thresholds (VIL, VIH), as illustrated in Figure 1.

Input/Output Characteristics:

- Input buffers: all inputs feature Schmitt-trigger buffers for high noise immunity and reliable operation with slow-slewing or noisy signals.
- Supported states: supports logic low (0), logic high (1), and high-impedance (Tri-state, Z) for advanced waveform generation and bus simulation.
- Output drive capacity: 32 mA per channel.
- Current clamping: ±50 mA per channel.

The programmable input (VIH, VIL) and output (VOH, VOL) voltage levels allow the DE2111 to interface directly with a wide range of devices.

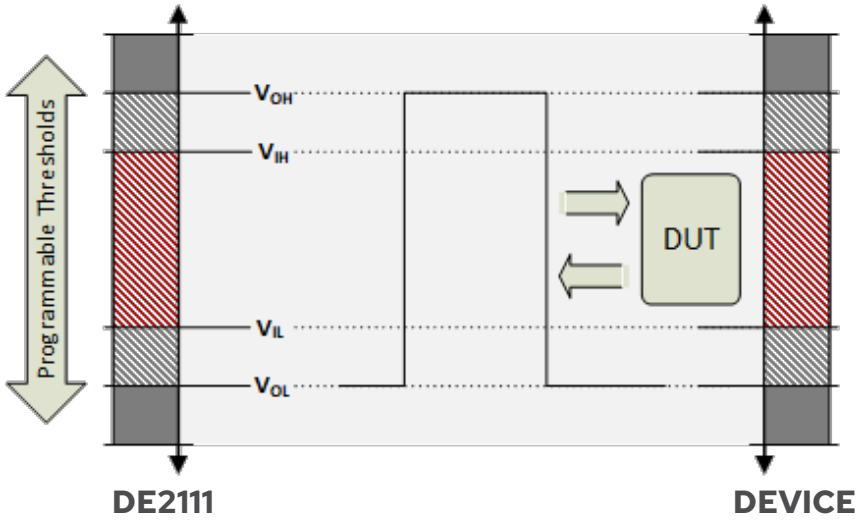


Figure 1 : Flexible Digital I/O Interface with Programmable Thresholds

2. Hardware Overview

2.1. Circuitry

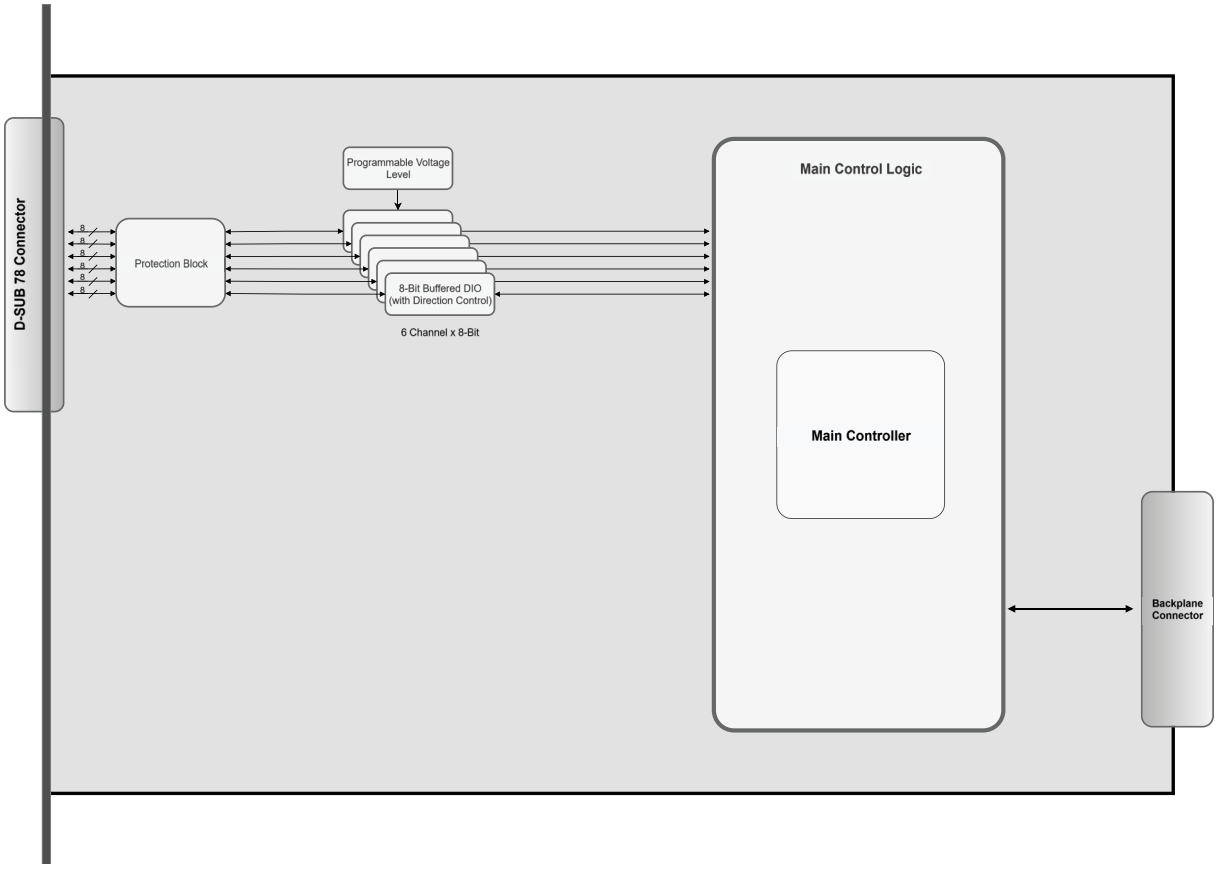


Figure 2: DE2111 Functional Block Diagram

2.2. Hardware Specifications

2.2.1. Electrical

Table 1: Electrical Specifications

Specification	Description
Input Voltage	+24 V DC (from backplane)
Power Consumption	Typical: 2.5 W Maximum: 8 W

Table 2: Digital IO

Specification	Description
Threshold Voltage Accuracy	±10 mV (over 0 V to 5.25 V DC)
Total Number of Bits	48 (6 Channel x 8 bit)
Number of Channels	6
Width per Channel	8 bit
Direction Control	Per-channel, independently configurable
Maximum Data Rate	420 Mb/s
Drive Capacity (per channel)	±32 mA (continuous)
Input Voltage Thresholds	Programmable, 0 V to 5.25 V
Output Voltage Levels	Programmable, 1.1 V to 5.25 V (supports open-drain configuration)
ESD Protection	±7 kV (human body model)
Current Clamping	±50 mA
Output Type	Tri-state, non-inverted
Input Type	Schmitt-trigger inputs allow for slow or noisy inputs

2.2.2. Physical

Table 3: Physical Specifications

Specification	Description
Dimensions (L x W x H)	281.5 mm x 180.1 mm x 25.7 mm
Weight	2 kg (typical)
Front Panel Connectors	1x D-SUB 78 (HARTING P/N: 09565527613)

2.2.3. Environmental

Table 4: Environmental Specifications

Specification	Condition	Value
Operating Humidity	Relative, non-condensing	10% - 90%
Storage Humidity	Relative, non-condensing	5% - 95%
Operating Temperature*	Forced-air cooling from chassis	0 °C to 55 °C
Storage Temperature	N/A (Not Applicable)	-40 °C to 71 °C

** The specified operating temperature range is only guaranteed when the module is installed in a chassis that provides adequate forced-air cooling.*

3. Software Overview

This module is compatible with IVISwtch class.

4. Signal Connections

This diagram outlines the integrated I/O architecture of the DE2111. On the digital side, the 48 I/O lines are grouped into six 8-bit “Channels” for ease of programming. On the analog side, the 32 single-ended / 16 differential inputs are managed by two 18-bit ADCs, while the 16 analog outputs are generated by two 16-bit DACs. This parallel and modular architecture ensures maximum flexibility and performance for both high-density digital testing and precision analog measurement and signal generation.

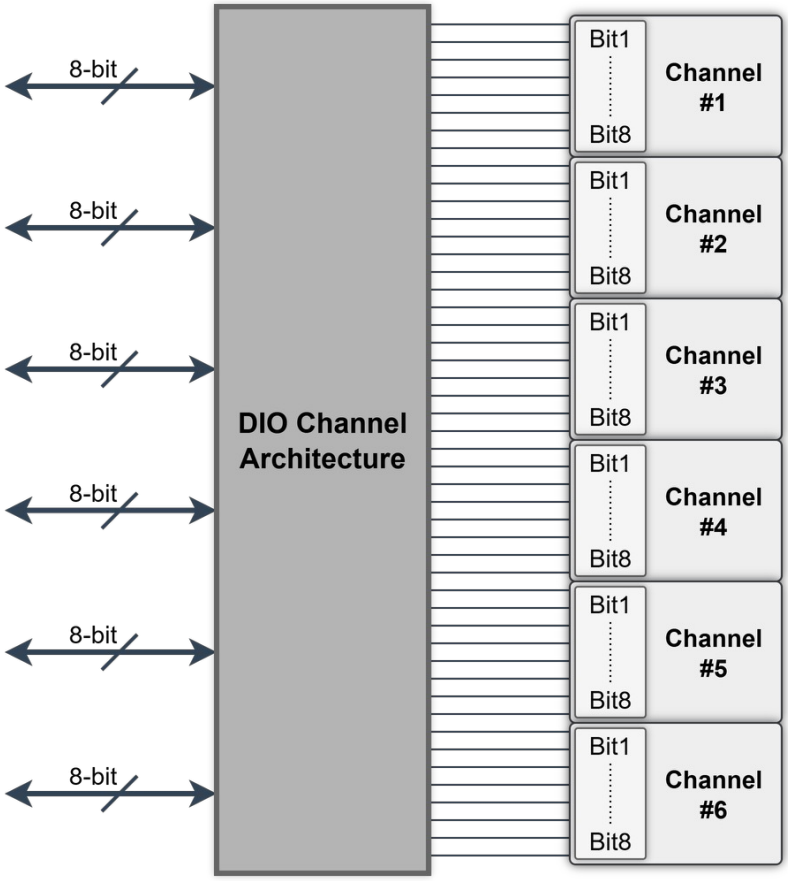


Figure 3 : DE2111 I/O Channel Architecture

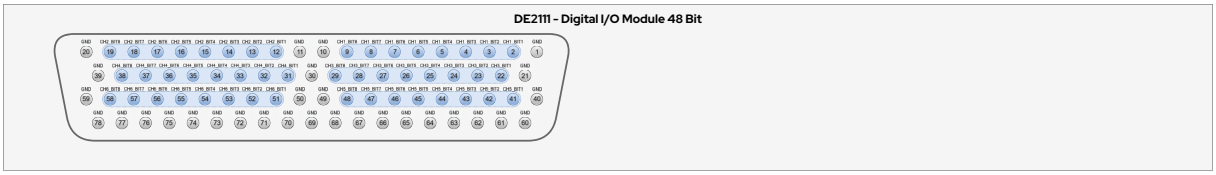


Figure 4 : Module Front Panel Connectors

4.1. Digital I/O Connector (DB-78)

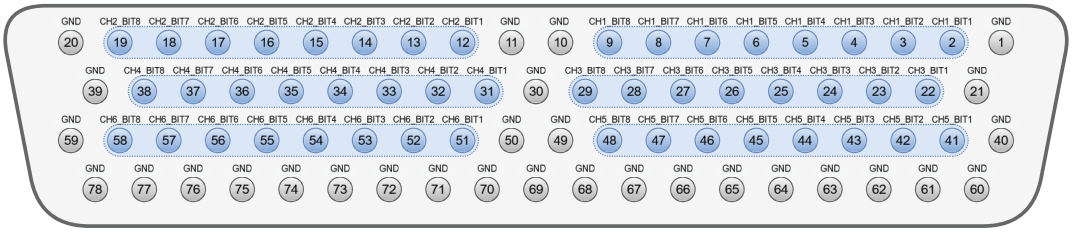


Figure 6 : Digital I/O Connector Pinout (DB-78, Female)

Table 5: Digital I/O Connector Pin Assignments

Description		Pin	Description		Pin	Description		Pin	Description	Pin	Description	Pin
CH1	BIT1	2	CH3	BIT1	22	CH5	BIT1	41	GND	1	GND	65
	BIT2	3		BIT2	23		BIT2	42		10		66
	BIT3	4		BIT3	24		BIT3	43		11		67
	BIT4	5		BIT4	25		BIT4	44		20		68
	BIT5	6		BIT5	26		BIT5	45		21		69
	BIT6	7		BIT6	27		BIT6	46		30		70
	BIT7	8		BIT7	28		BIT7	47		39		71
	BIT8	9		BIT8	29		BIT8	48		40		72
CH2	BIT1	12	CH4	BIT1	31	CH6	BIT1	51		49		73
	BIT2	13		BIT2	32		BIT2	52		50		74
	BIT3	14		BIT3	33		BIT3	53		59		75
	BIT4	15		BIT4	34		BIT4	54		60		76
	BIT5	16		BIT5	35		BIT5	55		61		77
	BIT6	17		BIT6	36		BIT6	56		62		78
	BIT7	18		BIT7	37		BIT7	57		63		
	BIT8	19		BIT8	38		BIT8	58		64		

5. Safety Guidelines

Caution

The DE2111 shall not be operated in any manner not specified in this document. Misuse of the product may result in a hazard. Safety protection features may be compromised if the product is damaged. In the event of damage, the product shall be returned for repair.

6. Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC). These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, if the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions specified in the product documentation.

Furthermore, any changes or modifications to the product not expressly approved by DEICO could void your authority to operate it under your local regulatory rules.

Caution

To ensure the specified EMC performance, the product shall be operated only with shielded cables and accessories.

Caution

To ensure the specified EMC performance, the length of any cable attached to the front connectors shall not exceed 3 m (10 ft.).

7. Supporting Products & Software

DE2111 should be used with Switching and DAQ Mainframe 8 Slot (DE2000) or Single Module Mainframe (DE2001).

Note

When the DE2111 is used with the DE2001, the ethernet speed shall be limited to 100 Mb/s.

Caution

The DE2111 shall not be operated without the DE2000 or DE2001. No connections shall be made to the rear panel connector.