VB-8054

2022-07-08

Contents

VB-8054 Specifications

Definitions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

Characteristics describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- **Typical** specifications describe the expected performance met by a majority of the models.
- **Nominal** specifications describe parameters and attributes that may be useful in operation.

Conditions

Typical specifications are valid under the following conditions unless otherwise noted:

- 25 °C
- 30-minute warm-up time before operation

Warranted specifications are valid at T_{cal} ±5 °C. Temperature coefficients are calculated using the temperature change from last external calibration.

Mixed Signal Oscilloscope

Analog Channels

Vertical System

Number of channels	4 single-ended, non-isolated

Bandwidth (-3 dB)[1]	500 MHz
Resolution	8 bits
Accuracy (warranted)	±2% of input ±1% full scale (V peak-to-peak)
Input coupling	DC, AC
Vertical sensitivity (range)	5 mV/div (40 mV peak-to-peak) 10 mV/div (100 mV peak-to-peak) 20 mV/div (200 mV peak-to-peak) 50 mV/div (400 mV peak-to-peak) 100 mV/div (1 V peak-to-peak) 200 mV/div (2 V peak-to-peak) 500 mV/div (4 V peak-to-peak) 1 V/div (10 V peak-to-peak) 2 V/div (20 V peak-to-peak) 5 V/div (40 V peak-to-peak)
Input impedance (user selectable)	1 MΩ || 12 pF or 50 Ω[2]

Range	Programmable Offset Range
5 mV/div, 10 mV/div, 20 mV/div, 50 mV/div	±5 V
100 mV/div, 200 mV/div, 500 mV/div,	±20 V

Range	Programmable Offset Range
1 V/div, 2 V/div, 5 V/div	

Table 1. DC Offset Range

Acquisition modes	Sample, peak detect, averaging

Horizontal System

Maximum sample rate	2 GS/s/channel
Maximum record length	1 MS/channel

Digital Channels/Logic Analyzer

Vertical System

Number of channels	34
Maximum input frequency	100 MHz
Input voltage	0 V to 5 V
Input current	≤50 µA

Note Mixed signal oscilloscope digital channels are designed to withstand accidental overvoltage from signals on the VB-8054 or similar devices. They are not recommended for use with signals likely to exceed 0 V to 5 V in normal operation.

Input threshold	Programmable, 0 V to 2.0 V

Threshold accuracy	350 mV
Input impedance	100 kΩ || 7.5 pF pulled to -2.0 V to +6.5 V, varies with the input threshold setting
Additional/internal channels	Digital I/O lines, function generator start, external trigger (TRIG), power line frequency

Horizontal System

Timing mode sample rate (warranted)	1 GS/s (down to ~15 kS/s)
Maximum external sample clock rate	100 MHz
Record length	
Typical	1 MS
Minimum[3]	4 kS
Decimation	External Sample Clock, 1:1, 2:1, and n*4:1 where n is an integer
Maximum sample compression	2^{15} to 1

Triggering

Trigger modes	Normal, Auto, Force, Single[4]
Trigger sources	Oscilloscope analog channels, oscilloscope digital channels, function generator start, digital I/O lines, external trigger (TRIG), power line frequency

Trigger types	
Analog	Edge with hysteresis, pulse width
Digital	Edge, pulse width, pattern, glitch[5]

Trigger resolution	
Analog/oscilloscope	500 ps
Digital/logic analyzer	1 ns
Trigger export	Available through external trigger (TRIG)

Waveform Measurements

Oscilloscope time[6]	Period, frequency, positive duty cycle, negative duty cycle, positive pulse width, negative pulse width, rise time, fall time, rise rate, fall rate
Oscilloscope voltage[6]	High, low, amplitude, maximum, minimum, peak-to-peak, overshoot, undershoot, RMS, mean, cycle RMS, cycle mean
Logic analyzer time[6]	Period, frequency, positive duty cycle, negative duty cycle, positive pulse width, negative pulse width

Waveform Math

Operations[7]	A + B, A - B, A * B, A/B, FFT

Function Generator (FGEN)

Waveforms	Sine, square, ramp/triangle, DC, arbitrary
Update rate	200 MS/s
Resolution	14 bits
Number of channels	1
Output impedance	50 Ω
Switchable filter[8]	71 MHz lowpass, 7-pole, elliptical

Sine

Maximum frequency	40 MHz

Total Harmonic Distortion (THD)

1 MHz	-55 dBc
10 MHz	-50 dBc

Spurious Free Dynamic Range (SFDR)	-70 dB at 1 MHz (non-harmonic)
Phase noise (1 MHz)	-125 dBc/Hz at 10 kHz offset

Square

Maximum frequency	5 MHz
Rise/fall time	<20 ns (10% to 90%)

Overshoot	<5%
Jitter	5 ns cycle-to-cycle

Ramp/triangle maximum frequency	1 MHz

Accuracy (with >10 kΩ load)

Amplitude (1 kHz sine)	±(1% of output value ± 5 mV)
DC	±(1% of output value ± 5 mV)

Output range

50 Ω	±6 V
Hi-Z (>10 kΩ)	±12 V

DC offset

50 Ω	±6 V
Hi-Z (>10 kΩ)	±12 V

Note The combination of signal amplitude and DC offset cannot exceed the output range specifications. The impedances listed are the loads applied by the user to the FGEN output.

Frequency

Accuracy	≤100 ppm
Resolution	1 µHz

Arbitrary waveform	
Points	1 MS
Sample rate	200 MS/s
Flatness	±0.3 dB to 40 MHz
Protection	Short-circuit protected

Triggering

Trigger types	Start of buffer[9]
Trigger resolution	5 ns
Trigger export	Available through external trigger (TRIG)

Digital I/O

Number of channels	8
Direction control	Input or output, software-selectable
Logic level	5 V compatible TTL input, 3.3 V LVTTL output
Drive strength	4 mA
Input voltage	0 V to 5 V

Note Digital I/O lines are designed to withstand accidental overvoltage from signals on the VB-8054 or similar devices. They are not recommended for use with signals likely to exceed 0 V to 5 V in normal operation.

DIO channel pull resistors	
dig/<0..5>	10 kΩ, pull-down to 0 V
dig/<6,7>	10 kΩ, pull-down to 0 V (default) or 1.5 kΩ, configurable pull-up to 3.3 V

External Power

3.3 V output	
Voltage	3.3 V ±10%
Current	20 mA

Digital Multimeter

Functions	DC voltage, AC voltage, DC current, AC current, resistance, diode, continuity[10]
Resolution	5½ digits
Sample rate	5 S/s

Caution Do not use this device for connection to signals or for measurements within Measurement Categories III or IV. For more information about Measurement Categories, refer to the Safety Voltages section.

Input protection	
Resistance, diode	Up to 300 V DC
DC and AC voltage	Up to 300 V DC or 265 V AC RMS, 400 V AC peak
DC and AC current	
DMM A current connector fuse	Internal ceramic fuse, 11 A, 1 kV AC, 10.3 × 38 mm, F 11A 1000V (SIBA part number 5019906.11 at www.siba-fuses.com)
DMM mA current connector fuse	Internal ceramic fuse, 1 A, 500 V AC, 5 × 20 mm, T 1A H 400V (Littelfuse part number 0477001.MXP at www.littelfuse.com)

Caution Fuses are located on bottom of device underneath door. Use Phillips #1 screwdriver for removal. Ensure all hazardous voltages are disconnected from the device prior to removal of door.

Fuse When this fuse symbol is marked on a device, take proper precautions.

Maximum common-mode voltage	300 V DC or AC RMS

DC

Range	Input Impedance	1-Year Accuracy ± (% of Reading + % of Range) (warranted)	Temperature Coefficient ± (% of Reading + % of Range)/°C (warranted)
100 mV*	>10 GΩ, 10 MΩ	0.015 + 0.005	0.001 + 0.0005
1 V	>10 GΩ, 10 MΩ	0.015 + 0.005	0.001 + 0.0005
10 V	>10 GΩ, 10 MΩ	0.015 + 0.005	0.001 + 0.0005
100 V	10 MΩ	0.035 + 0.005	0.005 + 0.0005
300 V	10 MΩ	0.035 + 0.005	0.005 + 0.0005

Range	Input Impedance	1-Year Accuracy ± (% of Reading + % of Range) (warranted)	Temperature Coefficient ± (% of Reading + % of Range)/°C (warranted)
* Add 15 µV if not immediately following offset null.			

Table 5. DC Voltage Accuracy

Range	Burden Voltage	1-Year Accuracy ± (% of Reading + % of Range) (warranted)	Temperature Coefficient ± (% of Reading + % of Range)/°C (warranted)
10 mA	<0.03 V	0.070 + 0.020	0.0035 + 0.0010
100 mA	<0.3 V	0.070 + 0.003	0.0020 + 0.0010
1 A	<0.03 V	0.130 + 0.025	0.0065 + 0.0010
10 A*	<0.3 V	0.130 + 0.004	0.0045 + 0.0010
* 30 seconds on, 30 seconds off. Add 300 ppm/A for currents >2.2 A. After measuring >5 A, wait two minutes to get full accuracy in the 1 A range.			

Table 9. DC Current Accuracy

Range	Short-Circuit Current	1-Year Accuracy ± (% of Reading + % of Range) (warranted)	Temperature Coefficient ± (% of Reading + % of Range)/°C (warranted)
100 Ω	170 µA	0.018 + 0.050	0.0010 + 0.0005
1 kΩ	170 µA	0.018 + 0.005	0.0010 + 0.0005
10 kΩ	70 µA	0.018 + 0.005	0.0010 + 0.0005
100 kΩ	10 µA	0.018 + 0.005	0.0010 + 0.0005
1 MΩ	1.1 µA	0.035 + 0.005	0.0040 + 0.0005
10 MΩ	1.1 µA	0.150 + 0.005	0.0100 + 0.0005
100 MΩ	1.1 µA	1.3 + 0.005	0.1000 + 0.0005
* Perform offset nulling.			

Table 4. DC Resistance Accuracy (2-Wire)*, 1 V Open Circuit Voltage

Caution The input terminals of the DMM are not protected for electromagnetic interference. As a result, the DMM may experience reduced measurement accuracy or other temporary performance

> degradation when connected to unshielded test leads in an environment with radiated or conducted radio frequency electromagnetic interference.

DC continuity accuracy range[11]	100 Ω
DC diode test range	2 V
Effective Common-Mode Rejection Ratio (CMRR), 1 kΩ resistance in LO lead	>100 dB
Normal-Mode Rejection Ratio (NMRR), 50/60 Hz ±0.1%	>100 dB
Overrange	105% of range except 300 V

AC

Range (rms)	Peak Voltage	Frequency	1-Year Accuracy ± (% of Reading + % of Range) (warranted)	Temperature Coefficient ± (% of Reading + % of Range)/°C (warranted)
100 mV, 1 V, 10 V, 100 V, 265 V	±210 mV, ±2.1 V, ±21 V, ±210 V, ±400 V	20 Hz to 45 Hz	0.91 + 0.10	0.01 + 0.005
		45 Hz to 65 Hz	0.30 + 0.05	0.01 + 0.005
		65 Hz to 1 kHz	0.21 + 0.05	0.01 + 0.005
		1 kHz to 5 kHz	0.12 + 0.05	0.01 + 0.005
		5 kHz to 20 kHz	0.35 + 0.05	0.01 + 0.005

Table 5. AC Voltage Accuracy

Range (rms)	Peak Current	Burden Voltage (rms)	Frequency	1-Year Accuracy ± (% of Reading + % of Range) (warranted)	Temperature Coefficient ± (% of Reading + % of Range)/°C (warranted)
5 mA	±10.5 mA	<0.02 V	20 Hz to 1 kHz	0.20 + 0.01	0.01 + 0.005
			1 kHz to 5 kHz	0.60 + 0.01	

Range (rms)	Peak Current	Burden Voltage (rms)	Frequency	1-Year Accuracy ± (% of Reading + % of Range) (warranted)	Temperature Coefficient ± (% of Reading + % of Range)/°C (warranted)
50 mA	±105 mA	<0.2 V	20 Hz to 1 kHz	0.20 + 0.01	0.01 + 0.005
			1 kHz to 5 kHz	0.50 + 0.01	
500 mA	±1.05 A	<0.02 V	20 Hz to 1 kHz	0.15 + 0.01	0.01 + 0.005
			1 kHz to 5 kHz	0.50 + 0.01	
5 A	±10.5 A	<0.2 V	20 Hz to 1 kHz	0.25 + 0.03	0.01 + 0.005
			1 kHz to 5 kHz	0.60 + 0.03	

Table 9. AC Current Accuracy

Caution The input terminals of the DMM are not protected for electromagnetic interference. As a result, the DMM may experience reduced measurement accuracy or other temporary performance degradation when connected to unshielded test leads in an environment with radiated or conducted radio frequency electromagnetic interference.

Input impedance	10 MΩ || 200 pF
CMRR, 1 kΩ resistance in LO lead	>70 dB (DC to 60 Hz)

DC Power Supply

Outputs	0 V to +6 V/0 A to 3 A, 0 V to +25 V/0 A to 1 A (isolated), 0 V to -25 V/0 A to 1 A (isolated)

Note The +25 V and -25 V channels are bank isolated from ground but not from each other.

Output	Type	+6 V	+25 V	-25 V
DC output (warranted)	Voltage	0 V to +6 V	0 V to +25 V	0 V to -25 V
	Current[12]	3 A	1 A	1 A
Programming accuracy[12] ± (% of reading + offset) (warranted)	Voltage	0.1% + 5 mV	0.1% + 20 mV	0.1% + 20 mV
	Current	0.2% + 10 mA	0.15% + 4 mA	0.15% + 4 mA
Readback accuracy[13] ± (% of reading + offset) (warranted)	Voltage	0.1% + 5 mV	0.1% + 20 mV	0.1% + 20 mV
	Current	0.2% + 10 mA	0.15% + 4 mA	0.15% + 4 mA
Programming resolution	Voltage	1.6 mV	6.6 mV	6.6 mV
	Current	0.90 mA	0.30 mA	0.30 mA
Readback resolution	Voltage	0.40 mV	1.7 mV	1.7 mV
	Current	210 µA	70 µA	70 µA
Load regulation[14] ± (% of reading + offset)	Voltage	0.01% + 25 mV	0.03% + 5 mV	0.03% + 5 mV

Table 9. DC Accuracy/Resolution

Overvoltage protection	30 V (all channels)
Reverse voltage protection	Reverse clamp diode, protected by self-resetting fuse

External Trigger (TRIG)

Direction control	Input or output, software-selectable
Logic level	5 V compatible TTL input, 3.3 V LVTTL output
Drive strength	4 mA
Input voltage	0 V to 5 V

Note The external trigger line is designed to withstand accidental overvoltage from signals on the VB-8054 or similar devices. It is not

recommended for use with signals likely to exceed 0 V to 5 V in normal operation.

Connectivity

Wired USB Interface

USB specification	USB 2.0 Hi-Speed

Wired Ethernet Interface

Network interface	1000 Base-TX, full-duplex; 100 Base-TX, full-duplex; 100 Base-TX, half-duplex; 10 Base-T, full-duplex; 10 Base-T, half-duplex
Communication rates	10/100/1000 Mbps, auto-negotiated
Maximum cabling distance	100 m/segment
Network IP configuration	IPv4, DHCP Client

Port	Protocol	Function
Port 80/TCP	HTTP	Device configuration (web, MAX)
Port 443/TCP	HTTP	Device configuration (web, MAX)
Port 3580/TCP	Service locator	Device configuration (web, MAX)
Port 9090/TCP	Configuration only	VirtualBench instrument protocol
Port 5353/UDP	Multicast DNS	Device discovery

Table 9. Network Protocols and Ports Used

Wireless Interface

Port	Protocol	Function
Port 80/TCP	HTTP	Device configuration (web, MAX)

Port	Protocol	Function
Port 443/TCP	HTTP	Device configuration (web, MAX)
Port 3580/TCP	Service locator	Device configuration (web, MAX)
Port 9090/TCP	Configuration only	VirtualBench instrument protocol
Port 5353/UDP	Multicast DNS	Device discovery

Table 9. Network Protocols and Ports Used

Network IP configuration	IPv4, DHCP Client/Server
Radio mode	IEEE 802.11 b,g,n
Wireless modes	AP mode (default), client mode
Frequency band	2.4 GHz ISM
Channel width	20 MHz
Channels	USA 1-11, International 1-13 (12 and 13 client mode only)
TX power	+10 dBm maximum (10 mW)
Security	Open, WPA, WPA2, WPA2-Enterprise
Enterprise security EAP types	EAP-TLS, EAP-TTLS/MS-CHAPv2, PEAPv0/MS-CHAPv2
Antenna	External RP-SMA omnidirectional dipole

Software Compatibility

For information about operating system support for Windows and iPad, go to ni.com/info and enter vbfeatures.

Power Requirements

Caution The protection provided by the VirtualBench hardware can be impaired if it is used in a manner not described in the **NI VirtualBench VB-8054 Safety, Environmental, and Regulatory Information**.

Voltage input range	100 V AC to 240 V AC, 50/60 Hz
Power consumption	150 W maximum
Power input connector	IEC C13 power connector
Power disconnect	The AC power cable provides main power disconnect. Do not position the equipment so that it is difficult to disconnect the power cable. Depressing the front panel power button does not inhibit the internal power supply.

Calibration

Calibration cycle (digital multimeter, mixed signal oscilloscope, function generator, DC power supply)	1 year
Specified temperature	T_{cal} ± 5 °C
Warmup time	30 minutes

Physical Characteristics

Dimensions	
Enclosure	30.48 cm × 20.32 cm × 9.40 cm (12.0 in. × 8.0 in. × 3.7 in.)

Enclosure with connectors and antenna	30.48 cm × 25.40 cm × 16.00 cm (12.0 in. × 10.0 in. × 6.3 in.)

Note Use the VirtualBench instrument in a horizontal orientation. Allow at least 10.16 cm (4.0 in.) of clearance in front, on the sides, and behind the VirtualBench instrument for airflow clearances, and USB, power, and common connector cabling.

Weight	3.130 kg (6 lb 4.4 oz)

Connectivity

Mixed signal oscilloscope	4, BNC
Logic analyzer	1, 2x20 shrouded IDC header
External trigger	1, BNC
Function generator	1, BNC

Digital I/O

Type	1, pluggable screw terminal, 3.5 mm (14 position)
Screw terminal wiring	0.1 mm^2 to 2.0 mm^2 (30 AWG to 14 AWG)
Torque	0.25 N · m (2.2 lb · in.)

Digital multimeter	4, 4 mm banana jacks
DC power supply	6, 4 mm binding posts

Security cable slot	1, complies with Kensington security slot dimensions

If you need to clean the device, wipe it with a dry towel.

Safety Voltages

Connect only voltages that are within these limits.

DMM Isolation Voltages

Hazardous Voltage This icon denotes a warning advising you to take precautions to avoid electrical shock.

Channel-to-earth ground	
Continuous	300 V, Measurement Category II
Withstand	3,000 V RMS, verified by a 5 s dielectric withstand test

Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system. This category refers to local-level electrical distribution, such as that provided by a standard wall outlet, for example, 115 V for U.S. or 230 V for Europe.

Caution Do not connect the VirtualBench hardware to signals or use for measurements within Measurement Categories III or IV.

DC Power Supply Isolation Voltages

+25 V and -25 V-to-earth ground, continuous	60 V DC, Measurement Category I

Note Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are for other circuits not intended for direct

> connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Environmental

Operating temperature	0 °C to 40 °C
Storage temperature	-20 °C to 70 °C
Operating humidity	10% to 90% RH, noncondensing DMM full accuracy at 10% to 80%
Storage humidity	5% to 95% RH, noncondensing
Cooling	Forced air circulation (negative pressurization) through a fan. Fan speed automatically adjusts according to operating conditions. Intake locations are on the sides of device. Exhaust location is on the rear of device. Ensure that the intake and exhaust locations are not obstructed.
Pollution Degree	2
Maximum altitude	2,000 m

Indoor use only.

Shock and Vibration

Operational shock	30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC 60068-2-27. Test profile developed in accordance with MIL-PRF-28800F.)

Random vibration

Operating 5 Hz to 500 Hz, 0.3 g_{rms}

Nonoperating	5 Hz to 500 Hz, 2.4 g_{rms} (Tested in accordance with IEC 60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Safety

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA C22.2 No. 61010-1

Note For UL and other safety certifications, refer to the product label or the Online Product Certification section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use; for radio equipment; and for telecommunication terminal equipment:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations.

In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.

Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.

Note For EMC declarations and certifications, and additional information, refer to the Online Product Certification section.

CE Compliance CE

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 2014/53/EU; Radio Equipment Directive (RED)

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the **Minimize Our Environmental Impact** web page at ni.com/environment. This page contains the

environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

> **EU Customers** At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit ni.com/environment/weee.

电子信息产品污染控制管理办法（中国 RoHS）

> **中国客户** National Instruments 符合中国电子信息产品中限制使用某些有害物质指令(RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 ni.com/environment/rohs_china。(For information about China RoHS compliance, go to ni.com/environment/rohs_china.)

[1] Bandwidth using 50 Ω mode or 1 MΩ mode with the accessory oscilloscope probe.

[2] Maximum voltage when using 50 Ω input mode is 5 V RMS. For a periodic waveform with frequency below 100 kHz, the maximum voltage is derated to 2.5 V RMS.

[3] Under most conditions, the logic analyzer can acquire 1 MS of data. Under some conditions with very high sustained activity on multiple inputs, the logic analyzer may only capture 4 kS of data.

[4] Single trigger mode is only available in the VirtualBench application. For feature differences between the VirtualBench application for Windows and iPad, go to ni.com/info and enter vbfeatures.

[5] Glitch triggers are only available with the NI VirtualBench driver.

[6] Waveform measurements are only available in the VirtualBench application.

[7] Waveform math is only available in the VirtualBench application.

[8] Switchable filters are only available with the NI VirtualBench driver. The VirtualBench application automatically enables the lowpass filter in sine mode.

[9] The function generator can only produce a trigger.

[10] Continuity is only available in the VirtualBench application.

[11] DC continuity is only available in the VirtualBench application.

[12] Minimum programmable current limit is 1% of range.

[13] Programming and readback accuracy specified at no load.

[14] Change in output voltage for any load within range.