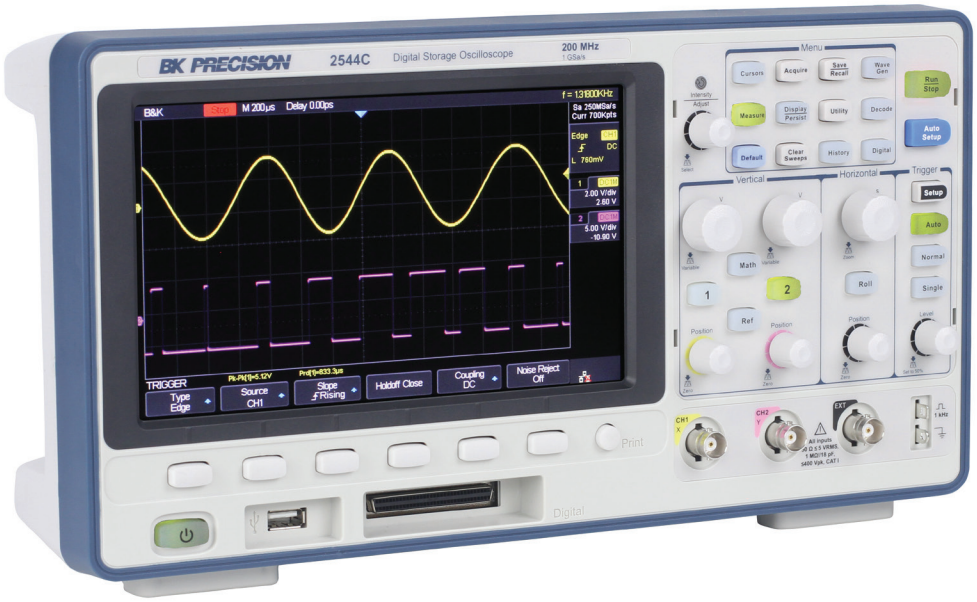
Data Sheet

Mixed Signal Oscilloscopes
2540C Series



The 2540C Digital Storage and Mixed Signal Oscilloscope (MSO) Series delivers advanced features and debug capabilities for a wide range of applications at an entry-level price point. With up to 200 MHz bandwidth in a 2-channel configuration, each model offers a maximum sample rate of 1 GSa/s, and a maximum memory depth of 14 Mpts. In addition, these oscilloscopes provide an 8" color display with 256 levels of color grading combined with a high waveform update rate up to 60,000 wfms/sec, which allows the instruments to capture infrequent glitches with excellent signal fidelity. The logic analyzer and decode software provides 16 additional digital channels and serial bus decoding for I²C, SPI, UART/RS232, CAN, and LIN protocols.

Maximize productivity using extensive features such as digital filtering, waveform recording, pass/fail limit testing, and automatic measurements. The built-in 25 MHz function/arbitrary waveform generator (AWG) comes standard with all models and provides stimulus output of 4 arbitrary waveforms, sine, square, ramp, pulse, DC, noise, cardiac, Gaussian pulse, and exponential rise/fall waveforms to the device under test.

The 2540C Series oscilloscopes are ideal for applications in design, education, service, and repair. This instrument offers a comprehensive set of tools to capture signal anomalies, decode serial bus protocols, and help speed up debug and analysis. The MSO and decoding functionalities are available for upgrade in the field with the purchase of a license key.

Model	2540C	2540C-MSO	2542C	2542C-MSO	2544C	2544C-MSO
Bandwidth	70 MHz		100 MHz		200 MHz	
Channels	2		2		2	
Digital Channels	Upgradeable	16	Upgradeable	16	Upgradeable	16

Features & Benefits

- Bandwidth up to 200 MHz
- 1 GSa/s maximum sample rate
- 14 Mpts maximum record length
- 16 digital channels with logic analyzer (MSO upgrade)
- Serial bus decoding supporting I²C, SPI, UART/RS232, CAN, and LIN protocols (Decode upgrade)
- Built-in Function and Arbitrary Waveform Generator comes standard on all models
- Large 8" widescreen display with 256-level color gradient
- 60,000 wfms/s maximum waveform capture rate
- Compact footprint and lightweight
- High speed hardware-based pass/fail testing function and masking
- Segmented acquisition history waveform record function (record length up to 80,000 frames)
- Trigger types: Edge, Slope, Pulse, Video, Window, Runt, Interval, Dropout, Pattern, Serial
- FFT including seven other math functions: Addition, Subtraction, Multiplication, Division, Integration, Differential, and Square Root
- 36 automatic measurements supporting statistics, gating, math, history and reference measurements
- Multi-language user interface and built-in context sensitive help
- Software provided for remote PC control
- Front panel USB port for saving and recalling waveforms, setups, and screenshots
- Standard LAN and USBTMC-compliant USB device port
- Selectable 50 Ω and 1 MΩ input coupling

Technical data subject to change
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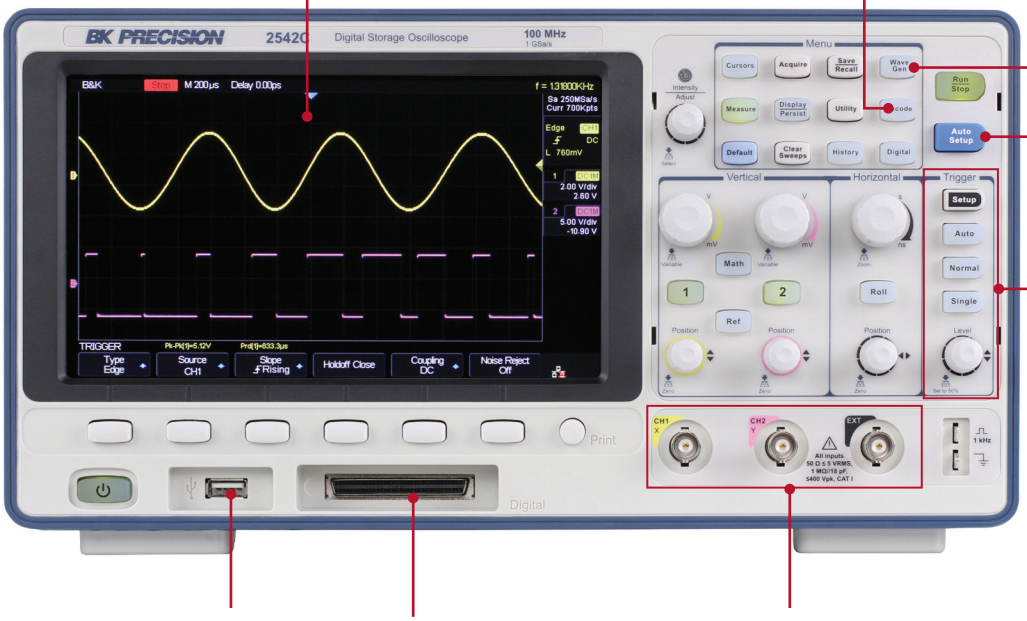
Front panel

8-inch TFT-LCD display
8-inch high resolution TFT-LCD display lets you see more details in your signal.

Serial Decoding
Decode and analyze I²C, SPI, UART/RS232, CAN, and LIN protocols and display results in binary, decimal, hex, or ASCII in real-time. Enabled with decode upgrade or try 30 times for free with each unit.



Arbitrary Waveform Generator (AWG)
Built-in 25 MHz AWG comes standard in all models.

Auto setup
Vertical, horizontal, and trigger controls are automatically adjusted for fast signal display.

Advanced Triggering
9 standard and 5 serial protocol triggering modes.

USB host port
Connect your USB flash drive to conveniently store and recall waveform data, setups, and screenshots.

16-Channel Digital Ports
Connect a logic analyzer probe to access 16 digital channels enabled with MSO upgrade or try 30 times for free with each unit.

Intuitive channel operation
Both channels in the 2540C Series are clearly indicated by their own color, labeled on the input, knobs, and display.

Rear panel

LAN and USB ports enable remote control from a PC

Pass/Fail or Trig Out Output

AWG Output

Input fuse holder

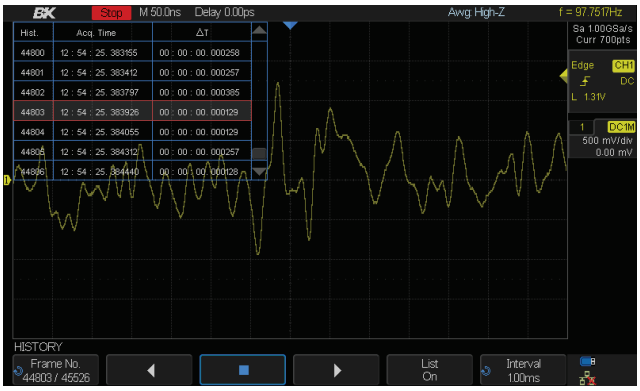
AC line input

Kensington security slot
Helps to secure your oscilloscope and prevent theft.

The tools you need

All traditional digital oscilloscope features come standard in the 2540C Series: Cursors, 50 Ω input coupling, reference signals, persist, rolling, noise rejection and deskew.

Waveform History and Recording



Quickly scroll through millions of points with History Mode's playback functionality to find difficult to capture events. Eliminate unnecessary idle signals and dead-time by selectivity capturing up to 80,000 segments.

Function and Arbitrary Waveform Generator

A powerful 25 MHz function/arbitrary waveform generator comes standard in the 2540C Series. Use complimentary software to generate waveforms and load up to 4 arbitrary waveforms into the instrument. Built-in functions are sine, square, ramp, pulse, DC, noise, cardiac, Gaussian pulse, and exponential rise/fall.

Automatic Waveform Math and Measurement

Display 36 automated measurements that include voltage, time, and statistics. Arithmetic and FFT functions can be performed on analog channels and two reference signals.

Color Grading

With 256 levels of color grading, the most common occurrences are represented in red and the least common are represented in purple. Easily spot outliers as they will persist for a user specified time.

Hardware Pass/Fail and Masking

Perform up to 40,000 pass/fail decisions a second. Easy to generate masking templates help capture anomalies even with complicated waveforms.

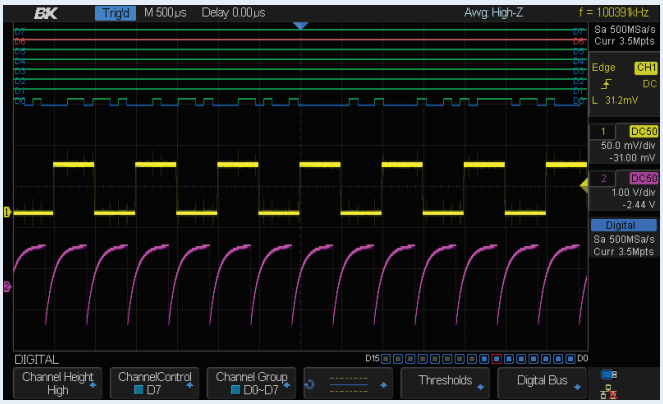
PC Connectivity

PC software is provided (free download at www.bkprecision.com) for seamless integration between the oscilloscope and PC. Capture and transfer waveforms, screen images, setups and measurement results to a Windows PC via the USB device port on the back of the instrument. A USB host port on the front allows for quick and easy screen saving.

The tools you need

Included in all MSO models

MSO license - LA2540C

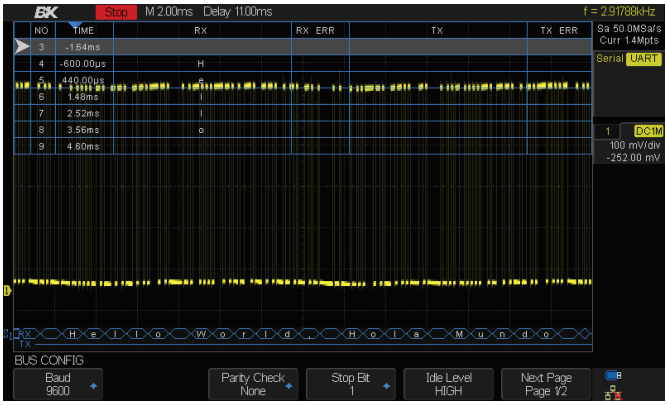


The 16 integrated digital channels are displayed along-side analog channels allowing users to view up to 18 time-correlated channels with shared triggering and acquisition on one screen. The LA2540C license enables the 16 digital channels of the 2540C Series and is included with MSO models.

16 channel logic probe - LP2540C

The 16-channel color-coded logic probe consists of two eight-channel pods. To make contact with the DUT, the probe connects directly to square pins or clips to test points using the included grabbers. With an input capacitance of only 8 pF and 100 kΩ input impedance, the probe protects the integrity of your signal. The probe is included with MSO models.

Decode license - DC2540C



Select up to 2 serial bus protocols I²C, SPI, UART/RS232, CAN, and LIN and decode concurrently from analog and MSO channels. Decode information in real-time and display in binary, decimal, hex, or ASCII.

Buy now, upgrade later

Install the MSO and decode licenses at any time or try before you buy with the 30 trial license on each model. Any DSO model in the 2540C Series can be upgraded to an MSO. Installation is quick and easily done within the oscilloscope menu. To purchase a license key, please fill out the license request form or visit the 2540C Series accessories page.

Available Upgrades		
	DSO Models	MSO Models
16-channel logic probe (LP2540C)	Optional	Standard
MSO license (LA2540C)	Optional	Standard
Decode license (DC2540C)	Optional	Optional

Specifications

Model	2540C / 2542C / 2544C
Performance Characteristics	
Bandwidth	70 MHz / 100 MHz / 200 MHz
Rise Time	<5 ns / <3.5 ns / <1.8 ns
Sample Rate	1 GSa/s (single channel), 500 MSa/s (dual channel)
Input Channels	Analog: 2 Digital: 16 (-MSO models or with LA2540C upgrade)
Memory Depth	14 Mpts (single channel), 7 Mpts (dual channel)
Waveform Update Rate	60,000 wfms/s
Hardware Bandwidth Limits	20 MHz
Input Coupling	DC, AC, GND
Input Impedance	1 MΩ ± 2% ‖ (22 pF ±3 pF) 50 Ω ± 2%
Ch to Ch Isolation	>40dB
Acquisition System	
Peak Detect	1 ns
Average	4, 16, 32, 64, 128, 256, 512, 1024
Enhanced Resolution	0.5, 1, 1.5, 2., 2.5, 3 bits selectable
Interpolation	Sin(x)/x, Linear
Vertical System	
Vertical Resolution	8 bits
Vertical Sensitivity	500 µV/div to 10 V/div (1-2-5)
Maximum Input Voltage	1 MΩ < 400 Vpk; 50 Ω <5 Vrms
DC Gain Accuracy	±3%: 5 mV/div to 10 V/div; ±4%: < 2 mV/div
Horizontal System	
Time Base Range	2.0 ns/div to 50 s/div
Time Base Accuracy	±25 ppm
Ch to Ch Deskew Range	±100 ns
Trigger System	
Modes	Auto, Normal, Single
Coupling	DC, AC, LF Reject, HF Reject, Noise Reject Ch1-Ch2
Trigger Level	Internal: ±4.5 div from center
	External: EXT: ±0.6 V EXT/5: ±3 V
Hold-Off Range	100 ns to 1.5 s
Types	Edge, Slope, Pulse, Video, Window, Interval, Dropout, Runt, Pattern
Serial Trigger	I2C, SPI, UART/RS232, CAN, LIN
Cursors	
Mode	Manual, Track
Measurements	ΔT, 1/ΔT, X2, X1, ΔV, Y2, Y1

Note: All specifications apply to the unit after a temperature stabilization time of 30 minutes over an ambient temperature range of 23 °C ± 5 °C.

Waveform Math	
Math Operation	Add, Subtract, Multiply, Divide, FFT, Derivative, Integral, Square Root
FFT	Windows: Rectangle, Blackman, Hanning, Hamming, Flattop
Waveform Measurements	
Voltage	Vpp, Vmax, Vmin, Vamp, Vtop, Vbase, Mean, Cmean, Stdev, Cstd, Vrms, Crms, FOV, FPRE, ROV, RPRE, Level@Trigger
Time	+SR, -SR, Period, Freq, +Width, -Width, Rise, Fall, BWidth, +Duty, -Duty, Time@Mid
Delay	Phase, FRR, FRF, FFR, FFF, LRR, LRF, LFF, Skew
Statistics	Current, Mean, Min, Max, Stdev, Count
Gating	Time domain
I/O Interface	
Standard	USB Host, USB Device, LAN, Pass/Fail, Trigger Out
Pass/Fail	3.3 V TTL Output
Display System	
Display	8" Color TFT-LCD, 800 x 480 Resolution
Wave Display Mode	Vectors, Dots
Persistence	Off, Infinite, 1 sec, 5 sec, 10 sec, 30 sec
Intensity Grading	256 Levels
Language	Simplified Chinese, Traditional Chinese, English, French, Japanese, Korean, German, Russian, Italian, Portuguese
Environmental and Safety	
Temperature	Operating: 10 °C to +40 °C Storage: -20 °C to +60 °C
Humidity	Operating: 85% RH, 40 °C, 24 hours Storage: 85% RH, 65 °C, 24 hours
Altitude	Operating: 3,000 m Storage: 15,266 m
General	
Power Requirements	100 to 240 VAC, CAT II, 50 VA Max, 45 Hz to 440 Hz
Dimensions (W x H x D)	4.8" x 7.2" x 13.4" (123 x 184 x 340 mm)
Weight	7.3 lbs (3.3 kg)
	Three-Year Warranty
Included Accessories	Passive probes (one per channel), power cord, certificate of calibration, USB (Type A to B) communication cable
Optional Accessories	16-channel digital logic probe (LP2540C)

Specifications

Function/Arbitrary Waveform Generator	
Waveforms	Sine, Square, Ramp, Pulse, DC, Noise , Cardiac, Gaus Pulse, Exp Rise
Arbitrary	4 Slots for Arbitrary Waveforms
Maximum Output Frequency	25 MHz
Sample Rate	125 MSa/s
Frequency Resolution	1 µHz
Frequency Accuracy	±50 ppm
Vertical Resolution	14 bits
Amplitude Range	-1.5 to +1.5 V @ 50 Ω; -3 to +3 V @ 1 MΩ
Output Impedance	50 Ω ±2%
Protection	Short-Circuit Protection
Sine Characteristics	
Frequency	1 µHz to 25 MHz
Offset Accuracy (100 kHz)	±(0.3 dB * Offset Setting Value + 1 mVpp)
Amplitude flatness	±0.3 dB (100 kHz, 5 Vpp)
Spurious (non harmonics)	DC to 1 MHz: -60 dBc 1 MHz to 5 MHz: -55 dBc 5 MHz to 25 MHz: -50 dBc
Harmonic distortion	DC to 5 MHz: -50 dBc 5 MHz to 25 MHz: -45 dBc
Square/Pulse Characteristics	
Frequency	1 µHz to 10 MHz
Duty Cycle	20% to 80%
Rise/Fall Time	< 24 ns (10% to 90%)
Overshoot (1 kHz, 1 Vpp Typical)	< 3%
Pulse Width	> 50 ns
Jitter	< 500 ps + 10 ppm
Ramp Characteristics	
Frequency	1 µHz to 300 kHz
Linearity (Typical)	< 0.1% of Pk-Pk (Typical, 1 kHz, 1 Vpp, 100% Symmetry)
Symmetry	0% to 100% (Adjustable)
DC Characteristics	
Offset Range	±1.5 V (50 Ω) ±3 V (High-Z)
Accuracy	±(|offset|*1%+3 mV)
Noise Characteristics	
Bandwidth	> 25 MHz (-3 dB)
Arbitrary Wave Characteristics	
Frequency	1 µHz to 5 MHz
Wave Length	16 Kpts
Sample Rate	125 MSa/s

Serial Decoder (DC2540C)	
Threshold	-4.5 to 4.5 div
Recorded List	1 to 7 Lines
I2C Decoder	
Signal	SCL, SDA
Address	7 bit, 10 bit
SPI Decoder	
Signal	CLK, MISO, MOSI, CS
Edge Select	Rising Falling
Idle Level	Low, High
Bit Order	MSB, LSB
UART / RS232 Decoder	
Signal	RX, TX
Data Width	5, 6, 7, 8 bit
Parity Check	None, Odd, Even
Stop Bit	1, 1.5, 2 bit
Idle Level	Low, High
CAN Decoder	
Signal	CAN_H, CAN_L
Source	CAN_H, CAN_L, CAN_H-CAN_L
LIN Decoder	
Supported Specification	Ver1.3, Ver2.0

MSO Digital Channels (LA2540C/LP2540C)	
Digital Channels	16
Sample Rate	500 MSa/s
Memory Depth	14 Mpts/Ch
Maximum Input Voltage	± 20 Vpeak
Threshold Accuracy	± (3% of threshold setting + 150 mV)
Input Dynamic Range	± 10 V
Minimum Input Voltage Swing	800 mVpp
Input Impedance	100 kΩ ‖ 8 pF
Maximum Input Frequency	60 MHz
Minimum Detectable Pulse Width	8.3 ns
Ch to Ch Skew	± (1 digital sample interval)
User Defined Threshold Range	± 3 V in 10 mV steps
Threshold Selections	TTL, CMOS, LVCMOS3.3, LVCMOS2.5, Custom (-3 to +3 V)

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