

# Analog Oscilloscope

## Economic models

TOS-2020CH/2040CH/2050CH

TOS-2020CF/2040CF/2050CF: with built-in 6 digits frequency counter

TOS-2020CT/2040CT/2050CT: with component test function

### Features

- ✓ Dual channel 20MHz/40MHz/50MHz
- ✓ 10 times sweep magnification
- ✓ TV synchronization; X-Y mode
- ✓ High illumination internal graticule CRT
- ✓ Encoded switch, reliable and durable
- ✓ Fully sealed durable attenuation switch
- ✓ ALT triggering function, enabling simultaneous observation of two independent signals

TOS-2020CH



TOS-2020CF



TOS-2020CT



### Specifications

Model	20MHz	40MHz	50MHz
<b>Vertical system</b>			
Sensitivity	5mV~5V/DIV, 10 steps in 1-2-5 sequence		
Accuracy	≤3%		
Vernier sensitivity	≤1/2.5 of panel indicated value		
Bandwidth	DC (AC 10Hz)~20MHz	DC (AC 10Hz)~40MHz	DC (AC 10Hz)~50MHz
AC coupling	<10Hz (at 100kHz, 8DIV, frequency response -3dB)		
Rise time	Approx. 17.5ns	Approx. 8.75ns	Approx. 7ns
Input impedance	Approx. 1MΩ//Approx. 25pF		
DC balance shift	5mV~5V/DIV: ±0.5DIV		
Vertical mode	CH1, CH2, DUAL (ALT/CHOP), ADD, CH2 INV		
Chopping repetition frequency	Approx. 250kHz		
Input coupling	AC, GND, DC		
Max. Input voltage	400V peak-peak, AC frequency≤1kHz		
Common mode rejection ratio	>50:1 at 50kHz sine wave (set CH1 and CH2 at same sensitivity)		
CH2 INV BAL	Balanced point variation≤1DIV (referred to graticule center)		

# Analog Oscilloscope

Horizontal system					
Sweep time	0.2 $\mu$ s~0.5s/DIV, 20 steps in 1-2-5 sequence				
Accuracy	$\pm$ 3%, X10MAG: $\pm$ 5% (20ns~50ns/DIV uncalibrated)				
Vernier sweep time control	$\leq$ 1/2.5 of panel indicated value				
Sweep magnification	X10 (fastest sweep time 20ns/DIV)				
Position shift@X10MAG	$\leq$ 2DIV at CRT screen center				
Linearity	$\pm$ 5%, X10MAG: $\pm$ 10% (0.2s~1 $\mu$ s)				
Trigger system					
Trigger mode	AUTO, NORM, TV-V, TV-H				
Trigger level lock	Not provided				
Trigger source	CH1, CH2, ALT, LINE, EXT				
Trigger coupling	AC: 20Hz to full bandwidth				
Trigger slope	"+" or "-"				
Sensitivity	Frequency	20Hz~2MHz	2MHz~20MHz	20MHz~40MHz	40MHz~50MHz
	CH1, CH2	1DIV	1.5DIV	2.5DIV	3DIV
	ALT	2DIV	3DIV		
	EXT	200mV	800mV		
	TV	Sync pulse>1DIV (EXT: 1V)			
External trigger input					
Input impedance	Approx. 1M $\Omega$ //Approx. 25pF				
Max. input voltage	400V (DC+AC peak), AC frequency $\leq$ 1kHz				
X-Y mode					
Sensitivity	5mV~5V/DIV $\pm$ 3%				
X-axis bandwidth	DC~500kHz (-3dB)				
Phase error	$\leq$ 3 $^\circ$ at DC~50kHz				
Calibration signal output					
Waveform	Positive-going square wave				
Frequency	Approx. 1kHz				
Duty ratio	<48:52				
Output voltage	2Vpp $\pm$ 2%				
Output impedance	Approx. 1k $\Omega$				
Frequency counter (only for TOS-2020CF, TOS-2040CF, TOS-2050CF)					
Display	6 digits LED				
Accuracy	$\pm$ 0.01%				
Component test (only for TOS-2020CT, TOS-2040CT, TOS-2050CT)					
Testing subject	Resistor, Capacitor, Coil, Diode, Zener or simple combination of the components				
Testing voltage	Approx. 9Vac pp				
Testing frequency	50/60Hz				
Testing current	Approx. 0.6mA				
CRT					
Type	6-inch rectangular with internal graticule, 8x10DIV (1DIV=1cm)				
Phosphor	P31				
Accelerating voltage	Approx. 2kV (20MHz); Approx. 12kV (40MHz)				
Trace rotation	Adjustable at front panel				
General					
Power source	AC110V/220V $\pm$ 10%, 50/60Hz, Max. 35VA				
Accessories	Power cord x1, Operation manual x1, Probe x2				
Dimension (WxHxD)	310x150x455mm				
Weight	Approx. 8kg				

# Analog Oscilloscope

## Standard models

TOS-2020/2040/2050

TOS-2020FG/2040FG/2050FG: with built-in 6 digits frequency counter

### Features

- ✓ Dual channel 20MHz/40MHz/50MHz
- ✓ High sensitivity 1mV/DIV
- ✓ 10 times sweep magnification
- ✓ TV synchronization; X-Y mode
- ✓ Z-axis modulation input; CH1 signal output
- ✓ High illumination internal graticule CRT
- ✓ Encoded switch, reliable and durable
- ✓ Fully sealed durable attenuation switch
- ✓ ALT triggering function, enabling simultaneous observation of two independent signals
- ✓ Trigger level lock and auto synchronize function

TOS-2020



TOS-2020FG



### Specifications

Model	20MHz	40MHz	50MHz
<b>Vertical system</b>			
Sensitivity	5mV~5V/DIV, 10 steps in 1-2-5 sequence		
Accuracy	≤3%; X5MAG: ≤5%		
Vernier sensitivity	≤1/2.5 of panel indicated value		
Bandwidth	DC~20MHz (X5MAG: DC~7MHz)	DC~40MHz (X5MAG: DC~15MHz)	DC~50MHz (X5MAG: DC~15MHz)
AC coupling	<10Hz (at 100kHz, 8DIV, frequency response -3dB)		
Rise time	Approx. 17.5ns (X5MAG: Approx. 50ns)	Approx. 8.75ns (X5MAG: Approx. 25ns)	Approx. 7ns (X5MAG: Approx. 23.3ns)
Input impedance	Approx. 1MΩ//Approx. 25pF		
DC balance shift	5mV~5V/DIV: ±0.5DIV		
Vertical mode	CH1, CH2, DUAL (ALT/CHOP), ADD, CH2 INV		
Chopping repetition frequency	Approx. 250kHz		
Input coupling	AC, GND, DC		
Max. Input voltage	400V peak-peak, AC frequency ≤1kHz		
Common mode rejection ratio	>50:1 at 50kHz sine wave (set CH1 and CH2 at same sensitivity)		
CH2 INV BAL	Balanced point variation ≤1DIV (referred to graticule center)		

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# Analog Oscilloscope

<b>Horizontal system</b>					
Sweep time	0.2 $\mu$ s~0.5s/DIV, 20 steps in 1-2-5 sequence				
Accuracy	$\pm$ 3%, X10MAG: $\pm$ 5% (20ns~50ns/DIV uncalibrated)				
Vernier sweep time control	$\leq$ 1/2.5 of panel indicated value				
Sweep magnification	X10 (fastest sweep time 20ns/DIV)				
Position shift@X10MAG	$\leq$ 2DIV at CRT screen center				
Linearity	$\pm$ 5%, X10MAG: $\pm$ 10% (0.2s~1 $\mu$ s)				
<b>Trigger system</b>					
Trigger mode	AUTO, NORM, TV-V, TV-H				
Trigger level lock	Provided				
Trigger source	CH1, CH2, ALT, LINE, EXT				
Trigger coupling	AC: 20Hz to full bandwidth				
Trigger slope	"+" or "-"				
Sensitivity	Frequency	20Hz~2MHz	2MHz~20MHz	20MHz~40MHz	40MHz~50MHz
	CH1, CH2	1DIV	1.5DIV	2.5DIV	3DIV
	ALT	2DIV	3DIV		
	EXT	200mV	800mV		
	TV	Sync pulse>1DIV (EXT: 1V)			
<b>External trigger input</b>					
Input impedance	Approx. 1M $\Omega$ //Approx. 25pF				
Max. input voltage	400V (DC+AC peak), AC frequency $\leq$ 1kHz				
<b>X-Y mode</b>					
Sensitivity	5mV~5V/DIV $\pm$ 3%				
X-axis bandwidth	DC~500kHz (-3dB)				
Phase error	$\leq$ 3 $^{\circ}$ at DC~50kHz				
<b>CH1 signal output</b>	At least 20 mV/div at 50 $\Omega$ terminal, frequency at least 50Hz to 50MHz				
<b>Calibration signal output</b>					
Waveform	Positive-going square wave				
Frequency	Approx. 1kHz				
Duty ratio	<48:52				
Output voltage	2Vpp $\pm$ 2%				
Output impedance	Approx. 1k $\Omega$				
<b>Z-axis input</b>					
Bandwidth	DC~2MHz				
Sensitivity	5Vpp				
Input impedance	Approx. 47k $\Omega$				
Max. input voltage	30V (DC+AC peak), AC frequency $\leq$ 1kHz				
<b>Frequency counter (only for TOS-2020FG, TOS-2040FG, TOS-2050FG)</b>					
Display	6 digits LED				
Accuracy	$\pm$ 0.01%				
<b>CRT</b>					
Type	6-inch rectangular with internal graticule, 8x10DIV (1DIV=1cm)				
Phosphor	P31				
Accelerating voltage	Approx. 2kV (20MHz); Approx. 12kV (40MHz)				
Trace rotation	Adjustable at front panel				
<b>General</b>					
Power source	AC110V/220V $\pm$ 10%, 50/60Hz, Max. 35VA				
Accessories	Power cord x1, Operation manual x1, Probe x2				
Dimension (WxHxD)	310x150x455mm				
Weight	Approx. 8kg				

# Analog Oscilloscope

Standard models, using encoder knob

TOS-2020B/2040B

TOS-2020BF/2040BF: with built-in 6 digits frequency counter

## Features

- ✓ Dual channel 20MHz/40MHz
- ✓ High sensitivity 1mV/DIV
- ✓ 10 times sweep magnification
- ✓ TV synchronization; X-Y mode
- ✓ Z-axis modulation input; CH1 signal output
- ✓ High illumination internal graticule CRT
- ✓ Encoded switch, reliable and durable
- ✓ ALT triggering function, enabling simultaneous observation of two independent signals
- ✓ Trigger level lock and auto synchronize function

TOS-2020B



TOS-2020BF



## Specifications

Model	20MHz	40MHz
<b>Vertical system</b>		
Sensitivity	5mV~20V/DIV, 10 steps in 1-2-5 sequence	
Accuracy	≤3%; X10MAG: ≤5% (20nSec~50nSec uncalibrated)	
Vernier sensitivity	≤1/2.5 of panel indicated value	
Bandwidth	DC~20MHz (X5MAG: DC~7MHz)	DC~40MHz (X5MAG: DC~15MHz)
AC coupling	<10Hz (at 100kHz, 8DIV, frequency response -3dB)	
Rise time	Approx. 17.5ns (X5MAG: Approx. 50ns)	Approx. 8.75ns (X5MAG: Approx. 25ns)
Input impedance	Approx. 1MΩ//Approx. 25pF	
DC balance shift	5mV~5V/DIV: ±0.5DIV	
Vertical mode	CH1, CH2, DUAL (ALT/CHOP), ADD, CH2 INV	
Chopping repetition frequency	Approx. 250kHz	
Input coupling	AC, GND, DC	
Max. Input voltage	300V peak-peak, AC frequency≤1kHz	
Common mode rejection ratio	>50:1 at 50kHz sine wave (set CH1 and CH2 at same sensitivity)	
CH2 INV BAL	Balanced point variation≤1DIV (referred to graticule center)	

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# Analog Oscilloscope

<b>Horizontal system</b>				
Sweep time	0.2us~0.5s/DIV, 20 steps in 1-2-5 sequence			
Accuracy	±3%, X10MAG: ±5% (20ns~50ns/DIV uncalibrated)			
Vernier sweep time control	≤1/2.5 of panel indicated value			
Sweep magnification	X10 (fastest sweep time 20ns/DIV)			
Position shift@X10MAG	≤2DIV at CRT screen center			
Linearity	±5%, X10MAG: ±10% (0.2s~1us)			
<b>Trigger system</b>				
Trigger mode	AUTO, NORM, TV-V, TV-H			
Trigger level lock	Provided			
Trigger source	CH1, CH2, ALT, LINE, EXT			
Trigger coupling	AC: 20Hz to full bandwidth			
Trigger slope	"+" or "-"			
Sensitivity	Frequency	20Hz~2MHz	2MHz~20MHz	20MHz~40MHz
	CH1, CH2	1DIV	1.5DIV	2.5DIV
	ALT	2DIV	3DIV	
	EXT	200mV	800mV	
	TV	Sync pulse>1DIV (EXT: 1V)		
<b>External trigger input</b>				
Input impedance	Approx. 1MΩ//Approx. 25pF			
Max. input voltage	300V (DC+AC peak), AC frequency≤1kHz			
<b>X-Y mode</b>				
Sensitivity	5mV~5V/DIV±3%			
X-axis bandwidth	DC~500kHz (-3dB)			
Phase error	≤3° at DC~50kHz			
<b>CH1 signal output</b>	At least 20 mV/div at 50Ω terminal, frequency at least 50Hz to 50MHz			
<b>Calibration signal output</b>				
Waveform	Positive-going square wave			
Frequency	Approx. 1kHz			
Duty ratio	<48:52			
Output voltage	2Vpp±2%			
Output impedance	Approx. 1kΩ			
<b>Z-axis input</b>				
Bandwidth	DC~2MHz			
Sensitivity	5Vpp			
Input impedance	Approx. 47kΩ			
Max. input voltage	30V (DC+AC peak), AC frequency≤1kHz			
<b>Frequency counter (only for TOS-2020BF, TOS-2040BF)</b>				
Display	6 digits LED			
Accuracy	±0.01%			
<b>CRT</b>				
Type	6-inch rectangular with internal graticule, 8x10DIV (1DIV=1cm)			
Phosphor	P31			
Accelerating voltage	Approx. 2kV (20MHz); Approx. 12kV (40MHz)			
Trace rotation	Adjustable at front panel			
<b>General</b>				
Power source	AC110V/220V±10%, 50/60Hz, Max. 35VA			
Accessories	Power cord x1, Operation manual x1, Probe x2			
Dimension (WxHxD)	310x150x455mm			
Weight	Approx. 8kg			



# Analog Oscilloscope

## 100MHz standard model with 10 sets panel settings storage TOS-2100C

### Features

- ✓ Dual channel 100MHz
- ✓ Time base auto-range
- ✓ Cursor readout with 7 measurements
- ✓ Panel lock function
- ✓ Buzzer alarm
- ✓ LED indicators
- ✓ TV synchronization; X-Y mode
- ✓ Z-axis modulation input; Trigger signal output
- ✓ Signal delay function, monitoring the leading edge
- ✓ Continuously adjustable screen illumination
- ✓ Delayed sweep
- ✓ 10 sets save & recall for panel settings



### Specifications

Vertical system	
Sensitivity	2mV~5V/DIV, 11 steps in 1-2-5 sequence
Accuracy	≤3%
Vernier sensitivity	Continuously variable to 1/2.5 or less of panel indicated value
Bandwidth (-3dB)	DC (AC 10Hz)~100MHz (2mV/DIV: DC~20MHz)
AC coupling	<10Hz (at 100kHz, 8DIV, frequency response -3dB)
Rise time	Approx. 3.5ns (2mV/DIV: Approx. 17.5ns)
Input impedance	Approx. 1MΩ//Approx. 25pF
DC balance shift	5mV~5V/DIV: ±0.5DIV
Vertical mode	CH1, CH2, DUAL (ALT/CHOP), ADD, CH2 INV
Chopping repetition frequency	Approx. 250kHz
Input coupling	AC, GND, DC
Max. Input voltage	400V peak-peak, AC frequency≤1kHz
Bandwidth limit	20MHz
Common mode rejection ratio	>50:1 at 50kHz sine wave (set CH1 and CH2 at same sensitivity)
Dynamic range	5DIV at 100MHz
CH2 INV BAL	Balanced point variation≤1DIV (referred to graticule center)
Signal delay	Leading edge can be monitored
Horizontal system	
Horizontal mode	MAIN (A), ALT, DELAY (B)
A (main) sweep time	50ns~0.5s/DIV, continuously variable (UNCAL)
B (delay) sweep time	50ns~50ms/DIV
Accuracy	±3%, X10MAG: ±5%
Sweep magnification	X10 (fastest sweep time 5ns/DIV)
Hold off time	Variable
Delay time	1us~5s
Delay jitter	Better than 1:20000
Alternate separation	Variable
Trigger system	
Trigger mode	AUTO, NORM, TV-V, TV-H
Trigger source	CH1, CH2, LINE, EXT
Trigger coupling	AC, DC, HFR, LFR
Trigger slope	“+” or “-”

# Analog Oscilloscope

Trigger system						
Sensitivity	Mode	Auto		Norm		TV
	Frequency	10Hz~20MHz	20MHz~100MHz	DC~20MHz	20MHz~100MHz	Sync signal
	INT	0.35DIV	1.5DIV	0.35DIV	1.5DIV	1DIV
	EXT	50mVpp	150mVpp	50mVpp	150mVpp	200mVpp
TV sync	TV-V, TV-H					
Trigger level range	INT: 4DIV or more, EXT: $\pm 0.4V$ or more					
External trigger input						
Input impedance	Approx. 1M $\Omega$ //Approx. 25pF					
Max. input voltage	400V (DC+AC peak), AC frequency $\leq$ 1kHz					
X-Y operation						
Mode	X-axis: selectable CH1, CH2, EXT ; Y-axis: selectable CH1, CH2, CH1 and CH					
Sensitivity	2mV~5V/DIV $\pm 3\%$ ; EXT: 0.1V/DIV $\pm 5\%$					
X-axis bandwidth	DC~500kHz (-3dB)					
Phase error	$\leq 3^\circ$ at DC~50kHz					
Trigger signal output						
Voltage	Approx. 25mV/DIV into 50 $\Omega$ terminal					
Frequency response	DC~10MH					
Output impedance	Approx. 50 $\Omega$					
Calibration signal output						
Waveform	Positive-going square wave					
Frequency	Approx. 1kHz					
Duty ratio	<48:52					
Output voltage	2Vpp $\pm 2\%$					
Output impedance	Approx. 2k $\Omega$					
Z-axis input						
Coupling	DC					
Bandwidth	DC~5MHz					
Sensitivity	5V or more					
Max. input voltage	30V (DC+AC peak), AC frequency $\leq$ 1kHz					
Cursor readout						
Cursor measurement	$\Delta V$ , $\Delta V\%$ , $\Delta VdB$ , $\Delta T$ , $1/\Delta T$ , $\Delta T\%$ , $\Delta \theta$					
Cursor resolution	1/25DIV					
Effective cursor range	Vertical: $\pm 3DIV$ ; Horizontal: $\pm 4DIV$					
Panel setting	Vertical: V/DIV (CH1, CH2), UNCAL, ALT/CHOP/ADD, INV, Probe factor, AC/DC/GND Horizontal: S/DIV (MTB, DTB), UNCAL, X10 MAG, delay time, HO Trigger: source, coupling, slope, level, TV-V, TV-H Others: X-Y, LOCK, Save/recall memory 0-9					
Special function						
Time base auto-range, Panel lock, 10 sets save & recall for panel settings						
CRT						
Display	6-inch rectangular with internal graticule; 0%, 10%, 90% and 100% markers; 8x10DIV (1DIV=1cm)					
Phosphor	P31					
Accelerating voltage	Approx. 16kV					
CRT illumination	Continuously adjustable					
General						
Power source	AC110V/220V $\pm 10\%$ , 50/60Hz, Max. 65VA					
Accessories	Power cord x1, Operation manual x1, Probe x2					
Dimension (WxHxD)	310x150x455mm					
Weight	Approx. 8kg					