

27454A

**QUAD-CHANNEL CONDITIONER
BALANCED CURRENT EXCITATION**
±10 V Common Mode; 255 or 510 Cutoff Frequencies

 **PRECISION
FILTERS, INC.**

SYSTEM 27000 FEATURES

- Graphical User Interface (GUI) for system control
- Intelligent gain and system scaling algorithms
- Test input and output monitor busses
- Go/no-go test with diagnostics to be used before tests
- Rigorous factory acceptance test for maintenance

27000 SIGNAL CONDITIONING WIZARD

The 27000 Signal Conditioning Wizard™ provides all the power you need to manage your test measurements:

- Mix transducers in a single system
- Condition signals for immediate data conversion
- Manage hundreds of channels and a mix of sensors
- Assure system integrity before performing measurements
- Reduce life-cycle costs
- Upgrade and expand equipment as requirements change
- Count on unsurpassed performance and reliability

The Precision 27000 makes it easy to manage a test with hundreds of channels and a mix of transducers. Choose charge, voltage (filter amplifier), strain, RTD, potentiometer, current, frequency, or other transducers. There are 27000 cards to condition them.

The Wizard employs a management system of structured databases (sensors and equipment), a graphical user interface, and a collection of algorithms to help you manage your measurements. The databases keep records of the sensors and equipment which can be imported when you are designing or setting up a test. The GUI provides control panels for configuration, setup, operation, and tests. And the Wizard's algorithms transmute tedious and complex engineering calculations into simple setup entries. It's as simple as using a spreadsheet. Just change one parameter and the algorithm makes all other relevant calculations. System scaling becomes easy. Best of all, you won't have to pore over filter plots to calculate the tradeoffs between cutoff frequency, sampling rate, and attenuation of aliases. The filter algorithm does it for you, in the blink of an eye.

The built-in test hardware and software (optional) provide quick go/no-go tests which can be run before each test, and rigorous factory acceptance tests to assure you that the 27000 meets your most stringent requirements for critical applications. It won't be long before these tests earn a permanent place in your maintenance routine. And since they are traceable to NIST, they eliminate the need for off-site calibration.

In every phase of your tests—record keeping, installation, design, setup, operation, maintenance and upgrading—the Wizard has thought of ways to help you save time and money over the life of the system.

PRECISION 27454A APPLICATIONS

- Static or dynamic strain gage conditioner
- Full bridge conditioner
- RTD conditioner
- Hot wire anemometry
- Low level AC or DC amplifier (<1 mV to 10 V inputs)
- Anti-aliasing filter/amplifier

PRECISION 27454A FEATURES

- 4 channels per card, 64 channels per chassis
- Balanced differential constant current source with 20 V compliance
- Programmable AC or DC coupled input
- Up to 127.5 kHz "filtered" bandwidth or 250 kHz "wide-band" bandwidth
- 2- or 4-wire input plus shield per channel
- Manual or automatic zero suppress
- Sensor open and short detection
- Excitation current monitor
- Voltage substitution test signals
- AC current test mode for verifying transducer, cabling and frequency response
- Programmable amplifier: x1/16 to x8,192 with 0.05% vernier
- 4, 6 or 8-pole anti-alias filters with filter bypass (wide-band)
- 1° phase matching between any channels
- Overload detection
- Precise digital calibration

27454A DESCRIPTION

The 27454A is a member of the Precision 27000 family of signal conditioners. It provides conditioning for strain gages, RTDs, or other resistive non-self-generating transducers with 2-wire or 4-wire (Kelvin) connections.

The 27454A is equipped with Precision Filters' proprietary balanced differential constant current excitation. This topology is especially useful for reducing pickup from interfering sources as compared with traditional unbalanced current sources. The gage health monitor circuits indicate open or shorted gages and the input overload detector reports overloads by out-of-band signals which could cause in-band distortion.

27454A DESCRIPTION (Continued)

Balanced Constant Current Excitation

Balanced constant current excitation provides a true balanced input for rejection of common-mode signals. Using a proprietary constant current source, the 27454A is able to deliver accurate excitation to the gage. Programmable excitation provides 0 to ± 25.5 mA of constant current with an "excitation off" mode to detect self-induced signals. Gage open/short detection is also provided.

For dynamic strain conditioning applications, the 27454A can provide accurate measurements with only two wires by AC coupling the input. For best AC or DC measurements (required for RTD type transducers), the 27454A provides a 4-wire Kelvin connection for remote sense.

The 27454A may be used for full bridge applications with the advantage that excitation delivered to the bridge is unaffected by excitation supply lead wire resistance. The 27454A BC5 configuration card supports the use of precision resistors for bipolar single step shunt calibration. The 27454A utilizes dedicated shunt cal lines to the bridge that allow the user to perform the shunt cal on non-current carrying leads. Single shunt calibration of any arm of the bridge and double shunt calibration of opposing bridge arms are supported. Also, since the bridge balance technique is non-evasive to the bridge, shunt calibration results are unaffected by bridge balance circuitry.

Suppression of the gage DC operating point is performed automatically using the zero suppress feature of the 27454A. Zero suppress allows the use of more gain to emphasize small gage fluctuations. Zero suppress also provides the user with an accurate means to balance a full bridge.

Excitation current flows through an accurate sense resistor in the current loop allowing for direct monitoring of the excitation current. The current source output may be modulated to allow AC current injection in the loop. The frequency and amplitude of the AC current is user controlled. This allows the user to simulate changes in gage resistance in the loop and provides direct AC input stimulation to the signal conditioner for end-to-end system calibration.

Input Stage

The 27454A input stage provides 80 dB of common-mode rejection and may be either AC or DC coupled. AC coupling is useful for dynamic applications where the DC bias on the transducer that can limit dynamic range can be coupled out of the signal. With the input DC coupled, low drift and ultra low noise (< -163 dBV/ $\sqrt{\text{Hz}}$) is provided by the 27454A input stage. The input stage may be shorted to verify signal conditioner channel noise and DC offsets.

27454A DESCRIPTION (Continued)

A switch at the input stage is provided to connect the amplifier to the 27000 system test bus. The test bus is used to inject signals for performance verification. In addition, both drive and sink current levels may be monitored separately making it possible to detect excitation current leakage conditions in the external current loop.

Amplifier and Filter

Programmable pre- and post-filter gain provides gain of 8192. Gain is distributed both before and after the filter to provide protection from large out of band signals or transients that could cause clipping in the filter, distorting the data. The Gain Wizard allows the user to set a gain reserve and then apportions the gain between the input and output. This provides input gain for best noise performance yet conforms to the limitations of the user's worst case estimate of outband or transient signals.

The 27454A has a wide range of anti-aliasing filter characteristics including 4-, 6- and 8-pole Butterworth, Bessel, Elliptic and time delay filters. Choose from a wide selection of cutoff frequency settings to 127.5 kHz. These real anti-aliasing filters make the 27454A data acquisition ready.

27454A PROGRAMMABLE FEATURES

- Excitation level (0 to 25.5 mA in 50 μA steps)
- Excitation sense (local or remote)
- Automatic zero suppress
- AC/DC coupling
- Input short detection threshold
- Test Modes: Amp Short, Excitation Off, Voltage Substitution, Excitation Drive Current Monitor, Excitation Sink Current Monitor, AC Current Inject
- Output Monitor
- Gain (x1/16 to x8192 with 0.05% resolution)
- Cutoff frequency (1 Hz to 127.5 kHz)
- Wide-band (250 kHz) or filtered operation
- Shield (guarded, open, grounded)

GRAPHICAL USER INTERFACE DISPLAY

All programmable features in addition to:

- Configuration readback
- Auto-suppress status
- Input wiring
- Transducer sensitivity
- System scaling in engineering units
- Overload, input short and input open status
- Gain Wizard
- Filter Wizard
- Group Control

27454A CONDITIONER CARDS

The detailed description and specifications for the 27454A card are organized as follows in the sections below.

- Card Model Number Structure
- Input Configuration Modules
- Input Resistor Modules
- Excitation Supply
- Input Characteristics and Options
- Amplifier Characteristics
- Test Modes
- Filter Cutoff Frequency Settings
- Filter Type Characteristics
- Filter Specifications
- Output Characteristics
- Mainframes and Accessories

27454A CARD MODEL NUMBER

The 27454A card model number describes the configuration of the four channels on the card. The model number identifies:

- The cutoff frequency, fixed or programmable, of the filters.
- The filter characteristic, or filter type, of the low-pass filters.
- Options included on the card.

27454A-X-YYY-?

Options:

- 6 Programmable AC/DC Input Cplg
- N Programmable Input Attn (std)
- P Enhanced Filter Module (std)

Filter Type:

- EL8, TD8, BU8, BE8
- LP1, TD6, BU6, BE6
- EL4, TD4, BU4, BE4

See the Filter Type section below for more information.

Cutoff Frequency:

- A, C or E for Dual prog. frequency range
- F8??? for Single prog. frequency range
- XXXX for single fixed frequency

See Filter Cutoff Frequency Settings section below for more information.

27454A INPUT CONFIGURATION MODULES

Plug-on input configuration (27454A-BC?) modules are available for the 27454A and one configuration module must be specified for each 27454A signal conditioning card. Two versions of input configuration modules are available: BC4 for a general-purpose sensor interface and BC5 for interfacing to bridges where shunt calibration is needed. The GUI reads back and reports the model number from the plug-on card.

The 27454A-BC4 module enables the 27454A to interface to a wide variety of transducers including single active gages, full bridges and RTD's. The 27454A-BC4 input configuration module provides programmable selection between two-wire or four-wire transducer interface and has switches for directly measuring DRIVE and SINK excitation currents through the amplifier channel, even while the transducer is connected.

For full bridge applications where shunt calibration is desired, the 27454A-BC5 module provides bipolar single step shunt calibration and allows the user to apply a single shunt of any bridge arm or double shunt of either opposing bridge arms. As with the BC4, DRIVE and SINK currents may be monitored directly through the amplifier.

27454A Input Wiring

Input Connector: 26-pin D-shell (2 ea.)

BC4 Input Wiring:
I DRIVE (1)
I SINK (1)
±SIGNAL (2)
Shield (1)

BC5 Input Wiring:
I DRIVE (1)
I SINK (1)
±SIGNAL (2)
Shunt Cal (4)
Shield (1)

27454A Input Configuration Modules

27454A-BC4	2- or 4-wire input configuration with switches for current sense
27454A-BC5	Bridge configuration module with single step bipolar single shunt or double shunt

27454A INPUT RESISTOR MODULES

27454A Input Resistor Modules

Plug-on resistor modules provide accurate, stable resistors for excitation current sensing and shunt calibration resistors. There are two base models: BR4 for use with BC4 configuration modules, and BR5 for use with BC5 modules. One input resistor module must be specified per 27454A signal conditioning card. Resistor values are read back and displayed on the GUI panel.

27454A-BR4-100:

Resistor for current sense (100 Ω).
Requires BC4 completion card.

27454A-BR5/4-100-5940:

Resistors for current sense (100 Ω) and shunt cal resistor scaled for 120 Ω bridge.

27454A INPUT RESISTOR MODULES (Continued)

27454A-BR5/4-100-17325:

Resistors for current sense (100 Ω) and shunt cal resistor scaled for 350 Ω bridge.

27454A-BR5/4-100-49500:

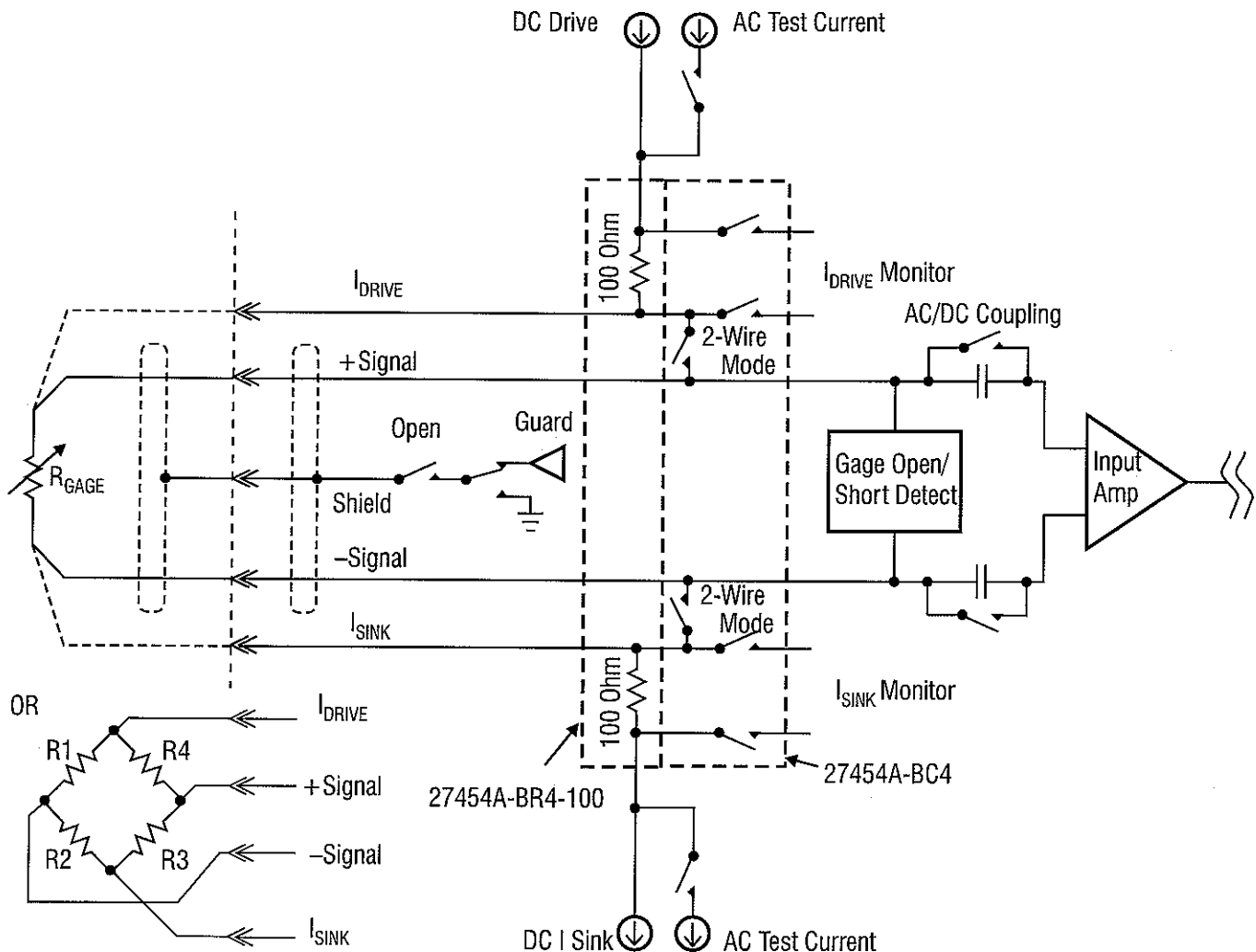
Resistors for current sense (100 Ω) and shunt cal resistor scaled for 1000 Ω bridge.

27454A-BR5-100-YYY:

Resistors for current sense (100 Ω) and user-specified shunt cal resistor.

Note: Specified shunt cal resistor gives 10 mV/V double shunt, or 5 mV/V single shunt for indicated bridge resistance.

Note: YYY = User specified shunt cal resistor. Consult factory for custom resistors.



27454A EXCITATION SUPPLY

Type: Balanced differential constant current excitation

Total Gage Voltage: $24 - I * 600$

Maximum Output: 25.55 mA

Steps: 0 to 25.55 mA in 50 μ A steps

Input Impedance: 100 k Ω nominal per side

CMRR (DC to 1 kHz): 80 dB for 120 Ω gage
70 dB for 350 Ω gage
60 dB for 1k Ω gage

Initial Accuracy: 5 μ A + 0.05% of setting

Temp. Drift: 30 nA + 0.0024% of setting per $^{\circ}$ C

Noise: 65 pA/ $\sqrt{\text{Hz}}$ at 1 kHz

Bandwidth: ± 0.05 dB to 50 kHz ($R_{\text{GAGE}} < 1$ kHz)

Open/Short Detection: Gage open and short detection. Short detection threshold is programmable.

27454A INPUT CHARACTERISTICS

Common Mode Voltage: ± 10 V operating

CMRR: 120 dB, DC to 60 Hz, with input gain of x8 or greater

Input Protection: ± 50 V

Input Impedance: 15 M Ω //100 pF per side
30 M Ω //50 pF differential
1000 M Ω //24 pF common mode

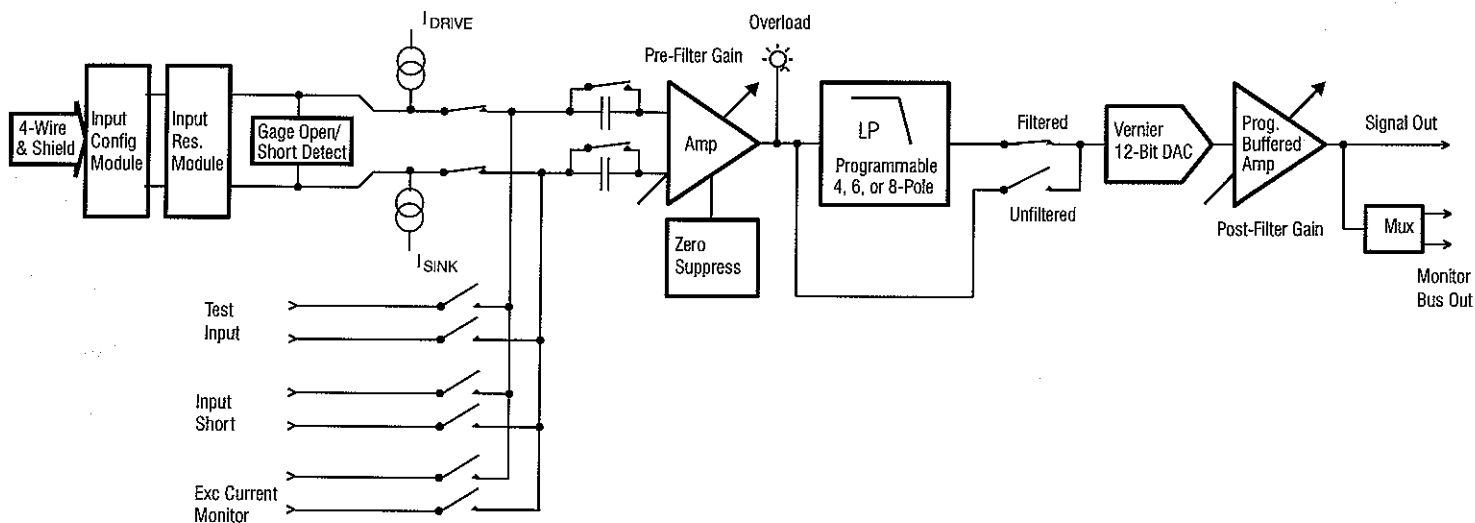
Max Level: ± 10 Vpk for $f \leq 50$ kHz;
 ± 10 Vpk (50 kHz/f) for $f > 50$ kHz

Offset Drift: 1 μ V/ $^{\circ}$ C, typical

Noise: 7 nV/ $\sqrt{\text{Hz}}$ RTI at 1 kHz and gain $> x64$

Shield: Programmable (driven, open, or grounded)

Gage Completion: Plug-on completion card provides 4-wire 100 $\Omega \pm 0.01\%$ current sense resistors and 2- & 4-wire connections to gage. Programmable local (gage) or remote (instrument) sense.



27454A INPUT CHARACTERISTICS (Continued)

Auto Zero Suppress: A programmable DC offset derived from a precision 10 V reference is injected at the channel input stage to suppress the gage DC operating voltage. Manual or automatic suppression modes are supported.

Ranges: -160 mV to +160 mV in 78 μ V steps
-1.25 V to +1.25 V in 625 μ V steps
-10.24 V to +10.24 V in 5 mV steps

Accuracy: 0.25% of setting +5 mV
DC Drift: \pm (Input drift + 13.5 μ V/ $^{\circ}$ C)

Auto Suppress Time: Less than 15 seconds per system of 64 channels

Option 6: Programmable AC/DC input coupling (1 Hz)

Note: Specs below apply to AC-coupled setting. Specs are unchanged from above for the DC-coupled setting.

Impedance: (0.1 μ F & 1.58 M Ω)//100 pF per side (1 Hz)

Common Mode Z: 0.2 μ F & 30 M Ω

CMRR: 120 dB, 60 Hz and input gain of x8 or greater

Noise: 14 nV/ $\sqrt{\text{Hz}}$ RTI at 1 kHz and gain $> x64$

Option N: Programmable Input Attenuator to support system go/no-go test option. Standard on 27454A cards.

27454A AMPLIFIER CHARACTERISTICS

Pre-filter Gain:	x1 to x512 in binary steps with overload detection (10.5 Vpk threshold)
Post-filter Gain:	x1/16 to x16 in binary steps with vernier adjustment of 0.05% of setting
Calibration:	DC Gain is automatically adjusted to better than 0.1% at any setting at user's command.
DC Accuracy:	0.1% after auto-adjust at any gain setting
Stability:	±0.02% for 6 months
Temp Coeff:	±0.004%/°C
DC Linearity:	±0.005% re Fullscale, relative to the best straight line
Freq. Response:	DC to 51 kHz, 0 dB ±0.1 dB 127.5 kHz, -0.2 dB ±0.15 dB
-3.01 dB Bandwidth:	250 kHz, typ
High Freq. Rolloff:	12 dB/octave

27454A TEST MODES

AC Current Inject:	A small AC current is injected into the current loop to evaluate end-to-end system frequency response. The AC current is generated from a voltage on the test bus. Frequency and amplitude of the AC current may be controlled by changing the frequency and amplitude of the test bus signal.
AC Current Ampl.:	100 μ A ±0.2% per volt of test bus signal
I Drive:	The excitation drive current is measured and verified by connecting the input amplifier to a precision sense resistor (100 Ω , 0.01%, 1 ppm).
I Sink:	The excitation sink current is measured and verified by connecting the input amplifier to a precision sense resistor (100 Ω , 0.01%, 1 ppm).
I Zero:	The excitation current is set to zero (open circuit).
Short:	A switch at the amplifier input is utilized to ground the input stage for measurement of noise and DC offset.
Test Bus:	Test input allows for injection of a test signal. An external test signal or the 27000B-?-TEST Test Subsystem may be connected at the rear panel. Refer to the 27000B-?-TEST Test Subsystem specification for more information.
Loop Resistance:	Excitation is set to 1 mA with unity amplifier gain to evaluate the resistance of the current loop.

CUTOFF FREQUENCY SETTINGS

A selection of cutoff frequency choices are supported, including fixed frequency and programmable cutoff frequency cards.

Fixed Frequency Filters

27454A-XXXX-YYY Single fixed frequency
YYY = Filter Type Characteristic
XXXX = Single fixed frequency, from 1 Hz to 127.5 kHz, listed as 1 to 999.9, 1K to 127K5

Examples:

XXXX=5 is $F_c = 5$ Hz
XXXX=100 is $F_c = 100$ Hz
XXXX=25K5 is $F_c = 25.5$ kHz
XXXX=1K25 is $F_c = 1.25$ kHz

Programmable Filters

27454A-F8???-YYY Single programmable frequency range.
YYY = Filter Type Characteristic
??? Hz to 255*??? Hz in ??? steps
where ??? = 1, 10, 100, 200 or 500
F8001 = 1 Hz to 255 Hz, 1 Hz steps
F8010 = 10 Hz to 2.55 kHz, 10 Hz steps
F8100 = 100 Hz to 25.5 kHz, 1 kHz steps
F8200 = 200 Hz to 51 kHz, 200 Hz steps
F8500 = 500 Hz to 127.5 kHz, 500 Hz steps

27454A-X-YYY Dual programmable frequency range.
YYY = Filter Type Characteristic
X = A, C or E
A = 5 Hz to 1.275 kHz in 5 Hz steps and 1.5 kHz to 127.5 kHz in 500 Hz steps
C = 1 Hz to 255 Hz in 1 Hz steps and 300 Hz to 25.5 kHz in 100 Hz steps
E = 1 Hz to 255 Hz in 1 Hz steps and 260 Hz to 2.55 kHz in 10 Hz steps

Custom Frequency Ranges

Custom frequency ranges are available. Contact the factory.

27454A FILTER TYPE CHARACTERISTICS

A wide selection of 8-pole, 6-pole, and 4-pole low-pass anti-alias filter types are offered on the 27454A card. Refer to the detailed filter selection guides on the following pages for detailed specifications on the filter types listed below.

8-Pole Filters

EL8: 8-pole, 8-zero Elliptic low-pass filter.
TD8: 8-pole, 6/8-zero constant time delay (linear phase) low-pass filter. Both the TD8A and TD8B characteristics are provided. Selecting between the TD8A and TD8B is accomplished via front panel or computer control.
BU8: 8-pole Butterworth low-pass characteristic.
BE8: 8-pole Bessel low-pass characteristic.

FILTER TYPE CHARACTERISTICS (Continued)

6-Pole Filters

- LP1: 6-pole, 6-zero Elliptic low-pass filter.
 TD6: 6-pole, 4/6-zero constant time delay (linear phase) low-pass filter. Both the TD6A and TD6B characteristics are provided. Selecting between TD6A and TD6B is accomplished via front panel or computer control.
 BU6: 6-pole Butterworth low-pass characteristic.
 BE6: 6-pole Bessel low-pass characteristic.

4-Pole Filters

- EL4: 4-pole, 4-zero Elliptic low-pass filter.
 TD4: 4-pole, 4-zero constant time delay (linear phase) low-pass filter.
 BU4: 4-pole Butterworth low-pass characteristic.
 BE4: 4-pole Bessel low-pass characteristic.

27454A FILTER SPECIFICATIONS

Cutoff Amplitude: -0.1 dB for EL8
 -3.01 dB for TD8B, BU8, BE8, LP1,
 TD6B, BU6, BE6, EL4, TD4, BU4, BE4
 -10.06 dB for TD8A
 - 9.61 dB for TD6A

BU4, BE4, EL4, TD4, BU6, BE6, TD6, BU8, BE8, TD8:

- Ampl. Accuracy: (DC to F-3.01 dB) ± 0.1 dB max
 Ampl. Match: (DC to F-3.01 dB) ± 0.05 dB max, $F_c \leq 20$ kHz
 ± 0.1 dB max, $F_c > 20$ kHz
 Phase Match: (DC to F-3.01 dB) $\pm 0.5^\circ$ max, $F_c \leq 20$ kHz
 $\pm 1^\circ$ max, $F_c > 20$ kHz

27454A FILTER SPECIFICATIONS (Continued)

For LP1, EL8:

- Ampl. Accuracy: (DC to F-0.1 dB) ± 0.1 dB max, $F_c \leq 20$ kHz
 (DC to F-0.1 dB) ± 0.15 dB max, $F_c > 20$ kHz
 Ampl. Match: (DC to F-0.1 dB) ± 0.05 dB max, $F_c \leq 20$ kHz
 ± 0.1 dB max, $F_c > 20$ kHz
 Phase Match: (DC to F-0.1 dB) $\pm 0.5^\circ$ max, $F_c \leq 20$ kHz
 $\pm 1^\circ$ max, $F_c > 20$ kHz

Filter Bypass (Std): Bypasses the filter but not the amplifier stages.

Stop-Band Amplitude Response

- Conformance: f = frequency in the stop-band or where there is greater than 80 dB attenuation for monotonic filters.
 A_{min} = Minimum stop-band attenuation of filter or -80 dB for monotonic filters.
 for $f \leq 100$ kHz, attenuation = $A_{min} \pm 3$ dB
 for $100 \text{ kHz} < f < 1 \text{ MHz}$, $A_{min} \pm 5$ dB

Option P: Enhanced filter module

8-Pole Filter Selection Guide

	EL8	TD8		BU8	BE8
		TD8A	TD8B		
Filter Type	LP	LP	LP	LP	LP
Function	Cauer	Bessel w/Z	Bessel w/Z	Butterworth	Bessel
Number of Poles, Zeroes	8p, 8z	8p, 6z	8p, 8z	8p	8p
Pass-band Ripple (dB p-p)	0.1	n/a	0.2	n/a	n/a
-0.1 dB Frequency	F_c	$0.104 F_c$	$0.569 F_c$	$0.791 F_c$	$0.185 F_c$
-3.01 dB Frequency	$1.099 F_c$	$0.565 F_c$	F_c	F_c	F_c
-20 dB Frequency	$1.266 F_c$	$1.345 F_c$	$1.694 F_c$	$1.333 F_c$	$2.347 F_c$
-40 dB Frequency	$1.441 F_c$	$1.867 F_c$	$2.340 F_c$	$1.778 F_c$	$3.337 F_c$
-60 dB Frequency	$1.618 F_c$	$2.396 F_c$	$2.951 F_c$	$2.371 F_c$	$4.522 F_c$
-80 dB Frequency	$1.750 F_c$	$2.915 F_c$	$3.332 F_c$	$3.162 F_c$	$6.069 F_c$
Stop-band Frequency	$1.788 F_c$	n/a	$3.332 F_c$	n/a	n/a
Stop-band Atten. (dB)	90.75	n/a	80.28	n/a	n/a
Phase at F_c ($^\circ$)	-359.20	-301.88	-301.88	-360.00	-182.16
Phase Distortion at F_c ($^\circ$)	84.9	0.23	0.23	66.2	0.00
Overshoot (%)	19.8	0.19	5.56	16.7	0.34
1% Settling Time (sec)	$5.15/F_c$	$1.34/F_c$	$1.54/F_c$	$3.45/F_c$	$0.79/F_c$
0.1% Settling Time (sec)	$7.97/F_c$	$1.86/F_c$	$2.23/F_c$	$5.08/F_c$	$1.14/F_c$

27454A OUTPUT CHARACTERISTICS

Type: DC-coupled, single-ended output. Programmable wideband (100 kHz) or filtered.

Z: 50 Ω shunted by 100 pF

Max Output: ± 10 Vpk, ± 20 mApk

Offset Drift: 1 $\mu\text{V}/^\circ\text{C}$, RTI + 150 $\mu\text{V}/^\circ\text{C}$, RTO, typ

Noise: 2 μVrms RTI + 300 μVrms RTO, typ
0.1 Hz to 127.5 kHz

Crosstalk: -80 dB, DC to 25 kHz between adjacent channels with the same configuration and programmed settings.

Auto-Offset Adjust (Standard)

Auto-offset automatically zeroes offset at the channel output to less than 5 mV at any gain setting. The auto-offset cycle is initiated in the GUI. The offset DAC settings are stored in non-volatile memory on the card for every gain setting. Changes in gain result in minimal disruption of the channel.

Output Monitor (Standard)

Output Monitor: A switch located at the output of each channel allows for multiplexed connection to the mainframe output monitor bus. The output monitor bus is available at a connector located in the 17th slot at the rear of the mainframe. The monitor function is used by the Test Subsystem or is available to the user for viewing channel outputs.

27454A CARD GENERAL CHARACTERISTICS

27454A Card Size: 5.68 x 13.15 x 0.75 inches
14.43 x 33.40 x 1.91 cm

Card Weight: 1.87 lb. net, 3.3 lb. shipping
(0.85 kg net, 1.5 kg shipping)

Temperature: 0 $^\circ$ to 40 $^\circ$ C (operating)
-20 $^\circ$ to 70 $^\circ$ C (storage)

27000 MAINFRAME

27000D-M3-E03: 16-slot chassis with low-noise linear supply and four DB50 connectors for 27454A outputs. External excitation supply input (Option E). RS-232C remote interface. Compatible with all other 27000 signal conditioning cards. 120 VAC operation, 46-66 Hz.

Option 2: 220 VAC Power Supply

Option 3: 240 VAC Power Supply

BACKPLANE INTERFACE CARD

27000C-BIF1: Backplane interface module with Auto Offset capability. Installed in dedicated card slot 17 in 27000D-M3-E03 mainframe.

Option T: Test hardware to support 27000B-2-TEST

6-Pole Filter Selection Guide

	LP1	TD6A	TD6B	BU6	BE6
Filter Type	LP	LP	LP	LP	LP
Function	Cauer	Bessel w/Z	Bessel w/Z	Butterworth	Bessel
Number of Poles, Zeroes	6p, 6z	6p, 4z	6p, 6z	6p	6p
Pass-band Ripple (dB p-p)	0.1	n/a	0.2	n/a	n/a
-0.1 dB Frequency	0.925 F_c	0.109 F_c	0.582 F_c	0.731 F_c	0.186 F_c
-3.01 dB Frequency	F_c	0.589 F_c	F_c	F_c	F_c
-20 dB Frequency	1.190 F_c	1.388 F_c	1.882 F_c	1.467 F_c	2.350 F_c
-40 dB Frequency	1.474 F_c	2.113 F_c	3.093 F_c	2.154 F_c	3.640 F_c
-60 dB Frequency	1.776 F_c	3.017 F_c	4.428 F_c	3.162 F_c	5.416 F_c
-80 dB Frequency	1.970 F_c	4.064 F_c	n/a	4.642 F_c	7.990 F_c
Stop-band Frequency	1.970 F_c	n/a	4.893 F_c	n/a	n/a
Stop-band Attenuation (dB)	80	n/a	70	n/a	n/a
Phase at F_c ($^\circ$)	-358.50	-255.32	-255.32	-270.00	-154.37
Phase Distortion at F_c ($^\circ$)	111.3	2.11	2.11	48.6	0.00
Overshoot (%)	19.2	0.60	5.04	14.4	0.64
1% Settling Time (sec)	4.64/ F_c	1.21/ F_c	1.46/ F_c	2.36/ F_c	0.74/ F_c
0.1% Settling Time (sec)	8.45/ F_c	1.94/ F_c	2.21/ F_c	3.89/ F_c	1.16/ F_c

ACCESSORIES

Input Connectors

The input connectors are integral to the 27454A. Cutouts on the 27000 Mainframe allow for the input connector to pass through the backplane to directly mate with the input cable.

27000-IN-26D: High-Density 26-pin D-shell mating connector with crimp pins and backshell with strain relief. Two connectors required per slot (4 channels).

27000-IN-26D-SC: Same as above, with solder cup pins.

Output Connectors

The 27000D-M0-EO3 mainframe contains 4 50-pin D shell connectors mounted on the rear panel. Sixteen twisted pairs are accommodated per connector.

27000-OUT-50D: 50-pin D-shell mating connector with crimp pins and backshell with strain relief. One required per 16 channels or up to four per 27000 mainframe.

27000-OUT-50D-SC: Same as above with solder cup pins.

Cables

CB-DD50P/16BNCL-L: DD50P to 16 channel isolated BNC male output cable. L = length in feet.

CB-DD50P/16BNCF-BH-L: DD50P to 16 channel isolated BNC female output cable for bulkhead panel mount. L = length in feet.

PNL-32BNCBH-1U: Panel for 32 bulkhead mounted BNC's. Standard 19" rack mount, 1.75" high.

ACCESSORIES (Continued)

Fan Trays

When greater than four cards are installed in the 27000 mainframe, fan trays are required for system cooling.

27000-FT1: Fan Tray Assembly 115 VAC
27000-FT2: Fan Tray Assembly 220 VAC

Note: Fan trays require 2U of rack space above and 1U of rack space below the 27000 chassis for a total of 5.25 inches of vertical rack space. The fan trays accommodate a rack mounting depth of 17.75 inches to 23.75 inches.

Rack Mount Kits

SM18: Rack mount kit with slides. Accommodates a nominal rack mounting depth of 18 inches.

SM20: Rack mount kit with slides. Accommodates a nominal rack mounting depth of 20 inches.

SM22: Rack mount kit with slides. Accommodates a nominal rack mounting depth of 22 inches.

SM24: Rack mount kit with slides. Accommodates a nominal rack mounting depth of 24 inches.

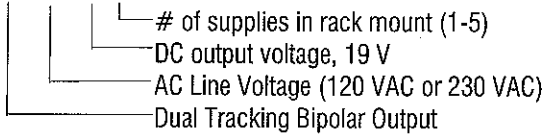
4-Pole Filter Selection Guide

	EL4	TD4	BU4	BE4
Filter Type	LP	LP	LP	LP
Function	Cauer	Bessel w/Z	Butterworth	Bessel
Number of Poles, Zeroes	4p, 4z	4p, 4z	4p	4p
Pass-band Ripple (dB p-p)	0.1	n/a	n/a	n/a
-0.1 dB Frequency	0.827 F _c	0.189 F _c	0.625 F _c	0.189 F _c
-3.01 dB Frequency	F _c	F _c	F _c	F _c
-20 dB Frequency	1.492 F _c	2.524 F _c	1.776 F _c	2.542 F _c
-40 dB Frequency	2.398 F _c	4.483 F _c	3.162 F _c	4.724 F _c
-60 dB Frequency	3.666 F _c	7.049 F _c	5.623 F _c	8.482 F _c
-80 dB Frequency	4.719 F _c	9.144 F _c	10.00 F _c	15.13 F _c
Stop-band Frequency	4.719 F _c	9.144 F _c	n/a	n/a
Stop-band Attenuation (dB)	80	80	n/a	n/a
Phase at F _c (°)	-220.35	-107.16	-180.00	-120.82
Phase Distortion at F _c (°)	53.26	0.25	30.49	0.28
Overshoot (%)	13.8	0.80	11.4	1.03
1% Settling Time (sec)	2.73/F _c	0.63/F _c	1.66/F _c	0.64/F _c
0.1% Settling Time (sec)	4.36/F _c	1.15/F _c	2.73/F _c	1.00/F _c

EXTERNAL EXCITATION SUPPLIES

Note: One excitation supply is required per mainframe. Up to five excitation supplies can be housed in one cabinet.

27000-EXC2-YYY-19-n



GRAPHICAL USER INTERFACE

27000-GUI-WIN: Graphical User Interface Software for 27000 system. Requires Pentium III Computer with one serial port, 1024x768 graphics resolution and 128 MB of RAM.

27000-GUI-WIN-SL: Site license for 27000 GUI software.

OPTIONAL BUILT-IN TEST

27000B-2-TEST: Test instruments required for Factory Acceptance Test (FAT) and Go/No-Go (GNG) tests.

27454A-FAT-WIN: Factory Acceptance Test software. Requires Pentium computer as specified for 27000-GUI-WIN. In addition, the 27000-FAT-WIN requires two serial ports or one GPIB port for control of the test instruments.

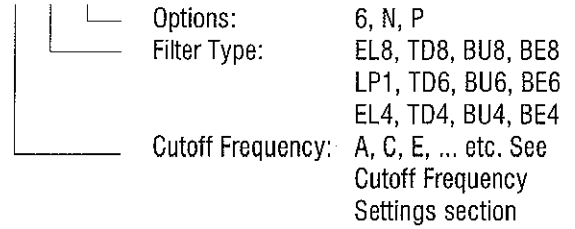
27454A-GNG-WIN: Go/No-Go Test software. Requirements are the same as for the 27000-FAT-WIN

27454A-FAT-WIN-SL: Site license for 27000 FAT software.

27454A-GNG-WIN-SL: Site license for 27000 GNG software.

ORDERING INFORMATION

27454A-X-YYY-?



Note: A 27454A-BC? input configuration module and 27454A-BR? input resistor module must be ordered in addition to the base 27454A card.

