GY4102A Fast Toggling Video Switch

Features

- 20 ns switching time (toggle)
- make-before-break switching
- 100 MHz at ±0.1dB, bandwidth (flattened)
- Pb-free and Green
- typically 0.04 dB insertion loss at 1 MHz
- typically 0.03 % differential gain at 3.58 MHz
- typically 0.01 degree differential phase at 3.58 MHz

Applications

- Sub-pixel video switching
- Fast data sampling
- Modulation
- Special Effects video switching

Description

The GY4102A is a bipolar, monolithic SPDT video switch incorporating fast control logic. The analog signal path is characterised by low differential gain, low differential phase and low insertion loss, coupled with a ±0.1dB bandwidth of typically 100MHz into a 10pF load, using an external series resistor.

In demanding video applications the GY4102A features a typical switching glitch of less than 30mV over a 3ns period. The device offers toggle rates up to 50MHz. The control input is TTL and 5V CMOS compatible.

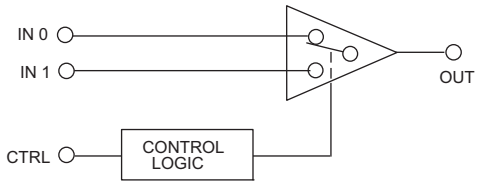


Figure A: GY4102A Functional Block Diagram

Revision History

Version	Date	Changes and/or Modifications
4	November 2009	Updated to latest Gennum template and changed from document number 52021 to 13408.
3	July 2004	Added lead-free and green information.
2	–	Revisions made.
1	February 1991	New document.

Contents

1. Pin Connections

1.1 Pin Connections

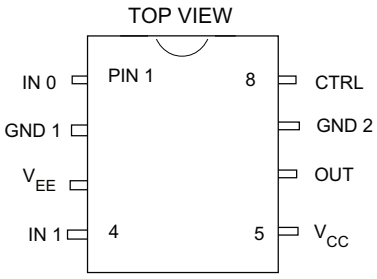


Figure 1-1: 8-Pin PDIP, 8-Pin SOIC

1.2 Truth Table

Table 1-1: Truth Table

CTRL	OUTPUT
0	IN 0
1	IN 1

2. Electrical Characteristics

2.1 Absolute Maximum Ratings

Table 2-1 lists the absolute maximum ratings for the GY4102A. Conditions exceeding the limits listed may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those listed in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Table 2-1: Absolute Maximum Ratings

Parameter	Value
Supply Voltage Range	±6.0 V
Operating Temperature Range	-0°C to 70°C
Storage Temperature Range	-65°C to 150°C
Lead Temperature (Soldering, 10 Sec)	260°C
Analog Input Voltage (IN 0, IN 1)	$V_{EE} < V_{IN} < V_{CC} + 0.3V$
Control Input Voltage Range	$-5V < V_{CTRL} < V_{CC} + 0.3V$

2.2 Electrical Characteristics

Table 2-2 shows the electrical characteristics of the GY4102A where conditions are V_S = ±5V DC, T_A = 0 to 70°C, C_L = 10pF, R_L = 10kΩunless otherwise shown.

Table 2-2: Electrical Characteristics

	Parameter	Symbol	Conditions	Min	Typ	Max	Units
DC SUPPLY	Supply Voltage	$\pm V_S$	–	4.5	5	5.5	V
	Supply Current	I +	–	–	23	30	mA
		I -	–	–	25	32	mA
LOGIC	Control Input Bias	I_{CTRL}	Control = 1	–	5	25	µA
	Logic Level Threshold	V_{LOGIC}	1	2	–	–	V
			0	–	–	0.8	V

Table 2-2: Electrical Characteristics (Continued)

	Parameter	Symbol	Conditions	Min	Typ	Max	Units
STATIC	Analog Input Bias Current	I_{BIAS}	Selected Channel	–	12	30	µA
			Deselected Channel	–	26	60	µA
	Signal Voltage Swing	V_{SIG}	Extremes before clipping occurs	-1.5	–	+3	V
	Output Offset Voltage	V_{OS}	T_A = 25°C	-6	+4	+14	mV
	Output Offset Voltage	$V_{OSCH-CH}$	T_A = 25°C channel to channel	–	1	5	µA
	Output Offset Drift	$\Delta V_{OS}/T$	–	–	+93	+200	µV/°C
DYNAMIC	Input Resistance	R_{IN}	Channel On	500	–	–	kΩ
	Input Capacitance	C_{IN}	Channel On	1.3	–	–	pF
	Frequency Response Flatness	–	DC - 100MHz R_S = 33Ω	–	±0.2	–	dB
			DC - 8MHz R_S = 33Ω	–		±0.01	dB
	Insertion Loss	IL	*f* = 1MHz	–	0.04	–	dB
	Differential Gain	dg	*f* = colorburst 3.58 or 4.43MHz	–	0.03	–	%
	Differential Phase	dp	*f* = colorburst 3.58 or 4.43MHz	–	0.01	–	degrees
	Crosstalk (all hostile)	$XTALK_{AH}$	*f* = 10MHz See Figure 3-3.	75	80	–	dB
	Slew Rate	+SR	V_{IN} = 2Vp-p T_A = 25°C	400	620	–	V/µs
		-SR		250	330	–	V/µs

2.3 Switching Characteristics

Table 2-3 shows the switching characteristics of the GY4102A where conditions are V_S = ±5V, T_A = 0°C to 70°C, C_L = 10pF, R_S = 33Ω, R_L = 10kΩ, unless otherwise shown.

Table 2-3: Switching Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Delay Time	t_d (on 1)	V_{SIG} = 0 -1V	–	5.4	9	ns
	t_d (on 2)		–	8.2	13	ns
	t_d (off 1)	V_{SIG} = 1 - 0V	–	6	11	ns
	t_d (off 2)		–	12.5	22	ns
Settling Time	t_S (on)	T_O 0.5 IRE on 0 to 1V output, T_A = 25°C	–	9	15	ns
	t_S (off)	T_O 0.5 IRE on 1 to 0V output, T_A = 25°C	–	7	15	ns
Switching Transient* (Unfiltered)		POS Amplitude	–	+30	+50	mV
		POS Duration	–	3	5	ns
		NEG Amplitude	–	-20	-30	mV
*CH0 = CH1 = GND		NEG Duration	–	2	3	ns

3. Typical Performance Curves

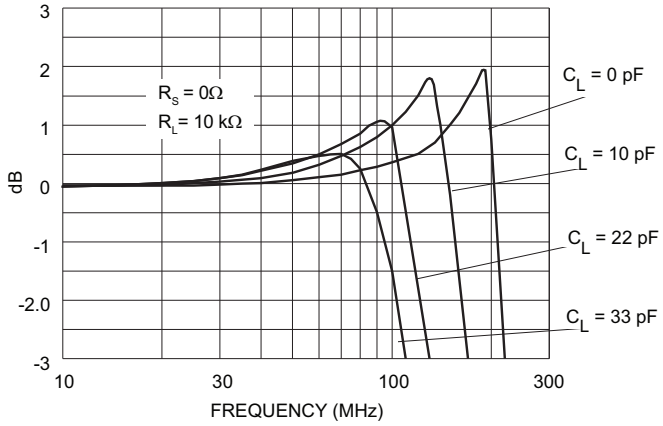


Figure 3-1: Frequency Response

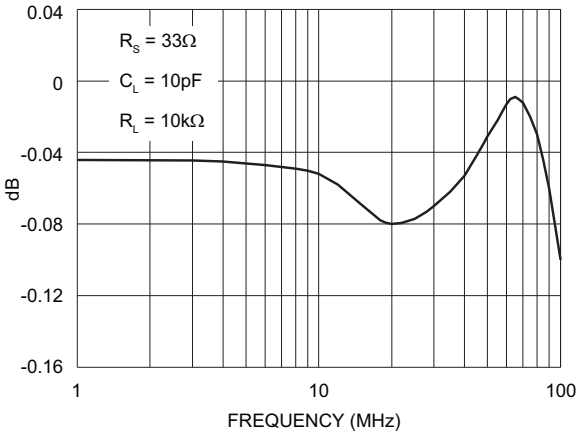


Figure 3-2: Flattened Frequency Response

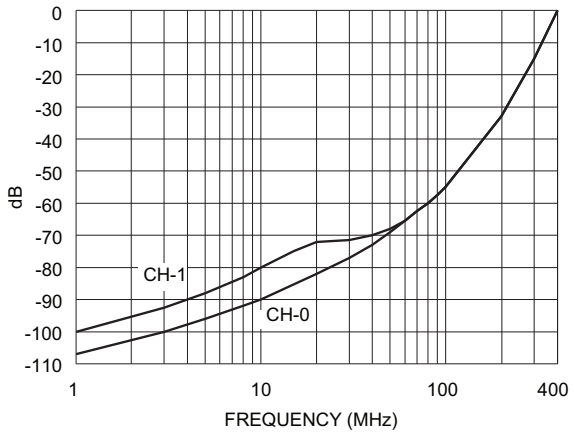


Figure 3-3: Crosstalk vs Frequency

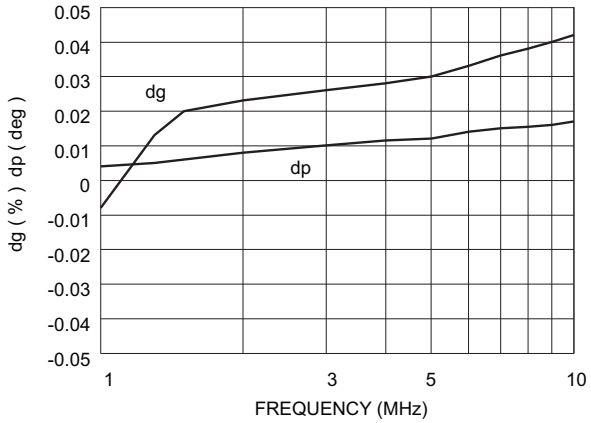
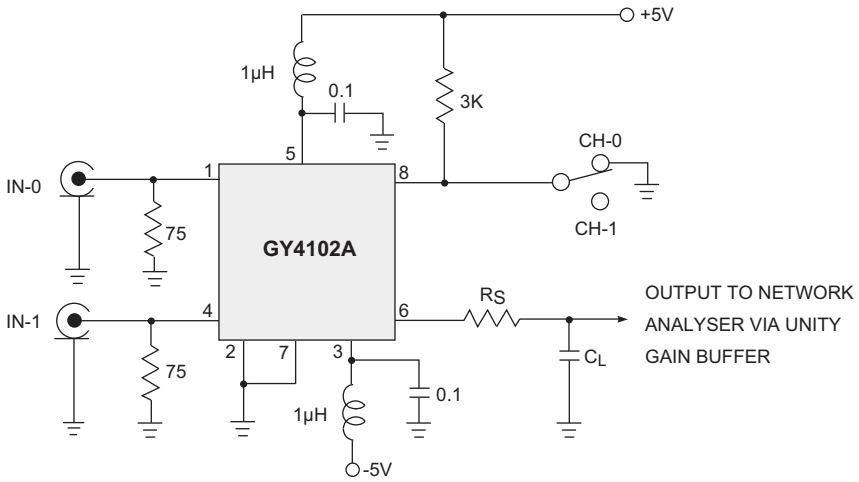


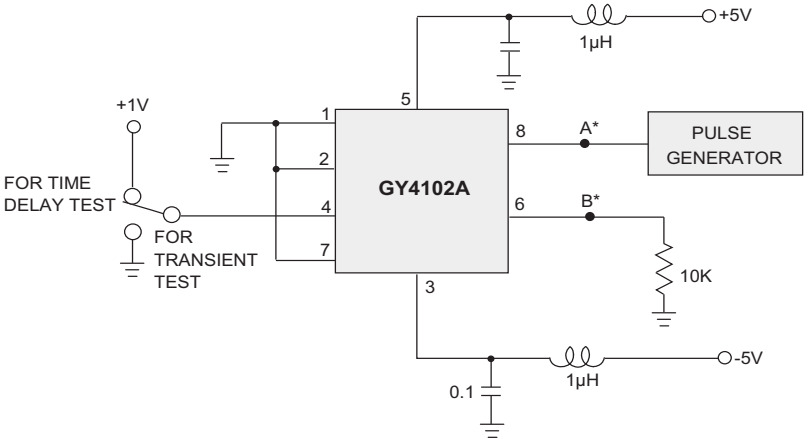
Figure 3-4: Differential Gain and Phase

4. Test Circuits



All resistors in ohms, all capacitors in microfarads, unless otherwise stated.

Figure 4-1: Frequency Response



*USE ULTRA LOW CAPACITANCE SCOPE PROBES AT POINTS A & B

PULSE GENERATOR CHARACTERISTICS: $t_r = t_f \leq 1ns$ $V_o = 5V$ $p_{rr} \leq 20MHz$

All resistors in ohms, all capacitors in microfarads, unless otherwise stated.

Figure 4-2: Switching Transient/Time Delays

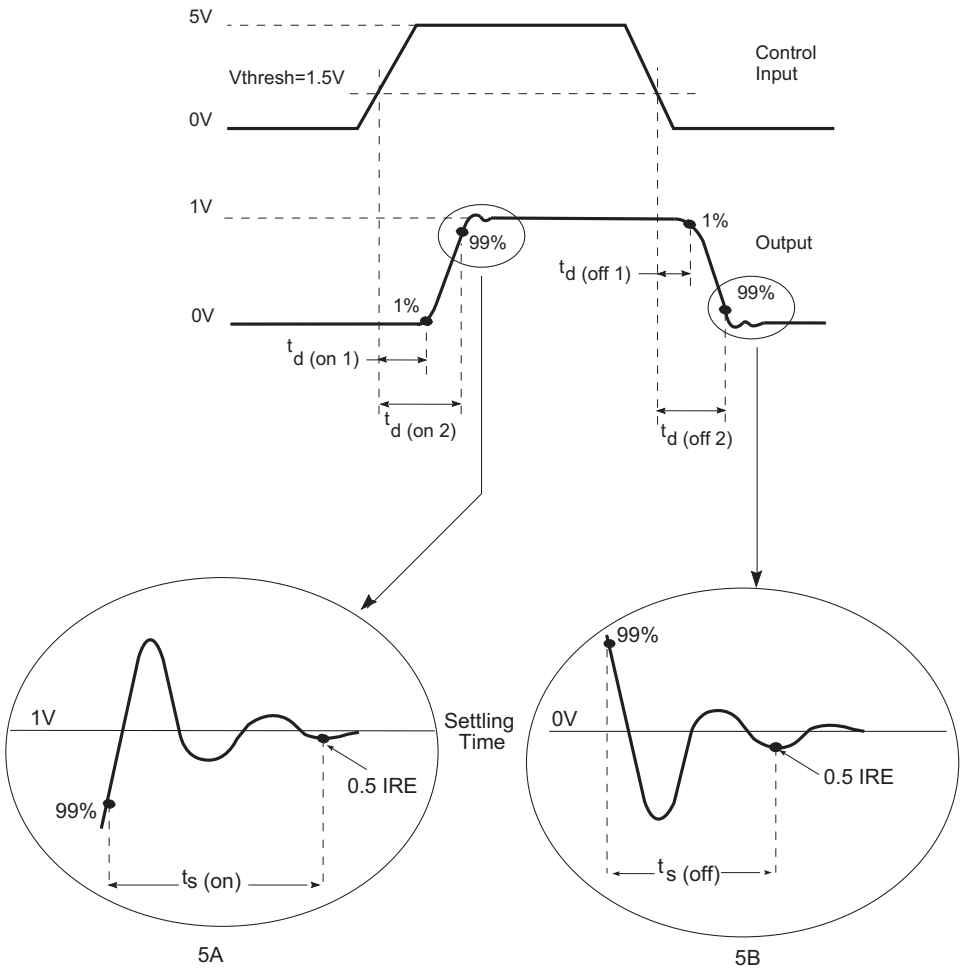


Figure 4-3: Delay Time

5. Ordering Information

Table 5-1: Ordering Information

Part Number	Package	Temperature Range	Pb-Free and Green
GY4102ACDA	8 pin PDIP	0°C to 70°C	No
GY4102ACKA	8 pin SOIC	0°C to 70°C	No
GY4102ACKAE3	8 pin SOIC	0°C to 70°C	Yes

DOCUMENT IDENTIFICATION
DATA SHEET
The product is in production. Gennum reserves the right to make changes to the product at any time without notice to improve reliability, function or design, in order to provide the best product possible.

CAUTION
ELECTROSTATIC SENSITIVE DEVICES
DO NOT OPEN PACKAGES OR HANDLE EXCEPT AT A STATIC-FREE WORKSTATION

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