General Description

The Maxim HI-201 monolithic CMOS quad single-polesingle-throw (SPST) analog switch is a plug-in upgrade for the Harris HI-201. Maxim has eliminated the need for a VREF supply, which is normally required for operation with power supplies other than ± 15 V. And Maxim's part consumes 1/4 the power (4mW typ), making it better suited for portable applications.

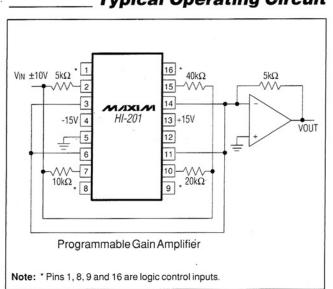
Maxim's switch can be continuously operated with power supplies ranging from ± 4.5 V to ± 18 V, or single supplies over a range of ± 5 V to ± 30 V. Each switch can be independently selected and features fast switching (ton= 260ns, toff = 100ns typ) and low on resistance (45Ω typ). Maxim guarantees these switches will not latchup if the power supplies are disconnected with switch input signals still present. Logic inputs are both CMOS and TTL compatible without the need for pull-up resistors.

Applications

Disk Drives Test Equipment Communication Systems

PBX, PABX

- Guidance and Control Systems
- Heads-Up Displays



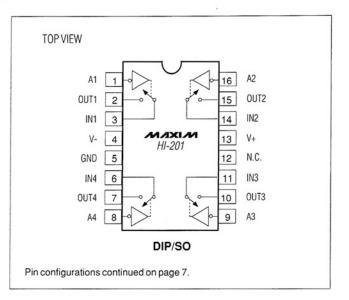
Typical Operating Circuit

Features

- No VREF Supply Required
- Monolithic, Low-Power CMOS Design
- Guaranteed Single-Supply Operation from +5V to +30V
- Guaranteed ±4.5V to ±18V Operation
- Fast Switching Times: ton = 260ns (typ) toff = 100ns (typ)
- 45Ω (typ) On Resistance
- Non-Latching with Supplies Turned Off and Input Signals Present
- CMOS and TTL Logic Compatible (0.8V/2.4V)

Ordering Information PIN-PACKAGE TEMP. RANGE PART 16 Plastic DIP HI3-0201-5 0°C to +70°C 16 Wide SO HI6-0201-5 0°C to +70°C 16 CERDIP 0°C to +70°C HI1-0201-5 0°C to +70°C Dice HI0-0201-6 HI3-0201-9 -40°C to +85°C 16 Plastic DIP 16 Wide SO HI6-0201-9 -40°C to +85°C -40°C to +85°C 16 CERDIP HI1-0201-9 16 CERDIP -55°C to +125°C HI1-0201-2 HI4-0201-8* -55°C to +125°C 20 LCC Contact Factory for Availability

Pin Configurations



_____ Maxim Integrated Products 1

For pricing, delivery, and ordering information, please contact Maxim/Dallas Direct! at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage Between Pins 4 and 13 .44V (±22) VREF to Ground .20V, -5V Digital Input Voltage +VSUPPLY +4V
-V _{SUPPLY} -4V Analog Input Voltage (One Switch) +V _{SUPPLY} +2.0V -V _{SUPPLY} -2.0V
Analog Current - Continuous, Peak

Operating Temperature
HI0201-5,6
HI0201-9
HI0201-2,8
Storage Temperature
Power Dissipation (Note 1)
16-Pin CERDIP (Note 2)
16-Pin Plastic DIP (Note 3) 470mW
16-Pin Wide SO (Note 4) 400mW

Note 1: Device mounted with all pins soldered to PC board. Note 2: Derate 12mW/°C above +75°C. Note 3: Derate 6.5mW/°C above +25°C. Note 4: Derate 7mW/°C above +25°C.

Stresses listed under "Absolute Maximum Ratings" may be applied (one at a time) to devices without resulting in permanent damage. These are stress ratings only, and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum ratings conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

(V+ = +15V, V- = -15V, GND = 0V, TA = +25 $^{\circ}$ C, unless otherwise noted.)

			LIMITS							
PARAMETER	SYMBOL	CONDITIONS		HI0201-2/8			HI0201-5/6/9			
				MIN (Note 5)	TYP (Note 6)	MAX	MIN (Note 5)	TYP (Note 6)	MAX	
SWITCH										
Analog-Signal Range	VANALOG			-15		15	-15		15	V
Drain-Source On Resistance (Note 7)	rDS (on)	$V_D = \pm 10V$,	VIN = 0.8V, IS = 1mA		45	70		45	80	Ω
Source-Off Leakage Current	IS (off)	VIN = 2.4V	$V_{S} = 14V, V_{D} = -14V$	-5	±0.01	5	-10	±0.01	10	- nA
			Vs = -14V, VD = 14V	-5	±0.02	5	-10	±0.02	10	
Drain-Off Leakage Current	ID (off)	V _{IN} = 2.4V	$V_D = 14V, V_S = -14V$	-5	±0.01	5	-10	±0.01	10	nA
			VD = -14V, VS = 14V	-5	±0.02	5	-10	±0.02	10	
Drain-On Leakage Current (Note 8)		$V_{S} = -14V, V_{IN} = 0.8V$ $V_{D} = 14V, V_{IN} = 0.8V$		-5	±0.1	5	-10	±0.1	10	
	ID (on)			-5	±0.15	5	-10	±0.15	10	- nA
LOGIC INPUT										
Input Current with Input Voltage High	Іілн	VIN = 2.4V		-1	±0.0004	1	-1	±0.0004	1	
		VIN = 15V		-1	0.003	1	-1	0.003	1	μΑ
Input Current with Input Voltage Low	linl	VIN = OV		-1	±0.0004	1	-1	±0.0004	1	μΑ

ELECTRICAL CHARACTERISTICS (continued)

(V+ = +15V, V- = -15V, GND = 0V, TA = +25°C, unless otherwise noted.)

			LIMITS							
PARAMETER	SYMBOL	CONDITIONS		HI0201-2/8			HI0201-5/6/9			
	CONDITIONS			MIN (Note 5)	TYP (Note 6)	MAX	MIN (Note 5)	TYP (Note 6)	МАХ	
DYNAMIC										
Turn-On Time	ton	See Switching-Time Test	t Circuit		260	400		260	500	ns
Turn-Off Time	toff	See Switching-Time Test		100	300		100	350	ns	
Charge Injection	Q	CL = 1000pF, VGEN = 0		20			20		pC	
Source-Off Capacitance	CS (off)	$V_{S} = 0V, V_{IN} = 5V$	f = 140kHz		5			5		pF
Drain-Off Capacitance	CD (off)	$V_S = 0V, V_{IN} = 5V$	f = 140 kHz		5			5		pF
Channel-On Capacitance	CD (on) ⁺ CS (on)	$V_D = V_S = 0V, V_{IN} = 0V$	f = 140kHz		16			16		pF
Off Isolation		$V_{IN} = 5V, Z_L = 75\Omega$			70			70		dB
Crosstalk (Channel-to-Channel)		VS = 2.0V, f = 100kHz			90			90		dB
SUPPLY										
Positive Supply Current	l+	All Channels On or Off			0.2	0.3		0.2	0.3	mA
Negative Supply Current	-			-0.1	-0.01		-0.1	-0.01		mA
Power-Supply Range for Continuous Operation	VOP	(Note 7)		±4.5		±18	±4.5		±18	V

Note 5: The algebraic convention where the most negative value is a minimum and the most positive a maximum is used in this data sheet. Note 6: Typical values are for DESIGN AID ONLY, not guaranteed or subject to production testing. Note 7: Electrical characteristics, such as on resistance, will change when power supplies other than ±15V are used.

Note 8: ID(on) is leakage from driver into on switch.

N/XI/N

ELECTRICAL CHARACTERISTICS

(V+ = +15V, V- = -15V, GND = 0V, TA = TMIN to TMAX)

		1. T.	LIMITS							
PARAMETER	SYMBOL	CONDITIONS		HI201-2/7/8			HI201-5/6/9			
FANAMETEN	STWDUL			MIN (Note 5)	TYP (Note 6)	MAX	MIN (Note 5)	TYP (Note 6)	МАХ	UNITS
SWITCH										
Analog-Signal Range	VANALOG			-15		15	-15		15	V
Drain-Source On Resistance (Note 9)	rDS (on)	$V_D = \pm 10V, V_{IN} = 0.8V, I_S = 1mA$				100			100	Ω
Source-Off Leakage		V _{IN} = 2.4V	VS = 14V, VD = -14V			500			250	nA
Current	IS (off)		Vs = -14V, Vp = 14V	-500			-250			
Drain-Off Leakage Current	ID (off)	VIN = 2.4V	V _D = 14V, V _S = -14V			500			250	nA
			VD = -14V, VS = 14V	-500			-250			
Drain-On Leakge	ID (on)	$V_{S} = -14V, V_{IN} = 0.8V$ $V_{D} = 14V, V_{IN} = 0.8V$				500			250	nA
Current (Note 10)				-500			-250			
LOGIC INPUT										
Input Current with Input Voltage High	IINH	VIN = 2.4V		-1.0			-1.0			μA
		VIN = 15V				1.0			1.0	μΛ
Input Current with Input Voltage Low	linl	VIN = 0V		-1.0			-1.0			μA
DYNAMIC										
Turn-On Time	ton	See Switching-Time Test Circuit				500			600	ns
Turn-Off Time	toff	See Switching-Time Test Circuit				400			450	ns
SUPPLY				1						
Positive Supply Current	1+	All Channels On or Off				0.4			0.4	mA
Negative Supply Current	-	All Channels On or Off		-0.1			-0.1			mA

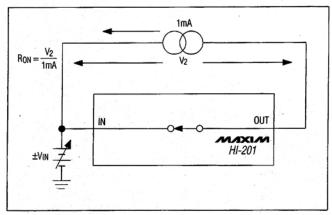
Note 9: Electrical characteristics, such as on resistance, will change when power supplies other than $\pm 15V$ are used. **Note 10:** $I_{D(on)}$ is leakage from driver into on switch.

HI-201

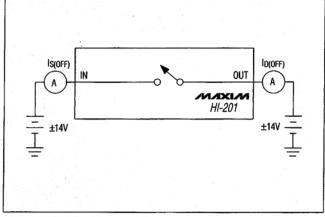
Protecting Against _____Fault Conditions

Fault conditions occur when power supplies are turned off and input signals are still present, or overvoltages occur at the inputs during normal operation. In either case, source-to-body diodes can be forward biased and conduct current from the signal source. If this current is required to be kept to low (μ A) levels, the addition of external protection diodes is recommended (Figure 1).

To provide protection for overvoltages up to 20V above the supplies, a 1N4001 or 1N914 type diode should be placed in series with the positive and negative supplies, as shown in Figure 1. The addition of these diodes will reduce the analog-signal range to 1V below the positive supply and 1V above the negative supply.









MIXIM

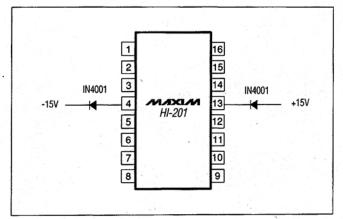
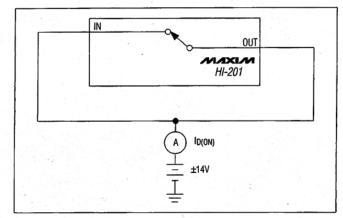


Figure 1. Protection Against Fault Conditions





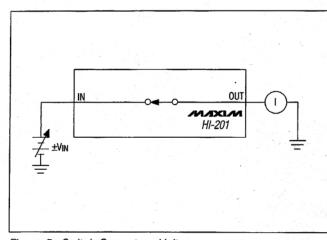
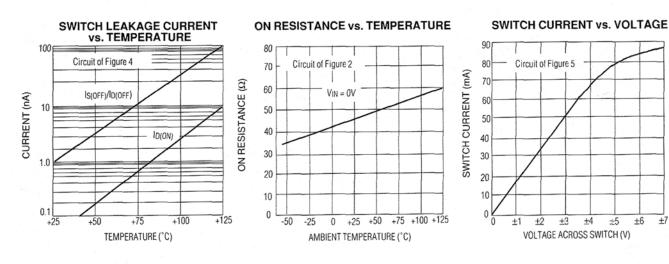


Figure 5. Switch Current vs. Voltage

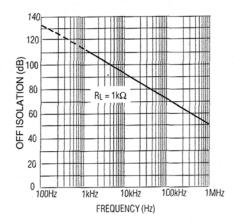
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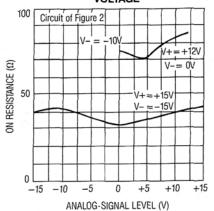
Typical Operating Characteristics



OFF ISOLATION vs. FREQUENCY



ON RESISTANCE vs. ANALOG-SIGNAL LEVEL AND POWER SUPPLY VOLTAGE

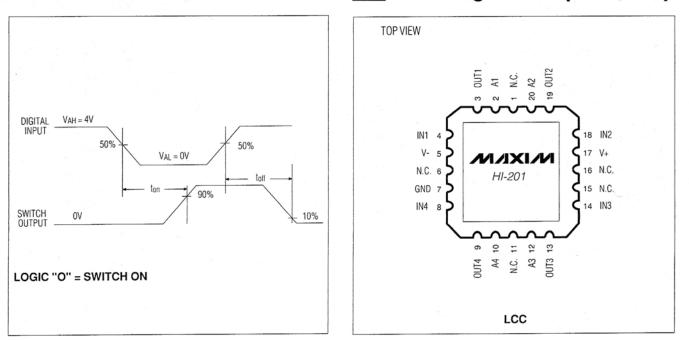


HI-201

6

N/IXI/N

±6 ±7



_ Pin Configurations (continued)

Figure 6. HI-201 Switch Timing

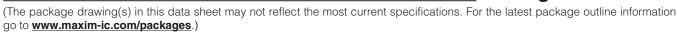
HI-201

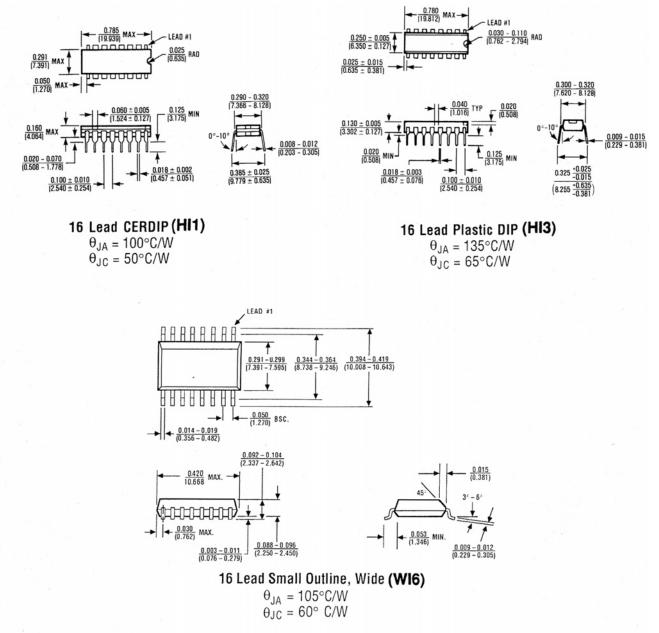
MIXIM.

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HI-20

Package Information





Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

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