# Dual/Quad RF/Video Switches

T-51-11

### **General Description**

The IH5341 and the IH5352 are dual and quad, single pole single throw (SPST) switches designed specifically for switching RF and video signals. Maxim's IH5341 and IH5352 incorporate an enhanced series-shunt-series structure, providing 70dB of OFF isolation and Cross Schuling rejection (an additional 40dB) are not structure. cross coupling rejection (an additional 10dB compared with other manufacturers' products).

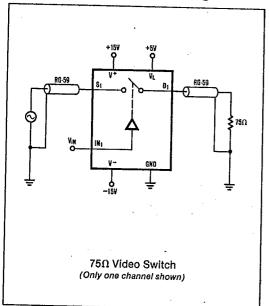
Both devices can be operated with supplies ranging from  $\pm 5V$  to  $\pm 15V$ . The switches typically have a  $t_{ON}$  = 160ns and a  $t_{OFF}$  = 70ns, assuring break-before-make switching. The channel thruput resistance of 500 provides a system of 500 provides and 500 provides a system of 500 provides a system of 500 provides and 500 provides a system of 500 provides a system of 500 provides and 500 provides a system of 500 provides and 500 provides a system of 500 provides a system of 500 provides and 500 provides a system of 500 excellent matching to video impedances. In the D.C. state, with switches being either on oroff, power supply quiescent currents are typically 100nA. This limits the quiescent current drain to  $3\mu$  watts—ideal for portable equipment.

#### **Applications**

These devices are used in applications requiring the routing, blocking or switching of video or RF signals such as:

> Winchester Disk Drives Commercial TV Cameras Video Special Effects Low Power RF Switching Radar Switching Mil and Space Communications

#### Typical Operating Circuit



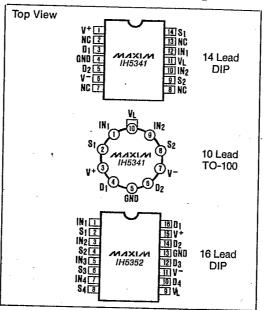
#### Features

- "OFF" Isolation ≥ 70dB @ 10MHz
- Cross Coupling Isolation ≥ 70dB @ 10MHz
- $r_{ds(on)} < 75\Omega$ , < 3dB Loss from DC to 100 MHz
- $\pm$ 5V to  $\pm$ 15V Operating Supply Range
- Supply Currents  $< 1\mu$ A
- Fast, Break-Before-Make Switching (70ns/160ns typ.)
- Monolithic, Low Power CMOS Design

#### Ordering Information

PART	TEMP. RANGE	PACKAGE
IH5341CPD	0°C to +70°C	14 Lead Plastic DIP
IH5341IJD	-20°C to +85°C	14 Lead CERDIP
IH5341ITW	-20°C to +85°C	10 Lead TO-100
1H5341MJD	-55°C to +125°C	14 Lead CERDIP
IH534IMTW	-55°C to +125°C	10 Lead TO-100
IH5341C/D	0°C to 70°C	Dice
IH5352CPE	0°C to +70°C	16 Lead Plastic DIP
IH5352IJE	-20°C to +85°C	16 Lead
IH5352MJE	-55°C to +125°C	16 Lead CERDIP
IH5352C/D	0°C to 70°C	Dice

#### **Pin Configuration**





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#### **ABSOLUTE MAXIMUM RATINGS**

Supply Voltages V<sup>+</sup> and V<sup>-</sup> ..... ±17V Current in any Terminal 50mA
Analog Input Voltage V<sup>+</sup> to V<sup>-</sup> Operating Temperature Range (M Version) -55°C to +125°C (I Version) -20°C to +85°C (C Version) 0°C to +70°C

Power Dissipation .....(Derate 7.5mW/°C above 25°C) Storage Temperature Range .....-65°C to +150°C 
 Logic Control Voltage
 V\* to V\*

 Voltage on V<sub>L</sub> Pin
 V\* to V\*

 Lead Temperature (Soldering, 10 sec.)
 +300°C

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. 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 rating conditions for extended periods may affect device reliability.

#### **ELECTRICAL CHARACTERISTICS**

 $(V^{+} = +15V, V_{1} = +5V, V^{-} = -15V, T_{A} = 25^{\circ}C$  unless otherwise specified)

			1	M GRADE DEVICE			I/C GRADE DEVICE			
PARAMETER	SYMBOL	CONDITIONS	TYP (Note 1)	-55°C	+25°C	+125°C	-20/ 0°C	+25°C	+85/ +70°C	UNITS
Supply Voltage Ranges Positive Supply Logic Supply Negative Supply	V <sup>+</sup> V <u>.</u> V	(Note 3)	4.5 > 16 4.5 > V <sup>+</sup> -4 > -16		5 to 15 5 to V <sup>+</sup> -5 to -15			5 to 15 5 to V <sup>+</sup> -5 to -15		v
Switch "ON"		V <sub>D</sub> - 5V to +5V		75	75	100	75	75	100	
Resistance (Note 4)	r <sub>ds(ON)</sub>	I <sub>S</sub> = 10 mA, V <sub>IN</sub> = 2.4V V <sub>D</sub> = -10V to +10V		125	125	175	150	150	175	
Switch "ON" Resistance	r <sub>ds(ON)</sub>	$V = V_L = 5V, V_{IN} = 3V$ $V^- = -5V, V_D = \pm 3V$	·	250	250	350	300	300	350	Ω
On Resistance Match		I <sub>S</sub> = 10mA, V <sub>D</sub> = ±5V	5							
Switch "OFF" Leakage (Notes 2 and 4)	D(OFF) Or	V <sub>S/D</sub> = +5V to -5V V <sub>IN</sub> = 0.8V			±1	50		±2	100	
<del>`</del>	I <sub>S(OFF)</sub>	V <sub>S/D</sub> = +14V to -14V			±1	50		±2	100	nA.
Switch "ON" Leakage	D(ON)	V <sub>D</sub> = +5V or -5V V <sub>IN</sub> = 2.4V			±1	100	•	±2	100	
	I <sub>S(ON)</sub>	V <sub>D</sub> = +14V to -14V			±1	100		±2	100	
Input Logic Current	I <sub>IN</sub>	V <sub>IN</sub> > 2.4V or < 0	0.001	1	1	10	1	1	10	
Positive Supply Quiescent Current	l <sup>+</sup>	V <sub>IN</sub> = 0V or +5V (Note 5)	0.01	1	1	10	1	1	10	
Negative Supply Quiescent Current	l-	V <sub>IN</sub> = 0V or +5V (Note 5)	0.01	1	1	10	1	1	10	μΑ
Logic Supply Quiescent Current	١ <sub>L</sub>	V <sub>IN</sub> = 0V or +5V (Note 5)	0.01	1	1	10	1	1	10	

#### **AC ELECTRICAL CHARACTERISTICS**

 $V^{+} = +15V$ ,  $V_{1} = +5V$ ,  $V^{-} = 0V$ ,  $T_{A} = +25^{\circ}C$ 

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Switch "ON" Time	ton	See Figure 1		160	300	
Switch "OFF" Time	toff	See Figure 1		70	150	ns
"OFF" Isolation Rejection Ratio	OIRR	See Figure 2 (Note 6)	70	80		
Cross Coupling Rejection Ratio	CCRR	Figure 3 IH5341 (Note 6) IH5352	70 66	80 72		dB
Frequency where r <sub>ds(ON)</sub> = 0.7 x DC		(Note 6)	100			MHz

Note 1:	Typical values are not tested in production.	They are given as a design aid only.
Mata 0.	Desiring and accept to the state	and the second s

terminated coax leads, etc.

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	I	v	L	/1	X			v	
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Note 3: Note 4:

Positive and negative voltages applied to opposite sides of switch, in both directions successively.

These are the operating voltages at which the other parameters are tested, and are not directly tested.

The logic inputs are either greater than or equal to 2.4V or less than or equal to 0.8V, as required, for this test. Note 5:

Maximum values shown are for the dual (IH5341). They are doubled for the quad (IH5352).

All AC parameters are sample tested only. Test circuits should be built on copper clad ground plane board, with correctly

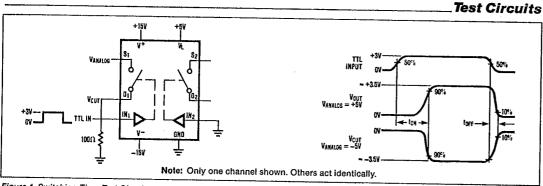
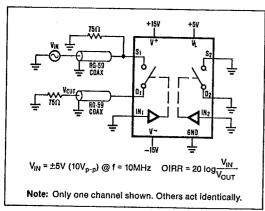


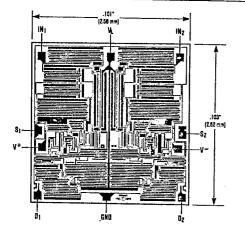
Figure 1. Switching Time Test Circuit and Waveforms

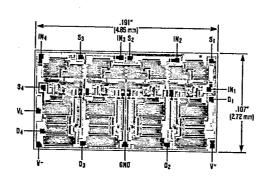


V<sub>IN</sub> 225mVrms @ f = 10MHz CCRR = 20 log VIN V<sub>IN</sub> Figure 3. Cross-Coupling Rejection Test Circuit

Figure 2. OFF Isolation Test Circuit

Chip Topography





IH5341 (Dual SPST)

IH5352 (Quad SPST)

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