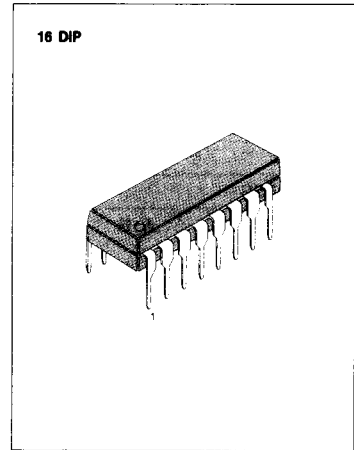


### 4 × 4 CROSSPOINT SWITCH WITH CONTROL MEMORY

The KT8592 consists of 4 × 4 matrix-array with 16 latches. Any one of 16 switches can be selected by applying its address to the device and a pulse to the strobe input pin. The selected switch can be turned on or off by applying a logical one or zero to the data in and the strobe input at logical one.

### FEATURES

- Low on resistance (Typ: 75Ω at V<sub>DD</sub> = 12V)
- Internal control latches
- 2V<sub>PP</sub> analog signal capability
- High linearity: 0.5% distortion (Typ) at f = 1KHz, V<sub>IN</sub> = 5V<sub>p-p</sub>, V<sub>DD</sub> = 10V, R<sub>L</sub> = 1KΩ



4

### ORDERING INFORMATION

Device	Package	Operating Temperature
KT8592N	16DIP	- 40 ~ + 85°C

### BLOCK DIAGRAM

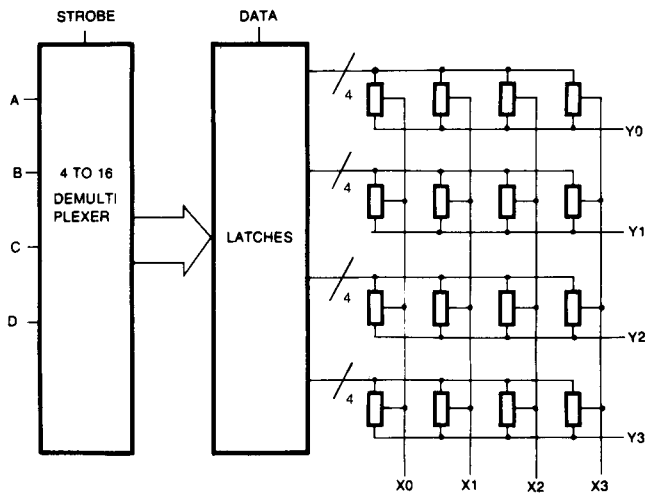


Fig. 1

### PIN CONFIGURATION

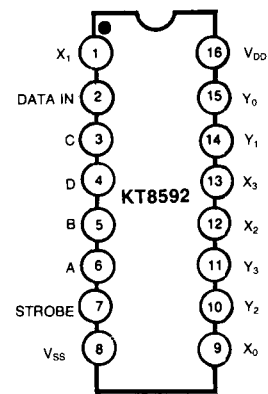


Fig. 2

## PIN DESCRIPTION

Pin No	Symbol	Description
<b>POWER</b>		
16	V <sub>DD</sub>	Positive power supply
8	V <sub>SS</sub>	Negative power supply
<b>ADDRESS</b>		
6, 5	A, B	X Address lines. These 2 pins are used to select one of the 4 rows of switches. Refer to the thruth table.
3, 4	C, D	Y Address lines. These 2 pins are used to select one of the 4 columns of switches. Refer to the thruth table.
<b>CONTROL</b>		
2	DATA-IN	This input determines if the selected switch will be turned On (closed) or Off (opened). If the pin is held high. The selected switch will be closed. If the pin is held low, the switch will be opened.
7	STROBE	This pin enables whatever action is selected by the address and data pins. When the strobe pin is held low, no switch openings or closings take place. When the strobe pin is holding high. The switch addressed by the selected lines will be opened or closed. (Depending upon the state of the data pin)
<b>DATA</b>		
9,1,12,13	X0-X3	Analog input/outputs. These pins are connected to the rows of the switch metrix.
15,14,10,11	Y0-Y3	Analog input/outputs. These pins are connected to the columns of the switch metrix.

## ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristic	Symbol	Value	Unit
Supply Voltage	V <sub>DD</sub>	-0.5 - +20	V
Input Voltage, All Inputs	V <sub>I</sub>	-0.5 - V <sub>DD</sub> + 0.5	V
Input Current (Analog Inputs)	I <sub>I</sub>	± 10	mA
Power Dissipation	P <sub>D</sub>	500	mW
Operating Temperature Range	T <sub>OPR</sub>	-40 - +85	°C
Storage Temperature Range	T <sub>STG</sub>	-65 - +150	°C

4

## DC ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Test Conditions	Value							Unit
			V <sub>IN</sub> (V)	V <sub>DD</sub> (V)	-40°C	85°C	25°C			
							Min	Typ	Max	
<b>CONTROLS</b>										
Input Low Voltage	V <sub>IL</sub>	OFF Switch I <sub>L</sub> < 0.2 μA		5	1.5			1.5	V	
				10	3		3			
				15	4		4			
Input High Voltage	V <sub>IH</sub>	ON Switch see Ron Charac.		5	3.5	3.5			V	
				10	7	7				
				15	11	11				
Input Current	I <sub>I</sub>	Any Control	0/18	18	± 0.1	± 1		± 10 <sup>-5</sup>	± 0.1	μA
<b>CROSSPOINTS</b>										
Quiescent Current	I <sub>DD(Q)</sub>			5	5	150	0.04	5	μA	
				10	10	300	0.04	10		
				15	20	600	0.04	20		
ON Resistance	R <sub>ON</sub>	Any Switch Vis = 0 to V <sub>DD</sub>		5	1000	1440	225	1250	Ω	
				10	145	205	85	180		
				12	110	155	75	135		
				15	75	110	65	95		
ΔON Resistance	ΔR <sub>ON</sub>	Between Any Two Switches		5			35		Ω	
				10			20			
				12			18			
				15			15			
OFF Switch Leakage Current	I <sub>LKG(OFF)</sub>	All Switches	0/18	18	± 100	± 100		± 1	± 100	nA

AC ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Characteristic	Symbol	Test Conditions				Value			Unit	
		f <sub>i</sub> (KHz)	R <sub>L</sub> (KΩ)	V <sub>IS</sub> (V)	V <sub>DD</sub> (V)	Min	Typ	Max		
<b>CONTROLS</b>						See Fig				
Propagation Delay Time Strobe to Output (Switch Turn on to High Level)	t <sub>D (PHZ)1</sub>	R <sub>L</sub> = 1KΩ C <sub>L</sub> = 50pF t <sub>r</sub> , t <sub>f</sub> = 20ns	—	—	5	5 10 15	—	300 125 80	600 250 160	ns
Data in to Output (Turn on to High Level)	t <sub>PZH1</sub>		—	—	6	5 10 15	—	110 40 25	220 80 50	
Address to Output (Turn on to High Level)	t <sub>PZH2</sub>		—	—	7	5 10 15	—	350 135 90	700 270 180	
Propagation Delay Time Strobe to Output (Switch Turn OFF)	t <sub>D (PHZ)2</sub>		—	—	5	5 10 15	—	165 85 70	330 170 140	
Data in to Output (Turn on to Low Level)	t <sub>PHL</sub>		—	—	6	5 10 15	—	210 110 100	420 220 200	
Address to Output (Turn OFF)	t <sub>PHZ</sub>		—	—	7	5 10 15	—	435 210 160	870 420 320	
<b>CROSSPOINTS</b>										
Propagation Delay Time (Switch ON) Signal Input to Output	t <sub>D (PHL)</sub> t <sub>D (PLH)</sub>	C <sub>L</sub> = 50pF t <sub>r</sub> , t <sub>f</sub> = 20ns Fig. 4	—	10	5 10 15	5 10 15	—	30 15 10	60 30 20	ns
Frequency Response (Any Switch ON) 20 log (V <sub>OS</sub> /V <sub>IS</sub> ) = -3dB	f <sub>RES</sub>	Sine Wave Input	1	1	5	10	—	40	—	MHz
Sine Wave Distortion	THD		1	1	5	10	—	0.5	—	%
Feedthrough (All Switches OFF)	G <sub>F</sub>	Sine Wave Input Fig. 5	1.6	1	5	10	—	-80	—	dB
Frequency for Signal Crosstalk Attenuation of 40dB Attenuation of 110dB	f <sub>CT</sub>	Sine Wave Input	—	1	10	10	—	1.5 0.1	—	MHz KHz
C, Capacitance Xn to Ground Yn to Ground Feedthrough	C <sub>XN</sub> C <sub>YN</sub> C <sub>F</sub>		—	—	—	5 ~ 15 5 ~ 15	—	18 30 0.4	—	pF

## AC ELECTRICAL CHARACTERISTICS (Continued)

Characteristic	Symbol	Test Conditions	Test Conditions			Value			Unit	
			R <sub>L</sub> (KΩ)	V <sub>IS</sub> (V)	See Fig.	V <sub>DD</sub> (V)	Min	Typ		Max
Setup Time Data in to Strobe, Address	t <sub>SU</sub>	R <sub>L</sub> = 1KΩ, C <sub>L</sub> = 50pF t <sub>r</sub> , t <sub>f</sub> = 20ns	—	—5	10 7	5 — 15	25	95 50 15	190 30	ns
			—	—	5	5 10 15	—	180 110 35	360 220 70	
Hold Time Data in to Strobe, Address	t <sub>H</sub>		—	—	—	5 10 15	0.6 1.6 2.5	1.2 3.2 5	—	MHz
Switching Frequency	f <sub>SW</sub>		—	—	—	5 10 15	—	300 120 90	600 240 180	ns
Strobe Pulse Width	t <sub>W</sub>		—	—	—	5 10 15	—	75	—	mV (Peak)
Control Crosstalk Data In, Address or Strobe to Output	V <sub>OUT</sub>	Square Wave Input t <sub>r</sub> , t <sub>f</sub> = 20ns	10	10	—	10	—	—	—	mV (Peak)
Input Capacitance	C <sub>I</sub>	Any Control Input	—	—	—	—	—	5	7.5	pF

TEST CIRCUIT

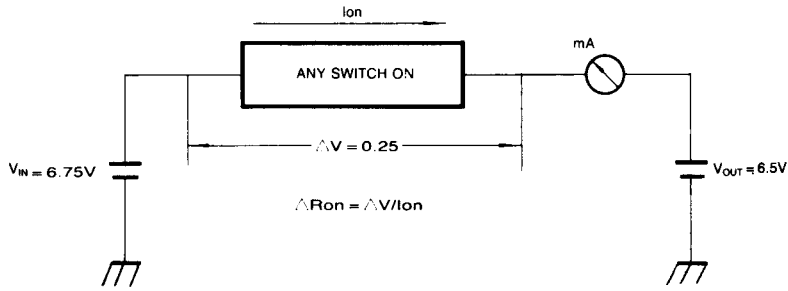


Fig. 3 Ron Measurement

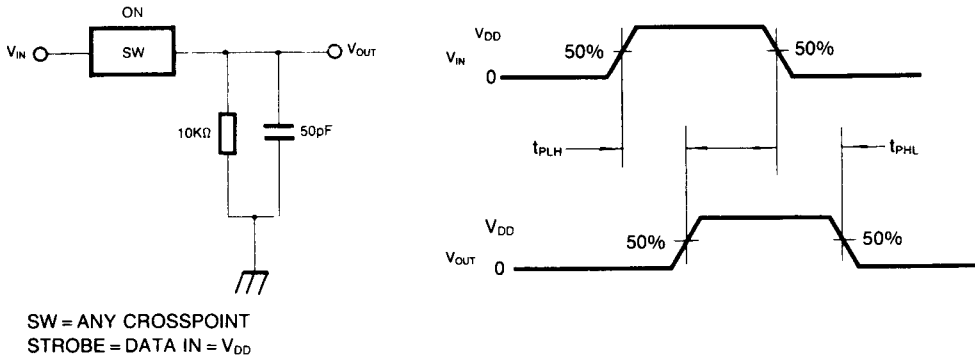


Fig. 4 Propagation Delay Time & Waveforms  
(Signal Input to Signal Output, Switch on)

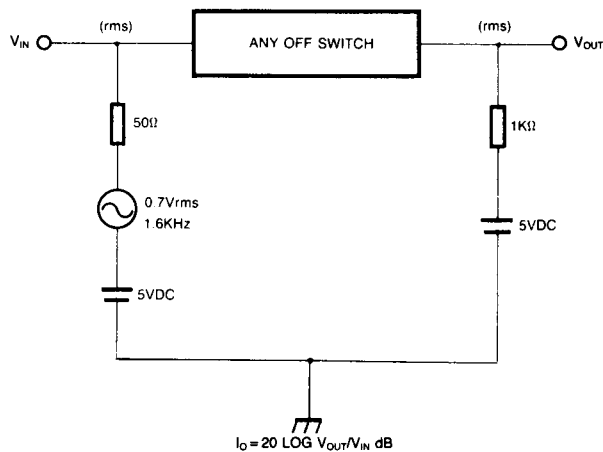


Fig. 5 OFF Isolation Measurement (Feedthrough)

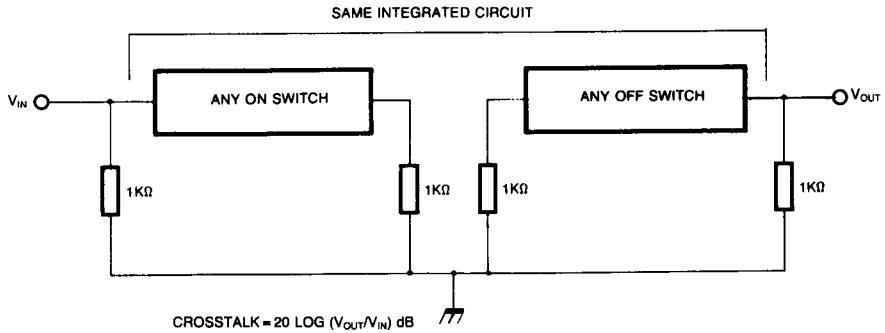


Fig. 6 Crosstalk Measurement

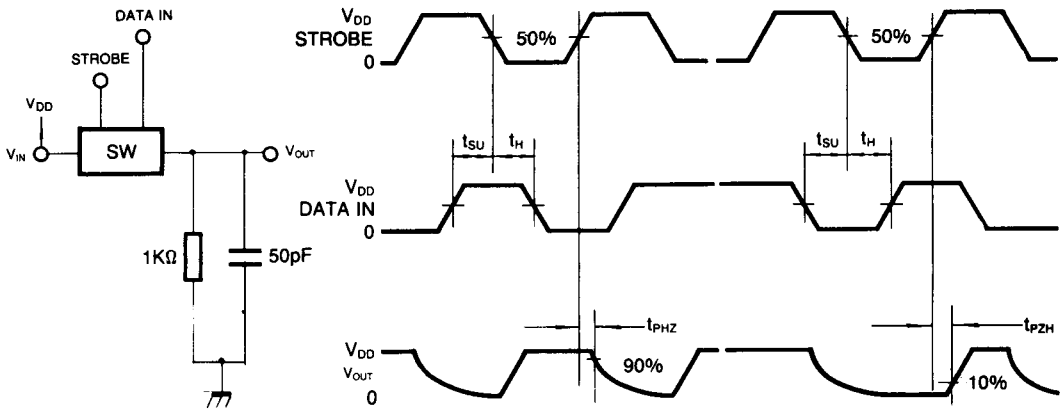
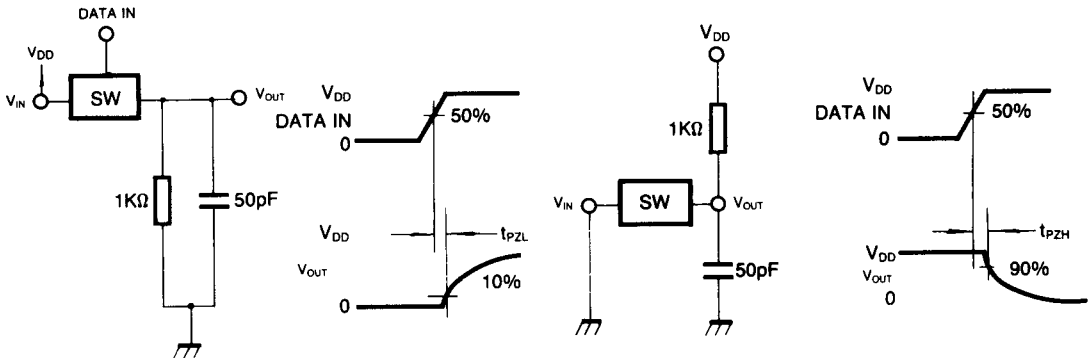
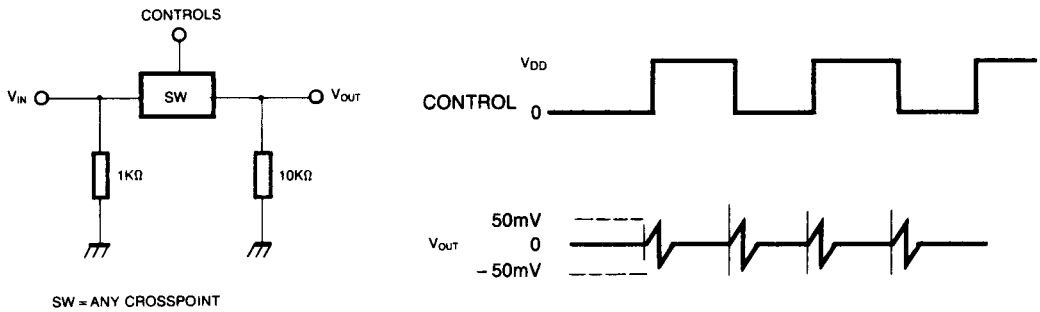
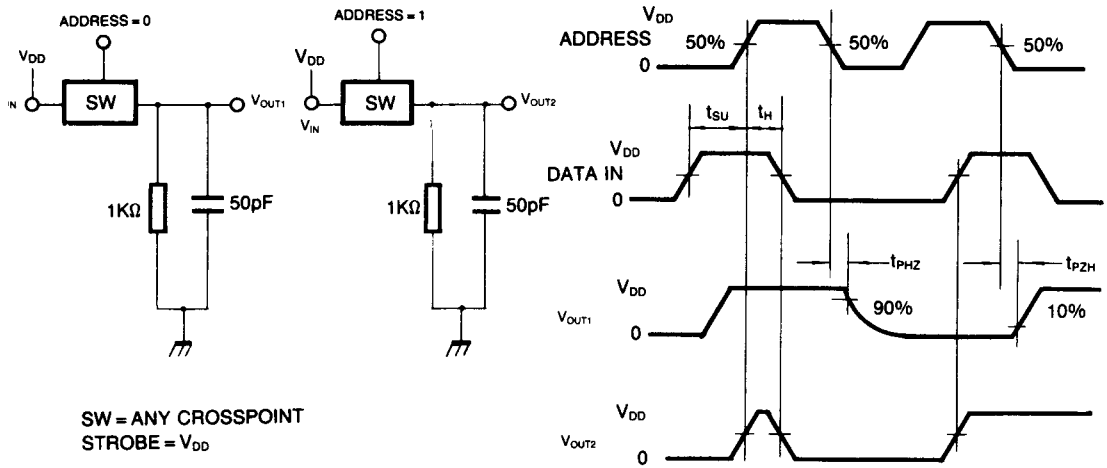


Fig. 7 Propagation Delay Time & Waveforms  
(Strobe to Signal Output, Switch Turn On or Turn Off)



SW = ANY CROSSPOINT  
STROBE = V<sub>DD</sub>

Fig. 8 Propagation Delay Time & Waveforms  
(Strobe to Signal Output, Switch Turn On to High or Low Level)





## TRUTH TABLE

ADDRESS				CONNECTIONS
A	B	C	D	
0	0	0	0	X0 - Y0
1	0	0	0	X1 - Y0
0	1	0	0	X2 - Y0
1	1	0	0	X3 - Y0
0	0	1	0	X0 - Y1
1	0	1	0	X1 - Y1
0	1	1	0	X2 - Y1
1	1	1	0	X3 - Y1
0	0	0	1	X0 - Y2
1	0	0	1	X1 - Y2
0	1	0	1	X2 - Y2
1	1	0	1	X3 - Y2
0	0	1	1	X0 - Y3
1	0	1	1	X1 - Y3
0	1	1	1	X2 - Y3
1	1	1	1	X3 - Y3