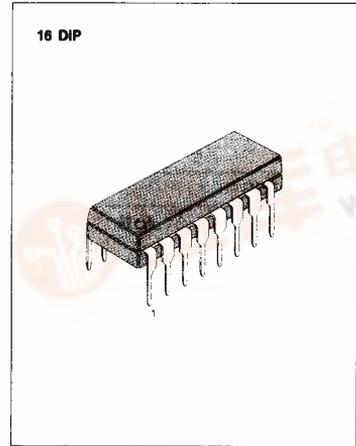


4 × 4 CROSSPOINT SWITCH WITH CONTROL MEMORY

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 $V_{DD} = 12V$)
- Internal control latches
- 2V_{PP} analog signal capability
- High linearity: 0.5% distortion (Typ) at $f = 1KHz$, $V_{IN} = 5V_{P-P}$, $V_{DD} = 10V$, $R_L = 1K\Omega$



4

ORDERING INFORMATION

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

BLOCK DIAGRAM

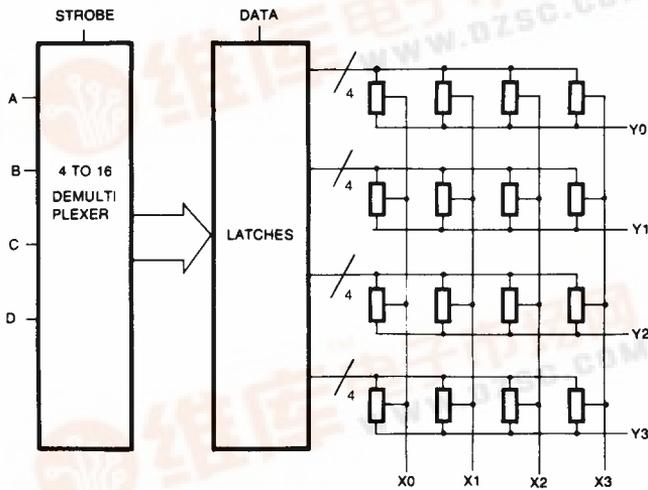


Fig. 1

PIN CONFIGURATION

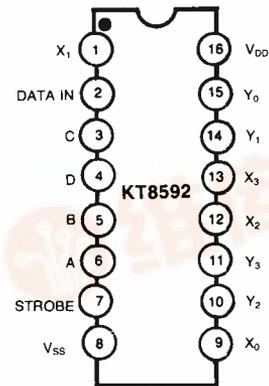


Fig. 2



PIN DESCRIPTION

Pin No	Symbol	Description
POWER		
16	V_{DD}	Positive power supply
8	V_{SS}	Negative power supply
ADDRESS		
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.
CONTROL		
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)
DATA		
9,1,12,13	X0-X3	Analog input/outputs. These pins are connected to the rows of the switch matrix.
15,14,10,11	Y0-Y3	Analog input/outputs. These pins are connected to the columns of the switch matrix.

ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{DD}	-0.5 - +20	V
Input Voltage, All Inputs	V_I	-0.5 - $V_{DD} + 0.5$	V
Input Current (Analog Inputs)	I_I	± 10	mA
Power Dissipation	P_D	500	mW
Operating Temperature Range	T_{OPR}	-40 ~ +85	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-65 ~ +150	$^\circ\text{C}$

DC ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Test Conditions	Value							Unit
			V_{IN} (V)	V_{DD} (V)	-40 $^\circ\text{C}$	85 $^\circ\text{C}$	25 $^\circ\text{C}$			
							Min	Typ	Max	
CONTROLS										
Input Low Voltage	V_{IL}	OFF Switch $I_L < 0.2 \mu\text{A}$		5 10 15	1.5 3 4			1.5 3 4	V	
Input High Voltage	V_{IH}	ON Switch see R_{on} Charac.		5 10 15	3.5 7 11	3.5 7 11			V	
Input Current	I_I	Any Control	0/18	18	± 0.1	± 1		$\pm 10^{-5}$	± 0.1	μA
CROSSPOINTS										
Quiescent Current	$I_{DD(Q)}$			5 10 15	5 10 20	150 300 600		0.04 0.04 0.04	5 10 20	μA
ON Resistance	R_{ON}	Any Switch $V_{is} = 0$ to V_{DD}		5 10 12 15	1000 145 110 75	1440 205 155 110		225 85 75 65	1250 180 135 95	Ω
Δ ON Resistance	ΔR_{ON}	Between Any Two Switches		5 10 12 15				35 20 18 15		Ω
OFF Switch Leakage Current	$I_{LKG(OFF)}$	All Switches	0/18	18	± 100	± 100		± 1	± 100	nA

AC ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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

AC ELECTRICAL CHARACTERISTICS (Continued)

Characteristic	Symbol	Test Conditions	Test Conditions				Value			Unit
			R _L (KΩ)	V _{is} (V)	See Fig.	V _{DD} (V)	Min	Typ	Max	
Setup Time Data in to Strobe, Address	t _{su}	R _L = 1KΩ, C _L = 50pF t _r , t _f = 20ns	—	—5	10 7	5 — 15	25	95 50 15	190 30	ns
Hold Time Data in to Strobe, Address	t _h		—	—	5	5 10 15	—	180 110 35	360 220 70	
Switching Frequency	f _{sw}		—	—	—	5 10 15	0.6 1.6 2.5	1.2 3.2 5	—	MHz
Strobe Pulse Width	t _w		—	—	—	5 10 15	—	300 120 90	600 240 180	ns
Control Crosstalk Data In, Address or Strobe to Output	V _{out}		Square Wave Input t _r , t _f = 20ns	10	10	—	10	—	75	—
Input Capacitance	C _i	Any Control Input	—	—	—	—	—	5	7.5	pF

4

TEST CIRCUIT

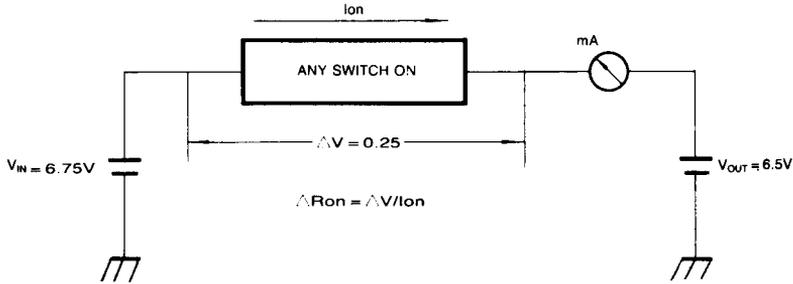
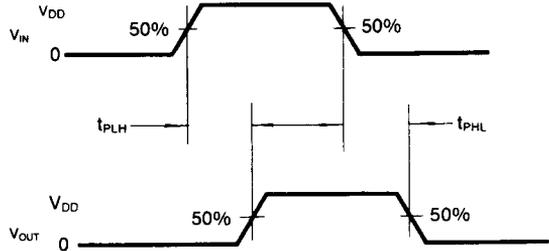
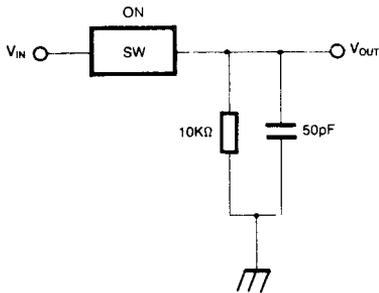


Fig. 3 Ron Measurement



SW = ANY CROSSPOINT
STROBE = DATA IN = V_{DD}

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

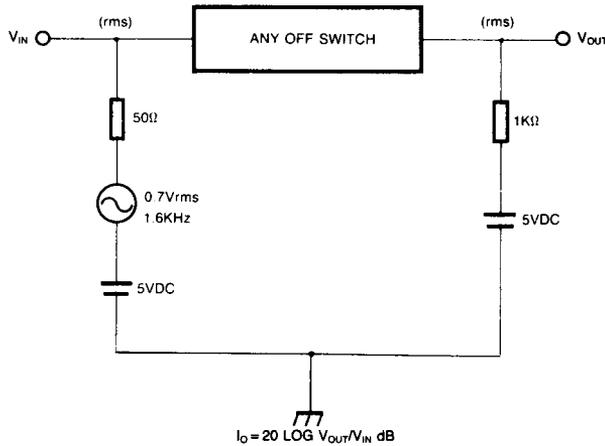


Fig. 5 OFF Isolation Measurement (Feedthrough)

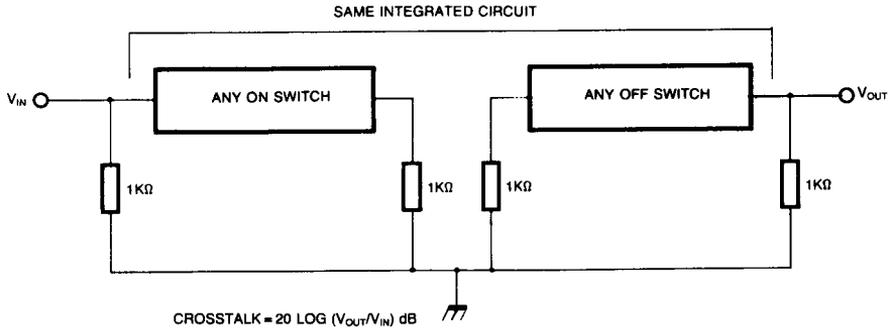


Fig. 6 Crosstalk Measurement

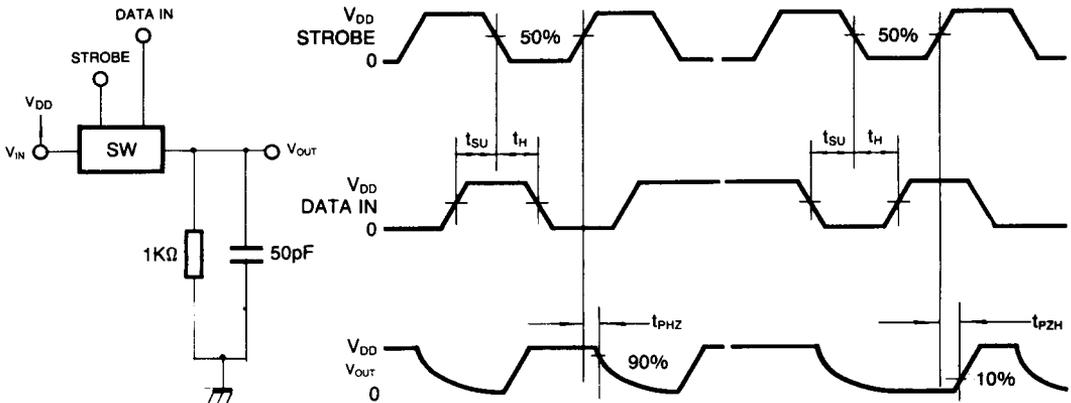
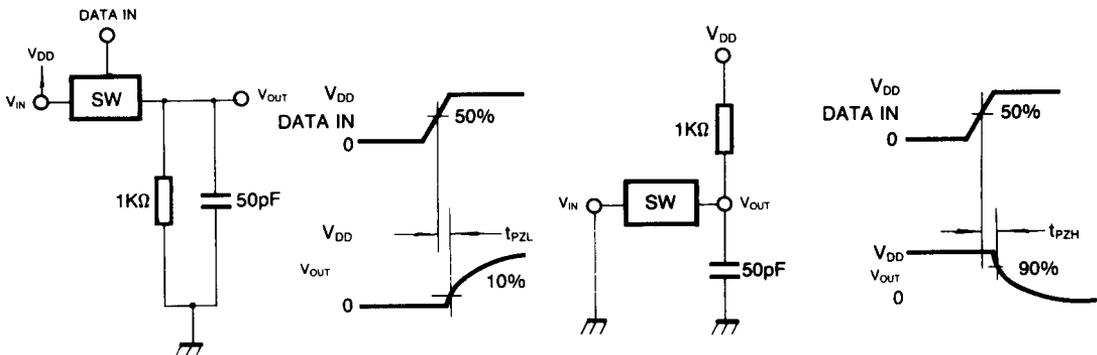


Fig. 7 Propagation Delay Time & Waveforms
(Strobe to Signal Output, Switch Turn On or Turn Off)



SW = ANY CROSSPOINT
STROBE = V_{DD}

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

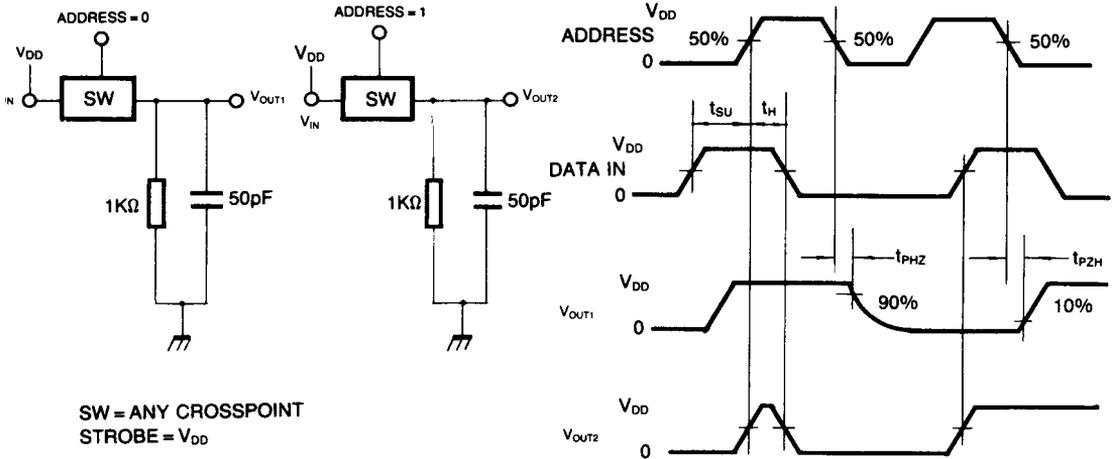


Fig. 9 Propagation Delay Time & Waveforms
(Address to Signal Output, Switch Turn On or Turn Off)

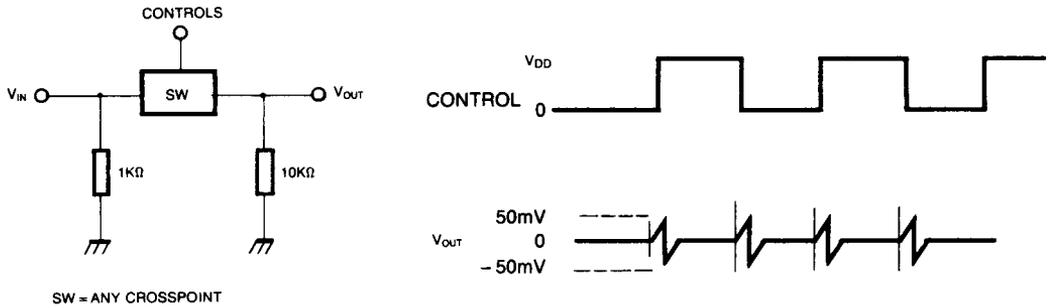


Fig. 10 Waveforms for Crosstalk (Control Input to Signal Output)

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