GM62093A

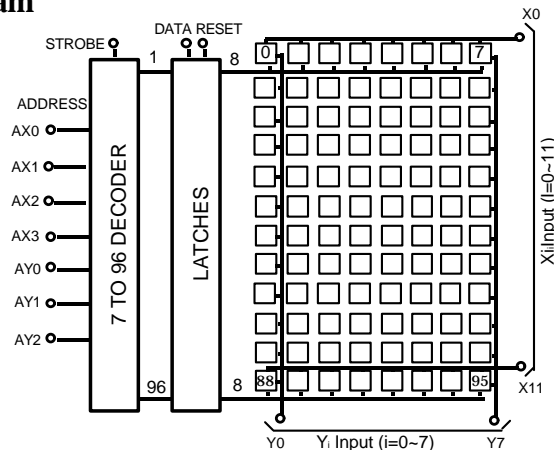## 12×8 CROSSPOINT SWITCH WITH CONTROL MEMORY

Description

The GM62093A contains a 12×8 array of crosspoint together with a 7 to 96 Line decoder and latch circuits. The GM62093A employs LG's advanced high voltage CMOS process technology. It provides extra low operating current and low power dissipation.

Anyone of the 96 switchs can be addressed by selecting the ap-propriate 7 input bits. The selected turned on or off by applying a logical one or zero to the data in and the strobe input at logical one. A reset signal can be used to turn off all the switches together when is switched at logical one. The GM62093A is avail-able in a 40 lead dual in-line plastic and ceramic package.
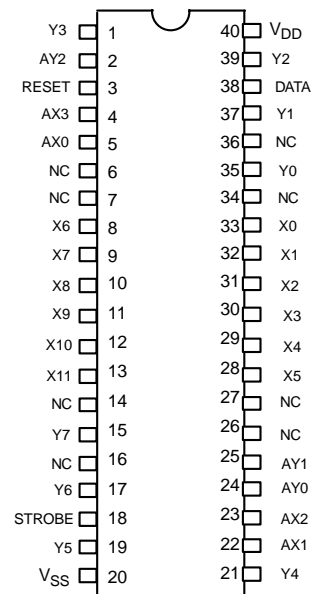
Feature

- CMOS 12×8 Cross Point Switch with Control Memory
- Low On Resistance
- Internal Control Latches
- DRon 15 Ω Max
- Less Than 1% Total Distortion at 0 dbm
- Extra Low Operating Current
- Extra Low Cross-Talk Between Any Two Switches
- Standard CMOS Noise Immunity
- **TTL Compatible Input**

Pin Configuration

(Top View)

Y3	1	40	V_{DD}
AY2	2	39	Y2
RESET	3	38	DATA
AX3	4	37	Y1
AX0	5	36	NC
NC	6	35	Y0
NC	7	34	NC
X6	8	33	X0
X7	9	32	X1
X8	10	31	X2
X9	11	30	X3
X10	12	29	X4
X11	13	28	X5
NC	14	27	NC
Y7	15	26	NC
NC	16	25	AY1
Y6	17	24	AY0
STROBE	18	23	AX2
Y5	19	22	AX1
V_{SS}	20	21	Y4

Application

- PBX Systems
- Mobile Radio
- Test Eqiepment Instrumentation
- Analog/ Digital Multiplexer

Block Diagram

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Absolute Maximum Rating

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{DD}	DC Supply Voltage	-0.5	18	V
V_{IN}	Input Voltage Range	-0.5	V+0.5	V
I_{IN}	DC Input current		±10	mA
P(P-DIP) (C-DIP)	Power Dissipation		0.6 1	W
T_{OPR}	Operation Temperature Range	0	70	°C
T_{STG}	Storage Temperature Range	-65	150	°C

Recommended Operating Range

SYMBOL	PARAMETER	MIN	MAX	UNIT
V_{DD}	DC Supply	8	16	V
V_{IN}	Input Voltage Range	0	V_{DD}	V
T_{OPR}	Operation Temperature Range	0	70	°C

Static Electrical Characteristics: ($T_A = 0°C$ to $70°C$, $V_{CC} = 14V$)

SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
CROSS POINT						
I_{DD}	Quiescent Supply Current	All Digital Input at Vss or V_{DD}			100	μA
		All Digital Input at 2.4 V		7	15	mA
Ron	On Resistance	$V_{DD} = 3.5V$ and I(thru S/W)=10mA			65	Ω
Ron	Ron Difference Between Any Two Switchs				15	Ω
Asc	Analog Signal Capability	$V_{DD} = 14V$ All Switchs On $V_{is} = 14V$ and I(thru S/W)$= -100$μA	13.96		14.0	V
I_{LOFF}	Off Leakage	All Switch off V=V=0 to V			±500	nA
CONTROLS						
V_{IL}	Input Low Voltage				0.8	V
V_{IH}	Input High Voltage		2.4			V
I_{LEAK}	Input Leakage	$V_{IN} = 0$ to V_{DD}			±500	nA

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Dynamic Electrical Characteristics : ($T_A = 25°C$, $C_L = 50pF$, $V_{DD} = 14V$)

SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT
CROSS POINT						
t_P	Propagation Delay Time	$R_L = 1k\Omega, V_{DC} = 5V$ $V_{IS} = 2V_{PP}$			30	NS
f_{RES}	Frequency Response [20log(V_{OUT}/V_{IN})=-3dB]	$R_L = 1k\Omega, V_{DC} = 5V$ $V_{IS} = 2V_{PP}$, $C_L = 3_pF$		40		MHz
	Sine Wave Response(Distortion)	$R_L = 1k\Omega, V_{DC} = 5V$, $V_{IS} = 2V_{PP}, f = 1MHz$			1	%
	Feedthrough (All S/W's Off)	$R_L = 1k\Omega, V_{DC} = 5V$ $V_{IS} = 2V_{PP}, f = 10KHz$			-80	dB
	Crosstalk Between Any Two Channels	$R_S = 50\Omega, R_L = 1k\Omega$, $V_{IS} = 2V_{PP}, f = 1KHz$		-110	-95	dB
C_X	Capacitance (X_N to Ground)	Switch Off			20	pF
C_Y	Capacitance (Y_N to Ground)	Switch Off			30	pF
C_{DI}	Digital Input Capacitance			5		pF
CONTROL						
t_{DS}	Strobe to Switch Delay	$R_L = 1k\Omega, t_r = t_f = 20nS$			160	nS
t_{DD}	Data to Switch Delay	$R_L = 1k\Omega, t_r = t_f = 20nS$			180	nS
t_{DA}	Address to Switch Delay	$R_L = 1k\Omega, t_r = t_f = 20nS$			200	nS
t_{DR}	Reset to Switch Delay	$R_L = 1k\Omega, t_r = t_f = 20nS$			200	nS
t_{SD} t_{SA}	Data Setup Time Address Setup Time	$R_L = 1k\Omega, t_r = t_f = 20nS$	30			nS
t_{HD} t_{HA}	Data Hold Time Address Hold Time	$R_L = 1k\Omega, t_r = t_f = 20nS$	30			nS
t_{SW} t_{RW}	Minimum Strobe Pulse Width Minimum Reset Pulse Width	$R_L = 1k\Omega, t_r = t_f = 20nS$	200			nS

Functional Description

The GM62093A contains a 12×8 array of analog switches, each with a latch to maintain its on(closed)or off(opened) state.
Seven ADDRESS lines(AX0~AX3, AY0~AY2) are provided to address any one of the 96 switches.
After any one of the switches is selected, the DATA pin may be held high to turn the switch on, or low to turn it off.
Finally a positive pulse to the STROBE pin initiates the ac-tion determined by the ADDRESS and DATA pins. All 96 switches can be turned off by forcing the RESET pin high.

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Timing Diagram
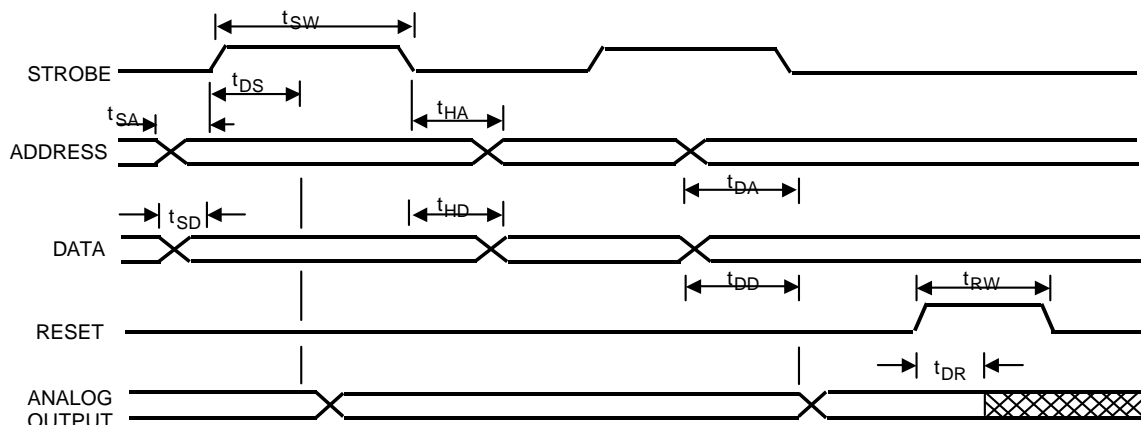
Truth Table

Address							Connections
AX0	AX1	AX2	AX3	AY0	AY1	AY2	
0	0	0	0	0	0	0	X0-Y0
1	0	0	0	0	0	0	X1-Y0
0	1	0	0	0	0	0	X2-Y0
1	1	0	0	0	0	0	X3-Y0
0	0	1	0	0	0	0	X4-Y0
1	0	1	0	0	0	0	X5-Y0
0	0	0	1	0	0	0	X6-Y0
1	0	0	1	0	0	0	X7-Y0
0	1	0	1	0	0	0	X8-Y0
1	1	0	1	0	0	0	X9-Y0
0	0	1	1	0	0	0	X10-Y0
1	0	1	1	0	0	0	X11-Y0
0	0	0	0	1	0	0	X0-Y1
↓	↓	↓	↓	↓	↓	↓	↓ ↓
1	0	1	1	1	0	0	X11-Y1
0	0	0	0	0	1	0	X0-Y2
↓	↓	↓	↓	↓	↓	↓	↓ ↓
1	0	1	1	0	1	0	X11-Y2
0	0	0	0	1	1	0	X0-Y3
↓	↓	↓	↓	↓	↓	↓	↓ ↓
1	0	1	1	1	1	0	X11-Y3
0	0	0	0	0	0	1	X0-Y4
↓	↓	↓	↓	↓	↓	↓	↓ ↓
1	0	1	1	0	0	1	X11-Y4
0	0	0	0	1	0	1	X0-Y5
↓	↓	↓	↓	↓	↓	↓	↓ ↓
1	0	1	1	1	0	1	X11-Y5
0	0	0	0	0	1	1	X0-Y6
↓	↓	↓	↓	↓	↓	↓	↓ ↓
1	0	1	1	0	1	1	X11-Y6
0	0	0	0	1	1	1	X0-Y7
↓	↓	↓	↓	↓	↓	↓	↓ ↓
1	0	1	1	1	1	1	X11-Y7

A_X =0110, 1110, 0111 and 1111 and not allowed

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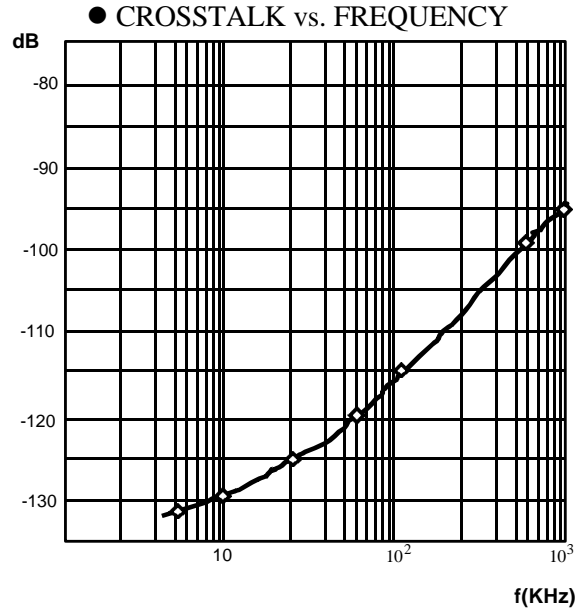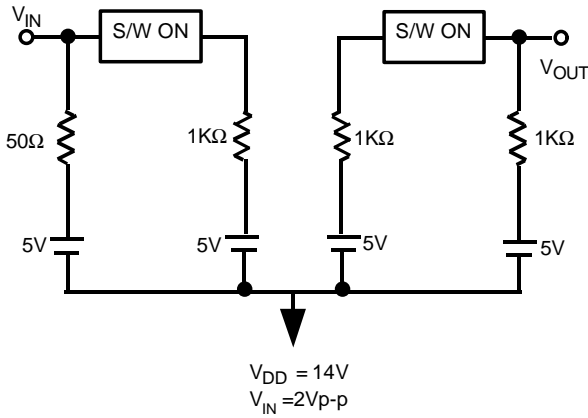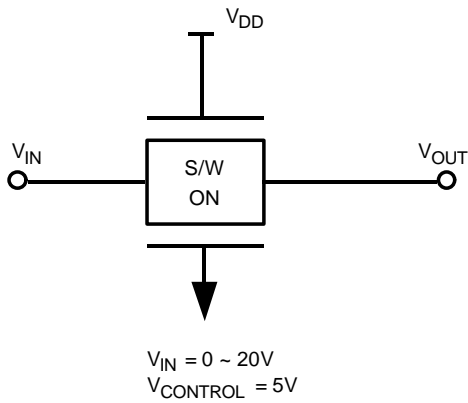## Test circuit and Characteristics.

Fig.1-Crosstalk

● TEST CIRCUIT

● CROSSTALK vs. FREQUENCY

$V_{DD} = 14V$
$V_{IN} = 2Vp\text{-}p$

● RESULT

Fig.2 –analog signal capability(Vin vs. Vout)

● TEST CIRCUIT

$V_{IN} = 0 \sim 20V$
$V_{CONTROL} = 5V$

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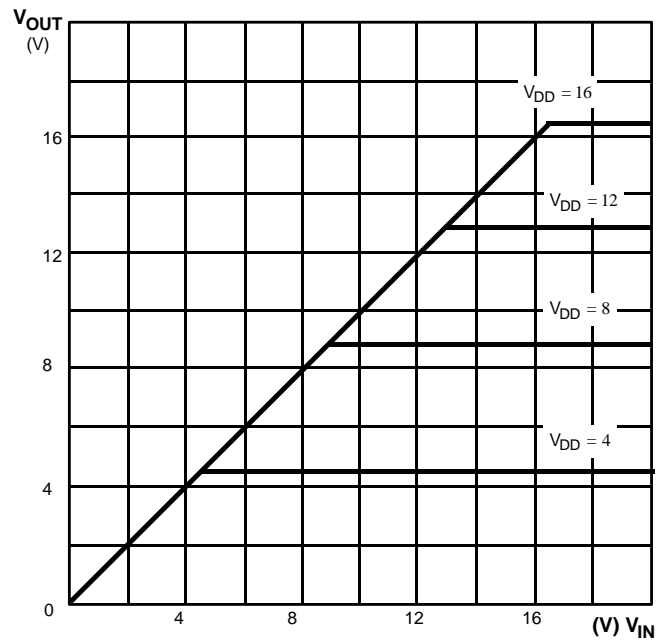
● RESULT

Fig.3-Ron measurement

● TEST CIRCUIT

$$R_{ON} = \frac{\tilde{V}}{I_{ON}} = \frac{\tilde{V}}{10mA}$$

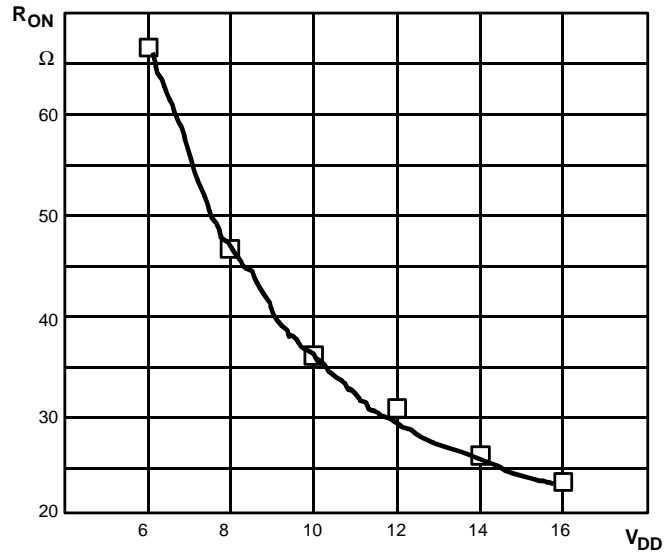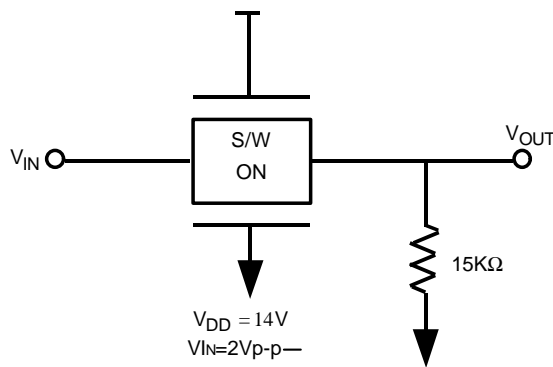$V_{CONTROL} = 5V$

$V_{DD} = 6 \sim 18V$
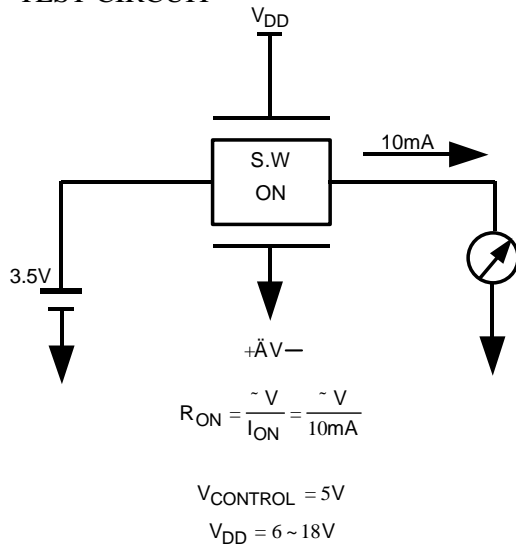
Fig.4-Frequency response.

● TEST CIRCUIT

● BANDWIDTH
(-3dB point: ABOUT 45MHz)

$V_{DD} = 14V$

$V_{IN} = 2Vp\text{-}p$

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