

M66260FP

8 × 4 CROSSPOINT SWITCH with MIXING FUNCTION

DESCRIPTION

The M66260 is an integrated circuit consisting of a 8 × 4 cross point switch capable of selecting 32 analog switches with mixing resistance respectively by serial control inputs. Using the M66260 with an external standard Op-Amp, 8 analog input signals can be mixed and output to any of 4 outputs freely by serial control inputs.

FEATURES

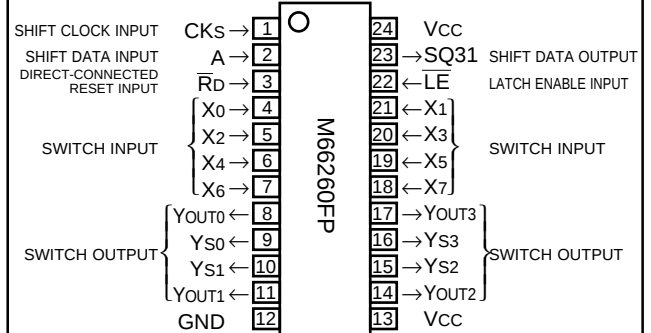
- Serial data input type
- Switching and mixing function possible with standard Op-Amp.
- Switch matrix can be extended to 8 × 8 or 8 × 12 by combining 2 or 3 ICs in parallel.
- Excellent crosstalk characteristic
..... -90 dB [f = 3 kHz, V_{IN} = -10dBV] (typ.)

APPLICATION

Line switching with mixing function of telephone and communication equipments.

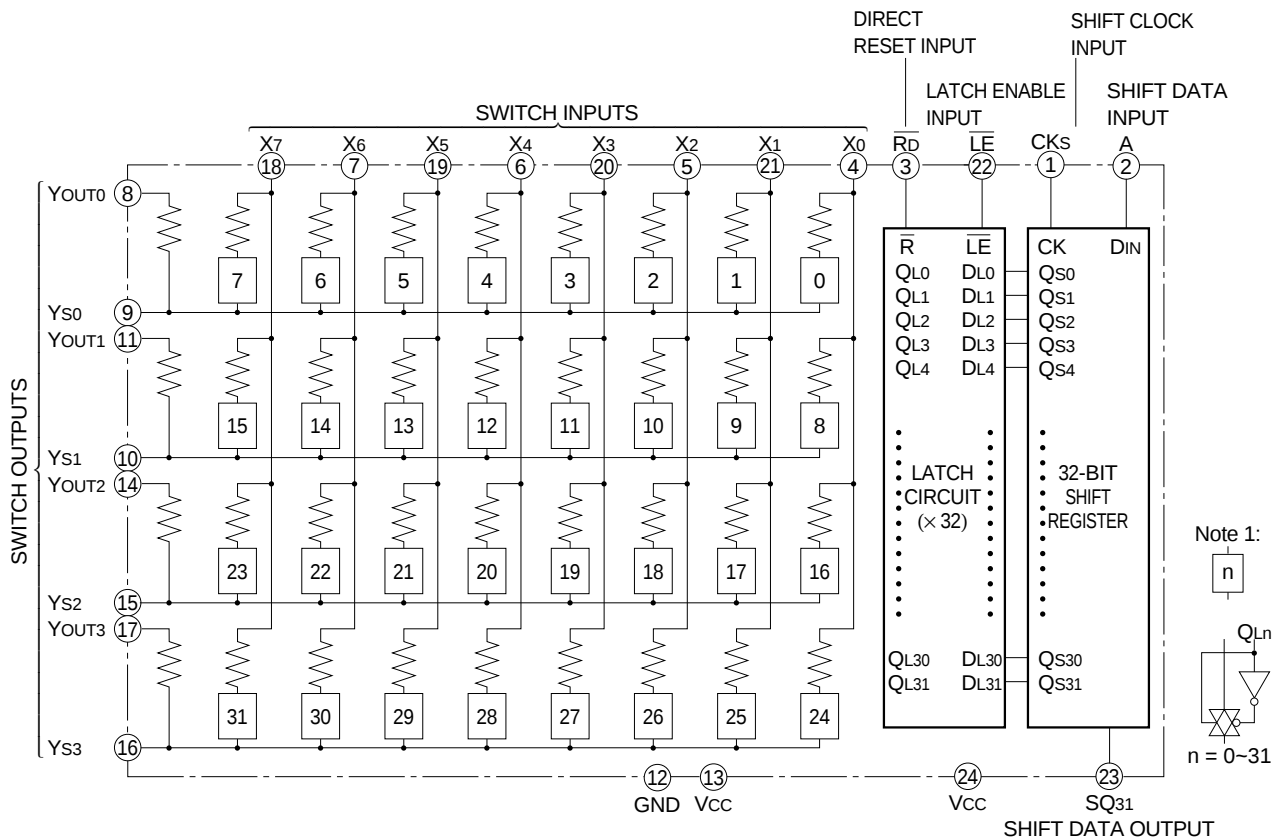
FUNCTION

Serial data input A is the data input of the first step of 32 BIT SHIFT REGISTER and when latch enable input LE is "L", the signal of A shifts shifting registers one by one when shift clock input CKs changes from "L" to "H", in units of 32 bits.

PIN CONFIGURATION (TOP VIEW)**Outline 24P2N-B**

The 32 bits are stored into LATCH CIRCUIT in parallel when latch enable LE changes from "L" to "H".

Analog switches come on in a low-impedance state when the output of the corresponding latch circuit is "H". They come off in a high-impedance stage when the output of the corresponding circuit is "L".

BLOCK DIAGRAM

FUNCTION TABLES

(1) 32-bit shift register (Note 2)

Operation mode	Inputs				Internal outputs								Output
	$\overline{RD}$	A	CKs	$\overline{LE}$	QS0	QS1	QS2	QS3	...	QS29	QS30	QS31	
Shift	x	L	↑	L	L	Q ⁰ S0	Q ⁰ S1	Q ⁰ S2	...	Q ⁰ S28	Q ⁰ S29	Q ⁰ S30	qs ⁰ 30
	x	H	↑	L	H	Q ⁰ S0	Q ⁰ S1	Q ⁰ S2	...	Q ⁰ S28	Q ⁰ S29	Q ⁰ S30	qs ⁰ 30

(2) Latch circuit [× 32] (Note 2)

Operation mode	Inputs				Internal outputs							
	$\overline{RD}$	A	CKs	$\overline{LE}$	QL0	QL1	QL2	QL3	...	QL29	QL30	QL31
Reset	L	x	x	x	L	L	L	L	...	L	L	L
Shift	H	x	L	H	QS0	QS1	QS2	QS3	...	QS29	QS30	QS31
	H	x	x	L	Q ⁰ L0	Q ⁰ L1	Q ⁰ L2	Q ⁰ L3	...	Q ⁰ L29	Q ⁰ L30	Q ⁰ L31

(3) 8 × 4 cross point switch

QLn	Status of switch No. $\overline{n}$
L	OFF
H	ON

Table 1. Latch Output (QLN) and Corresponding Switch No. $\overline{n}$

Latch output	QL0	QL1	QL2	QL3	...	QL29	QL30	QL31
Switch No.	0	1	2	3	...	29	30	31

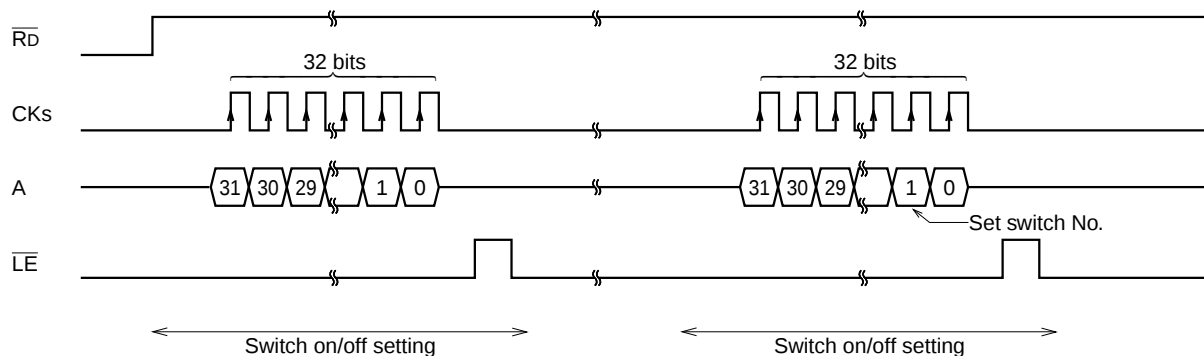
Note 2: ↑ : Change from "L" to "H"

x : "H" or "L"

Q⁰S : The content of shift register before CKs changed

Q⁰L : The content of latch circuit before $\overline{LE}$ changed from "H" to "L"

OPERATION TIMING CHART



8 × 4 CROSSPOINT SWITCH with MIXING FUNCTION

ABSOLUTE MAXIMUM RATINGS (Ta = -20°C to 75°C unless otherwise noted)

Symbol	Parameter	Conditions	Rating	Unit
V _{CC}	Supply voltage		-0.5 ~ +7.0	V
V _I	Input voltage	$\overline{RD}$, A, CKs, $\overline{LE}$	-0.5 ~ V _{CC} +0.5	V
		X ₀ ~ X ₇	-0.5 ~ V _{CC} +0.5	
V _O	Output voltage	YS ₀ ~ YS ₃ , YOUT ₀ ~ YOUT ₃	-0.5 ~ V _{CC} +0.5	V
P _d	Power dissipation		500	mW
T _{stg}	Storage temperature		-65 ~ 150	°C

RECOMMENDED OPERATIONAL CONDITIONS (Ta = -20°C to 75°C unless otherwise noted)

Symbol	Parameter	Limits			Unit
		Min.	Typ.	Max.	
V _{CC}	Supply voltage	2.8		5.5	V
V _I	Input voltage	$\overline{RD}$, A, CKs, $\overline{LE}$	0	V _{CC}	V
		X ₀ ~ X ₇	0	V _{CC}	
V _O	Output voltage	YS ₀ ~ YS ₃ , YOUT ₀ ~ YOUT ₃	0	V _{CC}	V
T _{opr}	Operating temperature	-20		75	°C

ELECTRICAL CHARACTERISTICS (Ta = -20°C to 75°C, V_{CC} = 2.8V ~ 5.5V and GND = 0V unless otherwise noted)

Symbol	Parameter		Test conditions	Limits			Unit
				Min.	Typ.	Max.	
V _{IH}	“H” Input voltage	$\overline{RD}$, A, CKs, $\overline{LE}$		0.8 × V _{CC}			V
V _{IL}	“L” Input voltage					0.2 × V _{CC}	V
V _{OL}	“L” output voltage	SQ31	I _{OL} = +100μA		0.55	V	
V _{OH}	“H” output voltage		I _{OH} = −100μA	V _{CC} − 0.8		V	
R _I	Input resistance	X _n →Y _{Sm} n = 0 ~ 7 m = 0 ~ 3	V _I (X _n) = 0.5 × V _{CC} (For any one of switches)	15	25	40	kΩ
R _f	Feedback resistance	Y _{OUTm} →Y _{Sm}	V _I (Y _{OUTm}) = 0.5 × V _{CC} (For any one of switches)	15	25	40	kΩ
ΔR	Resistance difference (R _f and R _I)		(1 block)	0.9	1	1.1	—
I _{OFF}	Off-state leakage current		Switches off; V _I * = V _{IH} or V _{IL} (for each of X _n , Y _{Sm} and Y _{OUTm})			1.0	μA
I _{CC}	Quiescent supply current		V _I * = V _{CC} or GND			400	μA
I _{IH}	“H” input current		V _I * = V _{CC}			+1.0	μA
I _{IL}	“L” input current		V _I * = GND			−1.0	μA
C _I	Input capacitance		f = 1MHz			10	pF

V_I* = V_I ($\overline{RD}$, A, CKs, $\overline{LE}$)

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TIMING CONDITIONS ($T_a = -20^{\circ}\text{C}$ to 75°C , $V_{CC} = 2.8\text{V} \sim 5.5\text{V}$ and $\text{GND} = 0\text{V}$ unless otherwise noted)

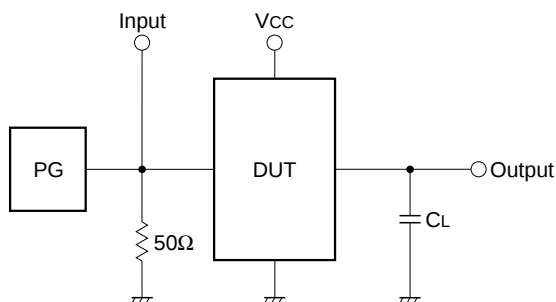
Symbol	Parameter	conditions	Limits			Unit
			Min.	Typ.	Max.	
t_c	Clock cycle	(Note 4)	1000			ns
$t_{w\pm}(\text{CKs})$	Clock pulse width		400			ns
$t_w(\overline{\text{LE}})$	Latch enable pulse width		1000			ns
$t_w(\overline{\text{RD}})$	Reset pulse width		1000			ns
$t_{su}(\text{A} - \text{CKs})$	A setup time before CKs		400			ns
$t_h(\text{CKs} - \text{A})$	A hold time after CKs		200			ns
$t_{rec}(\text{CKs} - \overline{\text{LE}})$	$\overline{\text{LE}}$ recovery time after CKs		1000			ns

SWITCHING CHARACTERISTICS ($T_a = -20^{\circ}\text{C}$ to 75°C , $V_{CC} = 2.8\text{V} \sim 5.5\text{V}$ and $\text{GND} = 0\text{V}$ unless otherwise noted)

Symbol	Parameter		conditions	Limits			Unit
				Min.	Typ.	Max.	
tPLH	Output "L-H" propagation time	CKs-SQ31	CL = 10pF (Note 4)			600	ns
tPHL	Output "H-L" propagation time					600	ns
—	Crosstalk frequency		(Note 3)		−90		dB

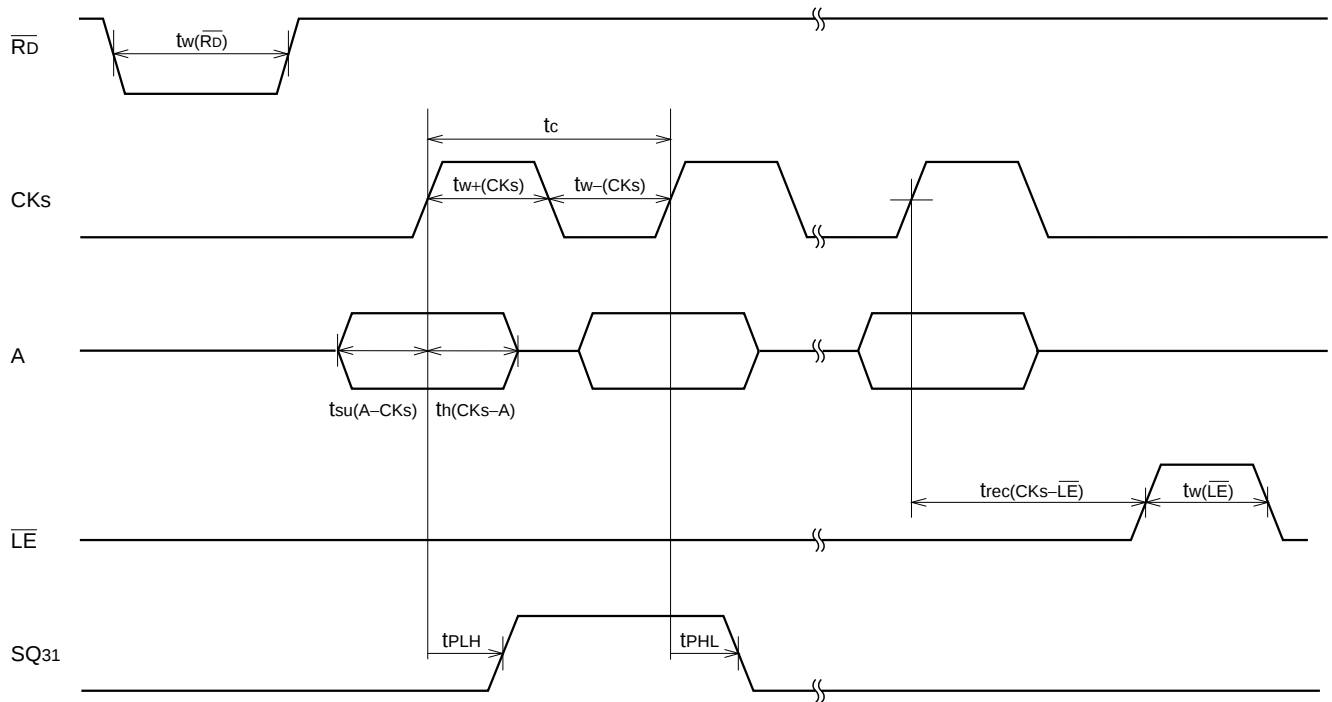
Note 3: $V_{IN} = 10\text{dBV}$, $f_{in} = 3\text{kHz}$
 Other inputs: $1\text{k}\Omega$ at terminal
 Standard Op-Amp: M5228P (connected externally)
 $R_L = 10\text{k}\Omega$
 Crosstalk: $20\log 10 \frac{V_O}{V_I}$

Note 4: TEST CIRCUIT



- (1) Pulse generator (PG) characteristics
 $t_r = t_f = 6\text{ns}$ (10% ~ 90%)
 $V_{IN} = 0$ to V_{CC}
- (2) C_L includes stray wiring capacitance and probe input capacitance.
- (3) Reference voltage
 Input voltage: $0.5 \times V_{CC}$
 Output voltage: $0.5 \times V_{CC}$

TIMING CHART



APPLICATION EXAMPLE

Cordless Telephone with Built-in Answering Machine (One host phone and two cordless extensions)

