

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

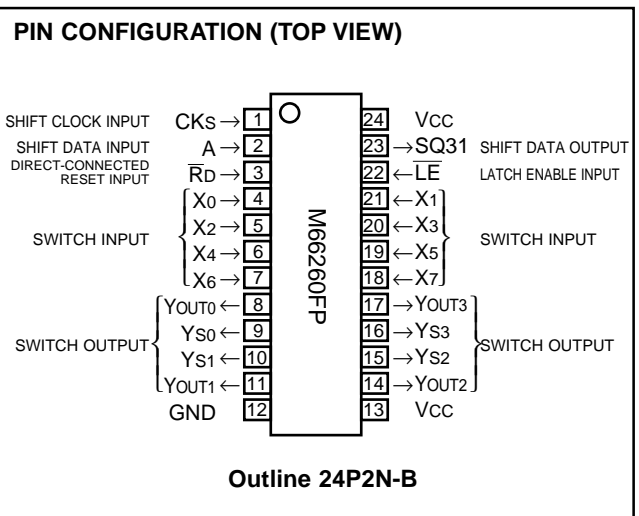
- Serial data input type
- Switching and mixing function possible with standard Op-Amp.
- Switch matrix can be extended to 8 × 8 or 8 × 12 by combining 2 or 3 ICs in parallel.
- Excellent crosstalk characteristic
 -90 dB [f = 3 kHz, V_{IN} = -10dBV] (typ.)

APPLICATION

Line switching with mixing function of telephone and communication equipments.

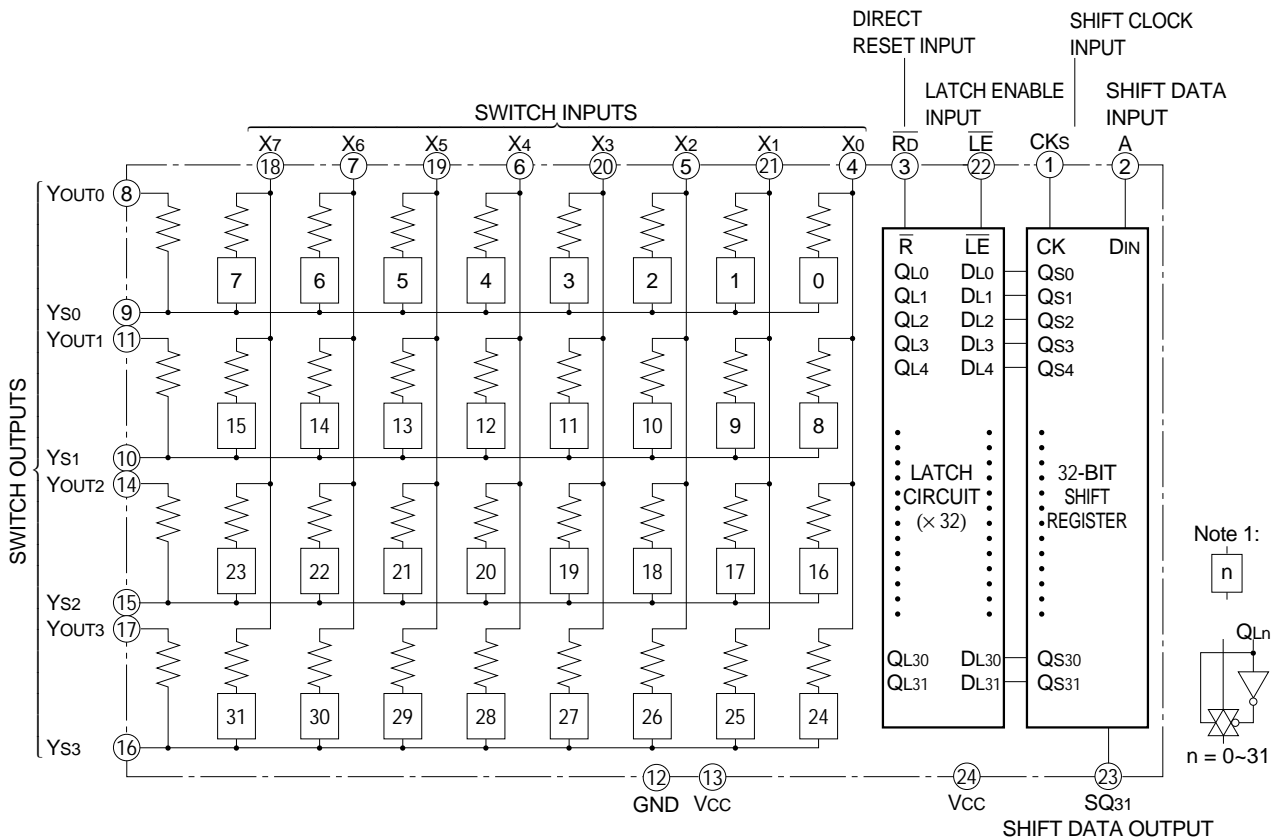
FUNCTION

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.



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	SQ31	
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

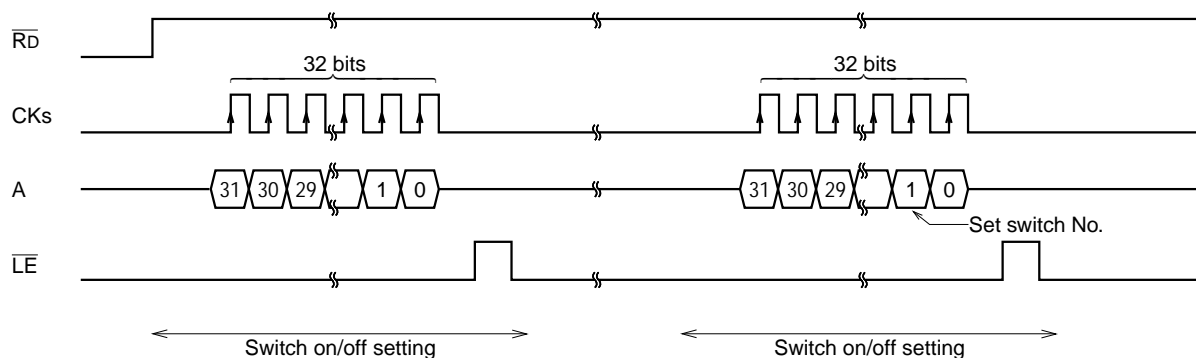
QLn	Status of switch No. [n]
L	OFF
H	ON

Table 1. Latch Output (QLN) and Corresponding Switch No. [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
Vcc	Supply voltage		-0.5 ~ +7.0	V
Vi	Input voltage	\overline{RD} , A, CKs, \overline{LE}	-0.5 ~ Vcc+0.5	V
		X0 ~ X7	-0.5 ~ Vcc+0.5	
Vo	Output voltage	YS0 ~ YS3, YOUT0 ~ YOUT3	-0.5 ~ Vcc+0.5	V
Pd	Power dissipation		500	mW
Tstg	Storage temperature		-65 ~ 150	°C

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

Symbol	Parameter	Limits			Unit
		Min.	Typ.	Max.	
Vcc	Supply voltage	2.8		5.5	V
Vi	Input voltage	\overline{RD} , A, CKs, \overline{LE}	0	Vcc	V
		X0 ~ X7	0	Vcc	
Vo	Output voltage	YS0 ~ YS3, YOUT0 ~ YOUT3	0	Vcc	V
Topr	Operating temperature	-20		75	°C

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

Symbol	Parameter	Test conditions	Limits			Unit		
			Min.	Typ.	Max.			
VIH	"H" Input voltage	\overline{RD} , A, CKs, \overline{LE}	0.8 × Vcc			V		
VIL	"L" Input voltage				0.2 × Vcc	V		
VOL	"L" output voltage	SQ31	IOL = +100μA		0.55	V		
VOH	"H" output voltage		IOH = -100μA		Vcc - 0.8	V		
Ri	Input resistance	Xn → YSm n = 0 ~ 7 m = 0 ~ 3	Vi (Xn) = 0.5 × Vcc (For any one of switches)		15	25	40	kΩ
Rf	Feedback resistance	YOUTm → YSm	Vi (YOUTm) = 0.5 × Vcc (For any one of switches)		15	25	40	kΩ
ΔR	Resistance difference (Rf and Ri)	(1 block)	0.9	1	1.1	—		
IOFF	Off-state leakage current	Switches off; Vi* = VIH or VIL (for each of Xn, Ysm and YOUTm)			1.0	μA		
ICC	Quiescent supply current	Vi* = Vcc or GND			400	μA		
IiH	"H" input current	Vi* = Vcc			+1.0	μA		
IiL	"L" input current	Vi* = GND			-1.0	μA		
CI	Input capacitance	f = 1MHz			10	pF		

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

8 × 4 CROSSPOINT SWITCH with MIXING FUNCTION

TIMING CONDITIONS (Ta = -20°C to 75°C, Vcc = 2.8V ~ 5.5V and GND = 0V unless otherwise noted)

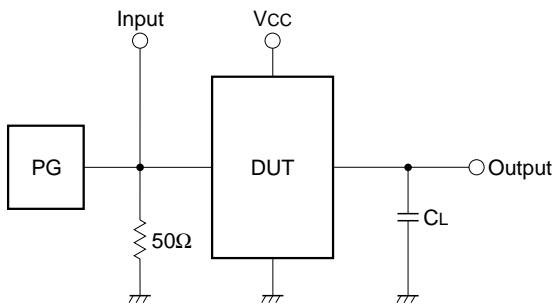
Symbol	Parameter	conditions	Limits			Unit
			Min.	Typ.	Max.	
t _C	Clock cycle	(Note 4)	1000			ns
t _{w±} (CKs)	Clock pulse width		400			ns
t _w ($\overline{\text{LE}}$)	Latch enable pulse width		1000			ns
t _w ($\overline{\text{RD}}$)	Reset pulse width		1000			ns
t _{su} (A - CKs)	A setup time before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

SWITCHING CHARACTERISTICS (Ta = -20°C to 75°C, Vcc = 2.8V ~ 5.5V and GND = 0V unless otherwise noted)

Symbol	Parameter	conditions	Limits			Unit
			Min.	Typ.	Max.	
t _{PLH}	Output "L-H" propagation time	CKs-SQ31 CL = 10pF (Note 4)			600	ns
t _{PHL}	Output "H-L" propagation time				600	ns
—	Crosstalk frequency	(Note 3)		-90		dB

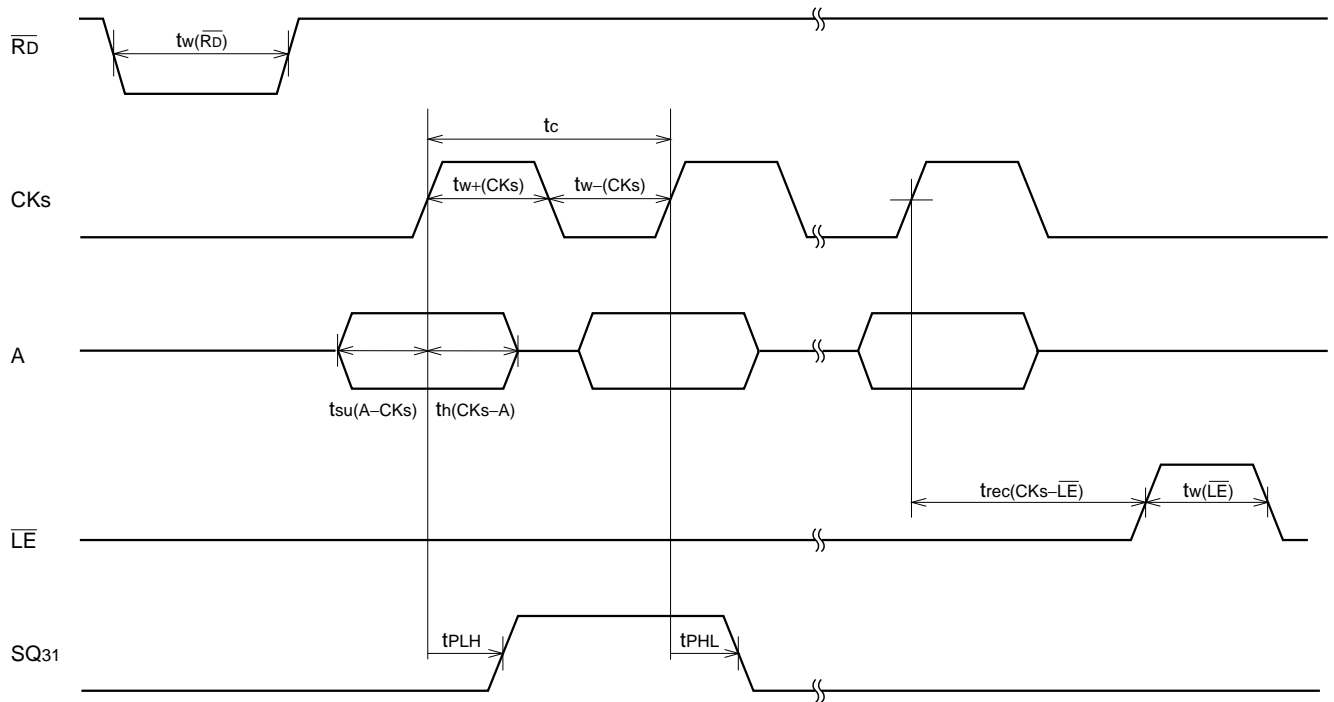
Note 3: V_{IN} = 10dBV, f_{IN} = 3kHz
 Other inputs: 1kΩ at terminal
 Standard Op-Amp: M5228P (connected externally)
 RL = 10kΩ
 Crosstalk: $20 \log_{10} \frac{V_O}{V_I}$

Note 4: TEST CIRCUIT



- (1) Pulse generator (PG) characteristics
 tr = tf = 6ns (10% ~ 90%)
 V_{IN} = 0 to V_{CC}
- (2) CL includes stray wiring capacitance and probe input capacitance.
- (3) Reference voltage
 Input voltage: 0.5 × V_{CC}
 Output voltage: 0.5 × V_{CC}

TIMING CHART



8 × 4 CROSSPOINT SWITCH with MIXING FUNCTION

APPLICATION EXAMPLE

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

