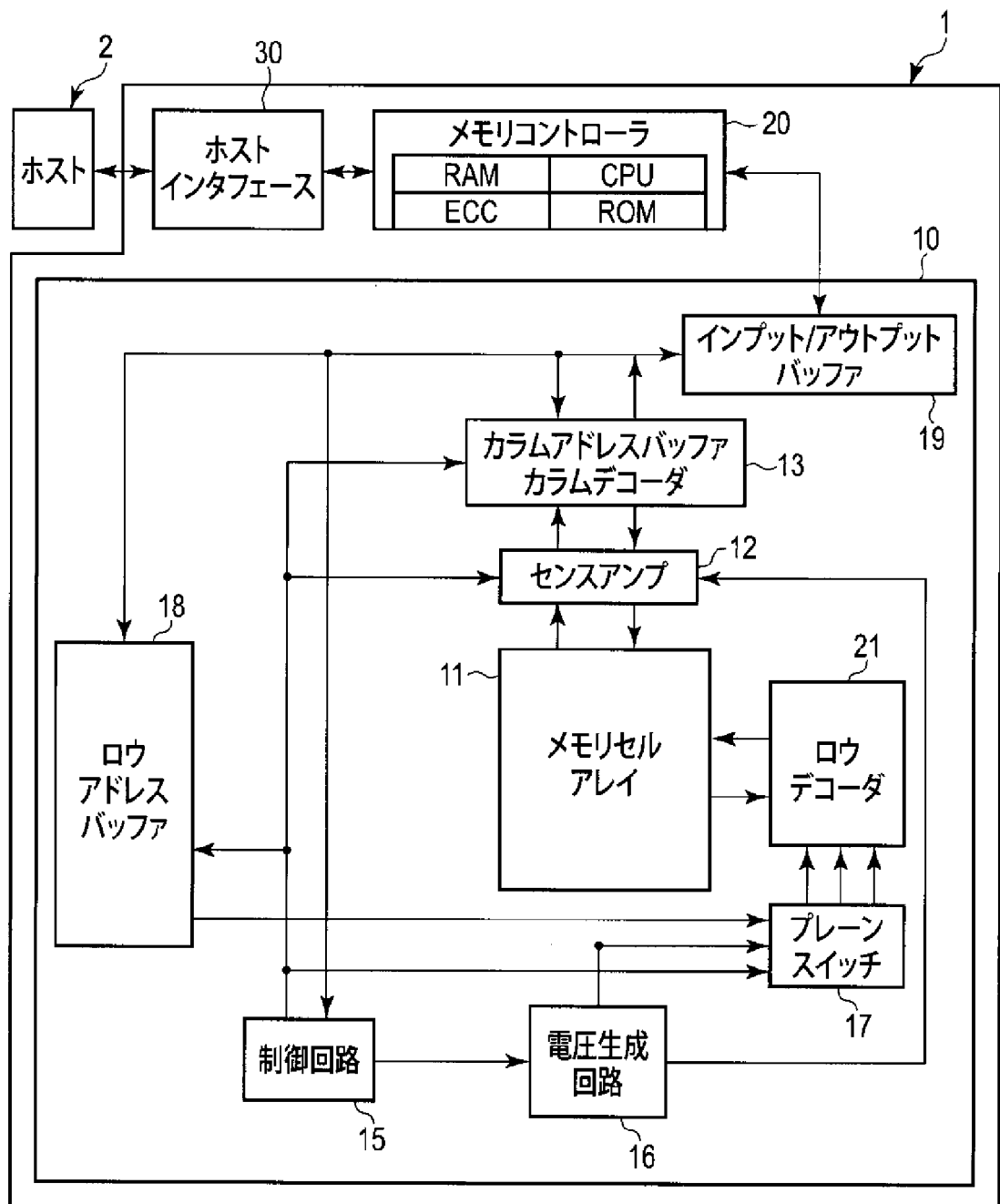
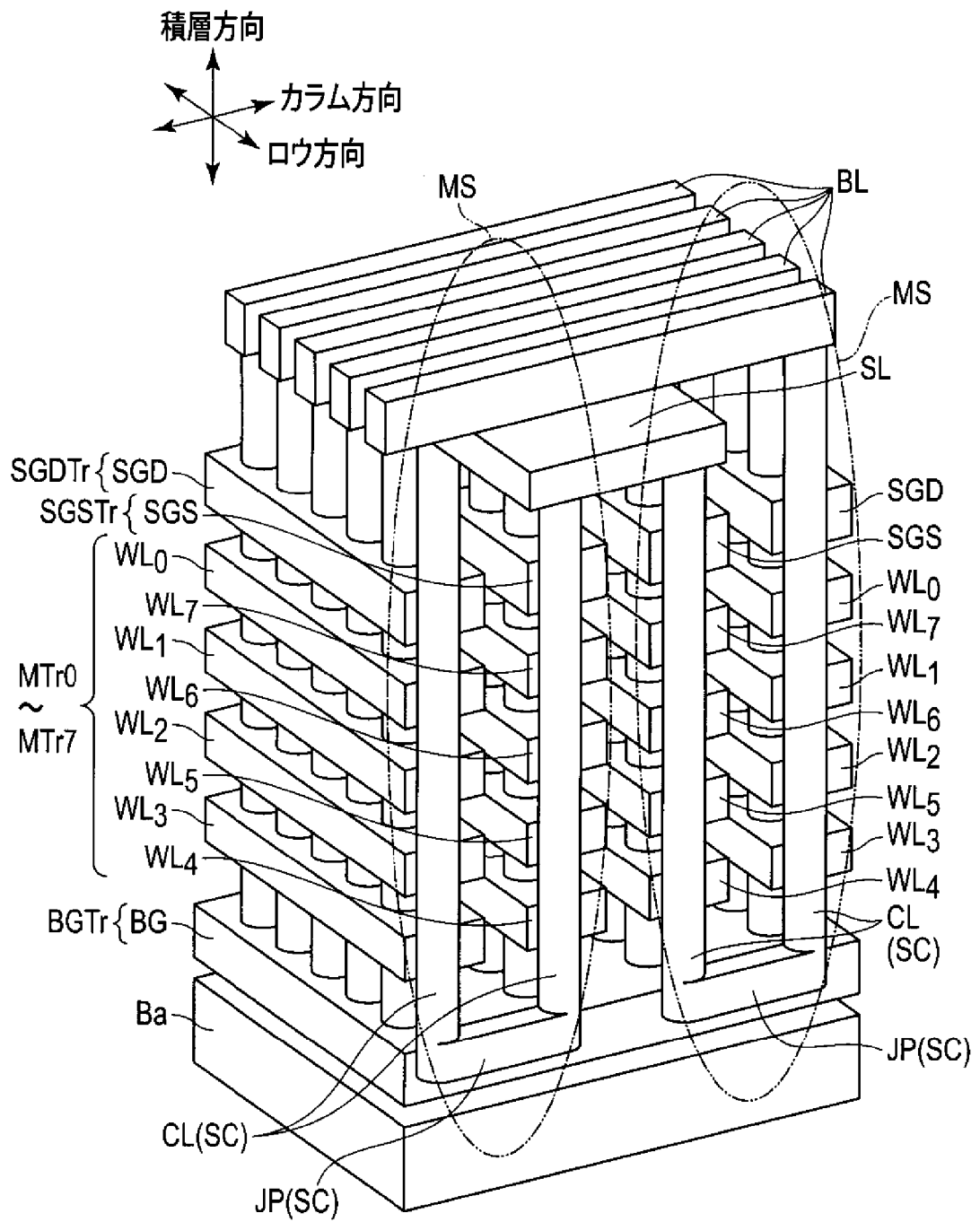


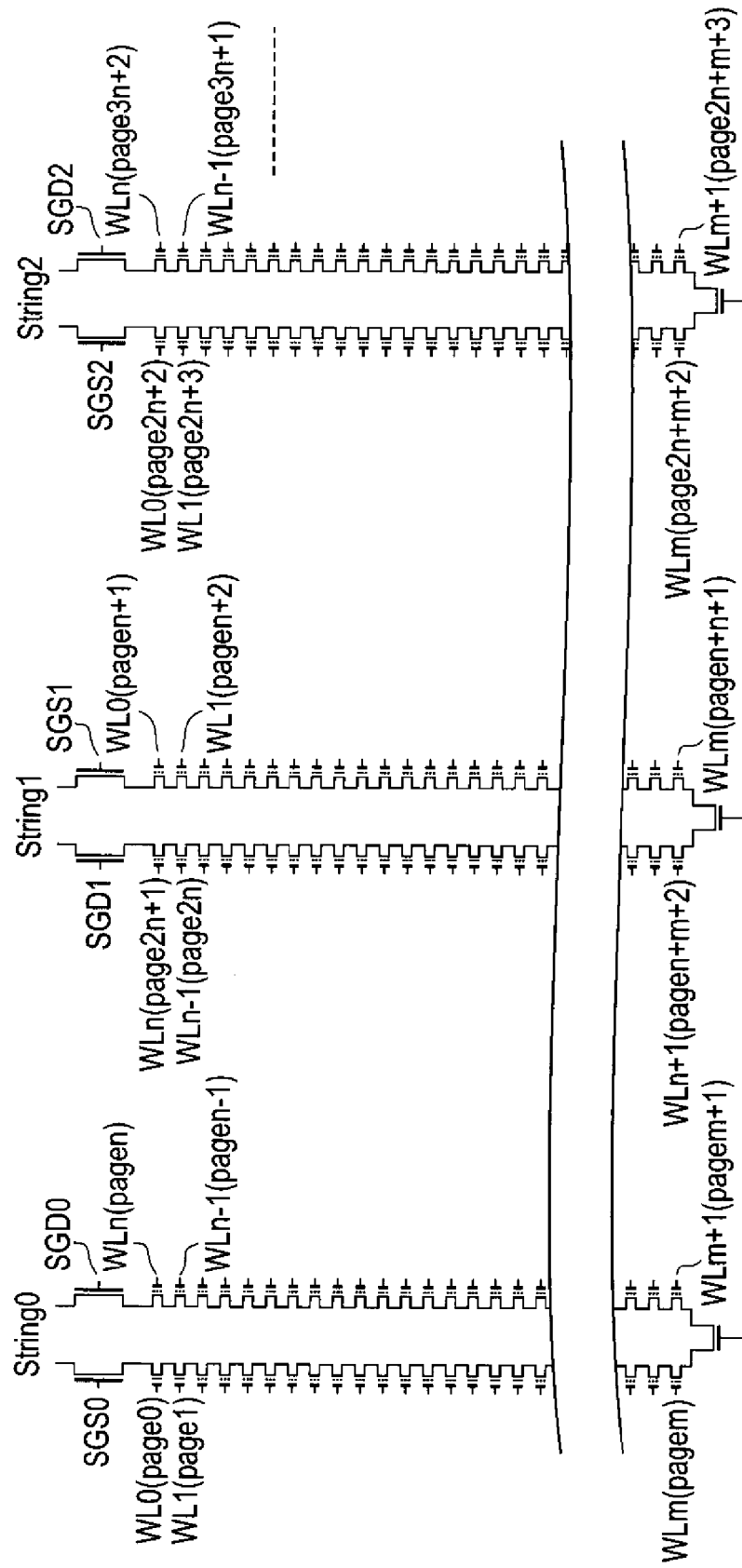
[図1]



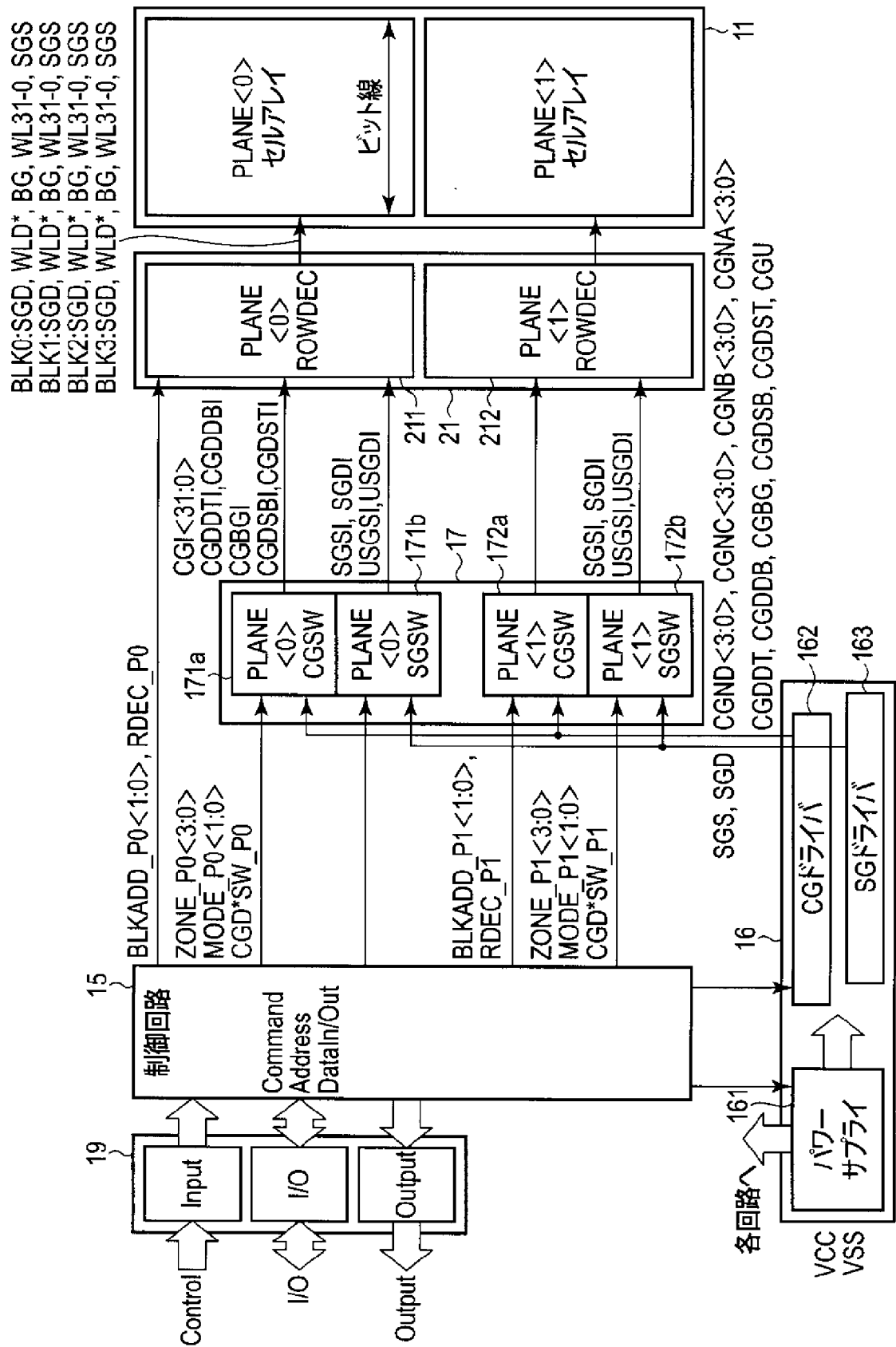
[図2]



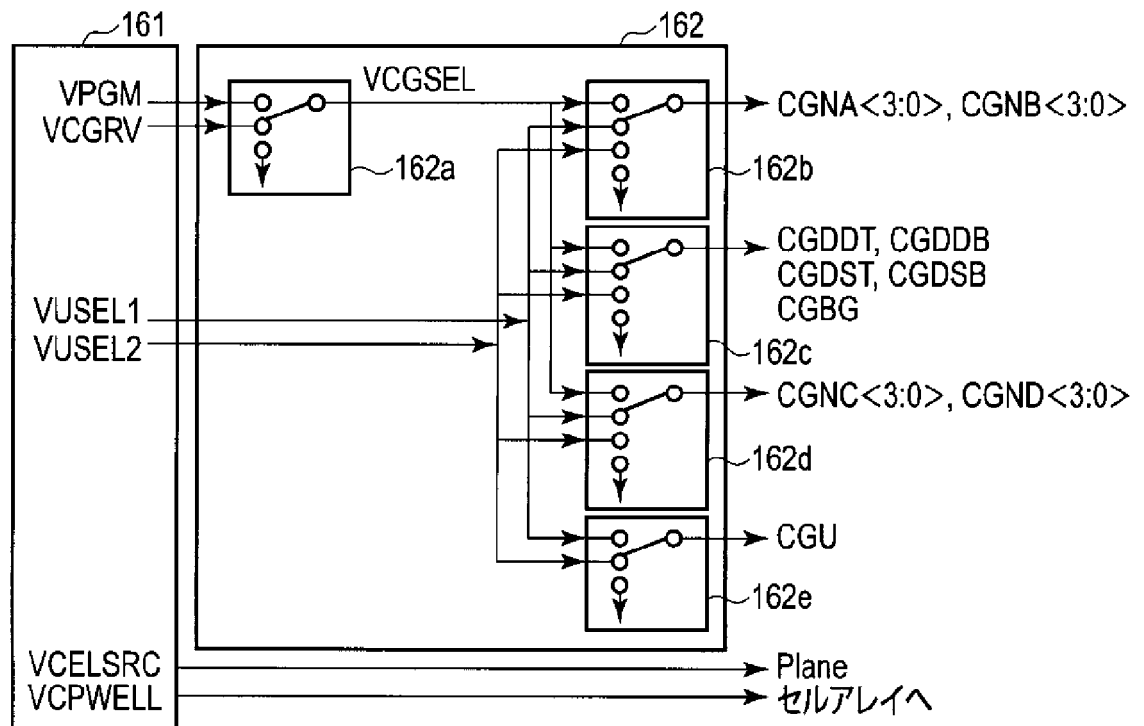
[図3]



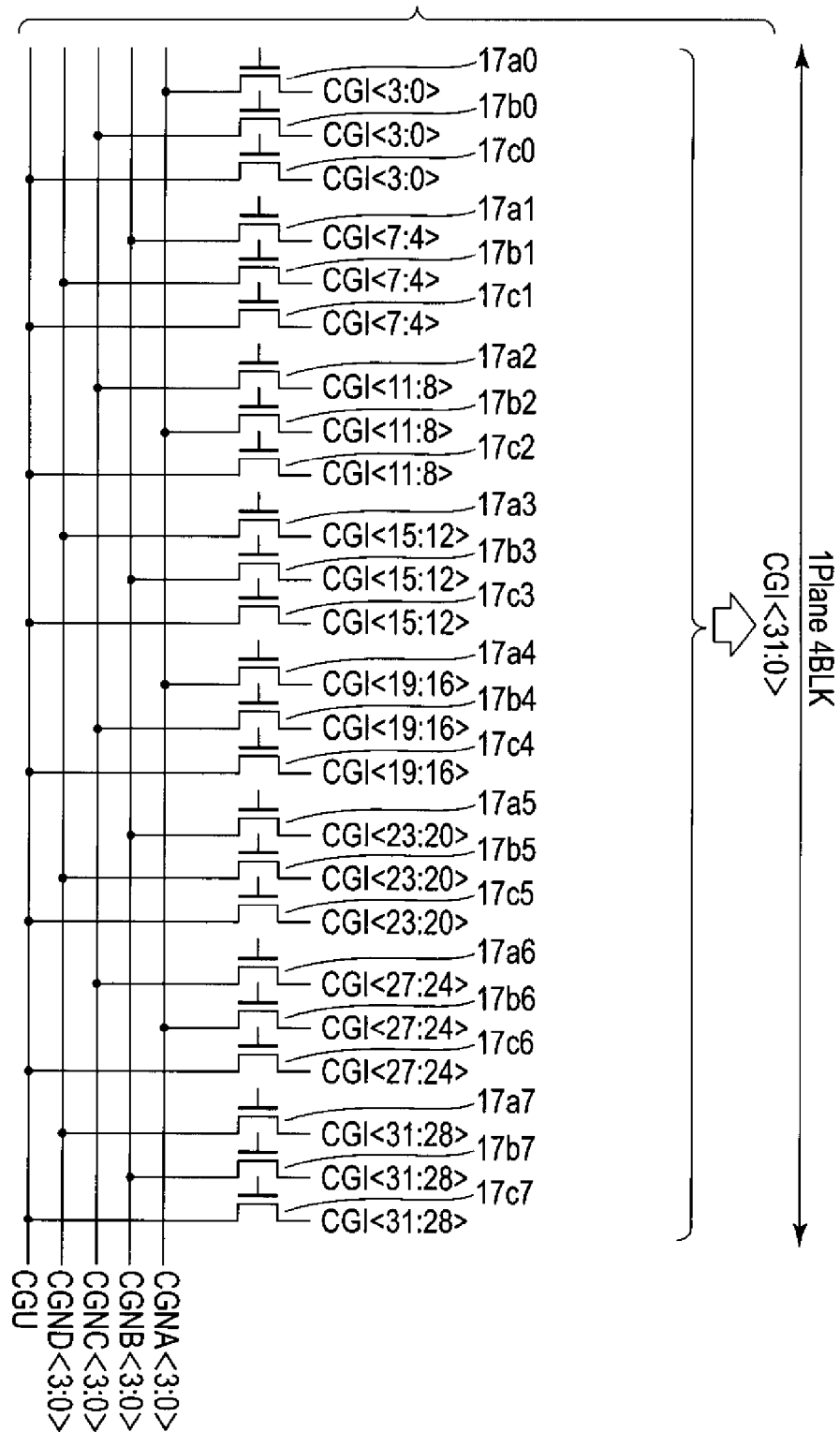
[図4]



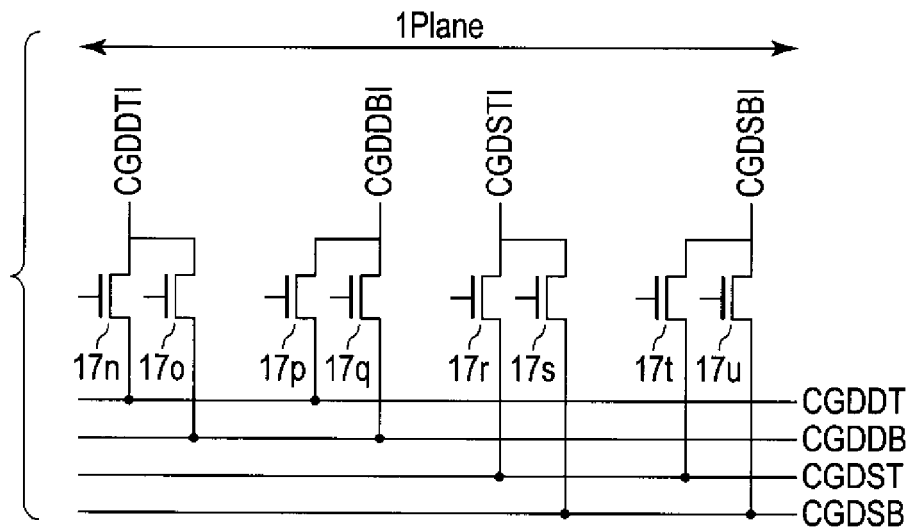
[図5]



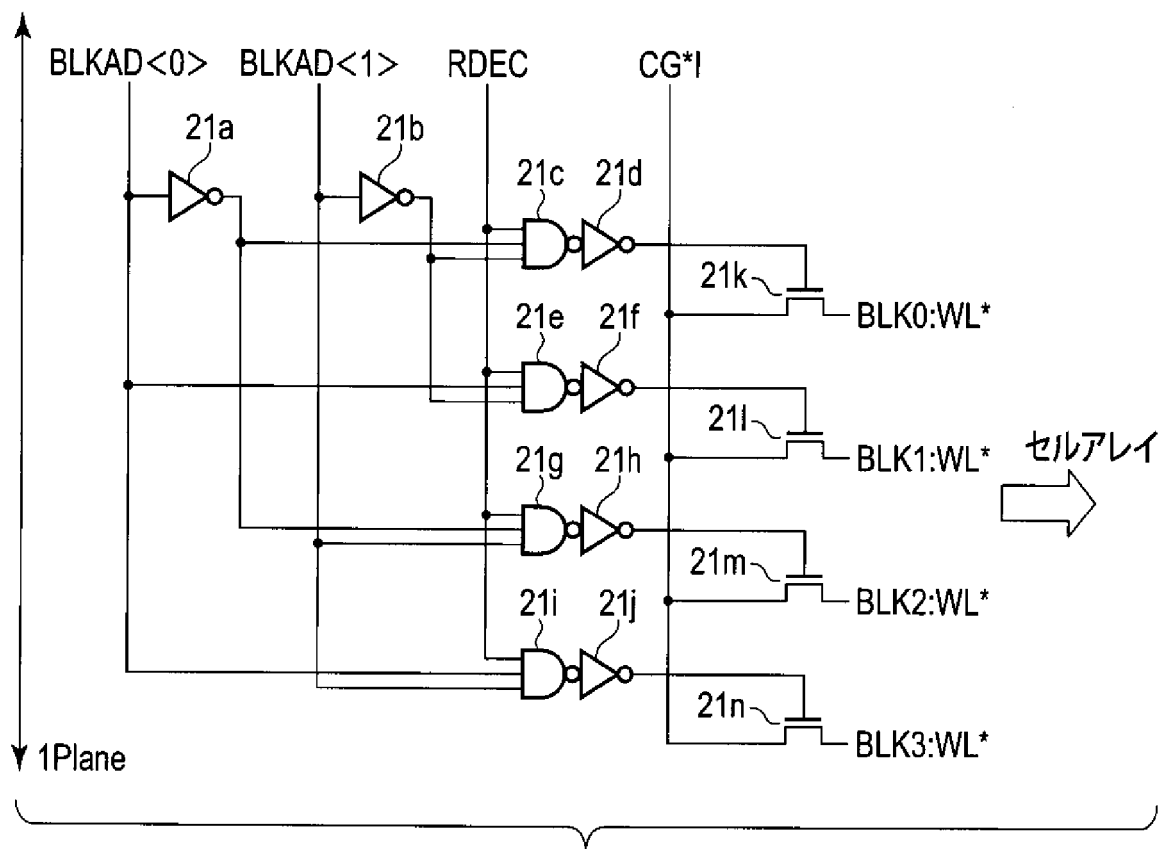
[図6]



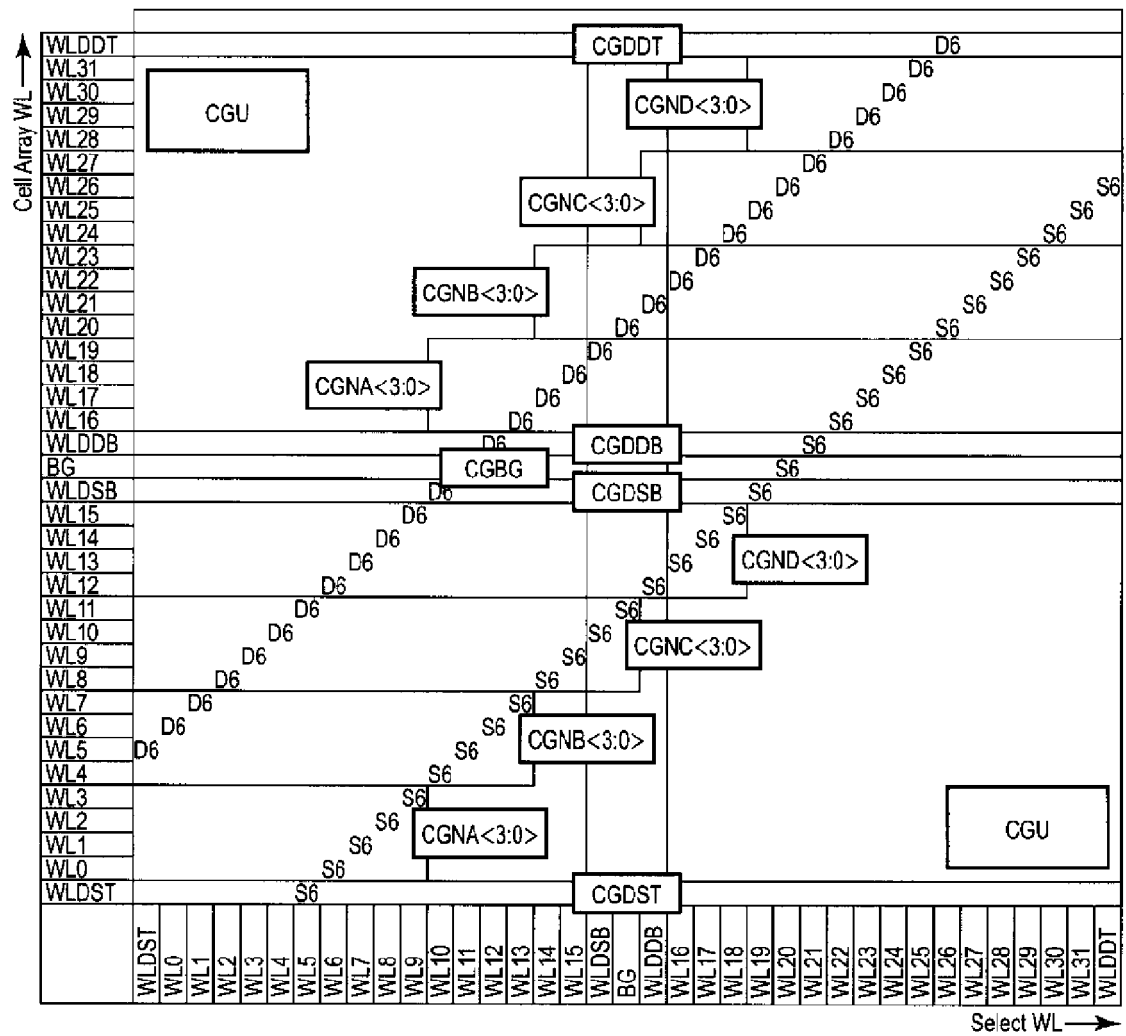
[図7]



[図8]



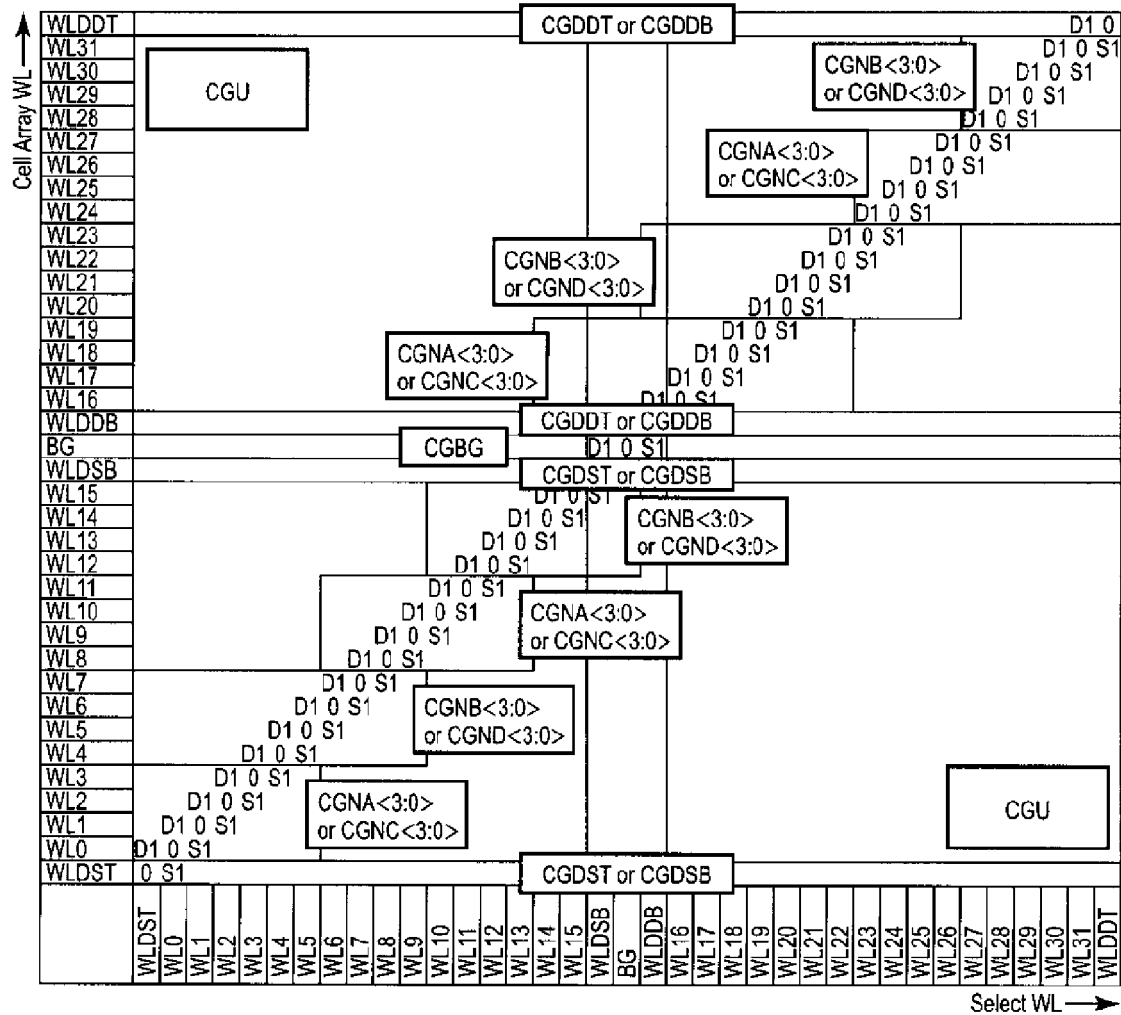
[図9]



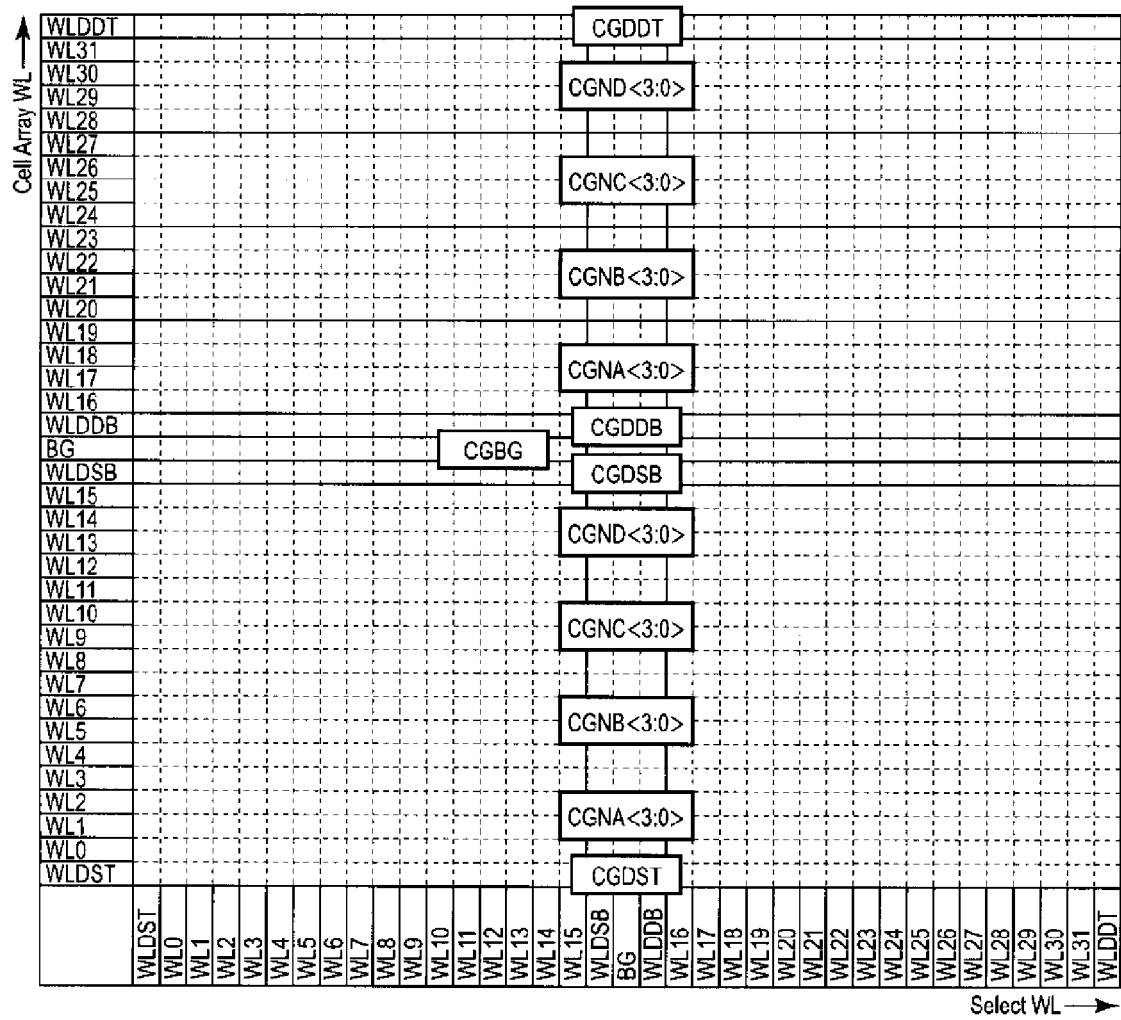
for rProg for Read ZONE<2:0>	PZ0		PZ1	PZ2	PZ3	PZ4	
	RZ0	RZ1	RZ2	RZ3	RZ4		RZ5
	000	001	010	011	100	101	110

[図10]

for rProg	PZ0		PZ1	PZ2	PZ3	PZ4		
for Read	RZ0	RZ1	RZ2	RZ3	RZ4		RZ5	RZ6
ZONE<2:0>	000	001	010	011	100	101	110	111



[図11]



[図12A]

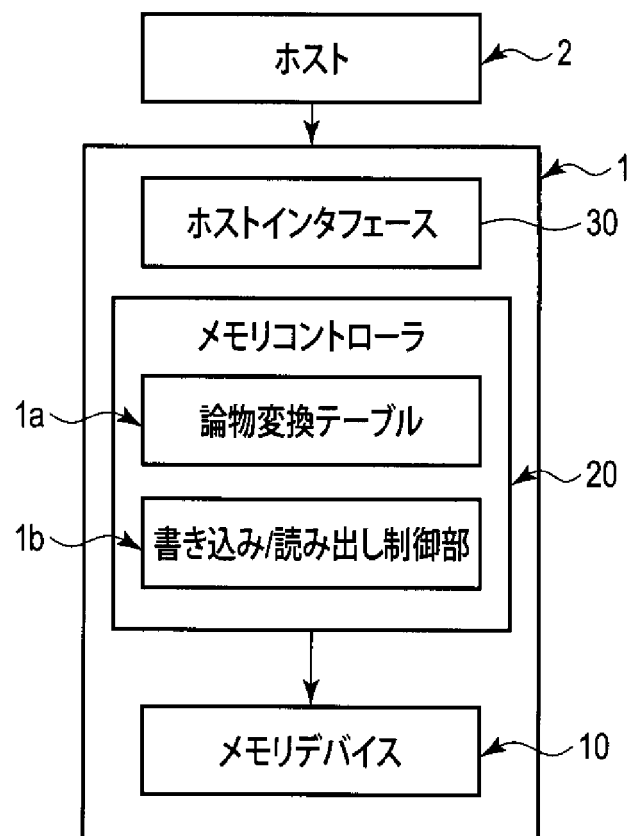
CGI Connect Control		CGI<31:28> Output										
MODE<1:0>	CGI Connect Control	<31:28>	<27:24>	<23:20>	<19:16>	<15:12>	<11:8>	<7:4>	<3:0>			
00 (Erase)	ZONE<2:0>	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>			
01 (Program)	Don't Care											
	000	CGU	CGU	CGU	CGU	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>			
	001	CGU	CGU	CGU	CGU	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>			
	010	CGU	CGU	CGU	CGNA<3:0>	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>			
	011	CGU	CGU	CGNB<3:0>	CGNA<3:0>	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>			
	100	CGU	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>	CGND<3:0>	CGU	CGU	CGU			
	101	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>	CGU	CGU	CGU	CGU			
10 (Read-A)	110	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>	CGU	CGU	CGU	CGU			
	111	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>	CGU	CGU	CGU	CGU			
	000	CGU	CGU	CGU	CGU	CGU	CGU	CGNB<3:0>	CGNA<3:0>			
	001	CGU	CGU	CGU	CGU	CGU	CGU	CGNB<3:0>	CGNA<3:0>			
	010	CGU	CGU	CGU	CGU	CGNB<3:0>	CGNA<3:0>	CGU	CGU			
	011	CGU	CGU	CGU	CGNA<3:0>	CGNB<3:0>	CGU	CGU	CGU			
	100	CGU	CGU	CGNB<3:0>	CGNA<3:0>	CGU	CGU	CGU	CGU			
11 (Read-B)	101	CGU	CGU	CGNB<3:0>	CGNA<3:0>	CGU	CGU	CGU	CGU			
	110	CGU	CGNA<3:0>	CGNB<3:0>	CGU	CGU	CGU	CGU	CGU			
	111	CGNB<3:0>	CGNA<3:0>	CGU	CGU	CGU	CGU	CGU	CGU			
	000	CGU	CGU	CGU	CGU	CGU	CGU	CGND<3:0>	CGNC<3:0>			
	001	CGU	CGU	CGU	CGU	CGU	CGU	CGND<3:0>	CGNC<3:0>			
	010	CGU	CGU	CGU	CGU	CGND<3:0>	CGNC<3:0>	CGU	CGU			
	011	CGU	CGU	CGU	CGNC<3:0>	CGND<3:0>	CGU	CGU	CGU			
	100	CGU	CGU	CGND<3:0>	CGNC<3:0>	CGU	CGU	CGU	CGU			
	101	CGU	CGU	CGND<3:0>	CGNC<3:0>	CGU	CGU	CGU	CGU			
	110	CGU	CGNC<3:0>	CGND<3:0>	CGU	CGU	CGU	CGU	CGU			
	111	CGND<3:0>	CGNC<3:0>	CGU	CGU	CGU	CGU	CGU	CGU			

[図12B]

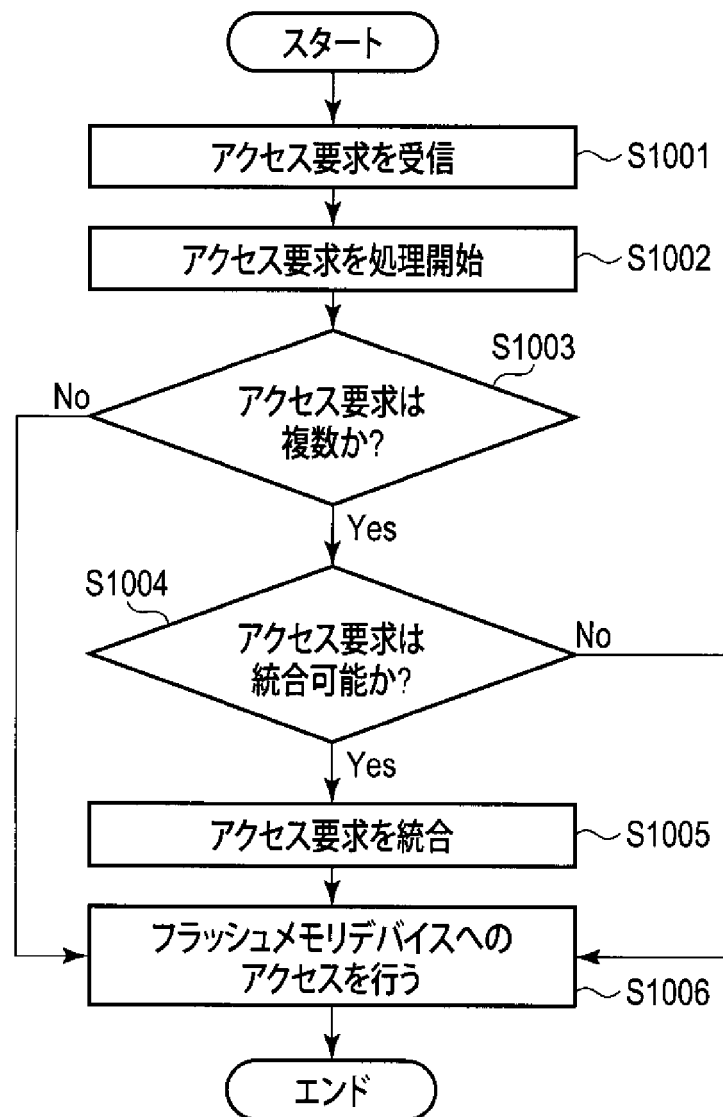
CGDDTI Connect Control		CGDSTI Connect Control	
CGDDTSW	CGDDTI Output	CGDSTSW	CGDSTI Output
0	CGDDT	0	CGDST
1	CGDDB	1	CGDSB

CGDDBI Connect Control		CGDSBI Connect Control	
CGDDBSW	CGDDBI Output	CGDSBSW	CGDSBI Output
0	CGDDB	0	CGDSB
1	CGDDT	1	CGDST

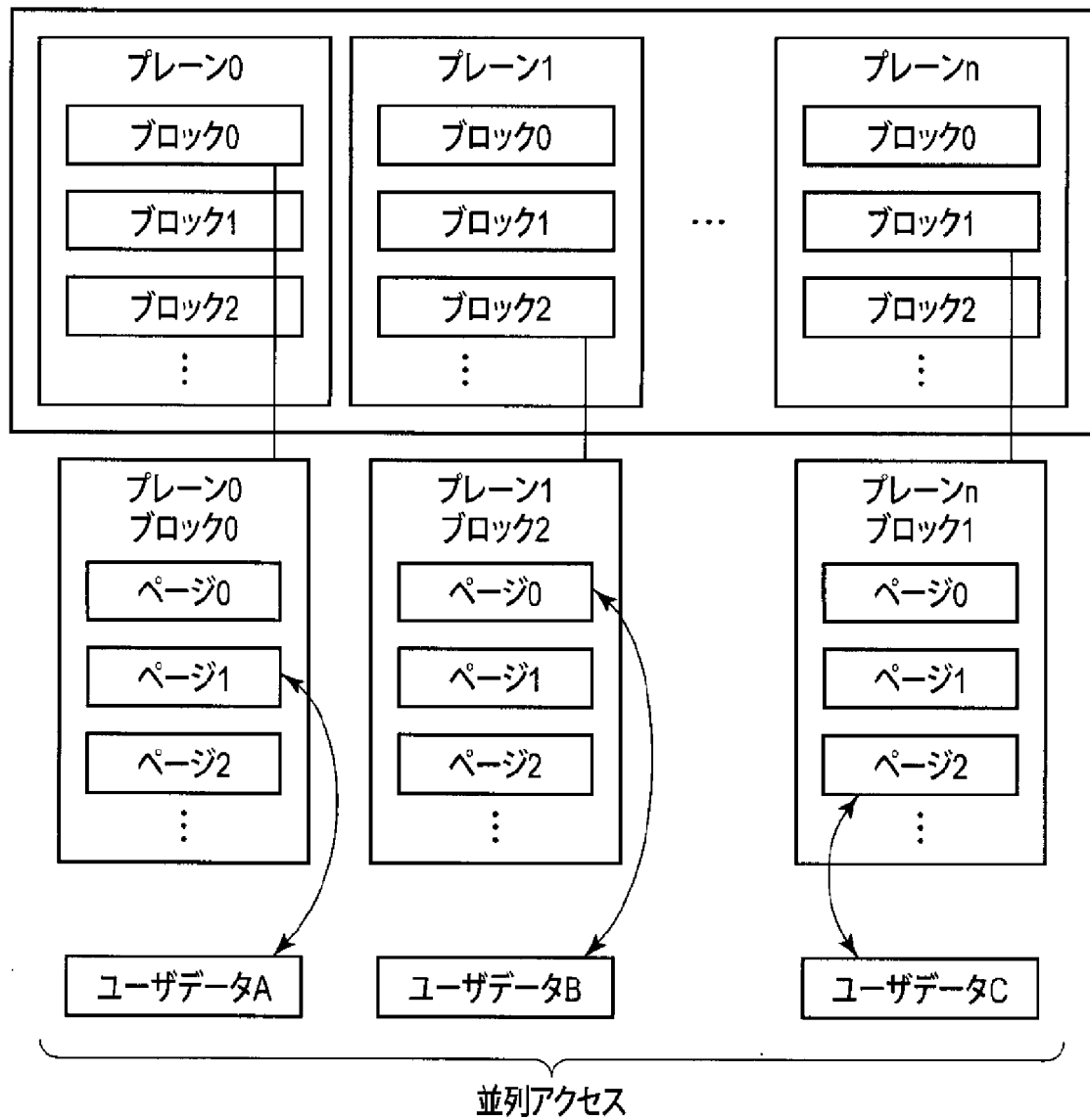
[図13]



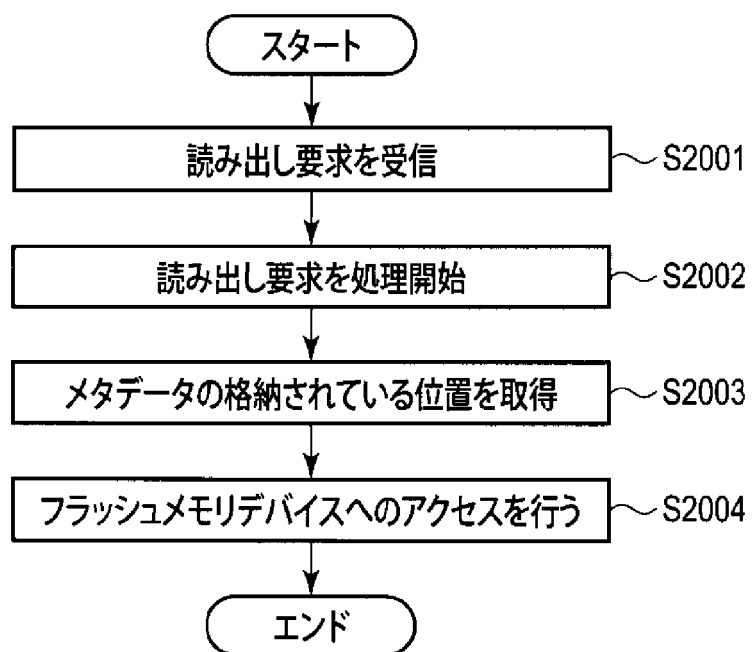
[図14]



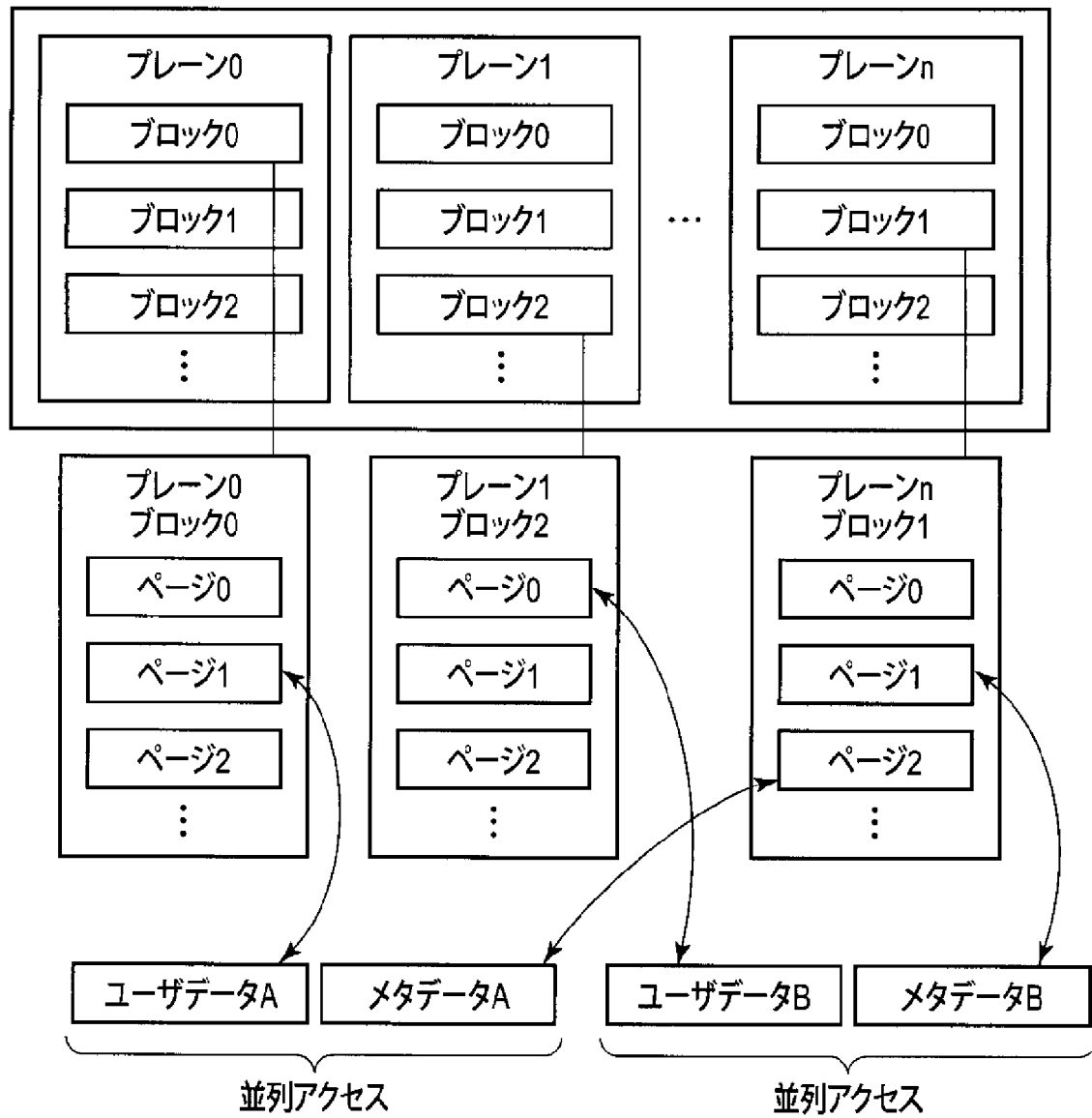
[図15]



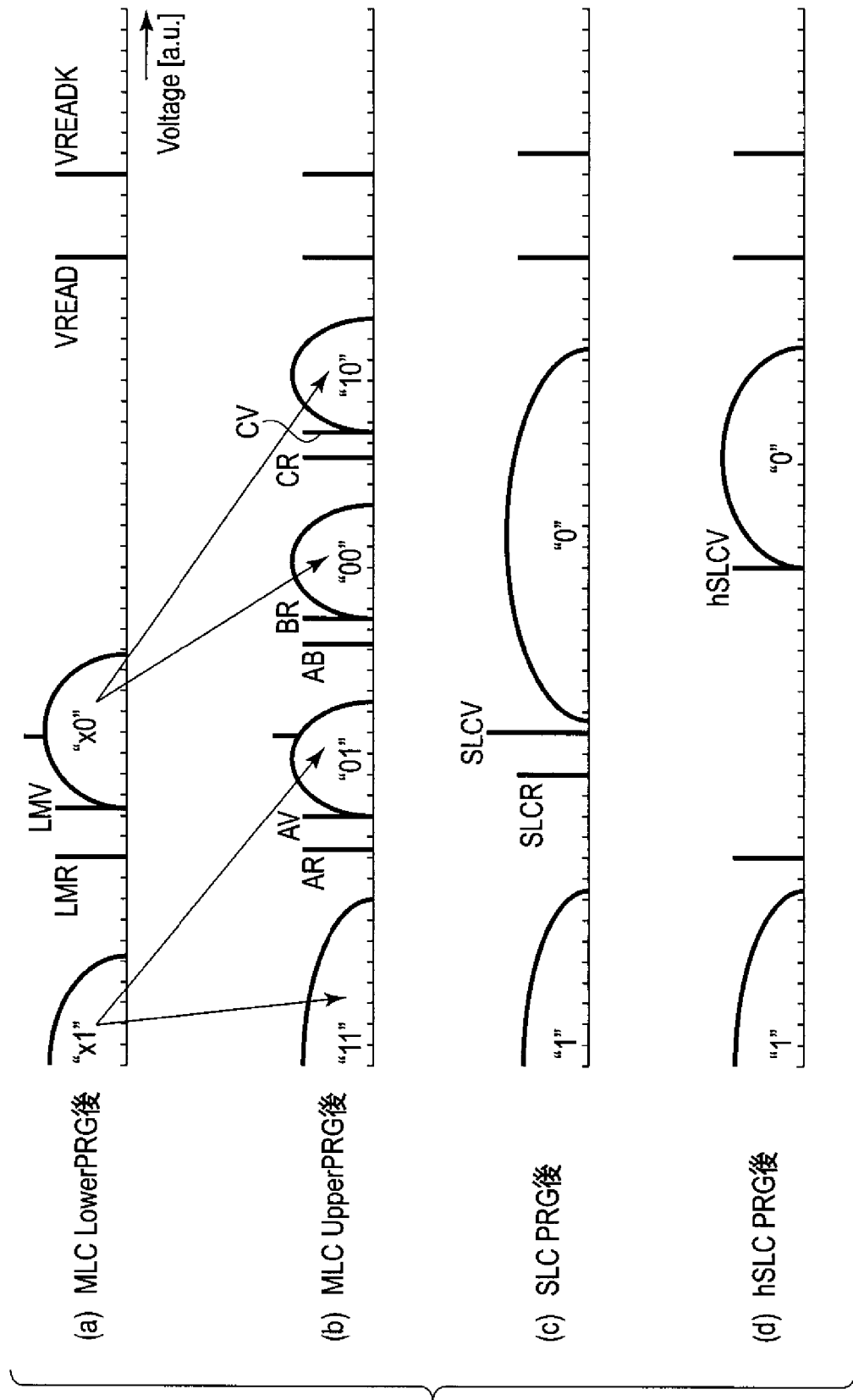
[図16]



[図17]



[図18]



[図19]

{ F_VPGMHSLC ... Initial VPGM for hSLC Program
 F_DVPGMHSLC ... Delta VPGM for hSLC Program
 F_VCG_HSLCV ... Verify Level for hSLC Program
 F_NLP_HSLC ... Loop max for hSLC Program

[図20]

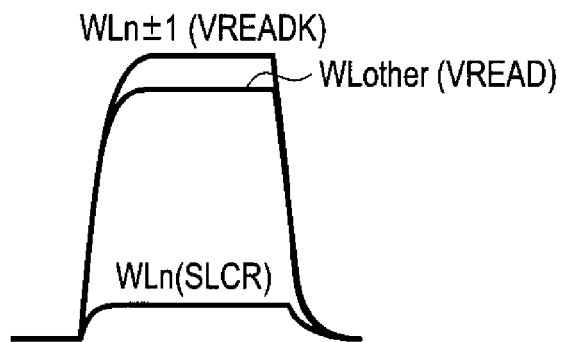
動作OptionA (F_HSLC_MODE=1)

Plane 0	Plane 1	Read Sequence
SLC	hSLC	SLCR
MLC-Lower (YetUpperProgram)	hSLC	BR→LMR
MLC-Upper (YetUpperProgram)	hSLC	AR→CR
MLC-Lower (UpperProgramed)	hSLC	BR
MLC-Upper (UpperProgramed)	hSLC	AR→CR

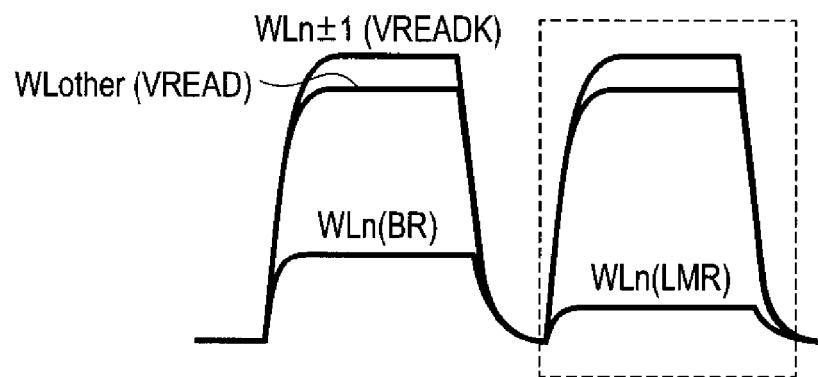
動作OptionB (F_HSLC_MODE=0)

Plane 0	Plane 1	Read Sequence
SLC	hSLC	SLCR
MLC-Lower (YetUpperProgramed)	hSLC	LMR→BR (New)
MLC-Upper (YetUpperProgramed)	hSLC	AR→CR
MLC-Lower (UpperProgramed)	hSLC	LMR→BR (New)
MLC-Upper (UpperProgramed)	hSLC	AR→CR

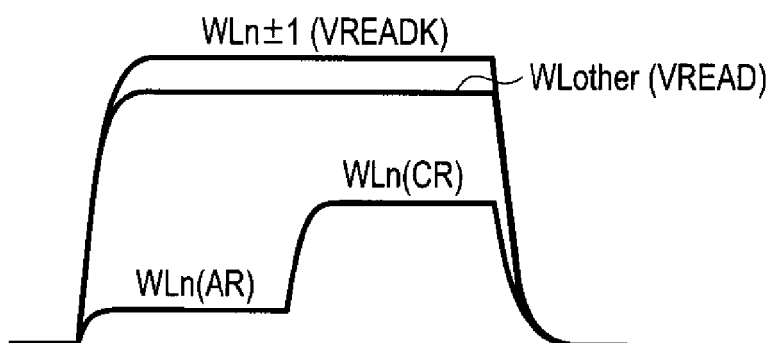
[図21A]

SLC Read

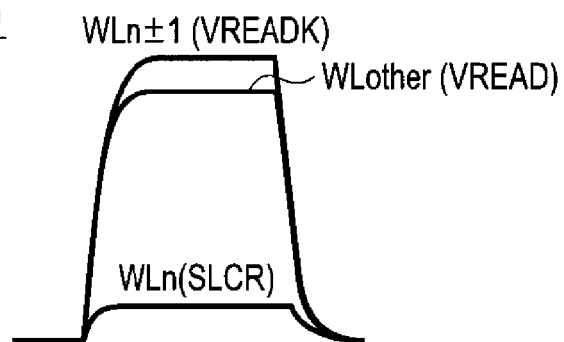
[図21B]

MLC Lower Read

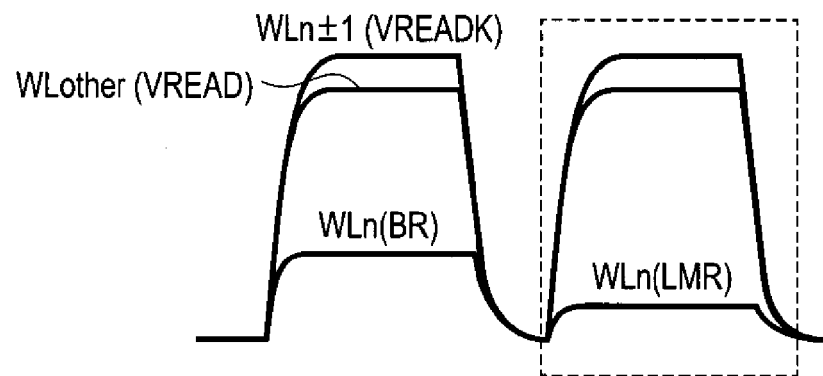
[図21C]

MLC Upper Read

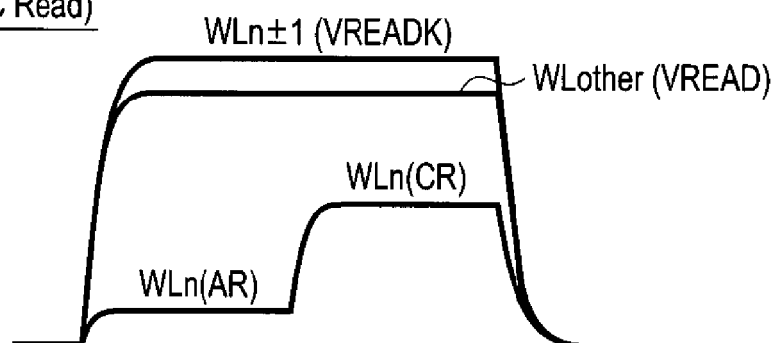
[図22A]

SLC Read(+hSLC Read)

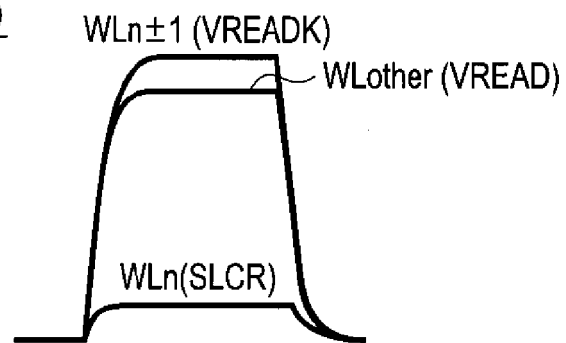
[図22B]

MLC Lower Read(+hSLC Read)

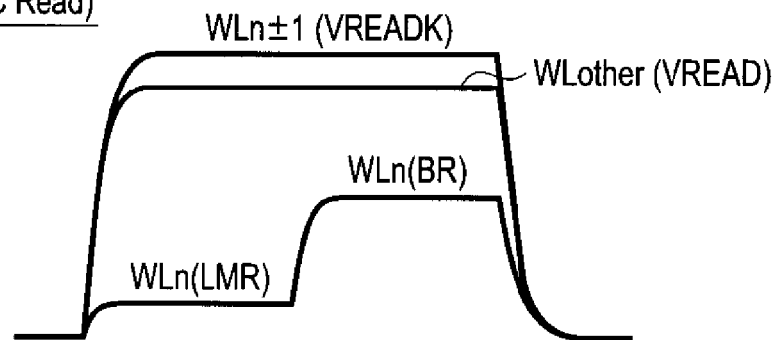
[図22C]

MLC Upper Read(+hSLC Read)

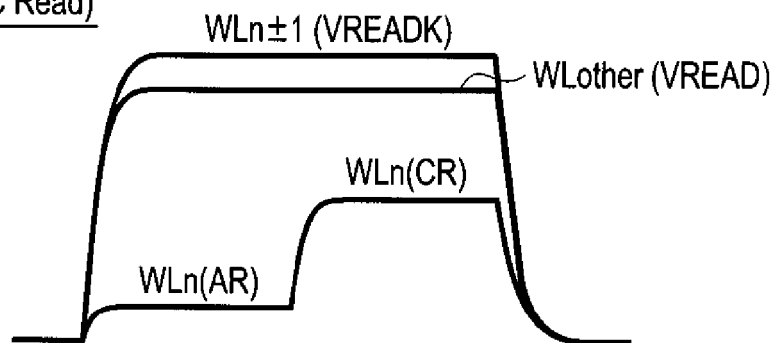
[図23A]

SLC Read(+hSLC Read)

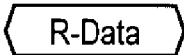
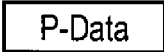
[図23B]

MLC Lower Read(+hSLC Read)

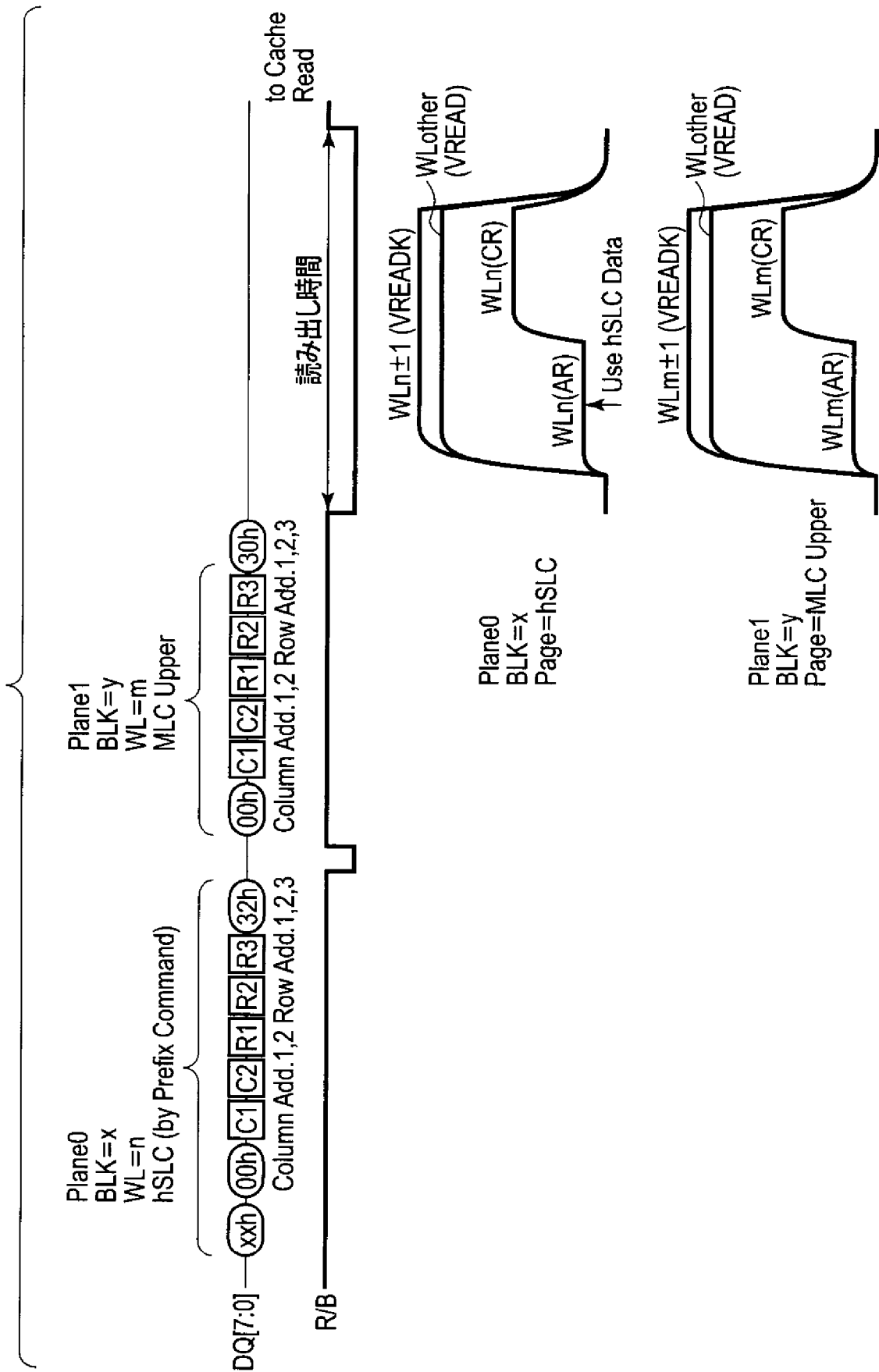
[図23C]

MLC Upper Read(+hSLC Read)

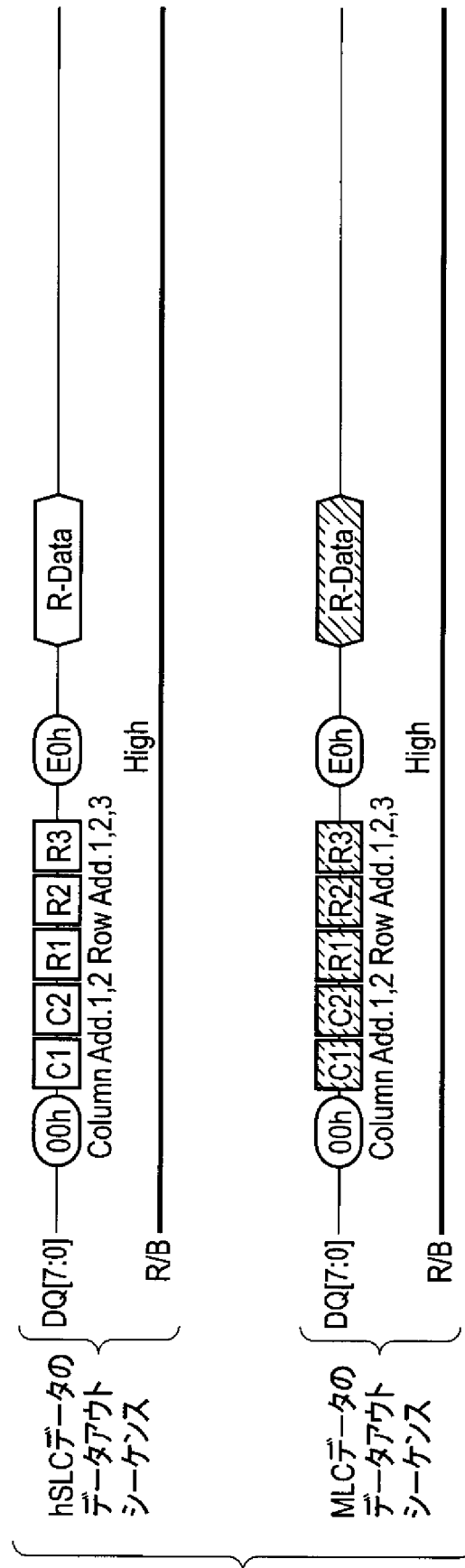
[図24]

	コマンドデータ
	アドレスデータ C1: カラムアドレス1 C2: カラムアドレス2 R1: ローアドレス1 R2: ローアドレス2 R3: ローアドレス3
	チップからデータアウトされたリードデータ
	チップにデータインするためのプログラムデータ

[図26]



[図27]



[図28]

	DQ7	DQ6	DQ5	DQ4	DQ3	DQ2	DQ1	DQ0
First cycle (C1) (Column address 1)	C1-7	C1-6	C1-5	C1-4	C1-3	C1-2	C1-1	C1-0
Second cycle (C2) (Column address 2)	L	C2-6	C2-5	C2-4	C2-3	C2-2	C2-1	C2-0
Third cycle (R1) (Row address 1)	R1-7	R1-6	R1-5	R1-4	R1-3	R1-2	R1-1	R1-0
Fourth cycle (R2) (Row address 2)	R2-7	R2-6	R2-5	R2-4	R2-3	R2-2	R2-1	R2-0
Fifth cycle (R3) (Row address 3)	L	L	L	R3-4	R3-3	R3-2	R3-1	R3-0

[図29A]

CGSW Control Signal

(hSLC)

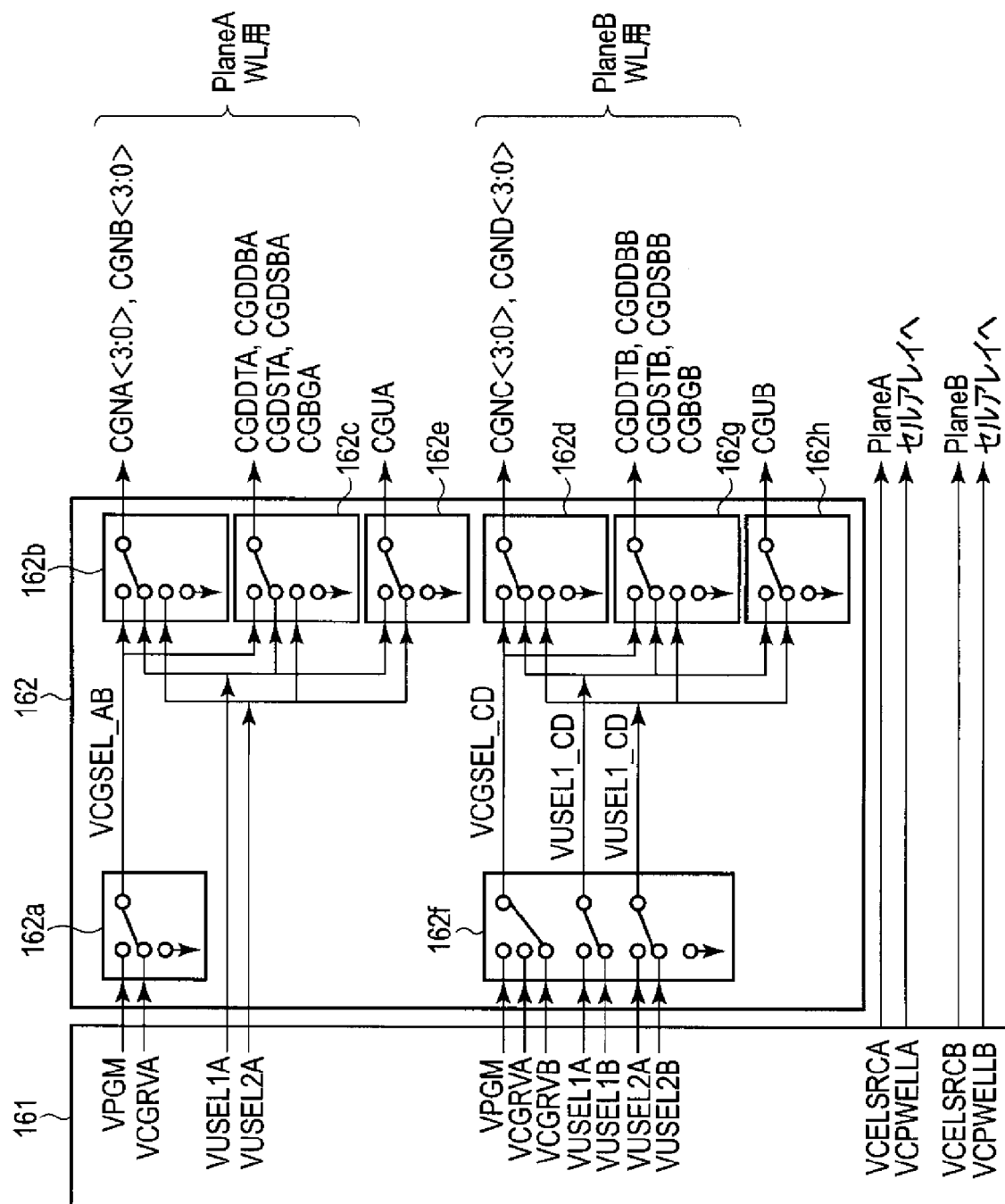
	Plane0 (Sel=Edge WL)	Plane1 (Sel=MidWL)
ZONE<3:0>	111	011
MODE<1:0>	10	11
CGDDTSW	0	1
CGDDBSW	0	0
CGDSTSW	1	1
CGDSBSW	0	1

[図29B]

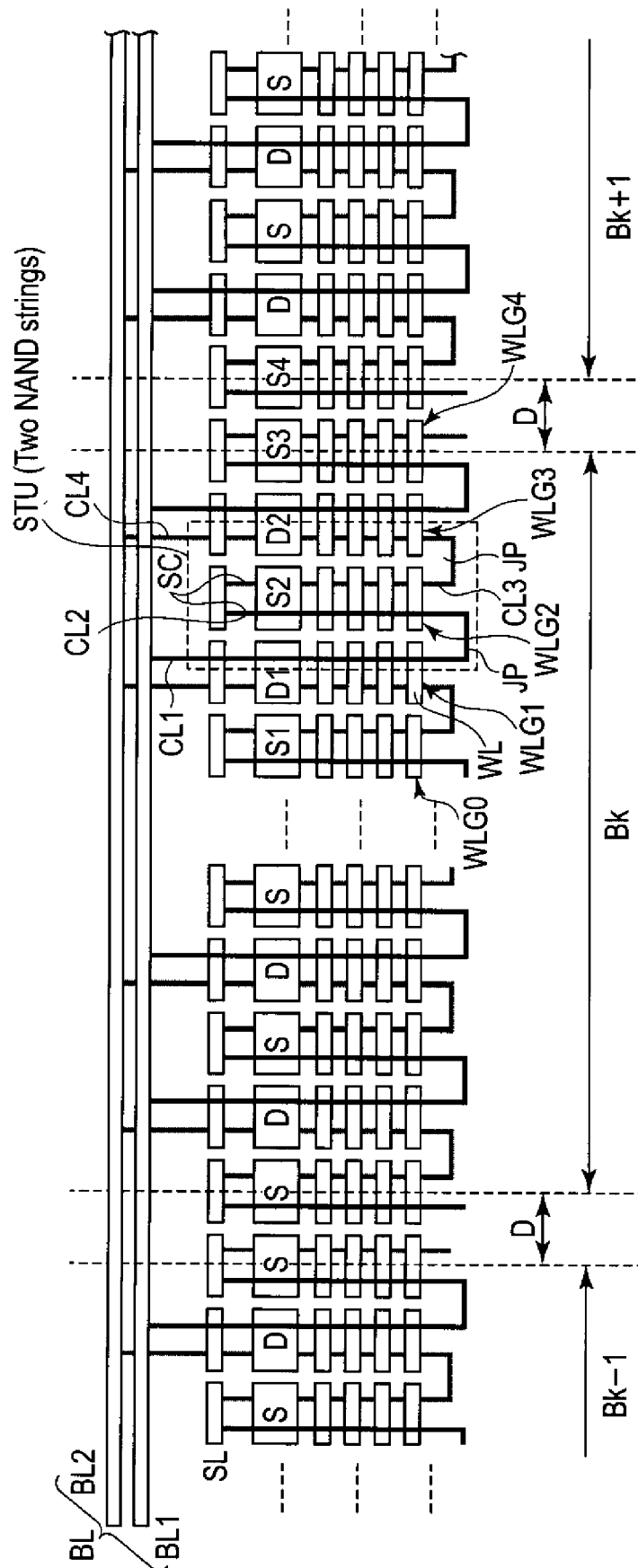
WL Voltage

(hSLC)

	Plane0 (Sel=Edge WL)	Plane1 (Sel=Edge WL)
WLDDT	CGDDTI=CGDDT=VREADK	CGDDTI=CGDDB=VREAD
WL31	CGI<31>=CGNB<3>=VCGRV	CGI<31>=CGU=VREAD
WL30	CGI<30>=CGNB<2>=VREADK	CGI<30>=CGU=VREAD
WL29	CGI<29>=CGNB<1>=VREAD	CGI<29>=CGU=VREAD
WL28	CGI<29>=CGNB<0>=VREAD	CGI<29>=CGU=VREAD
:	:	:
WL19	CGI<19>=CGU=VREAD	CGI<19>=CGU=VREAD
WL18	CGI<18>=CGU=VREAD	CGI<18>=CGU=VREAD
WL17	CGI<17>=CGU=VREAD	CGI<17>=CGU=VREAD
WL16	CGI<16>=CGU=VREAD	CGI<16>=CGU=VREAD
WLDDB	CGDDBI=CGDDB=VREAD	CGDDBI=CGDDB=VREAD
BG	CGBGI=CGBG=VREAD	CGBGI=CGBG=VREAD
WLDSB	CGDSBI=CGDSB=VREAD	CGDSBI=CGDST=VREADK
WL15	CGI<15>=CGU=VREAD	CGI<15>=CGND<3>=VCGRV
WL14	CGI<14>=CGU=VREAD	CGI<14>=CGND<2>=VREADK
WL13	CGI<13>=CGU=VREAD	CGI<13>=CGND<1>=VREAD
WL12	CGI<12>=CGU=VREAD	CGI<12>=CGND<0>=VREAD
:	:	:
WL3	CGI<3>=CGU=VREAD	CGI<3>=CGU=VREAD
WL2	CGI<2>=CGU=VREAD	CGI<2>=CGU=VREAD
WL1	CGI<1>=CGU=VREAD	CGI<1>=CGU=VREAD
WL0	CGI<0>=CGU=VREAD	CGI<0>=CGU=VREAD
WLDST	CGDSTI=CGDSB=VREAD	CGDSTI=CGDSB=VREAD

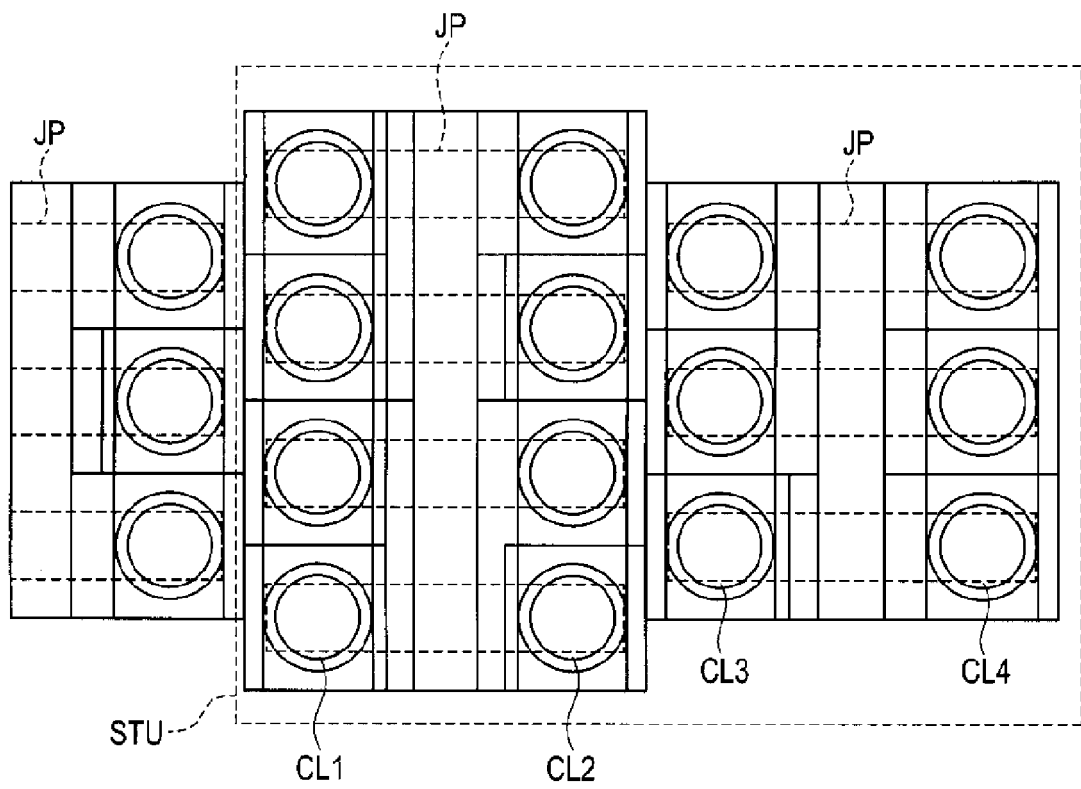


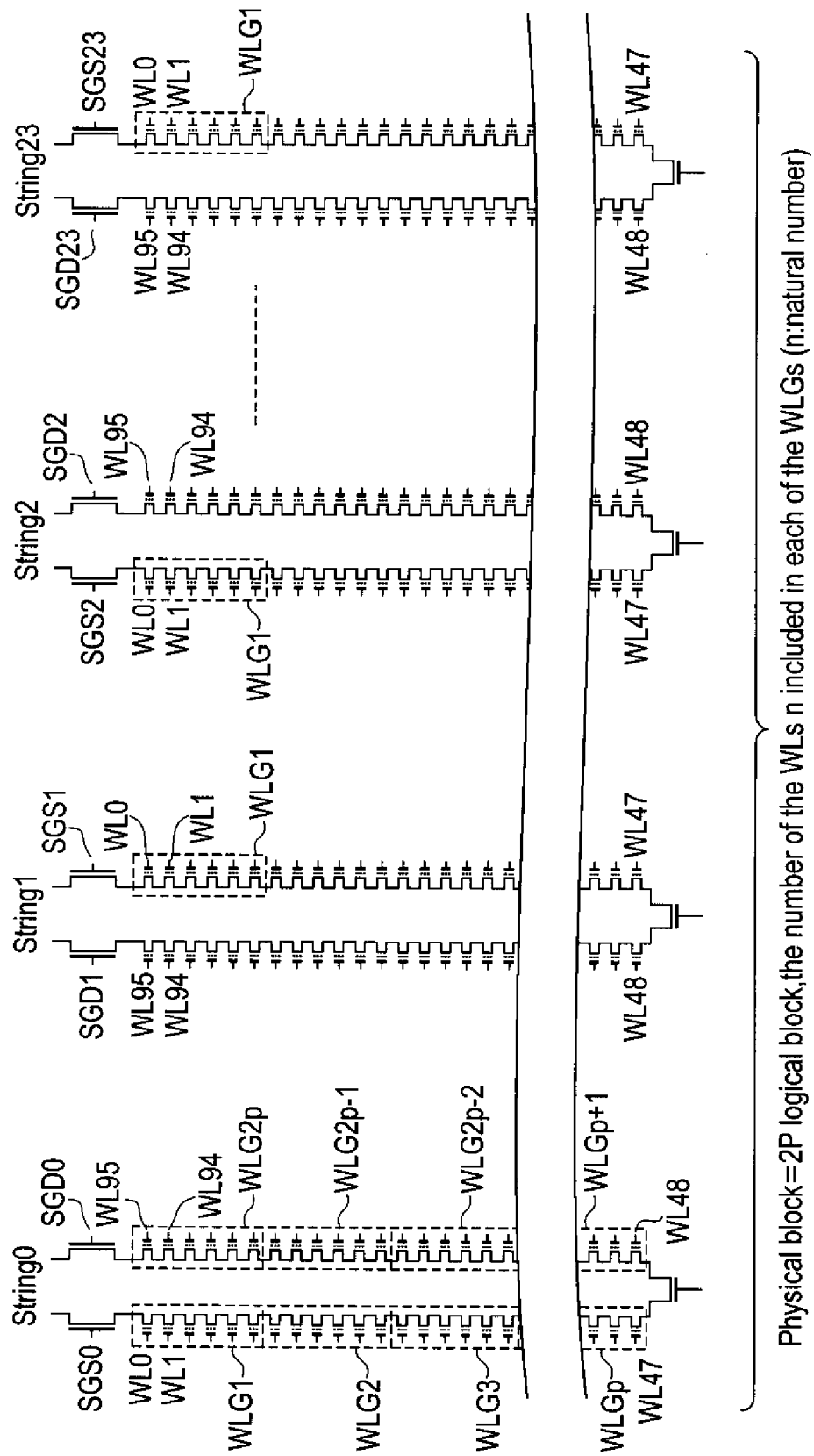
[図31]



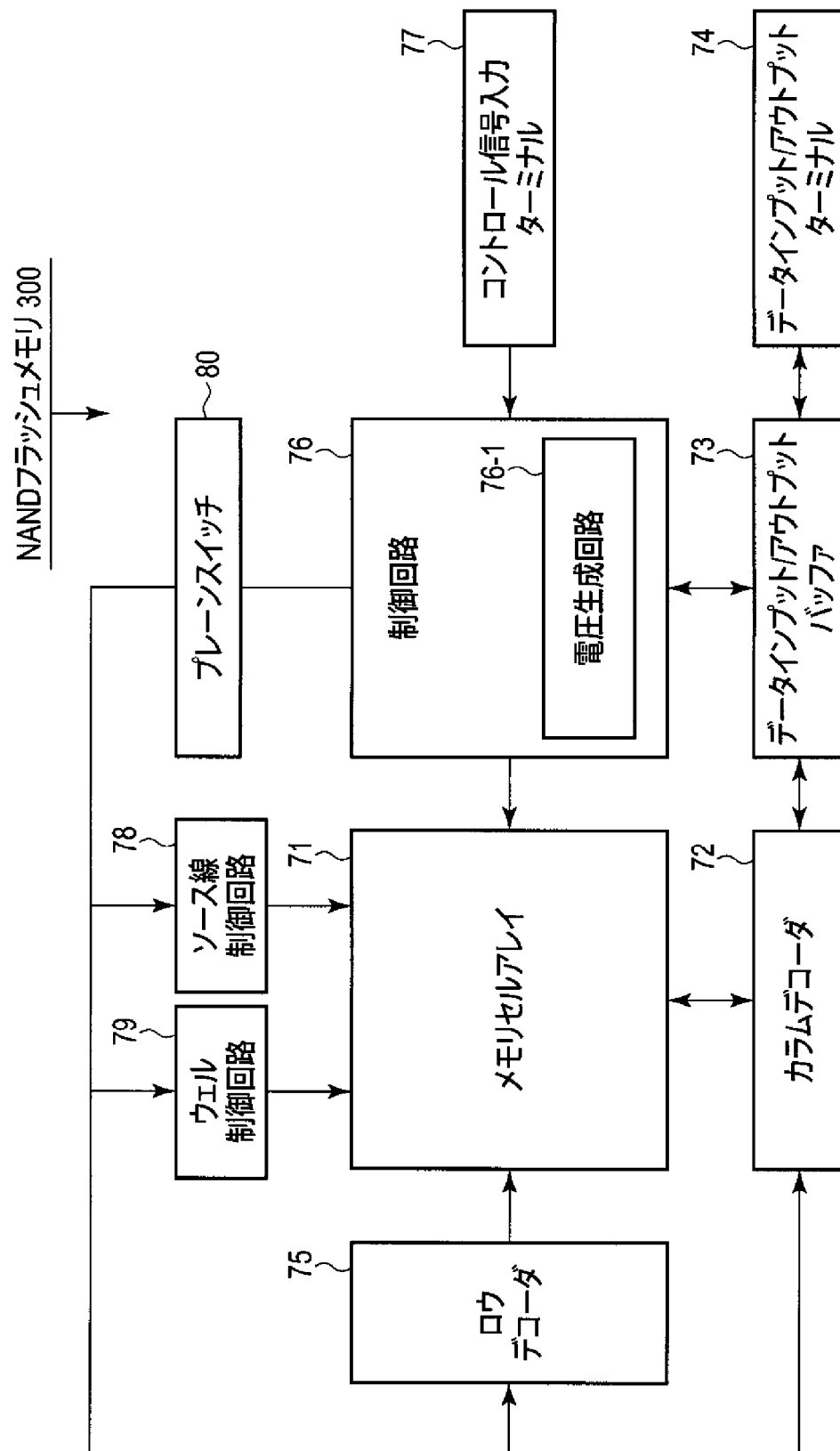
[illegible]

[図33]

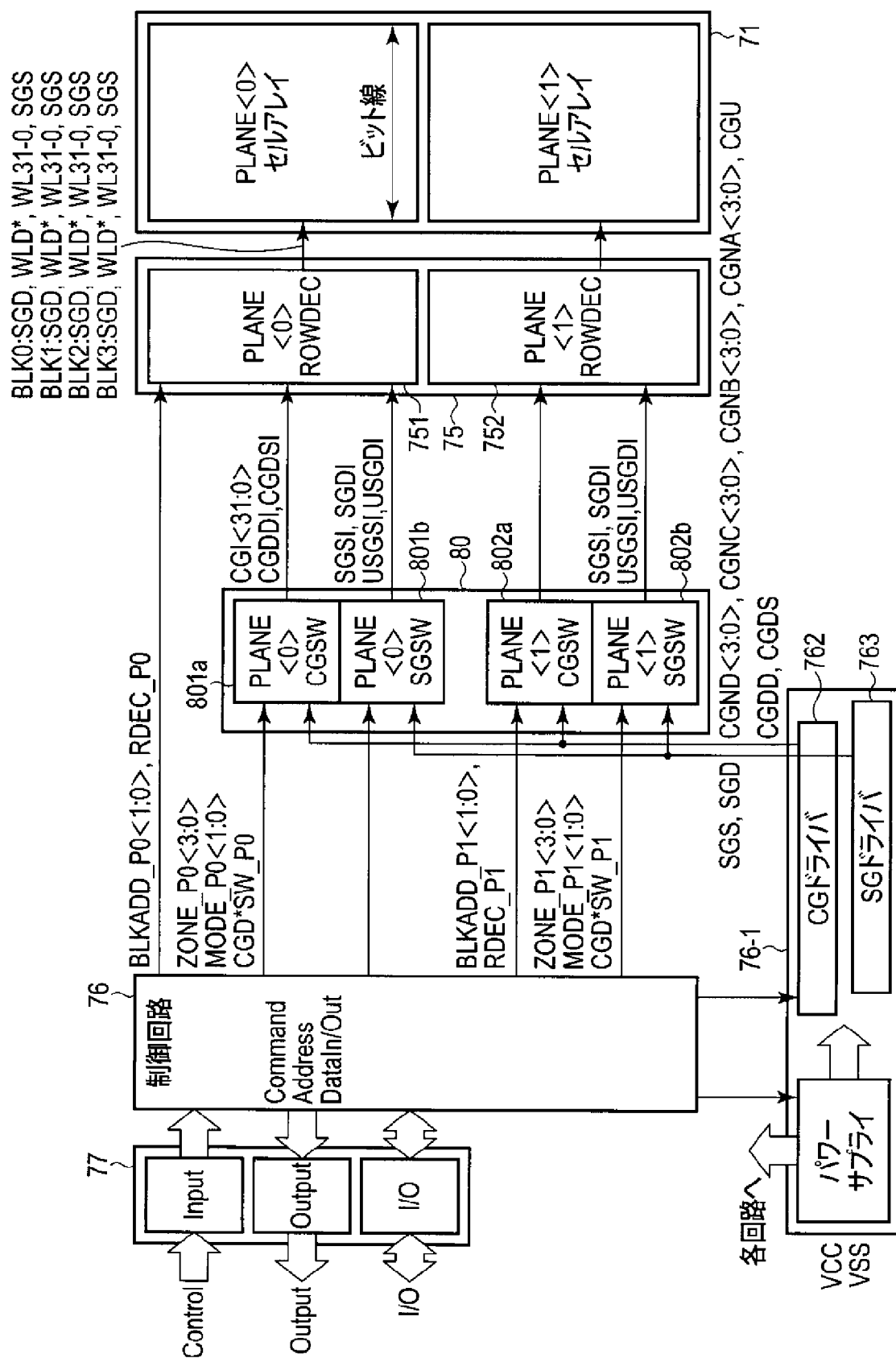




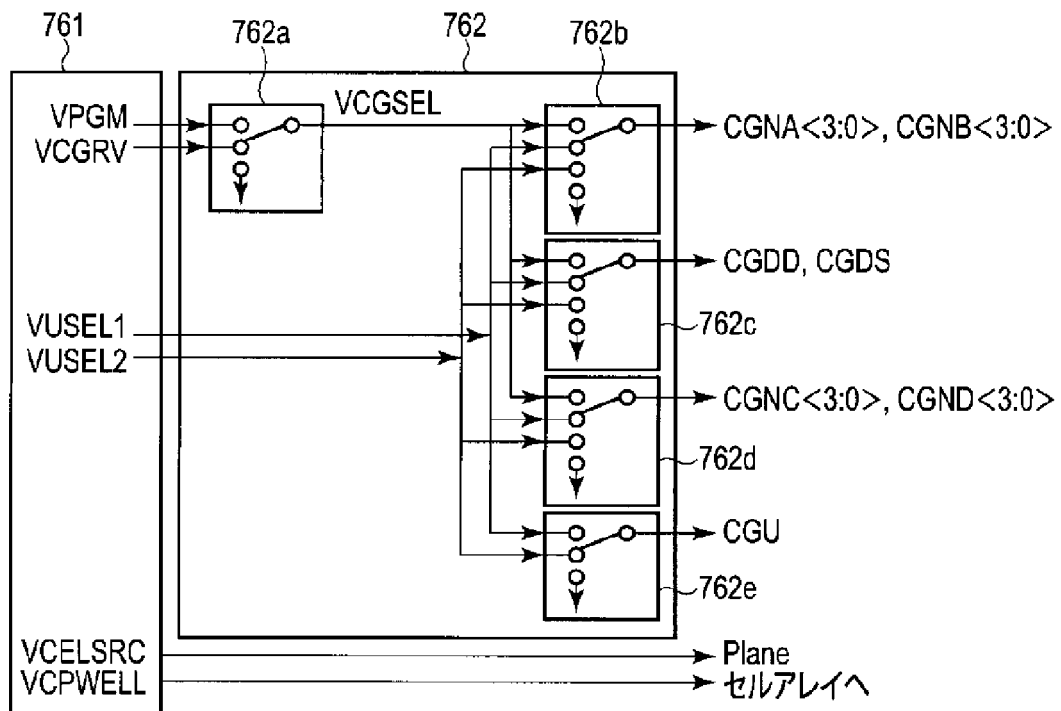
[図35]



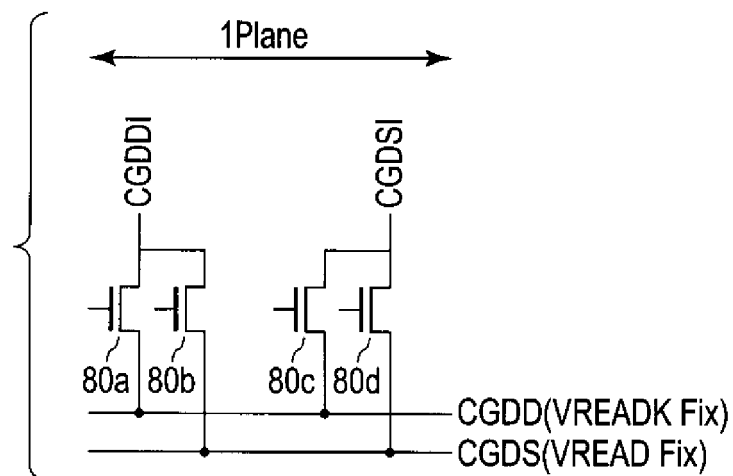
[図36]



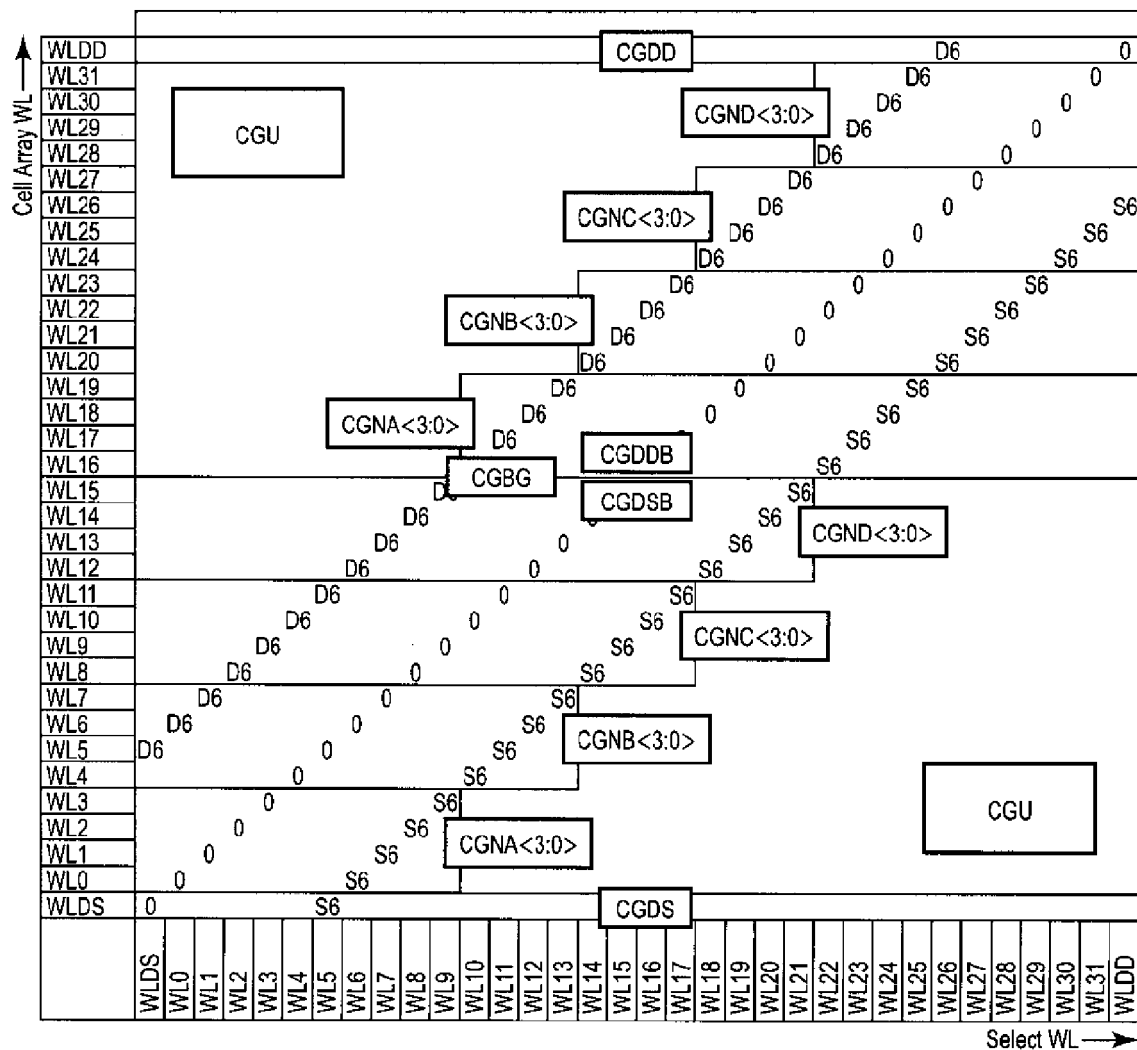
[図37]



[図38]



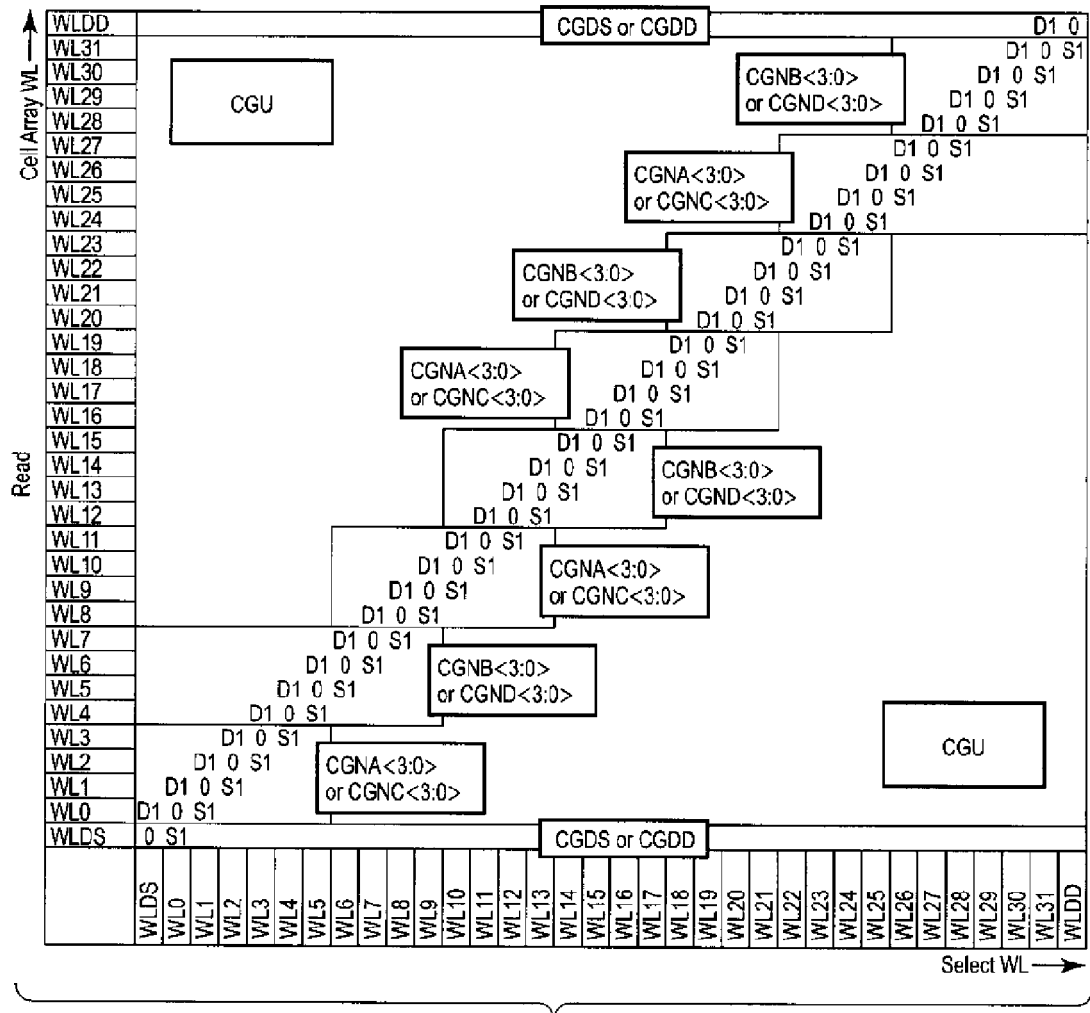
[図39]



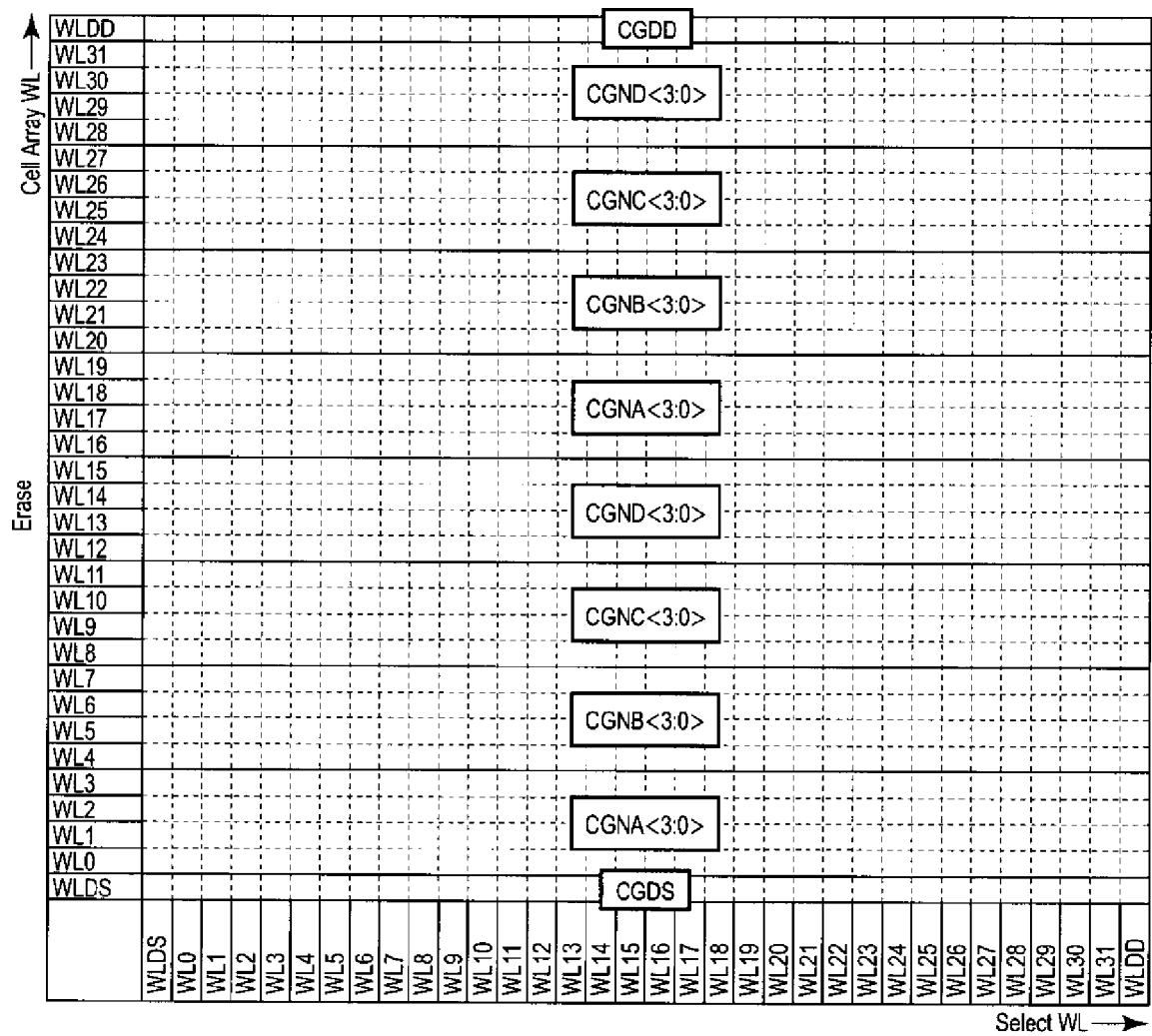
to rProg	PZ0		PZ1	PZ2	PZ3	PZ4	
for Read	RZ0	RZ1	RZ2	RZ3	RZ4	RZ5	RZ6
ZONE<2:0>	000	001	010	011	100	101	110

[図40]

to rProg	PZ0		PZ1	PZ2	PZ3	PZ4	
for Read	RZ0	RZ1	RZ2	RZ3	RZ4	RZ5	RZ6
ZONE<2:0>	000	001	010	011	100	101	110



[図41]



[図42A]

CGI Connect Control		CGI<31:28>Output									
MODE<1:0>	ZONE<2:0>	<31:28>	<27:24>	<23:20>	<19:16>	<15:12>	<11:8>	<7:4>	<3:0>		
00 (Erase)	Don't Care	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>		
	000	CGU	CGU	CGU	CGU	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>		
	001	CGU	CGU	CGU	CGU	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>		
	010	CGU	CGU	CGU	CGNA<3:0>	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>		
01 (Program)	011	CGU	CGU	CGNB<3:0>	CGNA<3:0>	CGND<3:0>	CGNC<3:0>	CGU	CGU		
	100	CGU	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>	CGND<3:0>	CGU	CGU	CGU		
	101	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>	CGU	CGU	CGU	CGU		
	110	CGND<3:0>	CGNC<3:0>	CGNB<3:0>	CGNA<3:0>	CGU	CGU	CGU	CGU		
10 (Read-A)	000	CGU	CGU	CGU	CGU	CGU	CGU	CGNB<3:0>	CGNA<3:0>		
	001	CGU	CGU	CGU	CGU	CGU	CGNA<3:0>	CGNB<3:0>	CGU		
	010	CGU	CGU	CGU	CGU	CGNB<3:0>	CGNA<3:0>	CGU	CGU		
	011	CGU	CGU	CGU	CGNA<3:0>	CGNB<3:0>	CGU	CGU	CGU		
11 (Read-B)	100	CGU	CGU	CGNB<3:0>	CGNA<3:0>	CGU	CGU	CGU	CGU		
	101	CGU	CGNA<3:0>	CGNB<3:0>	CGU	CGU	CGU	CGU	CGU		
	110	CGNB<3:0>	CGNA<3:0>	CGU	CGU	CGU	CGU	CGU	CGU		
	000	CGU	CGU	CGU	CGU	CGU	CGU	CGND<3:0>	CGNC<3:0>		
11 (Read-B)	001	CGU	CGU	CGU	CGU	CGU	CGNC<3:0>	CGND<3:0>	CGU		
	010	CGU	CGU	CGU	CGU	CGND<3:0>	CGNC<3:0>	CGU	CGU		
	011	CGU	CGU	CGU	CGNC<3:0>	CGND<3:0>	CGU	CGU	CGU		
	100	CGU	CGU	CGND<3:0>	CGNC<3:0>	CGU	CGU	CGU	CGU		
11 (Read-B)	101	CGU	CGNC<3:0>	CGND<3:0>	CGU	CGU	CGU	CGU	CGU		
	110	CGND<3:0>	CGNC<3:0>	CGU	CGU	CGU	CGU	CGU	CGU		

[図42B]

CGDDI Connect Control	
CGDDSW	CGDDI Output
0	CGDD
1	CGDS

CGDSI Connect Control	
CGDSSW	CGDSI Output
0	CGDS
1	CGDD

[図43A]

CGSW Control Signal

(hSLC)

	Plane0 (Sel=Edge WL)	Plane1 (Sel=MidWL)
ZONE<3:0>	110	011
MODE<1:0>	10	11
CGDDSW	0	1
CGDSSW	0	0

[図43B]

WL Voltage

(hSLC)

	Plane0 (Sel=Edge WL)	Plane1 (Sel=Edge WL)
WLDD	CGDDI=CGDD=VREADK	CGDDI=CGDS=VREAD
WL31	CGI<31>=CGNB<3>=VCGRV	CGI<31>=CGU=VREAD
WL30	CGI<30>=CGNB<2>=VREADK	CGI<30>=CGU=VREAD
WL29	CGI<29>=CGNB<1>=VREAD	CGI<29>=CGU=VREAD
WL28	CGI<28>=CGNB<0>=VREAD	CGI<28>=CGU=VREAD
:	:	:
WL19	CGI<19>=CGU=VREAD	CGI<19>=CGNC<3>=VREAD
WL18	CGI<18>=CGU=VREAD	CGI<18>=CGNC<2>=VREAD
WL17	CGI<17>=CGU=VREAD	CGI<17>=CGNC<1>=VREAD
WL16	CGI<16>=CGU=VREAD	CGI<16>=CGNC<0>=VREADK
WL15	CGI<14>=CGU=VREAD	CGI<15>=CGND<3>=VCGRV
WL14	CGI<14>=CGU=VREAD	CGI<14>=CGND<2>=VREADK
WL13	CGI<13>=CGU=VREAD	CGI<13>=CGND<1>=VREAD
WL12	CGI<12>=CGU=VREAD	CGI<12>=CGND<0>=VREAD
:	:	:
WL3	CGI<3>=CGU=VREAD	CGI<3>=CGU=VREAD
WL2	CGI<2>=CGU=VREAD	CGI<2>=CGU=VREAD
WL1	CGI<1>=CGU=VREAD	CGI<1>=CGU=VREAD
WL0	CGI<0>=CGU=VREAD	CGI<0>=CGU=VREAD
WLDS	CGDSI=CGDS=VREAD	CGDSI=CGDS=VREAD

[図44]

