



(12) **United States Patent**  
**Ino et al.**

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(54) **LIQUID-CRYSTAL DISPLAY APPARATUS**

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(73) Assignee: **Sony Corporation (JP)**

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(30) **Foreign Application Priority Data**

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Aug. 27, 1998	(JP)	10-241393

(51) **Int. Cl.**<sup>7</sup> ..... **G09G 3/30**

(52) **U.S. Cl.** ..... **345/87; 345/92; 345/98; 345/100; 345/205; 345/88; 345/600; 345/603**

(58) **Field of Search** ..... **345/87, 92, 204, 345/206, 211, 213, 100, 98, 88, 205, 600, 603**

(56) **References Cited**

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(57) **ABSTRACT**

When time-division driving, which allows the number of output pins of a driver IC to be reduced, is applied to an active-matrix LCD apparatus, a time-division number is set to an odd number, preferably to the n-th (n: natural number) power of three, and a time-sequential signal (dot inversion signal) output from the driver IC is time-divided by a time-division switch and sent to signal lines 12-1, 12-2, 12-3, . . . to implement complete dot inversion driving.

**17 Claims, 14 Drawing Sheets**

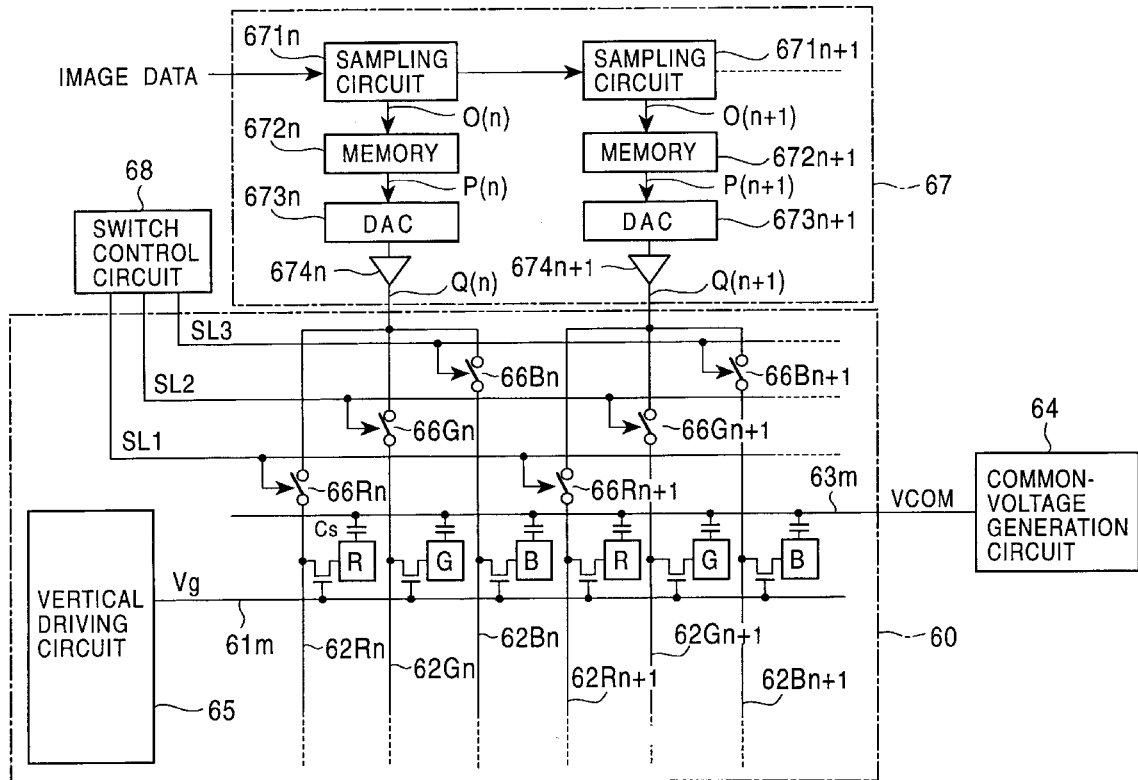


FIG. 1

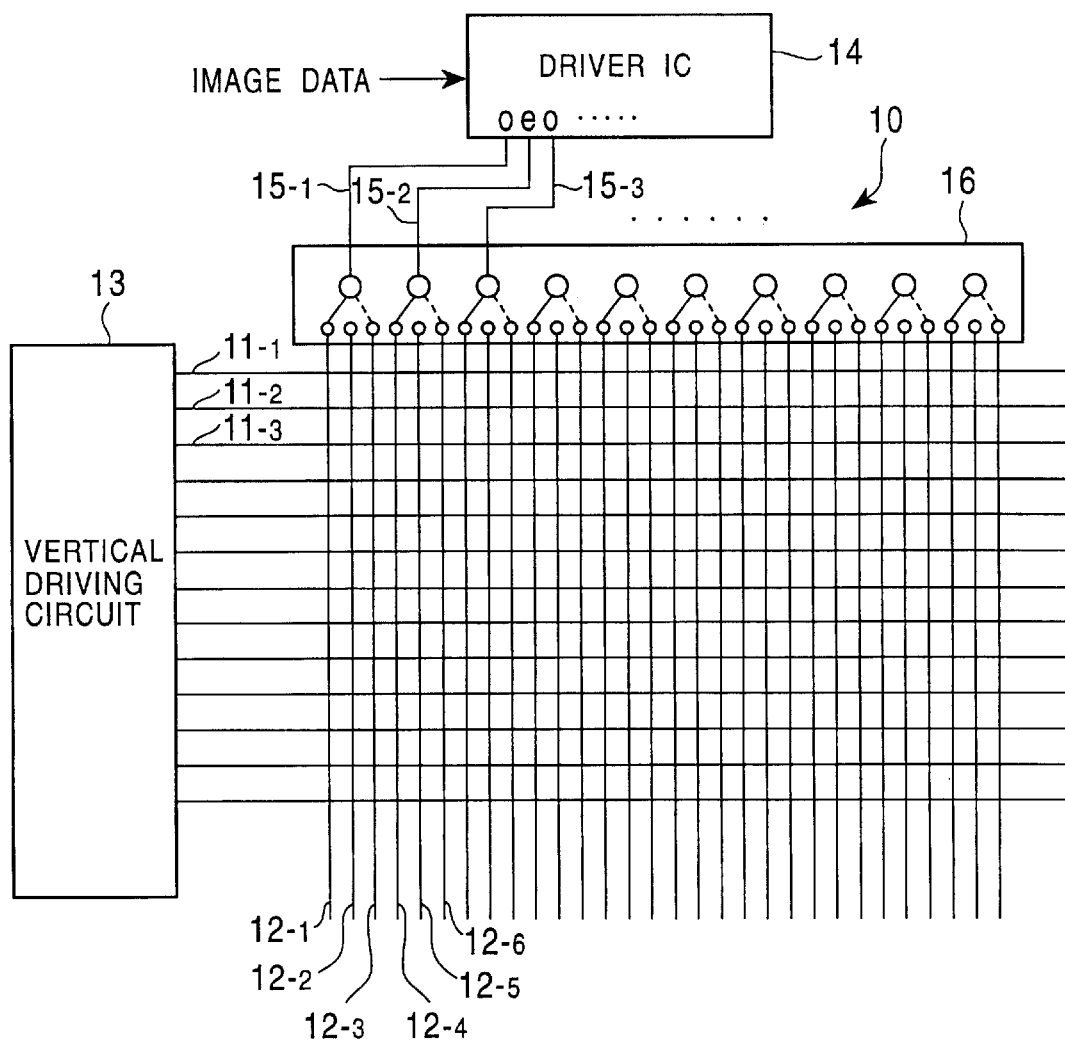


FIG. 2

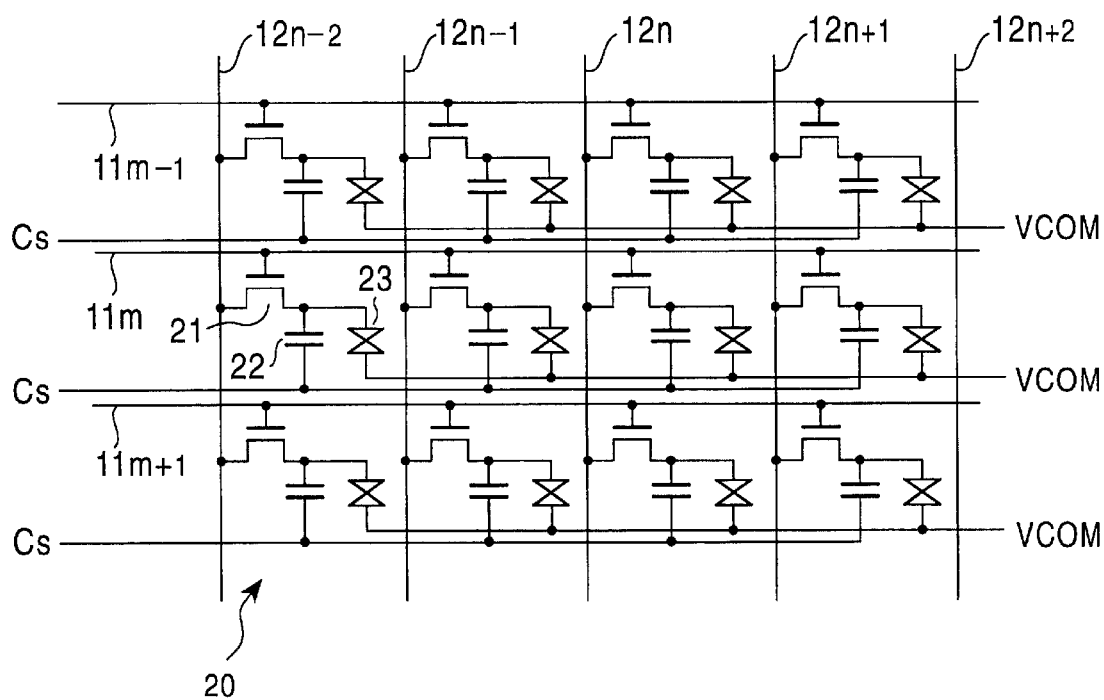


FIG. 3

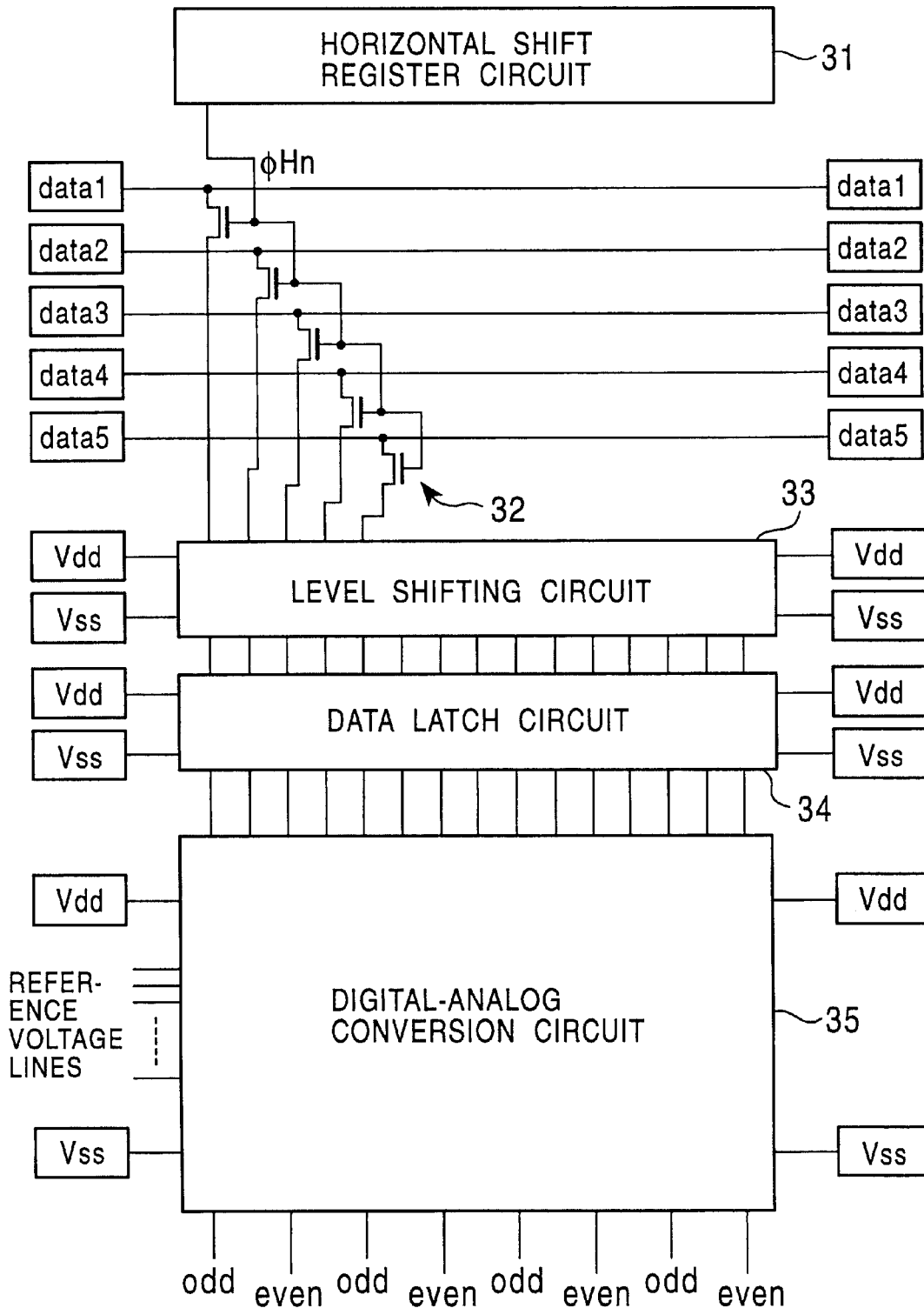


FIG. 4

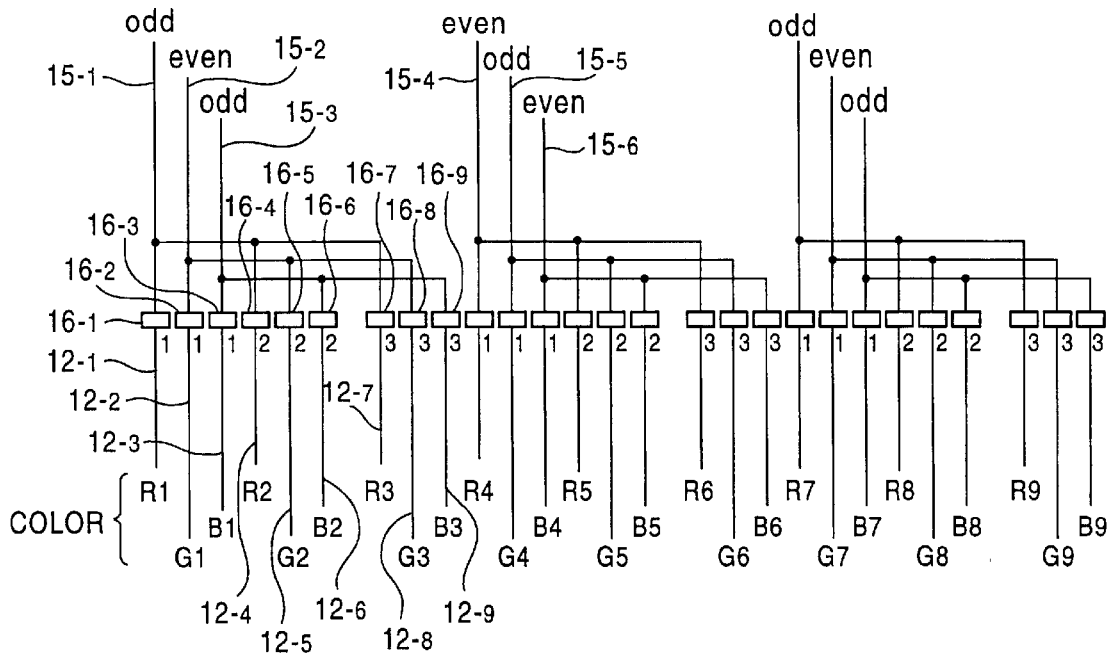


FIG. 5

	A1			B1A2			B2A3			B3											
1	H	L	H				L	H	L				H	L	H						
2				L	H	L				H	L	H				L	H	L			
3							H	L	H				L	H	L				H	L	H
1	L	H	L				H	L	H				L	H	L						
2				H	L	H				L	H	L				H	L	H			
3							L	H	L				H	L	H				L	H	L
1	H	L	H				L	H	L				H	L	H						
2				L	H	L				H	L	H				L	H	L			
3							H	L	H				L	H	L				H	L	H
1	L	H	L				H	L	H				L	H	L						
2				H	L	H				L	H	L				H	L	H			
3							L	H	L				H	L	H				L	H	L

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