Ordering number : EN*5786

CMOS LSI

LC895126

CD-ROM Decoder with Built-in SCSI Interface

Preliminary

Overview

The LC895126 is a CD-ROM decoder that in addition to CD-ROM functions also provides a built-in SCSI interface.

Functions

- CD-ROM ECC functions, subcode read function, SCSI interface, CAV audio functions

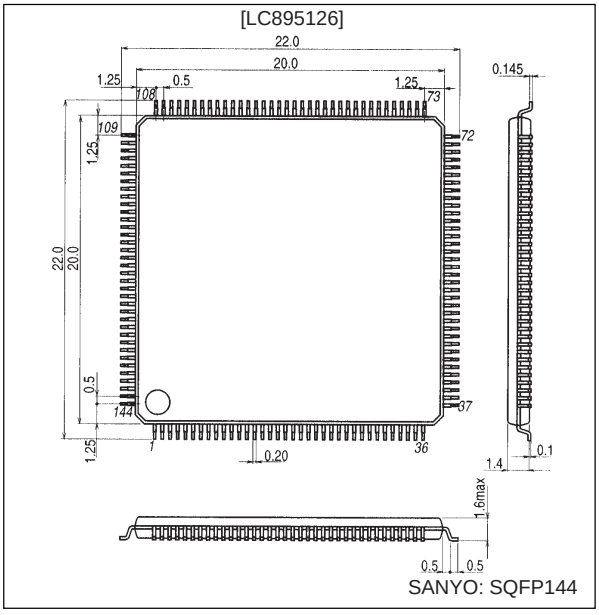
Features

- Built-in SCSI interface (Includes a SCAM selection register)
- Supports 24× playback and a 10MB/sec data transfer rate (when 16-bit data path 70-ns EDO DRAM is used).
- Supports the use of up to 4 Mbit of buffer RAM.
- Users can freely set up the CD main channel, C2 flag, and other areas in buffer RAM.
- Batch transfer function (Function that transfers the CD main channel, C2 flag, and other data in a single operation)
- Multiblock transfer function (Function that transfers multiple blocks automatically in a single operation)
- Subcode ECC functions and CD-Text support
- CAV audio functions
- Intelligent functions (Including auto buffering, auto decoding, and CD-R support)
- Supports 20MB/s transfers (This capability is currently under evaluation (July 1997) and cannot be guaranteed at present.)

Package Dimensions

unit: mm

3214-SQFP144



Specifications

Absolute Maximum Ratings at Ta = 25°C, V_{SS} = 0 V

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{DD} max		–0.3 to +7.0	V
Input and output voltage	V_I, V_O		–0.3 to V_{DD} +0.3	V
Allowable power dissipation	Pd max	Ta ≤ 70°C	550	mW
Operating temperature	Topr		–30 to +70	°C
Storage temperature	Tstg		–55 to +125	°C
Soldering conditions (pins only)		10 seconds	260	°C

Allowable Operating Ranges at Ta = –30 to +70°C, V_{SS} = 0 V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply voltage	V_{DD}		4.5	5.0	5.5	V
Input voltage range	V_{IN}		0		V_{DD}	V

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Electrical Characteristics at Ta = –30 to +70°C, V_{SS} = 0 V, V_{DD} = 4.5 to 5.5 V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input high-level voltage	$V_{IH}1$	TTL level pins: (1)	2.2			V
Input low-level voltage	$V_{IL}1$				0.8	V
Input high-level voltage	$V_{IH}2$	TTL level pins: (9)	2.2			V
Input low-level voltage	$V_{IL}2$	Pins with built-in pull-up resistors.			0.8	V
Input high-level voltage	$V_{IH}3$	TTL level pins: (2)	2.2			V
Input low-level voltage	$V_{IL}3$	Schmitt input pins			0.8	V
Input high-level voltage	$V_{IH}4$	CMOS level pins: (3)	0.8 V_{DD}			V
Input low-level voltage	$V_{IL}4$	Schmitt input pins			0.2 V_{DD}	V
Input high-level voltage	$V_{IH}5$	(4), (8), (10)	2.0			V
Input low-level voltage	$V_{IL}5$				0.8	V
Output high-level voltage	$V_{OH}1$	$I_{OH}1$ = –12 mA : (6)	V_{DD} – 2.1			V
Output low-level voltage	$V_{OL}1$	$I_{OL}1$ = 12 mA : (6)			0.4	V
Output high-level voltage	$V_{OH}2$	$I_{OH}2$ = –8 mA : (7)	2.4			V
Output low-level voltage	$V_{OL}2$	$I_{OL}2$ = 8 mA : (7)			0.4	V
Output high-level voltage	$V_{OH}2$	$I_{OH}2$ = –2 mA : (9), (5)	2.4			V
Output low-level voltage	$V_{OL}2$	$I_{OL}2$ = 2 mA : (9), (5)			0.4	V
Output low-level voltage	$V_{OL}4$	$I_{OL}4$ = 48 mA : (10)			0.4	V
Input leakage current	I_{IL}	V_I = V_{SS} or V_{DD}: All input pins.	–25		+25	µA
Pull-up resistance	R_{UP}	(5), (9)	60	120	240	kΩ

The pin sets referred to above are as follows:
INPUT
(1) TEST0 to TEST4, CSCTRL, SUA0 to SUA6, X1EN, WFCK, SBS0
(2) C2PO, SDATA, BCK, LRCK, SCOR, ZRESET
(3) ZCS, ZRD, ZWR
(4) SCSISEL, XTALSEL
OUTPUT
(5) ZINT0, ZINT1, ZSWAIT
(6) MCK, MCK2, MCK3
(7) EXCK, DSDATA, DLRCK, DBCK, ZRAS0, ZRAS1, ZCAS0, ZCAS1, ZOE, ZUWE, ZLWE, RA0 to RA8
INOUT
(8) ACK, ATN
(9) D0 to D7, IO0 to IO15, IOP0 to IOP4
(10) DB0 to DB7, DBP, BSY, I/O, MSG, SEL, RST, REQ, C/D

Note: The XTAL0, XTALCK0, XTAL1, and XTALCK1 pins are not covered by the electrical characteristics.

SCSI Interface Pin Input Characteristics

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input threshold voltage	V_{t+t1}	V_{DD} = 4.50 to 5.50 V		1.60	2.00	V
	V_{t-t1}		0.80	1.10		V
Hysteresis	ΔV_{tt1}	V_{DD} = 5.0 V	0.41	0.5		V

Active Negation Output Characteristics

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output high-level voltage	V_{OH}	I_{OH} = –24 mA	2.5			V
Output low-level voltage	V_{OL}	I_{OL} = 48 mA			0.4	V

Note: Active negation refers to the DB0 to DB7, REQ, and DBPB outputs.

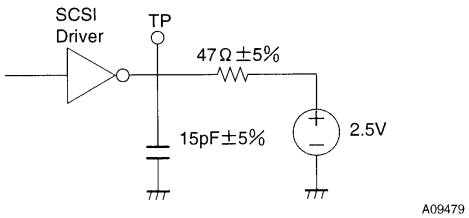

Figure 1

Pin Functions

I: Input pin, O: Output pin, B: Bidirectional pin, P: Power Supply pin, NC: Not Connection pin

Pin No.	Symbol	Type	Function
1	V_{SS0}	P	
2	IO2	B	Buffer RAM data I/O pins. Built in pull-up resistors.
3	IO1	B	
4	IO0	B	
5	MCK2SEL	I	Provided for switching between MCK2 (22 MHz, 20 MHz) and MCK3 (27 MHz, 25 MHz) in PLL mode. Currently, must be connected to V_{DD}.
6		NC	
7	V_{SS0}	P	
8	V_{SS0}	P	
9	V_{SS0}	P	
10		NC	
11		NC	
12	C2PO	I	CD DSP interface
13	SDATA	I	
14	BCK	I	
15	LRCK	I	
16	EXCK	O	Subcode I/O
17	WFCK	I	
18	V_{DD}	P	
19	V_{SS0}	P	
20	SBSO	I	Subcode I/O
21	SCOR	I	
22	DSDATA	O	D/A converter outputs
23	DLRCK	O	
24	DBCK	O	
25	MCK	O	Outputs the XTALCK1 state (1/1, 1/2, or stopped)
26	V_{SS0}	P	
27	XTALCK0	I	Crystal oscillator circuit input
28	XTAL0	O	Crystal oscillator circuit input
29	TEST0	I	Test pins. These pins must be connected to V_{SS0}.
30	TEST1	I	
31	TEST2	I	
32	TEST3	I	
33	TEST4	I	
34	MCK2	O	Outputs the XTALCK0 state (1/1, 1/2, 1/512, or stopped)
35	MCK3	O	
36	V_{SS0}	P	
37	V_{DD}	P	
38	ZRESET	I	Chip reset. The system is reset by a low-level input.
39	ZRD	I	Microcontroller data read signal input
40	ZWR	I	Microcontroller data write signal input

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Pin No.	Symbol	Type	Function
41	ZCS	I	Register chip select signal input from the microcontroller
42	CSCTRL	I	CS active low/active high selection input from the microcontroller
43	SUA0	I	Microcontroller register selection signals
44	SUA1	I	
45	SUA2	I	
46	SUA3	I	
47	SUA4	I	
48	SUA5	I	
49	SUA6	I	
50	D0	B	Microcontroller data signals
51	D1	B	
52	D2	B	
53	D3	B	
54	V_{DD}	P	
55	V_{SS0}	P	
56	D4	B	
57	D5	B	
58	D6	B	
59	D7	B	
60	ZINT0	O	Interrupt request signal output to the microcontroller (ECC side. Set up by register settings.)
61	ZINT1	O	Interrupt request signal output to the microcontroller (SCSI side. Set up by register settings.)
62	ZSWAIT	O	Wait signal output to the microcontroller
63	V_{SS0}	P	
64	IOP0	B	General-purpose I/O
65	IOP1	B	
66	IOP2	B	
67	IOP3	B	
68	IOP4	B	
69	X1EN	I	Must be tied low in versions without a PLL circuit. Must be connected to V_{DD} through a resistor in versions that use the PLL circuit.
70	ZTALCK1	I	Shock proof function oscillator circuit input. Used by the PLL circuit in PLL versions.
71	XTAL1	O	Shock proof function oscillator circuit output. Used by the PLL circuit in PLL versions.
72	V_{SS0}	P	Analog system ground in PLL versions
73	V_{DD}	P	Analog system power supply in PLL versions
74	V_{SS1}	P	
75	I/O	B	SCSI interface connections
76	$\overline{REQ}$	B	
77	V_{SS1}	P	
78	C/D	B	SCSI interface connections
79	$\overline{SEL}$	B	
80		NC	
81	V_{DD}	P	
82	V_{SS1}	P	
83	$\overline{MSG}$	B	SCSI interface connections
84	$\overline{RST}$	B	
85	V_{SS1}	P	
86	$\overline{ACK}$	B	SCSI interface connections
87	$\overline{BSY}$	B	
88	V_{SS1}	P	

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Pin No.	Symbol	Type	Function
89	$\overline{ATN}$	B	SCSI interface connections
90	V_{DD}	P	
91	V_{SS1}	P	
92		NC	
93	$\overline{DBP}$	B	SCSI interface connections
94	V_{DD}	P	
95	$\overline{DB7}$	B	SCSI interface connections
96	$\overline{DB6}$	B	
97	V_{SS1}	P	
98	$\overline{DB5}$	B	SCSI interface connections
99	$\overline{DB4}$	B	
100	V_{DD}	P	
101	$\overline{DB3}$	B	SCSI interface connections
102	$\overline{DB2}$	B	
103	V_{SS1}	P	
104	$\overline{DB1}$	B	SCSI interface connections
105	$\overline{DB0}$	B	
106	SCSISEL	I	SCSI pin assignment selection (No change when held low.)
107	XTALSEL	I	XATL oscillator selection in PLL mode
108	V_{SS1}	P	
109	V_{DD}	P	
110	V_{SS0}	P	
111	ZRAS0	O	RAS output 0 for buffer RAM (Normally, RAS 0 is used.)
112	ZRAS1	O	RAS output 1 for buffer RAM
113	ZCAS0	O	CAS output 0 for buffer RAM (Normally, CAS 0 is used.)
114	ZCAS1	O	CAS output 1 for buffer RAM
115	ZOE	O	Buffer RAM output enable
116	ZUWE	O	Buffer RAM upper write enable
117	ZLWE	O	Buffer RAM lower write enable
118	V_{SS0}	P	
119	RA0	O	Buffer RAM address outputs
120	RA1	O	
121	RA2	O	
122	RA3	O	
123	RA4	O	
124	RA5	O	
125	RA6	O	
126	V_{DD}	P	
127	V_{SS0}	P	
128	RA7	O	Buffer RAM address outputs
129	RA8	O	
130	RA9 (IO15)	B	Buffer RAM address and data outputs.
131	RA10 (IO14)	B	Built in pull-up resistors.

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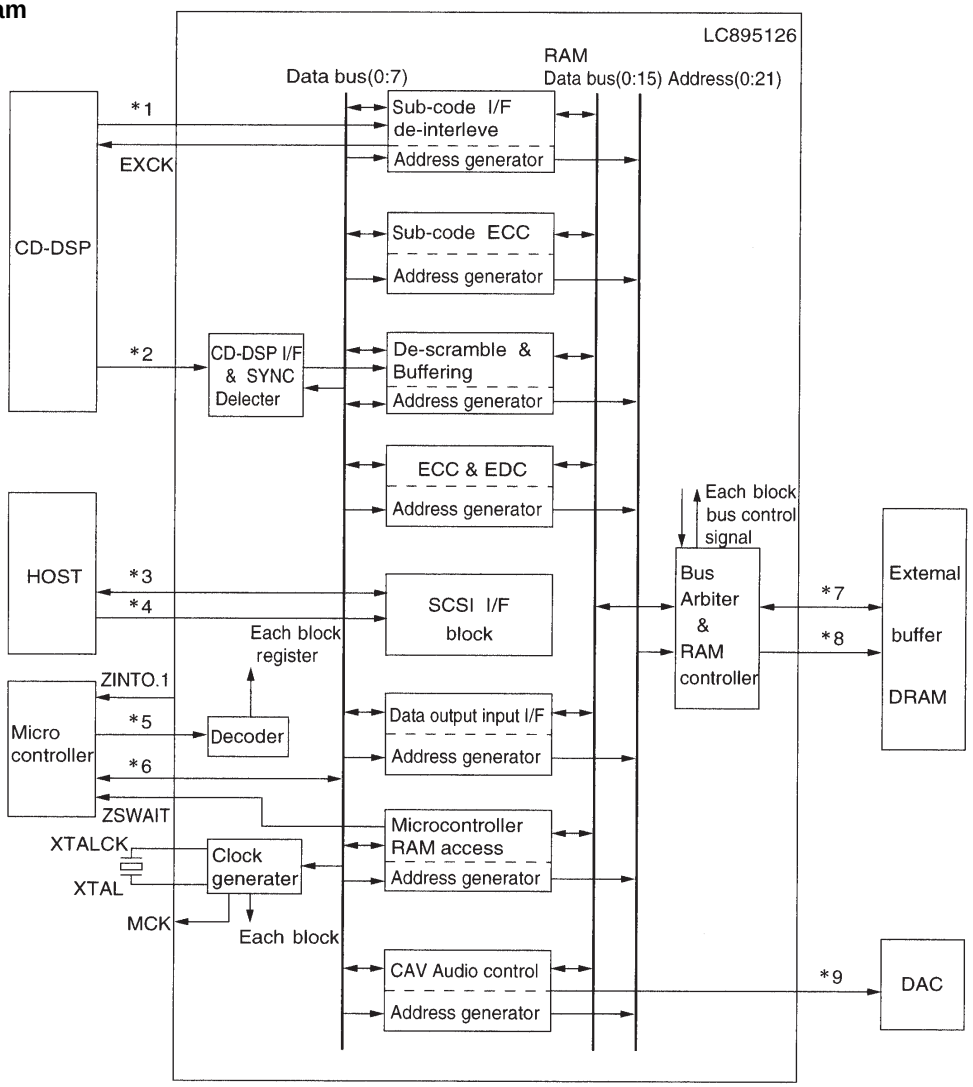
Pin No.	Symbol	Type	Function
132	IO13	B	Buffer RAM data I/O. Built in pull-up resistors.
133	IO12	B	
134	IO11	B	
135	IO10	B	
136	IO9	B	
137	IO8	B	
138	V_{SS0}	P	
139	IO7	B	Buffer RAM data I/O. Built in pull-up resistors.
140	IO6	B	
141	IO5	B	
142	IO4	B	
143	IO3	B	
144	V_{DD}	P	

NC pins must be left open.
Pin names that start with a 'Z' are negative logic (i.e. active low) pins.
V_{SS0} is the logic system ground, and V_{SS1} is the SCSI interface system ground.
If DRAM is used, undershoot prevention measures, such as inserting resistors in the RAS and CAS lines and inserting capacitors to ground, must be taken.
Since this IC includes buffers that sink 48 mA, applications must take adequate noise reduction measures.

Block Diagram



*1 WFCK, SBSO, SCOR
*2 BCK, SDATA, LRCK, C2PO
*3 DB0 to DB7, DBP, BSY, MSG, SEL, RST, REQ, I/O, C/D
*4 ACK, ATN
*5 ZRD, ZWR, SUA0 to AUA6, ZCS, CSCTRL
*6 D0 to D7
*7 IO0 to IO15
*8 RA0 to RA10, ZRAS0, ZRAS1, ZCAS0, ZCAS1, ZOE, ZUWE, ZLWE
*9 DBCK, DLRCK, DSDATA

Note: The pins IO15 and RA9 share pin 130, and the pins IO14 and RA10 share pin 131.