Ordering number : ENN6236

CMOS IC

LC895127, 895127K

40× CD-ROM Decoder with SCSI Interface

Functions

- CD-ROM ECC function
- SCSI I/F function
- Subcode I/F function
- CAV audio function

Features

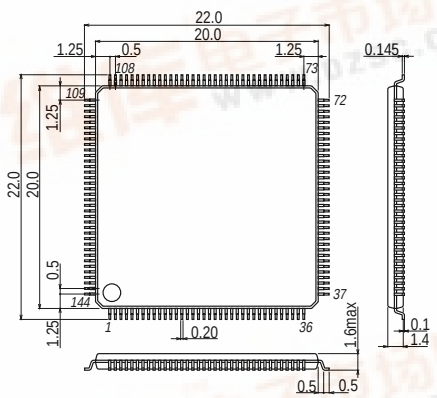
- SCSI interface (includes on-chip SCAM selection register)
- Supports 20× speed and a 10 MBytes/s transfer rate when using 16-bit 70-ns EDO DRAM
- Supports 40× speed and a 10 MB/s transfer rate when using 16-bit 50-ns EDO DRAM
- Up to 4 M bits of buffer RAM can be used.
- The user can freely set up the CD main channel and the C2 flag areas in buffer RAM.
- Batch transfer function (Allows the CD main channel, the C2 flags, and other data to be sent in a single operation.)
- Multi-block transfer function (Allows multiple blocks to be sent automatically in a single operation.)
- Subcode buffering and CD-TEXT support
- CAV audio function
- Supports 20 MBytes/s transfers
- Package: SQFP-144

Package Dimensions

unit: mm

3214-SQFP144

[LC895127, 895127K]



SANYO: SQFP144

Specifications

Absolute Maximum Ratings at V_{SS} = 0 V

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{DD} max	Ta = 25°C	–0.3 to +7.0	V
Input/output voltage	V_I, V_O	Ta = 25°C	–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 temperature (pin part only)		10 s	260	°C

Allowable Operating Ranges at Ta = –30°C 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

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

Parameter	Symbol	Conditions	Applicable pins	Ratings			Unit
				min	typ	max	
Input high-level voltage	V_{IH1}	TTL levels	(1)	2.2			V
Input low-level voltage	V_{IL1}					0.8	V
Input high-level voltage	V_{IH2}	TTL levels with pull-up resistor	(9)	2.2	—	—	V
Input low-level voltage	V_{IL2}			—	—	0.8	V
Input high-level voltage	V_{IH3}	TTL levels Schmitt	(2)	2.2	—	—	V
Input low-level voltage	V_{IL3}			—	—	0.8	V
Input high-level voltage	V_{IH4}	CMOS levels Schmitt	(3)	0.8 V_{DD}	—	—	V
Input low-level voltage	V_{IL4}			—	—	0.2 V_{DD}	V
Input high-level voltage	V_{IH5}		(4), (8), (10)	2.0		—	V
Input low-level voltage	V_{IL5}					0.8	V
Input high-level voltage	V_{IH2}	TTL levels with pull-up resistor	(11)	2.2		—	V
Input low-level voltage	V_{IL2}			—	—	0.8	V
Output high-level voltage	V_{OH1}	I_{OH1} = –12 mA	(6)	V_{DD} – 2.1	—	—	V
Output low-level voltage	V_{OL1}	I_{OL1} = 12 mA		—	—	0.4	V
Output high-level voltage	V_{OH2}	I_{OH2} = –8 mA	(7)	2.4			V
Output low-level voltage	V_{OL2}	I_{OL2} = 8 mA				0.4	V
Output high-level voltage	V_{OH2}	I_{OH2} = –2 mA	(9), (5), (11)	2.4			V
Output low-level voltage	V_{OL2}	I_{OL2} = 2 mA				0.4	V
Output low-level voltage	V_{OL4}	I_{OL4} = 48 mA	(10)			0.4	V
Input leakage current	I_{IL}	V_I = V_{SS}, V_{DD}	All input pins	–25		+25	µA
Pull-up resistance	R_{UP}		(5), (9), (11)	60	120	240	kΩ

Applicable pin sets are as follows.

INPUT

(1) TEST0 to TEST4, CSCTRL, SUA0 to SUA6, C2P0, SDATA, BCK, LRCK, SCOR, WFCK, SBS0, MCK2SEL

(2) $\overline{\text{RESET}}$

(3) $\overline{\text{CS}}$, $\overline{\text{RD}}$, $\overline{\text{WR}}$

(4) SCSISEL, XTALSEL

OUTPUT

(5) $\overline{\text{INT0}}$, $\overline{\text{INT1}}$, $\overline{\text{SWAIT}}$

(6) MCK

(7) EXCK, DSDATA, DLRCK, DBCK, $\overline{\text{RAS0}}$, $\overline{\text{CAS0}}$, $\overline{\text{CAS1}}$, $\overline{\text{OE}}$, $\overline{\text{UWE}}$, $\overline{\text{LWE}}$, RA0 to RA8

INOUT

(8) $\overline{\text{ACK}}$, $\overline{\text{ATN}}$

(9) D0 to D7, IO0 to IO15, IOP0 to IOP7

(10) $\overline{\text{DB0}}$ to $\overline{\text{DB7}}$, $\overline{\text{DBP}}$, $\overline{\text{BSY}}$, I/O, $\overline{\text{MSG}}$, $\overline{\text{SEL}}$, $\overline{\text{RST}}$, $\overline{\text{REQ}}$, C/D

(11) IOP0 to IOP7

Note: Pins XTAL0, XTALCK0, XTAL1, XTALCK1, and X1EN are not included in DC characteristics.

SCSI Pin Input Characteristics

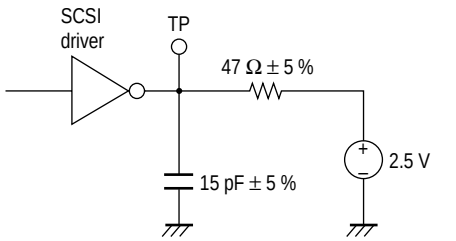
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input threshold voltage	V_{t+t1}	V_{DD} = 4.50 to 5.50 V		1.60	2.00	V
	V_{t-t1}		0.80	1.10		V
Hysteresis width	ΔV_{tt1}	V_{DD} = 5.0 V	0.41	0.5		V

Active-Low Output Characteristics

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output high-level voltage	V_{OH}		2.5			V
Output low-level voltage	V_{OL}				0.4	V

Note: Only applies to the active-low output pins $\overline{DB0}$ to $\overline{DB7}$, $\overline{REQ}$, $\overline{DBPB}$

Rise time test circuit



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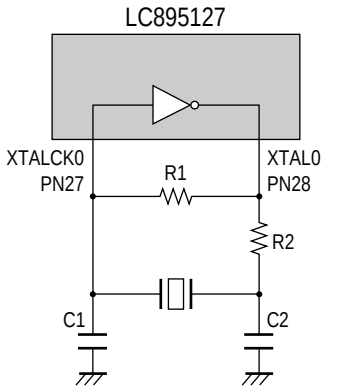
Recommended Oscillator and PLL Circuits



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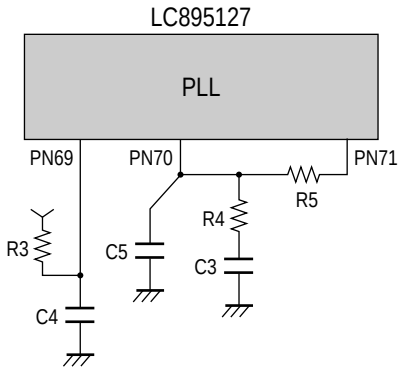

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R1 = 120 kΩ, R2 = 47 Ω, C1 = 30 pF

Crystal oscillator frequency XTALCK0 = 16.9344 MHz

R3 = 7.5 kΩ, R4 = 200 Ω, R5 = 10 kΩ, C3 = 0.1 µF

C4 = 0.1 µF, C5 = 0.002 µF to 0.01 µF

Note: The values listed above for R3, R4, R5, and C3 also apply when the XTALKC0 frequency is 33.8688 MHz.

Applications must be designed so that the analog V_{DD} and V_{SS} power supply system is completely independent of the logic system power supply and is not affected by the logic system power supply fluctuation in any way.

Note: Since the exact values of these components will vary depending on the characteristics of the printed circuit board used and other factors, consult the manufacturer of the crystal element when designing the oscillator circuit.

Pin Functions

Type					
I	INPUT	B	BIDIRECTION	NC	NOT CONNECT
O	OUTPUT	P	POWER		

Pin No.	Pin name	Type	Pin functions
1	V_{SS0}	P	
2	IO2	B	Buffer RAM data I/O These pins have built-in pull-up resistors.
3	IO1	B	
4	IO0	B	
5	MCK2SEL	I	PLL frequency selection. Currently, this pin must be connected to V_{DD}.
6	C2PO	I	CD DSP interface
7	SDATA	I	
8	BCK	I	
9	LRCK	I	
10	EXCK	O	Subcode I/O
11	WFCK	I	
12	SBSO	I	Subcode I/O
13	SCOR	I	
14	DSDATA	O	D/A converter outputs
15	DLRCK	O	
16	DBCK	O	
17	MCK	O	XTALCLK0 1/1, 1/2, and stop output
18	V_{DD}	P	
19	V_{SS0}	P	
20	$\overline{\text{RESET}}$	I	IC reset. The IC is reset on a low-level input
21	CSCTRL	I	MC (Microcontroller) CSL_0, Hi
22	TEST3	I	Test pins. These pins must be connected to V_{SS0} in normal operation.
23	TEST0	I	
24	TEST1	I	
25	TEST2	I	
26	V_{SS0}	P	
27	XTALCK0	I	Crystal oscillator circuit input
28	XTAL0	O	Crystal oscillator circuit output
29	TEST4	I	Test pin. This pin must be connected to V_{SS0} in normal operation.
30	V_{SS0}	P	
31	V_{SS0}	P	
32	V_{SS0}	P	
33	V_{SS0}	P	
34	IOP7	I	General-purpose I/O ports. These pins include built-in pull-up resistors.
35	IOP6	I	
36	V_{SS0}	P	
37	V_{DD}	P	
38	IOP5	I	General-purpose I/O ports. These pins include built-in pull-up resistors.
39	IOP4	I	
40	IOP3	I	
41	IOP2	I	
42	IOP1	I	
43	IOP0	I	
44	V_{SS0}	P	
45	$\overline{\text{RD}}$	I	Microcontroller data read signal input
46	$\overline{\text{WR}}$	I	Microcontroller data write signal input
47	$\overline{\text{CS}}$	I	Register chip select input from the microcontroller
48	SUA0	I	Microcontroller register selection signals
49	SUA1	I	
50	SUA2	I	
51	SUA3	I	
52	SUA4	I	
53	SUA5	I	

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Pin No.	Pin	I/O	Function
54	V_{DD}	P	
55	V_{SS0}	P	
56	SUA6	I	Microcontroller register selection signals
57	D0	B	Microcontroller data signals
58	D1	B	
59	D2	B	
60	D3	B	
61	D4	B	
62	D5	B	
63	V_{SS0}	P	
64	D6	B	Microcontroller data signals
65	D7	B	
66	$\overline{INT0}$	O	Interrupt request signal output to the microcontroller (ECC side. Set by setting a register value.)
67	$\overline{INT1}$	O	Interrupt request signal output to the microcontroller (SCSI side. Set by setting a register value.)
68	$\overline{SWAIT}$	O	Wait signal output to the microcontroller
69	X1EN	I	Used by the PLL. This pin must be connected to V_{DD} through a resistor.
70	XTALCK1	I	Used by the PLL.
71	XTAL1	O	Used by the PLL.
72	V_{SS0}	P	Analog V_{SS}
73	V_{DD}	P	Analog V_{DD}
74		NC	
75	I/O	B	SCSI interface
76	$\overline{REQ}$	B	
77	V_{SS1}	P	
78	C/D	B	SCSI interface
79	$\overline{SEL}$	B	
80		NC	
81	V_{DD}	P	
82	V_{SS1}	P	
83	$\overline{MSG}$	B	SCSI interface
84	$\overline{RST}$	B	
85	V_{SS1}	P	
86	$\overline{ACK}$	B	SCSI interface
87	$\overline{BSY}$	B	
88	V_{SS1}	B	
89	$\overline{ATN}$	B	SCSI interface
90	V_{DD}	P	
91	V_{SS1}	P	
92		NC	
93	$\overline{DBP}$	B	SCSI interface
94	V_{DD}	P	
95	$\overline{DB7}$	B	SCSI interface
96	$\overline{DB6}$	B	
97	V_{SS1}	P	
98	$\overline{DB5}$	B	SCSI interface
99	$\overline{DB4}$	B	
100	V_{DD}	P	
101	$\overline{DB3}$	B	SCSI interface
102	$\overline{DB2}$	B	
103	V_{SS1}	P	
104	$\overline{DB1}$	B	SCSI interface
105	$\overline{DB0}$	B	
106	SCSISEL	I	SCSI pin layout selection. (This pin must be connected to V_{SS0}.)
107	XTALSEL	I	PLL XTAL oscillator selection

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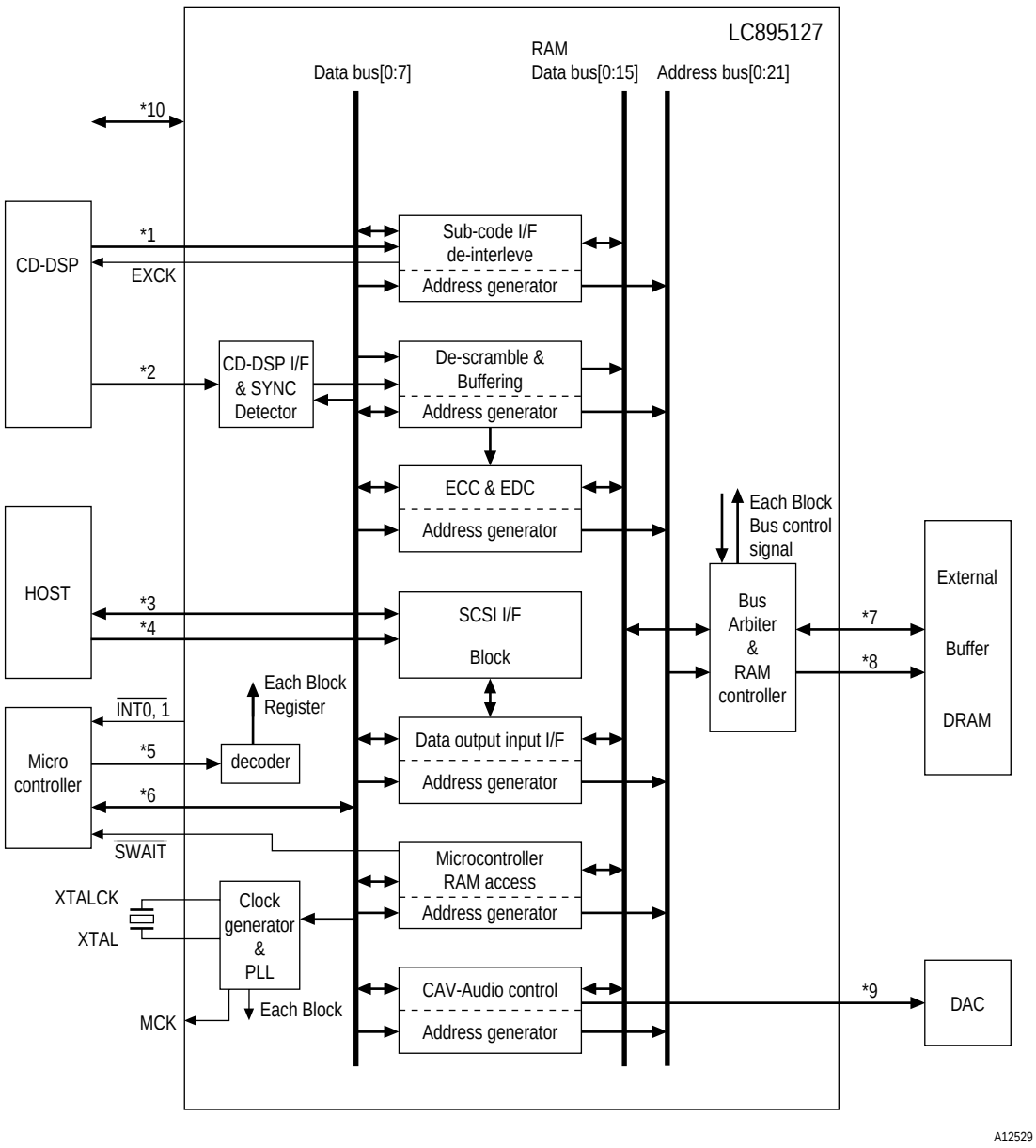
Pin No.	Pin	I/O	Function
108	V_{SS1}	P	
109	V_{DD}	P	
110	V_{SS0}	P	
111	$\overline{RAS0}$	O	Buffer RAM RAS signal output 0
112	V_{DD}	P	
113	$\overline{CAS0}$	O	Buffer RAM CAS signal output 0 (Normally held fixed at 0 (low).)
114	$\overline{CAS1}$	O	Buffer RAM RAS signal output 1
115	$\overline{OE}$	O	Buffer RAM output enable
116	$\overline{UWE\ (RA9)}$	O	Buffer RAM upper write enable (RA9 when 8M or more DRAM is used.)
117	$\overline{LWE}$	O	Buffer RAM lower write enable
118	V_{SS0}	P	
119	RA0	O	Buffer RAM address signal 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 signal outputs
129	RA8	O	
130	IO15	B	Buffer RAM data I/O These pins have built-in pull-up resistors.
131	IO14	B	
132	IO13	B	
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 These pins have built-in pull-up resistors.
140	IO6	B	
141	IO5	B	
142	IO4	B	
143	IO3	B	
144	V_{DD}	P	

Unused ("NC") pins must be left open.
Pins whose name is under a bar operate with inverted (negative) logic.
V_{SS0} is the logic system ground and V_{SS1} is the SCSI interface driver ground.
If DRAM is used, applications must adopt measures to prevent undershoot and other DRAM problems. Such measures include inserting resistors in the RAS and CAS lines and inserting capacitors between V_{SS} pins.
See the article on Designing with the Latest Microcontrollers and Memory in special issue number 25 of Transistor Technology for details on these measures.
Since this device includes buffers that sink a current of 48 mA, applications must take adequate noise prevention measures.

Block Diagram



*1 WFCK, SBSO, SCOR
*2 BCK, SDATA, LRCK, C2PO
*3 $\overline{DB0}$ to $\overline{DB7}$, $\overline{DBP}$, $\overline{BSY}$, $\overline{MSG}$, $\overline{SEL}$, $\overline{RST}$, $\overline{REQ}$, I/O, C/D
*4 $\overline{ACK}$, $\overline{ATN}$
*5 $\overline{RD}$, $\overline{WR}$, SUA0 to SUA6, ZCS, CSCTRL
*6 D0 to D7
*7 IO0 to IO15
*8 RA0 to RA10, $\overline{RAS1}$, $\overline{CAS0}$, $\overline{CAS1}$, $\overline{OE}$, $\overline{UWE}$, $\overline{LWE}$
*9 DBCK, DLRCK, DSDATA
*10 IOP7 to IOP0