



# LC89512W

## CD-ROM Error Correction LSI with Built-In SCSI Interface

### Preliminary

#### Overview

The LC89512W integrates a real-time error correction circuit and a SCSI interface in a single chip.

#### Functions

- CD-ROM error correction function, subcode readout function, SCSI interface

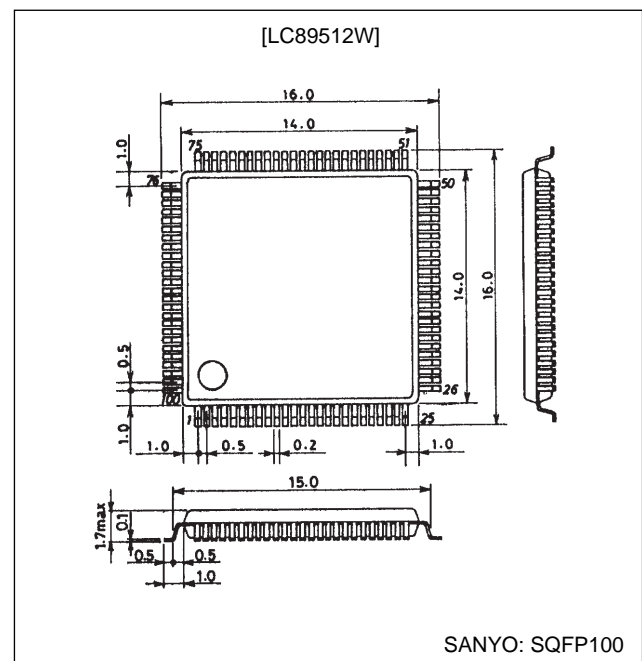
#### Features

- Support for double-speed drives at an operating frequency of 16.9344 MHz  
Either SRAM (120 ns), DRAM (80 ns) or pseudo SRAM (85 ns) can be used.
- Support for quad-speed drives at an operating frequency of 33.8688 MHz  
SRAM (70 ns) must be used.
- Built-in SCSI interface with built-in 48 mA sink buffer (Only the TARGET function is supported.)
- Built-in 12-byte output FIFO for sub-CPU to host computer data transmission
- Built-in 12-byte input FIFO for host computer to sub-CPU data transmission
- Subcode data can be written to buffer RAM and the sub-CPU can read the subcode values by connecting the LC89512 to the CD-DSP subcode pin.
- Sub-CPU access of buffer RAM through the LC89512
- Built-in function for buffer RAM internal data transfer
- Pseudo-SRAM (128-kword × 8-bit and smaller) can be used.
- DRAM (two 256-kword × 4-bit chips or two 1-Mword × 4-bit chips) can be used.
- Transfer speeds:  
2.8 MB/second (asynchronous mode) (for CD-ROM decode only operation)  
4.2 MB/second (synchronous mode) (CD-ROM decode operation is not supported in synchronous mode)  
Both of these transfer modes use a 16.9344 MHz clock. (The transfer speed depends on the frequency used.)
- Operating frequencies: 16.9344 MHz (up to double speed), 33.8688 (quad speed)

#### Package Dimensions

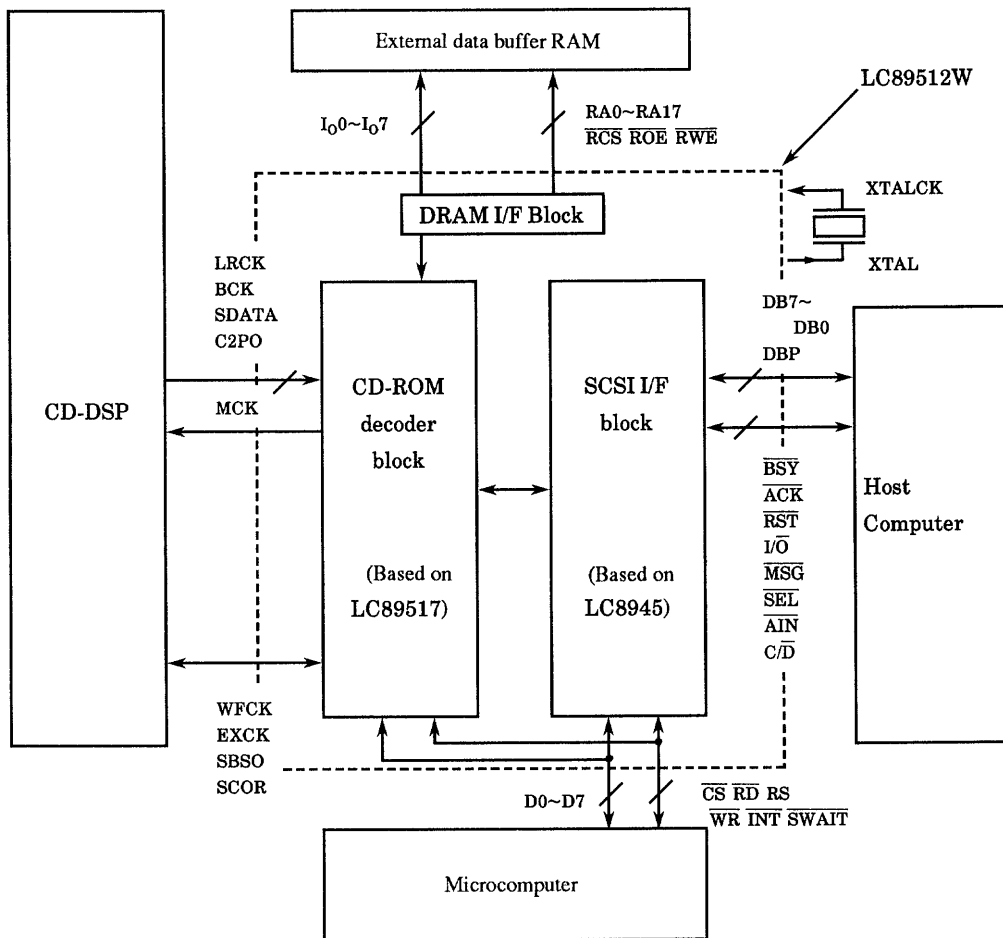
unit: mm

#### 3181A-SQFP100



# LC89512W

## Block Diagram



## LC89512W

### Pin Functions

Type: I: Input pin, O: Output pin, B: Bidirectional pin, P: Power supply pin, NC: No connection pin

Pin No.	Pin	Type	Function
1	$\overline{DB7}$	B	SCSI connection
2	$V_{SS1}$	P	
3	$\overline{DBP}$	B	SCSI connection
4	$\overline{ATN}$	B	SCSI connection
5	$V_{SS1}$	P	
6	$\overline{BSY}$	B	SCSI connection
7	$\overline{ACK}$	B	SCSI connection
8	$V_{SS1}$	P	
9	$\overline{RST}$	B	SCSI connection
10	$\overline{MSG}$	B	SCSI connection
11	$V_{SS1}$	P	
12	$\overline{SEL}$	B	SCSI connection
13	C/D	B	SCSI connection
14	$V_{SS1}$	P	
15	$\overline{REQ}$	B	SCSI connection
16	I/O	B	SCSI connection
17	$V_{SS0}$	P	
18	$I_{O0}$	B	Data buffer RAM data signals These pins have built-in pull-up resistors.
19	$I_{O1}$	B	
20	$I_{O2}$	B	
21	$I_{O3}$	B	
22	$I_{O4}$	B	
23	$I_{O5}$	B	
24	$I_{O6}$	B	
25	$I_{O7}$	B	
26	$\overline{INT1}$	O	SCSI block interrupt request signal output (set using a register)
27	$V_{SS0}$	P	
28	$V_{SS0}$	P	
29	D0	B	Microprocessor data signals These pins have built-in pull-up resistors.
30	D1	B	
31	D2	B	
32	D3	B	
33	D4	B	
34	D5	B	
35	D6	B	
36	D7	B	
37	$\overline{INT0}$	O	Microprocessor interrupt request signal output
38	XTALCK	I	Crystal oscillator circuit input
39	XTAL	O	Crystal oscillator circuit output
40	$V_{SS0}$	P	
41	$V_{DD}$	P	
42	RA0	O	Data buffer RAM address signal outputs
43	RA1	O	
44	RA2	O	
45	RA3	O	
46	RA4	O	
47	RA5	O	
48	RA6	O	
49	RA7	O	
50	RA8	O	
51	RA9	O	
52	RA10	O	
53	RA11	O	

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Pin No.	Pin	Type	Function
54	RA12	O	Data buffer RAM address signal outputs
55	RA13	O	
56	RA14	O	
57	RA15	O	
58	RA16	O	
59	RA17	O	
60	V <sub>DD</sub>	P	
61	V <sub>SS0</sub>	P	
62	$\overline{\text{RESET}}$	I	Reset
63	TEST1	I	Test inputs. These pins should be tied low in normal operation.
64	TEST2	I	
65	TEST3	I	
66	WFCK	I	Subcode I/O
67	SBSO	I	
68	SCOR	I	
69	SDATA	I	Serial data input
70	BCK	I	Serial data input clock
71	LRCK	I	44.1 kHz strobe signal input
72	C2PO	I	C2 pointer input
73	$\overline{\text{RD}}$	I	Microprocessor data read signal input
74	$\overline{\text{WR}}$	I	Microprocessor data write signal input
75	$\overline{\text{CS}}$	I	Chip select signal input (from the microprocessor)
76	RS	I	Register selection signal input
77	V <sub>SS0</sub>	P	
78	$\overline{\text{SWAIT}}$	O	Sub-CPU wait signal
79	EXCK	O	Sub code I/O
80	MCK	O	Crystal oscillator frequency output
81	TEST0	I	Test inputs. These pins should be tied low in normal operation
82	$\overline{\text{RCS}}$	O	RAM chip select
83	$\overline{\text{RWE}}$	O	RAM data write signal output
84	$\overline{\text{ROE}}$	O	RAM data read signal output
85		NC	
86		NC	
87		NC	
88		NC	
89	V <sub>DD</sub>	P	
90	V <sub>SS1</sub>	P	
91	$\overline{\text{DB0}}$	B	SCSI connection
92	$\overline{\text{DB1}}$	B	SCSI connection
93	V <sub>SS1</sub>	P	
94	$\overline{\text{DB2}}$	B	SCSI connection
95	$\overline{\text{DB3}}$	B	SCSI connection
96	V <sub>SS1</sub>	P	
97	$\overline{\text{DB4}}$	B	SCSI connection
98	$\overline{\text{DB5}}$	B	SCSI connection
99	V <sub>SS1</sub>	P	
100	$\overline{\text{DB6}}$	B	SCSI connection

Type: I: Input pin, O: Output pin, B: Bidirectional pin, P: Power supply pin, NC: No connection pin

Note: 1. NC must be left open. Do not connect any signals to these pins.

2. V<sub>SS0</sub> is the logic system ground and V<sub>SS1</sub> is the SCSI interface ground. (from the standard cell version)

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## Specifications

### Absolute Maximum Ratings at $V_{SS} = 0\text{ V}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{DD\text{ max}}$	$T_a = 25^\circ\text{C}$	-0.3 to +7.0	V
I/O voltages	$V_I, V_O$	$T_a = 25^\circ\text{C}$	-0.3 to $V_{DD} + 0.3$	V
Allowable power dissipation	$P_d\text{ max}$	$T_a \leq 70^\circ\text{C}$	350	mW
Operating temperature	$T_{opr}$		-30 to +70	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-55 to +125	$^\circ\text{C}$
Soldering thermal stress limit (pins only)		10 seconds	260	$^\circ\text{C}$

### Allowable Operating Ranges at $T_a = -30\text{ to }+70^\circ\text{C}$ , $V_{SS} = 0\text{ V}$

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

### DC Characteristics at $T_a = -30\text{ to }+70^\circ\text{C}$ , $V_{SS} = 0\text{ V}$ , $V_{DD} = 4.5\text{ to }5.5\text{ V}$

Parameter	Symbol	Conditions	min	typ	max	Unit
Input high level voltage	$V_{IH1}$	All input pins other than (1), (3), and XTALCK	2.2			V
Input low level voltage	$V_{IL1}$				0.8	V
Input high level voltage	$V_{IH2}$	$\overline{\text{RESET}}$ , $I_{O0}$ to $I_{O7}$ , $D0$ to $D7$ , $\overline{\text{RD}}$ , $\overline{\text{CS}}$ , $\overline{\text{WR}}$ , $\overline{\text{WFCK}}$ , $\overline{\text{SBSO}}$ and $\overline{\text{SCOR}}(1)$	2.5			V
Input low level voltage	$V_{IL2}$				0.6	V
Input high level voltage	$V_{IH3}$	$\overline{\text{ACK}}$ , $\overline{\text{ATN}}$ and the input pins (3)	2.0			V
Input low level voltage	$V_{IL3}$				0.8	V
Output high level voltage	$V_{OH1}$	$I_{OH1} = -3\text{ mA}$ : $I_{O0}$ to $I_{O7}$ , $D0$ to $D7$ and all output pins other than (2), (3) and XTALCK	2.4			V
Output low level voltage	$V_{OL1}$	$I_{OL1} = 3\text{ mA}$ : $I_{O0}$ to $I_{O7}$ , $D0$ to $D7$ and all output pins other than (2), (3) and XTALCK			0.4	V
Output low level voltage	$V_{OL2}$	$I_{OL2} = 3\text{ mA}$ : $\overline{\text{INT1}}$ and $\overline{\text{INT0}}$ (pull-up resistor open drain) (2)			0.4	V
Output low level voltage	$V_{OL3}$	$I_{OL3} = 48\text{ mA}$ : $\overline{\text{DB0}}$ to $\overline{\text{DB7}}$ , $\overline{\text{DBP}}$ , $\overline{\text{BSY}}$ , $I/O$ , $\overline{\text{MSG}}$ , $\overline{\text{SEL}}$ , $\overline{\text{RST}}$ , $\overline{\text{REQ}}$ , $C/D$ (2)			0.4	V
Input leakage current	$I_L$	$V_I = V_{SS}$ , $V_{DD}$ : All input pins	-25		+25	$\mu\text{A}$
Pull-up resistance	$R_{UP}$	$I_{O0}$ to $I_{O7}$ , $D0$ to $D7$ , $\overline{\text{INT1}}$ and $\overline{\text{INT0}}$	40	80	160	$\text{k}\Omega$

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