Discontinued Product

OKI Semiconductor

This version: Feb. 1999
Previous version: May 1997

MSM9893L

4M-bit Serial Voice Flash Memory

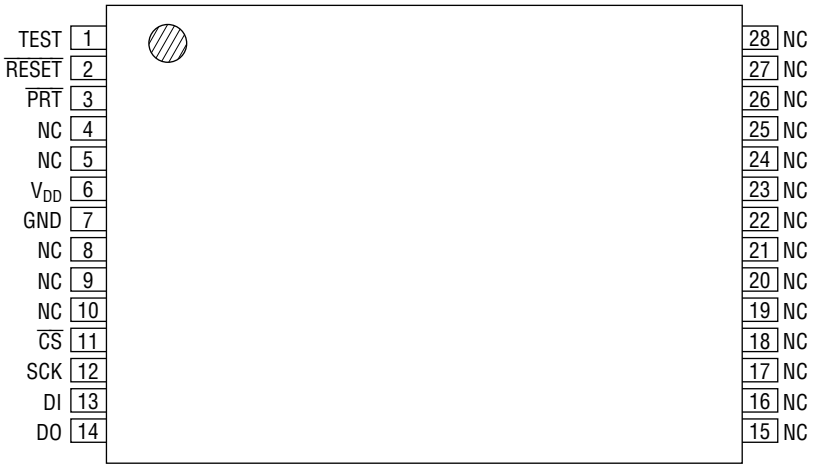
GENERAL DESCRIPTION

The MSM 9893L is a 4Mb flash memory that operates at 2.7 V to 3.6 V. Since backup is not needed, the number of pins is small, and the chip is contained in a small-package 28-pin TSOP or 30-pin SSOP, the MSM9893L is a flash memory suitable for applications such as handy terminals. In combination with Oki's recording/playback IC (MSM9888L/MSM9889L), a solid-state recording/playback system can be easily constructed.

FEATURES

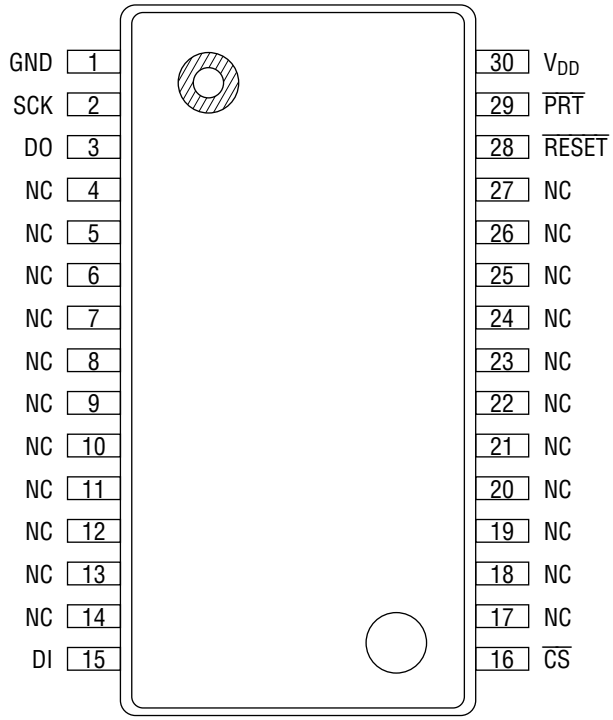
- Small page size (one-time write unit) : 2,112 bits per page
- Configuration : 2112 bits × 2048 pages
- Power supply voltage : Single 2.7 to 3.6 V
- Operating current : Supply current : Up to 35 mA
  : Stanby current : Up to 20 µA
- Operating temperature : –10 to +70°C
- Write Cycles : 10,000 cycles per page
- Package:
  28-pin plastic TSOP (TSOPI28-P-813-0.55-K) (Product name: MSM9893LTS-KT)
  30-pin plastic SSOP (SSOP30-P-56-0.65-K) (Product name: MSM9893ALGS-KT)

PIN CONFIGURATION (TOP VIEW)



NC : No connection

28-Pin Plastic TSOP



NC : No connection

30-Pin Plastic SSOP

PIN DESCRIPTIONS

Pin		Symbol	I/O	Description
TSOP	SSOP			
13	15	DI	I	Command, address, or data input pin.
14	3	DO	O	Data output pin.
12	2	SCK	I	Inputs the data transfer clock for the DI and DO pins.
11	16	$\overline{CS}$	I	The device accepts the SCK pulse when $\overline{CS}$ is at "L" level and does not accept the SCK pulse when $\overline{CS}$ is at "H" level.
1	—	TEST	O	Output pin for test. Leave this pin open.
3	29	$\overline{PRT}$	I	Prohibits flash memory programming at "L" level.
2	28	$\overline{RESET}$	I	The device is reset when $\overline{RESET}$ is at "L" level.
6	30	V_{DD}	I	Power supply pin (2.7 to 3.6 V)
7	1	GND	I	GND pin (0 V)

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Condition	Rating	Unit
Power Supply Voltage	V_{DD}	Ta=25°C	–0.3 to +7.0	V
Input Voltage	V_{IN}	Ta=25°C	–0.6 to V_{DD}+0.6	V
Storage Temperature	T_{STG}	—	–55 to +150	°C

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Condition	Range	Unit
Power Supply Voltage	V_{DD}	DGND=AGND=0V	2.7 to 3.6	V
Operating Temperature	T_{op}	—	–10 to +70	°C

ELECTRICAL CHARACTERISTICS

DC Characteristics

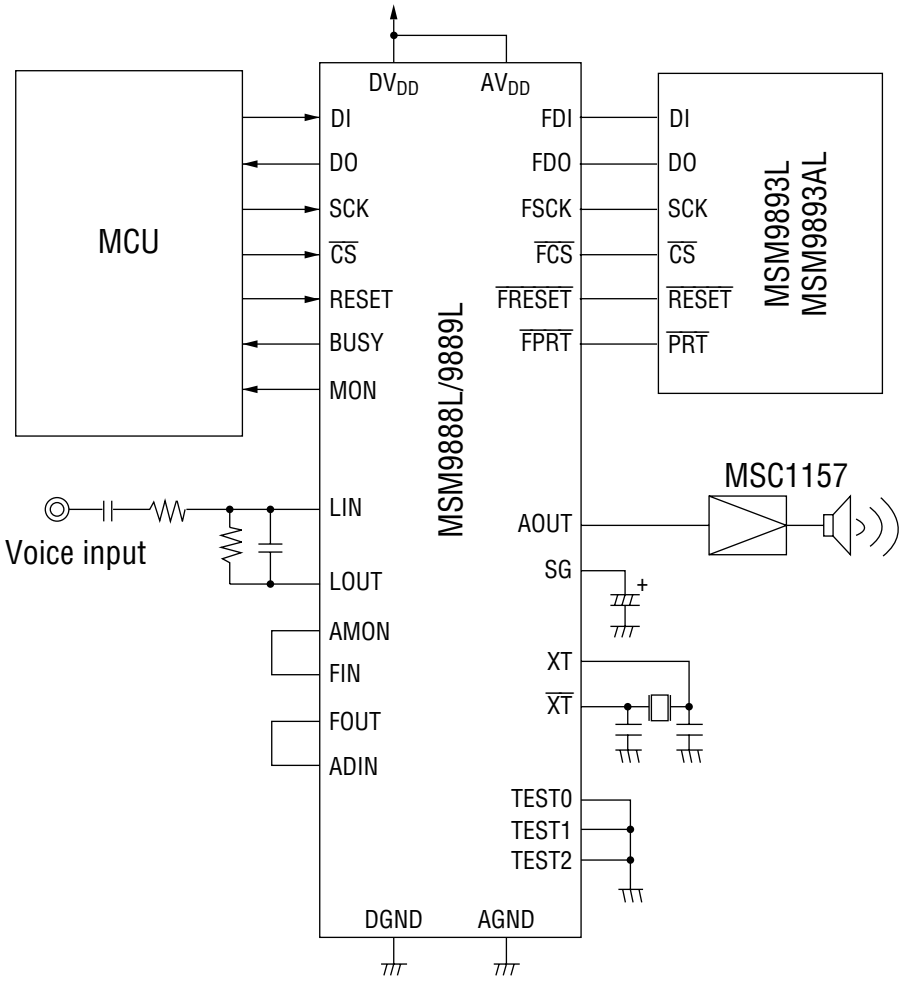
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit.
Operating Current	I_{CC}	—	—	15	35	mA
Standby Current	I_{SB}	T_{op}=–10 to +70°C	—	—	10	µA
Input Leackage Current	I_{IL}		—	—	1	µA
Output Leackage Current	I_{OL}		—	—	1	µA
Input Low Voltage	V_{IL}		—	—	0.6	V
Input High Voltage	V_{IH}		2.0	—	—	V
Output Low Voltage	V_{OL}		—	—	0.4	V
Output High Voltage	V_{OH}		2.0	—	—	V

PROGRAMMING/ERASE CHARACTERISTICS

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Erase/Programming Cycle	C_{EP}	—	—	—	10,000	Cycles
Data Retention Time	T_{DR}	—	—	—	10	Years
Write Disturb *1)	C_{PD}	Bit error : non	—	—	20,000	Cycles
		Bit error : 1bit	—	—	50,000	Cycles
		Bit error : 3bits	—	—	100,000	Cycles

*1) "Write Disturb" means a phenomenon that frequent write cycles executed to pages in Flash memory may cause a data error in another page to which write operations are not performed.
For example, 20,001 to 50,000 write operations performed to pages other than page "n" may cause a 1-bit error in page "n".

APPLICATION CIRCUIT

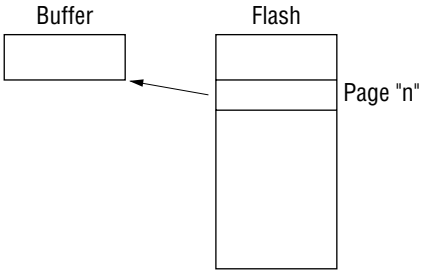


WRITE DISTURB

"Write Distrub" means a phenomenon that the change from digital "0" to "1" may occur in a Flash memory page to which data is scarcely written.
The above change can be avoided by refreshing Flash memory data with the DTRW command and WEND command of the MSM9888L/MSM9889L.

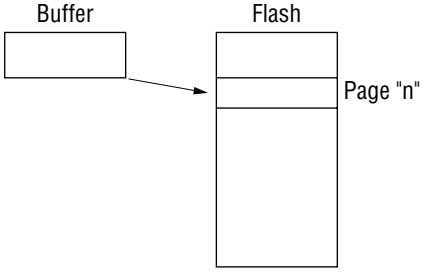
① DTRW command

This command moves some Flash memory page data to buffer.



② WEND command

This command programs buffer data to Flash memory.



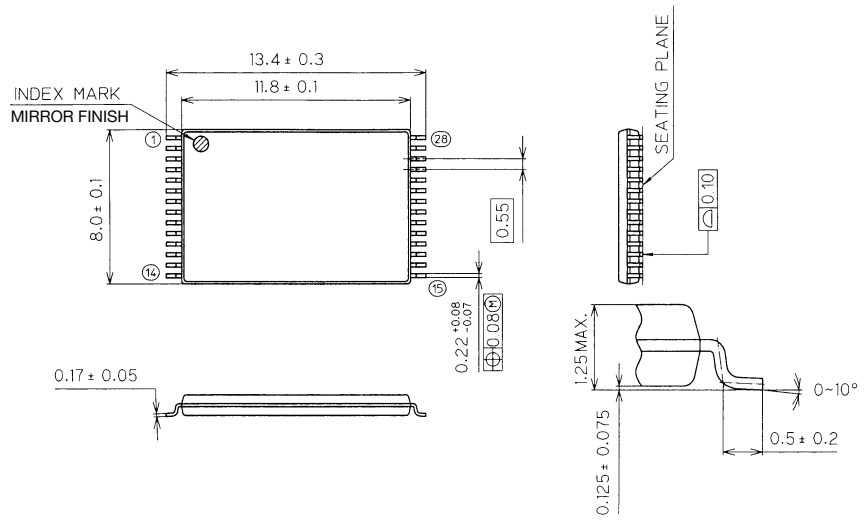
TIMING WHEN POWER IS ON

Refer to the MSM9888L/MSM9889L Data Sheet. If the timing diagrams described in the MSM9888L/MSM9889L Data Sheet are not satisfied, errors such as "Recording is disabled" or "Recorded message is erased" may occur.

PACKAGE DIMENSIONS

(Unit : mm)

TSOPI28-P-813-0.55-K



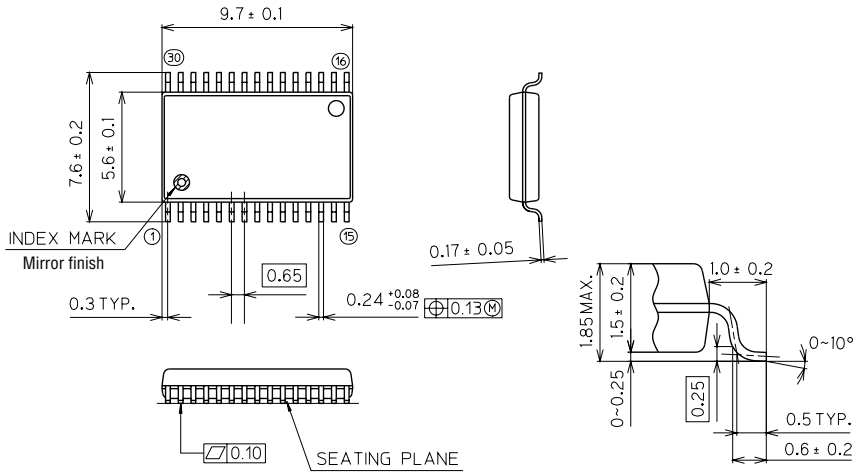
Package material	Epoxy resin
Lead frame material	42 alloy
Pin treatment	Solder plating
Solder plate thickness	7 μm or more
Package weight (g)	0.27 TYP.

Notes for Mounting the Surface Mount Type Package

The SOP, QFP, TSOP, TQFP, LQFP, SOJ, QFJ (PLCC), SHP, and BGA are surface mount type packages, which are very susceptible to heat in reflow mounting and humidity absorbed in storage. Therefore, before you perform reflow mounting, contact Oki's responsible sales person on the product name, package name, pin number, package code and desired mounting conditions (reflow method, temperature and times).

(Unit : mm)

SSOP30-P-56-0.65-K



Package material	Epoxy resin
Lead frame material	42 alloy
Pin treatment	Solder plating
Solder plate thickness	5 μm or more
Package weight (g)	0.19 TYP.

Notes for Mounting the Surface Mount Type Package

The SOP, QFP, TSOP, TQFP, LQFP, SOJ, QFJ (PLCC), SHP, and BGA are surface mount type packages, which are very susceptible to heat in reflow mounting and humidity absorbed in storage. Therefore, before you perform reflow mounting, contact Oki's responsible sales person on the product name, package name, pin number, package code and desired mounting conditions (reflow method, temperature and times).

NOTICE

1. The information contained herein can change without notice owing to product and/or technical improvements. Before using the product, please make sure that the information being referred to is up-to-date.

2. The outline of action and examples for application circuits described herein have been chosen as an explanation for the standard action and performance of the product. When planning to use the product, please ensure that the external conditions are reflected in the actual circuit, assembly, and program designs.

3. When designing your product, please use our product below the specified maximum ratings and within the specified operating ranges including, but not limited to, operating voltage, power dissipation, and operating temperature.

4. Oki assumes no responsibility or liability whatsoever for any failure or unusual or unexpected operation resulting from misuse, neglect, improper installation, repair, alteration or accident, improper handling, or unusual physical or electrical stress including, but not limited to, exposure to parameters beyond the specified maximum ratings or operation outside the specified operating range.

5. Neither indemnity against nor license of a third party's industrial and intellectual property right, etc. is granted by us in connection with the use of the product and/or the information and drawings contained herein. No responsibility is assumed by us for any infringement of a third party's right which may result from the use thereof.

6. The products listed in this document are intended for use in general electronics equipment for commercial applications (e.g., office automation, communication equipment, measurement equipment, consumer electronics, etc.). These products are not authorized for use in any system or application that requires special or enhanced quality and reliability characteristics nor in any system or application where the failure of such system or application may result in the loss or damage of property, or death or injury to humans. Such applications include, but are not limited to, traffic and automotive equipment, safety devices, aerospace equipment, nuclear power control, medical equipment, and life-support systems.

7. Certain products in this document may need government approval before they can be exported to particular countries. The purchaser assumes the responsibility of determining the legality of export of these products and will take appropriate and necessary steps at their own expense for these.

8. No part of the contents cotained herein may be reprinted or reproduced without our prior permission.

9. MS-DOS is a registered trademark of Microsoft Corporation.

Printed in Japan