



**LC89066, 89066M**

**6-Bit Video A/D Converters**

**Overview**

The LC89066 and LC89066M are high-speed analog-to-digital converters. They are of flash type, operate from single 5V supply, and feature a 15 Mega-samples per second conversion rate and low power dissipation.

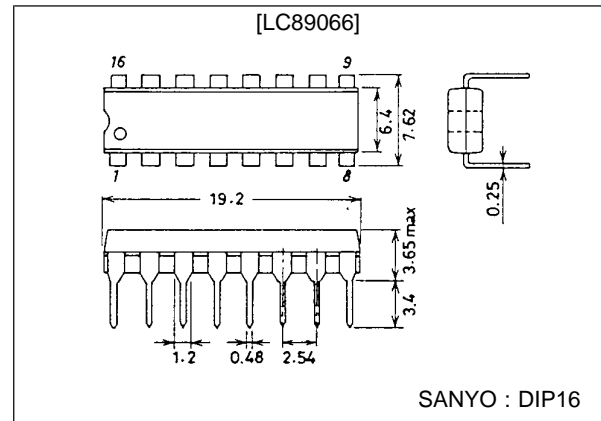
**Features**

- Conversion rate: 15 MSPS
- Low power dissipation: 120 mW
- Linearity error within  $\pm 0.8$  LSB (max)
- TTL-compatible inputs
- LC89066: DIP-16
- LC89066M: MFP-20

**Package Dimensions**

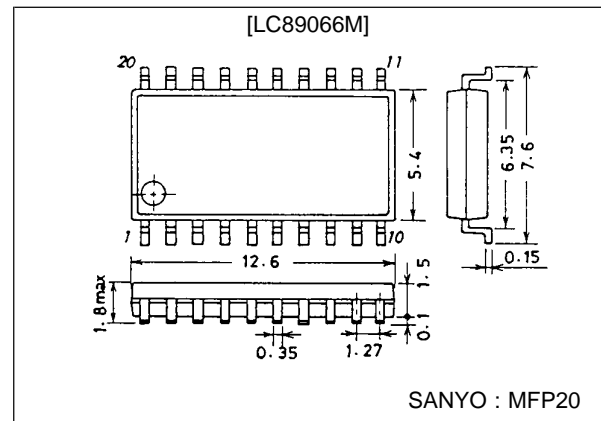
unit : mm

**3006B-DIP16**



unit : mm

**3036B-MFP20**



**Specifications**

**Absolute Maximum Ratings at  $T_a = 25^\circ\text{C}$ ,  $V_{SS} = 0\text{ V}$**

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{DD\text{ max}}$		-0.3 to +7.0	V
Input voltage	$V_{IN}$		-0.3 to $V_{DD} + 0.3$	V
Operating temperature	$T_{opr}$	LC89066	-30 to +75	$^\circ\text{C}$
		LC89066M	-30 to +65	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

**SANYO Electric Co.,Ltd. Semiconductor Business Headquarters**

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110 JAPAN

13097HA(II)/8099TA,TS(US) No.3086-1/4

# LC89066, 89066M

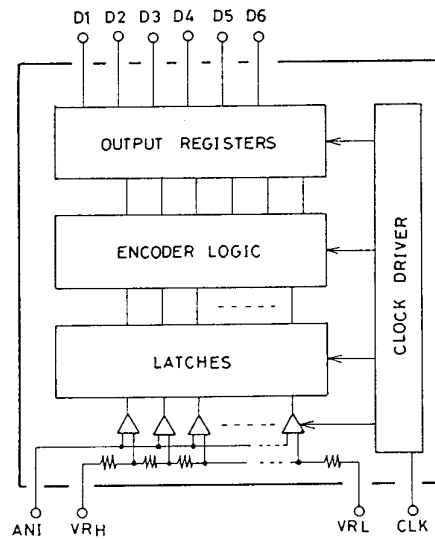
## Recommended Operating Conditions

Parameter	Symbol	Conditions	min	typ	max	Unit
Supply voltage	$V_{DD}$		4.75	5.0	5.25	V
Reference voltage (high)	$V_{RH}$				$V_{DD}$	V
Reference voltage (low)	$V_{RL}$		0			V
Input high-level voltage	$V_{IH}$		2.2		$V_{DD} + 0.3$	V
Input low-level voltage	$V_{IL}$		-0.3		+0.8	V
Analog input voltage	$V_{ANI}$		$V_{RL}$		$V_{RH}$	V
Clock high period	$T_{WH}$		30			ns
Clock low period	$T_{WL}$		30			ns

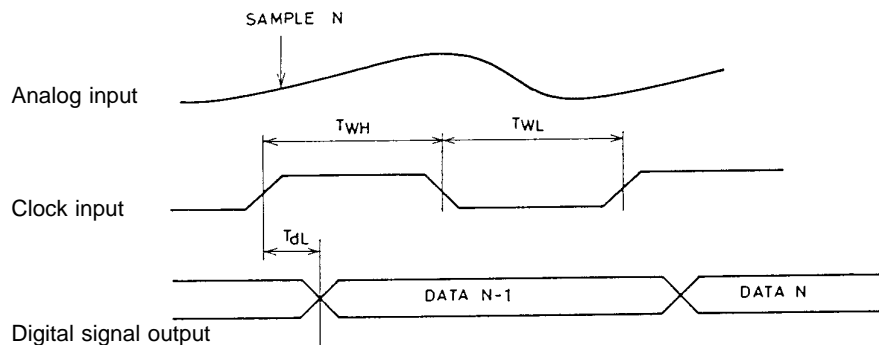
## Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{DD} = 5.0\text{ V}$ , $V_{RH} = 5.0\text{ V}$ , $V_{RL} = 3.0\text{ V}$

Parameter	Symbol	Conditions	min	typ	max	Unit
Resolution	RES				6	bit
Maximum sampling frequency	$F_s \text{ max}$		15			MSPS
Power dissipation	$P_d$	$F_s = 15\text{ MSPS}$		120	200	mW
Linearity error	I.L.	DC accuracy			$\pm 0.8$	LSB
Differential linearity error	D.L.	DC accuracy			$\pm 0.5$	LSB
String resistance	Rst		400	600	800	$\Omega$
Analog input capacitance	$C_{AIN}$			50		pF
Analog input resistance	$R_{AIN}$		10			$M\Omega$
Output delay time	$T_{dL}$			20	45	ns

## Equivalent Circuit Block Diagram



## Timing Chart



## LC89066, 89066M

### Pin Functions

• LC89066

Pin No.	Symbol	Description
1	D6	Digital output data (least significant bit)
2	D5	Digital output data
3	D4	
4	D3	
5	D2	
6	D1	Digital output data (most significant bit)
7	CLK	Clock input
8	GND	Ground (analog)
9	V <sub>DD</sub>	Power supply (analog)
10	V <sub>DD</sub>	
11	V <sub>RH</sub>	Reference voltage input (high)
12	ANI	Analog voltage input
13	V <sub>RL</sub>	Reference voltage input (low)
14	V <sub>DD</sub>	Power supply (digital)
15	V <sub>DD</sub>	
16	GND	Ground (digital)

• LC89066M

Pin No.	Symbol	Description
1	D6	Digital output data (least significant bit)
2	D5	Digital output data
3	N.C.	No connection
4	D4	Digital output data
5	D3	
6	D2	
7	D1	Digital output data (most significant bit)
8	N.C.	No connection
9	CLK	Clock input
10	GND	Ground (analog)
11	V <sub>DD</sub>	Power supply (analog)
12	V <sub>DD</sub>	
13	N.C.	No connection
14	V <sub>RH</sub>	Reference voltage input (high)
15	ANI	Analog voltage input
16	V <sub>RL</sub>	Reference voltage input (low)
17	V <sub>DD</sub>	Power supply (digital)
18	N.C.	No connection
19	V <sub>DD</sub>	Power supply (digital)
20	GND	Ground (digital)

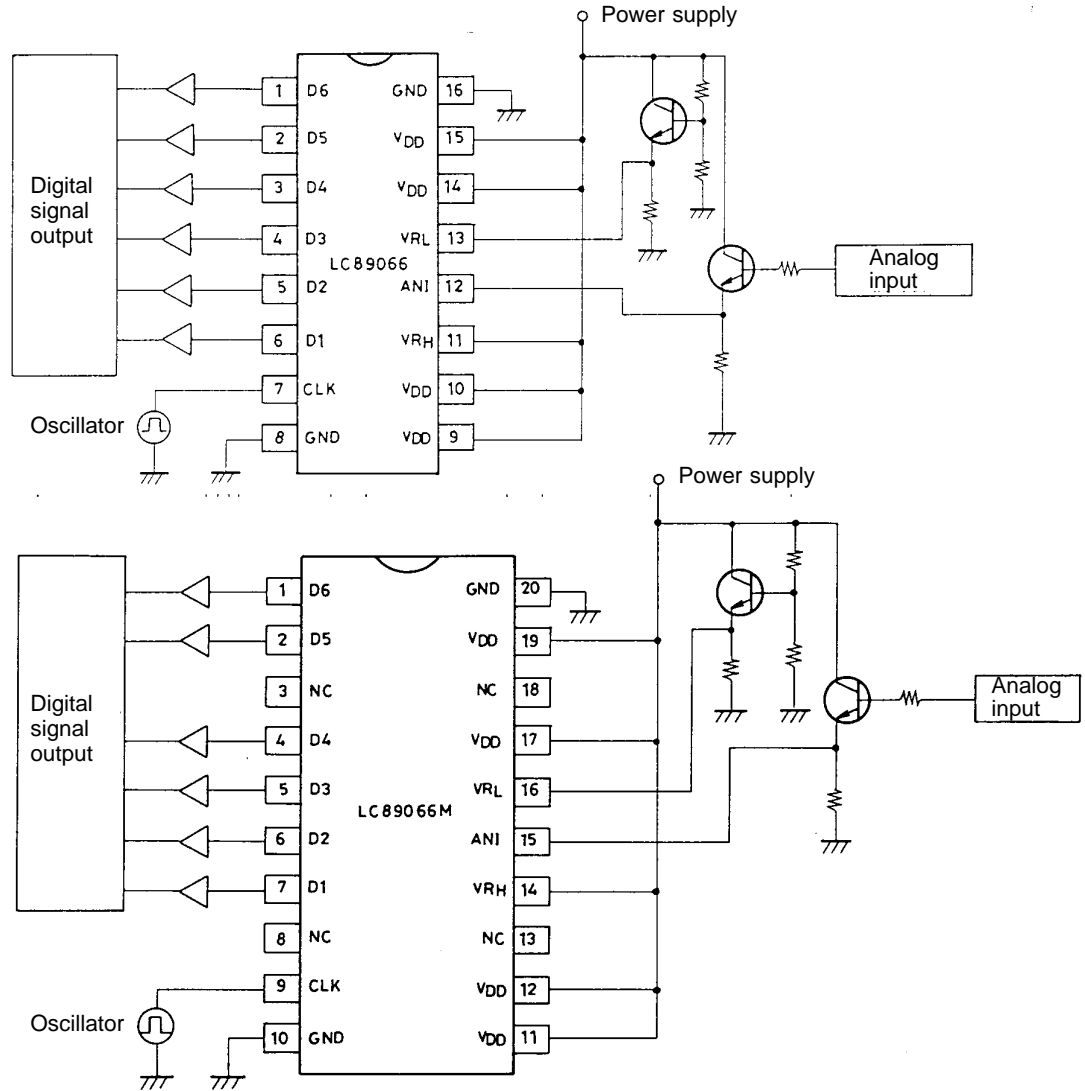
### Functional Description

Signal on the analog signal input pin ANI is input into the comparators on the rising edge of the CLK input signal. This signal is compared with the voltage divided by resistors and digitized. This digitized signal is coded by the encoder logic and output on the next rising edge of the CLK input signal. The conversion range depends on the converter high and low reference voltage V<sub>RH</sub> and V<sub>RL</sub>. When zero transient voltage is set to 3.000 V by V<sub>RL</sub> voltage and full scale transient voltage to 4.984 V by V<sub>RH</sub> voltage, the output data is linearly related to the input voltage as shown in the table below.

	Input voltage (V)	Output data
0	to 3.000	000000
1	3.000 to 3.032	000001
2	3.032 to 3.064	000010
3	3.064 to 3.096	000011
⋮	⋮	⋮
61	4.920 to 4.952	111101
62	4.952 to 4.984	111110
63	4.984 to	111111

Sample Application Circuits

The following diagrams show typical application circuits for the LC89066 and LC89066M. The high reference voltage is connected to the positive supply line, and the low reference voltage generated by a voltage divider and emitter follower. The analog signal is input with a low impedance.



- No products described or contained herein are intended for use in surgical implants, life-support systems, aerospace equipment, nuclear power control systems, vehicles, disaster/crime-prevention equipment and the like, the failure of which may directly or indirectly cause injury, death or property loss.
- Anyone purchasing any products described or contained herein for an above-mentioned use shall:
  - ① Accept full responsibility and indemnify and defend SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors and all their officers and employees, jointly and severally, against any and all claims and litigation and all damages, cost and expenses associated with such use:
  - ② Not impose any responsibility for any fault or negligence which may be cited in any such claim or litigation on SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors or any of their officers and employees jointly or severally.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of January, 1997. Specifications and information herein are subject to change without notice.