



**SANYO Semiconductors**

# DATA SHEET

## LA7860

## LA7860M

Monolithic Linear IC

For Multisynch Display

Deflection IC

### Overview

The LA7860, 7860M display deflection integrated circuit supports multisynch and high-definition displays. Implemented through proprietary Sanyo circuit technology, it offers unsurpassed low-noise performance.

Its outstanding characteristic is the simplified processing it offers for screen settling in response to fluctuations in horizontal scan frequency, which has required numerous components and complex control procedures in the past. This has been made possible through a combination of the conventional phase shift function (H. SHIFT) with a new horizontal oscillation frequency dependent phase shift function (S. GAIN) implemented internally in the IC.

Control pins for various other internal functions support control at 0 to 2.5V dc, making it possible to simply control horizontal oscillation frequency and horizontal and vertical image phase directly with a microcomputer. When used in conjunction with an interface such as a DAC, it will also support system bus applications.

### Features

- Supports multisynch displays
- Supports polar input signals
- DC control
- TTL output
- Low noise

### Functions

- Horizontal frequency independent screen phase shift (H. SHIFT)
- Horizontal frequency dependent screen phase shift (S. GAIN)
- Vertical screen phase shift (V. SHIFT)
- Horizontal oscillation frequency control (H. OSC)
- Horizontal synchronization and detection (H. LOCK)
- Vertical blanking output (V. BLK)

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# LA7860, 7860M

## Specifications

Maximum Ratings at  $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{21}$ max		14	V
Maximum supply current	$I_{14}$ max		75	mA
Maximum rush current	$I_{16\text{si}}$ max		10	mA
	$I_{24\text{si}}$ max		10	mA
	$I_{25\text{si}}$ max		2	mA
FBP minimum input voltage	$V_{IN18}$ min		-5	V
Allowable power dissipation	$P_d$ max	[LA7860] *1	0.95	W
		$T_a \leq 70^\circ\text{C}$ [LA7860M] *2	1.1	W
Operating temperature	$T_{opr}$		-10 to +70	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

Note: 1.  $T_C \leq 100^\circ\text{C}$ ,  $P_d$  max = 0.95W (The case temperature is the temperature of pin 23.)

2. Measured when mounted on a  $100 \times 70 \times 1.15 \text{ mm}^3$ , glass epoxy printed circuit board.

Recommended Operating Conditions at  $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{21}$		12	V
Recommended supply current	$I_{14}$		60	mA
Operating supply voltage	$V_{21op}$		10.5 to 13.5	V
Operating supply current	$I_{14op}$		55 to 65	mA
Recommended input voltage	$V_1$		2	Vp-p
Operating input voltage	$V_{30}$		2	Vp-p
	$V_{1op}$		1.0 to 3.0	Vp-p
	$V_{30op}$		1.0 to 3.0	Vp-p
Maximum horizontal input width	$V_{IN1}$ max		3/20	Th
Maximum vertical input width	$V_{IN30}$ max		3	ms
Maximum FBP input width	$V_{IN18}$ max		$1/5 + T_{delf}$	Th

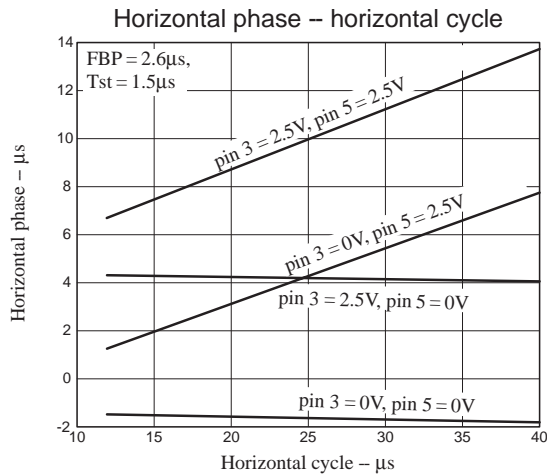
Where Th is one horizontal cycle, and Tdelf is 20-pin operation period.

## LA7860, 7860M

**Electrical Characteristics** at  $T_a = 25^\circ\text{C}$ ,  $V_{CC21} = 12\text{V}$ ,  $I_{CC14} = 60\text{mA}$

Parameter	Symbol	Conditions	Ratings			Unit
			Min	Typ	max	
$V_{CC21}$ current dissipation	$I_{21}$		4.2	5.6	7.0	mA
$V_{CC14}$ supply voltage	$V_{14}$		8.5	9.0	9.5	V
Maximum vertical pull-in frequency	$F_v \text{ max}$		180	210	240	Hz
Minimum vertical pull-in frequency	$F_v \text{ min}$		30.0	37.5	45.0	Hz
Maximum vertical blanking width	$W_b \text{ max}$		740	875	1010	$\mu\text{s}$
Minimum vertical blanking width	$W_b \text{ min}$		340	400	460	$\mu\text{s}$
Blanking pulse output high voltage	$V_{bh}$		4.5	5	5.5	V
Blanking pulse output low voltage	$V_{bl}$				0.3	V
Vertical blanking output current	$I_{25\text{so}}$		1.6	2		mA
Vertical output pulse width	$W_{vd}$		255	300	345	$\mu\text{s}$
Vertical output maximum shift	$P_v \text{ max}$		400	475	550	$\mu\text{s}$
Vertical output delay	$D_v \text{ min}$				1	$\mu\text{s}$
Vertical output voltage high	$V_{dvh}$		4.5	5.0	5.5	V
Vertical output voltage low	$V_{dvl}$				0.3	V
Vertical output current	$I_{24\text{so}}$		1.7	2.2		mA
Vertical oscillation start voltage	$F_{vst}$			5.0	6.0	V
Horizontal oscillation start voltage	$F_{Hst}$			5.0	6.0	V
Minimum horizontal oscillation frequency	$F_H \text{ min}$		25.7	27.1	28.5	kHz
Minimum horizontal oscillation frequency	$F_H \text{ max}$		89.5	94.6	99.7	kHz
Horizontal frequency pull-in range	$H_{pull}$		3.5	4.1		%
AFC control current	$I_{afc}$		500	630	760	$\mu\text{A}$
Horizontal output high voltage	$V_{hdh}$		4.5	5.0	5.5	V
Horizontal output low voltage	$V_{hdl}$				0.3	V
Minimum horizontal phase	$Ph \text{ min}$	$T_{fbp} = 2.6 \mu\text{s}$	-2.0	-1.4	-0.8	$\mu\text{s}$
Maximum horizontal phase	$Ph \text{ max}$	$T_{fbp} = 2.6 \mu\text{s}$	3.5	4.5	5.5	$\mu\text{s}$
Frequency dependent maximum phase	$Pf \text{ max}$	$T_{fbp} = 2.6 \mu\text{s}$	23	26.5	30	%
Frequency dependent minimum phase	$Pf \text{ min}$	$T_{fbp} = 2.6 \mu\text{s}$	-3	0	3	%
Minimum horizontal output pulse width	$W_h \text{ min}$		21	24	27	%
Maximum horizontal output pulse width	$W_h \text{ max}$		64	67	70	%
Horizontal output current	$I_{16\text{so}}$		1.7	2.3		mA
Synchronized output voltage	$V_{co}$		4.5	5	5.5	V
Asynchronized output voltage	$V_{nco}$				0.3	V
FBP input voltage	$V_{fbp}$		1.2	1.5	1.8	V
EN input voltage	$V_{en}$		2.0	2.5	3.0	V





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