



ON Semiconductor®

<http://onsemi.com>

# LA72730

Monolithic Linear IC

## Audio/Video Switch for TV

### Overview

The LA72730 is an Audio/Video Switch for TV.

### Functions

- Audio : Possible to Change 4 Channel×2, ALC OUTPUT, 4dB Amplifier MONITOR OUTPUT
- Video : Possible to Change 4 Channel, 6dB Amplifier
- Control : I<sup>2</sup>C (Slave address : 92h)

### Specifications

**Maximum Ratings** at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V <sub>CC</sub> max	Pin 8	7.0	V
Allowable power dissipation	Pd max	Ta ≤ 70°C	300	mW
Operating temperature	T <sub>opr</sub>		-20 to +70	°C
Storage temperature	T <sub>stg</sub>		-55 to +150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

**Recommended Operating Conditions** at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended operating voltage	V <sub>CC</sub>	Pin 8	5.0	V
Operating voltage range	V <sub>CC</sub> op	Pin 8	4.5 to 5.5	V

# LA72730

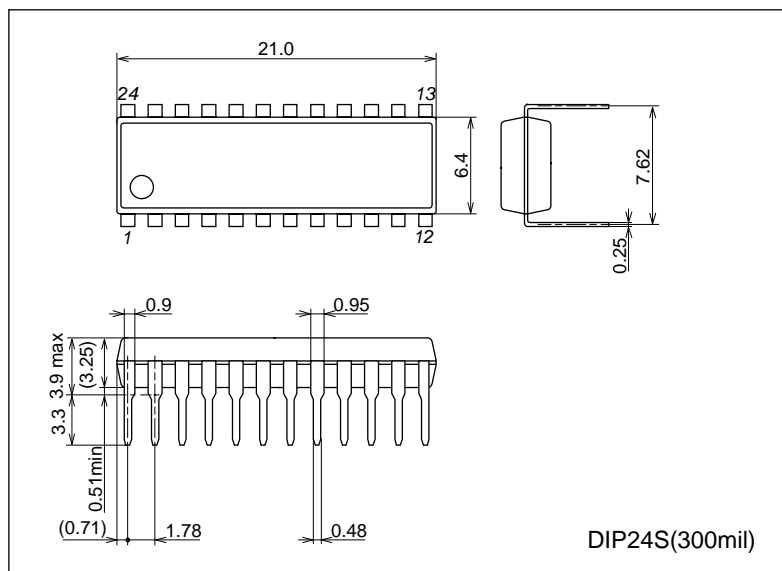
**Electrical Characteristics** at Ta = 25°C, V<sub>DD</sub> = 5.0V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current dissipation	I <sub>CC</sub>	V <sub>CC</sub> = 5V, No signal	15.2	18	20.8	mA
<b>Audio block</b>						
Audio input DC voltage	INa	No signal pin 1, 2, 3, 4, 5, 6, 23, 24 DC voltage	2.2	2.4	2.6	V
Audio output DC voltage	Oa	No signal pin 19, 20 DC voltage	2.2	2.4	2.6	V
Audio channel bandwidth	Fa	Input : 1kHz/20kHz, -6dBV : Pin 19, 20 output	-2	0	+2	dB
Audio voltage gain (Audio-out)	Aa1	f = 1kHz, V <sub>IN</sub> = -6dBV, Pin 19, 20 output	-0.3	0.0	+0.3	dB
Audio voltage gain (Monitor-out)	Aa2	f = 1kHz, V <sub>IN</sub> = -6dBV, Pin 12, 16 output	3.5	4.0	4.5	dB
Audio input dynamic range (Audio-out)	Da1	f = 1kHz, THD = ≤1% Pin 19, 20 output	-3.0	-1.0		dBV
Audio input dynamic range (Monitor-out)	Da2	f = 1kHz, THD = ≤1% Pin 13, 16 output	-5.0	-3.0		dBV
Audio channel PSRR	PSa	V <sub>CC</sub> = 5V+1Vp-p, SINE WAVE (50Hz)	35	50		dB
Audio channel input impedance	Ria		80	100	120	kΩ
Audio channel output impedance	Roa		150	200	250	Ω
Audio channel crosstalk	CTa	f = 1kHz	65	80		dB
Audio channel S/N	SNa	Filter = DIN/AUDIO	70	85		dB
Audio channel THD	THDa	f = 1kHz, V <sub>IN</sub> = -6dBV		0.15	0.3	%
ALC Detect level-1	ALC1		-10.5	-9	-7.5	dBV
ALC Detect level-2	ALC2		-15.5	-14	-12.5	dBV
ALC Detect level-3	ALC3		-13.5	-12	-10.5	dBV
ALC Detect level-4	ALC4		-19.5	-18	-16.5	dBV
<b>Video block</b>						
Video input DC voltage	INv		1.44	1.6	1.76	V
Video output DC voltage	Ov		1.26	1.4	1.54	V
Video channel bandwidth	Fv	-3dB frequency	10			MHz
Video signal voltage gain	Av	f = 500kHz, V <sub>IN</sub> = 1Vp-p	5.0	6.0	7.0	dB
Video input dynamic range	Dv	f = 100kHz, THD ≤ 1%	2.0	2.5		Vp-p
Video channel PSRR	PSv	V <sub>CC</sub> = 5V+1Vp-p, SINE WAVE (50Hz)	35	50		dB
Video channel input impedance	Riv		8.0	10	12.0	kΩ
Video channel output impedance	Rov		30	40	50	Ω
Video channel crosstalk	CTv	f = 3.58MHz, V <sub>IN</sub> = 1Vp-p	45	60		dB
Video channel noise	SNv	Bandwidth 10MHz	55	60		dB

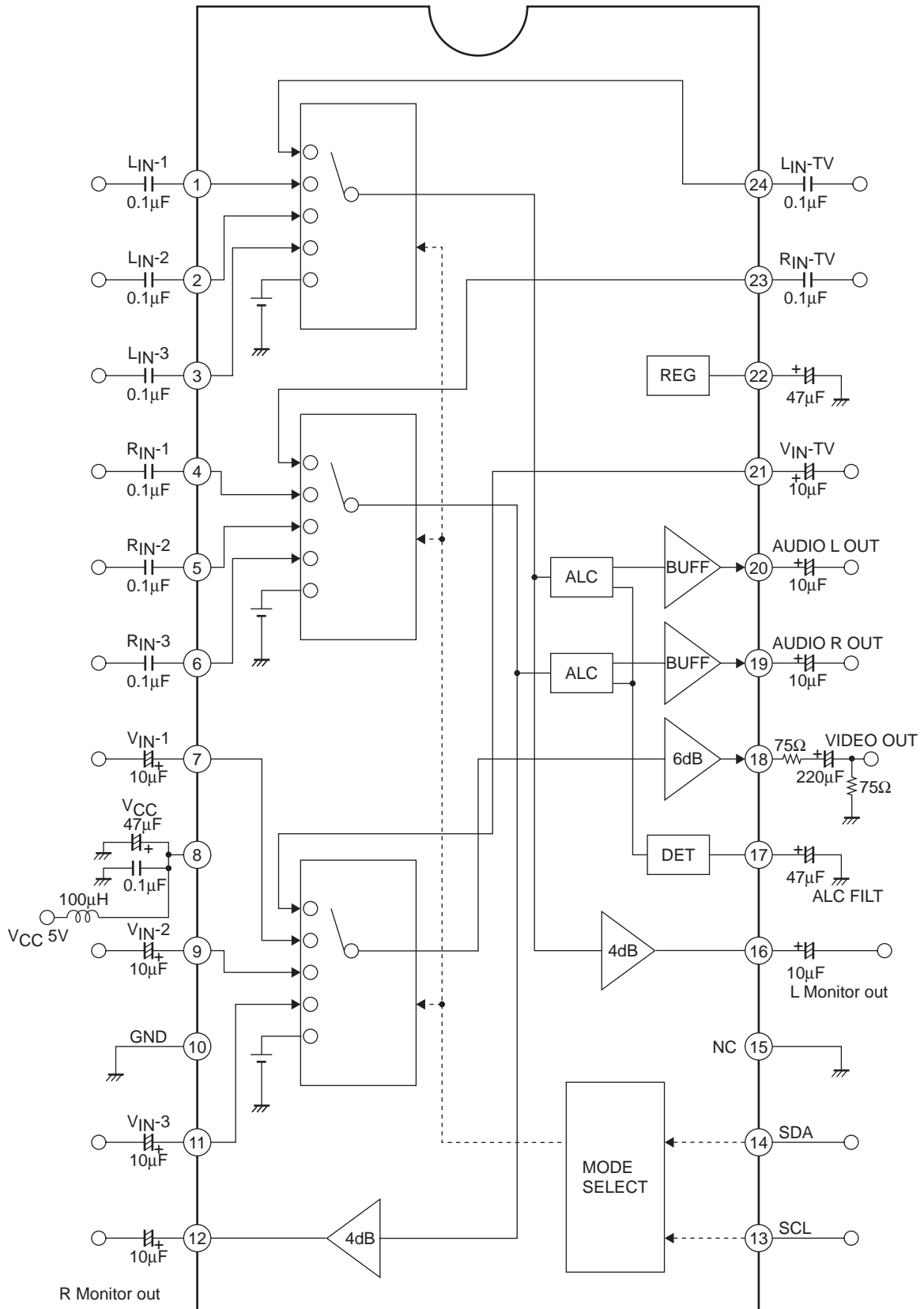
## Package Dimensions

unit : mm (typ)

3067B



Block Diagram



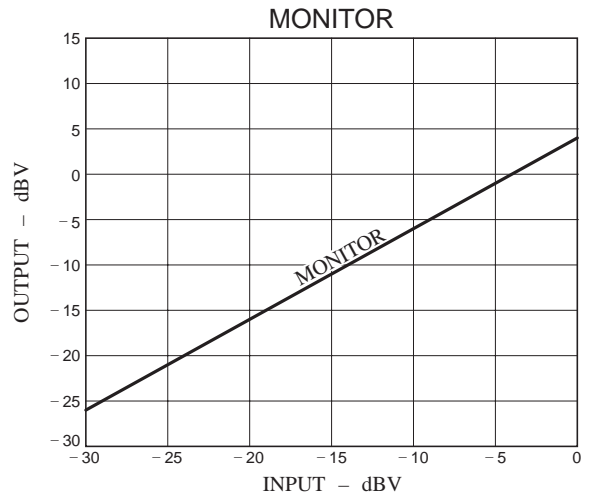
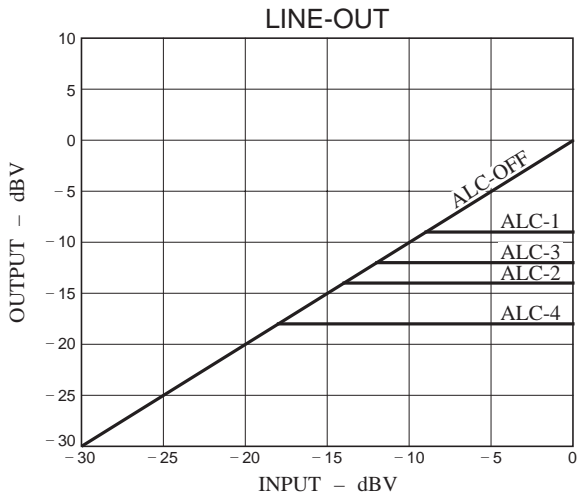
# LA72730

## I<sup>2</sup>C Bit Pattern

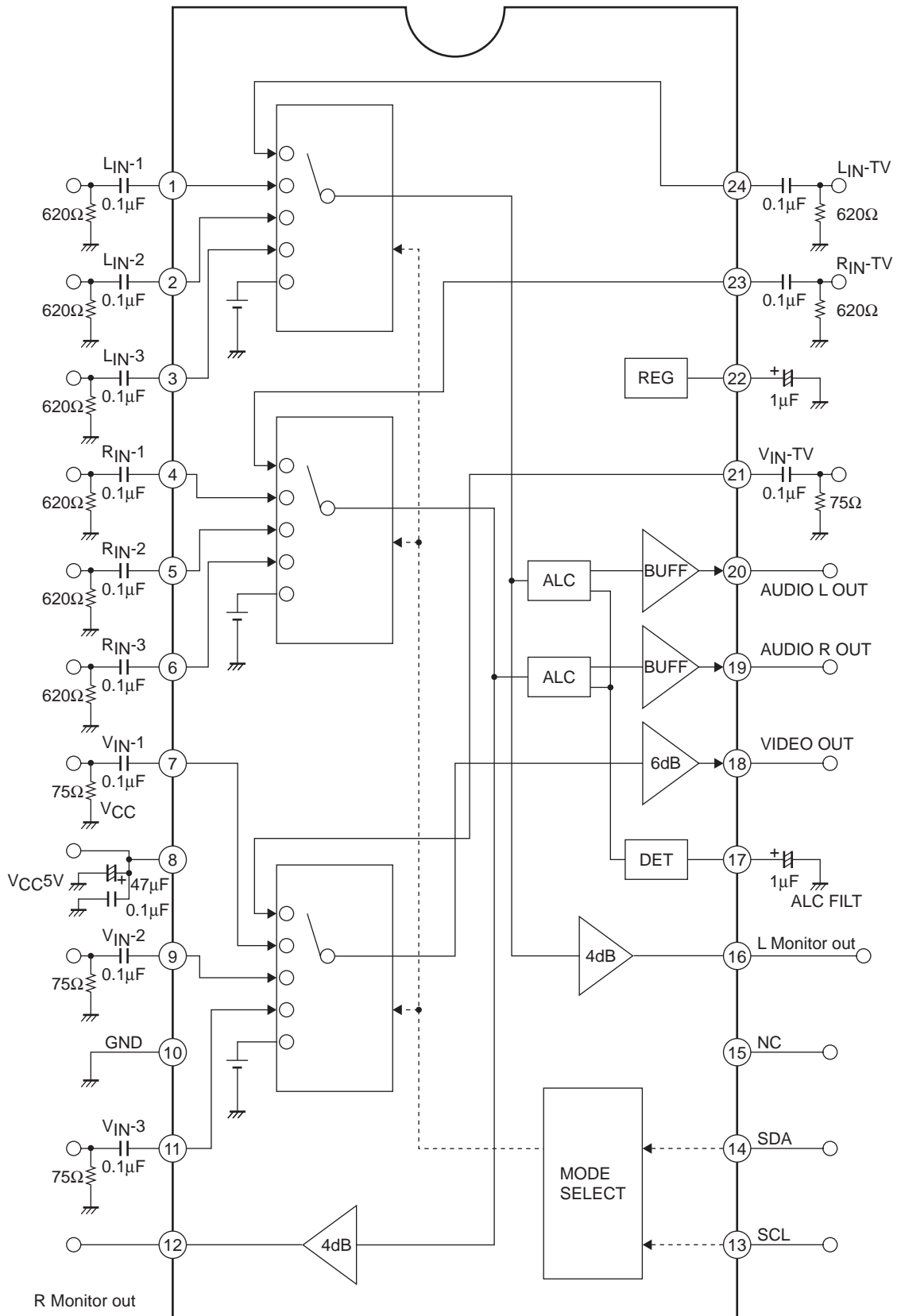
D8	D7	D6	D5	D4	D3	D2	D1	Condition
*						0	0	AV IN-TV
						0	1	AV IN-1
						1	0	AV IN-2
						1	1	AV IN-3
*					0			Norma
					1			Mute
			0	0				ALC Level-1 (-9dBV)
			0	1				ALC Level-2 (-14dBV)
*			1	0				ALC Level-3 (-12dBV)
			1	1				ALC Level-4 (-18dBV)
*		0						ALC-ON
		1						ALC-OFF
	0							Prohibit
*	1							Fix
*	0							Fix
	1							Prohibit

“\*” : Shows initial condition.

Slave address : 92h (1001 0010)



Test Circuit



# LA72730

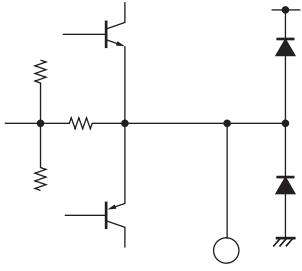
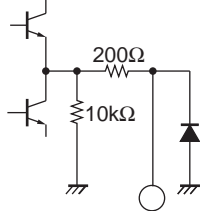
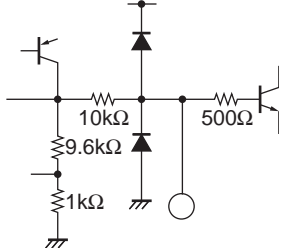
## Pin Functions

Pin No.	Pin Name	Function	DC : voltage	Equivalent Circuit
			AC : level	
1 2 3 4 5 6 23 24	PIA_L1 PIA_L2 PIA_L3 PIA_R1 PIA_R2 PIA_R3 PIA_RTV PIA_LTV	Audio input	DC : 2.4V	
7 9 11 21	PIV_1 PIV_2 PIV_3 PIV_TV	Video input	DC : 1.6V	
8	V <sub>CC</sub>			
10	GND			
12 16	POMONTR POMONTL	Monitor output	DC : 2.4V	
13	PISCL	Serial clock input		
14	PISDA	Serial data input		
17	POALCFIL	ALC detect filter		

Continued on next page

# LA72730

Continued from preceding page.

Pin No.	Pin Name	Function	DC : voltage	Equivalent Circuit
			AC : level	
18	POVIDEO	Video output	DC : 1.4V	
19 20	POALCR POALCL	Audio output	DC : 2.4V	
22	PCREG	Reference voltage	DC : 2.4V	

## I<sup>2</sup>C BUS serial interface specification

### (1) Data Transfer Manual

This IC adopts control method (I<sup>2</sup>C-BUS) with serial data, and controlled by two terminals which called SCL (serial clock) and SDA (serial data). At first, set up <sup>\*1</sup> the condition of starting data transfer, and after that, input 8 bit data to SDA terminal with synchronized SCL terminal clock. The order of transferring is first, MSB (the Most Scale of Bit), and save the order. The 9th bit takes ACK (Acknowledge) period, during SCL terminal takes “H”, this IC pull down the SDA terminal. After transferred the necessary data, two terminals lead to set up and of <sup>\*2</sup> data transfer stop condition, thus the transfer comes to close.

\*1 Defined by SDA fall down SCL during ‘H’ period.

\*2 Defined by SDA rise up SCL during ‘H’ period.

### (2) Transfer Data Format

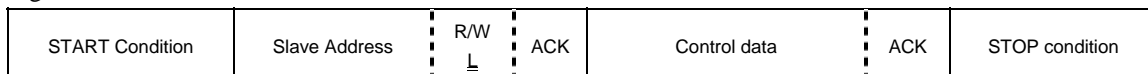
After transfer start condition, transfers slave address (92h : 1001 0010 ) to SDA terminal, control data, then, stop condition (See figure 1).

Slave address is made up of 7bits, <sup>\*3</sup> 8th bit shows the direction of transferring data, but this IC does not have READ mode, so that this bit fix to “L”.

Data works with all of bit, transfer the stop condition before stop 8bit transfer, and to stop transfer, it will be canceled the transfer dates.

\*3 It is called R/W bit.

Fig.1 DATA STRUCTURE



### (3) Initialize

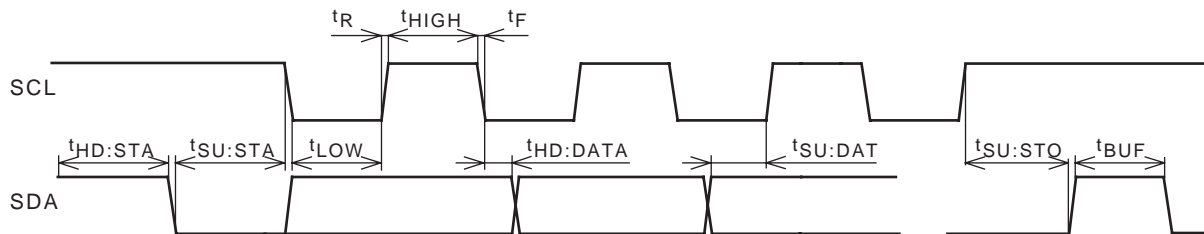
This IC is initialized for circuit protection. Initial condition is shown on bitmap.

# LA72730

## Reference

Parameter	Symbol	min	max	unit
LOW level input voltage	$V_{IL}$	-0.5	1.5	V
HIGH level input voltage	$V_{IH}$	2.5	5.5	V
LOW level output current	$I_{OL}$		3.0	mA
SCL clock frequency	$f_{SCL}$	0	100	kHz
Set-up time for a repeated START condition	$t_{SU:STA}$	4.7		$\mu s$
Hold time START condition. After this period, the first clock pulse is generated	$t_{HD:STA}$	4.0		$\mu s$
LOW period of the SCL clock	$t_{LOW}$	4.7		$\mu s$
Rise time of both SDA and SDL signals	$t_R$	0	1.0	$\mu s$
HIGH period of the SCL clock	$t_{HIGH}$	4.0		$\mu s$
Fall time of both SDA and SDL signals	$t_F$	0	1.0	$\mu s$
Data hold time	$t_{HD:DAT}$	0		$\mu s$
Data set-up time	$t_{SU:DAT}$	250		ns
Set-up time for STOP condition	$t_{SU:STO}$	4.0		$\mu s$
BUS free time between a STOP and START condition	$t_{BUF}$	4.7		$\mu s$

## Definition of timing



ON Semiconductor and the ON logo are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.