

**LA5613****VCR Regulator and Control Amplifier****Overview**

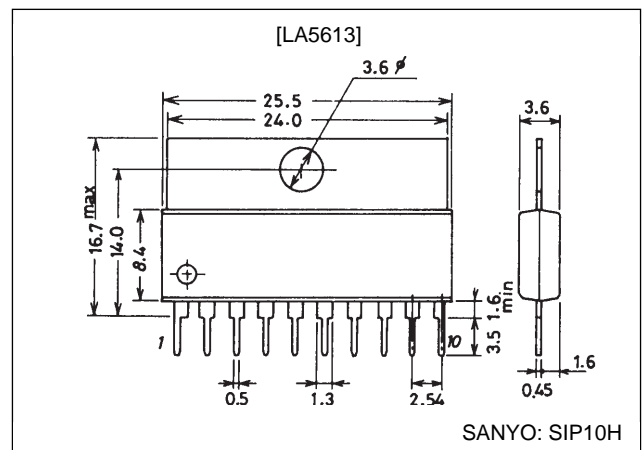
The LA5613 is an IC that includes an independently on/off switchable 5-V/0.7-A low-saturation regulator, an 11.3-V/0.3-A ripple filter, and a control amplifier on chip. It is optimal for use in VCR and similar products.

**Functions and Features**

- 5-V/0.7-A low-saturation regulator (Includes an on/off function.)
- 11.3-V/0.3-A ripple filter (Includes an on/off function.)
- Switching regulator control amplifier
- Includes input overvoltage and thermal protection circuits on chip.

**Package Dimensions**

unit: mm

**3046B-SIP10F****Specifications****Maximum Ratings at  $T_a = 25^\circ\text{C}$** 

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC1 \text{ max}}$		14	V
	$V_{CC2 \text{ max}}$	$V_{CC1} \geq V_{CC2}$	$V_{CC1}$	
Allowable power dissipation	$P_d \text{ max}$	No heat sink	1.7	W
Operating temperature	$T_{opr}$		-20 to +80	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +150	$^\circ\text{C}$

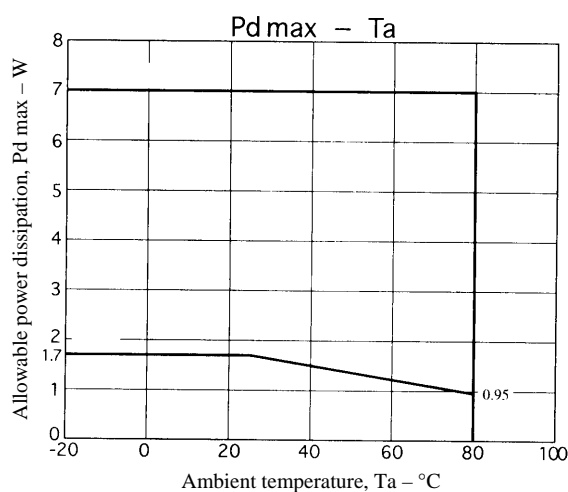
**Operating Conditions at  $T_a = 25^\circ\text{C}$** 

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	$V_{CC1}$		$12.3 \pm 0.4$	V
	$V_{CC2}$		$6 \pm 0.5$	V
Output current 1	$I_{O1}$		0 to 0.3	A
Output current 2	$I_{O2}$		0 to 0.7	A

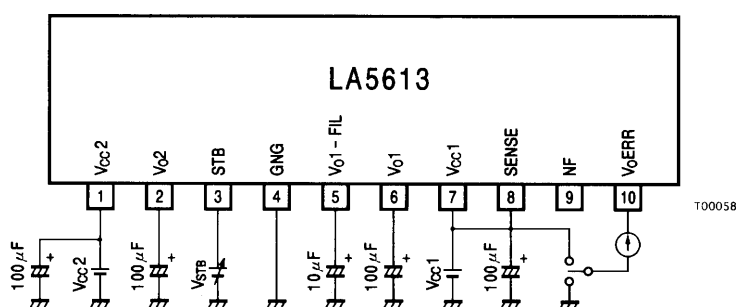
## LA5613

### Electrical Characteristics at Ta = 25°C in the specified Test Circuit

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[No Load] V <sub>STB</sub> = high, V <sub>CC1</sub> = 12.3 V, V <sub>CC2</sub> = 6 V, I <sub>O1</sub> and I <sub>O2</sub> = 0 A						
Quiescent current	I <sub>IN1</sub>		–	20	30	mA
	I <sub>IN2</sub>		–	0.2	0.3	mA
[Output 1] V <sub>STB</sub> = high, V <sub>CC1</sub> = 12.3 V, V <sub>CC2</sub> = 6 V, I <sub>O1</sub> = 0.3 A						
Output voltage 1	V <sub>O1</sub>		10.9	11.3	–	V
Dropout voltage	V <sub>DROP1</sub>		–	1.0	1.4	V
Peak output current	I <sub>OP1</sub>		0.3	–	–	A
Output low-level voltage	V <sub>O1 OFF</sub>		–	–	0.2	V
[Output 2] V <sub>STB</sub> = high, V <sub>CC1</sub> = 12.3 V, V <sub>CC2</sub> = 6 V, I <sub>O2</sub> = 0.7 A						
Output voltage 2	V <sub>O2</sub>		4.9	5.1	5.3	V
Dropout voltage	V <sub>DROP2</sub>		–	0.3	0.5	V
Line regulation	ΔV <sub>OLN2</sub>	6 V ≤ V <sub>CC2</sub> ≤ 7 V	–	–	20	mV
Load regulation	ΔV <sub>OLD2</sub>	0.1 A ≤ I <sub>O2</sub> ≤ 0.7 A	–	–	300	mV
Peak output current	I <sub>OP2</sub>		0.7	–	–	A
Output short-circuit current	I <sub>OSC2</sub>		–	–	0.75	A
Ripple rejection	R <sub>rej2</sub>	f = 120 Hz, 6 V ≤ V <sub>CC2</sub> ≤ 7 V	–	50	–	dB
Output low-level voltage	V <sub>O2 OFF</sub>		–	–	0.2	V
[Input Overvoltage Protection]						
Detection voltage	V <sub>HVTH</sub>		7.6	8.0	8.4	V
[Output 1 and Output 2 On/Off Control] V <sub>CC1</sub> = 12.3 V, V <sub>CC2</sub> = 6 V						
Output off control voltage	V <sub>STBL</sub>	V <sub>O1</sub> and V <sub>O2</sub> : off	–	–	1.0	V
Output on control voltage	V <sub>STBH</sub>	V <sub>O1</sub> and V <sub>O2</sub> : on	3.0	–	V <sub>CC1</sub>	
[Control Amplifier] V <sub>CC1</sub> = 12.3 V, V <sub>CC2</sub> = 6 V						
Control output current (sink)	I <sub>CONT</sub>	V <sub>CC1</sub> = 12.8 V	10	–	–	mA
Resistance ratio	KR	KR = R1/R2, V <sub>REF</sub> = 1.28 V typ	–	8.61	–	
Output inverted input voltage	V <sub>CC1</sub> - ERR	I <sub>O1</sub> = 0.3 A, I <sub>O2</sub> = 0.7 A	11.9	12.3	12.7	V



### Test Circuit



**Pin Functions**

Pin No.	Symbol	Function
1	V <sub>CC2</sub>	Low-voltage input
2	V <sub>O2</sub>	5.1-V/0.7-A regulator output, with on/off, current limiter thermal shutdown.
3	STB	V <sub>O1</sub> and V <sub>O2</sub> on/off control. Active high.
4	GND	Substrate of the LA5613 (minimum potential)
5	V <sub>O1-FIL</sub>	V <sub>O1</sub> ripple filter capacitor connection
6	V <sub>O1</sub>	Ripple filter 0.3-A output, with on/off, current limiter thermal shutdown.
7	V <sub>CC1</sub>	High-voltage input
8	SENSE	V <sub>CC1</sub> voltage detection
9	NF	Phase compensation and V <sub>CC1</sub> adjustment. Connect resistors between this pin and SENSE or ground.
10	V <sub>OERR</sub>	Switching register control amplifier drive output

Notes: 1. CL: Current limiter  
 2. TSD: Thermal shutdown

**Function Table** (○: built-in, ×: not built-in)

Function	Circuit block	V <sub>O1</sub>	V <sub>O2</sub>	Control amplifier
Input line		V <sub>CC1</sub>	V <sub>CC2</sub>	V <sub>CC1</sub>
Output current protection		○	○	×
Thermal shutdown protection		○	○	×
On/off control		○	○	×
Overvoltage protection		○	○	○

**Usage Notes**

- The relationship  $V_{CC1} \geq V_{CC2}$  must hold at all times when power is applied.
- Power should be applied to V<sub>CC1</sub> and V<sub>CC2</sub> simultaneously. Do not use this IC with only one or the other voltage applied.
- This IC will be destroyed if the V<sub>O1</sub> output load is shorted. Do not short the outputs of this IC.

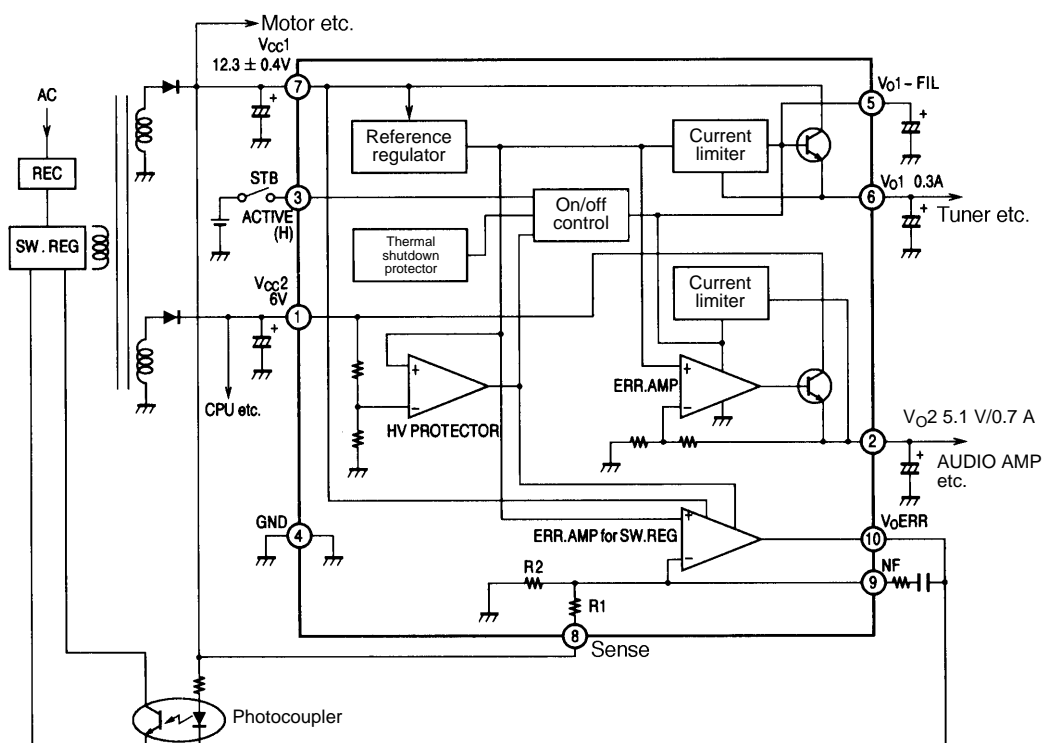
**Logic Table**

Conditions: When  $V_{CC1} \geq V_{CC2}$   
 (However, the conditions  $11.9\text{ V} \leq V_{CC1} \leq 12.7\text{ V}$  and  $5.5\text{ V} \leq V_{CC2} \leq 6.5\text{ V}$  must also apply.)

STB	V <sub>O1</sub> , V <sub>O2</sub>
L or open	L
H	H

Notes: 1. "H" for STB denotes high level; "L" denotes low level.  
 2. "H" for V<sub>O</sub> denotes output ON voltage; "L" denotes output OFF voltage.

## Equivalent Circuit Block Diagram and Sample Application Circuit



T00057

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