



# LA5616

## Microprocessor-Controlled Audio Power Supply

### Overview

The LA5616 is appropriate for use in power supplies for microprocessor-controlled CD players, tuners, receivers, and similar audio equipment.

### Functions

- Low-saturation 5-V, 400-mA power supply
- 7.0-V, 1.0-A power supply
- Output reset generation function
- The 5.0-V system can be controlled (on/off) from the provided active-high enable pin.

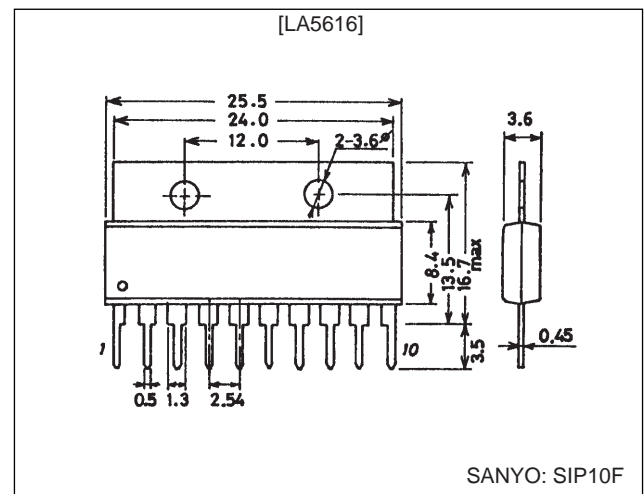
### Features

- The reset output delay time can be set with an external capacitor.
- Sharp-cutoff current limiter circuit and thermal protection circuit
- Active pull-up element incorporated in reset output circuit for improved noise suppression.

### Package Dimensions

unit: mm

3018A-SIP10F



### Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	$V_{IN\ max}$		18	V
Enable pin voltage	$V_{EN\ max}$		$V_{IN\ max}$	V
Reset output pin voltage	$V_{\overline{RES}\ max}$		18	V
Allowable power dissipation	$P_{d\ max}$		2	W
Operating temperature	$T_{opr}$		-20 to +80	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

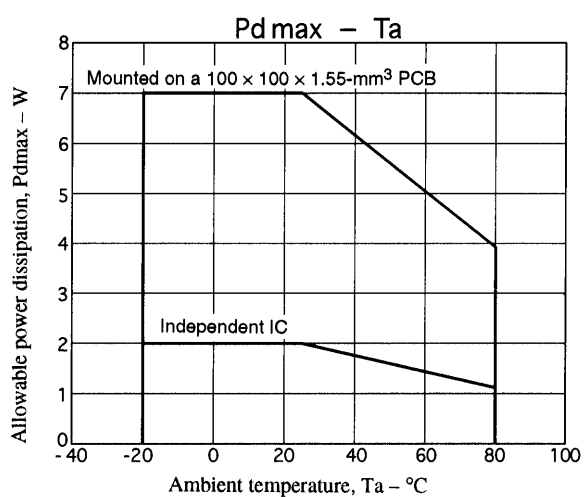
#### Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	$V_{IN}$		5.6 to 17	V
Output current	$I_{OUT1}$		0 to 400	mA
	$I_{OUT2}$		0 to 1.0	A
Reset output source current	$I_{ORH}$	High level	0 to 200	$\mu\text{A}$
Reset output sink current	$I_{ORL}$	Low level	0 to 2	mA

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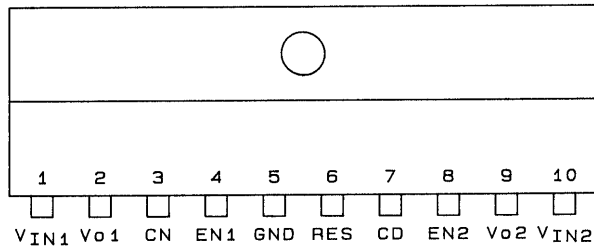
### Electrical Characteristics at Ta = 25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[5.0-V Power Supply Block] $V_{IN1} = V_{IN2}$ , $C_{OUT2} = 47 \mu\text{F}$						
Output voltage	$V_{OUT1}$	$V_{IN1} = 12 \text{ V}$ , $I_{OUT1} = 400 \text{ mA}$	4.75	5.0	5.25	V
Dropout voltage	$V_{DROP1}$	$V_{IN1} = 4.9 \text{ V}$ , $I_{OUT1} = 400 \text{ mA}$		0.5	1.0	V
Line regulation	$\Delta V_{OLN1}$	$5.6 \leq V_{IN1} \leq 17 \text{ V}$ , $I_{OUT1} = 400 \text{ mA}$		20	100	mV
Load regulation	$\Delta V_{OLD1}$	$5 \text{ mA} \leq I_O \leq 400 \text{ mA}$ , $V_{IN1} = 12 \text{ V}$		50	150	mV
Peak output current	$I_{OP1}$	$V_{IN1} = 12 \text{ V}$	400	500		mA
Output shorted current	$I_{OSC1}$	$V_{IN1} = 12 \text{ V}$		100	400	mA
Output noise voltage	$V_{N1}$	$10 \text{ Hz} \leq f \leq 100 \text{ kHz}$		70		$\mu\text{Vrms}$
Output voltage temperature coefficient	$\Delta V_O/\Delta T_a$	$T_j = 25 \text{ to } 125^\circ\text{C}$		1.6		$\text{mV}/^\circ\text{C}$
Ripple rejection	$R_{ref1}$	$f = 120 \text{ Hz}$ , $6 \text{ V} \leq V_{IN1} \leq 17 \text{ V}$		60		dB
Output on control voltage	$V_{ENH1}$	$V_{IN1} = 12 \text{ V}$	2.6			V
Output off control voltage	$V_{ENL1}$	$V_{IN1} = 12 \text{ V}$			1.0	V
Low-level output voltage	$V_{O\ OFF1}$	$V_{IN1} = 12 \text{ V}$			0.3	V
[Reset Block] $V_{IN1} = V_{IN2} = 12 \text{ V}$						
High reset output voltage	$V_{ORH}$	$I_{ORH} = 200 \mu\text{A}$ , Cd pin open	4.73	4.98	5.23	V
Low reset output voltage	$V_{ORL}$	$I_{SRL} = 2 \text{ mA}$ , with Cd shorted to GND		100	200	mV
Reset threshold voltage	$V_{RT}$		3.95	4.2	4.45	V
Reset hysteresis voltage	$V_{hys}$		40	100	200	mV
Reset output delay time	$t_d$	Cd = 0.1 $\mu\text{F}$	7.5	10	12.5	ms
[7.0-V Power Supply Block] $V_{IN1} = V_{IN2}$ , $C_{OUT2} = 47 \mu\text{F}$						
Output voltage	$V_{OUT2}$	$V_{IN2} = 12 \text{ V}$ , $I_{OUT2} = 1 \text{ A}$	6.5	7.0	7.5	V
Dropout voltage	$V_{DROP2}$	$V_{IN2} = 6.5 \text{ V}$ , $I_{OUT2} = 1 \text{ A}$		1.0	2.0	V
Line regulation	$\Delta V_{OLN2}$	$9.0 \leq V_{IN2} \leq 17 \text{ V}$ , $I_{OUT2} = 1 \text{ A}$			200	mV
Load regulation	$\Delta V_{OLD2}$	$5 \text{ mA} \leq I_O \leq 1.0 \text{ A}$ , $V_{IN2} = 12 \text{ V}$			300	mV
Peak output current	$I_{OP2}$	$V_{IN2} = 12 \text{ V}$	1.0			A
Output shorted current	$I_{OSC2}$	$V_{IN2} = 12 \text{ V}$		500		mA
Ripple rejection	$R_{ref2}$	$f = 120 \text{ Hz}$ , $9.0 \text{ V} \leq V_{IN2} \leq 17 \text{ V}$		50		dB
Output on control voltage	$V_{ENH2}$	$V_{IN2} = 12 \text{ V}$	2.6			V
Output off control voltage	$V_{ENL2}$	$V_{IN2} = 12 \text{ V}$			1.0	V
Low-level output voltage	$V_{O\ OFF2}$	$V_{IN2} = 12 \text{ V}$			0.3	V



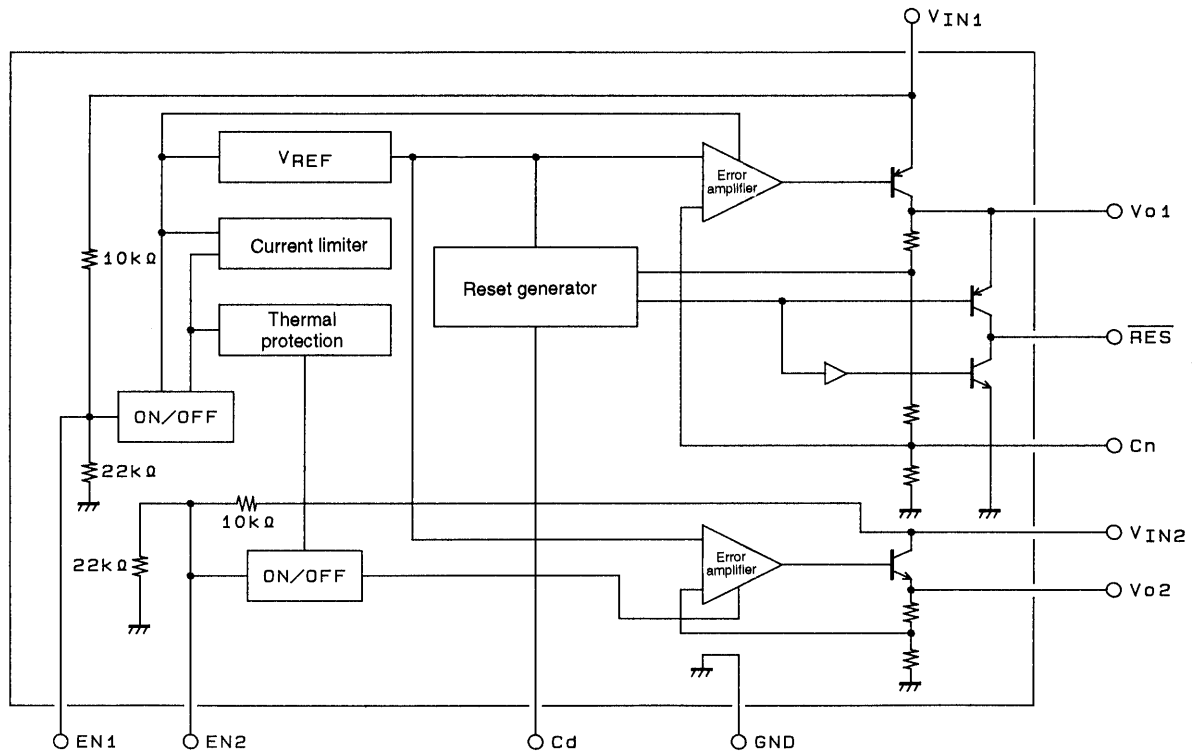
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## Pin Assignment



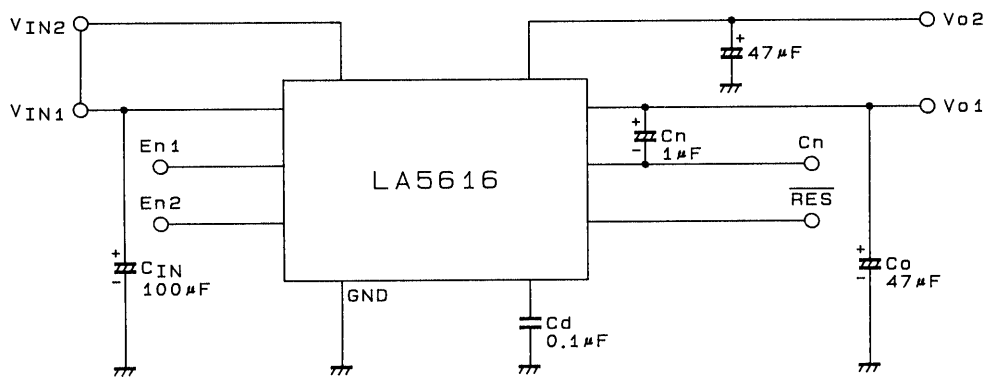
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## Equivalent Circuit Block Diagram



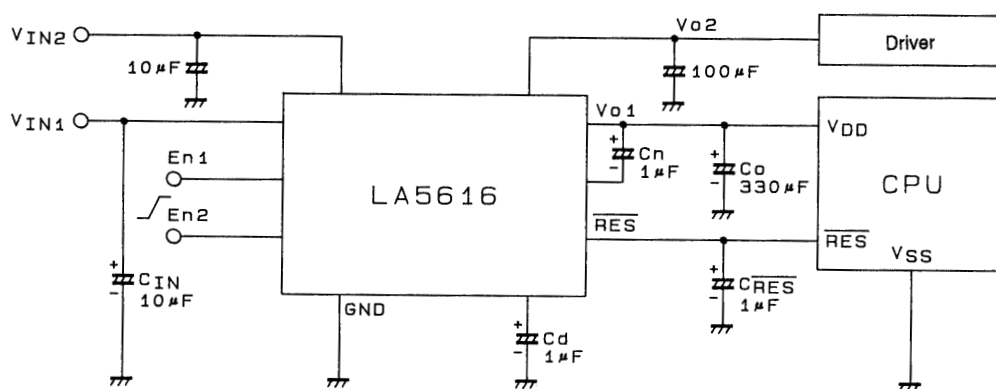
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## Test Circuit Diagram



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Application Circuit Example



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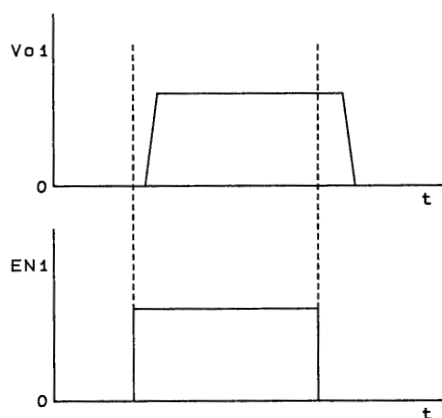
- Note: 1. The capacitors  $C_n$  and  $C_{RES}$  are only needed when external noise is a problem. If these capacitors are used, then capacitor  $C_o$  must have a value at least 1/3 that of capacitor  $C_{IN}$ . A certain amount of noise may occur when  $V_{IN}$  goes off due to differences in discharge timings between the capacitors.
2. A capacitor with a low temperature dependence must be used for the delay capacitor  $C_d$ .
3. The minimum value for the output capacitor  $C_o$  is 47  $\mu$ F.
4. The input voltages must obey the relationship  $V_{IN1} \leq V_{IN2}$ , and must be brought up at the same time.

Function Table

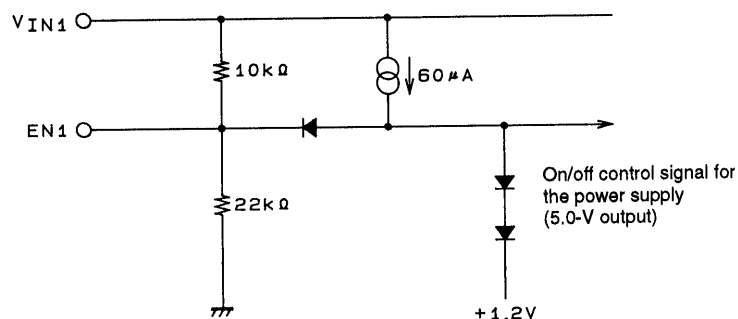
EN1, EN2	Vo1
L	L
H	H

Note: Open is also possible for the  $V_{EN1} = V_{EN2} =$  high state. ( $EN_1, EN_2$  is independent.)

Enable Input Equivalent Circuit

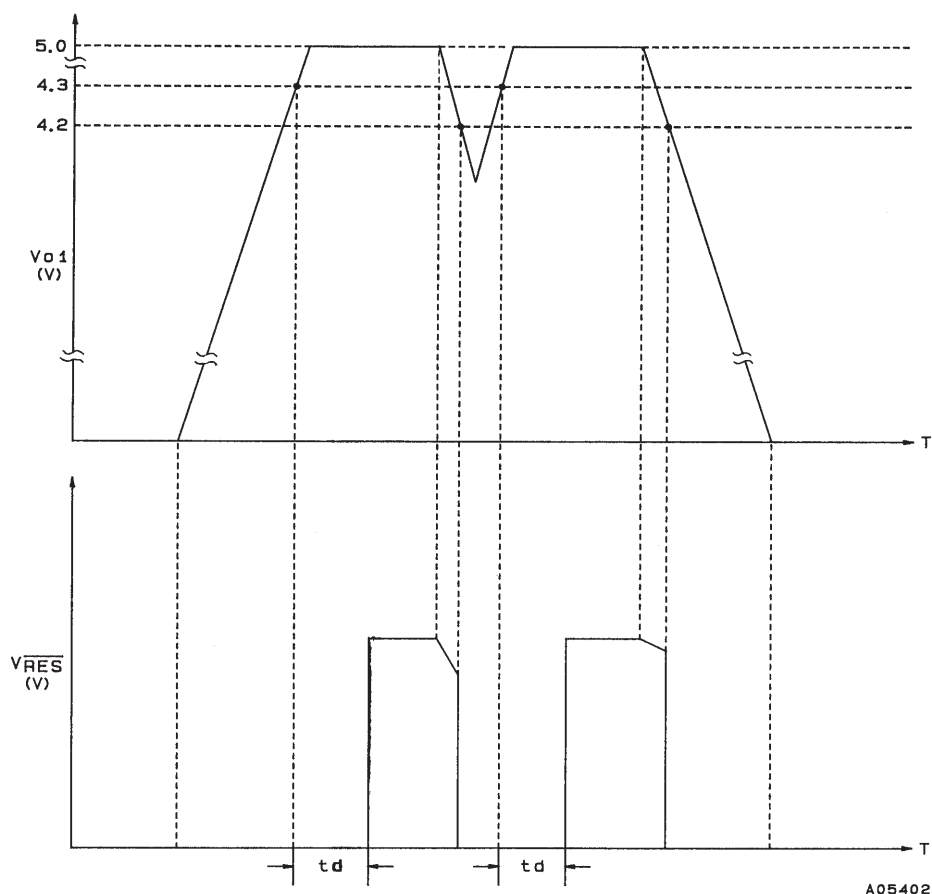


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## Reset Operation



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