Ordering number:ENN4063

Monolithic Linear IC

LA5603

Multifunction, Multiple Voltage Power Supply

Overview

The LA5603 is a multifunction, low dropout voltage, multiple voltage power supply for use in microcomputer controlled audio equipment such as CD players and minicomponent stereo systems.

The LA5603 features a 5.6V, 0.5A supply, a 7.5V, 1.0A supply and a –7.5V, –1.0A supply each with an on/off switch, a 4.8V (I_{OA2}=0.1A, I_{OA1}=0) supply with a reverse current prevention diode and a 5.6V (I_{OA1}=0.1A, I_{OA2}=0) supply enabling it to power both analog and digital components.

The LA5603 incorporates reset, mute and power-on functions for generating signals for the components (s) being powered and an adjustable startup delay function for controlling the sequence in which system components are powered up.

The LA5603 operates from a ±8.5 to ±16V dual supply and is available in 18-pin SIPs.

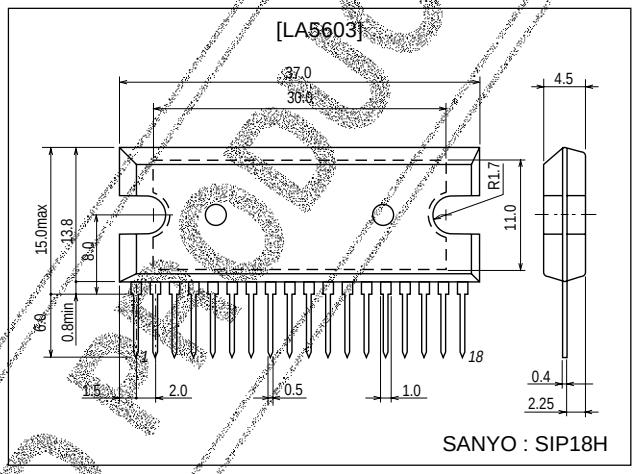
Features

- Low dropout voltage power supply.
- 5.6V, 0.5A supply with on/off switch.
- 7.5V, 1.0A and –7.5V, –1.0A supplies with on/off switches.
- 4.8V (I_{OA2}=0.1A, I_{OA1}=0) supply with diode to prevent reverse currents.
- 5.6V (I_{OA1}=0.1A, I_{OA2}=0) supply.
- Reset function.
- Mute function.
- Auto power-on function.
- Powers both analog and digital components.
- ±8.5 to ±16V dual supply.
- 18-pin SIP.

Package Dimensions

unit:mm

3109-SIP18H



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Specifications

Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}/V_{EE} max		±16	V
QUICK IN input voltage	$V_{QUICK\ IN}$		16	V
Allowable power dissipation	Pd max		15	W
Operating temperature	Topr		–20 to +85	˚C
Storage temperature	Tstg		–55 to +150	˚C

Recommended Operating Conditions at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}/V_{EE}		±8.5 to ±16	V
Output current 1	I_{O1}		0 to 500	mA
Output current 2	I_{O2}		0 to 1.0	A
Output current 3	I_{O3}		–1.0 to 0	A
MUTE output current	I_{MUTE}		0 to 10	mA
$\overline{RES}$ low-level output sink current	$I_{O\overline{R}L}$		0 to 2	mA
$\overline{RES}$ high-level output source current	$I_{O\overline{R}H}$		0 to 200	µA
Auxiliary power total supply output current	I_{OA1}, I_{OA2}	$I_{OA1}+I_{OA2}$	0 to 100	mA

Operating Characteristics

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[Main power supply] at Ta=25°C, Tj=25°C, V_{CC}/V_{EE}=±8.5V, V_{OA1}=5.6V, V_{OA2}=4.8V, I_{OA1}=100mA, unless otherwise noted						
Output voltage	V_{OA1}	I_{OA2}=0 (I_{OA1}=100mA)	5.2	5.6	5.9	V
	V_{OA2}	I_{OA2}=100mA (I_{OA1}=0)	4.2	4.8	5.2	V
Dropout voltage	V_{DROP}			0.6	1.0	V
Line regulation	$\Delta V_{OA1\ LN}$	V_{CC}=7 to 12V, I_{OA1}=50mA		10	80	mV
Load regulation	$\Delta V_{OA1\ LD}$	I_{OA1}=1 to 100mA		20	100	mV
Peak output current	I_{OP}		100	200		mA
Output short-circuit current	I_{OSC}			10		mA
Output leakage current	$I_{OA\ LEAK}$	V_{CC}=0V, V_{OA2}=6V			2	µA
Current drain with positive power supply	I_{QP1}	I_{O1}, I_{O2}, I_{O3}, I_{OA1} and I_{MUTE}=0A		6.5	19.5	mA
	I_{QP2}	I_{O1}=200mA, I_{O2}=500mA, I_{O3}=0mA, I_{OA1}=100mA, I_{MUTE}=5mA		26	78	mA
Current drain with negative power supply	I_{QM1}	I_{O1}, I_{O2}, I_{O3}, I_{OA1} and I_{MUTE}=0A		–3.2	–9.6	mA
	I_{QM2}	I_{O1}, I_{O2}, I_{OA1} and I_{MUTE}=0A, I_{O3}=–500mA		–6.3	–19	mA
[Reset] at Ta=25°C, Tj=25°C, V_{CC}/V_{EE}=±8.5V						
Output high-level voltage	$V_{O\overline{R}H}$	$I_{O\overline{R}H}$=200µA	4.47	4.97	5.47	V
Output low-level voltage	$V_{O\overline{R}L}$	$I_{O\overline{R}L}$=2mA, C_d grounded		100	200	mV
Output voltage threshold	V_{RT}	I_{OA1}=5mA, V_{OA1} detection voltage low	3.7	3.9	4.1	V
Hysteresis voltage	Vhys	I_{OA1}=5mA		100	200	mV
Output delay time	t_d	C_d=1µF	240	300	360	ms
[5.6V power supply] at Ta=25°C, Tj=25°C, V_{CC}/V_{EE}=±8.5V, I_O=200mA unless otherwise noted						
Output voltage	V_{O1}		5.1	5.6	5.9	V
Dropout voltage	V_{DROP}			0.6	1.0	V
Line regulation	ΔV_{OLN}	V_{CC}=8.5 to 16V		20	100	mV
		V_{CC}=9.5 to 16V		20	100	mV
Load regulation	ΔV_{OLD}	I_O=5 to 500mA		50	150	mV
		I_O=5 to 100mA		20	100	mV
Peak output current	I_{OP}		500	750		mA
Output short-circuit current	I_{OSC}			80		mA
Output noise voltage	V_{NO}	f=10Hz to 100kHz		70		µV
Output voltage temperature coefficient	$\Delta V_O/\Delta Ta$	Tj=25 to 85˚C		–0.7		mV/˚C
Ripple rejection ratio	R_{rej}	f=120Hz, V_{CC}=8.5 to 16V		74		dB
EN high-level output voltage	V_{ENH}	Main power source ON	0		0.3	V

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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[7.5V power supply] at Ta=25°C, Tj=25°C, V_{CC}/V_{EE}=±8.5V, I_O=500mA, C_O=100µF unless otherwise noted						
Output voltage	V_{O2}		7.1	7.5	7.8	V
Dropout voltage	V_{DROP}			0.6	1.0	V
		I_O=300mA		0.4	0.8	V
Line regulation	ΔV_{OLN}	V_{CC}=8.5 to 16V		20	100	mV
Load regulation	ΔV_{OLD}	I_O=5mA to 1A		80	200	mV
Peak output current	I_{OP}	V_{CC}/V_{EE}=±12V	1.0	1.5		A
Output short-circuit current	I_{OSC}			0.1		A
Output noise voltage	V_{NO}	f=10Hz to 100kHz		70		µVrms
Output voltage temperature coefficient	$\Delta V_O/\Delta Ta$	Tj=25 to 85˚C		–0.5		mV/˚C
Ripple rejection ratio	R_{rej}	f=120Hz, V_{CC}=8.5 to 16V		60		dB
[–7.5V power supply] at Ta=25°C, Tj=25°C, V_{CC}/V_{EE}=±8.5V, I_O=–500mA, C_O=100µF unless otherwise noted						
Output voltage	V_{O3}		–7.8	–7.5	–7.1	V
Dropout voltage	V_{DROP}			0.6	1.0	V
		I_O=–300mA		0.4	0.8	V
Line regulation	ΔV_{OLN}	V_{EE}=–16 to –8.5V		200	300	mV
Load regulation	ΔV_{OLD}	I_O=–1A to –5mA		80	200	mV
Peak output current	I_{OP}	V_{CC}/V_{EE}=±12V		–1.5	–1.0	A
Output short-circuit current	I_{OSC}			–0.3		A
Output noise voltage	V_{NO}	f=10Hz to 100kHz		70		µV
Output voltage temperature coefficient	$\Delta V_O/\Delta Ta$	Tj=25 to 85˚C		+0.5		mV/˚C
Ripple rejection ratio	R_{rej}	f=120Hz, V_{CC}=–16 to –8.5V		60		dB
[5.0V power supply with mute] at Ta=25°C, Tj=25°C, V_{CC}/V_{EE}=±8.5V, I_O=–5mA						
MUTE ON output voltage	$V_{MUTE\ ON}$		4.6	5.0	5.4	V
MUTE OFF output voltage	$V_{MUTE\ OFF}$	$V_{QUICK\ IN}$=5.5V		0.2	0.3	V
QUICK IN high-level input voltage	$V_{QUICK\ IN\ H}$		7.5		V_{CC}	V
QUICK IN low-level input voltage	$V_{QUICK\ IN\ L}$				5.5	V
QUICK IN high-level current	$I_{QUICK\ IN\ H}$	$V_{QUICK\ IN}$=7.5V		240	480	µA

Design Notes

When the 5.6 (V_{O1}), 7.5 and –7.5V output are ON, EN is high impedance.
When QUICK IN is HIGH, mute mode is ON. When QUICK IN is LOW, mute mode is OFF.
The output capacitors for V_{O1}, V_{OA1}, and V_{OA2} should be 47µF or greater. The output capacitors for V_{O2} and V_{O3} should be 100µF or greater. The output capacitors and C_d, the startup delay capacitor, should have good temperature stability to prevent oscillations at low temperatures.
Capacitors CN1, CN2, CN3 and CNA suppress noise and improve ripple rejection.

Pin Assignment