Ordering number:ENN4185

Monolithic Linear IC

LA5685N

Multifunction, Multi-Power Supply IC for Car Radios

Overview

The LA5685N is a multifunction, multipower supply IC developed for car radios. It has 8.5V AM output, 8.5V FM output, 8.5V common output, 5.2V microcomputer output, and 5.1V bias output, making it the ideal power supply for LA1833 and LA1887 ICs for FM/AM tuner systems.

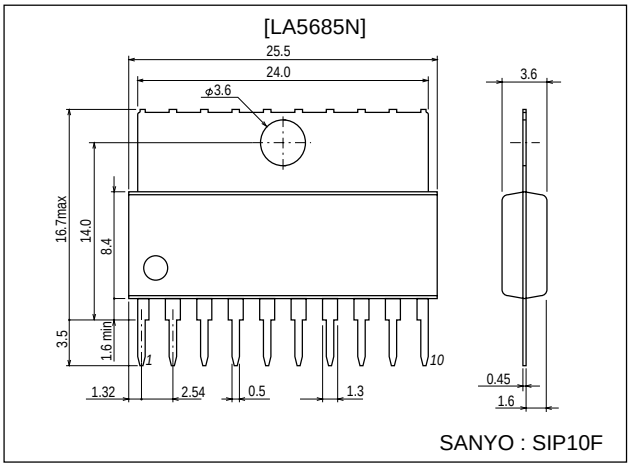
Features

- A total of five built-in outputs : V_1=8.5V (AM), V_2=8.5V (FM), V_3=8.5V (common), V_4=5.2V (microcomputer), and V_5=5.1V.
- R ON/OFF, FM/AM switching functions.
- Minimal static current for backup (120μA typ).
- Built-in overvoltage protection circuit (V_1, V_2, and V_3 go off at 28V (typ.), V_4 and V_5 go off at 56V (typ)).
- Built-in thermal shutdouwn circuit (output goes off at Tj=170°C (typ.)).
- Built-in short protection circuit.

Package Dimensions

unit:mm

3046B-SIP10F



Specifications

Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Input votage	V_{CC} max1	4% duty pulse width 200ms pulse input (input pulse when output on)	75	V
	V_{CC} max2		25	V
Output current	I1 max		80	mA
	I2 max		100	mA
	I3 max		200	mA
	I4 max		50	mA
	I5 max		5	mA
Allowable power dissipation	Pd max		2.45	W
Operating temperature	Topr		–35 to +85	˚C
Storage temperature	Tstg		–40 to +125	˚C

Operating Conditions at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Power supply voltage	V_{CC} op	9V to 10.5V not regulated	9 to 16	V
B/U voltage	B/U	6V to 8.5V not regulated	6 to 16	V

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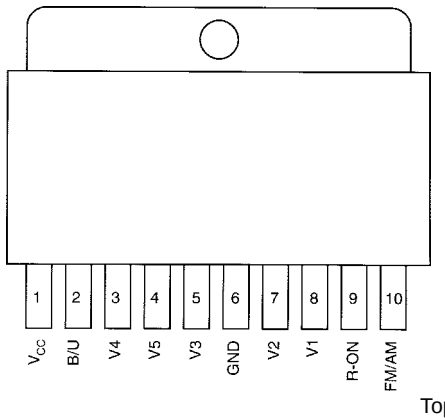
Operating Characteristics at Ta = 25˚C, unless otherwise noted, V_{CC}=12V, R-ON=FM/AM=5V
External 33µF OS capacitor connected to V1, V2, V3, and V4

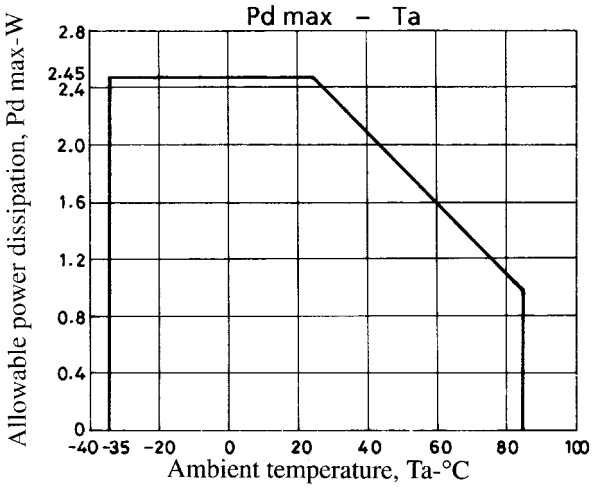
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Static current	$I_{CC}1$	R-ON=FM/AM=0V		4.5	7.0	mA
	$I_{CC}2$	R-ON=FM/AM=5V		4.5	7.0	mA
Output voltage	V1	FM/AM=0V, I1=20mA	7.8	8.5	9.2	V
	V2	FM/AM=5V, I2=50mA	7.8	8.5	9.2	V
	V3	I3=100mA	7.8	8.5	9.0	V
	V4	I4=20mA	4.9	5.2	5.5	V
	V5	I5=1mA	V4–0.5		V4	V
Line regulation	ΔV1 line	FM/AM=0V, 11V<V_{CC}<15V, I1=20mA			50	mV
	ΔV2 line	FM/AM=5V, 11V<V_{CC}<15V, I1=50mA			50	mV
	ΔV3 line	I3=100mA, 11V<V_{CC}<15V			50	mV
	ΔV4 line	I4=20mA, 11V<V_{CC}<15V			50	mV
	ΔV5 line	I5=1mA, 11V<V_{CC}<15V			50	mV
B/U static current	IB/U	B/U=16V, V_{CC}=0V			0.3	mA
V5 on-off TH voltage	$V5_{TH}$	B/U=12V	6	7	8	V
R-ON on voltage	R-ON ON		2.5		V_{CC}	V
R-ON off voltage	R-ON-OFF		–0.3		+1.0	V
FM/AM on voltage	FM/AM ON		2.5		V_{CC}	V
FM/AM off voltage	FM/AM OFF		–0.3		+1.0	V
Input current R-ON	IR-ON	R-ON=5V			0.2	mA
Input current FM/AM	IFM/AM	FM/AM=5V			0.2	mA
Load regulation	ΔV1 Load	FM/AM=0V, 1mA<I1<65mA			50	mV
	ΔV2 Load	FM/AM=5V, 1mA<I2<90mA			50	mV
	ΔV3 Load	1mA<I3<160mA			100	mV
	ΔV4 Load	1mA<I4<40mA			50	mV
	ΔV5 Load	0.1mA<I5<2mA			200	mV
Ripple regulation	Rr1	FM/AM=0V, f=120Hz, I1=20mA	40*			dB
	Rr2	FM/AM=5V, f=120Hz, I2=50mA	40*			dB
	Rr3	f=120Hz, I3=100mA	40*			dB
	Rr4	f=120Hz, I4=20mA	40*			dB
	Rr5	f=120Hz, I5=1mA	40*			dB

Note : * indicates design guaranteed value.

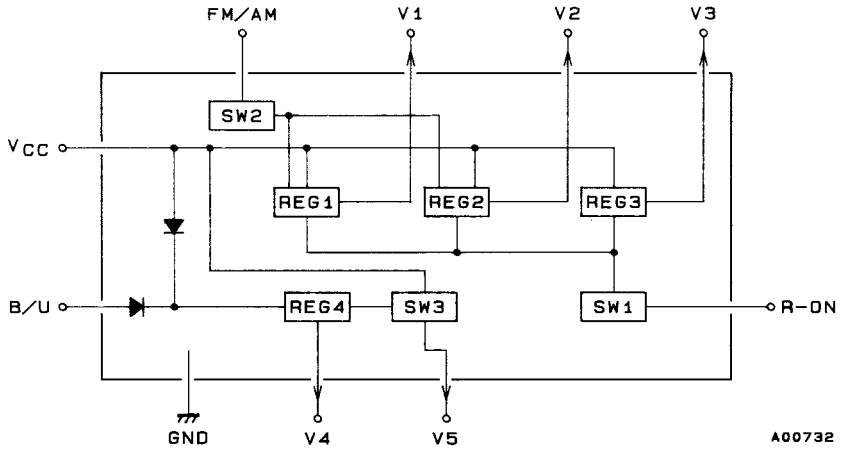
Pin Assignment



Top view

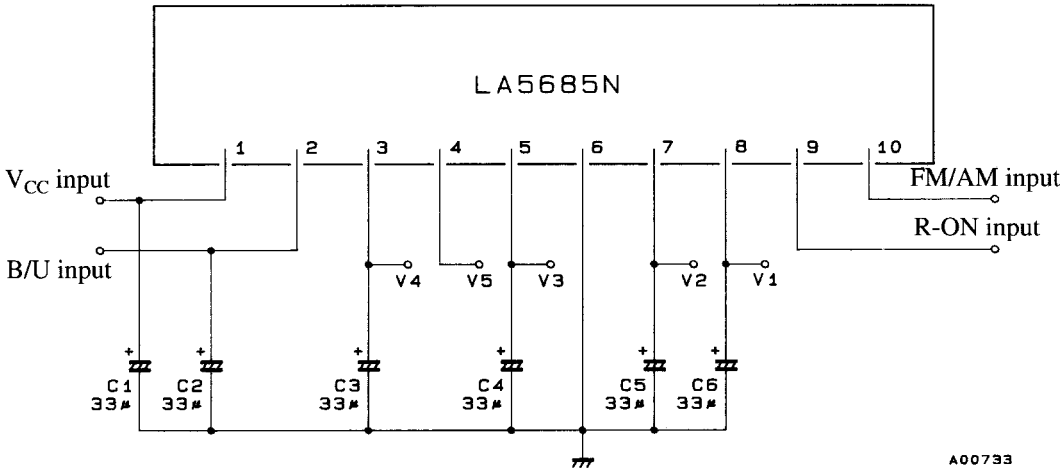


Block Diagram



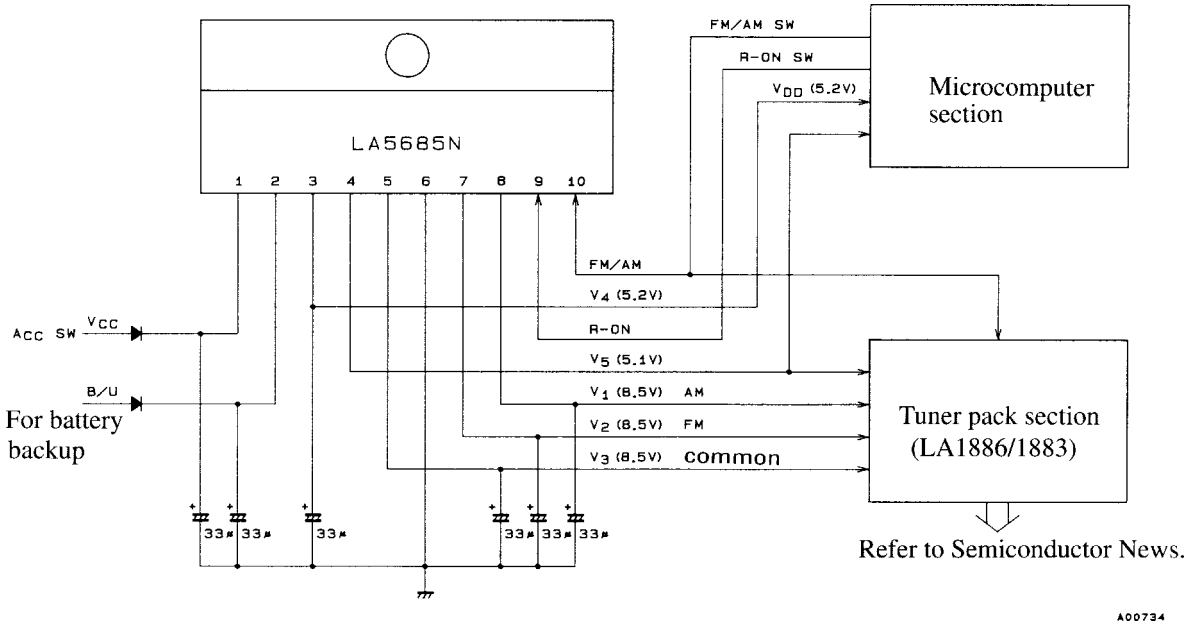
Pin	Name	Pin	Name
1	V_{CC}	6	GND
2	B/U	7	V2
3	V4	8	V1
4	V5	9	R-ON
5	V3	10	FM/AM

Test Circuit



Unit (capacitance: F)

Sample Application Circuit



Input/Output Table

Inputs				Outputs				
A_{CC}	B/U	R-ON	FM/AM	V1	V2	V3	V4	V5
L	L	*	*	L	L	L	L	L
L	H	*	*	L	L	L	H	L
H	*	H	L	H	L	H	H	H
H	*	H	H	L	H	H	H	H
H	*	L	*	L	L	L	H	H

- Negative voltages are not to be applied to these pins.
- Always use input/output capacitors (instead of for V5).
  (We recommended OS capacitors with good characteristics at low temperature.)
- Built-in overvoltage protection circuit (V1, V2, and V3 go off at 28V (typ.), V4 and V5 go off at 56V (typ.))
- Built-in thermal shutdown circuit (output goes off at Tj=170°C (typ.))
- Built-in short protection circuit.