

HA13173AH

Multiple Voltage Regulator for Car Audio

REJ03F0227-0100

Rev.1.00

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Description

The HA13173AH is a multiple voltage regulator for car audio system. This IC has 5.0 V output for a microcontroller, 3.3 V output for a Digital Signal Processor, 8.0 V output for CD driver, 8.4 V output for audio control, 8.4 V output for illuminations, and high side switch output for external output.

The HA13173AH also has FREG that is possible to control external PNP transistor. It is adjustable output voltage by changing an external resistor.

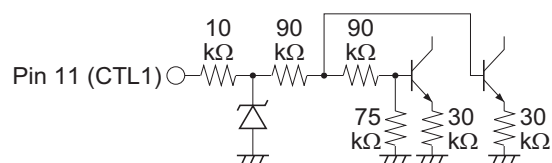
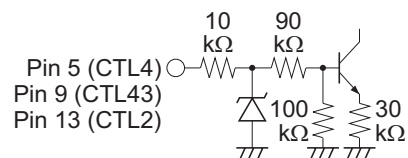
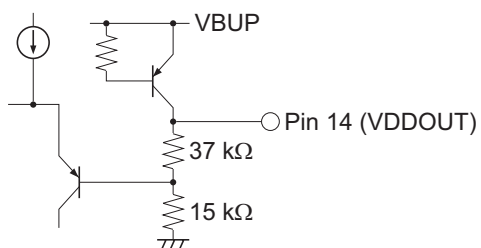
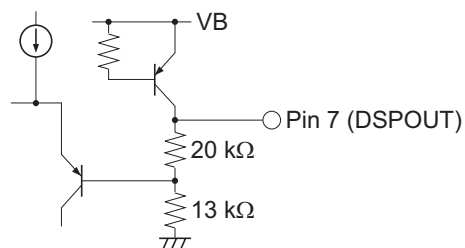
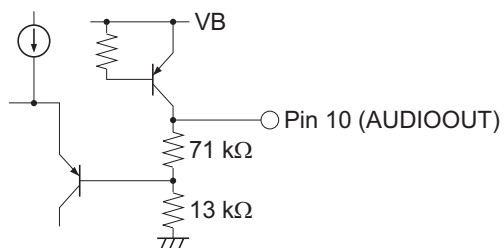
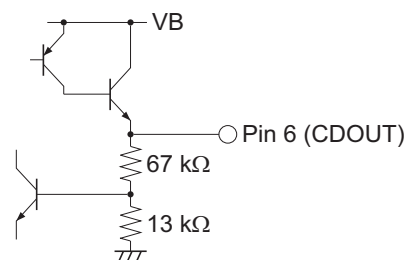
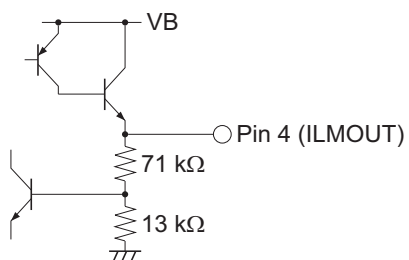
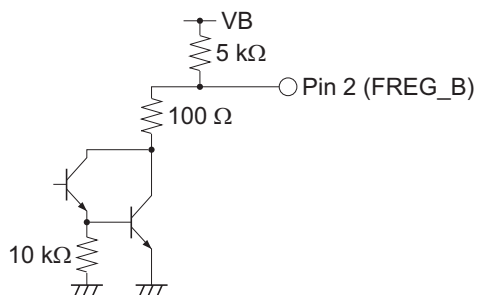
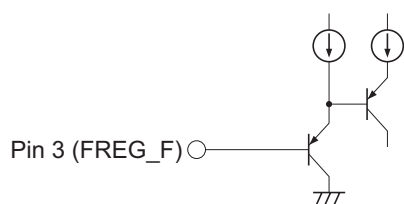
Functions

- Standby current is 100 μ A max.
- The Vdd output for microcontroller has backup function, by independent power supply line.
- Low saturation output (PNP output) used for audio output.
- Output current limit circuit to avoid device destruction caused by shorted output, etc.
- High surge input protector against VB and VBUP.
- Built in a thermal shutdown circuit to prevent against the thermal destruction.
- The package is PRSS0015DA-C (SP-15TGV).

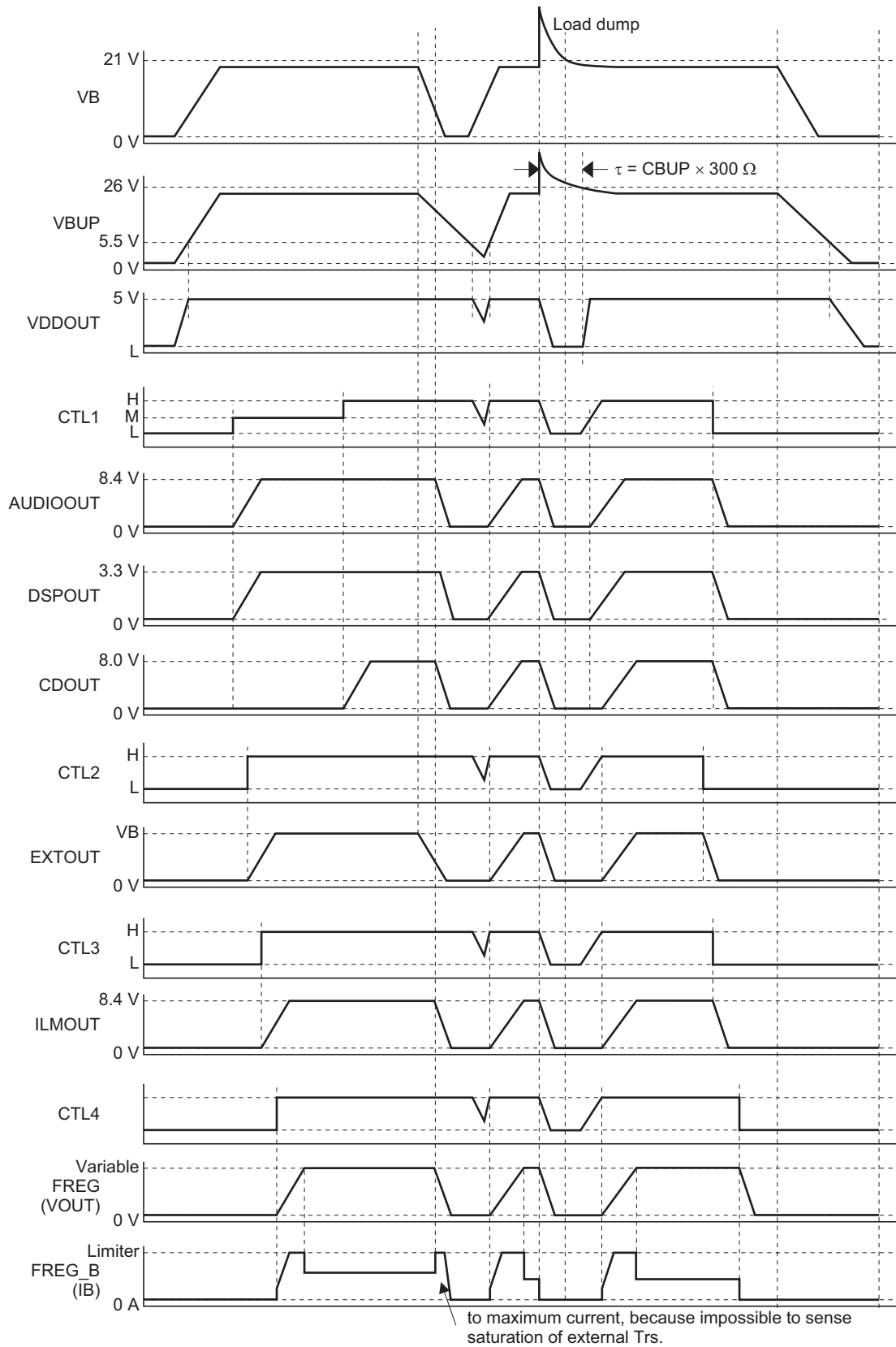
Pin Description

Pin No.	Pin Name	Specification	Protection			
			Normal	TSD ON	VB = 24 V	VB = 50 V
1	GND	Ground	—	—	—	—
2	FREG_B	External transistor bias operation	Available	Available	Off	Off
3	FREG_F	FREG feed back terminal	Available	Available	Off	Off
4	ILM OUT	8.4 V output for ILM/500 mA max	Available	Off	Off	Off
5	CTL4	FREG control terminal	Available	Available	Not available	Not available
6	CD OUT	8.0 V output for CD/1.3 A max	Available	Off	Off	Off
7	DSP OUT	3.3 V output for DSP/250 mA max	Available	Off	Off	Off
8	VB	Battery	—	—	—	—
9	CTL3	ILM control terminal	Available	Not available	Not available	Not available
10	AUDIO OUT	8.4 V output for AUDIO/500 mA max	Available	Off	Off	Off
11	CTL1	DSP, CD, AUDIO control terminal	Available	Not available	Not available	Not available
12	EXT OUT	High side output/600 mA max	Available	Off	Off	Off
13	CTL2	EXT control terminal	Available	Not available	Not available	Not available
14	VDD OUT	5.0 V output for microcontroller	On	On	On	Off
15	VBUP	Back up	—	—	—	—

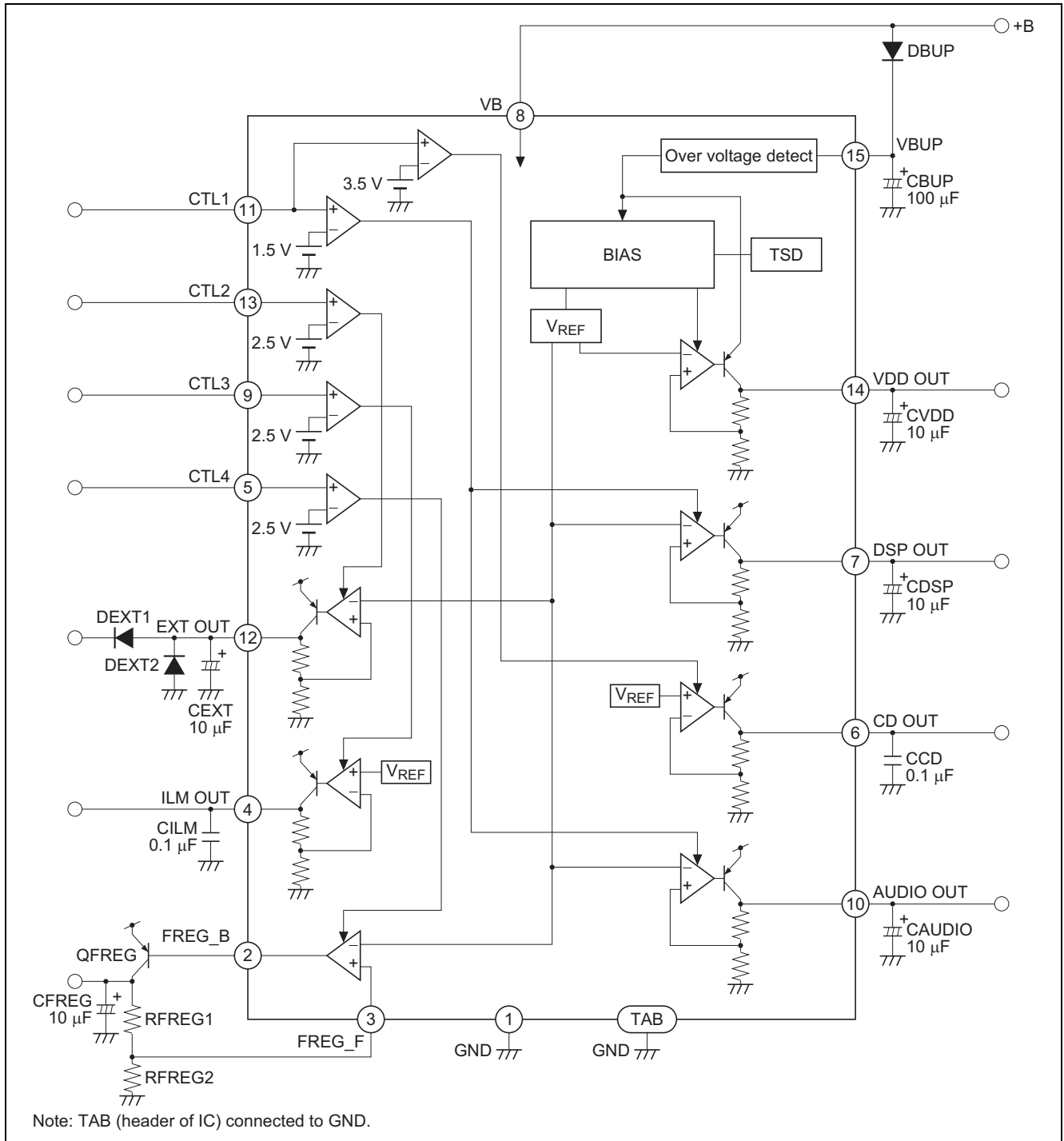
Equivalent Circuit



Timing Chart



Block Diagram



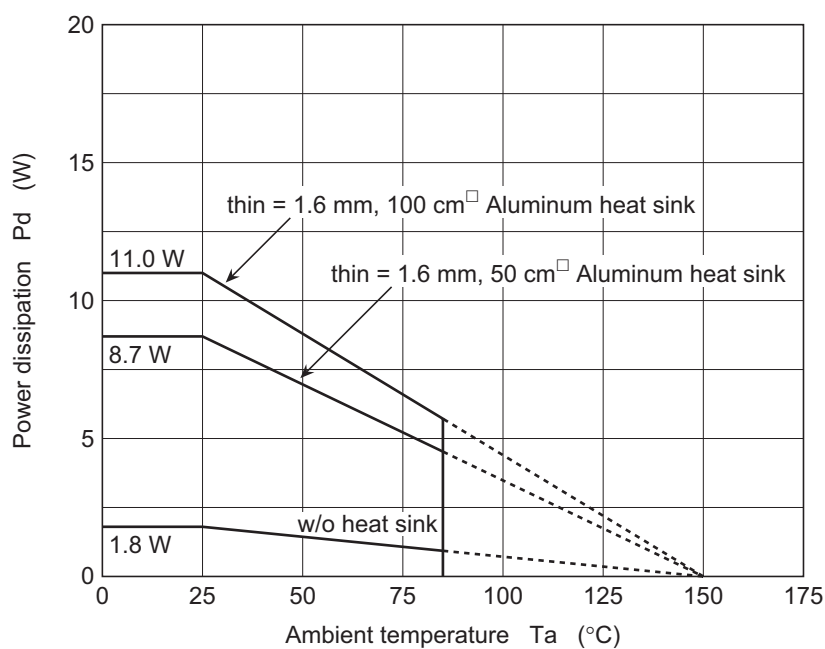
Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Rating	Unit	Note
Operating power supply voltage 1	Vcc1	19	V	
Operating power supply voltage 2	Vcc2	24	V	1
Peak voltage	Vcc(PEAK)	50	V	2
Power dissipation	Pd	36	W	3
Junction temperature	Tj	150	°C	
Operating temperature	Topr	–40 to +85	°C	
Storage temperature	Tstg	–55 to +125	°C	

Notes: Recommended power supply voltage range 10 to 16 V.

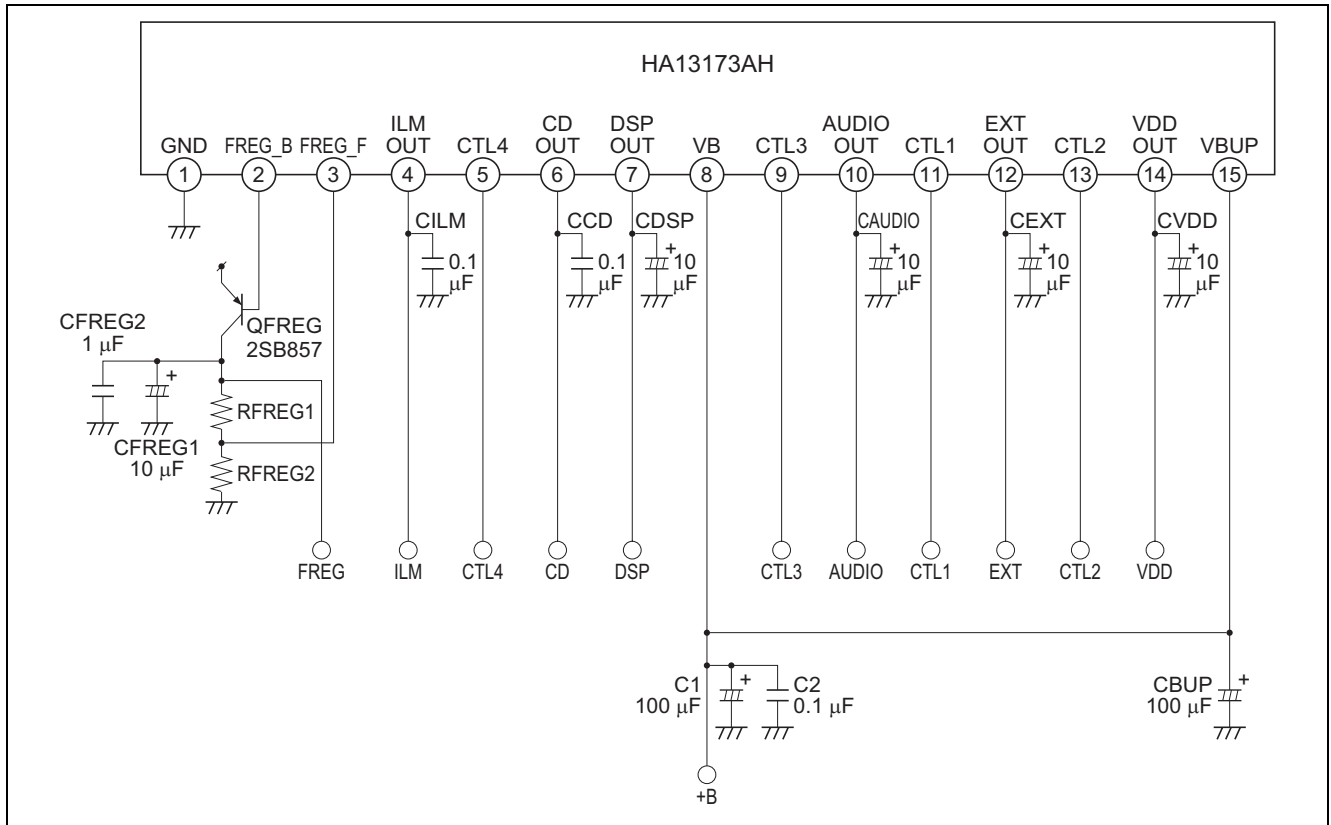
1. Applied time is less than 60 s.
2. Surge pulse as input.
3. Ta = 25°C. : Permissible power dissipation when using a heat sink of infinite area. Refer to the derating curves below.

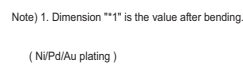


Electrical Characteristics

Item		Symbol	Min	Typ	Max	Unit	Test Condition
Standby current		IST	—	65	100	μA	CTL1, 2, 3, 4 = 0 V
CTL1 L level (DSP, AUDIO, CD OFF)		VC1L	0.0	—	1.0	V	
CTL1 M level (DSP, AUDIO ON, CD OFF)		VC1M	2.0	—	3.0	V	
CTL1 H level (DSP, AUDIO, CD ON)		VC1H	4.0	—	6.0	V	
CTL2 L level (EXT OFF)		VC2L	0.0	—	2.0	V	
CTL2 H level (EXT ON)		VC2H	3.0	—	6.0	V	
CTL3 L level (ILM OFF)		VC3L	0.0	—	2.0	V	
CTL3 H level (ILM ON)		VC3H	3.0	—	6.0	V	
CTL4 L level (FREG OFF)		VC4L	0.0	—	2.0	V	
CTL4 H level (FREG ON)		VC4H	3.0	—	6.0	V	
VDD OUT	Output voltage	Vo1	4.75	5.00	5.25	V	Io1 = 160 mA
	Voltage regulation	ΔVo11	—	10	50	mV	Vcc = 10 to 16 V, Io1 = 160 mA
	Load regulation	ΔVo12	—	50	100	mV	Io1 = 0 to 160 mA
	Minimum I/O voltage differential	ΔVo13	—	0.4	0.9	V	Io1 = 160 mA
	Output current capacity	Io1	200	400	—	mA	Vo1 ≥ 4.7 V
	Ripple rejection ratio	SVR1	45	55	—	dB	f = 100 Hz, Io1 = 160 mA
CD OUT	Output voltage	Vo2	7.6	8.0	8.4	V	Io2 = 1.0 A
	Voltage regulation	ΔVo21	—	40	100	mV	Vcc = 10 to 16V, Io2 = 1.0 A
	Load regulation	ΔVo22	—	70	150	mV	Io2 = 10m to 1.0 A
	Minimum I/O voltage differential	ΔVo23	—	1.0	1.5	V	Io2 = 1.0 A
	Output current capacity	Io2	1.3	2.0	—	mA	Vo2 ≥ 7.6 V
	Ripple rejection ratio	SVR2	40	50	—	dB	f = 100 Hz, Io2 = 1.0 A
AUDIO OUT	Output voltage	Vo3	8.1	8.4	8.7	V	Io3 = 400 mA
	Voltage regulation	ΔVo31	—	30	90	mV	Vcc = 10 to 16 V, Io3 = 400 mA
	Load regulation	ΔVo32	—	100	200	mV	Io3 = 10 to 400 mA
	Minimum I/O voltage differential	ΔVo33	—	0.4	0.9	V	Io3 = 400 mA
	Output current capacity	Io3	500	850	—	mA	Vo3 ≥ 8.1 V
	Ripple rejection ratio	SVR3	45	50	—	dB	f = 100 Hz, Io3 = 400 mA
DSP OUT	Output voltage	Vo4	3.1	3.3	3.5	V	Io4 = 200 mA
	Voltage regulation	ΔVo41	—	40	100	mV	Vcc = 10 to 16 V, Io4 = 200 mA
	Load regulation	ΔVo42	—	50	100	mV	Io4 = 0 to 200 mA
	Output current capacity	Io4	250	500	—	mA	Vo4 ≥ 3.1 V
	Ripple rejection ratio	SVR4	45	55	—	dB	f = 100 Hz, Io4 = 200 mA
ILM OUT	Output voltage	Vo5	8.0	8.4	8.8	V	Io5 = 400 mA
	Voltage regulation	ΔVo51	—	40	100	mV	Vcc = 10 to 16 V, Io5 = 400 mA
	Load regulation	ΔVo52	—	70	150	mV	Io5 = 10 to 400 mA
	Minimum I/O voltage differential	ΔVo53	—	1.0	1.3	V	Io5 = 400 mA
	Output current capacity	Io5	500	900	—	mA	Vo5 ≥ 8.0 V
	Ripple rejection ratio	SVR5	40	50	—	dB	f = 100 Hz, Io5 = 400 mA
EXT OUT	Minimum I/O voltage differential	ΔVo61	—	0.6	1.0	V	Vcc = 10 to 16 V, Io6 = 480 mA
	Load regulation	ΔVo62	—	200	400	mV	Io6 = 10 to 480 mA
	Output current capacity	Io6	600	900	—	mA	Vo61 ≤ 1.0 V
FREG OUT	FREG_F Output voltage	VFF7	1.17	1.23	1.29	V	Iload (external PNP) = 400 mA
	FREG_F Voltage regulation	ΔVFF71	—	10	25	mV	Vcc = 10 to 16 V, Iload = 400 mA
	FREG_F Load regulation	ΔVFF72	—	10	25	mV	Iload = 10 to 400 mA
	FREG_B Output current capacity	IFB7	30	30	—	mA	VFF ≥ 1.17 V
	FREG_F input bias current	IFF7	—	50	300	nA	

Evaluation Circuit



Unit : mm

Notes:

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