

HA13173AH

Multiple Voltage Regulator for Car Audio

REJ03F0227-0100 Rev.1.00 Jan 16, 2007

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.

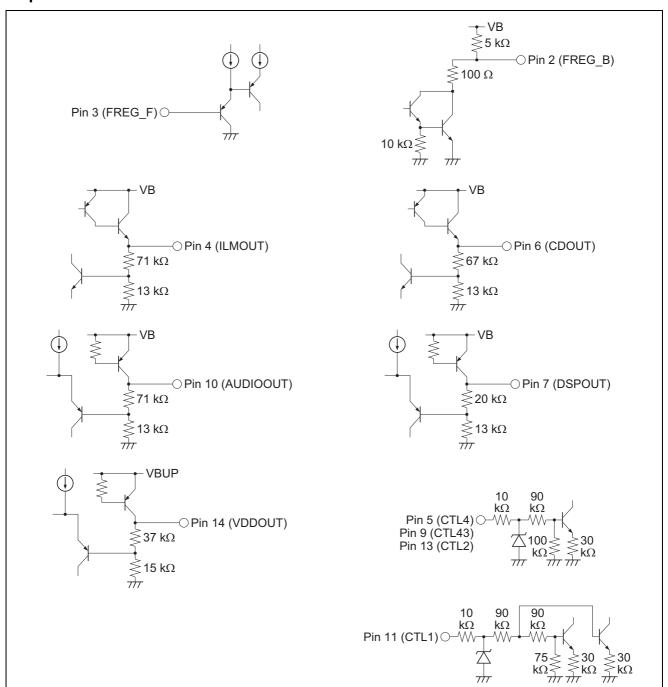
Functions

- Standby current is 100 μA 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).

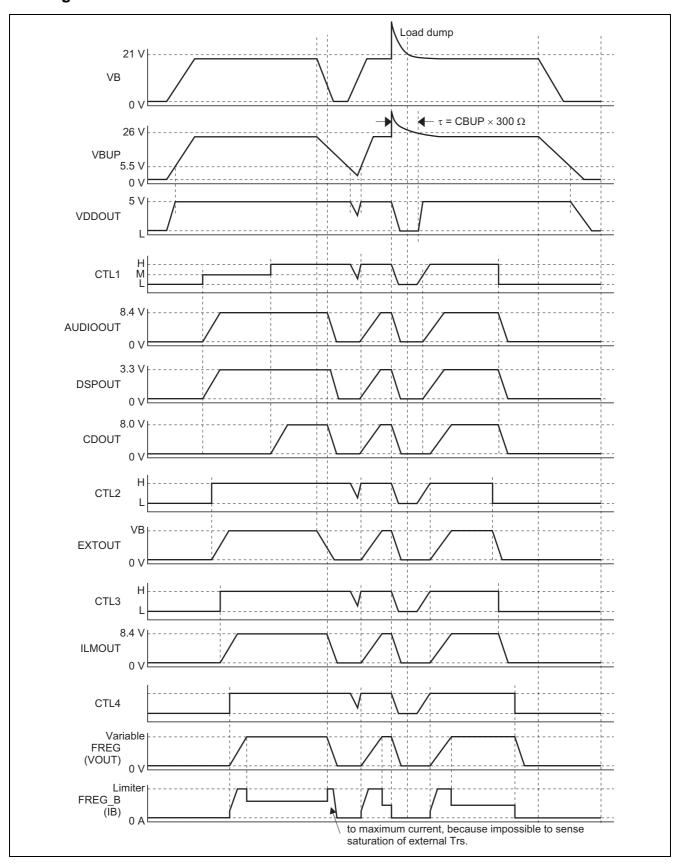
Pin Description

Pin			Protection				
No.	Pin Name	Specification	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	Not	
					available	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	Not	Not	
				available	available	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	Not	Not	
				available	available	available	
12	EXT OUT	High side output/600 mA max	Available	Off	Off	Off	
13	CTL2	EXT control terminal	Available	Not	Not	Not	
				available	available	available	
14	VDD OUT	5.0 V output for microcontroller	On	On	On	Off	
15	VBUP	Back up	_	_	_	_	

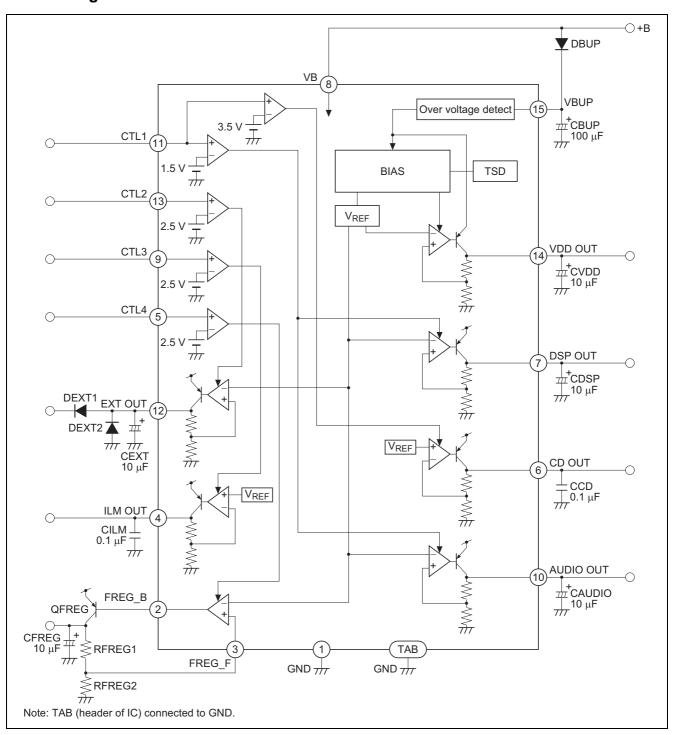
Equivalent Circuit



Timing Chart



Block Diagram



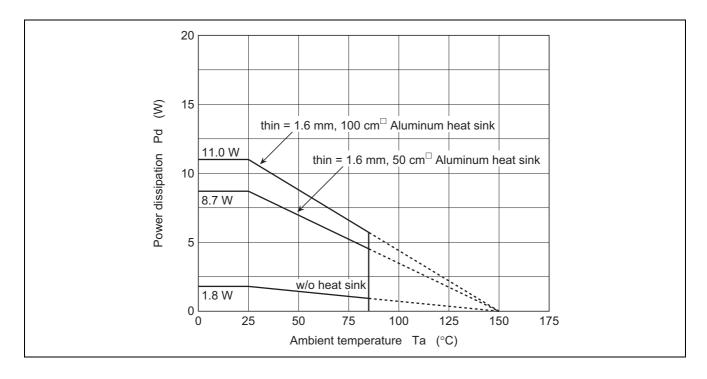
Absolute Maximum Ratings

 $(Ta = 25^{\circ}C)$

Item	Symbol	Rating	Unit	Note
Operating power supply voltage 1	Vcc1	19	V	
Operating power supply voltage 2	Vcc2	24		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.

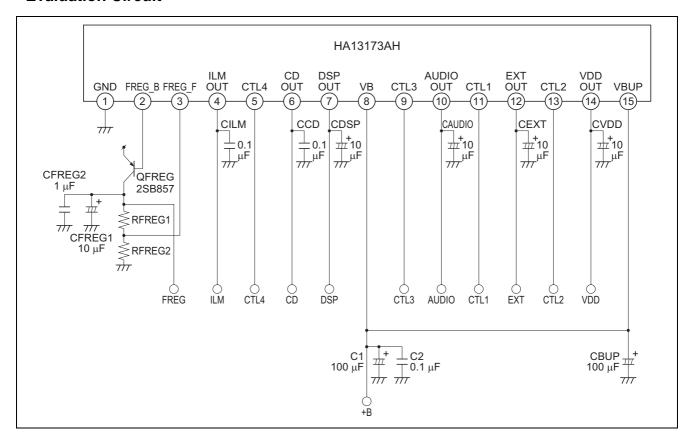
- 1. Applied time is less than 60 s.
- 2. Surge pulse as input.
- 3. Ta = 25°C.: Permissible power dissipation when using a heat sink of infinite area. Refer to the derating curves below.



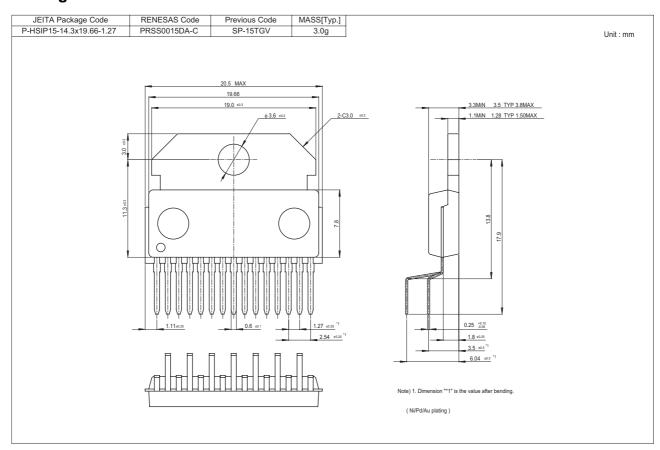
Electrical Characteristics

	Item		Min	Тур	Max	Unit	Test Condition	
Standby current		Symbol IST	_	65	100	μА	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 le	vel (EXT OFF)	VC2L	0.0	_	2.0	V		
CTL2 H le	evel (EXT ON)	VC2H	3.0	_	6.0	V		
CTL3 L le	vel (ILM OFF)	VC3L	0.0	_	2.0	V		
CTL3 H le	evel (ILM ON)	VC3H	3.0	_	6.0	V		
CTL4 L le	vel (FREG OFF)	VC4L	0.0	_	2.0	V		
CTL4 H le	evel (FREG ON)	VC4H	3.0	_	6.0	V		
VDD	Output voltage	Vo1	4.75	5.00	5.25	V	lo1 = 160 mA	
OUT	Voltage regulation	ΔVo11		10	50	mV	Vcc = 10 to 16 V, lo1 = 160 mA	
	Load regulation	ΔVo12		50	100	mV	Io1 = 0 to 160 mA	
	Minimum I/O voltage differential	ΔVo13		0.4	0.9	V	lo1 = 160 mA	
ł	Output current capacity	lo1	200	400	_	mA	Vo1 ≥ 4.7 V	
	Ripple rejection ratio	SVR1	45	55	_	dB	f = 100 Hz, Io1 = 160 mA	
CD	Output voltage	Vo2	7.6	8.0	8.4	V	lo2 = 1.0 A	
OUT	Voltage regulation	ΔVo21	_	40	100	mV	Vcc = 10 to 16V, lo2 = 1.0 A	
	Load regulation	ΔVo22		70	150	mV	lo2 = 10m to 1.0 A	
	Minimum I/O voltage differential	ΔVo23	_	1.0	1.5	V	lo2 = 1.0 A	
	Output current capacity	lo2	1.3	2.0	_	mA	Vo2 ≥ 7.6 V	
	Ripple rejection ratio	SVR2	40	50	_	dB	f = 100 Hz, lo2 = 1.0 A	
AUDIO	Output voltage	Vo3	8.1	8.4	8.7	V	Io3 = 400 mA	
OUT	Voltage regulation	ΔVo31	_	30	90	mV	Vcc = 10 to 16 V, lo3 = 400 mA	
İ	Load regulation	ΔVo32		100	200	mV	lo3 = 10 to 400 mA	
	Minimum I/O voltage differential	ΔVo33	_	0.4	0.9	V	lo3 = 400 mA	
	Output current capacity	lo3	500	850	_	mA	Vo3 ≥ 8.1 V	
	Ripple rejection ratio	SVR3	45	50	_	dB	f = 100 Hz, Io3 = 400 mA	
DSP	Output voltage	Vo4	3.1	3.3	3.5	V	lo4 = 200 mA	
OUT	Voltage regulation	∆Vo41	_	40	100	mV	Vcc = 10 to 16 V, Io4 = 200 mA	
İ	Load regulation	ΔV042	_	50	100	mV	lo4 = 0 to 200 mA	
	Output current capacity	lo4	250	500	_	mA	Vo4 ≥ 3.1 V	
ļ	Ripple rejection ratio	SVR4	45	55	_	dB	f = 100 Hz, lo4 = 200 mA	
ILM	Output voltage	Vo5	8.0	8.4	8.8	V	Io5 = 400 mA	
OUT	Voltage regulation	∆Vo51		40	100	mV	Vcc = 10 to 16 V, lo5 = 400 mA	
	Load regulation	∆Vo52	_	70	150	mV	lo5 = 10 to 400 mA	
	Minimum I/O voltage differential	ΔV053	_	1.0	1.3	V	lo5 = 400 mA	
	Output current capacity	lo5	500	900	_	mA	Vo5 ≥ 8.0 V	
i	Ripple rejection ratio	SVR5	40	50	_	dB	f = 100 Hz, Io5 = 400 mA	
EXT OUT	Minimum I/O voltage differential	ΔV061	_	0.6	1.0	V	Vcc = 10 to 16 V, lo6 = 480 mA	
ł	Load regulation	ΔV062	_	200	400	mV	lo6 = 10 to 480 mA	
	Output current capacity	lo6	600	900	_	mA	Vo61 ≤ 1.0 V	
FREG	FREG_F Output voltage	VFF7	1.17	1.23	1.29	V	Iload (external PNP) = 400 mA	
OUT	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	
İ	FREG_B Output current capacity	IFB7	30	30	_	mA	VFF ≥ 1.17 V	
1					1			

Evaluation Circuit



Package Dimensions



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