HA13165H

Multiple Voltage Regulator for Car Audio

REJ03F0223-0100
Rev.1.00
Jan 16, 2007

Description

The HA13165H is a compact multiple voltage regulator for car audio system. This IC has seven output system, these are 5.7 V output for a microcontroller, 7 V output for CD driver, 8.5 V output for audio control, 10 V output for illuminations, 5.0 V output for independent from microcontroller line, and high side switch for remote-ANT and remote-external AMP.

Functions

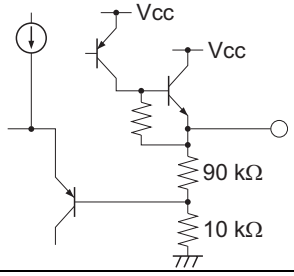
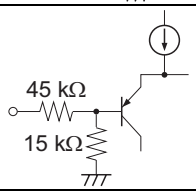
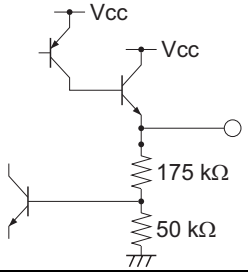
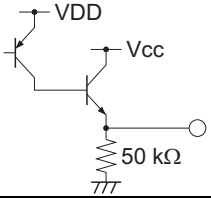
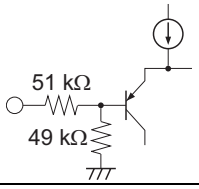
General

- ACC power monitor circuit is built-in as to detect low voltage.
- Low saturation output (PNP output) used for audio output.
- Adjustable voltage for illumination output by changing an external resistor.

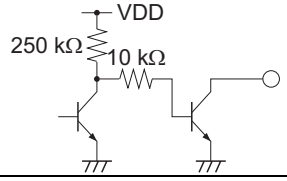
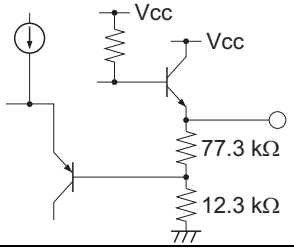
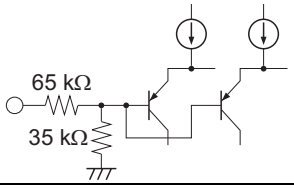
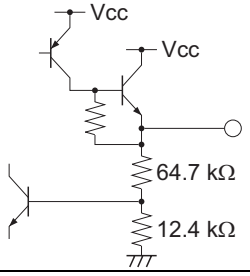
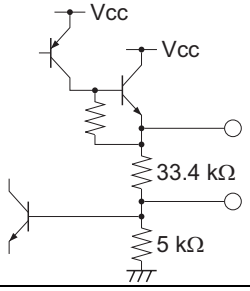
Protections

- Output current limit circuit to avoid device destruction caused by shorted output, etc.
- High surge input protector against VCC and ACC.
- Built in a thermal shutdown circuit to prevent against the thermal destruction.

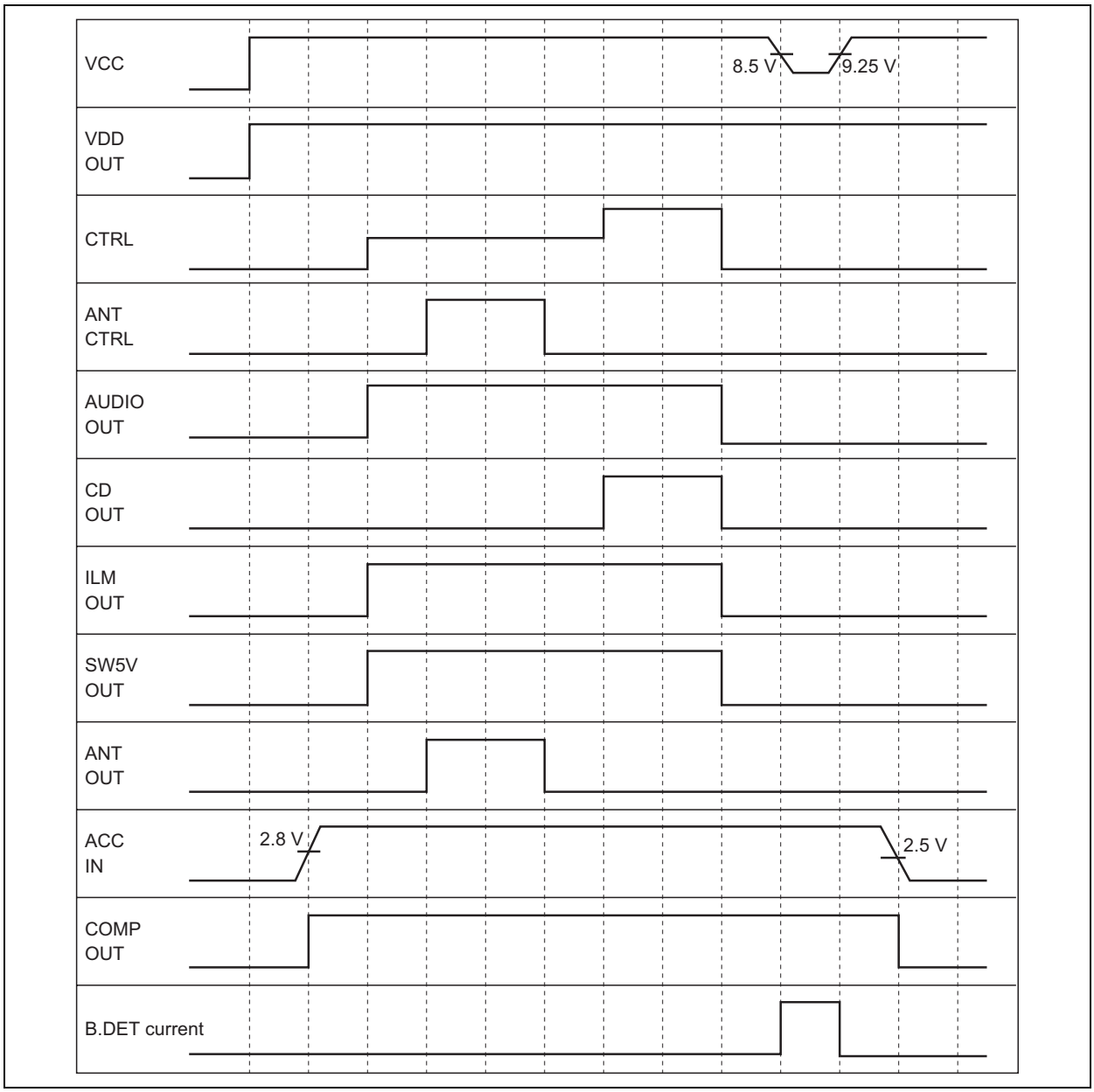
Pin Description and Equivalent Circuit

Pin No.	Pin Name	Specification	Equivalent Circuit	Function			
				Normal Operation	TSD	24 V	Surge Input
1	—	NC		—	—	—	—
2	ANT OUT	VCC-1 V/500 mA min		Output voltage is VCC-1 V when M or H level to CTRL pin and H level to ANT-CTRL.	0 V	0 V	0 V
3	ACC IN	—		Connected to ACC.	—	—	—
4	VDD OUT	5.7 V/100 mA min		Regular 5.7 V.	5.7 V	5.7 V	0 V
5	SW5V OUT	5.0 V/100 mA min		Output voltage is 5 V when M or H level applied to CTRL pin.	0 V	0 V	0 V
6	COMP OUT	5.0 V/100 mA min		Output for ACC detector	0 V	5 V (ACC Hi)	0 V
7	ANT CTRL	—		L: ANT output OFF H: ANT output ON	—	—	—
8	VCC	—		Connected to VCC	—	—	—

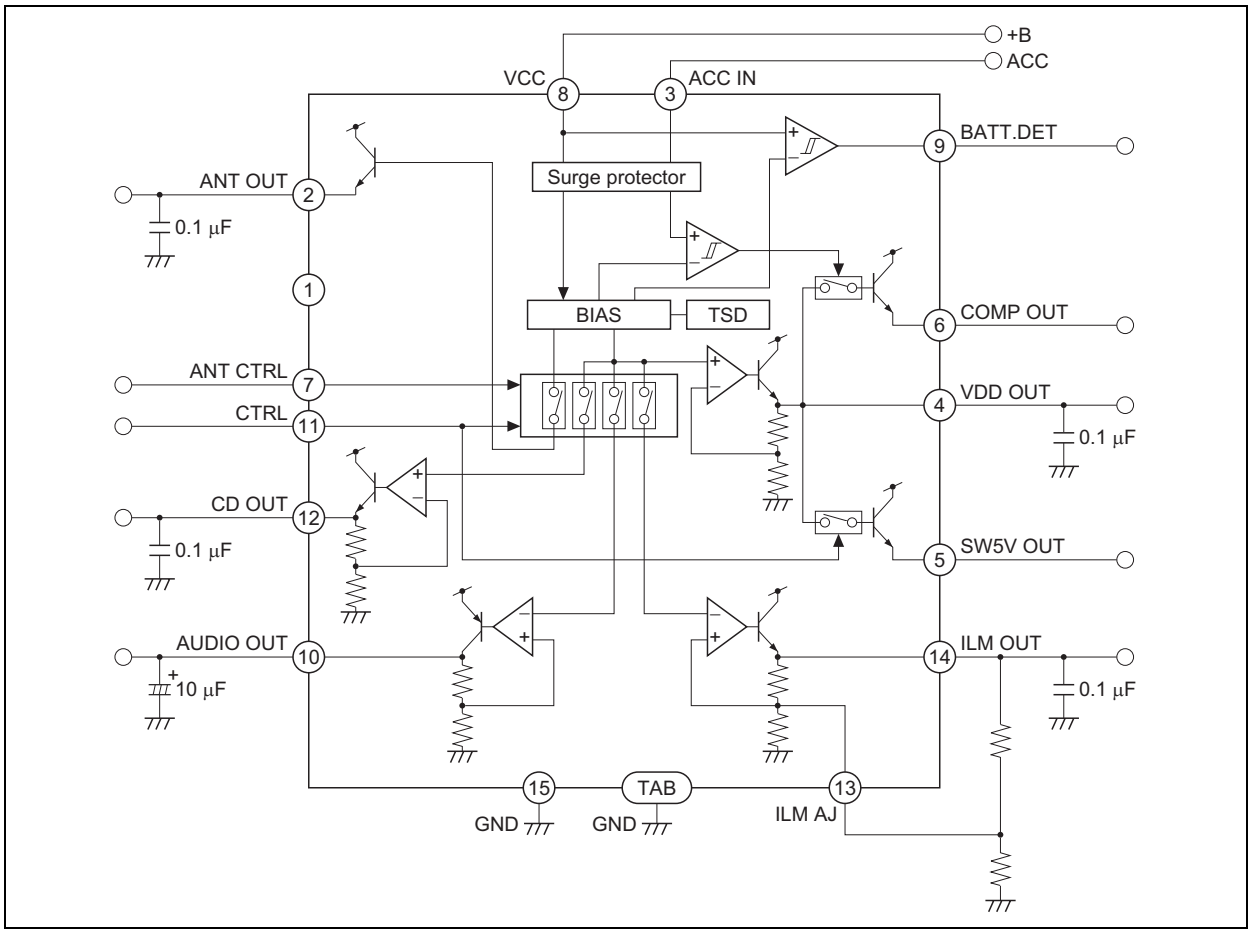
Pin Description and Equivalent Circuit (cont.)

Pin No.	Pin Name	Specification	Equivalent Circuit	Function			
				Normal Operation	TSD	24 V	Surge Input
9	BATT DET	—		Low battery detect.	Detect	Detect	Not detect
10	AUDIO OUT	8.5 V/500 mA min		Output voltage is 8.5 V when M or H level applied to CTRL pin.	0 V	0 V	0 V
11	CTRL	—		L: BIAS OFF M: BIAS ON H: CD ON	—	—	—
12	CD OUT	7.0 V/1.3 A min		Output voltage is 7 V when H level applied to CTRL pin.	0 V	0 V	0 V
13	ILM AJ	—		Adjustment pin for ILM output voltage.	—	—	—
14	ILM OUT	10.0 V/500 mA min		Output voltage is 10 V when M or H level applied to CTRL pin	0 V	0 V	0 V
15	GND	—		Connected to GND	—	—	—

Timing Chart



Block Diagram



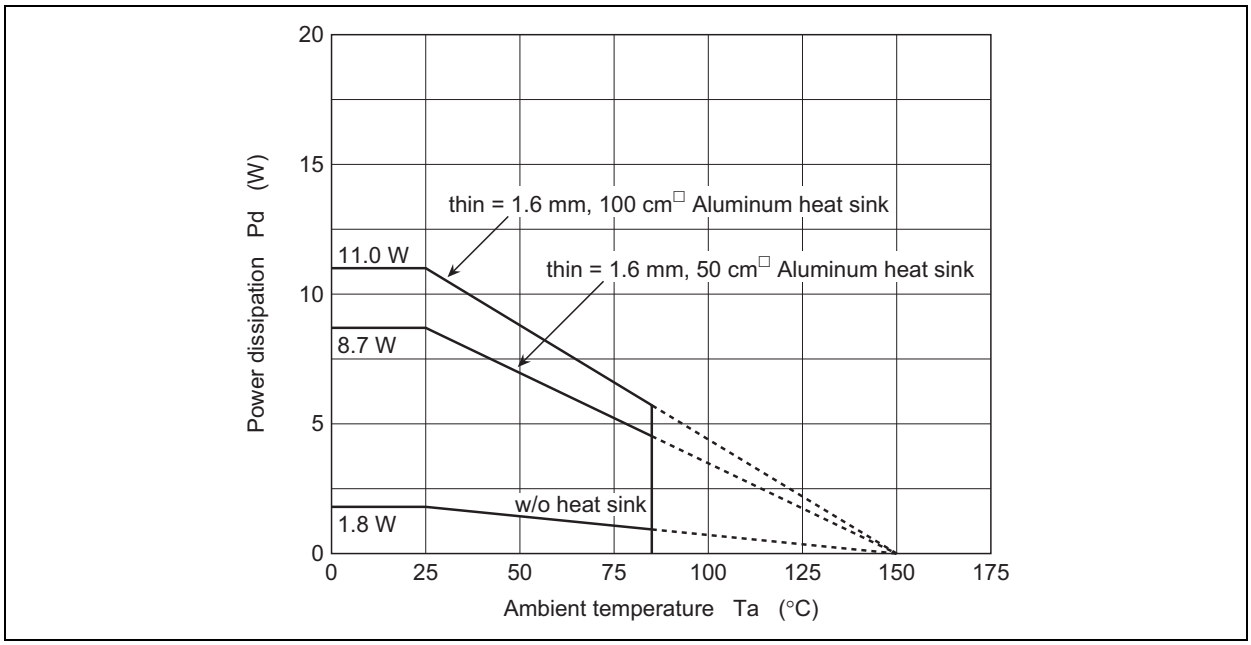
Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Rating	Unit	Note
Operating power supply voltage	Vcc	18	V	
DC supply voltage	Vcc(DC)	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.

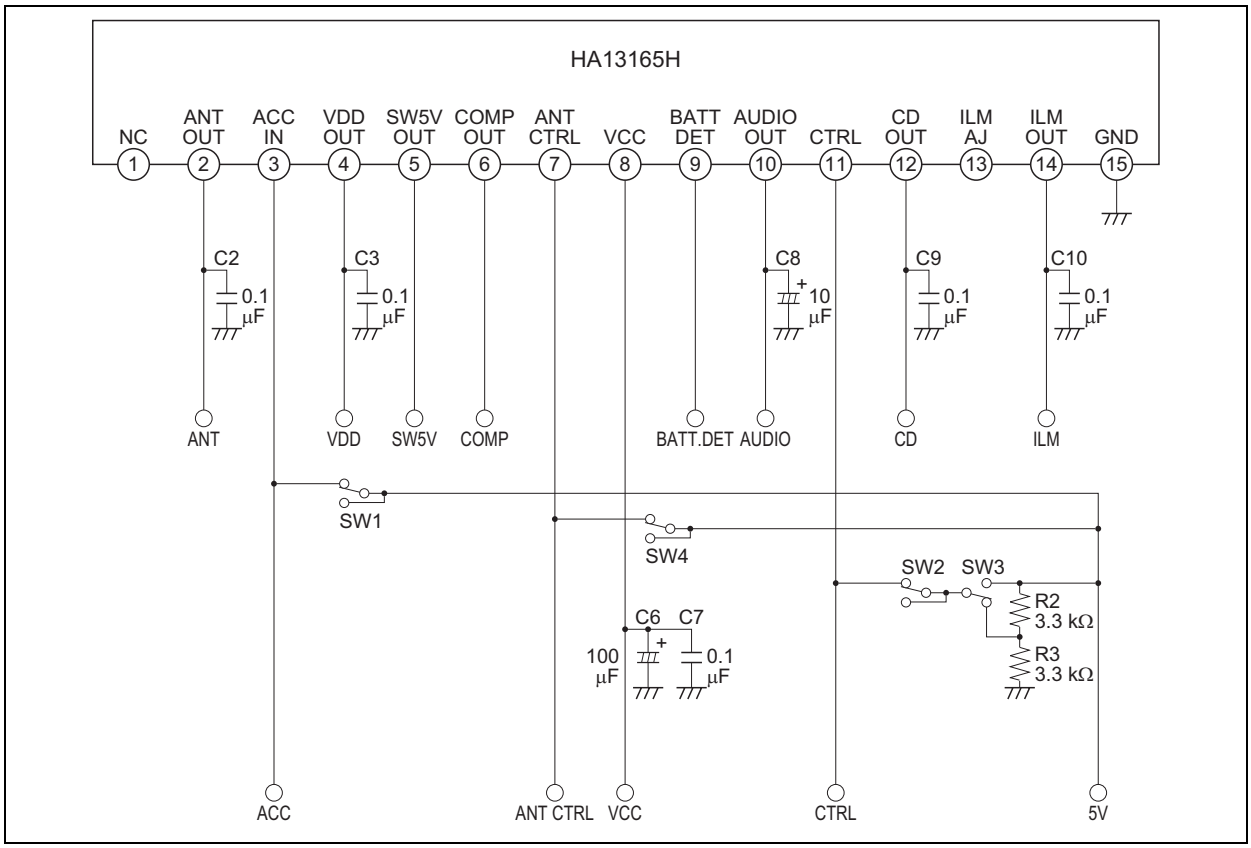


Electrical Characteristics

(unless otherwise noted, Vcc = 13.2 V, Ta = 25°C)

Item		Symbol	Min	Typ	Max	Unit	Test Condition
Standby current		IST	—	460	700	μA	ACC = 0 V, CTRL = 0 V
CTRL L level (STBY mode)		VCL	0	—	1.0	V	
CTRL M level (CD OFF mode)		VCM	2.0	—	3.0	V	
CTRL H level (CD ON mode)		VCH	4.0	—	–	V	
ANT CTRL L level (ANT OFF mode)		VACL	0	—	2.0	V	
ANT CTRL H level (ANT ON mode)		VACH	3.0	—	–	V	
VDD OUT	Output voltage	Vo1	5.45	5.7	5.95	V	Io1 = 80 mA
	Voltage regulation	ΔVo11	—	10	50	mV	Vcc = 10 to 16 V, Io1 = 80 mA
	Load regulation	ΔVo12	—	50	100	mV	Io1 = 0 to 80 mA
	Minimum I/O voltage differential	ΔVo13	—	1.0	1.5	V	Io1 = 80 mA
	Output current capacity	Io1	100	250	—	mA	Vo1 ≥ 5.45 V
	Ripple rejection ratio	SVR1	50	60	—	dB	f = 100 Hz, Io1 = 80 mA
CD OUT	Output voltage	Vo2	6.7	7.0	7.3	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	—	A	Vo2 ≥ 6.7 V
	Ripple rejection ratio	SVR2	45	50	—	dB	f = 100 Hz, Io2 = 1.0 A
AUDIO OUT	Output voltage	Vo3	8.0	8.5	9.0	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 ≥ 8.0 V
	Ripple rejection ratio	SVR3	40	50	—	dB	f = 100 Hz, Io3 = 400 mA
ILM OUT	Output voltage	Vo4	9.35	9.85	10.35	V	Io4 = 400 mA
	Voltage regulation	ΔVo41	—	40	100	mV	Vcc = 12.5 to 16 V, Io4 = 400 mA
	Load regulation	ΔVo42	—	50	100	mV	Io4 = 10 to 400 mA
	Minimum I/O voltage differential	ΔVo43	—	1.0	1.5	V	Io4 = 400 mA
	Output current capacity	Io4	500	900	—	mA	Vo4 ≥ 9.35 V
	Ripple rejection ratio	SVR4	32	40	—	dB	f = 100 Hz, Io4 = 400 mA
ANT OUT	Differential I/O voltage	ΔVo51	—	1.0	1.5	V	Io5 = 500 mA
	Load regulation	ΔVo52	—	350	600	mV	Io5 = 10 to 500 mA
	Output current capacity	Io5	500	900	—	mA	Vo5 ≥ 11.7 V
SW5V OUT	Output voltage	Vo6	4.6	5.0	5.4	V	Io6 = 80 mA, VDD = no load
	Output current capacity	Io6	100	300	—	mA	Vo6 ≥ 4.6 V
ACC OUT	Output voltage	Vo7	4.6	5.0	5.4	V	Io7 = 40 mA, VDD = no load
	Output current capacity	Io7	100	300	—	mA	Vo7 ≥ 4.6 V
	Rise threshold voltage	VTHH7	2.6	2.8	3.0	V	
	Hysteresis range	ΔVTH7	0.2	0.3	0.4	V	
BATT. DET	Threshold voltage	VTHH8	8.3	8.6	8.9	V	
	Hysteresis range	ΔVTH8	0.55	0.75	0.95	V	
	Output current capacity	Io8	200	—	—	μA	Vo = 0.3 V

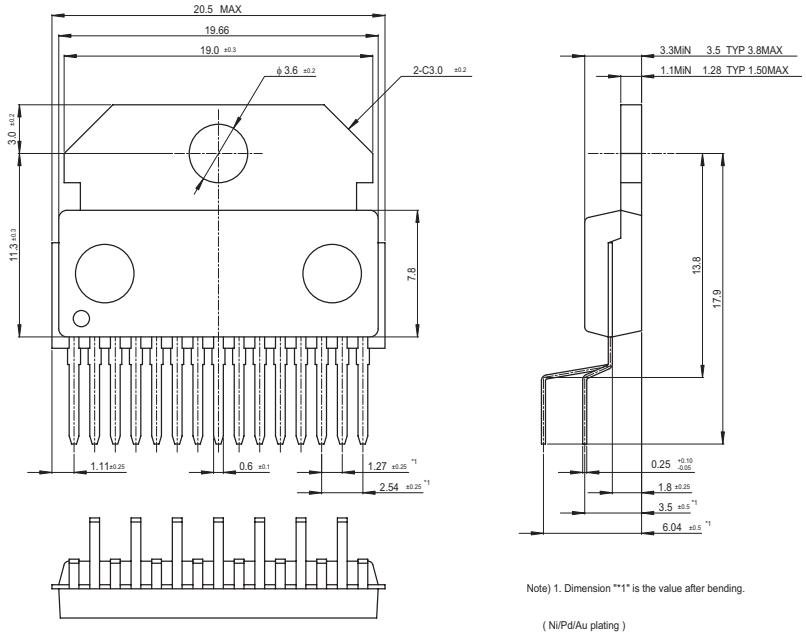
Evaluation Circuit



Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-HSIP15-14.3x19.66-1.27	PRSS0015DA-C	SP-15TGV	3.0g

Unit : mm



Note) 1. Dimension "*1" is the value after bending.

(Ni/Pd/Au plating)

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

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Renesas Technology America, Inc.
450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

Renesas Technology Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

Renesas Technology (Shanghai) Co., Ltd.
Unit 204, 205, AZIACenter, No.1233 Lujiazui Ring Rd, Pudong District, Shanghai, China 200120
Tel: <86> (21) 5877-1818, Fax: <86> (21) 6887-7898

Renesas Technology Hong Kong Ltd.
7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2730-6071

Renesas Technology Taiwan Co., Ltd.
10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology Singapore Pte. Ltd.
1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Renesas Technology Korea Co., Ltd.
Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

Renesas Technology Malaysia Sdn. Bhd
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510

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