3A Termination Regulator

FEATURES

- 3A Source and Sink Current Ability
- Support DDR1 ($1.25V_{TT}$) and DDR2 ($0.9V_{TT}$) Requirements
- Low Output Voltage Offset, ±20mV
- High Accuracy Output Voltage at Full-Load
- Adjustable V_{OUT} by External Resistor
- Low External Component Count
- Current Limit protection
- Thermal Protection
- SOP-8, TO-252 and TO-263 Packages

APPLICATIONS

- Mother Board
- Graphic Cards
- DDR Termination Voltage Supply

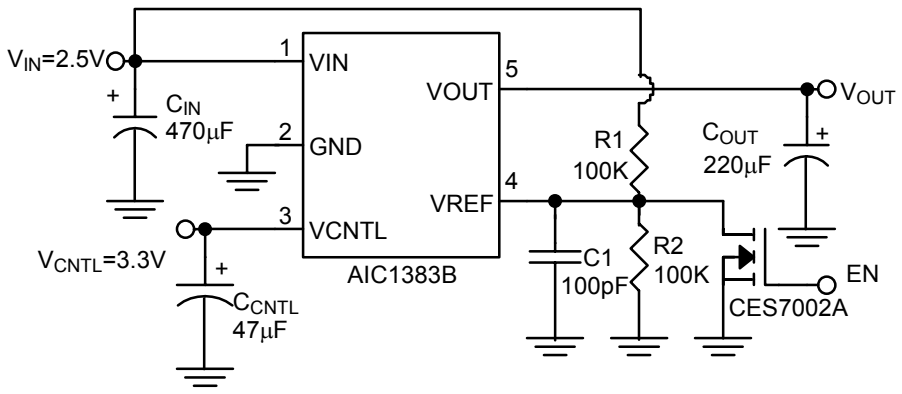
DESCRIPTION

AIC1383B linear regulator is designed to achieve 3A source and sink current while regulating an output voltage to within 45mV.

AIC1383B converts voltage supplies range from 1.6V to 6V into an output voltage that adjusts by two external voltage divider resistors. It provides an excellent voltage source for active termination schemes of high-speed transmission lines as those seen in high-speed memory buses, and it meets the JEDEC SSTL-2 and SSTL-3 specifications for termination of DDR-SRAM.

Built-in current limiting in source and sink mode, with thermal shutdown provide maximal protection to the AIC1383B against fault conditions.

TYPICAL APPLICATION CIRCUIT



ORDERING INFORMATION

AIC1383BXXX XX

- PACKING TYPE
  TR: TAPE & REEL
- PACKAGE TYPE
  M5: TO-263-5
  E5: TO-252-5
  S: SOP-8
- C: COMMERCIAL
  P: LEAD FREE COMMERCIAL

Example: AIC1383BCE5TR

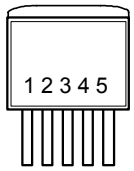
→ 3A Version, in TO-252-5 Package, Tape & Reel Packing Type

AIC1383BPE5TR

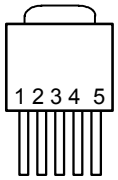
→ 3A Version, in Lead Free TO-252-5 Package, Tape & Reel Packing

PIN CONFIGURATION

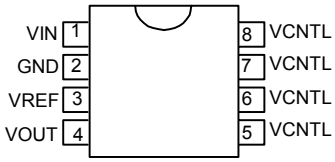
TO-263-5
FRONT VIEW
1: VIN
2: GND
3. VCNTL
4. VREF
5: VOUT



TO-252-5
TOP VIEW
1: VIN
2: GND
3. VCNTL
4. VREF
5: VOUT



SOP-8
TOP VIEW

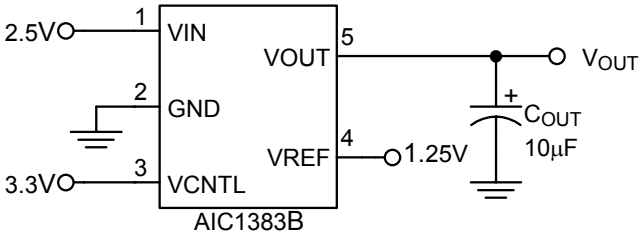


ABSOLUTE MAXIMUM RATINGS

Supply Voltage		-0.4V to 7V
Operating Temperature Range		-40°C~85°C
Junction Temperature		125°C
Storage Temperature Range		-65°C ~150°C
Lead Temperature (Solder, 10sec)		260°C
Thermal Resistance θ_{JC}	TO-263	3°C /W
	TO-252	12.5°C /W
	SO-8	40°C /W
Thermal Resistance θ_{JA}	TO-263	60°C /W
(Assume no ambient airflow, no heatsink)	TO-252	100°C /W
	SO-8	160°C /W

Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

TEST CIRCUIT



ELECTRICAL CHARACTERISTICS

(V_{CNTL}=3.3V, V_{IN}=2.5V, V_{REF}=0.5V_{IN}, C_{OUT}=10μF, T_A=25°C, unless otherwise specified) (Note 1)

PARAMETER	TEST CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Input Voltage (DDR1/2) (Note2)	Keep operate $V_{CNTL} \geq V_{IN}$ at power on and off sequences	V_{IN}	1.6	2.5	6	V
		V_{CNTL}	3.0	3.3	6	
Output Voltage	I_{OUT} = 0mA	V_{OUT}		V_{REF}		V
Output Voltage Offset	I_{OUT} = 0mA	V_{OS}	-20		20	mV
Load Regulation (DDR1/2) (Note2)	I_{OUT} =0.1mA ~ +3A	ΔV_{LOR}		35	45	mV
	I_{OUT} =0.1mA ~ -3A			35	45	
Quiescent Current	V_{REF}<0.2V, V_{OUT} = OFF	I_Q		8	30	μA
Operating Current of V_{CNTL}	No load	I_{CNTL}		3	10	mA
V_{REF} Bias Current	V_{REF}=1.25V		0		1	μA
Current Limit		I_{IL}	3.2	4	6.5	A
THERMAL PROTECTION						
Thermal Shutdown Temperature	3.3V≤V_{CNTL}≤5V	T_{SD}	125	150		°C
Thermal Shutdown Hysteresis	Guaranteed by design			30		°C
SHUTDOWN SPECIFICATIONS						
Shutdown Threshold	Output ON (V_{REF}=0V→1.25V)		0.8			V
	Output OFF (V_{REF}=1.25V→0V)				0.2	

Note 1: Specifications are production tested at T_A=25°C. Specifications over the -40°C to 85°C operating temperature range are assured by design, characterization and correlation with Statistical Quality Controls (SQC).

Note 2: DDR2 is not available for TO-263 package.

Note 3: V_{OS} is the voltage measurement, which is defined as V_{OUT} subtracted V_{REF}.

Note 4: Load regulation is measured at constant junction temperature, using pulse testing with a low ON time.

Note 5: Current limit is measured by pulsing a short time.

Note 6: For operate system safely; V_{CNTL} must be always greater than V_{IN}.

TYPICAL PERFORMANCE CHARACTERISTICS

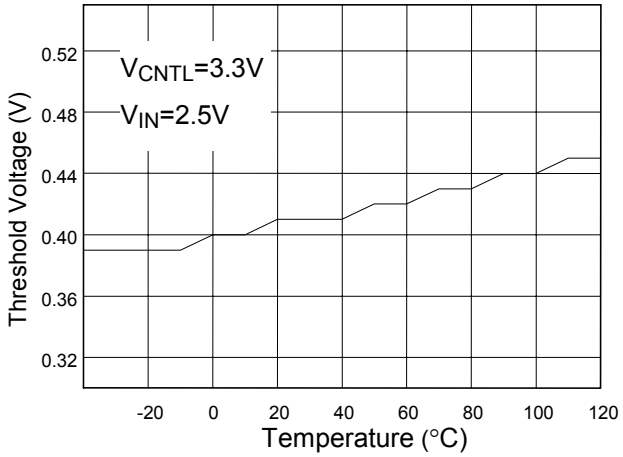


Fig. 1 Turn-On Threshold vs. Temp.

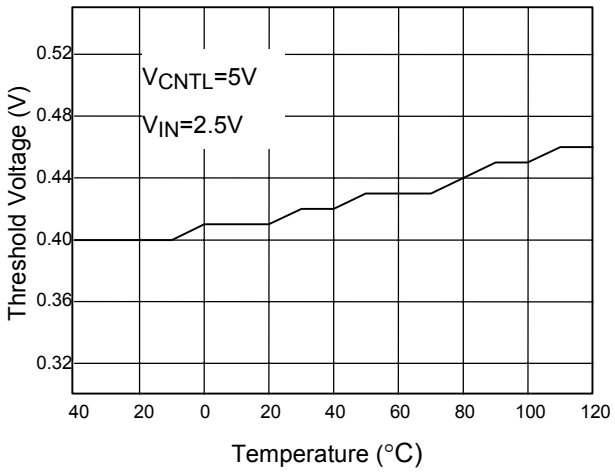


Fig. 2 Turn On Threshold vs. Temp.

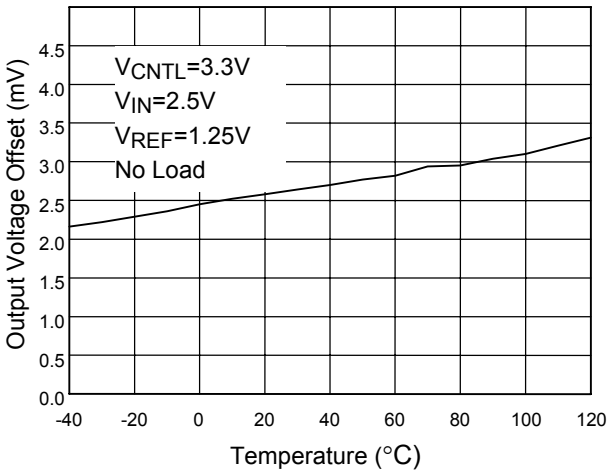


Fig. 3 Output Voltage Offset vs. Temp.

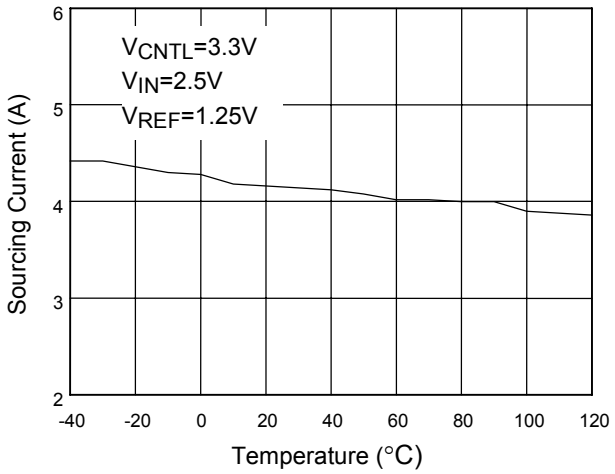


Fig. 4 Current-Limit (Sourcing) vs. Temp.

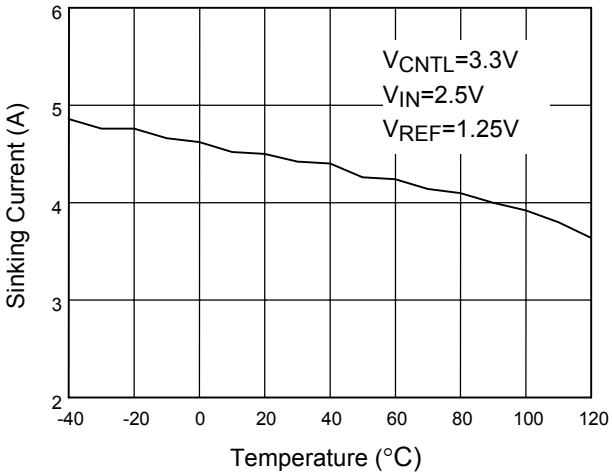


Fig. 5 Current-Limit (Sinking) vs. Temp.

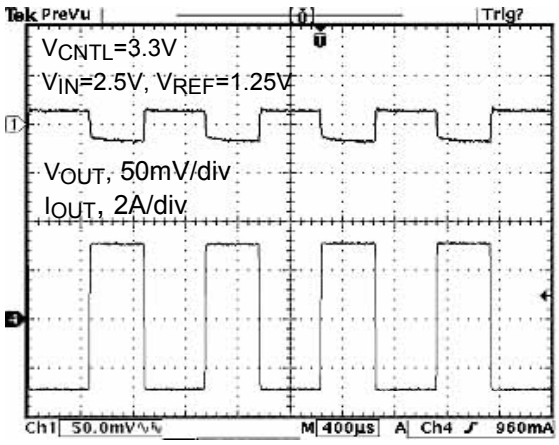


Fig. 6 Transient Response at $1.25V_{TT}$/3A

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

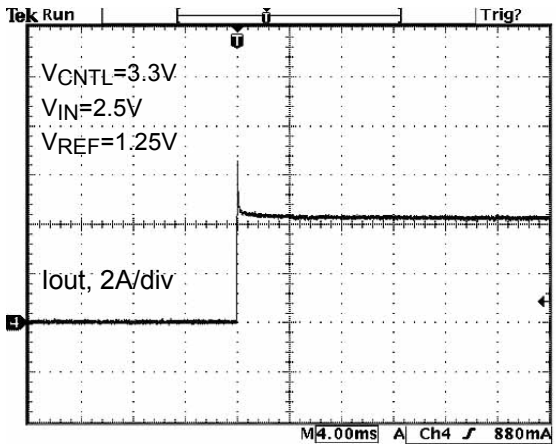


Fig. 7 Output Short-Circuit Protection (Sinking)

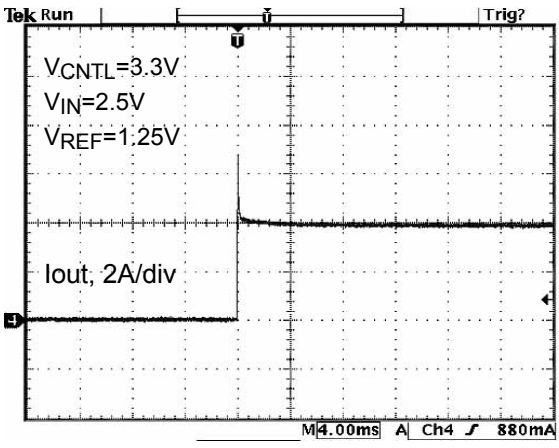
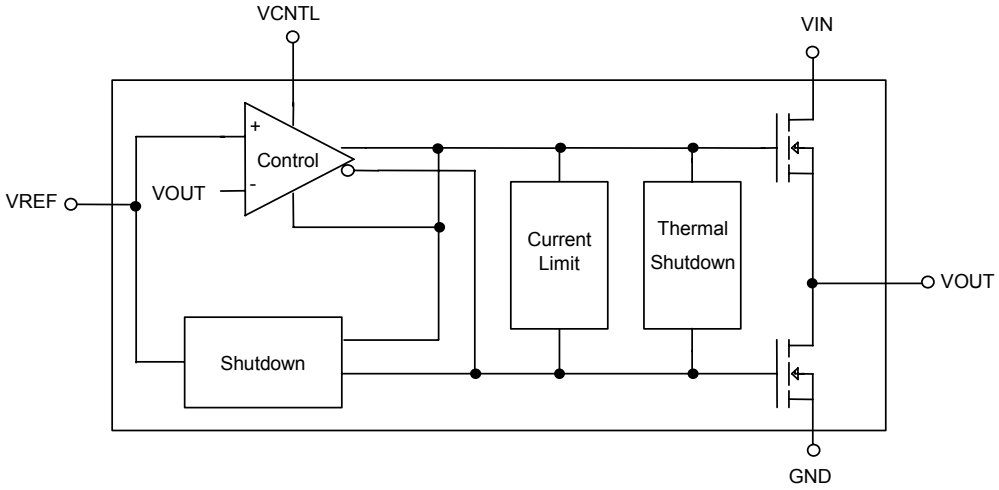


Fig. 8 Output Short-Circuit Protection (Sourcing)

BLOCK DIAGRAM



PIN DESCRIPTIONS

PIN 1: VIN - Input supply pin. It provides main power to create the external reference voltage by divider resistors for regulating V_{REF} and V_{OUT}.

PIN 2: GND - Ground pin.

PIN 3: VCNTL - Input supply pin. It is used to supply all the internal control circuitry.

PIN 4: VREF - Reference voltage input. Pull this pin low to shutdown device.

PIN 5: VOUT - Output pin.

APPLICATION INFORMATION

Layout Consideration

AIC1383B is in SO-8 (DDR1/2), TO-252-5 (DDR1/2) and TO-263-5 (DDR1) packages resulting in unable to dissipate heat easily when it operates in high current. In order to prevent maximum junction temperature exceeded, the suitable copper area has to use.

The large copper at V_{CNTL} pins is available, and the heat dissipation is relieved. Using via to lead heat into the bottom layer to strengthen as below figures show.

All capacitors should be placed as close as possible to relative pins.

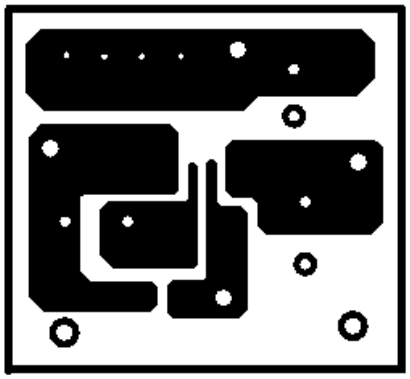


Fig. 9 Top layer of SO-8

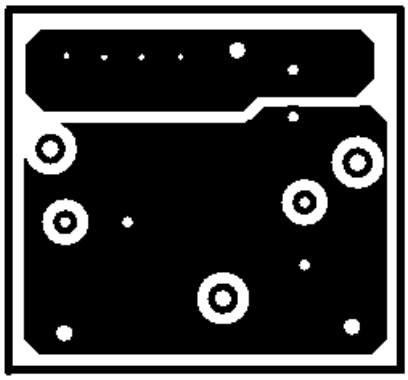


Fig. 10 Bottom layer of SO-8

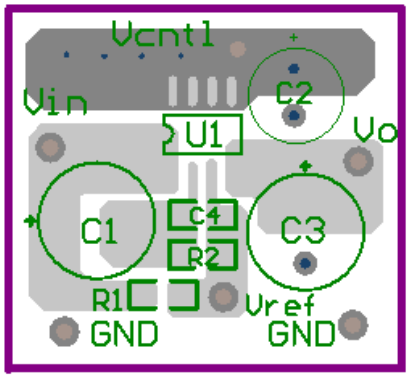
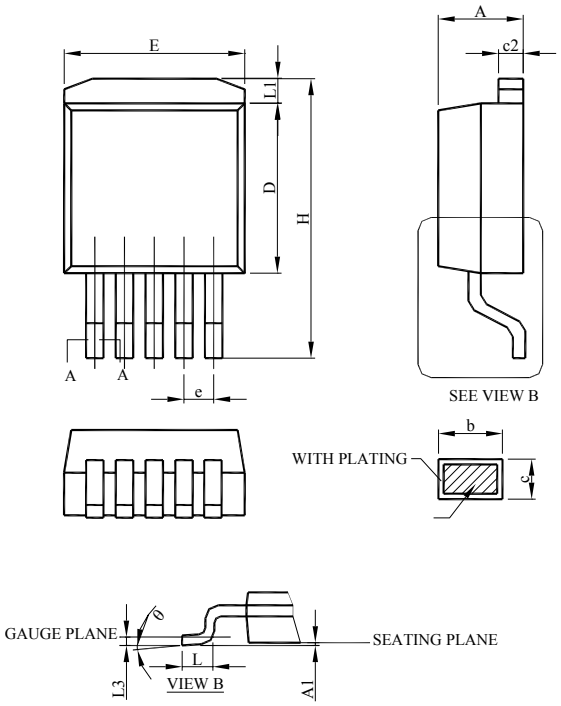


Fig. 11 Placement of SO-8

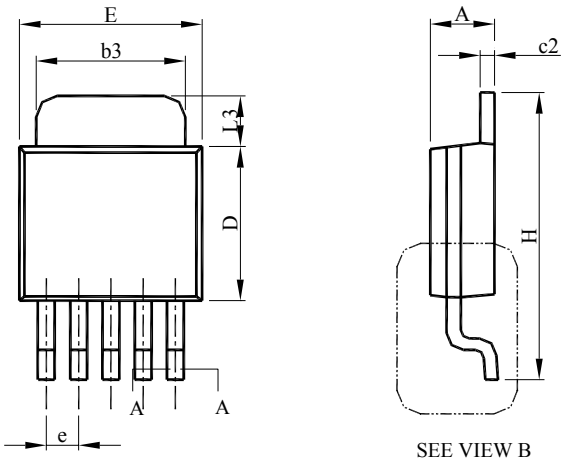
PHYSICAL DIMENSIONS (unit: mm)

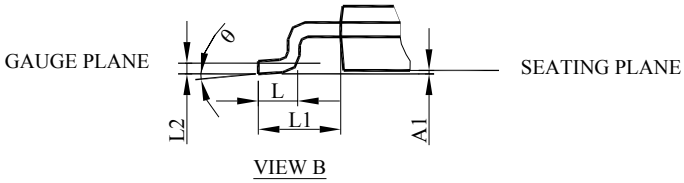
- **TO-263-5**



SYMBOL	TO-263-5L	
	MILLIMETERS	
	MIN.	MAX.
A	4.06	4.83
A1	0.00	0.25
b	0.51	0.99
c	0.38	0.74
c2	1.14	1.65
D	8.38	9.65
E	9.65	10.67
e	1.70 BSC	
H	14.61	15.88
L	1.78	2.79
L1	--	1.68
L3	0.25 BSC	
θ	0°	8°

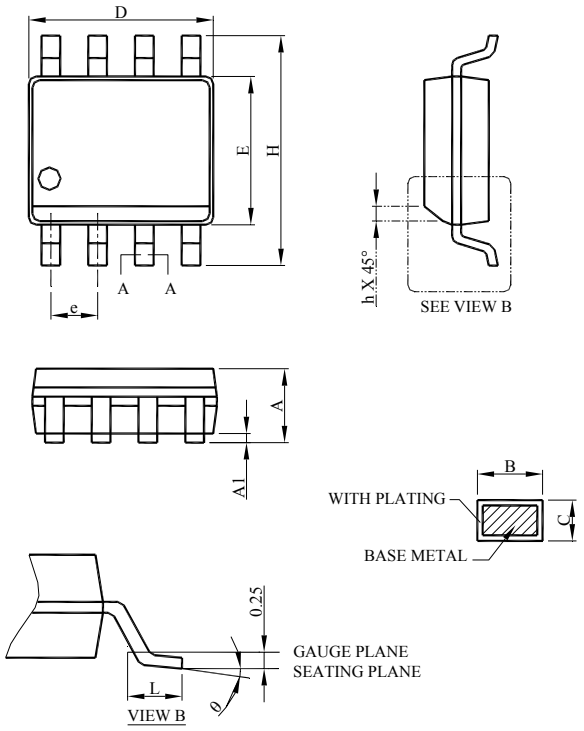
- **TO-252-5**





SYMBOL	TO-252-5L	
	MILLIMETERS	
	MIN.	MAX.
A	2.19	2.38
A1	0.00	0.13
b	0.51	0.71
b3	4.32	5.46
c	0.46	0.61
c2	0.46	0.89
D	5.33	6.22
E	6.35	6.73
e	1.27 BSC	
H	9.40	10.41
L	1.40	1.78
L1	2.67 REF	
L2	0.51 BSC	
L3	0.89	2.03
θ	0°	8°

- **SOP-8**



SYMBOL	SOP-8	
	MILLIMETERS	
	MIN.	MAX.
A	1.35	1.75
A1	0.10	0.25
B	0.33	0.51
C	0.19	0.25
D	4.80	5.00
E	3.80	4.00
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.27
θ	0°	8°

Note:

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