

# 1.5A Termination Regulator

## FEATURES

- 1.5A Source and Sink Current Ability
- Support DDR1 (1.25V<sub>TT</sub>) and DDR2 (0.9V<sub>TT</sub>) Requirements
- Low Output Voltage Offset, ±20mV
- High Accuracy Output Voltage at Full-Load
- Adjustable V<sub>OUT</sub> by External Resistor
- Low External Component Count
- Current Limit protection
- Thermal Protection
- SOP-8 Package

## APPLICATIONS

- Mother Board
- Graphic Cards
- DDR Termination Voltage Supply

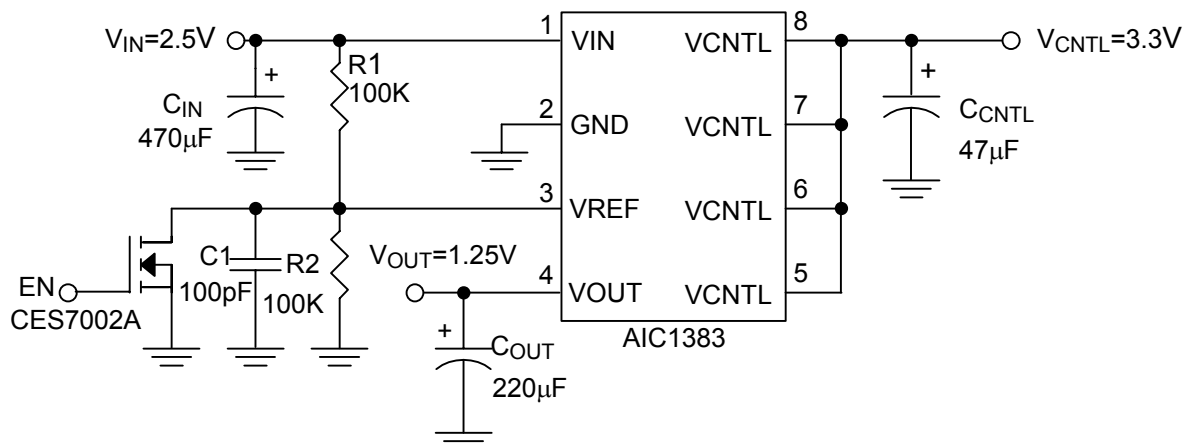
## DESCRIPTION

AIC1383 linear regulator is designed to achieve 1.5A source and sink current while regulating an output voltage to within 25mV.

AIC1383 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.

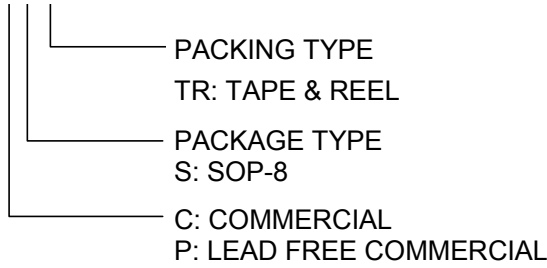
Built-in current limiting in source and sink mode, with thermal shutdown provide maximal protection to the AIC1383 against fault conditions.

## TYPICAL APPLICATION CIRCUIT



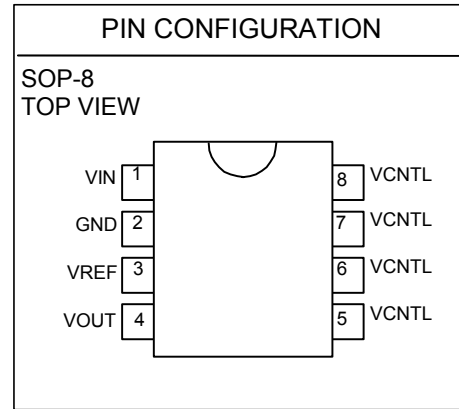
**ORDERING INFORMATION**

AIC1383XXXX



Example: AIC1383CSTR  
 → 1.5A Version, in SOP-8 Package, Tape & Reel Packing Type

AIC1383PSTR  
 → 1.5A Version, in Lead Free SOP-8 Package, Tape & Reel Packing Type



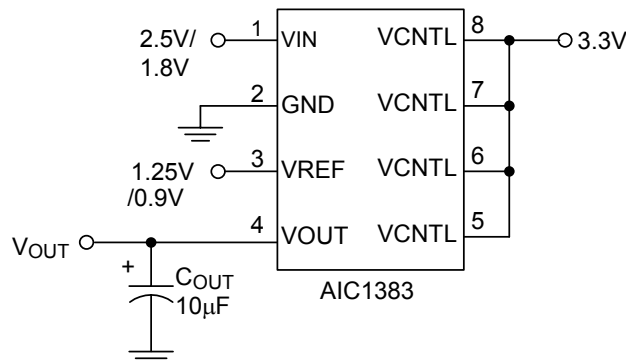
**ABSOLUTE MAXIMUM RATINGS**

Supply Voltage.....	-0.4V to 7V
Operating Temperature Range.....	-40°C~85°C
Junction Temperature Range.....	125°C
Storage Temperature Range.....	-65°C ~150°C
Lead Temperature (Solder, 10sec).....	260°C
Thermal Resistance $\theta_{JC}$ SO-8.....	40°C /W
Thermal Resistance $\theta_{JA}$ SO-8.....	160°C /W

(Assume no ambient airflow, no heatsink)

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

**TEST CIRCUIT**



■ **ELECTRICAL CHARACTERISTICS** ( $V_{CNTL}=3.3V$ ,  $V_{IN}=2.5V$ ,  $V_{REF}=0.5V_{IN}$ ,  $C_{OUT}=10\mu F$ ,  $T_A=25^\circ C$ , unless otherwise specified) (Note 1)

PARAMETER	TEST CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Input Voltage (DDR1/2)	Keep operate $V_{CNTL} \geq V_{IN}$ at power on and off sequences	$V_{IN}$	1.6	2.5/1.8		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)	$I_{OUT} = 0.1mA \sim +1.5A$	$\Delta V_{LOR}$		10	25	mV
	$I_{OUT} = 0.1mA \sim -1.5A$			10	25	
Quiescent Current	$V_{REF} < 0.2V$ , $V_{OUT} = OFF$	$I_Q$		8	30	$\mu A$
Operating Current of $V_{CNTL}$	No load	$I_{CNTL}$		3	10	mA
$V_{REF}$ Bias Current	$V_{REF} = 1.25V$				1	$\mu A$
Current Limit		$I_{IL}$	2.1	3	4.5	A
<b>THERMAL PROTECTION</b>						
Thermal Shutdown Temperature	$3.3V \leq V_{CNTL} \leq 5V$	$T_{SD}$	125	150		$^\circ C$
Thermal Shutdown Hysteresis	Guaranteed by design			30		$^\circ C$
<b>SHUTDOWN SPECIFICATIONS</b>						
Shutdown Threshold	Output ON ( $V_{REF} = 0V \rightarrow 1.25V$ )		0.8			V
	Output OFF ( $V_{REF} = 1.25V \rightarrow 0V$ )				0.2	

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

**Note 2:**  $V_{OS}$  is the voltage measurement, which is defined as  $V_{OUT}$  subtracted  $V_{REF}$ .

**Note 3:** Load regulation is measured at constant junction temperature, using pulse testing with a low ON time.

**Note 4:** Current limit is measured by pulsing a short time.

**Note 5:** For operate system safely;  $V_{CNTL}$  must be always greater than  $V_{IN}$ .

**TYPICAL PERFORMANCE CHARACTERISTICS**

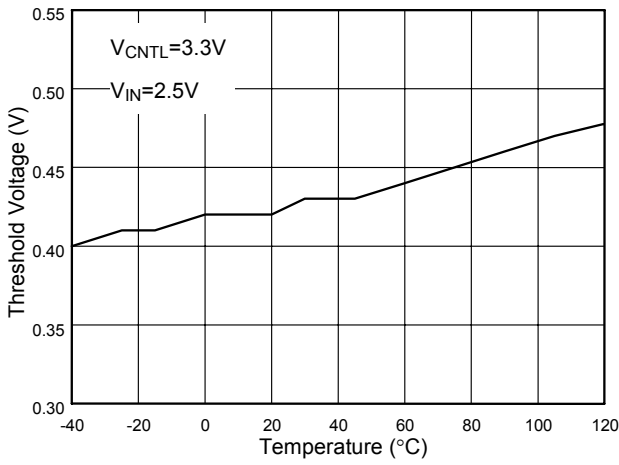


Fig. 1 Turn-On Threshold vs. Temp.

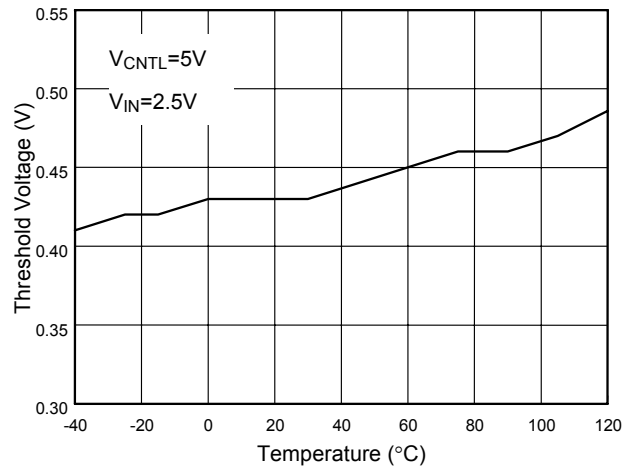


Fig. 2 Turn-On Threshold vs. Temp

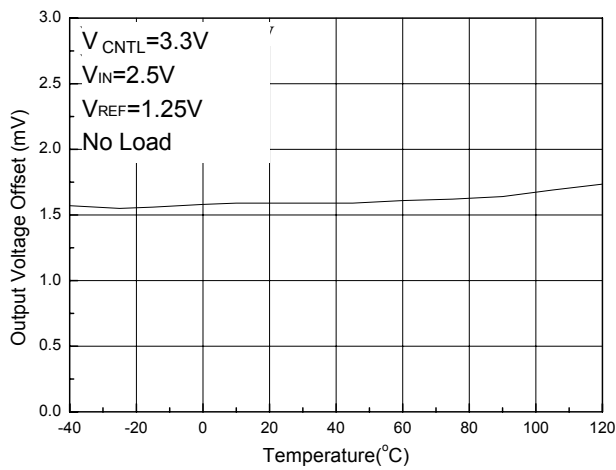


Fig. 3 Output Voltage Offset vs. Temperature

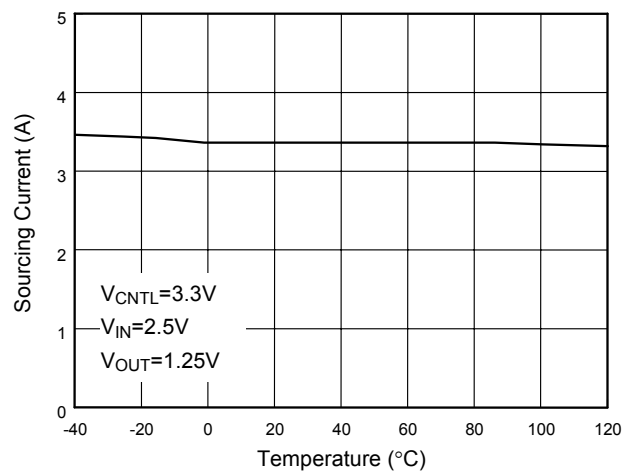


Fig. 4 Current-Limit (Sourcing) vs. Temperature

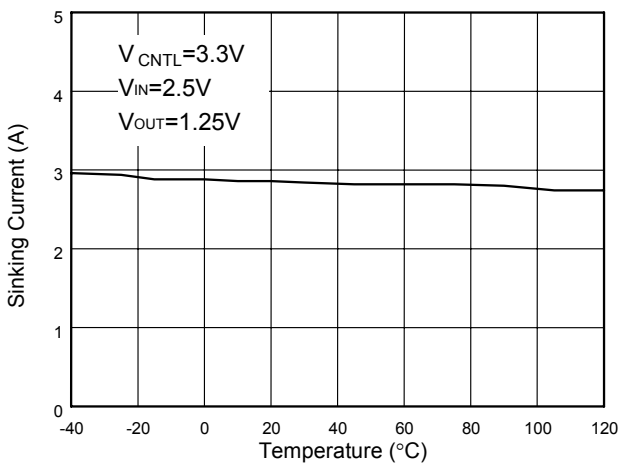


Fig. 5 Current-Limit (Sinking) vs. Temperature

**TYPICAL PERFORMANCE CHARACTERISTICS (Continued)**

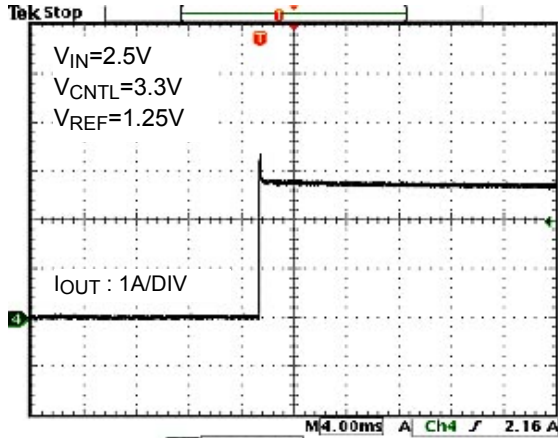


Fig. 6 Output Short-Circuit (Sinking)

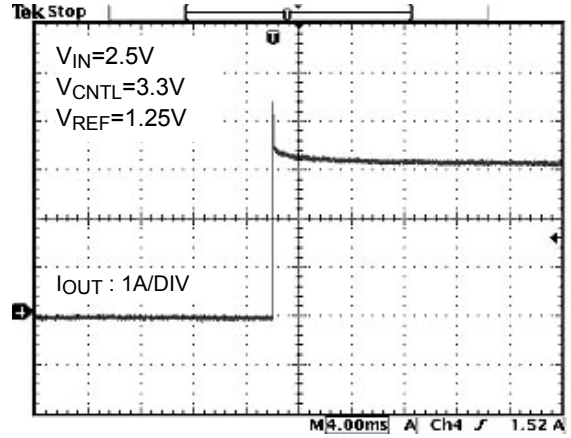


Fig. 7 Output Short-Circuit Protection (Sourcing)

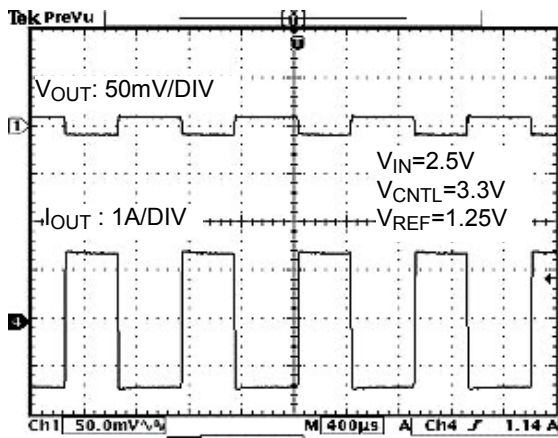


Fig. 8 Transient Response at 1.25V<sub>TT</sub>/1.5A

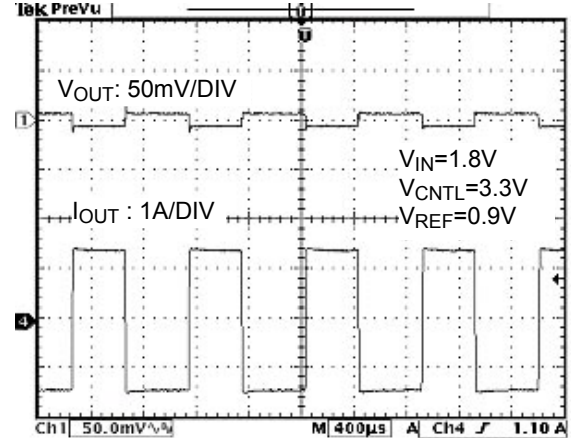
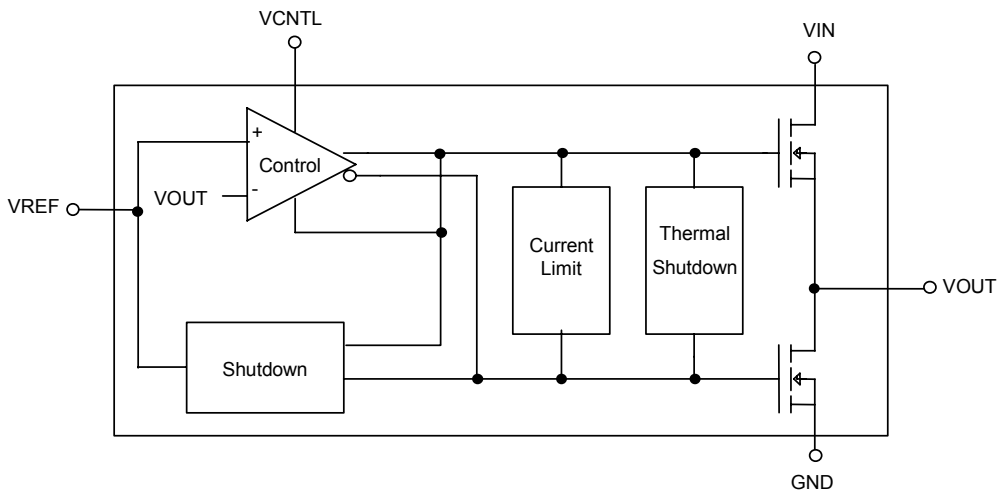


Fig. 9 Transient Response at 0.9V<sub>TT</sub>/1.5A

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

PIN 4: VOUT - Output pin.

PIN 5~8: VCNTL - Input supply pin. It is used to supply all the internal control circuitry.

## ■ APPLICATION INFORMATION

### Layout Consideration

AIC1383 is in SOP-8 package 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.

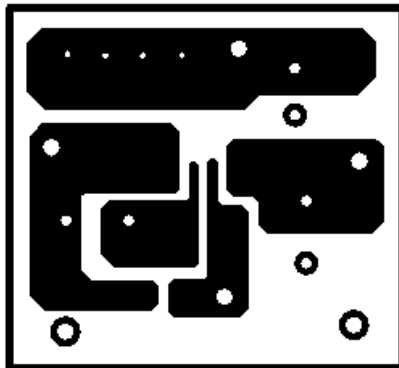


Fig. 10. Top layer

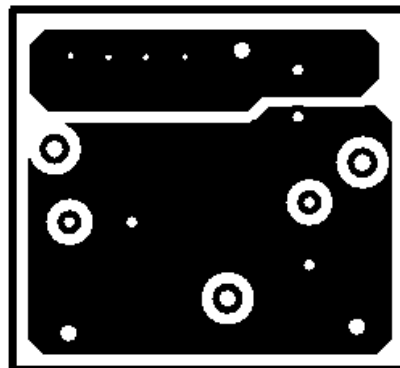


Fig. 11. Bottom layer

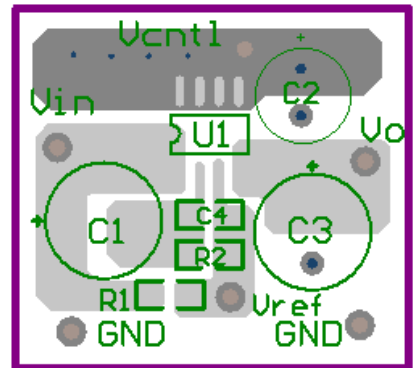
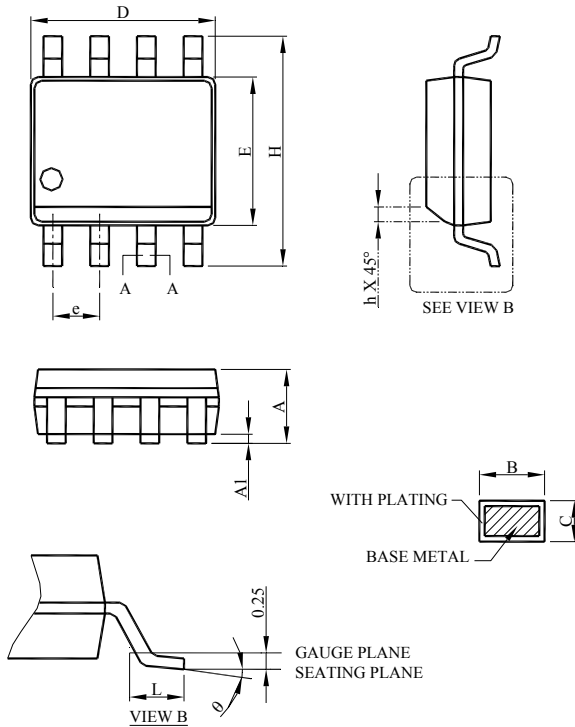


Fig. 12. Placement

**PHYSICAL DIMENSIONS (unit: mm)**
**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
$\theta$	0°	8°

**Note:**

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