3A DDR Termination Regulator

FEATURES

- Source and sink current capability of 3A
- Low output voltage offset, ±20mV
- High accuracy output voltage at full-load
- V_{OUT} adjustable by external resistors
- Low external component count
- Current limit protection
- Thermal protection
- SO-8, TO-252-5 and TO-263-5 packages

APPLICATIONS

- Mother Boards
- Graphic Cards
- DDR Termination Voltage Supply - supports DDR1 (1.25V_{TT}), DDR2 (0.9V_{TT}), and meets JEDEC SSTL-2 and SSTL-3 term. specifications

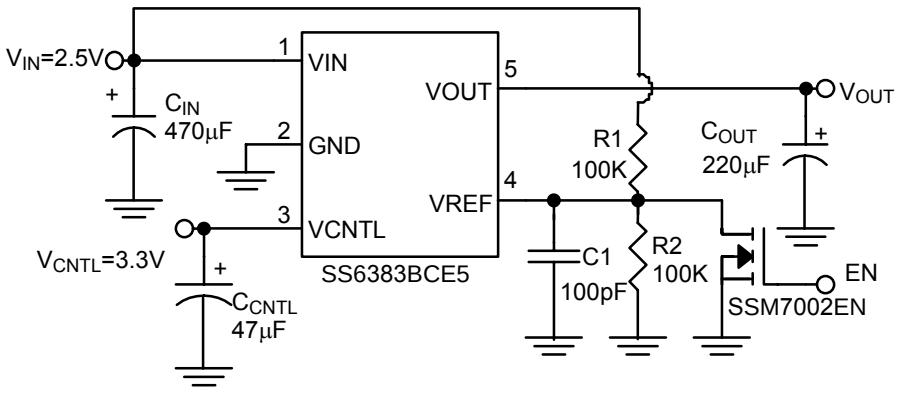
DESCRIPTION

The SS6383B linear regulator is designed to provide 3A source and sink current while regulating an output voltage to within 45mV.

The SS6383B converts voltage supplies ranging from 1.6V to 6V into an output voltage that is set by two external voltage-divider resistors. It provides an excellent voltage source for active termination schemes for high-speed transmission lines such as those seen in high-speed memory buses.

The built-in current-limiting in source and sink mode, together with thermal shutdown, provides maximum protection to the SS6383B against fault conditions.

TYPICAL APPLICATION CIRCUIT



This device is available with Pb-free lead finish (second-level interconnect) as SS6383BGxx

ORDERING INFORMATION

SS6383BXXX XX

- Packing
  - TR: Tape and reel
- Package type
  - CM5: TO-263-5, commercial
  - CE5 : TO-252-5, commercial
  - CS : SO-8, commercial
  - GM5 : TO-263-5, commercial, Pb-free
  - GE5 : TO-252-5, commercial, Pb-free
  - GS : SO-8, commercial, Pb-free

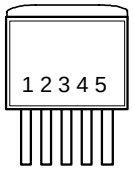
Example: SS6383BGE5TR

→ in TO-252-5 package, with Pb-free lead finish, shipped on tape and reel

PIN CONFIGURATION

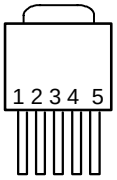
TO-263-5

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



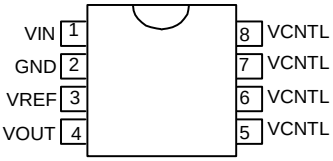
TO-252-5

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



SO-8

TOP VIEW

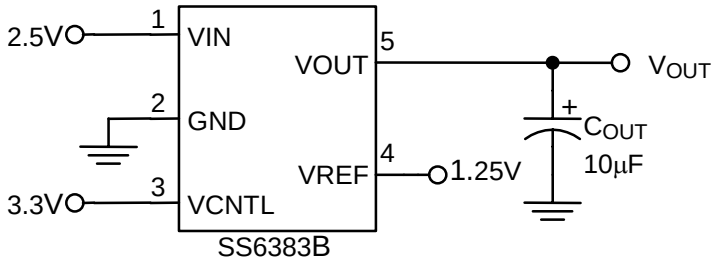


ABSOLUTE MAXIMUM RATINGS

Supply Voltage		-0.4V to 7V
Operating Temperature Range		-40°C~85°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)

PARAMETER	TEST CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Input Voltage (DDR1/2)	Keep $V_{CNTL} \geq V_{IN}$ during 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)	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 2: V_{OS} is the voltage measurement, which is defined as the difference between V_{OUT} and 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: To operate the system safely; V_{CNTL} must be always greater than V_{IN}.
Note 6: Specifications are guaranteed by Statistical Quality Controls (SQC), and not production tested, within the operating temperature range of -40°C to 85°C.
Note 7: DDR2 is not supported in the TO-263 package.

TYPICAL PERFORMANCE CHARACTERISTICS

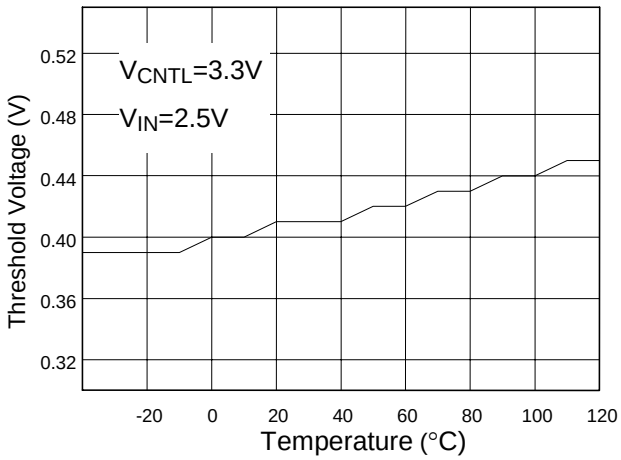


Fig. 1 Turn-On Threshold vs. Temp.

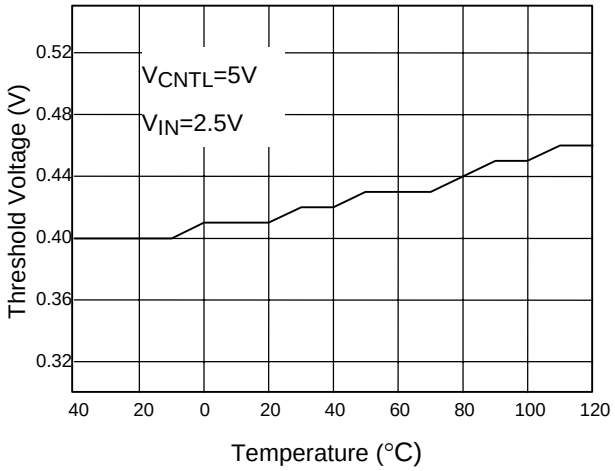


Fig. 2 Turn On Threshold vs. Temp.

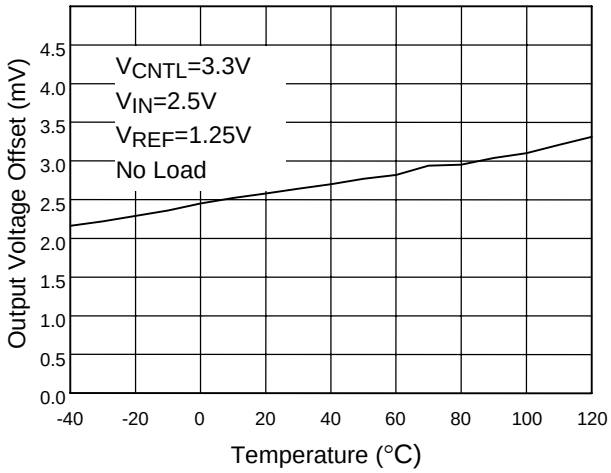


Fig. 3 Output Voltage Offset vs. Temp.

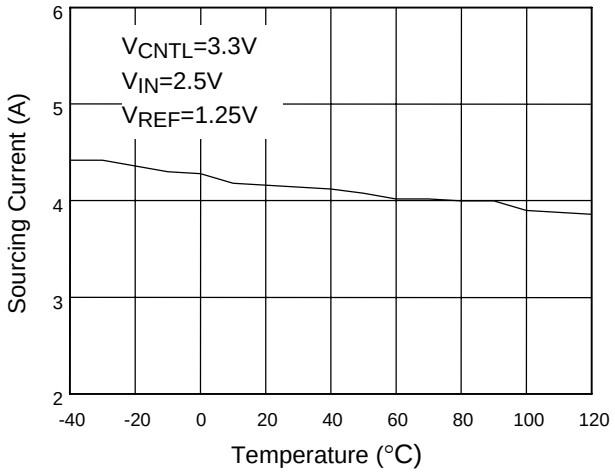


Fig. 4 Current-Limit (Sourcing) vs. Temp.

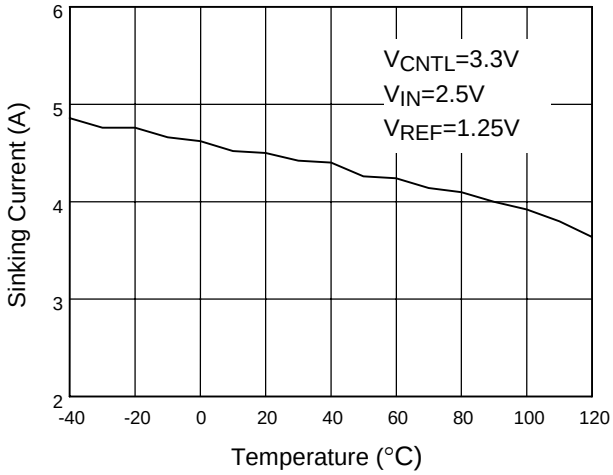


Fig. 5 Current-Limit (Sinking) vs. Temp.

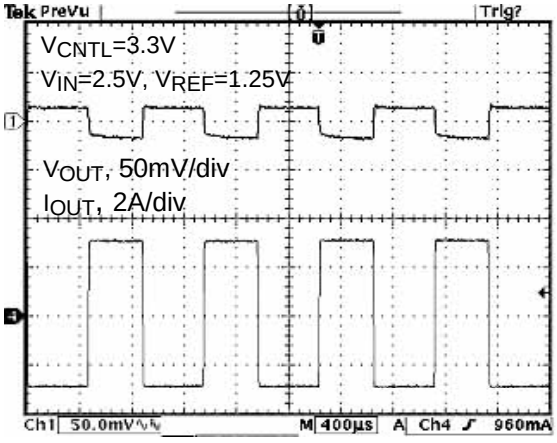


Fig. 6 Transient Response at $1.25V_{TT}$/3A

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

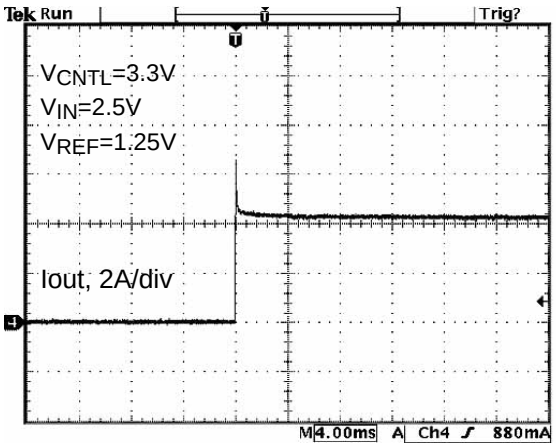


Fig. 7 Output Short-Circuit Protection (Sinking)

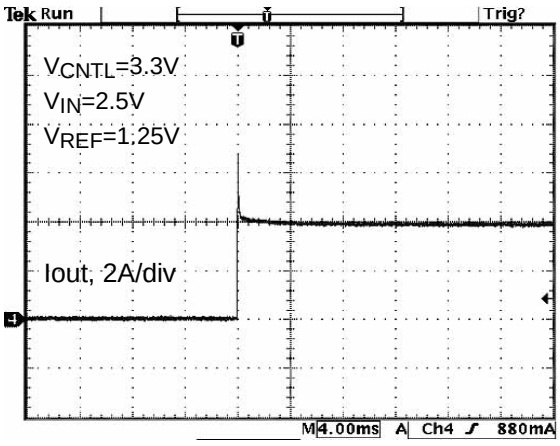
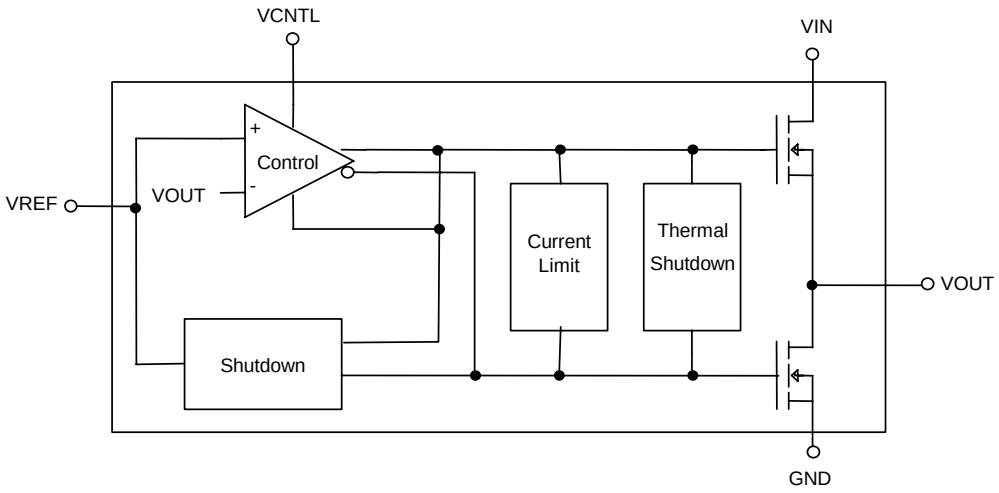


Fig. 8 Output Short-Circuit Protection (Sourcing)

BLOCK DIAGRAM



PIN DESCRIPTIONS (Pin numbers refer to TO-252/263)

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

As the SS6383B is in either SO-8, TO-252-5 or TO-263-5 packages, it is unable to dissipate heat easily when it operates at high current. To avoid exceeding the maximum junction temperature, a suitable copper area must be used.

The large copper area shown at V_{CNTL} pins is able to relieve the thermal dissipation. Using the via to direct heat into the large copper area shown on the bottom layer also helps significantly.

All capacitors should be placed as close as possible to the relevant pins.

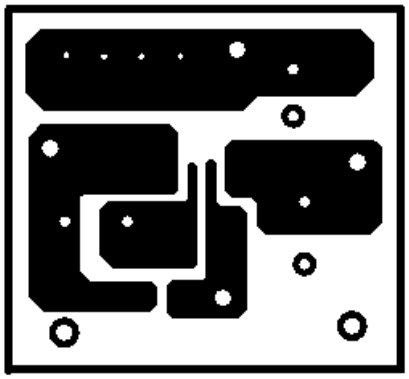


Fig. 9 Top layer for SO-8

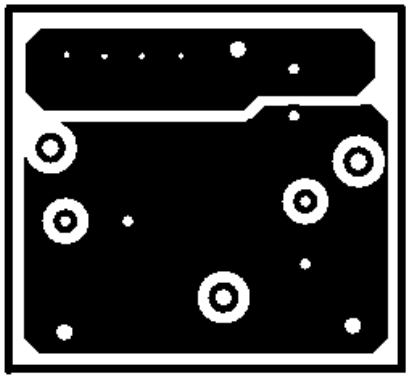


Fig. 10 Bottom layer for SO-8

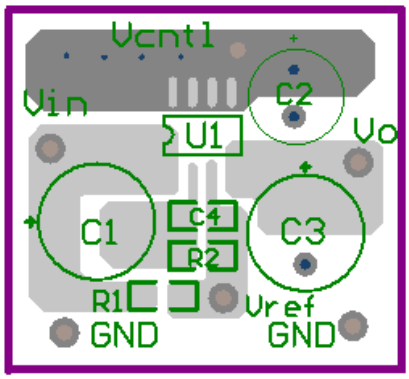
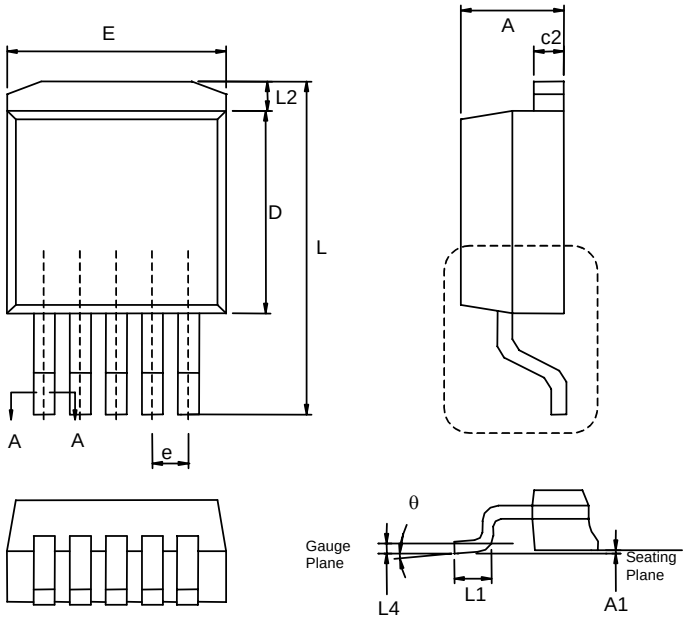


Fig. 11 Placement for SO-8

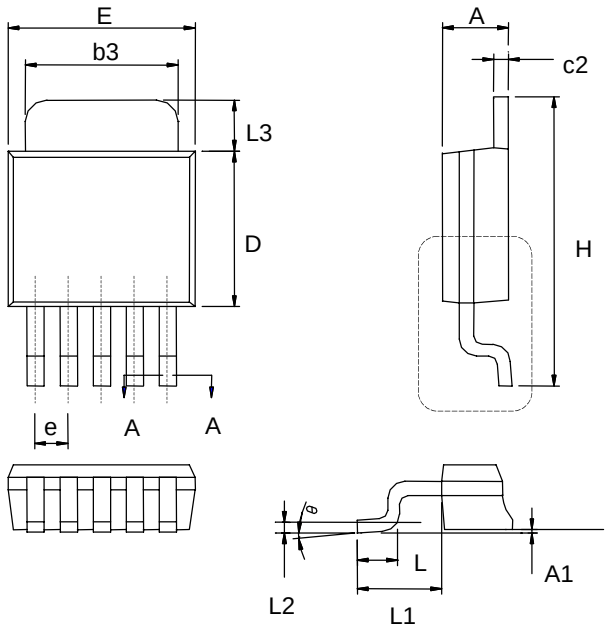
PHYSICAL DIMENSIONS

TO-263-5



SYMBOL	MIN	MAX
A	4.06	4.83
A1	0	0.15
C2	1.14	1.40
D	8.38	9.65
E	9.65	10.29
e	1.70 BSC	
L	14.61	15.88
L1	2.29	2.79
L2		1.40
L4	0.25 BSC	
θ	0°	8°

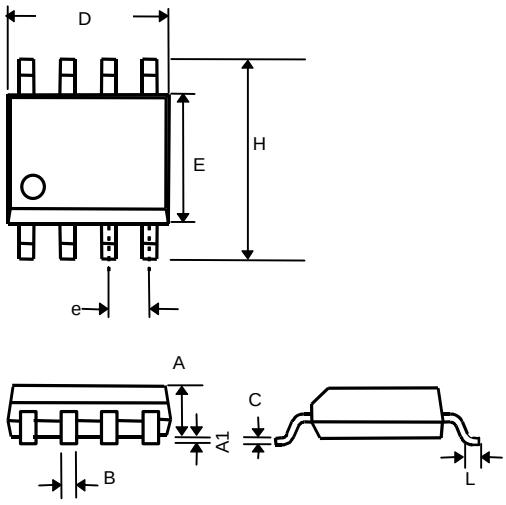
TO-252-5



SYMBOL	MIN	MAX
A	2.19	2.38
A1	0	0.13
b3	5.21	5.46
c2	0.46	0.58
D	5.33	5.59
E	6.35	6.73
e	1.27 BSC	
H	9.40	10.41
L	1.4	1.78
L1	2.67 REF	
L2	0.51 BSC	
L3	1.52	2.03
θ	0°	8°

PHYSICAL DIMENSIONS (cont.)

SO-8



SYMBOL	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(TYP)	
H	5.80	6.20
L	0.40	1.27

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