



A/AS535

2.5 V Precision Reference / Amplifier

Features

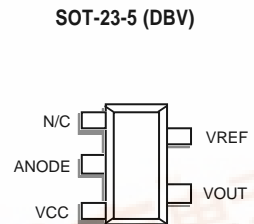
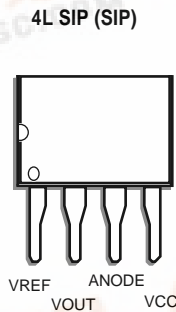
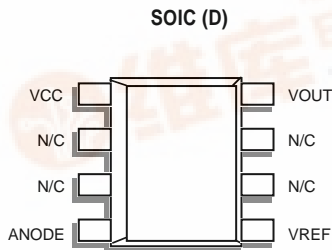
- Temperature-compensated: 50 ppm/°C
- Trimmed 0.5% typical bandgap reference
- High gain Internal amplifier with 100 mA capability
- Nominal temperature range extended to 105° C
- Low frequency dynamic output impedance: < 150 mΩ
- Low output noise

Description

The AS535 is a three terminal adjustable shunt regulator utilizing an accurate 2.5V bandgap reference. The AS535 is functionally similar to an AS2431 except that the reference and amplifier operate off of a separate supply from the output, allowing very low output voltages (0.1V Typically)

Because of its robust bipolar technology, the AS535 handles a wide range of current, and holds off up to 18V so its use is not limited to low power, low voltage systems. Significant care has been taken to provide adequate AC bandwidth to allow the AS535 as an amplifier in control systems and power electronics. ASTEC also offers a 1.0% version of this part, the A535.

Pin Configuration — Top view

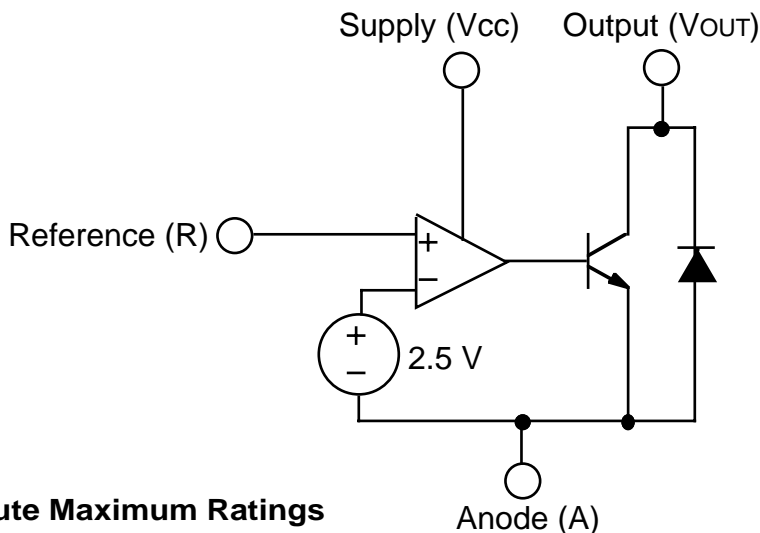


Ordering Information

Description	Temperature Range	0.5% Order Codes	1.0%
8-Pin Plastic SOIC	0 to 105° C	AS535D	A535D
4-Pin Plastic SIP	0 to 105° C	AS535SIP	A535SIP
SOT-23-5	0 to 105° C	AS535DBV	A535DBV



Functional Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Supply Voltage	VCC	18	V
Output Voltage	V _{OUT}	18	V
Anode-V _{OUT} Forward Current	I _{AO}	1	A
Operating Output Current	I _{OUT}	100	mA
Reference Input Current	I _{REF}	1	mA
Continuous Power at 25° C	P _D		
8L SOIC		750	mW
4L SIP		1000	mW
SOT-23-5		200	mW
Junction Temperature	T _J	150	°C
Storage Temperature	T _{STG}	- 65 to 150	°C
Lead Temperature (Soldering 10 sec.)	T _L	300	°C

Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Recommended Conditions

Parameter	Symbol	Rating	Unit
Output Voltage	V _{OUT}	-0.2 to 18	V
Output Current	I _{OUT}	10	mA

Typical Thermal Resistances

Package	θ _{JA}	θ _{JC}	Typical Derating
SOIC	175° C/W	45° C/W	5.7 mW/°C
SIP	95° C/W	50° C/W	10.5 mW/°C
SOT-23-5	575° C/W	150° C/W	1.7 mW/°C

Electrical Characteristics

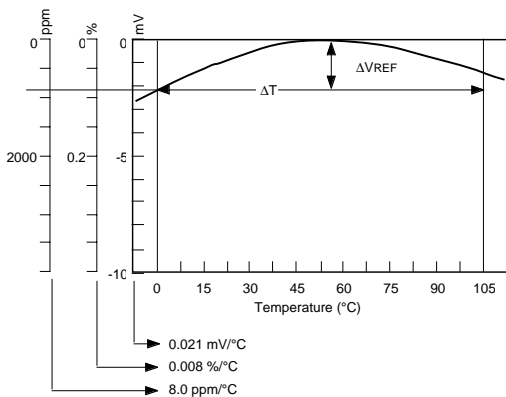
Electrical characteristics are guaranteed over the full junction temperature range (0-105 °C). Ambient temperature must be derated based upon power dissipation and package thermal characteristics. Unless otherwise stated, test conditions are: $V_{OUT} = V_{REF}$, $V_{CC} = 5V$ and $I_{OUT} = 1\text{ mA}$.

Parameter	Symbol	Test Condition	A535 (1.0 %)			AS535 (0.5 %)			Units
			Min	Typ	Max	Min	Typ	Max	
Supply Voltage	VCC		4		15	4		15	V
Supply Current	ICC			0.5	1		0.5	1	mA
Reference Voltage	V_{REF}	$T_J = 25^\circ\text{C}$	2.475	2.500	2.525	2.488	2.500	2.513	V
Line Regulation	ΔV_{OUT}	$V_{CC} = 4\text{ to }15\text{ V}$		-1	-10		-1	-10	mV
Load Regulation	ΔV_{OUT}	$I_{OUT} = 1\text{ to }100\text{ mA}$		1	50		1	50	mV
Temperature Deviation	ΔV_{OUT}	$0 < T_J < 105^\circ\text{C}$		3	10		3	8	mV
Reference Input Current	I_{REF}			0.1	0.4		0.1	0.4	μA
Amplifier open loop gain	A_v		70	80		70	80		dB
Amplifier Unity gain frequency	F_1	$C_{LOAD} < 1\text{ nF}$	1	2		1	2		MHz
Output Saturation Voltage	V_{SAT}	$I_{OUT} = 100\text{ mA}$			0.4			0.4	V
Off State Leakage	I_{LEAK}	$V_{REF} = 0\text{ V}, V_{OUT} = 15\text{ V}$		0.04	500		0.04	500	nA

*Temperature deviation is defined as the maximum deviation of the reference over the given temperature range and does not imply an incremental deviation at any given temperature.

Typical Performance Curves

*Calculating Average Temperature Coefficient (TC)



$$\bullet \text{ TC in mV}/^\circ\text{C} = \frac{\Delta V_{REF}}{\Delta T_A} \quad (\text{mV})$$

$$\bullet \text{ TC in } \%/^\circ\text{C} = \frac{\left(\frac{\Delta V_{REF}}{V_{REF \text{ at } 25^\circ\text{C}}} \right) \times 100}{\Delta T_A}$$

$$\bullet \text{ TC in ppm}/^\circ\text{C} = \frac{\left(\frac{\Delta V_{REF}}{V_{REF \text{ at } 25^\circ\text{C}}} \right) \times 10^6}{\Delta T_A}$$