

100mA, 30V Low Dropout Linear Regulator

General Description

The ASD78LXX are low power, low dropout linear regulators. They are designed to operate with wide input voltage range of 3.0 – 30 Volts while delivering 100mA of load current. These products are available in either fixed or adjustable output Voltages.

Designed primarily to survive in the harsh automotive environment, the device will protect all external load circuitry from input fault conditions caused by reverse battery connection, two battery jump starts, and excessive line transients during load dump.

Due to its low supply current consumption, the devices are ideally suited for standby power applications. The ASD78LXX offer complete short-circuit and thermal protection. The combination of these two internal protection circuits gives the device a comprehensive safety system to safe guard against extreme adverse operating conditions.

The ASD78LXX are available in thermally enhanced SOT89 package, and it is rated for -40°C to +125°C temperature range.

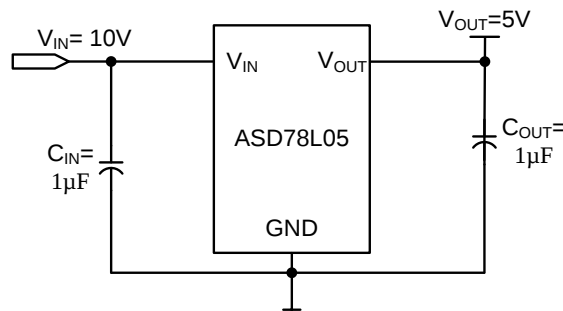
Features

- V_{IN} range: 3.0 – 30V
- 100mA maximum output current
- 2mA of typical supply current
- 0.02% line and 0.2% load regulation
- 360mV typical dropout voltage @ full load
- Short circuit protection
- Thermal shutdown protection
- -40°C to +125°C temperature range
- Available in SOT-89 package
- RoHS & WEEE compliant

Applications

- Set-top Box
- Automotive
- Remote Control

Typical Application



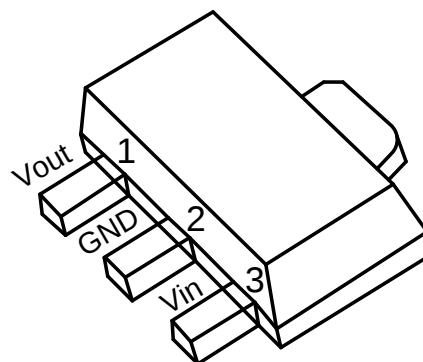
Pin Description

Symbol	Description
GND	Ground connection.
V_{OUT}	Regulated output Voltage. Connect a 1μF capacitor from this pin to ground.
V_{IN}	Input supply pin. Connect a 1μF capacitor between this pin and ground.

Pin Configuration

ASD78LXX

SOT89 (Top View)



Absolute Maximum Ratings ⁽¹⁾

Maximum Input Supply Voltage -0.3V to 35V

Recommended Operating Conditions

Input Voltage 3.0 to 30V

Ambient Operating Temperature..... -40°C to +125°C

Thermal Information ⁽²⁾

SOT-89 θ_{JA} 160°C/W

Storage Temperature Range -65 to 150°C

Lead Temperature (soldering 10s) 300°C

Junction Temperature -40°C to +125°C

Electrical Characteristics

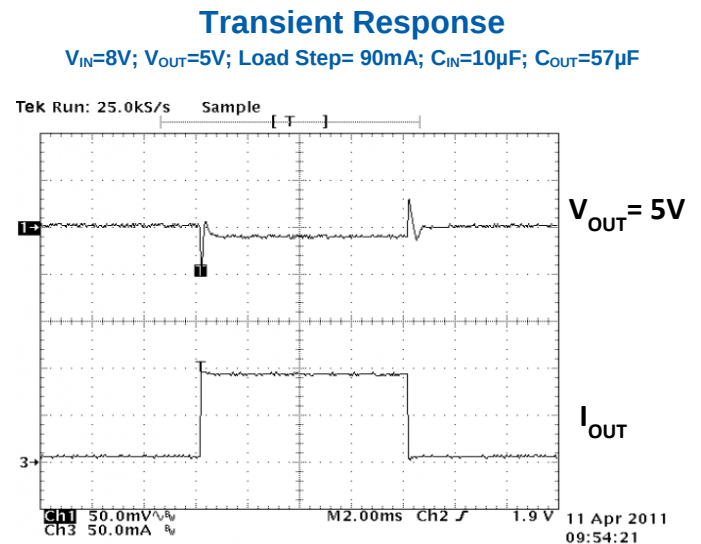
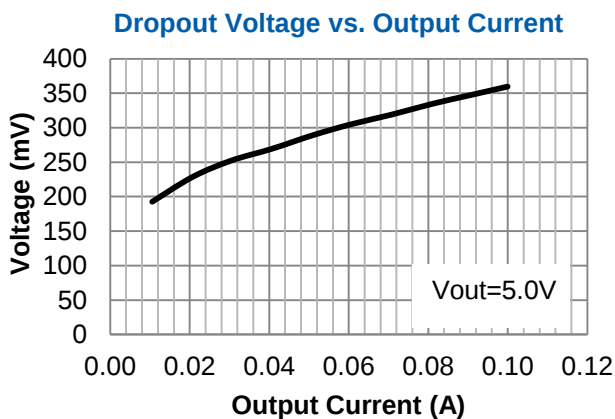
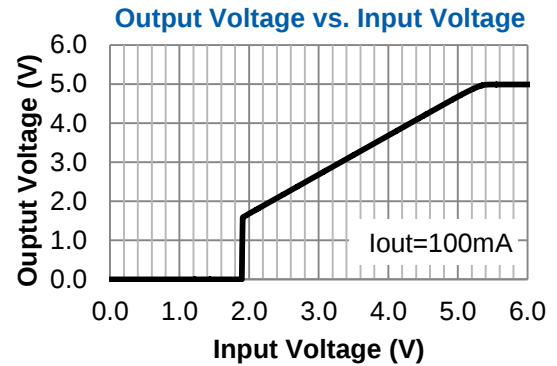
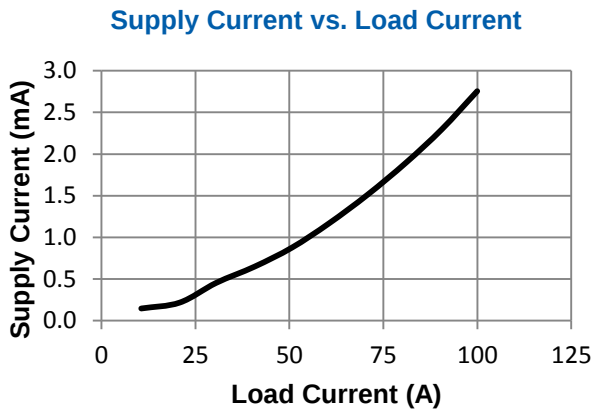
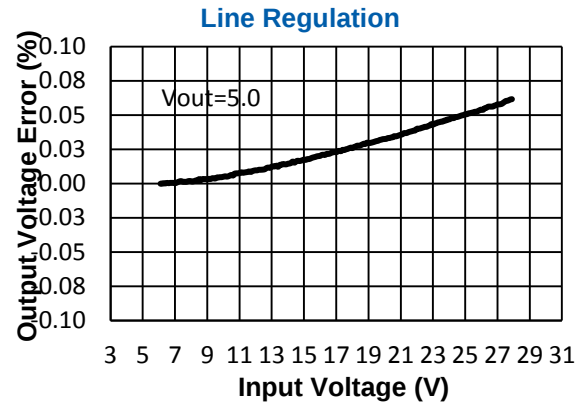
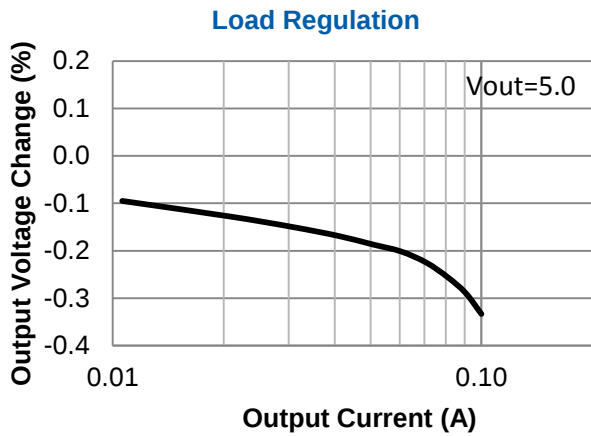
UNLESS OTHERWISE NOTED: $V_{IN}=6.5V$; $V_O=5.0V$; $C_{IN}=10\mu F$; $C_{OUT}=57\mu F$; $-40^{\circ}C \leq T_A=T_J \leq 125^{\circ}C$; $T_{J(MAX)}=125^{\circ}C$; TYPICAL VALUES ARE $T_A=25^{\circ}C$

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy	V_{OUT}	Fixed $V_{OUT}=5V$; $I_{OUT}=100mA$	-0.5		0.5	%
Dropout Voltage	V_D	$V_{IN}=99\%*V_{OUT}$; $I_{OUT}=100mA$		360	450	mV
Minimum Output Current	I_O		100			mA
Supply Current	I_Q	Fixed Option; $I_{OUT}=100mA$		2.75	10	mA
Current Limit	I_{LIM}					A
Line Regulation		$6.0V \leq V_{IN}-V_{OUT} \leq 28V$; $I_{OUT}=10mA$		0.06	0.2	%
Load Regulation ^{1,3}		$V_{IN}=6.5V$; $I_{OUT}=10mA - 100mA$	-0.5	0.33	0.5	%
Ripple Rejection Ratio	PSRR	$F=120Hz$; $I_O=1A$; $V_O - V_{IN}=2.5V$		58		dB

Notes:

1. Stresses above those listed in Absolute Maximum Ratings may cause permanent damage to the device.
2. Measured on approximately 1" square of 1oz copper
3. The ASD78LXX is guaranteed to meet performance specifications over the -40°C to +125°C operating temperature range and is assured by design, characterization, and correlation with statistical process control.

Typical Characteristic



Application Hint

Input Capacitor (C_{IN})

Input capacitor may be required when the device is not near the source power supply or when supplied by a battery. This capacitor will reduce the circuit's sensitivity when powered from complex source impedance and significantly enhance the output transient response. The input bypass should be mounted with the short possible track directly across the regulator's input and ground terminals. A 1 μ F (tantalum, ceramic or aluminum) electrolytic capacitor should be adequate for most applications.

Output Capacitor (C_{OUT})

The output capacitor provides not only stability to the regulator, but also, enhances the load transient response. For output voltages greater than 5V, a minimum capacitance of 1 μ F is required. For output voltages less than 5V, a 3.3 μ F capacitance is recommended. The capacitors should have ESR ranging from 20m Ω to 5 Ω . Higher values of the output capacitance can be used to enhance transient response.

Thermal Considerations

The ASD78LXX is designed to provide 100mA of continuous current in a very small package. Maximum power dissipation can be calculated based on the output current and the voltage drop across the part. To determine the maximum power dissipation of the package, use the junction-to-ambient thermal resistance of the device and the following basic equation:

$$P_{D(max)} = \left(\frac{T_{J(max)} - T_A}{\theta_{JA}} \right)$$

Where $T_{J(max)}$ is the maximum junction temperature of the die, T_A is the ambient operating temperature, and θ_{JA} is layout dependent.

The actual power dissipation of the regulator circuit can be determined using the equation:

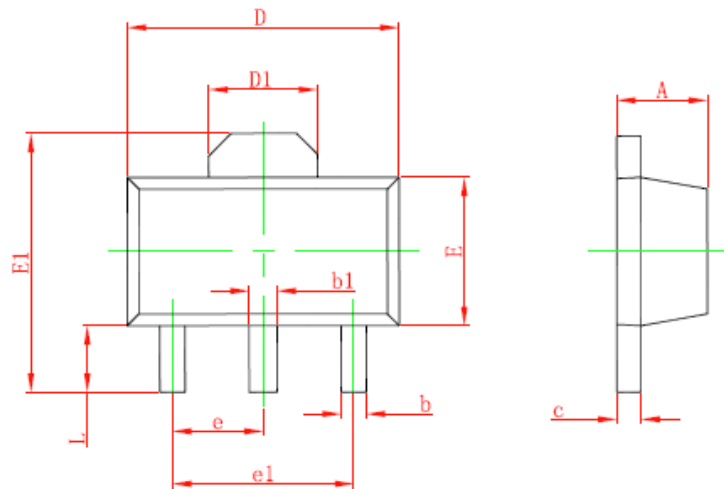
$$P_D = (V_{IN} - V_{OUT}) * I_{OUT} + V_{IN} * I_{SUP}$$

Substituting $P_{D(max)}$ for P_D and solving for the operating conditions that are critical to the application will give the maximum operating conditions for the regulator circuit.

Ordering Information

Device	Package	Output Voltage	Packing Method & Quantity
ASD78L05R	SOT89-3L	5.0V	2500 Tape & Reel
ASD78L33R	SOT89-3L	3.3V	2500 Tape & Reel
ASD78L30R	SOT89-3L	3.0V	2500 Tape & Reel
ASD78L25R	SOT89-3L	2.5V	2500 Tape & Reel
ASD78L18R	SOT89-3L	1.8V	2500 Tape & Reel
ASD78L15R	SOT89-3L	1.5V	2500 Tape & Reel

Outline Drawing and Landing Pattern (SOT89)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

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