National Semiconductor

December 16, 2010

LM123QML

3-Amp, 5-Volt Positive Regulator

General Description

The LM123 is a three-terminal positive regulator with a preset 5V output and a load driving capability of 3 amps. New circuit design and processing techniques are used to provide the high output current without sacrificing the regulation characteristics of lower current devices.

The 3 amp regulator is virtually blowout proof. Current limiting, power limiting, and thermal shutdown provide the same high level of reliability obtained with these techniques in the LM109 1 amp regulator.

No external components are required for operation of the LM123. If the device is more than 4 inches from the filter capacitor, however, a 1 µF solid tantalum capacitor should be used on the input. A 0.1 µF or larger capacitor may be used on the output to reduce load transient spikes created by fast switching digital logic, or to swamp out stray load capacitance.

An overall worst case specification for the combined effects of input voltage, load currents, ambient temperature, and power dissipation ensure that the LM123 will perform satisfactorily as a system element.

For applications requiring other voltages, see LM150 series adjustable regulator data sheet.

Features

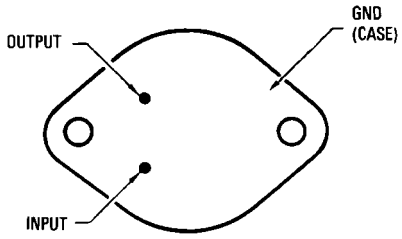
- 3 amp output current
- Internal current and thermal limiting
- 0.01Ω typical output impedance
- 7.5V minimum input voltage
- 30W power dissipation

Ordering Information

NS Part Number	SMD Part Number	NS Package Number	Package Description
LM123K/883		K02C	2LD T0-3 Metal Can

Connection Diagram

Metal Can Package



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See NS Package Number K02C

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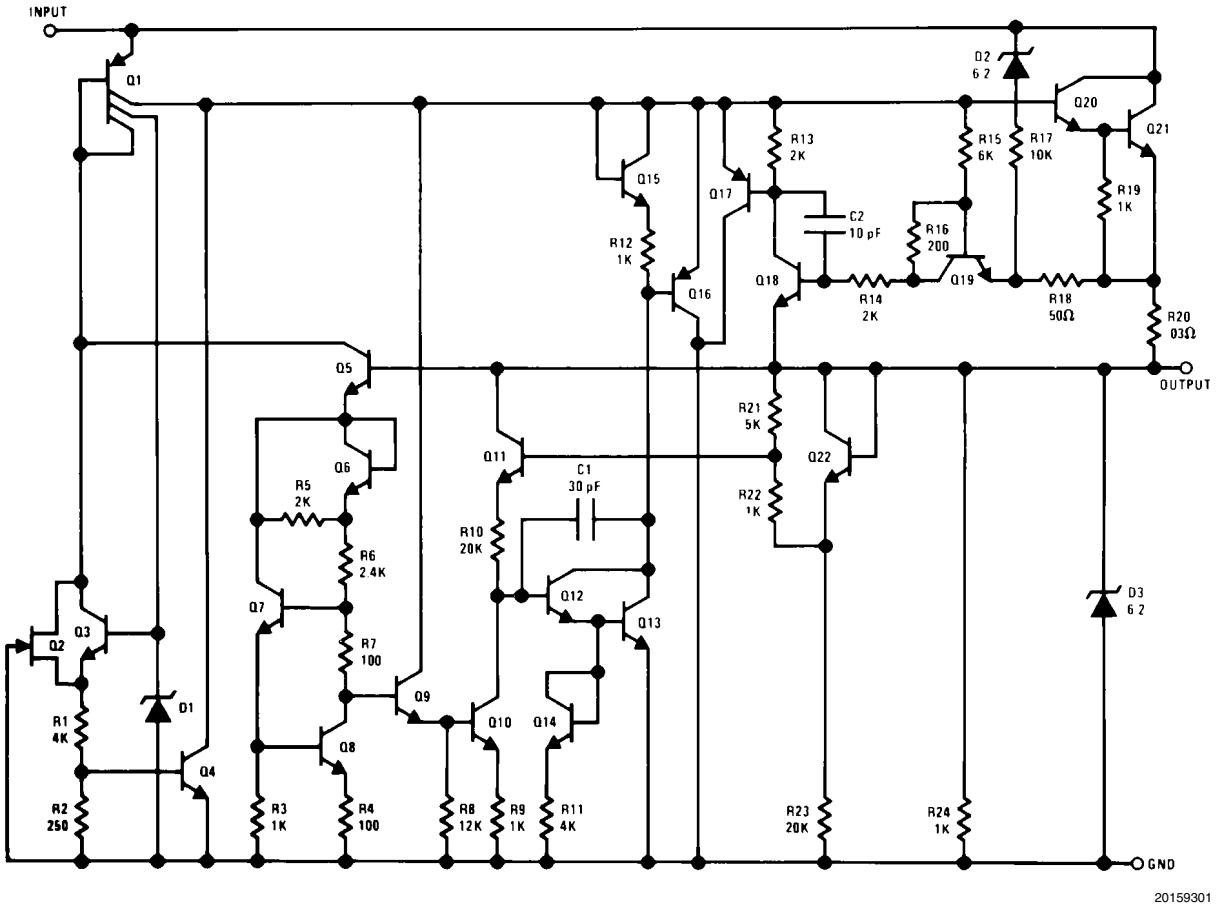
Schematic Diagram



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Absolute Maximum Ratings (*Note 1*)

Input Voltage	20V
Power Dissipation (*Note 2*)	Internally Limited
Operating Junction Temperature Range	$-55°C \le T_J \le +150°C$
Storage Temperature Range	$-65°C \le T_J \le +150°C$
Lead Temperature (Soldering, 10 sec.)	300°C
ESD Tolerance (*Note 3*)	2000V

Quality Conformance Inspection

Mil-Std-883, Method 5005 - Group A

Subgroup	Description	Temp (°C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55
12	Settling time at	+25
13	Settling time at	+125
14	Settling time at	-55

DC Parameters

Symbol	Parameter	Conditions	Notes	Min	Max	Units	Sub-groups
V_{OUT}	Output Voltage	V_{IN} = 7.5V, I_O = 0A		4.7	5.3	V	1
		7.5V ≤ V_{IN} ≤ 15V, 0 ≤ I_O ≤ 3A, P ≤ 30W		4.6	5.4	V	1, 2, 3
V_{RLine}	Line Regulation	7.5V ≤ V_{IN} ≤ 15V, I_O = 0A		-25	25	mV	1
V_{RLoad}	Load Regulation	V_{IN} = 7.5V, 0 ≤ I_O ≤ 3A		-100	100	mV	1
I_Q	Quiescent Current	V_{IN} = 15V, 0 ≤ I_O ≤ 3A			20	mA	1, 2, 3
		V_{IN} = 7.5V, 0 ≤ I_O ≤ 3A			20	mA	1, 2, 3
I_{SC}	Short Circuit Current	V_{IN} = 15V			4.5	A	1
		V_{IN} =7.5V			5.0	A	1
$\Delta V_O / \Delta T$	Long Term Stability		(*Note 4*)		35	mV	1

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed. Some performance characteristics may degrade when the device is not operated under the listed test conditions.

Note 2: The maximum power dissipation must be derated at elevated temperatures and is dictated by T_{Jmax} (maximum junction temperature), θ_{JA} (package junction to ambient thermal resistance), and T_A (ambient temperature). The maximum allowable power dissipation at any temperature is $P_{Dmax} = (T_{Jmax} - T_A)/\theta_{JA}$ or the number given in the Absolute Maximum Ratings, whichever is lower.

Note 3: Human body model, 1.5 kΩ in series with 100 pF.

Note 4: Guaranteed parameter not tested.

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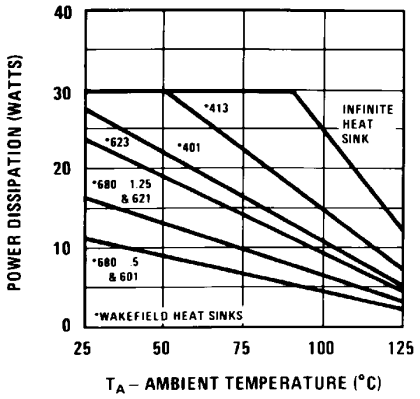
Typical Performance Characteristics

Maximum Average Power Dissipation for LM123



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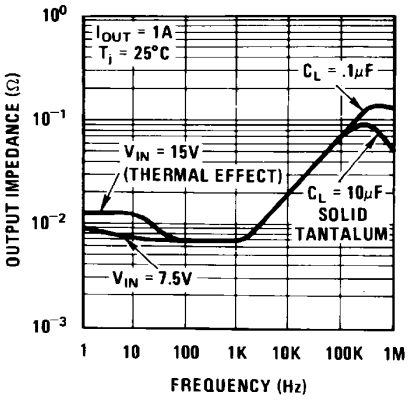
Output Impedance



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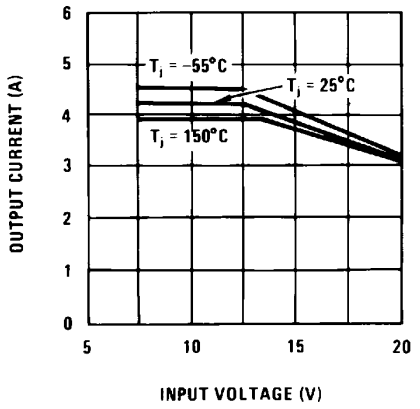
Peak Available Output Current



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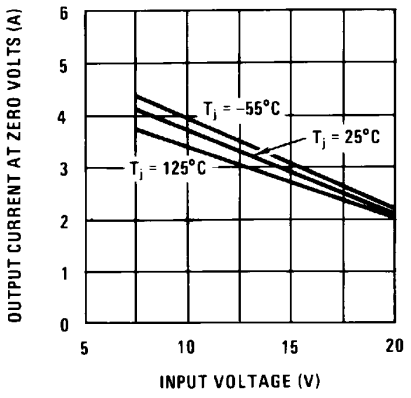
Short Circuit Current



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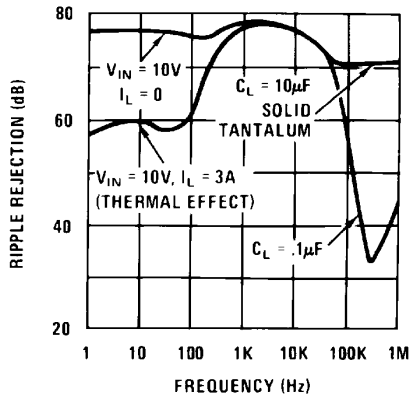
Ripple Rejection



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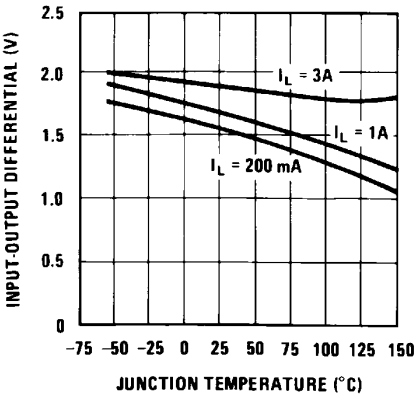
Dropout Voltage



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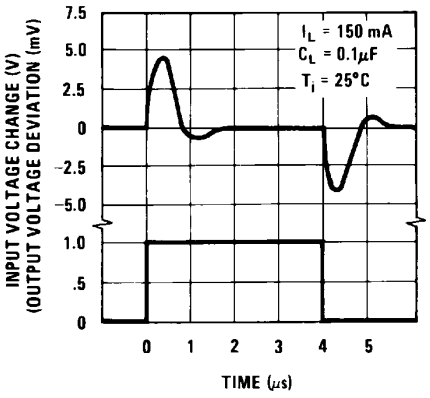
Line Transient Response



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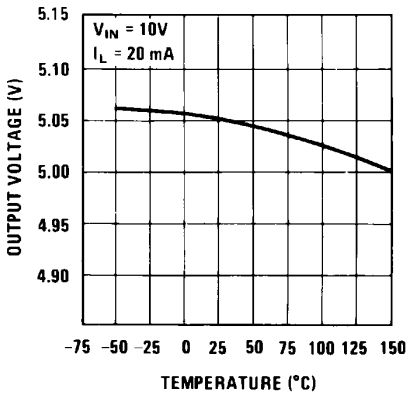
Output Voltage



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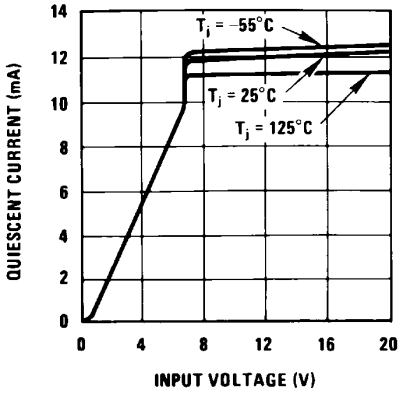
Quiescent Current



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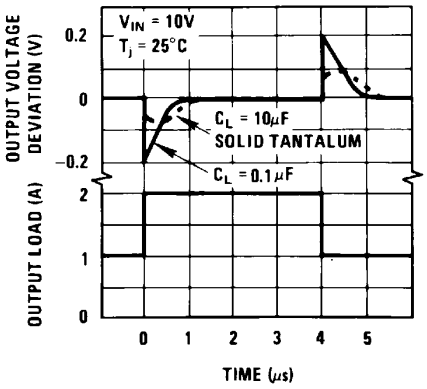
Load Transient Response



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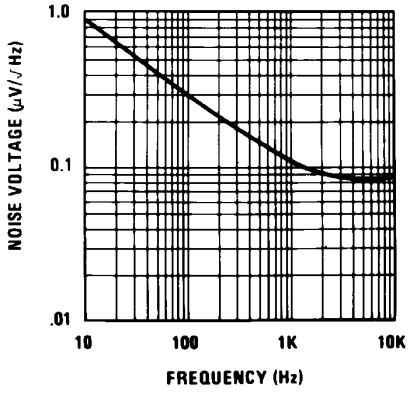
Output Noise Voltage



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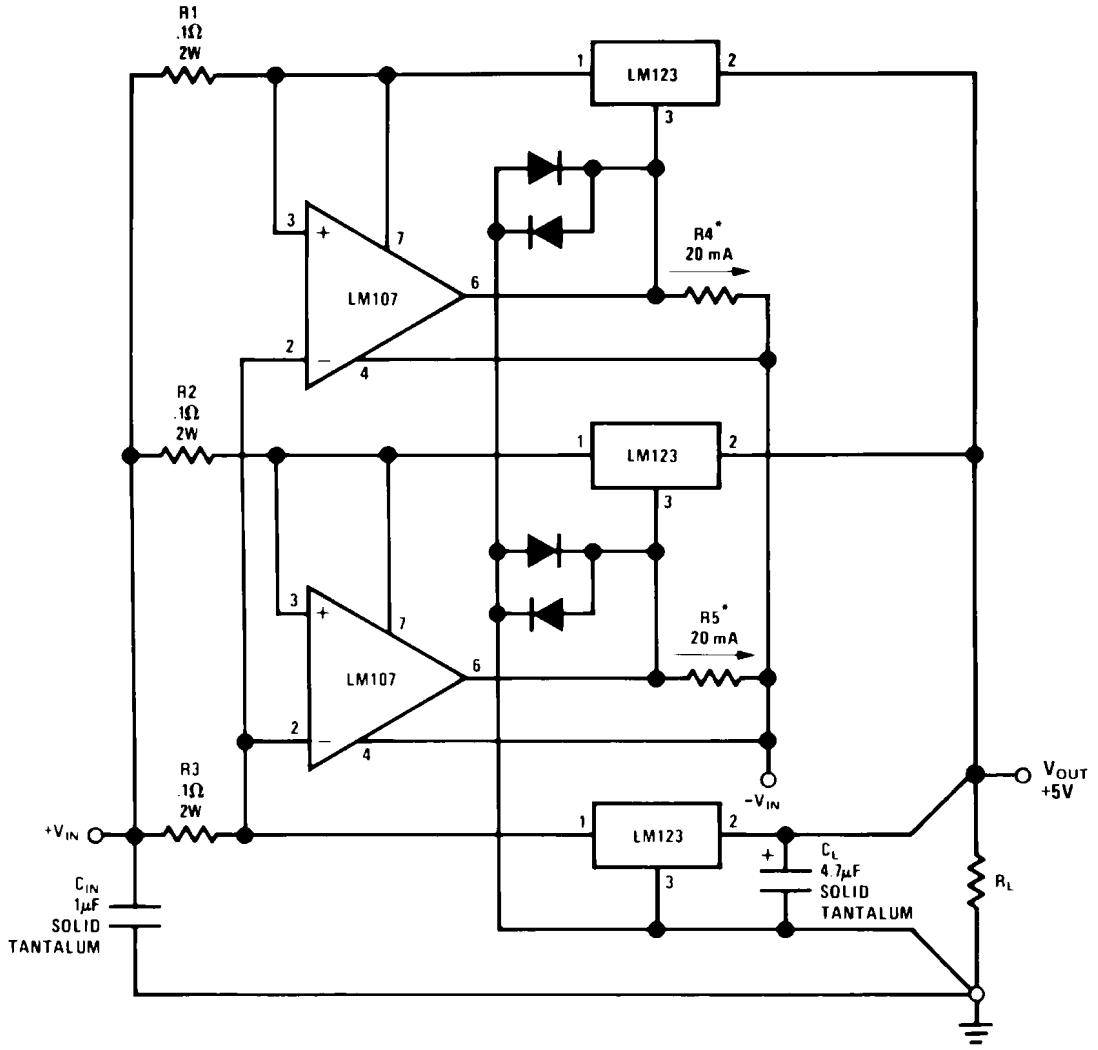
Typical Applications

10 Amp Regulator with Complete Overload Protection



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*Select for 20 mA Current from Unregulated Negative Supply

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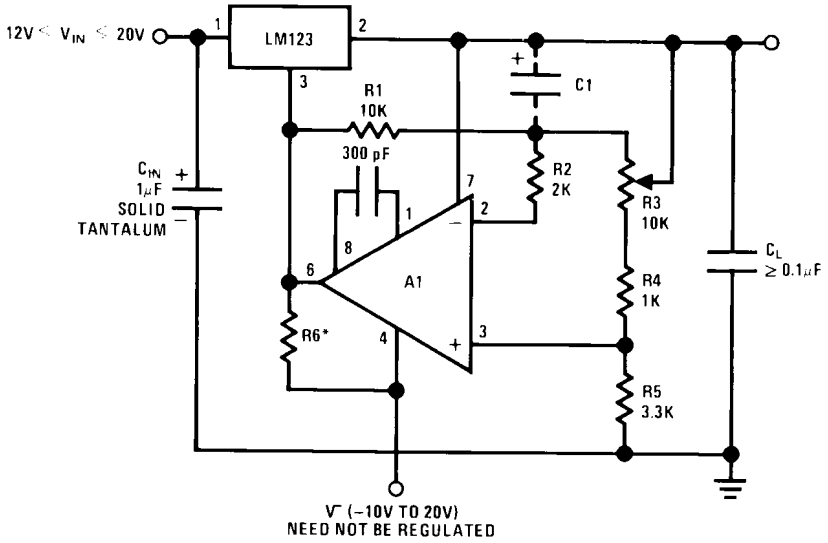
Adjustable Regulator 0V–10V @ 3A



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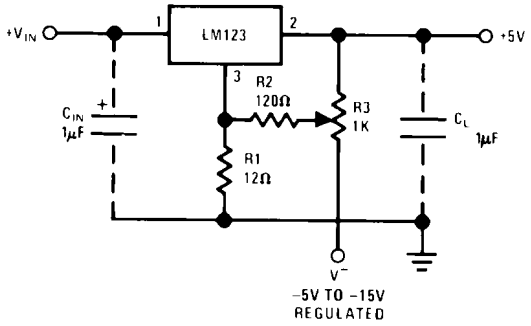
$$*R6 = \frac{V^-}{12\ mA}$$

A_1—LM101A

C_1—2 µF Optional—Improves Ripple Rejection, Noise, and Transient Response

Trimming Output to 5V



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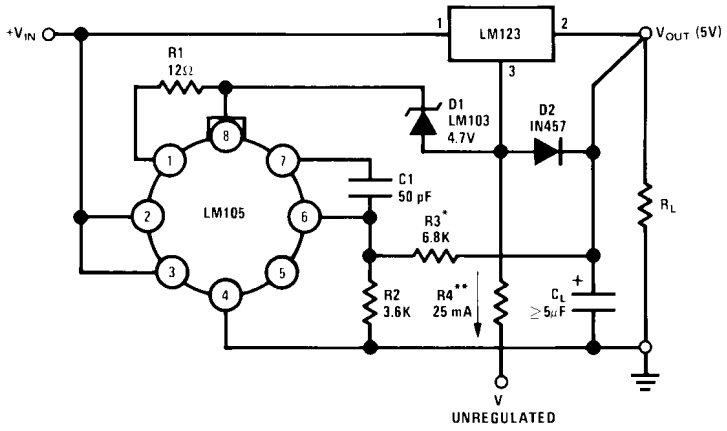
Adjustable Output 5V–10V 0.1% Regulation



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*Select to Set Output Voltage

**Select to Draw 25 mA from V⁻

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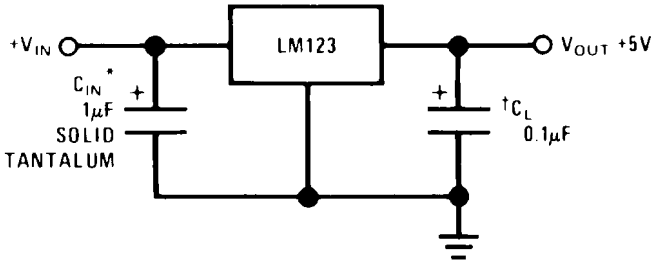
Basic 3 Amp Regulator



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*Required if LM123 is more than 4″ from filter capacitor.

†Regulator is stable with no load capacitor into resistive loads.

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Revision History Section

Released	Revision	Section	Changes
12/16/2010	A	New Release, Corporate format	1 MDS data sheet converted into one Corp. data sheet format. The drift table was eliminated from the 883 section since it did not apply; MNLM123-X Rev 0BL will be archived.

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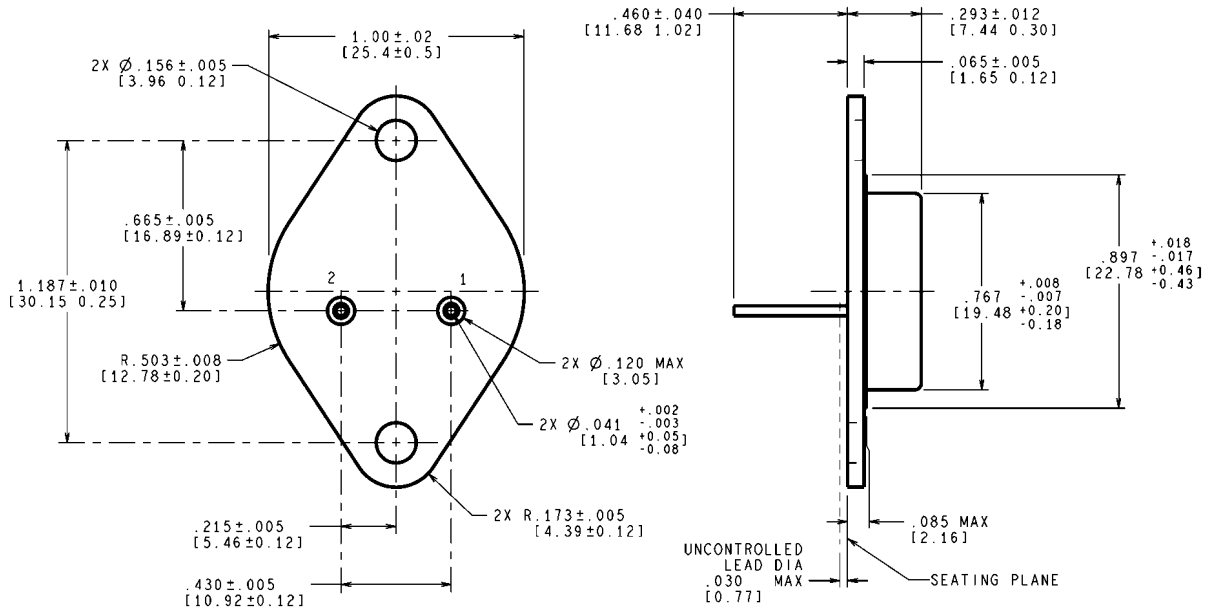
Physical Dimensions inches (millimeters) unless otherwise noted



CONTROLLING DIMENSION IS INCH
VALUES IN [ ] ARE MILLIMETERS

MIL-PRF-38535
CONFIGURATION CONTROL

K02C (Rev E)

Metal Can Package (K)
NS Package Number K02C

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Notes

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Notes

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