Rochester Electronics

Datasheet

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
    - Class Q Military
    - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)

    - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

National Semiconductor

August 11, 2010

LM120/LM320

Series 3-Terminal Negative Regulators

General Description

The LM120 series are three-terminal negative regulators with a fixed output voltage of −5V, −12V, and −15V, and up to 1.5A load current capability. Where other voltages are required, the LM137 and LM137HV series provide an output voltage range of −1.2V to −47V.

The LM120 need only one external component—a compensation capacitor at the output, making them easy to apply. Worst case guarantees on output voltage deviation due to any combination of line, load or temperature variation assure satisfactory system operation.

Exceptional effort has been made to make the LM120 Series immune to overload conditions. The regulators have current limiting which is independent of temperature, combined with thermal overload protection. Internal current limiting protects against momentary faults while thermal shutdown prevents junction temperatures from exceeding safe limits during prolonged overloads.

Although primarily intended for fixed output voltage applications, the LM120 Series may be programmed for higher output voltages with a simple resistive divider. The low quiescent drain current of the devices allows this technique to be used with good regulation.

Features

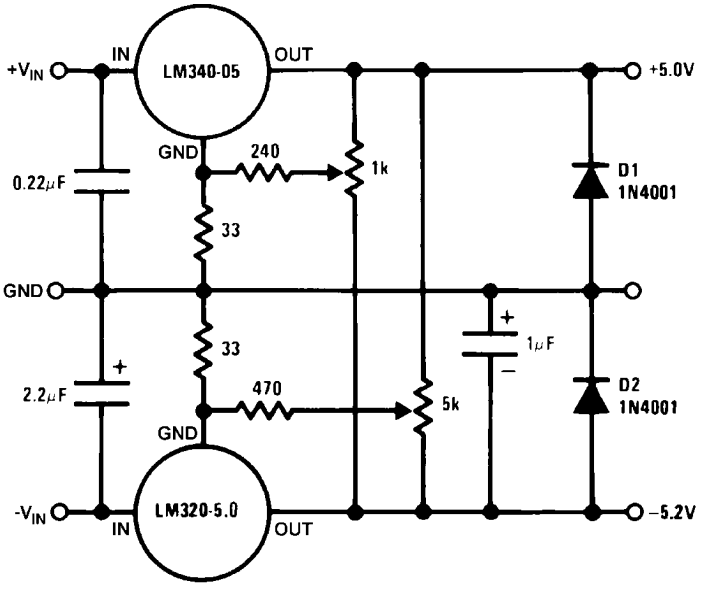
- Preset output voltage error less than ±3%
- Preset current limit
- Internal thermal shutdown
- Operates with input-output voltage differential down to 1V
- Excellent ripple rejection
- Low temperature drift
- Easily adjustable to higher output voltage

LM120 Series Packages and Power Capability

Device	Package	Rated Power Dissipation	Design Load Current
LM120/LM320	TO-3 (K)	20W	1.5A
	TO-39 (H)	2W	0.5A
LM320	TO-220 (T)	15W	1.5A

Typical Applications

Dual Trimmed Supply



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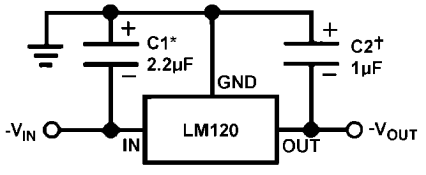
Fixed Regulator



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*Required if regulator is separated from filter capacitor by more than 3 inches. For value given, capacitor must be solid tantalum. 25 µF aluminum electrolytic may be substituted.

†Required for stability. For value given, capacitor must be solid tantalum. 25 µF aluminum electrolytic may be substituted. Values given may be increased without limit.

For output capacitance in excess of 100 µF, a high current diode from input to output (1N4001, etc.) will protect the regulator from momentary input shorts.

Absolute Maximum Ratings

−5 Volt Regulators (*Note 5*, *Note 3*)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Power Dissipation	Internally Limited
Input Voltage	−25V
Input-Output Voltage Differential	25V
Junction Temperatures	(*Note 1*)
Storage Temperature Range	−65°C to +150°C
Lead Temperature	
(Soldering, 10 sec.)	300°C
Plastic	260°C

LM120K-5.0 and LM320K-5.0 Electrical Characteristics (*Note 3*)

Order Numbers		Metal Can Package						Units
		LM120K-5.0 (TO-3)			LM320K-5.0 (TO-3)			
Design Output Current (I_D) Device Dissipation (P_D)		1.5A 20W						
Parameter	**Conditions** (*Note 1*)	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	
Output Voltage	T_J = 25°C, V_{IN} =10V, I_{LOAD} = 5 mA	−5.1	−5	−4.9	−5.2	−5	−4.8	V
Line Regulation	T_J = 25°C, I_{LOAD} = 5 mA, $V_{MIN} \le V_{IN} \le V_{MAX}$		10	25		10	40	mV
Input Voltage		−25		−7	−25		−7	V
Ripple Rejection	f = 120 Hz	54	64		54	64		dB
Load Regulation, (*Note 2*)	T_J = 25°C, V_{IN} = 10V, 5 mA $\le I_{LOAD} \le I_D$		50	75		60	100	mV
Output Voltage, (*Note 1*)	−7.5V $\le V_{IN} \le V_{MAX}$, 5 mA $\le I_{LOAD} \le I_D$, P $\le P_D$	−5.20		−4.80	−5.25		−4.75	V
Quiescent Current	$V_{MIN} \le V_{IN} \le V_{MAX}$		1	2		1	2	mA
Quiescent Current Change	T_J = 25°C							
	$V_{MIN} \le V_{IN} \le V_{MAX}$		0.1	0.4		0.1	0.4	mA
	5 mA $\le I_{LOAD} \le I_D$		0.1	0.4		0.1	0.4	mA
Output Noise Voltage	T_A = 25°C, C_L = 1 µF, I_L = 5 mA, V_{IN} = 10V, 10 Hz ≤ f ≤ 100 kHz		150			150		µV
Long Term Stability			5	50		5	50	mV
Thermal Resistance								
Junction to Case				3			3	°C/W
Junction to Ambient				35			35	°C/W

LM120H-5.0 Electrical Characteristics (*Note 3*)

Order Numbers		Metal Can Package			Units
		LM120H-5.0 (TO-39)			
Design Output Current (I_D) Device Dissipation (P_D)		0.5A 2W			
Parameter	**Conditions** (*Note 1*)	**Min**	**Typ**	**Max**	
Output Voltage	T_J = 25°C, V_{IN} =10V, I_{LOAD} = 5 mA	−5.1	−5	−4.9	V
Line Regulation	T_J = 25°C, I_{LOAD} = 5 mA, $V_{MIN} \le V_{IN} \le V_{MAX}$		10	25	mV
Input Voltage		−25		−7	V
Ripple Rejection	f = 120 Hz	54	64		dB
Load Regulation, (*Note 2*)	T_J = 25°C, V_{IN} = 10V, 5 mA $\le I_{LOAD} \le I_D$		30	50	mV
Output Voltage, (*Note 6*)	−7.5V $\le V_{IN} \le V_{MAX}$, 5 mA $\le I_{LOAD} \le I_D$, P $\le P_D$	−5.20		−4.80	V
Quiescent Current	$V_{MIN} \le V_{IN} \le V_{MAX}$		1	2	mA
Quiescent Current Change	T_J = 25°C				
	$V_{MIN} \le V_{IN} \le V_{MAX}$		0.05	0.4	mA
	5 mA $\le I_{LOAD} \le I_D$		0.04	0.4	mA
Output Noise Voltage	T_A = 25°C, C_L = 1 µF, I_L = 5 mA, V_{IN} = 10V, 10 Hz ≤ f ≤ 100 kHz		150		µV
Long Term Stability			5		mV
Thermal Resistance					
Junction to Case				(*Note 4*)	°C/W
Junction to Ambient				(*Note 4*)	°C/W

Note 1: This specification applies over −55°C ≤ T_J ≤ +150°C for the LM120 and 0°C ≤ T_J ≤ +125°C for the LM320.

Note 2: Regulation is measured at constant junction temperature. Changes in output voltage due to heating effects must be taken into account separately. To ensure constant junction temperature, low duty cycle, pulse testing is used. The LM120/LM320 series does have low thermal feedback, improving line and load regulation. On all other tests, even though power dissipation is internally limited, electrical specifications apply only up to P_D.

Note 3: For −5V 3 amp regulators, see LM145 data sheet.

Note 4: Thermal resistance of typically 85°C/W (in 400 linear feet air flow), 224°C/W (in static air) junction to ambient, of typically 21°C/W junction to case.

Note 5: Refer to RETS120-5H drawing for LM120H-5.0 or RETS120-5K drawing for LM120-5K military specifications.

Absolute Maximum Ratings

−12 Volt Regulators (*Note 9*)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Power Dissipation	Internally Limited
Input Voltage	−35V
Input-Output Voltage Differential	30V
Junction Temperatures	(*Note 6*)
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 10 sec.)	300°C

LM120K-12 Electrical Characteristics

Order Numbers		Metal Can Package LM120K-12 (TO-3)			Units
Design Output Current (I_D) Device Dissipation (P_D)		1A 20W			
Parameter	**Conditions** (*Note 6*)	**Min**	**Typ**	**Max**	
Output Voltage	T_J = 25°C, V_{IN} = 17V, I_{LOAD} = 5 mA	−12.3	−12	−11.7	V
Line Regulation	T_J = 25°C, I_{LOAD} = 5 mA, $V_{MIN} \le V_{IN} \le V_{MAX}$		4	10	mV
Input Voltage		−32		−14	V
Ripple Rejection	f = 120 Hz	56	80		dB
Load Regulation, (*Note 7*)	T_J = 25°C, V_{IN} = 17V, 5 mA $\le I_{LOAD} \le I_D$		30	80	mV
Output Voltage, (*Note 6*)	14.5V $\le V_{IN} \le V_{MAX}$, 5 mA $\le I_{LOAD} \le I_D$, $P \le P_D$	−12.5		−11.5	V
Quiescent Current	$V_{MIN} \le V_{IN} \le V_{MAX}$		2	4	mA
Quiescent Current Change	T_J = 25°C $V_{MIN} \le V_{IN} \le V_{MAX}$ 5 mA $\le I_{LOAD} \le I_D$		 0.1 0.1	 0.4 0.4	 mA mA
Output Noise Voltage	T_A = 25°C, C_L = 1 µF, I_L = 5 mA, V_{IN} = 17V, 10 Hz ≤ f ≤ 100 kHz		400		µV
Long Term Stability			12	120	mV
Thermal Resistance Junction to Case Junction to Ambient				 3 35	 °C/W °C/W

LM120H-12 Electrical Characteristics

Order Numbers		Metal Can Package			Units
		LM120H-12 (TO-39)			
Design Output Current (I_D)		0.2A			
Device Dissipation (P_D)		2W			
Parameter	**Conditions** (*Note 6*)	**Min**	**Typ**	**Max**	
Output Voltage	T_J = 25°C, V_{IN} = 17V, I_{LOAD} = 5 mA	−12.3	−12	−11.7	V
Line Regulation	T_J = 25°C, I_{LOAD} = 5 mA, $V_{MIN} \le V_{IN} \le V_{MAX}$		4	10	mV
Input Voltage		−32		−14	V
Ripple Rejection	f = 120 Hz	56	80		dB
Load Regulation, (*Note 7*)	T_J = 25°C, V_{IN} = 17V, 5 mA $\le I_{LOAD} \le I_D$		10	25	mV
Output Voltage, (*Note 6*)	14.5V $\le V_{IN} \le V_{MAX}$, 5 mA $\le I_{LOAD} \le I_D$, P $\le P_D$	−12.5		−11.5	V
Quiescent Current	$V_{MIN} \le V_{IN} \le V_{MAX}$		2	4	mA
Quiescent Current Change	T_J = 25°C				
	$V_{MIN} \le V_{IN} \le V_{MAX}$		0.05	0.4	mA
	5 mA $\le I_{LOAD} \le I_D$		0.03	0.4	mA
Output Noise Voltage	T_A = 25°C, C_L = 1 µF, I_L = 5 mA, V_{IN} = 17V, 10 Hz ≤ f ≤ 100 kHz		400		µV
Long Term Stability			12	120	mV
Thermal Resistance					
Junction to Case				(*Note 8*)	°C/W
Junction to Ambient				(*Note 8*)	°C/W

LM320T-12 Electrical Characteristics

Order Numbers		Power Plastic Package			Units
		LM320T-12 (TO-220)			
Design Output Current (I_D)		1A			
Device Dissipation (P_D)		15W			
Parameter	**Conditions** (*Note 6*)	**Min**	**Typ**	**Max**	
Output Voltage	T_J = 25°C, V_{IN} = 17V, I_{LOAD} = 5 mA	−12.4	−12	−11.6	V
Line Regulation	T_J = 25°C, I_{LOAD} = 5 mA, $V_{MIN} \le V_{IN} \le V_{MAX}$		4	20	mV
Input Voltage		−32		−14.5	V
Ripple Rejection	f = 120 Hz	56	80		dB
Load Regulation, (*Note 7*)	T_J = 25°C, V_{IN} = 17V, 5 mA $\le I_{LOAD} \le I_D$		30	80	mV
Output Voltage, (*Note 6*)	14.5V $\le V_{IN} \le V_{MAX}$, 5 mA $\le I_{LOAD} \le I_D$, P $\le P_D$	−12.6		−11.4	V
Quiescent Current	$V_{MIN} \le V_{IN} \le V_{MAX}$		2	4	mA
Quiescent Current Change	T_J = 25°C				
	$V_{MIN} \le V_{IN} \le V_{MAX}$		0.1	0.4	mA
	5 mA $\le I_{LOAD} \le I_D$		0.1	0.4	mA
Output Noise Voltage	T_A = 25°C, C_L = 1 µF, I_L = 5 mA, V_{IN} = 17V, 10 Hz ≤ f ≤ 100 kHz		400		µV
Long Term Stability			24		mV
Thermal Resistance					
Junction to Case			4		°C/W
Junction to Ambient			50		°C/W

Note 6: This specification applies over −55°C ≤ T_J ≤ +150°C for the LM120 and 0°C ≤ T_J ≤ +125°C for the LM320.

Note 7: Regulation is measured at constant junction temperature. Changes in output voltage due to heating effects must be taken into account separately. To ensure constant junction temperature, low duty cycle, pulse testing is used. The LM120/LM320 series does have low thermal feedback, improving line and load regulation. On all other tests, even though power dissipation is internally limited, electrical specifications apply only up to P_D.

Note 8: Thermal resistance of typically 85°C/W (in 400 linear feet/min air flow), 224°C/W (in static air) junction to ambient, of typically 21°C/W junction to case.

Note 9: Refer to RETS120H-12 drawing for LM120H-12 or RETS120-12K drawing for LM120K-12 military specifications.

Absolute Maximum Ratings

−15 Volt Regulators (*Note 13*)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Power Dissipation	Internally Limited
Input Voltage	
LM120/LM320	−40V
LM320T	−35V
Input-Output Voltage Differential	30V
Junction Temperatures	(*Note 10*)
Storage Temperature Range	−65°C to +150°C
Lead Temperature	
(Soldering, 10 sec.)	300°C

LM120K-15 and LM320K-15 Electrical Characteristics

Order Numbers		Metal Can Package						Units
		LM120K-15 (TO-3)			LM320K-15 (TO-3)			
Design Output Current (I_D)		1A						
Device Dissipation (P_D)		20W						
Parameter	**Conditions** (*Note 10*)	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	
Output Voltage	T_J = 25°C, V_{IN} = 20V, I_{LOAD} = 5 mA	−15.3	−15	−14.7	−15.4	−15	−14.6	V
Line Regulation	T_J = 25°C, I_{LOAD} = 5 mA, $V_{MIN} \le V_{IN} \le V_{MAX}$		5	10		5	20	mV
Input Voltage		−35		−17	−35		−17	V
Ripple Rejection	f = 120 Hz	56	80		56	80		dB
Load Regulation, (*Note 11*)	T_J = 25°C, V_{IN} = 20V, 5 mA ≤ $I_{LOAD} \le I_D$		30	80		30	80	mV
Output Voltage, (*Note 10*)	17.5V ≤ $V_{IN} \le V_{MAX}$, 5 mA ≤ $I_{LOAD} \le I_D$, P ≤ P_D	−15.5		−14.5	−15.6		−14.4	V
Quiescent Current	$V_{MIN} \le V_{IN} \le V_{MAX}$		2	4		2	4	mA
Quiescent Current Change	T_J = 25°C							
	$V_{MIN} \le V_{IN} \le V_{MAX}$		0.1	0.4		0.1	0.4	mA
	5 mA ≤ $I_{LOAD} \le I_D$		0.1	0.4		0.1	0.4	mA
Output Noise Voltage	T_A = 25°C, C_L = 1 µF, I_L = 5 mA, V_{IN} = 20V, 10 Hz ≤ f ≤ 100 kHz		400			400		µV
Long Term Stability			15	150		15	150	mV
Thermal Resistance								
Junction to Case				3			3	°C/W
Junction to Ambient				35			35	°C/W

LM120H-15 Electrical Characteristics

Order Numbers		Metal Can Package LM120H-15 (TO-39)			Units
Design Output Current (I_D) Device Dissipation (P_D)		0.2A 2W			
Parameter	**Conditions** (*Note 10*)	**Min**	**Typ**	**Max**	
Output Voltage	T_J = 25°C, V_{IN} = 20V, I_{LOAD} = 5 mA	−15.3	−15	−14.7	V
Line Regulation	T_J = 25°C, I_{LOAD} = 5 mA, $V_{MIN} \le V_{IN} \le V_{MAX}$		5	10	mV
Input Voltage		−35		−17	V
Ripple Rejection	f = 120 Hz	56	80		dB
Load Regulation, (*Note 11*)	T_J = 25°C, V_{IN} = 20V, 5 mA $\le I_{LOAD} \le I_D$		10	25	mV
Output Voltage, (*Note 10*)	17.5V $\le V_{IN} \le V_{MAX}$, 5 mA $\le I_{LOAD} \le I_D$, P $\le P_D$	−15.5		−14.5	V
Quiescent Current	$V_{MIN} \le V_{IN} \le V_{MAX}$		2	4	mA
Quiescent Current Change	T_J = 25°C $V_{MIN} \le V_{IN} \le V_{MAX}$ 5 mA $\le I_{LOAD} \le I_D$		 0.05 0.03	 0.4 0.4	 mA mA
Output Noise Voltage	T_A = 25°C, C_L = 1 µF, I_L = 5 mA, V_{IN} = 20V, 10 Hz ≤ f ≤ 100 kHz		400		µV
Long Term Stability			15	150	mV
Thermal Resistance Junction to Case Junction to Ambient				 (*Note 12*) (*Note 12*)	 °C/W °C/W

LM320T-15 Electrical Characteristics

Order Numbers		Power Plastic Package LM320T-15 (TO-220)			Units
Design Output Current (I_D) Device Dissipation (P_D)		1A 15W			
Parameter	**Conditions** (*Note 10*)	**Min**	**Typ**	**Max**	
Output Voltage	T_J = 25°C, V_{IN} = 20V, I_{LOAD} = 5 mA	−15.5	−15	−14.5	V
Line Regulation	T_J = 25°C, I_{LOAD} = 5 mA, $V_{MIN} \leq V_{IN} \leq V_{MAX}$		5	20	mV
Input Voltage		−35		−17.5	V
Ripple Rejection	f = 120 Hz	56	80		dB
Load Regulation, (*Note 11*)	T_J = 25°C, V_{IN} = 20V, 5 mA $\leq I_{LOAD} \leq I_D$		30	80	mV
Output Voltage, (*Note 10*)	17.5V $\leq V_{IN} \leq V_{MAX}$, 5 mA $\leq I_{LOAD} \leq I_D$, P $\leq P_D$	−15.7		−14.3	V
Quiescent Current	$V_{MIN} \leq V_{IN} \leq V_{MAX}$		2	4	mA
Quiescent Current Change	T_J = 25°C $V_{MIN} \leq V_{IN} \leq V_{MAX}$ 5 mA $\leq I_{LOAD} \leq I_D$		 0.1 0.1	 0.4 0.4	 mA mA
Output Noise Voltage	T_A = 25°C, C_L = 1 µF, I_L = 5 mA, V_{IN} = 20V, 10 Hz $\leq$ f $\leq$ 100 kHz		400		µV
Long Term Stability			30		mV
Thermal Resistance Junction to Case Junction to Ambient			 4 50		 °C/W °C/W

Note 10: This specification applies over −55°C $\leq T_J \leq$ +150°C for the LM120 and 0°C $\leq T_J \leq$ +125°C for the LM320.

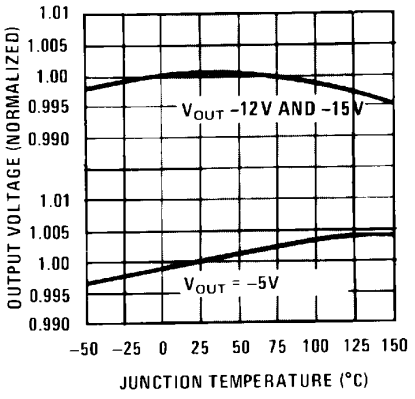
Note 11: Regulation is measured at constant junction temperature. Changes in output voltage due to heating effects must be taken into account separately. To ensure constant junction temperature, low duty cycle, pulse testing is used. The LM120/LM320 series does have low thermal feedback, improving line and load regulation. On all other tests, even though power dissipation is internally limited, electrical specifications apply only up to P_D.

Note 12: Thermal resistance of typically 85°C/W (in 400 linear feet/min air flow), 224°C/W (in static air) junction to ambient, of typically 21°C/W junction to case.

Note 13: Refer to RETS120-15H drawing for LM120H-15 or RETS120-15K drawing for LM120K-15 military specifications.

Typical Performance Characteristics

Output Voltage vs Temperature



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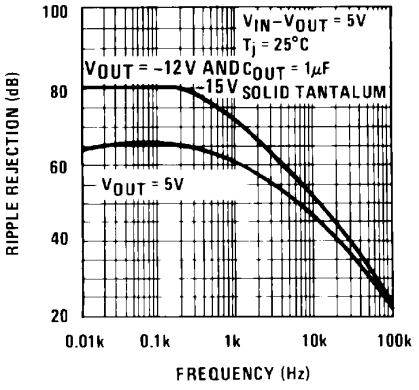
Ripple Rejection (All Types)



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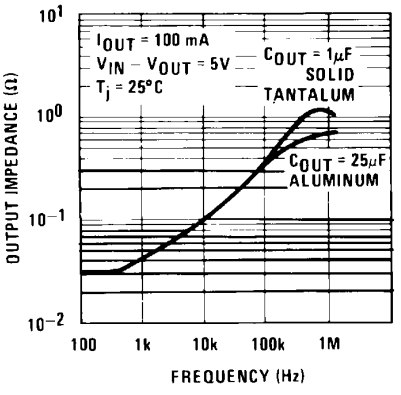
Output Impedance TO-3 and TO-220 Packages



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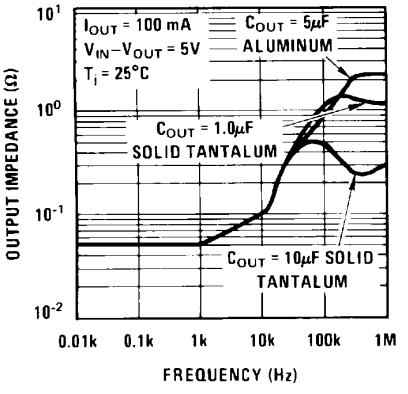
Output Impedance TO-5 and TO-202 Packages



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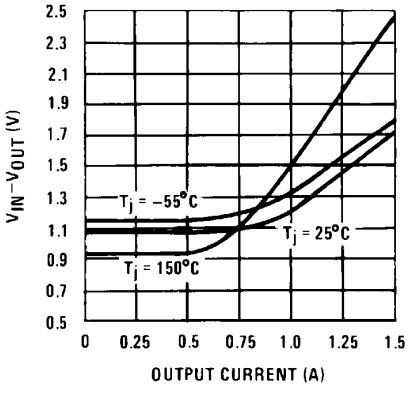
Minimum Input-Output Differential TO-3 and TO-220 Packages



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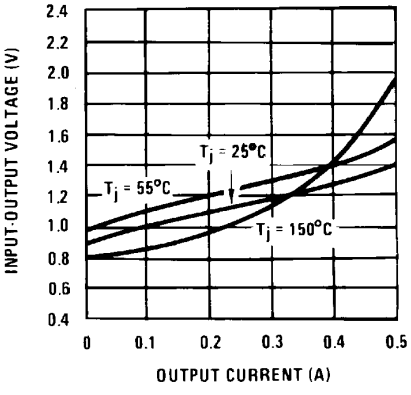
Minimum Input-Output Differential TO-5 and TO-202 Packages



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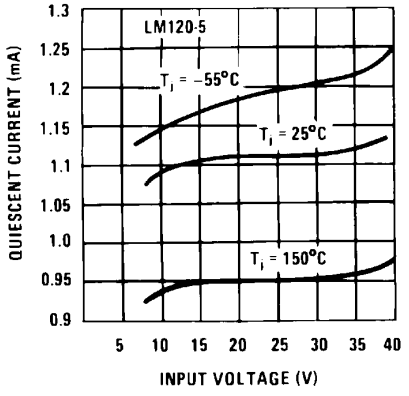
Quiescent Current vs Input Voltage



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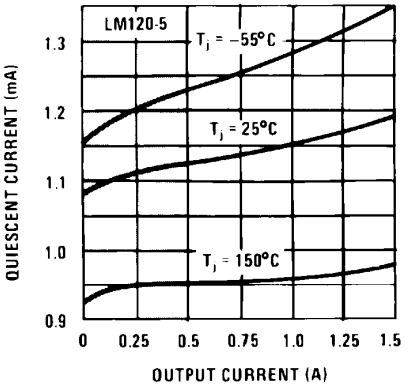
Quiescent Current vs Load Current



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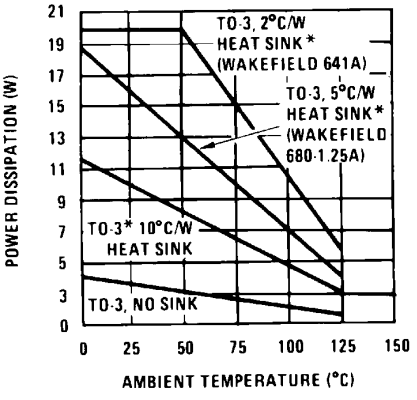
Maximum Average Power Dissipation (TO-3)



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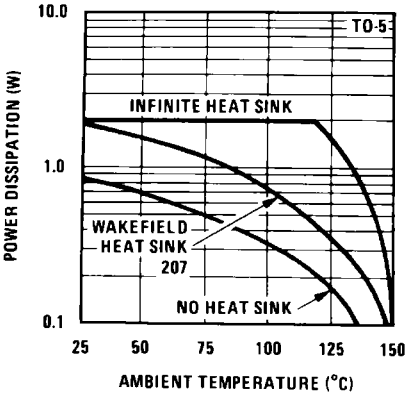
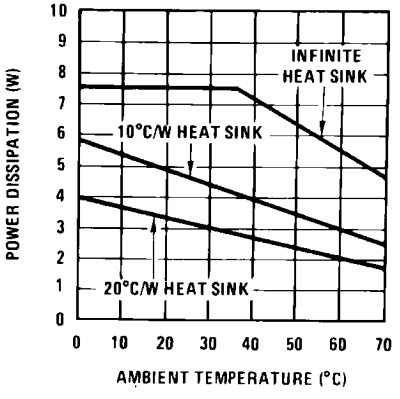
*These curves for LM120. Derate 25°C further for LM320.

Maximum Average Power Dissipation (TO-5)



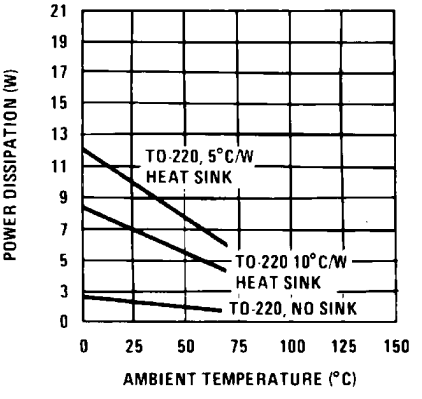
776729

Maximum Average Power Dissipation (TO-202)



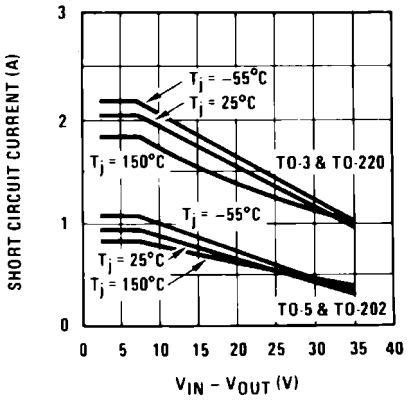
776730

Maximum Average Power Dissipation (TO-220)



776731

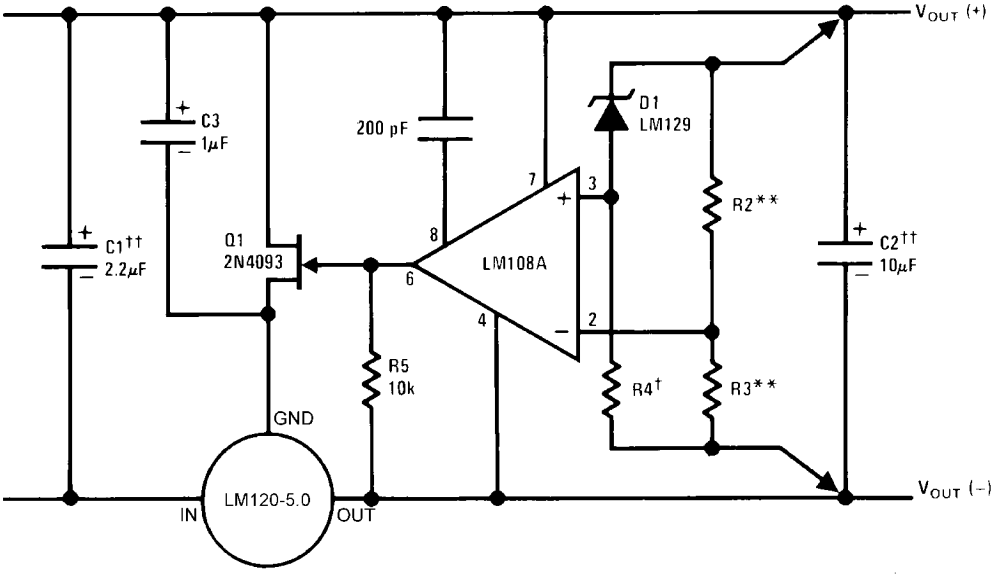
Short Circuit Current



776732

Typical Applications

High Stability 1 Amp Regulator



776706

Lead and line regulation — 0.01% temperature stability — 0.2%

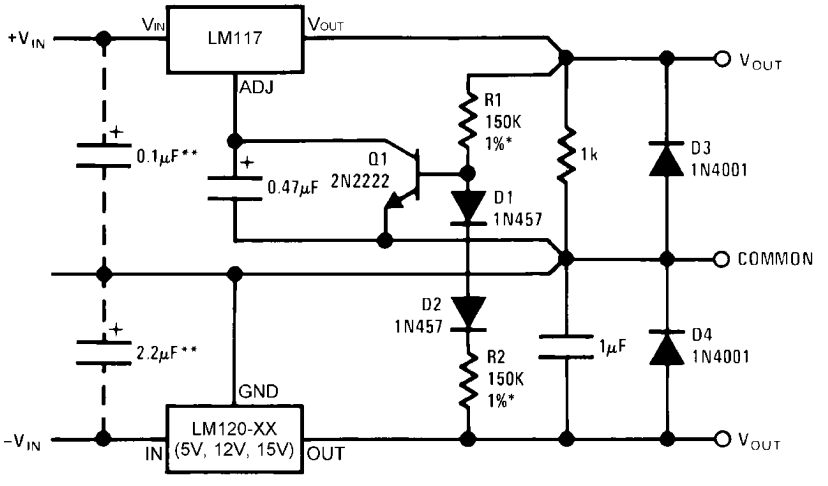
†Determines Zener current.

††Solid tantalum.

An LM120-12 or LM120-15 may be used to permit higher input voltages, but the regulated output voltage must be at least −15V when using the LM120-12 and −18V for the LM120-15.

**Select resistors to set output voltage. 2 ppm/°C tracking suggested.

Wide Range Tracking Regulator



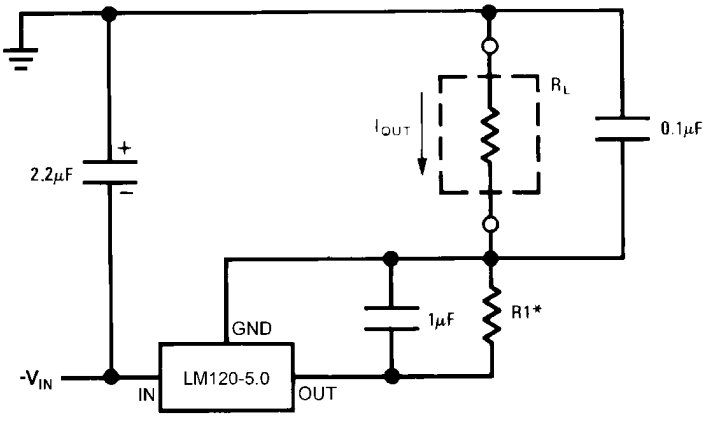
776707

*Resistor tolerance of R1 and R2 determine matching of (+) and (−) inputs.

**Necessary only if raw supply capacitors are more than 3″ from regulators

An LM3086N array may substitute for Q1, D1 and D2 for better stability and tracking. In the array diode transistors Q5 and Q4 (in parallel) make up D2; similarly, Q1 and Q2 become D1 and Q3 replaces the 2N2222.

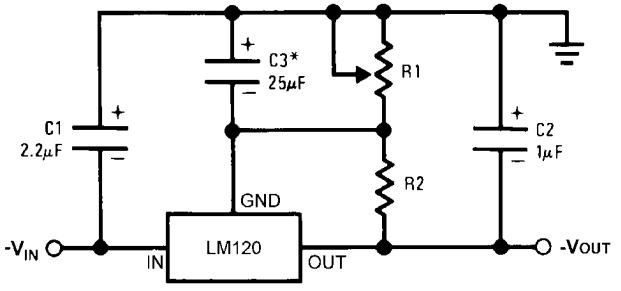
Current Source



776708

$$*I_{OUT} = 1\ mA + \frac{5.0V}{R1}$$

Variable Output Current Source



776709

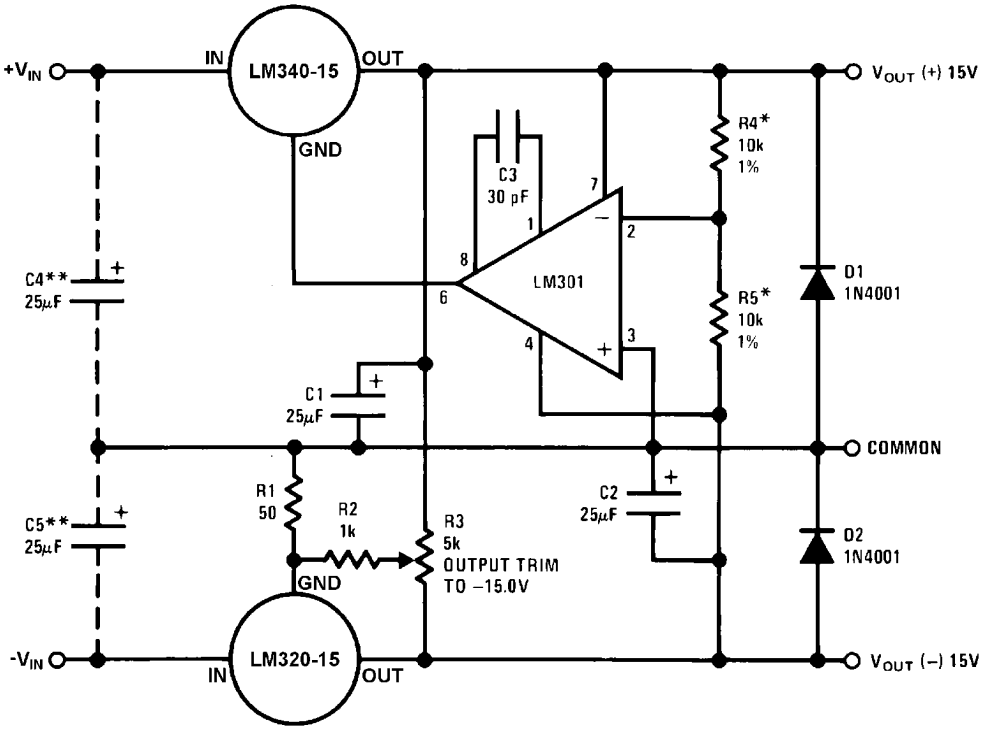
SELECT R2 AS FOLLOWS:

LM120-5	**300Ω**
LM120-12	**750Ω**
LM120-15	**1k**

$$V_{OUT} = V_{SET}\frac{R1 + R2}{R2}$$

*C3 optional. Improves transient response and ripple rejection.

±15V, 1 Amp Tracking Regulators



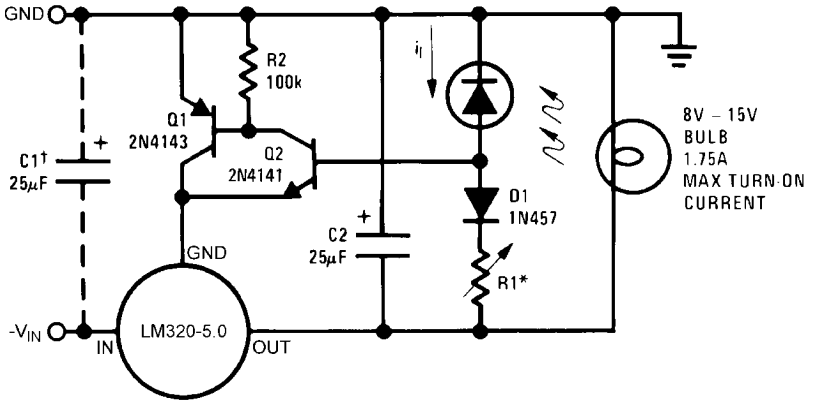
776712

Performance (Typical)

Load Regulation at ΔI_L = 1A	10 mV	1 mV
Output Ripple, C_{IN} = 3000 µF, I_L = 1A	100 µVrms	100 µVrms
Temperature Stability	+50 mV	+50 mV
Output Noise 10 Hz ≤ f ≤ 10 kHz	150 µVrms	150 µVrms

*Resistor tolerance of R4 and R5 determine matching of (+) and (−) outputs.
**Necessary only if raw supply filter capacitors are more than 2 inches from regulators.

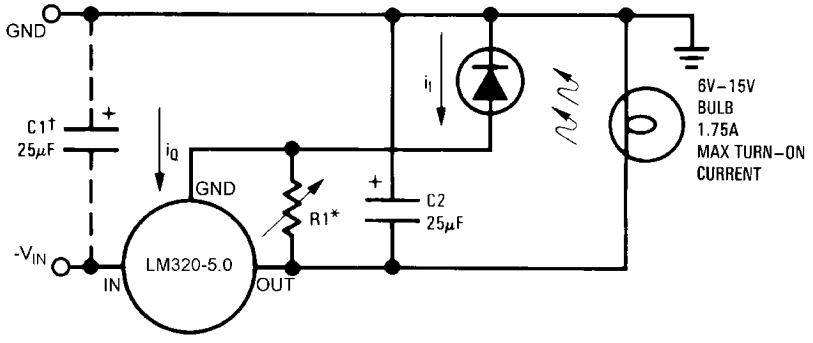
Light Controllers Using Silicon Photo Cells



776710

*Lamp brightness increases until i_I = 5V/R1 (i_I can be set as low as 1 μA).

†Necessary only if raw supply filter capacitor is more than 2 inches from LM320MP.

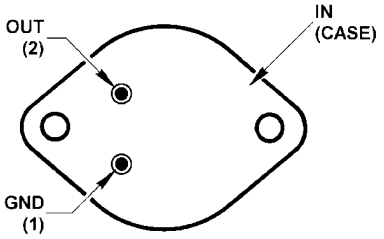


776711

*Lamp brightness increases until $i_I = i_Q$ (1 mA) + 5V/R1.

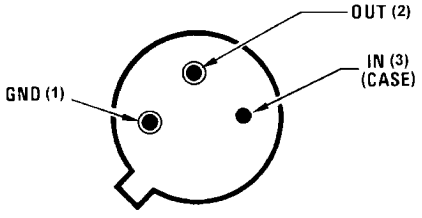
†Necessary only if raw supply filter capacitor is more than 2 inches from LM320.

Connection Diagrams



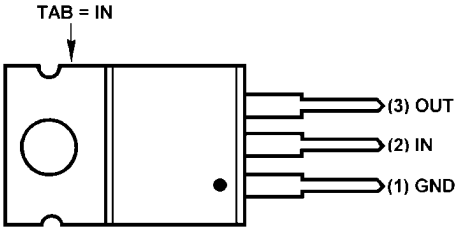
776714

Bottom View
Steel Metal Can Package TO-3 (K)
Order Number LM120K-5.0/883, LM120K-12/883, LM120K-15/883, LM320K-5.0, LM320K-15
See NS Package Number K02A



776713

Bottom View
Metal Can Package TO-39 (H)
Order Number LM120H-5.0, LM120H-12, LM120H-15, LM120H-5.0/883, LM120H-12/883, LM120H-15/883
See NS Package Number H03A

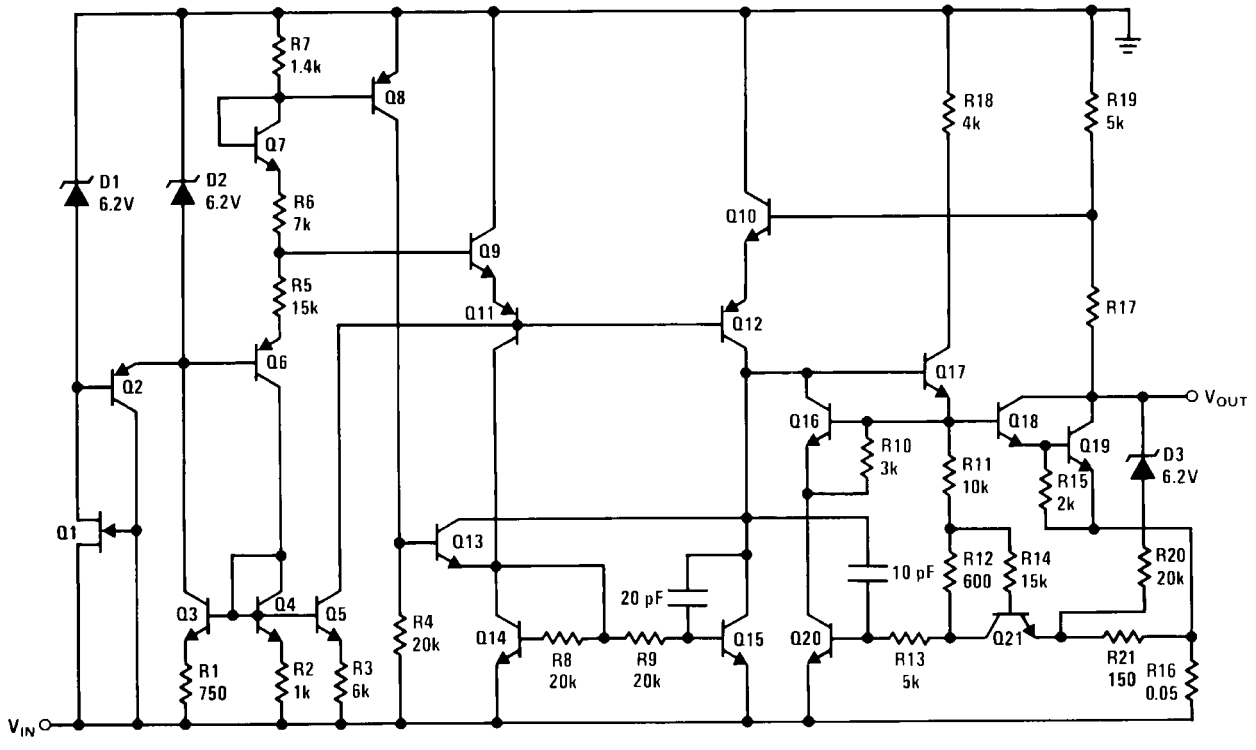


776717

Front View
Power Package TO-220 (T)
Order Number LM320T-12 or LM320T-15
See NS Package Number T03B

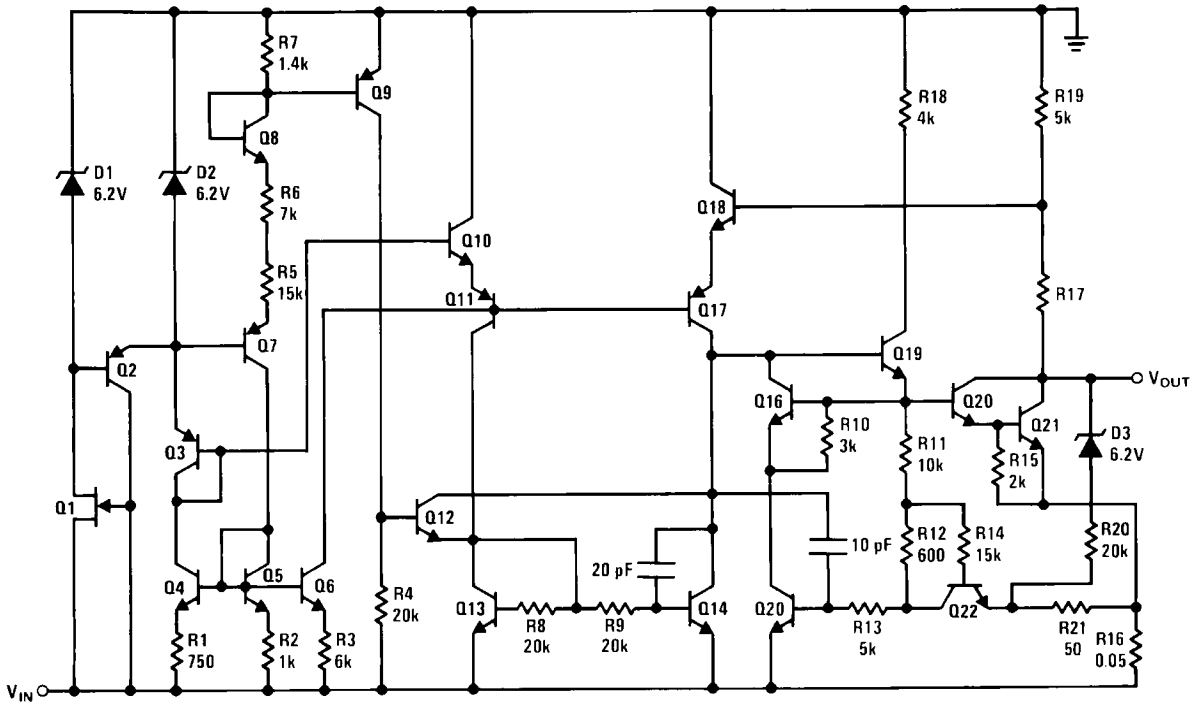
Schematic Diagrams

−5V



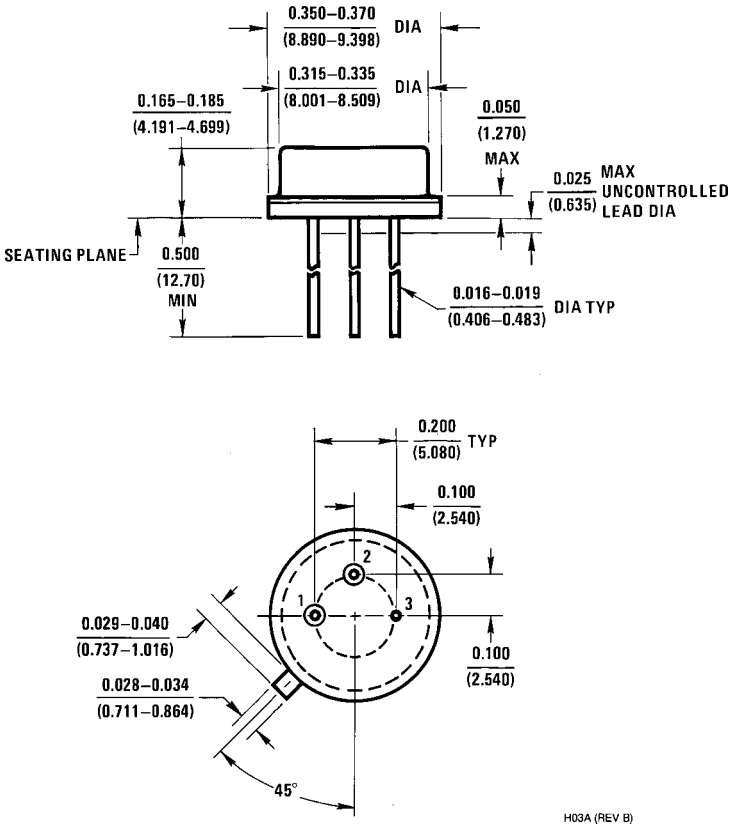
776718

−12V and −15V

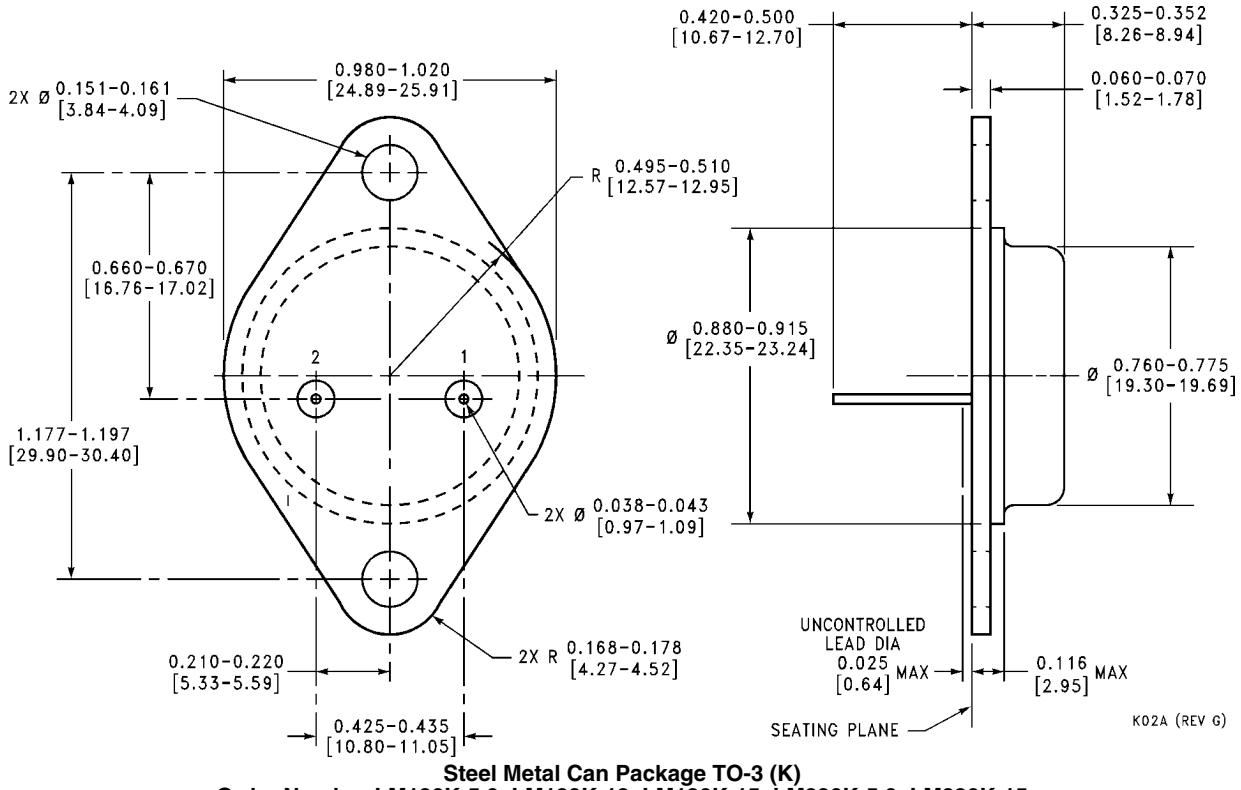


776719

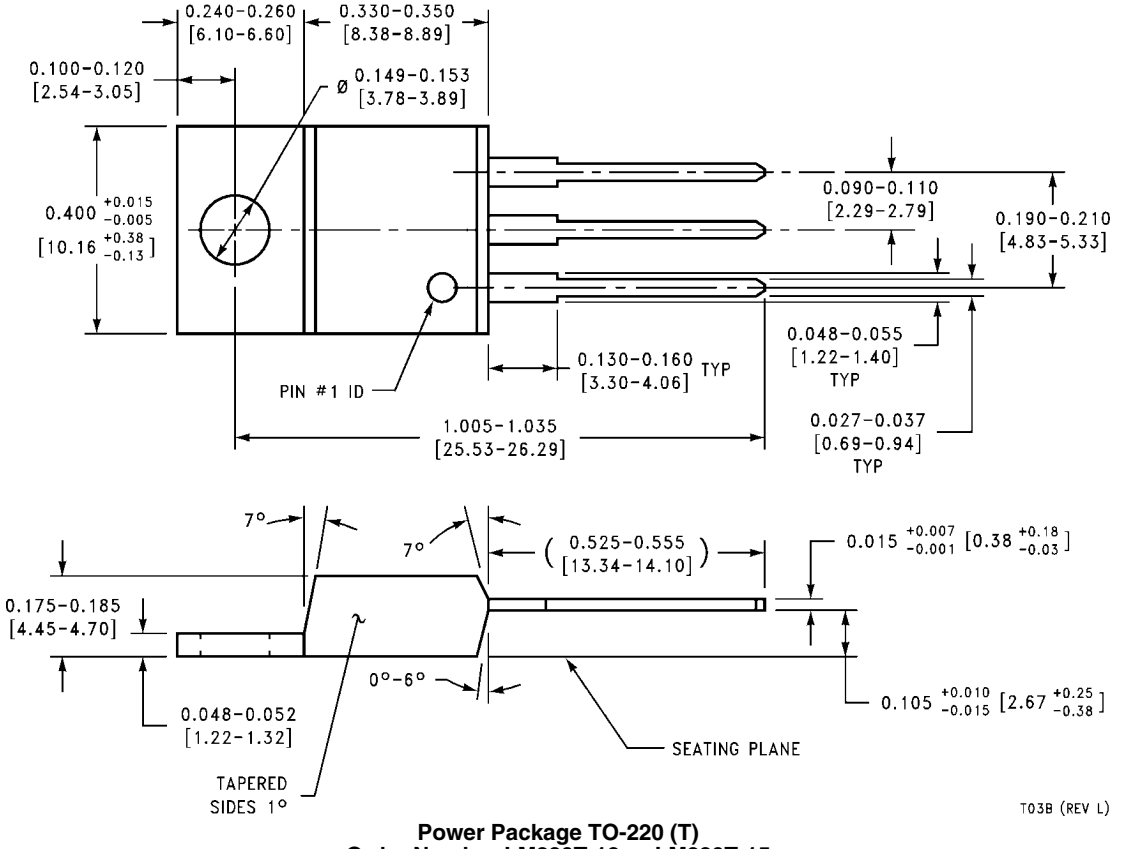
Physical Dimensions inches (millimeters) unless otherwise noted



Metal Can Package (TO-39) (H)
Order Number LM120H-5.0, LM120H-12, LM120H-15
NS Package Number H03A



Steel Metal Can Package TO-3 (K)
Order Number LM120K-5.0, LM120K-12, LM120K-15, LM320K-5.0, LM320K-15
NS Package Number K02A



Power Package TO-220 (T)
Order Number LM320T-12 or LM320T-15
NS Package Number T03B

Notes

Notes

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