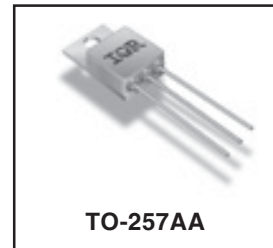# International IƎR Rectifier

Adjustable Low Dropout Positive Voltage Regulator

OM185ST
V_{ADJ}, 3.0A

Product Summary

Part Number	Output Voltage	Output Current	Package
OM185ST	Adjustable	3.0A	TO-257AA

TO-257AA

Description

These three terminal positive adjustable voltage regulators are designed to provide 3.0A with higher efficiency than conventional voltage regulators. The devices are designed to operate to 1.5V input to output differential and the dropout voltage is specified as a function of load current. Devices are pin compatible with older three terminal regulators and are supplied in the easy-to-use hermetic metal TO-257 package. These devices are ideally suited for Military applications where small size, hermeticity and high reliability are required.

Features

■ Operates Down to 1.0V Dropout @ Max Current
■ 0.015% Line Regulation
■ 0.01% Load Regulation
■ 1% Reference Voltage
■ Hermetic TO-257AA (Isolated Tab) Package
■ Electrically Equivalent to LM1085
■ This part is also available in
  D2 Package as OM185SR

Absolute Maximum Ratings @ T_C = 25°C

Parameter	Symbol	Value	Units
Output Current	I_O	3.0	A
Differential Voltage	V_{DIFF}	29	V
Thermal Resistance, Junction to Case	$R_{\theta JC}$	4.2	°C/W
Operating Junction Temperature Range	T_J	-55 to +150	°C
Storage Temperature Range	T_{STG}	-65 to +150	

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Electrical Characteristics $T_J = 25°C$ (Unless Otherwise Specified)

Parameter	Test Conditions	Min.	Typ.	Max.	Units
Reference Voltage	$I_{OUT} = 10mA$, $(V_{IN} - V_{OUT}) = 3.0V$	1.238	1.250	1.262	V
	$10mA \leq I_{OUT} \leq I_{FULL\ LOAD}$, $1.5V \leq (V_{IN} - V_{OUT}) \leq 25V$ ③	1.220	1.250	1.270	
Line Regulation	$I_{LOAD} = 10mA$, $1.5V \leq (V_{IN} - V_{OUT}) \leq 15V$	-	0.015	0.2	%
	①②	-	0.035	0.2	
Load Regulation	$(V_{IN} - V_{OUT}) = 3.0V$, $10mA \leq I_{OUT} \leq I_{FULL\ LOAD}$	-	0.5	0.8	
	①②③	-	0.8	1.0	
Dropout Voltage	$\triangle V_{REF} = 1\%$, $I_{OUT} = I_{FULL\ LOAD}$ ④	-	1.3	1.5	V
Current Limit	$(V_{IN} - V_{OUT}) = 5.0V$	3.0	-	-	A
	$(V_{IN} - V_{OUT}) = 25V$	0.2	-	-	
Minimum Load Current	$(V_{IN} - V_{OUT}) = 25V$	-	5.0	10	mA
Thermal Regulation	30ms Pulse Width (Guaranteed by design)	-	0.004	0.02	%/W
Ripple Rejection	$f = 120Hz$, $C_{Adj} = 25\mu F$ Tantalum $I_{OUT} - I_{FULL\ LOAD}$ $(V_{IN} - V_{OUT}) = 3.0V$	60	75	-	dB
Adjust Pin Current		-	55	-	μA
Adjust Pin Current Change	$10mA \leq I_{OUT} \leq I_{FULL\ LOAD}$ $1.5V \leq (V_{IN} - V_{OUT}) \leq 25V$	-	0.2	5.0	
Temperature Stability	$-55°C \leq T_J \leq +150°C$	-	0.5	-	%
Long Term Stability	$T_J = 125°C$, $t = 1000hrs$	-	0.3	1.0	

Notes

1. Load and line regulation are measured at a constant junction temperature by low duty cycle pulse testing.
2. Line and load regulation are guaranteed up to the maximum power dissipation. Power dissipation is determined by the input/output differential voltage and output current. Guaranteed maximum power dissipation will not be available over the full input/output voltage range.
3. I FULL LOAD curve is defined as the minimum value of current limit as a function of input to output voltage. Note that power dissipation is only achievable over a limited range of input to output voltage.
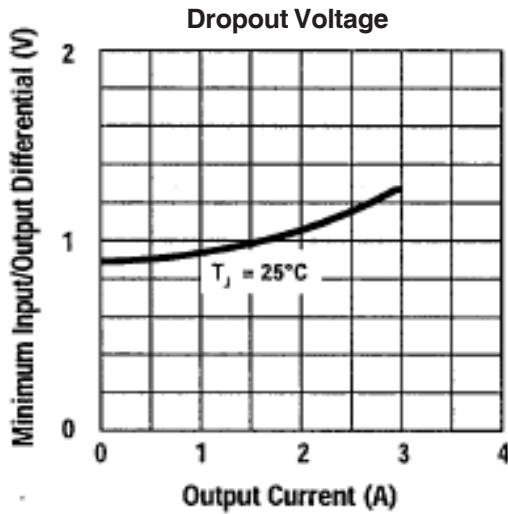4. Dropout voltage is specified over the full output current range of the device.

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Dropout Voltage

Fig 1: Typical Minimum Input/Output Differential Vs Output Current

Short Circuit Current
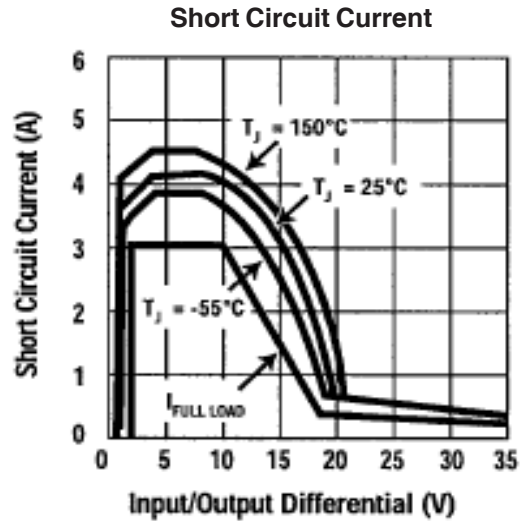
Fig 2: Typical Short Circuit Current Vs Input/Output Differential
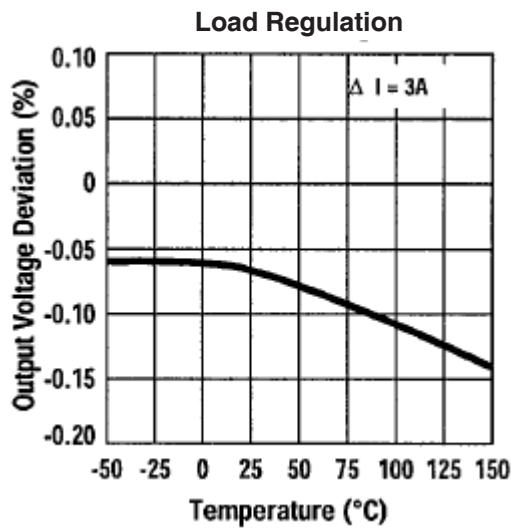
Load Regulation

Fig 3: Typical Output Voltage Deviation Vs Temperature

OM185ST

Application Notes:
Stability

The OM185ST Series requires the use of an output capacitor as part of the device frequency compensation. For all operating conditions, the addition of 150μF aluminum electrolytic or a 22μF solid tantalum on the output will ensure stability. Normally, capacitors much smaller than this can be used. Many different types of capacitors with widely varying characteristics are available. These capacitors differ in capacitor tolerance (sometimes ranging up to $\pm$100%), equivalent series resistance, and capacitance temperature coefficient. The 150μF or 22μF values given will ensure stability.

When the adjustment terminal is bypassed to improve the ripple rejection, the requirement for an output capacitor increases. The values of 22μF tantalum or 150μF aluminum cover all cases of bypassing the adjustment terminal. Without bypassing the adjustment terminal, smaller capacitors can be used with equally good results and the table below shows approximately what size capacitors are needed to ensure stability.

Normally, capacitor values on the order of 100μF are used in the output of many regulators to ensure good transient response with heavy load current changes. Output capacitance can be increased without limit and larger values of output capacitor further improve stability and transient response of the regulators.

Recommended Capacitor Values

Input	Output	Adjustment
10μF	10μF Tantalum, 50μF Aluminum	None
10μF	22μF Tantalum, 150μF Aluminum	20μF

Output Voltage - Adjustable Regulators

The OM185ST devices develop a 1.25V reference voltage between the output and the adjust terminal (see Fig 4). By placing a resistor, R1 between these two terminals, a constant current is caused to flow through R1 and down through R2 to set the overall output voltage. Normally this current is the specified minimum load current of 10mA. Because I_{ADJ} is very small and constant when compared with the current through R1, it represents a small error and can usually be ignored.
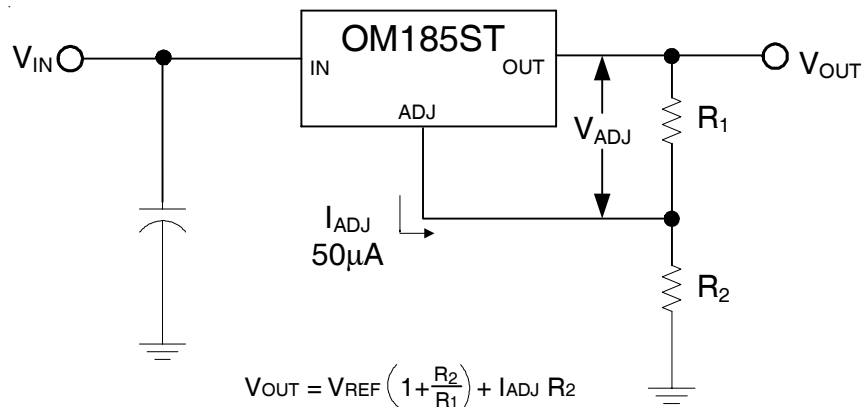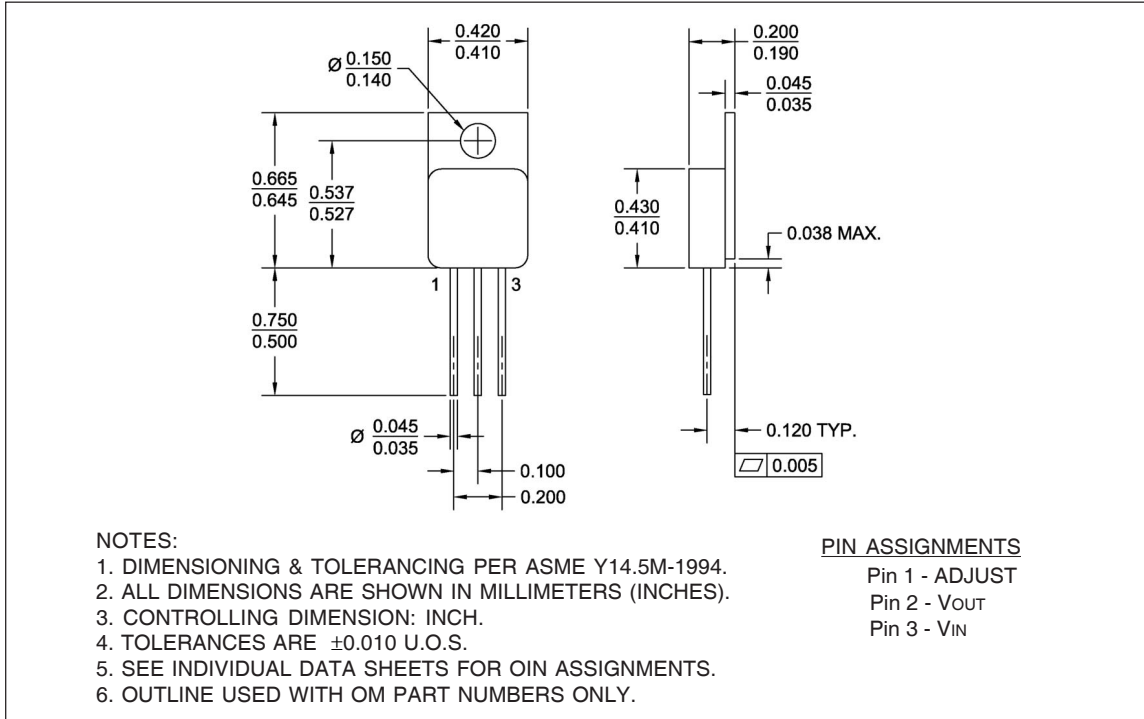

$$V_{OUT} = V_{REF}\left(1+\frac{R_2}{R_1}\right) + I_{ADJ}\, R_2$$

Fig 4. Basic Adjustable Regulator

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Case Outline and Dimensions - TO-257AA 3Pin (T-3)

NOTES:
1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
3. CONTROLLING DIMENSION: INCH.
4. TOLERANCES ARE ±0.010 U.O.S.
5. SEE INDIVIDUAL DATA SHEETS FOR OIN ASSIGNMENTS.
6. OUTLINE USED WITH OM PART NUMBERS ONLY.

PIN ASSIGNMENTS
Pin 1 - ADJUST
Pin 2 - V$_{OUT}$
Pin 3 - V$_{IN}$

Part Numbering Nomenclature

OM   185   S   T   M

Screening Level

Device Number

Package Code
T = TO-257AA

Isolated / Non-Isolated
S = Isolated

International **IƆR** Rectifier