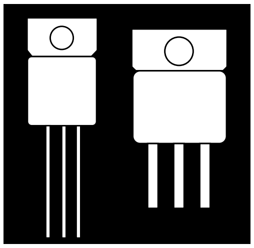
7.5A, 5A, 3A, 1.5A LOW DROPOUT POSITIVE ADJUSTABLE REGULATORS



Three Terminal Adjustable Low Dropout TO-257/TO-258 Positive Voltage Regulators

FEATURES

- Operates Down to 1V Dropout, 1.5V @ Max. Current
- .015% Line Regulation
- .01% Load Regulation
- 1% Reference Voltage
- Hermetic TO-257 and TO-258 Isolated Packages
- Electrically Equivalent to LT1083, 84, 85 and 86

DESCRIPTION

These three terminal positive adjustable voltage regulators are designed to provide 7.5A, 5A, 3A, and 1.5A with higher efficiency than conventional voltage regulators. The devices are designed to operate to 1 Volt input to output differential and the dropout voltage is specified as a function of load current. All devices are pin compatible with older three terminal regulators. Supplied in the easy-to-use hermetic metal TO-257 and TO-258 JEDEC packages also supplied in Omnirel's new surface mount D^2 Pac.. These devices are ideally suited for Military applications where small size, hermeticity and high reliability are required.

ABSOLUTE MAXIMUM RATINGS @ 25°C

Input Voltage	35 V
Operating Junction Temperature Range	- 55°C to + 150°C
Storage Temperature	- 65°C to + 150°C
Output Current - OM183SC	7.5 A
OM184SC	5 A
OM185ST/SR	3 A
OM186ST/SR	1.5 A

Note: OM183SC and OM184SC products are packaged in the TO-258 Package (7.5A & 5A).
OM185ST and OM186ST products are packaged in the TO-257 Package (3A & 1.5A).

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

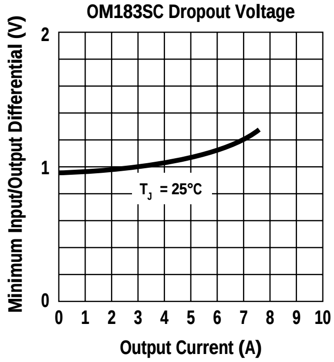
Parameter	Conditions	Min.	Typ.	Max.	Units
Reference Voltage	I_{OUT} = 10 mA, T_j = 25°C				
	$(V_{IN} - V_{OUT})$ = 3 V	1.238	1.250	1.262	V
	10mA ≤ I_{OUT} ≤ $I_{FULL\ LOAD}$				
	1.5 V ≤ $(V_{IN} - V_{OUT})$ ≤ 25 V (Note 3)	1.220	1.250	1.270	V
Line Regulation	I_{LOAD} = 10 mA, 1.5 V ≤ $(V_{IN} - V_{OUT})$ ≤ 15 V,		0.015	0.2	%
	T_j = 25°C		0.035	0.2	%
	15 V ≤ $(V_{IN} - V_{OUT})$ ≤ 35 V (Notes 1 & 2)		0.05	0.5	%
Load Regulation	$(V_{IN} - V_{OUT})$ = 3 V				
	10 mA ≤ I_{OUT} ≤ $I_{FULL\ LOAD}$				
	T_j = 25°C		0.5	0.8	%
	(Notes 1, 2, 3)		.8	1.0	%
Dropout Voltage	ΔV_{REF} = 1%, I_{OUT} = $I_{FULL\ LOAD}$		1.3	1.5	V
Current Limit					
OM183SC	$(V_{IN} - V_{OUT})$ = 5 V		8.0		A
	$(V_{IN} - V_{OUT})$ = 25 V		0.4		A
OM184SC	$(V_{IN} - V_{OUT})$ = 5 V		5.5		A
	$(V_{IN} - V_{OUT})$ = 25 V		0.3		A
OM185ST/SR	$(V_{IN} - V_{OUT})$ = 5 V		3.2		A
	$(V_{IN} - V_{OUT})$ = 25 V		0.2		A
OM186ST/SR	$(V_{IN} - V_{OUT})$ = 5 V		1.5		A
	$(V_{IN} - V_{OUT})$ = 25 V		0.75		A
Minimum Load Current	$(V_{IN} - V_{OUT})$ = 25 V		5	10	mA
Thermal Regulation	T_A = 25°C, 30 ms pulse				
OM183SC	Guaranteed by design		0.002	0.01	%/W
OM184SC			0.003	0.15	%/W
OM185ST/SR			0.004	0.02	%/W
OM186ST/SR			0.010	0.05	%/W
Ripple Rejection	f = 120 Hz				
	C_{ADJ} = 25 µF Tantalum				
	I_{OUT} - $I_{FULL\ LOAD}$ $(V_{IN} - V_{OUT})$ = 3 V	60	75		dB
Adjust Pin Current	T_J = 25°C		55		µA
Adjust Pin Current Change	10mA ≤ I_{OUT} ≤ $I_{FULL\ LOAD}$				
	1.5 V ≤ $(V_{IN} - V_{OUT})$ ≤ 25 V		0.2	5	µA
Temperature Stability	-55°C ≤ T_J ≤ +150°C		0.5		%
Long Term Stability	T_A = 125°C, 1000 Hrs.		0.3	1	%
Thermal Resistance	Junction-to-Case				
TO-257AA/D^2 Pac				4.2	°C/W
TO-258AA				2.75	°C/W

Note 1: Load and line regulation are measured at a constant junction temperature by low duty cycle pulse testing.
Note 2: Line and load regulation are guaranteed up to the maximum power dissipation (OM183/60W, OM184/45W, OM185/30W, OM186/15W). Power dissipation is determined by the input/output differential and the output current. Guaranteed maximum power dissipation will not be available over the full input/output voltage range.
Note 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.
Note 4: Dropout voltage is specified over the full output current range of the device.

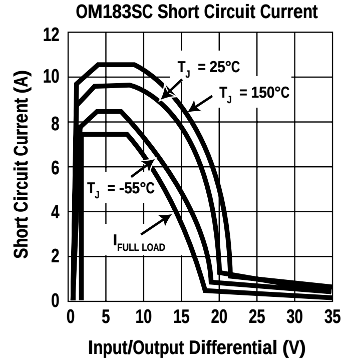
3.3

TYPICAL PERFORMANCE CHARACTERISTICS

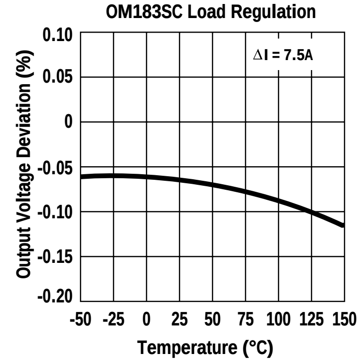
OM183SC Dropout Voltage



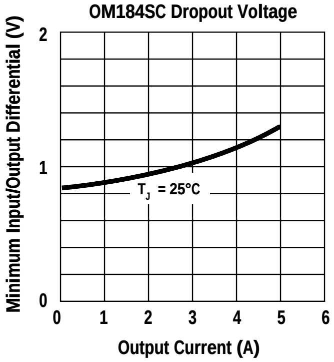
OM183SC Short Circuit Current



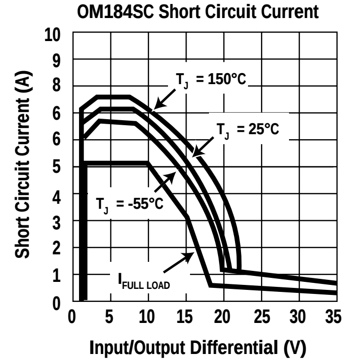
OM183SC Load Regulation



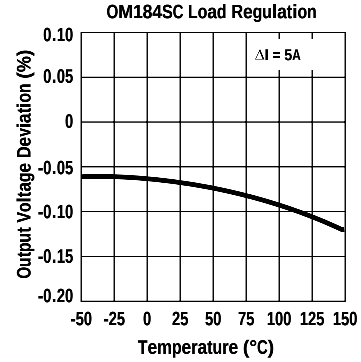
OM184SC Dropout Voltage



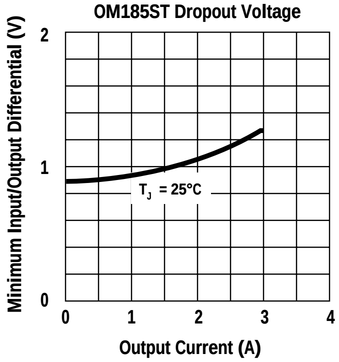
OM184SC Short Circuit Current



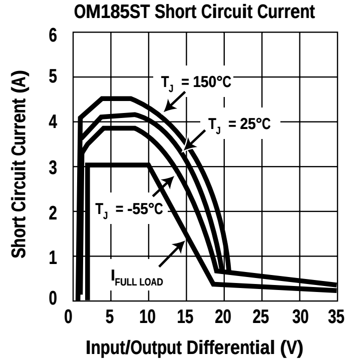
OM184SC Load Regulation



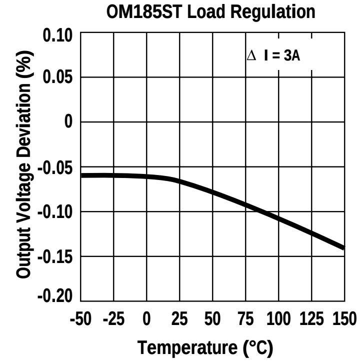
OM185ST Dropout Voltage



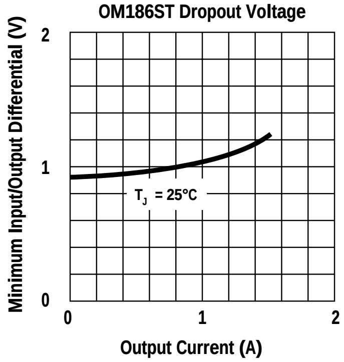
OM185ST Short Circuit Current



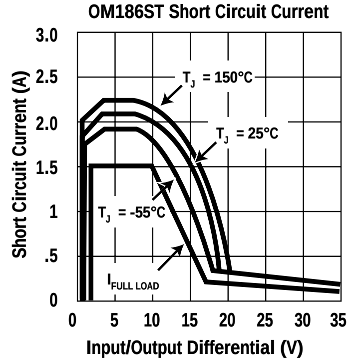
OM185ST Load Regulation



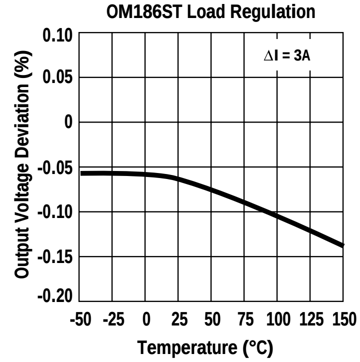
OM186ST Dropout Voltage



OM186ST Short Circuit Current



OM186ST Load Regulation



APPLICATION NOTES

Stability

The OM183-186 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 ±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.

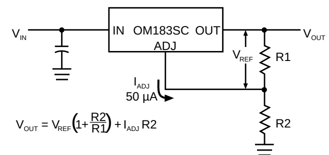
Recommended Capacitor Values

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

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 OM183SC regulators.

Output Voltage — Adjustable Regulators

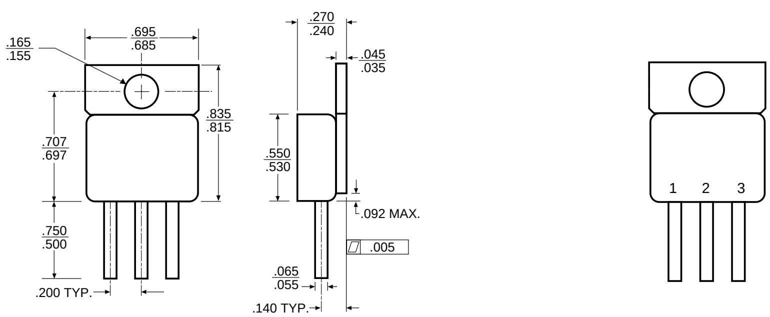
The OM183-OM186 devices develop a 1.25V reference voltage between the output and the adjust terminal (see below). By placing a resistor, R1, between these two terminals, a constant current is caused to flow through R1 and down through R2 to set the overall output voltage. Normally this current is the 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.



Basic Adjustable Regulator

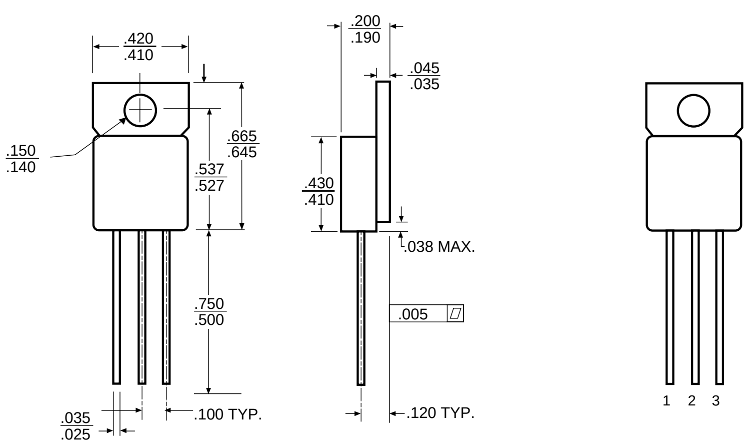
MECHANICAL SPECIFICATIONS

P/N OM183SC and OM184SC JEDEC TO-258AA



Pin 1 - Adjust
Pin 2 - V_{OUT}
Pin 3 - V_{IN}

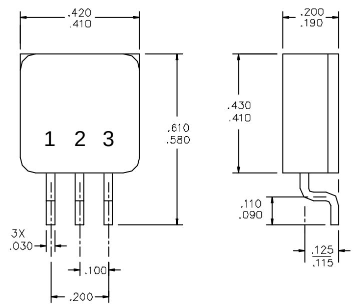
P/N OM185ST and OM186ST JEDEC TO-257AA



Pin 1 - Adjust
Pin 2 - V_{OUT}
Pin 3 - V_{IN}

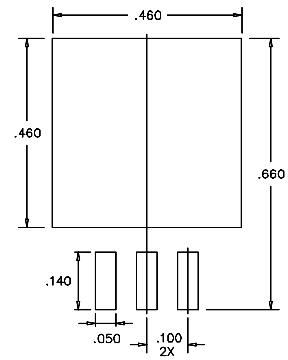
3.3

MECHANICAL OUTLINE



Pin 1: Adjust
Pin 2: Vout
Pin 3: Vin
Case N/C

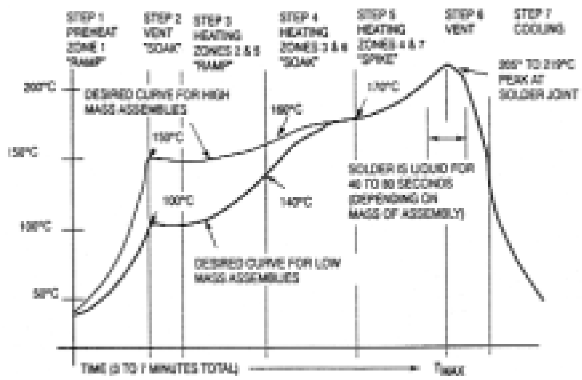
SOLDERING FOOTPRINT



TYPICAL SOLDERING PROFILE

Figure 1 shows a typical soldering profile for the D^2 and D^3 Packages when soldering a to a printed circuit board. The profile will vary from system to system and solders to solders. Factors that can affect the profile include the type of soldering system used, density and type of components on the board or substrate material being used. This profile shows temperature versus time. The two profiles described are based on a high density and a low density board. The type solder used was 62/36/2 Tin Lead Silver with a melting point between 177-189ºC. An convection/infrared soldering reflow system was used. The circuit and solder joints heat up first due to their mass followed by the components which typically run 30 degrees cooler than the solder joints.

TYPICAL HEATING PROFILE



Typical Soldering Heating Profile
Fig 1.

PART NUMBER DESIGNATOR

OM	183	S	R	M
↑	↑	↑	↑	↑
Omnirel	**Device Type**	**Isolated Package**	**Package Style**	**Hi-Rel Screening Level**

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