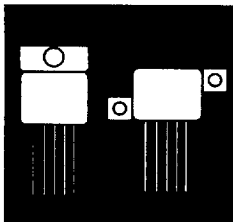


STEP-UP SWITCHING VOLTAGE REGULATOR IN HERMETIC ISOLATED PACKAGE



1 Amp, 12 V, 15 V And Adjustable Output Voltage Versions In MO-078 Metal Package

FEATURES

- Similar To Industry Standard LM1577 Series
- Available in 12V, 15V And Adjustable Output Voltage Versions
- Hermetic Isolated Packages
- Requires Few External Components
- Protection Features Current And Thermal Limitations
- Hi-Rel Screened

DESCRIPTION

These devices are monolithic integrated circuits that provide all of the power and control functions for step-up (boost), flyback and converter switching regulators. They are simple to use and cost effective as they only require a small number of external components for implementation. The chip incorporates a 3.0 Amp NPN switch and associated protection circuitry featuring current and thermal limitations and under voltage lockout.

ABSOLUTE MAXIMUM RATINGS (See note 1)

Input Voltage, V_{IN}	45 V
Output Switch Voltage, V_{SWITCH}	65 V
Output Switch Current, I_{SWITCH} (See note 2)	6.0 A
Storage Temperature Range	-65°C to + 150°C
Junction Temperature, T_J	+150°C
Lead Soldering Temperature, (10 seconds)	260°C
Power Dissipation, P_D	Internally Limited
Thermal Resistance:	
Junction-to-Case, θ_{JC}	3.0°C/W Typically
Junction-to-Ambient, θ_{JA}	65°C/W

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RECOMMENDED OPERATING CONDITIONS

Input Voltage Range, V_{IN}	3.5 to 40 V
Ambient Operating Temperature Range, T_A	-55°C to + 125°C
Output Switch Voltage Range, V_{SWITCH}	0 to 60 V
Output Switch Current, I_{SWITCH}	≤ 3.0 A

Notes:

1. Stresses above the absolute maximum rating may cause damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.
2. Output current cannot be internally limited when the device is used as a step-up regulator. To prevent damage to the switch, the current must be externally limited to 6.0 A. However, output current is internally limited when the device is used as a flyback or forward converter regulator.

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ELECTRICAL CHARACTERISTICS - OM1577-12-55°C ≤ T_A ≤ 125°C, V_{IN} = 5V, I_{SWITCH} = 0A, V_{FEEDBACK} = V_{REF} unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Max.	Unit
System Parameters					
Output Voltage	V _{OUT}	V _{IN} = 5V to 10V I _{LOAD} = 100mA to 800mA	11.60 11.40	12.40 12.60	V
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	V _{IN} = 3.5V to 10V I _{LOAD} = 300mA		60 120	mV
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta I_{LOAD}}$	V _{IN} = 5V I _{LOAD} = 100mA to 800mA		60 120	mV
Device Parameters					
Input Supply Current	I _S	V _{FEEDBACK} = 14V (Switch Off) I _{SWITCH} = 2.0A V _{COMP} = 2.0 V, (Max. duty cycle)		14 18 60 95	mA
Input Supply Under-Voltage Lockout	V _{UV}	I _{SWITCH} = 100mA	2.70 2.65	3.10 3.15	V
Reference Voltage	V _{REF}	Measures at FEEDBACK Pin V _{IN} = 3.5V to 40V V _{COMP} = 1.0V	11.76 11.64	12.24 12.36	V
Error Amplifier Transconductance	gm	I _{COMP} = -30μA to +30μA V _{COMP} = 1.0V	210 130	515 615	μmho
Error Amplifier Voltage Gain	A _{VOL}	V _{COMP} = 1.1V to 1.9V R _{COMP} = 1.0MΩ (Note 1)	40 20		V/V
Error Amplifier Output Swing		V _{FEEDBACK} = 10.0V Upper Limit	2.1 1.9	5.0 5.0	V
		V _{FEEDBACK} = 15.0V Lower Limit		0.45 0.60	V
Error Amplifier Output Current	I _{EAO}	V _{FEEDBACK} = 10.0V to 15.0V V _{COMP} = 0V	±120 ±280	±300 ±400	μA
Soft Start Current	I _{SS}	V _{FEEDBACK} = 10.0V V _{COMP} = 0V	2.2 7.0	7.5 9.5	μA
Maximum Duty Cycle	D _C	I _{SWITCH} = 100mA V _{COMP} = 1.5 V	93 90		%
Switch Leakage Current	I _L	V _{FEEDBACK} = 15V V _{SWITCH} = 65V, switch off	-1.0 -1.0	360 700	μA
Switch Saturation Voltage	V _{SAT}	V _{COMP} = 2.0V I _{SWITCH} = 2.0A (Max. Duty Cycle)		.65 .85	V
NPN Switch Current Limit		V _{COMP} = 2.0V	3.5 2.9	5.3 6.0	A
Oscillator Frequency	f _o	Measured at SWITCH pin, I _{SWITCH} = 100mA	48 42	56 62	kHz

Notes:

The ● denotes the specifications which apply over the full operating temperature range.

- A 1.0 MΩ resistor is connected to the COMPENSATION pin (error amplifier output) to ensure accuracy in measuring A_{VOL}. In actual applications, the COMPENSATION pin's load resistance should be ≥ 10 MΩ, resulting in A_{VOL} that is typically twice the guaranteed minimum limit.
- OM1577-ADJ have the same test conditions as OM1577-12 (see Test Circuit on page 3).

ELECTRICAL CHARACTERISTICS - OM1577-15-55°C ≤ T_A ≤ 125°C, V_{IN} = 5V, I_{SWITCH} = 0A, V_{FEEDBACK} = V_{REF} unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Max.	Unit
System Parameters					
Output Voltage	V _{OUT}	V _{IN} = 5V to 12V I _{LOAD} = 100mA to 600mA	• 14.50 14.25	15.50 15.75	V
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	V _{IN} = 3.5V to 12V I _{LOAD} = 300mA	•	60 120	mV
Load Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{LOAD}}$	V _{IN} = 5V I _{LOAD} = 100mA to 600mA	•	60 120	mV
Device Parameters					
Input Supply Current	I _S	V _{FEEDBACK} = 18V (Switch Off) I _{SWITCH} = 2.0A V _{COMP} = 2.0 V, (Max. duty cycle)	•	14 18 60 95	mA
Input Supply Under-Voltage Lockout	V _{UV}	I _{SWITCH} = 100mA	• 2.70 2.65	3.10 3.15	V
Reference Voltage	V _{REF}	Measures at FEEDBACK Pin V _{IN} = 3.5V to 40V V _{COMP} = 1.0V	• 14.70 14.55	15.30 15.45	V
Error Amplifier Transconductance	gm	I _{COMP} = -30μA to +30μA V _{COMP} = 1.0V	• 160 400	420 500	μmho
Error Amplifier Voltage Gain	A _{VOL}	V _{COMP} = 1.1V to 1.9V R _{COMP} = 1.0MΩ (Note 1)	• 35 15		V/V
Error Amplifier Output Swing		V _{FEEDBACK} = 12.0V Upper Limit	• 2.1 1.9	5.0 5.0	V
		V _{FEEDBACK} = 18.0V Lower Limit	•	0.45 0.60	V
Error Amplifier Output Current	I _{EAO}	V _{FEEDBACK} = 12.0V to 18.0 V V _{COMP} = 1.0V	• ±120 ±280	±300 ±400	μA
Soft Start Current	I _{SS}	V _{FEEDBACK} = 12.0V V _{COMP} = 0V	• 2.2 7.0	7.5 9.5	μA
Maximum Duty Cycle	D _C	I _{SWITCH} = 100mA V _{COMP} = 1.5 V	• 93 90		%
Switch Leakage Current	I _L	V _{FEEDBACK} = 18V V _{SWITCH} = 65V, switch off	• -1.0 -1.0	360 700	μA
Switch Saturation Voltage	V _{SAT}	V _{COMP} = 2.0V I _{SWITCH} = 2.0A (Max. Duty Cycle)	•	.65 .85	V
NPN Switch Current Limit		V _{COMP} = 2.0V	• 3.5 2.9	5.3 6.0	A
Oscillator Frequency	f _o	Measured at SWITCH pin, I _{SWITCH} = 100mA	• 48 42	56 62	kHz

Notes:

The • denotes the specifications which apply over the full operating temperature range.

1. A 1.0 MΩ resistor is connected to the COMPENSATION pin (error amplifier output) to ensure accuracy in measuring A_{VOL}. In actual applications, the COMPENSATION pin's load resistance should be ≥ 10 MΩ, resulting in A_{VOL} that is typically twice the guaranteed minimum limit.

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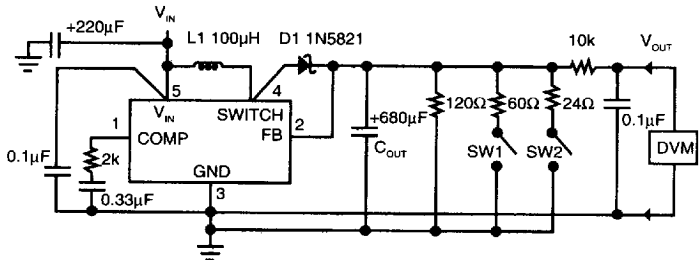
ORDERING INFORMATION

EXAMPLE: P/N OM1577-12SCM = 12 Volt, C5 Package With Screening

BASIC PART NUMBER	VOLTAGE LEVEL	CASE STYLE	SCREENING
OM1577	12 = 12 Volt	SC = C5 Package	Add "M"
	15 = 15 Volt	SCZ = C5S Package	for 883
	A = Adjustable	Both Packages Isolated	screening

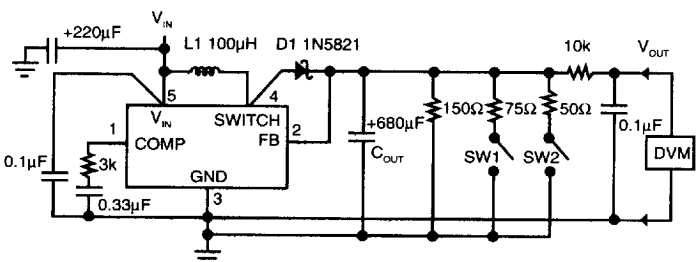
OM1577-12 TEST CIRCUIT

Circuit Used To Specify System Parameters For 12 Volt Version.



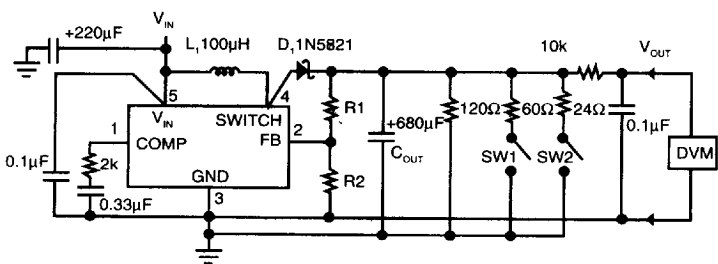
OM1577-15 TEST CIRCUIT

Circuit Used To Specify System Parameters For 15 Volt Version.

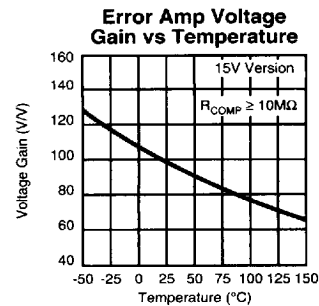
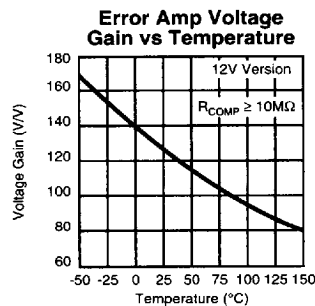
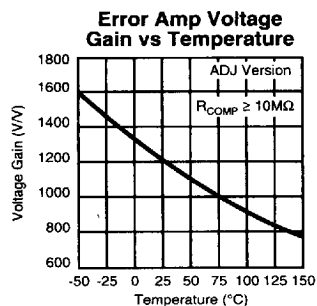
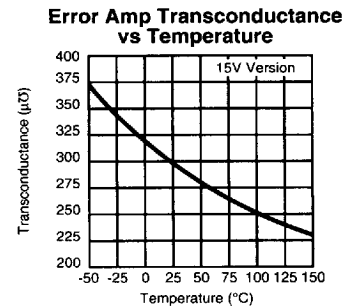
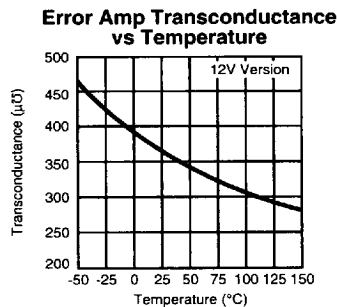
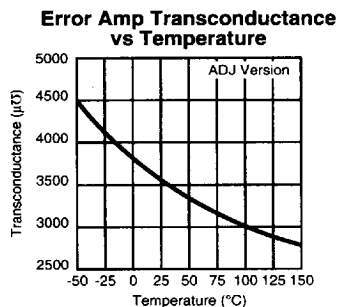
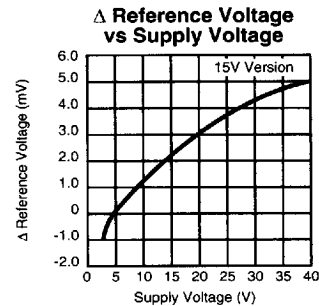
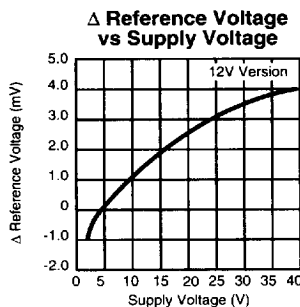
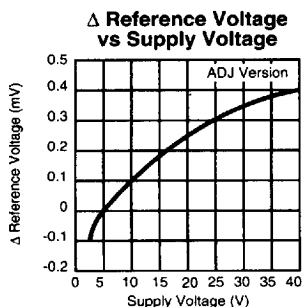
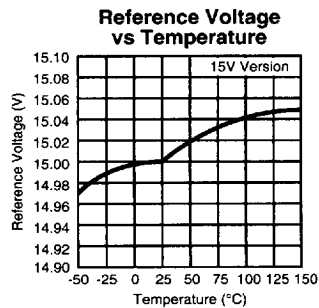
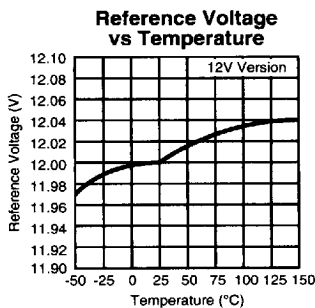
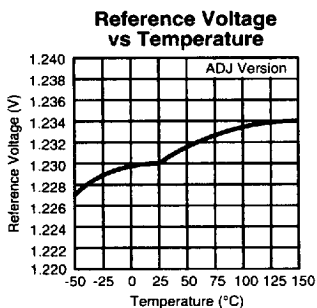


OM1577-A TEST CIRCUIT

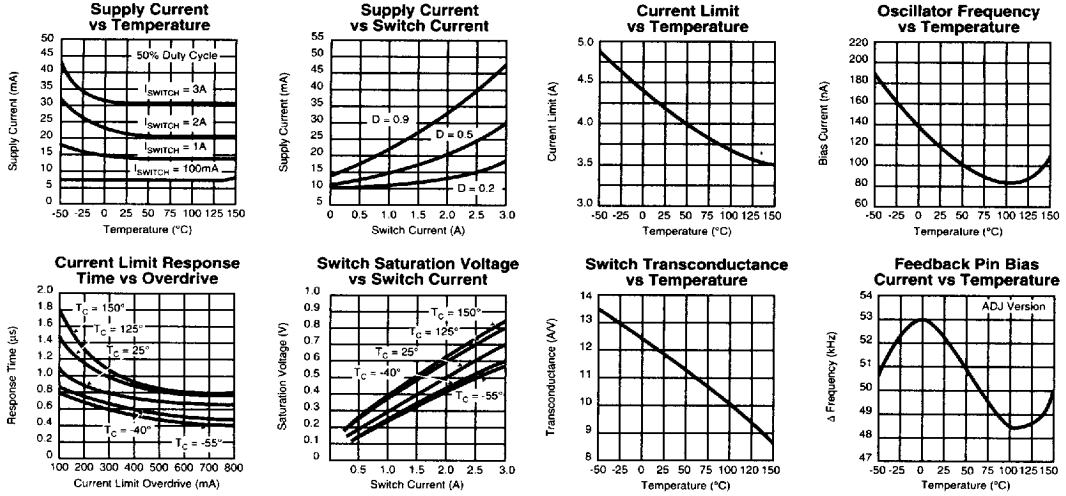
Circuit Used To Specify System Parameters For Adjustable Voltage Version.



TYPICAL PERFORMANCE CHARACTERISTICS



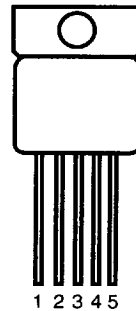
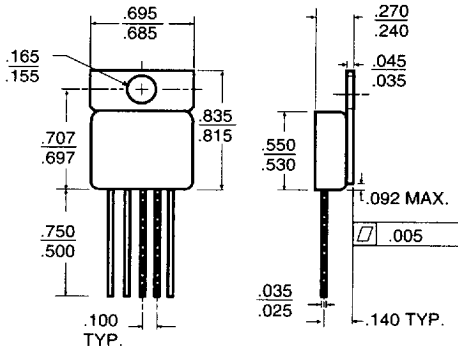
TYPICAL PERFORMANCE CHARACTERISTICS



MECHANICAL OUTLINE

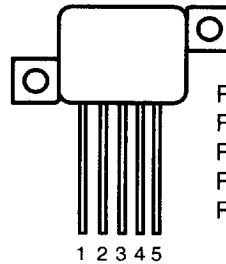
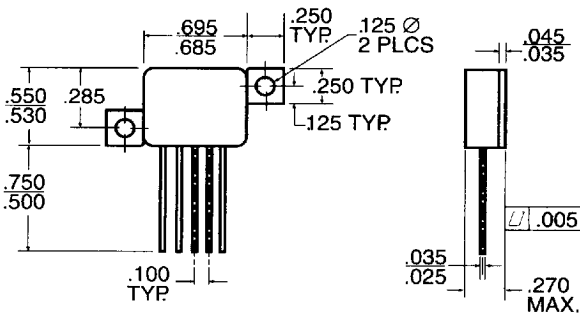
PIN CONNECTION

SC (C-5 PACKAGE)



- Pin 1: Comp
- Pin 2: Feedback
- Pin 3: GND
- Pin 4: Switch
- Pin 5: V_{IN}

SCZ (C-5S PACKAGE)



- Pin 1: Comp
- Pin 2: Feedback
- Pin 3: GND
- Pin 4: Switch
- Pin 5: V_{IN}

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205 Crawford Street, Leominster, MA 01453 USA (508) 534-5776 FAX (508) 537-4246

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