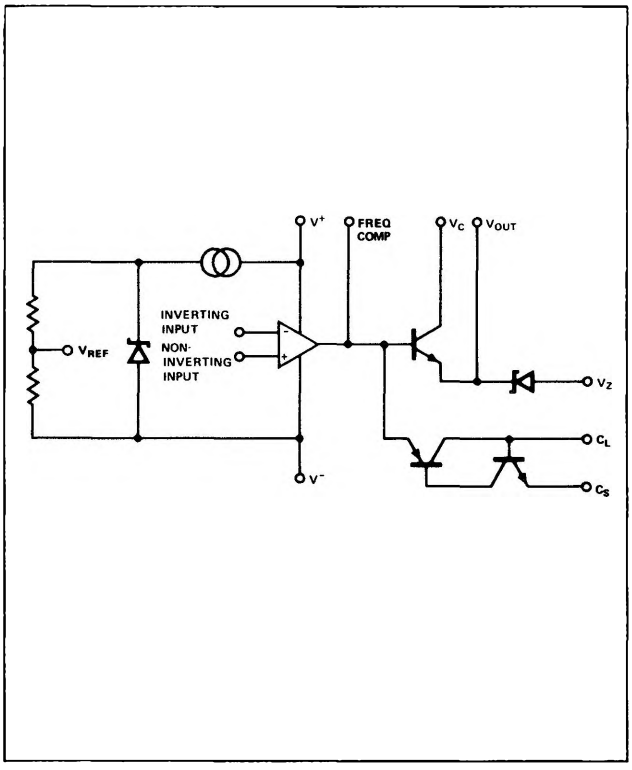
DESCRIPTION

The 550 is a precision monolithic voltage regulator capable of positive or negative supply operation as series, shunt, switching or floating regulator. Guaranteed line regulation is provided for input voltages ranging from 8.5 volts to as high as 50 volts. The output voltage can be continuously adjusted from 2 volts to 40 volts. Foldback current limiting can be accomplished through the use of one external resistor. Internal circuitry permits on and off strobing with DTL and TTL logic inputs and latched shut-down with a pulsed input.

FEATURES:

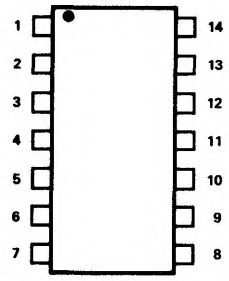
- LINE REGULATION GUARANTEED OVER INPUT VOLTAGE RANGE OF 8.5 VOLTS TO AS HIGH AS 50 VOLTS.
- OUTPUT VOLTAGE CONTINUOUSLY ADJUSTABLE FROM 2 VOLTS TO 40 VOLTS
- LOAD REGULATION 0.1% OF V_{out}
- ADJUSTABLE LIMITING OF SHORT CIRCUIT CURRENT
- FOLDBACK CURRENT LIMITING WITH ONE EXTERNAL RESISTOR
- REMOTE AND LATCHING SHUTDOWN
- OUTPUT CURRENT UP TO 150mA WITHOUT EXTERNAL POWER TRANSISTORS

BASIC CIRCUIT SCHEMATIC



PIN CONFIGURATIONS

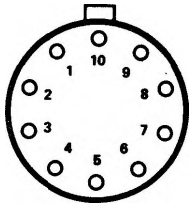
A PACKAGE
(Top View)



1. NC
2. Current Limit
3. Current Sense
4. Inverting Input
5. Noninverting Input
6. V_{REF}
7. V^-
8. NC
9. V_z
10. V_{out}
11. V_C
12. V^+
13. Frequency Compensation
14. NC

ORDER PART NO. NE550A

L PACKAGE



1. Current Sense
2. Inverting Input
3. Noninverting Input
4. V_{REF}
5. V^-
6. V_{out}
7. V_C
8. V^+
9. Frequency Compensation
10. Current Limit

ORDER PART NOS. NE550L/SE550L

ABSOLUTE MAXIMUM RATINGS:

	SE550	NE550
Voltage from V^+ to V^-	50V	40V
Input-Output Voltage Differential	45V	37V
Maximum Output Current	150mA	150mA
Current from V_Z	15mA	15mA
Internal Power Dissipation (Note 1)	800mW	800mW
Operating Temperature Range	-55°C to +125°C	-0°C to 70°C
Storage Temperature Range	-65°C to +150°C	-65°C to +150°C
Lead Temperature	300°C	300°C

NOTE:

1. Rating applies for case temperatures to 125°C; derate linearly at 6.5mW/°C for ambient temperatures above +75°C.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified) (Notes 1 and 2)

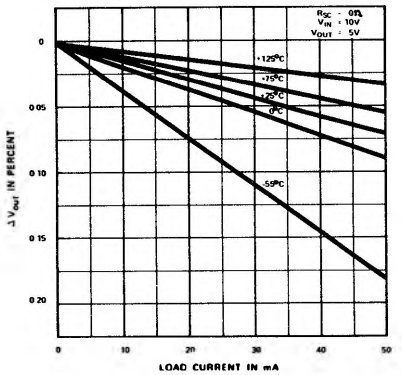
PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
NE550					
Line Regulation		.08	0.3	% V_{out}	V_{in} = 8.5 to 40V
			0.35	% V_{out}	0°C ≤ T_A ≤ 70°C, V_{in} = 12 to 40V
Load Regulation		.03	0.2	% V_{out}	I_L = 1mA to 50mA
			0.4	% V_{out}	0°C ≤ T_A ≤ 70°C, I_L = 1mA to 50mA
Ripple Rejection		75		dB	f = 50 Hz to 10 kHz, CREF = 0
		90		dB	f = 50 Hz to 10 kHz, CREF = 5μF
Average Temperature Coefficient of Output Voltage		.002	.015	%/°C	0°C ≤ T_A ≤ 70°C
Short Circuit Current Limit	50	60	70	mA	RSC = 10Ω, V_{out} = 0
Reference Voltage	1.53	1.63	1.73	V	
Output Noise Voltage		20		μV rms	BW = 100 Hz to 10 kHz, CREF = 0
		2.5		μV rms	BW = 100 Hz to 10 kHz, CREF = 5μF
Long Term Stability		0.1		%/1000 hrs.	
Standby Current Drain		1.6	3.0	mA	I_L = 0, V_{in} = 40V
Input Voltage Range	8.5		40	V	
Output Voltage Range	2.0		37	V	
Input-Output Voltage Differential	3.0		38	V	
SE550					
Line Regulation		0.05	0.1	% V_{out}	V_{in} = 12 to 40V
		0.2	0.6	% V_{out}	V_{in} = 8.5 to 50V
			0.25	% V_{out}	-55°C ≤ T_A ≤ +125°C, V_{in} = 12 to 40V
Load Regulation		0.3	.10	% V_{out}	I_L = 1mA to 50mA
			.6	% V_{out}	-55°C ≤ T_A ≤ +125°C, I_L = mA to 50mA
Ripple Rejection		75		dB	F = 50 Hz to 10 kHz, CREF = 0
		90		dB	F = 50 Hz to 10 kHz, CREF = 5μF
Average Temperature Coefficient of Output Voltage		.002	.012	%/°C	-55°C ≤ T_A ≤ +125°C
Short Circuit Limit	50	60	70	mA	RSC = 10Ω, V_{out} = 0
Reference Voltage	1.58	1.63	1.68	V	
Output Noise Voltage		20		μV rms	BW = 100 Hz to 10 kHz, CREF = 0
		2.5		μV rms	BW = 100 Hz to 10 kHz, CREF = 5μF
Long Term Stability		0.1		%/1000 hrs.	
Standby Current Drain		1.3	2.0	mA	I_L = 0, V_{in} = 50V
Input Voltage Range	8.5		50	V	
Output Voltage Range	2.0		40	V	
Input-Output Voltage Differential	3.0		45	V	

NOTES

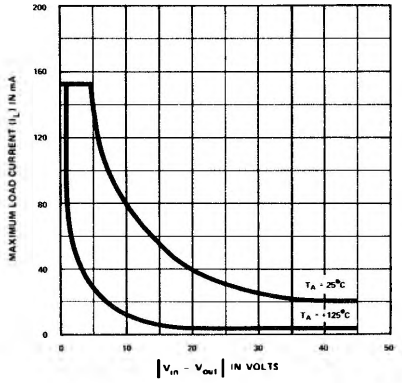
1. Unless otherwise specified, T_A = 25°C, V_{in} = V^+ = V_c = 12V, V^- = 0V, V_{out} = 5V, I_L = 1mA, R_{sc} = 0, C_1 = 100pF, and divider impedance as seen by error amplifier ≃ 2kΩ when connected as shown in Figure 1.
2. The load and line regulation specifications are for constant junction temperature. Temperature drift effects must be taken into account separately when the unit is operating under conditions of high or varying dissipation.

TYPICAL CHARACTERISTIC CURVES

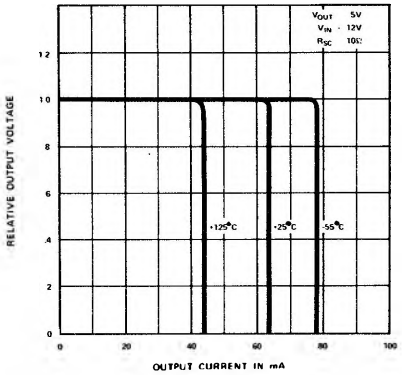
LOAD REGULATION AS A FUNCTION OF LOAD CURRENT



MAXIMUM LOAD CURRENT AS A FUNCTION OF INPUT-OUTPUT VOLTAGE DIFFERENTIAL

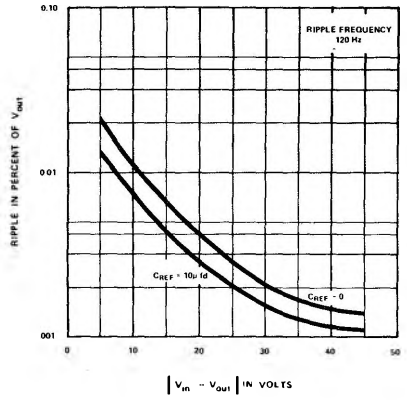


RELATIVE OUTPUT VOLTAGE AS A FUNCTION OF LIMITED OUTPUT CURRENT

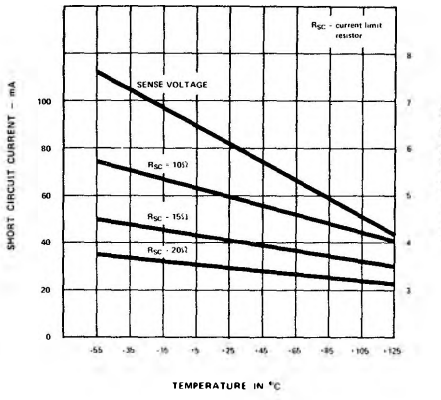


TYPICAL CHARACTERISTIC CURVES (Cont'd.)

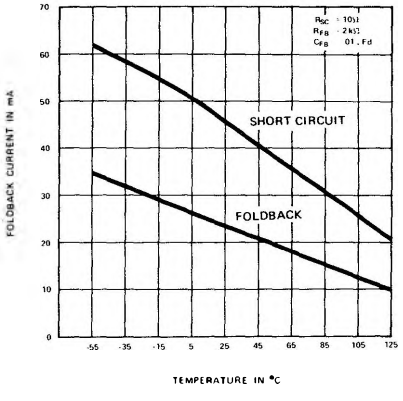
RIPPLE REJECTION AS A FUNCTION OF INPUT-OUTPUT VOLTAGE DIFFERENTIAL



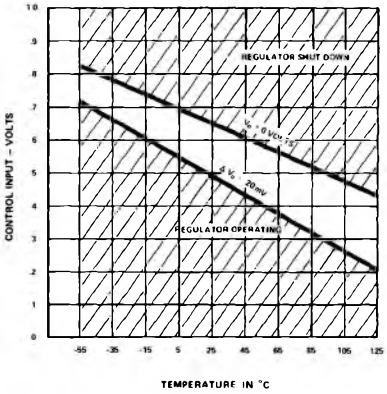
SENSE VOLTAGE AND SHORT CIRCUIT CURRENT LIMIT AS A FUNCTION OF TEMPERATURE



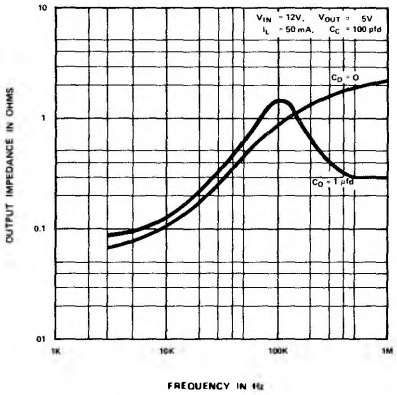
SHORT CIRCUIT FOLDBACK CURRENT AS A FUNCTION OF TEMPERATURE



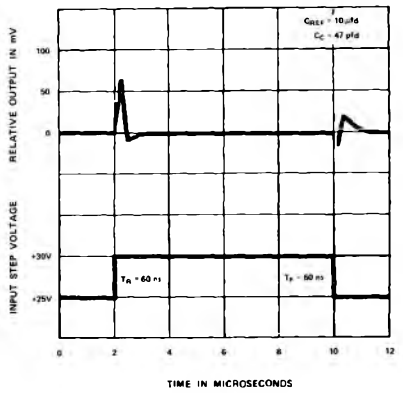
REMOTE CONTROL CHARACTERISTICS AS A FUNCTION OF TEMPERATURE



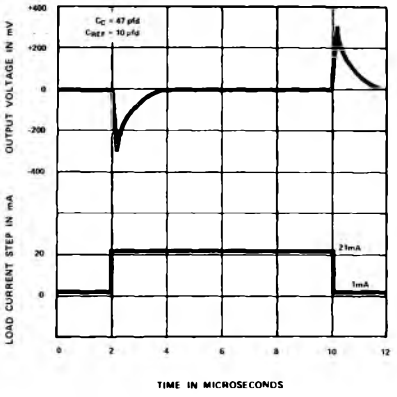
OUTPUT IMPEDANCE AS A FUNCTION OF FREQUENCY



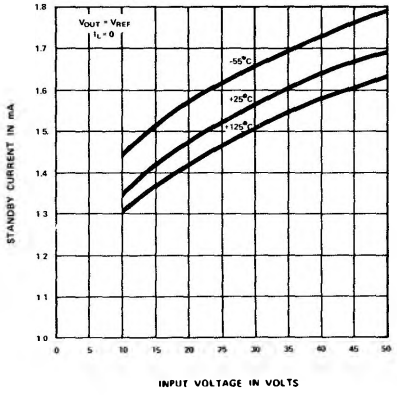
LINE TRANSIENT RESPONSE



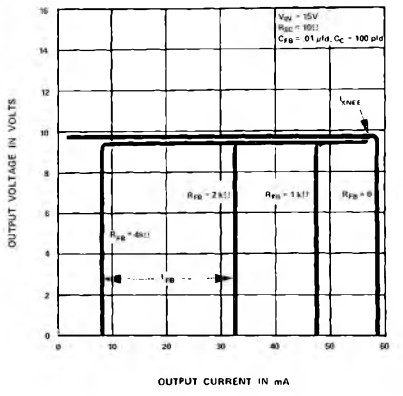
LOAD TRANSIENT RESPONSE



STANDBY CURRENT AS A FUNCTION OF INPUT VOLTAGE

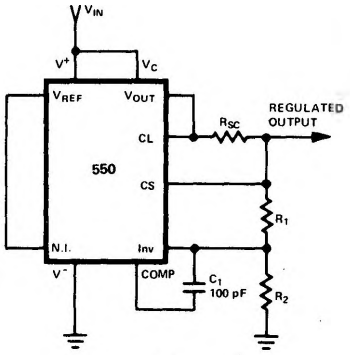


FOLDBACK CURRENT LIMITED OUTPUT VOLTAGE AS A FUNCTION OF OUTPUT CURRENT



TYPICAL APPLICATIONS

BASIC POSITIVE VOLTAGE REGULATOR

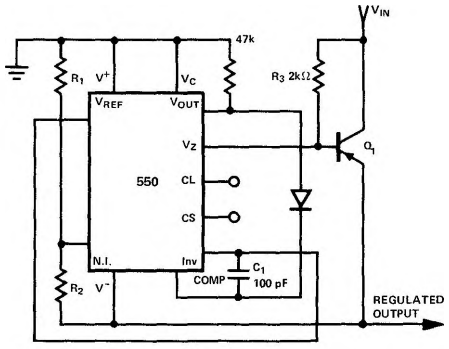


$$V_{out} = V_{REF} \frac{R_1 + R_2}{R_2}$$

$\frac{R_1 R_2}{R_1 + R_2} = 2k\Omega$ for minimum temperature drift

FIGURE 1

NEGATIVE VOLTAGE REGULATOR



$$V_{out} = -V_{REF} \times \frac{R_1 + R_2}{R_2}$$

$\frac{R_1 R_2}{R_1 + R_2} = 2k\Omega$ for minimum temperature drift

NOTE 1

FIGURE 2

POSITIVE VOLTAGE REGULATOR (External PNP Pass Transistor)

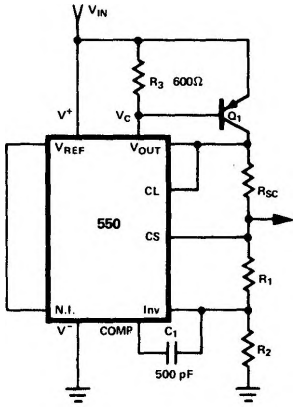


FIGURE 3

POSITIVE VOLTAGE REGULATOR (External NPN Pass Transistor)

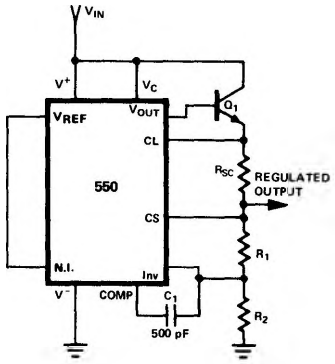
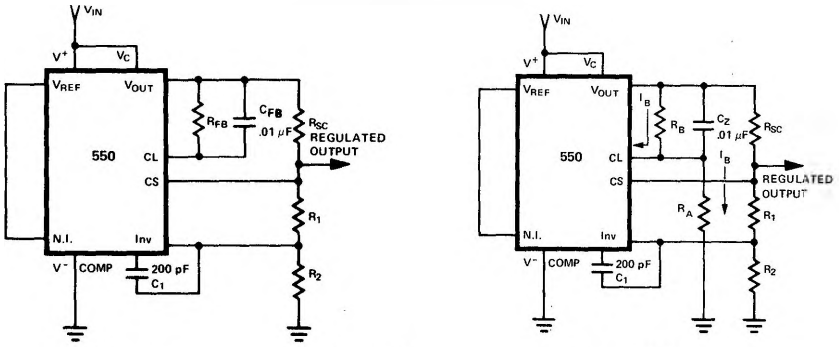


FIGURE 4.

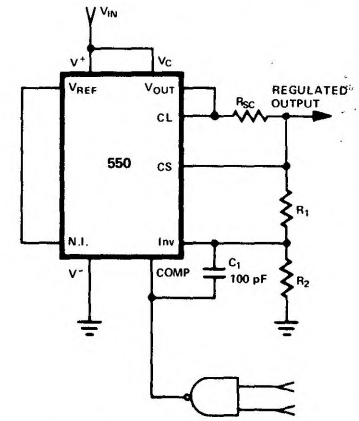
FOLDBACK CURRENT LIMITED OUTPUT VOLTAGE AS A FUNCTION OF OUTPUT CURRENT



$$I_{SC} = \frac{V_{SENSE}}{R_{SC}} \qquad R_A = \frac{I_{FL} R_{SC} - V_{SENSE}}{I_{BLEED}} \qquad R_B = \frac{V_{OUT} + V_{SENSE}}{I_B + I_{BIAS}}$$

FIGURE 5.

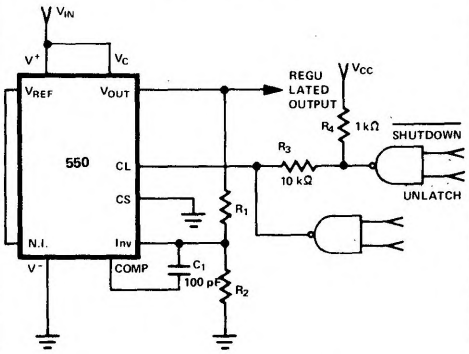
REMOTE SHUTDOWN REGULATOR WITH CURRENT LIMITING



1/4 8T80, 1/6 8T90, 1/10 8T01B, etc.

FIGURE 6

REMOTE LATCHING SHUTDOWN REGULATOR

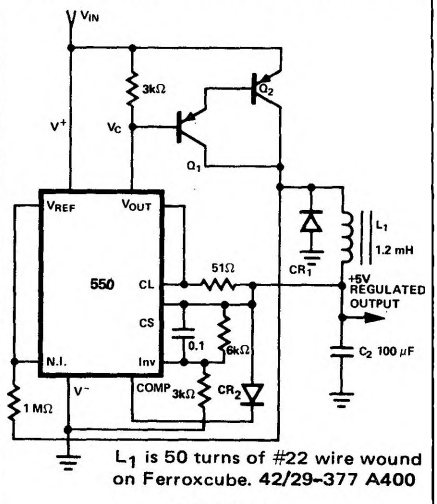


8415, 8417, 2/3 8471, 1/3 8891, 8T90, 1/2 8481, 8881, 8T90

NOTE 2

FIGURE 7

POSITIVE SWITCHING REGULATOR



L_1 is 50 turns of #22 wire wound on Ferroxcube. 42/29-377 A400

FIGURE 8

TYPICAL APPLICATIONS (Cont'd.)

POSITIVE FLOATING REGULATOR

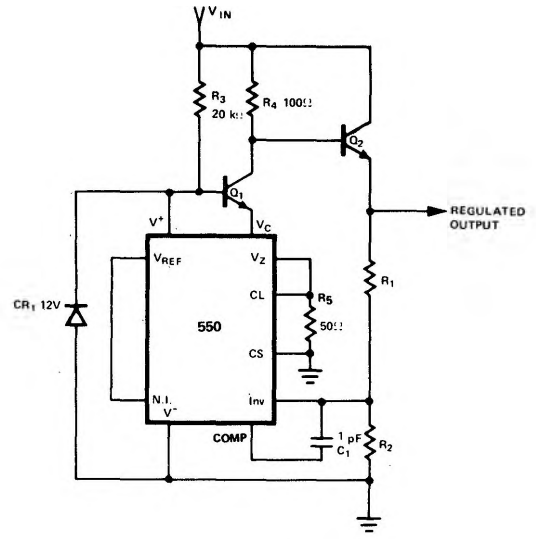


FIGURE 9

NEGATIVE FLOATING REGULATOR

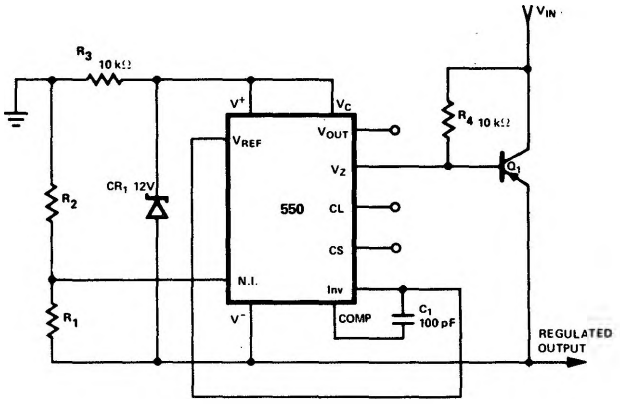


FIGURE 10

NOTES:

1. To utilize the SE550L in applications which require V_Z, an external 6.2 volt zener diode should be connected in series with V_{OUT}.
2. The "Shut-down" gate need only be pulsed to latch the regulator output to zero. R_4 may be omitted for active pull-up devices. The "Unlatch" gate must have an open collector.

EQUIVALENT CIRCUIT