Regulating Pulse Width Modulator

FEATURES

- ±5% Typ. Oscillator Tolerance
- 20mV/1000 Hrs Typ. Long Term Stability
- Interchangeable with all SG3524 or LM3524 Devices
- Operates Above 100kHz

APPLICATIONS

- Switching Power Supplies
- Motor Speed Control
- Off-Line Power Converters

DESCRIPTION

The SG3524 PWM switching regulator control circuit contains all the essential circuitry to implement single-ended or push-pull switching regulators. Included on the circuit are oscillator, voltage reference, a pulse width modulator, error amplifier, overload protection circuitry and output drivers.

Although pin-for-pin and functionally compatible with industry standard 3524 devices, Linear Technology has incorporated several improvements in the design of the 3524. A subsurface zener reference has been used to provide excellent stability with time and the reference is trimmed at the wafer level.

Linear Technology Corporation's advanced processing, design and passivation techniques make the SG3524 a superior and more reliable choice over previous devices.

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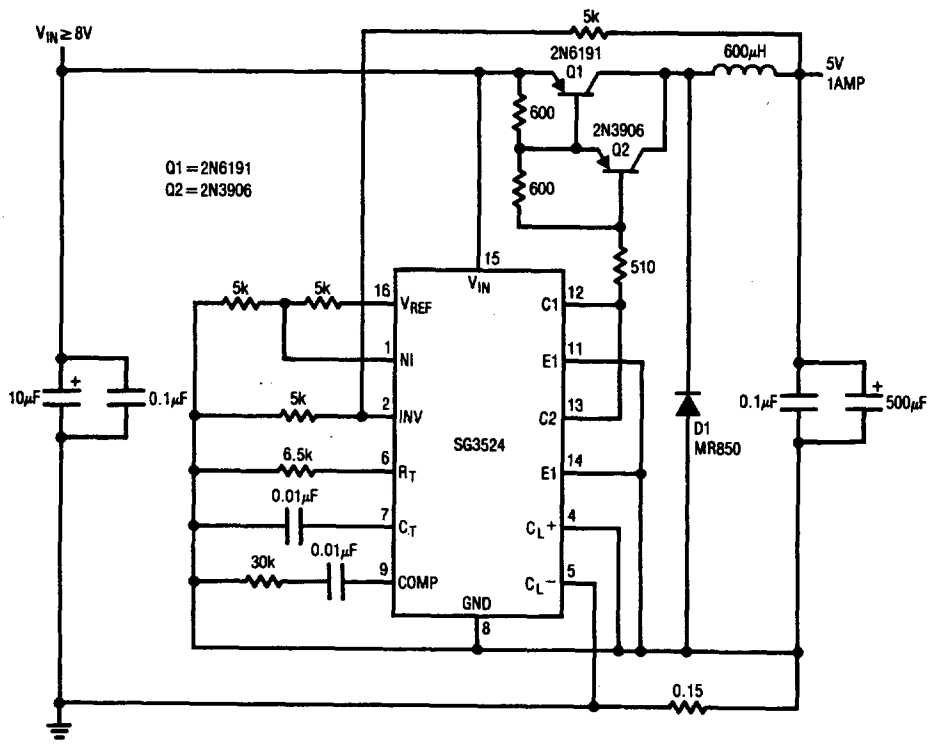
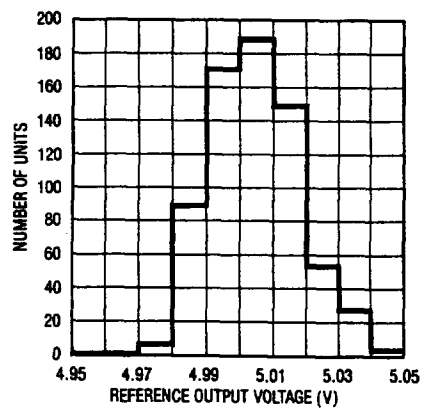
5V, 1 Amp Regulator



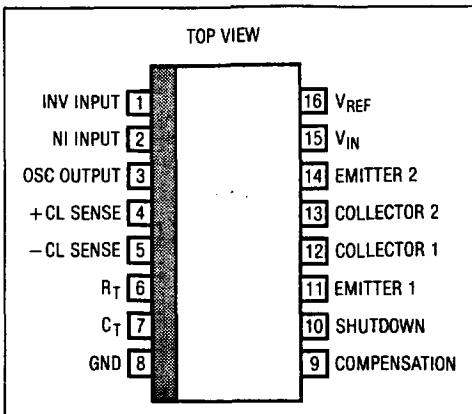
Distribution of Reference Output Voltage



ABSOLUTE MAXIMUM RATINGS

Input Voltage 40V
Reference Output Current 50mA
Output Current (Each Output) 100mA
Oscillator Charging Current (Pin 6 or 7) 5mA
Internal Power Dissipation (Note 1) 1W
Operating Temperature Range ..... 0°C to 70°C
Storage Temperature Range ..... −65°C to 150°C
Lead Temperature (Soldering, 10 sec.) ..... 300°C

PACKAGE/ORDER INFORMATION



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ORDER PART NUMBER
SG3524S
PART MARKING
SG3524S

ELECTRICAL CHARACTERISTICS (Note 2)

PARAMETER	CONDITIONS		SG3524 MIN	SG3524 TYP	SG3524 MAX	UNITS
Reference Section:						
Output Voltage		●	4.6	5.0	5.4	V
Line Regulation	V_{IN} = 8V to 40V	●		10	30	mV
Load Regulation	I_L = 0mA to 20mA	●		20	50	mV
Ripple Rejection	f = 120Hz			66		dB
Short Circuit Current Limit	V_{REF} = 0			100		mA
Temperature Stability		●		0.3	1	%
Long Term Stability				20		mV/√khr
Oscillator Section:						
Maximum Frequency	C_T = 0.001μF, R_T = 2kΩ	●		300		kHz
Initial Accuracy	R_T and C_T Constant			5		%
Voltage Stability	V_{IN} = 8V to 40V				1	%
Temperature Stability	Note 3	●		2		%
Output Amplitude	Pin 3			3.5		V
Output Pulse Width	C_T = 0.01μF, T_A = 25°C			0.5		μs
Error Amplifier Section:						
Input Offset Voltage	V_{CM} = 2.5V	●		2	10	mV
Input Bias Current	V_{CM} = 2.5V	●		2	10	μA
Open Loop Voltage Gain		●	60	80		dB
Common-Mode Voltage			1.8		3.4	V
Common-Mode Rejection Ratio				70		dB
Small Signal Bandwidth	A_V = 0dB			3		MHz
Output Voltage			0.5		3.8	V
Comparator Section:						
Duty Cycle	% Each Output On	●	0		45	%
Input Threshold	Zero Duty Cycle	●		1		V
Input Threshold	Max Duty Cycle	●		3.5		V
Input Bias Current		●		1		μA

ELECTRICAL CHARACTERISTICS (Note 2)

PARAMETER	CONDITIONS		SG3524 MIN	SG3524 TYP	SG3524 MAX	UNITS
Current Limiting Section:						
Sense Voltage	Pin 9 = 2V with Error Amplifier Set for Max Out		180	200	220	mV
Sense Voltage T.C.		●		0.2		mV/°C
Common-Mode Voltage		●	−1		1	V
Output Section: (Each Output)						
Collector-Emitter Voltage		●	40			V
Collector Leakage Current	V_{CE} = 40V	●		0.1	50	µA
Saturation Voltage	I_C = 50mA	●		1	2	V
Emitter Output Voltage	V_{IN} = 20V	●	17	18		V
Rise Time	R_C = 2kΩ			0.2		µs
Fall Time	R_C = 2kΩ			0.1		µs
Total Standby Current:	V_{IN} = 40V (Note 4)	●		8	10	mA

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

Note 1: For operating at elevated temperatures, the device in the SO package must be derated at 100°C/W to a maximum junction temperature of 115°C.

Note 2: These specifications apply for V_{IN} = 20V, f = 20kHz. T_A = 25°C unless otherwise noted.

Note 3: Although many manufacturers specify a maximum specification of 2%, Linear Technology's experience is that this specification is not being presently met by other manufacturers. Linear Technology's basic design, although improved, is essentially identical to other manufacturer's devices. Linear Technology is, however, unwilling to place a maximum specification on its data sheet which cannot be met or guaranteed.

Note 4: Standby current does not include the oscillator charging current, error and current limit dividers, and the outputs are open circuit.

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