

## ABSOLUTE MAXIMUM RATINGS (Note 1)

|                                   |                          |
|-----------------------------------|--------------------------|
| Input Voltage (+V <sub>IN</sub> ) | 42V                      |
| Collector Voltage                 | 60V                      |
| Logic Inputs                      | -0.3V to 5.5V            |
| Current Limit Sense Inputs        | -0.3V to V <sub>IN</sub> |
| Output Current (each transistor)  | 200mA                    |
| Reference Load Current            | 50mA                     |

Note 1. Values beyond which damage may occur.

|                                                           |                |
|-----------------------------------------------------------|----------------|
| Oscillator Charging Current                               | 5mA            |
| Operating Junction Temperature                            |                |
| Hermetic (J, L Packages)                                  | 150°C          |
| Plastic (N, DW Packages)                                  | 150°C          |
| Storage Temperature Range                                 | -65°C to 150°C |
| Lead Temperature (Soldering, 10 seconds)                  | 300°C          |
| RoHS Peak Package Solder Reflow Temp. (40 sec. max. exp.) | 260°C(+0, -5)  |

## THERMAL DATA

J Package:

|                                                       |        |
|-------------------------------------------------------|--------|
| Thermal Resistance-Junction to Case, $\theta_{JC}$    | 30°C/W |
| Thermal Resistance-Junction to Ambient, $\theta_{JA}$ | 80°C/W |

N Package:

|                                                       |        |
|-------------------------------------------------------|--------|
| Thermal Resistance-Junction to Case, $\theta_{JC}$    | 40°C/W |
| Thermal Resistance-Junction to Ambient, $\theta_{JA}$ | 65°C/W |

DW Package:

|                                                       |        |
|-------------------------------------------------------|--------|
| Thermal Resistance-Junction to Case, $\theta_{JC}$    | 40°C/W |
| Thermal Resistance-Junction to Ambient, $\theta_{JA}$ | 95°C/W |

L Package:

|                                                       |         |
|-------------------------------------------------------|---------|
| Thermal Resistance-Junction to Case, $\theta_{JC}$    | 35°C/W  |
| Thermal Resistance-Junction to Ambient, $\theta_{JA}$ | 120°C/W |

Note A. Junction Temperature Calculation:  $T_J = T_A + (P_D \times \theta_{JA})$ .

Note B. The above numbers for  $\theta_{JC}$  are maximums for the limiting thermal resistance of the package in a standard mounting configuration. The  $\theta_{JA}$  numbers are meant to be guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.

## RECOMMENDED OPERATING CONDITIONS (Note 2)

|                                       |                             |
|---------------------------------------|-----------------------------|
| Input Voltage (+V <sub>IN</sub> )     | 7V to 40V                   |
| Collector Voltage                     | 0V to 60V                   |
| Error Amp Common Mode Range           | 2.3V to V <sub>REF</sub>    |
| Current Limit Sense Common Mode Range | 0V to V <sub>IN</sub> -2.5V |
| Output Current (each transistor)      | 0 to 100mA                  |
| Reference Load Current                | 0 to 20mA                   |
| Oscillator Charging Current           | 25µA to 1.8mA               |

Note 2: Range over which the device is functional.

|                                               |                 |
|-----------------------------------------------|-----------------|
| Oscillator Frequency Range                    | 100Hz to 400KHz |
| Oscillator Timing Resistor (R <sub>T</sub> )  | 2KΩ to 150KΩ    |
| Oscillator Timing Capacitor (C <sub>T</sub> ) | 1nF to 0.1µF    |
| Operating Ambient Temperature Range           |                 |
| SG1524B                                       | -55°C to 125°C  |
| SG2524B                                       | -25°C to 85°C   |
| SG3524B                                       | 0°C to 70°C     |

## ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, these specifications apply over the operating ambient temperatures for SG1524B with -55°C ≤ T<sub>A</sub> ≤ 125°C, SG2524B with -25°C ≤ T<sub>A</sub> ≤ 85°C, SG3524B with 0°C ≤ T<sub>A</sub> ≤ 70°C, and +V<sub>IN</sub> = 20V. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

| Parameter                      | Test Conditions                  | SG1524B/2524B |      |      | SG3524B |      |      | Units |
|--------------------------------|----------------------------------|---------------|------|------|---------|------|------|-------|
|                                |                                  | Min.          | Typ. | Max. | Min.    | Typ. | Max. |       |
| Reference Section (Note 3)     |                                  |               |      |      |         |      |      |       |
| Output Voltage                 | T <sub>J</sub> = 25°C            | 4.95          | 5.00 | 5.05 | 4.90    | 5.00 | 5.10 | V     |
| Line Regulation                | V <sub>IN</sub> = 7V to 40V      |               | 3    | 20   |         | 3    | 30   | mV    |
| Load Regulation                | I <sub>L</sub> = 0 to 20mA       |               | 5    | 30   |         | 5    | 50   | mV    |
| Temperature Stability (Note 7) | Over Operating Temperature Range |               | 15   | 50   |         | 15   | 50   | mV    |
| Total Output Voltage Range     | Over Line, Load and Temperature  | 4.90          |      | 5.10 | 4.80    |      | 5.20 | V     |
| Short Circuit Current          | V <sub>REF</sub> = 0V            | 25            | 50   | 120  | 25      | 50   | 120  | mA    |
| Undervoltage Lockout Section   |                                  |               |      |      |         |      |      |       |
| Threshold Voltage              |                                  | 4.3           | 4.5  | 4.7  | 4.2     | 4.5  | 4.9  | V     |

Note 3. I<sub>L</sub> = 0mA

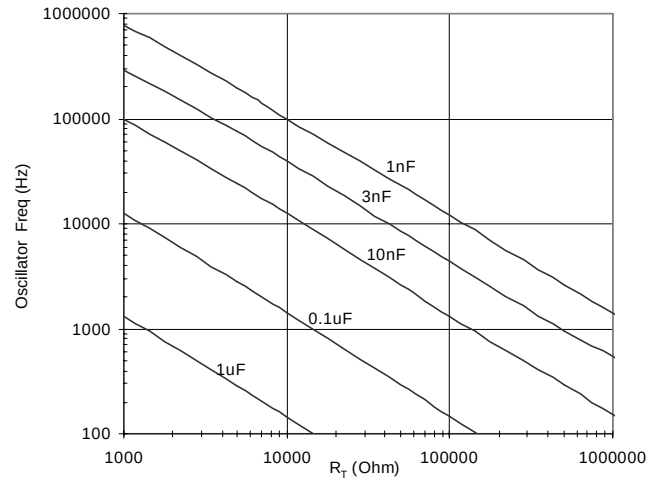
## ELECTRICAL CHARACTERISTICS (continued)

| Parameter                                       | Test Conditions                                                              | SG1524B/2524B |      |      | SG3524B |      |      | Units |
|-------------------------------------------------|------------------------------------------------------------------------------|---------------|------|------|---------|------|------|-------|
|                                                 |                                                                              | Min.          | Typ. | Max. | Min.    | Typ. | Max. |       |
| <b>Oscillator Section</b> (Note 4)              |                                                                              |               |      |      |         |      |      |       |
| Initial Accuracy                                | T <sub>J</sub> = 25°C                                                        | 42            | 45   | 48   | 40      | 45   | 50   | KHz   |
| Voltage Stability                               | V <sub>IN</sub> = 7V to 40V                                                  |               | 0.1  | 1    |         | 0.1  | 1    | %     |
| Temperature Stability (Note 7)                  | Over Operating Range                                                         |               | 1    | 2    |         | 1    | 2    | %     |
| Minimum Frequency (Note 7)                      | R <sub>T</sub> = 150KΩ, C <sub>T</sub> = 0.1μF                               |               | 50   | 140  |         | 50   | 120  | Hz    |
| Maximum Frequency                               | R <sub>T</sub> = 2KΩ, C <sub>T</sub> = 470pF                                 | 400           | 600  |      | 400     | 600  |      | KHz   |
| Sawtooth Peak Voltage                           | V <sub>IN</sub> = 40V                                                        |               | 3.5  | 3.9  |         | 3.5  | 3.9  | V     |
| Sawtooth Valley Voltage                         | V <sub>IN</sub> = 7V                                                         | 0.6           | 1    |      | 0.6     | 1    |      | V     |
| Clock Amplitude                                 |                                                                              | 3.0           | 4.0  |      | 3.0     | 4.0  |      | V     |
| Clock Pulse Width                               |                                                                              | 0.2           | 0.5  | 1.2  | 0.2     | 0.5  | 1.2  | μs    |
| <b>Error Amplifier Section</b> (Note 5)         |                                                                              |               |      |      |         |      |      |       |
| Input Offset Voltage                            | R <sub>S</sub> ≤ 2KΩ                                                         |               | 0.5  | 5    |         | 2    | 10   | mV    |
| Input Bias Current                              |                                                                              |               | 1    | 5    |         | 1    | 10   | μA    |
| Input Offset Current                            |                                                                              |               |      | 1    |         |      | 1    | μA    |
| DC Open Loop Gain                               | R <sub>L</sub> ≥10MΩ                                                         | 60            | 78   |      | 60      | 78   |      | dB    |
| Output Low Level                                | I <sub>SINK</sub> = 100μA; V <sub>PIN 1</sub> - V <sub>PIN 2</sub> ≥ 150mV   |               | 0.2  | 0.5  |         | 0.2  | 0.5  | V     |
| Output High Level                               | I <sub>SOURCE</sub> = 100μA; V <sub>PIN 2</sub> - V <sub>PIN 1</sub> ≥ 150mV | 3.8           | 4.2  |      | 3.8     | 4.2  |      | V     |
| Common Mode Rejection                           | V <sub>CM</sub> = 2.3V to V <sub>REF</sub>                                   | 70            | 90   |      | 70      | 90   |      | dB    |
| Supply Voltage Rejection                        | V <sub>IN</sub> = 7V to 40V                                                  | 76            | 100  |      | 76      | 100  |      | dB    |
| Gain-Bandwidth Product (Note 7 )                | T <sub>J</sub> = 25°C                                                        | 1             | 2    |      | 1       | 2    |      | MHz   |
| <b>P.W.M. Comparator</b> (Note 4)               |                                                                              |               |      |      |         |      |      |       |
| Minimum Duty Cycle                              | V <sub>COMP</sub> = 0.5V                                                     |               |      | 0    |         |      | 0    | %     |
| Maximum Duty Cycle                              | V <sub>COMP</sub> = 3.9V                                                     | 45            | 49   |      | 45      | 49   |      | %     |
| <b>Current Limit Amplifier Section</b> (Note 6) |                                                                              |               |      |      |         |      |      |       |
| Sense Voltage                                   |                                                                              | 180           | 200  | 220  | 170     | 200  | 230  | mV    |
| Input Bias Current                              |                                                                              |               | -3   | -10  |         | -3   | -10  | μA    |
| <b>Shutdown Input Section</b>                   |                                                                              |               |      |      |         |      |      |       |
| HIGH Input Voltage                              |                                                                              | 2.0           |      |      | 2.0     |      |      | V     |
| HIGH Input Current                              | V <sub>SHUTDOWN</sub> = 5.0V                                                 |               | 0.1  | 1    |         | 0.1  | 1    | mA    |
| LOW Input Voltage                               |                                                                              |               |      | 0.6  |         |      | 0.6  | V     |
| <b>Output Section</b> (each transistor)         |                                                                              |               |      |      |         |      |      |       |
| Collector Leakage Current                       | V <sub>CE</sub> = 60V                                                        |               |      | 50   |         |      | 50   | μA    |
| Collector Saturation Voltage                    | I <sub>C</sub> = 10mA                                                        |               | 0.2  | 0.4  |         | 0.2  | 0.4  | V     |
|                                                 | I <sub>C</sub> = 100mA                                                       |               | 1.0  | 2.0  |         | 1.0  | 2.0  | V     |
| Emitter Output Voltage                          | I <sub>E</sub> = 10mA                                                        | 17.5          | 19   |      | 17.5    | 19   |      | V     |
|                                                 | I <sub>E</sub> = 100mA                                                       | 17            | 18   |      | 17      | 18   |      | V     |
| Emitter Voltage Rise Time (Note 7)              | R <sub>E</sub> = 2KΩ, T <sub>A</sub> = 25°C                                  |               | 0.2  | 0.5  |         | 0.2  | 0.5  | μs    |
| Collector Voltage Fall Time                     | R <sub>C</sub> = 2KΩ, T <sub>A</sub> = 25°C                                  |               | 0.1  | 0.2  |         | 0.1  | 0.2  | μs    |
| <b>Power Consumption</b>                        |                                                                              |               |      |      |         |      |      |       |
| Standby Current                                 | V <sub>IN</sub> = 40V, V <sub>SHUTDOWN</sub> = 2.0V                          |               | 5    | 12   |         | 5    | 12   | mA    |

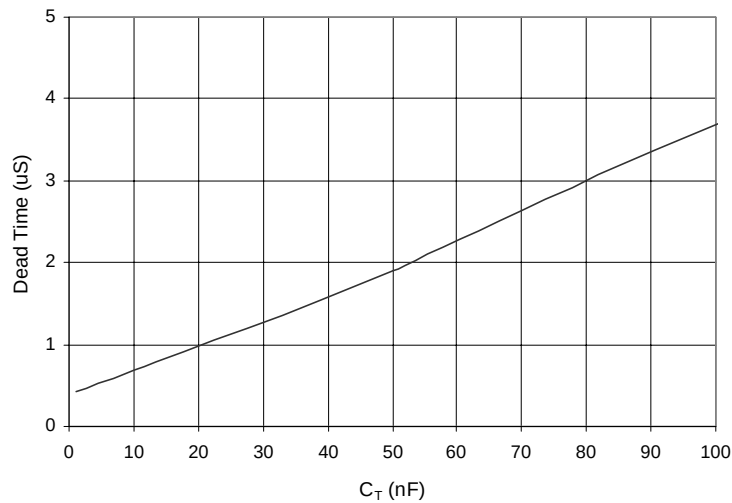
Note 4.  $F_{OSC} = 45\text{KHz}$  ( $R_T = 2700\Omega$ ,  $C_T = .01\mu\text{F}$ )Note 5.  $V_{CM} = 2.3\text{V to } V_{REF}$ Note 6.  $V_{CM} = 0\text{V to } 17.5\text{V}$ 

Note 7. These parameters, although guaranteed over the recommended operating conditions, are not tested in production.

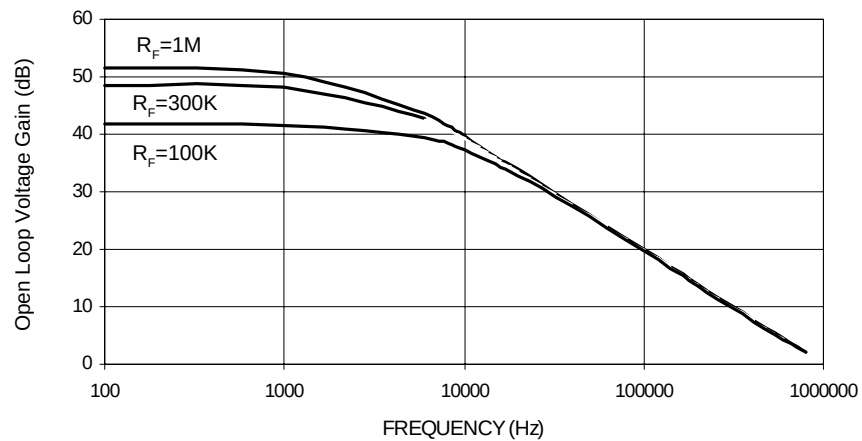
# TYPICAL CHARACTERISTIC CURVES



**Figure 1**  
Oscillator Frequency vs. Timing Resistor and Capacitor  
 $V_{IN}=20V$ ,  $T_A=25^{\circ}C$



**Figure 2**  
SG1524B Dead Time vs. Timing capacitance ( $R_T=2.7k$ )  
 $V_{IN}=20V$ ,  $T_A=25^{\circ}C$



**Figure 3**  
SG1524B Error Amp Voltage Gain vs. Freq over  $R_F$   
 $V_{IN}=20V$ ,  $T_A=25^{\circ}C$

## CONNECTION DIAGRAMS & ORDERING INFORMATION (See Notes Below)

| Package                                                | Part No.                                                           | Ambient Temperature Range                                                          | Connection Diagram                                                                                                        |
|--------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| 16-PIN CERAMIC DIP<br>J - PACKAGE                      | SG1524BJ/883B<br>SG1524BJ/DESC<br>SG1524BJ<br>SG2524BJ<br>SG3524BJ | -55°C to 125°C<br>-55°C to 125°C<br>-55°C to 125°C<br>-25°C to 85°C<br>0°C to 70°C | <p>N Package: RoHS Compliant / Pb-free Transition DC: 0503<br/>N Package: RoHS / Pb-free 100% Matte Tin Lead Finish</p>   |
| 16-PIN PLASTIC DIP<br>N - PACKAGE                      | SG2524BN<br>SG3524BN                                               | -25°C to 85°C<br>0°C to 70°C                                                       |                                                                                                                           |
| 16-PIN WIDE BODY<br>PLASTIC S.O.I.C.<br>DW - PACKAGE   | SG2524BDW<br>SG3524BDW                                             | -25°C to 85°C<br>0°C to 70°C                                                       | <p>DW Package: RoHS Compliant / Pb-free Transition DC: 0516<br/>DW Package: RoHS / Pb-free 100% Matte Tin Lead Finish</p> |
| 20-PIN CERAMIC<br>LEADLESS CHIP CARRIER<br>L - PACKAGE | SG1524BL/883B<br>SG1524BL                                          | -55°C to 125°C<br>-55°C to 125°C                                                   |                                                                                                                           |

Note 1. Contact factory for JAN and DESC product availability.  
2. All packages are viewed from the top.