

Connection Diagrams and Ordering Information

Ambient Temperature	Type	Package	Part Number	Packaging Type	Connection Diagram
55°C to 125°C	J	16-PIN Ceramic Dual Inline Package	SG1524BJ	CERDIP	
			SG1524BJ-883B		
			SG1524BJ-DESC		
-25°C to 85°C	N	16-PIN Dual Inline Plastic Package	SG2524BN	PDIP	N Package: RoHS Compliant / Pb-free Transition DC: 0503 N Package: RoHS / Pb-free 100% Matte Tin Lead Finish
0°C to 70°C			SG3524BN		
-25°C to 85°C	DW	16-PIN Small Outline Wide Body Package	SG2524BDW	SOWB	
0°C to 70°C			SG3524BDW		
-55°C to 125°C	L	20-Pin Ceramic Leadless Chip Carrier	SG1524BL-883B	CLCC	
			SG1524BL		

Note:

1. Contact factory for DESC product availability.
2. All packages are viewed from the top.
3. Hermetic Packages J, & L use Sn63/ Pb37 hot solder lead finish, contact factory for availability of RoHS versions
4. Available in Tape & Reel. Append the letters "TR" to the part number. (i.e. SG3524BDW-TR)

Absolute Maximum Ratings

Parameter	Value	Units
Input Voltage, (+V _{IN})	42	V
Collector Voltage	60	V
Logic Inputs	-0.3 to 5.5	V
Current Limit Sense Inputs	-0.3 to V _{IN}	V
Output Current (Each transistor)	200	mA
Reference Load Current	50	mA
Oscillator Charging Current	5	mA
Operating Junction Temperature		
Hermetic (J, L Packages)	150	°C
Plastic (N, DW Packages)	150	°C
Storage Temperature Range	-65 to 150	°C
Lead Temperature (Soldering, 10 seconds)	300	°C
RoHS Peak Package Solder Reflow Temp. (40 sec. max. exp.)	260 (+0, -5)	°C
Note: 1. Values beyond which damage may occur		

Thermal Data

Parameter	Value	Units
J Package		
Thermal Resistance-Junction to Case, θ_{JC}	30	°C/W
Thermal Resistance-Junction to Ambient, θ_{JA}	80	°C/W
N Package		
Thermal Resistance-Junction to Case, θ_{JC}	40	°C/W
Thermal Resistance-Junction to Ambient, θ_{JA}	65	°C/W
DW Package		
Thermal Resistance-Junction to Case, θ_{JC}	40	°C/W
Thermal Resistance-Junction to Ambient, θ_{JA}	95	°C/W
L Package		
Thermal Resistance-Junction to Case, θ_{JC}	35	°C/W
Thermal Resistance-Junction to Ambient, θ_{JA}	120	°C/W
Note: 1. Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$. 2. The above numbers for θ_{JC} are maximums for the limiting thermal resistance of the package in a standard mounting configuration. The θ_{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 Conditions¹

Parameter	Value	Units
Input Voltage (+V _{IN})	7 to 40	V
Collector Voltage	0 to 60	V
Error Amp Common Mode Range	2.3 to V _{REF}	V
Current Limit Sense Common Mode Range	0 to V _{IN} - 2.5V	V
Output Current (Each transistor)	0 to 100	mA
Reference Load Current	0 to 20	mA
Oscillator Charging Current	25 to 1.8	μA / mA
Oscillator Frequency Range	100 to 400	Hz / kHz
Oscillator Timing Resistor (R _T)	2 to 150	kΩ
Oscillator Timing Capacitor (C _T)	1 to 0.1	nF / μF
Operating Ambient Temperature Range		
SG1524B	-55 to 125	°C
SG2524B	-25 to 85	°C
SG3524B	0 to 70	°C

Note: 1. Range over which the device is functional.

Electrical Characteristics

(Unless otherwise specified, these specifications apply over the operating ambient temperatures for SG1524B with $-55^{\circ}\text{C} \leq T_A \leq 125^{\circ}\text{C}$, SG2524B with $-25^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$, SG3524B with $0^{\circ}\text{C} \leq T_A \leq 70^{\circ}\text{C}$, and +V_{IN} = 20V. Low duty cycle pulse testing techniques are used that 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 ¹								
Output Voltage	T _J = 25°C	4.95	5.00	5.05	4.90	5.00	5.10	V
Line Regulation	V _{IN} = 7V to 40V		3	20		3	30	mV
Load Regulation	I _L = 0 to 20mA		5	30		5	50	mV
Temperature Stability ⁵	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 _{REF} = 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
Notes:								
1. I _L = 0mA								
2. F _{OSC} = 45 kHz (R _T = 2700 Ω, C _T = .01μF)								
3. V _{CM} = 2.3V to V _{REF}								
4. V _{CM} = 0V to 17.5V								
5. These parameters, although guaranteed over the recommended operating conditions, are not tested in production.								

Electrical Characteristics (continued)

Parameter	Test Conditions	SG1524B/2524B			SG3524B			Units
		Min.	Typ.	Max	Min.	Typ.	Max	
Oscillator Section ²								
Initial Accuracy	T _J = 25°C	42	45	48	40	45	50	kHz
Voltage Stability	V _{IN} = 7V to 40V		0.1	1		0.1	1	%
Temperature Stability ⁵	Over Operating Range		1	2		1	2	%
Minimum Frequency ⁵	R _T = 150kΩ, C _T = 0.1μF		50	140		50	120	Hz
Maximum Frequency	R _T = 2 kΩ, C _T = 470pF	400	600		400	600		kHz
Sawtooth Peak Voltage	V _{IN} = 40V		3.5	3.9		3.5	3.9	V
Sawtooth Valley Voltage	V _{IN} = 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
Error Amplifier Section ³								
Input Offset Voltage	R _S ≤ 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 _L ≥ 10MΩ	60	78		60	78		dB
Output Low Level	I _{SINK} = 100μA; V _{PIN 1} - V _{PIN 2} ≥ 150mV		0.2	0.5		0.2	0.5	V
Output High Level	I _{SOURCE} = 100μA; V _{PIN 2} - V _{PIN 1} ≥ 150mV	3.8	4.2		3.8	4.2		V
Common Mode Rejection	V _{CM} = 2.3V to V _{REF}	70	90		70	90		dB
Supply Voltage Rejection	V _{IN} = 7V to 40V	76	100		76	100		dB
Gain-Bandwidth Product ⁵	T _J = 25°C	1	2		1	2		MHz
P.W.M. Comparator ²								
Minimum Duty Cycle	V _{COMP} = 0.5V			0			0	%
Maximum Duty Cycle	V _{COMP} = 3.9V	45	49		45	49		%
Current Limit Amplifier Section ⁴								
Sense Voltage		180	200	220	170	200	230	mV
Input Bias Current			-3	-10		-3	-10	μA
Notes:								
1. I _L = 0mA								
2. F _{OSC} = 45kHz (R _T = 2700 Ω, C _T = .01μF)								
3. V _{CM} = 2.3V to V _{REF}								
4. V _{CM} = 0V to 17.5V								
5. These parameters, although guaranteed over the recommended operating conditions, are not tested in production.								

Parameter	Test Conditions	SG1524B/2524B			SG3524B			Units
		Min.	Typ.	Max	Min.	Typ.	Max	
Shutdown Input Section								
HIGH Input Voltage		2.0			2.0			V
HIGH Input Current	V _{SHUTDOWN} = 5V		0.1	1		0.1	1	mA
LOW Input Voltage				0.6			0.6	V
Output Section (Each transistor)								
Collector Leakage Current	V _{CE} = 60V			50			50	μA
Collector Saturation Voltage	I _C = 10mA		0.2	0.4		0.2	0.4	V
	I _C = 100mA		1.0	2.0		1.0	2.0	V
Emitter Output Voltage	I _E = 10mA	17.5	19		17.5	19		V
	I _E = 100mA	17	18		17	18		V
Emitter Voltage Rise Time ⁵	R _E = 2kΩ, T _A = 25°C		0.2	0.5		0.2	0.5	μs
Collector Voltage Fall Time	R _C = 2kΩ, T _A = 25°C		0.1	0.2		0.1	0.2	μs
Power Consumption								
Standby Current	V _{IN} = 40V, V _{SHUTDOWN} = 2.0 V		5	12		5	12	mA
Notes: 1. I _L = 0mA 2. F _{OSC} = 45kHz (R _T = 2700Ω, C _T = .01μF) 3. V _{CM} = 2.3V to V _{REF} 4. V _{CM} = 0V to 17.5V 5. These parameters, although guaranteed over the recommended operating conditions, are not tested in production.								

Characteristic Curves

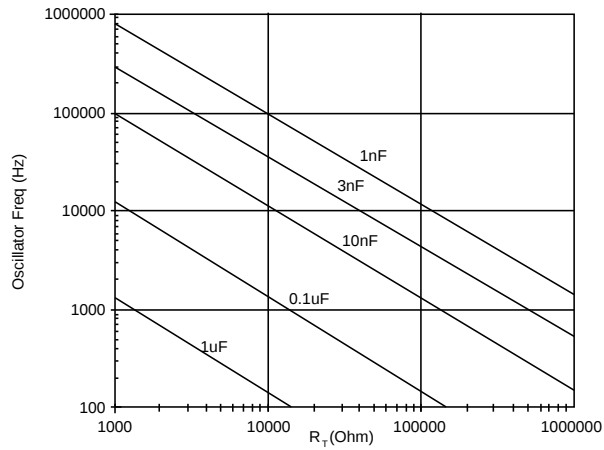


Figure 2 • Oscillator Frequency vs. Timing Resistor and Capacitor $V_{IN} = 20V$, $T_A = 25^\circ C$

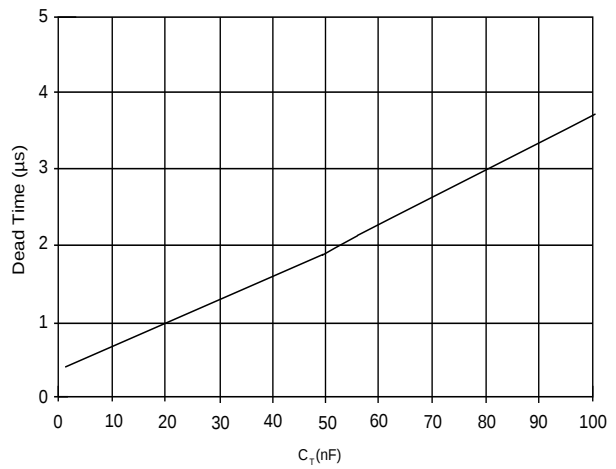


Figure 3 • SG1524B Dead Times vs. Timing Capacitance ($R_T = 2.7k\Omega$) $V_{IN} = 20V$, $T_A = 25^\circ C$

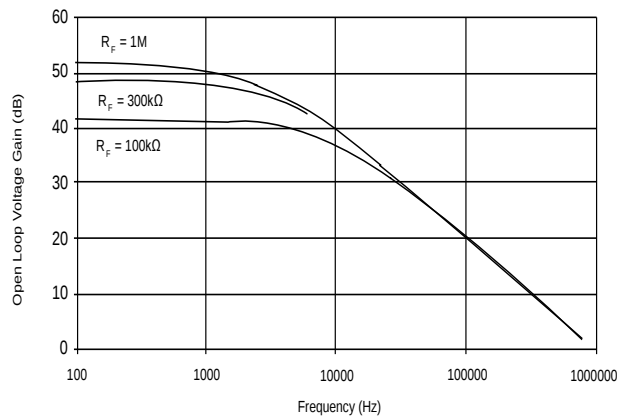
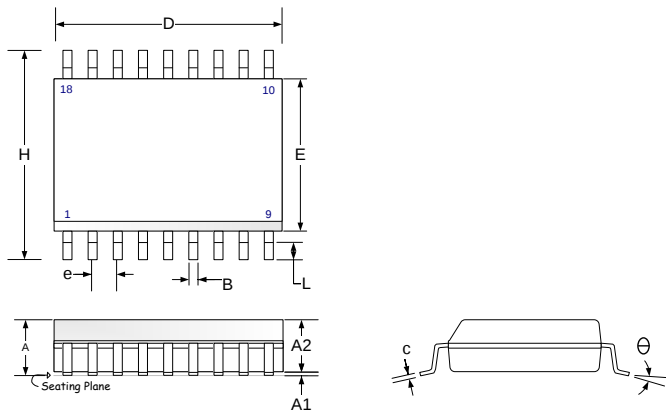


Figure 4 • SG1524B Error Amp Voltage Gain vs. Freq Over R_F ; $V_{IN} = 20V$, $T_A = 25^\circ C$

Package Outline Dimensions

Controlling dimensions are in inches, metric equivalents are shown for general information.



Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	1.52	0.049	0.060
b	0.33	0.51	0.013	0.020
c	0.19	0.25	0.007	0.010
D	9.78	10.01	0.385	0.394
E	5.79	6.20	0.228	0.244
e	1.27 BSC		0.050 BSC	
H	3.81	4.01	0.150	0.158
L	0.40	1.27	0.016	0.050
Θ	0	8	0	8
*LC		0.10		0.004

*Lead coplanarity

Note:

Dimensions do not include protrusions; these shall not exceed 0.155mm (.006") on any side. Lead dimension shall not include solder coverage.

Figure 5 • DW 16-Pin SOWB Package Dimensions

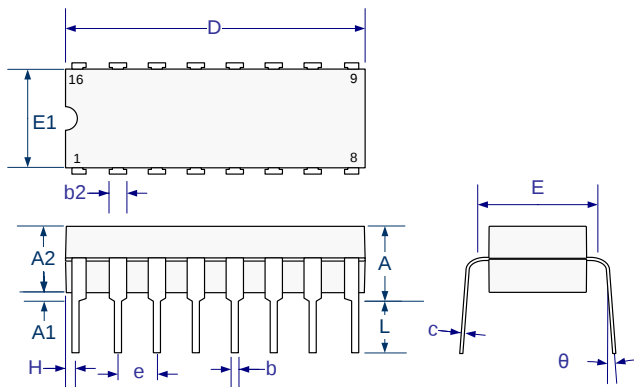


Figure 6 •

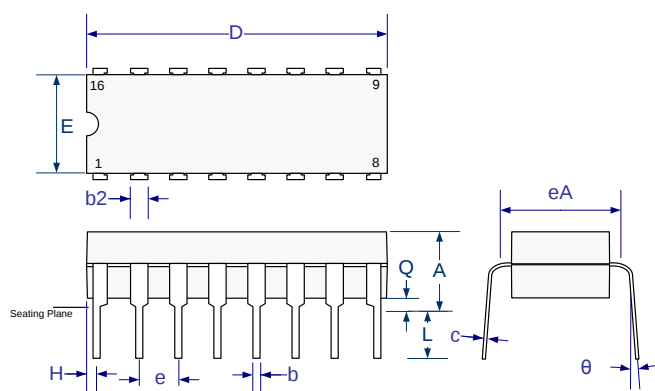
Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	5.08	-	0.200
A1	0.38	0.51	0.015	0.040
A2	3.30 Typ.		0.130 Typ.	
b	0.38	0.51	0.015	0.020
b2	0.76	1.52	0.030	0.060
c	0.20	0.38	0.008	0.015
D	18.54	20.57	0.730	0.810
e	2.54 BSC		0.100 BSC	
E1	6.10	6.60	0.240	0.260
E	7.62 BSC		0.300 BSC	
L	3.05		0.120	
θ	-	15°	-	15°

Note:

Dimensions do not include protrusions; these shall not exceed 0.155mm (.006") on any side. Lead dimension shall not include solder coverage.

Figure 6 • N 16-Pin Plastic Dual Inline Package Dimensions

Package Outline Dimensions

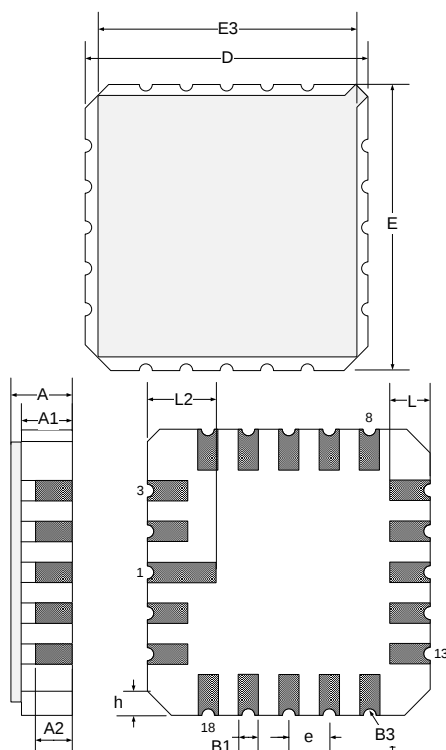


Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A		5.08		0.200
b	0.38	0.51	0.015	0.020
b2	1.04	1.65	0.045	0.065
c	0.20	0.38	0.008	0.015
D	19.30	19.94	0.760	0.785
E	5.59	7.11	0.220	0.280
e	2.54 BSC		0.100 BSC	
eA	7.37	7.87	0.290	0.310
H	0.63	1.78	0.025	0.070
L	3.18	5.08	0.125	0.200
α	-	15°	-	15°
Q	0.51	1.02	0.020	0.040

Note:

Dimensions do not include protrusions; these shall not exceed 0.155mm (.006") on any side. Lead dimension shall not include solder coverage.

Figure 7 • J 16-Pin Ceramic Dual Inline Package Dimensions



Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
D/E	8.64	9.14	0.340	0.360
E3	-	8.128	-	0.320
e	1.270 BSC		0.050 BSC	
B1	0.635 TYP		0.025 TYP	
L	1.02	1.52	0.040	0.060
A	1.626	2.286	0.064	0.090
h	1.016 TYP		0.040 TYP	
A1	1.372	1.68	0.054	0.066
A2	-	1.168	-	0.046
L2	1.91	2.41	0.075	0.95
B3	0.203R		0.008R	

Note:

All exposed metalized area shall be gold plated 60 micro-inch minimum thickness over nickel plated unless otherwise specified in purchase order.

Figure 8 • L 20-Pin Ceramic Leadless Chip Carrier (LCC) Package Outline Dimensions



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