

LINEAR INTEGRATED CIRCUITS

DESCRIPTION

The 5596 is a monolithic Double-Balanced Modulator/Demodulator designed for use where the output voltage is a product of an input voltage (signal) and a switched function (carrier). The S5596 will operate over the full military temperature range of -55°C to $+125^{\circ}\text{C}$. The N5596 is intended for applications within the range of 0°C to $+70^{\circ}\text{C}$.

FEATURES

- EXCELLENT CARRIER SUPPRESSION
 - 65dB typ @ 0.5 MHz
 - 50dB typ @ 10 MHz
- ADJUSTABLE GAIN AND SIGNAL HANDLING
- BALANCED INPUTS AND OUTPUTS
- HIGH COMMON-MODE REJECTION – 85dB typ

APPLICATIONS

- SUPPRESSED CARRIER AND AMPLITUDE MODULATION
- SYNCHRONOUS DETECTION
- FM DETECTION
- PHASE DETECTION
- SAMPLING
- SINGLE SIDEBAND
- FREQUENCY DOUBLING

ABSOLUTE MAXIMUM RATINGS

Applied V_{oltage} (Note 1)	30V
Differential Input Signal ($V_7 - V_8$)	$\pm 5.0\text{V}$
Differential Input Signal ($V_4 - V_1$)	$\pm (5 + I_{\text{B}} R_{\text{e}})\text{V}$
Input Signal ($V_2 - V_1, V_3 - V_4$)	5.0V
Bias Current (I_{B})	10mA
Power Dissipation (Pkg. Limitation)	

K-Package	680mW
Derate above 25°C	5.4mW/ $^{\circ}\text{C}$
A-Package (TO-116)	900mW
Derate above 25°C	7.2mW/ $^{\circ}\text{C}$

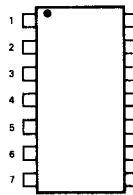
Operating Temperature Range	-55°C to $+125^{\circ}\text{C}$
Storage Temperature Range	-65°C to $+150^{\circ}\text{C}$

NOTES:

1. Voltage applied between pins 6-7, 8-1, 9-7, 9-8, 7-4, 7-1, 8-4, 6-8, 2-5, 3-5.
2. Pin number references pertain to K package pinout only.

PIN CONFIGURATIONS

A PACKAGE (Top View)



1. Positive Signal Input
2. Gain Adjust
3. NC
4. Gain Adjust
5. Negative Signal Input
6. Bias
7. NC
8. Positive Output
9. Positive Carrier Input
10. Negative Carrier Input
11. NC
12. NC
13. Negative Output
14. V^-

ORDER PART NOS.
S5596A/N5596A

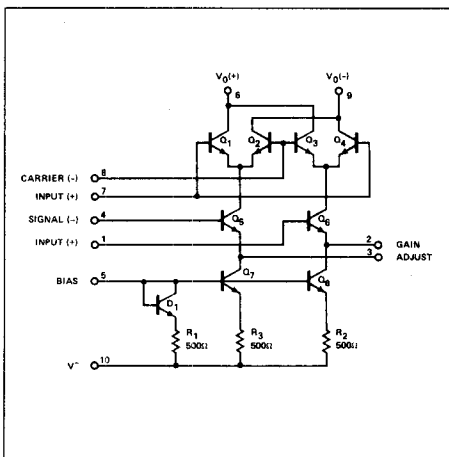
K PACKAGE



1. Positive Signal Input
2. Gain Adjust
3. Gain Adjust
4. Negative Signal Input
5. Bias
6. Positive Output
7. Positive Carrier Input
8. Negative Carrier Input
9. Negative Output
10. V^-

ORDER PART NOS.
S5596K/N5596K

SCHEMATIC DIAGRAM



SIGNETICS ■ 5596 – BALANCED MODULATOR - DEMODULATOR

ELECTRICAL CHARACTERISTICS*

(All input and output characteristics are single-ended unless otherwise noted.)

PARAMETER	S5596			N5596			UNITS
	MIN	TYP	MAX	MIN	TYP	MAX	
Carrier Feedthrough $V_C = 60$ mV(rms) sine wave and offset adjusted to zero $f_C = 1.0$ kHz $f_C = 10$ MHz $V_C = 300$ mVp-p square wave: offset adjusted to zero $f_C = 1.0$ kHz offset not adjusted $f_C = 1.0$ kHz		40 140			40 140		μ V (rms) mV (rms)
Carrier Suppressions $f_S = 10$ kHz, 300 mV(rms) $f_C = 500$ kHz, 60 mV(rms) sine wave $f_C = 10$ MHz, 60 mV(rms) sine wave	50	65 50		40	65 50		dB
Transadmittance Bandwidth (Magnitude) ($R_L = 50\Omega$) Carrier Input Port, $V_C = 60$ mV(rms) sine wave $f_S = 1.0$ kHz, 300 mV(rms) sine wave Signal Input Port, $V_S = 300$ mV(rms) sine wave $ V_C = 0.5$ V dc		300 80			300 80		MHz
Signal Gain $V_S = 100$ mV(rms), $f = 1.0$ kHz; $ V_C = 0.5$ V dc	2.5	3.5		2.5	3.5		V/V
Single-Ended Input Impedance, Signal Port, $f = 5.0$ MHz Parallel Input Resistance Parallel Input Capacitance		200 2.0			200 2.0		k Ω pF
Single-Ended Output Impedance, $f = 10$ MHz Parallel Output Resistance Parallel Output Capacitance		40 5.0			40 5.0		k Ω pF
Input Bias Current $I_1 + I_4$ $I_{bS} = \frac{I_1 + I_4}{2}$; $I_7 + I_8$ $I_{bC} = \frac{I_7 + I_8}{2}$		12 12	25 25		12 12	30 30	μ A
Input Offset Current $I_{ioS} = I_1 - I_4$; $I_{ioC} = I_7 - I_8$		0.7 0.7	5.0 5.0		0.7 0.7	7.0 7.0	μ A
Average Temperature Coefficient of Input Offset Current ($T_A = -55^\circ\text{C}$ to $+125^\circ\text{C}$)		2.0			2.0		nA/ $^\circ\text{C}$
Output Offset Current ($I_6 - I_9$)		14	50		15	80	μ A
Average Temperature Coefficient of Output Offset Current ($T_A = -55^\circ\text{C}$ to $+125^\circ\text{C}$)		90			90		nA/ $^\circ\text{C}$
Common-Mode Input Swing, Signal Port, $f_S = 1.0$ kHz		5.0			5.0		Vp-p
Common-Mode Gain, Signal Port, $f_S = 1.0$ kHz, $ V_C = 0.5$ V dc		-85			-85		dB
Common-Mode Quiescent Output Voltage (Pin 6 or Pin 9)		8.0			8.0		Vdc
Differential Output Voltage Swing Capability		8.0			8.0		Vp-p
Power Supply Current $I_6 + I_9$ I_{10}		2.0 3.0	3.0 4.0		2.0 3.0	4.0 5.0	mAdc
DC Power Dissipation		33			33		mW

($V^+ = +12$ V dc, $V^- = -8.0$ V dc, $I_5 = 1.0$ mA dc, $R_L = 3.9$ k Ω , $R_e = 1.0$ k Ω , $T_A = +25^\circ\text{C}$ unless otherwise noted)

*Pin number references pertain to K package pinout only.

