

**DESCRIPTION**

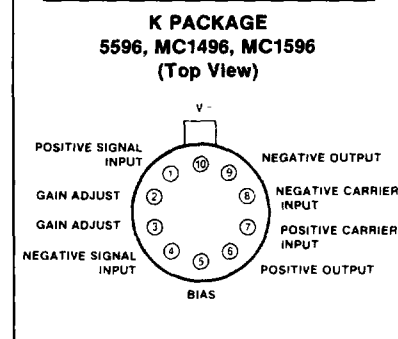
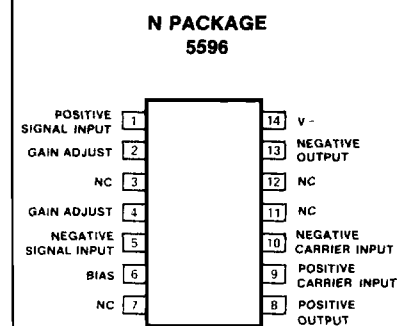
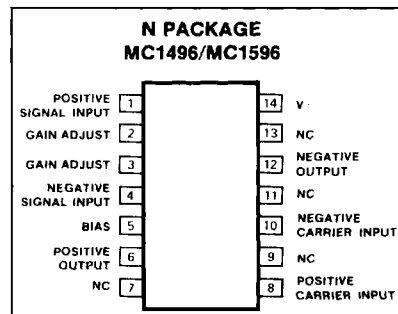
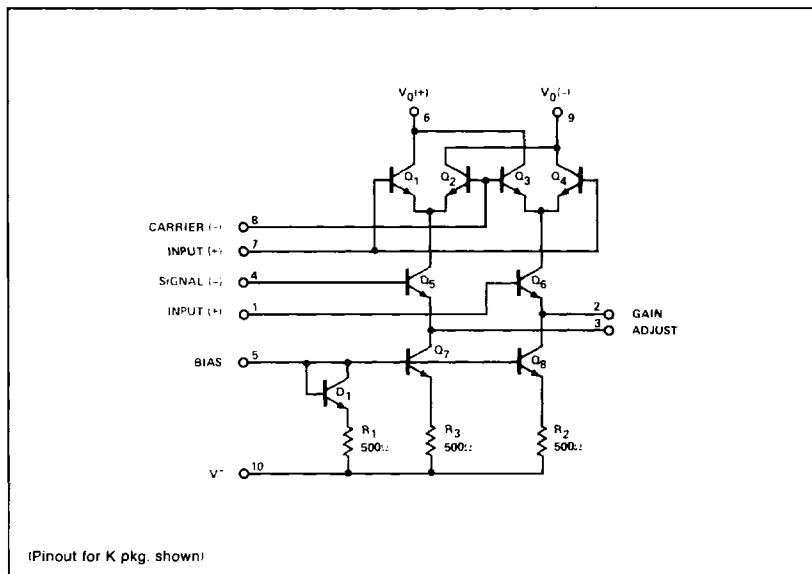
The 5596 is a monolithic Double-Balanced Modulator/Demodulator designed for use where the output voltage is a product of an input voltage (signal) and a switched function (carrier). The S5596 will operate over the full military temperature range of  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .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

**FEATURES**

- Excellent carrier suppression  
65dB typ @ 0.5MHz  
50dB typ @ 10MHz
- 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

**PIN CONFIGURATIONS****EQUIVALENT SCHEMATIC****ABSOLUTE MAXIMUM RATINGS**

PARAMETER	RATING	UNIT
Applied voltage <sup>1,2</sup>	30	V
Differential input signal ( $V_7-V_8$ )	$\pm 5.0$	V
Differential input signal ( $V_4-V_1$ )	$(5 \pm 15 R_{\theta})$	V
Input signal ( $V_2-V_1, V_3-V_4$ )	5.0	V
Bias current ( $I_5$ )	10	mA
Power dissipation (pkg. limitation)		
K package	680	mW
Derate above $25^{\circ}\text{C}$	5.4	mW/ $^{\circ}\text{C}$
A package (TO-116)	900	mW
Derate above $25^{\circ}\text{C}$	7.2	mW/ $^{\circ}\text{C}$
Operating temperature range	$-55$ to $+125$	$^{\circ}\text{C}$
Storage temperature range	$-65$ 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.

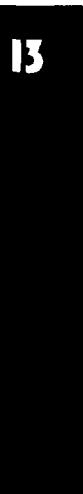
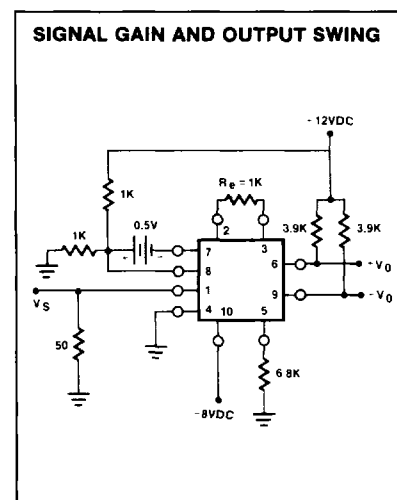
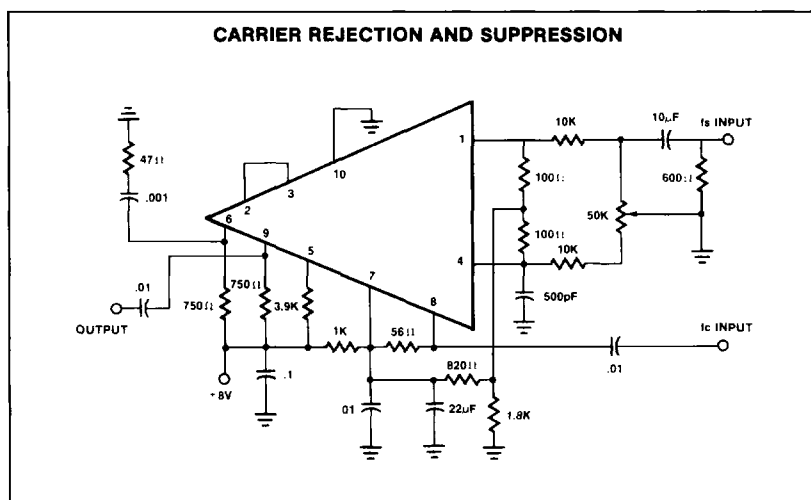
**DC ELECTRICAL CHARACTERISTICS**

$V^+ = +12Vdc$ ,  $V^- = -9.0Vdc$ ,  $I_S = 1.0mA$ ,  $R_L = 3.9k\Omega$ ,  $R_e = 1.0k\Omega$ ,  $T_A = 25^\circ C$  unless otherwise specified.

PARAMETER	TEST CONDITIONS	MC1596			MC1496/5596			UNIT
		Min	Typ	Max	Min	Typ	Max	
$R_{ip}$ $C_{ip}$	Single-ended input impedance Parallel input resistance Parallel input capacitance		200 2.0			200 2.0		$k\Omega$ pF
$R_{op}$ $C_{op}$	Single-ended output impedance Parallel output resistance Parallel output capacitance		40 5.0			40 5.0		$k\Omega$ pF
$I_{bS}$ $I_{bC}$	Input bias current $I_{bS} = \frac{I_1 + I_4}{2}$ $I_{bC} = \frac{I_7 + I_8}{2}$		12 12	25 25		12 12	30 30	$\mu A$ $\mu A$
$I_{ioS}$ $I_{ioC}$	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	$\mu A$ $\mu A$
$T_{cIio}$ $I_{oo}$	Average temperature coefficient of input offset current Output offset current $I_6 - I_9$		2.0 14			2.0 15		nA/ $^\circ C$ $\mu A$
$T_{cIoo}$ $V_o$	Average temperature coefficient of output offset current Common-mode quiescent Output voltage (Pin 6 or Pin 9)		90 8.0			90 8.0		nA/ $^\circ C$ Vdc
$I_{D+}$ $I_{D-}$	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
$P_D$	DC power dissipation		33			33		mW

NOTE

Pin number references pertain to K package pinout only.



**AC ELECTRICAL CHARACTERISTICS**  $V^+ = +12V_{dc}$ ,  $V^- = -9.0V_{dc}$ ,  $I_S = 1.0mAdc$ ,  $R_L = 3.9k\Omega$ ,  $R_e = 1.0k\Omega$ ,  $T_A = +25^\circ C$  unless otherwise specified.

PARAMETER	TEST CONDITIONS	MC1596			MC1496/5596			UNIT
		Min	Typ	Max	Min	Typ	Max	
V <sub>CFT</sub> Carrier feedthrough	$V_C = 60mV_{rms}$ sinewave and offset adjusted to zero $f_C = 1.0kHz$ $f_C = 10MHz$ $V_C = 300mV_{p-p}$ squarewave: Offset adjusted to zero $f_C = 1.0kHz$ Offset not adjusted $f_C = 1.0kHz$		40 140			40 140	$\mu V_{rms}$	
			0.04 20	0.2 100		0.04 20	0.4 200	mVrms
V <sub>CS</sub> Carrier suppressions	$f_S = 10kHz$ , $300mV_{rms}$ sinewave $f_C = 500kHz$ , $60mV_{rms}$ sinewave $f_C = 10MHz$ , $60mV_{rms}$ sinewave	50	65 50		40	65 50	dB	
BW <sub>3dB</sub> Transadmittance bandwidth (Magnitude) ( $R_L = 50\Omega$ )	Carrier input port, $V_C = 60mV_{rms}$ sinewave $f_S = 1.0kHz$ , $300mV_{rms}$ sinewave Signal input port, $V_S = 300mV_{rms}$ sinewave $ V_C  = 0.5V_{dc}$		300			300	MHz	
			80			80		MHz
AV <sub>S</sub> Signal gain	$V_S = 100mV_{rms}$ ; $f = 1.0kHz$ $ V_C  = 0.5V_{dc}$	2.5	3.5		2.5	3.5	V/V	
CMV Common-mode input swing	Signal port, $f_S = 1.0kHz$		5.0			5.0	Vp-p	
ACM Common-mode gain	Signal port, $f_S = 1.0kHz$ $ V_C  = 0.5V_{dc}$		-85			-85	dB	
DV <sub>OUT</sub> Differential output voltage swing capability			8.0			8.0	Vp-p	

NOTE

Pin number references pertain to K package pinout only.

