



Communication Circuits

LM373

LM373 am/fm/ssb if strip general description

The LM373 is a broadband communications subsystem, capable of performing the diverse functions required in AM, FM or Single Sideband receivers and transmitters. Simple external connections convert the strip from one mode to another. Bandpass shaping may be performed by a single external filter, which may be crystal, ceramic, mechanical or LC, at frequencies from audio up to 15 MHz. The device features:

Connected for FM operation:

- Three emitter coupled limiting stages, quadrature detector.
- For wideband FM, a single LC tuned quadrature circuit gives 80 mV audio out for ± 75 kHz deviation at 10.7 MHz IF.
- Active network for precise dc balance of quadrature detector input

Connected for AM operation:

- Self contained AGC system, gain stages and active detector.
- AGC Range: 70 dB

- High gain; AGC operates down to $50 \mu V$ rms input

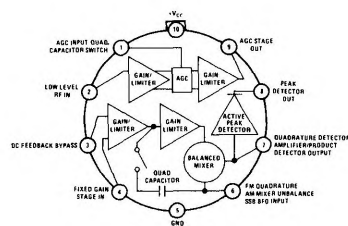
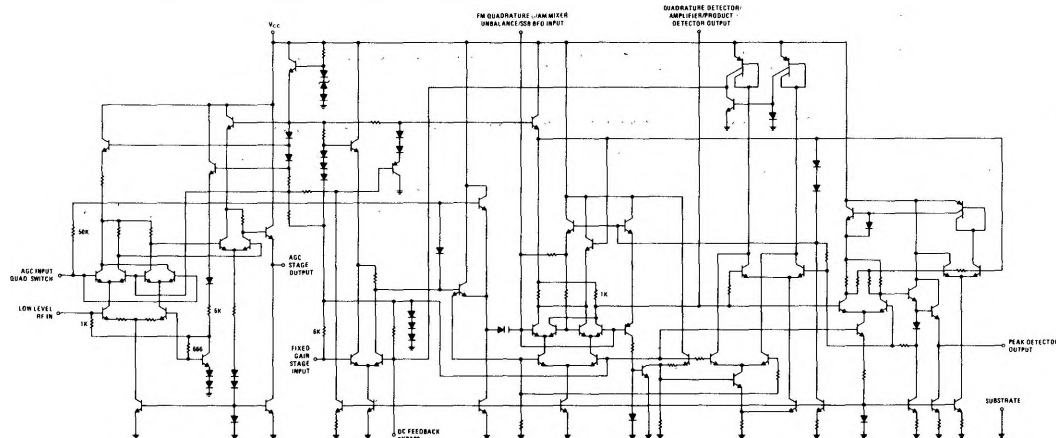
Connected for SSB operation:

- Self contained audio operated AGC system, gain stages, and double balanced product detector.
- Fast attack, slow release AGC operated by recovered audio peaks.
- Automatic active mixer balancing loop. Separate external DC control available for nulling of signal and local oscillator ports.

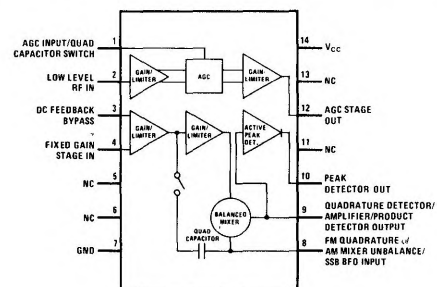
In addition, the versatile microcircuit may be used as a:

- Gated video amplifier with AGC
- Constant amplitude or amplitude modulated RF oscillator
- Balanced modulator
- Suppressed carrier signal generator
- Synchronous demodulating IF strip
- Receiver first IF strip, with balanced mixer output at the second IF.

schematic and connection diagrams



Top View



absolute maximum ratings

Supply Surge Voltage	24V
Supply Operating Voltage	18V
Storage Temperature	-65°C to +150°C
Operating Temperature	0°C to +70°C
RF Voltage into Pin 2	1.4V p-p
RF Voltage into Pin 4	1.4V p-p

electrical characteristics ($T_A = 25^\circ\text{C}$, $V_{CC} = +12\text{V}$ unless otherwise noted)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
DC Characteristics						
Power Supply Drain Current	I_{ps}	5.1K from pin 6 to gnd.		14	20	mA
Pin 9 DC Output	V_9	Pin 1 gnd.		4.75		V
Pin 9 DC Shift	ΔV_9	Pin 1 from 0 to +5V		0.1	0.2	V
Pin 7 DC Output	V_7	Pin 6 open		3.80		V
Pin 7 DC Output	V_7	10K from pin 6 to gnd.		3.80		V
Peak Detector DC Output	V_8	No RF at Pin 7		3.80		V
AGC Input Current	I_1	$V_1 = 5\text{V}$		50	110	μA
AM Characteristics (See Fig. 1 test circuit)						
AGC Threshold	V_{th}	$f_o = 455\text{ kHz}$ $f_o = 10.7\text{ MHz}$		80 100		$\mu\text{V rms}$ $\mu\text{V rms}$
AGC Figure of Merit		Input change for 10 dB output decrease referred to 100 mV in. $f_o = 455\text{ kHz}$ $f_o = 10.7\text{ MHz}$		60 58		dB dB
Usable Range		$f_o = 455\text{ kHz}$, SNR = 6 dB to overload		80		dB
External Gain Control Range		$f_o = 455\text{ kHz}$ $f_o = 10.7\text{ MHz}$		80 70		dB dB
Audio Output	V_o	1 kHz, 70% Mod. $f_o = 455\text{ kHz}$ $f_o = 10.7\text{ MHz}$		120 120		mV rms mV rms
Audio Distortion	THD	1 kHz, 30% Mod. $f_o = 455\text{ kHz}$ $f_o = 10.7\text{ MHz}$		3% 5%		% %

electrical characteristics ($T_A = 25^\circ\text{C}$, $V_{CC} = +12\text{V}$ unless otherwise noted)						
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
FM Characteristics ($f_o = 10.7\text{ MHz}$) (See Fig. 2 test circuit)						
Limiting Threshold	V_{th}			1500		$\mu\text{V rms}$
AM Rejection	AMRR	$V_{in} = 30\text{ mV rms}$		40		dB
Audio Output	V_o	1 kHz Mod. 75 kHz deviation		80		mV rms
Audio Distortion	THD	1 kHz Mod. 75 kHz deviation		1.5		%
SSB Characteristics (See Fig. 3 test circuit)						
AGC Threshold	V_{th}	$f_o = 455\text{ kHz}$		300		$\mu\text{V rms}$
AGC Figure of Merit		Input change for 10 dB output decrease referred to 100 mV in.				
Audio Output	$V_{o(p-p)}$	$f_o = 455\text{ kHz}$ $f_o - f_{inj} = 1\text{ kHz}$ $f_o = 455\text{ kHz}$		60		dB
Video Characteristics				50		mV rms
Voltage Gain, Pin 2-9	$A_{v_{2-9}}$	Pin 1 gnd	29.0	32.0		dB
-3 dB Bandwidth, Pin 2-9	Bw_{2-9}	Pin 1 gnd		30		MHz
Voltage Gain, Pin 4-7	$A_{v_{4-7}}$	10K from pin 6 to gnd	32	37		dB
-3 dB Bandwidth, Pin 4-7	Bw_{4-7}	10K from pin 6 to gnd		20		MHz
Input-Output Terminal Characteristics ($f_o = 10.7\text{ MHz}$, $V_{meas} < 20\text{ mV}$, $V_{CC} = 12\text{V}$)						
Pin 2 Input Resistance	R_2			1.3		$\text{k}\Omega$
Pin 2 Input Capacitance	C_2			3.0		pF
Pin 4 Input Resistance	R_4			5.8		$\text{k}\Omega$
Pin 4 Input Capacitance	C_4			4.5		pF
Pin 9 Output Resistance	R_9			85		Ω
Pin 7 Output Resistance	R_7			1.0		$\text{k}\Omega$
Pin 7 Output Capacitance	C_7			6.0		pF
Pin 6 Input Resistance	R_6			3.0		$\text{k}\Omega$
Pin 6 Input Capacitance	C_6			7.7		pF

test circuits

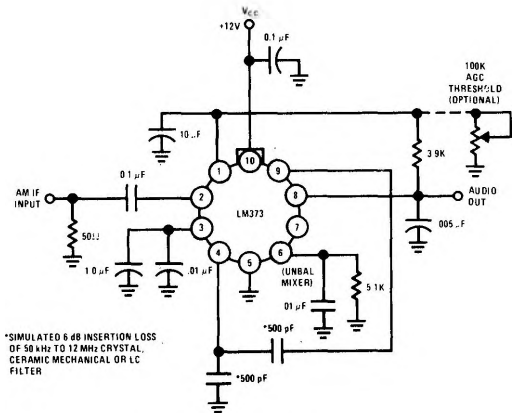


FIGURE 1. AM IF Strip

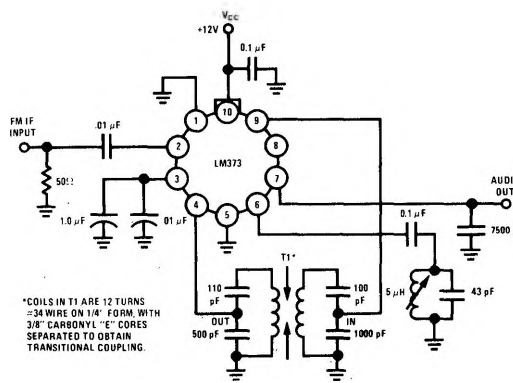


FIGURE 2. FM IF Strip

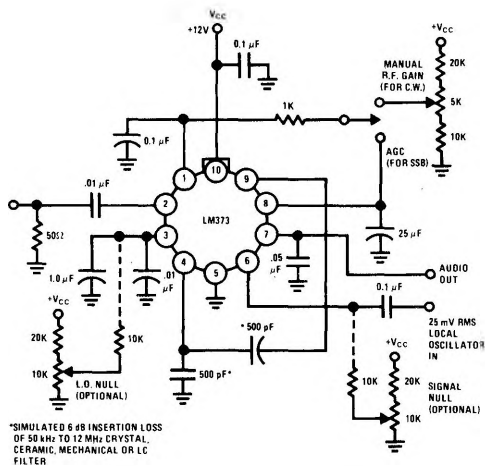


FIGURE 3. SSB/CW IF Strip

application precautions

As with any high gain, wideband subsystem, good RF layout practice is needed to maintain stability. External component leads should be short. High quality grounds, such as to adjacent copperclad board, should be used. Supply bypassing is recommended. It is especially important that bypassing

of the DC bypass point, pin 3, be effective at all frequencies. This is assured by a small, low inductance RF bypass, for high frequencies, in parallel with a larger Tantalum capacitor, for audio frequencies, from pin 3 to ground.