

T-77-05-07

**MC3361**

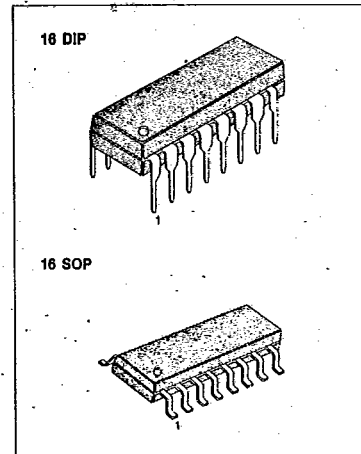
**LINEAR INTEGRATED CIRCUIT**

**LOW POWER NARROW BAND FM IF**

The MC3361 is designed for use in FM dual conversion communication equipment. It contains a complete narrow band FM demodulation system operable to less than 2.5V supply voltage.

**FEATURES**

- Includes: Oscillator, Mixer, Limiting Amp, Quadrature Discriminator, Active Filter, Squelch, Scan Control, and Mute Switch
- Stable operation with wide supply voltage (2.5V to 7.0V)
- Low drain current (4.0mA Typ. at  $V_{CC}=4.0V$ )
- Excellent Input Sensitivity (-3dB limiting,  $2.0\mu V_{rms}$  Typ.)
- Minimum number of external parts required.



**ORDERING INFORMATION**

Device	Package	Operating Temperature
MC3361N	16 DIP	-20 ~ +70°C
MC3361D	16 SOP	

**BLOCK DIAGRAM**

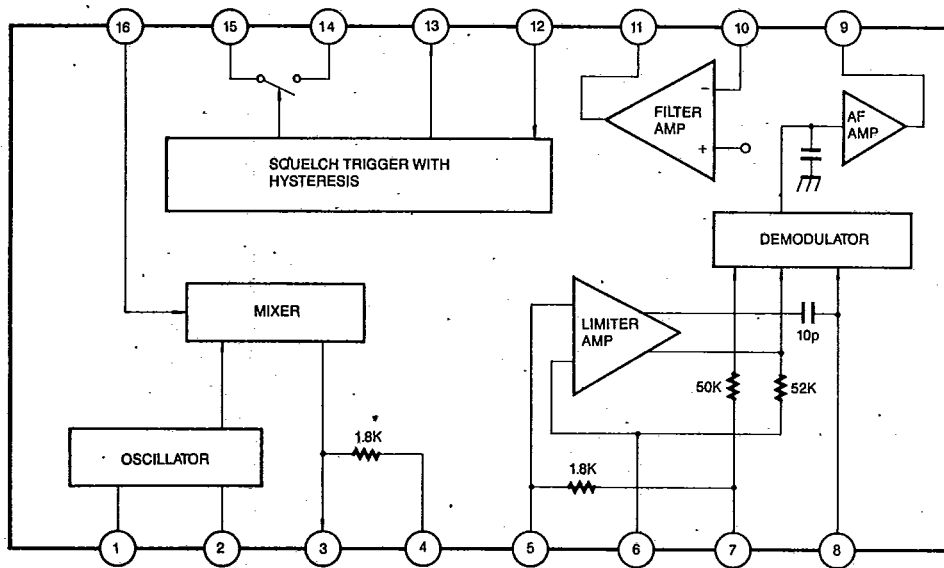


Fig. 1

## MC3361

## LINEAR INTEGRATED CIRCUIT

ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

Characteristic	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	10	V
Detector Input Voltage	$V_D$	1.0	$V_{P-P}$
Input Voltage ( $V_{CC} \geq 4.0\text{V}$ )	$V_{I6}$	1.0	Vrms
Mute Function	$V_{I4}$	-0.5 ~ +5.0	Vpeak
Operating Temperature	$T_{opr}$	-20 ~ +70	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-65 ~ +150	$^\circ\text{C}$

## ELECTRICAL CHARACTERISTICS

( $V_{CC} = 4.0\text{V}$ ,  $f_0 = 10.7\text{MHz}$ ,  $\Delta f = \pm 3\text{KHz}$ ,  $f_{mod} = 1\text{KHz}$ ,  $T_a = 25^\circ\text{C}$ , Unless Otherwise Specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Circuit Current	$I_{CC}$	Squelch Off Squelch On		4.0 6.0		mA
Input Limiting Voltage	$V_{INL}$	-3dB Limiting		2.0		$\mu\text{V}$
Detector Output Voltage	$V_7$			2.0		V
Detector Output Impedance	$Z_{OD}$			400		ohm
Recovered Audio Output Voltage	$V_O$	$V_{IN} = 10\text{mV}$	100	150		mVrms
Filter Gain	$A_{VF}$	$f = 10\text{KHz}$ , $V_{IN} = 5\text{mV}$	40	48		dB
Filter Output Voltage	$V_{OF}$			1.5		V
Trigger Hysteresis	$V_{TH}$			50		mV
Mute Function Low	$R_{OL}$			10		ohm
Mute Function High	$R_{OH}$			10		Mohm
Scan Function Low	$V_{I3L}$	Mute Off ( $V_{I2} = 2\text{V}$ )			0.5	V
Scan Function High	$V_{I3H}$	Mute On ( $V_{I2} = \text{GND}$ )	3.0			V
Mixer Conversion Gain	$A_{VM}$			24		dB
Mixer Input Resistance	$R_I$			3.3		Kohm
Mixer Input Capacitance	$C_I$			2.2		pF

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**LINEAR INTEGRATED CIRCUIT**

**PIN CONNECTIONS**

- Pin 1: Oscillator
- Pin 2: Oscillator
- Pin 3: Mixer Output
- Pin 4: Vcc
- Pin 5: Limiter Input
- Pin 6: Decoupling
- Pin 7: Limiter Output
- Pin 8: Quad Coil
- Pin 9: Recovered Audio Output
- Pin 10: Filter Input
- Pin 11: Filter Output
- Pin 12: Squelch In
- Pin 13: Scan Control
- Pin 14: Mute
- Pin 15: GND
- Pin 16: Mixer Input

**TEST CIRCUIT**

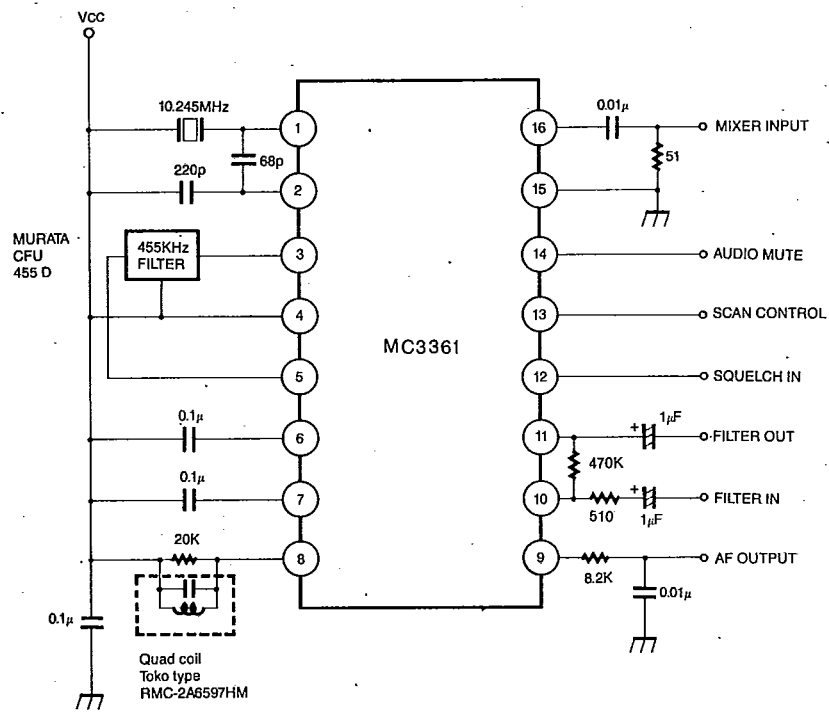


Fig. 2

**MC3361****LINEAR INTEGRATED CIRCUIT****CIRCUIT DESCRIPTION (see block diagram)**

The MC3361 functions include an Oscillator, Mixer, FM IF limiting amplifier, FM demodulator, OP-amp, Scan control and Mute switch.

The mixer combines the crystal controlled oscillator to convert the input frequency from 10.7MHz to an intermediate frequency of 455KHz, where, after external bandpass filtering, most of the amplification is done. A conventional quadrature detector is used to demodulate the FM signal. The Q of the quad coil, which is determined by the external resistor placed across it, has multiple affects on the audio output. Increasing the Q increases output level because of nonlinearities in the tank phase characteristic.

After detection and de-emphasis, the audio output at pin 9 is partially filtered, then buffered by an emitter follower. The signal still requires volume control and further amplification before driving loudspeaker.

The op amp inverting input (pin 10) which is internally referenced to 0.7V, receives DC bias from the output of pin 11 through the external feedback network. It is normally utilized as either a bandpass filter to extract a specific frequency from the audio output, such as a ring or dial-tone, or as a highpass filter to detect noise due to no input at the mixer. This information is applied to pin 12. An external positive bias to pin 12 sets up the squelch trigger circuit such that pin 13 is low and the audio mute (pin 14) is open circuit. If pin 12 is pulled down to 0.5Vdc by the noise or tone detector, pin 13 will rise to approximately 0.5Vdc below  $V_{CC}$  and pin 14 is internally short circuited to ground. There is 50mV of hysteresis at pin 12 to prevent jitter. Audio muting is accomplished by connecting pin 14 to a high-impedance ground-reference point in the audio path between pin 9 and the audio amplifier.

