IF AMPLIFIER

FEATURES

- **MC3357 Compatible**
- **IF Amp, Local Osc, Squelch**
- **Ceramic Discriminator or Quad Coil**
- **60 MHz Operation**

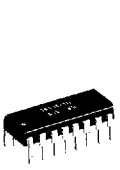
APPLICATIONS

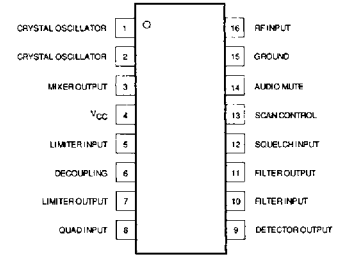
- **Communications Equipment**
- **Cable TV Descramblers**
- **Telecommunications**
- **Data Receivers**
- **For Low-Voltage Operation**

DESCRIPTION

The TK10421 is a Silicon Monolithic Bipolar Integrated Circuit that is the basis for a complete dual conversion narrow band IF system. Typical configurations include 10.7 MHz and 455 kHz IF frequencies although other frequencies may be used, up to 60 MHz. The mixer/oscillator combination converts the input down to 455 kHz with an external bandpass filter. The audio is recovered using a conventional quadrature coil or ceramic discriminator. The absence of an input signal is detected by the presence of noise above the normal audio band. This noise is monitored by an active filter and detector. This detector output can be used to control scanning, and at the same time, an internal switch is operated that can mute the audio output (squelch). The oscillator is an internally biased colpitts type with the collector, base and emitter brought out to pins 4, 1 and 2 respectively. A crystal or coil can be used. The mixer is doubly balanced to reduce spurious responses. The input impedance at pin 16 is set by an internal 3 kΩ resistor and has low capacitance, allowing the circuit to be preceded by a crystal filter. Pin 3 must be connected to B+ and can swing to 0.5 V below V_{CC}. After suitable bandpass filtering (either ceramic or LC) the signal is fed to the input of a limiter at pin 5. The limiter output on pin 7 drives a multiplier, both internally and directly, and externally through a quadrature coil or ceramic discriminator to detect the FM. Pin 7 is also used to supply DC feedback to the limiter input at pin 5. The other side of the first limiter stage is decoupled at pin 6. The recovered audio is partially filtered, then buffered giving an impedance of about 400 Ω at pin 9. A simple inverting opamp is provided with an output at pin 11, providing DC bias (external) to the input at pin 10, which is referred internally to 2.0 volts. An external filter can be made with external impedance elements to discriminate frequencies. With an external AM detector the filtered audio signal can be checked for the presence of noise above the normal audio band or a tone signal. This information is applied to pin 12. An external positive bias to pin 12 sets up the squelch trigger circuit so that pin 13 is low at an impedance level of around 60 kΩ and the audio mute pin 14 is open circuit. If pin 12 is pulled down to 0.7 V by the noise or tone detector, pin 13 will rise to about 0.5 V below V_{CC} and support a load current of around 500 uA, while pin 14 is internally short circuited to ground. There is 100 mV 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.

TK10421D





ORDERING INFORMATION

TK10421 □ □ □□

- Tape/Reel Code
- Temp. Range
- Package Code

PACKAGE CODE	TEMP. RANGE	TAPE/REEL CODE
D: PLASTIC DIP	C : -30 to +70 °C	BX: Bulk/Bag MG: Magazine

ABSOLUTE MAXIMUM RATINGS

Input Voltage V_{CCMAX} ..... 12 V
Power Dissipation (Note 1) ..... 540 mW
Junction Temperature ..... 150 °C
Storage Temperature Range ..... -55 to +125 °C
Operating Temperature Range ..... -30 to +70 °C
Lead Soldering Temp. (10 sec.) ..... 300 °C
Operating Voltage Range ..... 2.7 to 5.5 V

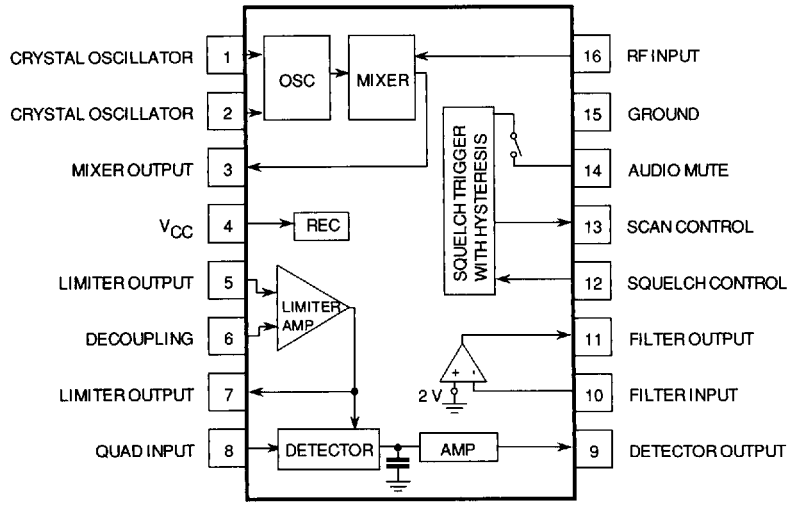
ELECTRICAL CHARACTERISTICS

Test conditions: V_{CC} = 3.0 V, f_O = 10.7 MHz, Δf = ±3.0 kHz, T_A = 25 °C, f_{MOD} = 1 kHz

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CC1}	Current Consumption	Squelch Off		1.5	2.8	mA
I_{CC2}	Current Consumption	Squelch On		2.3	4.0	mA
Limit	Limiting Sensitivity	-3 dB Point		6.0		µV
V_{DC}	Detector Output	at MOD OFF		1.3		Vdc
Terminal Voltage						
Z_{OUT}	Detector Output	V_{IN} = 10 mV (10.7 MHz)		700	1700	Ω
Impedance						
V_{OUT}	Detector Output Voltage	V_{IN} = 10 mV (10.7 MHz)	80	220		mV(rms)
F_{GAIN}	Filter Gain	V_{IN} = 5 mV (10 kHz)	39	44		dB
HYS	Trigger Hysteresis	V_{IN} = 5 mV (10 kHz)	15	40		mV_{DC}
ML	MUT. Function Low	V12 + 0 V_{DC}, V_{IN} = 1V(rms) = 1 kHz		30	90	Ω
MH	MUT. Function High	V12 = 2 V_{DC}, V_{IN} f = 1 kHz	1.0	10		MΩ
FDC	Filter Terminal Voltage	at V_{IN} = 0	1.0	1.3	1.7	V_{DC}
SL	Scan Function Low	V12 = 2 V_{DC}		0	0.5	V_{DC}
SH	Scan Function High	V12 = 0 V_{DC}	2.0	2.8		V_{DC}
G_C	Mixer Exchange Gain			1.6		dB
R_{IN}	Mixer Input Resistance			3.3		kΩ
C_{IN}	Mixer Input Capacitance			3.6		pF
Range	Operational Frequency			10.7	50	MHz

Note 1: Power dissipation must be derated at the rate of 6.6 mW/ °C for operation at T_A = 25 °C and above.

BLOCK DIAGRAM



TEST CIRCUIT