

## FM IF SYSTEM FOR CAR STEREO

The KA22441 is a monolithic integrated circuit consisting of FM IF system suitable for use in car stereo and music centers.

It features practically all of the functions for use a FM tuner, including AGC output, AFC output, level meter output in a single package.

## FUNCTIONS

- FM IF amplifier.
- Quadrature detector.
- AFC output.
- AGC output.
- Level meter output.
- Muting for weak signal.
- Muting for detuned condition.

## FEATURES

- Soft muting function.
- Variable muting maximum attenuation.
- Variable muting attack input signal.
- Variable muting slope with respect to input signal level.
- Level meter output.
- AFC output.
- AGC output.
- High sensitivity ( $V_{i(LIM)} = 25\text{dB}\mu$ : Typ).
- High output level.
- Good S/N ratio (78dB: Typ).
- Low distortion (0.05%: Typ).
- Wide operating supply voltage range:  $V_{CC} = 6\text{V} \sim 14\text{V}$

## BLOCK DIAGRAM

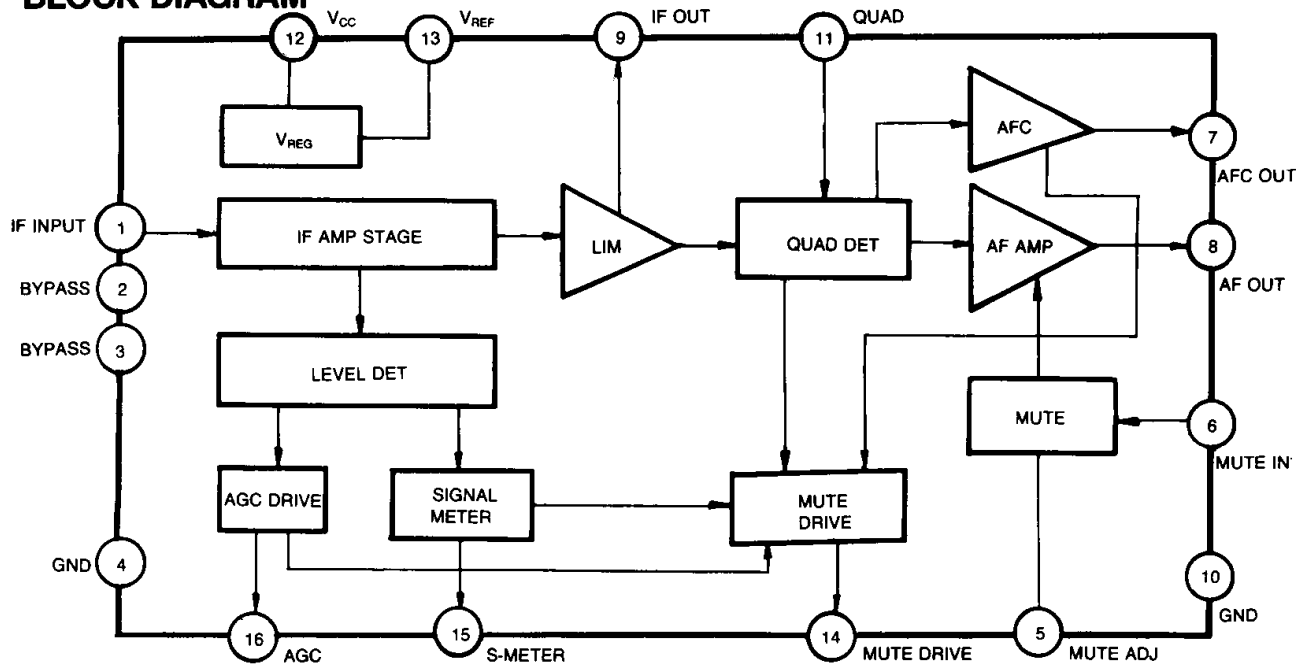
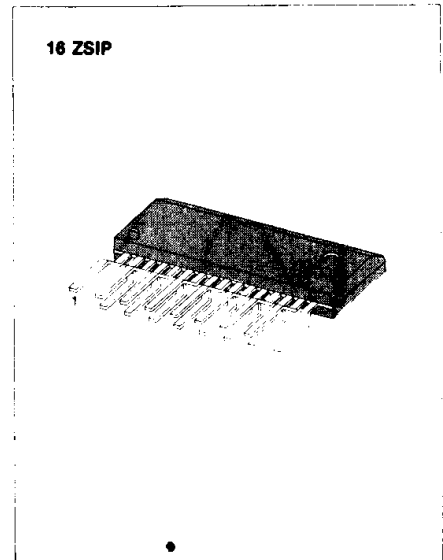


Fig. 1



## ORDERING INFORMATION

Device	Package	Operating Temperature
KA22441	16 ZSIP	-20°C ~ +70°C

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

Characteristic	Symbol	Value	Unit
Supply Voltage	$V_{CC}$	16	V
Power Dissipation	$P_D$	640	mW
Operating Temperature	$T_{OPR}$	-20 ~ +70	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-40 ~ +125	$^\circ\text{C}$

## ELECTRICAL CHARACTERISTICS

( $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 8\text{V}$ ,  $\Delta f = \pm 75\text{KHz}$ ,  $V_i = 100\text{dB}\mu$ ,  $f_m = 400\text{Hz}$ , unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage	$V_{CC}$		6	8	14	V
-3dB Limiting Sensitivity	$I_{CCQ}$	$V_i = 0$	15	21	27	mA
Input Limiting Sensitivity	$V_{I(LIM)}$	$V_o (V_o = 100\text{dB}\mu) - 3\text{dB down}$		25	29	$\text{dB}\mu$
Dectector Output Voltage	$V_{O(DET)}$		200	260	320	mV
Total Harmonic Distortion	THD			0.05	0.2	%
Signal to Noise Ratio	S/N		70	78		dB
AM Rejection Ratio	AMR	AM: $f_m = 1\text{KHz}$ , 30% Mod	50	63		dB
Signal Meter Output Voltage	$V_M$	$V_i = 0$	0	0.1	0.3	V
		$V_i = 100\text{dB}\mu$	4.5	5.3	6.0	
AGC Output Voltage	$V_{O(AGC)}$	$V_i = 0$	3.5	4.1	4.5	V
		$V_i = 100\text{dB}\mu$	0	0.02	0.3	
Muting Sensitivity	$S_{MUTE}$	$V_{14} = 2\text{V}$	22	26	32	$\text{dB}\mu$
Muting Attenuation	$ATT_{MUTE}$	$V_6 = 2\text{V}$	10	15	20	dB
		$V_6 = 5\text{V}$	24	28	32	
Muting Bandwidth	$BW_{MUTE}$	$V_{14} = 2\text{V}$	140	210	370	KHz

TEST CIRCUIT

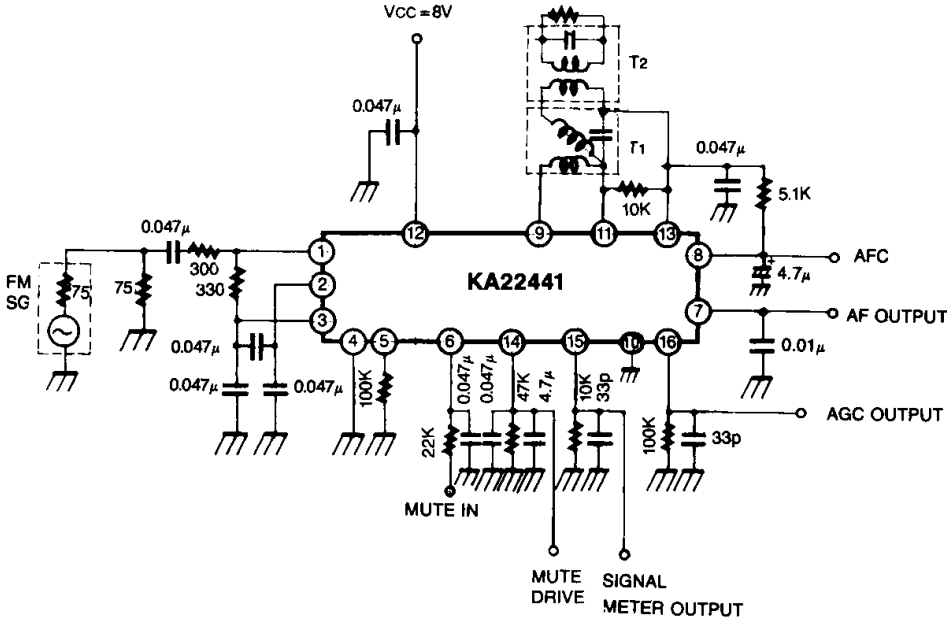


Fig. 2

## APPLICATION INFORMATION

### **C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub>: IF amplifier bypass capacitors**

These capacitors bypass to the ground both the carrier signal and the high-frequency components of the amplifier output.

**C<sub>10</sub> : Power supply bypass capacitor**

**C<sub>9</sub> : Internal regulated power supply bypass capacitor**

**C<sub>8</sub> : AFC output smoothing capacitor**

This capacitor bypasses to the ground the detector signal output at Pin 7.

**C<sub>7</sub> : De-emphasis capacitor**

The value of the C<sub>8</sub> determines the de-emphasis time constant.

**C<sub>6</sub> : Mute drive output smoothing capacitor**

This capacitor bypasses to the ground high-frequency noise components included in the muting output.

**C<sub>5</sub> : Signal meter output voltage smoothing capacitor**

This capacitor is used to reduce any IF carrier signal components or other high-frequency components remaining on the level meter output voltage.

**C<sub>4</sub> : AGC voltage smoothing capacitor**

If C<sub>11</sub> is not connected, the AGC output will contain residual IF carrier frequency components.

**R<sub>1</sub> : IF amplifier resistor**

The IF amplifier input impedance is determined by the value of this resistance.

**R<sub>2</sub> : Muting maximum attenuation adjustment resistor**

The value of this resistor sets the maximum muting attenuation which is used when no signal is present or in the detuned condition. If the value of R<sub>5</sub> is made small, the maximum muting attenuation is decreased.

**R<sub>3</sub> : Mute drive current adjusting resistor**

This resistor is used to adjust the slope of the muting attenuation. If the value of this resistor is made small, the muting slope for the input signal level is increased.

**R<sub>4</sub> : Muting bandwidth adjustment resistor**

This resistor is capable of adjusting the muting bandwidth and AFC sensitivity. If the value of R<sub>7</sub> is made small, the muting bandwidth widens and the AFC sensitivity decreases.

**R<sub>5</sub> : Damping resistor**

If the value of R<sub>11</sub> is made small, the Q of the tuned circuit decreases with an accompanying decrease in gain.

**R<sub>6</sub> : Damping resistor**

**R<sub>7</sub> : Mute drive load resistor**

If R<sub>14</sub> is made large, the time required for muting to be removed will increase.

**R<sub>8</sub> : Signal meter output load resistor**

This resistor is used to adjust the slope of the muting attenuation. If the value of this resistor is made small, the slope of the muting attenuation is increased.

**R<sub>9</sub> : AGC output load resistor**

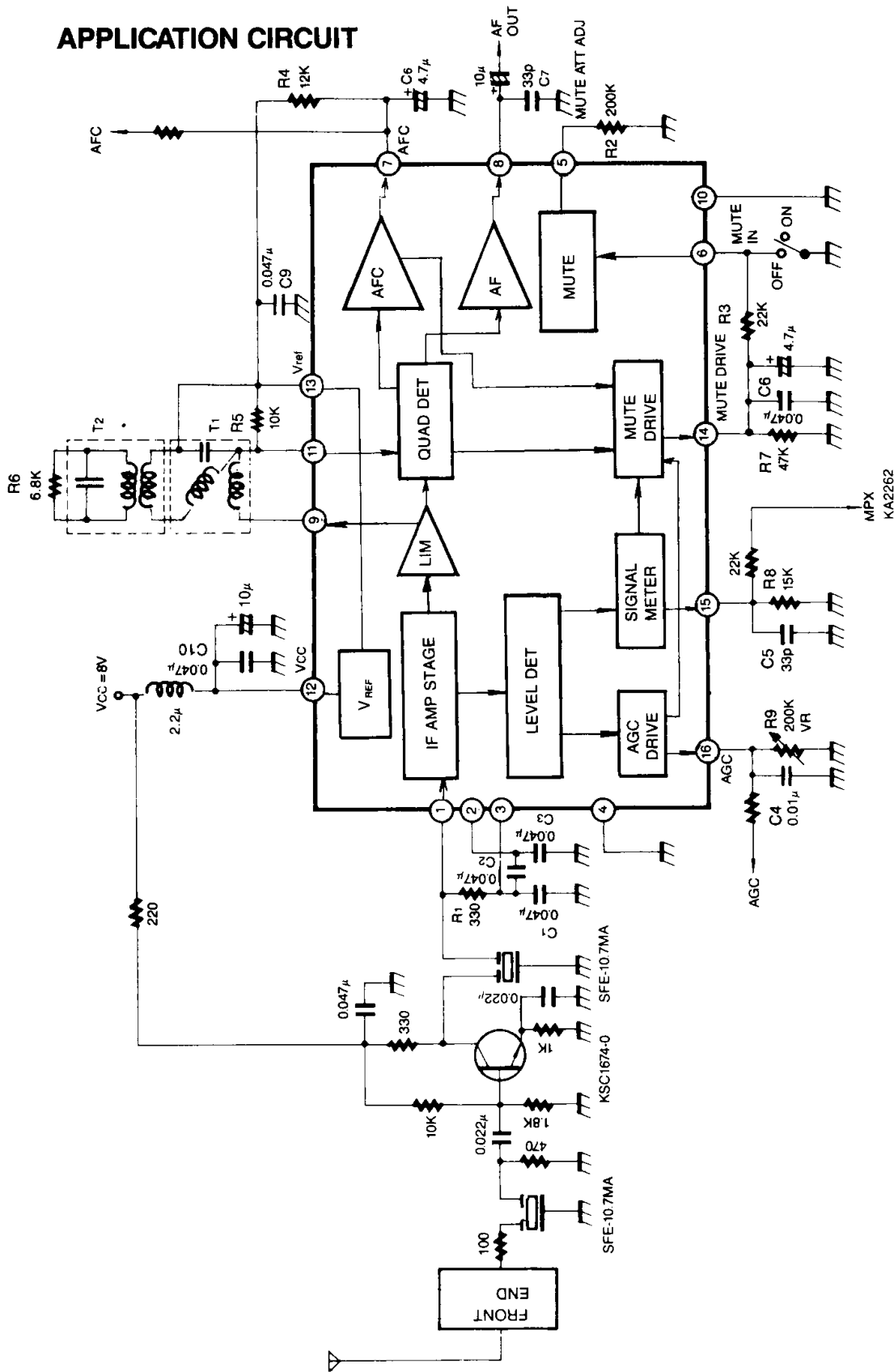
This resistor is used to set the weak-signal muting starting point. If the value of this resistor is made small, the starting point of input signal level for muting is raised.

**L<sub>1</sub> : Power supply chock coil**

**T<sub>1</sub>, T<sub>2</sub> : IF transformer**

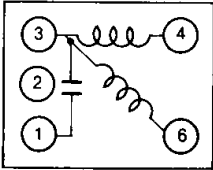
The detector output voltage and total harmonic distortion are determined by the Q of this quadrature detector coil.

APPLICATION CIRCUIT



COIL SPECIFICATIONS

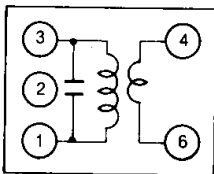
1. T1



C <sub>o</sub> (pF)	f (MHz)	Q <sub>o</sub> (%)	Turns	
			3-4	6-3
120	10.7	20 (Min)	89 1/2	17 1/2

KOREA TOKO 292MEA-K5018FKG-KR 0.07ϕ 2UEW

2. T2



C <sub>o</sub> (pF)	f (MHz)	Q <sub>o</sub> (%)	Turns	
			1-3	6-4
62	10.7	20 (Min)	24	1

KOREA TOKO 292MEA-K5019AN-KR 0.07ϕ 2UEW

COIL COMBINATION

