

## INTRODUCTION

The KA22901/D is a monolithic integrated circuit which consists of a one-chip tuner and a no adjustment FM multiplex for AM/FM radios and headphone radios.

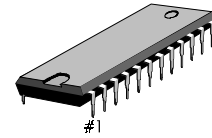
## FEATURES

- One chip tuner with built-in FM Multiplex
- No adjustment for FM detector and VCO
- No AM detect coil, IF coupling capacitor, FM IF bypass capacitor needed
- Built-in AM/FM selection switch
- Minimum number of external parts required
- Wide operating voltage range:  $V_{CC} = 1.8V \sim 7V$
- Low distortion (FM IF: 0.4 %, AM IF : 1%, MPX: 0.2% (Typ))

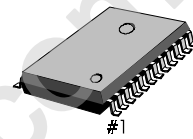
## ORDERING INFORMATION

| Device   | Package     | Operating Temperature |
|----------|-------------|-----------------------|
| KA22901  | 24-SDIP-300 | - 20°C ~ +75°C        |
| KA22901D | 24-SOP-375  |                       |

24-SDIP-300



24-SOP-375



**BLOCK DIAGRAM**

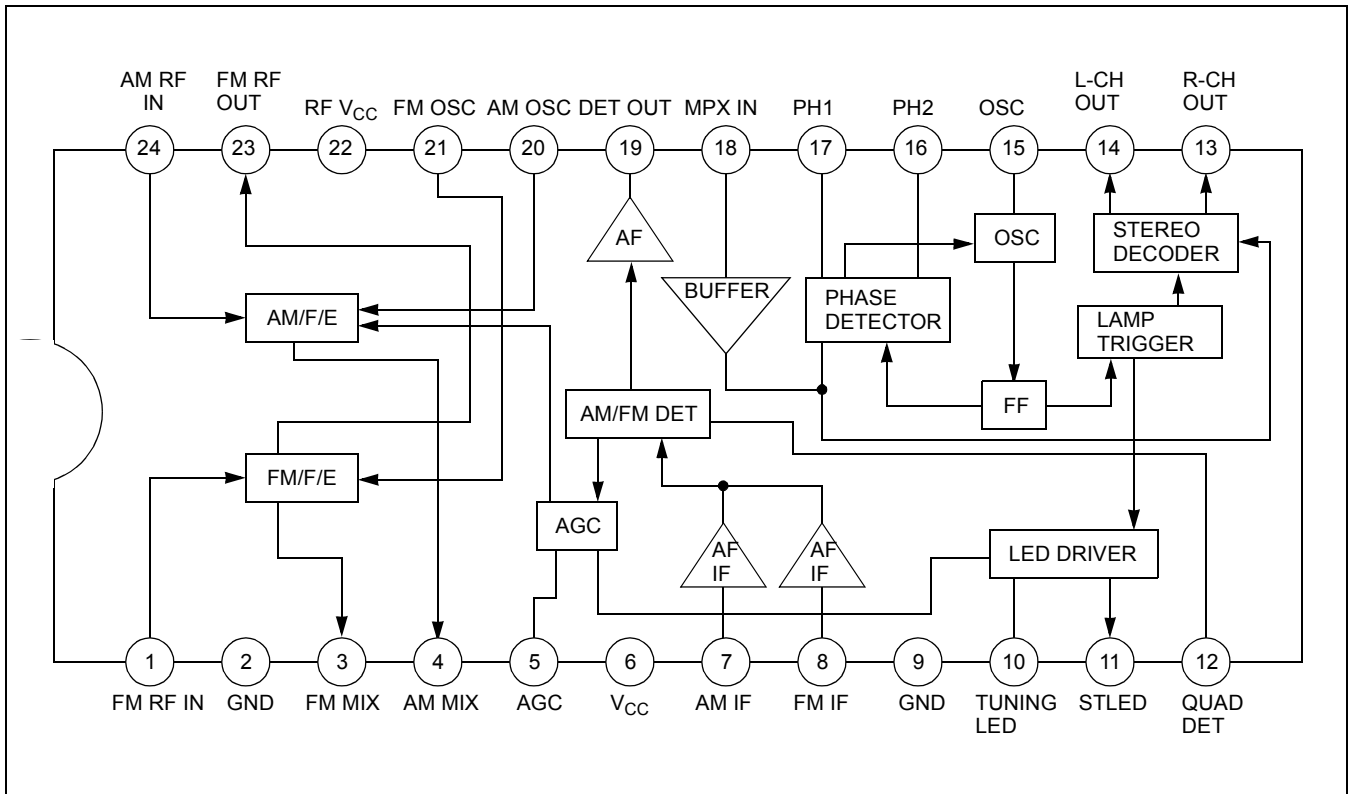


Figure 1.

**ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C)**

| Characteristic        | Symbol           | Value      | Unit |
|-----------------------|------------------|------------|------|
| Supply Voltage        | V <sub>CC</sub>  | 8          | V    |
| Power Dissipation     | P <sub>D</sub>   | 1200       | mW   |
| Operating Temperature | T <sub>OPR</sub> | -20 ~ +75  | °C   |
| Storage Temperature   | T <sub>STG</sub> | -55 ~ +150 | °C   |
| LED Driver Voltage    | V <sub>DR</sub>  | 10         | V    |
| LED Driver Current    | I <sub>DR</sub>  | 10         | mA   |

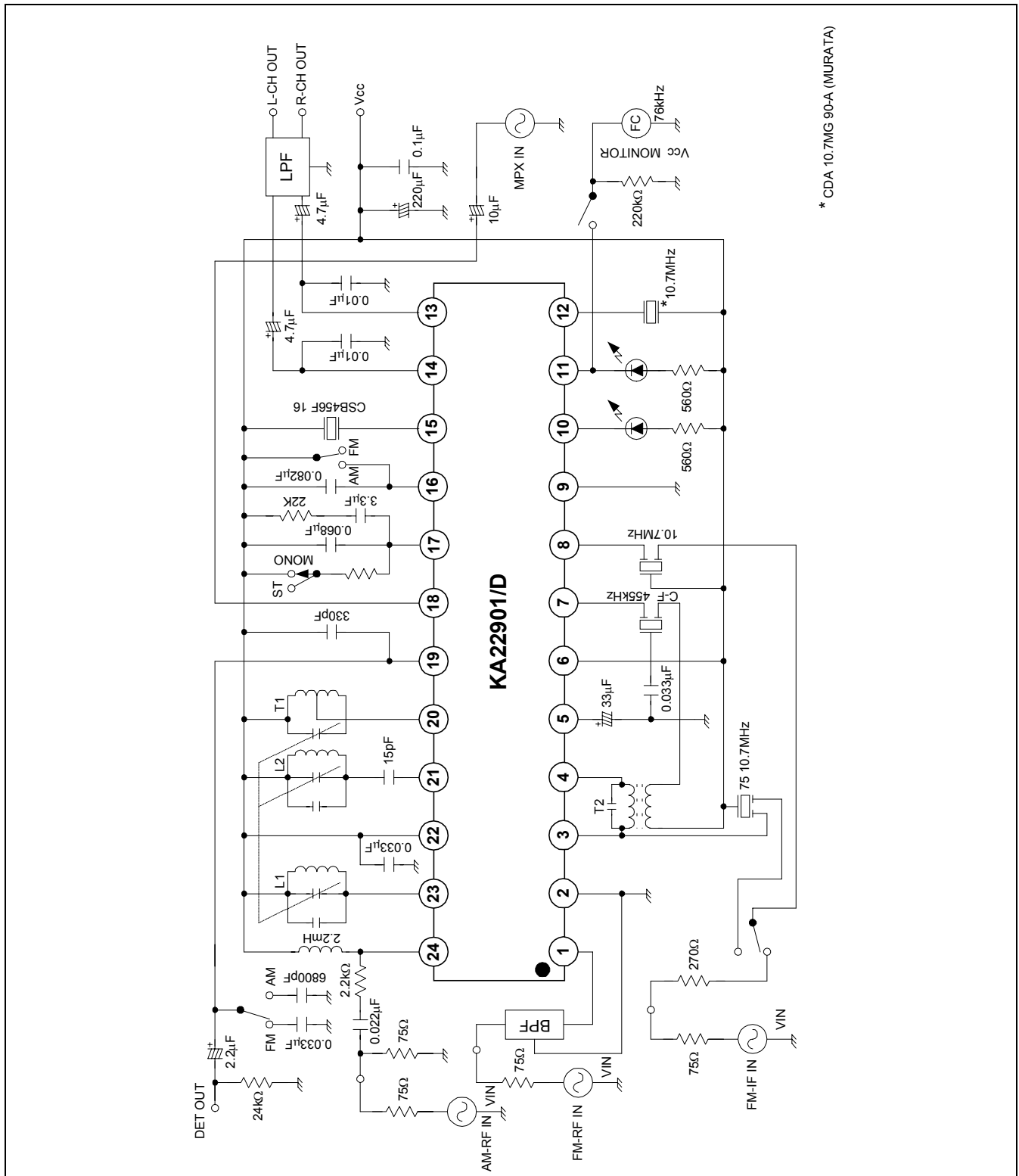
**ELECTRICAL CHARACTERISTICS**(Ta = 25 °C, V<sub>CC</sub> = 3 V, unless otherwise specified)

- FM F/E: f = 98MHz, fm = 1kHz, Δf = 22.5kHz AM: f = 1MHz, fm = 1kHz, 30 % Mod
- FM IF: f = 10.7MHz, fm = 1kHz, Δf = 22.5kHz MPX: f = 1kHz, L + R = 90%, P = 10%, V<sub>I</sub> = 150mV

| Characteristic            |                            | Symbol               | Test Conditions          | Min. | Typ. | Max. | Unit | Test Circuit |
|---------------------------|----------------------------|----------------------|--------------------------|------|------|------|------|--------------|
| Quiescent Circuit Current |                            | I <sub>CCQ1</sub>    | FM, V <sub>I</sub> = 0   | 10   | 14   | 18   | mA   | 1            |
|                           |                            | I <sub>CCQ2</sub>    | AM, V <sub>I</sub> = 0   | 3.5  | 6.0  | 9    | mA   | 1            |
| F/E                       | -3 dB Limiting Sensitivity | V <sub>I(LIM)1</sub> | V <sub>O</sub> = -3dB    | 10   | 14   | 18   | dBμ  | 1            |
|                           | Oscillation Voltage        | V <sub>OSC</sub>     | f <sub>OSC</sub> = 98MHz | 70   | 105  | 140  | mV   | 2            |
| FM<br>IF                  | -3 dB Limiting Sensitivity | V <sub>I(LIM)2</sub> | V <sub>O</sub> = -3dB    | 39   | 44   | 49   | dBμ  | 1            |
|                           | Detector Output Voltage    | V <sub>O(DET)1</sub> | V <sub>I</sub> = 80dBμ   | 55   | 80   | 110  | mV   | 1            |
|                           | Signal to Noise Ratio      | S/N <sub>1</sub>     | V <sub>I</sub> = 80dBμ   | 60   | 70   | -    | dB   | 1            |
|                           | Total Harmonic Distortion  | THD <sub>1</sub>     | V <sub>I</sub> = 80dBμ   | -    | 0.4  | 1    | %    | 1            |
|                           | AM Rejection Ratio         | AMR                  | V <sub>I</sub> = 80dBμ   | 40   | 50   | -    | dB   | 1            |
|                           | Tuning Indication Voltage  | V <sub>LI</sub>      | I <sub>LED</sub> = 1mA   | 39   | 44   | 49   | dBμ  | 1            |
| AM<br>IF                  | Voltage Gain               | G <sub>V1</sub>      | V <sub>I</sub> = 23dBμ   | 20   | 40   | 80   | mV   | 1            |
|                           | Detector Output Voltage    | V <sub>O(DET)2</sub> | V <sub>I</sub> = 60dBμ   | 50   | 60   | 100  | mV   | 1            |
|                           | Signal to Noise Ratio      | S/N <sub>2</sub>     | V <sub>I</sub> = 60dBμ   | 34   | 44   | -    | dB   | 1            |
|                           | Total Harmonic Distortion  | THD <sub>2</sub>     | V <sub>I</sub> = 60dBμ   | -    | 1    | 2    | %    | 1            |
|                           | Tuning Indication Voltage  | V <sub>LI2</sub>     | I <sub>LED</sub> = 1mA   | 19   | 24   | 30   | dBμ  | 1            |

|                       | Characteristic            | Symbol       | Test Conditions   | Min. | Typ.    | Max. | Unit | Test Circuit |
|-----------------------|---------------------------|--------------|-------------------|------|---------|------|------|--------------|
| MPX                   | Maximum Input Voltage     | $V_{I(MAX)}$ | Stereo, THD = 3%  | 250  | 350     | –    | mV   | 1            |
|                       | Channel Separation        | $CS_1$       | Stereo, f = 100Hz | 35   | 42      | –    | dB   | 1            |
|                       |                           | $CS_2$       | Stereo, f = 1kHz  | 35   | 42      | –    | dB   | 1            |
|                       |                           | $CS_3$       | Stereo, f = 10kHz | 35   | 42      | –    | dB   | 1            |
|                       | Total Harmonic Distortion | $THD_3$      | Mono              | –    | 0.2     | 1    | %    | 1            |
|                       |                           | $THD_4$      | Stereo            | –    | 0.2     | 1    | %    | 1            |
|                       | Voltage Gain              | $G_{V2}$     | Mono              | –5   | –3      | –1   | dB   | 1            |
|                       | Channel Balance           | CB           | Mono              | –2   | 0       | 2    | dB   | 1            |
|                       | Lamp on Level             | $VL_{(ON)}$  | Pilot only        | –    | 8       | 16   | mV   | 1            |
|                       |                           | $VL_{(OFF)}$ | Pilot only        | 2    | 6       | –    | mV   | 1            |
|                       | Lamp Hysteresis           | HY           | –                 | –    | 2       | –    | mV   | 1            |
|                       | Capture Range             | CR           | Pilot only        | –    | $\pm 3$ | –    | %    | 1            |
| Signal to Noise Ratio | $S/N_3$                   | Mono         | 60                | 70   | –       | dB   | 1    |              |

TEST CIRCUIT 1



\* CDA 10.7MG 90-A (MURATA)

Figure 2.

TEST CIRCUIT 2

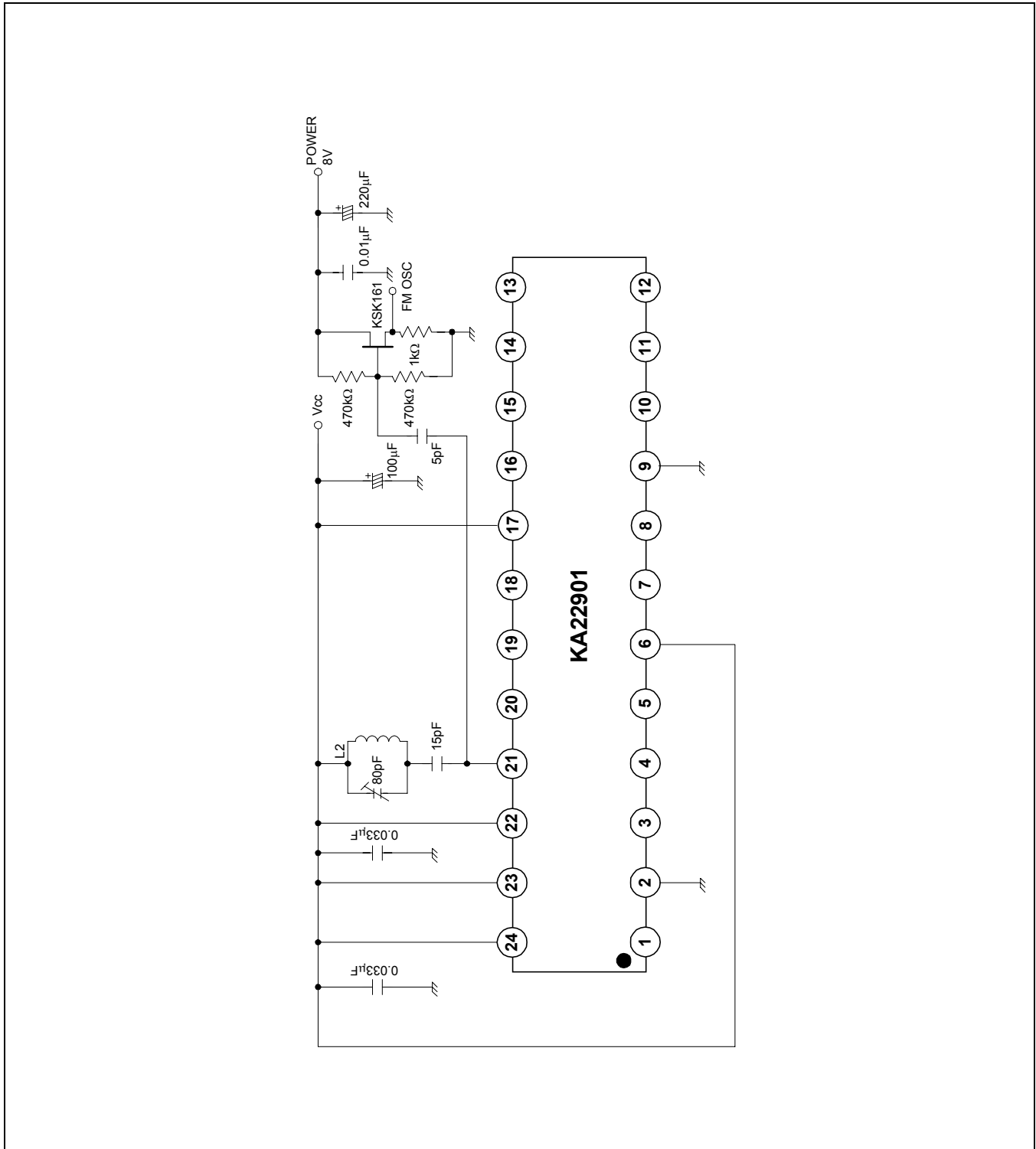
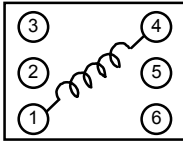


Figure 3.

COIL SPECIFICATION

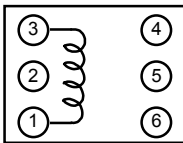
L1 FM RF



| f<br>(MHz) | Q <sub>o</sub> | TURNS |  |  |
|------------|----------------|-------|--|--|
|            |                | 1-4   |  |  |
| 100        | 100            | 2 1/2 |  |  |

0.5mmΦ

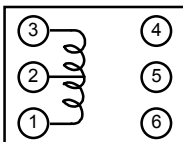
L2 FM OSC



| f<br>(MHz) | Q <sub>o</sub> | TURNS |  |  |
|------------|----------------|-------|--|--|
|            |                | 1-3   |  |  |
| 100        | 100            | 2 3/4 |  |  |

0.5mmΦ

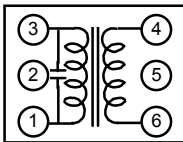
T1 AM OSC



| f<br>(MHz) | Q <sub>o</sub> | TURNS |     |  | L<br>(uH) |
|------------|----------------|-------|-----|--|-----------|
|            |                | 1-3   | 2-3 |  |           |
| 796        | 115            | 13    | 73  |  | 288       |

KOREA TOKO  
0.08mmΦ

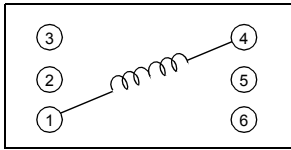
T2 AM IFT (MIX OUT)



| Co (pF) | f<br>(MHz) | Q <sub>o</sub> | TURNS |     |  |
|---------|------------|----------------|-------|-----|--|
| 1-3     |            |                | 1-3   | 4-6 |  |
| 180     | 455        | 120            | 180   | 15  |  |

KOREA TOKO  
0.08mmΦ

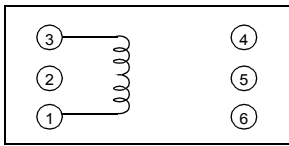
L1 FM RF



KST-FR1

| F (MHz) | Qo  | TURNS   |        | KWANG SUNG PART NO |
|---------|-----|---------|--------|--------------------|
|         |     | 1-4     | WIRE   |                    |
| 100     | 100 | 2*(1/2) | 0.5m/m | KST-FR1            |

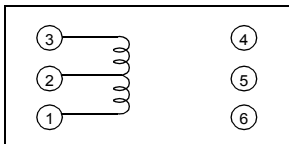
L2 FM OSC



KST-FO1

| F (MHz) | Qo  | TURNS   |        | KWANG SUNG PART NO |
|---------|-----|---------|--------|--------------------|
|         |     | 1-3     | WIRE   |                    |
| 100     | 100 | 2*(3/4) | 0.5m/m | KST-FO1            |

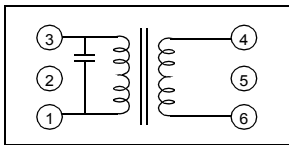
T1 AM OSC



KSI-AO1

| F (MHz) | Qo  | TURNS |     | L (uH) | KWANG SUNG PART NO |
|---------|-----|-------|-----|--------|--------------------|
|         |     | 1-3   | 2-3 |        |                    |
| 796     | 115 | 13    | 73  | 288    | KSI-AO1            |

T2 AM IFT (MEX OUT)



KSI-AA1

| Co(pF) | F (kHz) | Qo  | TURNS |     | KWANG SUNG PART NO |
|--------|---------|-----|-------|-----|--------------------|
|        |         |     | 1-3   | 4-6 |                    |
| 180    | 455     | 120 | 146   | 14  | KSI-AA1            |



APPLICATION CIRCUIT

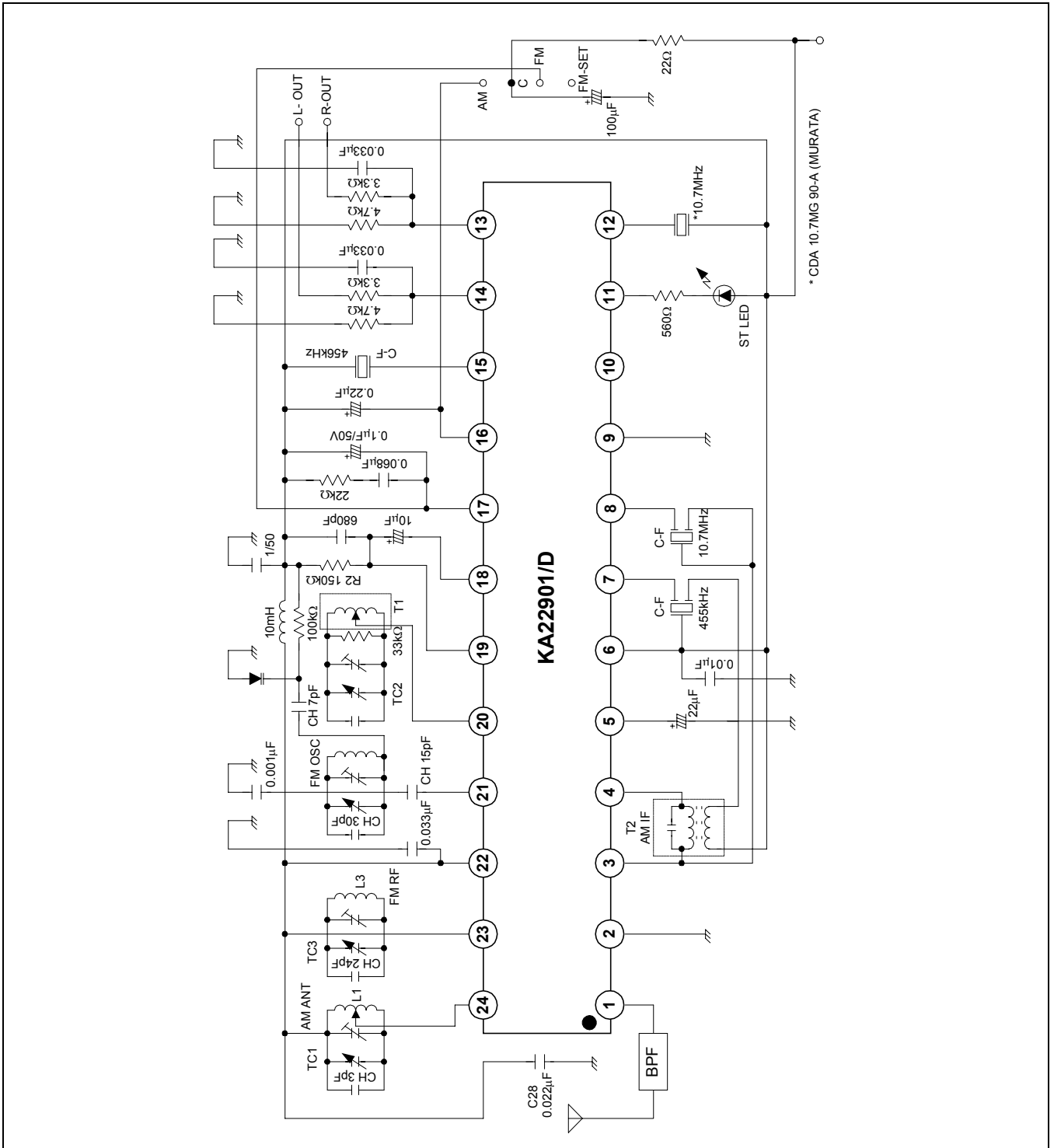


Figure 4.

NOTES