

INTRODUCTION

The S1A2298A01 is a monolithic integrated circuit which consists of an FM IF AMP, FM QUAD DET, AM IF AMP, AM DET, MPX block and Counter output pin for a DTS (Digital Tuning System) set.

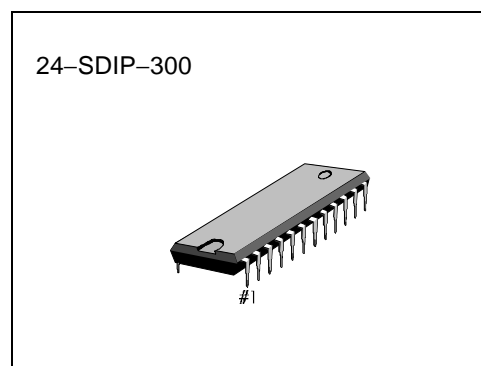
It is designed for use in portable radio cassette recorders.

FEATURES

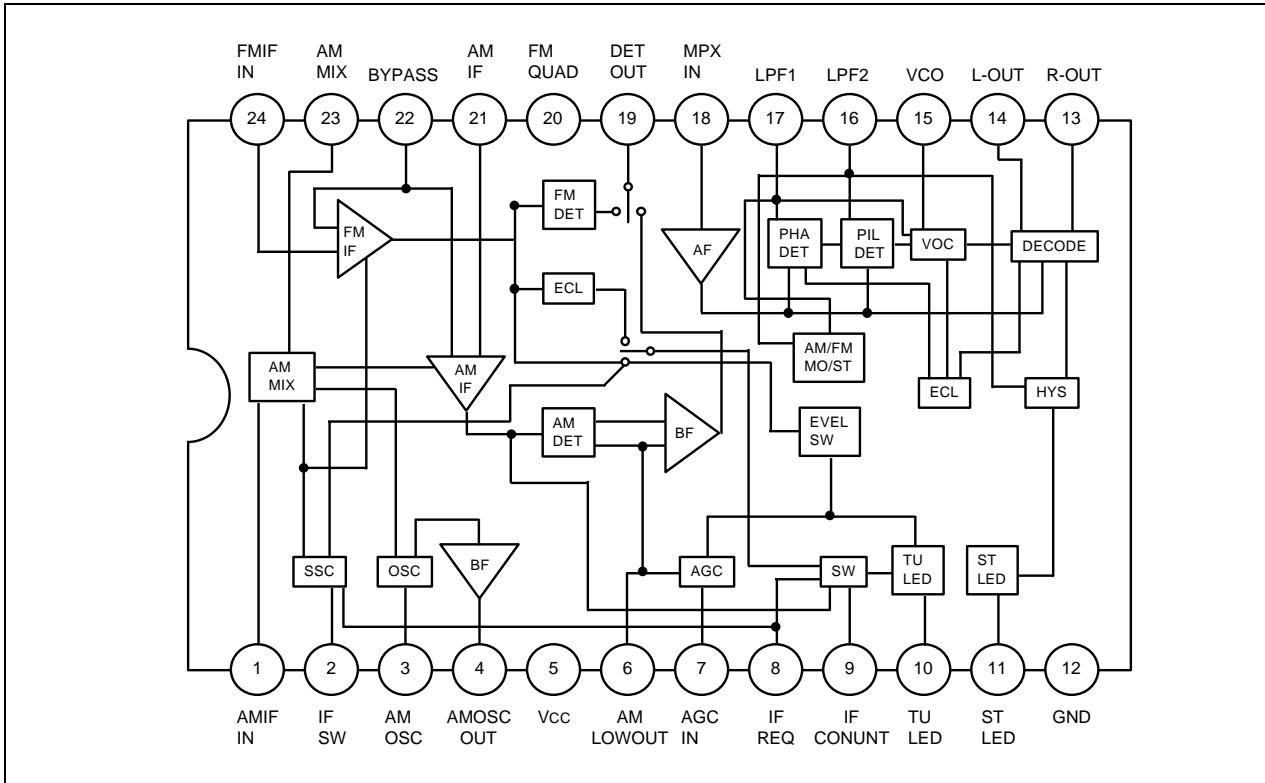
- AM/FM IF, 1 Chip for DTS
- Wide Operating Voltage: $V_{CC} = 1.8V - 7V$
- Adjust free FM Quadrature Detector
- Adjust free MPX VCO

ORDERING INFORMATION

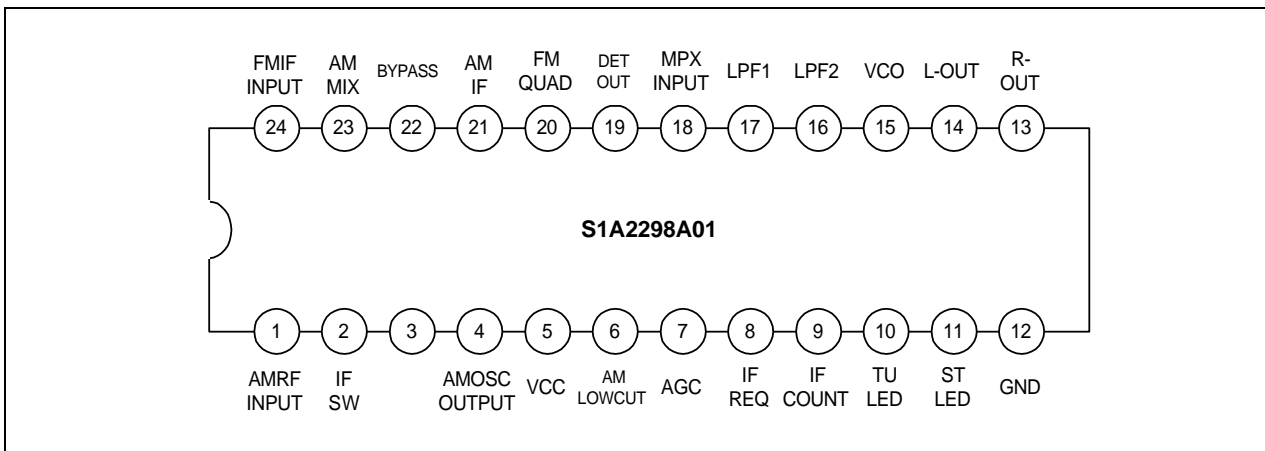
| Device | Package | Operating Temperature |
|-----------------|-------------|-----------------------|
| S1A2298A01-A0B0 | 24-SDIP-300 | - 20°C - + 75°C |



BLOCK DIAGRAM



PIN CONFIGURATION



PIN FUNCTION

| Pin No | Symbol | I/O | Function |
|--------|-----------------|-----|---------------------------|
| 1 | AM RF | I | AM RF Input Pin |
| 2 | IF SW | I | IF GAIN Control Pin |
| 3 | AM OSC | O | AM Oscillator Pin |
| 4 | AM OSC BF | O | AM Oscillator Buffer Pin |
| 5 | V _{CC} | | V _{CC} Pin |
| 6 | AM LOW CUT | O | AM Low Cut Pin |
| 7 | AGC | O | AGC Pin |
| 8 | IF REQ | O | IF Count Control Pin |
| 9 | IF COUNT | O | IF Count Pin |
| 10 | TU LED | O | Tuning LED Output Pin |
| 11 | ST LED | O | Stereo LED Output Pin |
| 12 | GND | | Ground Pin |
| 13 | R-OUT | O | R-OUT Output Pin |
| 14 | L-OUT | O | VCO Output Pin |
| 15 | VCO | O | VCO Output Pin |
| 16 | LPF2 | O | Low Pass Filter 2 Pin |
| 17 | LPF1 | O | Low Pass Filter 1 Pin |
| 18 | MPX | I | MPX Input Pin |
| 19 | DET | O | AM/FM Detector Output Pin |
| 20 | QUAD | O | Quadrature Detector Pin |
| 21 | AM IF | I | AM IF Input Pin |
| 22 | BYPASS | | AM/FM Bypass Pin |
| 23 | AM MIX | O | AM Mixer Pin |
| 24 | FM IF | I | FM IF Input Pin |

ABSOLUTE MAXIMUM RATING (Ta = 25°C)

| Characteristic | Symbol | Value | Unit |
|-----------------------|------------------|------------|------|
| Supply Voltage | V _{CC} | 8 | V |
| Power Dissipation | P _D | 1200 | mW |
| Operating Temperature | T _{OPR} | -20 – +75 | °C |
| Storage Temperature | T _{STG} | -55 – +150 | °C |

ELECTRICAL CHARACTERISTICS

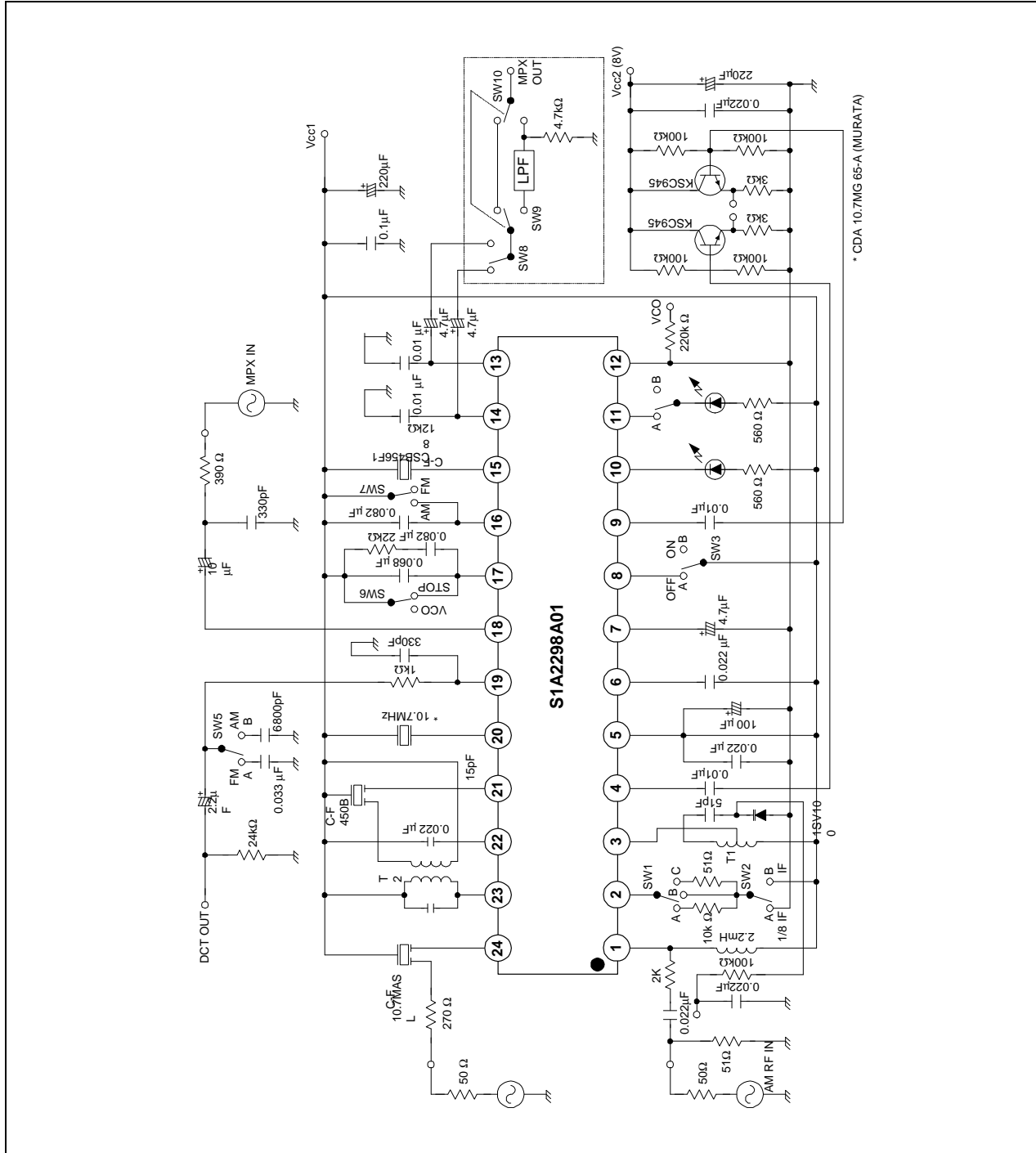
(Ta = 25 °C, VCC = 3 V, unless otherwise specified)

- FM: $f_C = 10.7\text{MHz}$, $f_m = 1\text{kHz}$, $\Delta f = 22.5\text{kHz}$, $SW1 = 10\text{k}\Omega$
- AM: $f_C = 1\text{MHz}$, $f_m = 1\text{kHz}$, $MOD = 30\%$, $SW1 = 10\text{k}\Omega$
- MPX: $f_m = 1\text{kHz}$, $L + R = 90\%$, $Pilot = 10\%$, $V_I = 150\text{mV}$

| Characteristic | | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------------|----------------------------|--|--|--------|--------|--------|------|
| Quiescent Circuit Current | | I_{CCQ1} | FM, $V_I = 0$ | 6.5 | 9.5 | 13.5 | mA |
| | | I_{CCQ2} | AM, $V_I = 0$ | 7 | 10 | 14 | mA |
| FM | -3 dB Limiting Sensitivity | $V_{I(SEN)}$ | $V_O = -3\text{dB}$ | 41 | 46 | 51 | dBu |
| | Detector Output Voltage | V_O | $V_I = 80\text{dBu}$ | 50 | 75 | 100 | mV |
| | Signal to Noise Ratio | S/N | $V_I = 80\text{dBu}$ | 55 | 65 | – | dB |
| | AM Rejection Ratio | AMR | $V_I = 80\text{dBu}$ | – | 38 | – | dB |
| | Total Harmonic Distortion | THD | $V_I = 80\text{dBu}$ | – | 0.2 | 1.0 | % |
| | Lamp On Level | $V_{L(on)}$ | $V_I = \text{variable}$ | 44 | 49 | 54 | dBu |
| | IF Countout Frequency 1 | F_{if1} | $V_I = 20\text{dBu}$ | – | 10.7 | – | MHz |
| | IF Countout Frequency 2 | $F_{1/8if2}$ | $V_I = 80\text{dBu}$ | 1,3374 | 1,3375 | 1,3376 | MHz |
| | IF Countout Voltage 1 | V_{if1} | $V_I = 61\text{dBu}$ | 350 | 500 | – | mVpp |
| | IF Countout Voltage 2 | $V_{1/8if2}$ | $V_I = 61\text{dBu}$ | 350 | 500 | – | mVpp |
| | IF Count Sensitivity 1 | S_{if1} | $SW1 = 0, SW2 = \text{GND}$ | 69 | 76 | 83 | dBu |
| | IF Count Sensitivity 2 | S_{if2} | $SW1 = 0.51\text{k}\Omega, SW2 = \text{GND}$ | 61 | 68 | 75 | dBu |
| | IF Count Sensitivity 3 | S_{if3} | $SW1 = 0, SW2 = V_{cc}$ | 70 | 77 | 83 | dBu |
| | IF Count Sensitivity 4 | S_{if4} | $SW1 = 0.51\text{k}\Omega, SW2 = V_{cc}$ | 62 | 69 | 76 | dBu |
| AM | Detector Output Voltage 1 | V_O | $V_I = 26\text{dBu}$ | 10 | 57 | 85 | mV |
| | Detector Output Voltage 2 | V_O | $V_I = 60\text{dBu}$ | 50 | 75 | 100 | mV |
| | Total Harmonic Distortion | THD | $V_I = 60\text{dBu}$ | – | 1 | 2 | % |
| | Signal to Noise Ratio | S/N | $V_I = 60\text{dBu}$ | 31 | 41 | – | dB |
| | Lamp ON Level | $V_{L(on)}$ | $V_I = \text{variable}$ | 21 | 26 | 31 | dBu |
| | Oscillation Voltage | V_{OSC} | $V_I = 0$ | 300 | 500 | – | mV |
| | IF Count Voltage | V_{if} | $V_I = 39\text{dBu}$ | 350 | 500 | – | mV |
| | IF Count Sensitivity 5 | S_{if5} | $SW1 = 0, SW2 = \text{GND}$ | 42 | 49 | 56 | dBu |
| | IF Count Sensitivity 6 | S_{if6} | $SW1 = 0.51\text{k}\Omega, SW2 = \text{GND}$ | 35 | 42 | 49 | dBu |
| | IF Count Sensitivity 7 | S_{if7} | $SW1 = 0, SW2 = V_{cc}$ | 42 | 49 | 56 | dBu |
| IF Count Sensitivity 8 | S_{if8} | $SW1 = 0.51\text{k}\Omega, SW2 = V_{cc}$ | 35 | 42 | 49 | dBu | |

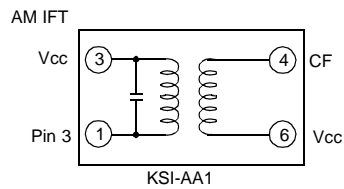
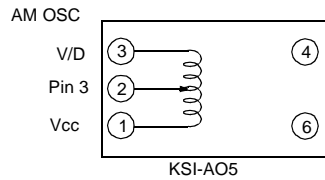
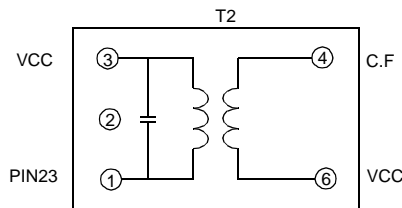
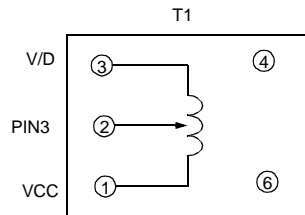
| Characteristic | | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|----------------|---------------------------|--------------|--------------------|------|------|------|------|
| MPX | Channel Separation 1 | CS1 | Stereo, fm = 100Hz | 35 | 42 | – | dB |
| | Channel Separation 2 | CS2 | Stereo, fm = 1kHz | 35 | 42 | – | dB |
| | Channel Separation 3 | CS3 | Stereo, fm = 10kHz | 35 | 42 | – | dB |
| | Total Harmonic Distortion | THD | Stereo | – | 0.2 | 1.0 | % |
| | Total Harmonic Distortion | THD | Mono | – | 0.2 | 1.0 | % |
| | Maximum Input Voltage | $V_{I(MAX)}$ | Stereo, THD = 3% | 250 | 350 | – | mW |
| | Voltage Gain | G_V | Mono | –5 | –3 | –1 | dB |
| | Channel Balance | CB | Mono | –1 | 0 | +1 | dB |
| | Signal to Noise Ratio | S/N | Mono | 68 | 78 | – | dB |
| | Lamp On Level | $V_{L(on)}$ | Pilot | – | 8 | 15 | mV |
| | Lamp Hysteresis | HY | Pilot | 1 | 2 | 5 | mV |
| | Capture Range | CR(H) | Pilot | 0 | 1.3 | 3.15 | % |
| | Capture Range | CR(L) | Pilot | –3.5 | –1.3 | 0 | % |

TEST CIRCUIT



COIL CIRCUIT

| No | Function | of (kHz) | Q | L (uH) | P (pF) | Turns | | | | | Write (mmf) |
|----|----------|----------|-----|--------|--------|-------|-----|-----|-----|-----|-------------|
| | | | | | | 1-2 | 2-3 | 1-3 | 1-4 | 4-6 | |
| T1 | AM OSC | 796 | 115 | 288 | - | 13 | 73 | - | - | 32 | 0.08 |
| T2 | AM IFT | 455 | 120 | - | 75 | - | - | 180 | - | 15 | 0.06 |



| NO | F (kHz) | Qo | Turns | | | C.L | KWANG SUNG PART NO |
|----|---------|-----|-------|-----|-----|--------|--------------------|
| | | | 4-6 | 1-2 | 2-3 | | |
| T1 | 796 | 115 | 4-6 | 1-2 | 2-3 | 288 uH | KSI-AO5 |
| | | | 32 | 13 | 73 | | |
| T2 | 455 | 120 | 4-6 | | 1-3 | 180 pF | KSI-AA1 |
| | | | 14 | | 146 | | |

APPLICATION INFORMATION

1) IF COUNT OUTPUT

IF Count Output is determined by the Pin 8 voltage. Tuning LED switching Count output occurs at pin 9.

The output impedance is 1.5k Ω .

V8; High (TU-LED ON) : Output

Low (TU-LED OFF) : No output

2) IF Switch

IF sensitivity is determined by the resistors of SW1 (0 Ω , 0.51 K Ω , 10 K Ω) regulating the AM mixer and FM IF gain.

When SW2 is V_{CC}, the count output frequency is 10.7 MHz.

When SW2 is GND, the count output frequency is 1.33375MHz, one eighth of 10.7MHz.

3) AM Low Cut

One of the signals which passed through DET AMP is provided to AF AMP, another is converted to AC before its feedback to AGC voltage and they are simultaneously used as a high frequency bypass.

4) AM OSC BUFFER

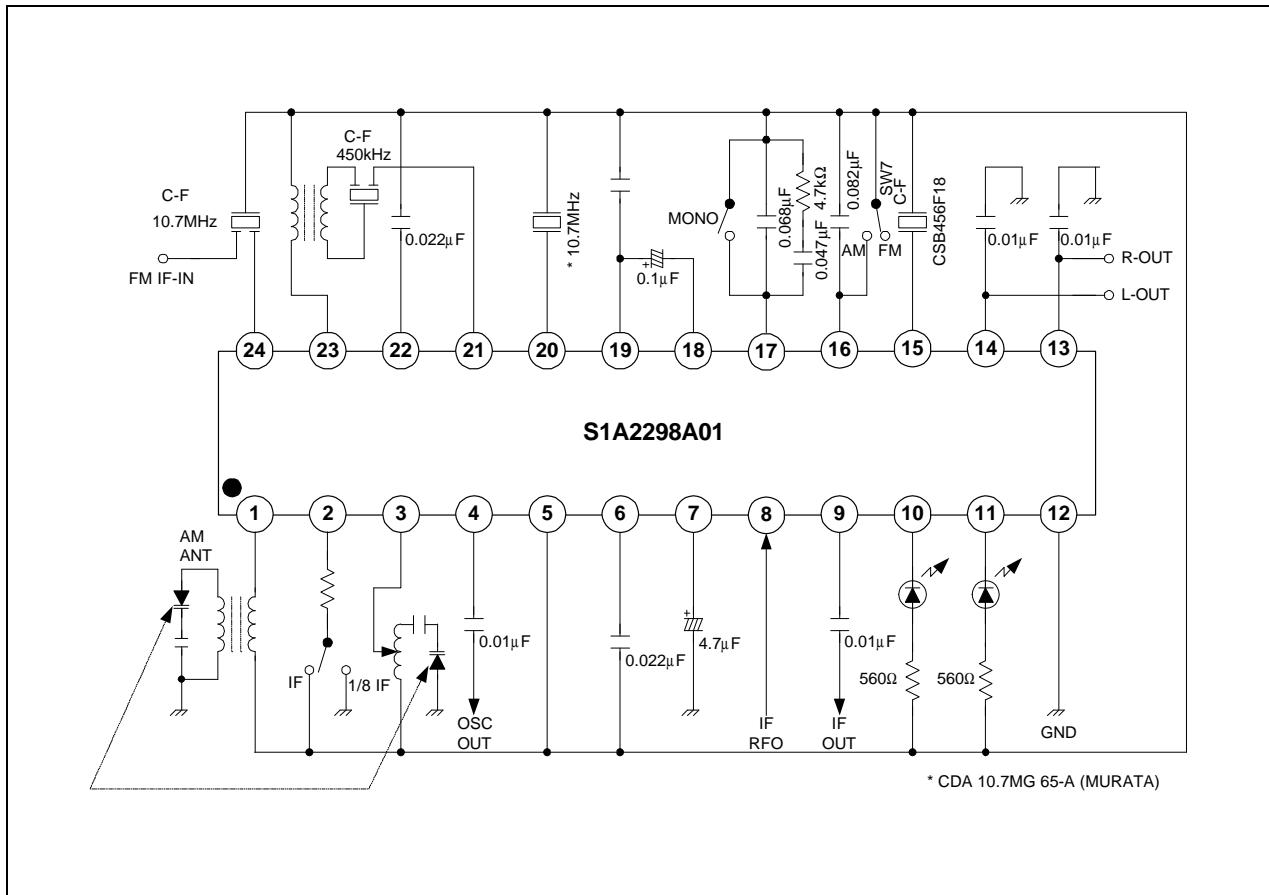
Output Impedance is 6.1k Ω , SIGNAL WAVE FORM is the rectangle wave, and the voltage scale of the OSC buffer OUTPUT is 500mVp-p.

5) MPX

INPUT IMPEDANCE: 25k Ω

OUTPUT IMPEDANCE: 5k Ω

APPLICATION CIRCUIT



APPLICATION CIRCUIT

