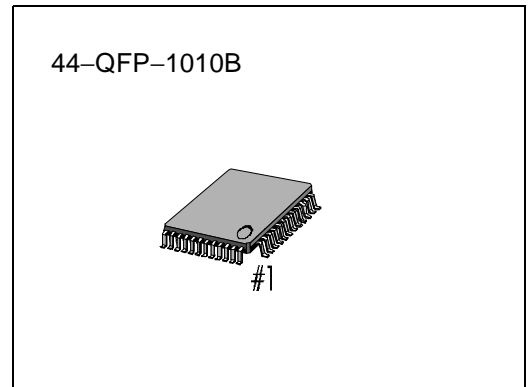


GENERAL DESCRIPTION

OVERVIEW

- AM : AM RF Mixer, AM OSC, AM_IF AMP, AM Detector, AGC, Tuning LED Driver,
- OSC Buffer, IF Buffer
- FM : RF Amp, FM RF Mixer, FM OSC, FM_IF AMP, Quadrature Detector,
- Tuning LED Driver, OSC Buffer, IF Buffer
- MPX : PLL, Stereo Decoder, Stereo LED, MPX VCO SELF-Adjustment
- DTS : Prescaler, AM/FM Programmable Divider, AM/FM IF Counter,
- Lock Detector, LED Controller
- Microprocessor Interface



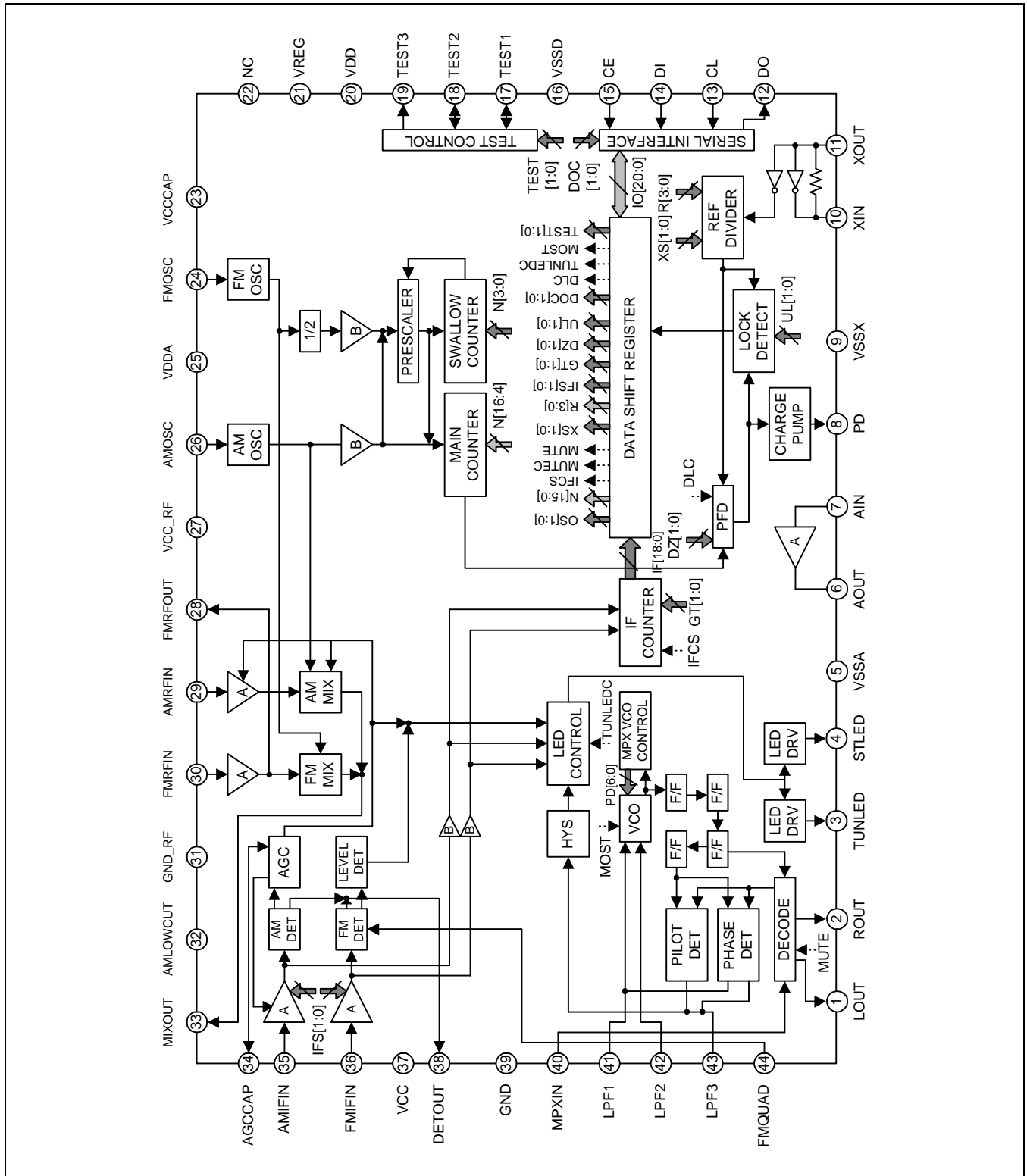
FEATURES

- Adopt New FCC
- AM/FM 1 Chip DTS with PLL
- MPX-VCO SELF-Adjustment
- Programmable Divider
 - FM : 10 - 160MHz <Pulse Swallow Technique>
 - AM : 2 - 40MHz <Pulse Swallow Technique>
 - 0.5 - 10MHz <Direct Division Technique>
- IF Counter : 0.4 - 12MHz <AM/FM IF Counting>
- Reference Frequency
 - Selectable Crystal (75kHz, 3.6MHz, 7.2MHz, 10.8MHz) Choice
- Package : 44 QFP

ORDERING INFORMATION

| Device | Package | Operating Temperature |
|-----------------|--------------|-----------------------|
| S1A0903X01-R0B0 | 44-QFP-1010B | -20°C - +75°C |

BLOCK DIAGRAM



PIN DESCRIPTION

| Pin No. | Symbol | In/out | Function |
|---------|--------|--------|--|
| 1 | LOUT | O | Stereo left channel output |
| 2 | ROUT | O | Stereo right channel output |
| 3 | TUNLED | O | Tuning LED |
| 4 | STLED | O | Stereo LED |
| 5 | VSSA | - | Ground |
| 6 | AOUT | O | Connections for the MOS Tr. used for the PLL active LPF. |
| 7 | AIN | I | |
| 8 | PD | O | PLL charge pump output |
| 9 | VSSX | - | Ground |
| 10 | XOUT | O | Crystal oscillator element connection. 75kHz, 3.6MHz, 7.2MHz, 10.8MHz) |
| 11 | XIN | I | |
| 12 | DO | O | Serial data output to the microprocessor |
| 13 | CL | I | Clock used for data synchronization for serial data input (DI) and serial data output (DO) |
| 14 | DI | I | Serial data input from the microprocessor |
| 15 | CE | I | Chip enable for serial I/O |
| 16 | VSSD | - | Ground |
| 17 | TEST1 | I/O | Only for test |
| 18 | TEST2 | I/O | - |
| 19 | TEST3 | O | - |
| 20 | VDD | - | Regulator voltage input |
| 21 | VREG | - | Regulator voltage output |
| 22 | NC | - | No connection |

| Pin No. | Symbol | In/out | Function |
|---------|----------|--------|--|
| 23 | VCCCAP | - | VCC ripple rejection cap. |
| 24 | FMOSC | I | FM oscillator input |
| 25 | VDDA | - | Power |
| 26 | AMOSC | I | AM oscillator input |
| 27 | VCC_RF | - | Power |
| 28 | FMRFOUT | O | FM RF output |
| 29 | AMRFIN | I | AM RF input |
| 30 | FMRFIN | I | FM RF input |
| 31 | GND_RF | - | Ground |
| 32 | AMLOWCUT | - | AM low cut cap. |
| 33 | MIXOUT | O | AM/FM MIX output |
| 34 | AGCCAP | - | AGC cap. |
| 35 | AMIFIN | I | AM IF input |
| 36 | FMIFIN | I | FM IF input |
| 37 | VCC | - | Power |
| 38 | DETOUT | O | AM/FM detector output |
| 39 | GND | - | Ground |
| 40 | MPXIN | - | MPX input |
| 41 | LPF1 | - | Connection for the phase detector LPF |
| 42 | LPF2 | - | Connection for the VCO LPF |
| 43 | LPF3 | - | Connection for the pilot detector and the phase detector LPF |
| 44 | FMQUND | - | Connection for FM QUAD detector resonator |

CHARACTERISTICS

ABSOLUTE MAXIMUM RATING

| Parameter | Symbol | Rating | Unit | Remarks |
|-----------------------|--------|-------------|------|---------|
| Supply Voltage | VS | 10 | V | |
| Operating Temperature | Top | -20 – + 75 | °C | |
| Storage Temperature | Tstg | -55 – + 150 | °C | |
| Power Dissipation | Pdmax | 1800 | mW | |

TEMPERATURE CHARACTERISTICS

| Parameter | Symbol | Condition | Rating | Unit | Remarks |
|----------------------------------|------------------|--------------|--------|------------------|---------|
| Quiescent circuit current 1 (FM) | ΔI_{cc1} | -20 – + 70°C | 20 | $\mu A/^\circ C$ | |
| Quiescent circuit current 2 (AM) | ΔI_{cc2} | -20 – + 70°C | 20 | $\mu A/^\circ C$ | |

ELECTRO_STATIC DISCHARGE CHARACTERISTICS

| Parameter | Condition | Pin No. | Rating | Unit | Remarks |
|------------------|------------------------------|----------|------------|------|---------|
| Human Body Model | C = 100pF, R = 1.5k Ω | All pins | ± 2000 | V | |
| Machine Model | C = 200, R = 0k Ω | All pins | ± 300 | V | |
| CDM | - | All pins | ± 800 | V | |

ELECTRICAL CHARACTERISTICS

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

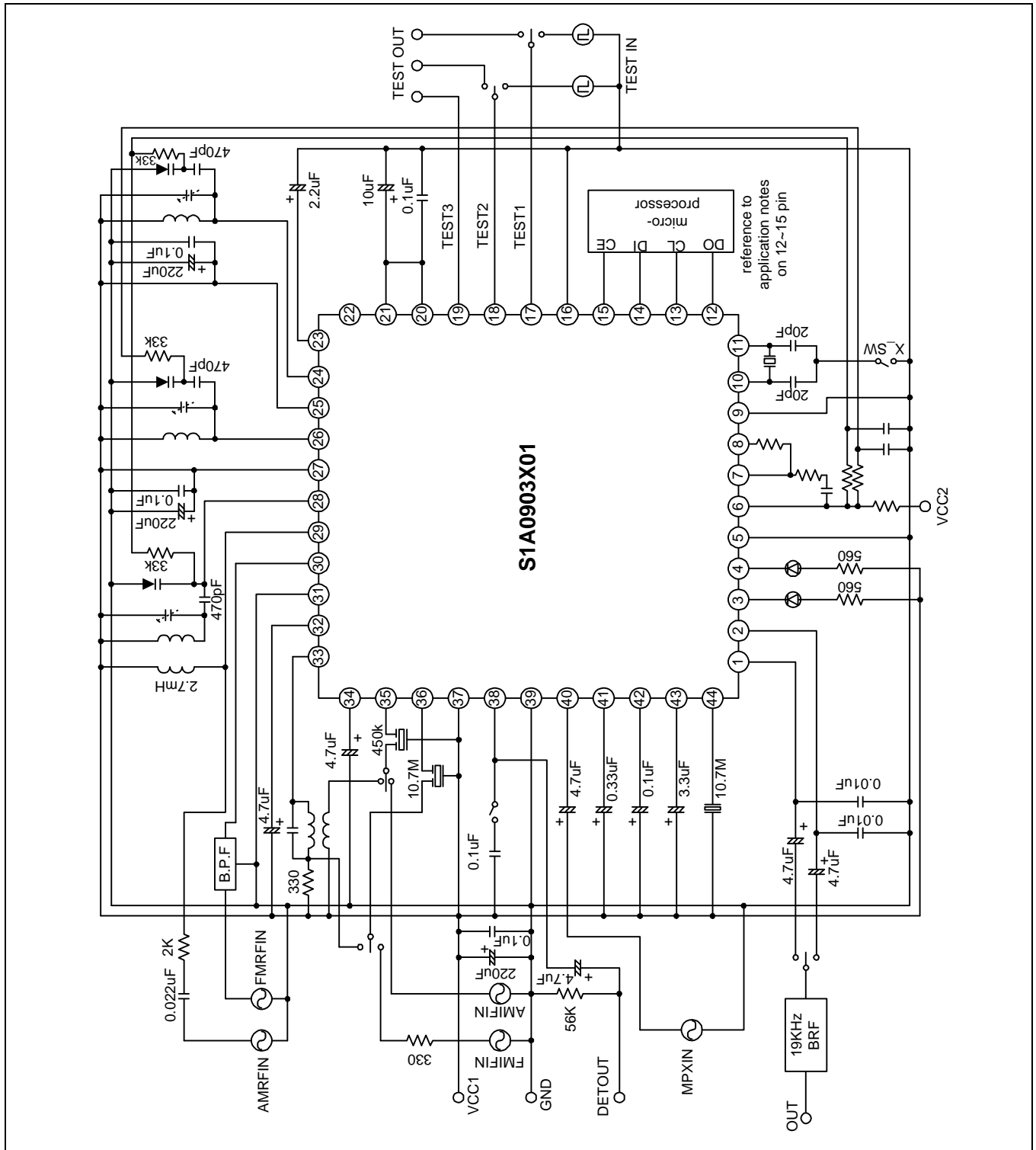
FM F/E : f = 98MHz, fm = 1kHz, Δf = 22.5kHz AM : f = 1MHz, fm = 1kHz, 30% Mod

FM IF : f = 10.7MHz, fm = 1kHz, Δf = 22.5kHz MPX : f = 1kHz, L+R = 90%, P = 10%, Vi = 150mV)

| PARAMETER | | SYMBOL | CONDITION | RATINGS | | | UNIT |
|----------------------|---------------------------|--------------|-----------------|---------|------|------|------|
| | | | | MIN. | TYP. | MAX. | |
| Supply Voltage Range | | Vcc | | 2.0 | - | 9.0 | V |
| Supply Current | | Iccq1 | FM, Vi = 0 | 7.3 | 11.3 | 15.3 | mA |
| | | Iccq2 | AM, Vi = 0 | 3.8 | 6.8 | 9.8 | mA |
| F/E | Input Limiting oltage | Vi lim1 | Vo = -3dB | - | 12 | 18 | dBu |
| | Local Oscillation oltage | Vosc | fos c= 108.7MHZ | 40 | 70 | 110 | mV |
| FM IF | Input Limiting oltage | Vi lim2 | Vo = -3dB | 35 | 40 | 45 | dBu |
| | Detection Output oltage | Vo det1 | Vi = 80dBu | 55 | 80 | 110 | mV |
| | S/R | S/N1 | Vi = 80dBu | 55 | 65 | - | dB |
| | FM Mute Attenuation atio | Amute | Vi = 80dBu | 60 | 70 | - | dB |
| | AM Depression Ratio | AMR | Vi = 80dBu | 40 | 50 | - | dB |
| | THD | THD1 | Vi = 80dBu | - | 0.2 | 1.0 | % |
| | LED Turning On ensitivity | VI11 | IFS[1:0] = 0 | 40 | 45 | 50 | dBμ |
| | | VI12 | IFS[1:0] = 1 | 35 | 40 | 45 | dBμ |
| VI13 | | IFS[1:0] = 2 | 30 | 35 | 40 | dBμ | |
| VI14 | | IFS[1:0] = 3 | 24 | 29 | 34 | dBμ | |
| AM IF | Voltage Gain | Gv1 | Vi=26dBu | 20 | 40 | 70 | mV |
| | Detection Output oltage | Vo det2 | Vi = 60dBu | 50 | 70 | 90 | mV |
| AM IF | S/R | S/N2 | Vi = 60dBu | 32 | 42 | - | dB |
| | THD | THD2 | Vi = 60dBu | - | 1 | 2 | % |
| | LED Turning On ensitivity | VI21 | IFS[1:0] = 0 | 28 | 32 | 38 | dBμ |
| | | VI22 | IFS[1:0] = 1 | 22 | 26 | 32 | dBμ |
| | | VI23 | IFS[1:0] = 2 | 16 | 20 | 26 | dBμ |
| VI24 | | IFS[1:0] = 3 | 10 | 14 | 20 | dBμ | |

| PARAMETER | | SYMBOL | CONDITION | RATINGS | | | UNIT | | |
|-----------------------------------|-----------------------------|------------|-----------|------------------------|-----------------------------------|------|---------|----|----|
| | | | | MIN. | TYP. | MAX. | | | |
| MPX | Maximum Input Voltage | | Vimax | Stereo, THD = 3% | 350 | 500 | - | mV | |
| | Voltage Gain | | Gv2 | | -5 | -3 | -1 | dB | |
| | Channel Balance | | CB | Mono | -1.5 | 0 | 1.5 | dB | |
| | THD1 | | THD3 | Mono | - | 0.2 | 1.0 | % | |
| | THD2 | | THD4 | Stereo | - | 0.2 | 1.0 | % | |
| | Separation 1 | | CS1 | Stereo, f = 100HZ | 25 | 45 | - | dB | |
| | Separation 2 | | CS2 | Stereo, f = 1kHz | 32 | 45 | - | dB | |
| | Separation 3 | | CS3 | Stereo, f = 10kHz | 25 | 45 | - | dB | |
| | LED Turning On ensitivity | | Vlon | TUNLED=ON, Pilot only | - | 8 | 16 | mV | |
| | LED Turning Off ensitivity | | Vloff | TUNLED=OFF, Pilot only | 2 | 6 | - | mV | |
| | Lamp Hysteresis | | HY | | - | 2 | - | mV | |
| | Capture Range | | CR | Pilot only | - | 8 | - | % | |
| S/R | | S/N3 | Mono | 65 | 80 | - | dB | | |
| DTS | Input Voltage | High Level | Vih | CE, DI, CL | 0.7Vreg | - | - | V | |
| | | Low Level | Vil | CE, DI, CL | 0 | - | 0.3Vreg | V | |
| | Output Voltage | High Level | Voh1 | PD : lo = -1mA | 0.7Vreg | - | - | V | |
| | | Low Level | Vol1 | PD : lo = 1mA | - | - | 0.3Vreg | V | |
| | | | Vol2 | DO : lo = 5mA | 0 | - | 0.3Vreg | V | |
| | Output Voltage Range | | Vo | Aout | 0 | - | 9 | V | |
| | Internal Feedback egistance | | Rf | XIN | - | 0.4 | - | MΩ | |
| | Input Current | | lin1 | | CE, DI, CL = VDD r GND | - | - | 5 | μA |
| | | | | | XIN = VDD or GND | 1.3 | - | 8 | μA |
| | Supply Current | | Idd1 | | X'tal = 10.8MHz, M = 130MHz | - | 2.5 | 6 | mA |
| | | | | | PLL stop mode, X'tal = 10.8MHz | - | 0.3 | - | mA |
| PLL stop mode, X'tal stop mode | | | | | - | - | 10 | μA | |

TEST CIRCUIT



NOTES