

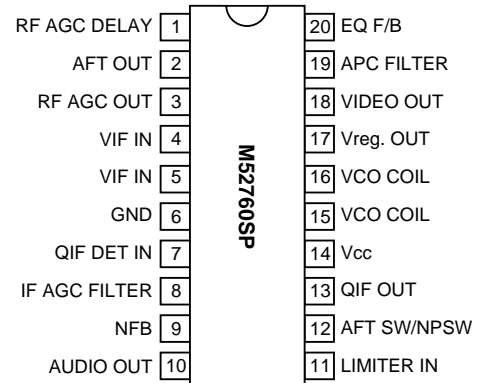
DESCRIPTION

The M52760SP is IF signal-processing IC for VCRs and TVs. It enable the PLL detection system despite size as small as that of conventional quasi-synchronous VIF/SIF detector, IF/RF AGC, SIF limiter, FM detector and EQ AMP.

FEATURES

- Video detection output is 2VP-P. It has built-in EQ AMP.
- The package is a 20-pin shrink-DIP, suitable for space saving.
- The video detector uses PLL for full synchronous detection circuit. It produces excellent characteristics of DG, DP, 920kHz beat, and cross color.
- Dynamic AGC realizes high speed response with only single filter.
- Video IF and sound IF signal processings are separated from each other. VCO output is used to obtain intercarrier. This PLL-SPLIT method provide good sound sensitivity and reduces buzz.
- As AFT output voltage uses the APC output voltage, VCO coil is not used.
- Audio FM demodulation uses PLL system, so it has wide frequency range with no external parts and no adjustment.
- QIF AMP has a fixed gain, and good characteristic for NICAM.

PIN CONFIGURATION (TOP VIEW)



Outline 20P4B

APPLICATION

TV sets, VCR tuners

RECOMMENDED OPERATING CONDITION

In case of Vcc and Vreg. out short

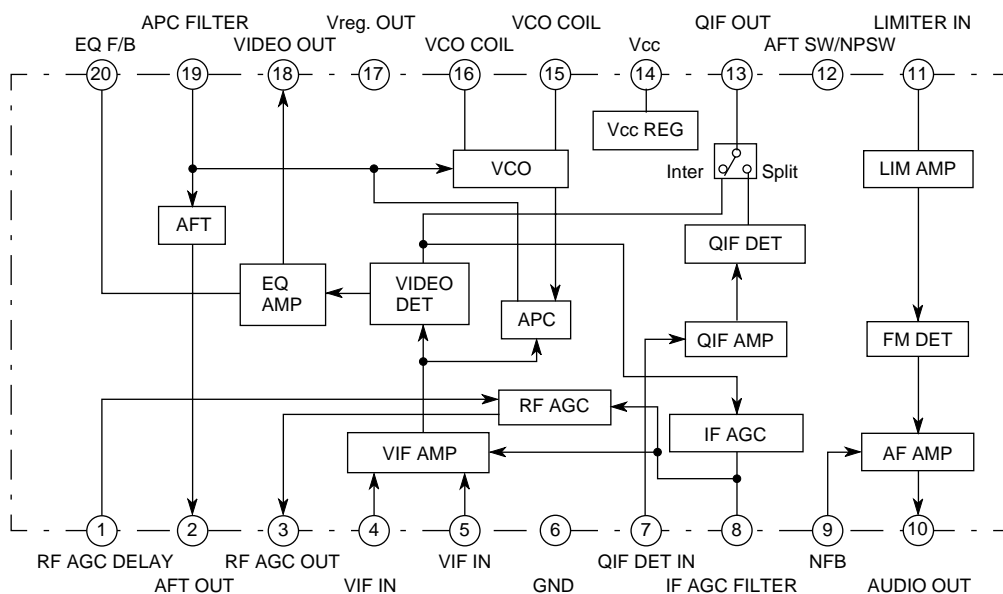
Supply voltage range.....4.75 to 5.25V

Recommended supply voltage.....5.0V

In case of Vreg. out open

Supply voltage range.....8.5 to 12.5V

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta=25°C, surge protection capacitance 200pF resistance 0Ω, unless otherwise noted)

| Symbol | Parameter | Ratings | Unit |
|-----------|--------------------------|-------------|------|
| Vcc | Supply voltage1 | 13.2 | V |
| Vreg. OUT | Supply voltage Vreg. OUT | 6 | V |
| Pd | Power dissipation | 1524 | mW |
| Topr | Operating temperature | -20 to +75 | °C |
| Tstg | Storage temperature | -40 to +150 | °C |
| Surge | Surge voltage resistance | ±200 | V |

AMBIENT OPERATING CONDITION (Ta=25°C, unless otherwise noted)

| Supply voltage | Supply voltage range | Recommended supply voltage |
|------------------------------------|----------------------|----------------------------|
| IN CASE OF Vcc AND Vreg. OUT SHORT | 4.75 to 5.25V | 5.0V |
| IN CASE OF Vreg. OUT OPEN | 8.5 to 12.5V | – |

ELECTRICAL CHARACTERISTICS (Vcc=5V, Ta=25°C, unless otherwise noted)

| Symbol | Parameter | Test circuit | Test point | Input point | Input SG | Measurement condition | | | Limits | | | Unit | |
|-------------|-----------------------------|--------------|------------|-------------|----------|-----------------------|----------|-----|---|------|------|------|------------------|
| | | | | | | External power supply | | | switches set to position 1 unless otherwise indicated | Min. | Typ. | | Max. |
| | | | | | | V7 | V8 | V12 | | | | | |
| VIF section | | | | | | | | | | | | | |
| Icc1 | Circuit current1 Vcc=5V | 1 | A | VIF IN | SG1 | – | – | 5 | Vcc=5V SW17=1, SW14=2 | 33 | 46 | 59 | mA |
| Icc2 | Circuit current2 Vcc=12V | 1 | A | VIF IN | SG1 | – | – | 5 | Vcc=12.5V SW14=SW17=2 | 33 | 46 | 59 | mA |
| Vcc2 | Vreg voltage | 1 | TP17 | – | – | – | – | 5 | Vcc=12.5V SW7=2 | 4.60 | 4.95 | 5.30 | V |
| V18 | Video output DC voltage | 1 | TP18A | – | – | – | 0 | – | SW8=2 | 3.2 | 3.5 | 3.8 | V |
| Vo det | Video output voltage | 1 | TP18A | VIF IN | SG1 | – | – | – | – | 1.8 | 2.1 | 2.4 | V _{P-P} |
| Video S/N | Video S/N | 1 | TP18A | VIF IN | SG2 | – | – | – | SW18=2 | 51 | 56 | – | dB |
| BW | Video band width | 1 | TP18A | VIF IN | SG3 | – | Variable | – | SW8=2 | 7.0 | 9.0 | – | MHz |
| VIN MIN | Input sensitivity | 1 | TP18A | VIF IN | SG4 | – | – | – | – | – | 48 | 52 | dBμ |
| VIN MAX | Maximum allowable input | 1 | TP18A | VIF IN | SG5 | – | – | – | – | 101 | 105 | – | dBμ |
| GR | AGC control range input | – | – | – | – | – | – | – | – | 50 | 57 | – | dB |
| V8 | IF AGC voltage | 1 | TP8 | VIF IN | SG6 | – | – | – | – | 2.9 | 3.2 | 3.5 | V |
| V8H | Maximum IF AGC voltage | 1 | TP8 | – | – | – | – | – | – | 4.0 | 4.4 | – | V |
| V8L | Minimum IF AGC voltage | 1 | TP8 | VIF IN | SG7 | – | – | – | – | 2.2 | 2.4 | 2.6 | V |
| V3H | Maximum RF AGC voltage | 1 | TP3 | VIF IN | SG6 | – | – | – | (Vcc=9V) (Vcc=12V) | 4.2 | 4.7 | – | V |
| | | | | | | | | | | 8.0 | 8.9 | – | |
| V3L | Minimum RF AGC voltage | 1 | TP3 | VIF IN | SG7 | – | – | – | (Vcc=9V) (Vcc=12V) | – | 0.1 | 0.5 | V |
| | | | | | | | | | | – | 0.2 | 0.7 | |
| V3 | RF AGC Operation voltage | 1 | TP3 | VIF IN | SG8 | – | – | – | – | 89 | 92 | 95 | dBμ |
| CL-U | Capture range U | 1 | TP18A | VIF IN | SG9 | – | – | – | – | 1.0 | 1.7 | – | MHz |
| CL-L | Capture range L | 1 | TP18A | VIF IN | SG9 | – | – | – | – | 1.8 | 2.4 | – | MHz |
| CL-T | Capture range T | 1 | – | – | – | – | – | – | – | 3.1 | 4.1 | – | MHz |
| VCO Δf | VCO SW ON Drift | 1 | TP18A | – | – | – | 0 | – | – | ±0 | +20 | +40 | kHz |
| μ | AFT sensitivity | 1 | TP2 | VIF IN | SG10 | – | – | 3.3 | – | 20 | 30 | 60 | mV/kHz |

ELECTRICAL CHARACTERISTICS (cont.)

| Symbol | Parameter | Test circuit | Test point | Input point | Input SG | Measurement condition | | | Limits | | | Unit | |
|-----------------|-------------------------------|--------------|------------|------------------|-------------|-----------------------|----------|------|---|------|------|------|-------|
| | | | | | | External power supply | | | switches set to position 1 unless otherwise indicated | Min. | Typ. | | Max. |
| | | | | | | V7 | V8 | V12 | | | | | |
| V2H | AFT maximum voltage | 1 | TP2 | VIF IN | SG10 | - | - | 3.3 | (Vcc=9V) | 3.85 | 4.15 | - | V |
| | | | | | | | | | (Vcc=12V) | 7.7 | 8.1 | - | |
| | | | | | | | | | | 10.7 | 11.1 | - | |
| V2L | AFT minimum voltage | 1 | TP2 | VIF IN | SG10 | - | - | 3.3 | (Vcc=9V) | - | 0.7 | 1.2 | V |
| | | | | | | | | | (Vcc=12V) | - | 0.7 | 1.2 | |
| | | | | | | | | | | - | 0.7 | 1.2 | |
| AFT def1 | AFT Defeat 1 | 1 | TP2 | VIF IN | SG10 | - | - | 1.65 | (Vcc=9V) | 2.2 | 2.5 | 2.8 | V |
| | | | | | | | | | (Vcc=12V) | 4.1 | 4.5 | 4.9 | |
| | | | | | | | | | | 5.5 | 6.0 | 6.5 | |
| AFT def2 | AFT Defeat 2 | 1 | TP2 | VIF IN | SG10 | - | - | 4.6 | (Vcc=9V) | 2.2 | 2.5 | 2.8 | V |
| | | | | | | | | | (Vcc=12V) | 4.1 | 4.5 | 4.9 | |
| | | | | | | | | | | 5.5 | 6.0 | 6.5 | |
| IM | Inter modulation | 1 | TP18A | VIF IN | SG11 | - | Variable | - | SW8=2 | 35 | 40 | - | dB |
| DG | Differential gain | 1 | TP18A | VIF IN | SG12 | - | - | - | | - | 2 | 5 | % |
| DP | Differential phase | 1 | TP18A | VIF IN | SG12 | - | - | - | | - | 2 | 5 | deg |
| V13 SYNC | Sync. tip level | 1 | TP18A | VIF IN | SG2 | - | - | - | | 0.85 | 1.15 | 1.45 | V |
| RINV | VIF input resistor | 2 | TP4 | | | | | | | - | 1.2 | - | kΩ |
| CINV | VIF input capacitance | 2 | TP4 | | | | | | | - | 5 | - | pF |
| SIF section | | | | | | | | | | | | | |
| QIF1 | QIF output 1 | 1 | TP13 | VIF IN QIF IN | SG2 SG13 | - | - | - | | 108 | 114 | 120 | dBμ |
| QIF2 | QIF output 2 | 1 | TP13 | VIF IN QIF IN | SG2 SG14 | - | - | - | | 94 | 100 | 106 | dBμ |
| Vos | SIF detection output | 1 | TP13 | VIF IN | SG15 | 0 | - | 5 | SW7=2 | 94 | 100 | 106 | dBμ |
| V1 | AF output DC voltage | 1 | TP10 | SIF IN | SG19 | - | - | 5 | | 1.6 | 2.2 | 2.8 | V |
| VoAF1 | AF output (4.5MHz) | 1 | TP10 | SIF IN | SG16 | - | - | 5 | | 320 | 560 | 800 | mVrms |
| VoAF2 | AF output (5.5MHz) | 1 | TP10 | SIF IN | SG20 | - | - | 0 | | 255 | 450 | 645 | mVrms |
| THD AF1 | AF output distortion (4.5MHz) | 1 | TP10 | SIF IN | SG16 | - | - | 5 | | - | 0.2 | 0.9 | % |
| THD AF2 | AF output distortion (5.5MHz) | 1 | TP10 | SIF IN | SG20 | - | - | 0 | | - | 0.2 | 0.9 | % |
| LIM1 | Limiting sensitivity (4.5MHz) | 1 | TP10 | SIF IN | SG17 | - | - | 5 | | - | 42 | 55 | dBμ |
| LIM2 | Limiting sensitivity (5.5MHz) | 1 | TP10 | SIF IN | SG21 | - | - | 0 | | - | 42 | 55 | dBμ |
| AMR1 | AM rejection (4.5MHz) | 1 | TP10 | SIF IN | SG18 | - | - | 5 | | 55 | 62 | - | dB |
| AMR2 | AM rejection (5.5MHz) | 1 | TP10 | SIF IN | SG22 | - | - | 0 | | 55 | 64 | - | dB |
| AF S/N 1 | AF S/N (4.5MHz) | 1 | TP10 | SIF IN | SG19 | - | - | 5 | | 55 | 62 | - | dB |
| AF S/N 2 | AF S/N (5.5MHz) | 1 | TP10 | SIF IN | SG23 | - | - | 0 | | 55 | 64 | - | dB |
| RINS | SIF input resistance | 2 | TP7 | | | | | | | - | 1.5 | - | kΩ |
| CINS | SIF input capacitance | 2 | TP7 | | | | | | | - | 4 | - | pF |
| Control section | | | | | | | | | | | | | |
| CQIF | QIF control | 1 | TP7 | - | - | Variable | - | - | SW7=2 | - | 0.7 | 1.0 | V |

PIN12 VOLTAGE CONTROL

| Pin12 voltage (V) | | AF | AFT |
|-------------------|------------|------|--------|
| 0 to 2.3 | 0 to 0.6 | PAL | NORMAL |
| | 1.0 to 2.3 | | DEFEAT |
| 2.7 to 5.0 | 2.7 to 4.0 | NTSC | NORMAL |
| | 4.4 to 5.0 | | DEFEAT |

ELECTRICAL CHARACTERISTICS TEST METHOD

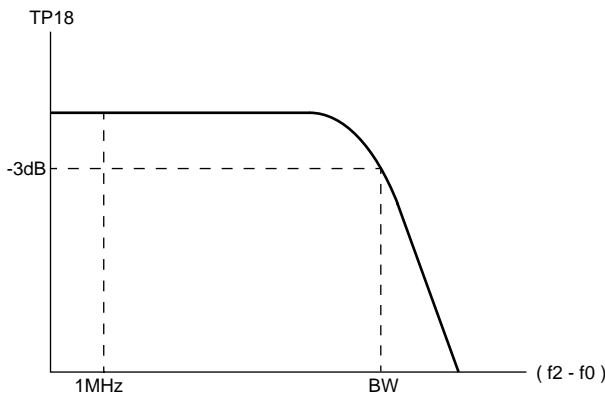
Video S/N

Input SG2 into VIF IN and measure the video out (Pin 18) noise in r.m.s at TP18B through a 5MHz (-3dB) L.P.F.

$$S/N=20 \log \left(\frac{0.7 \times V_o \text{ det}}{\text{NOISE}} \right) (\text{dB})$$

BW Video band width

1. Measure the 1MHz component level of EQ output TP18A with a spectrum analyzer when SG3 (f2=57.75MHz) is input into VIF IN. At that time, measure the voltage at TP8 with SW8, set to position 2, and then fix V8 at that voltage.
2. Reduce F2 and measure the value of (f2-f0) when the (f2-f0) component level reaches -3dB from the 1MHz component level as shown below.



VIN MIN Input sensitivity

Input SG4 (Vi=90dBμ) into VIF IN, and then gradually reduce Vi and measure the input level when the 20kHz component of EQ output TP18A reaches -3dB from Vo det level.

VIN MAX Maximum allowable input

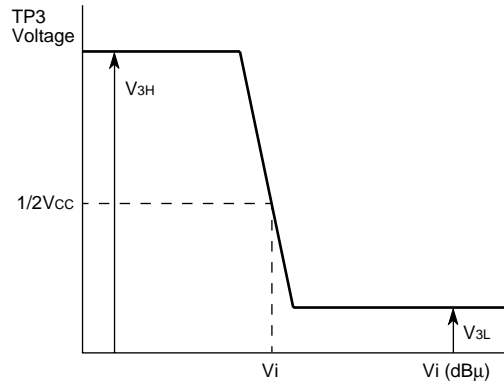
1. Input SG5 (Vi=90dBμ) into VIF IN, and measure the level of the 20kHz component of EQ output.
2. Gradually increase the Vi of SG and measure the input level when the output reaches -3dB.

GR AGC control range

$$GR=VIN \text{ MAX}-VIN \text{ MIN} (\text{dB})$$

V3 RF AGC operating voltage

Input SG8 into VIF IN, and gradually reduce Vi and then measure the input level when RF AGC output TP3 reaches 1/2 Vcc, as shown below.



CL-U Capture range

1. Increase the frequency of SG9 until the VCO is out of locked-oscillation.
 2. Decrease the frequency of SG9 and measure the frequency fU when the VCO locks.
- $$CL-U=fU-58.75 (\text{MHz})$$

CL-L Capture range

1. Decrease the frequency of SG9 until the VCO is out of locked-oscillation.
 2. Increase the frequency of SG9 and measure the frequency fL when the VCO locks.
- $$CL-L=58.75-fL (\text{MHz})$$

CL-T Capture range

$$CL-T=CL-U+CL-L (\text{MHz})$$

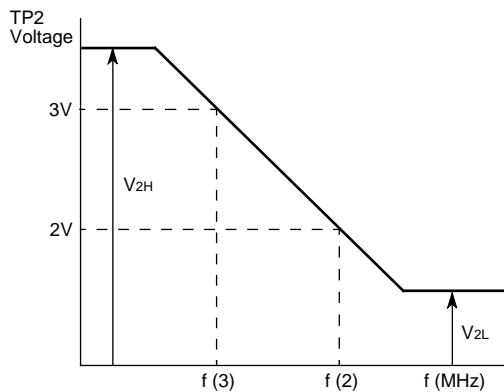
VCO Δf VCO SW on drift

1. Input SG2 into VIF IN .
2. Adjust the VCO coil so that AFT voltage can be reached to 1/2 Vcc in 10 seconds after the power switch is turned to on.
3. IF AGC FILTER (Pin8) is connected to GND (0V) after turning off the VIF input.
4. And then, measure each free running frequencies of 10 and 60 seconds later.

$$VCO \Delta f (\text{kHz}) = \text{frequency2 (60 sec. later)} - \text{frequency1 (10 sec. later)}$$

μ AFT sensitivity, V_{2H} Maximum AFT voltage, V_{2L} Minimum AFT voltage

1. Input SG10 into VIF IN , and set the frequency of SG10 so that the voltage of AFT output TP2 is 3V. This frequency is f (3).
2. Set the frequency of SG10 so that the AFT output voltage is 2V. This frequency is f (2)
3. IN the graph, maximum and minimum DC voltage are V_{2H} and V_{2L}, respectively.



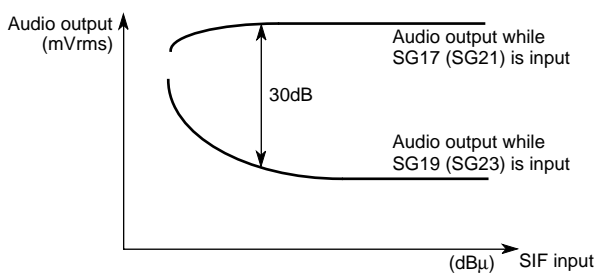
$$\mu = \frac{1000 \text{ (mV)}}{f(2) - f(3) \text{ (kHz)}} \text{ (mV/kHz)}$$

IM Intermodulation

1. Input SG11 into VIF IN, and measure EQ output TP18A with an oscilloscope.
2. Adjust AGC filter voltage V8 so that the minimum DC level of the output waveform is 1.0V.
3. At this time, measure, TP18A with a spectrum analyzer. The intermodulation is defined as a difference between 1.07MHz and 4.43MHz frequency components.

LIM Limiting sensitivity

1. Input SG17 (SG21) into SIF input, and measure the 400Hz component level of AF output TP10.
2. Input SG19 (SG23) into SIF input, and measure the 400Hz component level of AF output TP10.
3. The input limiting sensitivity is defined as the input level when a difference between each 400Hz components of audio output (TP10) is 30dB, as shown below.



AMR AM Rejection

1. Input SG18 into SIF input, and measure the output level of AF output TP10. This level is VAM.
2. AMR is;

$$AMR = 20 \log \left(\frac{VoAF \text{ (mVr.m.s)}}{VAM \text{ (mVr.m.s)}} \right) \text{ (dB)}$$

AF S/N

1. Input SG19 into SIF input, and measure the output noise level of AF output TP1. This level is VN.
2. S/N is;

$$S/N = 20 \log \left(\frac{VoAF \text{ (mVr.m.s)}}{VN \text{ (mVr.m.s)}} \right) \text{ (dB)}$$

CqIF QIF control

Lower the voltage of V7, and measure the voltage of V7 when the DC voltage of TP13 begins to change.

THE NOTE IN THE SYSTEM SETUP

M52760SP has 2 power supply pins of Vcc (pin 14) and Vreg.OUT (pin 17) .

Pin 14 is for AFT output, RF AGC output circuits and 5V regulated power supply circuit and Pin 17 is for the other circuit blocks.

In case M52760SP is used together with other ICs like VIF operating at more than 5V, the same supply voltage as that of connected ICs is applied to Vcc and Vreg.Out is opened. The other circuit blocks, connected to Vreg.OUT are powered by internal 5V regulated power supply.

In case the connecting ICs are operated at 5V, 5V is supplied to both Vcc and Vreg.OUT.

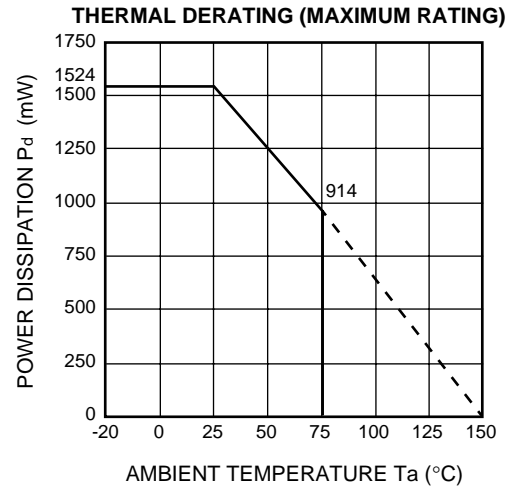
LOGIC TABLE

| | | AF | AFT |
|---------|---------|------|--------|
| 10k "H" | 20k "H" | NTSC | DEFEAT |
| | 20k "L" | | NORMAL |
| 10k "L" | 20k "H" | PAL | DEFEAT |
| | 20k "L" | | NORMAL |

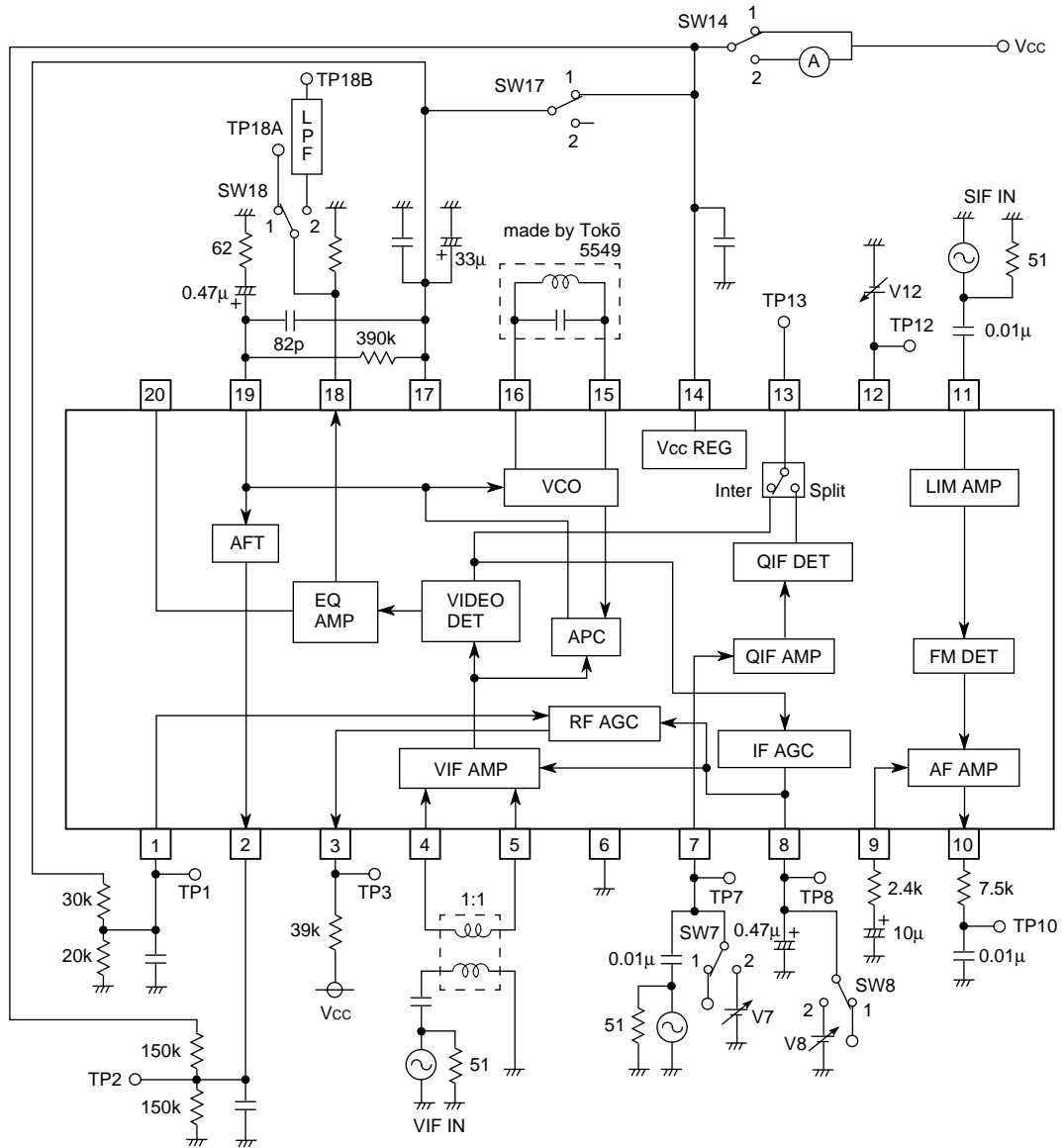
INPUT SIGNAL

| SG No. | Signals (50Ω termination) |
|--------|--|
| 1 | f ₀ =58.75MHz AM20kHz 77.8% 90dBμ |
| 2 | f ₀ =58.75MHz 90dBμ CW |
| 3 | f ₁ =58.75MHz 90dBμ CW (Mixed signal) f ₂ =Frequency variable 70dBμ CW (Mixed signal) |
| 4 | f ₀ =58.75MHz AM20kHz 77.8% level variable |
| 5 | f ₀ =58.75MHz AM20kHz 14.0% level variable |
| 6 | f ₀ =58.75MHz 80dBμ CW |
| 7 | f ₀ =58.75MHz 110dBμ CW |
| 8 | f ₀ =58.75MHz CW level variable |
| 9 | f ₀ =Variable AM20kHz 77.8% 90dBμ |
| 10 | f ₀ =Variable 90dBμ CW |
| 11 | f ₁ =58.75MHz 90dBμ CW (Mixed signal) f ₂ =55.17MHz 80dBμ CW (Mixed signal) f ₃ =54.25MHz 80dBμ CW (Mixed signal) |
| 12 | f ₀ =58.75MHz 87.5% TV modulation ten-step waveform sync tip level 90dBμ |
| 13 | f ₁ =54.25MHz 95dBμ CW |
| 14 | f ₁ =54.25MHz 75dBμ CW |
| 15 | f ₁ =58.75MHz 90dBμ CW (Mixed signal) f ₂ =54.25MHz 70dBμ CW (Mixed signal) |
| 16 | f ₀ =4.5MHz 90dBμ FM400Hz±25kHz dev |
| 17 | f ₀ =4.5MHz FM400Hz±25kHz dev level variable |
| 18 | f ₀ =4.5MHz 90dBμ AM400Hz 30% |
| 19 | f ₀ =4.5MHz 90dBμ CW |
| 20 | f ₀ =5.5MHz 90dBμ FM400Hz±50kHz dev |
| 21 | f ₀ =5.5MHz FM400Hz±50kHz dev level variable |
| 22 | f ₀ =5.5MHz 90dBμ AM400Hz 30% |
| 23 | f ₀ =5.5MHz 90dBμ CW |

TYPICAL CHARACTERISTICS



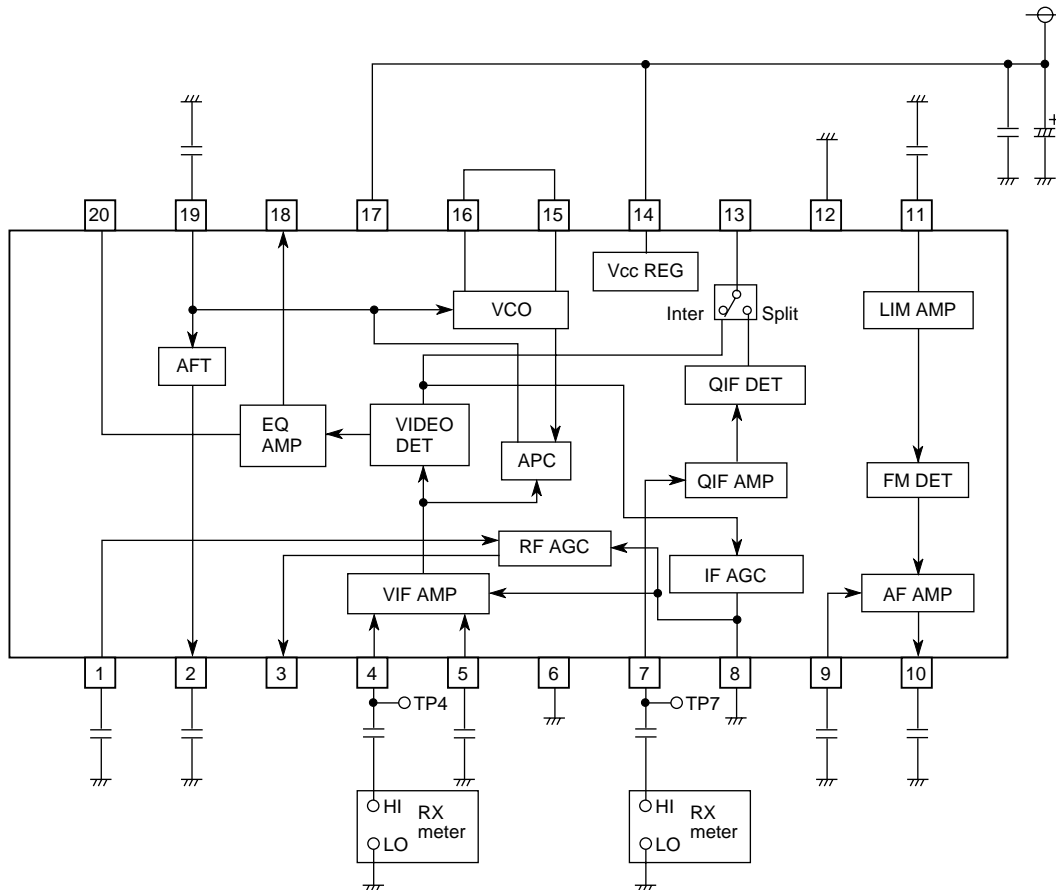
APPLICATION EXAMPLE 1



* Capacitors without an assignment are 0.01μF.
 * The Measuring Circuit 1 is Mitsubishi standard evaluation fixture.

Units Resistance : Ω
 Capacitance : F

APPLICATION EXAMPLE 2



* All capacitor is 0.01 μ F, unless otherwise specified.