Ordering number : EN2257B

Monolithic Linear IC

# LA1177

## Electronic Tuning-Use FM Front End for Car Radio, Home Stereos

### Overview

• The LA1177 is an FM front end IC for use in car radio, home stereo applications. It requires fewer external parts. The on-chip oscillator and oscillation buffer facilitate designing of electronic tuning sets.

### Features

• Wide-band AGC circuit (Improvement in intermodulation, cross modulation characteristics).
• On-chip local oscillation buffer (For electronic tuning).

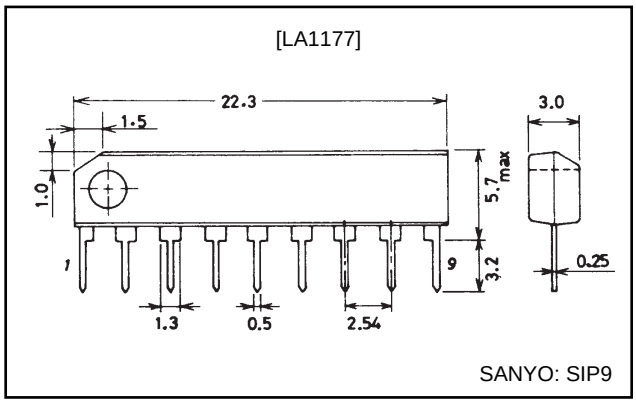
### Functions

• Oscillator, oscillation buffer.
• Mixer.
• Wide-band AGC circuit.
• IF amplifier.

### Package Dimensions

unit: mm

**3017C-SIP9**




## Specifications

### Maximum Ratings at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Maximum supply voltage | $V_{CC}$ max | Pins 2, 9 | 10 | V |
| Allowable power dissipation | Pd max | Ta≤70°C | 440 | mW |
| Operating temperature | Topr | | –20 to +70 | °C |
| Storage temperature | Tstg | | –40 to +125 | °C |

### Operating Conditions at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Recommended supply voltage | $V_{CC}$ | | 8 | V |
| Operating voltage range | $V_{CC}$ op | | 8 to 9 | V |

### Electrical Characteristics at Ta=25°C, $V_{CC}$=8V, fin=88MHz

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Quiescent current | $I_{CCO}$ | No input | 21 | 26 | 31 | mA |
| AGC high-level voltage | $V_{AGC}$-H | $V_{IN}$=0dBμ | 7.7 | 8.0 | | V |
| AGC low-level voltage | $V_{AGC}$-L | $V_{IN}$=100dBμ | | 0.07 | 0.3 | V |
| AGC mixer input voltage | $V_{i\ AGC}$ | $V_{AGC}$≤2V, Pin 3 | 73 | 80 | 87 | dBμ |
| IF saturation output voltage | $V_{IF}$-max | $V_{IN}$=1.0dBμ | 108 | 112 | 116 | dBμ |
| Input limiting voltage | $V_{i\ lim}$ | | 76 | 83 | 90 | dBμ |
| Voltage gain | VG | $V_{IN}$=65dBμ | 88 | 92 | 96 | dBμ |
| Local OSC output voltage | $V_{OSC}$ | No input, 75Ω termination | 80 | 84 | 88 | dBμ |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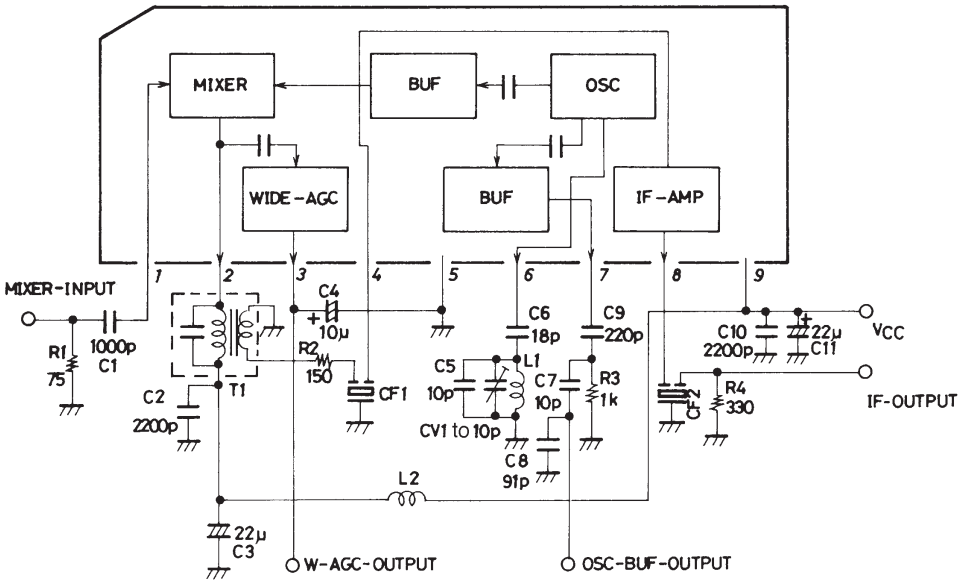
## Evaluation Circuit and Internal Equivalent Circuit Block Diagram




Unit (resistance : Ω, capacitance : F)

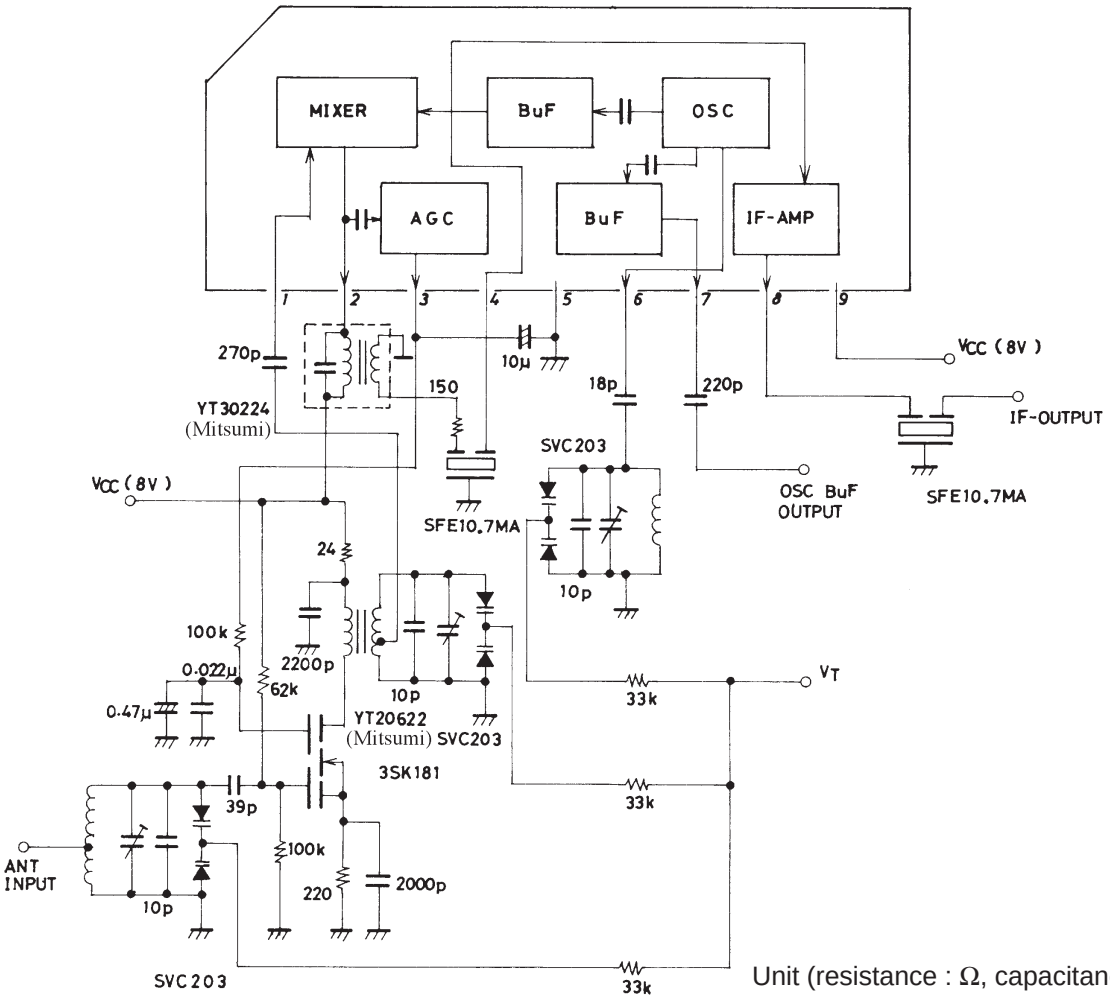
T1 : YT30224 (Mitsumi)
L1 : HU-50448 (Mitsumi)
CF1-CF2 : SFE10.7MA (Murata)

## Typical Voltage on Each Pin

| Pin No. | Typical voltage | Description | Remarks |
|---|---|---|---|
| 1 | 2.7V | Mixer input | |
| 2 | 8.0V | Mixer output | |
| 3 | 8.0V | AGC input | No input |
| 4 | 2.0V | IF input | |
| 5 | 0V | GND | |
| 6 | 4.9V | Oscillator base terminal | |
| 7 | 1.4V | Oscillation buffer output | |
| 8 | 4.4V | IF output | |
| 9 | 8.0V | $V_{CC}$ | |

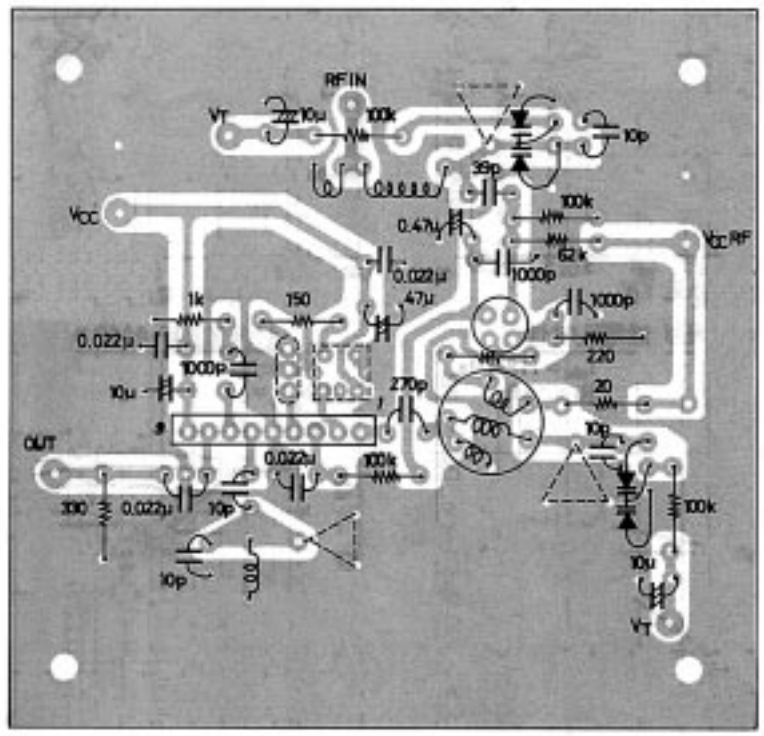
Note : Extreme caution should be exercised when applying voltage across pin 9 (+) and other pins as dielectric breakdown may occur.

## Sample Application Circuit




Unit (resistance : Ω, capacitance : F)

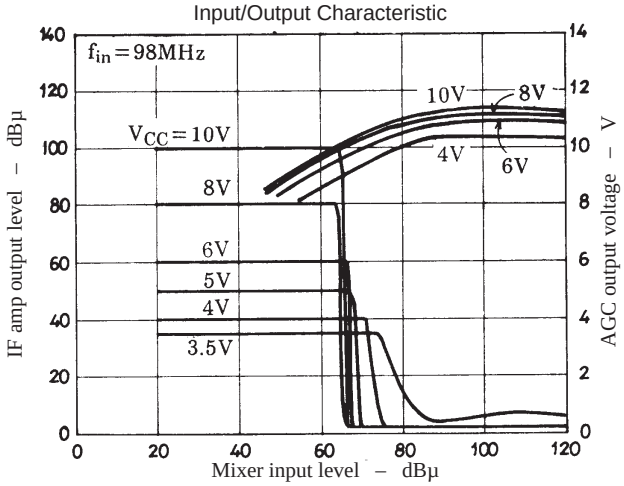
## Sample Printed Circuit Pattern



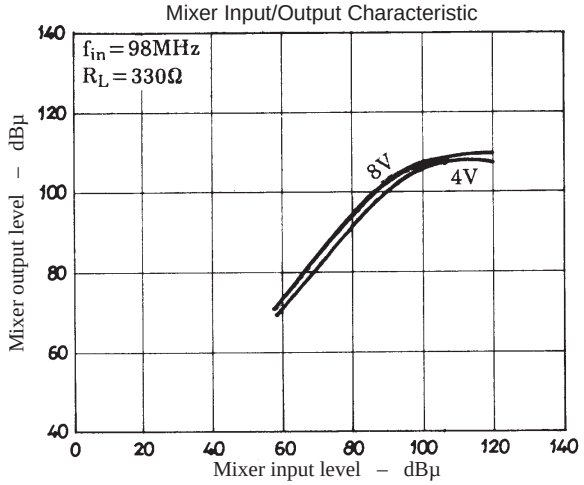

Cu-foiled area 85×82 mm²

Unit (resistance : Ω, capacitance : F)

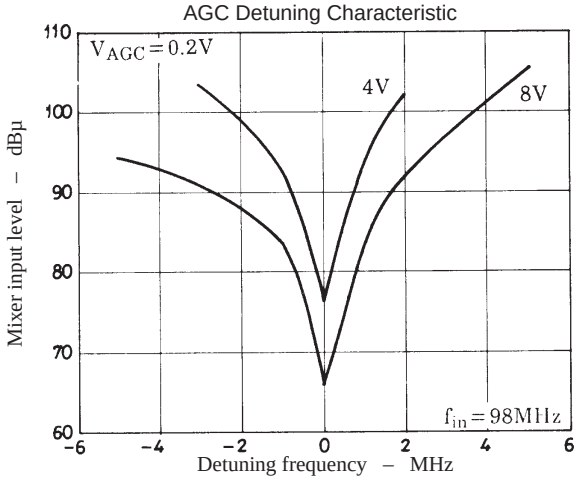
Input/Output Characteristic



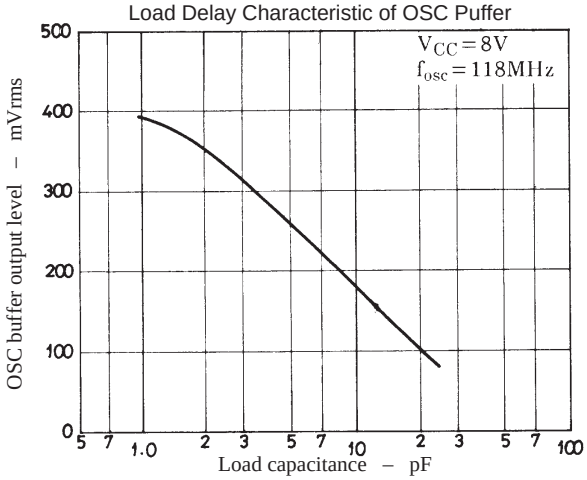

Mixer Input/Output Characteristic



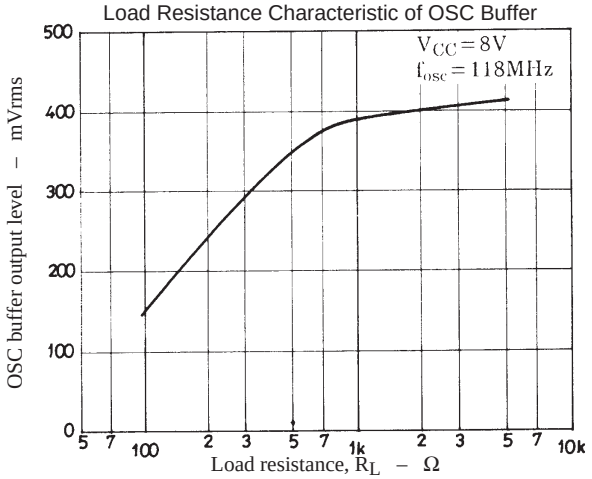

AGC Detuning Characteristic



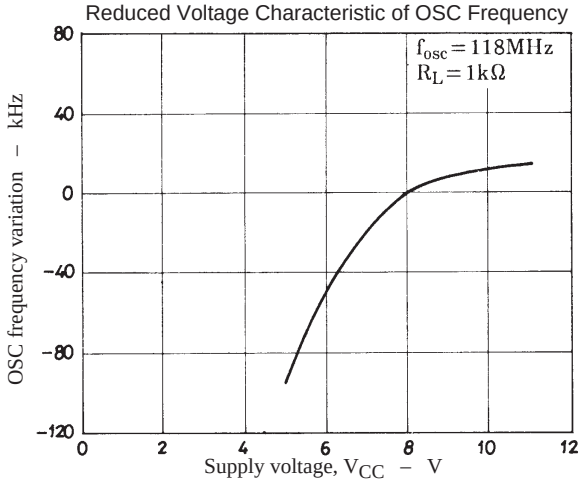

Load Delay Characteristic of OSC Puffer



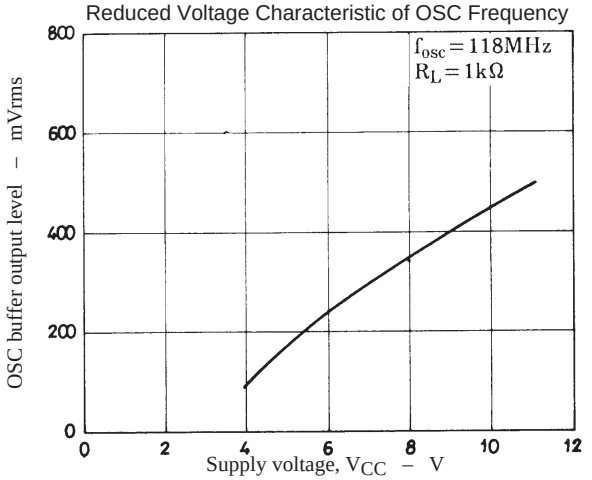

Load Resistance Characteristic of OSC Buffer



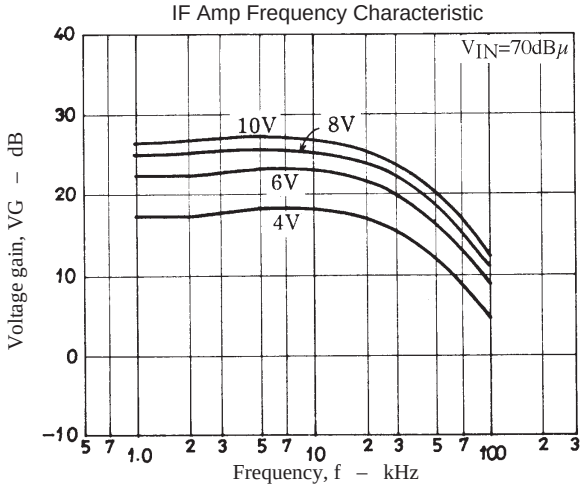

Reduced Voltage Characteristic of OSC Frequency



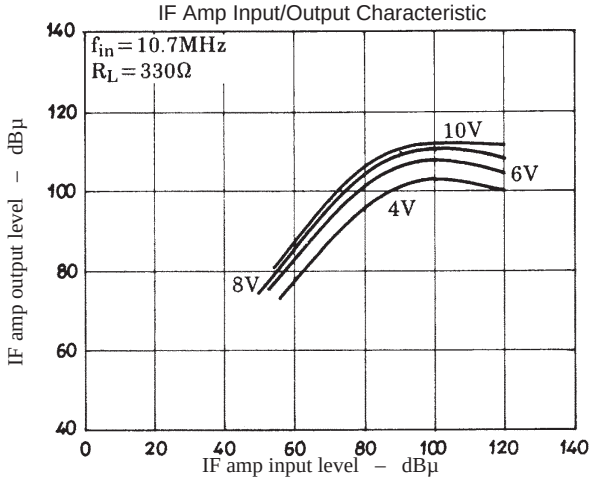

Reduced Voltage Characteristic of OSC Frequency



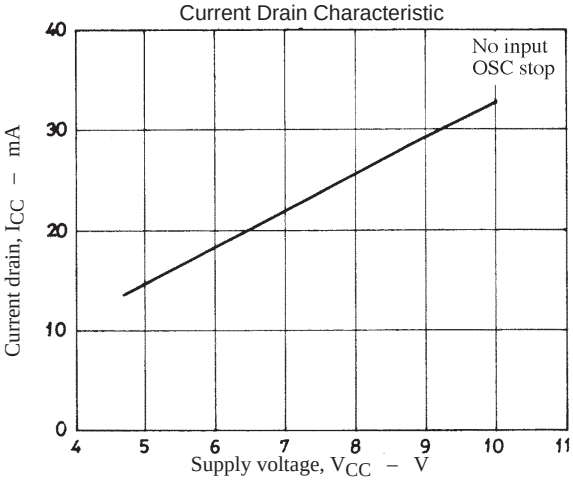

IF Amp Frequency Characteristic



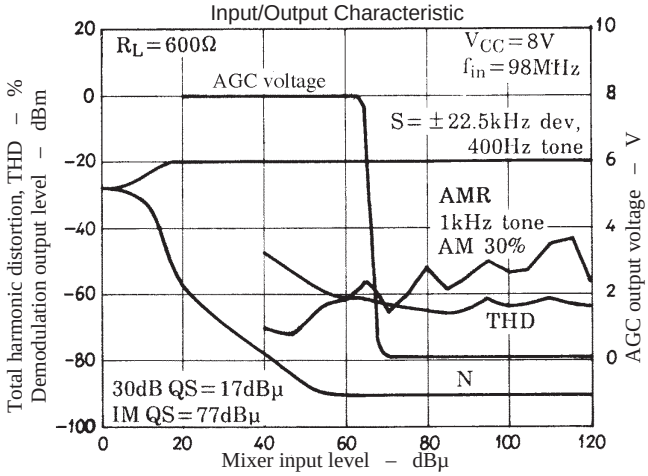
IF Amp Input/Output Characteristic



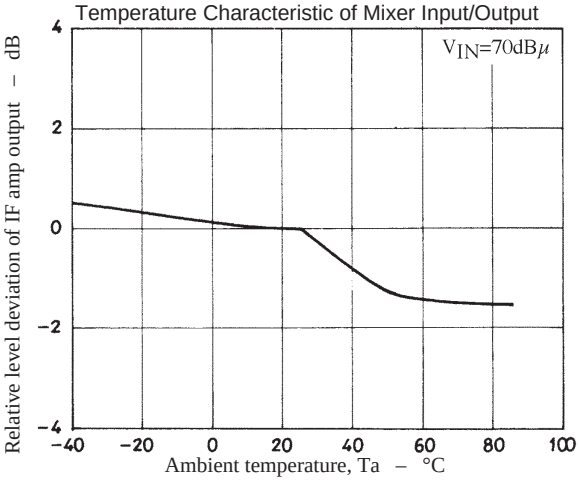

Current Drain Characteristic



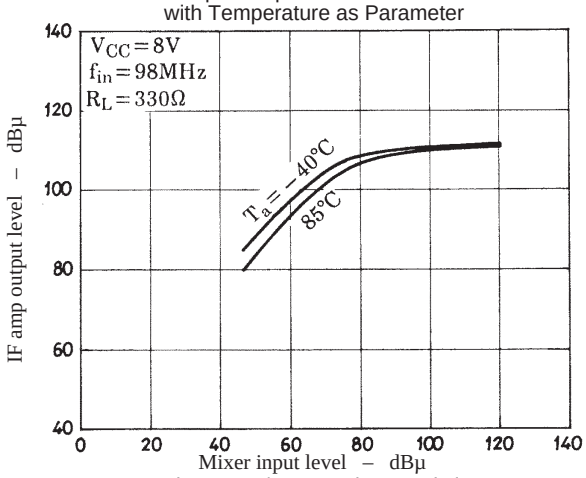

Input/Output Characteristic



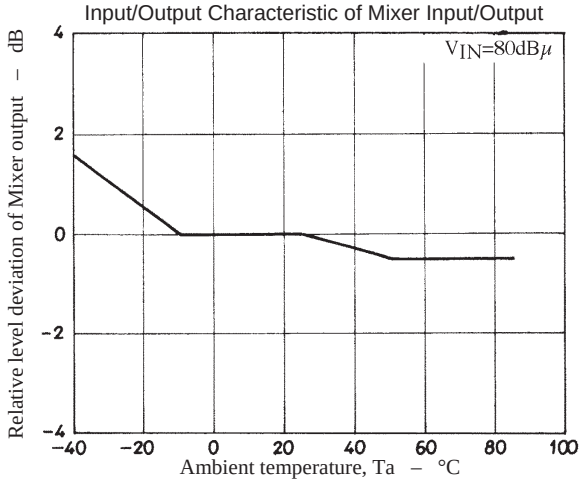

Temperature Characteristic of Mixer Input/Output



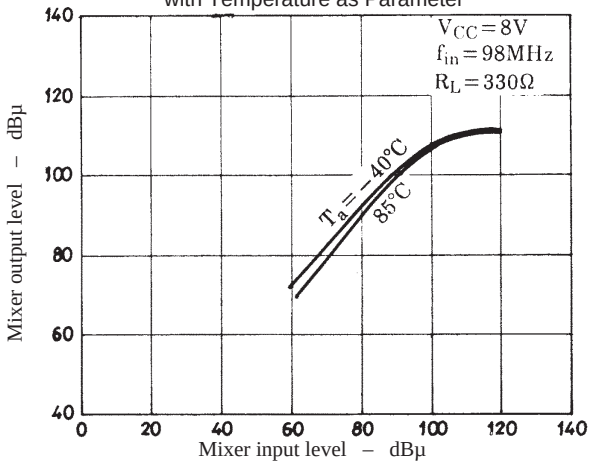

Input/Output Characteristic
with Temperature as Parameter



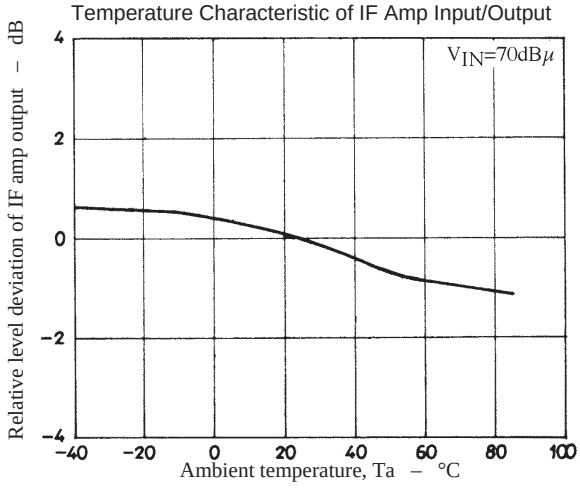

Input/Output Characteristic of Mixer Input/Output



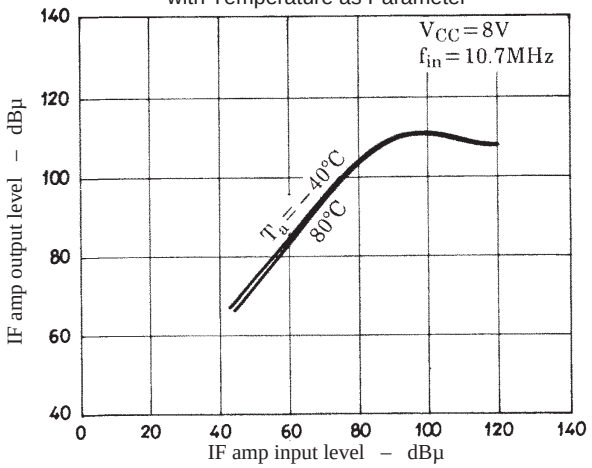

Mixer Input/Output Characteristic
with Temperature as Parameter



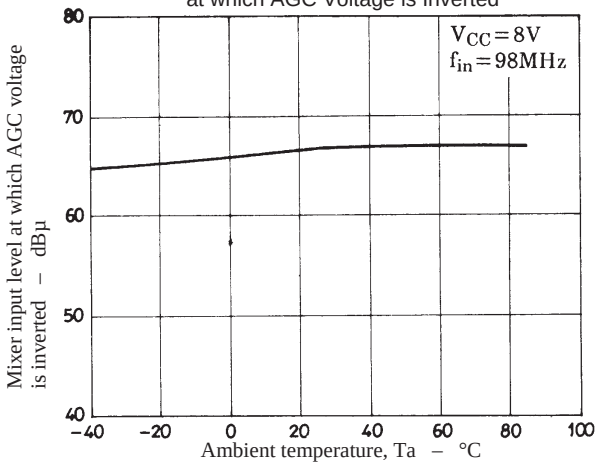

Temperature Characteristic of IF Amp Input/Output



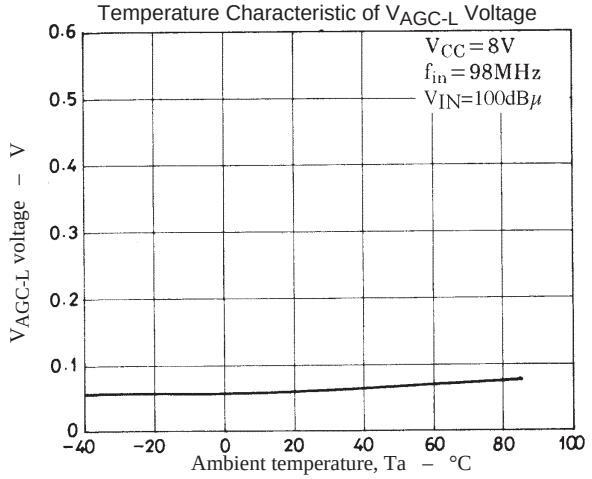
IF Amp Input/Output Characteristic with Temperature as Parameter



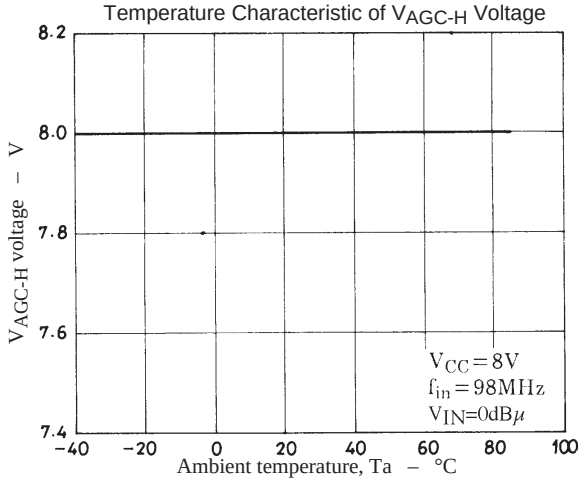

Temperature Characteristic of Mixer Input level at which AGC Voltage is Inverted



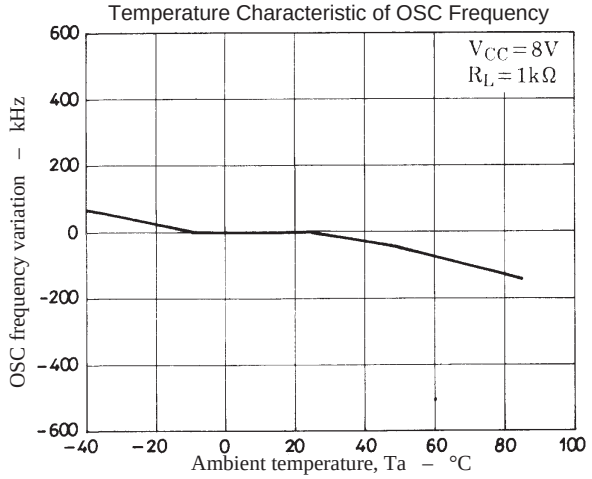

Temperature Characteristic of $V_{AGC-L}$ Voltage



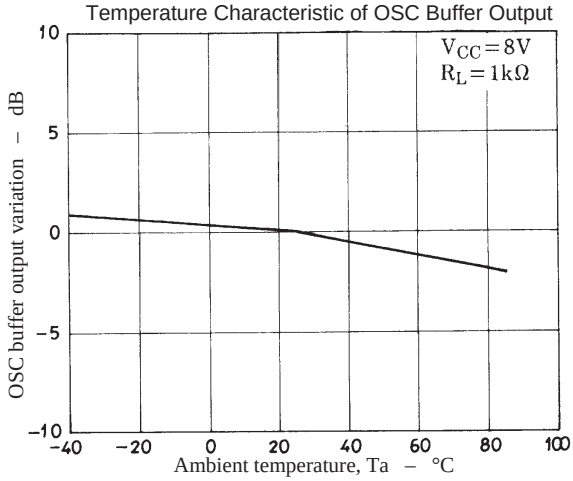

Temperature Characteristic of $V_{AGC-H}$ Voltage



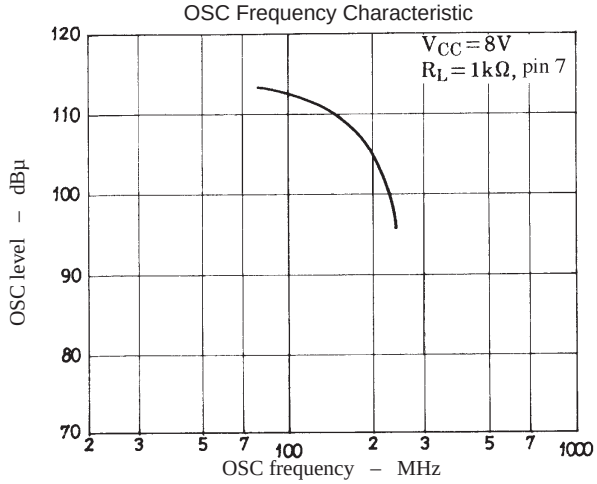

Temperature Characteristic of OSC Frequency



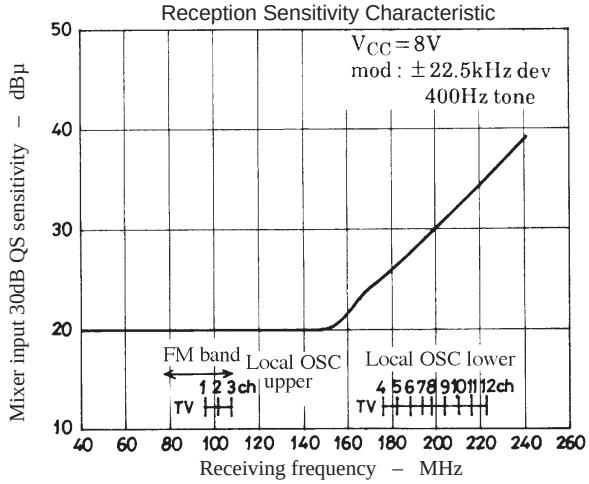

Temperature Characteristic of OSC Buffer Output



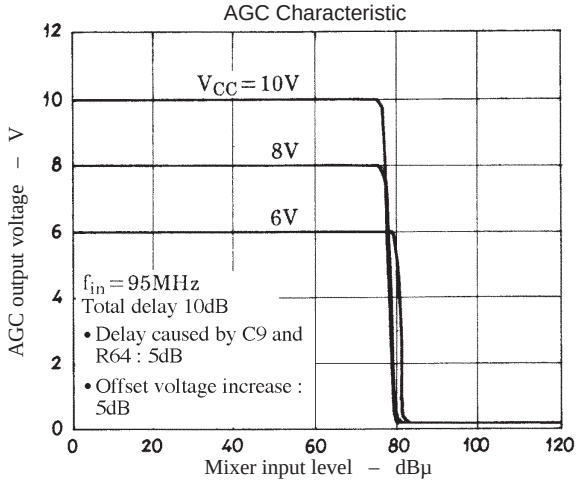

OSC Frequency Characteristic



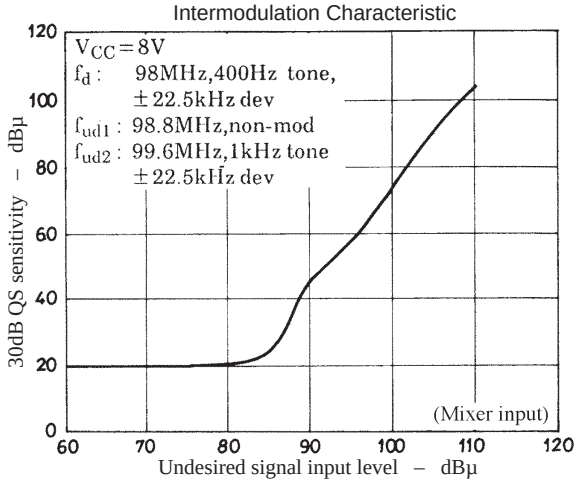

Reception Sensitivity Characteristic



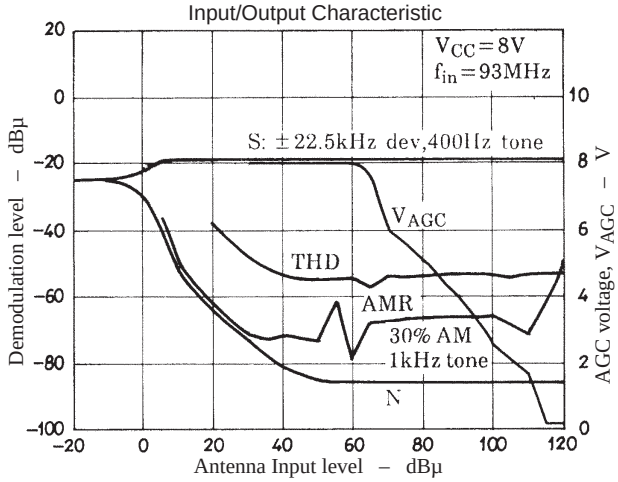
AGC Characteristic



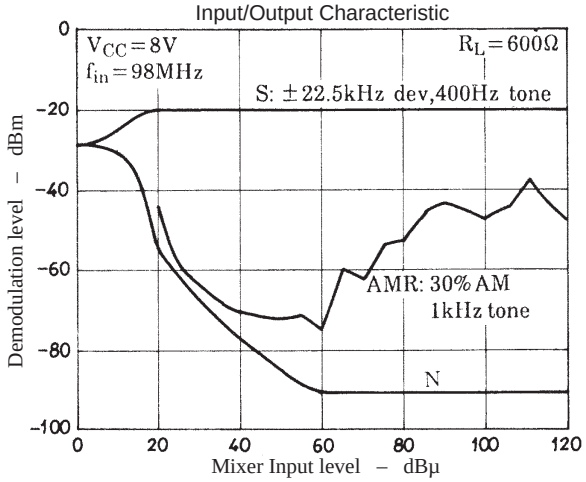

Intermodulation Characteristic



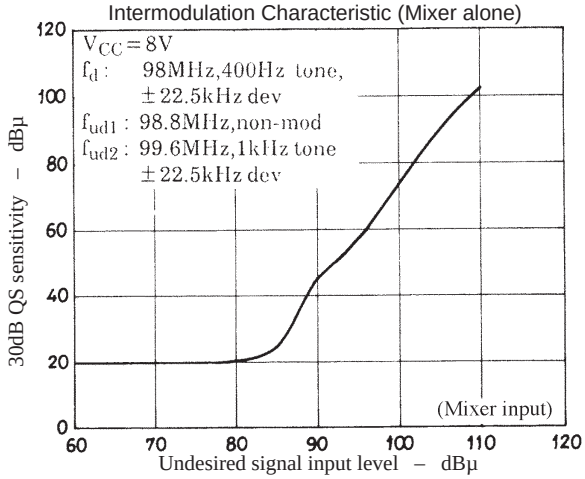

Input/Output Characteristic



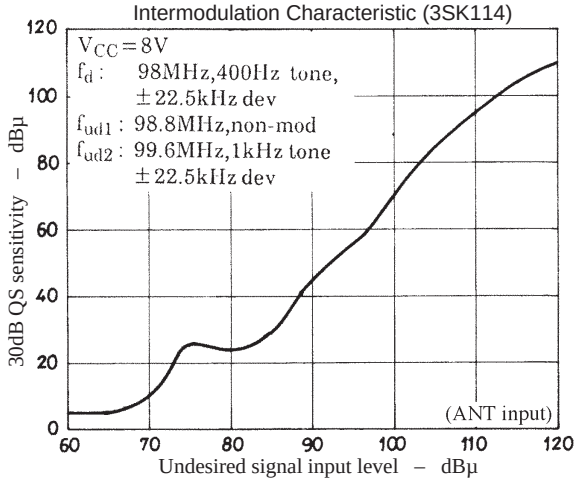

Input/Output Characteristic



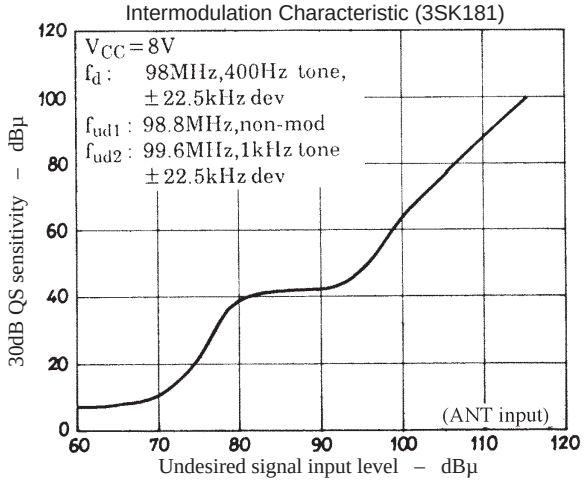

Intermodulation Characteristic (Mixer alone)



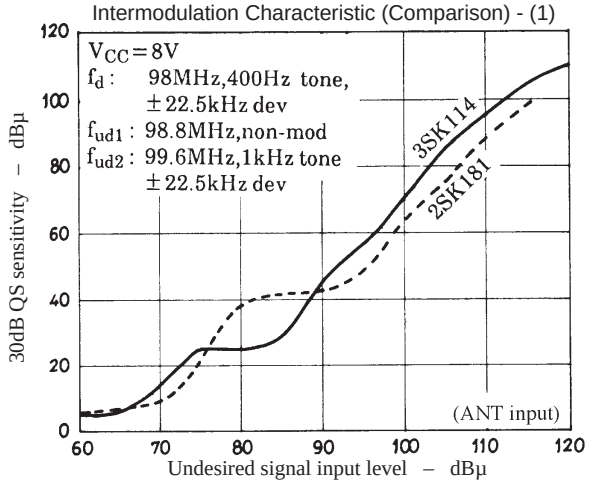

Intermodulation Characteristic (3SK114)




Intermodulation Characteristic (3SK181)



Intermodulation Characteristic (Comparison) - (1)




Intermodulation Characteristic (Comparison) - (2)