



SANYO Semiconductors

DATA SHEET

LA1845NV — Monolithic Linear IC Single-Chip Home Stereo IC

The LA1845NV is designed for use in mini systems and is a single-chip tuner IC that provides electronic tuning functions using SD/IF-count technique. It incorporates a pilot canceler and an adjustment-free MUX VCO circuit, thus allows additional parts to be reduced.

Functions

- AM : RF amplifier, mixer, oscillator, IF amplifier, detector, AGC, SD, oscillator buffer, IF buffer, stereo IF output, AGC time constant switch
- FM IF : IF amplifier, quadrature detector, S-meter, SD (signal detection), S-curve detection, IF buffer output
- MPX : PLL stereo decoder, stereo display, forced monaural, VCO stop, audio muting, adjacent channel interference rejection function, pilot canceler

Features

- Integrated MPX VCO (ceramic resonators are no longer required.)
- Built-in adjacent channel interference rejection function (114kHz, 190kHz)
- Supports both SD and IF-count techniques
- Both FM SD sensitivity and bandwidth can be set
- Pilot canceler built in.

Maximum Ratings at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|------------------------------|---------------------|--|-------------|------|
| Maximum Power Supply Voltage | V _{CC} max | | 6 | V |
| Allowable Power Consumption | Pd max | Ta = 80°C with board 114.3mm×76.1mm×1.6mm material : Glass epoxy resin | 360 | mW |
| Operating Temperature | Topr | | -20 to +80 | °C |
| Storage Temperature | Tstg | | -40 to +125 | °C |

Operating Conditions at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|--------------------------------|--------------------|------------|------------|------|
| Recommended Supply Voltage | V _{CC} | | 5 | V |
| Operating Supply Voltage Range | V _{CC} op | Ta = 80°C | 4.3 to 5.5 | V |

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Electrical Characteristics • Operating Characteristics at $V_{CC} = 8V$, in the specified test circuit.

FM Mono Characteristics at $f_c = 10.7MHz$, $V_i = 100dB\mu$, $f_m = 1kHz$, Modulation = 75kHz

| Parameter | Conditions | Ratings | | | Unit |
|---------------------------|--|---------|------|-----|----------|
| | | min | typ | max | |
| Current Drain | With no input signal | 20 | 30 | 40 | mA |
| Demodulator Output | 100dB μ , 100% modulation, $f_m = 1kHz$ | 230 | 360 | 460 | mVrms |
| Total Harmonic Distortion | 100dB μ , 100% modulation, $f_m = 1kHz$ | | 0.35 | 1.5 | % |
| Signal-to-Noise Ratio | 100dB μ , 100% modulation, $f_m = 1kHz$ | 73 | 80 | | dB |
| AM Rejection Ratio | 100dB μ , AM = 30% modulation, $f_m = 1kHz$ | 47 | 65 | | dB |
| 3dB Sensitivity | 100dB μ , 100% modulation, $f_m = 1kHz$ Output reference, -3dB input | | 32 | 40 | dB μ |
| SD Sensitivity | 0% modulation | 38 | 47 | 56 | dB μ |
| IF Counter Buffer Output | 100dB μ | 200 | 275 | 400 | mVrms |
| Mute Attenuation | 100dB μ , 100% modulation, $f_m = 1kHz$ | | 76 | | dB |

FM Stereo Characteristics at $f_c = 10.7MHz$, $V_i = 100dB\mu$, L+R = 90%, Pilot = 10%, $f_m = 1kHz$

| Parameter | Conditions | Ratings | | | Unit |
|------------------------------------|---|---------|------|-----|------|
| | | min | typ | max | |
| Separation | L+R = 90%, Pilot = 10%, $f_m = 1kHz$ | 30 | 42 | | dB |
| Stereo On Level | Pilot input | 1.5 | 3.5 | 5.5 | % |
| Total Harmonic Distortion | Pilot input | | 0.45 | 1.5 | % |
| Adjacent Channel Rejection Ratio 1 | $f_s = 113kHz$, VS = 90%, Pilot = 10% ; The left-right modulation, demodulated output | | 36 | | dB |
| Adjacent Channel Rejection Ratio 2 | $f_s = 189kHz$, VS = 90%, Pilot = 10% ; The left-right modulation, demodulated output | | 41 | | dB |
| Carrier Leak | L+R = 90%, Pilot = 10% reference, Pilot = 10% output | 38 | 44 | | dB |

AM Characteristics at $f_c = 1000kHz$, $V_i = 80dB\mu$, $f_m = 1kHz$, Modulation = 30%

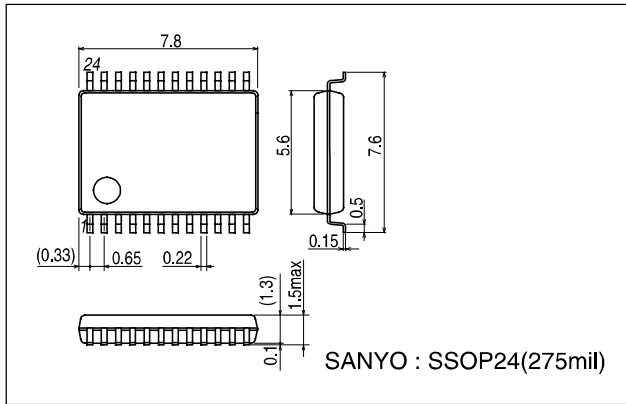
| Parameter | Conditions | Ratings | | | Unit |
|--------------------------------|--|---------|-----|-----|----------|
| | | min | typ | max | |
| Current Drain | With no input signal | 13 | 27 | 39 | mA |
| Detector Output 1 | 23dB μ , 30% modulation, $f_m = 1kHz$ | 40 | 80 | 160 | mVrms |
| Detector Output 2 | 80dB μ , 30% modulation, $f_m = 1kHz$ | 90 | 160 | 230 | mVrms |
| Signal-to-Noise Ratio 1 | 23dB μ , 30% modulation, $f_m = 1kHz$ | 17 | 23 | | dB |
| Signal-to-Noise Ratio 2 | 80dB μ , 30% modulation, $f_m = 1kHz$ | 46 | 52 | | dB |
| Total Harmonic Distortion 1 | 80dB μ , 30% modulation, $f_m = 1kHz$ | | 0.4 | 1.1 | % |
| Total Harmonic Distortion 2 | 107dB μ , 30% modulation, $f_m = 1kHz$ | | 0.5 | 1.3 | % |
| SD Sensitivity | 0% modulation | 11 | 20 | 29 | dB μ |
| Local Oscillator Buffer Output | With no input signal | 100 | 140 | 200 | mVrms |
| IF Counter Buffer Output | 23dB μ | 140 | 285 | 400 | mVrms |

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Package Dimensions

unit : mm

3175B



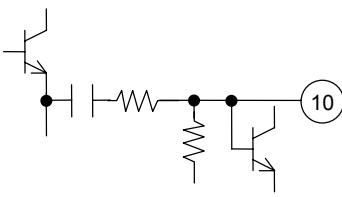
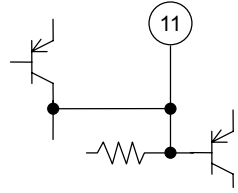
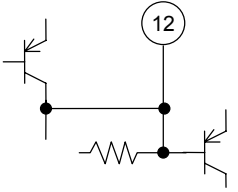
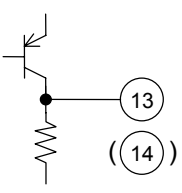
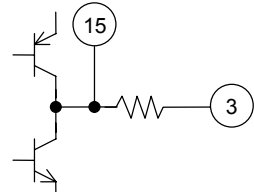
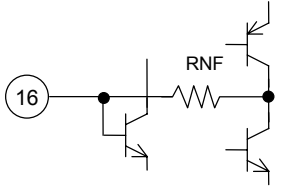
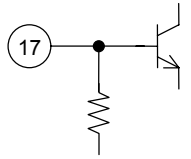
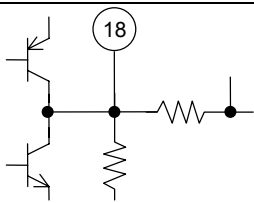
Pin Description

| Pin No. | Pin function | Pin voltage | Equivalent circuit | Notes |
|---------|---------------------|-----------------|--------------------|---|
| 1 | FM IF input | Vreg | | Input impedance $r_i = 330\Omega$ |
| 2 | AM mixer output | V _{CC} | | Connect the mixer coil between this pin and V _{CC} |
| 3 | REG | 2.1 | | Vreg = 2.1V |
| 4 | AM IF input | Vreg | | Input impedance $r_i = 2k\Omega$ |
| 5 | GND | 0V | | |
| 6 | Tu-LED | V _{CC} | | Active low Open collector |
| 7 | ST-LED/AF-IF output | | | |
| 8 | FM detector | V _{CC} | | The 600BEAS-10471 (Toko Mfg. Co., Ltd.) is recommended for detector coil. |
| 9 | V _{CC} | | | |

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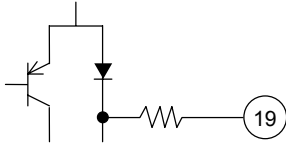
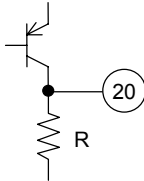
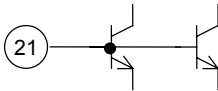
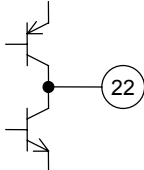
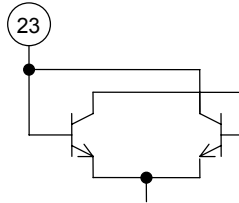
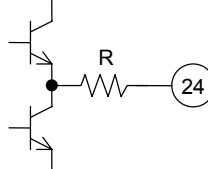
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| Pin No. | Pin function | Pin voltage | Equivalent circuit | Notes |
|----------|---|---------------|---|--|
| 10 | AM/FM IF counter output, output control switch, mute switch | 0V |  | $V_{10} \leq 0.5V$: Reception state $1.4V \leq V_{10} \leq 2.2V$: Muting on $V_{10} \geq 3.5V$: IF counter output and muting on |
| 11 | Phase comparator low-pass filter (AM/FM switching) | $V_{CC}-1.0$ |  | The device operates in AM mode when a current of over 200μA flows from pin. 12. |
| 12 | Pilot detector low-pass filter (Forced mono) (VCO stop) | $V_{CC}-1.0$ |  | The device is forced to monaural when a current of over 50μA flows from this pin. The VCO is stopped when a current of over 200μA flows from this pin. The limit values for the resistor are the same as those for pin 11. |
| 13 14 | L outputs R outputs | 3.2V |  | Output impedance $r_o = 3.3k\Omega$ |
| 15 | Pilot canceler output | Vreg |  | |
| 16 | Decoder input | Vreg |  | Inverting input pin $RNF = 20k\Omega$ |
| 17 | PLL input | Vreg |  | Input impedance $r_i = 20k\Omega$ |
| 18 | FM demodulator output | $V_{reg}+0.7$ |  | Output impedance $r_o = 2.3k\Omega$ The channel separation can be adjusted with an external capacitor connected between this pin and ground. |

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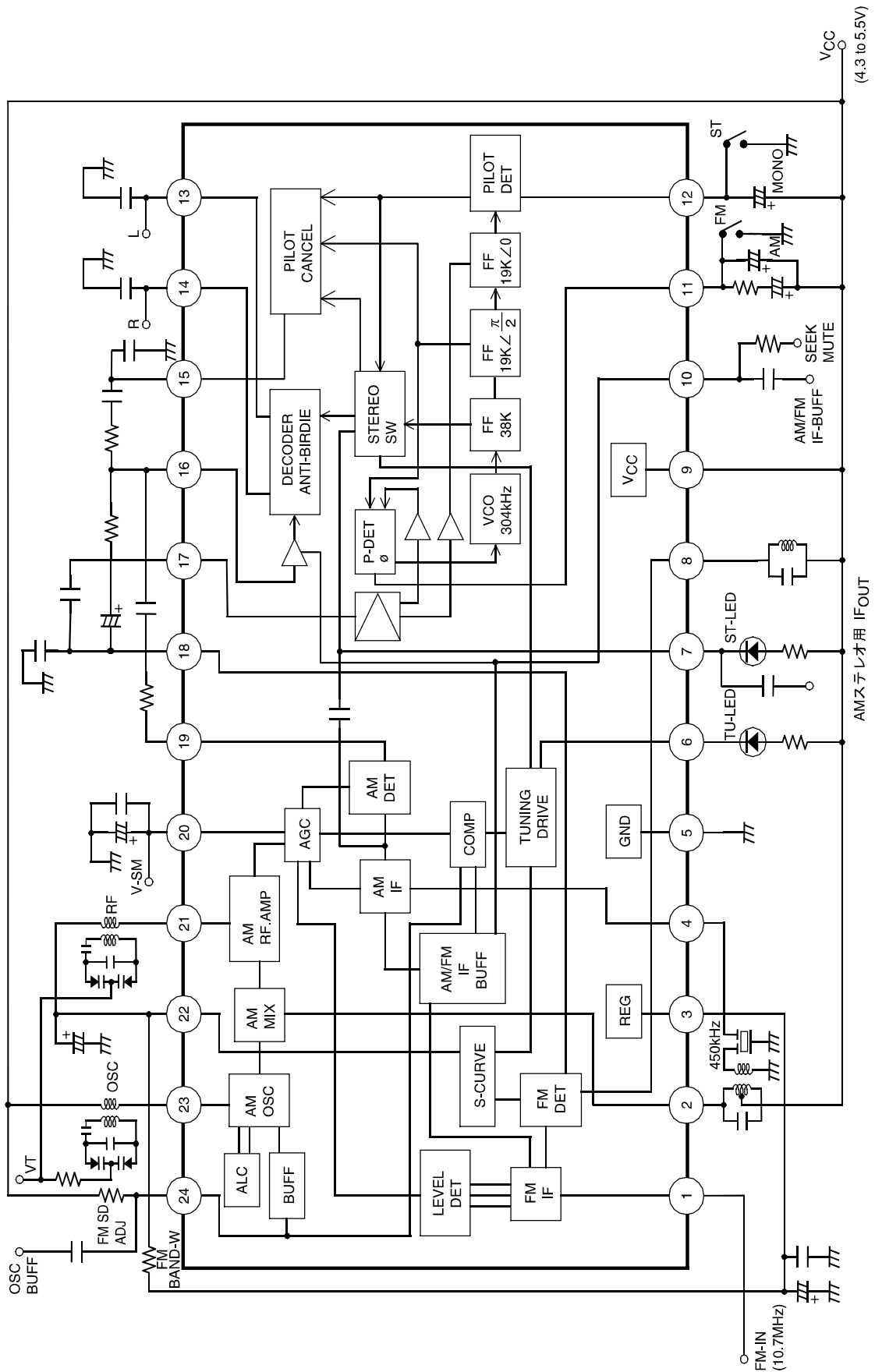
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| Pin No. | Pin function | Pin voltage | Equivalent circuit | Notes |
|---------|---|------------------------|---|--|
| 19 | AM detector output | 0V (FM) 1.5V (AM) |  | Output impedance $r_o = 3.3k\Omega$ |
| 20 | S meter, AM AGC | 0.2V (FM) 0.9V (AM) |  | The resistance of the built-in resistor R is 13.9kΩ. The SD response during seek operation is determined with the external capacitor connected to this pin. |
| 21 | AM RF input | Vreg |  | Must be used at the same potential as pin 22. |
| 22 | AFC | Vreg |  | The FM SD bandwidth can be adjusted with the external resistor connected between this pin and pin 3 (Vreg). |
| 23 | OSC | V _{CC} |  | Connect the oscillator coil between this pin and pin 9 (V _{CC}). Note : Impedance of the secondary oscillator coil must be 5kΩ or higher. |
| 24 | Oscillator buffer output, FM SD sensitivity adjustment | V _{CC} -1.4 |  | The FM SD sensitivity can be adjusted with an external resistor connected to this pin. Output impedance R = 200Ω Note : Resistance of the external resistor connected to the pin 24 must be 3.3kΩ or higher. |

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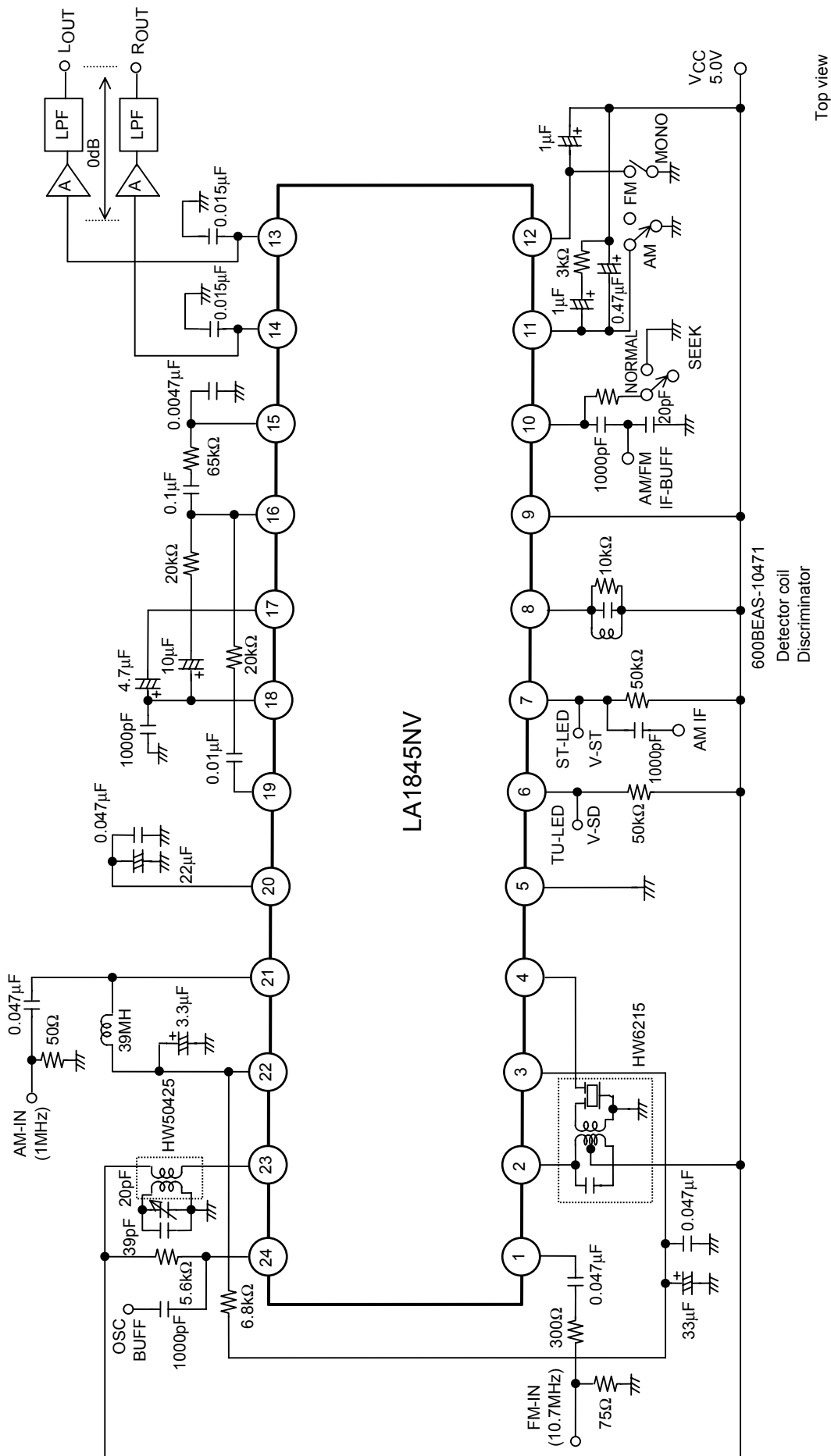
Equivalent Circuit Block Diagram



Top view

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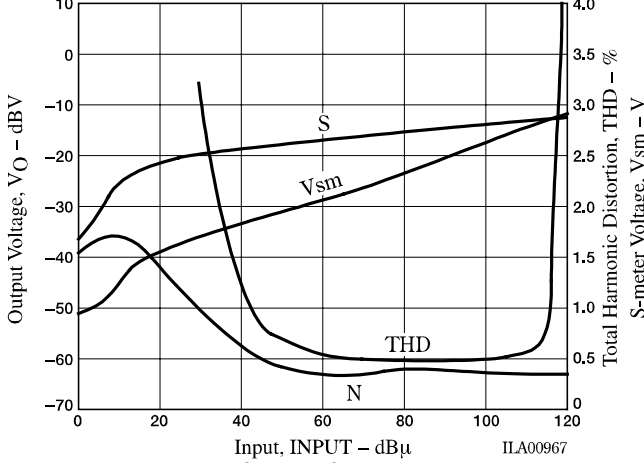
Test Circuit



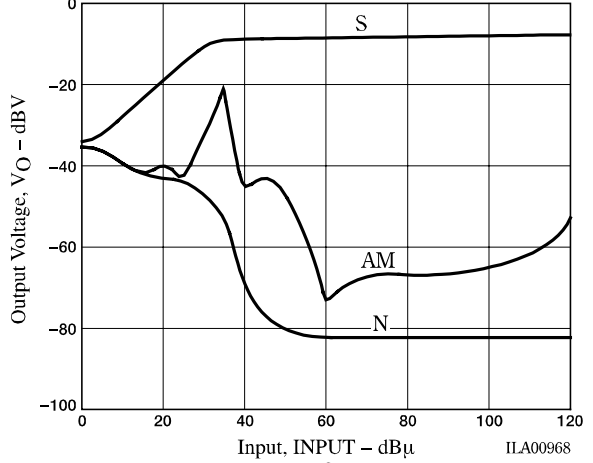
Top view

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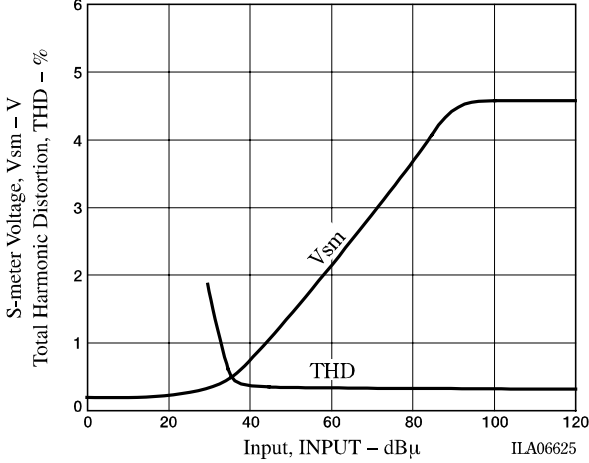
AM Input/Output Characteristics



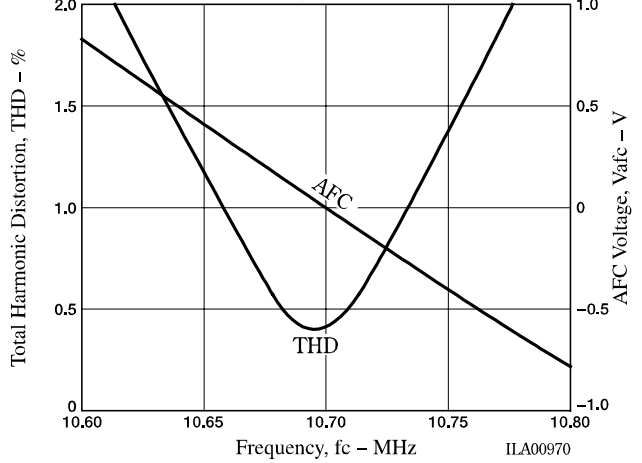
FM Input/Output Characteristics 1



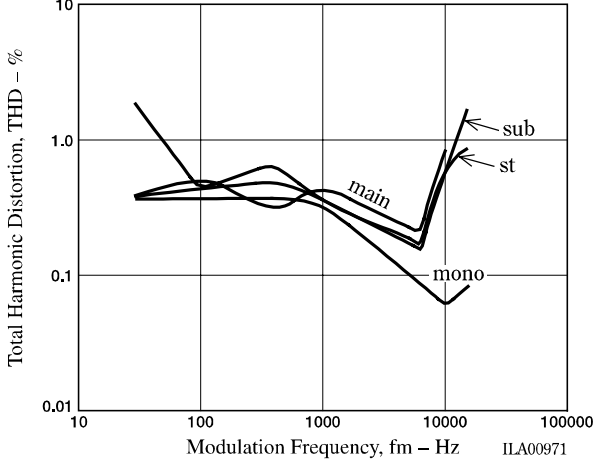
FM Input/Output Characteristics 2



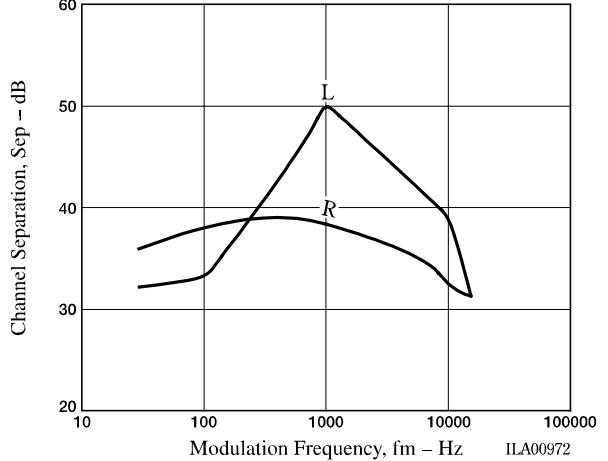
FM Detuning Characteristics



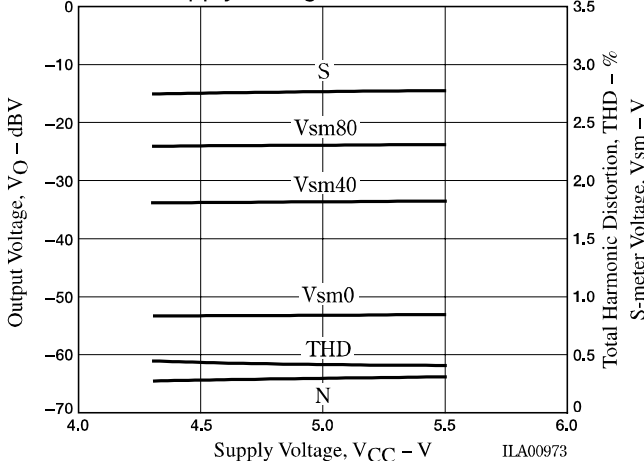
Multiplex Frequency Characteristics 1



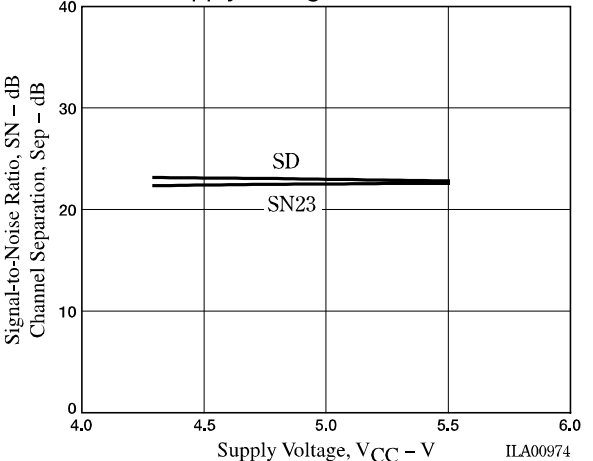
Multiplex Frequency Characteristics 2



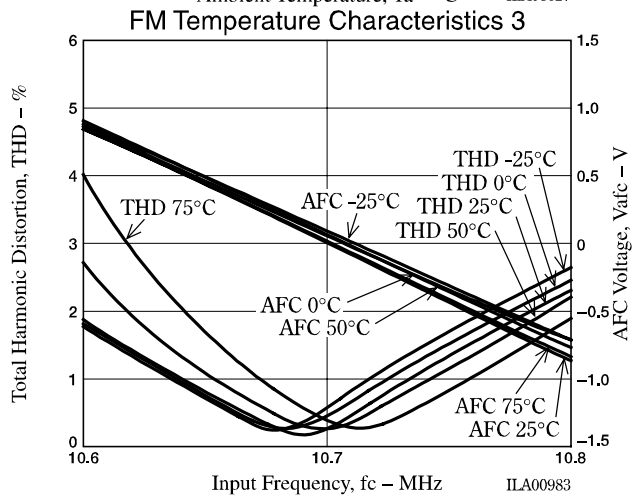
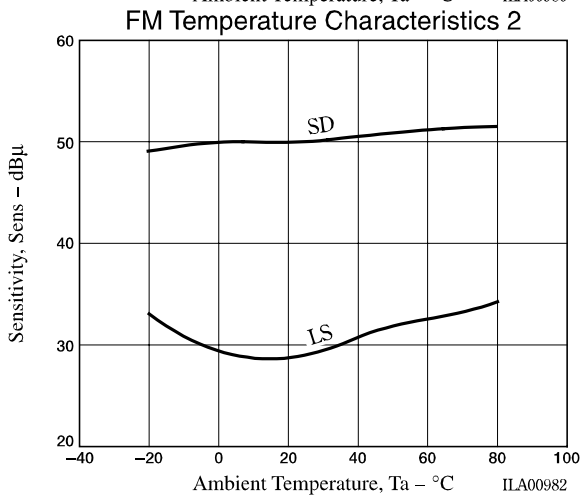
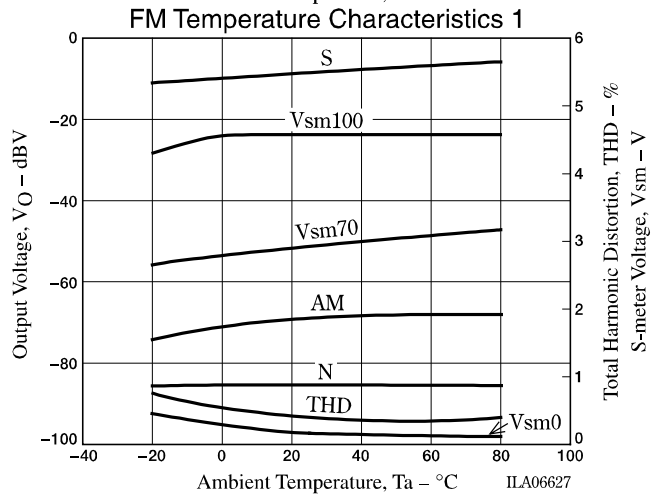
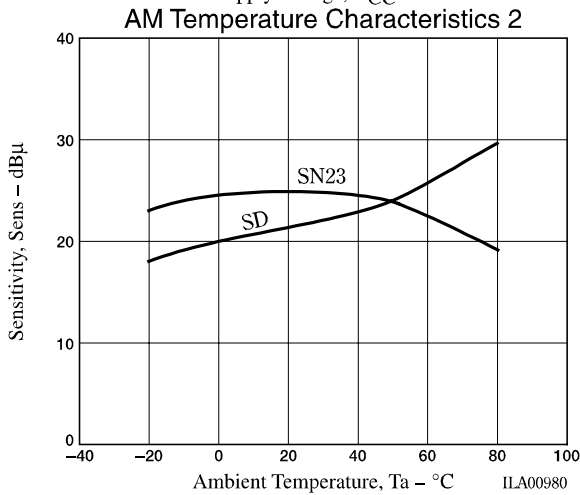
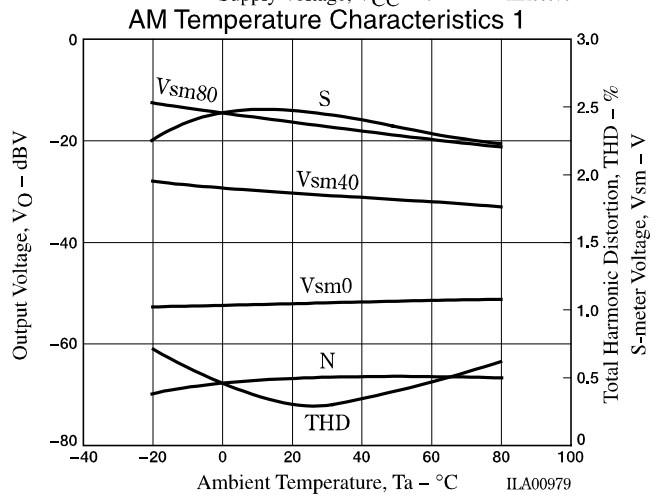
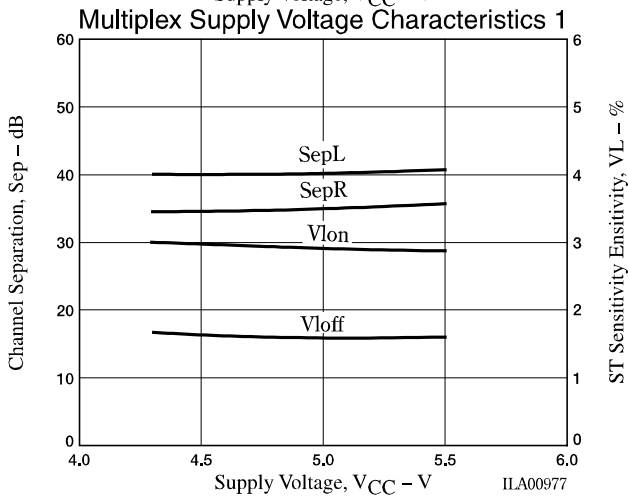
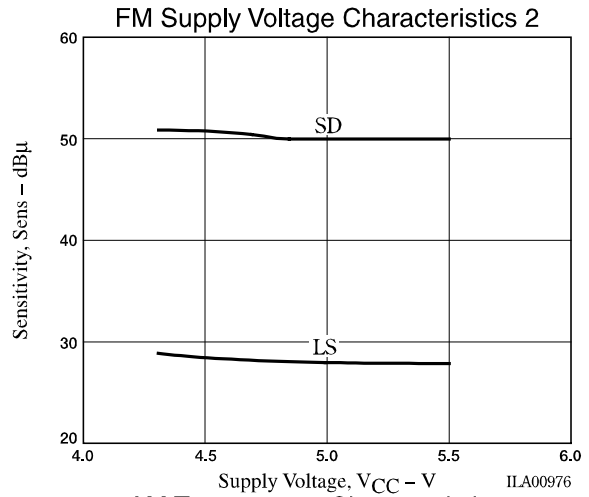
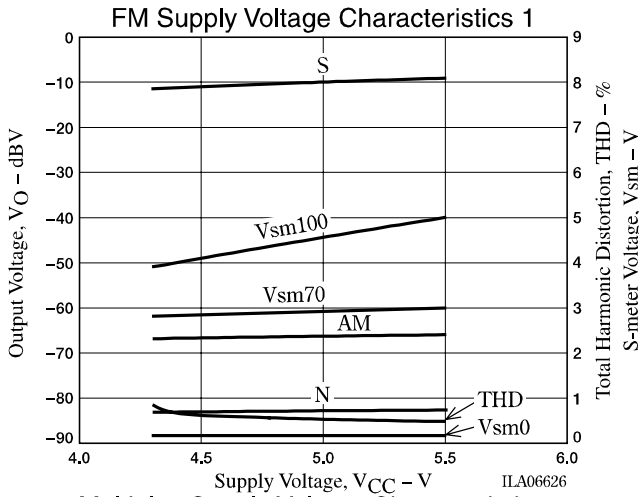
AM Supply Voltage Characteristics 1



AM Supply Voltage Characteristics 2

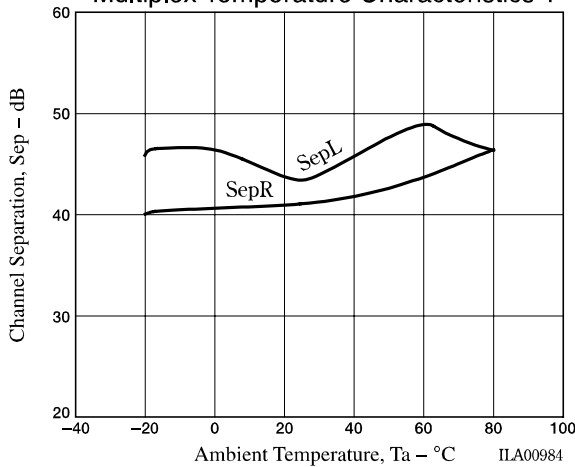


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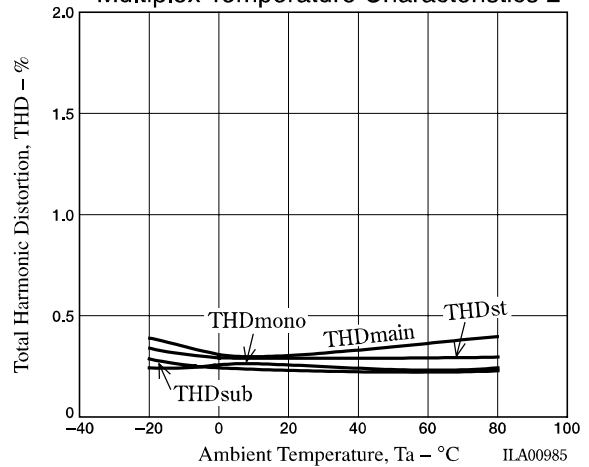


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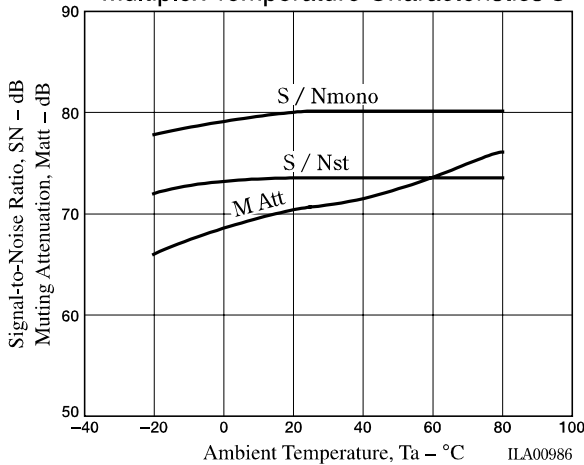
Multiplex Temperature Characteristics 1



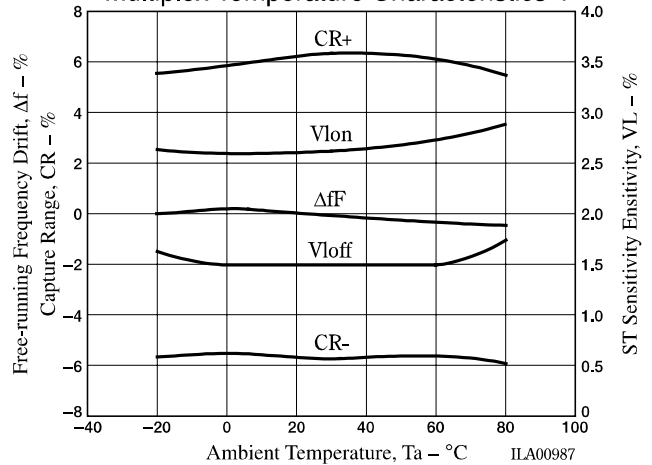
Multiplex Temperature Characteristics 2



Multiplex Temperature Characteristics 3



Multiplex Temperature Characteristics 4



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