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LA1845N

Monolithic Linear IC

Single-Chip Tuner IC for Home Stereo IC

Overview

The LA1845N 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.

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.

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

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CC} max		9	V
Allowable power dissipation	P _d max	Ta = 80°C	400	mW
Operating temperature	T _{opr}		-20 to +80	°C
Storage temperature	T _{stg}		-40 to +125	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		8	V
Operating supply voltage range	$V_{CC\ op}$	$T_a = 80^\circ\text{C}$	4.3 to 8.5	V

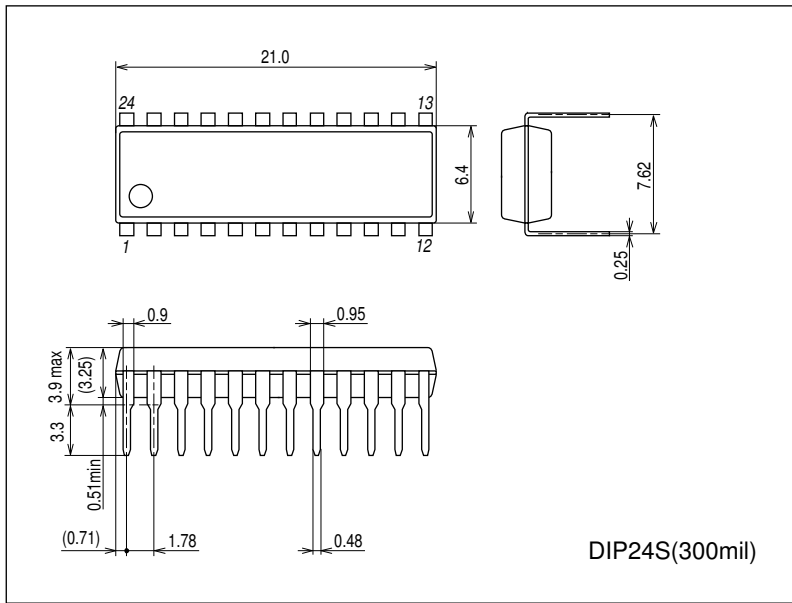
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 8\text{V}$, in the specified test circuit.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
FM mono characteristics $f_c = 10.7\text{MHz}$, $V_i = 100\text{dB}\mu$, $f_m = 1\text{kHz}$, Modulation = 75kHz						
Current drain	I_{CCO-FM}	With no input signal	20	30	40	mA
Demodulator output	V_{OFM}	100dB μ , 100% modulation, $f_m = 1\text{kHz}$	230	360	460	mVrms
Total harmonic distortion	THD_{FM}	100dB μ , 100% modulation, $f_m = 1\text{kHz}$		0.35	1.5	%
Signal-to-noise ratio	S/N_{FM}	100dB μ , 100% modulation, $f_m = 1\text{kHz}$	73	80		dB
AM rejection ratio	AMR	100dB μ , AM 30% modulation, $f_m = 1\text{kHz}$	47	65		dB
3dB sensitivity		100dB μ , 100% modulation, $f_m = 1\text{kHz}$ Output reference, -3dB input		32	40	dB μ
SD sensitivity		0% modulation	38	47	56	dB μ
IF counter buffer output	$V_{IFBuff-FM}$	100dB μ	200	275	400	mVrms
Mute attenuation	Mute-Att	100dB μ , 100% modulation, $f_m = 1\text{kHz}$		76		dB
FM stereo characteristics $f_c = 10.7\text{MHz}$, $V_i = 100\text{dB}\mu$, $f_m = 1\text{kHz}$, L + R = 90%, pilot = 10%						
Separation	Sep_L	L + R = 90%, Pilot = 10%, $f_m = 1\text{kHz}$	30	42		dB
Stereo on level	ST_{ON}	Pilot input	1.5	3.5	5.5	%
Total harmonic distortion	THD_{-main}	Pilot input		0.45	1.5	%
Adjacent channel rejection ratio	Brej-3rd	$f_s = 113\text{kHz}$, $V_s = 90\%$, Pilot = 10% : The left - right modulation, demodulated output		36		dB
	Brej-5th	$f_s = 189\text{kHz}$, $V_s = 90\%$, 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 $f_c = 1000\text{kHz}$, $V_i = 80\text{dB}\mu$, $f_m = 1\text{kHz}$, Modulation = 30%						
Current drain	I_{CCO-AM}	With no input signal	13	27	39	mA
Detector output	V_{OAM1}	23dB μ , 30% modulation, $f_m = 1\text{kHz}$	40	80	160	mVrms
	V_{OAM2}	80dB μ , 30% modulation, $f_m = 1\text{kHz}$	90	160	230	mVrms
Signal-to-noise ratio	S/N_{AM1}	23dB μ , 30% modulation, $f_m = 1\text{kHz}$	17	23		dB
	S/N_{AM2}	80dB μ , 30% modulation, $f_m = 1\text{kHz}$	46	52		dB
Total harmonic distortion	THD_{AM1}	80dB μ , 30% modulation, $f_m = 1\text{kHz}$		0.4	1.1	%
	THD_{AM2}	107dB μ , 30% modulation, $f_m = 1\text{kHz}$		0.5	1.3	%
SD sensitivity		0% modulation	11	20	29	dB μ
Local oscillator buffer output	V_{OSC-AM}	With no input signal	100	140	200	mVrms
IF counter buffer output	$V_{IFBuff-AM}$	23dB μ	140	285	400	mVrms

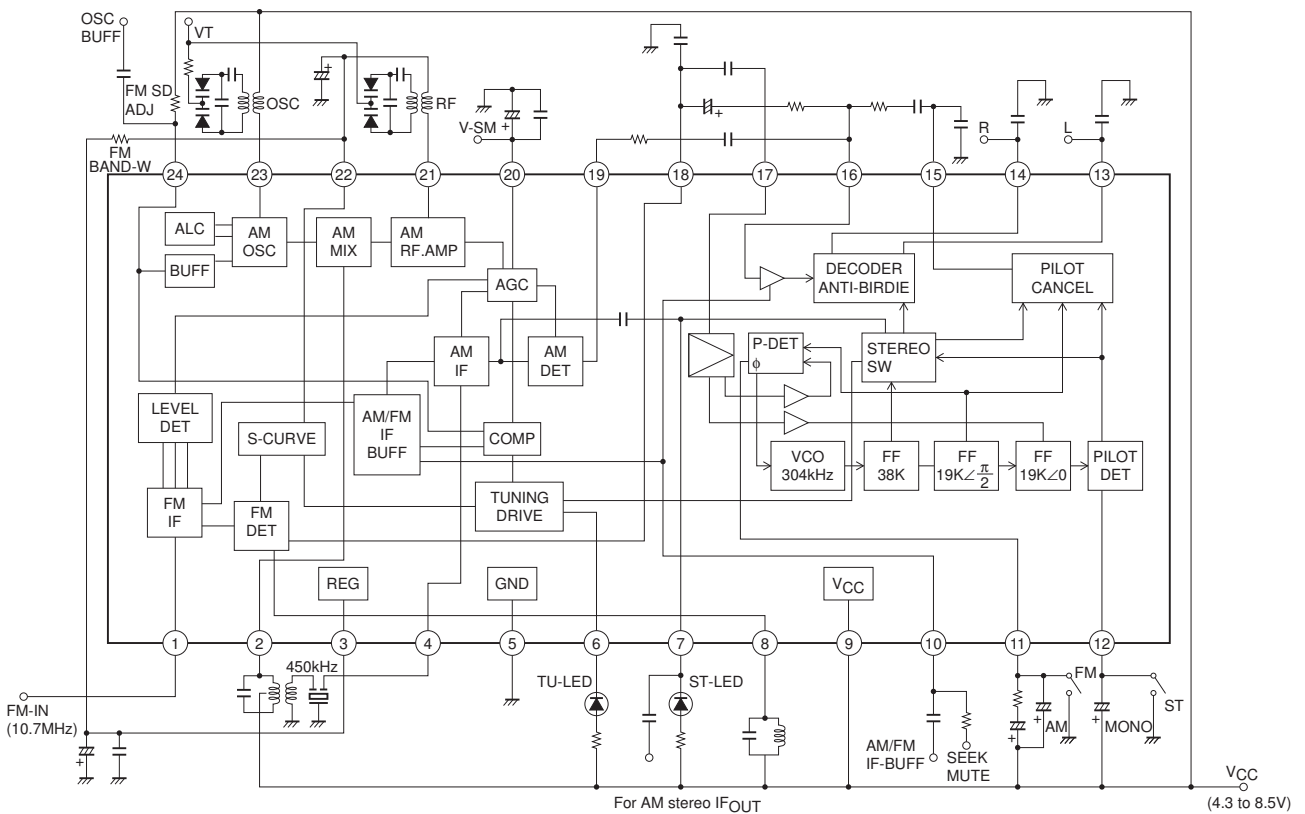
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Package Dimensions

unit : mm (typ)
3067B



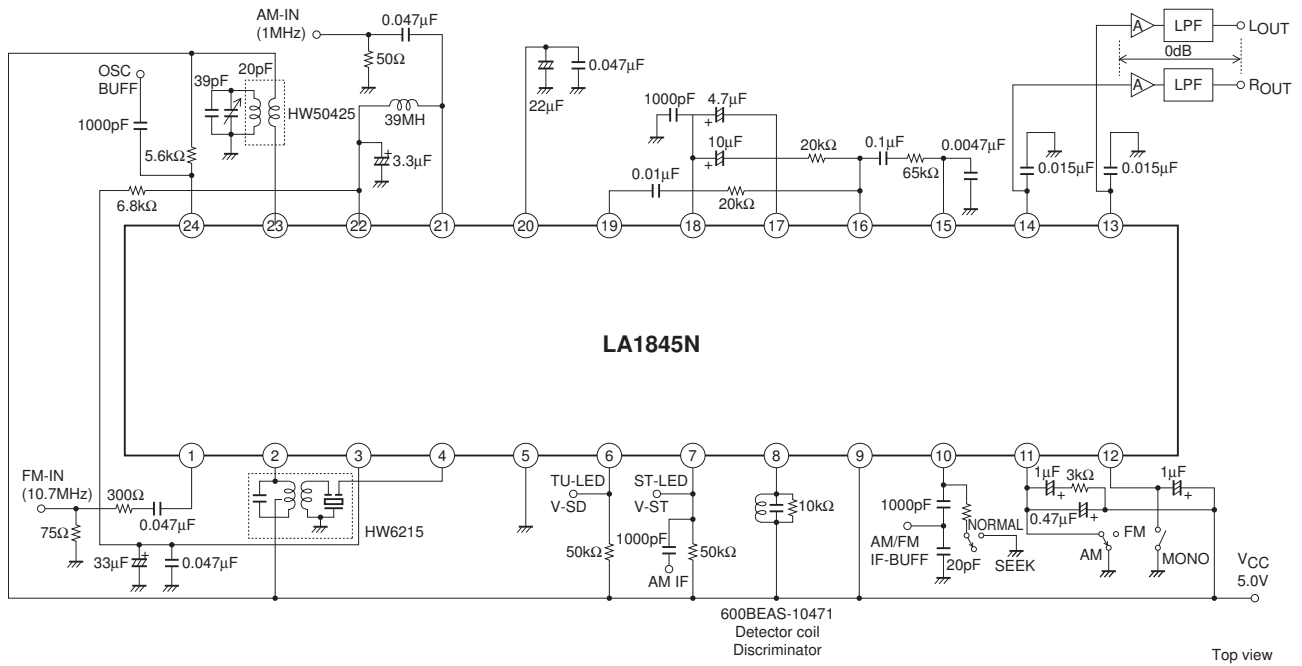
Block Diagram



Top view

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Test Circuit



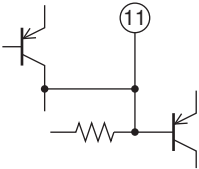
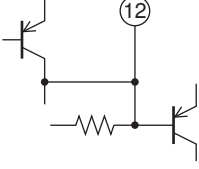
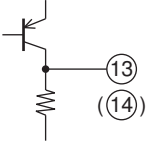
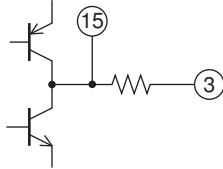
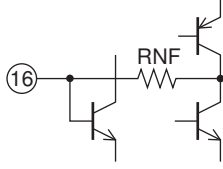
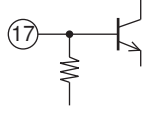
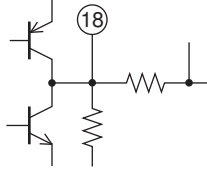
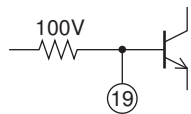
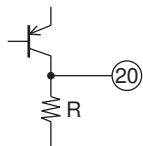
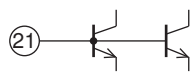
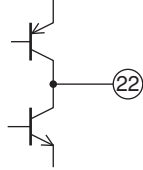
Pin Functions

Pin No.	Pin function	Pin voltage (V)	Pin description	Equivalent circuit
1	FM IF input	Vreg	Input impedance $r_i = 330\Omega$	
2	AM mixer output	VCC	Connect the mixer coil between this pin and VCC.	
3	REG	2.3	Vreg = 2.3V	
4	AM IF input	Vreg	Input impedance $r_i = 2k\Omega$	
5	GND	0		
6	Tu-LED	VCC	Active low	
7	ST-LED / AM-IF output	VCC	Open collector	
8	FM detector	VCC	The 600BEAS-10471 (Toko Mfg. Co., Ltd.) is recommended for detector coil.	
9	VCC			
10	AM / FM IF counter output, output control switch, mute switch	0	$V_{10} \leq 0.5V$: Reception state $1.4V \leq V_{10} \leq 2.2V$: Muting on $V_{10} \leq 3.5V$: IF counter output and muting on	

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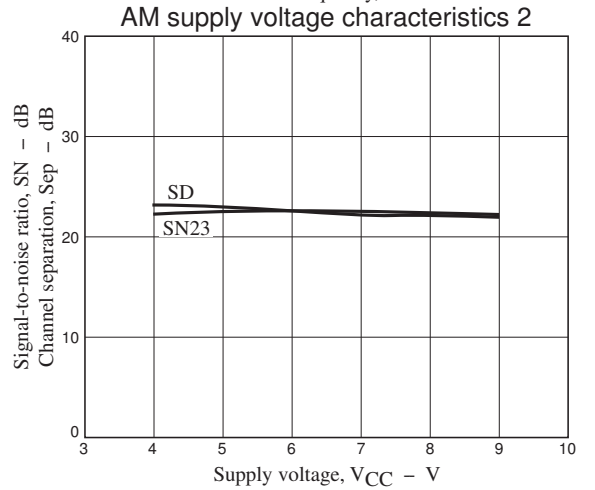
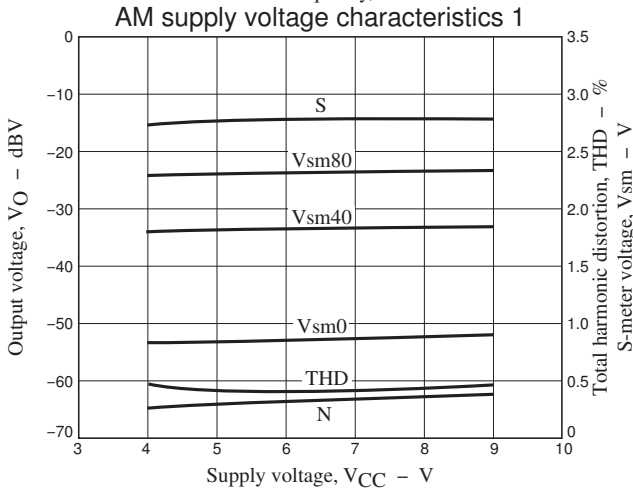
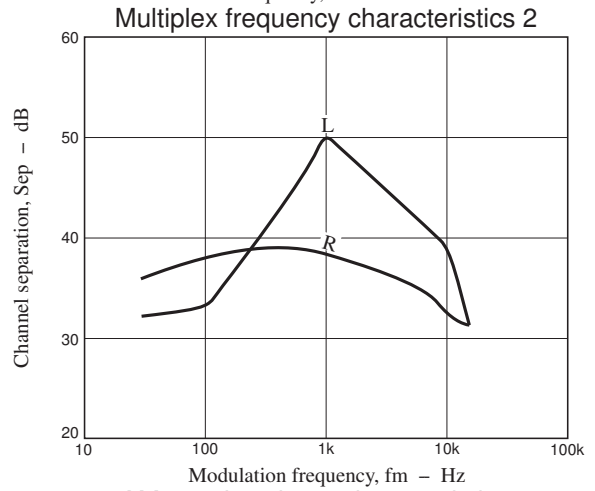
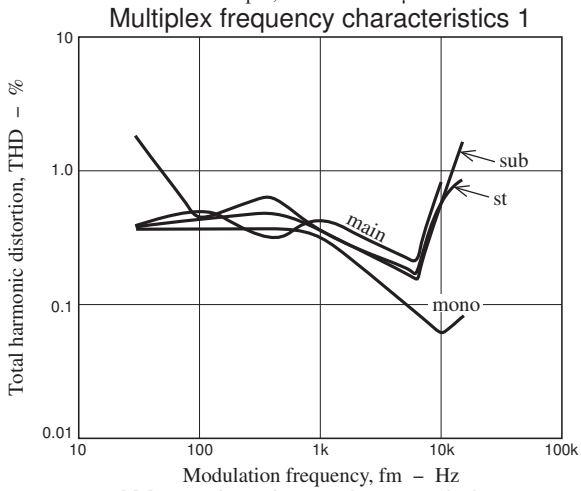
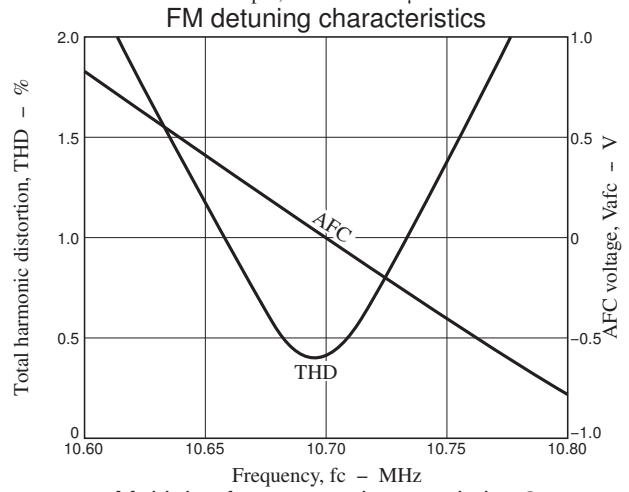
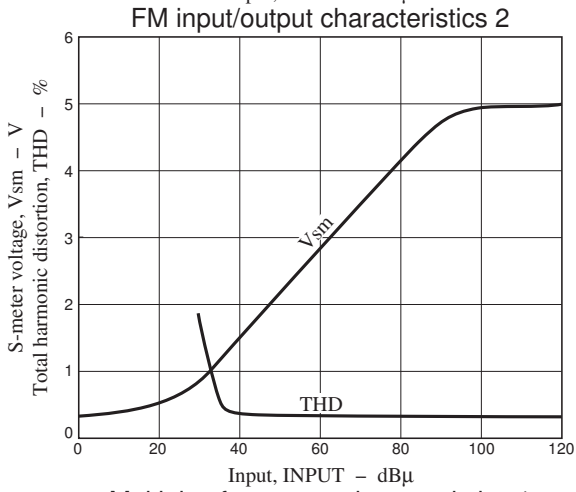
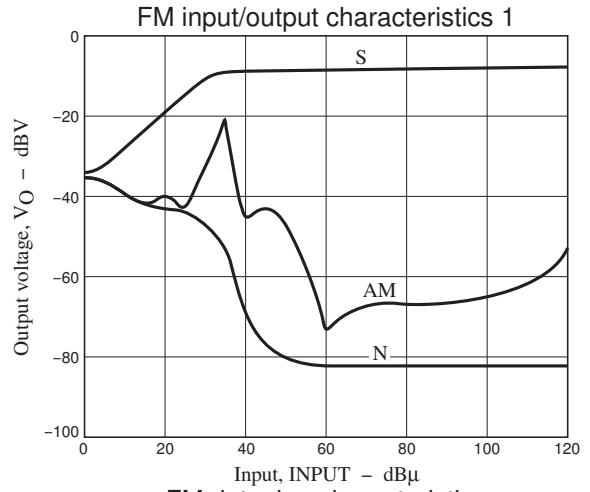
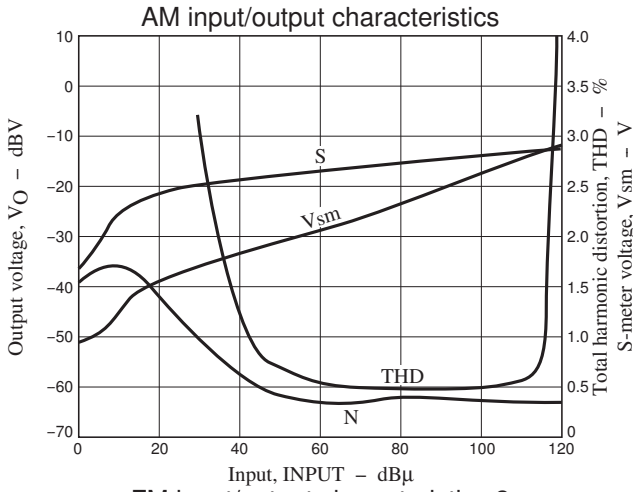
Pin No.	Pin function	Pin voltage (V)	Pin description	Equivalent circuit
11	Phase comparator low-pass filter (AM/FM switching)	$V_{CC}-1.0$	The device operates in AM mode when a current of over $200\mu\text{A}$ flows from pin.12. Limit values for the resistor : $2.7\text{k}\Omega$ (When $V_{CC} = 7\text{V}$) $3.9\text{k}\Omega$ (8V)	
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 $50\mu\text{A}$ flows from this pin. The VCO is stopped when a current of over $200\mu\text{A}$ flows from this pin. The limit values for the resistor are the same as those for pin 11.	
13 14	L outputs R outputs	3.2 3.2	Output impedance $r_O = 3.3\text{k}\Omega$	
15	Pilot canceler output	V_{reg}		
16	Decoder input	V_{reg}	Inverting input pin $R_{NF} = 20\text{k}\Omega$	
17	PLL input	V_{reg}	Input impedance $r_i = 20\text{k}\Omega$	
18	FM demodulator output	$V_{reg} + 0.7$	Output impedance $r_O = 2.3\text{k}\Omega$ The channel separation can be adjusted with an external capacitor connected between this pin and ground.	
19	AM detector output	0 (FM) 1.5 (AM)	Output impedance $r_O = 10\text{k}\Omega$	
20	S meter, AM AGC	0.2 (FM) 0.9 (AM)	The resistance of the built-in resistor R is $13.9\text{k}\Omega$ The SD response during seek operation is determined with the external capacitor connected to this pin.	
21	AM RF input	V_{reg}	Must be used at the same potential as pin 22.	
22	AFC	V_{reg}	The FM SD bandwidth can be adjusted with the external resistor connected between this pin and pin 3 (V_{reg}).	

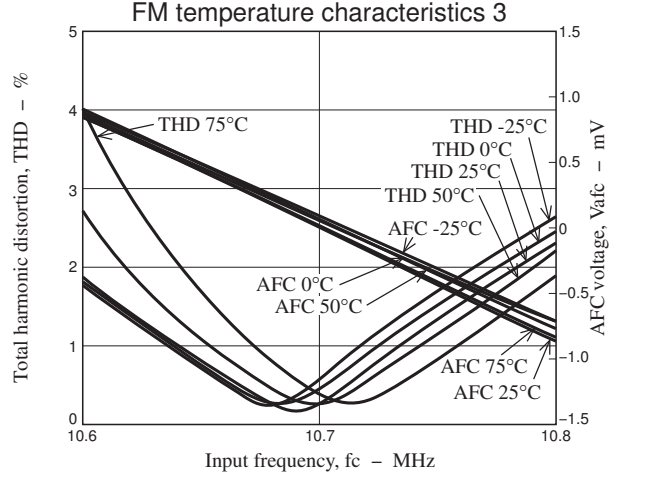
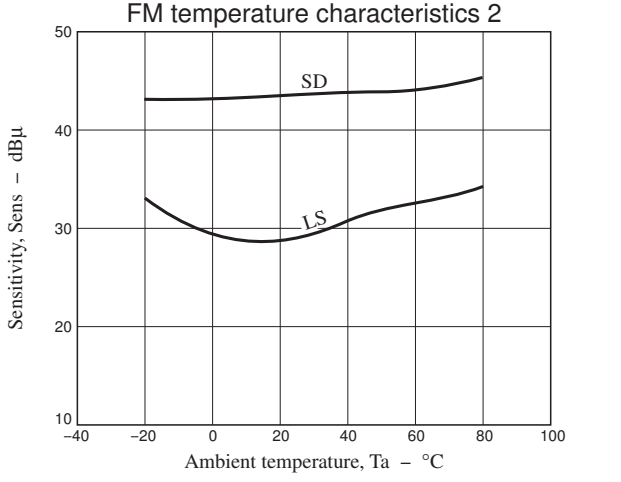
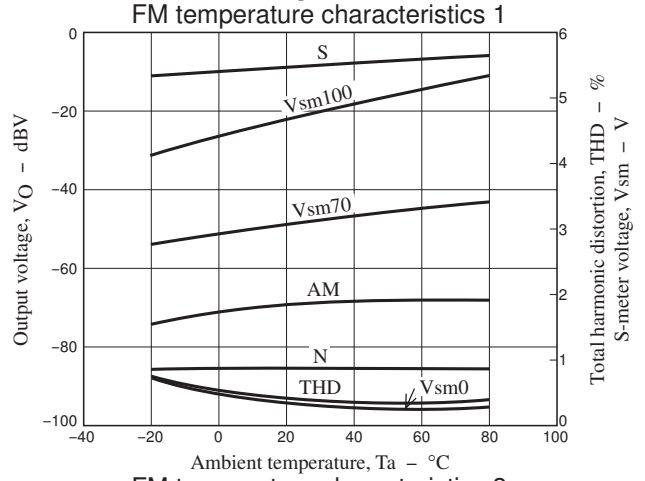
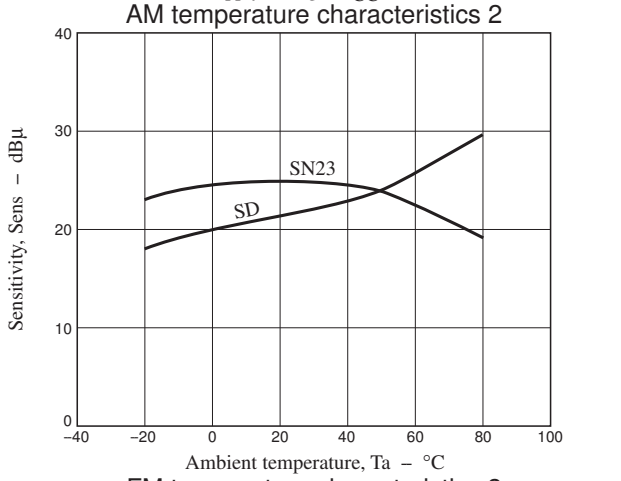
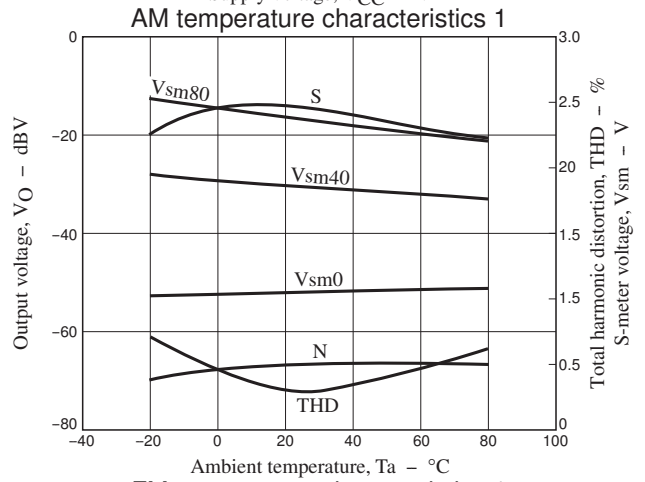
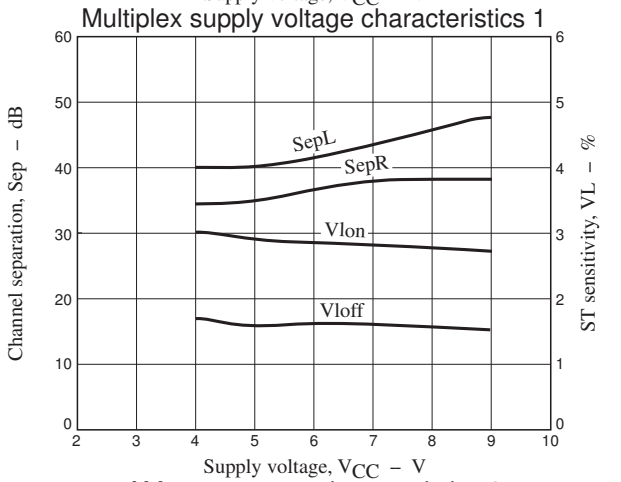
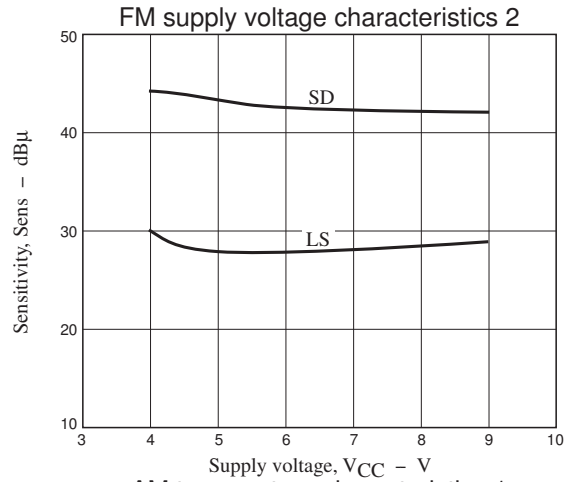
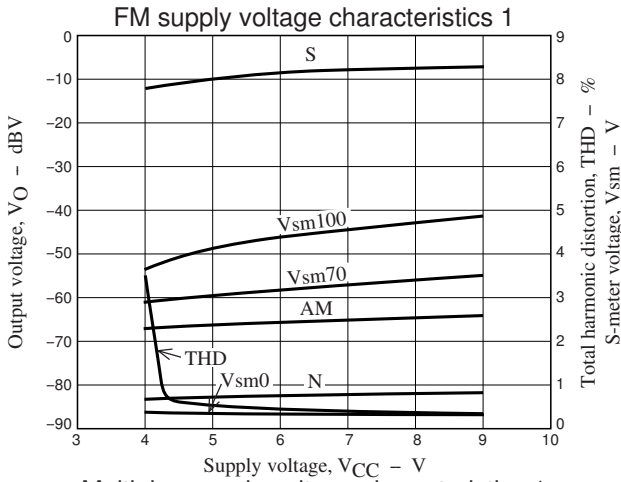
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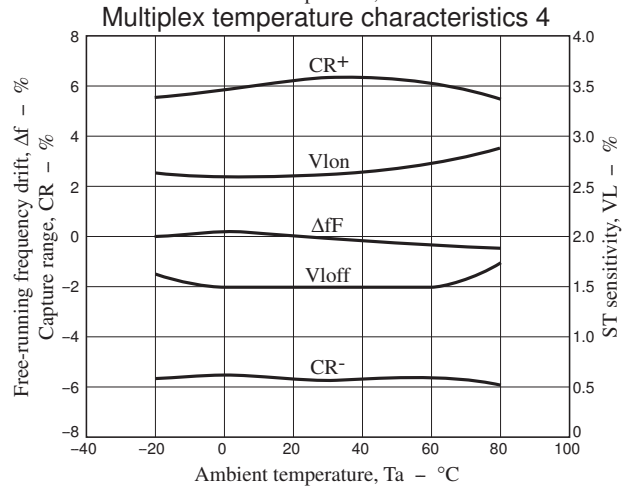
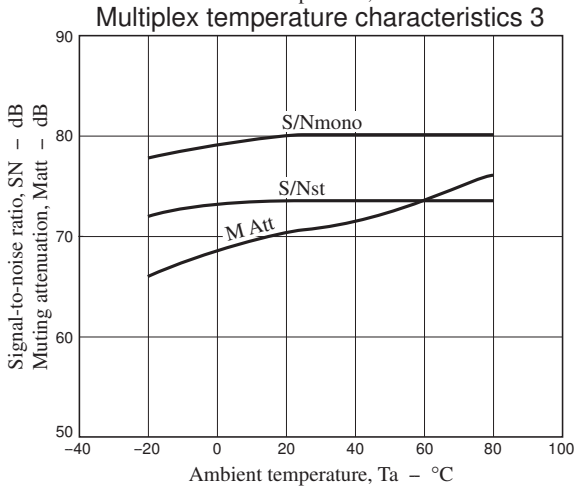
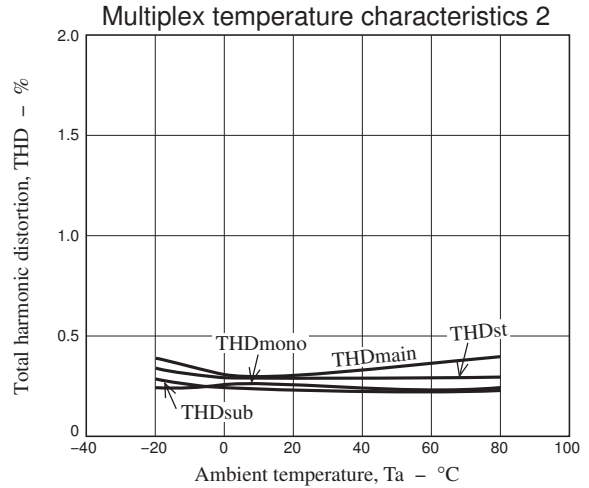
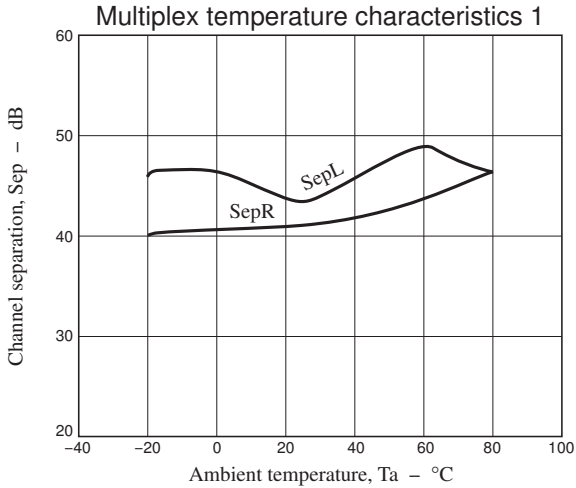
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Pin No.	Pin function	Pin voltage (V)	Pin description	Equivalent circuit
23	OSC	V_{CC}	Connect the oscillator coil between this pin and pin 9 (V_{CC}). Note : Impedance of the secondary oscillator coil must be $5k\Omega$ or higher.	
24	Oscillator buffer 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 $r_o = 200\Omega$ Note : Resistance of the external resistor connected to the pin 24 must be $3.3k\Omega$ or higher.	







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