Ordering number : EN7185C

LA1845N

Monolithic Linear IC

Single-Chip Tuner IC for Home Stereo IC

ON Semiconductor®

http://onsemi.com

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 technigue. 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	Pd max	Ta = 80°C	400	mW
Operating temperature	Topr		-20 to +80	°C
Storage temperature	Tstg		-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.

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		8	V
Operating supply voltage range	V_{CC} op	Ta = 80°C	4.3 to 8.5	V

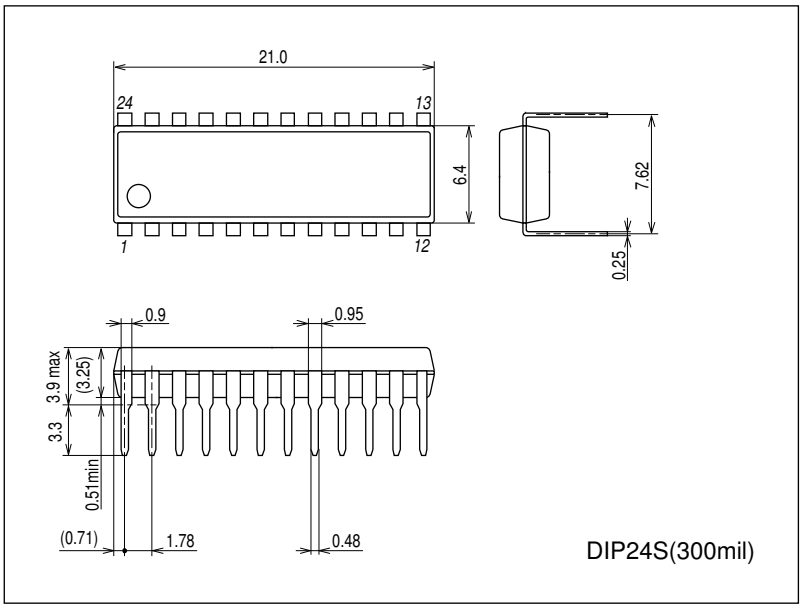
Electrical Characteristics at Ta = 25°C, V_{CC} = 8V, in the specified test circuit.

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

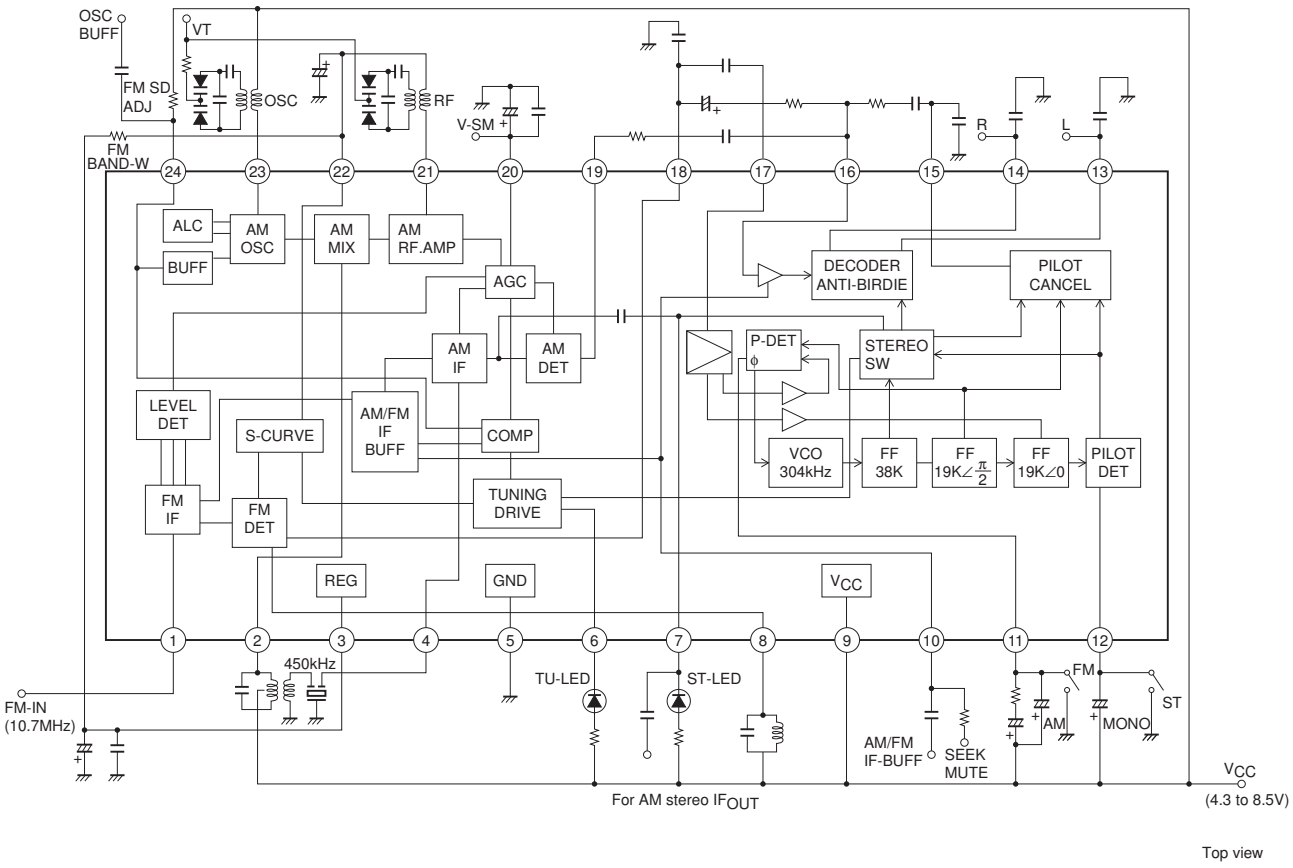
Package Dimensions

unit : mm (typ)

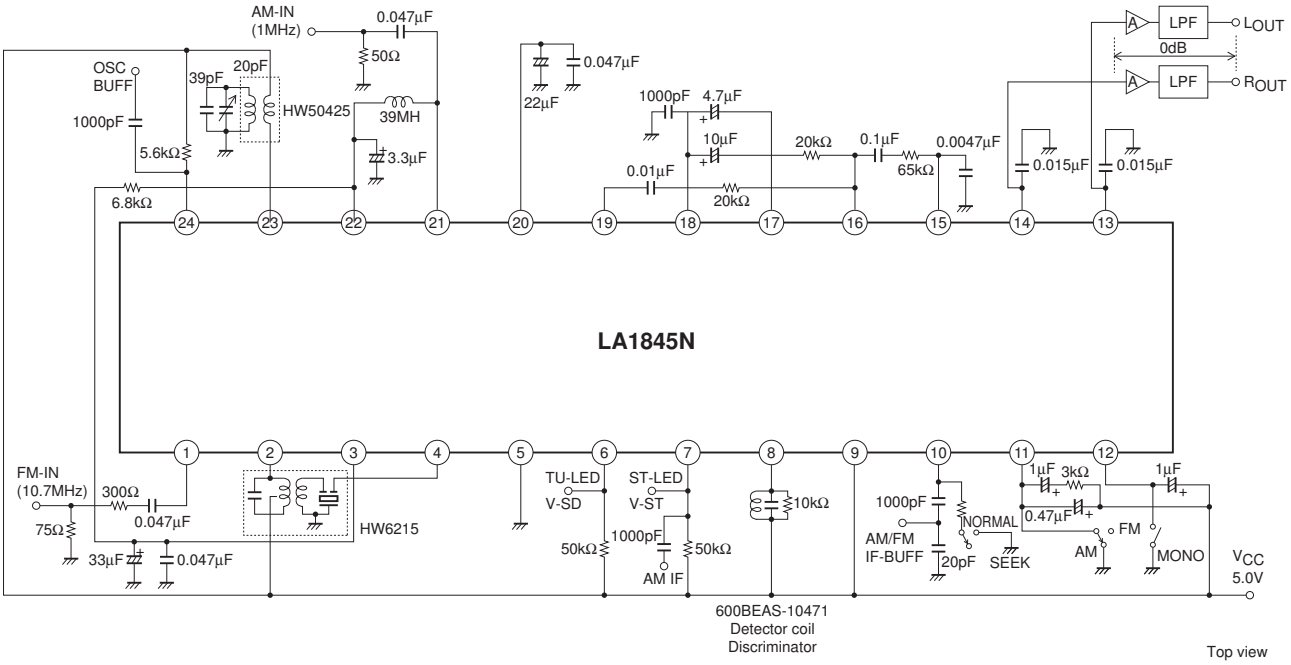
3067B



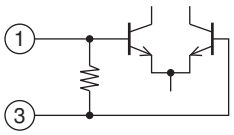
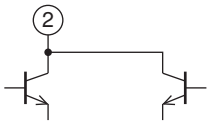
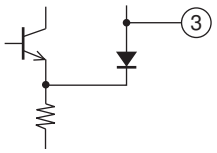
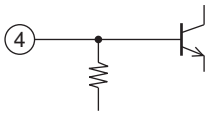
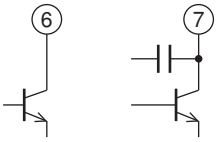
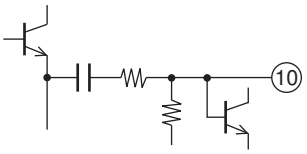
Block Diagram



Test Circuit



Pin Functions

Pin No.	Pin function	Pin voltage (V)	Pin description	Equivalent circuit
1	FM IF input	Vreg	Input impedance r_i = 330Ω	
2	AM mixer output	V_{CC}	Connect the mixer coil between this pin and V_{CC}.	
3	REG	2.3	Vreg = 2.3V	
4	AM IF input	Vreg	Input impedance r_i = 2kΩ	
5	GND	0		
6 7	Tu-LED ST-LED / AM-IF output	V_{CC} V_{CC}	Active low Open collector	
8	FM detector	V_{CC}	The 600BEAS-10471 (Toko Mfg. Co., Ltd.) is recommended for detector coil.	
9	V_{CC}			
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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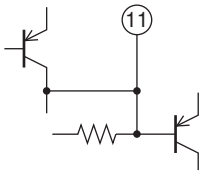
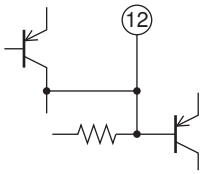
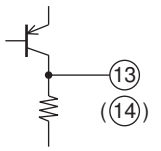
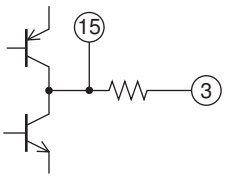
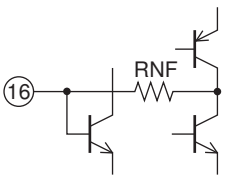
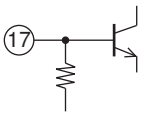
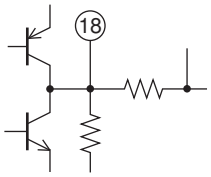
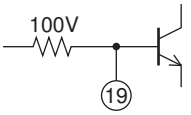
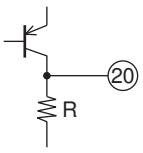
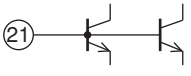
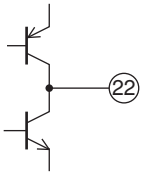
Pin No.	Pin function	Pin voltage (V)	Pin description	Equivalent circuit
11	Phase comparator low-pass filter (AM/FM switching)	V_{CC}-1.0	The device operates in AM mode when a current of over 200μA flows from pin.12. Limit values for the resistor : 2.7kΩ (When V_{CC} = 7V) 3.9kΩ (8V)	
12	Pilot detector low-pass filter (Forced mono) (VCO stop)	V_{CC}-1.0	The device is forced to monaural when a current of over 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	3.2 3.2	Output impedance r_o = 3.3kΩ	
15	Pilot canceler output	Vreg		
16	Decoder input	Vreg	Inverting input pin RNF = 20kΩ	
17	PLL input	Vreg	Input impedance r_i = 20kΩ	
18	FM demodulator output	Vreg + 0.7	Output impedance r_o = 2.3kΩ 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 = 10kΩ	
20	S meter, AM AGC	0.2 (FM) 0.9 (AM)	The resistance of the built-in resistor R is 13.9kΩ The SD responce 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).	

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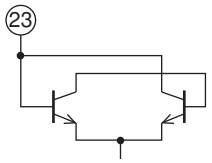
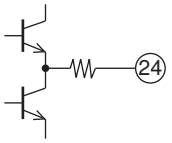
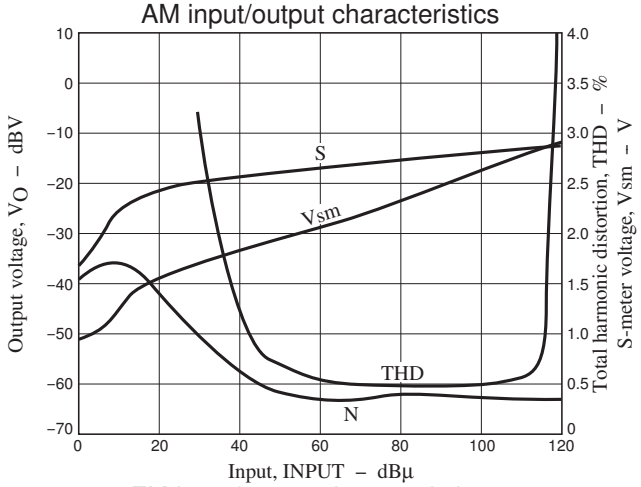
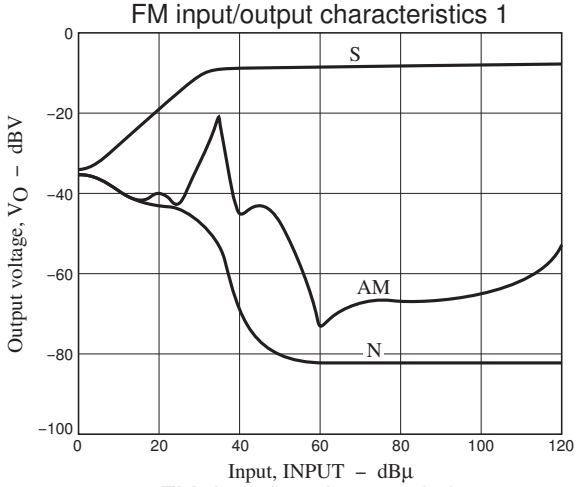
Pin No.	Pin function	Pin voltage (V)	Pin description	Equivalent circuit
23	OSC	V_{CC}	Connect the oscillator coil between this pin and pin 9 (V_{CC}). Note : Impedance of the secondary oscillator coil must be 5kΩ or higher.	
24	Oscillator buffer output, FM SD sensitivity adjustment	V_{CC}-1.4	The FM SD sensitivity can be adjusted with an external resistor connected to this pin. Output impedance r_o = 200Ω Note : Resistance of the external resistor connected to the pin 24 must be 3.3kΩ or higher.	

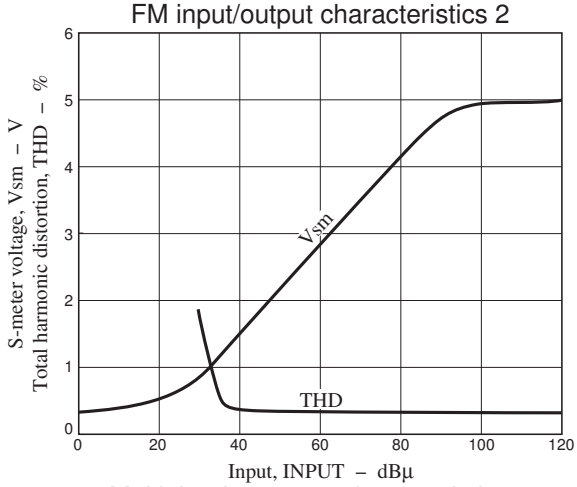
AM input/output characteristics



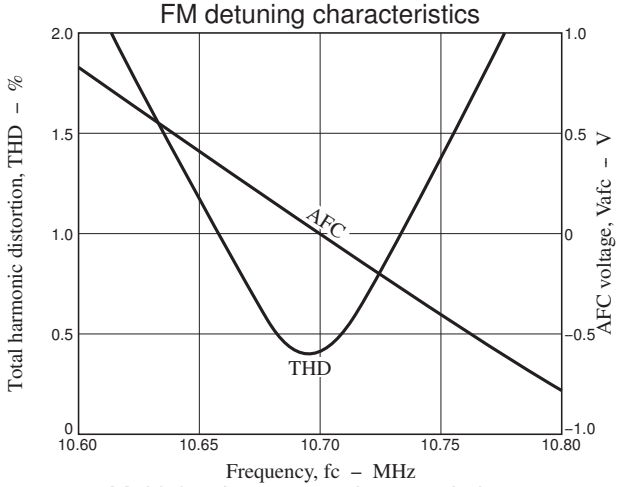
FM input/output characteristics 1



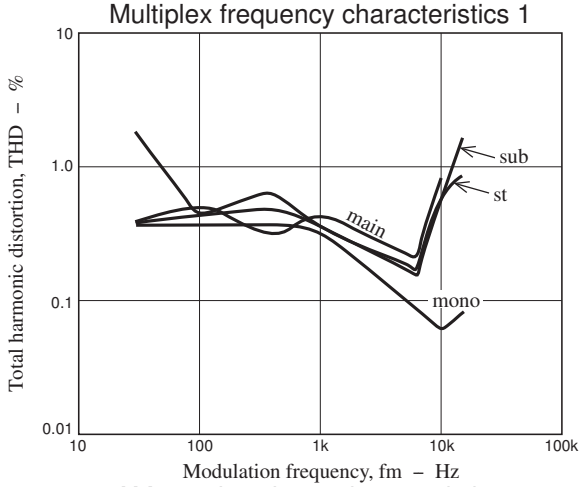
FM input/output characteristics 2



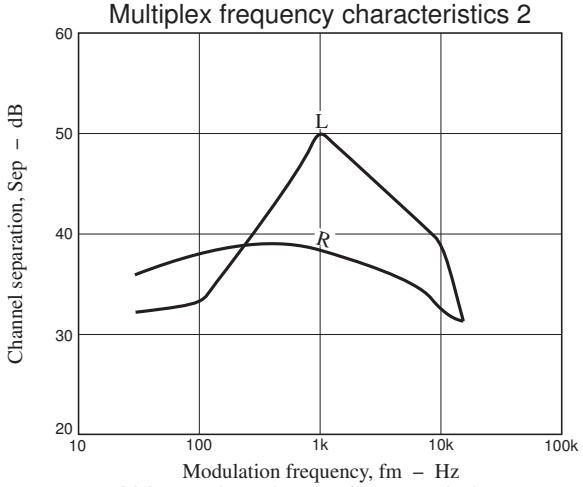
FM detuning characteristics



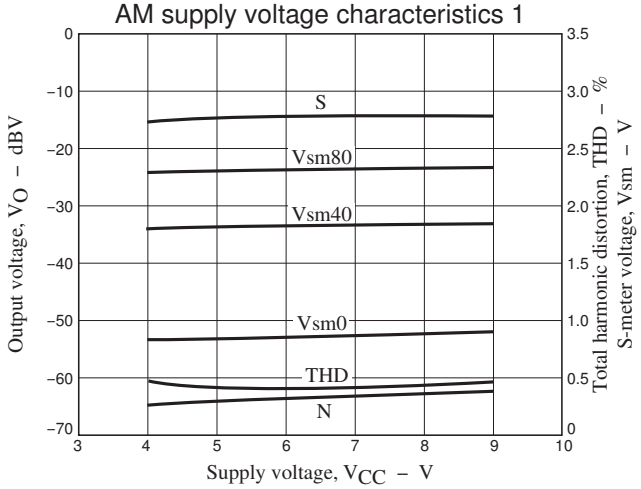
Multiplex frequency characteristics 1



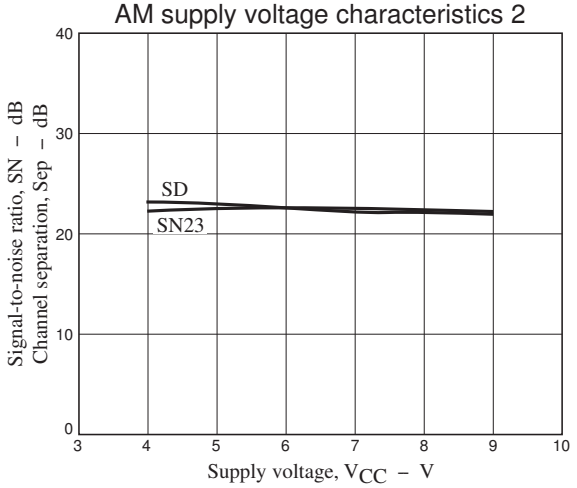
Multiplex frequency characteristics 2



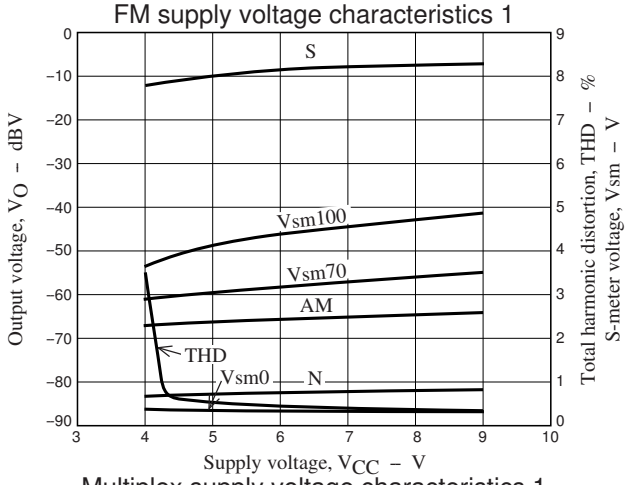
AM supply voltage characteristics 1



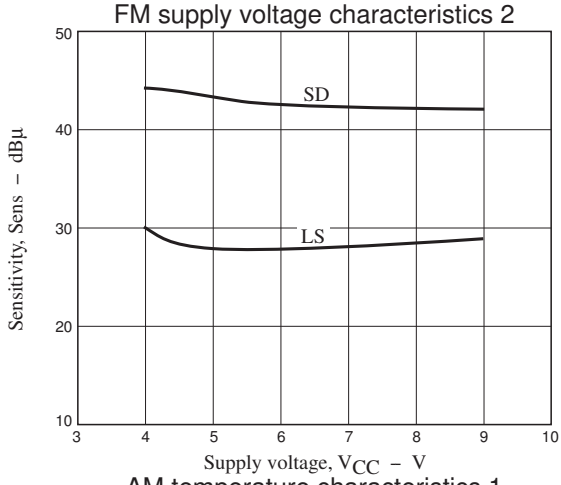
AM supply voltage characteristics 2



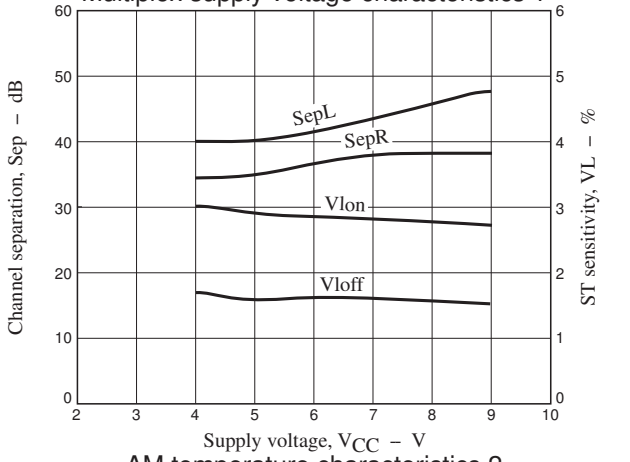
FM supply voltage characteristics 1



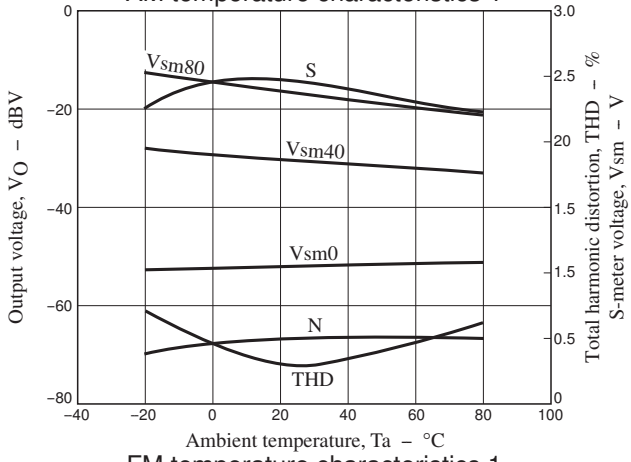
FM supply voltage characteristics 2



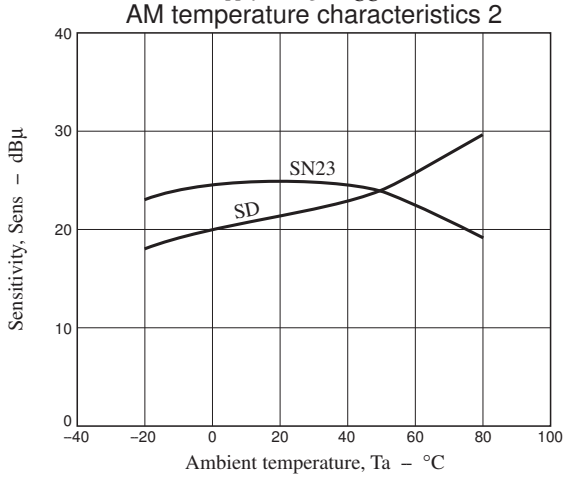
Multiplex supply voltage characteristics 1



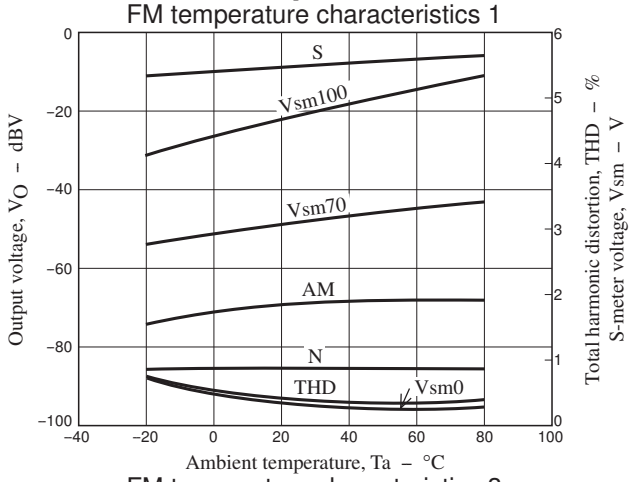
AM temperature characteristics 1



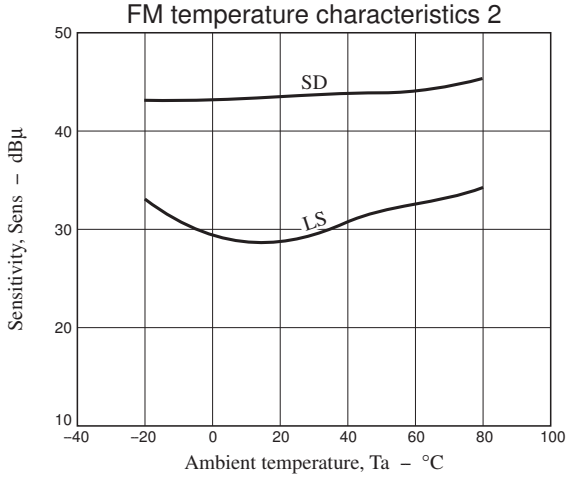
AM temperature characteristics 2



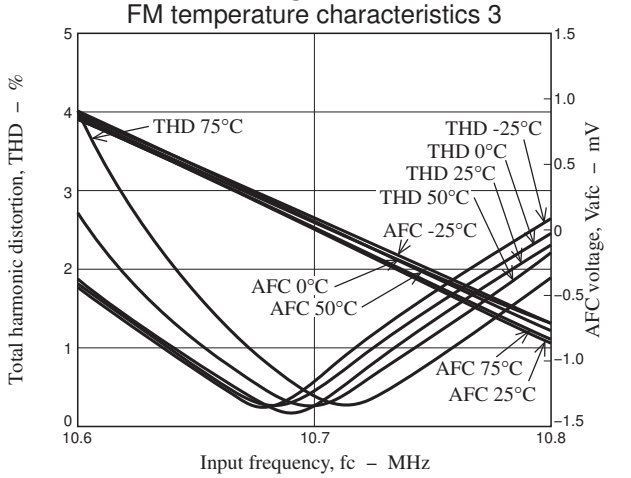
FM temperature characteristics 1



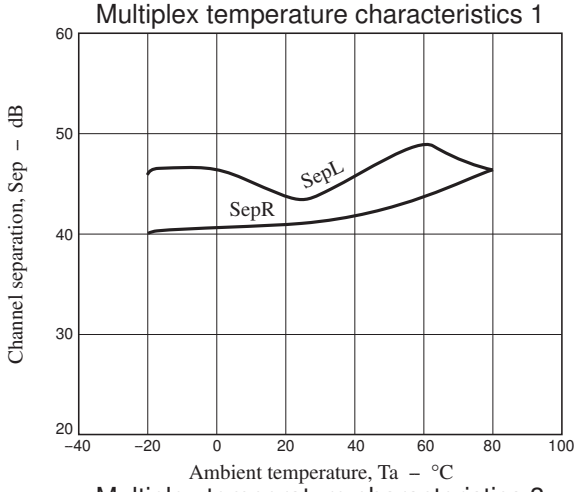
FM temperature characteristics 2



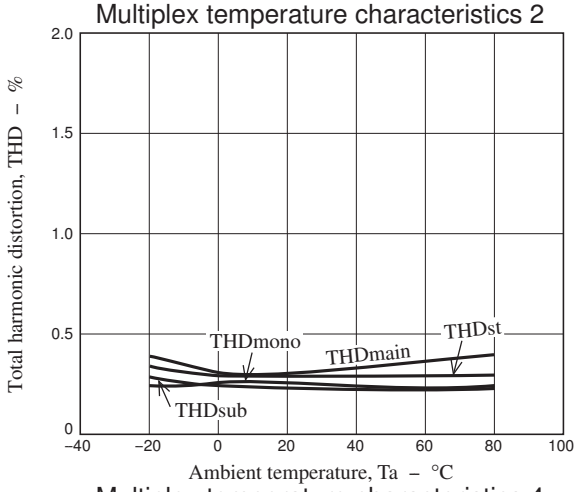
FM temperature characteristics 3



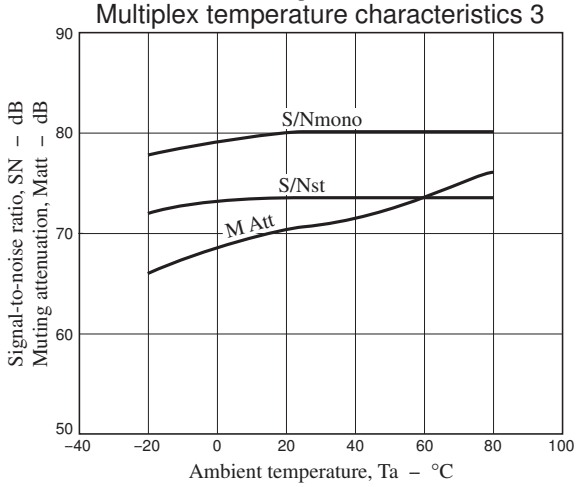
Multiplex temperature characteristics 1



Multiplex temperature characteristics 2



Multiplex temperature characteristics 3



Multiplex temperature characteristics 4