Ordering number : ENA2057A

SANYO Semiconductors
DATA SHEET

An ON Semiconductor Company

LA1844MC — Monolithic Linear IC For Home Stereo Single-chip Tuner IC

Overview

The LA1844MC 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.
- Package : MFP24SJ(300mil)

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 ≤ 45°C	400	mW
		Ta ≤ 80°C	260	mW
Operating temperature	Topr		-20 to +80	°C
Storage temperature	Tstg		-20 to +150	°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		4.3 to 8.0	V

Electrical Characteristics at Ta = 25°C

FM Mono Characteristics at f_C = 10.7MHz, V_{CC} = 5V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I_{CCO-FM}	With no input signal	18	28	38	mA
Demodulator output	V_{OFM}	100dBμ, 100% modulation, fm = 1kHz	210	330	420	mVrms
Total harmonic distortion	$THD_{FM\ mono}$	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	Vi-limit	100dBμ, 100% modulation, fm = 1kHz output reference, -3dB input		32	40	dBμ
SD sensitivity	LED Sens	0% modulation	37	47	57	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 at f_C = 10.7MHz, 100dBμ, V_{CC} = 5V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Separation	Sep	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 1	BR1	fs = 113kHz, Vs = 90%, pilot = 10% : The left - right modulation, demodulated output		36		dB
Adjacent channel rejection ratio 2	BR2	fs = 189kHz, Vs = 90%, pilot = 10% : The left - right modulation, demodulated output		41		dB
Carrier leak	CL	L+R = 90%, pilot = 10% reference, pilot = 10% output	38	44		dB

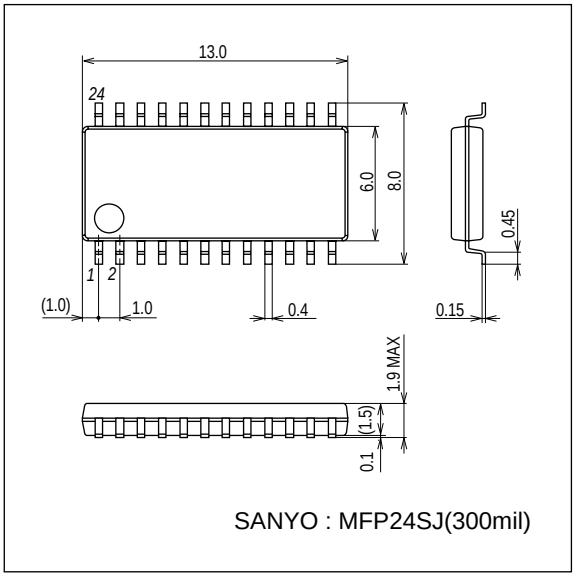
AM Characteristics at f_C = 1000kHz, V_{CC} = 5V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I_{CCO-AM}	With no input signal	11	22	33	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	48	54		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	SD-Sens	0% modulation	11	21	31	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

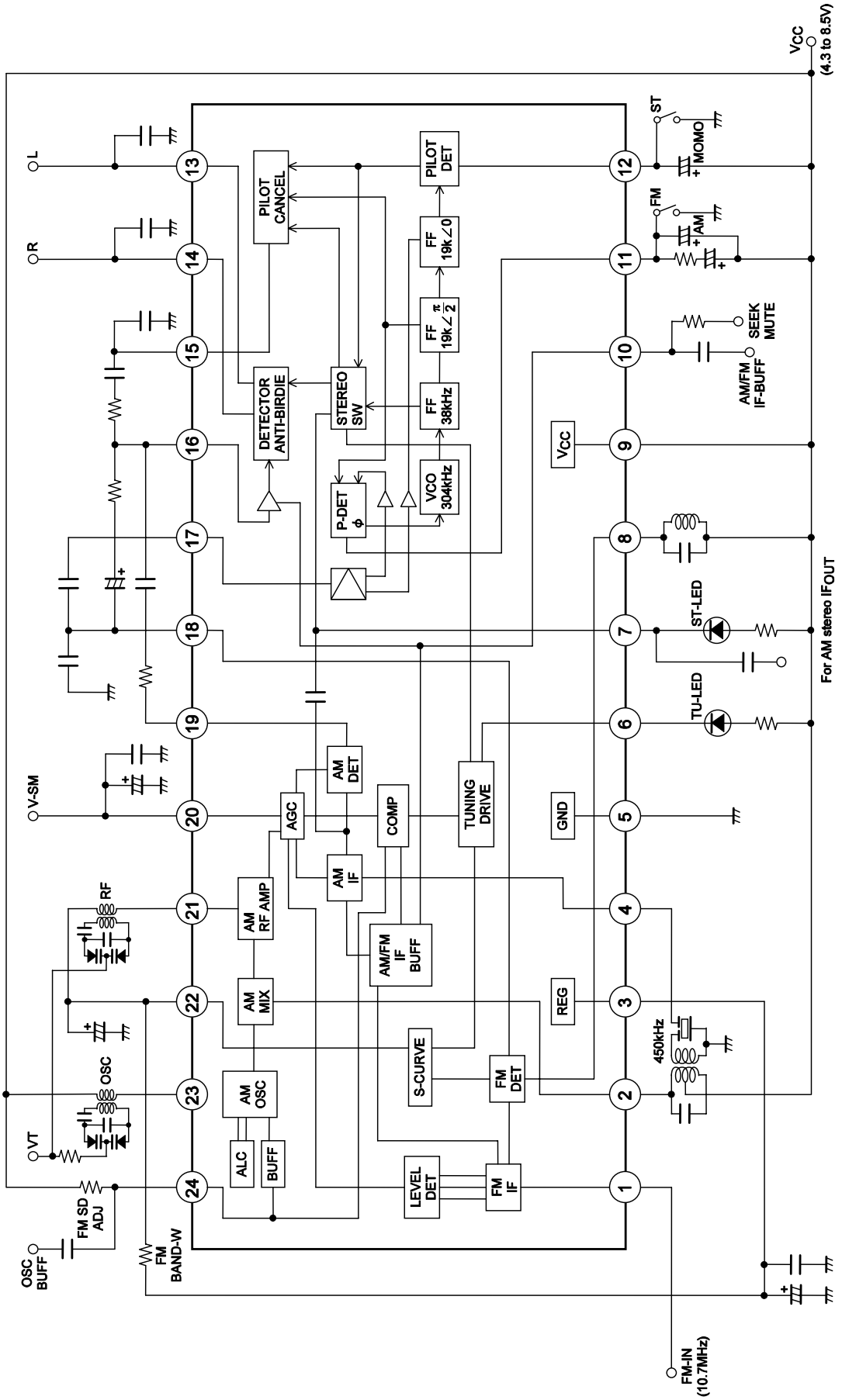
unit : mm

3419

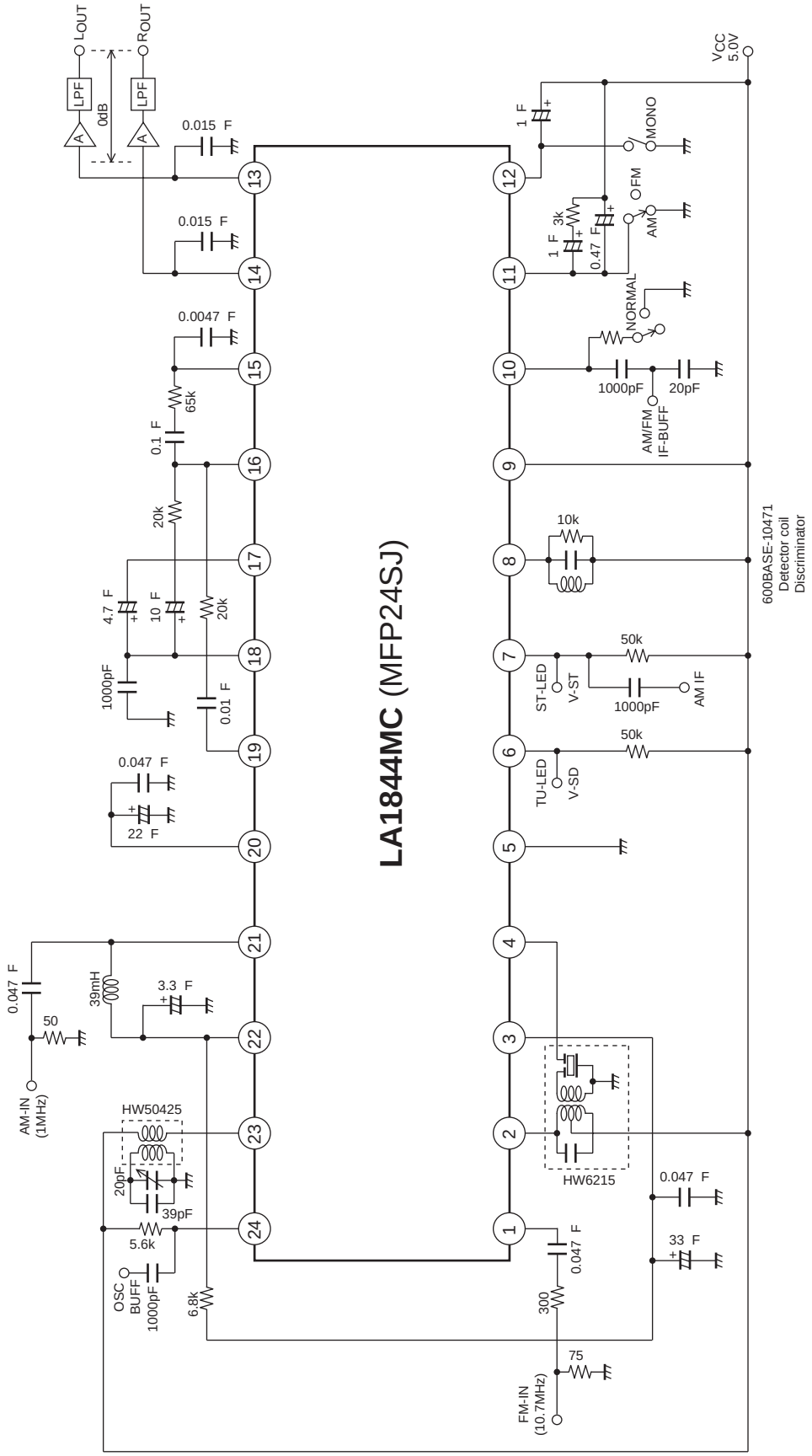


SANYO : MFP24SJ(300mil)

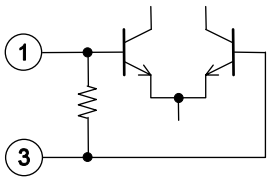
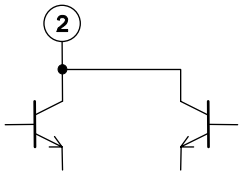
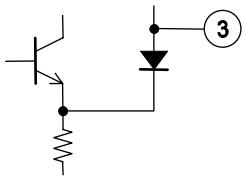
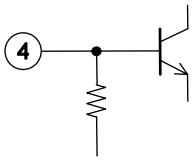
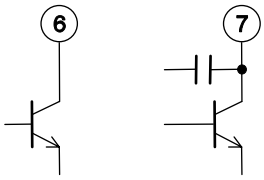
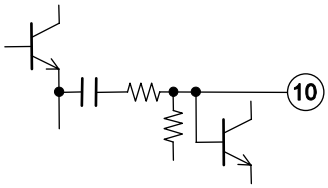
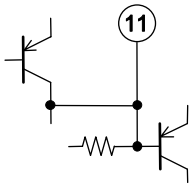
Block Diagram



Test Circuit



Pin Functions

Pin No.	Function	Pin voltage (V)	Equivalent circuit	Notes
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	2.1		Vreg = 2.4V
4	AM IF input	Vreg		Input impedance R_i = 2kΩ
5	GND	0		
6 7	Tu-LED ST-LED / AM-IF output	V_{CC}		Active low Open collector
8	FM detector	V_{CC}		The 600BEAS-10471 (Toko Mfg. Co., Ltd.) is recommended for detector coil.
9	VCC	5.0		
10	AM / FM IF counter output, output control switch, mute switch	0		$V_{10} \leq 0.5V$: Reception state (Normal) $1.4V \leq V_{10} \leq 2.2V$: Muting on (Mute) $V_{10} \geq 3.5V$: IF counter output and muting on (Seek)
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.

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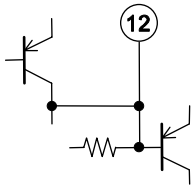
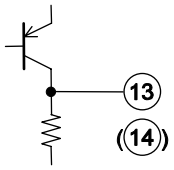
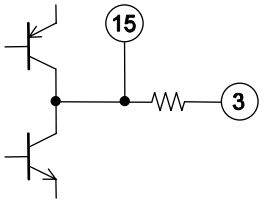
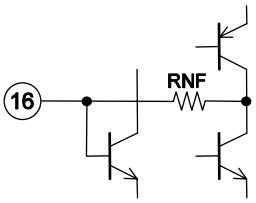
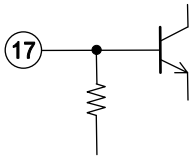
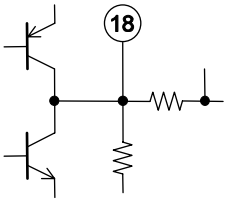
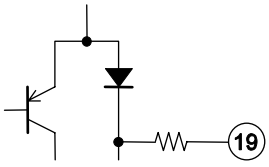
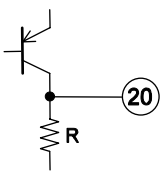
Pin No.	Function	Pin voltage (V)	Equivalent circuit	Notes
12	Pilot detector low-pass filter (Forced mono) (VCO stop)	V_{CC}-1.0		The device is forced to monaural when a current of over 50μA flows from this pin. The VCO is stopped when a current of over 200μA flows from this pin.
13 14	L outputs R outputs	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 = 3.3kΩ
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.

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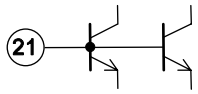
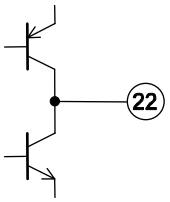
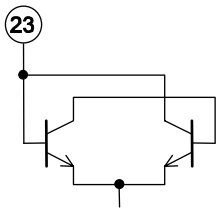
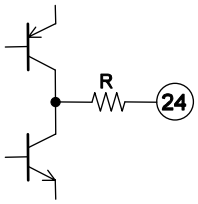
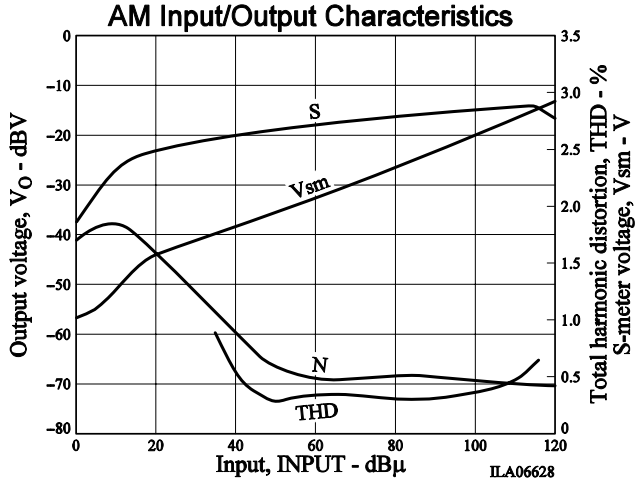
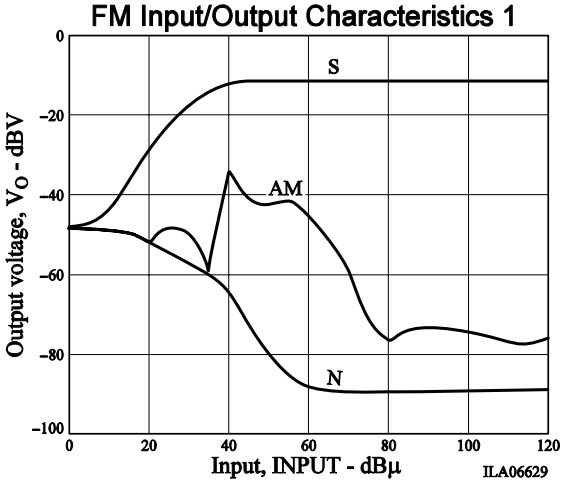
Pin No.	Function	Pin voltage (V)	Equivalent circuit	Notes
21	AM RF input	Vreg		Must be used at the same potential as pin 22
22	AFC	Vreg		The FM SD bandwidth can be adjusted with the external resistor connected between this pin and pin 3 (REG)
23	OSC	V_{CC}		Connect the oscillator coil between this pin 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.

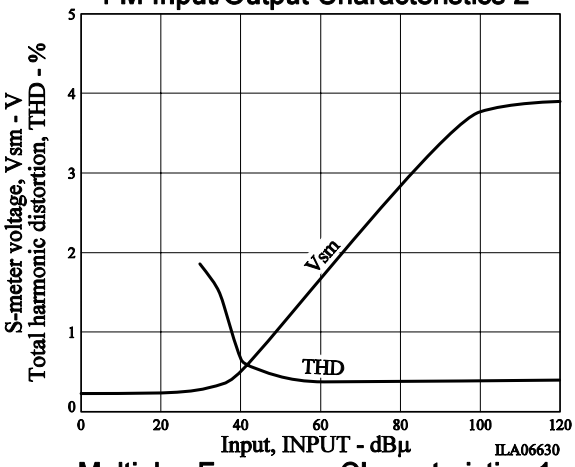
AM Input/Output Characteristics



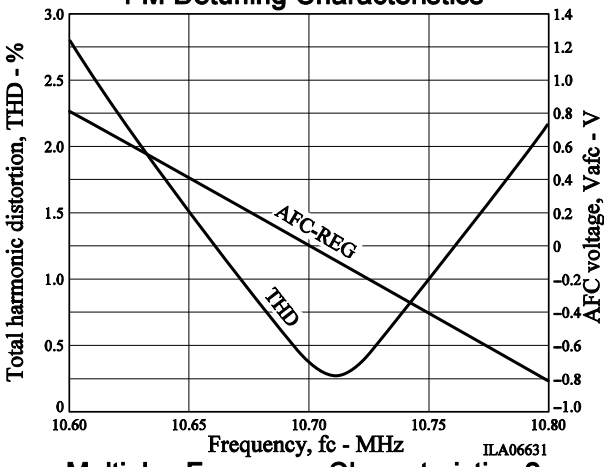
FM Input/Output Characteristics 1



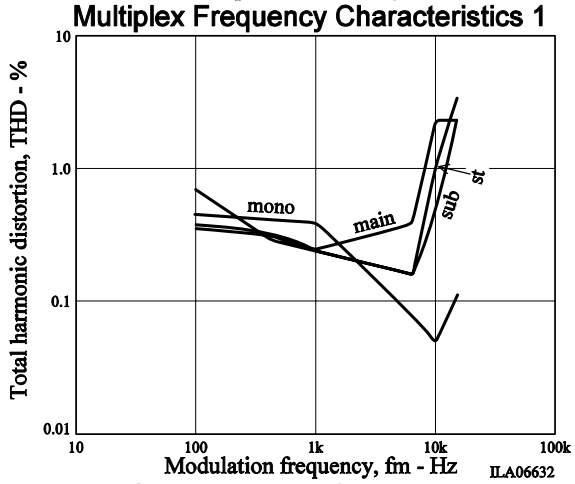
FM Input/Output Characteristics 2



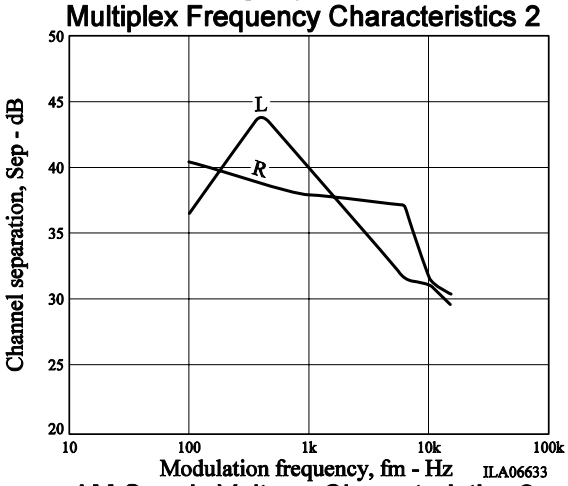
FM Detuning Characteristics



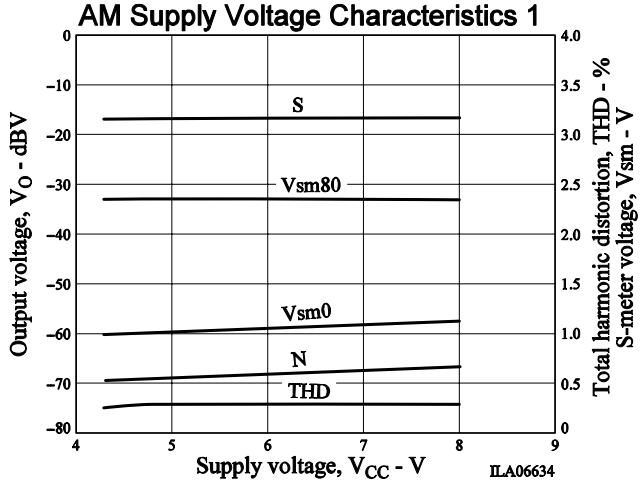
Multiplex Frequency Characteristics 1



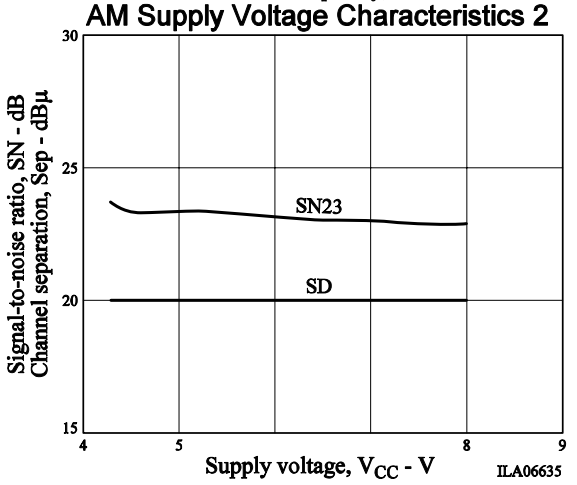
Multiplex Frequency Characteristics 2



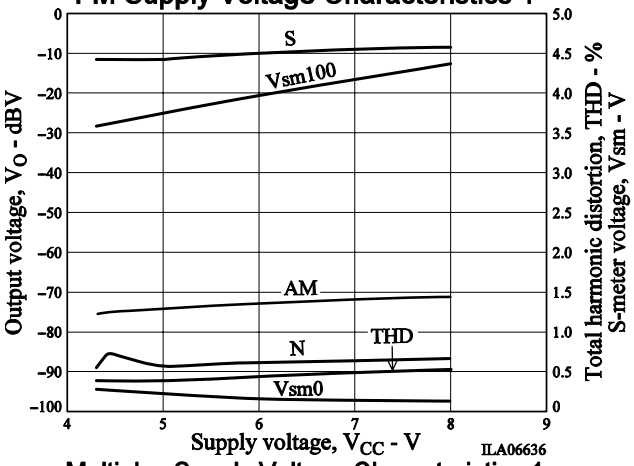
AM Supply Voltage Characteristics 1



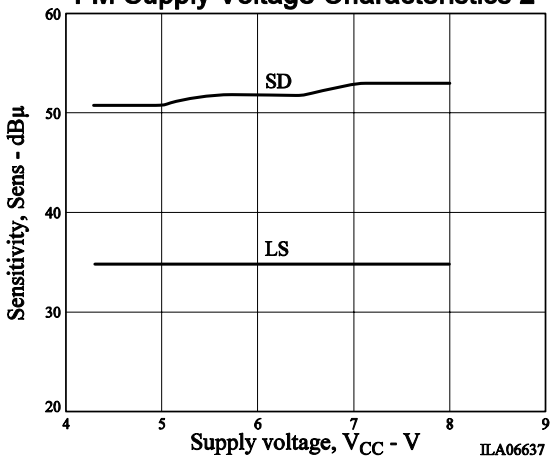
AM Supply Voltage Characteristics 2



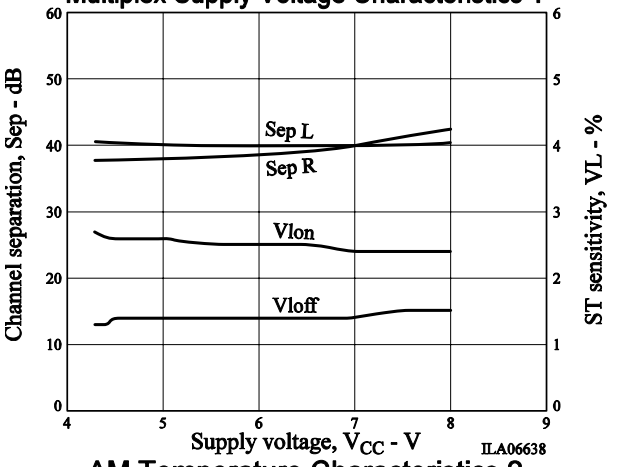
FM Supply Voltage Characteristics 1



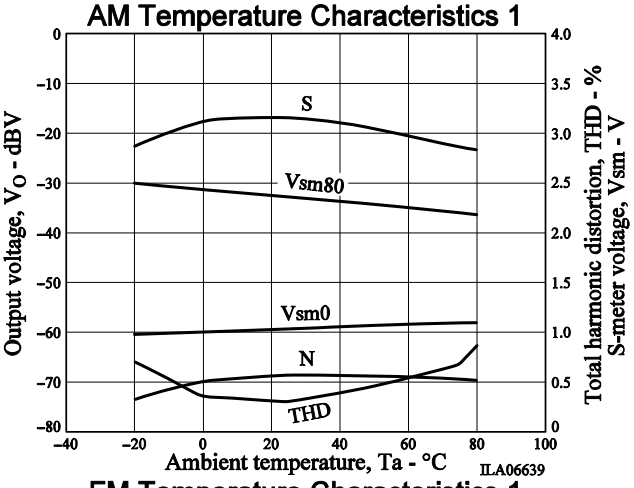
FM Supply Voltage Characteristics 2



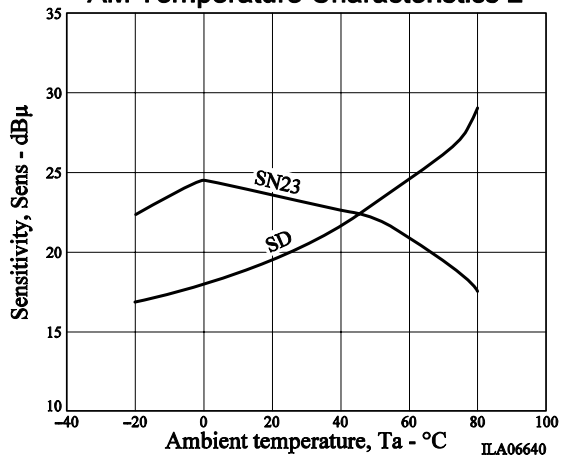
Multiplex Supply Voltage Characteristics 1



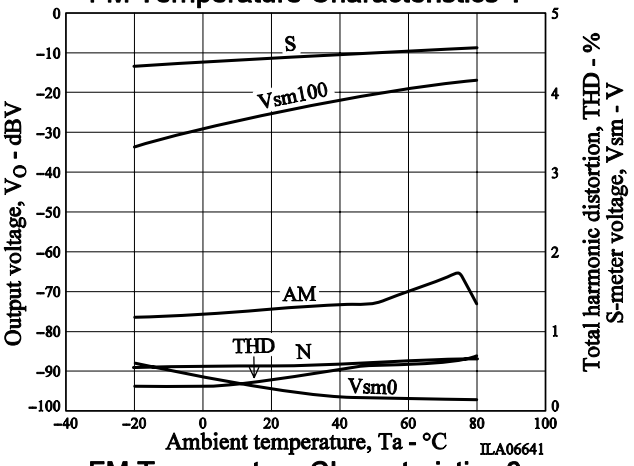
AM Temperature Characteristics 1



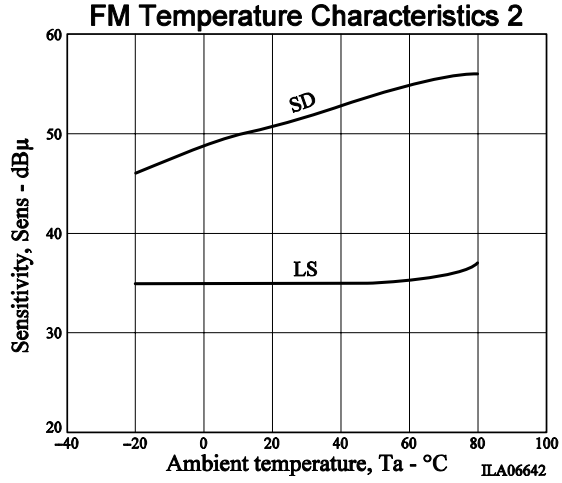
AM Temperature Characteristics 2



FM Temperature Characteristics 1



FM Temperature Characteristics 2



FM Temperature Characteristics 3