



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

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# LA1844MC

## Specifications

### Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC}$ max		9	V
Allowable power dissipation	$P_d$ max	$T_a \leq 45^\circ\text{C}$	400	mW
		$T_a \leq 80^\circ\text{C}$	260	mW
Operating temperature	$T_{opr}$		-20 to +80	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-20 to +150	$^\circ\text{C}$

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

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 $T_a = 25^\circ\text{C}$

#### FM Mono Characteristics at $f_C = 10.7\text{MHz}$ , $V_{CC} = 5\text{V}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	$I_{CCO-FM}$	With no input signal	18	28	38	mA
Demodulator output	$V_{OFM}$	100dB $\mu$ , 100% modulation, fm = 1kHz	210	330	420	mVrms
Total harmonic distortion	$THD_{FM}$ mono	100dB $\mu$ , 100% modulation, fm = 1kHz		0.35	1.5	%
Signal-to-noise ratio	$S/N_{FM}$	100dB $\mu$ , 100% modulation, fm = 1kHz	73	80		dB
AM rejection ratio	AMR	100dB $\mu$ , AM 30% modulation, fm = 1kHz	47	65		dB
3dB sensitivity	$V_i$ -limit	100dB $\mu$ , 100% modulation, fm = 1kHz output reference, -3dB input		32	40	dB $\mu$
SD sensitivity	LED Sens	0% modulation	37	47	57	dB $\mu$
IF counter buffer output	$V_{IFBuff-FM}$	100dB $\mu$	200	275	400	mVrms
Mute attenuation	Mute-Att	100dB $\mu$ , 100% modulation, fm = 1kHz		76		dB

#### FM Stereo Characteristics at $f_C = 10.7\text{MHz}$ , 100dB $\mu$ , $V_{CC} = 5\text{V}$

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	$f_s = 113\text{kHz}$ , $V_s = 90\%$ , pilot = 10% : The left - right modulation, demodulated output		36		dB
Adjacent channel rejection ratio 2	BR2	$f_s = 189\text{kHz}$ , $V_s = 90\%$ , 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

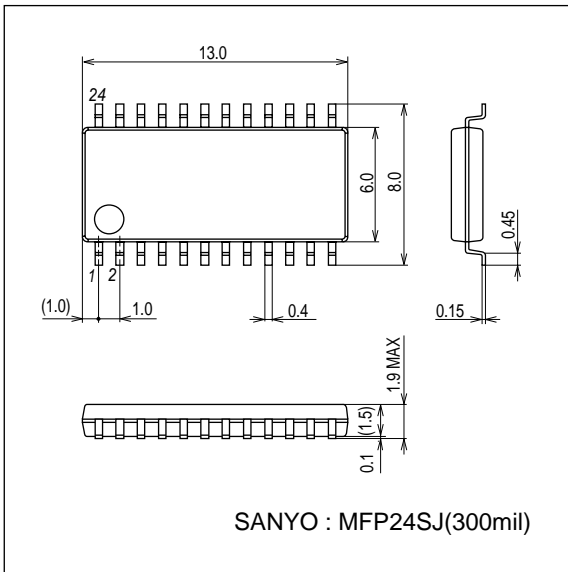
#### AM Characteristics at $f_C = 1000\text{kHz}$ , $V_{CC} = 5\text{V}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	$I_{CCO-AM}$	With no input signal	11	22	33	mA
Detector output	$V_{OAM1}$	23dB $\mu$ , 30% modulation, fm = 1kHz	40	80	160	mVrms
	$V_{OAM2}$	80dB $\mu$ , 30% modulation, fm = 1kHz	90	160	230	mVrms
Signal-to-noise ratio	$S/N_{AM1}$	23dB $\mu$ , 30% modulation, fm = 1kHz	17	23		dB
	$S/N_{AM2}$	80dB $\mu$ , 30% modulation, fm = 1kHz	48	54		dB
Total harmonic distortion	$THD_{AM1}$	80dB $\mu$ , 30% modulation, fm = 1kHz		0.4	1.1	%
	$THD_{AM2}$	107dB $\mu$ , 30% modulation, fm = 1kHz		0.5	1.3	%
SD sensitivity	SD-Sens	0% modulation	11	21	31	dB $\mu$
Local oscillator buffer output	$V_{OSC-AM}$	With no input signal	100	140	200	mVrms
IF counter buffer output	$V_{IFBuff-AM}$	23dB $\mu$	140	285	400	mVrms

Package Dimensions

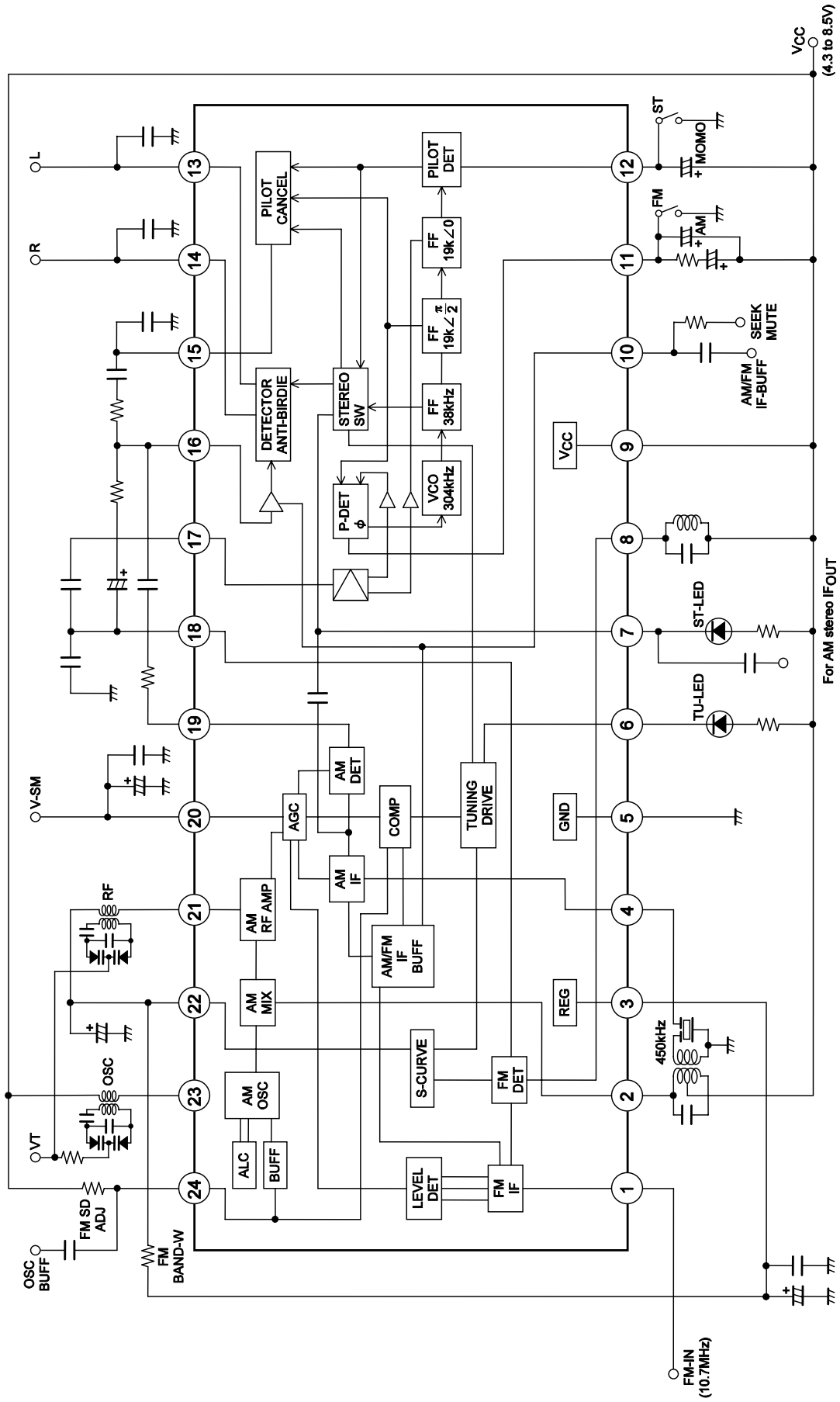
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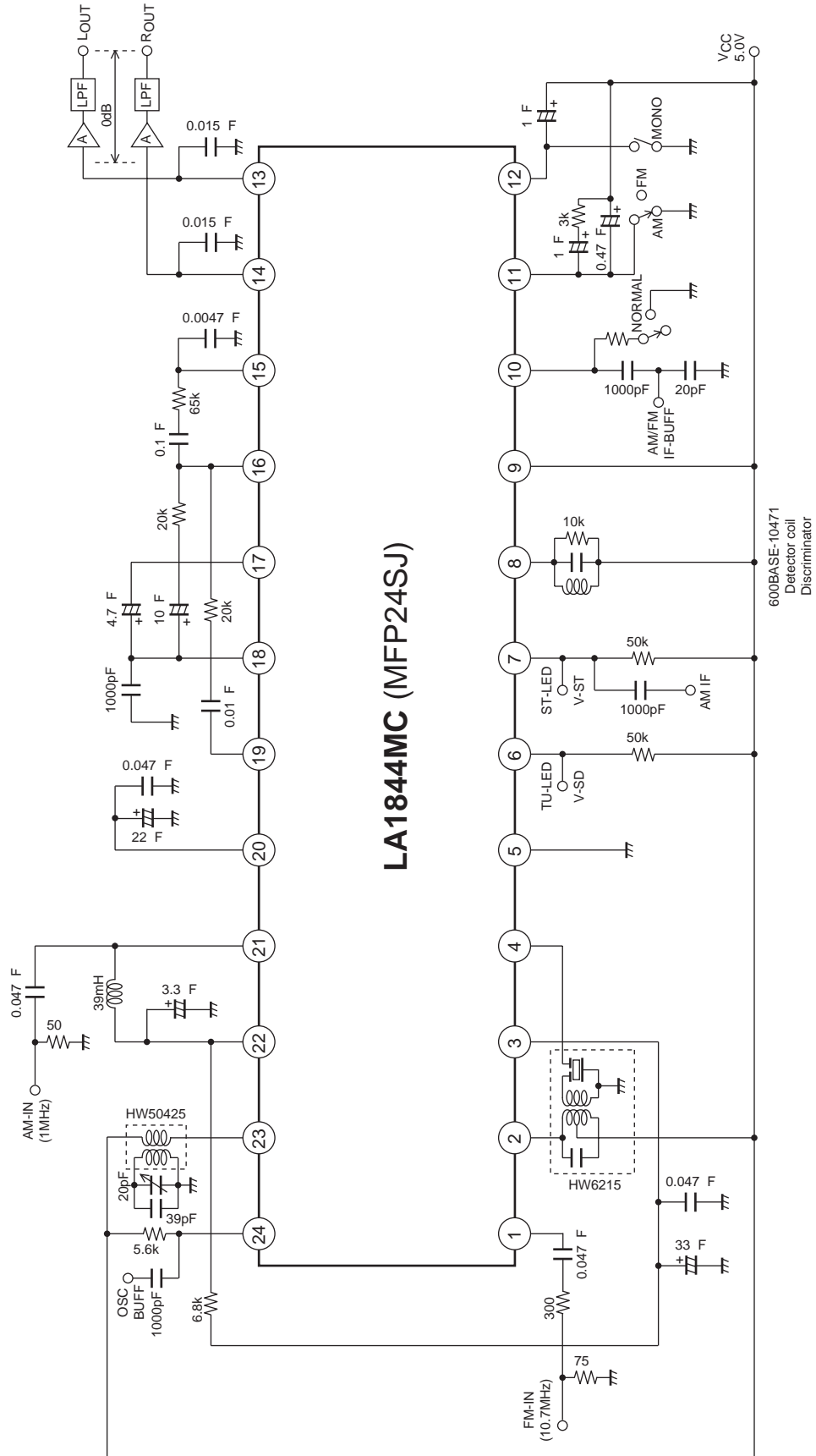
# LA1844MC

## Block Diagram



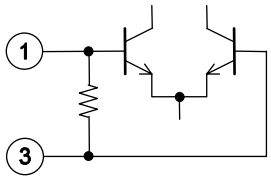
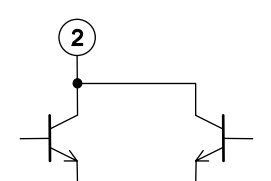
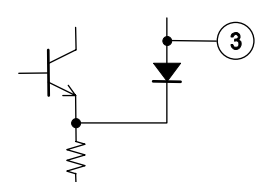
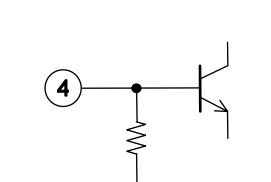
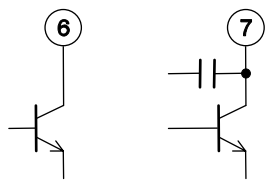
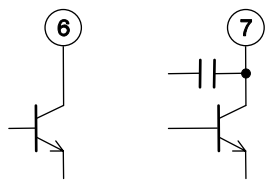
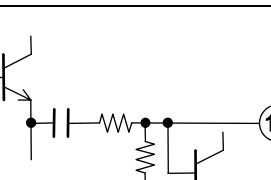
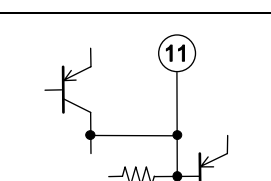
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## Test Circuit



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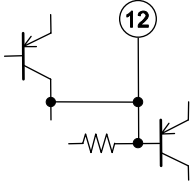
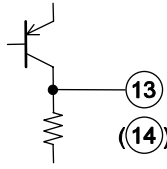
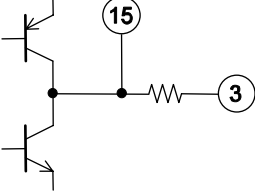
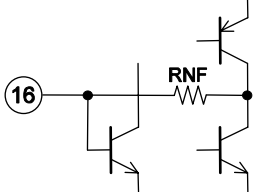
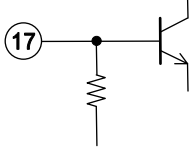
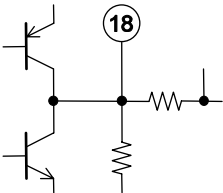
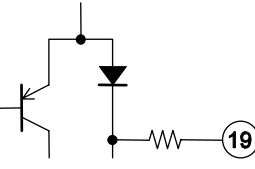
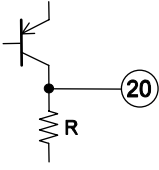
## Pin Functions

Pin No.	Function	Pin voltage (V)	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		$V_{reg} = 2.4V$
4	AM IF input	Vreg		Input impedance $R_i = 2k\Omega$
5	GND	0		
6	Tu-LED	$V_{CC}$		Active low
7	ST-LED / AM-IF output	$V_{CC}$		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 $200\mu A$ flows from pin 12.

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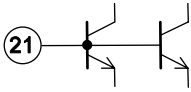
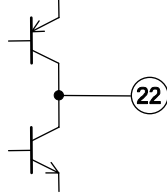
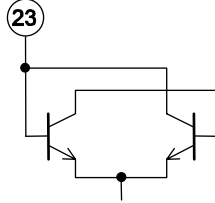
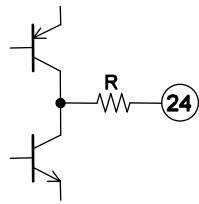
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Pin No.	Function	Pin voltage (V)	Equivalent circuit	Notes
12	Pilot detector low-pass filter (Forced mono) (VCO stop)	$V_{CC}-1.0$		The device is forced to monaural when a current of over $50\mu\text{A}$ flows from this pin. The VCO is stopped when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

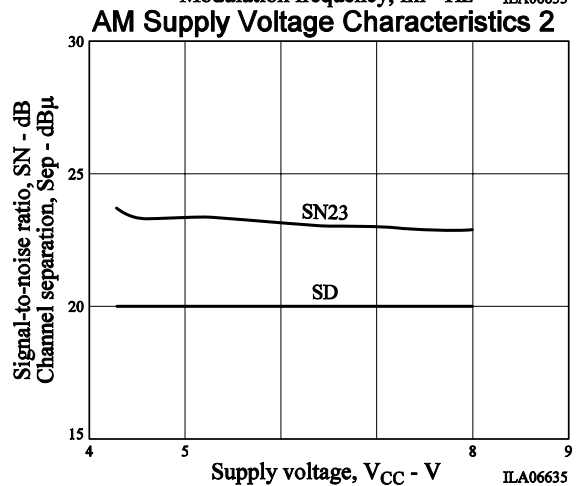
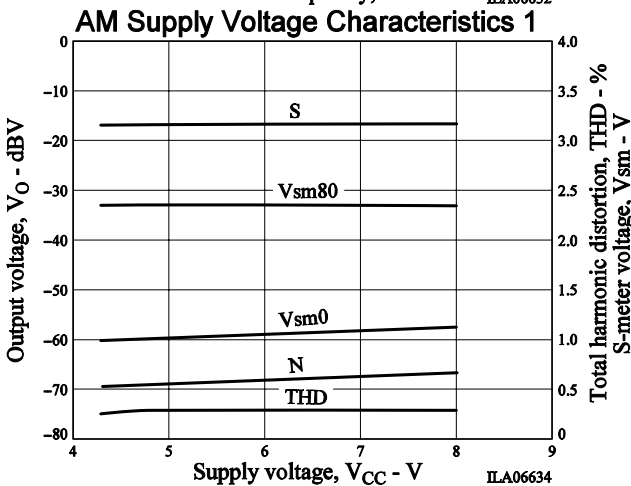
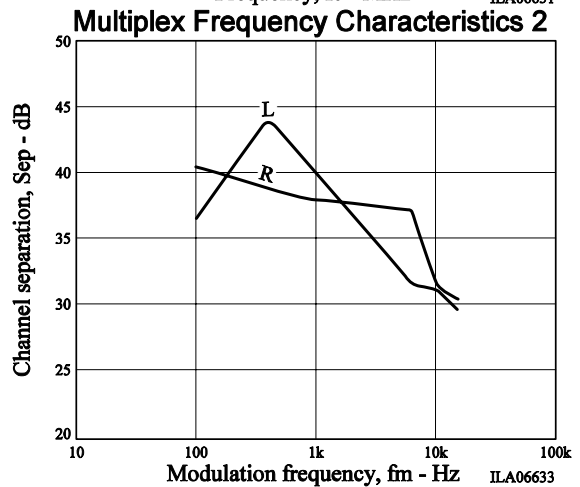
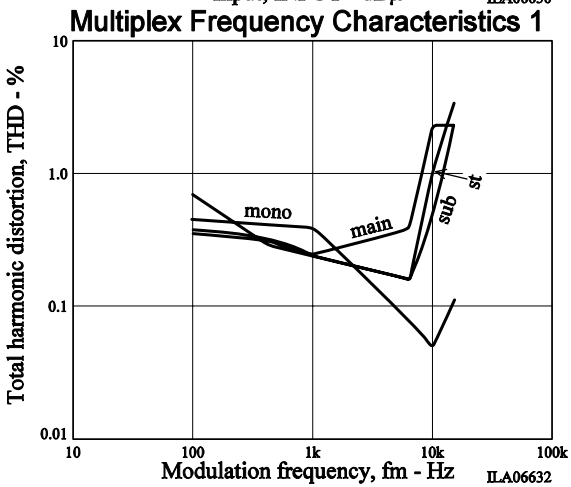
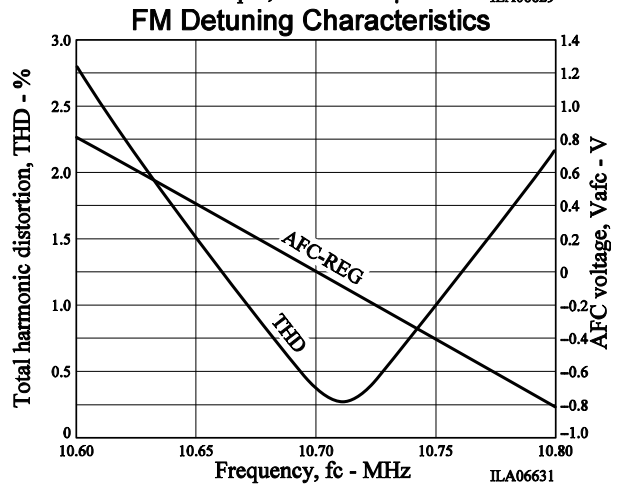
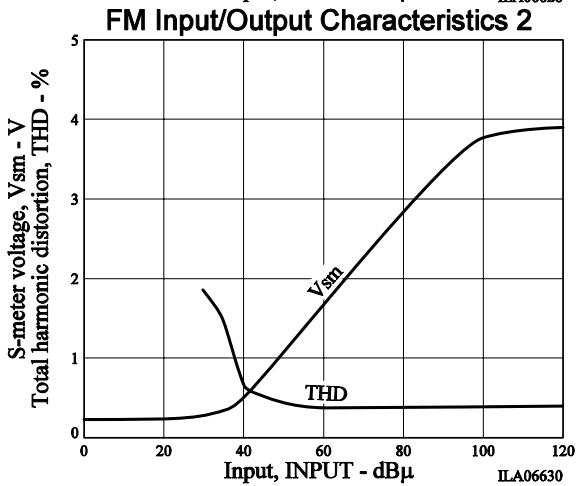
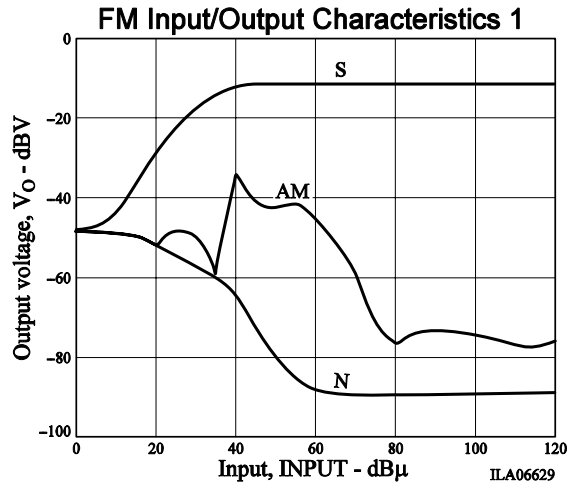
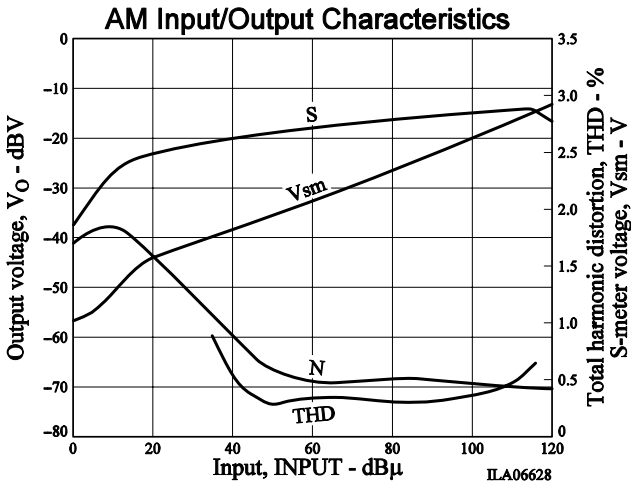
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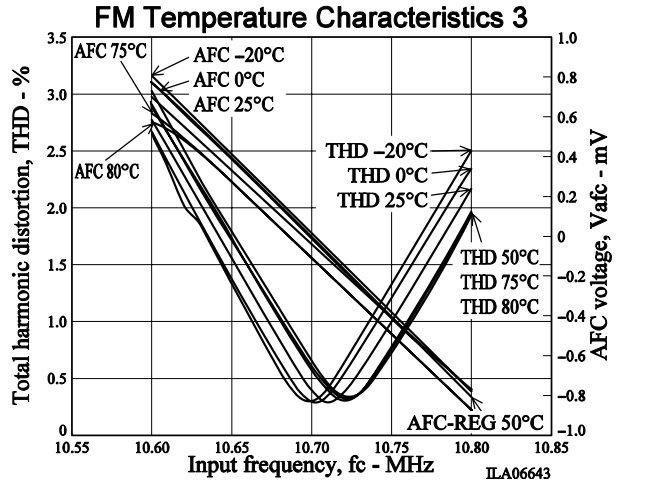
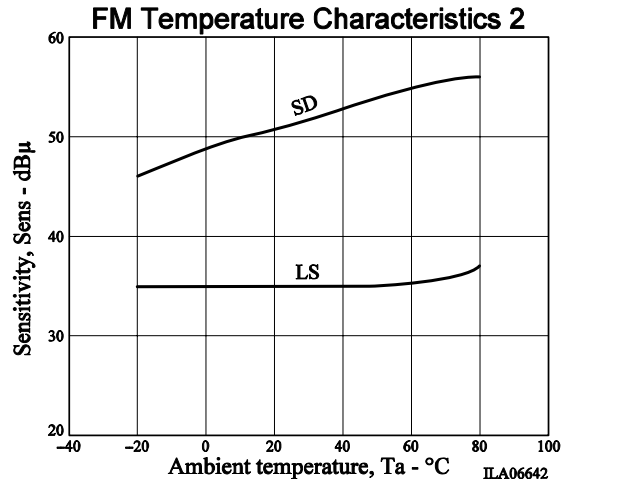
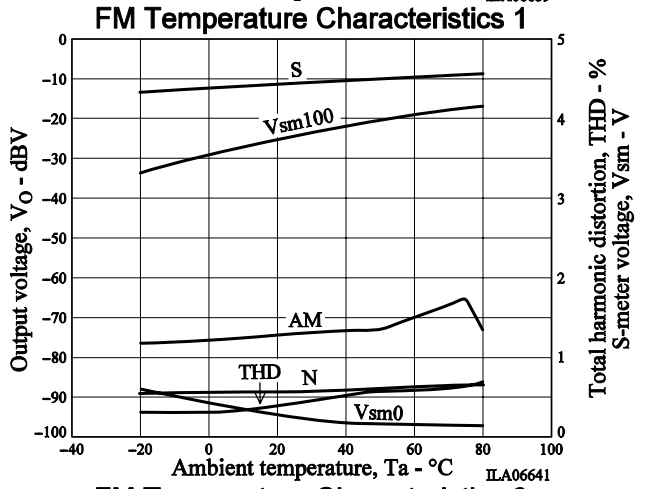
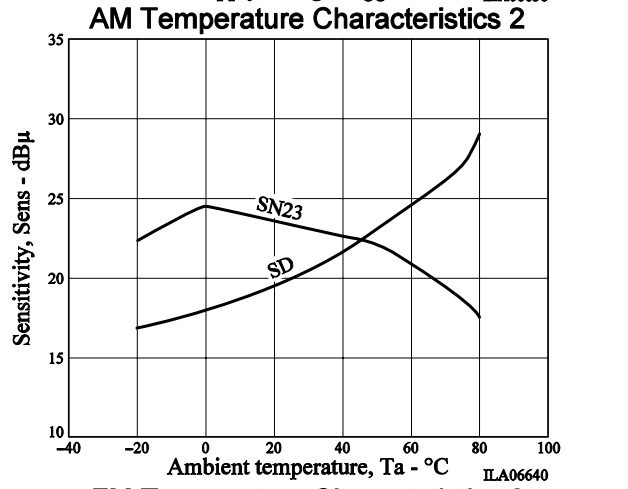
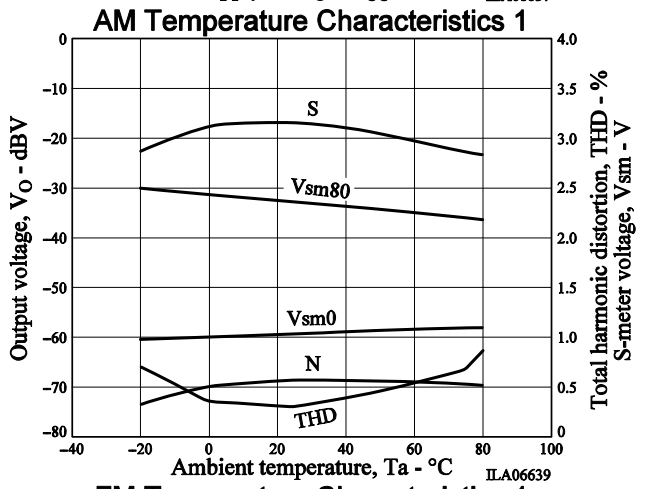
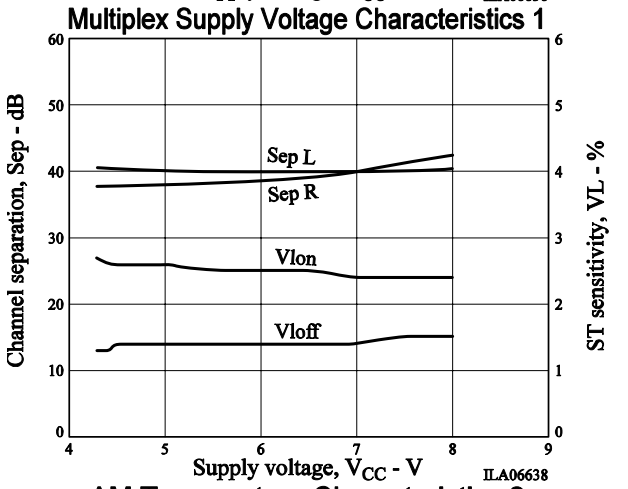
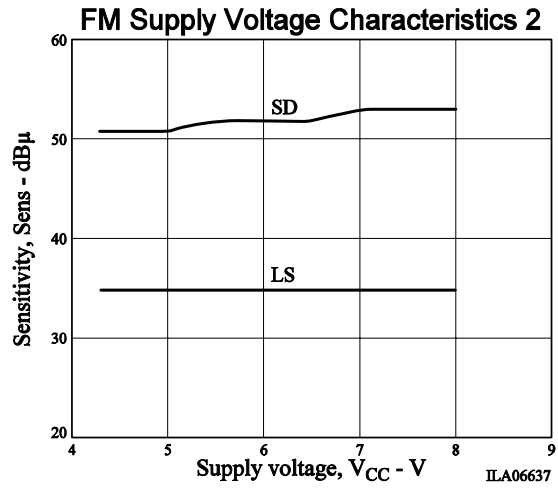
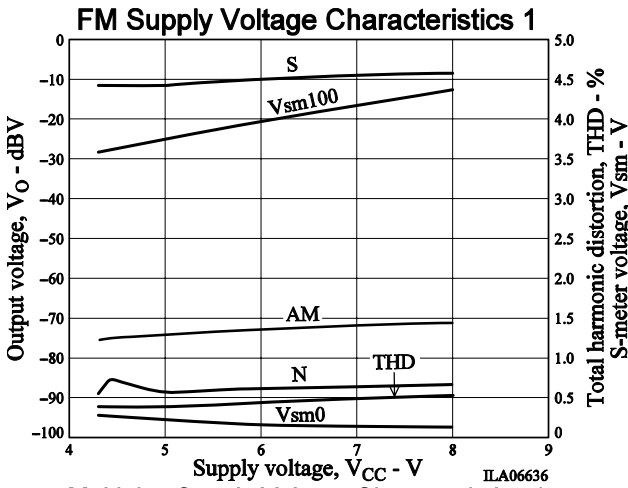
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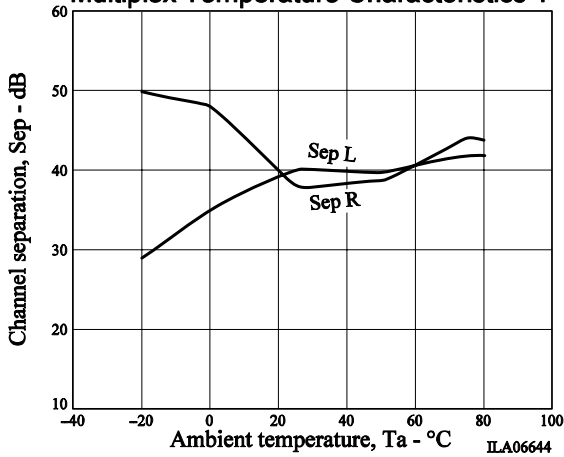
Pin No.	Function	Pin voltage (V)	Equivalent circuit	Notes
21	AM RF input	Vreg		Must be used at the same potential as pin 22
22	AFC	Vreg		The FM SD bandwidth can be adjusted with the external resistor connected between this pin and pin 3 (REG)
23	OSC	V <sub>CC</sub>		Connect the oscillator coil between this pin and pin 9 (V <sub>CC</sub> ) Note: Impedance of the secondary oscillator coil must be 5kΩ or higher.
24	Oscillator buffer output, FM SD sensitivity adjustment	V <sub>CC</sub> -1.4		The FM SD sensitivity can be adjusted with an external resistor connected to this pin. Output impedance R <sub>O</sub> = 200Ω Note: Resistance of the external resistor connected to the pin 24 must be 3.3kΩ or higher.



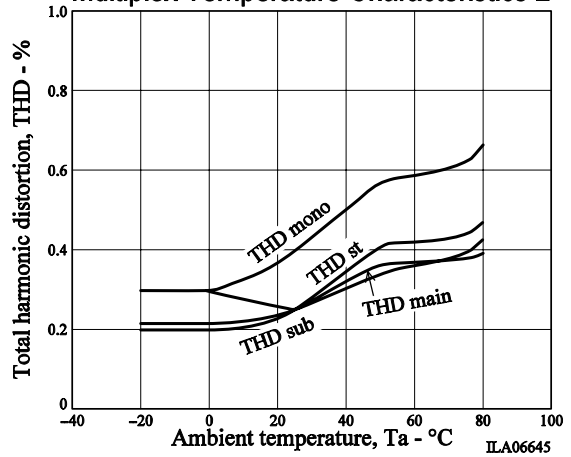




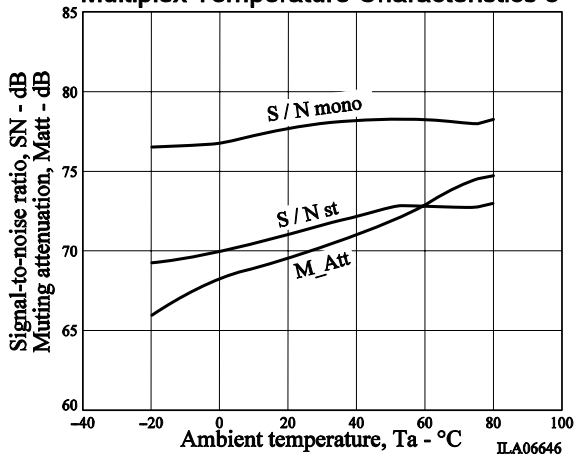
Multiplex Temperature Characteristics 1



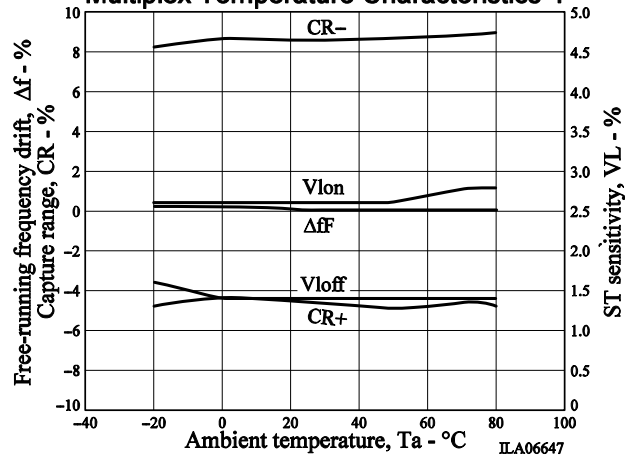
Multiplex Temperature Characteristics 2



Multiplex Temperature Characteristics 3



Multiplex Temperature Characteristics 4



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