BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC1227V

FM MULTIPLEX STEREO DEMODULATOR
SILICON MONOLITHIC BIPOLAR INTEGRATED CIRCUIT

DESCRIPTION

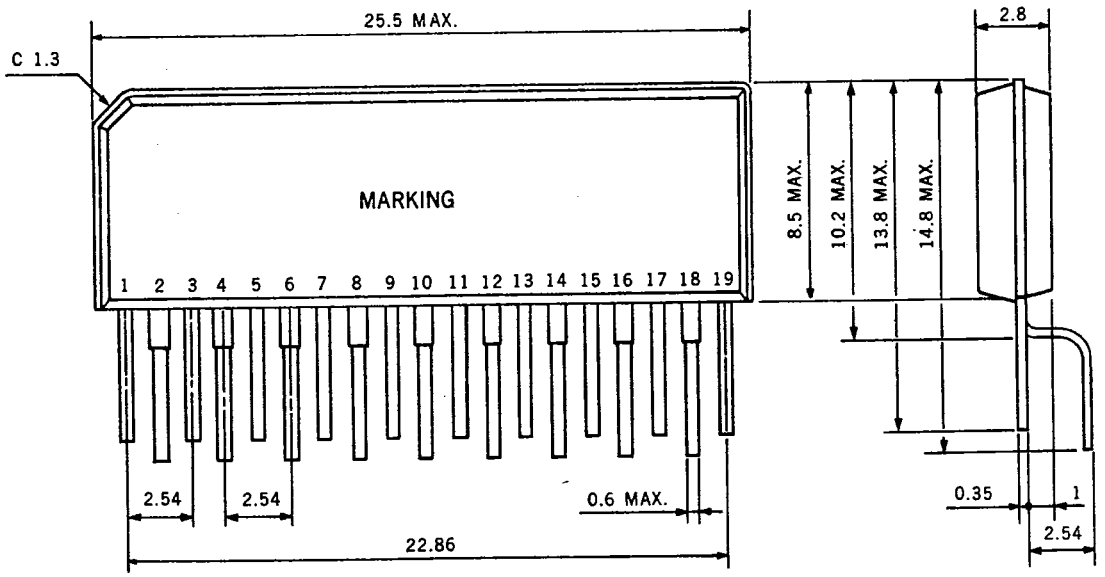
The μPC1227V is a silicon monolithic integrated circuit designed for FM multiplex stereo demodulator applications in FM stereo radio receivers using phase locked loop (PLL) techniques.

The device includes a variable blend facility that gives a smooth change from monaural to stereo reception. It also includes independent separation adjustment for L and R channels, forced monaural and VCO stop functions. Outline is a new developed 19-lead Vertical Dual In-Line Plastic Package (V-DIP), so that it is suitable for use in automotive radio receivers, where small mounting space is required.

FEATURES

- No coil necessary, all tuning performed with a single potentiometer.
- Automatic stereo/monaural switching.
- High Voltage gain: $A_V = -0.6$ dB ($R_L = 3.9$ kΩ)
- Easy to handle because of its V-DIP construction
- Reduction of the occupation of mounting area in P.C. Board and hand-insertion time, due to the external shape of the V-DIP.
- Free of mismounting due to its lead formation.
- Stereo noise reduction
- White Noise reduction
- Independent separation adjustment
- Wide supply voltage range: $V_{CC} = 6$ to 14 V

PACKAGE DIMENSIONS in millimeters



ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C)

Supply Voltage	V_{CC}	16	V
Package Dissipation (Ta = 75 °C)	P_D	430	mW
Lamp Driver Current (Pin 9)	I_L	75	mA
Operating Temperature	T_{opt}	−30 to +75	°C
Storage Temperature	T_{stg}	−40 to +125	°C

RECOMMENDED OPERATING CONDITIONS (Ta = 25 °C)

Operating Supply Voltage	V_{CC}	8	V
Supply Voltage Range	V_{CC}	6 to 14	V
Operating Ambient Temperature	Ta	−30 to +75	°C

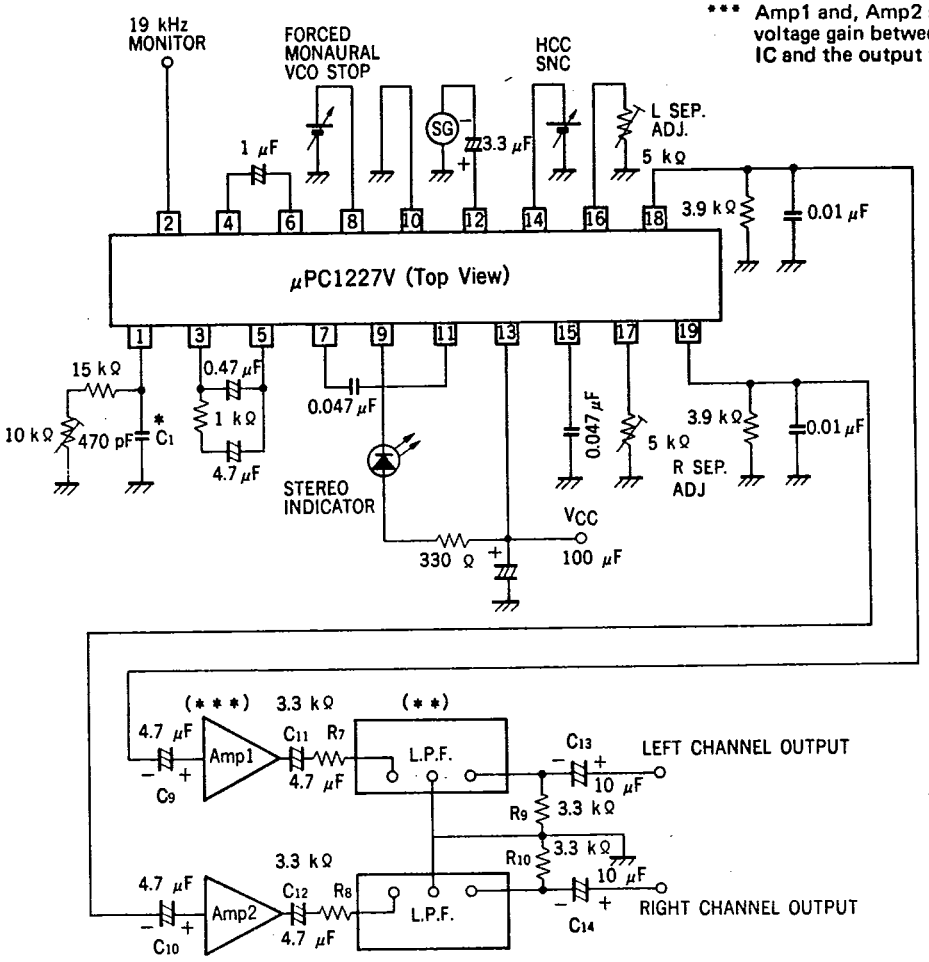
ELECTRICAL CHARACTERISTICS

[Ta = 25 °C, V_{CC} = 8 V, v_{in} = 300 mV $\left(\frac{\text{Pilot}}{\text{Composite}} = \frac{1}{10}\right)$, f = 1 kHz, R_L = 3.9 kΩ]

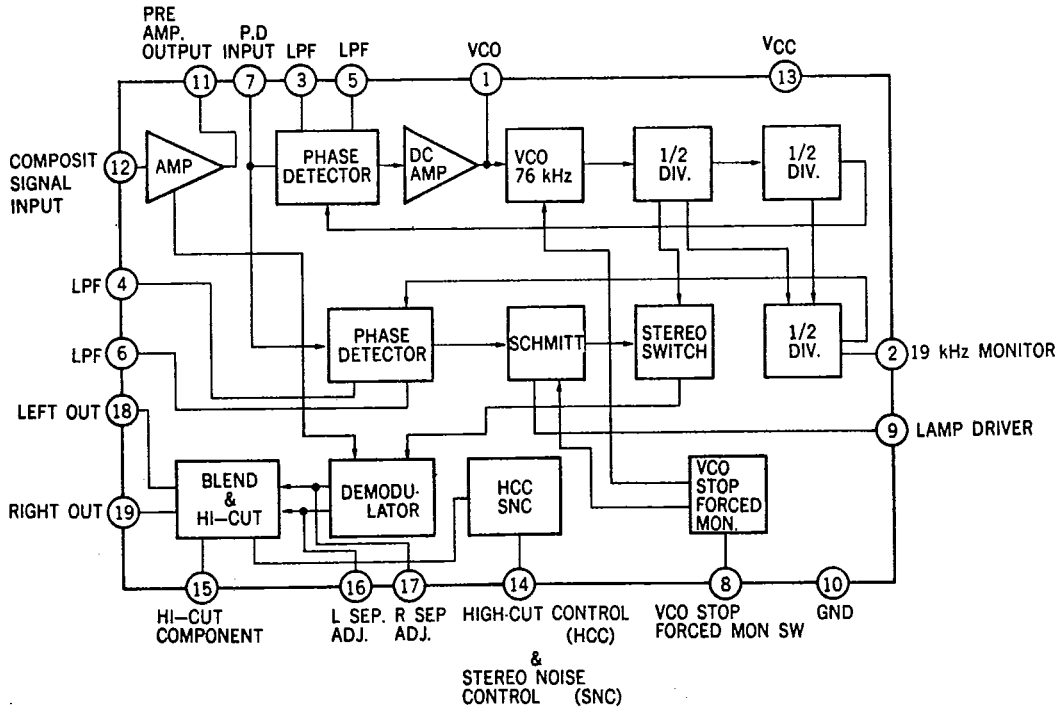
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Circuit Current	I_{CC}	12	20	28	mA	Quiescent
Input Impedance	Z_I		50		kΩ	
Stereo Channel Separation	Sep.	35	45		dB	f = 100 Hz, $v_{in\ (Pilot)}$ = 30 mV
		40	55		dB	f = 1 kHz, $v_{in\ (Pilot)}$ = 30 mV
		35	45		dB	f = 10 kHz, $v_{in\ (Pilot)}$ = 30 mV
Voltage Gain	A_v	−3.5	−0.6	+2.5	dB	Monaural input, $v_{in\ (L+R)}$ = 300 mV
Channel Balance	Ch.B.	−2	0	+2	dB	Monaural Input, $v_{in\ (L+R)}$ = 300 mV
	Ch.B.	−2	0	+2	dB	Stereo Input, $v_{in\ (Pilot)}$ = 30 mV
Total Harmonic Distortion	T.H.D.		0.05	0.3	%	Monaural Input, $v_{in\ (L+R)}$ = 300 mV
			0.05	0.3	%	Stereo Input, $v_{in\ (Pilot)}$ = 30 mV
Lamp Indicator Input Level	LAMP ON	4	8	12	mV	Pilot Level
Lamp Hysteresis			4		dB	Pilot Level
Capture Range	C.R.	±2	±4		%	$v_{in\ (Pilot)}$ = 30 mV
Ultrasonic Frequency Rejection	19 kHz Rej.		35		dB	19 kHz, $v_{in\ (Pilot)}$ = 30 mV
	38 kHz Rej.		45		dB	38 kHz, $v_{in\ (Pilot)}$ = 30 mV
SCA Rejection	SCA Rej.		70		dB	$\frac{\text{Pilot}}{\text{Composite}} = \frac{1}{10}$, $\frac{\text{SCA}}{\text{Composite}} = \frac{1}{10}$
Maximum Input Level	v_i	0.6	1.0		Vr.m.s.	Monaural Input, T.H.D. = 1 %
Signal-to-Noise Ratio	S/N	70	80		dB	Monaural Input, $v_{in\ (L+R)}$ = 300 mV
Forced Monaural Level	V_{mono}	0.8			V	#8 terminal
VCO Stop Level	V_{stop}	0.8			V	#8 terminal
Stereo Channel Separation	Sep. C1	0		3	dB	V_{14} = 0.4 V
	Sep. C2		17		dB	V_{14} = 1.0 V
	Sep. C3	40	55		dB	V_{14} = 1.6 V
Voltage Gain	A_{vH}	−23.5	−19	−15	dB	V_{14} = 0.4 V, f = 10 kHz

TEST CIRCUIT

* POLYSTYLENE CAPACITOR
** LOW PASS FILTER: BL – 13 (KORIN LAB.)
*** Amp1 and, Amp2 should be set so that, the voltage gain between the output terminal of the IC and the output terminal of the LPF is 0 dB

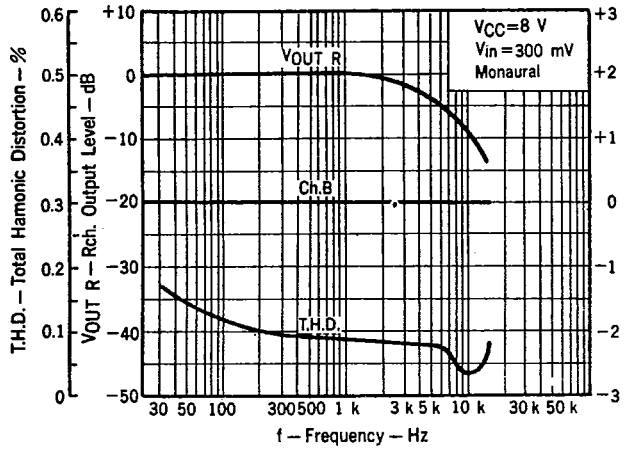


BLOCK DIAGRAM

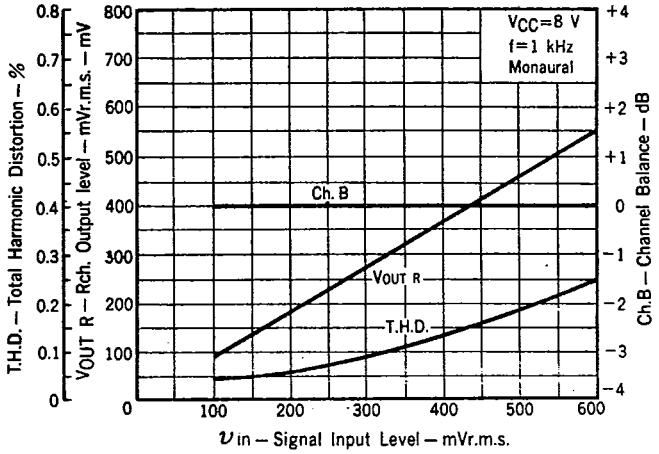


TYPICAL CHARACTERISTICS (Ta = 25 °C)

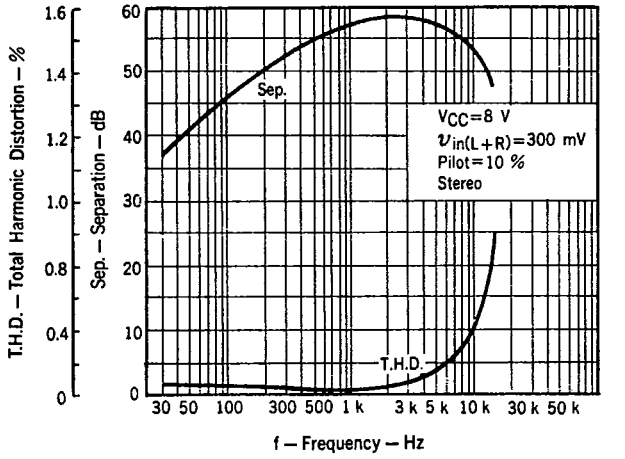
Rch. OUTPUT LEVEL, TOTAL HARMONIC DISTORTION, CHANNEL BALANCE vs. FREQUENCY



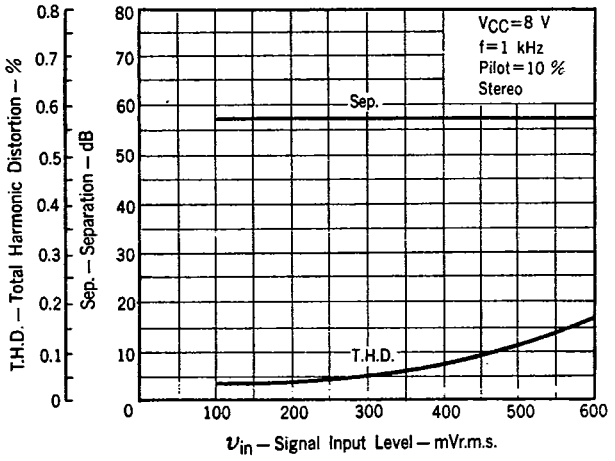
TOTAL HARMONIC DISTORTION, Rch. OUTPUT LEVEL, CHANNEL BALANCE vs. SIGNAL INPUT LEVEL



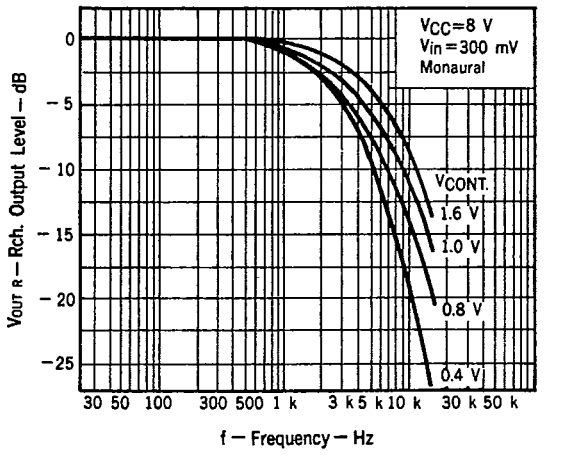
TOTAL HARMONIC DISTORITION, SEPARATION vs. FREQUENCY



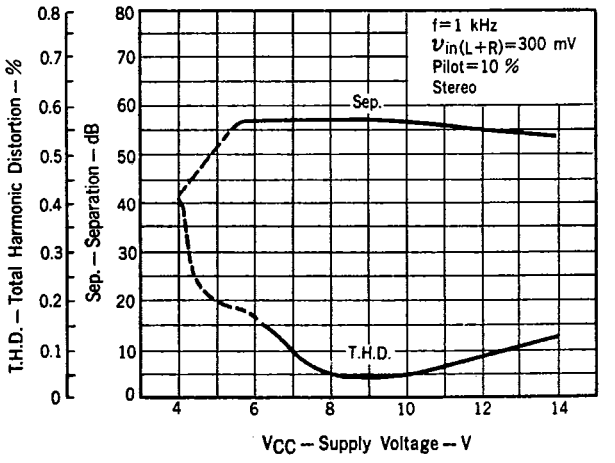
TOTAL HARMONIC DISTORTION, SEPARATION vs. SIGNAL INPUT LEVEL



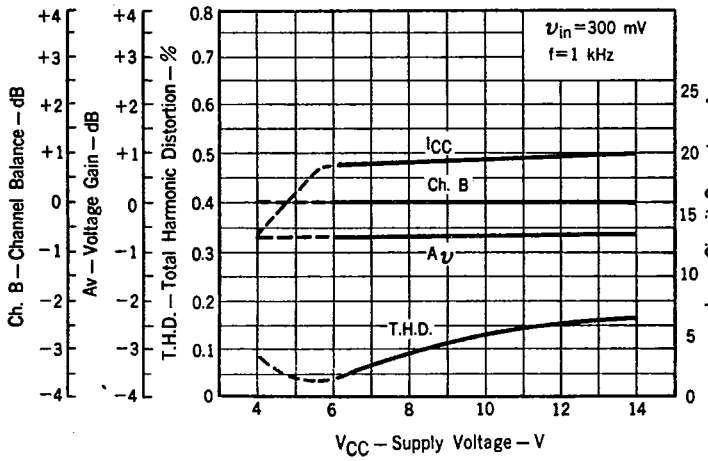
Rch. OUTPUT LEVEL vs. FREQUENCY



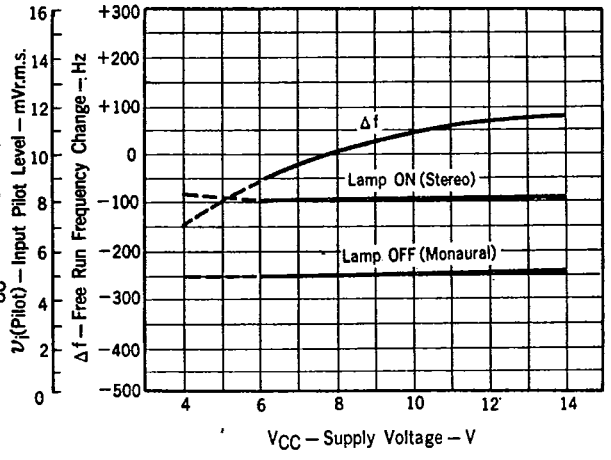
TOTAL HARMONIC DISTORTION, SEPARATION vs. SUPPLY VOLTAGE



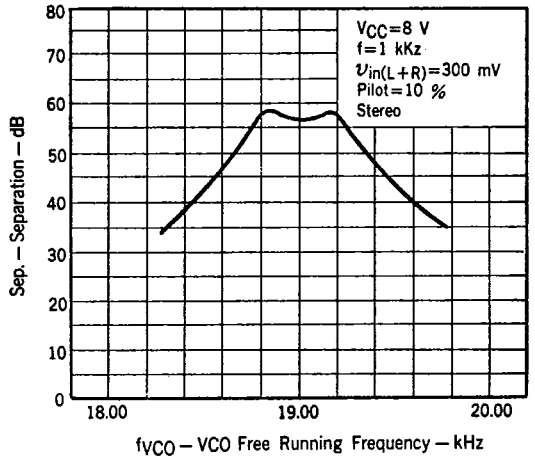
CHANNEL BALANCE, VOLTAGE GAIN, TOTAL HARMONIC DISTORTION, CIRCUIT CURRENT vs. SUPPLY VOLTAGE



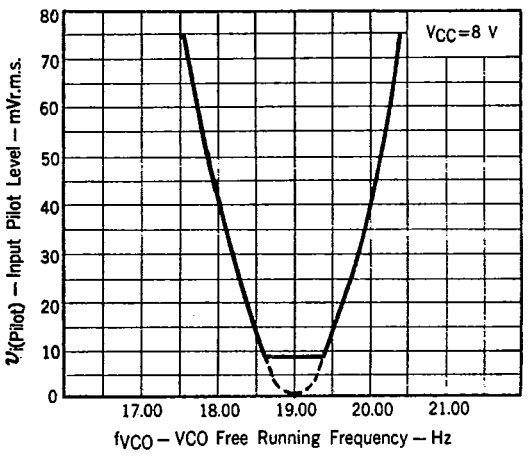
INPUT PILOT LEVEL, FREE RUN FREQUENCY CHANGE vs. SUPPLY VOLTAGE



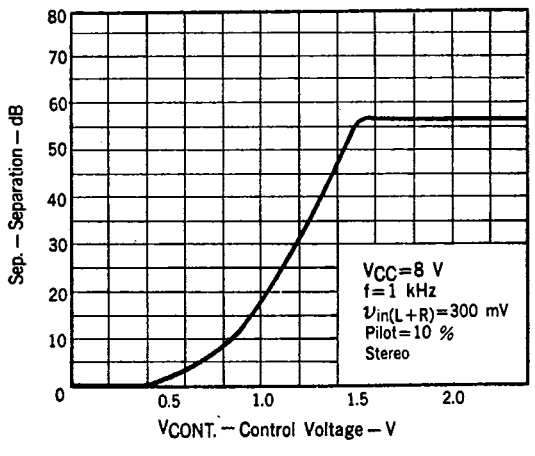
SEPARATION vs. VCO FREE RUNNING FREQUENCY



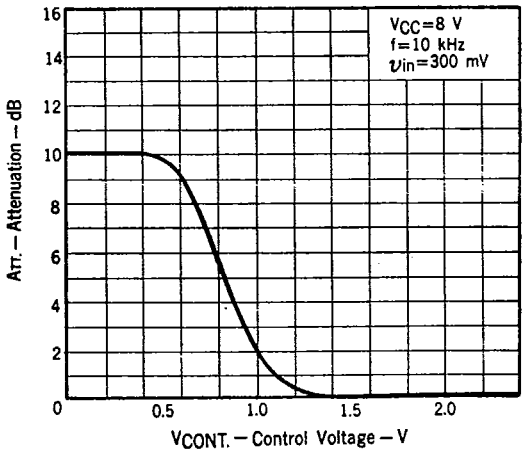
CAPTURE RANGE



SEPARATION vs. CONTROL VOLTAGE (SNC)



ATTENUATION vs. CONTROL VOLTAGE (HCC)



COMPONENTS LAYOUT FOR P.C. ASSEMBLY (Copper side)