

NEC
 ELECTRONIC DEVICE

BIPOLAR ANALOG INTEGRATED CIRCUIT

μ PC1197C

FM MULTIPLEX STEREO DEMODULATOR

SILICON MONOLITHIC BIPOLAR INTEGRATED CIRCUIT

DESCRIPTION

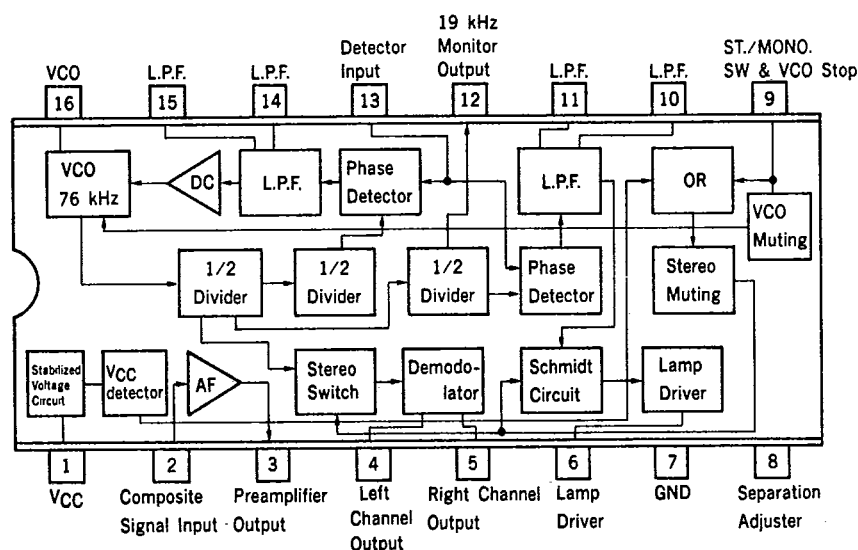
The μ PC1197C is a silicon monolithic integrated circuit for FM multiplex demodulator designed for stereo cassette tape recorder with radio receiver, car stereo and car radio operated at a low supply voltage.

The circuit consists of a voltage control oscillator (VCO) for a demodulator and a phase locked loop (PLL), phase comparators, low pass filters (LPF), frequency dividers and a DC amplifier. It also contains accessory circuits such as separation adjuster stereo-monoaural switcher, VCO stopper and stereo-monoaural switcher in depressed supply voltage.

FEATURES

- No coil is needed due to PLL (Phase Locked Loop) system. The absence of coil, essential component in conventional systems, enable to reduce the number of external components and save manpower for adjustments.
- The circuit provides stability in a wide range of power supply voltage. ($V_{CC} = 4$ to 16 V)
- A stereo/monaural switch can be controlled by a DC voltage obtained from IF signal by smoothing. It is also designed to provide very small shock noise generated when the stereo/monaural is switched.
- VCO, an unnecessary function for AM reception, can be stopped simply by connecting the control terminal to the power supply. ($V_{CC} - 3.0$ V)
- When the power supply voltage is depressed the mode is forced to shift to monaural. (Forced monaural reception; $V_{CC} - 3.5$ V)
- Separation adjustment terminal enables to adjust optimum channel separation.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

Power Supply Voltage	V_{CC}	16	V
Allowable Power Dissipation	P_D	350*	mW
Operational Temperature	T_{opt}	-20 to +75	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to +125	$^\circ\text{C}$

* $T_a = 75^\circ\text{C}$ **RECOMMENDED OPERATION CONDITIONS ($T_a = 25^\circ\text{C}$)**

Supply Voltage Range	V_{CC}	4 to 16 V
Operating Voltage	V_{CC}	9 V

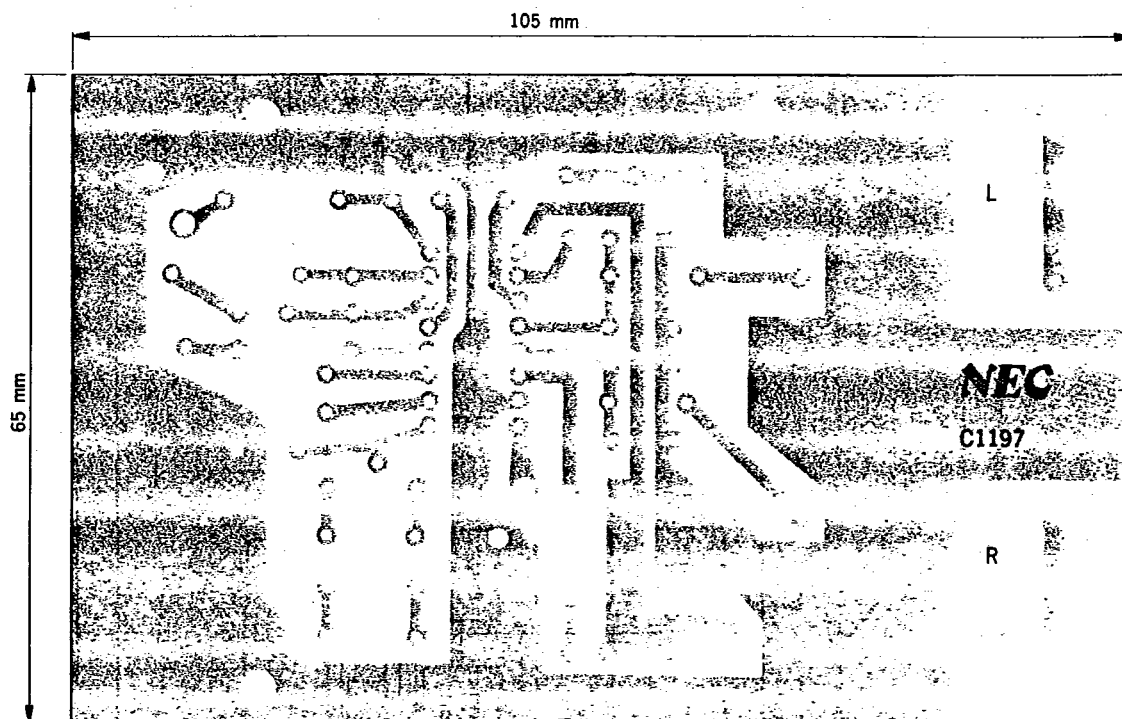
ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$, $V_{CC} = 9\text{ V}$, $v_i = 200\text{ mV}$, $L = 45\%$, $R = 45\%$, Pilot = 10 %)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
Circuit Current	I_{CC}		12		mA	Without signal
Separation	Sep.	30	45		dB	$f = 100\text{ Hz}$
		40	55		dB	$f = 1\text{ kHz}$
		30	45		dB	$f = 10\text{ kHz}$
Monaural Total Harmonic Distortion	T.H.D.		0.3	0.5	%	monaural $V_{in} = 200\text{ mV}$
Stereo Total Harmonic Distortion	T.H.D.		0.2	0.5	%	stereo pilot = 20 mV
Output Voltage	V_O		170		mV	$V_i = 200\text{ mV}$
Channel Balance	Ch. B.	-2	0	2	dB	monaural $V_i = 200\text{ mV}$
Lamp-on Level	LAMP-ON		8		mV	pilot signal
Lamp Hysteresis	Hys. (LAMP)		4		dB	pilot signal
Capture Range	C.R.		± 4		%	pilot = 20 mV
Ultrasonic Frequency Rejection	Rej (19)		35		dB	pilot = 20 mV
	Rej (38)		45		dB	pilot = 20 mV
SCA Rejection ratio	Rej (SCA)		70		dB	$\frac{\text{pilot}}{\text{composite}} = \frac{1}{10}$, $\frac{\text{SCA}}{\text{composite}} = \frac{1}{10}$
Signal to Noise Ratio	S/N		86		dB	$V_i = 200\text{ mV}$
Allowed Maximum Input Level	V_i (MAX)		500		mV	T.H.D. $\leq 2\%$
Forced-monaural Level	V (MONO)		0.7		V	#9 terminal
VCO-stop level	V (STOP)		3.0		V	#9 terminal
Stereo-monaural Switch-over Voltage	V_{CC} (MONO)		3.5		V	Supply Voltage

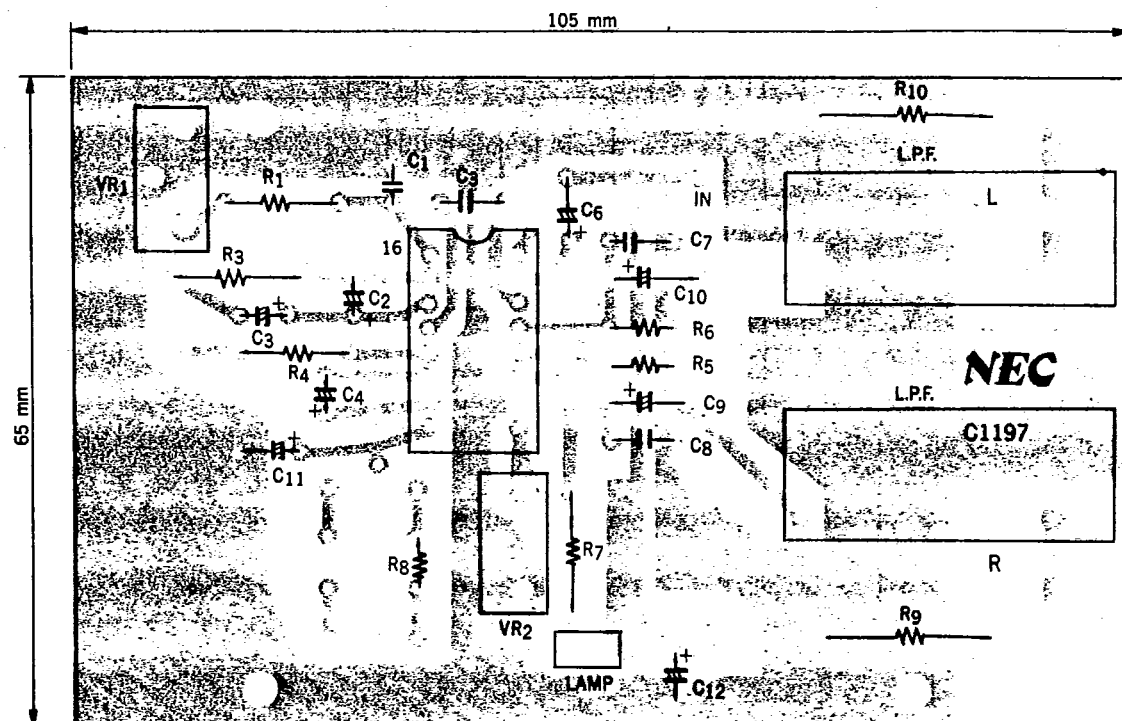
- * **C₁ = 470 pF**
Styrol Capacitor
- ** **L.P.F.**
BL-13 (K.K. KORIN)
- *** **Transistors Q₁ and Q₂**
compensate the gain
depression through LPF's

Typical values are shown unless specified otherwise.

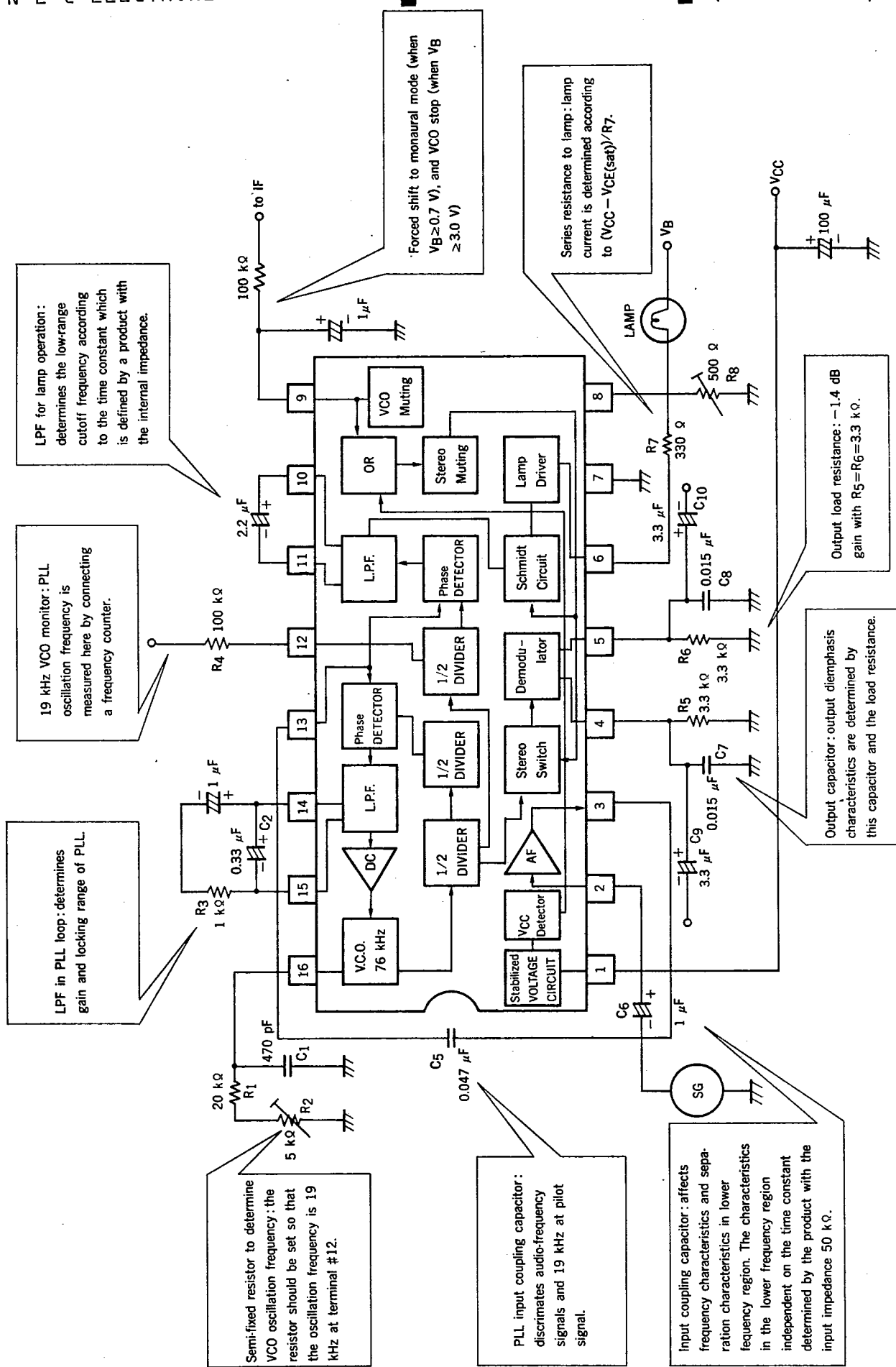
TYPICAL CIRCUIT BOARD ARRANGEMENT (VIEW OF PRINTED WIRING)



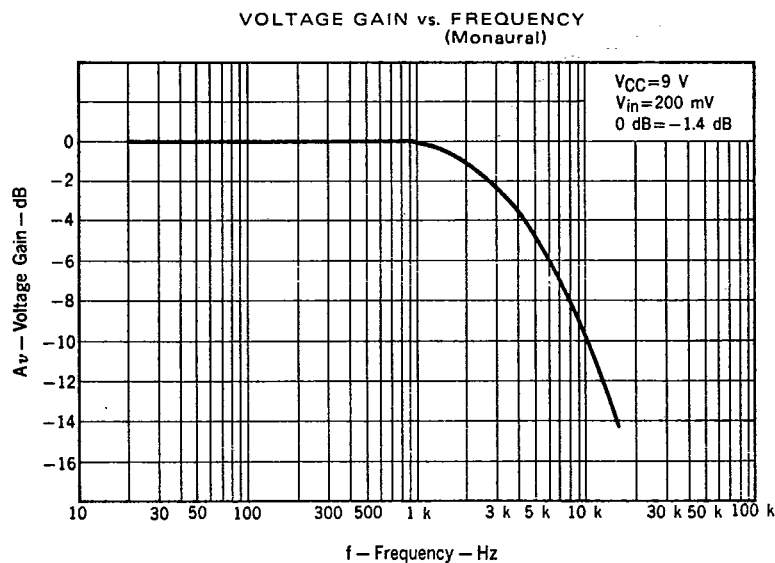
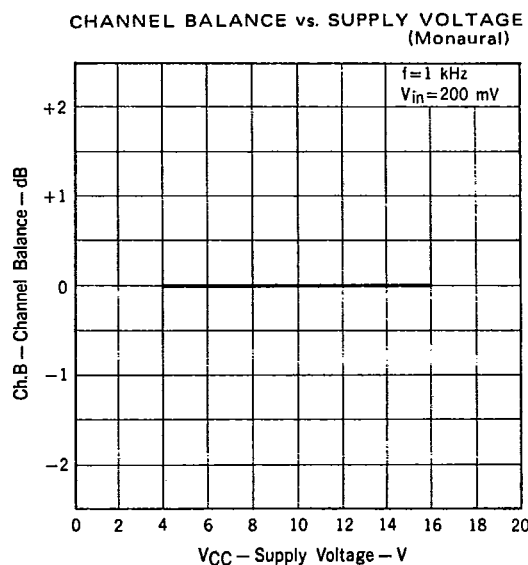
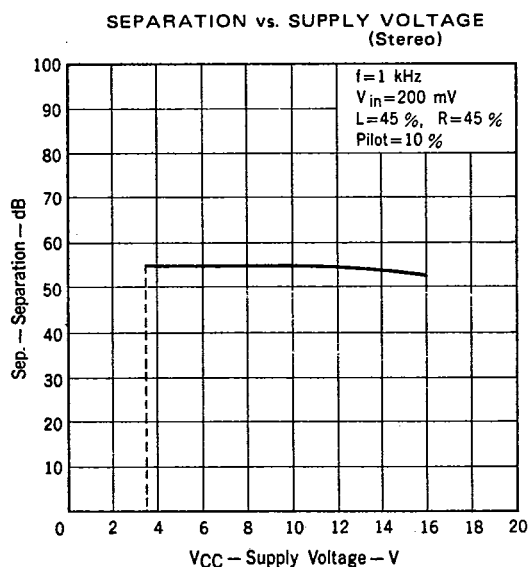
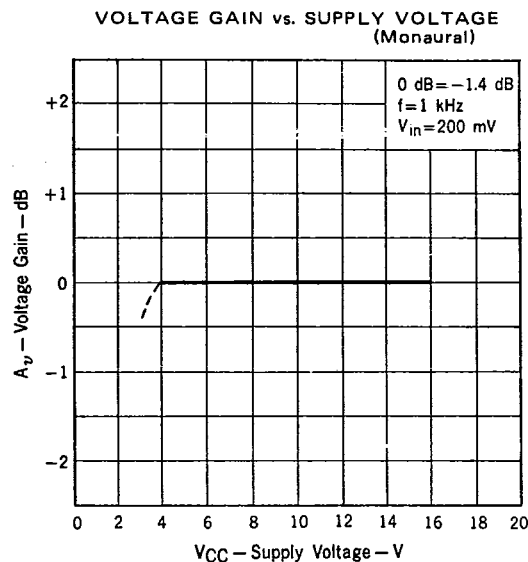
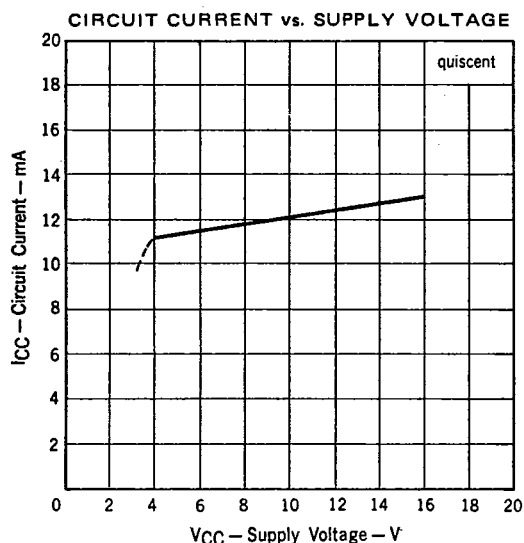
TYPICAL PARTS LOADING (TYPICAL APPLICATION)

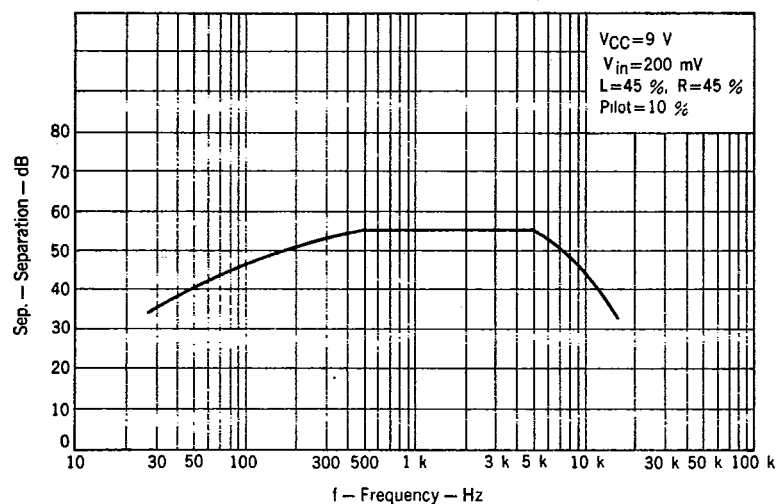
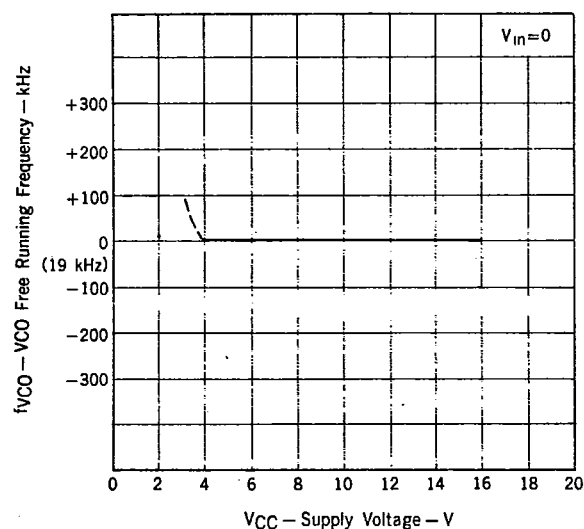
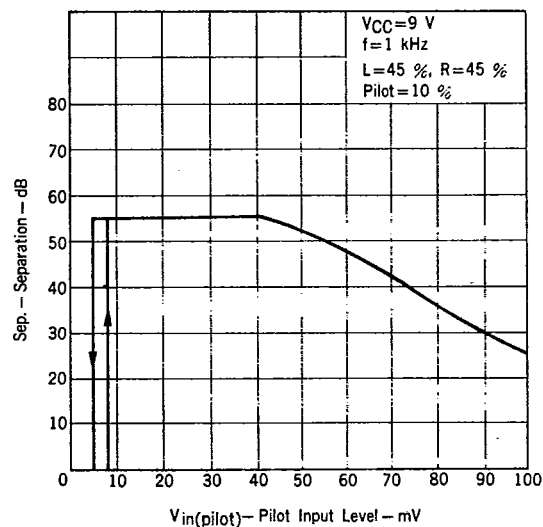
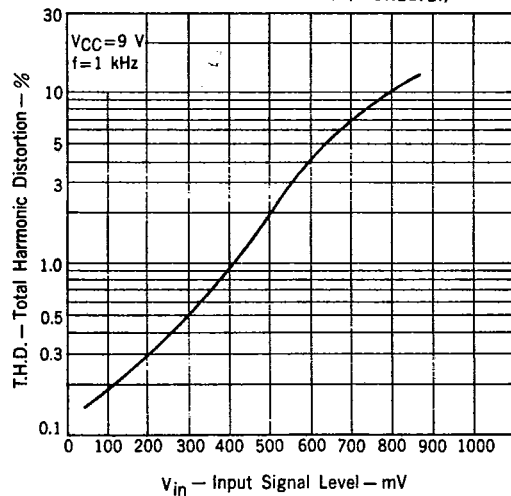
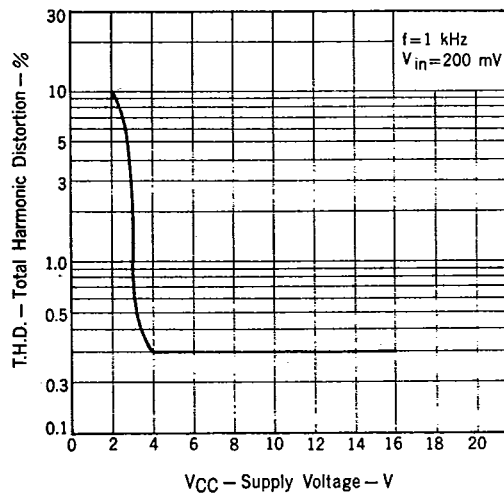
R₁ = 18 k Ω VR₁ = 5 k Ω R₃ = 1 k Ω R₄ = 100 k Ω R₅ = 3.3 k Ω R₆ = 3.3 k Ω R₇ = 330 Ω R₈ = 100 k Ω R₉ = 3.3 k Ω R₁₀ = 3.3 k Ω C₁ = 470 pF (Styrol Capacitor)C₂ = 0.33 μ FC₃ = 1 μ FC₄ = 2.2 μ FC₅ = 0.047 μ FC₆ = 1 μ FC₇ = 0.015 μ FC₈ = 0.015 μ FC₉ = 3.3 μ FC₁₀ = 3.3 μ FC₁₁ = 1 μ FC₁₂ = 100 μ F

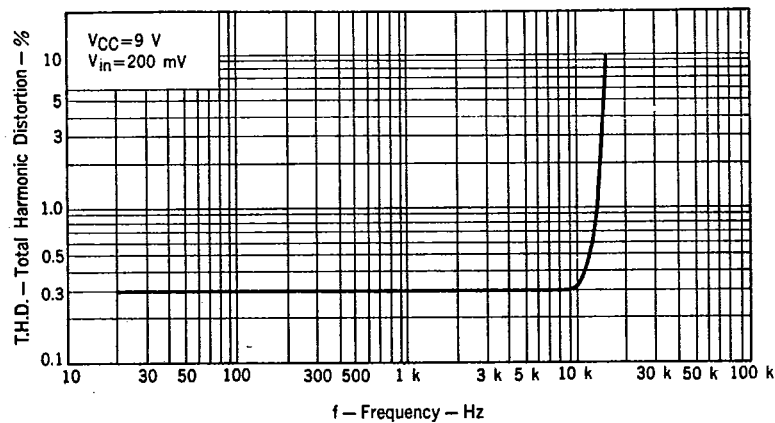
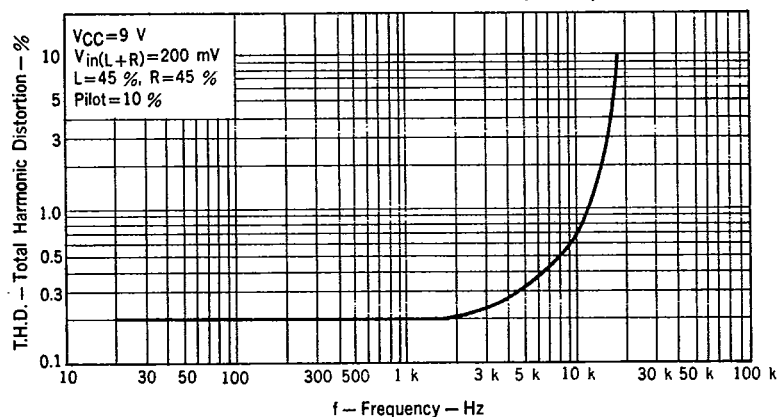
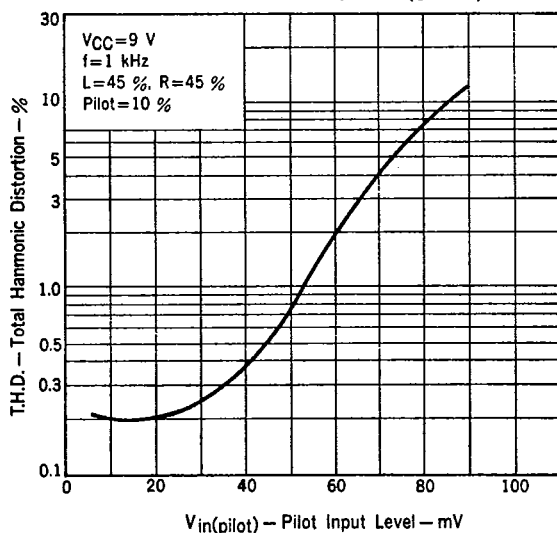
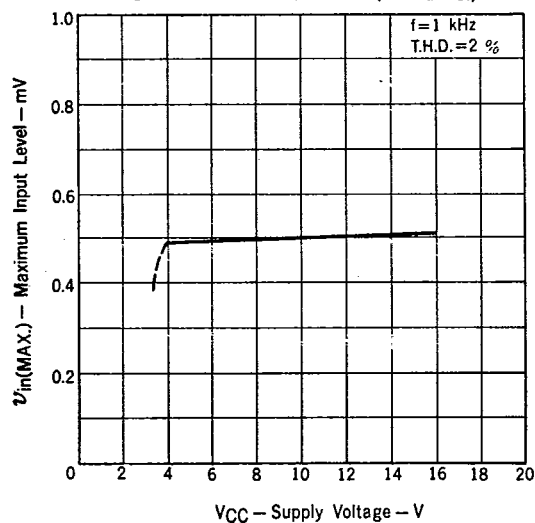
DESCRIPTION OF EXTERNALLY LOADED COMPONENT PARTS

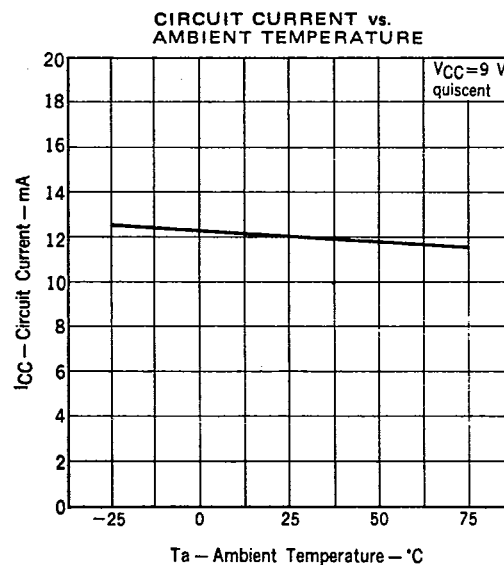
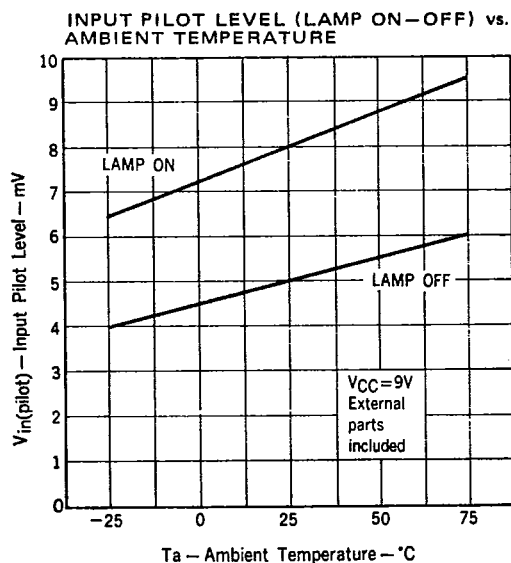
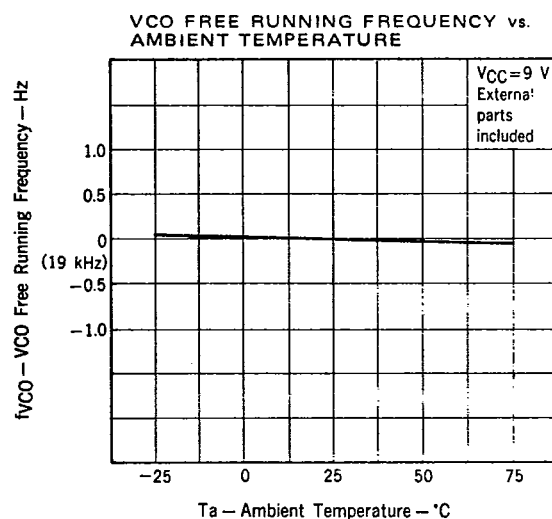
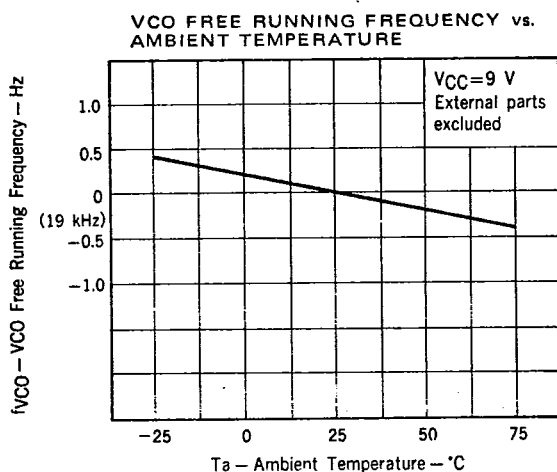
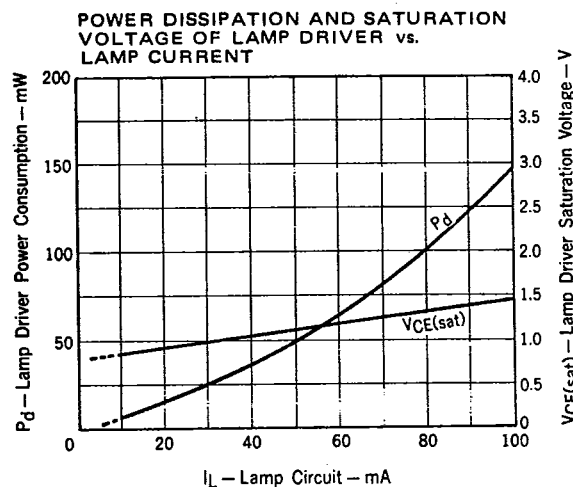
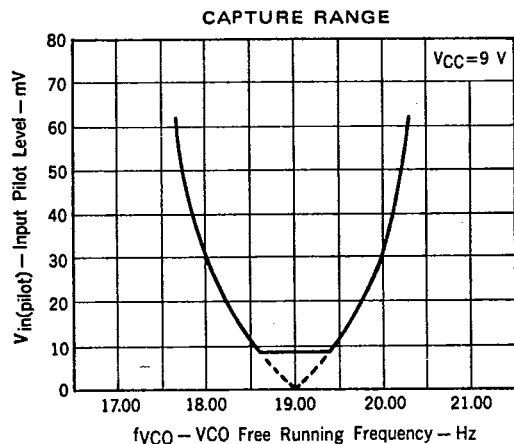


TYPICAL CHARACTERISTICS



SEPARATION vs. FREQUENCY
(Stereo)VCO FREE RUNNING FREQUENCY vs.
SUPPLY VOLTAGESEPARATION vs. PILOT INPUT LEVEL
(Stereo)TOTAL HARMONIC DISTORTION vs.
SIGNAL INPUT LEVEL (Monaural)TOTAL HARMONIC DISTORTION vs.
SUPPLY VOLTAGE (Monaural)

TOTAL HARMONIC DISTORTION vs.
FREQUENCY
(Monaural)TOTAL HARMONIC DISTORTION vs.
FREQUENCY
(Stereo)TOTAL HARMONIC DISTORTION vs.
PILOT INPUT LEVEL
(Stereo)MAXIMUM INPUT LEVEL vs.
SUPPLY VOLTAGE
(Monaural)



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