NEC

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC1215V

ELECTRONIC TUNING AM RADIO RECEIVER
SILICON BIPOLAR MONOLITHIC INTEGRATED CIRCUIT

DESCRIPTION

The μPC1215V is a monolithic integrated circuit that is provided with the mixer, low level oscillator, IF amplifier, detector and station detector for an electronic tuning AM radio receiver.

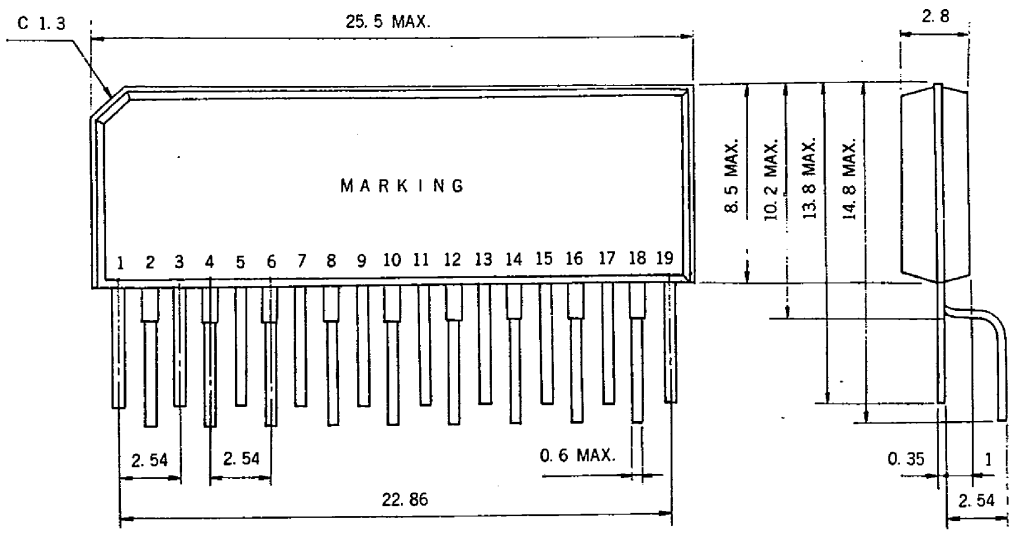
This IC also contains internal AGC for the first IF amplifier stage, delayed AGC for an optional external RF amplifier and oscillator buffer amplifier to drive a logic section.

The μPC1215V is suitable for use in automotive radio receivers, specially where compact mounting is required, such as car stereo sets, because its package is the 19-leads vertical dual in-line plastic package (V-DIP).

FEATURES

- High sensitivity and wide AGC range.
- Excellent overload characteristics.
- Delayed AGC for RF amplifier.
- Special low level oscillator to reduce tracking error.
- Oscillator buffer output.
- Station detector for auto scan stop.
- Occupation of minimum area in P.C. Board.

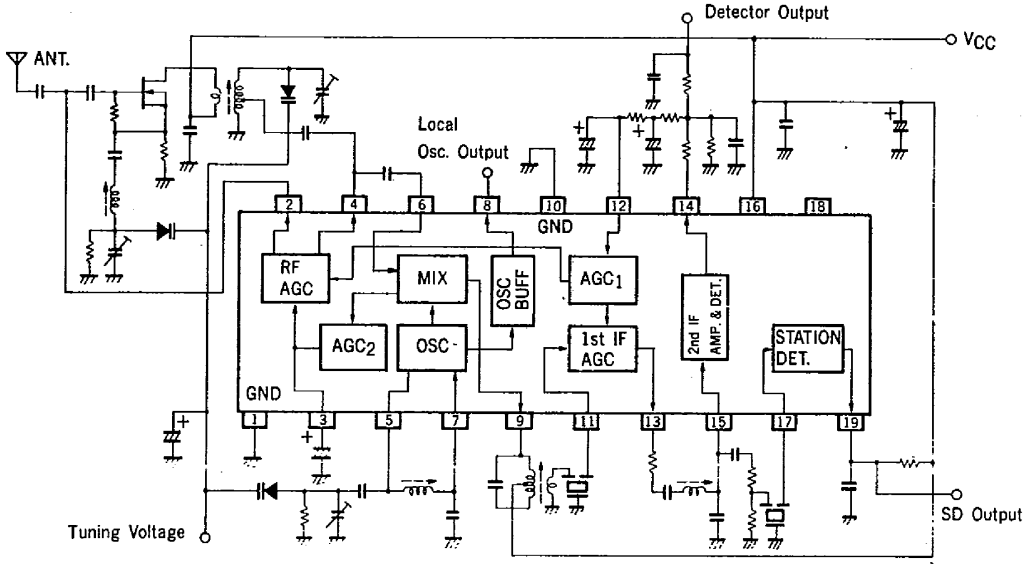
PACKAGE DIMENSIONS (in millimeters)



Nippon Electric Co.,Ltd.

N E C ELECTRONICS INC 72 DE 6427525 0008499 0 T-77-05-05

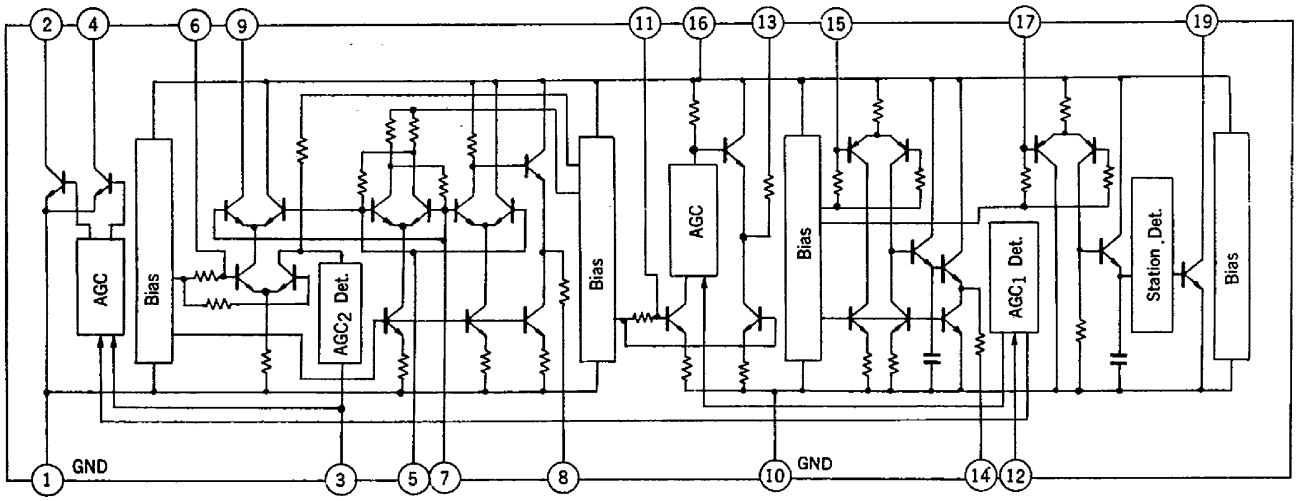
BLOCK DIAGRAM



CONNECTION DIAGRAM

Pin No.	Connection	Pin No.	Connection
1	GND_1	2	AGC for Antenna
3	AGC Filter	4	AGC for RF
5	OSC Tank	6	MIX Input
7	OSC Bypass	8	OSC Buffer Output
9	MIX Output	10	GND_2
11	1st IF Amp. Input	12	AGC Input
13	1st IF Amp. Output	14	Detector Output
15	2nd. IF Amp. Input	16	V_{CC}
17	Station Det. Input	18	
19	Station Det. Output		

EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C)

DC Supply Voltage	V_{CC}	15	V
Input Voltage	V_i	3.0	Vp-p
Package Dissipation	P_d	430 (Ta = 75 °C)	mW
Operating Temperature	T_{opt}	−30 to +75	°C
Storage Temperature	T_{stg}	−40 to +125	°C

RECOMENDED OPERATING CONDITIONS

DC Supply Voltage Range	V_{CC}	8.0 to 15	V
Operating Ambient Temperature	Ta	−30 to +75	°C

ELECTRICAL CHARACTERISTICS (Ta = 25 °C, V_{CC} = 10 V, f = 1.0 MHz, $f_{mod.}$ = 400 Hz, mod. = 30 %)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Circuit Current	I_{CC}	10	14	21	mA	At no signal
Maximum Sensitivity	MS	14	21	28	dBμV	v_o = 30 mVr.m.s.
Signal to Noise Ratio	S/N	8.0	13		dB	v_i = 21 dBμV
Detector Output Volt.*	v_o	70	100	130	mVr.m.s.	v_i = 74 dBμV
Harmonic Distortion	T.H.D.		0.5	1.0	%	v_i = 120 dBμV
SD Output Voltage	VSD-L			0.5	V	v_i = 0 dBμV
	VSD-H	8.0			V	v_i = 74 dBμV

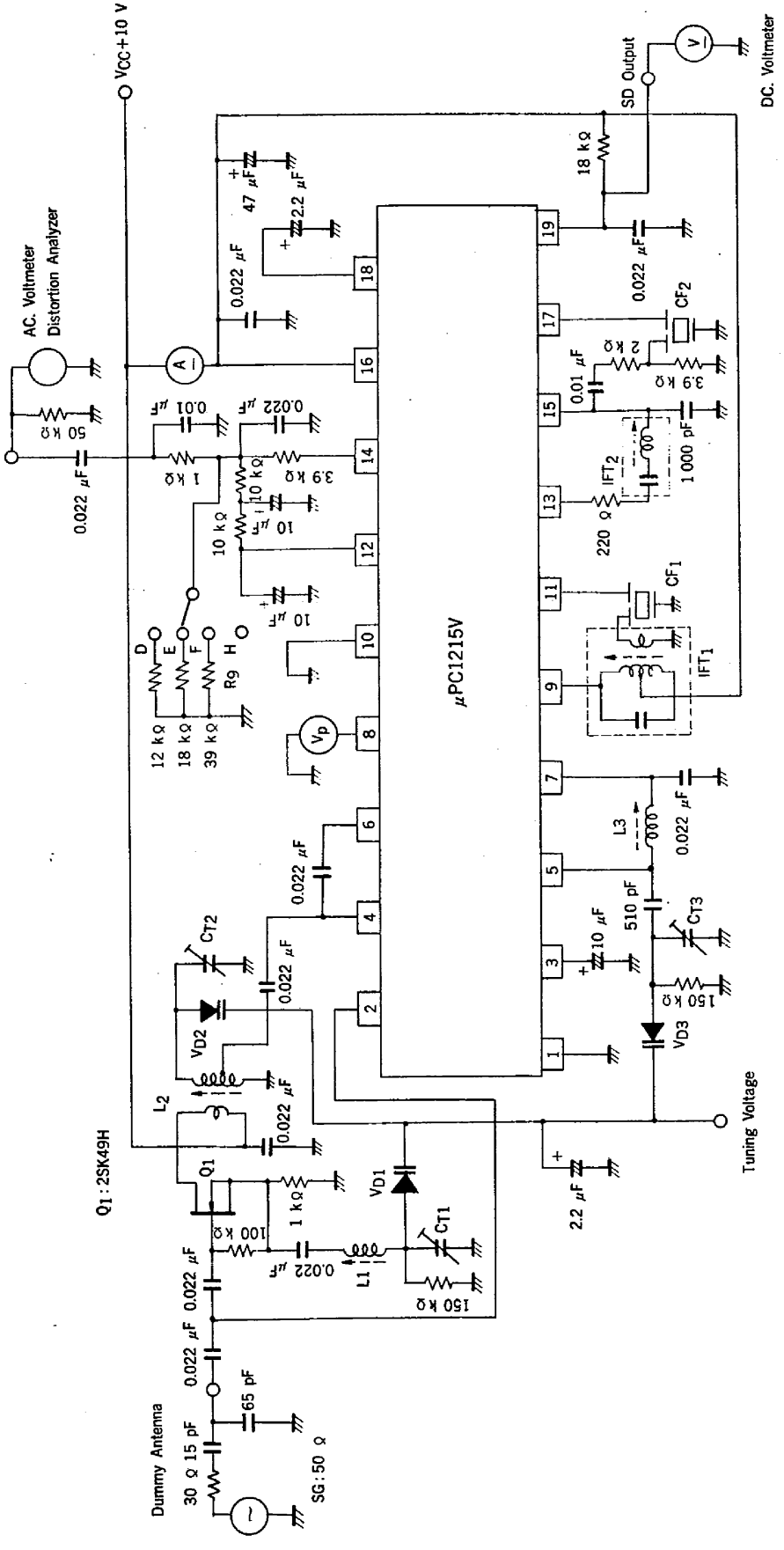
* Detector output voltage is classified into four ranks (D,E,F and H) which have different resistor Rg connected to pin-14.

TUNER PERFORMANCE CHARACTERISTICS

(Ta = 25 °C, V_{CC} = 10 V, f = 1.0 MHz, $f_{mod.}$ = 400 Hz, mod. = 30 %)

CHARACTERISTIC	TEST CONDITION	VALUE	UNIT
Maximum Sensitivity	v_o = 30 mVr.m.s.	22	dBμV
Usable Sensitivity	S/N = 20 dB	28	dBμV
Detector Output Voltage	v_i = 74 dBμV	100	mVr.m.s.
Total Harmonic Distortion	v_i = 74 dBμV	0.3	%
	v_i = 126 dBμV	0.6	%
	v_i = 74 dBμV, mod. = 80 %	1.2	%
Signal to Noise Ratio	v_i = 74 dBμV	52	dB
IF Rejection Ratio	v_o = 30 mVr.m.s., IF = 450 kHz	56	dB
Image Rejection Ratio	v_o = 30 mVr.m.s., f+2 IF	57	dB
Selectivity	Δf = ±10 kHz	39	dB
Tweet	v_i = 74 dBμV, 2 IF = 900 kHz	40	dB
	v_i = 74 dBμV, 3 IF = 1 350 kHz	47	dB
DX Sensitivity	V19 = 8.0 V	26	dBμV
SD Bandwidth	v_i = 74 dBμV, V_{SD} = 7 V	5.0	kHz
Oscillation Voltage	At terminal 5	150	mVr.m.s.
	At terminal 8	4.0	Vp-p

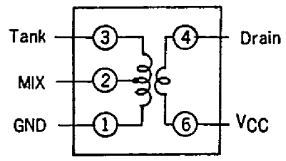
TEST CIRCUIT



COIL DATA

L1 & L2 : Ant. & RF Coil

TYPE 7BR-5407N (Toko Inc.)



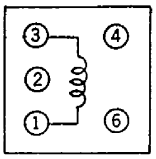
Qu=80 min., L=170 μH

①−②, ②−③, ④−⑥

7T 62T 14T

L3 : OSC Coil

TYPE 7BR-6048Z (Toko Inc.)



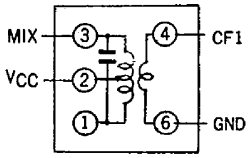
Qu=60 min., L=95 μH

①−③

48T

IFT1 : IFT

TYPE 7MC-4718N (Toko Inc.)



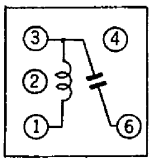
Qu=115±20 %, C=180 pF built in

①−②, ②−③, ④−⑥

69T 77T 14T

IFT2 : IFT

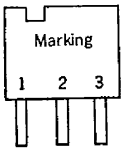
TYPE 7MC-101000CO (Toko Inc.)



L=680 μH, C=180 pF built in

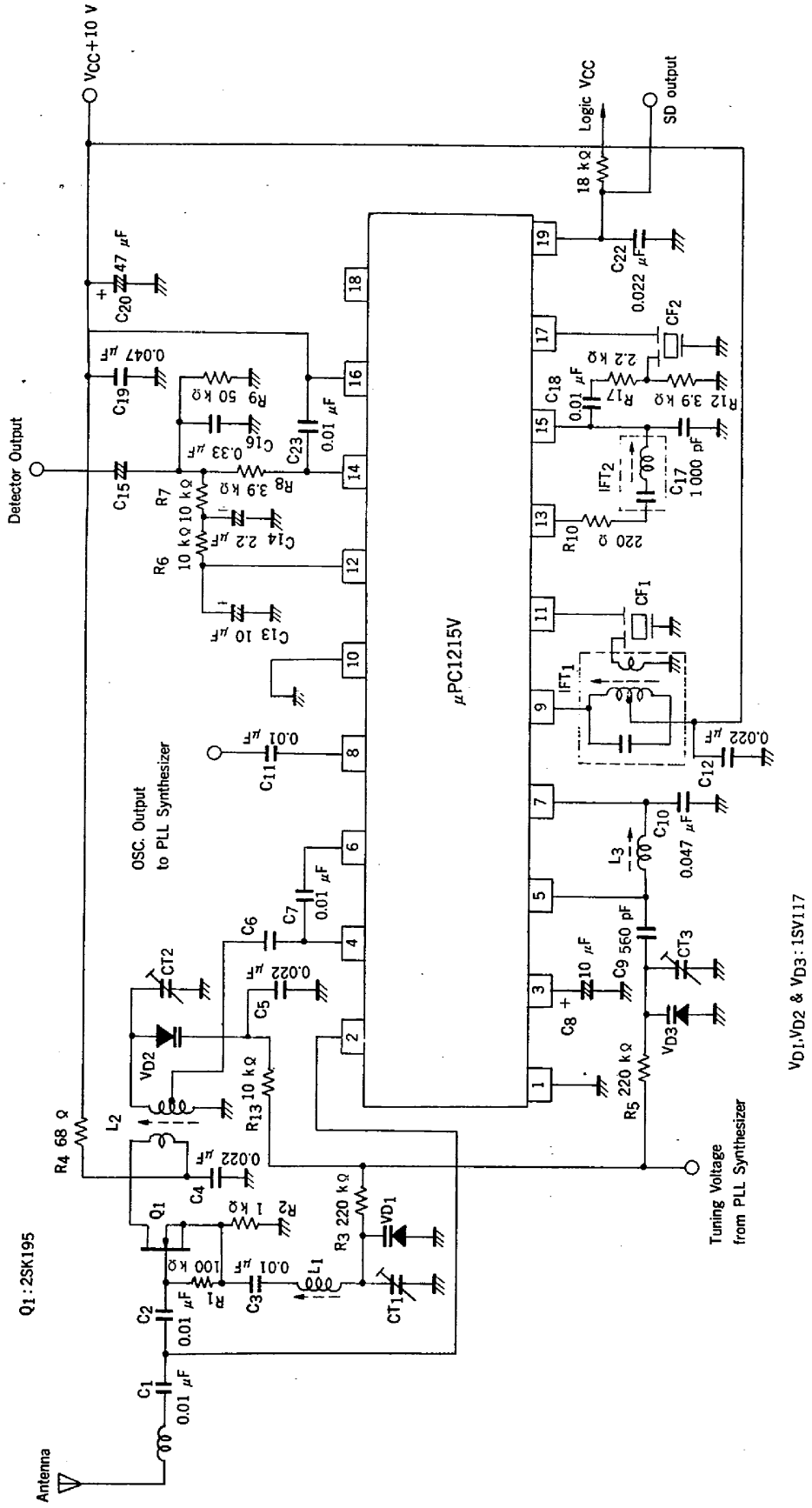
CERAMIC FILTER (Toko Inc.)

	CFM2-450BL	CFM2-450ZL
Center Frequency	450 kHz	450 kHz
6 dB Bandwidth	6 kHz min.	4 kHz min.
Selectivity ±9 kHz	16 dB min.	18 dB min.
Insertion Loss	6 dB max.	6 dB max.
Input Impedance	1.5 kΩ	1.0 kΩ
Output Impedance	2.0 kΩ	1.5 kΩ



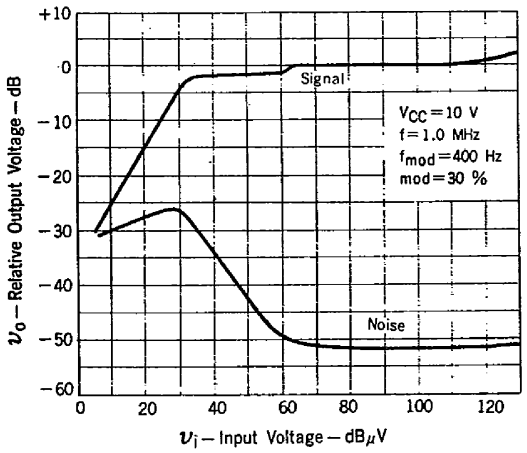
1 : Input
2 : GND
3 : Output

TYPICAL APPLICATION

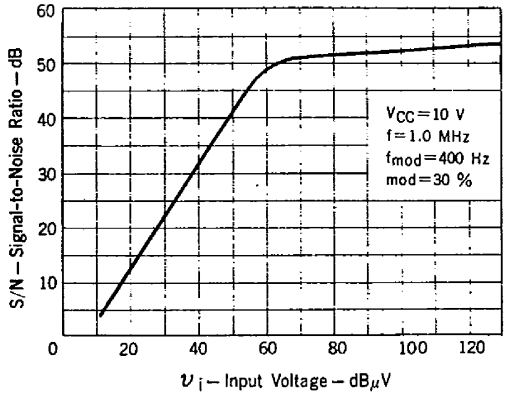


TYPICAL CHARACTERISTICS (Ta = 25 °C)

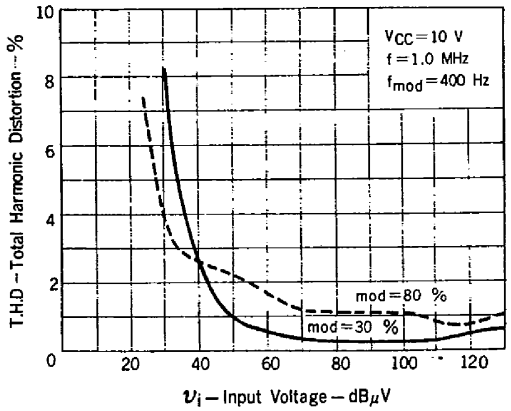
DETECTOR OUTPUT CHARACTERISTICS



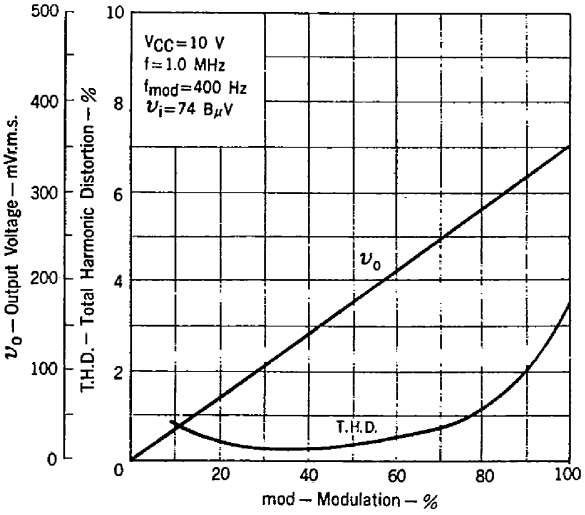
SIGNAL-TO-NOISE RATIO



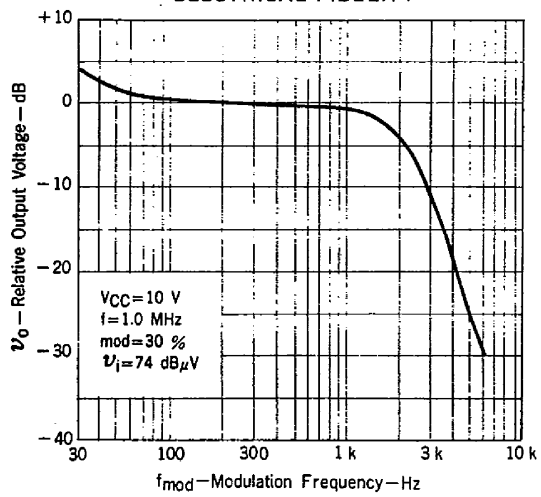
TOTAL HARMONIC DISTORTION vs. INPUT VOLTAGE



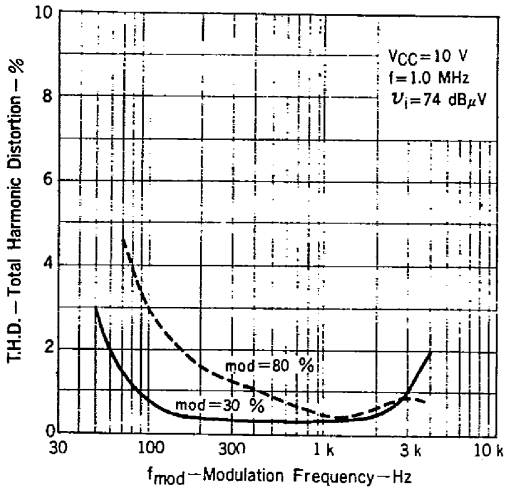
OUTPUT VOLTAGE AND TOTAL HARMONIC DISTORTION vs. MODULATION



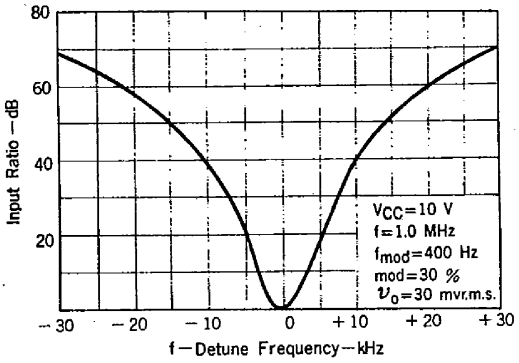
ELECTRICAL FIDELITY



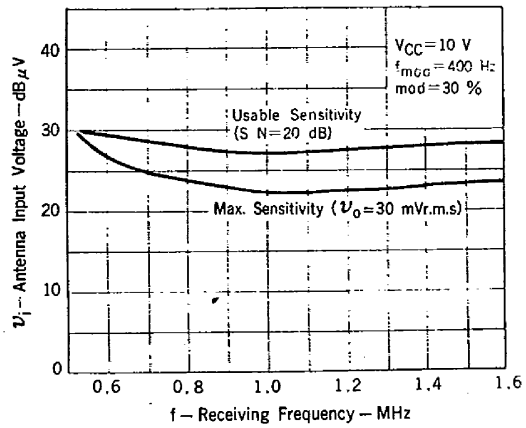
TOTAL HARMONIC DISTORTION vs. MODULATION FREQUENCY



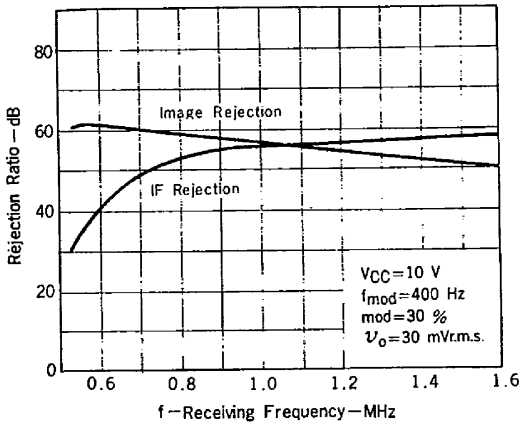
SELECTIVITY



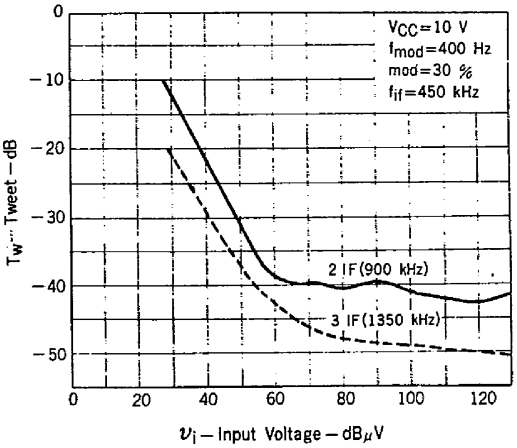
MAX. SENSITIVITY AND USABLE SENSITIVITY



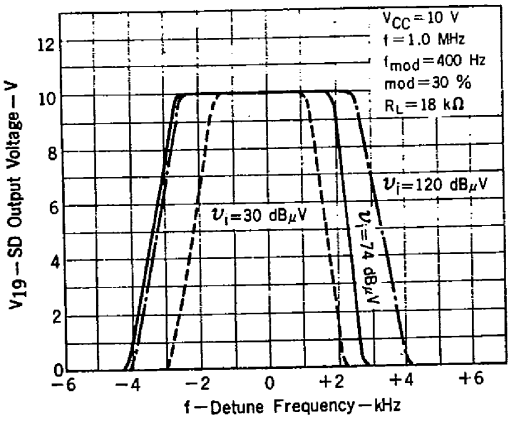
IF REJECTION AND IMAGE REJECTION



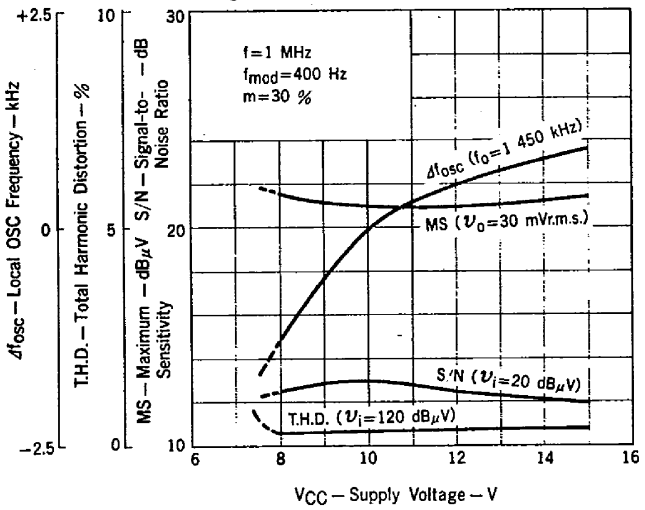
TWEET CHARACTERISTIC



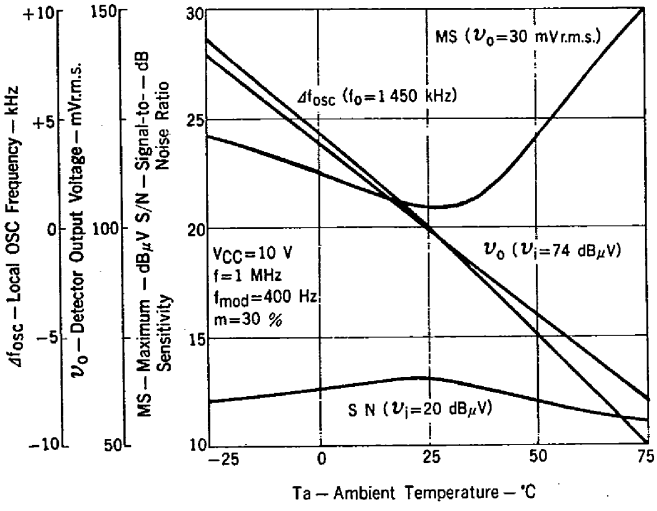
ON CHANNEL BANDWIDTH



SUPPLY VOLTAGE DEPENDENCIES

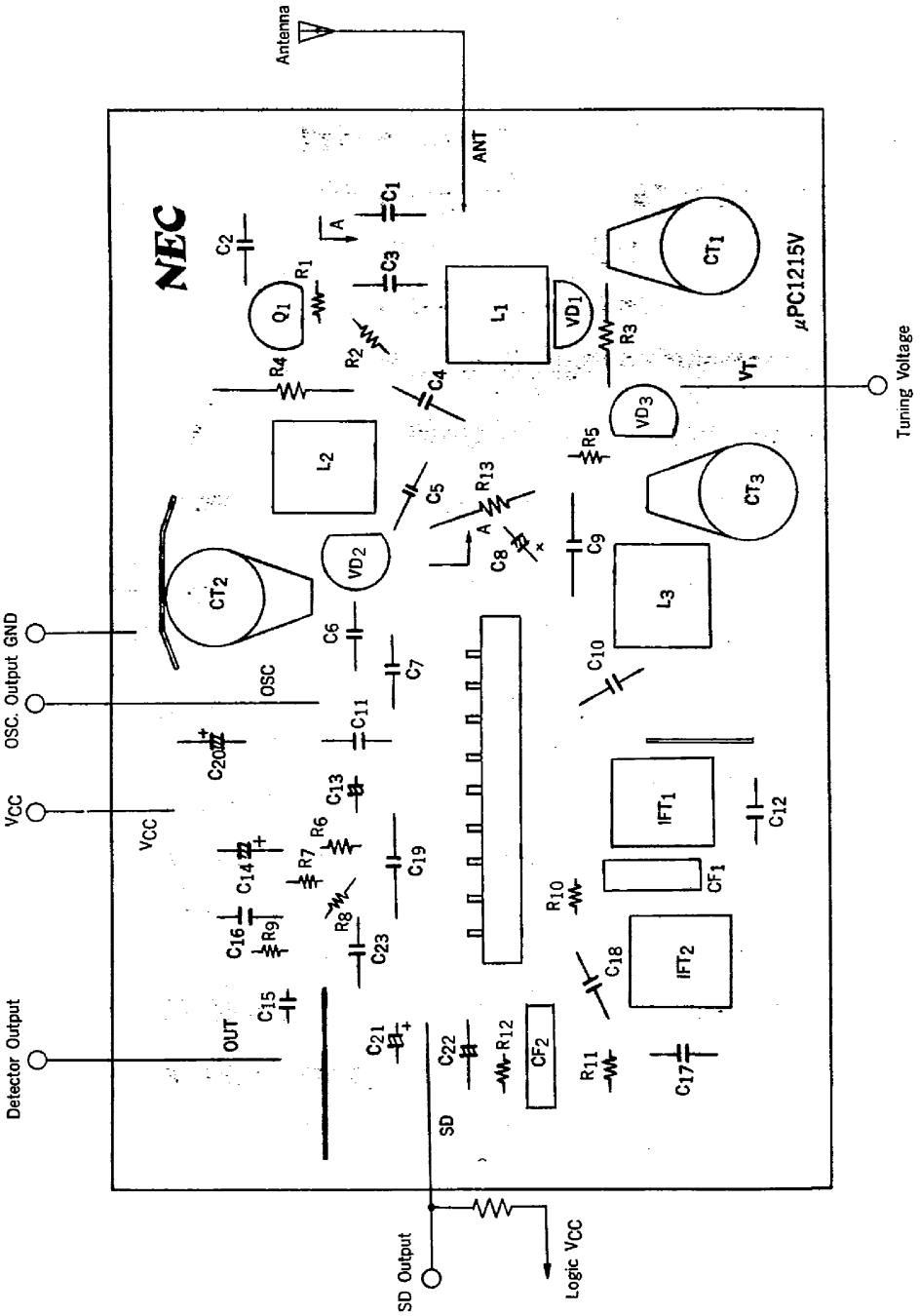


AMBIENT TEMPERATURE DEPENDENCIES



Note: Only IC without peripheral components is heated and cooled.

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



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