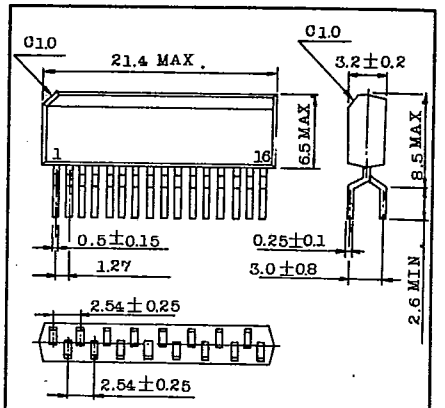
AM TUNER IC FOR CAR RADIO

Unit in mm



Lead pitch is 2.54 and tolerance is ±0.25 against theoretical center of each lead that is obtained on the basis of No.1 and No.2 leads.

JEDEC	-
TOSHIBA	Z16A-P

The TA7402P is AM tuner IC with high performance, especially excellent overload characteristic, for car radio applications.
This IC is also suitable for AM stereo decoder, because of excellent AGC and IF output Terminal.

- Function : RF Amplifer, Mixer, Local OSG, IF Amplifer, Detector, AGC
- Small Package :
  ZIP (Zigzag In-line Package) 16 pin
- Wide Supply Voltage Range :
  V_{CC}=7 ∿ 15V
  Recommended Voltage ; V_{CC}=9V

MAXIMUM RATINGS (Ta=25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	16	V
Power Dissipation (Note)	P_D	675	mW
Operating Temperature	T_{opr}	-30 ∿ 75	°C
Storage Temperature	T_{stg}	-55 ∿150	°C

Note: Derated above Ta=25°C in the proportion of 5.4mW/°C.

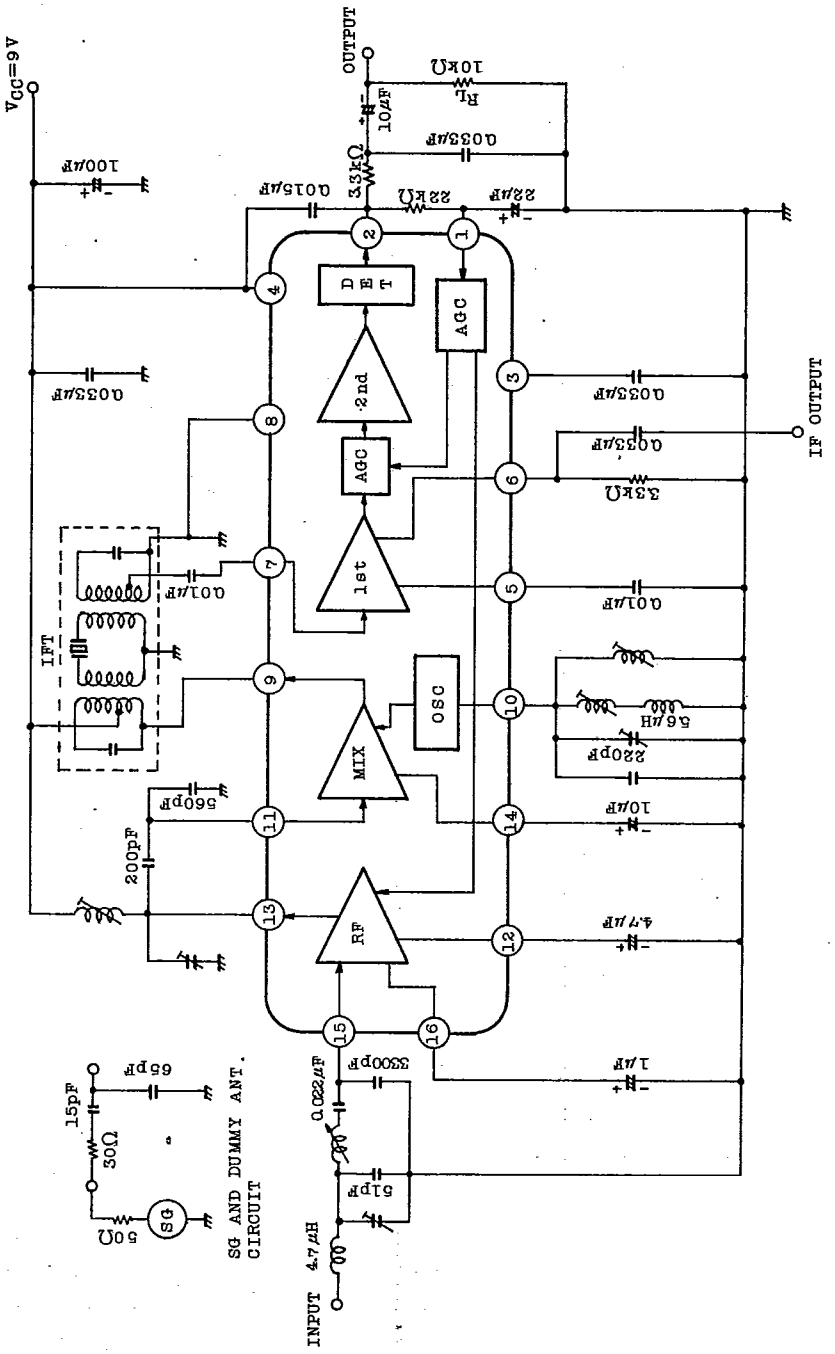
ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, V_{CC}=9V, f_S=1MHz, f_M=400Hz, Mode=30%, IF=455kHz, Ta=25°C)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Supply Current		I_{CC}	1	6 Pin Open		9	13	20	mA
Recovered Output Voltage		V_{OD}	1	V_{IN}=74dBμV		65	90	115	mV_{rms}
Maximum Sensitivity		MS	1	V_{OD}=20mV_{rms}		-	9	-	dBμV
Quieting Sensitivity		QS	1	S/N=20dB		-	24	30	dBμV
Signal to Noise Ratio		S/N	1	V_{IN}=74dBμV		46	52.5	-	dB
Total Harmonic Distortion		THD(1)	1	V_{IN}=74dBμV		-	0.3	3	%
		THD(2)	1	V_{IN}=74dBμV Mod=80%		-	0.6	-	
		THD(3)	1	V_{IN}=120dBμV		-	0.5	-	
Tweet		Tweet	1	V_{IN}=74dBμV	2IF	-	-37	-	dB
				Max. Point	3IF	-	-50	-	
Pin 15 Input Impedance	Parallel Input Resistance	R_{ip15}	2	f=1000kHz		-	6.6	-	kΩ
	Parallel Input Capacitance	C_{ip15}				-	3	-	pF
Pin 13 Output Impedance	Parallel Output Resistance	R_{op13}	3	f=1000kHz		-	100	-	kΩ
	Parallel Output Capacitance	C_{op13}				-	1.4	-	pF
Pin 11 Input Impedance	Parallel Input Resistance	R_{ip11}	4	f=1000kHz		-	1.1	-	kΩ
	Parallel Input Capacitance	C_{ip11}				-	7.5	-	pF
Pin 9 Output Impedance	Parallel Output Resistance	R_{op9}	5	f=455kHz		-	100	-	kΩ
	Parallel Output Capacitance	C_{op9}				-	3.5	-	pF
Pin 7 Input Impedance	Parallel Input Resistance	R_{ip7}	6	f=455kHz		-	3.5	-	kΩ
	Parallel Input Capacitance	C_{ip7}				-	8	-	pF
IF Output Voltage		V_{IF1}	1	V_{IN}=34dBμV		-	14	-	mVrms
		V_{IF2}		V_{IN}=74dBμV		-	76	-	

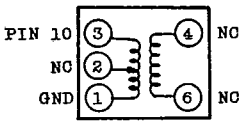
BLOCK DIAGRAM/TEST CIRCUIT

1. Icc, V_{DD}, MS, QS, S/N, THD, Tweet



COIL DATA

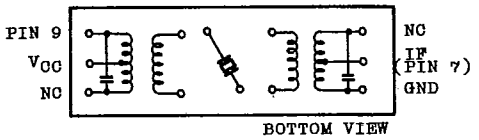
1. OSC COIL "L"



L=220μH STANDARD		
Q≧80 at 796kHz		
①~②	①~③	④~⑥
10T	98T	39T

DENKEN Co., 4691 OR EQUIVALENT

2. IFT



TOKO Co.,
CFT-455A OR EQUIVALENT IFT
CENTER FREQUENCY 455±3.5kHz

3. AM TUNER COIL

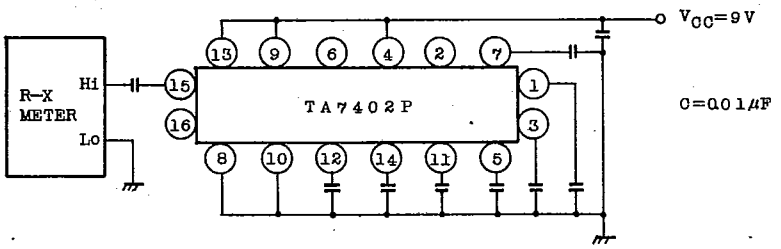
MITSUMI Co., CMM ZT-02 OR EQUIVALENT TUNER COIL

TUNING FREQUENCY RANGE 520 ∿ 1660±40kHz

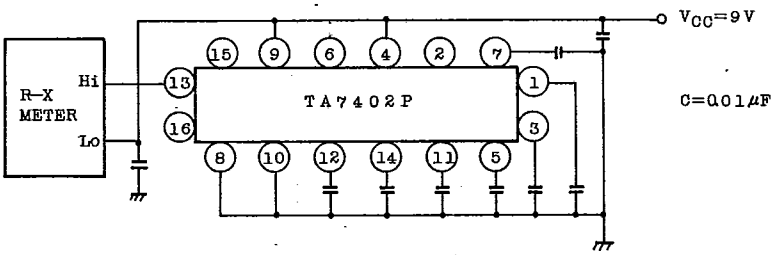
1. DC CHARACTERISTICS (V_{CC}=9V, Terminal Voltage at No Signal)

TERMINAL No.	ITEM	SYMBOL	TYP.	UNIT
1	AGC Input	V_1	2.0	V
2	Recovered Output	V_2	2.0	V
3	2nd IF Bypass	V_3	2.6	V
4	V_{CC}	V_4	9.0	V
5	1st IF Bypass	V_5	2.6	V
6	IF Output	V_6	2.5	V
7	IF Input	V_7	2.6	V
8	GND	V_8	-	V
9	Mix Output	V_9	9.0	V
10	Local OSC	V_{10}	-	V
11	Mix Input	V_{11}	4.3	V
12	AGC Bypass	V_{12}	4.8	V
13	RF Output	V_{13}	9.0	V
14	Mix Bypass	V_{14}	4.3	V
15	RF Input	V_{15}	2.0	V
16	RF Bypass	V_{16}	1.3	V

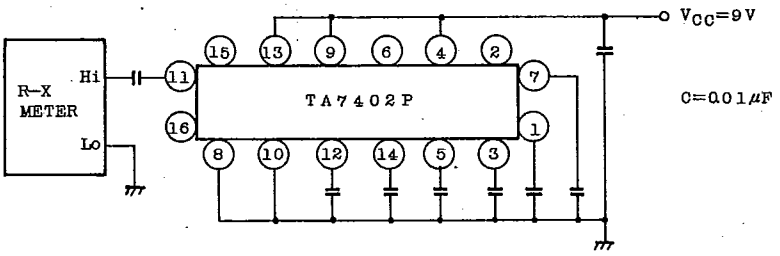
2. R_{ip15}, C_{ip15}



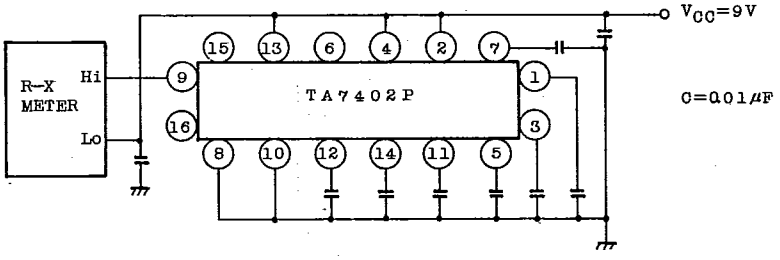
3. R_{op13}, C_{op13}



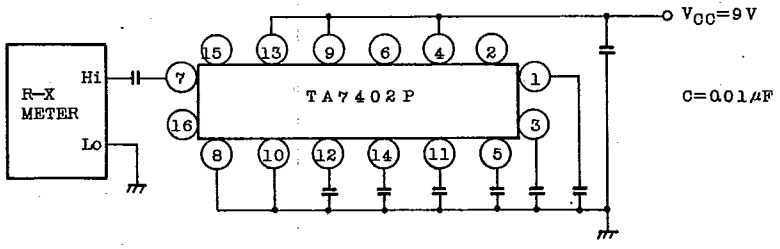
4. R_{ip11}, C_{ip11}



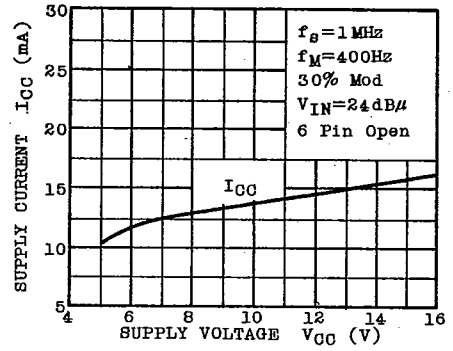
5. R_{op9}, C_{op9}



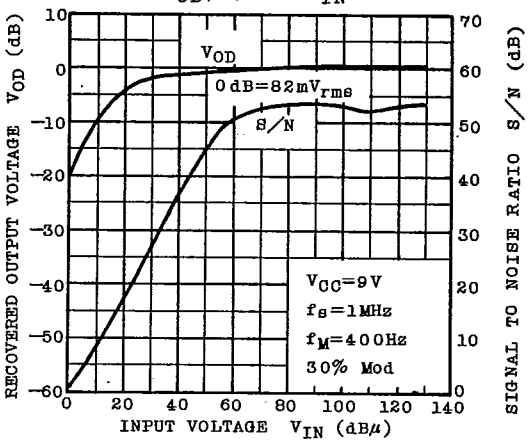
6. R_{ip7}, C_{ip7}



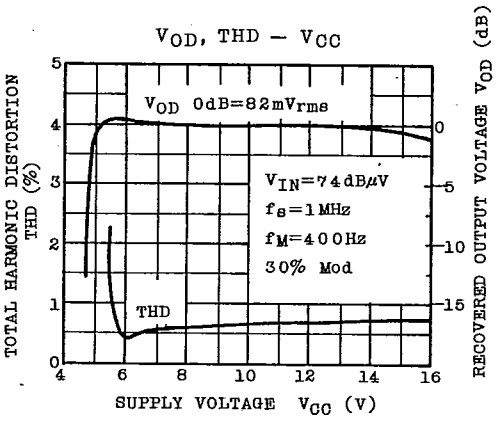
I_{CC} – V_{CC}



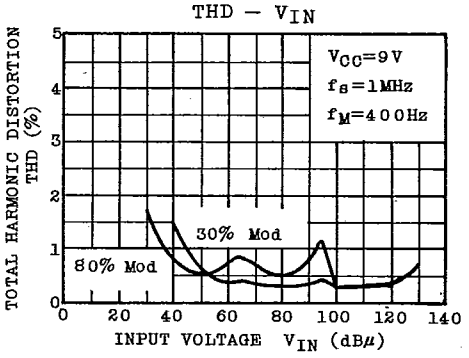
V_{OD}, S/N – V_{IN}



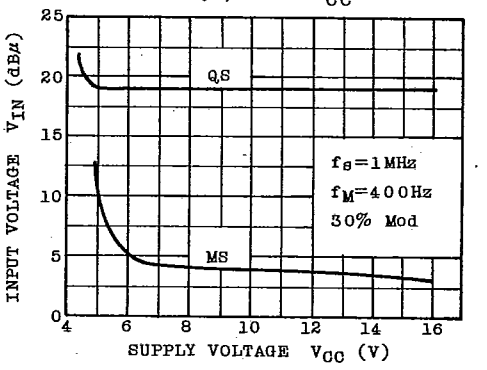
V_{OD}, THD – V_{CC}



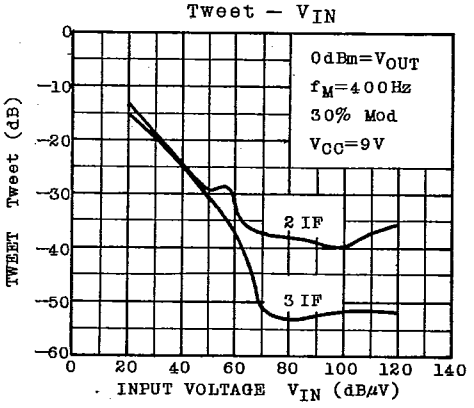
THD – V_{IN}



QS, MS – V_{CC}

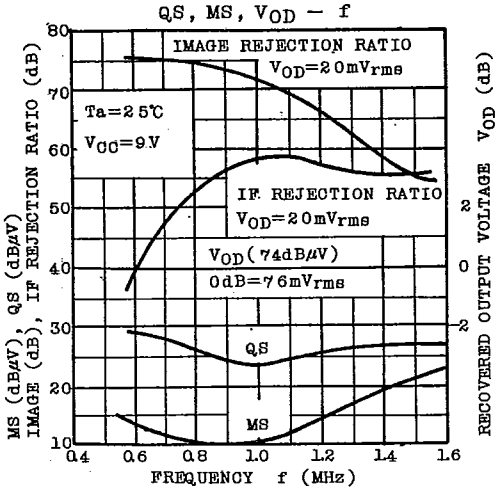


Tweet – V_{IN}

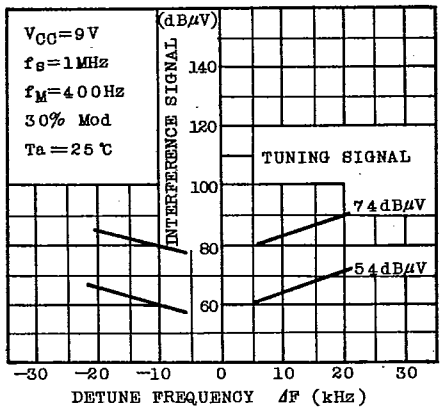


The tweet is defined as follow
0dB=V_{OD} at Mod=30%, f_M=400Hz

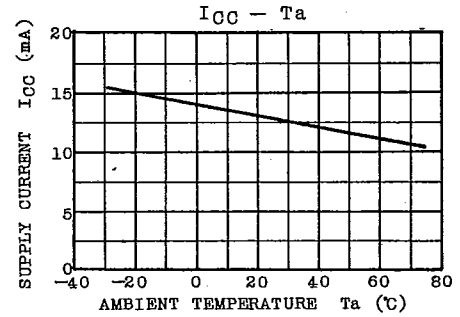
IF REJECTION RATIO,
IMAGE REJECTION RATIO
QS, MS, V_{OD} — f



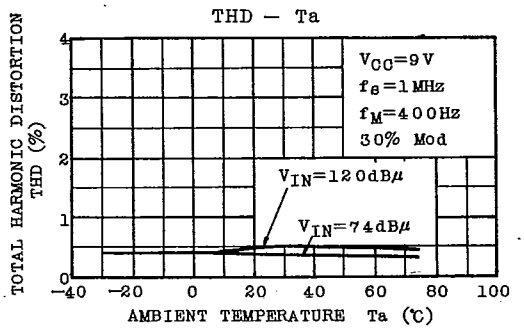
2 SIGNAL CHARACTERISTIC
−3dB SIGNAL SUPPRESION EFFECT



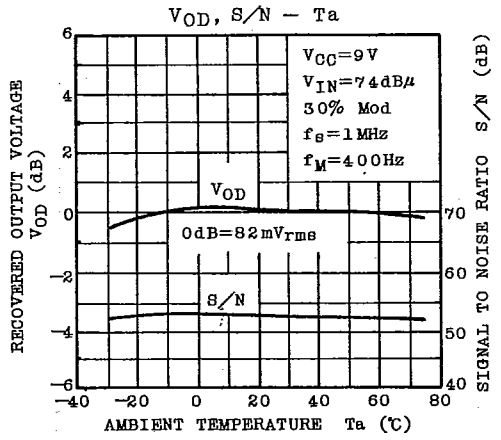
I_{CC} — Ta



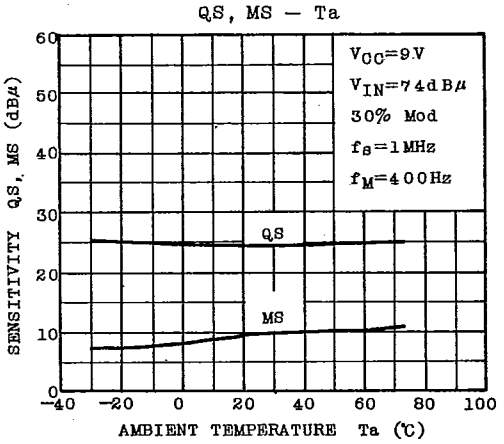
THD — Ta



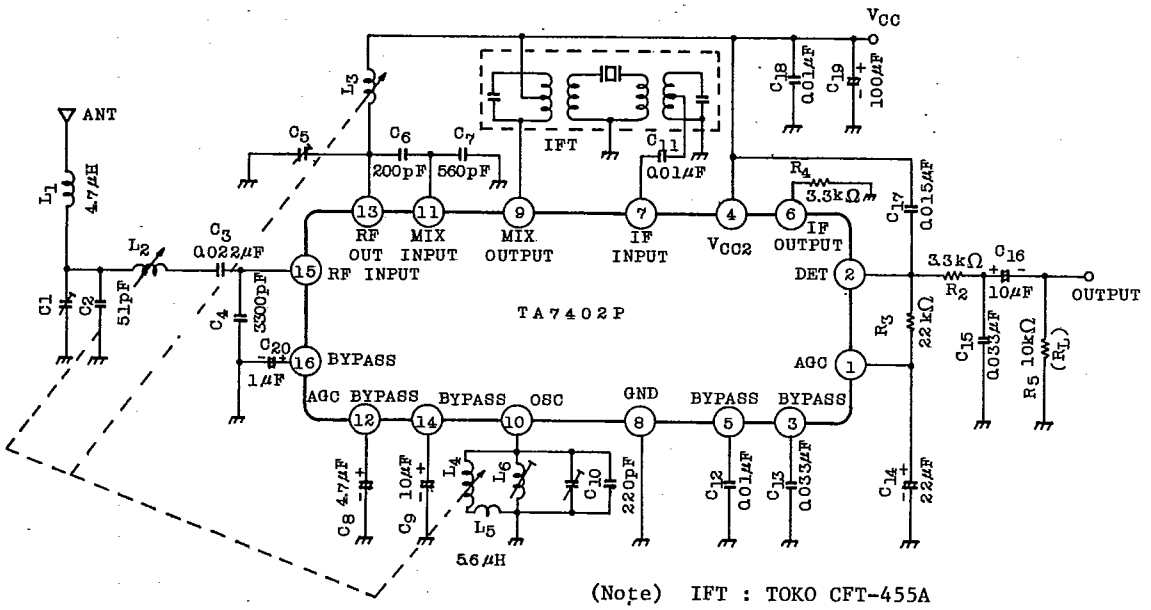
V_{OD}, S/N — Ta



QS, MS — Ta



APPLICATION CIRCUIT



(Note) IFT : TOKO CFT-455A

Note :

1. To avoid the instability (especially tweet problem), capacitor C_{17} must be placed near by 2 pin and 4 pin.
2. Inductor L_1 is the noise radiation suppressor from antenna.
3. Capacitor C_6 and C_7 must be selected so that the injection level of the mixer stage will be optimum value.
4. AGC by-passing capacitor C_{14} and C_8 determine AGC response speed.
   So, large value will cause slow response and too small value will cause poor distortion characteristics at low frequency.
5. When the output is not used, the terminal 6 could be open.

EXTERNAL PARTS TABLE

PARTS No.	TYPICAL	PURPOSE	INFLUENCE		NOTE
			SMALLER THAN TYP.	GREATER THAN TYP.	
C3	0.022μF	ANT Tuning Circuit	Decrease in ANT gain	Increase in ANT gain	
C4	3300pF	ANT Tuning Circuit	Degradation in quieting sensitivity Increase in ANT gain	Improvement in quieting sensitivity Decrease in ANT gain	Low temperature drift capacitor should be required
C6	200pF	RF Tuning and Coupling	Decrease in gain	Increase in gain	
C7	560pF	Coupling Divider	Increase in gain	Decrease in gain	
C8	4.7μF	RF AGC Bypass	Degradation of THD at high level input	Poor AGC response	
C9	10μF	Mix Bypass	Decrease in gain	-	
C11	0.01μF	Coupling Capacitor	Decrease in gain	-	
C12	0.01μF	IF Bypass	Decrease in gain	-	
C13	0.033μF	IF Bypass	Decrease in gain	-	
C14	22μF	AGC Ripple Filter & Time Constant	Degradation of THD at low f_m input	Poor AGC response	
C15	0.033μF	Part of Low Pass Filter (R_2, C_{15})	Degradation of S/N	Poor frequency response at higher frequency	
C17	0.015μF	Detector Circuit	Degradation of S/N Instability with IF leak	Decrease in recovered output voltage	
C18	0.01μF	Decoupling	Decrease in filter effect	-	
C19	100μF	Decoupling	Load to Motorboating	-	
C20	1μF	RF Bypass	Poor quieting sensitivity	Poor cross-modulation characteristics	
R2	3.3kΩ	Part of Low Pass Filter (R_2,C_{15})	Degradation of S/N	Poor frequency response at higher frequency	
R3	22kΩ	AGC Ripple Filter & Time Constant	Degradation of THD at low f_m input	Poor AGC response	
R4	3.3kΩ	IF Output Load	Degradation of tweet	-	