TA7761P
TA7761F

T-77-05-07

FM IF SYSTEM

TA7761P/F is the IC developed as 2nd IF system for communication devices and optimum for personal radio and cordless telephone.

- Double-balanced mixer
- Local oscillator
- Differential 5 stages IF limiter amplifier
- Signal meter output
- Quadrature detection
- AF inverter amplifier

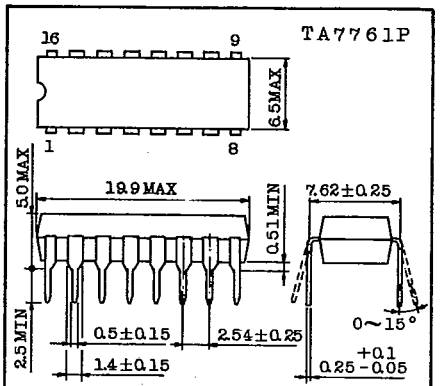
- By providing mixer bypass terminal, IM distortion is reduced and the sensitivity at using low frequency band (cordless telephone) is improved.
- By high frequency process, the upper limit of the operating frequency of the mixer is high.

  Operating frequency 10.7MHz~100MHz (standard)
- Connecting with 5 point LED driver TA7366P, the signal indicator can be easily constituted.
- Two inverter amplifiers are built in and the IC can be widely used.

  (For example, noise amplifier, BPF etc.)
- The range of operating power supply voltage is wide.

  V_{opr}=1.8~10V (Ta=25°C)

Unit in mm

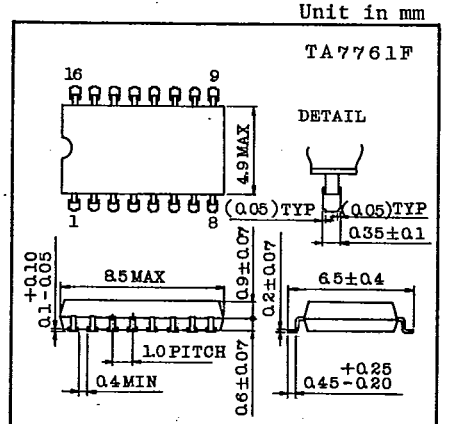


Lead pitch is 2.54 and tolerance is ±0.25 against theoretical center of each lead that is obtained on the basis of No.1 and No.16 leads.

JEDEC	—
TOSHIBA	3D16A-P

Weight : 1.00g

Unit in mm



JEDEC	—
TOSHIBA	F16GA2-P

Weight : 0.14g

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MAXIMUM RATINGS (Ta=25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	10	V
Power Dissipation (Note)	TA7761P	P_D	750	mW
	TA7761F		350	
Operating Temperature		Topr	-30~85	°C
Storage Temperature		Tstg	-55~150	°C

Note: Derated above Ta=25°C in the proportion of 6mW/°C for the TA7761P and of 2.8mW/°C for TA7761F.

TYPICAL DC VOLTAGE OF EACH TERMINAL

(V_{CC}=9V, Ta=25°C, Test circuit at No. signal)

TERMINAL No.	CHARACTERISTIC	DC VOLTAGE (V)
1	OSC_1	2.9
2	OSC_2	2.2
3	MIX_{out}	3.0
4	V_{CC}	3.0
5	IFin	2.1
6	NF	2.1
7	S-Level	2.8
8	Det	3.0
9	AF	0.9
10	in 1	0.7
11	out 1	0.9
12	in 2	0.7
13	out 2	0.9
14	BYPASS	1.6
15	GND	0
16	Mix_{in}	1.6

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ELECTRICAL CHARACTERISTICS

Unless otherwise specified, $V_{i(MIX)}$=70dBμ, $V_{i(IF)}$=80dBμ
f_{MIX}=58.1125MHz CW, f_{OSC}=57.6575MHz, V_{CC}=3V
f_{IF}=455MHz, f_m=1kHz, Δf=±3kHz, AM mod=30%, Ta=25°C

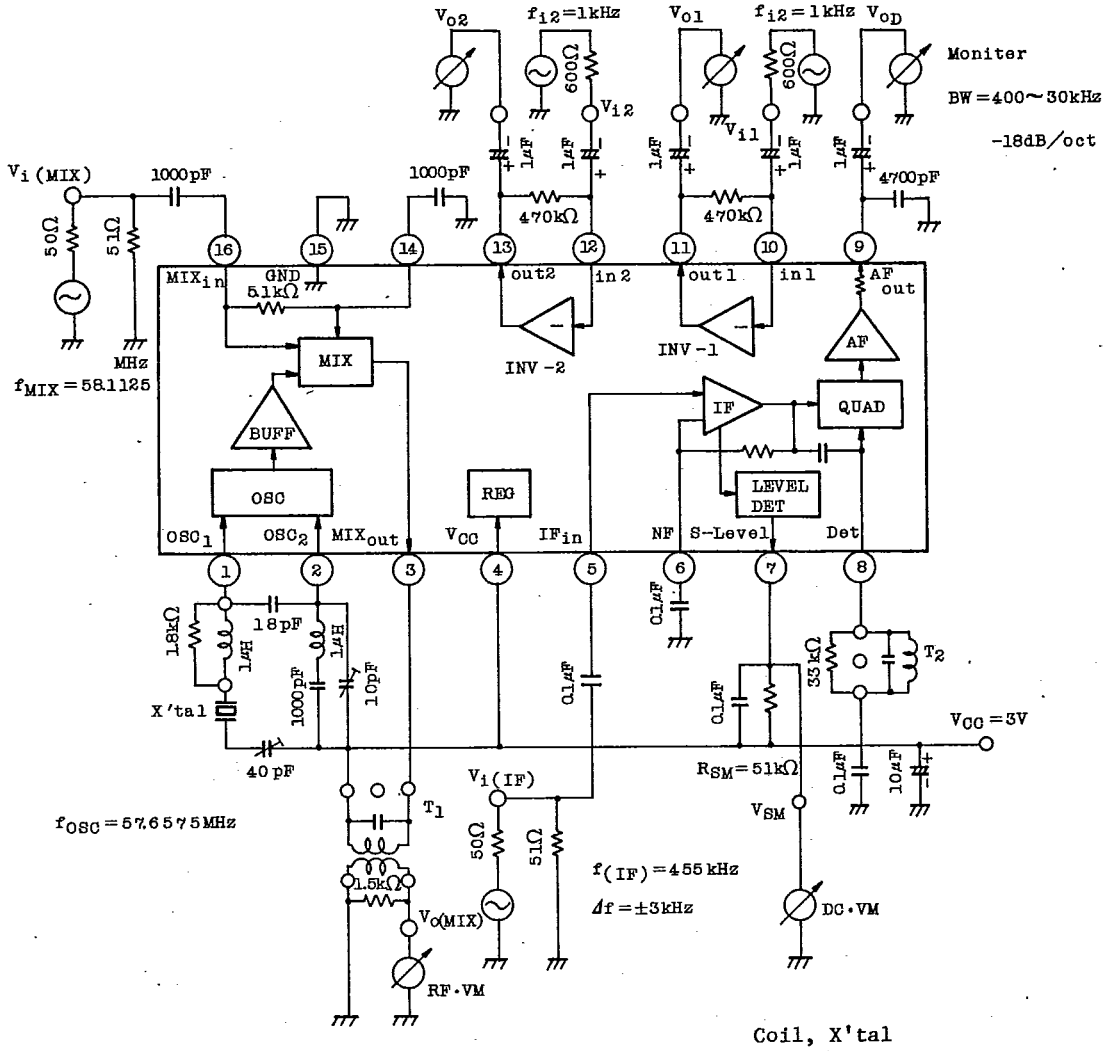
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Quiescent Current		I_{CCQ}	1		3.5	4.5	6.6	mA
Conversion Gain		G_{C1}	1		18	21	24	dB
		G_{C2}	2	f_{MIX}=100MHz, f_{OSC}=99.545MHz	-	21	-	
IF Input Limiting Voltage		$V_{i(lim)}$	1		18	23	28	dBμ
Detected Output		V_{OD}	1		75	100	150	mV_{rms}
Signal to Noise Ratio		S/N	1		50	65	-	dB
Total Harmonic Distortion		THD	1		-	-45	-	dB
AM Rejection Ratio		AMR	1		-	45	-	dB
Signal Meter Output		V_{SM1}	1	$V_{i(IF)}$=30dBμ	2.5	2.7	2.9	V
		V_{SM2}	1	$V_{i(IF)}$=60dBμ	1.1	1.6	2.0	
		V_{SM3}	1	$V_{i(IF)}$=90dBμ	0.2	0.6	1.4	
INV. AMP	Open Loop Gain	G_{VO}	1	V_i=1mV_{rms}, f=10kHz	40	50	-	dB
	Open Loop THD	THD1	3		-	-40	-	dB
MIX Input Impedance	Parallel Resistance	r_i	3	f=58MHz	-	3.5	-	kΩ
	Parallel Capacity	c_i	3		-	4.5	-	pF
MIX Output Impedance	Parallel Resistance	r_o	3	f=455kHz	-	300	-	kΩ
	Parallel Capacity	c_o	3		-	7	-	pF
AF Output Resistance		R_o	-		-	5.1	-	kΩ

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BLOCK DIAGRAM AND TEST CIRCUIT



Note: $V_{i(MIX)}$, $V_{i(IF)}$; Load Circuit

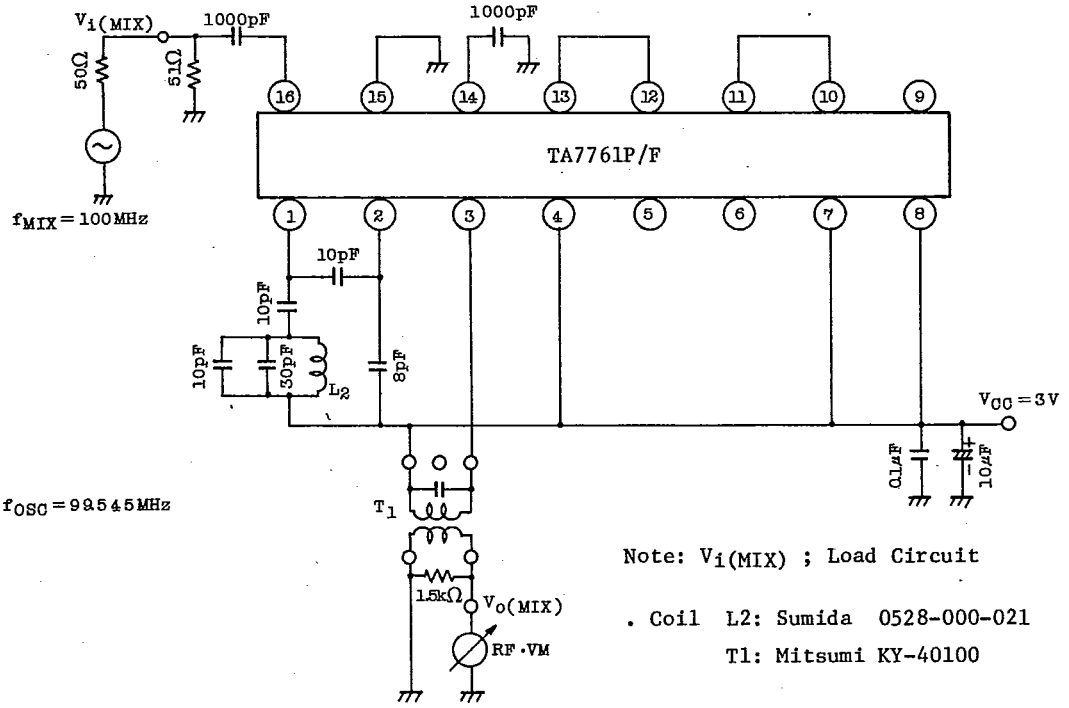
Coil, X'tal
T1: Mitsumi KY-40100
T2: Mitsumi KY-40110
X'tal: Tokyo Denpa TC43

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TEST CIRCUIT 2 (G_{C2})

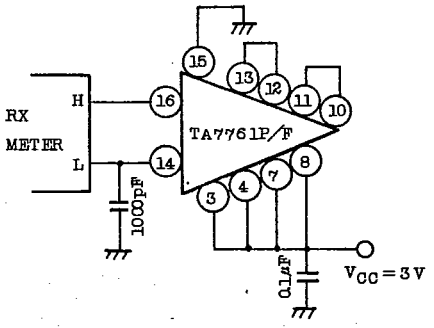


Note: $V_{i(MIX)}$; Load Circuit

. Coil L2: Sumida 0528-000-021
T1: Mitsumi KY-40100

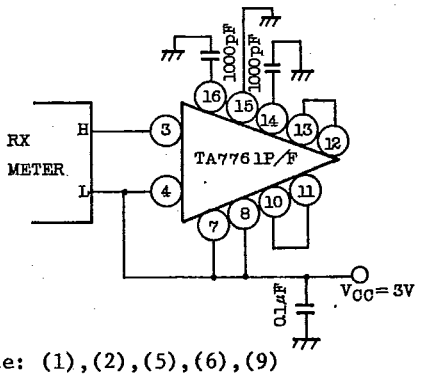
TEST CIRCUIT 3 (MIX IMPEDANCE)

(a) MIX Input Impedance



Note: (1),(2),(5),(6),(9)
No conection

(b) MIX Output Impedance



Note: (1),(2),(5),(6),(9)
No conection

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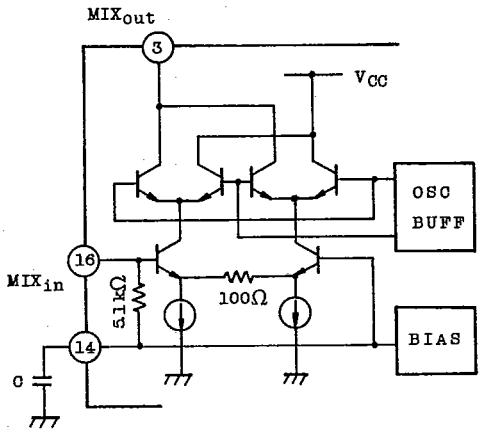
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BUILT-IN FUNCTIONS

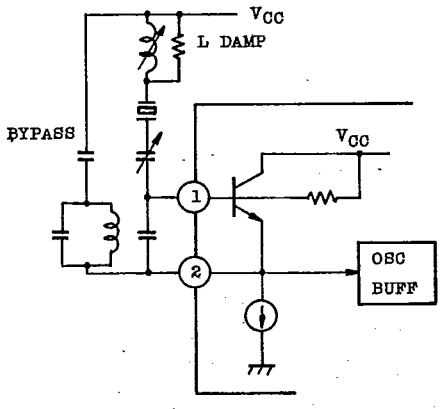
1. Mixer

A double-balanced mixer single input and single output is built in. A large measure Current (total 1mA) flows in this stage to reduce internal modulation distortion. Using this IC at comparativery low frequency (10.7MHz) sach as that for cordless telephones, generally only smallcapacity capacitor on the earth input side of the mixer can be built in, and the impedance have influence on conversion gain and actual sensitivity. To avoid this defect, in TA7761P/F, the capacitor C on the earth input side is provided externally and the kind of the capacitors can be selected according to the frequency to be used.

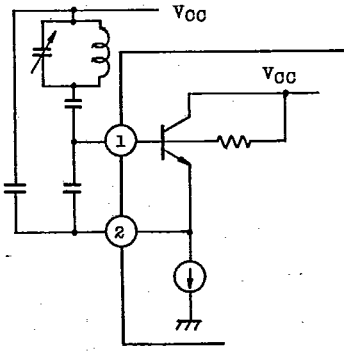


2. Application of Local OSC

The terminals for the base and the emitter of oscillating transistor are provided, and the device can be used for any of crystal oscillation and LC oscillation. Attention is paid to the starting problem due to the effective resistance of crystal, and it is desired to investigate the device sufficiently and use it.



In Case of Using X'tal



In Case of Using LC Circuit

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3. Application of Signal Meter

Connecting with 5 point LED driver TA7366P, the signal indicator can be easily constituted.

As shown in the right drawing, the input amplifier of TA7366P has ability of I-V conversion because of inverter input.

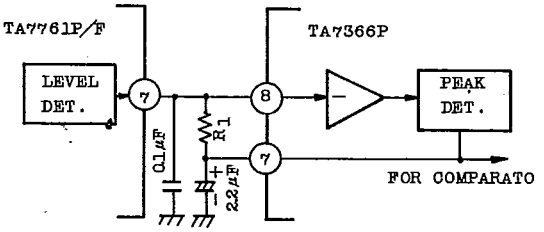
Therefore, The output of the signal meter of TA7366P/F takes the form of the current output which is reduced by increase of IF input.

Setting of the lighting sensitivity of TA7366P is performed by adjusting the value of Rl and the sensitivity is improved by lighting in the direction where the Rl value is large.

Without the signal indicator by connecting with TA7366P, the signal indicator output can be taken out by resistance load.

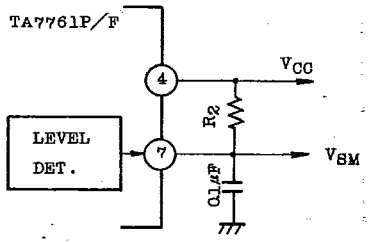
In this case, the output voltage value and the dynamic range are changed according to the degree of the value of R2.

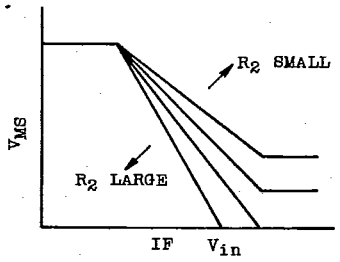
It is desired to investigate this point and use the device.



Note: Proper when Rl=33kΩ or so.

Costitution of Signal Indicator





Under as Signal Indicator Output

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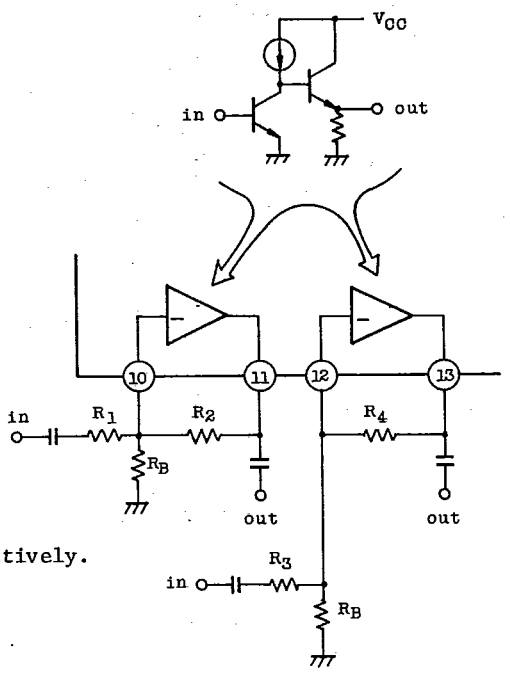
4. Method of Enlarging Dynamic Range of INVERTER Amplifier.

Cause of the reducing voltage characteristic (1.8V), the bias voltage of the inverter amplifier of TA7761P/F is set low. However, in case that the power supply voltage is high, the dynamic range can be enlarged.

The DC voltage at pins 11 and 13 is approximately 0.7V when RB is not provided in the right drawing.

For enlarging the dynamic range, raise the DC voltage at pins 11 and 13 so that the upper and the lower output stage is symmetrically clipped.

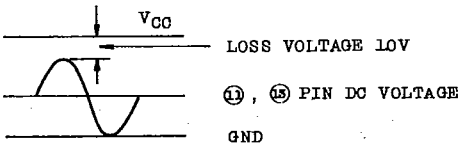
That is, the DC voltage at pins 11 and 13 are raised as shown below by earthing RB from the pins 10 and 12 respectively.



$$V_{11}=0.7\ \frac{R_B+R_2}{R_B}\quad (V)$$

$$V_{13}=0.7\ \frac{R_B+R_4}{R_B}\quad (V)$$

On the other hand, the loss voltage of swing on the upper and lower side of the output stage is 1.0V and 0V or so respectively, and it is sufficient to set the DC voltage at pins 11 and 13 considering the loss voltage and the power supply voltage to be used.



5. Application to BPF of Inverter Amplifier

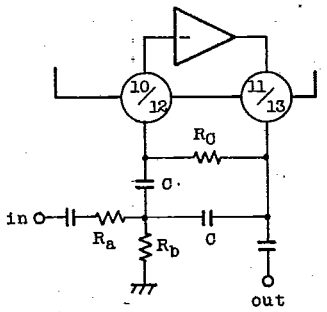
Determine R_a~R_c according to the following formulas

$$R_c=\frac{Q}{\pi f_o C}$$

$$R_a=\frac{R_c}{2A_o}$$

$$R_b=\frac{R_a R_c}{4QR_a-R_c}$$

Note: A_o=gain at f_o $Q \leq 10$

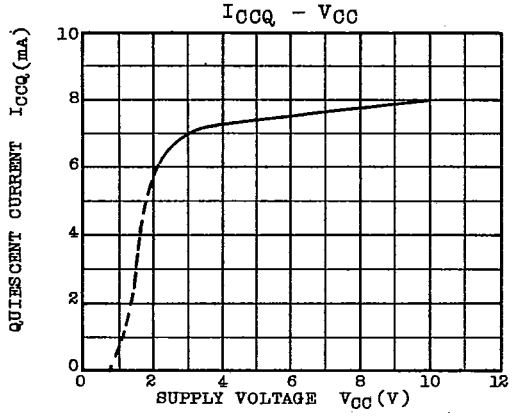


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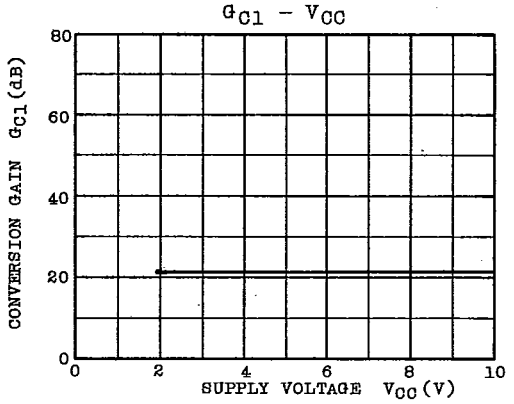
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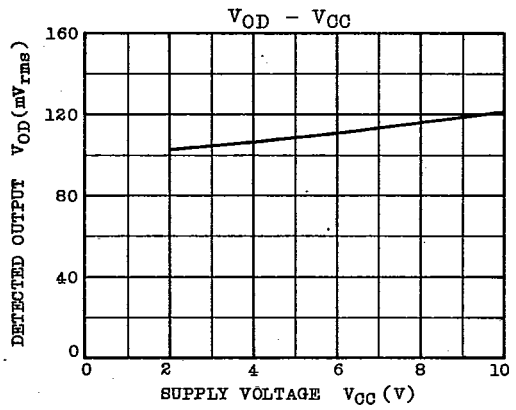
I_{CCQ} – V_{CC}



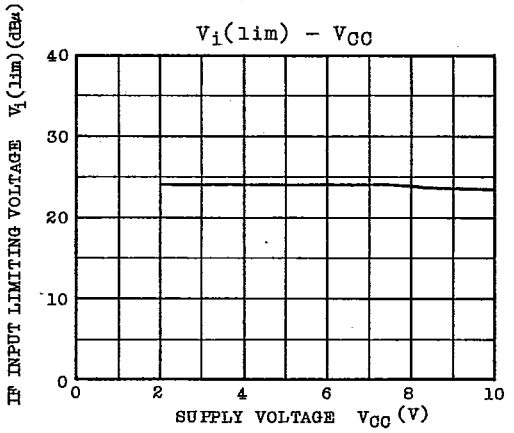
G_{C1} – V_{CC}



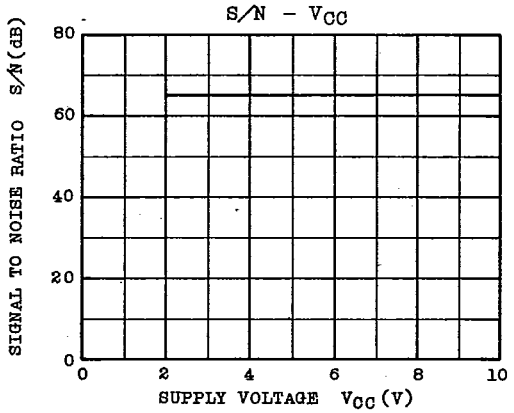
V_{OD} – V_{CC}



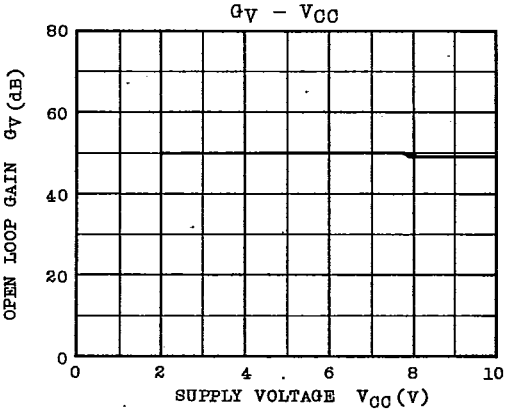
V_i(lim) – V_{CC}



S/N – V_{CC}



G_V – V_{CC}

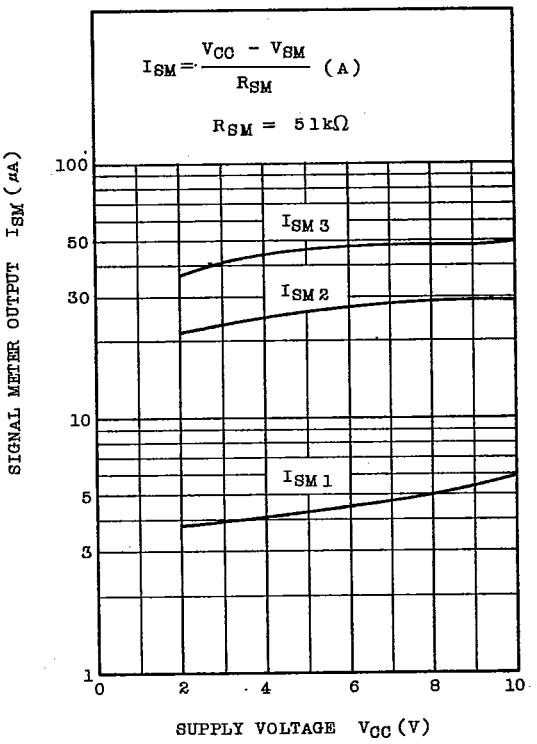


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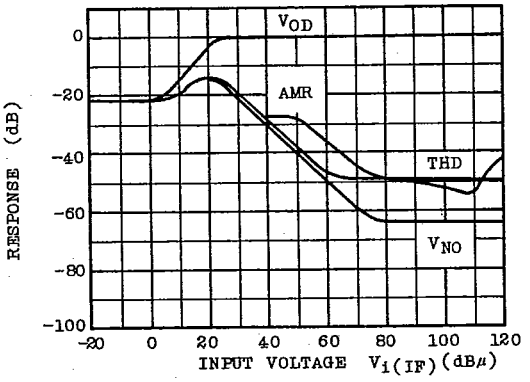
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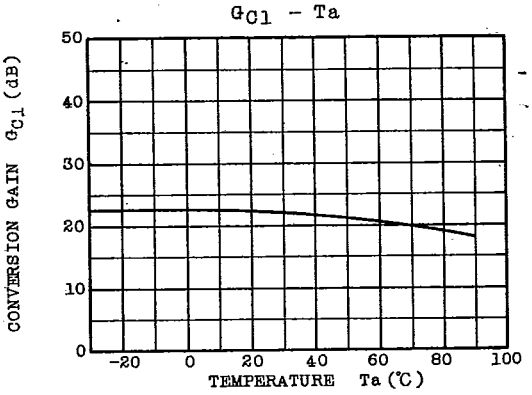
I_{SM} – V_{CC}



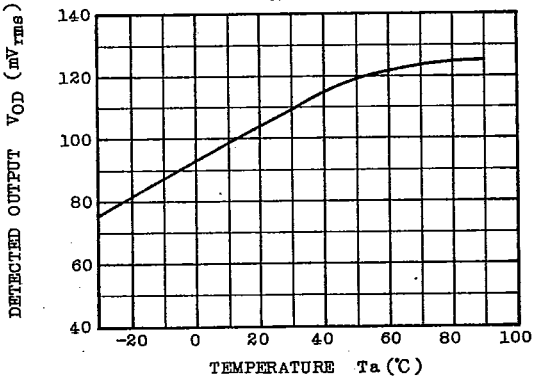
V_{OD}, AMR, THD, V_{NO} – $V_{i(IF)}$



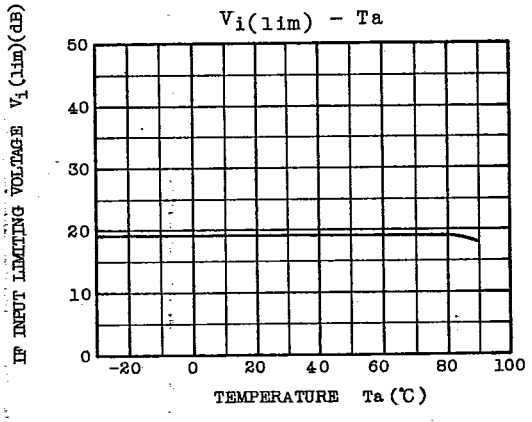
G_{C1} – Ta



V_{OD} – Ta



$V_{i(lim)}$ – Ta

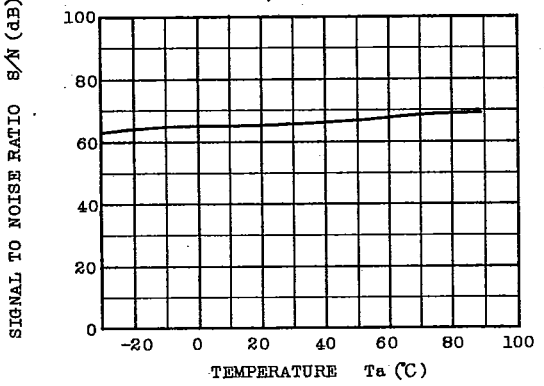


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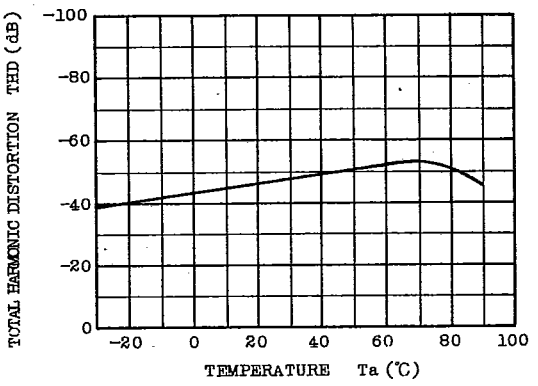
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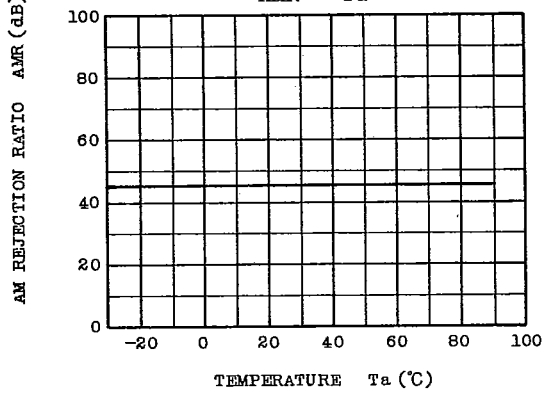
S/N – Ta



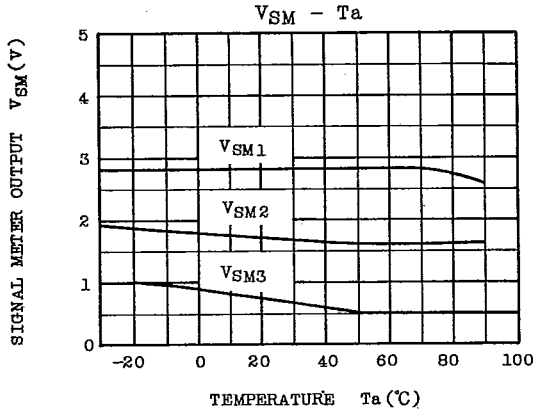
THD – Ta



AMR – Ta



V_{SM} – Ta



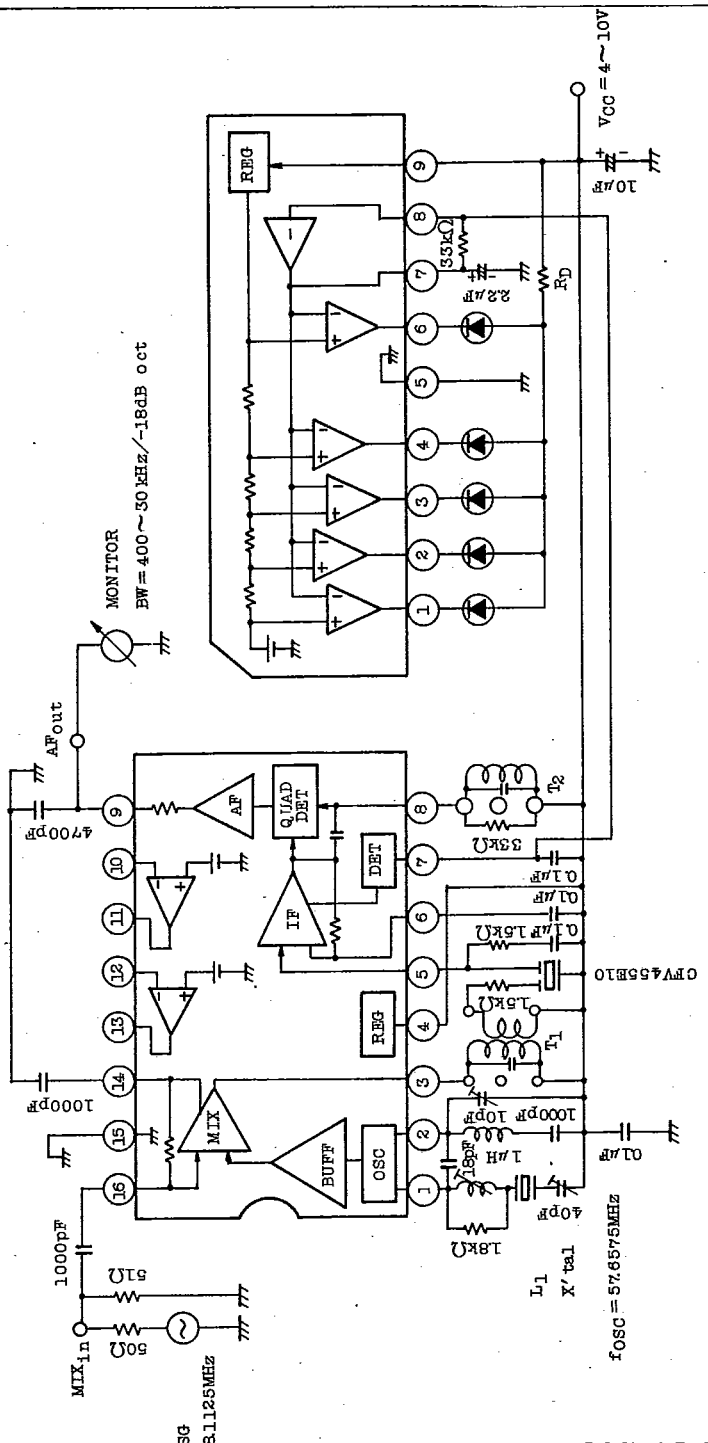
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APPLICATION CIRCUIT (Overall Characteristics)

(Application to personal radio)



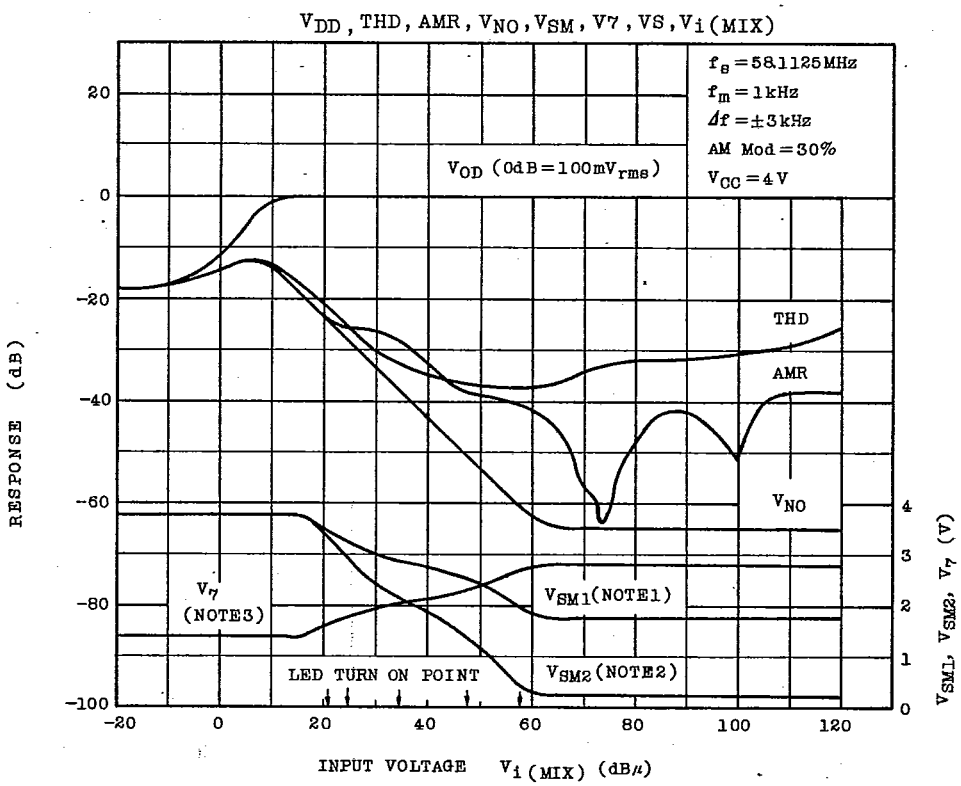
Note: Rd is used for protecting not to exceed Rd of TA7366P.
For the detail, refer to the technical data of TA7366P.

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OVER ALL CHARACTERISTICS (Consultation)



Note 1 : V_{SM1} shows the potential in the status where R_L=51kΩ is connected between pin 7 and V_{CC} of TA7761P without connecting TA7366P.

Note 2 : V_{SM2} shows the potential when R_L=100kΩ in the status in above 1.

Note 3 : V_7 shows the voltage at pin 7 of TA7366P in the status where TA7366P is connected.

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COIL

S : SUMIDA M : MITSUMI

COIL No.	STAGE	TEST FREQUENCY (MHz)	L (μH)	C_O (pF)	Q_O	NUMBER OF TURN				WIRE (mm)	REMARK COLUMS
						1-2	2-3	1-3	4-6		
L1	Local OSC	7.96	1		≧75				$11\frac{1}{4}$	0.2 UEW	M KY-40185
T_1	MIX	0.455		180	70			152	16	0.07 UEW	M KY-40100
T_2	Det	0.455		180	110			152		0.07 UEW	M KY-40110
	Det	0.455		180	105			145		0.07 UEW	S 4140-1289-181

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