

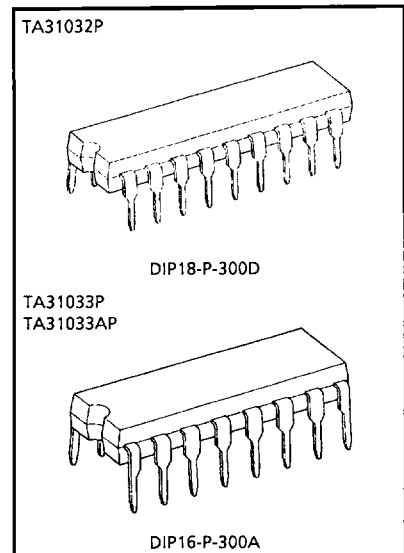
SPEECH NETWORK FOR TELEPHONE SET

FEATURES

- Direct interface with receiver (dynamic type, electromagnetic type) of low impedance type is possible.
- This IC is able to change over an input from transmitter to an input of dial signal (DTMF signal) and output to the line.
- Gain is automatically controlled according to the line current. (Auto pad function)
- Gain control terminal (function) in extension usage is provided.
- Low operating voltage provides an excellent branch performance.
- Wide operating temperature range : $T_{opr} = -40 \sim 85^{\circ}\text{C}$.

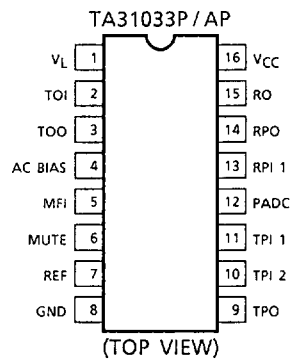
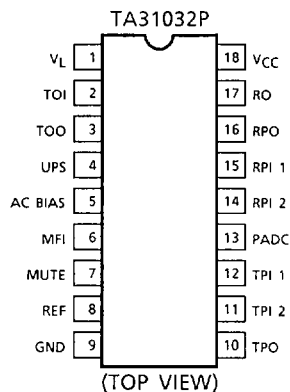
DIFFERENCE BETWEEN TA31033P and TA31033AP

NAME OF PRODUCT	TRANSMIT LOSS
TA31033P	- 3dB
TA31033AP	- 5dB



Weight DIP18-P-300D : 1.5g (Typ.)
DIP16-P-300A : 1.1g (Typ.)

PIN CONNECTION



TA31032P, TA31033P/AP-1

SPEECH NETWORK ICs

PIN FUNCTION

PIN No.	PIN NAME	FUNCTION
1 (1)	V _L	[Line current flow-in terminal] Connected to positive output of diode bridge circuit. The DC potential of this terminal determines line voltage, and if AC signal is not input, the highest DC potential appears. Transmit output signal and output signal of opposite transfer side are intermingled and output at this terminal in actual usage.
2 (2)	TOI	[Current input terminal of transmit output] Connected to V _L terminal (Pin 1, Pin (1)) through 43Ω. Since almost all the line currents are flowed in from this terminal, set allowable power of resistance 43Ω to be connected to V _L terminal from this terminal considering the maximum current of line current expected to be used.
3 (3)	TOO	[Current output terminal of transmit output] Connected to GND terminal (Pin 9, Pin (8)) through 15Ω. Since almost all the line currents are flowed out from this terminal, set allowable power of resistance 15Ω to be connected to GND terminal from this terminal considering the maximum current of line current expected to be used. Transmit signal is sent from this terminal. Signal of this terminal varies current which is input from line through connected resistance 15Ω, and makes it be output at V _L terminal (Pin 1, Pin (1)).
4 (-)	UPS	[Selecting terminal of DC impedance control] Connect this terminal to GND terminal (Pin 9) and set MUTE signal at "H", DC potentials of V _L terminal (Pin 1) and V _{CC} terminal (Pin 18) can be raised in the same line current. Turn it OPEN at non-use.
5 (4)	AC BIAS	[AC signal reference voltage terminal] Output terminal of internal reference electric potential.
6 (5)	MFI	[Input terminal of DTMF or external signals] Signal, which is input at this terminal, is output at V _L terminal (Pin 1, Pin (1)) when MUTE terminal (Pin 7, Pin (6)) is connected to V _{CC} terminal (Pin 18, Pin (16)). Since almost the same electric potential as that of REF terminal (Pin 8, Pin (7)) is biased to this terminal avoid direct impress of external DC potential by capacitor at impressing external signal.
7 (6)	MUTE	[Mute terminal] (DTMF signal and transmit signal switching terminal in transmit system) When this terminal is connected to V _{CC} terminal (Pin 18, Pin (16)), input signal from MFI terminal (Pin 6, Pin (5)) is output at V _L terminal (Pin 1, Pin (1)).
8 (7)	REF	[Internal reference voltage output terminal] Voltage of this terminal is used for reference voltage of internal pre-amplifier. Never use this terminal as an external power supply.
9 (8)	GND	[Ground terminal] Connected to negative output of diode bridge circuit.

2

TA31032P, TA31033P/AP-3

SPEECH NETWORK ICs

PIN No.	PIN NAME	FUNCTION
10 (9)	TPO	[Output terminal of transmit input amplifier] Makes negative feedback to TPI1 terminal (Pin 12, Pin (11)).
11 (10)	TPI 2	[Non-inversion input terminal of transmit input amplifier] Apply DC bias to this terminal from REF terminal (Pin 8, Pin (7)) through resistance.
12 (11)	TPI 1	[Inversion input terminal of transmit input amplifier] Receives negative feedback from TPO terminal (Pin 10, Pin (9)).
13 (12)	PADC	[Pad control terminal] Can control operating current of gain control (auto-pad) which is performed by line current, by means of connecting to GND terminal (Pin 9, Pin (8)) or VCC terminal (Pin 18, Pin (16)) through resistance. At open, gain is controlled at about 45mA. (line current)
14 (-)	RPI 2	[Non-inversion input terminal of receiving input amplifier] Biased internally with resistance of about 20kΩ from REF terminal (Pin 8).
15 (13)	RPI 1	[Inversion input terminal of receiving input amplifier] Receives negative feedback from RPO terminal (Pin 16, Pin (14))
16 (14)	RPO	[Output terminal of receiving input amplifier] Makes negative feedback to RPI1 terminal (Pin 15, Pin (13)).
17 (15)	RO	[Receiving output terminal] Connected to receiver (about 150Ω) of low impedance type through capacitor.
18 (16)	VCC	[Internal power supply voltage terminal] Power supply voltage of internal pre-amplifier.

Terminal No. in () is that of TA31033P, TA31033AP.

TRANSMIT GAIN ADJUSTING CIRCUIT

1. In case PADC terminal is open.

Transmit and receiving gains vary according to line current amount. With the increase of each line current amount, in the TA31032P or TA31033P, the gain attenuates by about -3dB at transmission and about -6dB at receiving. Further, in the TA31033AP the gain attenuates by about -5dB at transmission and about -6dB at receiving.

2. In case PADC terminal is connected to GND with resistance.

The gain begins to attenuate with the line current amount fewer than that when PADC terminal is open.

Set the value of resistance to be connected at 25kΩ or over.

3. In case PADC terminal is connected to VCC with resistance.

The gain begins to attenuate with the line current amount more than that when PADC terminal is open.

Set the value of resistance to be connected at 10kΩ or over.

TA31032P,TA31033P/AP-4

SPEECH NETWORK ICs

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Line Voltage		V_L	15	V
Line Current		I_L	150	mA
Peak Line Current ※		$I_{L\ peak}$	200	mA
Power	TA31032P	P_D	1300	mW
Dissipation	TA31033P / AP		1000	
Operating Temperature		T_{opr}	-40 ~ 85	°C
Storage Temperature		T_{stg}	-55 ~ 150	°C

※ : 2s.



ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Line Voltage		V_L	1	$I_L = 20\text{mA}$	3.1	3.5	3.9	V
				$I_L = 50\text{mA}$	5.4	6.0	6.4	
				$I_L = 120\text{mA}$	10.5	11.5	12.5	
Internal Power Supply Voltage		V_{CC}	1	$I_L = 20\text{mA}$	1.7	2.0	2.3	V
				$I_L = 50\text{mA}$	3.3	3.7	4.1	
				$I_L = 120\text{mA}$	7.2	7.6	8.0	
Transmit Gain	TA31032P	G_T	2	$I_L = 20\text{mA}$	35.0	37.0	39.0	dB
	TA31033P			$I_L = 120\text{mA}$	32.0	34.0	36.0	
	TA31033AP			$I_L = 20\text{mA}$	34.0	36.0	38.0	
				$I_L = 120\text{mA}$	29.0	31.0	33.0	
Receiving Gain		G_R	4	$I_L = 20\text{mA}$	-7.5	-4.5	-1.5	dB
				$I_L = 120\text{mA}$	-13.5	-10.5	-7.5	
MF Gain	TA31032P	G_{MF}	3	$I_L = 20\text{mA}$	20.5	22.5	24.5	dB
	TA31033P			$I_L = 120\text{mA}$	17.5	19.5	21.5	
	TA31033AP			$I_L = 20\text{mA}$	19.5	21.5	23.5	
				$I_L = 120\text{mA}$	14.5	16.5	18.5	
Transmit Dynamic Range		DR_T	2	$I_L = 20\text{mA}$ Distortion ratio 4%	2.5	—	—	V_{p-p}
				$I_L = 120\text{mA}$ Distortion ratio 4%	4.0	—	—	
Receiving Dynamic Range		DR_R	4	$I_L = 20\text{mA}$ Distortion ratio 10%	0.25	—	—	V_{p-p}
				$I_L = 120\text{mA}$ Distortion ratio 10%	0.3	—	—	
MFI Input Impedance		Z_i (MF)	—	$I_L = 50\text{mA}$	24	—	—	$k\Omega$
RPI 2 Input Impedance ※		Z_i (RPI 2)	—	$I_L = 50\text{mA}$	16	20	28	$k\Omega$
Mute Terminal Input Voltage	"H" Level	V_{IH} (MU)	—	$I_L = 20 \sim 120\text{mA}$	1.5	—	V_{CC}	V
	"L" Level	V_{IL} (MU)	—	$I_L = 20 \sim 120\text{mA}$	0	—	0.2	
Receiving Output Current		I_{source} (RO)	—	$I_L = 20 \sim 120\text{mA}$	4.0	—	—	mA

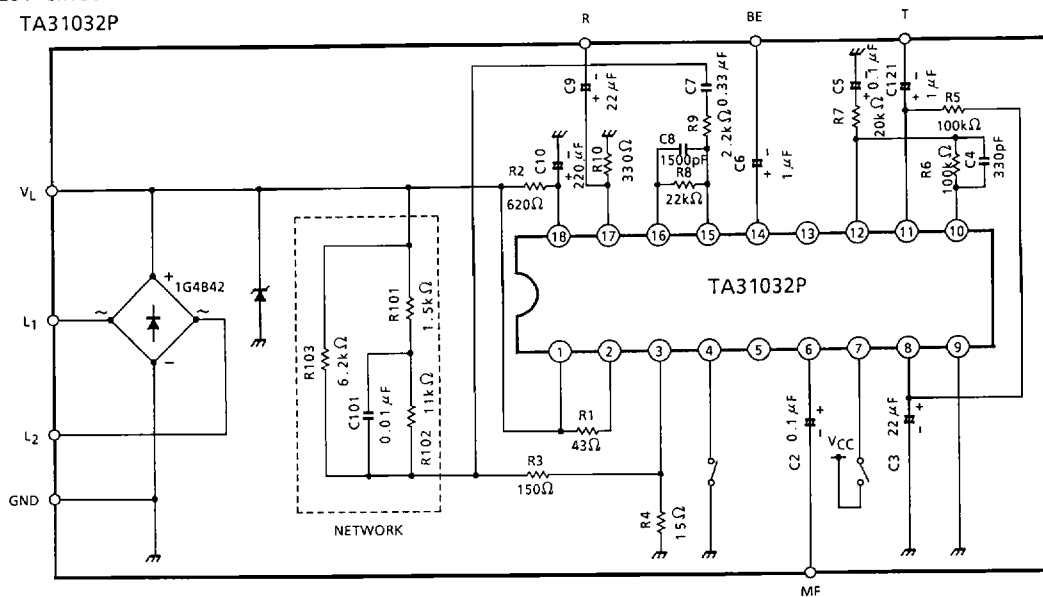
※ TA31032P only

TA31032P, TA31033P/AP-5

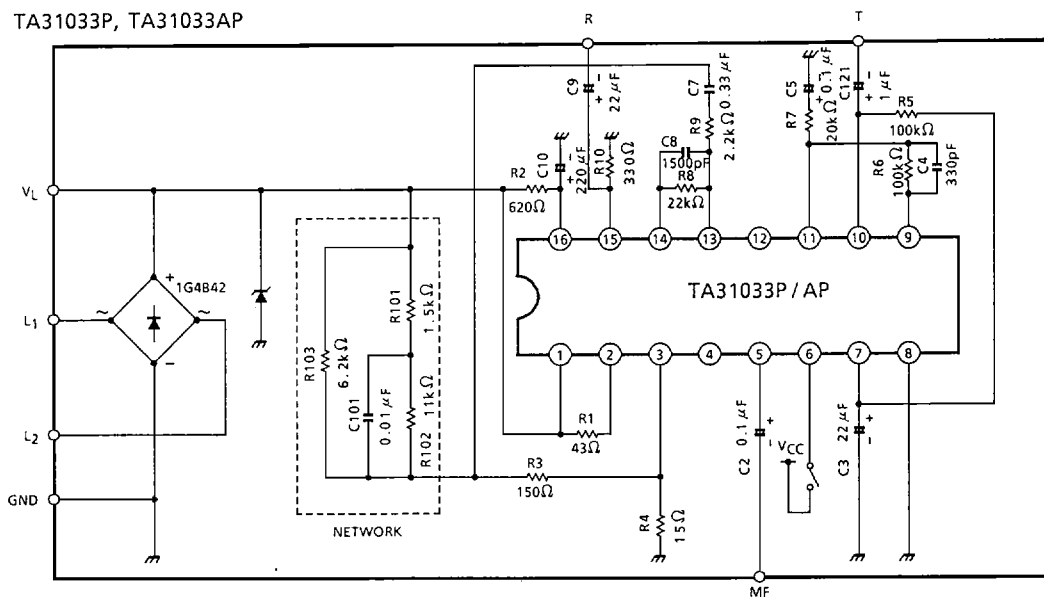
SPEECH NETWORK ICs

TEST CIRCUIT

TA31032P



TA31033P, TA31033AP

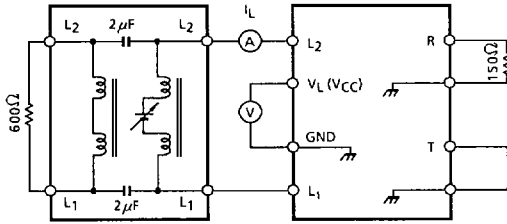


TA31032P, TA31033P/AP-6

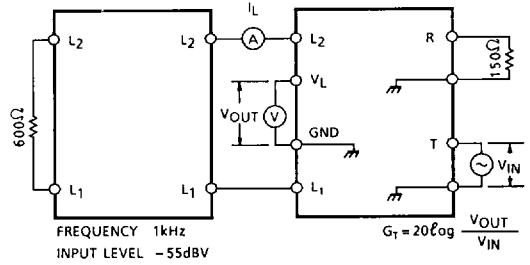
SPEECH NETWORK ICs

TEST CIRCUIT

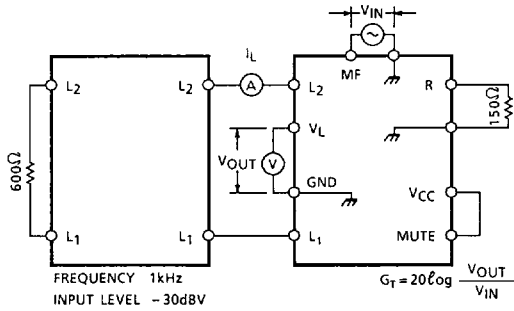
(1) V_L, V_{CC}



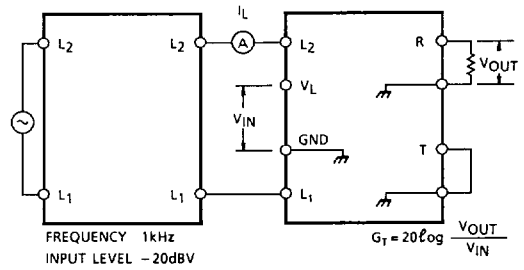
(2) G_T, DR_T



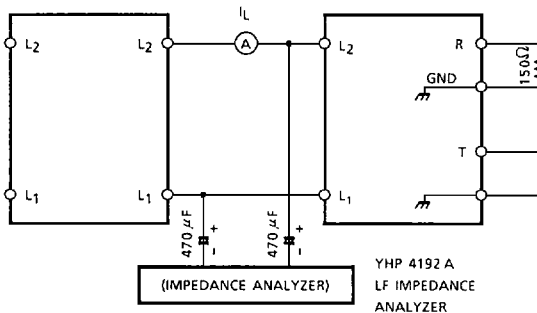
(3) G_{MF}, DR_{MF}



(4) G_R, DR_R

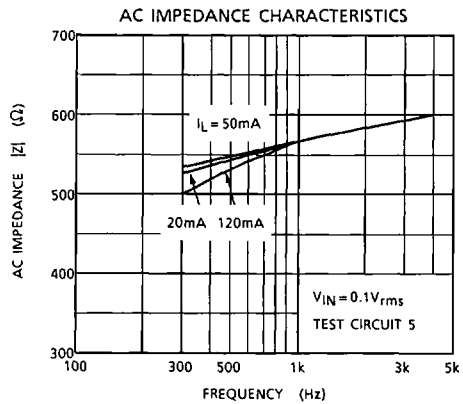
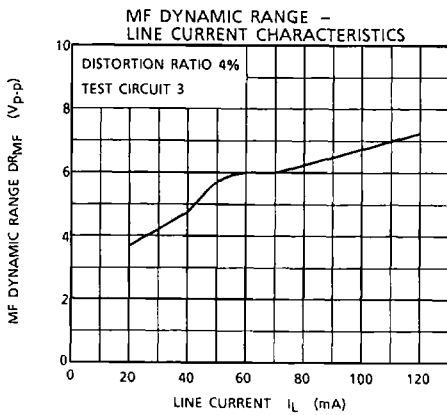
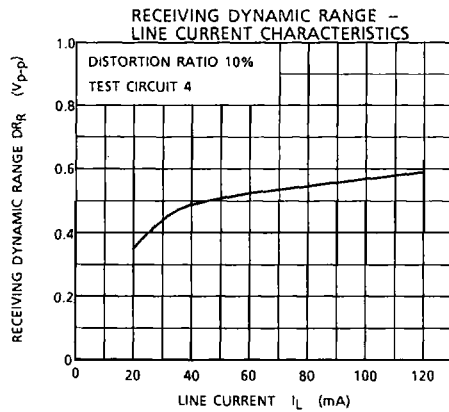
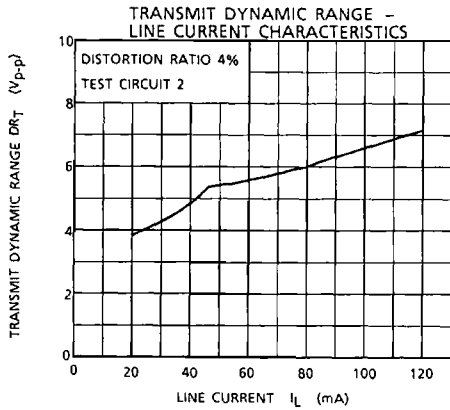
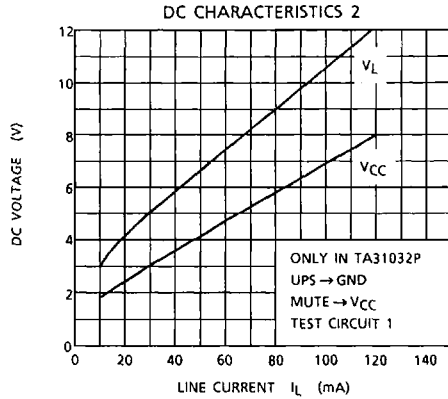
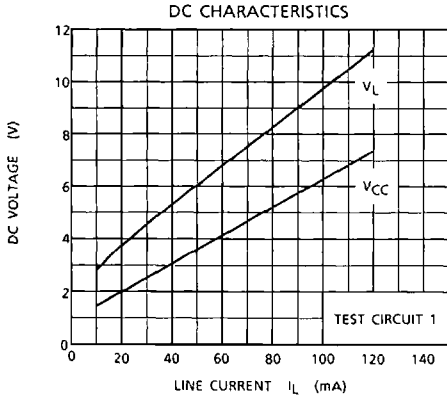


(5) Z_{tel}



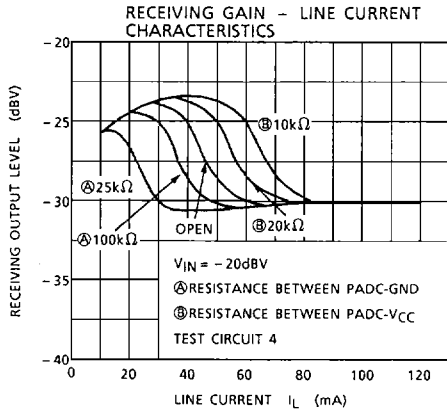
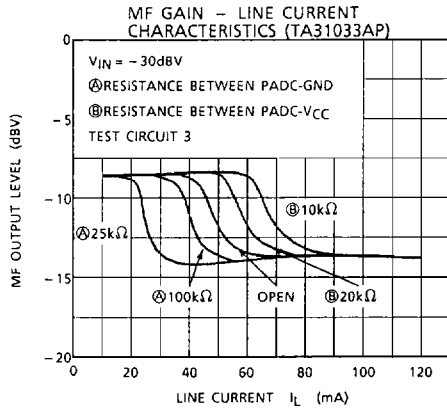
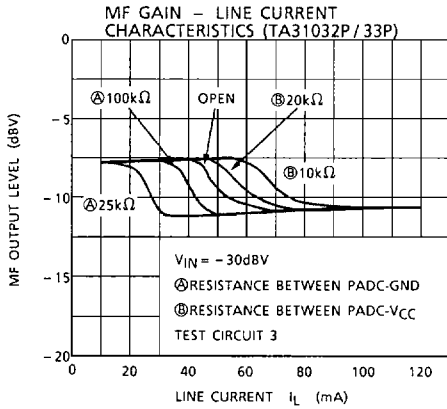
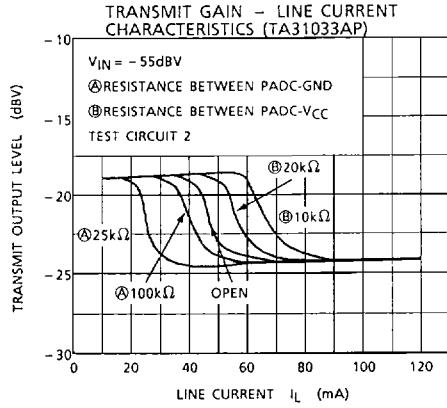
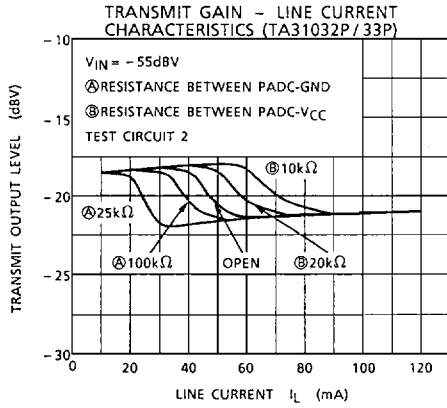
TA31032P, TA31033P/AP-7

SPEECH NETWORK ICs



TA31032P, TA31033P/AP-8

SPEECH NETWORK ICs

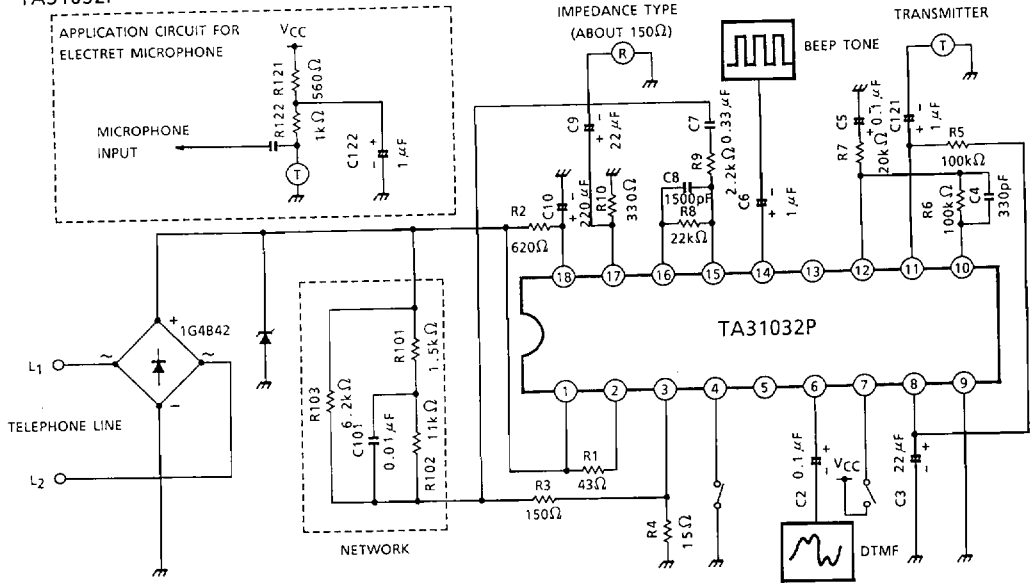


TA31032P, TA31033P/AP-9

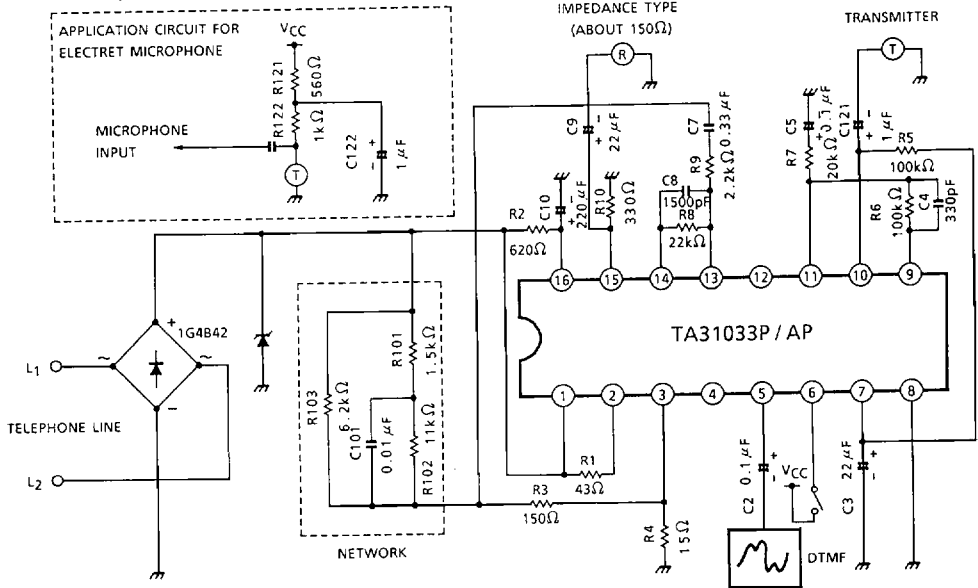
SPEECH NETWORK ICs

APPLICATION CIRCUIT

TA31032P



TA31033P, TA31033AP



TA31032P, TA31033P/AP-10