

TA31032F, TA31033F, TA31033AF

SPEECH NETWORK (FOR TELEPHONE SET)

- Direct interface with receiver (dynamic type, electromagnetic type) of low impedance type is possible.
- This IC is able to changing over an input from transmitter to an input of dial signal (DTMF signal) and outputting to the line.
- Gain is automatically controlled according to the line current. [Autopad Function]
- Gain control terminal (function) in extension usage is provided.
- Low operating voltage provides an excellent branch performance.
- Package is small. (Flat package for surface mount)

TA31032F (MFP-24PIN)

TA31033F/AF (FLP-16PIN)

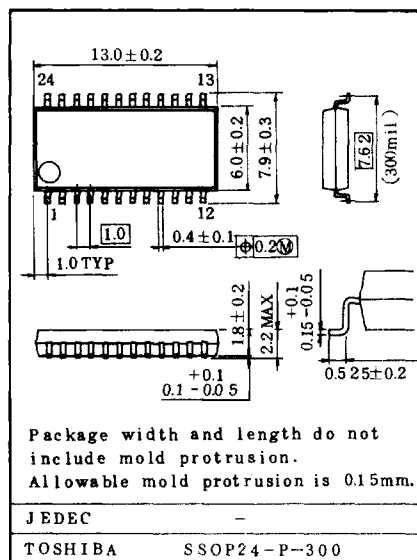
DIFFERENCE BETWEEN TA31033F and TA31033AF

NAME OF PRODUCT	TRANSMIT LOSS
TA31033F	-3dB
TA31033AF	-5dB

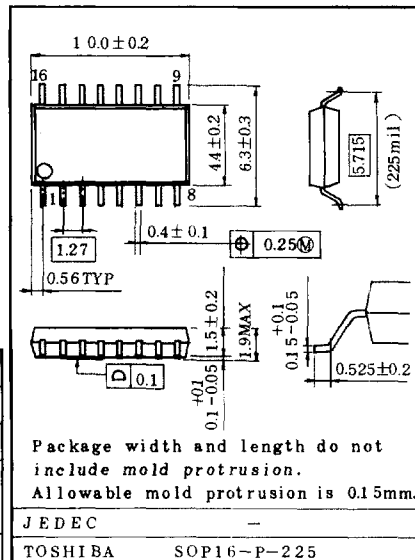
MAXIMUM RATINGS (Ta=25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Line Voltage	V _L	15	V
Line Current	I _L	150	mA
Power Dissipation	P _D	450	mW
		400	
Operating Temperature	T _{opr}	-30~60	°C
Storage Temperature	T _{stg}	-55~150	°C

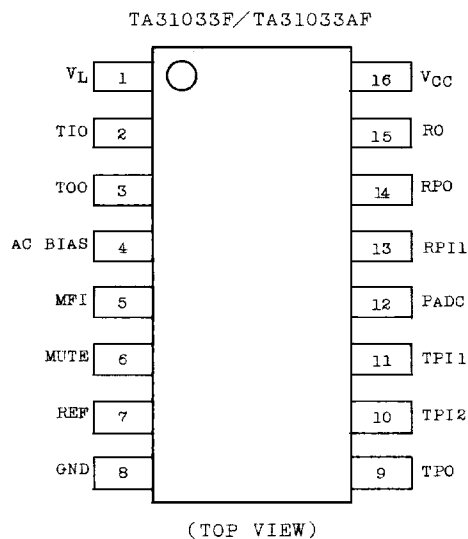
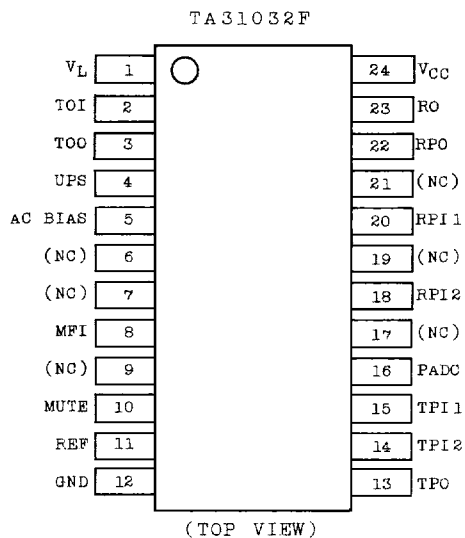
Unit in mm



Unit in mm



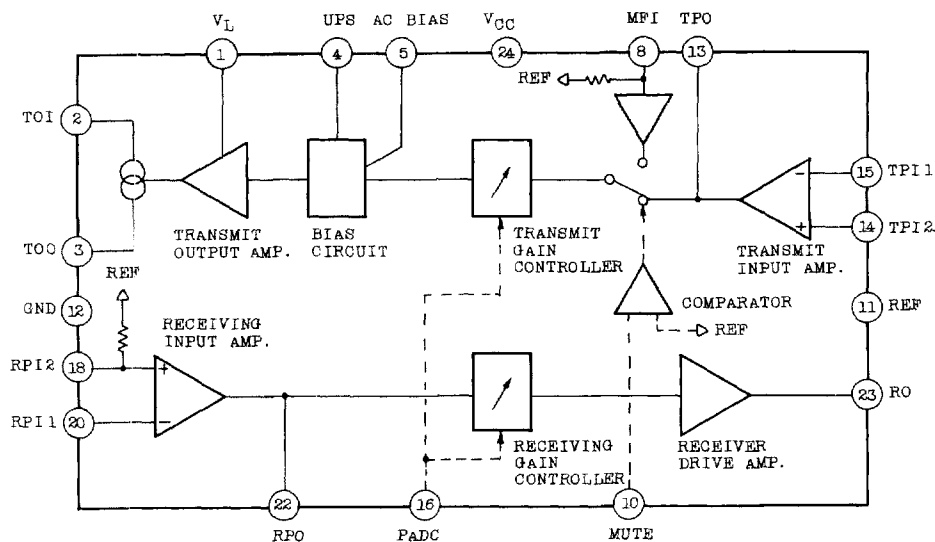
PIN CONNECTION



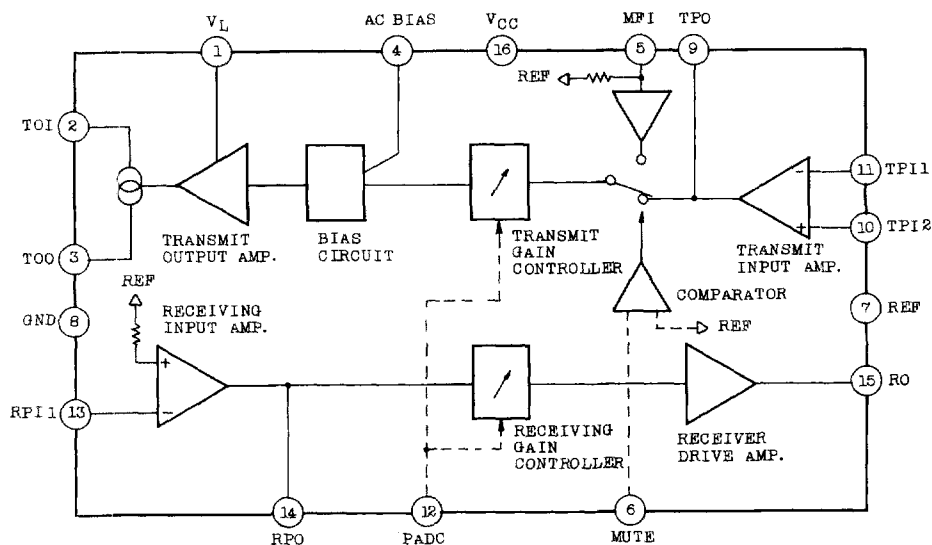
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BLOCK DIAGRAM

TA31032F



TA31033F, TA31033AF



FUNCTION OF EACH TERMINAL

TERMINAL No.		SYMBOL	FUNCTION
TA31032F	TA31033F TA31033AF		
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 (① pin or ① pin) through the transistor for heat radiation and 100Ω, and connected to T00 terminal (③ pin or ③ pin) through the transistor and 82Ω. Since almost all the line currents flow through the transistor, set allowable power of resistance of 82Ω which is connected to the collector of the transistor through taking into consideration the maximum current of the line current expected to be used.
③	③	T00	[Current output terminal of transmit output] Connected to GND terminal (⑫ pin or ⑧ pin) through 15Ω. Since almost all the line currents flow from this terminal to the resistance of 15Ω which is connected to GND terminal, set the allowable power of the resistance through taking into consideration the maximum current of the 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 (① pin or ① pin).

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FUNCTION OF EACH TERMINAL

TERMINAL No.		SYMBOL	FUNCTION
TA3103AF	TA31033F TA31033AF		
④	-	UPS	[Selecting terminal of DC impedance control] Connect this terminal to GND terminal (⑫ pin or ⑧ pin) and set MUTE signal at "H", DC potentials of V _L terminal (① pin or ① pin) and V _{CC} terminal (②④ pin or ①⑥ pin) 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.
⑧	⑤	MFI	[Input terminal of DTMF or external signals] Signal which is input at this terminal is output at V _L terminal (① pin or ① pin) when MUTE terminal (⑩ pin or ⑥ pin) is connected to V _{CC} terminal (②④ pin or ①⑥ pin). Since almost the same electric potential as that of REF terminal (⑪ pin or ⑦ pin) is biased to this terminal avoids direct impress of external DC potential by capacitor at impressing external signal.
⑩	⑥	MUTE	[Mute terminal] [DTMF signal and transmit signal switching terminal in transmit system] When this terminal is connected to V _{CC} terminal (②④ pin or ①⑥ pin), input signal from MFI terminal (⑧ pin or ⑤ pin) is output at V _L terminal (① pin or ① pin).
⑪	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.
⑫	⑧	GND	[Ground terminal] Connected to negative output of diode bridge circuit.

FUNCTION OF EACH TERMINAL

TERMINAL No.		SYMBOL	FUNCTION
TA31032F	TA31033F TA31033AF		
⑬	⑨	TPO	[Output terminal of transmit input amplifier] Makes negative feedback to TPI1 terminal (⑮ pin or ⑪ pin).
⑭	⑩	TPI2	[Non-inversion input terminal of transmit input amplifier] Apply DC bias to this terminal from REF terminal (⑪ pin or ⑦ pin) through resistance.
⑮	⑪	TPI1	[Inversion input terminal of transmit input amplifier] Receives negative feedback from TPO terminal (⑬ pin or ⑨ pin).
⑯	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 (⑫ pin or ⑧ pin) or V _{CC} terminal (⑳ pin or ⑯ pin) through resistance. At open, gain is controlled at about 45mA.
⑱	-	RPI2	[Non-inversion input terminal of receiving input amplifier] Biased internally with resistance of about 20kΩ from REF terminal (⑪ pin).
㉑	⑬	RPI1	[Inversion input terminal of receiving input amplifier] Receives negative feedback from RPO terminal (㉑ pin or ⑭ pin).
㉒	⑭	RPO	[Output terminal of receiving input amplifier] Makes negative feedback to RPI1 terminal (㉑ pin or ⑬ pin).
㉓	⑮	RO	[Receiving output terminal] Connected to receiver (about 150Ω) of low impedance type through capacitor.
㉔	⑯	V _{CC}	[Internal power supply voltage terminal] Power supply voltage of internal pre-amplifier.

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TRANSMIT GAIN ADJUSTING CIRCUIT

- . 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 TA31032F, TA31033F the gain attenuates by about -3dB at transmission and about -6dB at receiving. Further, in the TA31033AF the gain attenuates by about -5dB at transmission and about -6dB at receiving.

- . 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 25k Ω or over.

- . In case PADC terminal is connected to V_{CC} 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 10k Ω or over.

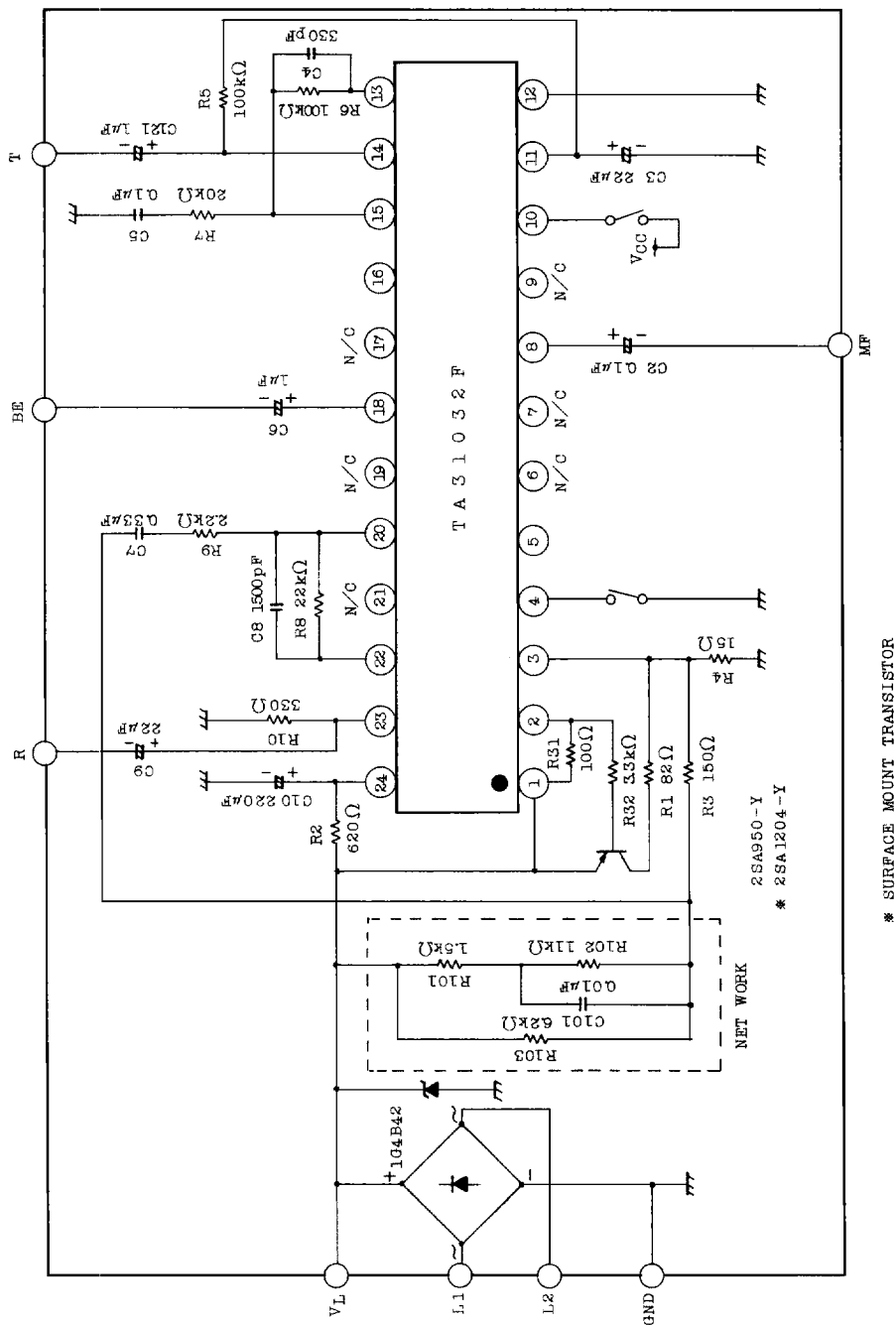
ELECTRICAL CHARACTERISTICS (Ta=25°C)

CHARACTERISTIC		SYMBOL	TEST CIR- CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Line Voltage		V _L	1	I _L =20mA	3.1	3.5	3.9	V
				I _L =50mA	5.4	6.0	6.4	
				I _L =120mA	10.5	11.5	12.5	
Internal Power Supply Voltage		V _{CC}	1	I _L =20mA	1.7	2.0	2.3	V
				I _L =50mA	3.3	3.7	4.1	
				I _L =120mA	7.2	7.6	8.0	
Transmit Gain	TA31032F TA31033F	G _T	2	I _L =20mA	35.0	37.0	39.0	dB
	TA31033AF			I _L =120mA	32.0	34.0	36.0	
				I _L =20mA	34.0	36.0	38.0	
				I _L =120mA	29.0	31.0	33.0	
Receiving Gain		G _R	4	I _L =20mA	-7.5	-4.5	-1.5	dB
				I _L =120mA	-13.5	-10.5	-7.5	
MF Gain	TA31032F TA31033F	G _{MF}	3	I _L =20mA	20.5	22.5	24.5	dB
	TA31033AF			I _L =120mA	17.5	19.5	21.5	
				I _L =20mA	19.5	21.5	23.5	
				I _L =120mA	14.5	16.5	18.5	
Transmit Dynamic Range		D _{RT}	2	I _L =20mA	2.5	-	-	V _{p-p}
				Distortion ratio 4%				
				I _L =120mA	4.0	-	-	
Receiving Dynamic Range		D _{RR}	4	I _L =20mA	0.25	-	-	V _{p-p}
				Distortion ratio 10%				
				I _L =120mA	0.3	-	-	
MFI Input Impedance		Z _I (MF)	-	I _L =50mA	24	-	-	kΩ
RPI2 Input Impedance*		Z _I (RPI2)	-	I _L =50mA	16	20	28	kΩ
MUTE Terminal High Level Input Voltage		V _{IH} (MU)	-	I _L =20~120mA	1.5	-	V _{CC}	V
MUTE Terminal Low Level Input Voltage		V _{IL} (MU)	-	I _L =20~120mA	0	-	0.2	V
Receiving Output Current		I _{source} (RO)	-	I _L =20~120mA	4.0	-	-	mA

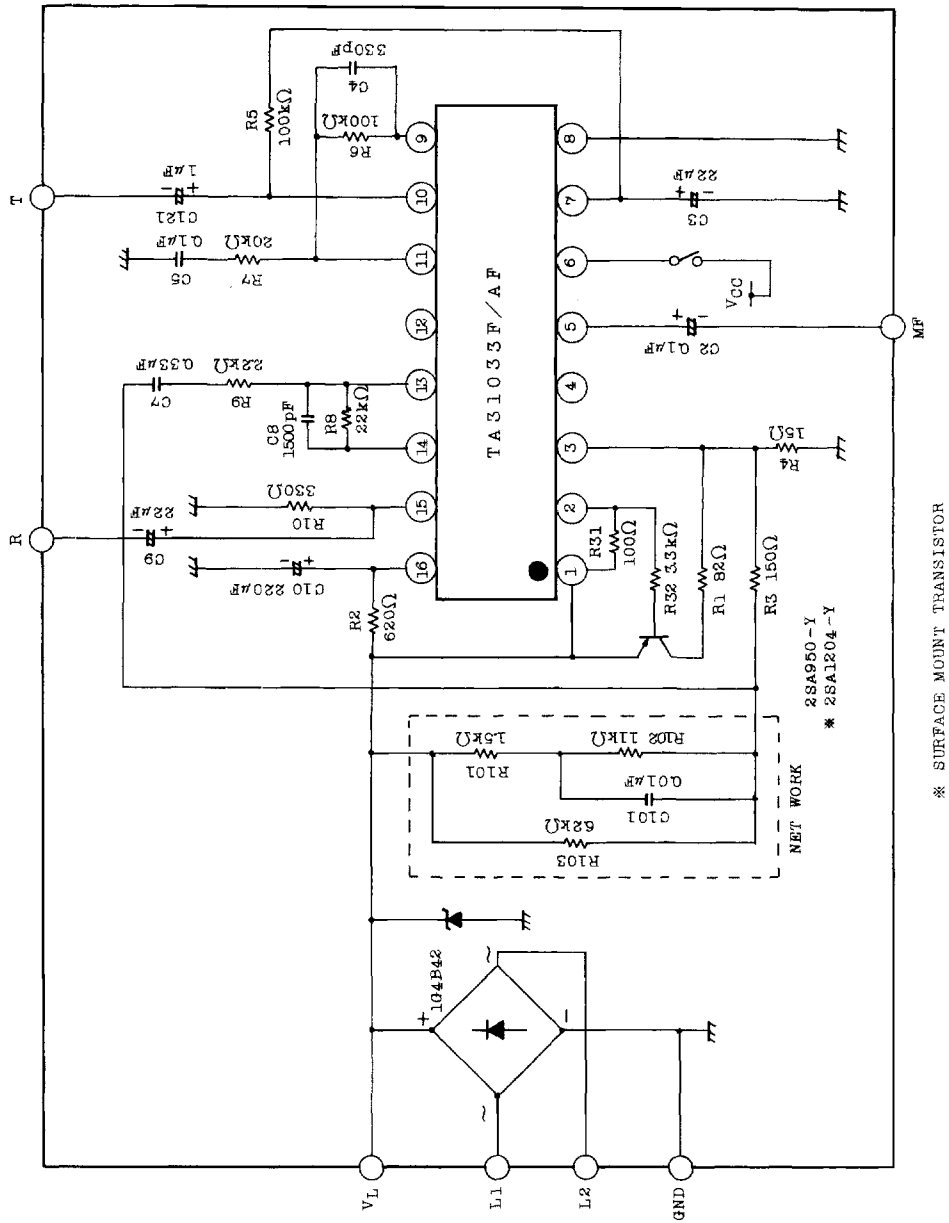
* TA31032F only.

TA31032F, TA31033F, TA31033AF

TA31032F TEST CIRCUIT



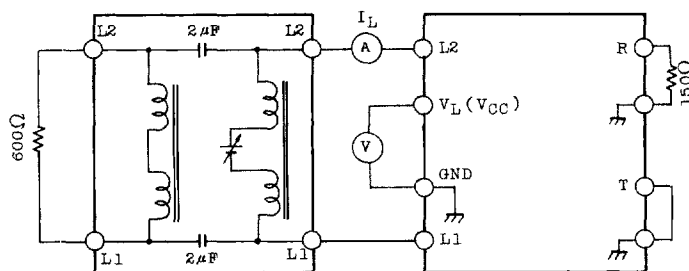
TA31033F, TA31033AF TEST CIRCUIT



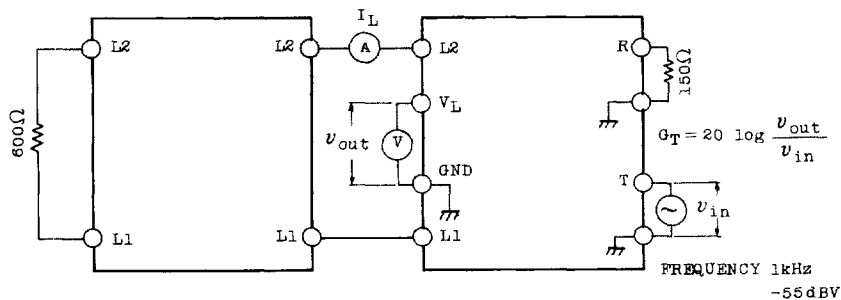
TA31032F, TA31033F, TA31033AF

TEST CIRCUIT

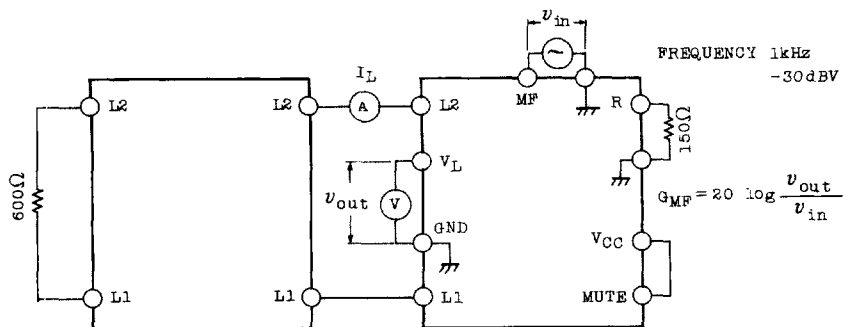
(1) V_L , V_{CC}



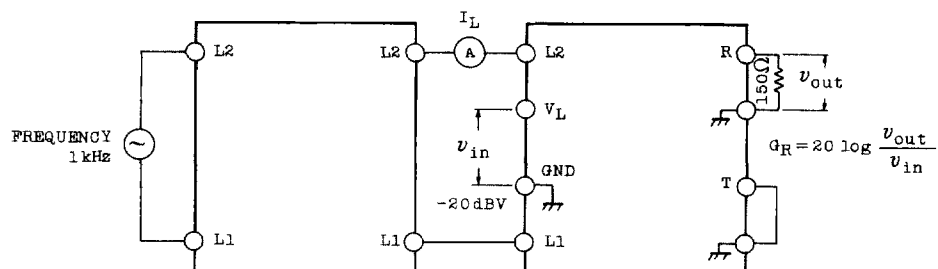
(2) G_T , DRT



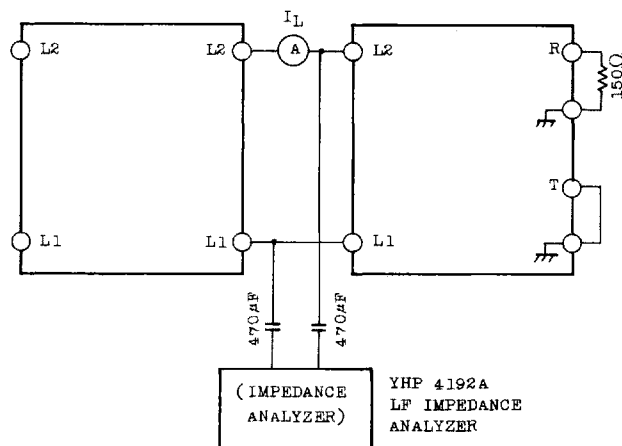
(3) G_{MF} , DRMF



(4) G_R , DR_R

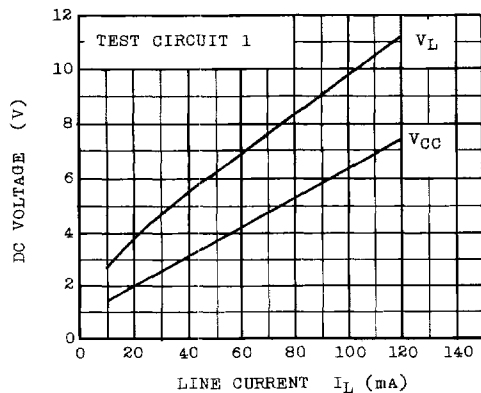


(5) Z_{te1}

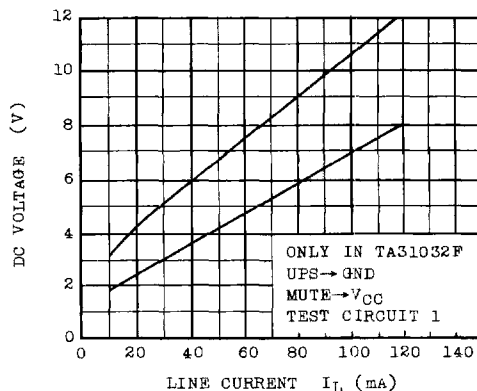


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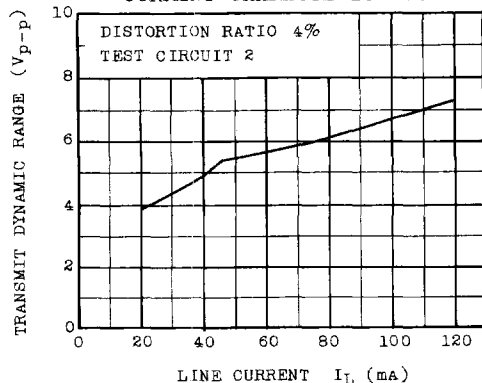
DC CHARACTERISTICS



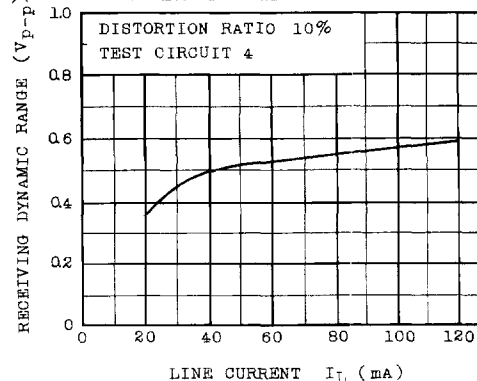
DC CHARACTERISTICS 2



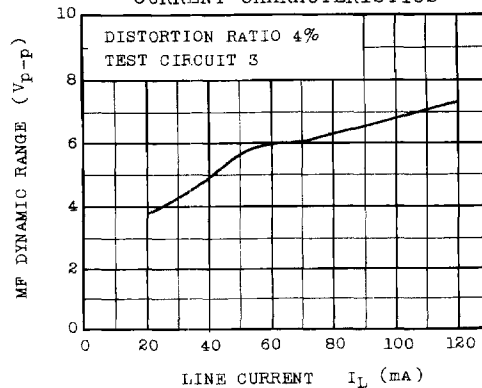
TRANSMIT DYNAMIC RANGE TO CURRENT CHARACTERISTICS



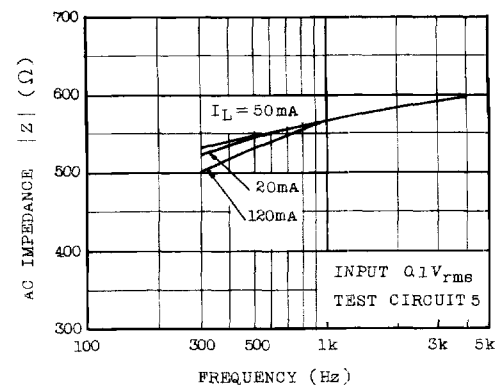
RECEIVING DYNAMIC RANGE TO CURRENT CHARACTERISTICS

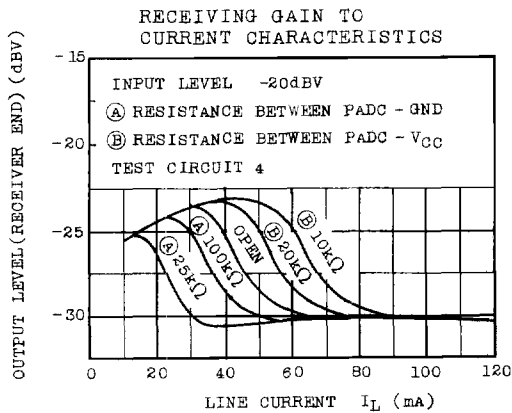
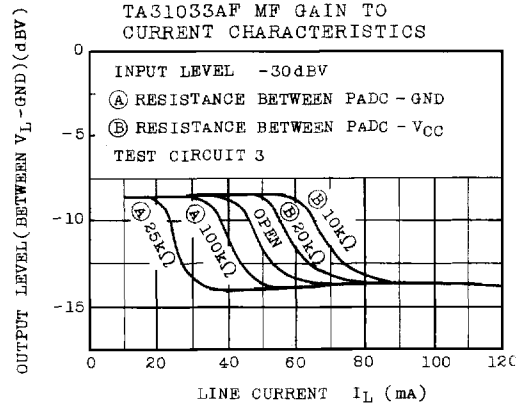
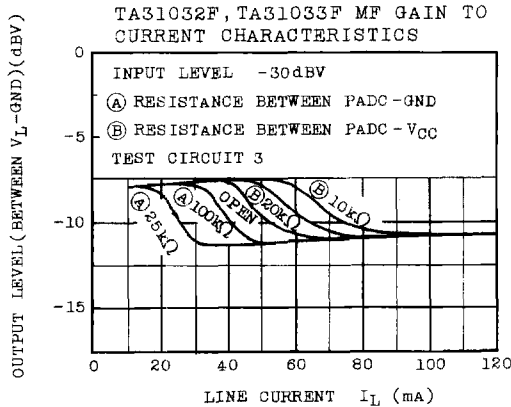
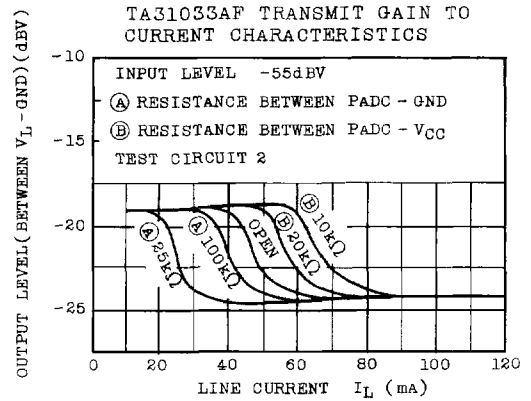
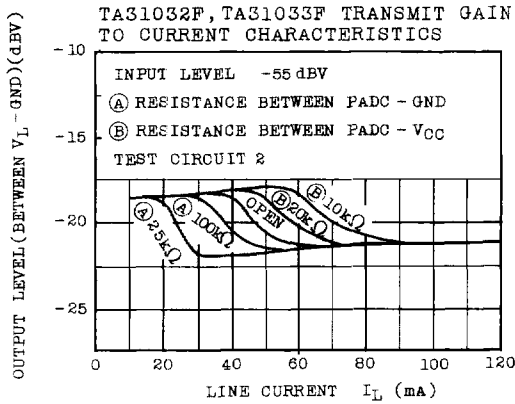


MF DYNAMIC RANGE TO CURRENT CHARACTERISTICS



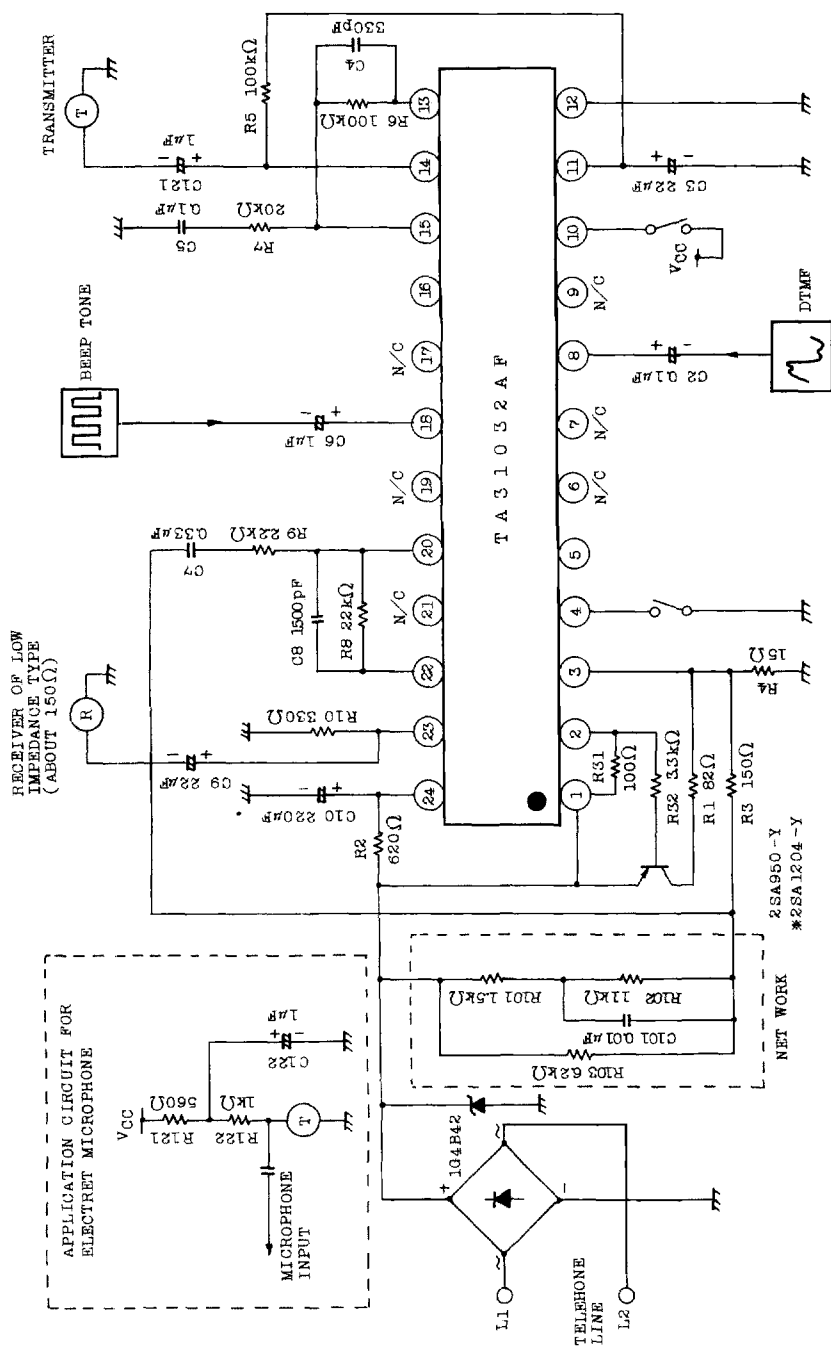
AC IMPEDANCE CHARACTERISTICS





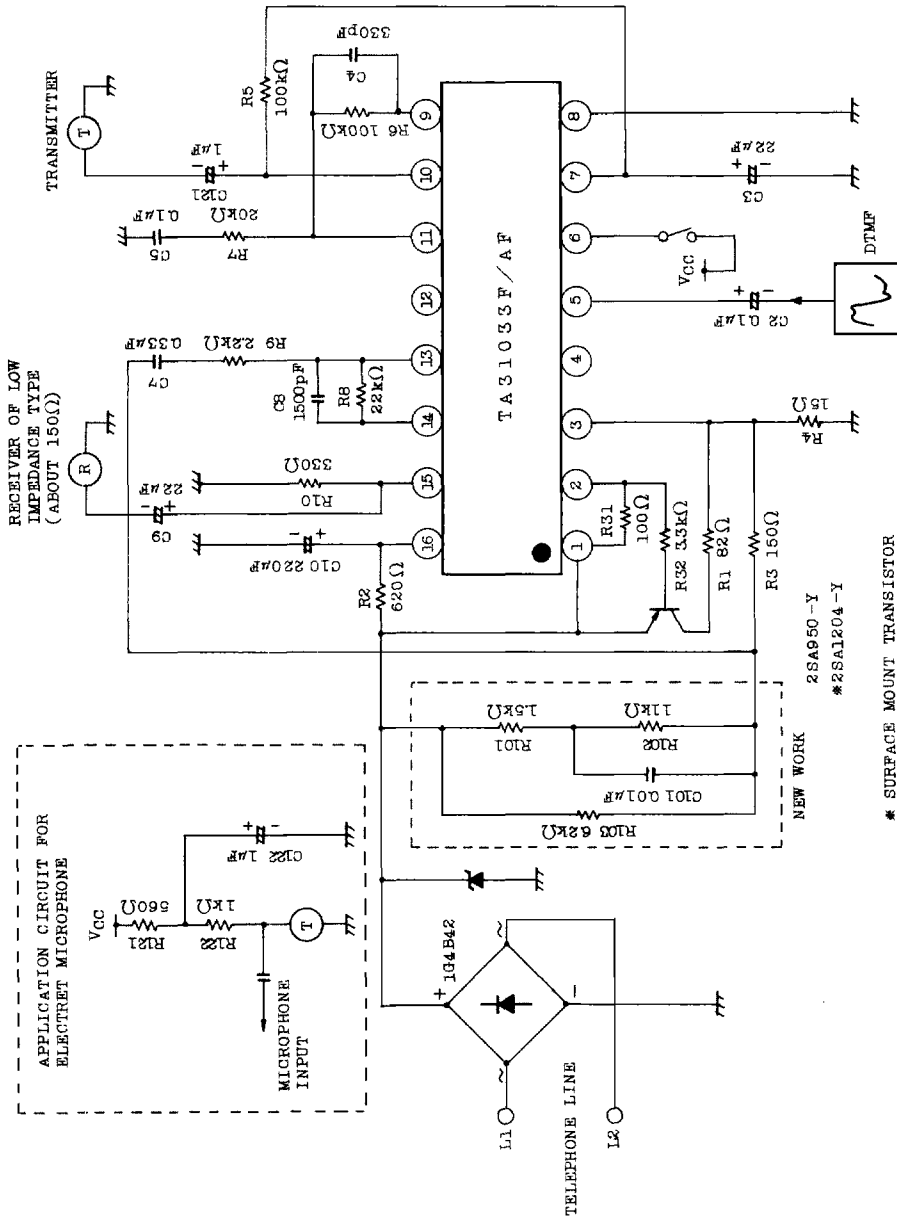
TA31032F, TA31033F, TA31033AF

TA31032F AN EXAMPLE OF APPLICATION CIRCUIT



* SURFACE MOUNT TRANSISTOR

TA31033F, TA31033AF AN EXAMPLE OF APPLICATION CIRCUIT



* SURFACE MOUNT TRANSISTOR

2SA950-Y
#2SA1204-Y