FUJITSU

MB4752A

TS544-A874
April 1987

SUBSCRIBER LINE INTERFACE IC

The Fujitsu MB4752A is designed for PBX (Private Branch Exchange), it has battery feed, supervision and 4-wire to 2-wire conversion functions.
Battery Feed mode can be established to 200Ω x 2, 440Ω x 2 constant feeding resistor, just changing the terminal connection. It is used the subscriber line interface circuit for digital PBX and CO. We can get much high longitudinal balance and 4W to 2W-gain and characteristics just adjusting external resistor.
So it can use not only domestic use but also overseas use.

- 440Ω x 2 / 200Ω x 2 feeding resistance
- Loop detection function
- Line fault protection
- Hybrid function (4-wire to 2-wire conversion function)
- Ring trip comparator
  Balancing impedance is selected by an external parts
- Digital output terminal has open-collector output with a pull up resistor
- 28-pad LCC package: (Suffix:-TV)

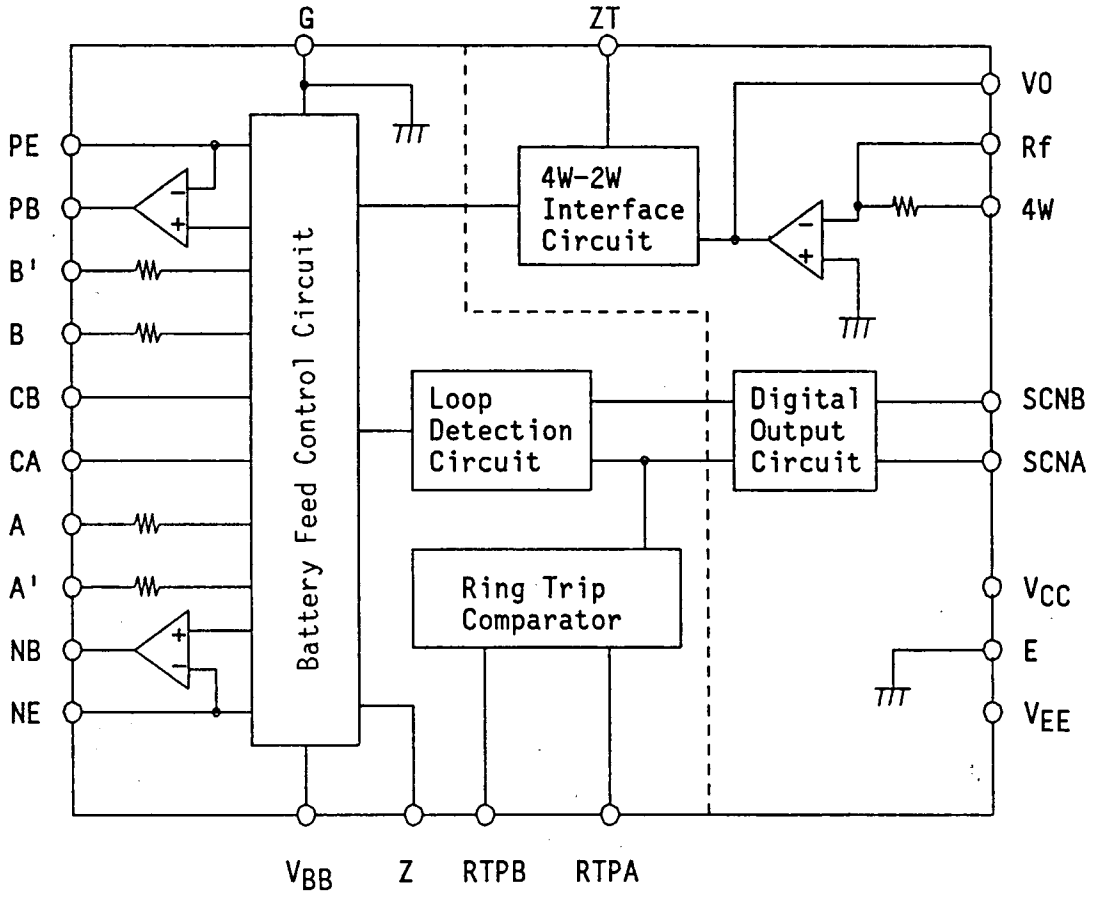
Absolute Maximum Rating (See Note)

Rating	Symbol	Value	Unit	Note
Power Supply Voltage	V_{BB}	-60 to +0.5	V	Referenced to GND
	V_{CC}	-0.5 to +7	V	Referenced to E
	V_{EE}	-7 to +0.5	V	
	V_{EG}	-7.5 to +0.5	V	Referenced to GND
Input Voltage	V_A	V_{BB}-0.5 to +0.5	V	Referenced to GND
	V_B	V_{BB}-0.5 to +0.5	V	
	RTPA	V_{BB}-0.5 to V_{BB}+30	V	
	RTPB	-30 to +0.5	V	
	V_{4W}	V_{EE}-0.5 to V_{CC}+0.5	V	Referenced to E
Storage Temperature	T_{STG}	-55 to +150	°C	

NOTE: Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

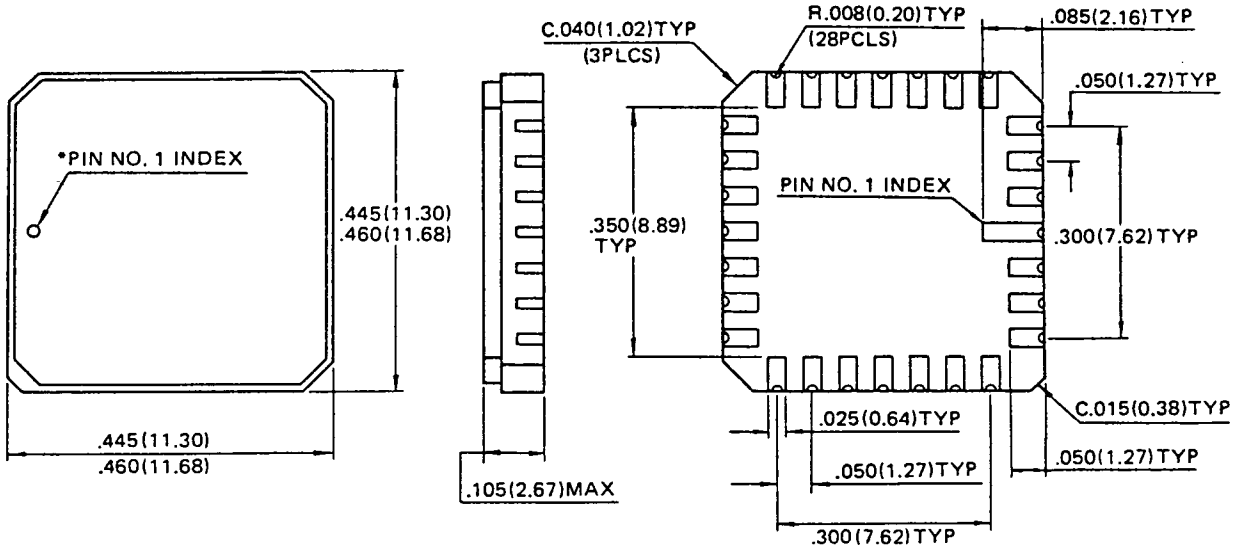
Figure-1 MB4752A Block Diagram



Package Dimensions

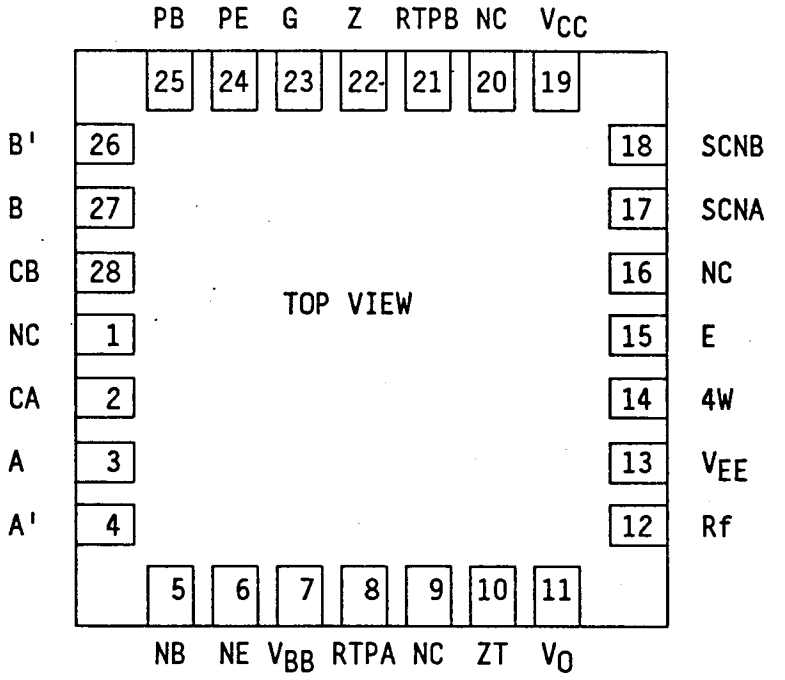
(Suffix:-TV)

28-PAD CERAMIC (FRIT SEAL) LEADLESS CHIP CARRIER
(CASE No.: LCC-28C-F01)



Dimensions in
inches (millimeters)

Pin Assignment



Pin Description

Pin No.	Symbol	Function
1	NC	No connection
2	CA	High-impedance capacitor pin. A capacitor is connected between this terminal and CB terminal. AC impedance of Battey Feed circuit is made up to high impedance by this external capacitor.
3	A	440Ω battery feed for line A
4	A'	200Ω battery feed for line A
5	NB	Base drive output for the NPN power transistor
6	NE	Emitter current sensing input for the NPN power transistor
7	V_{BB}	Most Negative Voltage Supply, -48V
8	RTPA	Ring-trip input for line A
9	NC	No connection
10	ZT	4W to 2W Transformation impedance
11	V_O	4W to 2W Gain setting resistor input
12	R_f	4W to 2W Gain setting resistor input
13	V_{EE}	Negative Voltage Supply, -5V
14	4W	4-wire input
15	E	Ground
16	NC	No connection
17	SCNA	SCN detecting output for line A
18	SCNB	SCN detecting output for line B
19	V_{CC}	Positive Voltage Supply, +5V
20	NC	No connection

Pin Description (Continued)

Pin No.	Symbol	Function
21	RTPB	Ring trip input for line B
22	Z	Compensation capacitor input
23	G	Ground
24	PE	Emitter current sensing input for the PNP power transistor
25	PB	Base drive output for the PNP power transistor
26	B'	200Ω battery feed for line B
27	B	440Ω battery feed for line B
28	CB	High-impedance capacitor pin. A capacitor is connected between this terminal and CB terminal. AC impedance of Battery Feed circuit is made up to high impedance by this external capacitor.

Functional Description

Battery feed

By selecting connection A,B or A',B', ballanced feeding resistance of 440Ω for PBX or 200Ω for CO application is selected.

Loop detection

The digital signal outputs indicate the condition of handset being hung on, both terminals of SCNA and SCNB simultaneously, detecting the current which is generated when the handset is hung on.

Line fault protection

It outputs the signals when line A or B is short circuited to SCNA, SCNB respectively.
When excess current flow, arrester provides system protection, DC feeding resistance becomes six times as large as normal value. As a result, current would decrease.

Hybrid (Four-to-two wire conversion)

As for the communication channel, telephone switching system has four-wire-line internally, telephone set system has two-wire-line. This device have also a built-in four-wire to two-wire converter. Two-wire to four-wire converter is comprised by external common industrial operational amplifier.

Ring trip comparator

It is necessary for electrical telephone switching system to detect receiver is hung up during a calling signal.
Ring trip detection is performed by connecting external low pass filter to input terminal RTPA or RTPB. Output signal is superimposed on trip supervise output SCA, when the handset is hung up.

Recommended Operating Conditions

Parameter		Symbol	Condition	Unit	Note
Power Supply Voltage		V_{BB}	-48 ± 5	V	Referenced to GND
		V_{CC}	5.0 ± 0.25	V	Referenced to E
		V_{EE}	-5.0 ± 0.25	V	
		V_{EG}	-0.5 to +0.5	V	Referenced to GND
2W	440Ω Feeding Loop Resistor	R_L	0 to 1200	Ω	Line resistor + terminal resistor
2W	200Ω Feeding Loop Resistor	R_L	0 to 1900	Ω	
2W	Low Frequency Inductive Current	I_{AC}	0 to 6.4	mArms	Single line current f=50/60Hz
4W	Input Offset Voltage	V_{RCS}	-0.2 to 0.2	V	
4W	Input Voltage	S_{4W}	∼ 7.0	dBm	
Operating Temperature		T_{OP}	5 to 70	°C	

DC Characteristics

(Recommended operating condition unless otherwise noted.)

Parameter		Symbol	Condition		Min	Typ	Max	Unit
Power Supply Current 440Ω Feeding Mode	On-Hook	I_{BB1}	V_B=0V V_A=V_{BB}	V_{BB}=-53V V_{CC}=5.25V V_{EE}=-5.25V V_{EG}=0V	-6.4	-3.8		mA
		I_{CC1}				2.5	6.6	mA
		I_{EE1}			-2.2	-1.1		mA
	Off-Hook R_L=0Ω	I_{BB2}	V_B=-26.5V V_A=V_{BB} +26.5V		-13	-8		mA
		I_{CC2}				2.5	6.4	mA
		I_{EE2}			-2.2	-1.2		mA
Power Supply Current 200Ω Feeding Mode	On-Hook	I_{BB3}	V_B=0V V_A=V_{BB}		-7.5	-4		mA
		I_{CC3}				2.5	6.6	mA
		I_{EE3}			-2.2	-1.1		mA
	Off-Hook R_L=0Ω	I_{BB4}	V_B=-26.5V V_A=V_{BB} +26.5V		-15.6	-9.5		mA
		I_{CC4}				2.5	6.4	mA
		I_{EE4}			-2.2	-1.2		mA

DC Characteristics (Continued)
(Recommended operating condition unless otherwise noted)

Parameter		Symbol	Condition		Min	Typ	Max	Unit
Loop Supply Current 440Ω Feeding Mode		I_{A1}	V_B=-24V V_A=V_{BB}+24V	V_{BB}=-48V V_{CC}=5.0V V_{EE}=-5.0V V_{EG}=0V	47.5	54	65	mA
		I_{B1}			-65	-54	-47.5	mA
		I_{A2}	V_B=-10V V_A=V_{BB}+10V		16.8	21	26.5	mA
		I_{B2}			-26.5	-21	-16.8	mA
Loop Supply Current 200Ω Feeding Mode		I_{A3}	V_B=-24V V_A=V_{BB}+24V		72.5	83	91.4	mA
		I_{B3}			-91.4	-83	-72.5	mA
		I_{A4}	V_B=-10V V_A=V_{BB}+10V		35.7	45	58	mA
		I_{B4}			-58	-45	-35.7	mA
Line-Fault Drooping Current 440Ω Feeding Mode		I_{PG1}	V_A=GND	V_{BB}=-53V V_{CC}=5.0V V_{EE}=-5.0V V_{EG}=0V		22	28	mA
		I_{PB1}	V_B=V_{BB}		-28	-22		mA
Line-Fault Dropping Current 200Ω Feeding Mode		I_{PG2}	V_A=GND			29	36	mA
		I_{PB2}	V_B=V_{BB}		-36	-29		mA
Loop Detection Current	Detection	I_{ON1}	V_{BB}=-43V	V_{CC}=5.0V V_{EE}=-5.0V V_{EG}=0V	11.1	12.4	14.2	mA
	Release	I_{OFF1}			10.4	11.5	13.4	mA
	Detection	I_{ON2}	V_{BB}=-53V		14.4	16.0	18.1	mA
	Release	I_{OFF2}			13.4	14.8	16.6	mA
Ring Trip Detection Voltage	RTPA	V_{RD1}	On-Hook	V_{BB}=-48V V_{CC}=5.0V V_{EE}=-5.0V V_{EG}=0V	-44	-43.3	-42.5	V
	RTPB	V_{RD2}	On-Hook		-5	-4.4	-4	V
Line-Fault Detection Volt. 200Ω Feeding Mode	Line A to GND	V_{GD1}	V_B=OPEN		24	26.5	30	V
	Line B to VBB		V_A=OPEN		24	26.5	30	V
Line Fault Detection Volt. 400Ω Feeding Mode	Line A to GND	V_{GD2}	V_B=OPEN		11	15.5	21	V
	Line B to VBB		V_A=OPEN		11	15.5	21	V
Line-Fault SCN Mask Current	SCNA	I_{MA}	VB=VBB		3.3	4.4	5.9	mA
	SCNB	I_{MB}	VA=0V		-5.9	-4.4	-3.3	mA
SCN Ouput Low Voltage	SCNA	V_{OLA}	I=1.2mA V_{CC}=5.25V On-Hook	V_{BB}=-48V V_{EE}=-5.0V V_{EG}=0V Reference to E		0.02	0.4	V
	SCNB	V_{OLB}				0.02	0.4	V
SCN Output High Voltage	SCNA	V_{OHA}	I=-50μA V_{CC}=4.75V Off-Hook		2.4	3.8		V
	SCNB	V_{OHB}			2.4	3.8		V

Note : Unless RTPA terminal is in use, it must be connected to V_{BB}.

AC Characteristics

(Recommended operationg condition unless otherwise noted)

Parameter		Symbol	Condition		Min	Typ	Max	Unit
4W to 2W Gain		G_{42}	L=+4dBm, f=1kHz		-5.4	-4.4	-3.4	dB
4W to 2W Gain Frequency Response		G_{f42}	f=0.2kHz	Referenced to output at f=1kHz L=-10dBr	-0.1	+0.07		dB
			f=0.3kHz		-0.1	+0.04	+0.2	dB
			f=0.4kHz		-0.1	+0.02	+0.2	dB
			f=0.6kHz		-0.1	0	+0.2	dB
			f=2.4kHz		-0.1	-0.01	+0.2	dB
			f=3.0kHz		-0.1	-0.01	+0.2	dB
			f=3.4kHz		-0.1	-0.01	+0.2	dB
4W to 2W Gain Level Linearity		G_{L42}	L=+3dBr	Referenced to output at L=-10dBr f=1kHz	-0.1	0	+0.1	dB
			L=-40dBr		-0.1	0	+0.1	dB
			L=-50dBr		-0.2	0	+0.2	dB
Idle Channel Noise		N_{I2}				-94	-76	dBmp
4W to 2W Signal / Noise Ratio		SN_{42}	L=0dBr	f=1KHz	50	57		dB
			L=-30dBr		46	61		dB
			L=-40dBr		36	52		dB
			L=-45dBr		31	47		dB
Longitudinal Balance		L_{B2W}	f=0.3kHz	Adjust REA 48 to 53Ω	43	60		dB
			f=1.0kHz		43	60		dB
			f=3.4kHz		43	60		dB
Power Supply Noise Rejection	VBB to 2W	P_{SRB}	L=0.245Vrms, f=1kHz		20	39		dB
	VCC to 2W	P_{SRC}			20	41		dB
	VEE to 2W	P_{SRE}			20	55		dB
	VEG to 2W	P_{SRR}			20	43		dB

Note : Unless RTPA terminal is in use, it must be connected to V_{BB}.

SCN Logical Table

Input Condition			SCNA	SCNB	Note
Loop Detection	Loop Detection (OFF-Hook to ON-Hook)	$I_L < I_{ON}$	L	L	I_L: Loop Current I_{ON} : I_{ON1}, I_{ON2} I_{OFF} : I_{OFF1}, I_{OFF2} See DC Char.
		$I_L > I_{ON}$	H	H	
	Loop Release (ON-Hook to OFF-Hook)	$I_L > I_{OFF}$	H	H	
		$I_L < I_{OFF}$	L	L	
Ring Trip Detection	RTPA input	$V_{RTPA} < V_{RD1}$	L	L	V_{RTPA} : RTPA Input Voltage V_{RTPB} : RTPB input Voltage VRD1 : See DC Char. VRD2 :
		$V_{RTPA} > V_{RD1}$	H	L	
	RTPB input	$V_{RTPB} > V_{RD2}$	L	L	
		$V_{RTPB} < V_{RD2}$	H	L	
Line-Fault Detection	Line A to Ground	IA + IB < ION * 2	L	L	IA : Line A Current IB : Line B Current IMA See DC Char. IMB
		IA + IB > ION * 2 and IB < IMB	H	L	
		IA + IB > ION * 2 and IB > IMB	H	H	
	Line B to Ground	IA + IB < ION * 2	L	L	
		IA + IB > ION * 2 and IA < IMA	L	H	
		IA + IB > ION * 2 and IA > IMA	H	H	

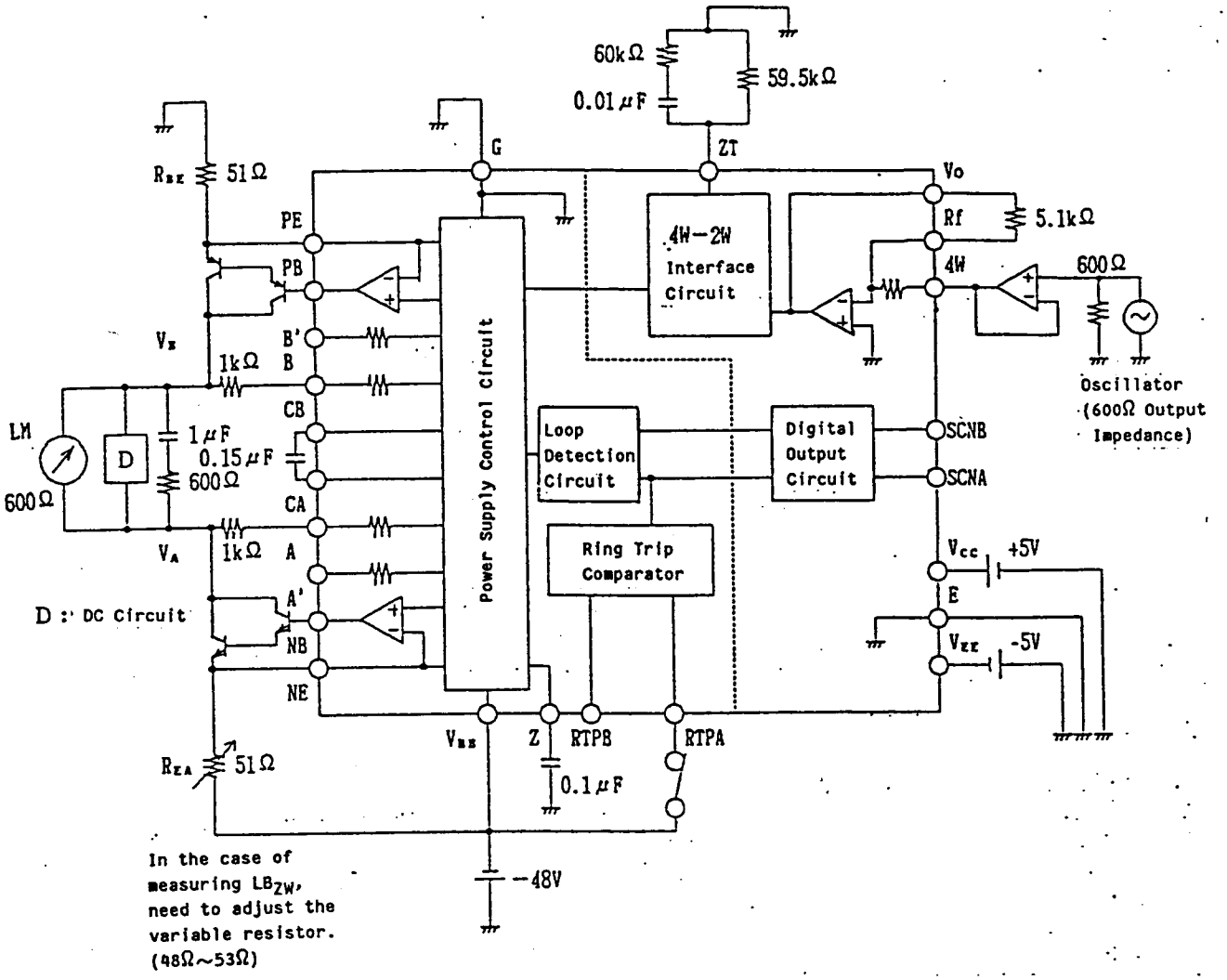
Note : Unless RTPA terminal is in use, it terminal must be connected to V_{BB}.

Line Fault Protection

2W State		Feed Mode	Note
Line to Ground/VBB	| VB + (VA - VBB) | < VGD	Normal Feeding (No Protection)	VA : Line A Voltage VB : Line B Voltage VGD, VGD1, VGD2 : See DC Char.
	| VB + (VA - VBB) | > VGD	Feeding resistor (6 times of normal value)	

◇ Measurement Circuit

◆ Power Supply Mode (440Ω)



◆ Power Supply Mode (200Ω)

Change A→A' and B→B' with connecting C_A and C_B, as shown in the bolow diagram.