M5219L, P, FP

DUAL LOW-NOISE OPERATIONAL AMPLIFIERS(DUAL POWER SUPPLY TYPE)

DESCRIPTION

The M5219 is a semiconductor integrated circuit designed for a preamplifier in audio equipment of stereo and cassette tape decks.

Two low-noise operational amplifier circuits displaying internal phase-compensated high gain and low distortion are contained in a 8-pin SIP, DIP or FP, suitable for application as an equalizer and tone control amplifier of stereo equipment and cassette tape decks.

The unit can also be used as a general-purpose amplifier in portable equipment such as a stereo cassette tape recorder of a single power supply type as it operates at a low supply voltage.

FEATURES

- Low noise ····· V_{NI}=0.9μVrms typ.(R_g=2.2kΩ, RIAA)
  S/N=77dB typ. (Shorted input, IHF-A network)
  (RIAA, PHONO=2.5mVrms)
- High voltage ····· V_{CC}=±25V(50V)
- Low PHONO maximum input voltage
  ····· V_i=230mVrms(typ.)
  (V_{CC}=±22.5V, f=1kHz)
- High gain, low distortion
  ····· G_{VO}=110dB, THD=0.001%(typ.)
- High slew rate ····· SR=6.5V/μs(typ.)
- High load current, high power dissipation
  ····· I_{LP}=±50mA, P_d=800mW(SIP)
  P_d=625mW(DIP), P_d=440mW(FP)

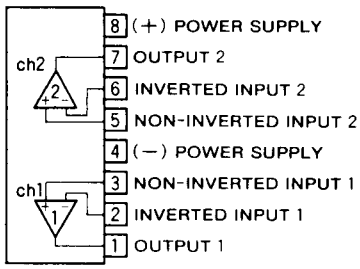
APPLICATION

General-purpose preamplifier in stereo equipment, tape decks and radio stereo cassette recorders.

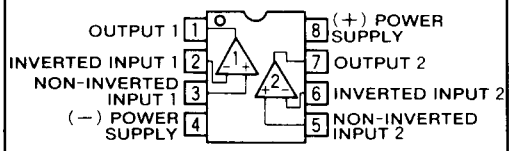
RECOMMENDED OPERATING CONDITIONS

Supply voltage range ····· ±2~±22.5V
Rated supply voltage ····· ±22.5V

PIN CONFIGURATION (TOP VIEW)

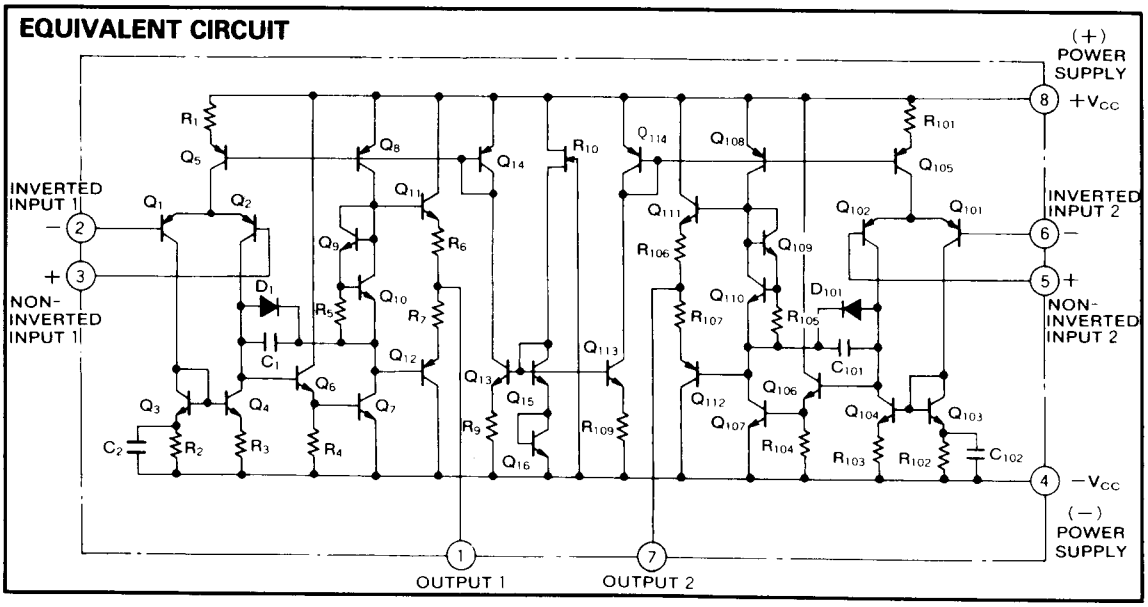


Outline 8P5 (M5219L)



Outline 8P4 (M5219P)
8P2S (M5219FP)

EQUIVALENT CIRCUIT



DUAL LOW-NOISE OPERATIONAL AMPLIFIERS(DUAL POWER SUPPLY TYPE)

ABSOLUTE MAXIMUM RATINGS (T_a=25℃, unless otherwise noted)

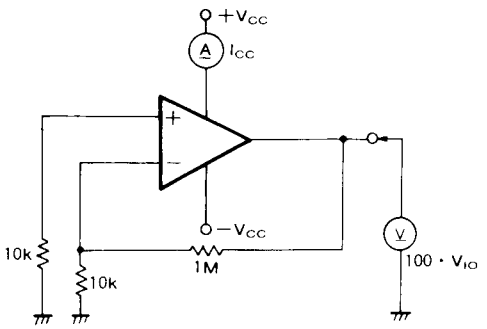
Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		±25(50)	V
I_{LP}	Load current		±50	mA
V_{id}	Differential input voltage		±30	V
V_{IC}	Common input voltage		±22.5V	V
Pd	Power dissipation		800(SIP)/625(DIP)/440(FP)	mW
K_θ	Thermal derating	T_a≧25℃	8(SIP)/6.25(DIP)/4.4(FP)	mW/℃
T_{opr}	Ambient temperature		−20～+75	℃
T_{stg}	Storage temperature		−55～+125	℃

ELECTRICAL CHARACTERISTICS (T_a=25℃, V_{CC}=±22.5V)

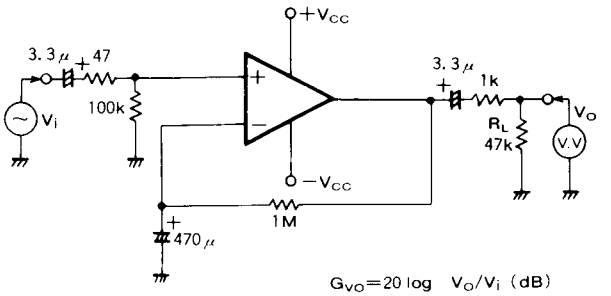
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{CC}	Circuit current	V_{in}=0		3.5	7.0	mA
V_{IO}	Input offset voltage	R_S≦10kΩ		0.5	6.0	mV
I_{IB}	Input bias current			0.3		μA
G_{VO}	Open loop voltage gain	f=100Hz, R_L=47kΩ, C_{NF}=470μF	90	110		dB
V_{OM}	Maximum output voltage	f=1kHz, THD=0.1%, R_L=47kΩ, RIAA	12.5	14.0		Vrms
THD	Total harmonic distortion	f=1kHz, V_O=5Vrms, R_L=47kΩ, RIAA		0.001	0.03	%
V_{NI}	Input referred noise voltage	R_g=2.2kΩ, BW=10Hz～30kHz, RIAA		0.9	1.8	μVrms
S/N	Signal-to-noise ratio	Shorted input (R_g=47Ω), IHF-A network PHONO=2.5mVrms, RIAA		77		dB

TEST CIRCUITS

(a) I_{CC}, V_{IO}

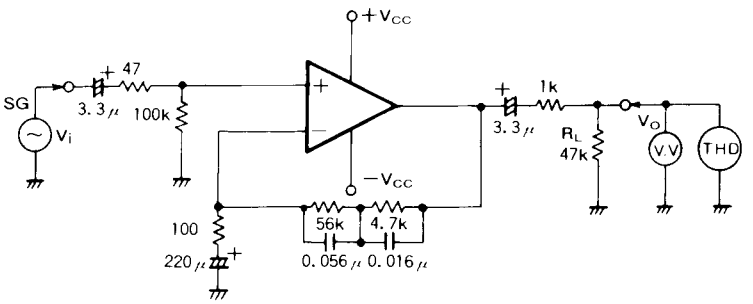


(b) G_{VO}



G_{VO}=20 log V_O/V_i (dB)

(c) V_{OM}, THD



Unit Resistance : Ω
Capacitance : F

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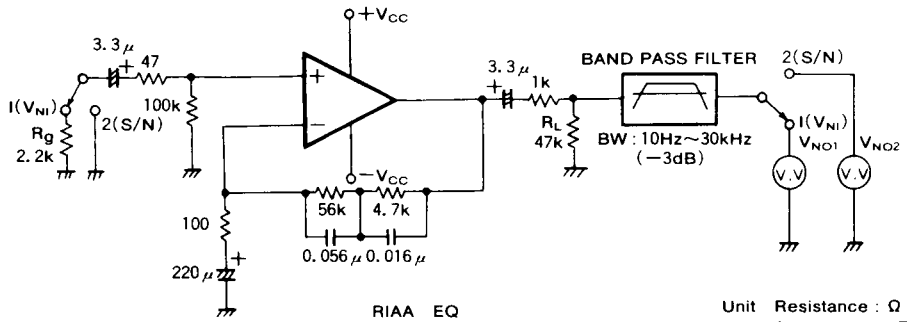
TEST CIRCUIT

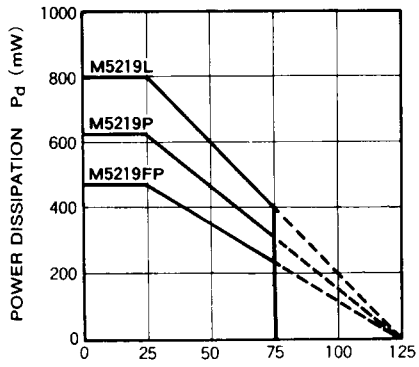
(d) V_{NI}, S/N



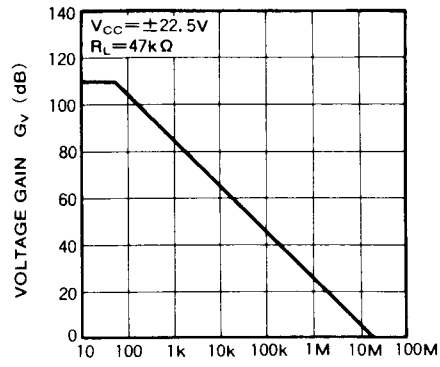
1. $V_{NI}=V_{NO1}/60(\mu Vrms)$
2. $S/N=20\log(2.5mVrms/(V_{NO2}/60))$ (dB)
   An AC voltmeter V.V with a built-in IHF-A network filter should be used for measuring the S/N ratio.

TYPICAL CHARACTERISTICS

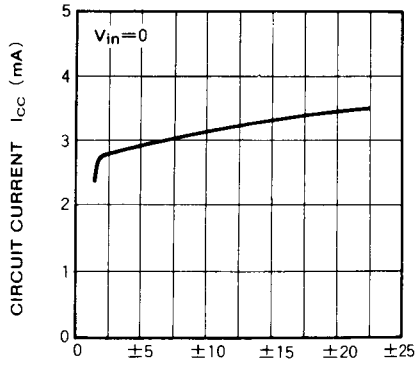
THERMAL DERATING (MAXIMUM RATING)



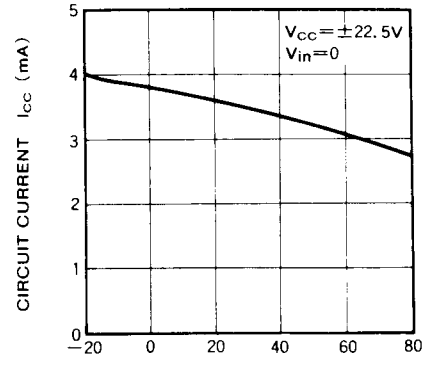
VOLTAGE GAIN VS. FREQUENCY RESPONSE



CIRCUIT CURRENT VS. SUPPLY VOLTAGE

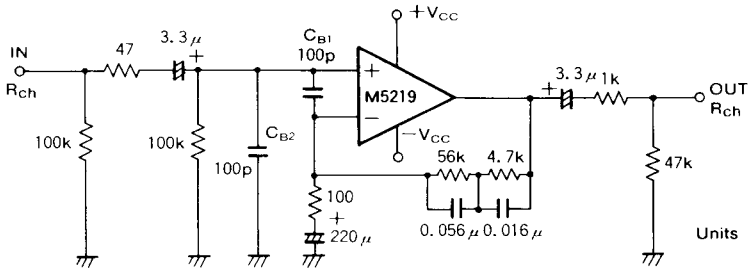


CIRCUIT CURRENT VS. AMBIENT TEMPERATURE



APPLICATION EXAMPLES

(1) Stereo equalizer amplifier circuit



TYPICAL CHARACTERISTICS (V_{CC}=±22.5V, RIAA)

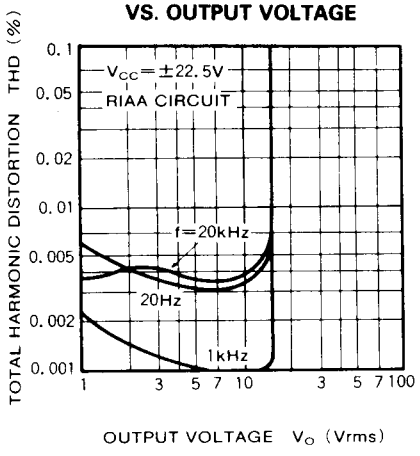
- G_V=35.6dB(f=1kHz)
- V_{NI}=0.9μVrms(R_g=2.2kΩ, BW=10Hz~30kHz)
- S/N=77dB(IHF-A network, shorted input, 2.5mVrms input sensitivity)
- THD=0.001%(f=1kHz, V_O=5Vrms)

Lch circuit constants are identical to those of Rch

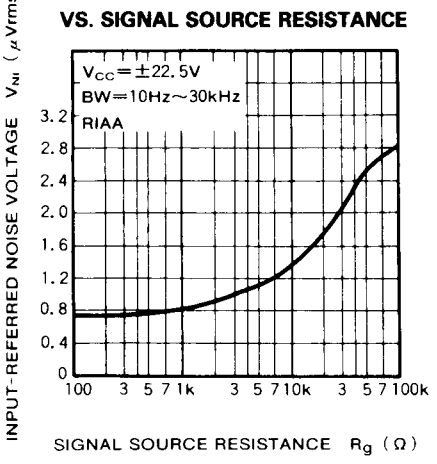
C_{B1}, C_{B2} : Capacitors for buzz prevention, use if required.

R_O : Resistor used to prevent parasitic oscillation for capacitive loads and current limiting with shorted and other abnormal load conditions.

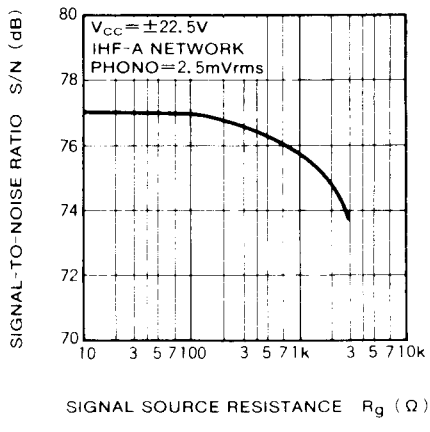
TOTAL HARMONIC DISTORTION VS. OUTPUT VOLTAGE



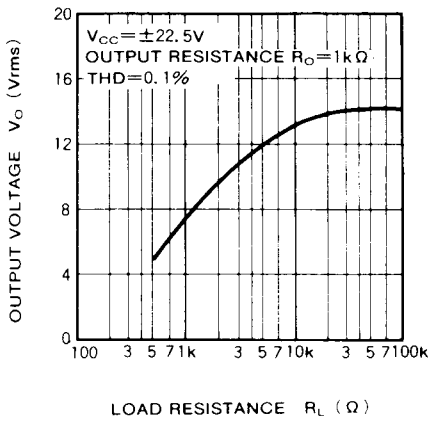
INPUT-REFERRED NOISE VOLTAGE VS. SIGNAL SOURCE RESISTANCE



SIGNAL-TO-NOISE RATIO VS. SIGNAL SOURCE RESISTANCE



OUTPUT VOLTAGE VS. LOAD RESISTANCE



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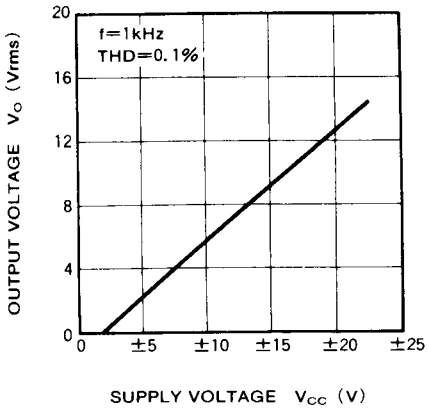
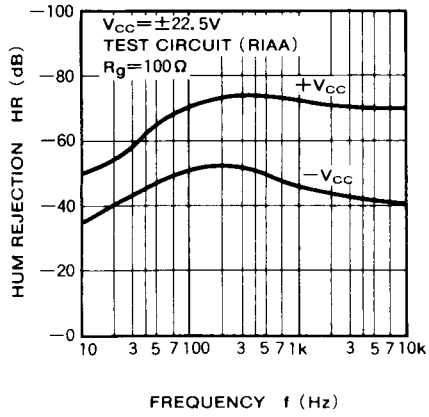
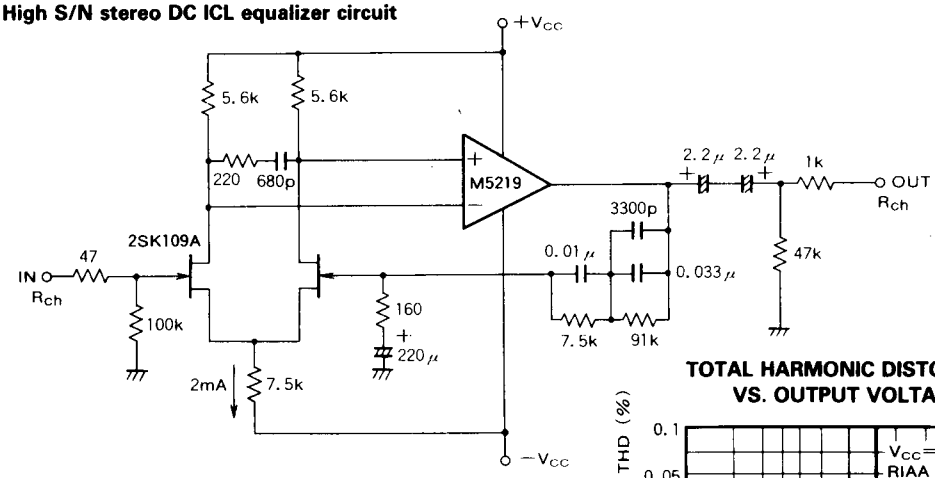
OUTPUT VOLTAGE VS. SUPPLY VOLTAGE



HUM REJECTION VS. FREQUENCY



(2) High S/N stereo DC ICL equalizer circuit



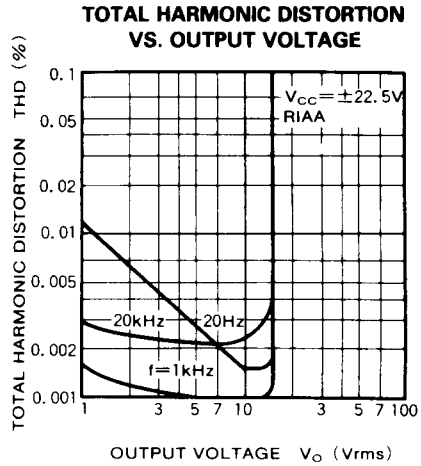
L_{ch} circuit constants are identical to those of R_{ch}.

Units Resistance : Ω
Capacitance : F

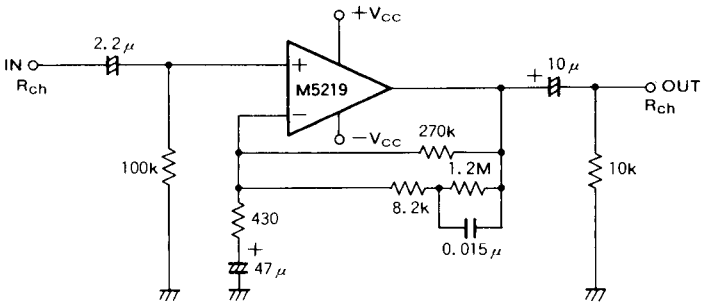
TYPICAL CHARACTERISTICS (V_{CC}=±22.5V, RIAA)

- S/N=85dB(IHF-A network, shorted input, 2.5mVrms input sensitivity)
- V_{NI}=0.77μVrms(R_g=5.1kΩ, BW=5Hz~100kHz)
- G_V=35.6dB(f=1kHz)

TOTAL HARMONIC DISTORTION VS. OUTPUT VOLTAGE



(3) Tape deck equalizer amplifier circuit



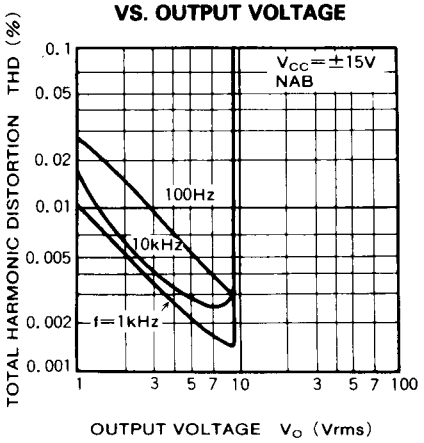
Units Resistance : Ω
Capacitance : F

L_{ch} circuit constants are identical to those of R_{ch}.

TYPICAL CHARACTERISTICS (V_{CC}=±15V, NAB)

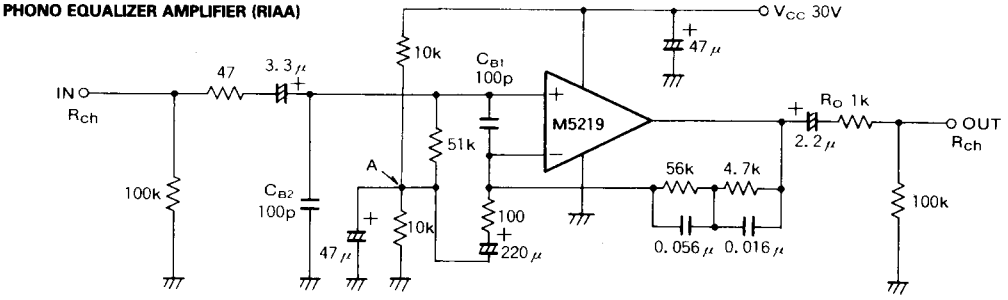
- G_V=29.9dB(f=1kHz)
- V_{NI}=1.4μVrms(R_g=2.2kΩ, BW=20Hz~15kHz)
  (−117dBv)

TOTAL HARMONIC DISTORTION VS. OUTPUT VOLTAGE



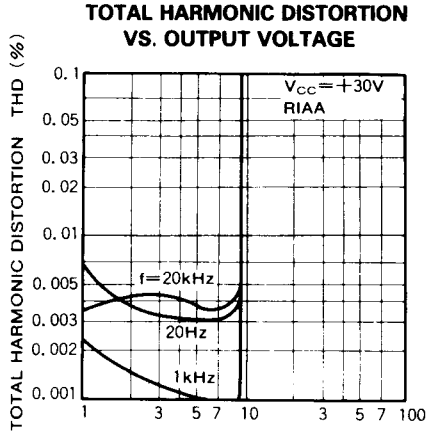
(4) Typical single power supply application

PHONO EQUALIZER AMPLIFIER (RIAA)



Units Resistance : Ω
Capacitance : F

TOTAL HARMONIC DISTORTION VS. OUTPUT VOLTAGE



TYPICAL CHARACTERISTICS (V_{CC}=+30V, RIAA)

- G_V=35.6dB(f=1kHz)
- V_{NI}=0.9μVrms(R_g=2.2kΩ, BW=10Hz~30kHz)
- S/N=77dB (IHF-A network, shorted input, 2.5mVrms input sensitivity)

- → Point A is the V_{CC}/2 point in DC terms (virtual ground) when the device is used as a single power supply type.
- C_{B1}, C_{B2} : Capacitor for buzz prevention, use if required.
- R_O : Resistor used to prevent parasitic oscillation for capacitive loads and current limiting with shorted and other abnormal conditions.