M56749FP

4 CHANNEL ACTUATOR MOTOR DRIVER

DESCRIPTION

The M56749FP is a semiconductor integrated circuit designed for a CD-ROM actuator driver.

This device can function 4 channel actuators by 1 chip due to include 4 channel BTL drivers.

Also, this device include a mute circuit, a Vcc check circuit and TSD function.

FEATURES

● Lower saturation voltage.
  (typical 1.35V at load current 500mA)
● Wide supply voltage range.
  (4.5V to 13.2V)
● Lower cross-over distortion.

APPLICATION

CD-ROM

PIN CONFIGURATION (TOP VIEW)

	M56749FP	
Vrefm-out	1	36 Vref
Mute3ch-	2	35 Vrefm
Mute4ch-	3	34 SS . GND
Vctl1L	4	33 Vctl4L
Vctl1H	5	32 Vctl4H
VM1(-)	6	31 VM4(-)
VM1(+)	7	30 VM4(+)
GND	8	29 GND
	9	28
	10	27
	11	26
VM2(+)	12	25 VM3(+)
VM2(-)	13	24 VM3(-)
Vctl2H	14	23 Vctl3(-)
Vctl2L	15	22 Vctl3(+)
Vm1	16	21 Vm2
Vbs1	17	20 Vbs2
Vcc	18	19 -Por
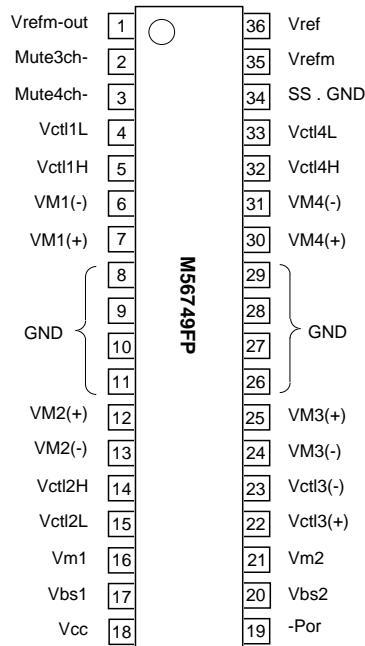
Outline 36P2R-D

BLOCK DIAGRAM

Mute on : Low or open
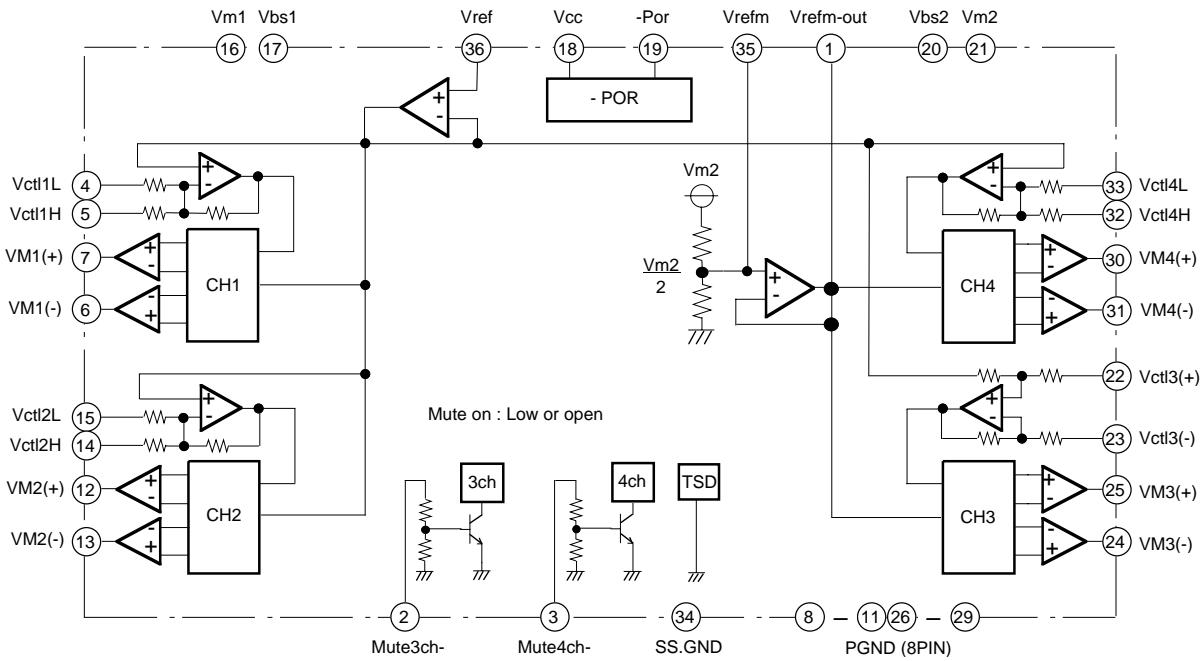
PIN DESCRIPTION

Pin No.	Symbol	Function	Pin No.	Symbol	Function
①	Vrefm-out	Vm2 middle voltage output	⑲	-Por	Vcc check signal output
②	Mute3ch-	3th channel mute terminal	⑳	Vbs2	Bootstrap power supply-2
③	Mute4ch-	4th channel mute terminal	㉑	Vm2	Motor power supply-2
④	Vctl1L	1st channel Low gain input	㉒	Vctl3(+)	3th channel non-inverted amp. input
⑤	Vctl1H	1st channel High gain input	㉓	Vctl3(-)	3th channel inverted amp. input
⑥	VM1(-)	1st channel inverted amp. output	㉔	VM3(-)	3th channel inverted amp. output
⑦	VM1(+)	1st channel non-inverted amp. output	㉕	VM3(+)	3th channel non-inverted amp. output
⑧ to ⑪	GND	GND	㉖ to ㉙	GND	GND
⑫	VM2(+)	2nd channel non-inverted amp. output	㉚	VM4(+)	4th channel non-inverted amp. output
⑬	VM2(-)	2nd channel inverted amp. output	㉛	VM4(-)	4th channel inverted amp. output
⑭	Vctl2H	2nd channel High gain input	㉜	Vctl4H	4th channel High gain input
⑮	Vctl2L	2nd channel Low gain input	㉝	Vctl4L	4th channel Low gain input
⑯	Vm1	Motor power supply-1	㉞	SS. GND	Small signal GND
⑰	Vbs1	Bootstrap power supply-1	㉟	Vrefm	Vm2 middle voltage monitor
⑱	Vcc	5V power supply	㊱	Vref	Reference voltage input

ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Symbol	Parameter	Conditions	Rating	Unit
Vbs	Bootstrap power supply	⑰ and ⑳ pins input voltage	15	V
Vm	Motor power supply	⑯ and ㉑ pins input voltage	15	V
Vcc	5V power supply	⑱ pin input voltage	7.0	V
Io	Output Current		700	mA
Vin	Maximum input voltage of terminals	②, ③, ④, ⑤, ⑭, ⑮, ⑲, ㉒, ㉓, ㉜, ㉝, ㉟, ㊱ pins	0 – Vcc	V
Pt	Power dissipation	Free Air	1.2	W
Kθ	Thermal derating	Free Air	9.6	mW/°C
Tj	Junction temperature		150	°C
Topr	Operating temperature		-20 – +70	°C
Tstg	Storage temperature		-40 – +150	°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Limits			Unit
		Min.	Typ.	Max.	
Vcc	5V power supply	4.5	5.0	5.5	V
Vm1,Vm2	Motor power supply		5.0		V
Vbs1,Vbs2	Bootstrap power supply		Vm+1.0		V

## ELECTRICAL CHARACTERISTICS (Ta=25°C, Vcc=Vbs1=Vbs2=Vm1=Vm2=5V, no-load current unless otherwise noted.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Icc1	Sleep Mode Supply current-1	⑯, ⑰, ⑳, ㉑ pins input current (Vref=Vctl=2.1V)	——	20	30	mA
Icc2	Sleep Mode Supply current-2	⑱ pin input current (Vref=Vctl=2.1V)	——	3.0	6.0	mA
Vsat	Saturation voltage	Top and Bottom saturation voltage. Load current 500mA.	——	1.35	1.90	V
Vofs1	Output offset voltage-1	1st, 2nd channel. Vref=Vctl=2.1V, Vm1=5V	-26	——	+26	mV
Vofs2	Output offset voltage-2	3th, 4th channel. Vref=Vctl=2.1V,Vm2=Vbs2=12V	-100	——	+100	mV
VPor	Vcc check voltage (⑲ pin L to H)	Vcc voltage when ⑲ pin (-POR circuit) returns to High from Low condition.	4.10	4.25	4.40	V
ΔVPor	Vcc check circuit Hysteresis		80	130	180	mV
Vmute-on	Mute-on voltage	3th and 4th channels Mute-on.	——	——	0.8	V
Vmute-off	Mute-off voltage	3th and 4th channels Mute-off.	2.0	——	——	V
Imute	Mute terminals input current	② and ③ pin input current at 5V input voltage.	——	170	250	μA
VrefmL	Vref amp. Low output voltage	① pin output voltage at load current 1.0mA when Vrefm (㉟ pin) inputs 0V.	——	0.15	0.3	V
VrefmH	Vref amp. High output voltage	① pin output voltage at load current 0.5mA when Vrefm (㉟ pin) inputs 5V.	Vbs2-2.25	Vbs2-1.9	——	V
Vrefin	Vref amp. Input voltage range	㊱ pin input voltage range.	1.5	2.1	Vcc-1.2	V

Voltage gain of each channel

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
Gain1L	1st channel voltage gain (L)	$\dfrac{\{VM1(+)-VM1(-)\}}{(Vctl1L-Vref)}$	(Vctl1L=④ pin)	8.86	9.77	10.6	db
Gain1H	1st channel voltage gain (H)	$\dfrac{\{VM1(+)-VM1(-)\}}{(Vctl1H-Vref)}$	(Vctl1H=⑤ pin)	14.6	15.6	16.4	db
Gain2L	2nd channel voltage gain (L)	$\dfrac{\{VM2(+)-VM2(-)\}}{(Vctl2L-Vref)}$	(Vctl2L=⑮ pin)	11.1	12.0	12.9	db
Gain2H	2nd channel voltage gain (H)	$\dfrac{\{VM2(+)-VM2(-)\}}{(Vctl2H-Vref)}$	(Vctl2H=⑭ pin)	14.5	15.4	16.2	db
Gain3	3th channel voltage gain	$\dfrac{\{VM3(+)-VM3(-)\}}{Vctl3(+)-Vctl3(-)}$	(Vctl3(+)=㉒ pin) (Vctl3(-)=㉓ pin)	-3.07	1.94	-1.33	db
Gain4L	4th channel voltage gain (L)	$\dfrac{\{VM4(+)-VM4(-)\}}{(Vctl4L-Vref)}$	(Vctl4L=㉝ pin)	11.1	12.0	12.9	db
Gain4H	4th channel voltage gain (H)	$\dfrac{\{VM4(+)-VM4(-)\}}{(Vctl4H-Vref)}$	(Vctl4H=㉜ pin is connected 10kΩ)	14.4	15.3	16.1	db

Input and output characteristics of each channels
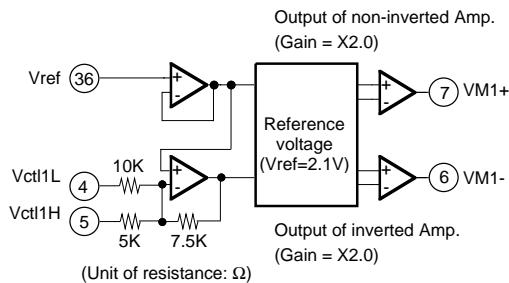
<Channel 1 Amp.>

Output of non-inverted Amp.
(Gain = X2.0)

Vref ㊱

Reference
voltage
(Vref=2.1V)

⑦ VM1+

⑥ VM1-

Vctl1L ④ 10K

Vctl1H ⑤ 5K   7.5K

Output of inverted Amp.
(Gain = X2.0)

(Unit of resistance: Ω)

The voltage between the input and output
when a voltage is inputted from Vctl(④ pin).

Vref
(2.1V)

Vctl1L <INPUT>
1V

Vref
(2.1V)

VM1- <OUTPUT> VM1+
1.5V
1.5V

<Channel 2 Amp.>

non-inverted Amp.
(Gain = X2)

Vref ㊱

Reference
voltage
(Vref=2.1V)

⑫ VM2+

⑬ VM2-

Vctl2L ⑮ 7.5K

Vctl2H ⑭ 5K   7.5K

inverted Amp.
(Gain = X2)

The voltage between the input and output
when a voltage is inputted from Vctl2(⑮ pin).

Vref
(2.1V)

Vctl2L
1V

Vref
(2.1V)

VM2-   VM2+
2.0V
2.0V

<Channel 3 Amp.>

non-inverted Amp.
(Gain = X2)

Vref ㊱

Reference
voltage
(Vrefm=
Vm2/2)

㉕ VM3+

㉔ VM3-

Vctl3+ ㉒ 10K   2K

Vctl3- ㉓ 10K   2K

inverted Amp.
(Gain = X2)
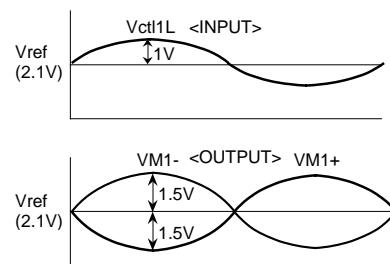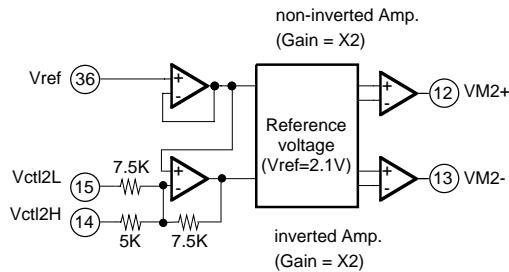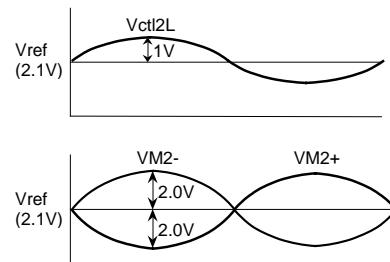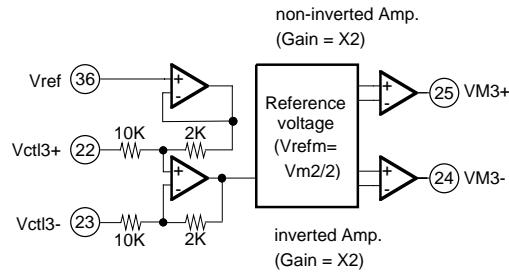
The voltage difference of 1V is inputted
between Vctl3- and Vctl3+.

Vref
(2.1V)

Vctl3-
1V
Vctl3+

Vrefm
(Vm2/2)

VM3-   VM3+
0.8V

<Channel 4 Amp.>

non-inverted Amp.
(Gain = X5)

Vref ㊱

Reference
voltage
(Vrefm=
Vm2/2)

㉚ VM4+

㉛ VM4-

Vctl4L ㉝ 18K

Vin4 ⎕ 10kΩ ㉜ 2K   7.2K

Vctl4H

inverted Amp.
(Gain = X5)
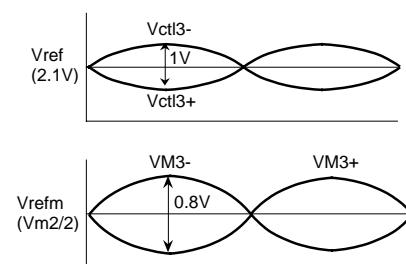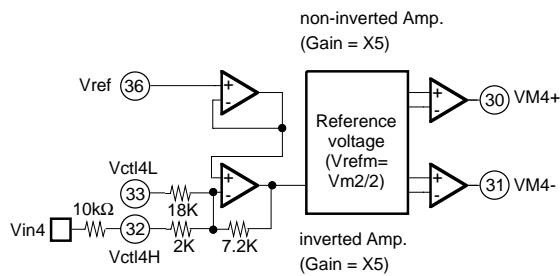
Vctl4H (㉜ pin) is connected 10kΩ and the voltage
between a input (Vin4) and out when a voltage is
inputted from Vin4.

Vref
(2.1V)

Vin4
1V

Vrefm
(Vm2/2)

VM4-   VM4+
3.0V
3.0V
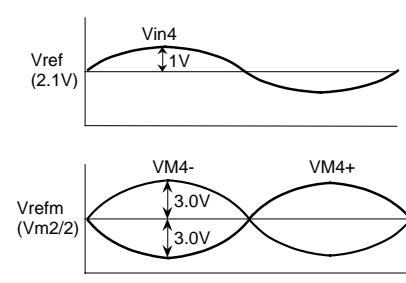
BASICALLY CHARACTERISTICS (Typical value)

Output saturation voltage and Load current characteristic (Vbs=Vm=Vcc=5V)
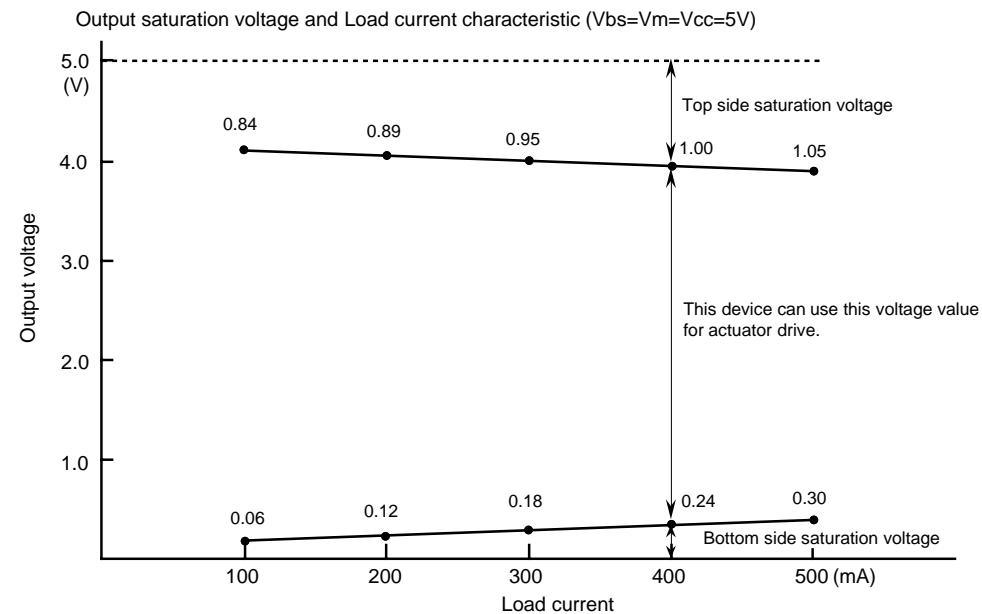
FREQUENCY CHARACTERISTIC
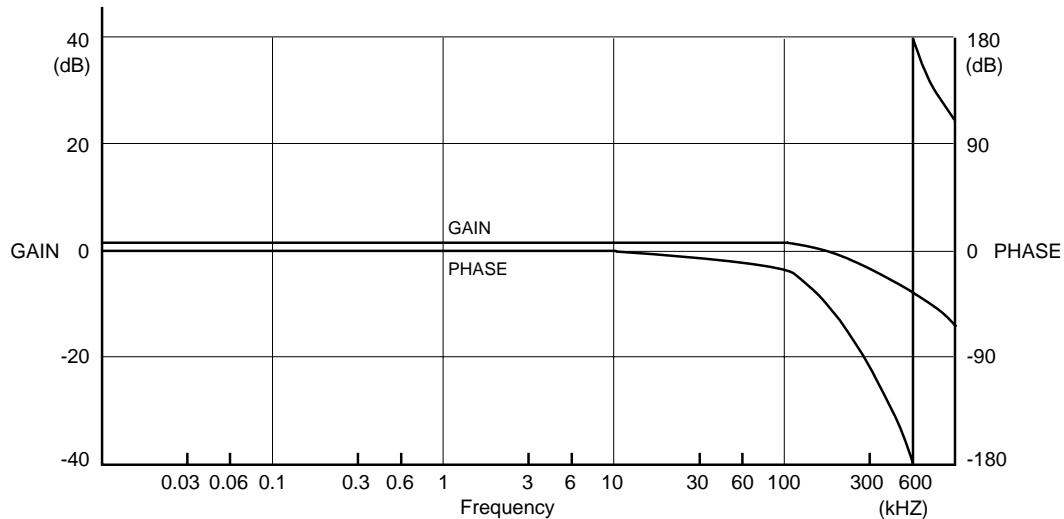


THERMAL DERATING
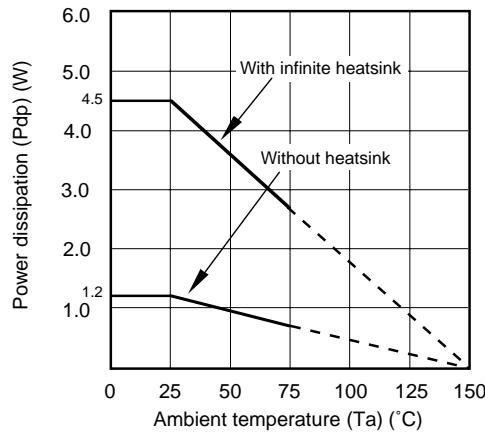
APPLICATION CIRCUIT

(Unit of resistance: Ω)
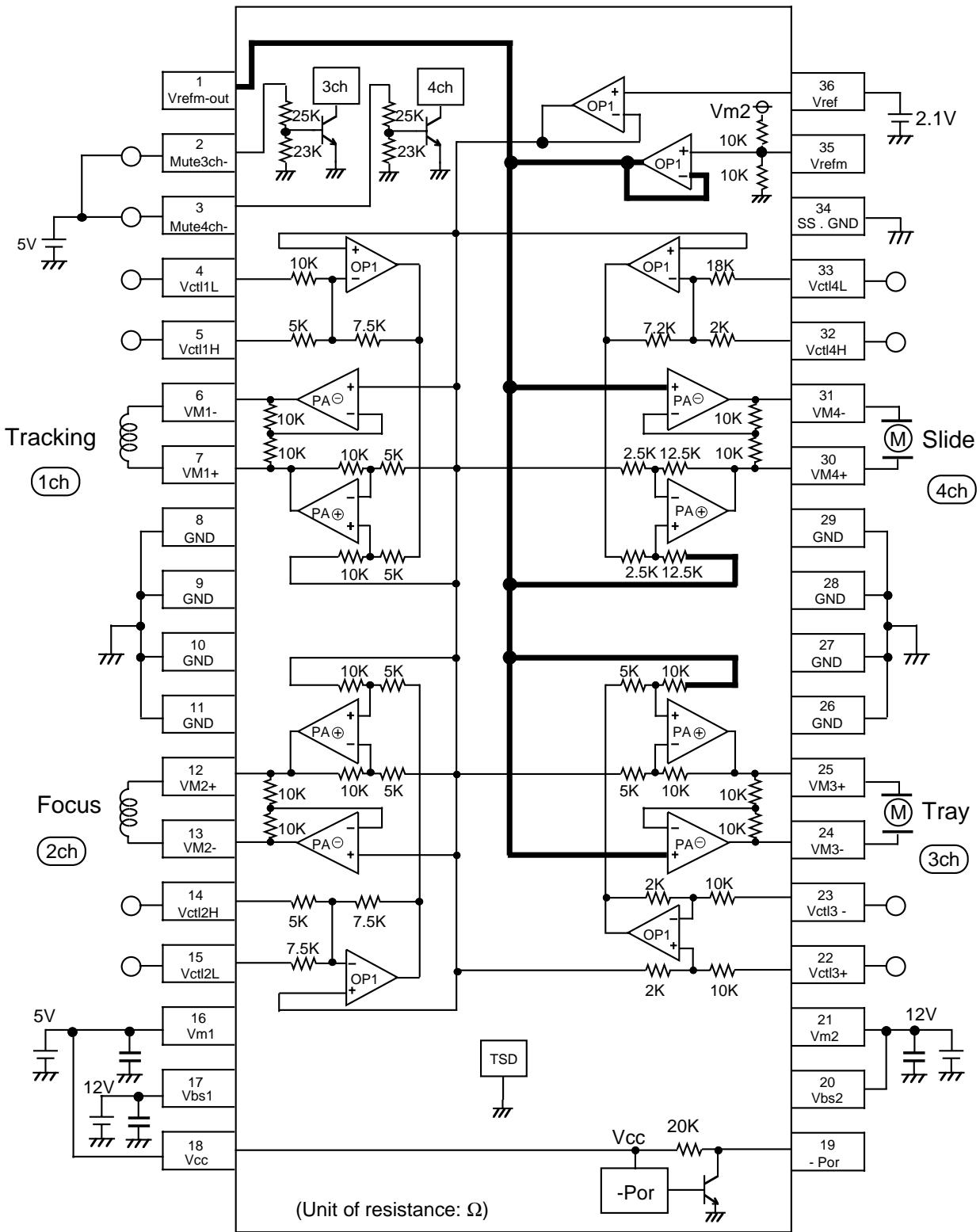
* When the Bootstrap function does not use, ⑰ and ⑳ pin must be connected with Motor power supply terminals (⑯ and ㉑ pins).