

MITSUBISHI SEMICONDUCTORS

# M63001FP

6CH ACTUATOR DRIVER

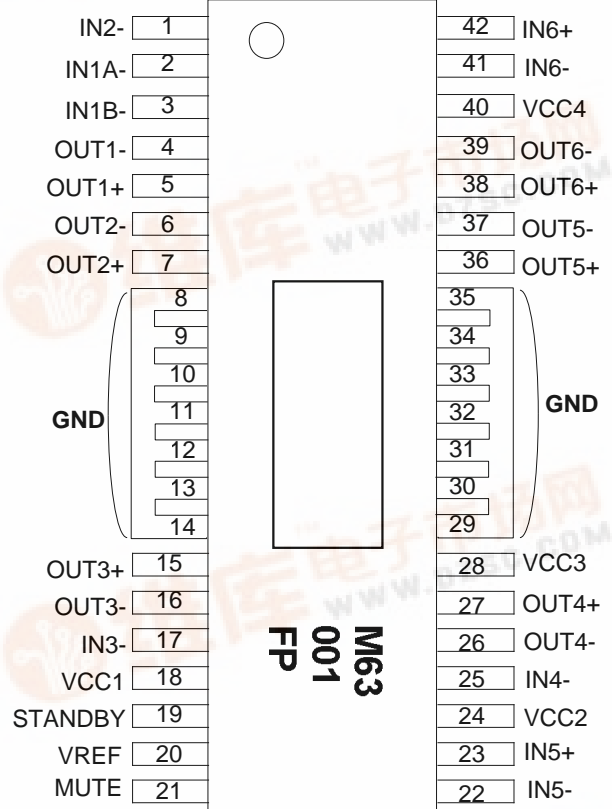
## < FEATURES >

M63001FP is 6ch actuator driver.  
 This circuit includes 6ch-BTL driver and Thermal Shut Down circuit and Stand-by circuit and Mute circuit (only 6ch) that is able to drive six actuators and motor with one IC.

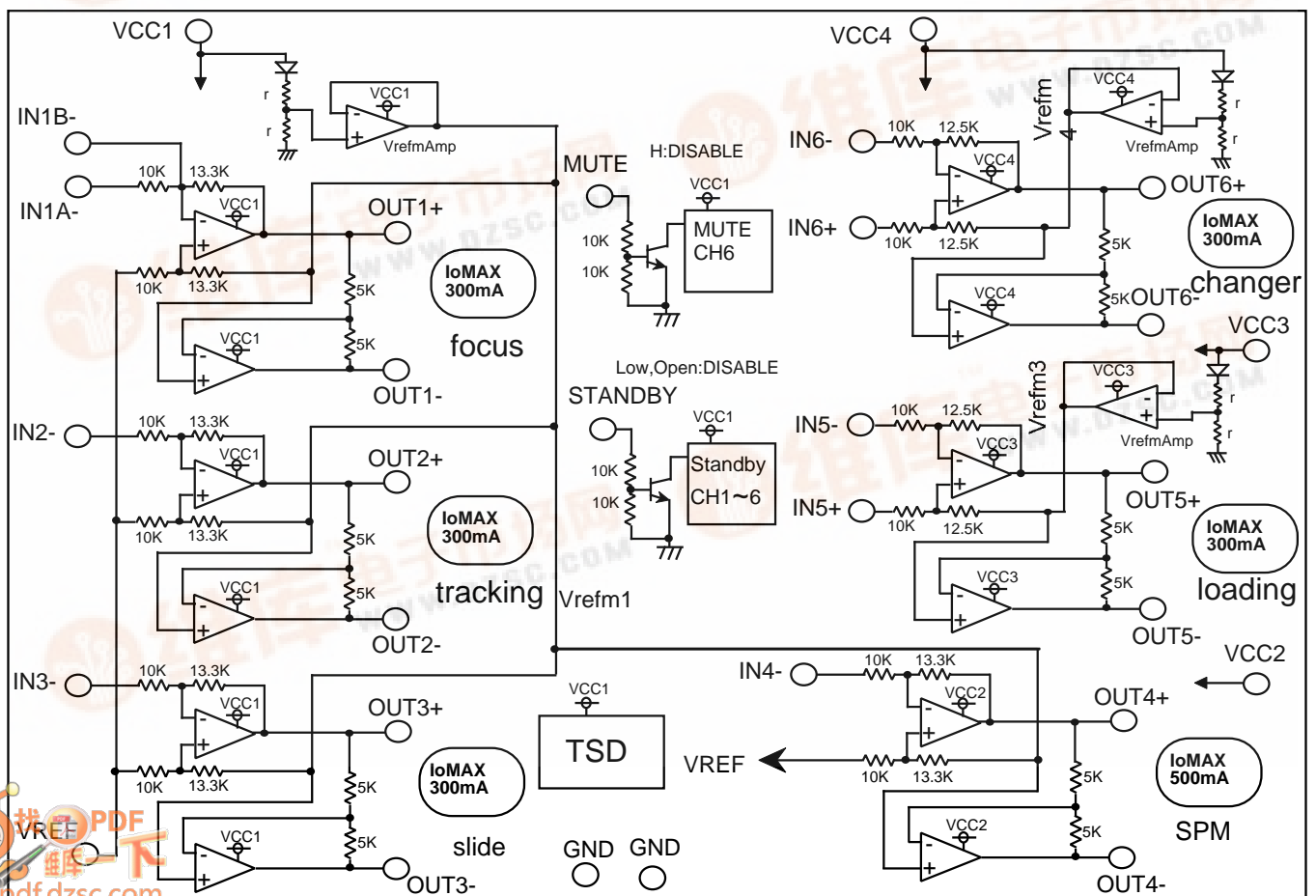
## < APPLICATION >

CD-player, MD,CD-ROM, CD-R etc.

### PIN CONFIGURATION(Top View)



Package outline : 42 PIN POWER SSOP (42P9R-D)



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<PIN FUNCTION>

TERMINAL	SYMBOL	TERMINAL FUNCTION	TERMINAL	SYMBOL	TERMINAL FUNCTION
1	IN2-	CH2 inverted input	42	IN6+	CH6 non-inverted input
2	IN1A-	CH1 inverted input	41	IN6-	CH6 inverted input
3	IN1B-	CH1 output offset control	40	VCC4	Power supply4(CH6)
4	OUT1-	CH1 inverted output	39	OUT6-	CH6 inverted output
5	OUT1+	CH1 non-inverted output	38	OUT6+	CH6 non-inverted output
6	OUT2-	CH2 inverted output	37	OUT5-	CH5 inverted output
7	OUT2+	CH2 non-inverted output	36	OUT5+	CH5 non-inverted output
8~14	GND	GND	29~35	GND	GND
15	OUT3+	CH2 non-inverted output	28	VCC3	Power supply3(CH5)
16	OUT3-	CH3 inverted output	27	OUT4+	CH4 non-inverted output
17	IN3-	CH3 inverted input	26	OUT4-	CH4 inverted output
18	VCC1	Power supply 1(CH1,CH2,CH3)	25	IN4-	CH4 inverted input
19	STANDBY	STANDBY signal input	24	VCC2	Power supply2(CH4)
20	VRFE	CH1~CH4 Reference voltage input	23	IN5+	CH5 non-inverted output
21	MUTE	Mute signal input (CH6)	22	IN5-	CH5 inverted input

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<ABSOLUTE MAXIMUM RATING> (Ta=25°C)

SYMBOL	PARAMETER	CONDITIONS	RATING	Units
VCC1,VCC2 VCC3,VCC4	Power supply		15	V
Io1	Output current 1		0.3	A
Io2	Output current 2	CH4 output current	0.5	A
Vin1	Maximum input voltage of terminals 1	1,2,3,17,19,20,21pin	0 ~ VCC1	V
Vin2	Maximum input voltage of terminals2	25pin	0 ~ VCC2	V
Vin3	Maximum input voltage of terminals3	22,23pin	0 ~ VCC3	V
Vin4	Maximum input voltage of terminals4	41,42pin	0 ~ VCC4	V
Pt	Power dissipation	Free Air	1.2	W
Kθ	Thermal delating	Free Air	9.6	mW/°C
Tj	Thermal delating		150	°C
Topr	Operating temperature		-20 ~ +75	°C
Tstg	Storage temperature		-40 ~ +125	°C

<RECOMMENDED OPERATING CONDITIONS>

SYMBOL	PARAMETER	LIMITS			Units
		MIN	TYP	MAX	
VCC1,VCC2 VCC3,VCC4	Power supply	4.5	5.0	13.2	V
Io1	CH1,2,3,5,6 Output drive current	—	—	300	mA
Io2	CH4 Output drive current	—	—	500	mA

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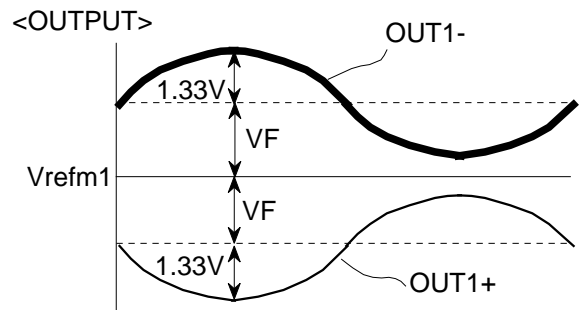
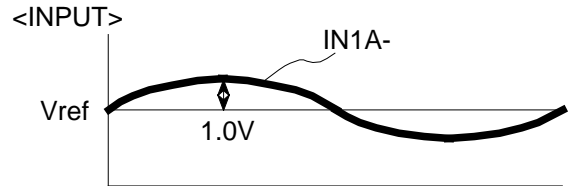
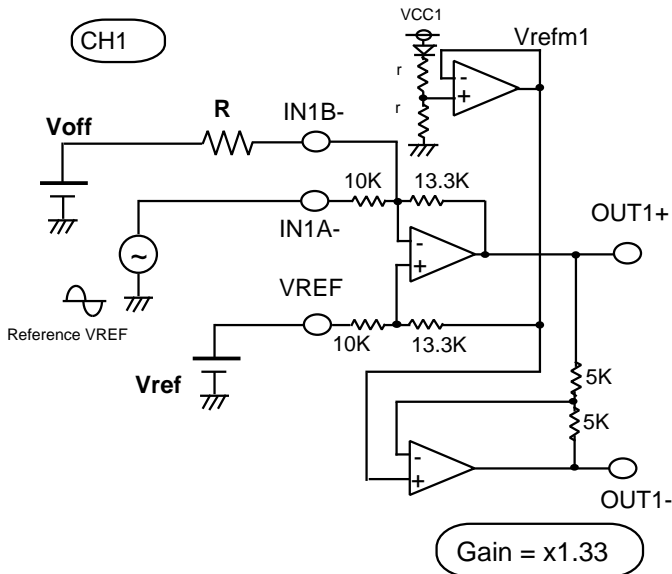
6CH ACTUATOR DRIVER

<ELECTRICAL CHARACTERISTICS>

(Ta=25°C, VCC1=VCC2=VCC3=VCC4=5V unless otherwise noted.)

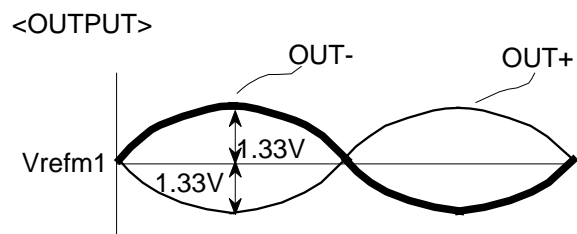
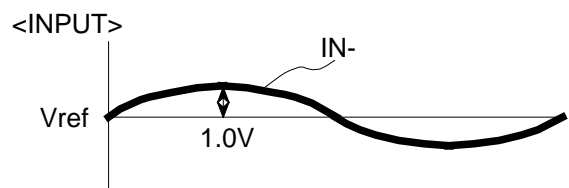
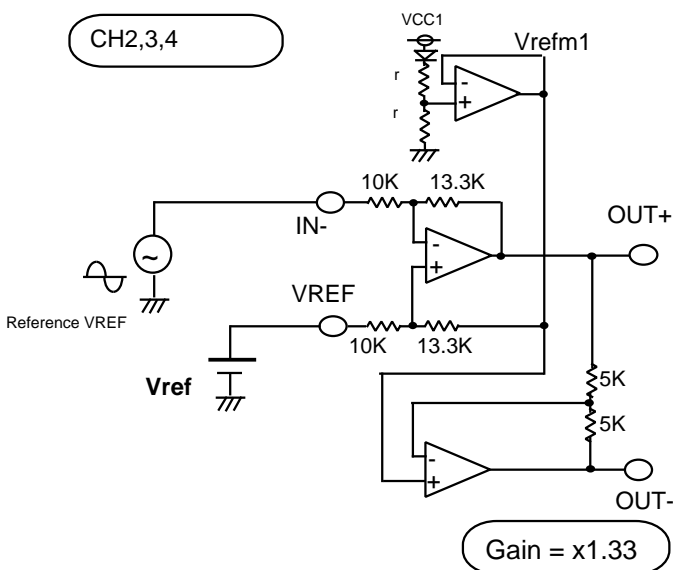
SYMBOL	PARAMETER	CONDITIONS	LIMITS			Units
			MIN	TYP	MAX	
IccS	STANDBY circuit current	VCC1 and VCC2 and VCC3 and VCC4 total input current (STANDBY= Low or OPEN)	—	—	10	uA
Icc	Sleep Mode supply current	VCC1 and VCC2 and VCC3 and VCC4 total input current (VREF=IN(+)=IN(-)=2.5V, IN1B(-)=Open, Standby= Hi)	—	24	34	mA
Vsat1	Output Saturation voltage1	Top and Bottom saturation voltage. (CH1,CH2,CH3,CH5,CH6) Load current 0.3A(bootstrap)	—	1.5	2.1	V
Vsat2	Output Saturation voltage2	Top and Bottom saturation voltage.(CH4) Load current 0.5A(bootstrap)	—	1.5	2.1	V
Gain1	Gain between input and output 1	CH1,CH2,CH3,CH4 Gain between input and output $Gain1 = \frac{OUT(-)-OUT(+)}{IN(-)-VREF}$	7.60	8.52	9.35	dB
Gain2	Gain between input and output 2	CH5,CH6 Gain between input and output $Gain2 = \frac{OUT(-)-OUT(+)}{IN(-)-IN(+)}$	7.04	7.96	8.79	dB
Vofs1	Output offset voltage 1	Output offset voltage(CH1,CH2,CH3,CH4) IN(+)=VREF(2.5V)	-35	—	+35	mV
Vofs2	Output offset voltage 2	Output offset voltage(CH5,CH6) IN(+)=IN(-)=(2.5V)	-35	0	+35	mV
Vin1	Input voltage range1	Input voltage range <CH1(IN1A-) and CH2,CH3(IN-)>	0	—	VCC1	V
Vin2	Input voltage range2	Input voltage range <CH4(IN-)>	0	—	VCC2	V
Vin3	Input voltage range3	Input voltage range <IN5-,IN5+>	0	—	VCC3	V
Vin4	Input voltage range4	Input voltage range <IN6-,IN6+>	0	—	VCC4	V
VinR	VREF input voltage range	VCC1=VCC2	0	—	VCC1	V
VsH	STANDBY H voltage	Minimum H voltage ofSTANDBY	2.0	—	—	V
VsL	STANDBY L voltage	Maximum L voltage of STANDBY	—	—	0.8	V
IsH	STANDBY input current H	STANDBY input current (STANDBY=5V)	—	—	520	uA
VmH	MUTE H voltage	Minimum H voltage ofMUTE	2.0	—	—	V
VmL	MUTE L voltage	Maximum L voltage of MUTE	—	—	0.8	V
ImH	MUTE input current H	MUTE input current (MUTE=5V)	—	—	520	uA

<I/O CHARACTERISTICS>



$$VF = [(Vrefm1 - Vref) \times 10k / 23.3k + Vref - Voff] \times 13.3k / R$$

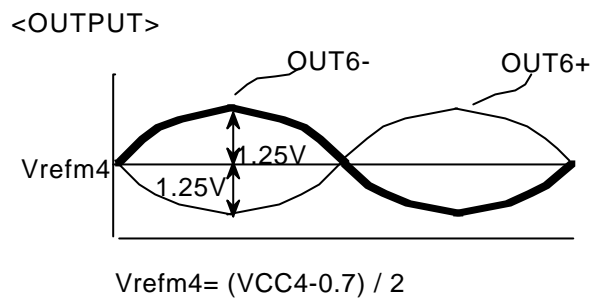
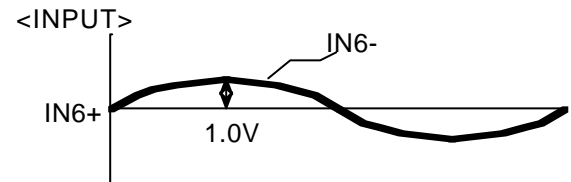
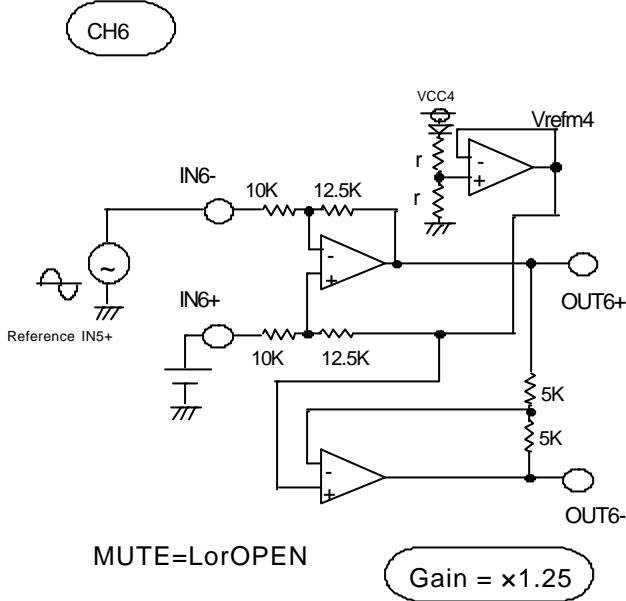
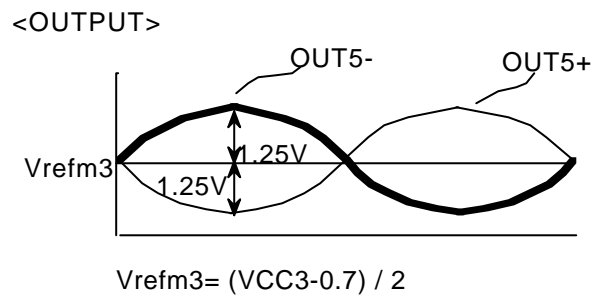
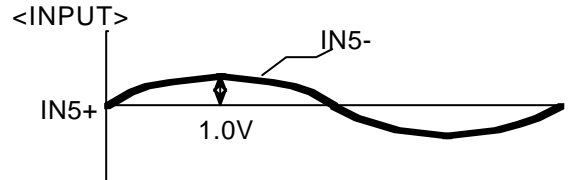
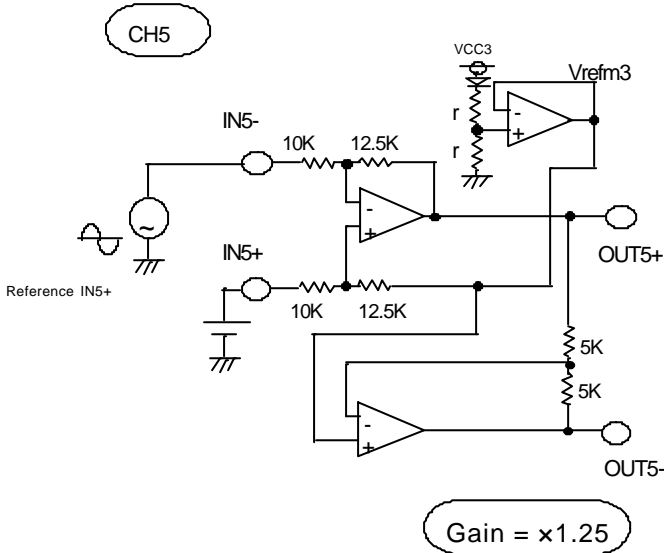
$$Vrefm1 = (VCC1 - 0.7) / 2$$



$$Vrefm1 = (VCC1 - 0.7) / 2$$

note) It is possible to give different supply voltage for VCC1, VCC2.  
 but Output middle voltage of CH1~CH4 are determined by VCC1 voltage only.

<I/O CHARACTERISTICS>



Between output voltage (DC input)

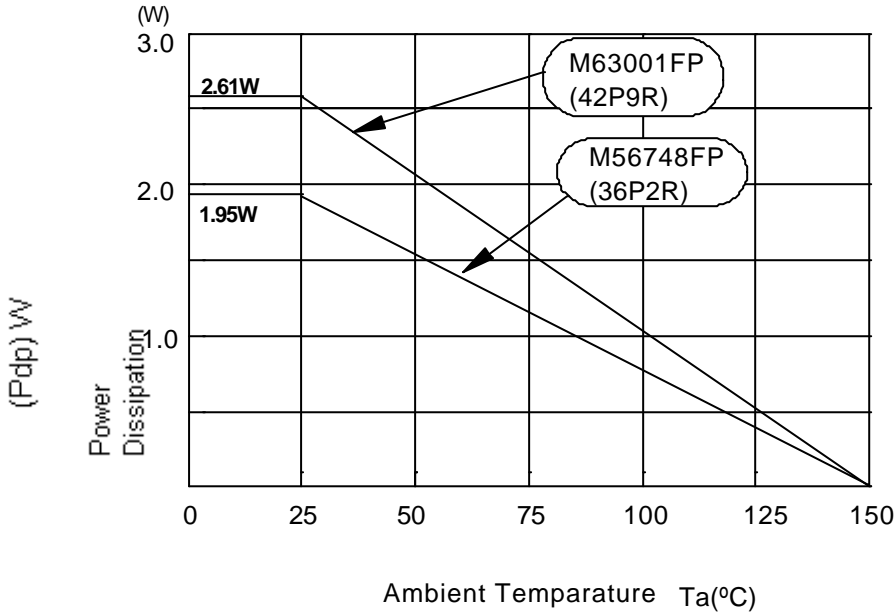
IN+	IN-	CH5	CH6	
			MUTE=L OPEN	MUTE=H
0V	0V	BRAKE	BRAKE	DISABLE
0V	4V	Reverse 10V	Reverse10V	DISABLE
4V	0V	Forward 10V	Forward10V	DISABLE
4V	4V	BRAKE	BRAKE	DISABLE

- Supply voltage of VCC3 and VCC4 give different voltage of VCC1 and VCC2.
- CH6 include Mute circuit.

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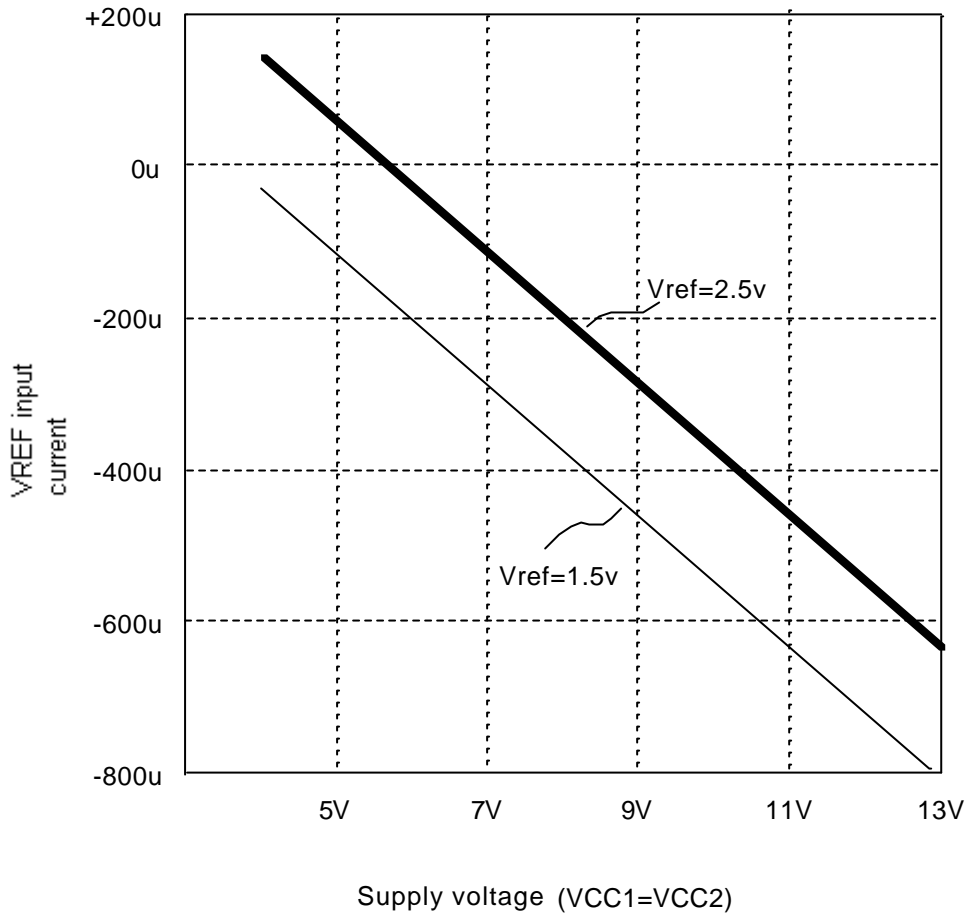
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<THERMAL DERATING>

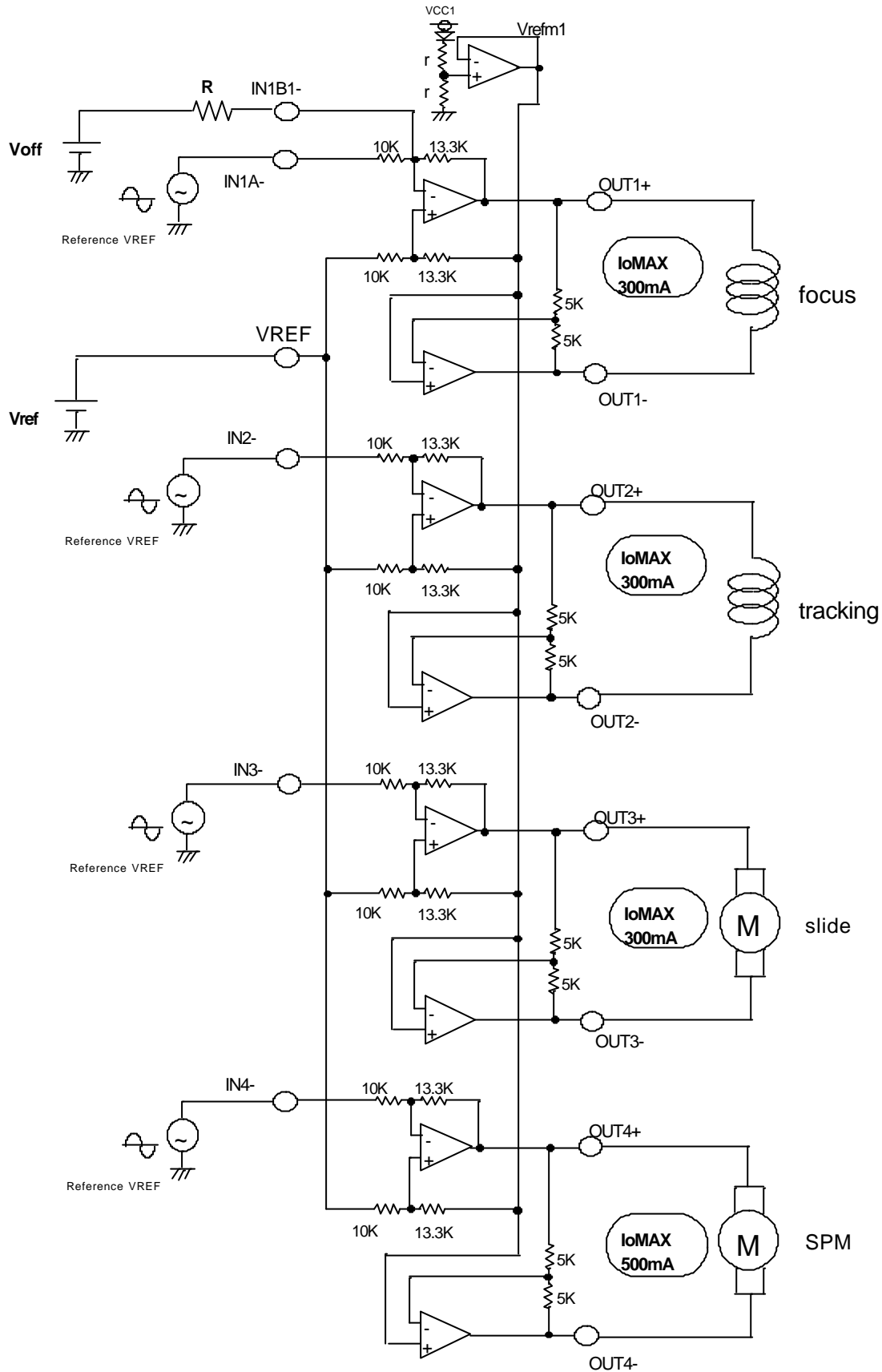


Characteristics of Left graph is using both sides board and measuring.  
\*Board size: 9.6x11.7mm(t=1.5mm)

<VREF input current>



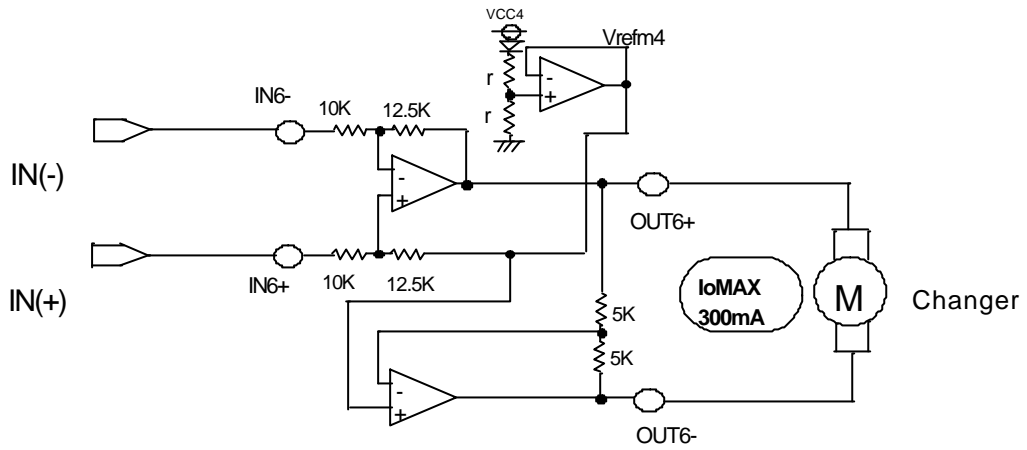
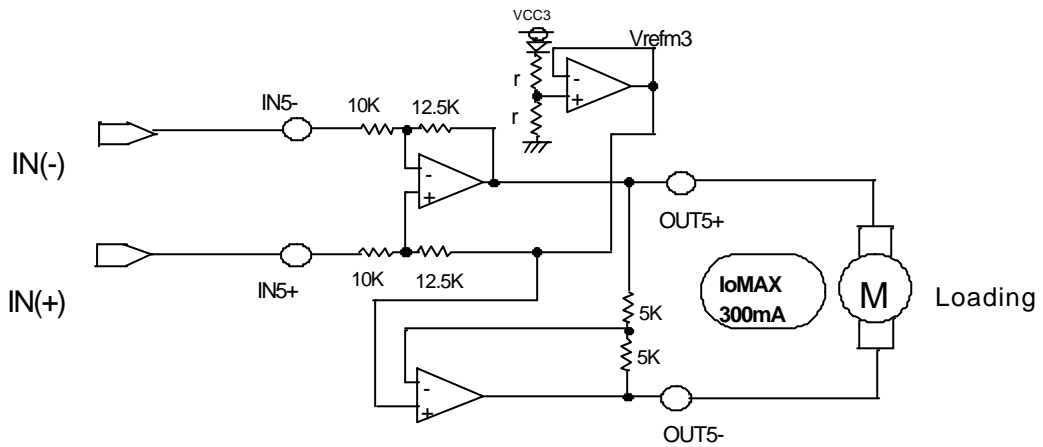
<APPLICATION CIRCUIT> Analog input (CH1 ~CH4)





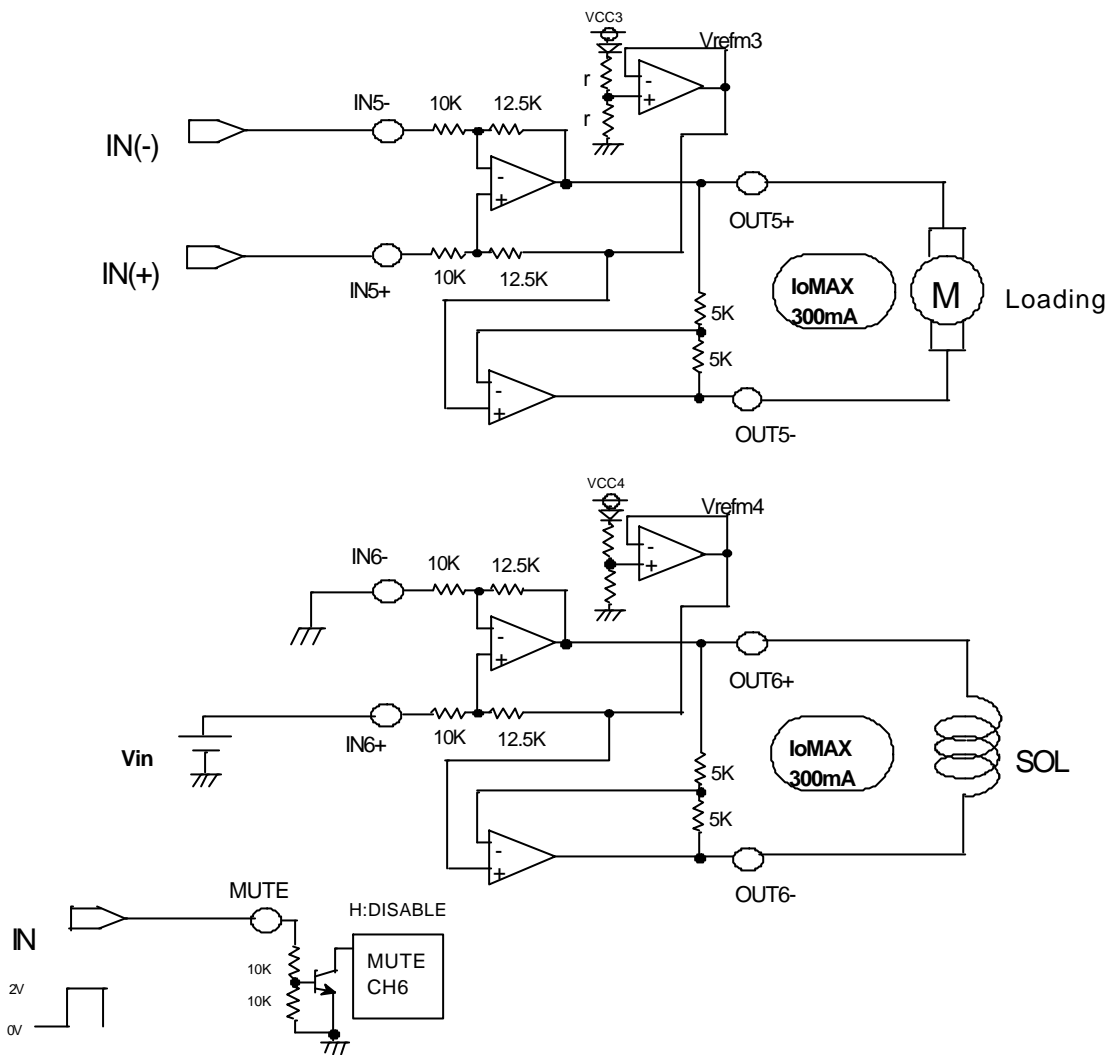
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<APPLICATION CIRCUIT> Active loading motor and changer motor (CH5,CH6)



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<APPLICATION CIRCUIT> Active loading motor and sorenoid (CH5,CH6)



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Datasheets for electronics components.