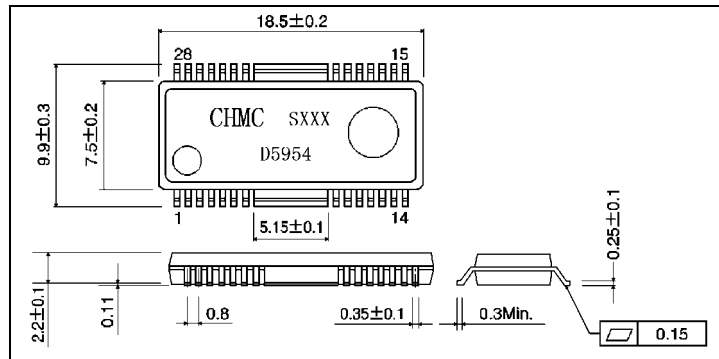# 4 CHANNEL DRIVER   MOTOR DRIVER   D5954

DESCRIPTION

Outline Drawing

The D5954 is a 4 channel driver for optical disc motor driver. Dual channel current feedback type drivers are built in, in addition to dual channel motor drivers
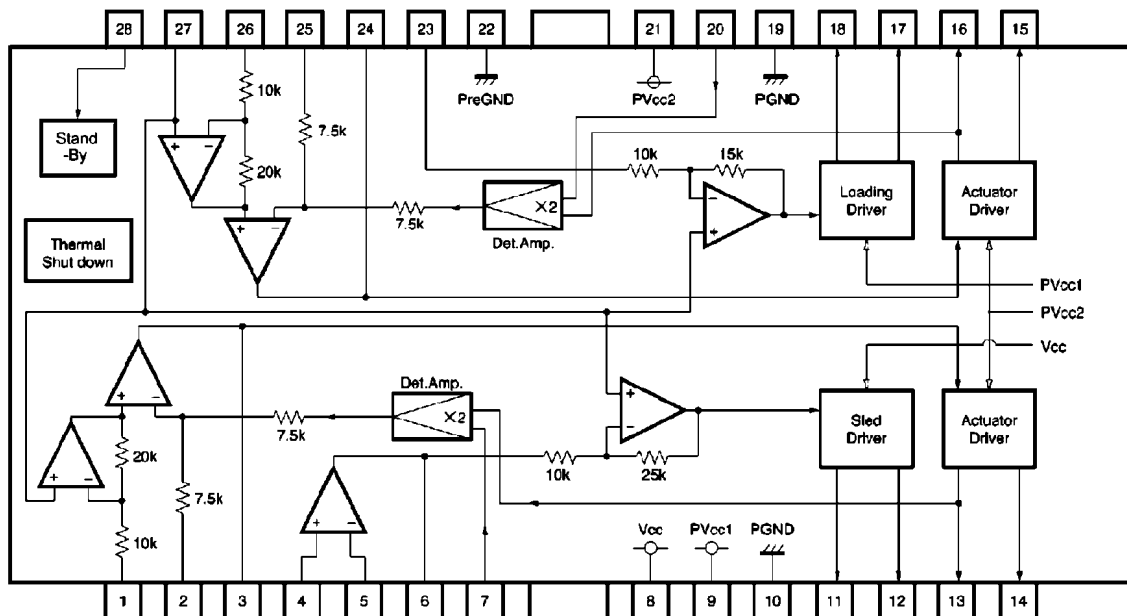

FEATURE

- Wide dynamic range. (4.0V (typ.) at PreVcc=12V,PVcc=5V,RL=8Ω)
- Separating Vcc into Pre+Power of sled motor, Power of loading motor and Power of actuator ,can make better power efficiency, by low supply voltage drive.
- Level shift circuit built in.
- Thermal-shut-down circuit built in
- Stand-by mode built in

BLOCK DIAGRAM

PIN DESCRIPTION

No	Symbol	Function	NO.	Symbol	Function
1	VINFC	Input for focus driver	15	VOTK+	Non inverting output for tracking
2	CECerr1	Connection with capacitor for error amplifier	16	VOTK-	Inverting output for tracking
3	CECerr2		17	OLD+	Non inverting output for loading
4	VINSL+	Non inverting input for OP-amp	18	VOLD-	Inverting output for loading
5	VINSL-	Inverting input for OP-amp	19	PGND	GND for power block
6	VOSL	Output of OP-amp	20	VNFTK	Feedback for tracking driver
7	VNFFC	Feedback for focus driver	21	PVcc2	Vcc for power block of actuator
8	Vcc	Vcc for pre-driver block and power block of sled	22	PreGND	GND for pre-drive block
9	PVcc1	Vcc for power block of loading	23	VINLD	Input for loading driver
10	PGND	GND for power block	24	CTKerr2	Connection with capacitor for error amplifier
11	VOSL-	Inverting output for sled	25	CTKerr1	
12	VOSL+	Non inverting output for sled	26	VINTK	Input for tracking driver
13	VOFC-	Inverting output for focus	27	BIAS	Input for reference voltage
14	VOFC+	Non inverting output for focus	28	STBY	Input for stand-by control

ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Characteristic	Symbol	Value	Unit
Supply voltage	Vcc	13.5	V
Power dissipation	PD	1.7*	W
Operating temperature	Topr	-35~85	°C
Storage Temperature	Tstg	-40~150	°C

* On less than 3%(percentage occupied by copper foil), $70\times70mm^2$, t=1.6mm, glass epoxy mounting. Reduce power by 13.6mW for each degree above 25°C

GUARANTEED OPERATING RANGES

Parameter	Symbol	Limits	Unit
Supply voltage	Vcc	4.3~13.2	V
	PVcc1	4.3~Vcc	
	PVcc2	4.3~Vcc	

ELECTRICAL CHARACTERISTICS

(unless otherwise specified: Ta=25°C, Vcc=12V   PVcc1=PVcc2=5V,BIAS=2.5V, R_L=8Ω, Rd=0.5Ω, C=100pF)

Characteristics	Test conditions	Symbol	Min	Typ	Max	Unit
Quiescent current		Icc		18	27	mA
Stand-by quiescent current		Isc			0.5	mA
Voltage for stand-by ON		V_{STON}			0.5	V
Voltage for stand-by OFF		V_{STOFF}	2.0			V
< Actuator driver >						
Output offset current		Ico	-6		6	mA
Maximum output voltage		V_{CM}	3.6	4.0		V
Trans conductance	V_{IN}=BIAS±0.2V	gm	1.3	1.5	1.7	A/V
< Sled motor driver/ Pre OP-amp >						
Common mode input range		V_{ICM}	-0.3		11.0	V
Input bias current		I_{BOP}		30	300	nA
Low level output voltage		V_{OLOP}		0.1	0.3	V
Output source current		I_{SO}	0.3	0.5		mA
Output sink current		I_{ST}	1			mA
< Sled motor driver >						
Output offset voltage		V_{OOFSL}	-100	0	100	mV
Maximum output voltage		V_{OMSL}	7.5	9.0		V
Closed loop voltage gain	V_{IN}=±0.2V	G_{VSL}	18	20	22	dB
< Loading motor driver>						
Output offset voltage		V_{OOFLD}	-50	0	50	mV
Maximum output voltage		V_{OMLD}	3.6	4.0		V
Closed loop voltage gain	V_{IN}=BIAS±0.2V	G_{VLD}	13.5	15.5	17.5	dB
Gain error by polarity	V_{IN}=BIAS±0.2V	ΔG_{VLD}	0	1	2	dB

TEST CIRCUIT
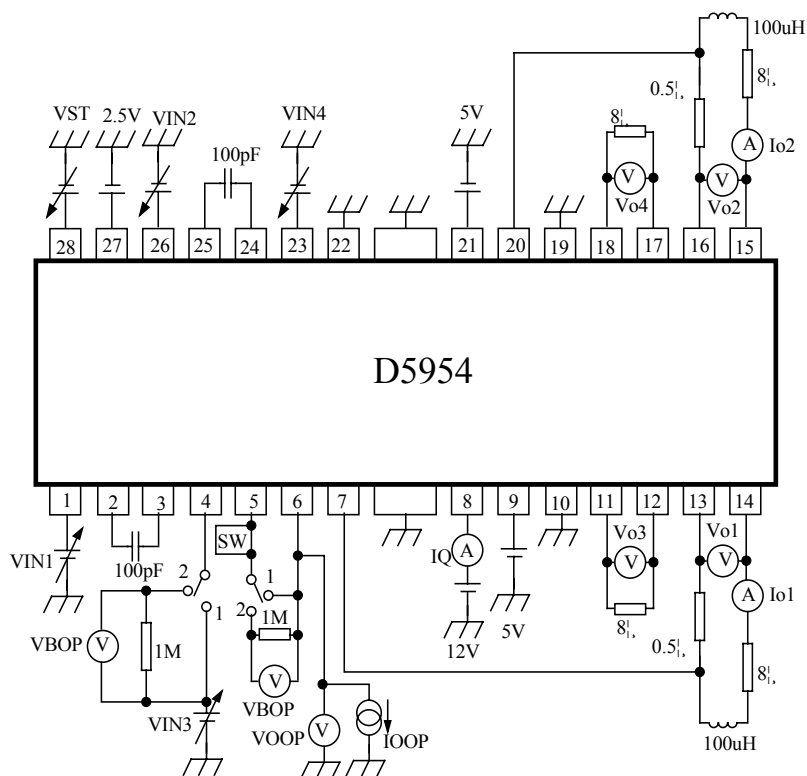
SWITCH TABLE

Characteristics	SW	Input voltage					Conditions	Measure point
		VIN1	VIN2	VIN3	VIN4	VST		
Quiescent current	1	2.5V	2.5V	2.5V	2.5V	5.0V		IQ
Stand-by quiescent current	1	2.5V	2.5V	2.5V	2.5V	0.5V		IQ
Voltage for stand-by ON	1	2.5V	2.5V	2.5V	2.5V	0.5V		IQ
Voltage for stand-by OFF	1	2.5V	2.5V	2.5V	2.5V	2.0V		IQ
< Actuator driver >								
Output offset current	1	2.5V	2.5V	2.5V	2.5V	5.0V		Vo1/2
Maximum output voltage	1	0V 5V	0V 5V	2.5V	2.5V	5.0V		Vo1/2
Trans conductance	1	2.3V 2.7V	2.3V 2.7V	2.5V	2.5V	2.5V		Vo1/2
< Loading motor driver>								
Output offset voltage	1	2.5V	2.5V	2.5V	2.5V	5.0V		Vo4
Maximum output voltage	1	2.5V	2.5V	2.5V	0V 5V	5.0V		Vo4
Voltage gain	1	2.5V	2.5V	2.5V	2.3V 2.7V	5.0V		Vo4

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Silicore D5954

SWITCH TABLE

| Characteristics	SW	Input voltage					Conditions	Measure point
		VIN1	VIN2	VIN3	VIN4	VST		
< Sled motor driver >								
Input bias current	2	2.5V	2.5V	2.5V	2.5V	5.0V		VBOP/1M
Low level output voltage	1	2.5V	2.5V	0V	2.5V	5.0V		Voop
Output source current	1	2.5V	2.5V	2.5V	2.5V	5.0V	Ioop=+0.2mA	Voop
Output sink current	1	2.5V	2.5V	2.5V	2.5V	5.0V	Ioop=-1mA	Voop
Output offset voltage	1	2.5V	2.5V	2.5V	2.5V	5.0V		Vo3
Maximum output voltage	1	2.5V	2.5V	0V 5V	2.5V	5.0V		Vo3
Closed loop voltage gain	1	2.5V	2.5V	2.3V 2.7V	2.5V	5.0V		Vo3

APPLICATION CIRCUIT
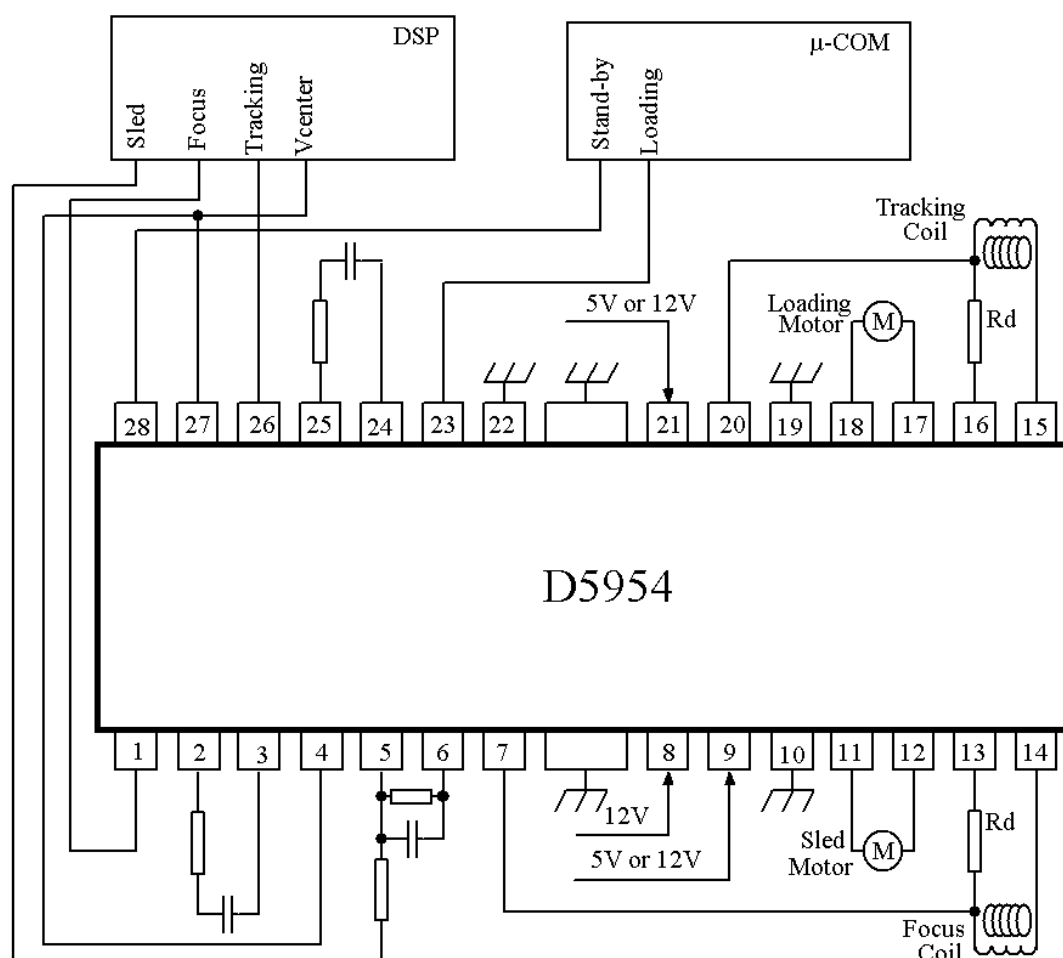
NOTES ON USE

1. Thermal-shut-down circuit built-in. In case IC chip temperature rise to 175°C(typ.), thermal-shut-down circuit operates and output current is muted. Next time IC chip temperature falls bellows 150°C(typ.), the driver blocks start.

2. In case stand-by-pin voltage under 0.5V or opened, quiescent current is muted. Stand-by-pin voltage should be over 2.0V for normal application.

3. In case supply voltage falls below 3.5V (typ.), output current is muted. Next time supply voltage rises to 3.7V(typ.), the driver blocks start.

4. Bias\pin (pin27) should be pulled up more than 1.2V. In case bias-pin voltage is pulled down under 0.9V (typ.), output current is muted.

5. Insert the by-pass capacitor between Vcc-pin and GND-pin of IC as possible as near (approximately 0.1μF).

6. Heat dissipation fins are attached to the GND on the inside of the package. Make sure to connect these to the external GND.

7. Output pin is to avoid short-circuit with Vcc, GND and other output pins.
    And, be fully careful in the direction of an integrated circuit when you put an integrated circuit.
    On the substrate. An integrated circuit is damaged, and smoke may come out by the case.

      Output pin …11~18pin   Vcc…8pin, PVcc1…9pin, PVcc2…21pin
      PreGND…22pin, PGND…10,19pin

CHARACTERISTIC CURVES
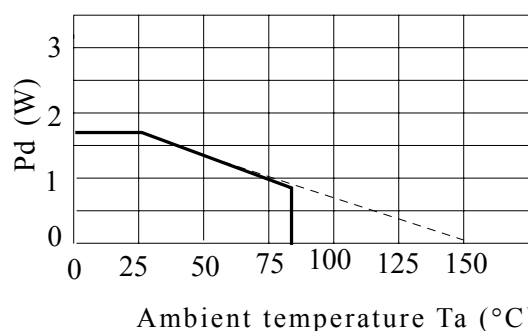
Ambient temperature Ta (°C)   Pd: power dissipation

* On less than 3%(percentage occupied by copper foil), $70\times70mm^2$, t=1.6mm, glass epoxy mounting.