AT5660

Preliminary Product Information

5-Channel Motor Driver for DVD/VCD

Features

- 2 channels of DC motor BTL driver
- 2 channels of BTL driver for coils with current feedback
- 1 channels forward/reverse control DC motor driver
- Built-in suspension function.
- Built-in thermal shutdown circuit.
- Operating voltage: 4.5V~13.2V

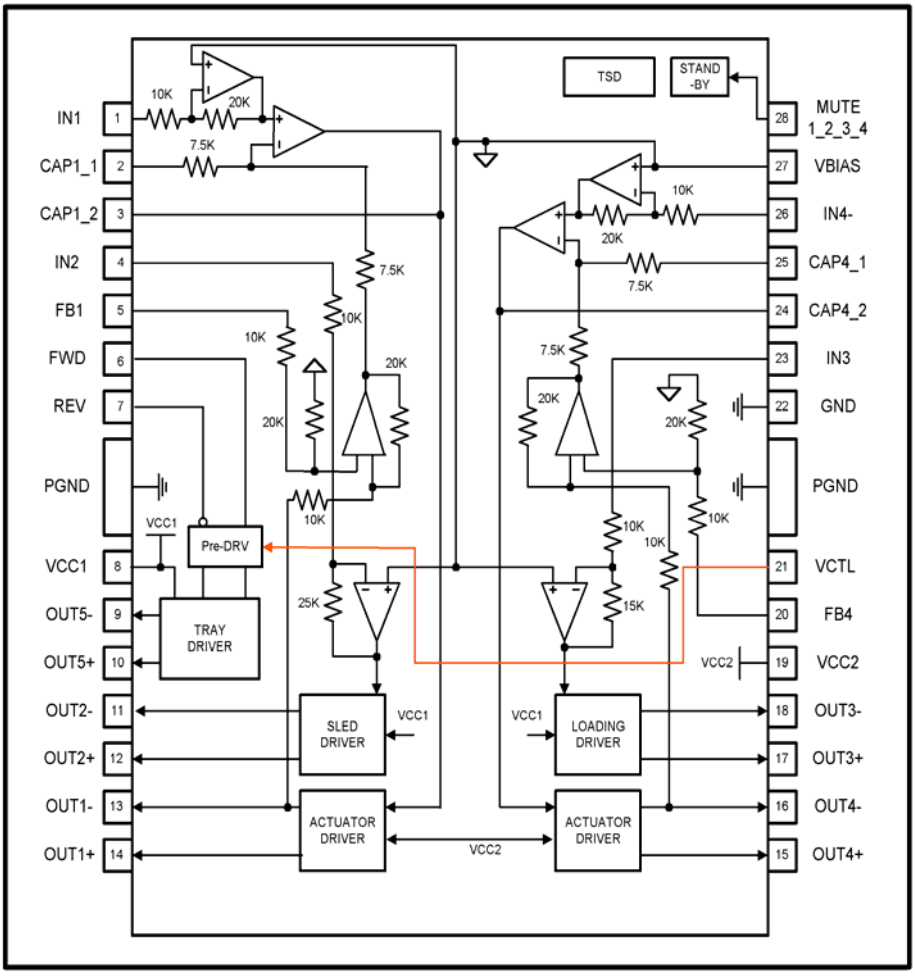
Description

The AT5660 is a 5-channel BTL driver IC. Two of them can drive DC motors and two can drive coils, such as the focus and tracking actuators of a CD-ROM/DVD-ROM/DVD-Player system, with current feedback. It also built-in one channel bi-direction DC motor driver for Tray.

Applications

CD-ROM/DVD-ROM/CD-RW drives
DVD player.

Block Diagram



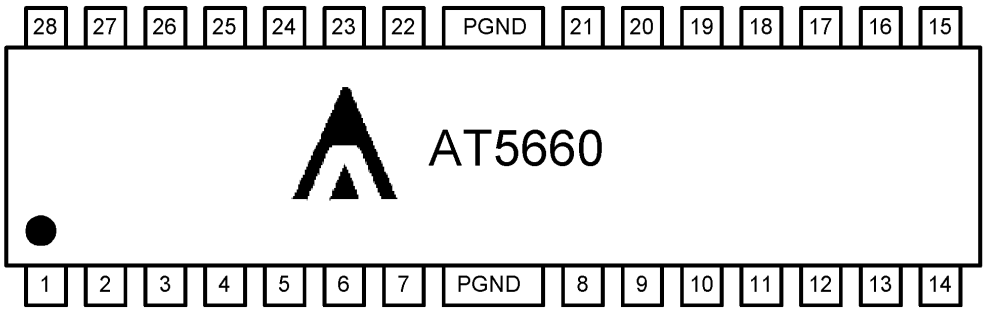
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Pin Descriptions

Pin No.	Pin name	Function
1	IN1	CH1(Focus coil) input
2	CAP1_1	CH1 error amplifier filter capacitor connection 1
3	CAP1_2	CH1 error amplifier filter capacitor connection 2
4	IN2	CH2(Sled driver) input
5	FB1	CH1(Focus coil) feedback pin
6	FWD	CH5 forward input
7	REV	CH5 reverse input
8	VCC1	Power Supply 1
9	OUT5-	CH5(Tray driver) output(-)
10	OUT5+	CH5(Tray driver) output(+)
11	OUT2-	CH2(Sled driver) output (-)
12	OUT2+	CH2(Sled driver) output (+)
13	OUT1-	CH1(Focus coil) output (-)
14	OUT1+	CH1(Focus coil) output (+)
15	OUT4+	CH4(Tracking coil) output (+)
16	OUT4-	CH4(Tracking coil) output (-)
17	OUT3+	CH3(Loader) output (+)
18	OUT3-	CH3(Loader) output (-)
19	VCC2	Power Supply 2
20	FB4	CH4(Tracking coil) feedback pin
21	VCTL	CH5 Speed control input
22	GND	Ground
23	IN3	CH3(Loader) input
24	CAP4_2	CH4 error amplifier filter capacitor connection 2
25	CAP4_1	CH4 error amplifier filter capacitor connection 1
26	IN4-	CH4 (Tracking driver) input
27	VBIAS	VREF input pin
28	MUTE_1_2_3_4	Mute control for CH1,Ch2,CH3,CH4

Notes: The indicated polarities for the output pins are under the condition that all inputs are (+).
The power supplies for the driver output are PVcc1 for the loader, PVcc2 for focus and tracking drivers, and Vcc for pre-block and sled driver. Therefore, make sure Vcc≧PVcc1,2.

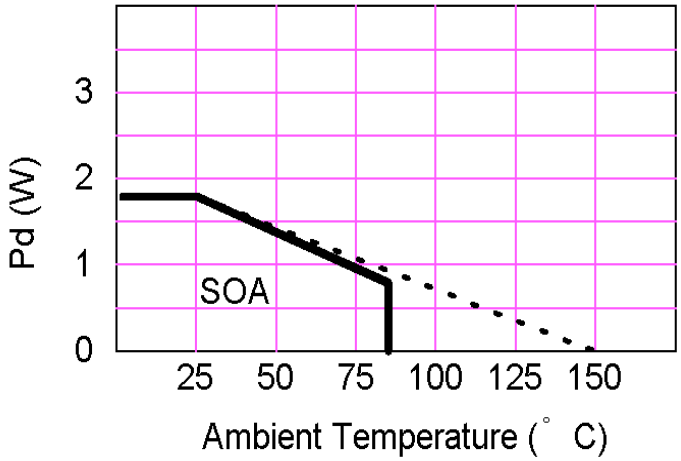
Pin Out



Ordering Information

Part number	Package	Marking
AT5660H	28-pin HSOP	AT5660H

Power Dissipation (Ta = 25°C)



Condition: mount on 50x50 mm^2 t=1.0mm paper phenol PCB

Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	unit
Power supply voltage	VCC1,2	13.5	V
Power dissipation	P_d	1.7	W
Operating temperature	T_{opr}	-30~+80	°C
Storage temperature	T_{stg}	-55~+150	°C

NOTE:*

1. Power dissipation reduces 13.6mW / °C for using above Ta=25°C
2. Do not exceed Pd and SOA.

Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Limits	unit
Power supply voltage	VCC1	4.0~13.2	V
	VCC2	4.0~Vcc1	V

Electrical characteristics

(unless otherwise noted, Ta = 25°C,VCC1 =12V, VCC2 =5V, VBIAS=2.5V, R_{L1}= R_{L2}=8Ω, R_{L3}= R_{L4}=12Ω)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current	I_{QC}	-	18	27	mA	No Load
Mute quiescent current	I_{QSB}	-	-	5	mA	CH5 active
Mute ON voltage	V_{SBON}	0	-	0.5	V	
Mute OFF voltage	V_{SBOFF}	2.0	-	-	V	
<Actuator driver>						
Output current offset	$I_{O1,2}$	-6	-	6	mA	
Maximum output voltage	$V_{O1,2}$	3.6	4.0	-	V	V_{IN} = V_{BIAS} ±1.5V
Gain	Gm	1.3	1.5	1.7	A/V	V_{IN} = V_{BIAS} ±0.2V
<Sled motor driver>						
Output voltage offset	V_{OFFSL}	-100	0	100	mV	
Maximum output voltage	V_{O3MAX}	7.5	9.0	-	V	V_{IN} = V_{BIAS} ±1.5V
Closed loop gain	G_{VSL}	18.0	20.0	22.0	dB	V_{IN} = V_{BIAS} ±0.2V
<Loader motor driver>						
Output voltage offset	V_{OFFLD}	-50	0	50	mV	
Maximum output voltage	V_{O4max1}	7.5	9.0	-	V	V_{IN} = V_{BIAS}±2.0V
Maximum output voltage	V_{O4max2}	3.6	4.0	-	V	V_{IN} = V_{BIAS} ±1.5V VCC1=5V
Closed loop gain	G_{VLD}	13.5	15.5	17.5	dB	V_{IN} = V_{BIAS} ±0.2V
Gain error	ΔG_{VLD}	0	1	2	dB	V_{IN} = V_{BIAS}±0.2V
<Tray motor driver>						
Maximum output voltage	V_{O5max1}	-	6.0	-	V	R_{L5}=45Ω, R_{VCTL}=400Ω,
		3.8	-	4.2	V	R_{L5}=45Ω, R_{VCTL}=0Ω, VCC1=VCC2=5V
Output voltage offset	V_{OFFTR}	-50	0	50	mV	
Input high level voltage	V_{IH}	2.0	-	-	V	
Input low level voltage	V_{IL}	-	-	0.8	V	

Tray Motor Driver

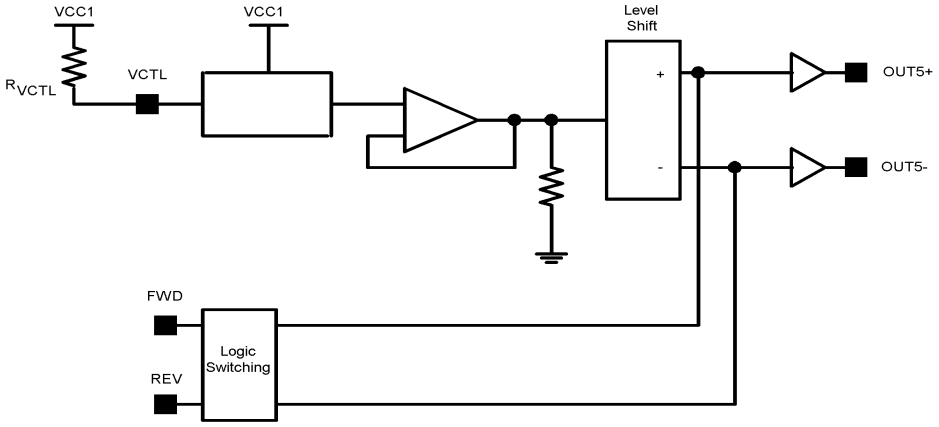


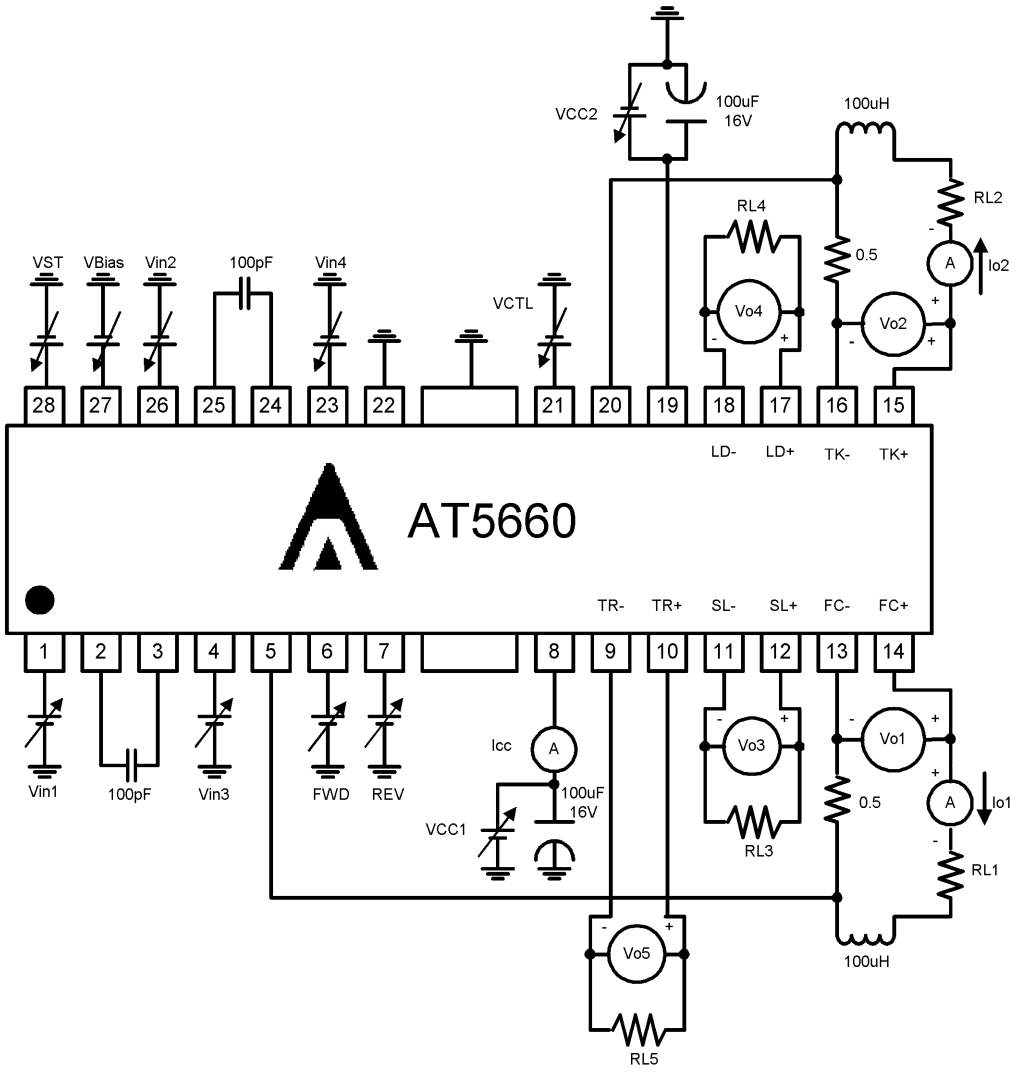
Fig1.

Input		Ouput		
FWD	REV	OUT5+	OUT5-	Status
High	High	Low	Low	Break
High	Low	High	Low	Forward
Low	High	Low	High	Reverse
Low	Low	Open	Open	Standby

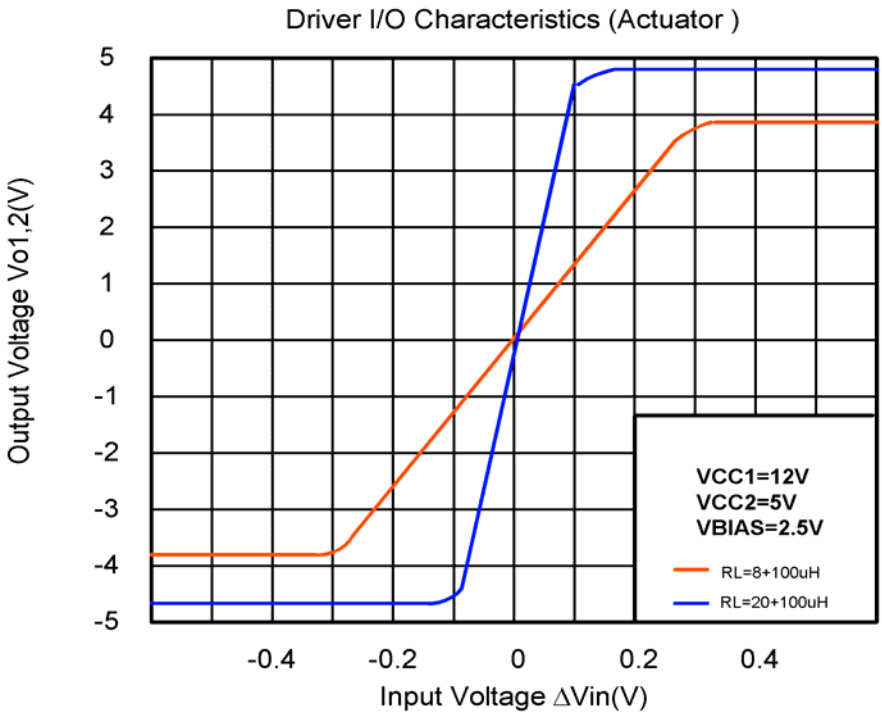
Tray Motor Speed Control

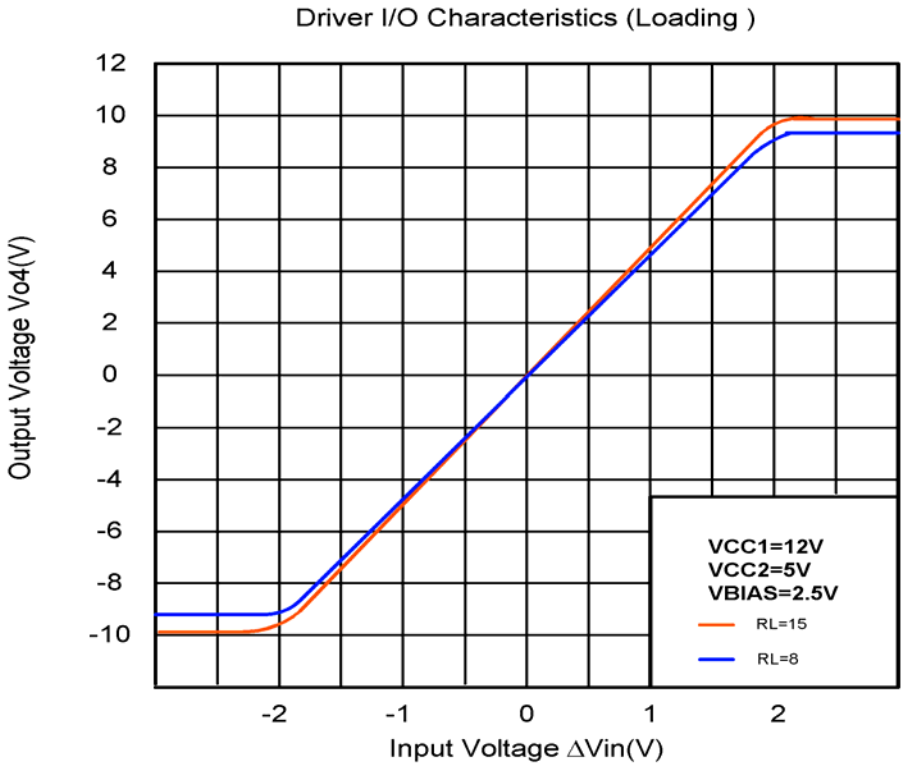
The amplitude of the output voltage is controlled by VCTL(pin21). If you want to control differential output voltage of the tray, insert external resistor R_{VCTL} as shown in figure 1.

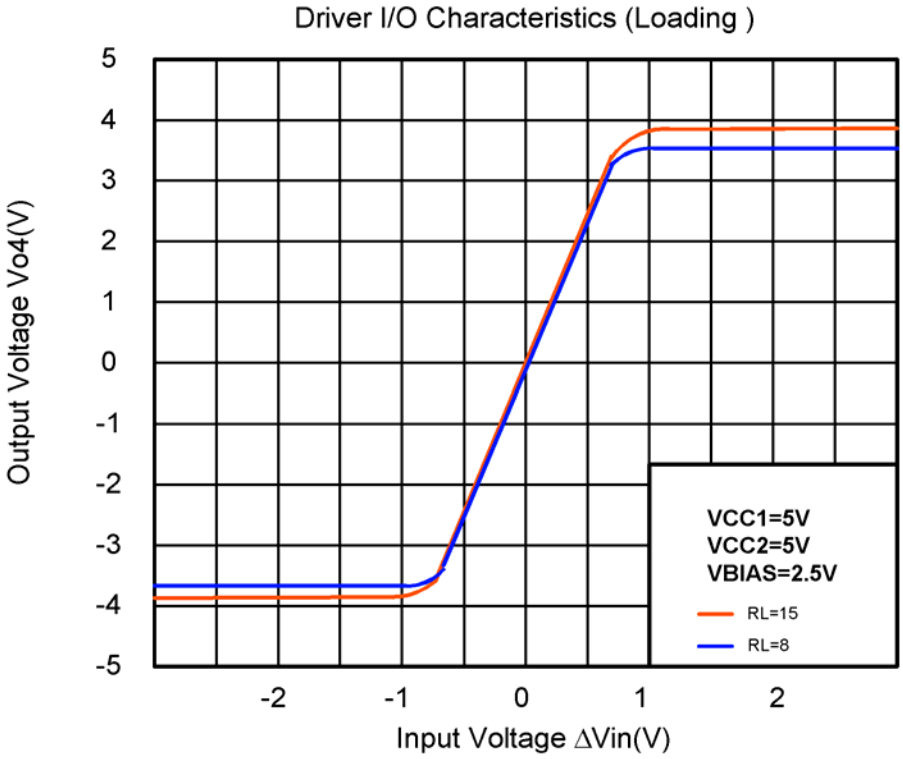
Test Circuit

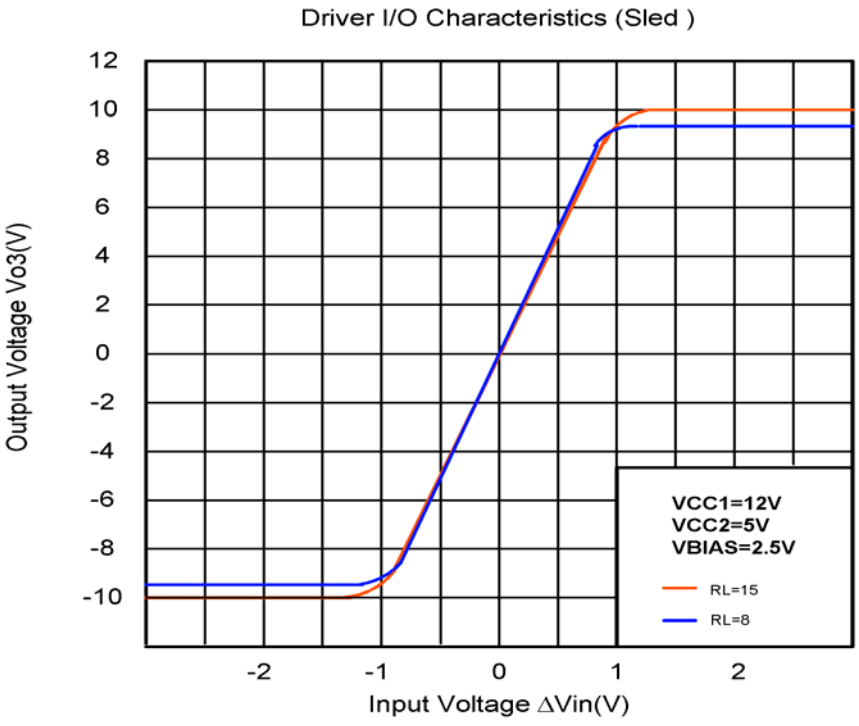


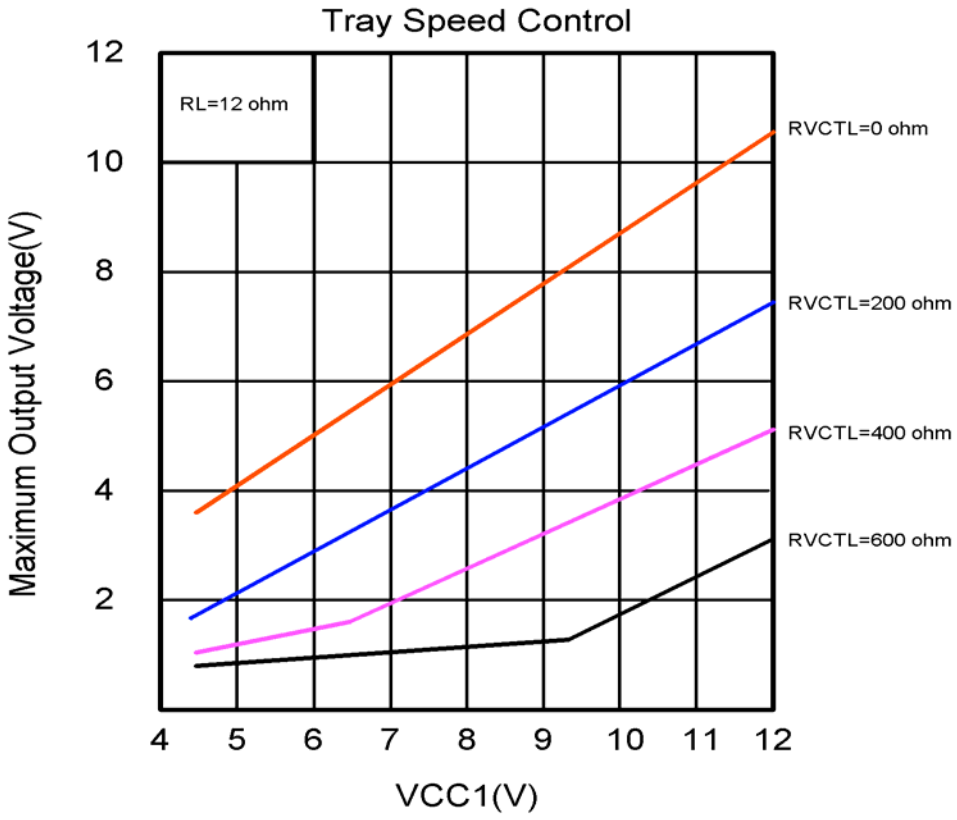
Typical Curve

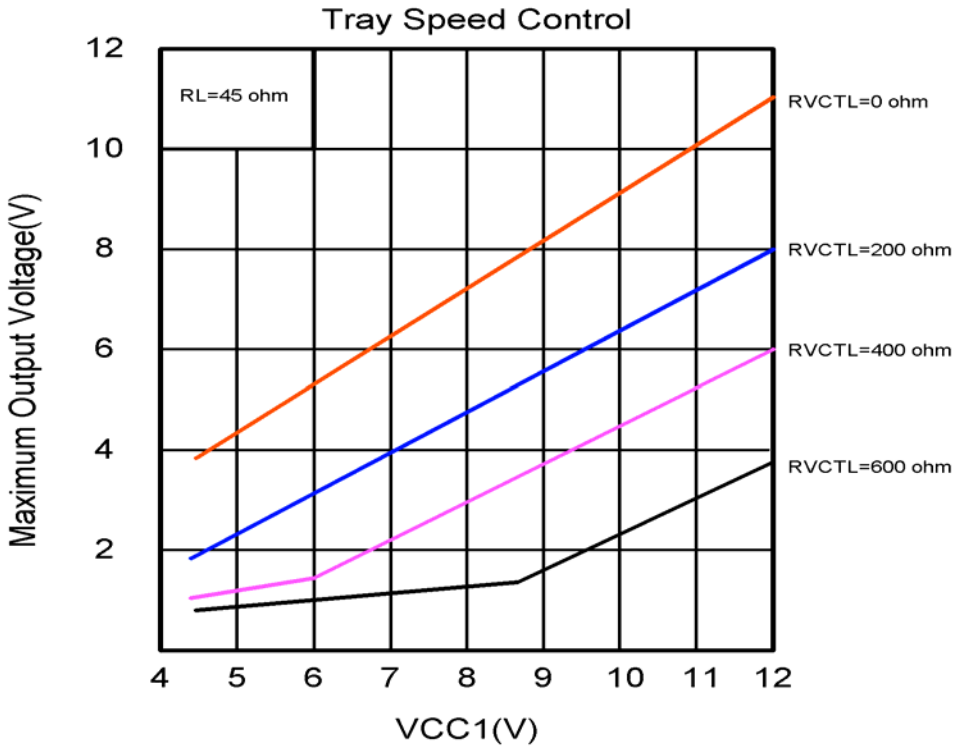




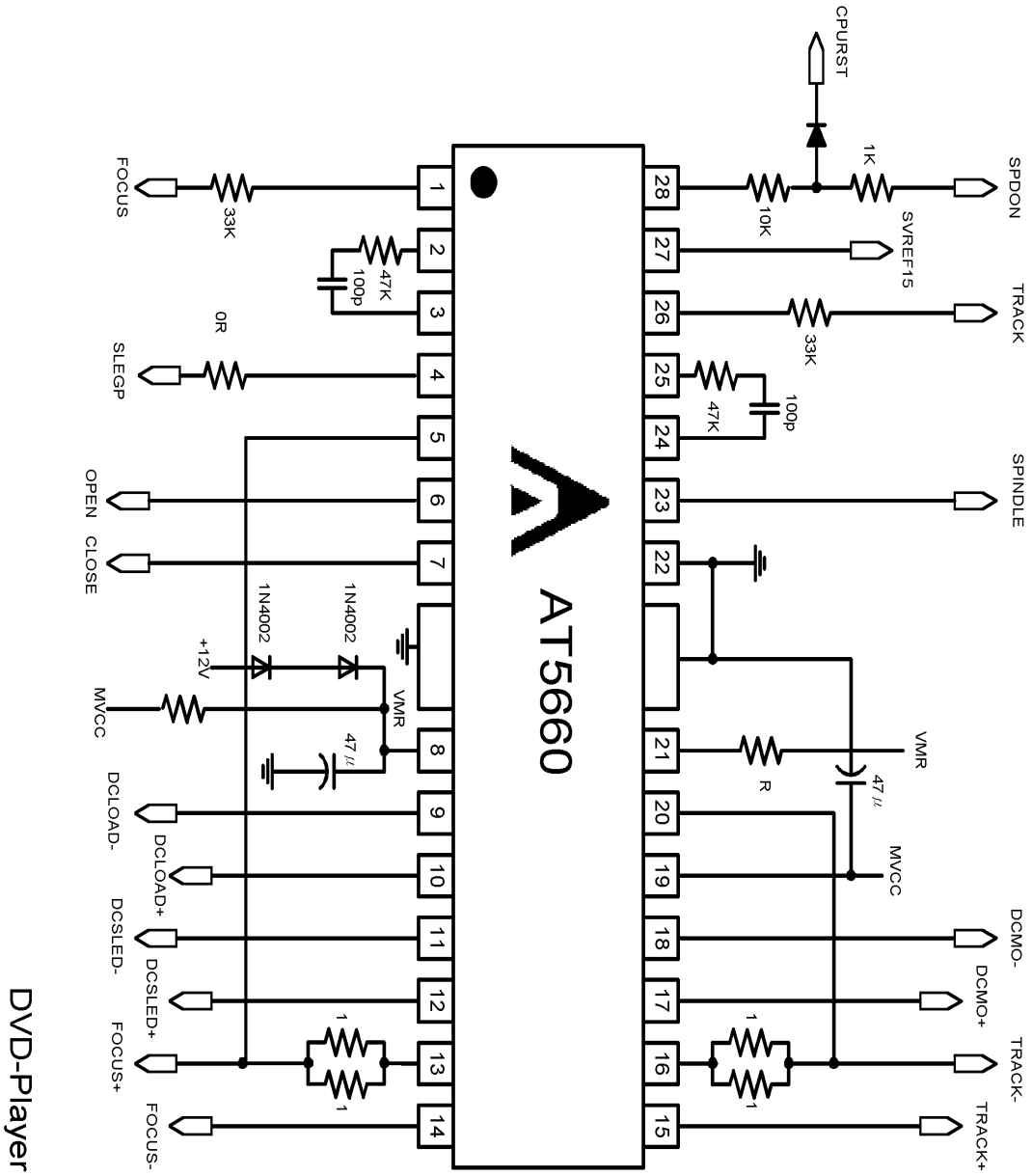

Driver I/O Characteristics (Loading)
Output Voltage Vo4(V)
5
4
3
2
1
0
-1
-2
-3
-4
-5
-2
-1
0
1
2
Input Voltage ΔVin(V)
VCC1=5V
VCC2=5V
VBIAS=2.5V
RL=15
RL=8

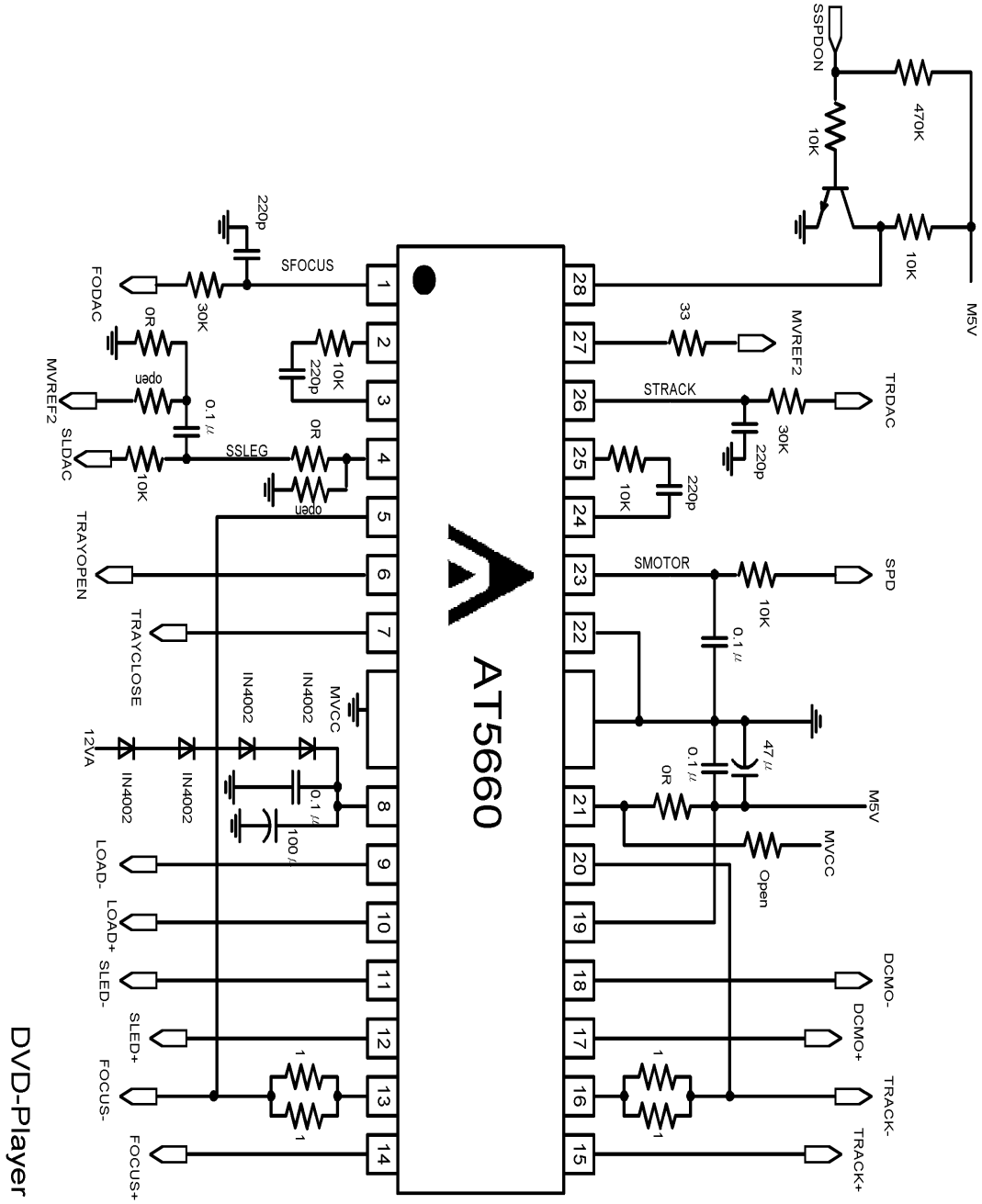

Driver I/O Characteristics (Sled)
Output Voltage Vo3(V)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-2
-1
0
1
2
Input Voltage ΔVin(V)
VCC1=12V
VCC2=5V
VBIAS=2.5V
RL=15
RL=8


Tray Speed Control
RL=12 ohm
RVCTL=0 ohm
RVCTL=200 ohm
RVCTL=400 ohm
RVCTL=600 ohm
Maximum Output Voltage(V)
12
10
8
6
4
2
4 5 6 7 8 9 10 11 12
VCC1(V)


Tray Speed Control
RL=45 ohm
RVCTL=0 ohm
RVCTL=200 ohm
RVCTL=400 ohm
RVCTL=600 ohm
Maximum Output Voltage(V)
12
10
8
6
4
2
4 5 6 7 8 9 10 11 12
VCC1(V)

Application circuit




AT5660
SSPDON
470K
10K
10K
M5V
220p
SFOCUS
FODAC
30K
0R
open
MVREF2
0.1μ
SLDAC
10K
SSLEG
0R
open
220p
10K
33
MVREF2
STRACK
TRDAC
30K
220p
10K
220p
SMOTOR
SPD
10K
0.1μ
47μ
0.1μ
0R
M5V
MVCC
Open
TRAYOPEN
TRAYCLOSE
IN4002
IN4002
MVCC
12VA
IN4002
IN4002
0.1μ
100μ
LOAD-
LOAD+
SLED-
SLED+
FOCUS-
FOCUS+
DCMO-
DCMO+
TRACK-
TRACK+
1
1
1
1
DVD-Player

Package Outlines (units:mm): HSOP-28

