

### DESCRIPTION

The CMD4510 is a 4-channel BTL driver IC for driving the motors and actuators such as used in DVD player and consists of two DC-DC Step Down Converters. It is pretty fit for portable DVD player application. Package material is Pb Free for environmental protection.

### FEATURE

- **4-channel BTL:**

1) Two channels are voltage-type BTL drivers for actuators of tracking and focus. Two channels are voltage-type BTL driver for sled and spindle motors. It is also built-in two DC-DC converters.

2) Wide dynamic range for motor drive [3.6V (typ.) when  $V_{CC} = 5V$ , at  $R_L = 20\Omega$ , load].

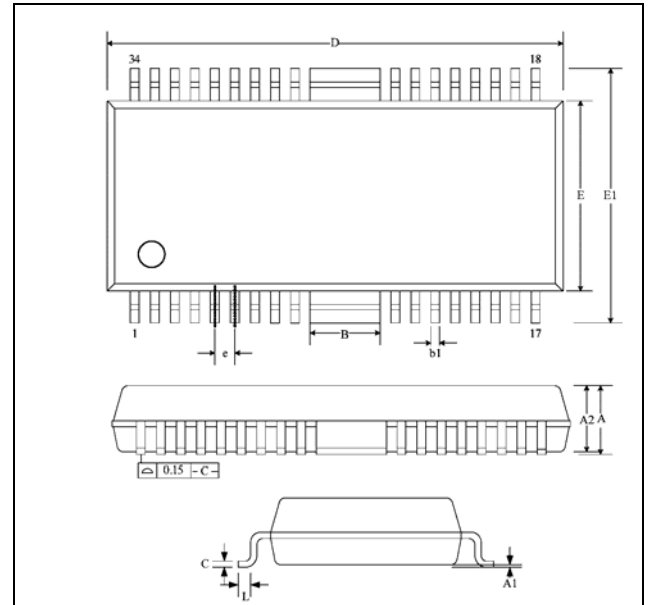
- **2 DC-DC Step down converters:**

- 1) Efficiency up to 85%
- 2) Operation from 4.5~16V
- 3) Typical frequency operation to 240KHz.
- 4) Over voltage protection built-in.
- 5) Over current protection built-in.

- **Common circuit**

- 1) Level shift circuit built-in.
- 2) Thermal shut down circuit built-in.
- 3) Mute mode built-in for motor drive. EN1, EN2 mode control for two set of DC-DC step down converters.

### Outline Drawing

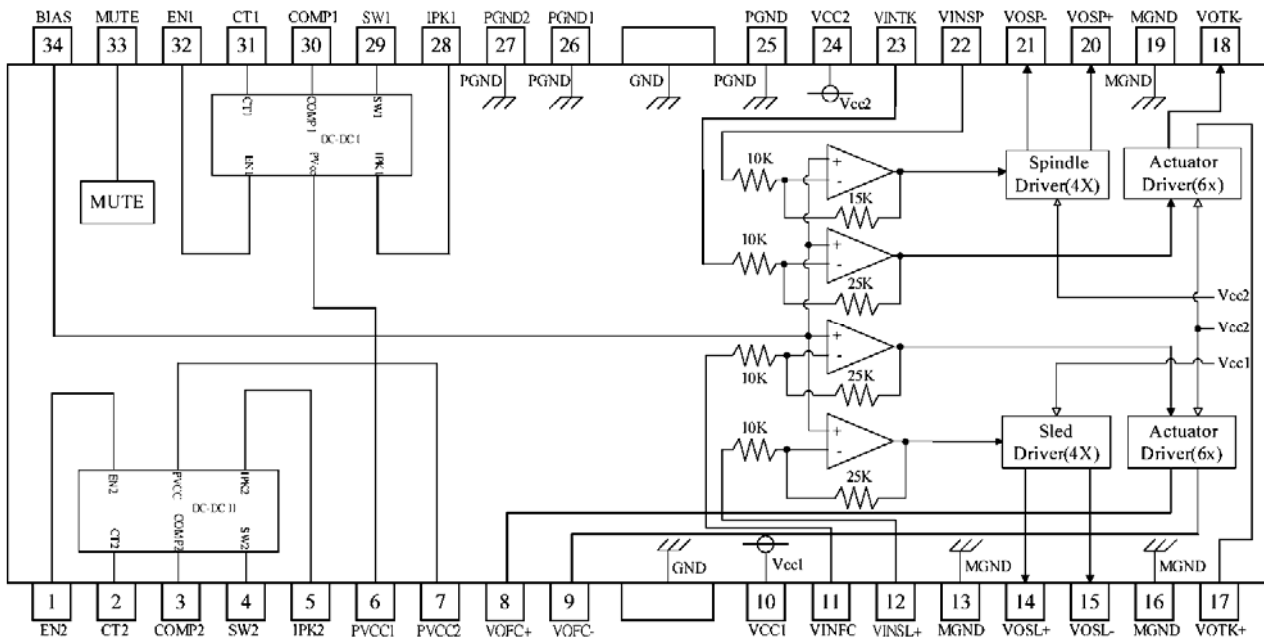


### APPLICATIONS

- BTL driver for portable DVD player with DC-DC power management

\* All specs and applications shown above subject to change without prior notice.

### BLOCK DIAGRAM AND PIN CONFIGURATION



### PIN DESCRIPTION

Pin No	Pin Name	Description
1	EN2	Enable pin for buck converter 2
2	CT2	Timing capacitor input 2
3	COMP2	Comparator inverting input 2
4	SW2	Switching output 2
5	IPK2	Current sense 2
6	PVcc1	Vcc for step down converter 1
7	PVcc2	Vcc for step down converter 2
8	VOFC+	Focus driver output(+)
9	VOFC-	Focus driver output(-)
10	Vcc1	Vcc for power block of sled
11	VINFC	Input for focus driver
12	VINSL+	Input for the sled driver
13	MGND	Ground for motor driver
14	VOsl+	Sled driver output(+)
15	VOsl-	Sled driver output(-)
16	MGND	Ground for motor driver
17	VOTK+	Tracking driver output(+)
18	VOTK-	Tracking driver output(-)
19	MGND	Ground for motor driver

Continue

\* All specs and applications shown above subject to change without prior notice.

Pin No	Pin Name	Description
20	VOSP+	Spindle driver output(+)
21	VOSP-	Spindle driver output(-)
22	VINSP	Input for spindle driver
23	VINTK	Input for tracking driver
24	Vcc2	Vcc for power block of spindle, tracking and focus
25	PGND	Ground for analog ground
26	PGND1	Ground for step down converter 1
27	PGND2	Ground for step down converter 2
28	IPK1	Current sense 1
29	SW1	Switching output 1
30	COMP1	Comparator inverting input 1
31	CT1	Timing capacitor input 1
32	EN1	Enable pin for buck converter 1
33	MUTE	Input for mute control
34	BIAS	Input for reference voltage

## ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Characteristic	Symbol	Value	Unit
Supply Voltage 1 for driver	Vcc1	13.5	V
Supply Voltage 2 for driver	Vcc2	13.5	V
Supply voltage for converter	PVcc	17.6	V
Power dissipation	Pd	2.2*	°C
Operating Temperature range	Topr	-40~+85	°C
Storage temperature range	Tstg	-55~+150**	°C

\* Power dissipation reduces 17.6mW/°C for operation above Ta=25°C

\*\* 70mm×70mm×1.6mm glass epoxy board.

## RECOMMENDED OPERATING CONDITIONS (Ta=25°C)

Characteristic	Symbol	Value	Unit
Power supply voltage	Vcc1	4.3~13.2	V
	Vcc2	4.3~Vcc1	
	PVcc	4.5~16	

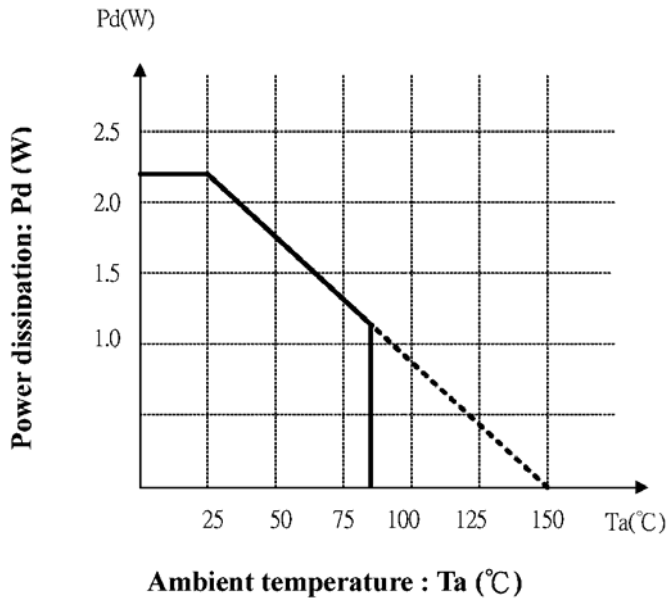
\* All specs and applications shown above subject to change without prior notice.

**ELECTRICAL CHARACTERISTICS** (Unless otherwise specified: Ta=25°C, Vcc1=5V, Vcc2=5V, PVcc=12V, BIAS=1.65V, RL=8Ω/10Ω/20Ω)

Characteristics	Symbol	Test conditions	Min	Typ	Max	Unit
Quiescent current	Icc			19		mA
Standby current 1	Istb1	Mute=L, EN1=H, EN2=H		3		mA
Standby current 2	Istb2	Mute=H, EN1=L, EN2=L		15		mA
Standby current 3	Istb3	Mute=L, EN1=L, EN2=L	40	52	60	μA
Voltage for mute ON	Vston		0		0.5	V
Voltage for mute OFF	Vstoff		2.0		5	V
Voltage for EN low	V <sub>ENL</sub>		0		0.5	V
Voltage for EN high	V <sub>ENH</sub>		2.0		5	V
<b>Actuator drivers</b>						
Output offset voltage	Voo				±50	mV
Maximum output voltage	Vom	@10Ω load		3.4		V
voltage gain	Gv	VIN=BIAS+0.2Vpp @1KHz ac	21.5	23.5	25.5	dB
<b>Sled motor driver</b>						
Output offset voltage	Voofsl				±100	mV
Maximum output voltage	Vomsl	@20Ω load		3.6		V
Closed loop voltage gain	Gvsl	VIN=BIAS+0.2Vpp @1KHz ac	18	20	22	dB
<b>Spindle motor driver</b>						
Output offset voltage	Voofld				±50	mV
Maximum output voltage	Vomax	@8Ω load		3.2		V
Voltage gain	Gvld	VIN=BIAS+0.2Vpp @1KHz ac	13.5	15.5	17.5	dB
Gain error by polarity	ΔGvld	VIN=BIAS+0.2Vpp @1KHz ac	0	1	2	dB
<b>Step down converter</b>						
Oscillator frequency	Fosc	CT=68PF		240		KHz
Charge current	Ichg			24		μA
Discharge current	Idischg			144		μA
Current limit sense voltage	Vipk	Rsc=0.1		200		mV
Comparator threshold voltage	Vth			1.25		V
Output source current	Isource	Vout=0V		180		mA
Output sink current	Isink	Vout=9V		120		mA

\* All specs and applications shown above subject to change without prior notice.

## POWER DISSIPATION CURVE:



## APPLICATION INFORMATION

1)The built-in thermal shutdown circuit mutes the output current of 4-channel BTL when the chip temperature reaches 175°C (typ.). The hysteresis is set to 25°C (typ.), so the circuit will start up again when the chip temperature falling to 150°C(typ.).

2) In case mute pin voltage is under 0.5V or NC, output current is muted (except two DC-DC converter). Mute pin voltage should be more than 2.0V for normal application.

3) In case EN pin voltage is under 0.5V or NC, the converter circuit will stop operation. EN pin voltage should be more than 2.0V for normal application.

4) Bias pin (pin 34) should be pulled up to more than 1.2V. In case the bias pin voltage is pulled down below 0.9V (typ.),the output current of 4-channel BTL is muted.

5) Heat dissipation fins are attached to the GND on the inside of the package. Make sure to connect them to the external GND.

6)DC-DC Step down converter: Please refer to application note.

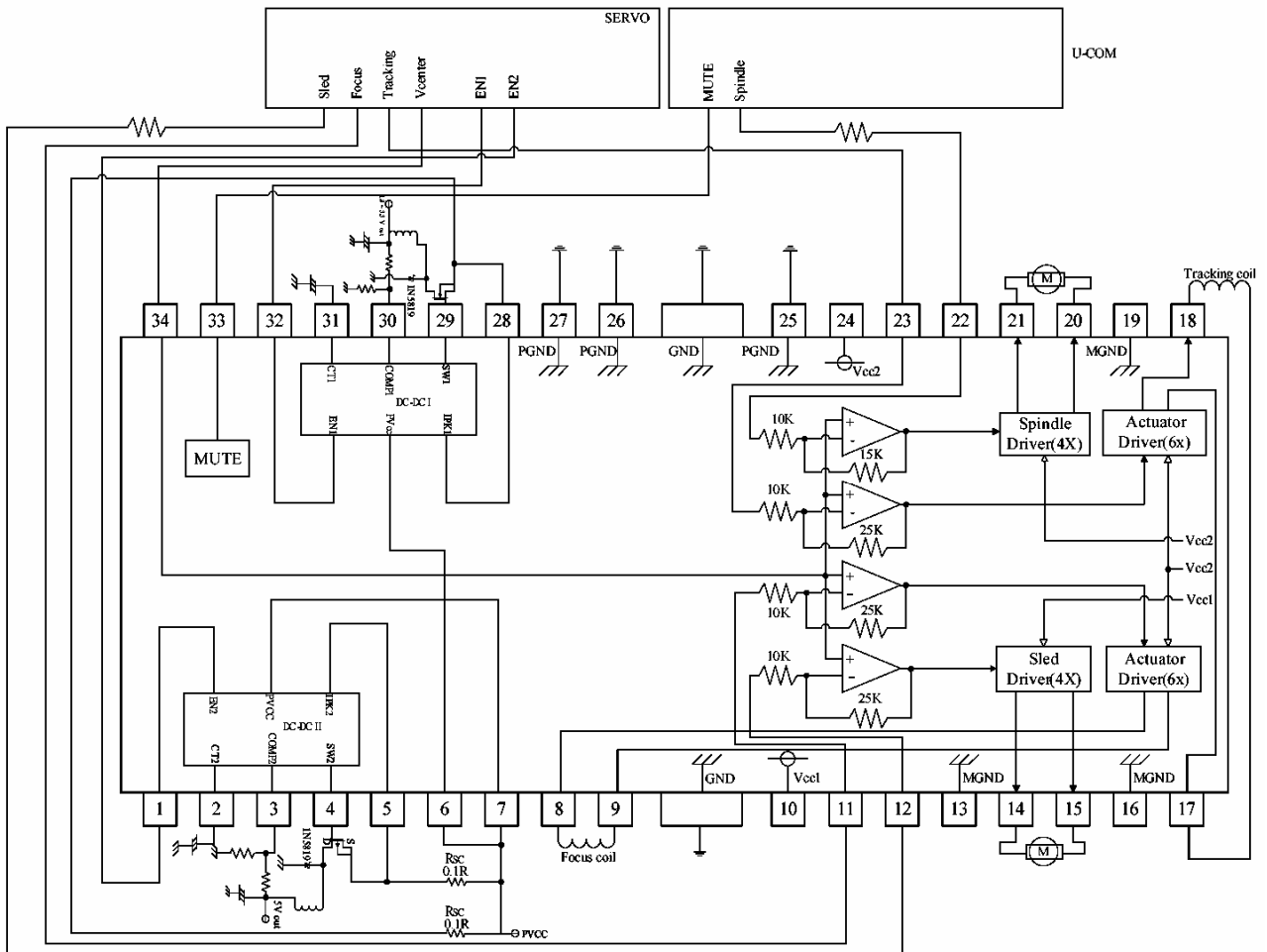
7)Truth table of Mute,EN1,EN2.

**Truth table** (O: active ×:inactive --:don't care)

Mute	EN1	EN2	Motor channel	DC-DC ctrl 1	DC-DC ctrl 2
H	--	--	O	--	--
--	H	--	--	O	--
--	--	H	--	--	O
L	L	L	×	×	×

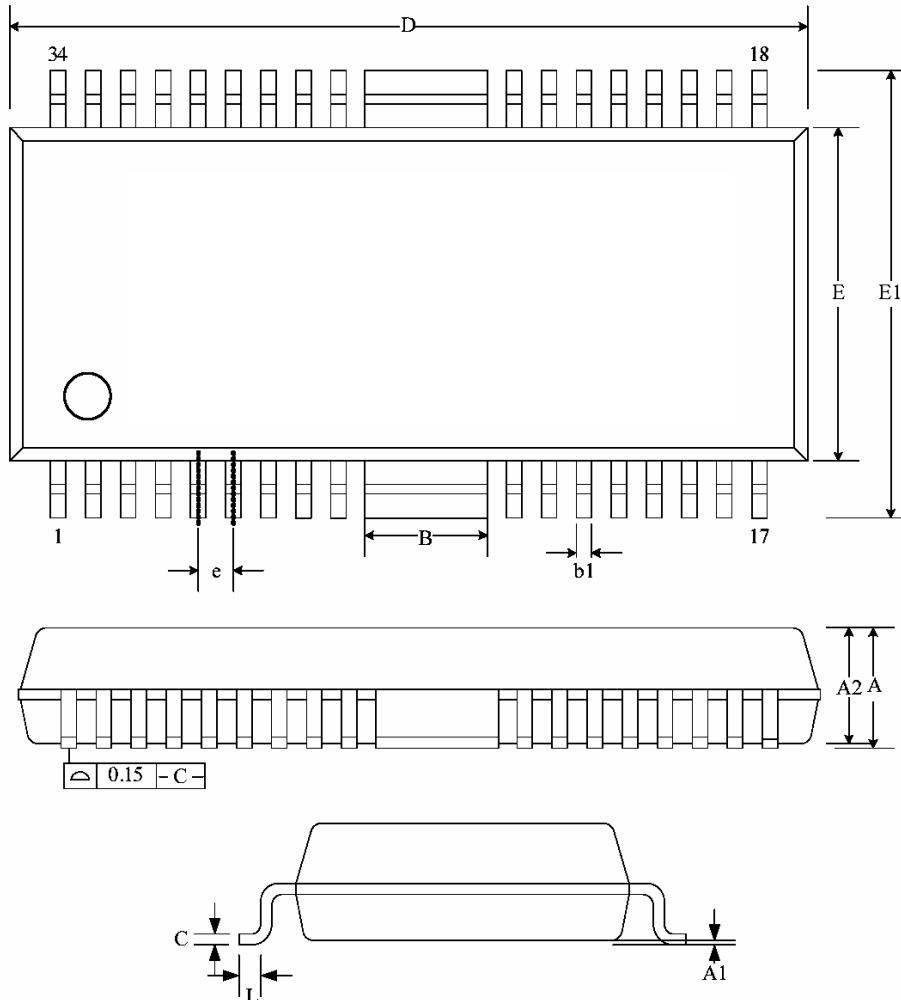
\* All specs and applications shown above subject to change without prior notice.

## APPLICATION CIRCUIT



\* All specs and applications shown above subject to change without prior notice.

## OUTLINE DRAWING



SYMBOL	MILLIMETERS		INCHES	
	Min.	Max.	Min.	Max.
A	-	2.75	-	0.108
A1	-	0.3	-	0.012
A2	-	2.45	-	0.096
B	2.55	2.95	0.1	0.16
b1	0.23	0.47	0.009	0.019
C	0.2	0.36	0.008	0.014
D	17.89	18.8	0.704	0.740
E	7.3	7.9	0.287	0.311
E1	9.6	10.65	0.378	0.419
e	0.8 (TYP)		0.031 (TYP)	
L	0.3	1.27	0.012	0.05

\* All specs and applications shown above subject to change without prior notice.