

STRUCTURE : Silicon Monolithic Integrated Circuit  
 PRODUCT NAME : 4ch DVD Driver for Car Audio

MODEL NAME : **BD8231EFV**

- FEATURES: · 3-phase brushless spindle motor driver, 2ch for actuator, 1ch for shared Sled/Loading (total 4ch).  
 · HTSSOP-B40 package which has large power dissipation is adopted.

<Spindle driver>

Highly effective and super silent 3-phase PWM drive system are adopted.

<Actuator/DC motor driver>

A linear BTL method with a low noise & a good playability is adopted.

ABSOLUTE MAXIMUM RATING : (Ta=25 )

Parameter	Symbol	Limits	Unit
Power-supply voltage	PREVCC, SLVM, AVM, VM_S, SPVM, SPRNF	15	V
Power dissipation	Pd	1.6 <sup>*1</sup>	W
Operating temperature	Topr	-40 ~ 85	
Storage temperature	Tstg	-55 ~ 150	

\* 1 70mm×70mm, thickness1.6mm, less than 3% share of copper foil when implementing glass epoxy board.  
 Operating at higher than Ta=25 , 12.8mW shall be reduced per 1

RANGE of RECOMMENDED OPERATION (Please set the power-supply voltage in consideration of a power dissipation.)

Parameter	Symbol	MIN	TYP	MAX	Unit
Linear driver PreVCC voltage	PREVcc	6	8	10	V
Thread/loading driver power part power-supply voltage	SLVM	6	8	PREVcc	V
Actuator driver power part power-supply voltage	AVM	4	8	PREcc	V
Spindle driver Pre driver part voltage	VM_S	6	8	10	V
Spindle driver power part power-supply voltage	SPVM,SPRNF	6	8	VM_S	V

This product is not designed for protection against radioactive rays.

Status of this document

The Japanese version of this document is the formal specification.  
 A customer may use this translation version only for a reference to help reading the formal version.  
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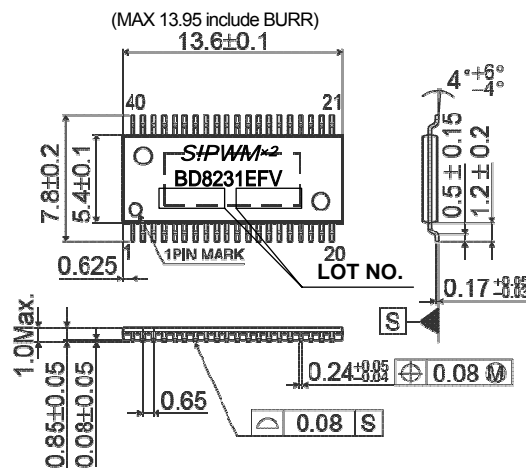
ELECTRICAL CHARACTERISTICS

(Unless otherwise noted Ta=25 , PREVcc=AVM=SLVM=SPVM=VM\_S=8V, Vc=1.65V, RL=8Ω, SPRNF=0.165Ω)

Parameter	Symbol	specification value			UNIT	Condition
		MIN	TYP	MAX		
Quiescent current	I <sub>Q</sub>	-	27.5	40.0	mA	At no load
<b>Actuator driver part (CH2,3)</b>						
Output offset voltage	V <sub>OFFT</sub>	-50	0	50	mV	
Output saturation voltage (vertical harmony)	V <sub>OFFT</sub>	-	1.5	2.3	V	IL=500mA
Voltage gain	G <sub>VFT</sub>	16.0	17.5	19.0	dB	
<b>SL/LD driver part (CH4)</b>						
Output offset voltage	V <sub>OFSL</sub>	-50	0	50	mV	
Output saturation voltage (vertical harmony)	V <sub>OSL</sub>	-	1.5	2.3	V	IL=500mA
voltage gain (SL)	G <sub>VSL</sub>	13.6	15.6	17.6	dB	VIN=±0.5V
voltage gain (LD)	G <sub>VLD</sub>	17.1	19.1	21.1	dB	VIN=±0.5V
<b>Spindle driver part &lt; hall bias &gt;</b>						
Voltage of hall bias	V <sub>HB</sub>	0.45	0.9	1.35	V	IHB=10mA
<b>Spindle driver part &lt; hall amplifier &gt;</b>						
Input bias current	I <sub>HIB</sub>	-5	-	5	uA	
Input level (one side)	V <sub>HIM</sub>	50	-	-	mVpp	
Common mode input range	V <sub>HICM</sub>	1	-	6	V	
<b>Spindle driver part &lt; torque instruction I/O &gt;</b>						
Input dead zone (one side)	V <sub>DZSP</sub>	0	10	40	mV	
I/O gain	gm <sub>SP</sub>	1.06	1.37	1.64	A/V	
Output ON resistance (vertical harmony)	R <sub>ONSP</sub>	-	1	1.8	Ω	IL=500mA
Output limit current	I <sub>LIMSP</sub>	0.8 (0.132)	1.0 (0.165)	1.2 (0.198)	A (V)	
Input impedance	R <sub>inSP</sub>	35	47	59	kΩ	
PWM frequency	f <sub>osc</sub>	-	100	-	kHz	
<b>Spindle driver part &lt; FG output &gt;</b>						
Low voltage	V <sub>FGL</sub>	-	0.1	0.3	V	10kΩ pull-up (3.3V)
<b>CTL Part</b>						
Low input voltage	V <sub>ICTL</sub>	-	-	0.8	V	
High input voltage	V <sub>ICTH</sub>	2	-	-	V	
High-level input current	I <sub>CTH</sub>	-	50	100	uA	CTL=3.3V

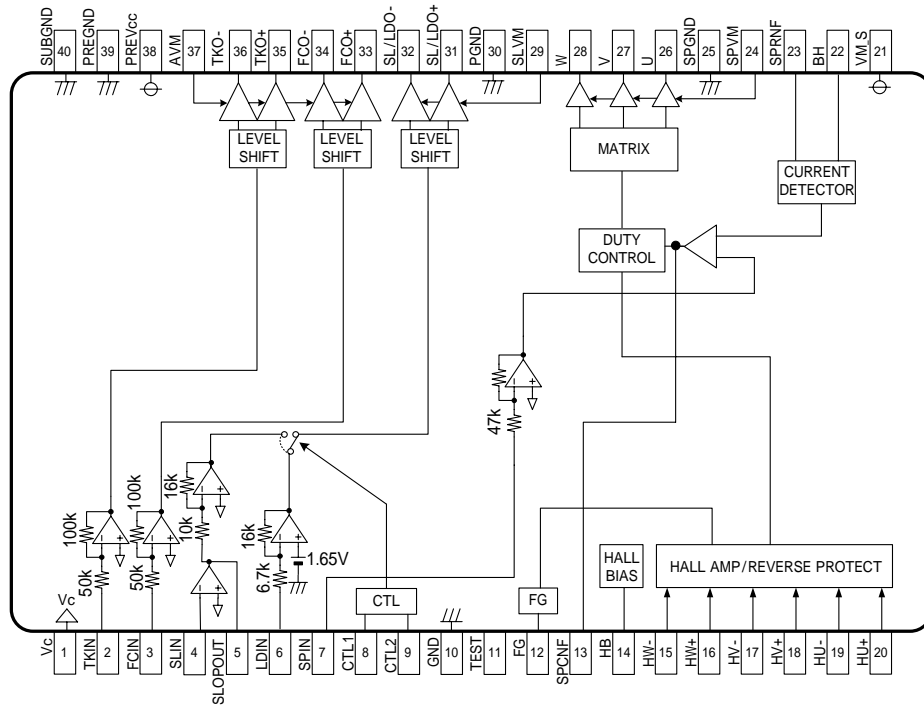
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PACKAGE OUTLINE



HTSSOP-B40 (UNIT : mm)

BLOCK DIAGRAM



PIN ASSIGNMENT

No.	Symbol	Description	No.	Symbol	Description
1	Vc	Control standard voltage input	21	VM_S	Spindle driver Pre part power supply
2	TKIN	Tracking input	22	BH	Spindle driver current sense bottom hold
3	FCIN	Focus input	23	SPRNF	Spindle driver current sense
4	SLIN	Sled input	24	SPVM	Spindle driver power supply
5	SLOPOUT	Sled input OPAMP output terminal	25	SPGND	Spindle part Power GND
6	LDIN	Loading input	26	U	Spindle driver U aspect output
7	SPIN	Spindle driver input	27	V	Spindle driver V aspect output
8	CTL1	Control terminal 1	28	W	Spindle driver W aspect output
9	CTL2	Control terminal 2	29	SLVM	Sled/Loading driver power supply
10	GND	GND	30	PGND	Power GND
11	TEST	Test input terminal (Connect it to GND).	31	SL/LDO+	Sled/Loading positive output
12	FG	FG signal output	32	SL/LDO-	Sled/Loading negative output
13	SPCNF	Spindle driver filter terminal	33	FCO+	Focus positive output
14	HB	Hall bias	34	FCO-	Focus negative output
15	HW-	Hall signal W-input	35	TKO+	Tracking positive output
16	HW+	Hall signal W+input	36	TKO-	Tracking negative output
17	HV-	Hall signal V-input	37	AVM	Actuator driver power supply
18	HV+	Hall signal V+input	38	PREVcc	Linear driver pre part power supply
19	HU-	Hall signal U-input	39	PREGND	PREGND
20	HU+	Hall signal U+input	40	SUBGND	SUBGND

•The FOCUS·TRACKING·SLED·LOADING driver's positive output and negative output are the polarities to the FCIN·TKIN·SLOPOUT·LDIN input respectively.

Example) FCO+>>FCO- at FCIN>Vc, FCO+<<FCO- at FCIN<Vc

NOTE ON USE

1. Absolute maximum ratings

We are careful enough for quality control about this IC. So, there is no problem under normal operation, excluding that it exceeds the absolute maximum ratings. However, this IC might be destroyed when the absolute maximum ratings, such as impressed voltages or the operating temperature range is exceeded, and whether the destruction is short circuit mode or open circuit mode cannot be specified. Please take into consideration the physical countermeasures for safety, such as fusing, if a particular mode that exceeds the absolute maximum rating is assumed.

2. Reverse polarity connection

Connecting the power line to the IC in reverse polarity (from that recommended) will damage the part. Please utilize the direction protection device as a diode in the supply line and motor coil line.

3. Power supply line

Due to return of regenerative current by reverse electromotive force, using electrolytic and ceramic suppress filter capacitors (0.1μF) close to the IC power input terminals (Vcc and GND) are recommended. Please note the electrolytic capacitor value decreases at lower temperatures and examine to dispense physical measures for safety.

4. GND line

Please keep the GND line [GND(10pin), SPGND(25pin), PGND(30pin), PREGND(39pin), SUBGND(40pin)] the lowest potential always, and check the GND voltage when transient voltages are connected to the IC.

5. Thermal design

Do not exceed the power dissipation (Pd) of the package specification rating under actual operation, and please design enough temperature margins. This product has exposed the frame to the back side of the package, but please notes that it is assumed to use heat radiation efficiency by the heat radiation for this part. Please take the heat radiation pattern on not only the surface of the substrate but also the back of the substrate widely.

6. Short circuit mode between terminals and wrong mounting

Do not mount the IC in the wrong direction and displacement, and be careful about the reverse-connection of the power connector. Moreover, this IC might be destroyed when the dust short the terminals between them or GND.

7. Radiation

Strong electromagnetic radiation can cause operation failures.

8. ASO (Area of Safety Operation)

Do not exceed the maximum ASO and the absolute maximum ratings of the output driver.

9. TSD (Thermal Shut-Down)

The TSD is activated when the junction temperature (Tj) exceeds Tjmax, and the output terminal is switched to OPEN. The guarantee and protection of set are not purpose. Therefore, please do not use this IC after TSD circuit operates, nor use it for assumption that operates the TSD circuit.

10. Capacitor between output and GND

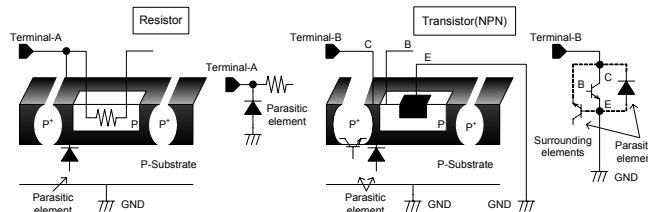
If a large capacitor is connected between the output and GND, this IC might be destroyed when Vcc becomes 0V or GND, because the electric charge accumulated in the capacitor flows to the output. Please set said capacitor to smaller than 0.1μF.

11. Inspection by the set circuit board

The stress might hang to IC by connecting the capacitor to the terminal with low impedance. Then, please discharge electricity in each and all process. Moreover, when attaching or detaching from jig in the inspection process, please turn off the power before mounting the IC, and turn on after mounting the IC, and vice versa. In addition, please take into consideration the countermeasures for electrostatic damage, such as giving the earth in assembly process, transportation or preservation.

12. Input terminal

This IC is a monolithic IC, and has P<sup>+</sup> isolation and P substrate for the element separation. Therefore, a parasitic PN junction is formed in this P-layer and N-layer of each element. For instance, the resistor or the transistor is connected to the terminal as shown in the figure below. When the GND voltage potential is greater than the voltage potential at Terminal A on the resistor, at Terminal B on the transistor, the PN junction operates as a parasitic diode. In addition, the parasitic NPN transistor is formed in said parasitic diode and the N layer of surrounding elements close to said parasitic diode. These parasitic elements are formed in the IC because of the voltage relation. The parasitic element operating causes the interference of circuit operation, then the wrong operation and destruction. Therefore, please be careful so as not to operate the parasitic elements by impressing to input terminals lower voltage than GND (P substrate). Please do not apply the voltage to the input terminal when the power-supply voltage is not impressed. Moreover, please impress each input terminal lower than the power-supply voltage or equal to the specified range in the guaranteed voltage when the power-supply voltage is impressing.



Simplified structure of IC

13. Earth wiring pattern

If small signal GND and large current GND exist, disperse their pattern. In addition, for voltage change by pattern wiring impedance and large current not to change voltage of small signal GND, each ground terminal of IC must be connected at the one point on the set circuit board. As for GND of external parts, it is similar to the above-mentioned.

14. Reverse-rotation braking

In the case of reverse-rotation braking from high-speed rotation, pay good attention to reverse electromotive force. Furthermore, fully check output current and consider the revolutions applied to the reverse-rotation brake.

15. About the capacitor between SPVM and PGND

The capacitor between SPVM and PGND absorbs the change in a steep voltage and the current because of the PWM drive, as a result, there is a role to suppress the disorder of the SPVM voltage. However, the effect falls by the influence of the wiring impedance etc, if the capacitor becomes far from IC. Please examine the capacitor between SPVM and PGND to arrange it near IC.

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