

译文

TB62210FNG

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TOSHIBA CORPORATION

Semiconductor & Storage Products Company

东芝 BiCD 单晶硅集成电路

TB62210FNG

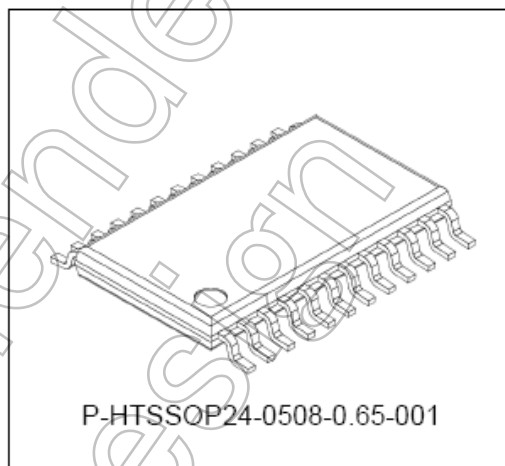
采用 BiCD 工艺的恒流两相双极步进马达驱动器集成电路

TB62210FNG 是一种使用 PWM 斩波的两相双极步进电机驱动器，采用 BiCD 工艺制作，额定功率为 40V/1.0A。

片上电压稳压器可以实现对带有单个 V_M 电源的步进马达进行控制。

特性

- 双极步进马达驱动器
- PWM 控制恒流驱动
- 相控制
- 能进行两相、1-2 相和 W1-2 相励磁
- BiCD 工艺：用双扩散金属氧化物半导体场效应晶体管（DMOS FET）作为输出功率晶体管。
- 高压和强电流：40V/1.0A（极限参数）
- 热关断（TSD）、过流保护（ISD）和上电复位（PORs）
- 封装：P-HTSSOP24-0508-0.65-001

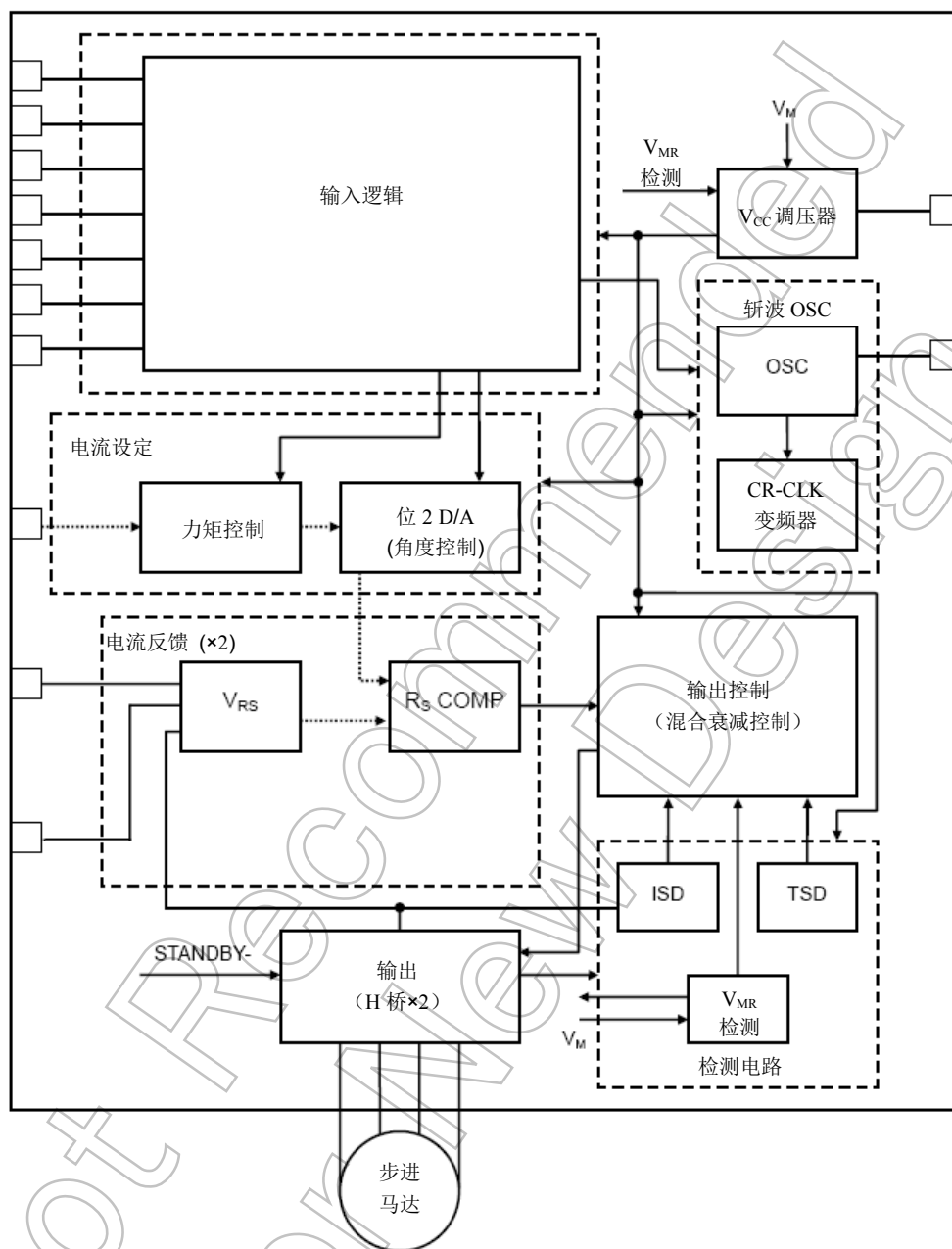


重量：0.1g（典型值）

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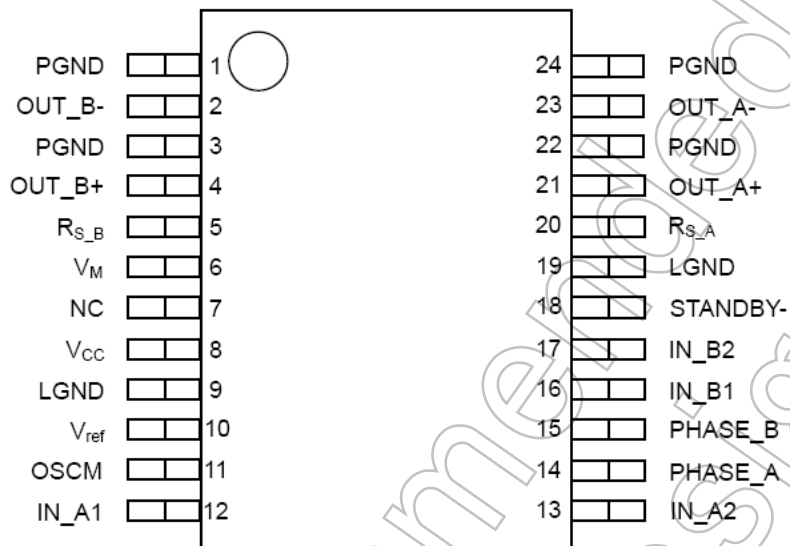
方框图



方块图中的功能块/电路/常量为了便于说明做了省略或简化。

引脚分配

(顶视图)



引脚功能

本表为端子 1~24 号的功能说明。

引脚编号	引脚名称	功能
1	PGND	电机电源地线
2	OUT_B-	B相负驱动器输出
3	PGND	电机电源地线
4	OUT_B+	B相正驱动器输出
5	RS_B	B相电机线圈电流感应
6	V _M	电机电源
7	NC	无连接
8	V _{CC}	逻辑电源平滑滤波器
9	LGND	逻辑接地
10	V _{ref}	调节电机驱动器的电流强度
11	OSCM	PWM斩波振荡器
12	IN_A1	A相励磁控制输入
13	IN_A2	A相励磁控制输入
14	PHASE_A	A相电流方向信号输入
15	PHASE_B	B相电流方向信号输入
16	IN_B1	B相励磁控制输入
17	IN_B2	B相励磁控制输入
18	STANDBY-	输出；关断OSCM后进入低功耗模式
19	LGND	逻辑接地
20	RS_A	A相电机线圈电流感应
21	OUT_A+	A相正驱动器输出
22	PGND	电机电源地线
23	OUT_A-	A相负驱动器输出
24	PGND	电机电源地线

输出功能

操作说明

输入			输出		
PHASE_A, PHASE_B	IN_A1 IN_B1	IN_A2 IN_B2	OUT_A+ OUT_B+	OUT_A- OUT_B-	I _{OUT}
H	H	H	H	L	100%
	H	L	H	L	71%
	L	H	H	L	38%
	L	L	输出关断	输出关断	0%
L	H	H	L	H	-100%
	H	L	L	H	-71%
	L	H	L	H	-38%
	L	L	输出关断	输出关断	0%

极限参数 ($T_a = 25^{\circ}\text{C}$)

特征	符号	额定值	单位
马达电源	V_M	40	V
马达输出电压	V_{OUT}	40	V
马达输出电流	I_{OUT}	1.0	A
逻辑电源	V_{CC}	6.0	V
逻辑输入电压	V_{IN}	6.0	V
V_{ref} 基准电压	V_{ref}	5.0	V
功耗	P_D	3.125	W
工作温度	$T_{opr.}$	$-20 \sim 85$	$^{\circ}\text{C}$
贮存温度	T_{stg}	$-55 \sim 150$	$^{\circ}\text{C}$
结点温度	$T_{j(max)}$	150	$^{\circ}\text{C}$

工作范围 ($T_a = 0 \sim 85^{\circ}\text{C}$)

特征	符号	最小	典型	最大	单位
马达电源	V_M	10.0	24.0	38.0	V
马达输出电流	I_{OUT}	-	0.6	1.0	A
逻辑输入电压	$V_{IN(H)}$	2.0	-	5.5	V
	$V_{IN(L)}$	-0.4	-	1.0	V
斩波频率	f_{chop}	40	-	150	kHz
V_{ref} 基准电压	V_{ref}	GND	-	3.6	V
电流检测电阻电压	V_{RS}	0.0	± 1.0	± 1.5	V

电气特征 1 ($T_a = 25^\circ\text{C}$, $V_M = 24\text{ V}$, 除非另有说明)

特征		符号	测试条件	最小	典型	最大	单位
数字输入电压	高	$V_{\text{IN(H)}}$	数字输入引脚	2	3.3	5.5	V
	低	$V_{\text{IN(L)}}$	数字输入引脚	-0.4	-	1.0	V
输入滞后电压		$V_{\text{IN(HIS)}}$	数字输入引脚	100	200	300	mV
数字输入电流	高	$I_{\text{IN(H)}}$	测试中的数字输入管脚 $V_{\text{IN}} = 5\text{V}$	35	50	75	μA
	低	$I_{\text{IN(L)}}$	测试中的数字输入管脚 $V_{\text{IN}} = 0\text{V}$	-	-	1	μA
电流消耗		I_{M1}	输出管脚打开, 待机=低	-	2	3	mA
		I_{M2}	输出管脚打开, 待机=高	-	3.5	5	mA
		I_{M3}	输出开启 (两相励磁)	-	5	7	mA
输出泄漏电流	高侧	I_{OH}	$V_{\text{RS}} = V_M = 40\text{V}$, $V_{\text{OUT}} = 0\text{V}$	-	-	2	μA
	低侧	I_{OL}	$V_{\text{RS}} = V_M = V_{\text{OUT}} = 40\text{V}$	2	-	-	μA
通道之间的电流差		ΔI_{OUT1}	通道之间的误差	-5	0	5	%
输出电流相对于预定值的误差		ΔI_{OUT2}	$I_{\text{OUT}} = 1.0\text{A}$	-7	0	7	%
R_S 引脚电流		I_{RS}	$V_{\text{RS}} = V_M = 24\text{V}$	0	-	10	μA
输出晶体管的漏源导通电阻 (上下之和)		$R_{\text{ON(D-S)}}$	$I_{\text{OUT}} = 1.0\text{A}$, $T_j = 25^\circ\text{C}$	-	1.2	1.5	Ω

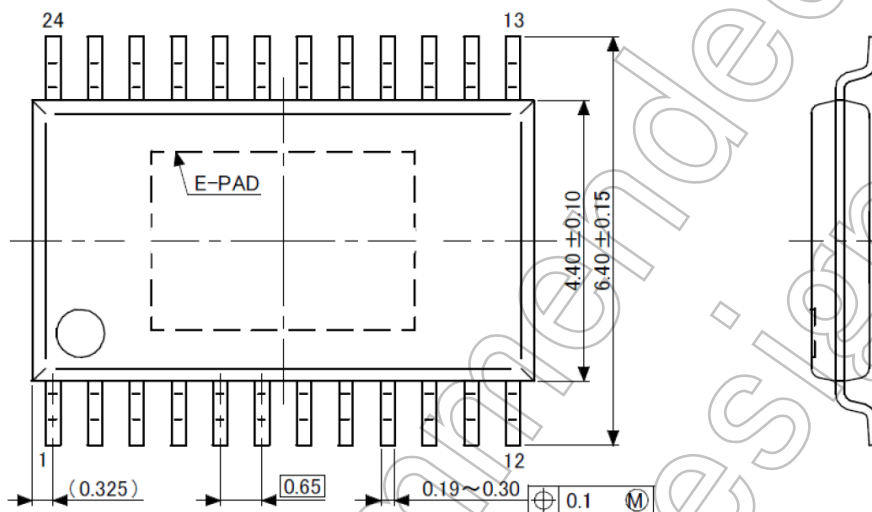
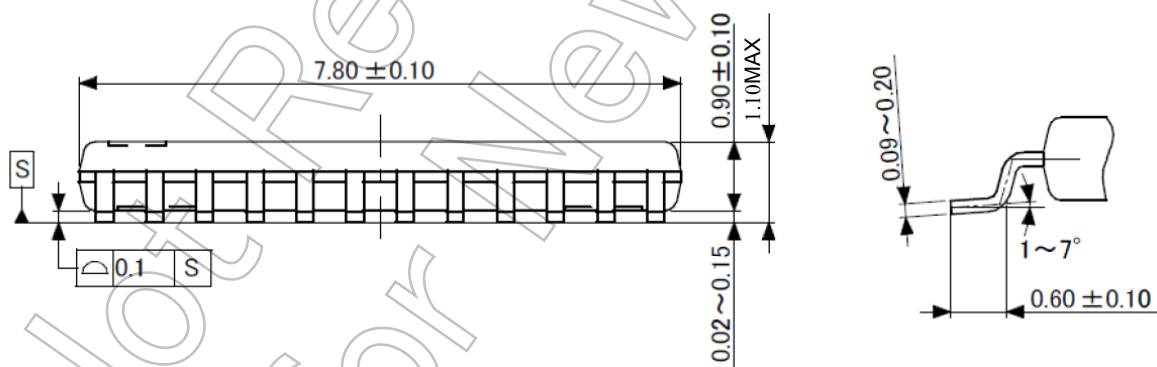
电气特征 2 ($T_a = 25^\circ\text{C}$, $V_M = 24\text{ V}$, 除非另有说明)

特征	符号	测试条件	最小	典型	最大	单位
V_{ref} 输入电流	I_{ref}	$V_{\text{ref}} = 3.0\text{V}$	-	0	1	μA
V_{ref} 衰减率	$V_{\text{ref}} (\text{gain})$	$V_{\text{ref}} = 2.0\text{V}$	1/4.8	1/5.0	1/5.2	-
TSD阈值	$T_j\text{TSD}$	-	140	150	170	$^\circ\text{C}$
V_M 恢复电压	V_{MR}	-	7.0	8.0	9.0	V
内部电路电源电压	V_{CC}	$I_{\text{CC}} = 5.0\text{ mA}$	4.75	5.00	5.25	V

封装尺寸

P-HTSSOP24-0508-0.65-001

单位: mm

散热片位于背面，尺寸为 $2.85\text{mm} \times 4.05\text{mm}$ 。

内容注意事项

方框图

出于解释目的，可能忽略或简化部分功能框、电路或常数。

集成电路使用注意事项

集成电路搬运注意事项

- (1) 一个半导体装置的绝对最大额定值是一组任何时候都严禁超过的额定值的集合。严禁超过这些额定值。

否则会造成装置击穿、损坏或退化，并因爆炸或燃烧而使人受伤。

- (2) 使用适当的电源保险丝，以确保在过电流和/或集成电路故障时不会持续流过大电流。当在超过绝对最大额定值的条件下使用，接线路径不对，或者在接线或负载处产生异常脉冲噪声而造成大电流持续通过时，集成电路会被完全击穿，并导致烟雾或起火。为了尽量减小击穿时大电流流过的影响，必须进行适当的设置，例如保险丝容量、熔断时间及插入电路的位置。

- (3) 若设计包括马达线圈等有感负荷，则应在设计中包含保护电路，防止上电时涌流产生的电流或者断电时反电动势产生的负电流造成装置故障或击穿。进而造成伤害、烟雾或起火。

应使用带集成电路的具有内置保护功能的稳定电源。若电源不稳定，保护功能可能不工作而造成集成电路击穿，进而造成伤害、烟雾或起火。

- (4) 严禁装置插错方向或插入错误。

保证电源的正负极端子接线正确。

否则电流消耗或功耗会超过绝对最大额定值而造成装置击穿、损坏或变坏，并因爆炸或燃烧而使人受伤。

此外，严禁使用插错方向或插入错误的任何装置，哪怕对其施加电流只有一次。

- (5) 小心选择外部元件（如输入和负反馈电容器）和负载组件（如扬声器），例如功率放大器和稳压器。

若输入或负反馈电容器等发生大量漏电，集成电路输出的直流电压就会增加。如果输出电压连接到带低输入耐压的扬声器，过电流或集成电路故障可能导致冒烟或着火。（过电流可能导致集成电路本身冒烟或点火。）当使用将输出直流电压直接输入扬声器的桥接式负载（BTL）连接类集成电路时，应特别注意。

集成电路搬运要点

过流检测电路

过电流检测电路（简称为电流限制器电路）不一定在所有情况下保护晶片。如果过电流检测电路的运行方向与过电流相反，则立即清除过电流状态。

根据用途和使用条件，如超过绝对最大额定值，可以导致过电流检测电路运行不正常或操作前集成电路故障。此外，视使用方法及使用条件而定，若在工作后过电流继续长时间流过，集成电路会发热而造成击穿。

过热关机电路

过热关机电路不一定能在所有情况下对集成电路进行保护。若过热关机电路在超温下工作，应立即消除发热状况。

视使用方法及使用条件而定，超过绝对最大额定值会造成过热关机电路不能正常工作或者造成集成电路在工作前击穿。

散热设计

在使用大电流集成电路时（例如，功率放大器，调节器或驱动器），请设计适当的散热装置，保证在任何时间和情况下不会超过规定的接点温度（TJ）。这些集成电路甚至在正常使用时会发热。对于集成电路散热不足的设计，会造成集成电路特性变差或击穿。此外，在设计装置时，请考虑集成电路散热对外围部件的影响。

反电动势

当马达突然反转、停止或放慢时，由于反电动势的影响，电流会回流到马达电源。若电源的电流吸收能力小，装置的马达电源和输出引脚就会存在超过绝对最大额定值的风险。为了避免出现这种问题，在系统设计中应考虑反电动势的影响。

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