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FAIRCHILD SEMICONDUCTOR®

2013 年 11 月

FAN73711
大电流高侧栅极驱动 IC

产品特性

- 浮动通道可实现高达 +600V 的自举运行
- 4 A / 4 A 的源电流 / 灌电流驱动能力
- 共模 dv/dt 噪声消除电路
- 兼容 3.3V 和 5V 逻辑输入电平
- 输出与输入信号同相
- V_{BS} 欠压锁定
- V_{DD} 和 V_{BS} 上的内置分流稳压器
- 8 引脚小尺寸封装 (SOP)

应用

- 高速栅极驱动器
- PDP 应用中维持放电开关驱动器
- PDP 应用中能量恢复电路开关驱动器
- 大功率降压转换器
- 电机驱动逆变器

说明

FAN73711 是单片高侧栅极驱动 IC，可以驱动工作电压最高达 +600V 的高速 MOSFET 和 IGBT。它具有缓冲输出级，且所有 NMOS 晶体管设计为具有高脉冲电流驱动能力和最低交叠导通。

飞兆的高压工艺和共模噪声消除技术 s 可使高侧驱动器在高 dv/dt 噪声环境下稳定运行。先进的电平转换电路，能使高侧栅极驱动器的工作电压在 V_{BS}=15V 时高达 V_S=-9.8 V （典型值）。UVLO 电路可防止 V_{BS} 低于指定阈值电压时发生故障。

大电流和低输出压降功能使得此器件适合作为等离子显示板的维持放电和能量恢复电路开关驱动器、电机驱动逆变器、开关电源和大功率 DC-DC 转换器应用中的。

8-SOP

订购信息

器件编号	工作温度范围	封装	封装方法
FAN73711MX	-40°C ~ 125°C	8-SOP	卷带和卷盘

典型应用电路图

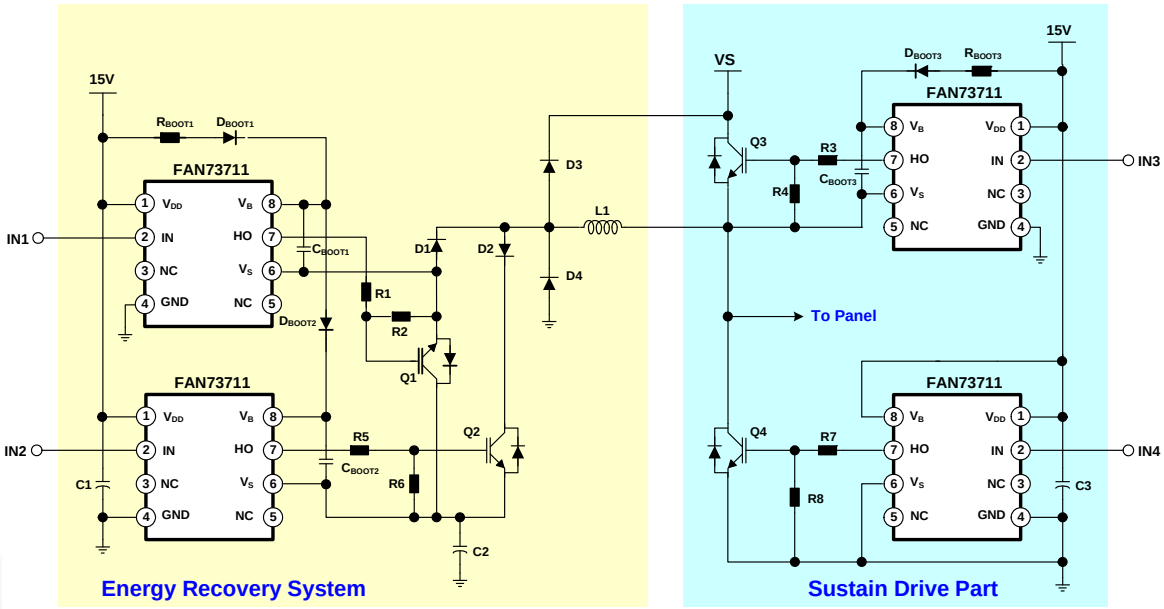

图 1. 浮动双向开关和半桥驱动器：PDP 应用

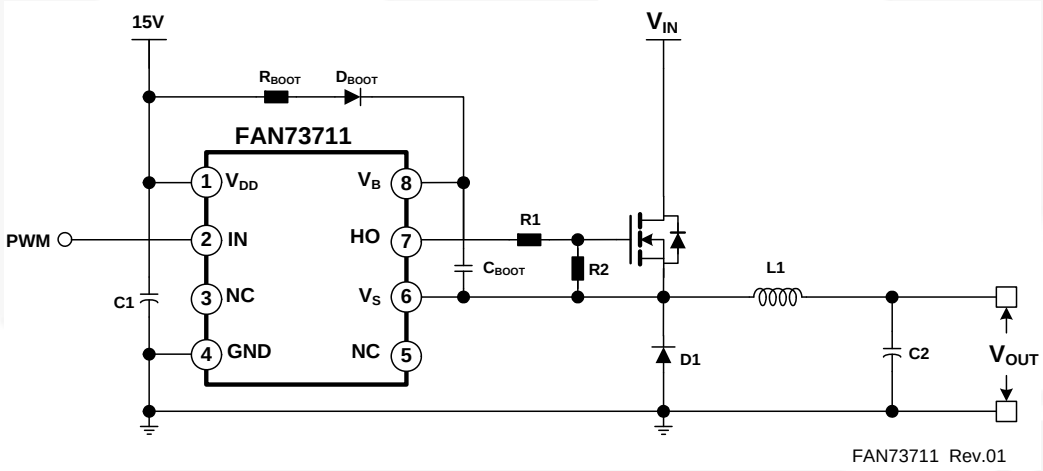

图 2. 降压式 （Buck） DC-DC 转换器应用

内部框图

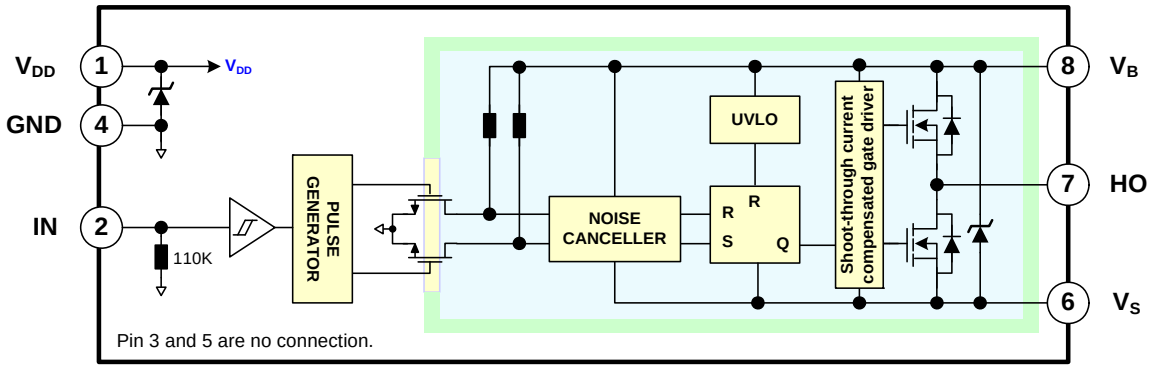

图 3. 功能性框图

引脚布局

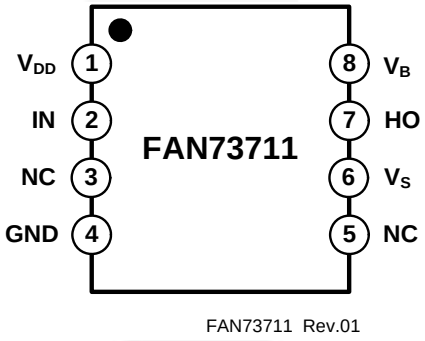

图 4. 引脚布局 （顶视图）

引脚说明

引脚号	名称	说明
1	V_{DD}	电源电压
2	IN	高侧栅极驱动器输出的逻辑输入
3	NC	无连接
4	GND	接地
5	NC	无连接
6	V_S	高侧浮动电源电压返回
7	HO	高侧驱动输出
8	V_B	高侧浮动电源

绝对最大额定值

应力超过绝对最大额定值，可能会损坏设备。在超出推荐的工作条件的情况下，该器件可能无法正常运行或操作，且不建议让器件在这些条件下长期工作。此外，长期工作在在高于推荐的工作条件下工作，会影响器件的可靠性。绝对最大额定值仅是额定应力值。 T_A=25°C，除非另有规定。

符号	特性	最小值	最大值	单位
V_S	高侧浮动偏 O 置电压 (1)	V_B-V_{SHUNT}	V_B+0.3	V
V_B	高侧浮动电源电压	-0.3	625.0	V
V_{HO}	高侧浮动输出电压	V_S-0.3	V_B+0.3	V
V_{DD}	低侧和逻辑电源电压 (1)	-0.3	V_{SHUNT}	V
V_{IN}	逻辑输入电压	-0.3	V_{DD}+0.3	V
dV_S/dt	允许偏置电压变化速率		± 50	V/ns
P_D	功耗 (2, 3, 4)		0.625	W
θ_{JA}	热阻		200	°C/W
T_J	结温	-55	+150	°C
T_{STG}	存储温度	-55	+150	°C

注意：

1. 此IC包含V_{DD}和V_{BS}的电压调节器。此电源引脚不得被大于在“电气特性”部分指定的 V_{SHUNT}的低阻抗电压源驱动。
2. 安装在 76.2 x 114.3 x 1.6mm PCB 板上 (FR-4 环氧玻璃材料)。
3. 请查阅以下标准：
   JESD51-2：集成电路热测试方法环境条件、自然对流和
   JESD51-3：含铅表面贴装封装的低有效导热系数测试板。
4. 任何环境下，都请勿超过功耗 (P_D)。

推荐工作条件

推荐的工作条件表明确了器件的真实工作条件。指定推荐的工作条件，以确保设备的最佳性能达到数据表中的规格。飞兆不建议超出额定或依照绝对最大额定值进行设计。

符号	参数	最小值	最大值	单位
V_B	高侧浮动电源电压	V_S+10	V_S+20	V
V_S	高侧浮动电源偏置电压	6-V_{DD}	600	V
V_{HO}	高侧输出电压	V_S	V_B	V
V_{IN}	逻辑输入电压	GND	V_{DD}	V
V_{DD}	电源电压	10	20	V
T_A	工作环境温度	-40	+125	°C

电气特性

$V_{偏压}$ (V_{DD}, V_{BS}) = 15.0V 且 T_A = 25°C，除非另有规定。V_{IN} 和 I_{IN} 参数以 GND 为参考点。V_O 和 I_O 参数是以 V_S 为参考，且适用于输出 HO。

符号	特性	测试条件	最小值	典型值	最大值	单位
电源部分						
I_{QDD}	静态 V_{DD} 电源电流	V_{IN}=0 V 或 5 V		25	70	µA
I_{PDD}	工作 V_{DD} 电源电流	f_{IN}=20 kHz，无负载		35	100	µA
自举电源部分						
V_{BSUV+}	V_{BS} 电源欠压正向阈值电压	V_{BS} 扫描	8.0	9.0	10.0	V
V_{BSUV-}	V_{BS} 电源欠压负向阈值电压	V_{BS} 扫描	7.3	8.3	9.3	V
V_{BSHYS}	V_{BS} 电源欠压锁定滞回电压回差	V_{BS} 扫描		0.7		V
I_{LK}	偏置电源的漏电流	V_B=V_S=625 V			10	µA
I_{QBS}	静态 V_{BS} 电源电流	V_{IN}=0V 或 5 V		60	120	µA
I_{PBS}	工作 V_{BS} 电源电流	C_{LOAD}=1000 pF，f_{IN}=20 kHz，均方跟值		470	800	µA
电压调节器部分						
V_{SHUNT}	V_{DD} 和 V_{BS} 电压调节器箝位电压	V_{DD} 扫描或 V_{BS} 扫描 I_{SHUNT}=5 mA	21	23	25	V
输入逻辑部分						
V_{IH}	逻辑 “1” 输入电压		2.5			V
V_{IL}	逻辑 “0” 输入电压				0.8	V
I_{IN+}	逻辑输入高偏压电流	V_{IN}=5 V		40	65	µA
I_{IN-}	逻辑输入低偏压电流	V_{IN}=0 V			2	µA
R_{IN}	输入下拉电阻		90	110		KΩ
栅极驱动器输出部分						
V_{OH}	高电平输出电压 (V_{BIAS} - V_O)	无负载			1.2	V
V_{OL}	低电平输出电压	无负载			30	mV
I_{O+}	输出高，短路脉冲电流 t[5]	V_{HO}=0 V, V_{IN}=5 V, PW ≤10 µs	3	4		A
I_{O-}	输出低，短路脉冲电流 t[5]	V_{HO}=15 V,V_{IN}=0 V, PW ≤10 µs	3	4		A
V_S	IN 信号传播到 HO 时允许的 VS 引脚负电压			-9.8	-7.0	V

注意：

5. 这些参数由设计保证。

动态电气特性

V_{DD}=V_{BS}=15 V， GND=0 V， C_{LOAD}=1000 pF， T_A=25°C，除非另有规定。

符号	参数	工作条件	最小值	典型值	最大值	单位
t_{ON}	导通传播延时	V_S=0 V		150	210	ns
t_{OFF}	关断传播延时	V_S=0 V		150	210	ns
t_r	导通上升时间			25	50	ns
t_f	关断下降时间			15	40	ns

典型特征

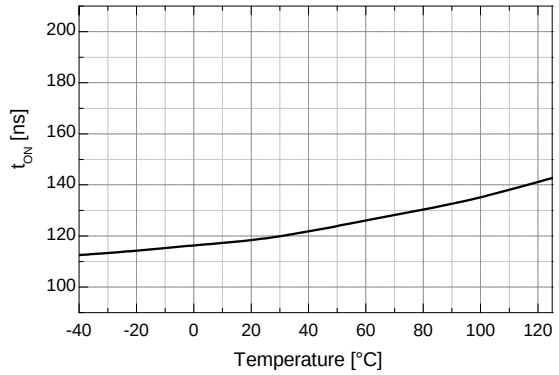

图 5. 导通传播延时
与温度的关系

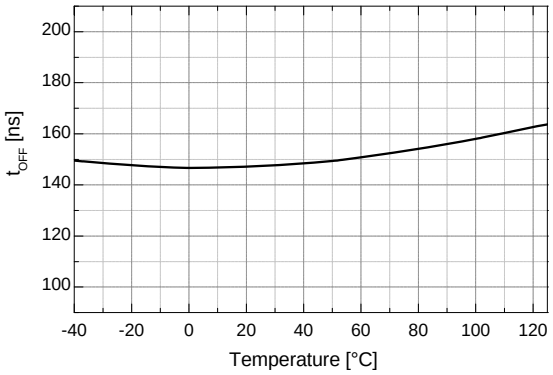

图 6. 关断传播延时
与温度的关系

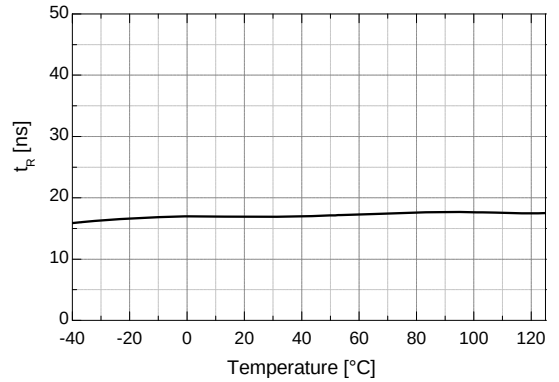

图 7. 导通上升时间
与温度的关系

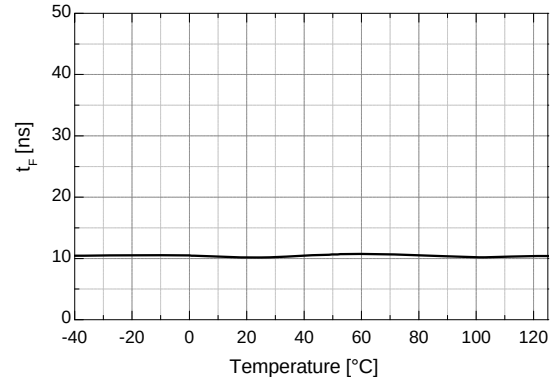

图 8. 关断下降时间
与温度的关系

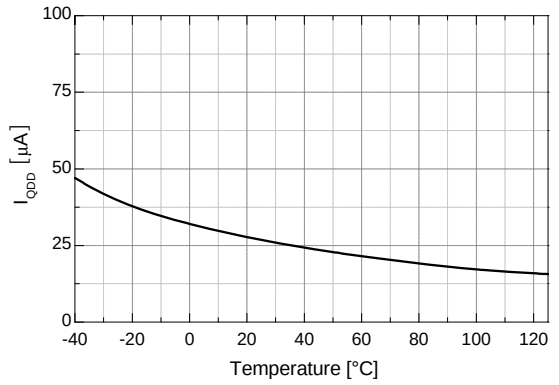

图 9. 静态 V_{DD} 电源电流
与温度的关系

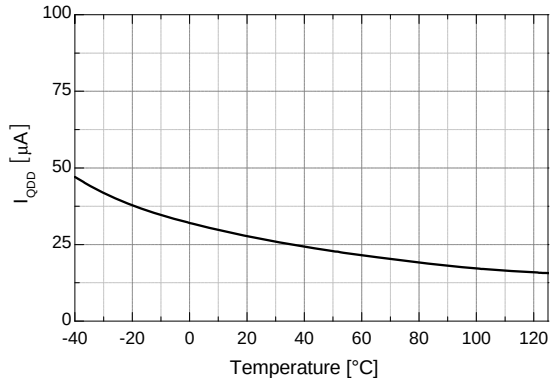

图 10. 静态 V_{BS} 电源电流
与温度的关系

典型特性 （续）

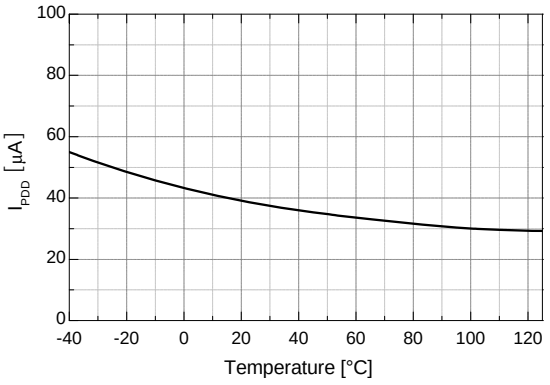

图 11. 工作 V_{DD} 电源电流与温度的关系

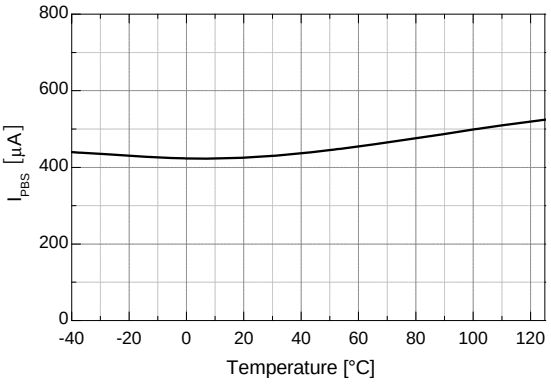

图 12. 工作 V_{BS} 电源电流与温度的关系

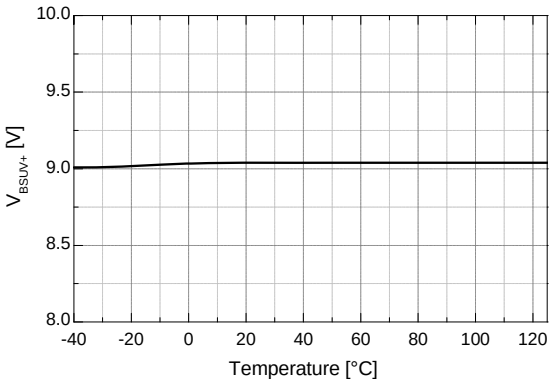

图 13. V_{BS} UVLO+ 与温度的关系

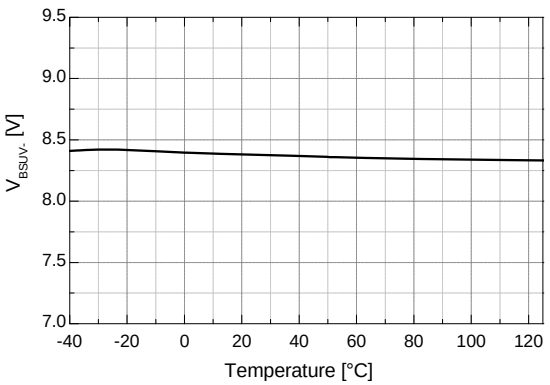

图 14.V_{BS} UVLO- 与温度的关系

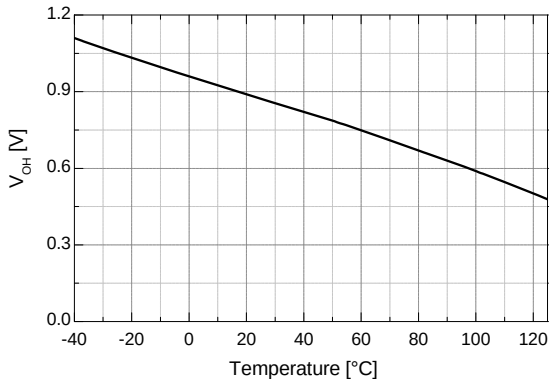

图 15. 高电平输出电压与温度的关系

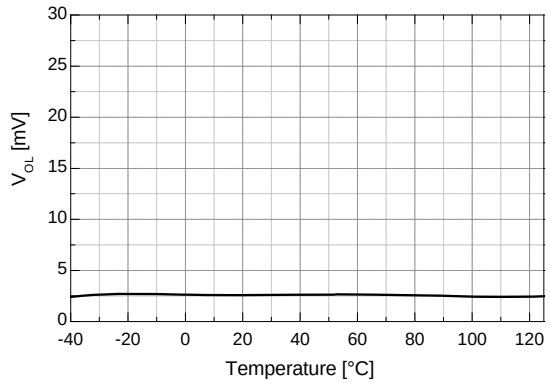

图 16. 低电平输出电压与温度的关系

典型特性 （续）

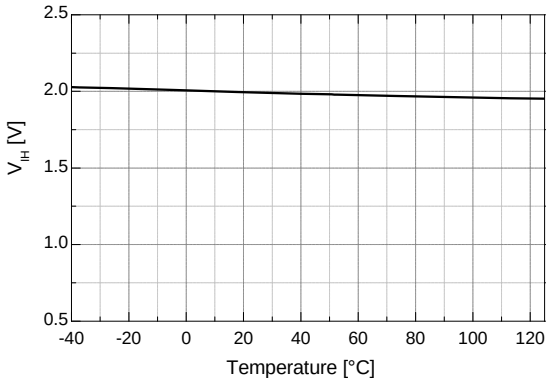

图 17. 逻辑高输入电压与温度的关系

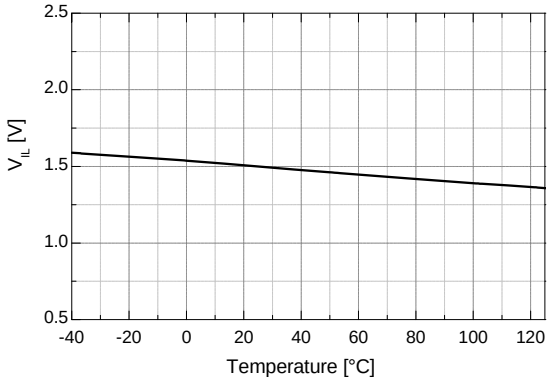

图 18. 逻辑低输入电压与温度的关系

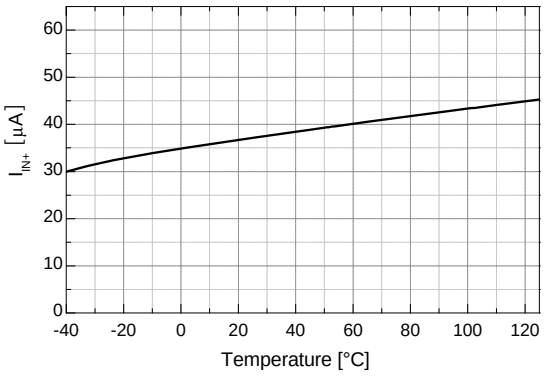

图 19. 逻辑输入高偏压电流与温度的关系

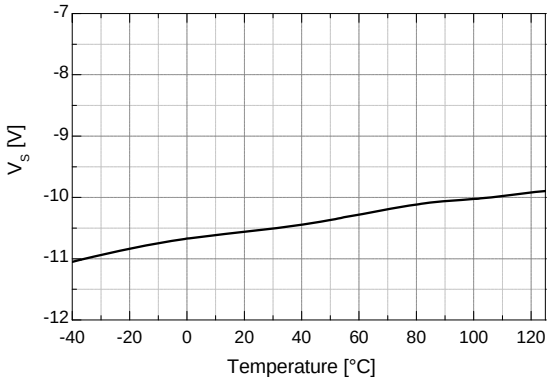

图 20. 容许的负 V_S 电压与温度的关系

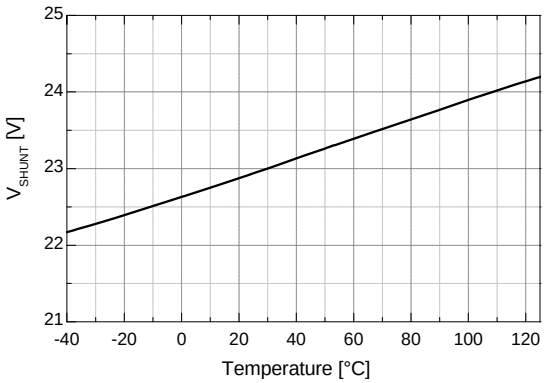

图 21. 电压调节器箝位电压与温度的关系

开关时间定义

时序图

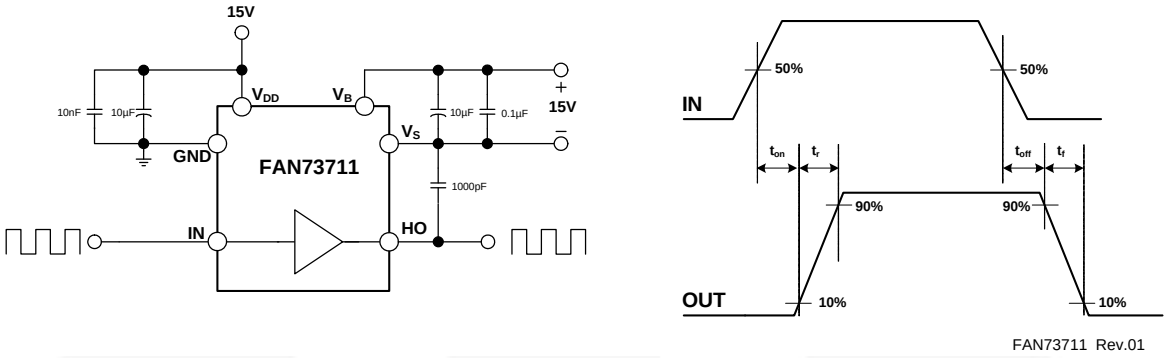

图 22. 开关时间测试电路和波形定义

封装尺寸

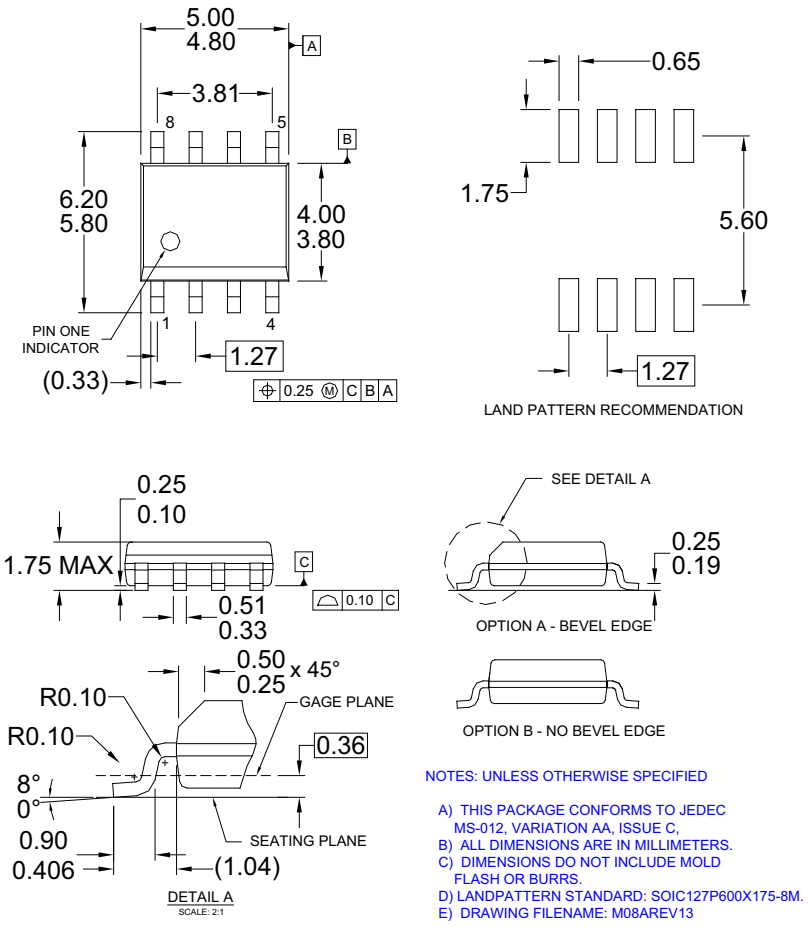

图 23. 8- 引脚小尺寸封装 (SOP)

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1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I64

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