



DRV10866 5V、三相无传感器、无刷直流 (BLDC) 电机驱动器

1 特性

- 输入电压范围：1.65V 至 5.5V
- 六个峰值输出电流为 680mA 的集成金属氧化物半导体场效应晶体管 (MOSFET)
- 超低静态电流：待机模式下为 5 μ A（典型值）
- 总体驱动器 H+L R_{DSon} 900m Ω
- 无传感器私有 BMEF 控制系统配置
- 150° 整流
- 同步整流脉宽调制 (PWM) 操作
- 可选 FG 和 1/2 FG 开漏输出
- 15kHz 至 50kHz 的 PWM_{IN} 输入
- 锁定检测
- 电压浪涌保护
- 欠压闭锁 (UVLO)
- 热关断

2 应用范围

- 笔记本 CPU 风扇
- 游戏站 CPU 风扇
- ASIC 冷却风扇

3 说明

DRV10866 是一款具有集成功率金属氧化物半导体场效应晶体管 (MOSFET) 的三相无传感器电机驱动器，驱动电流峰值可达 680mA。DRV10866 专门针对低噪声和低外部元件数风扇电机驱动应用而设计。

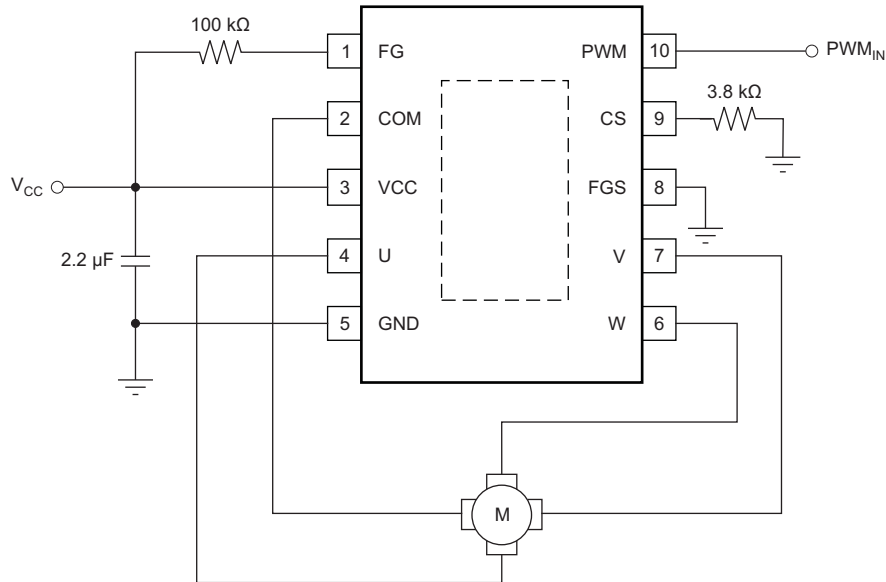
DRV10866 具有内置过电流保护，无需外部电流感测电阻。同步整流运行模式可提高电机驱动器应用的效率。DRV10866 通过开漏输出端输出 FG 或 1/2 FG 以指示电机速度。该器件实现了适合三相电机的 150° 无传感器反电动势 (BEMF) 控制方案。DRV10866 采用 10 引脚、3mm × 3mm × 0.75mm 高效散热型 SON (DSC) 封装。额定工作温度为 -40°C 至 125°C。

器件信息⁽¹⁾

器件型号	封装	封装尺寸（标称值）
DRV10866	WSO (10)	3.00mm x 3.00mm

(1) 要了解所有可用封装，请见数据表末尾的可订购产品附录。

DRV10866 典型应用



目录

1	特性	1	7.3	Feature Description	8
2	应用范围	1	7.4	Device Functional Modes	9
3	说明	1	8	Application and Implementation	10
4	修订历史记录	2	8.1	Application Information	10
5	Pin Configuration and Functions	3	8.2	Typical Application	10
6	Specifications	4	9	Power Supply Recommendations	14
6.1	Absolute Maximum Ratings	4	10	Layout	14
6.2	ESD Ratings	4	10.1	Layout Guidelines	14
6.3	Recommended Operating Conditions	4	10.2	Layout Example	14
6.4	Thermal Information	4	11	器件和文档支持	15
6.5	Electrical Characteristics	5	11.1	商标	15
6.6	Typical Characteristics	6	11.2	静电放电警告	15
7	Detailed Description	7	11.3	术语表	15
7.1	Overview	7	12	机械封装和可订购信息	15
7.2	Functional Block Diagram	7			

4 修订历史记录

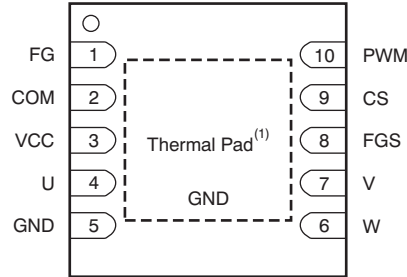
Changes from Original (November 2012) to Revision A

Page

- 已添加 引脚配置和功能部分, ESD 额定值表, 特性描述部分, 器件功能模式, 应用和实施部分, 电源相关建议部分, 布局部分, 器件和文档支持部分以及机械、封装和可订购信息部分..... **1**

5 Pin Configuration and Functions

**10-Pins WSON with Thermal Pad
DSC Package
Top View**



(1) Thermal pad connected to ground.

Pin Functions

PIN		I/O	DESCRIPTION
NAME	NO.		
COM	2	I	Motor common terminal input
CS	9	I	Overcurrent threshold setup pin. The constant current of the internal constant current source flows through the resistor connected to this pin. The other side of the resistor is connected to ground. The voltage across the resistor compares with the voltage converted from the bottom MOSFET current. If the MOSFET current is high, the part enters the overcurrent protection mode by turning off the top PWM MOSFET and holding the bottom MOSFET on. $I \text{ (mA)} = 3120/R_{CS}(\text{k}\Omega)$. Equation valid range: $300 \text{ mA} < I_{\text{LIMIT}} < 850 \text{ mA}$
FG	1	O	Frequency generator output. If the FGS pin is connected to ground, the output has a period equal to one electrical cycle (FG). If the FGS pin is connected to VCC, the output has a period equal to two electrical cycles (1/2FG).
FGS	8	I	FG and 1/2FG control pin. Latched upon wake-up signal from the PWM pin. For details, refer to Frequency Generator .
GND	5	—	Ground pin
PWM	10	I	PWM input pin. The PWM input signal is converted to a fixed 156-kHz switching frequency on the MOSFET driver. The PWM input signal resolution is less than 1%. This pin can also control the device and put it in or out of standby mode. After the signal at the PWM stays low (up to 500 μs), the device goes into low-power standby mode. Standby current is approximately 5 μA . The rising edge of the PWM signal wakes up the device and puts it into active mode, where it is ready to start to turn the motor.
U	4	O	Phase U output
V	7	O	Phase V output
VCC	3	I	Input voltage for motor and chip-supply voltage; the internal clamping circuit clamps the V_{CC} voltage.
W	6	O	Phase W output

6 Specifications

6.1 Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted).⁽¹⁾

		MIN	MAX	UNIT
Input voltage ⁽²⁾	VCC	−0.3	6.0	V
	CS, FGS, PWM	−0.3	6.0	V
	GND	−0.3	0.3	V
	COM	−1.0	6.0	V
Output voltage ⁽²⁾	U, V, W	−1.0	7.0	V
	FG	−0.3	6.0	V
Temperature	Operating junction temperature, T _J	−40	125	°C
	Storage temperature, T _{stg}	−55	150	°C

- (1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) All voltage values are with respect to network ground terminal unless otherwise noted.

6.2 ESD Ratings

		VALUE	UNIT
V _(ESD) Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	±4000	V
	Charged-device model (CDM), per JEDEC specification JESD22-C101 ⁽²⁾	±500	

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted).

		MIN	MAX	UNIT
Supply voltage	VCC	1.65	5.5	V
Voltage range	U, V, W	−0.7	6.5	V
	FG, CS, FGS, COM	−0.1	5.5	V
	GND	−0.1	0.1	V
	PWM	−0.1	5.5	V
Operating junction temperature, T _J		−40	125	°C

6.4 Thermal Information

THERMAL METRIC ⁽¹⁾		DRV10866	UNIT
		DSC (WSON)	
		10 PINS	
R _{θJA}	Junction-to-ambient thermal resistance	42.3	°C/W
R _{θJC(top)}	Junction-to-case (top) thermal resistance	44.5	
R _{θJB}	Junction-to-board thermal resistance	17.1	
Ψ _{JT}	Junction-to-top characterization parameter	0.3	
Ψ _{JB}	Junction-to-board characterization parameter	17.3	
R _{θJC(bot)}	Junction-to-case (bottom) thermal resistance	4.3	

- (1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report, [SPRA953](#).

6.5 Electrical Characteristics

Over operating free-air temperature range (unless otherwise noted).

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
SUPPLY CURRENT						
I _{VCC}	Supply current	T _A = +25°C; PWM = V _{CC} ; V _{CC} = 5 V		2.5	3.5	mA
I _{VCC-Standby}	Standby current	T _A = +25°C; PWM = 0 V; V _{CC} = 5 V		5	10	μA
UVLO						
V _{UVLO-Th_r}	UVLO threshold voltage, rising	Rise threshold, T _A = +25°C		1.80	1.9	V
V _{UVLO-Th_f}	UVLO threshold voltage, falling	Fall threshold, T _A = +25°C	1.6	1.65		V
V _{UVLO-Th_hys}	UVLO threshold voltage, hysteresis	T _A = +25°C	75	150	225	mV
INTEGRATED MOSFET						
R _{DS(on)}	Series resistance (H+L)	T _A = +25°C; V _{CC} = 5 V; I _O = 0.5 A		0.8	1.2	Ω
		T _A = +25°C; V _{CC} = 4 V; I _O = 0.5 A		0.9	1.4	
		T _A = +25°C; V _{CC} = 3 V; I _O = 0.5 A		1.1	1.7	
PWM						
V _{PWM-IH}	High-level input voltage	V _{CC} ≥ 4.5 V	2.3			V
V _{PWM-IL}	Low-level input voltage	V _{CC} ≥ 4.5 V			0.8	V
F _{PWM}	PWM input frequency		15		50	kHz
I _{PWM-Source}		Standby mode, V _{CC} = 5 V		5		μA
		Active mode, V _{CC} = 5 V		100		
T _{STBY}		PWM = 0		500		μs
FG AND FGS						
I _{FG-Sink}	FG pin sink current	V _{FG} = 0.3 V	5			mA
V _{FGS-Th}	FG set threshold voltage	FG pin output, full FG signal, V _{CC} ≥ 4.5 V			0.8	V
		FG pin output, one-half FG signal, V _{CC} ≥ 4.5 V	2.3			
LOCK PROTECTION						
T _{LOCK-On}	Lock detect time	FG = 0	2	3	4	s
T _{LOCK-Off}	Lock release time		2.5	5	7.5	s
CURRENT LIMIT						
	Current limit	CS pin to GND resistor = 3.9 kΩ	680	800	920	mA
THERMAL SHUTDOWN						
T _{SHDN}	Shutdown temperature threshold			160		°C
		Hysteresis		10		

6.6 Typical Characteristics

At $T_A = +25^\circ\text{C}$, with standard cooling fan, unless otherwise noted.

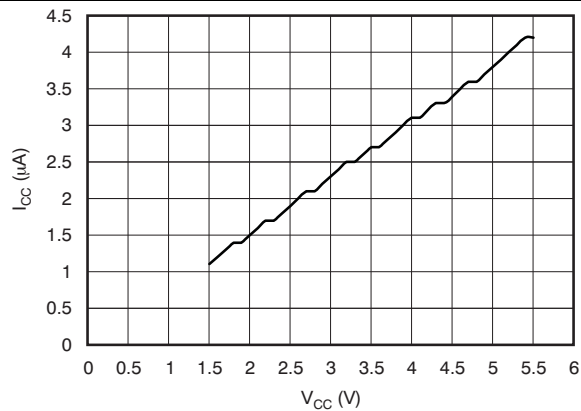


Figure 1. Standby Current vs Input Voltage

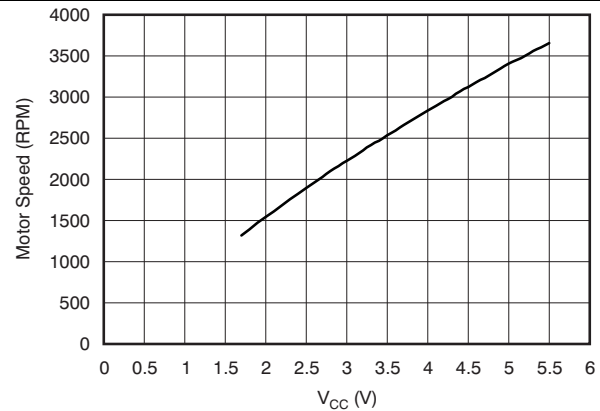


Figure 2. RPM vs Input Voltage

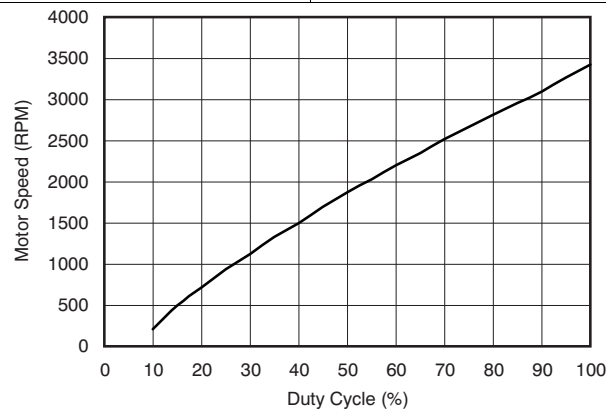


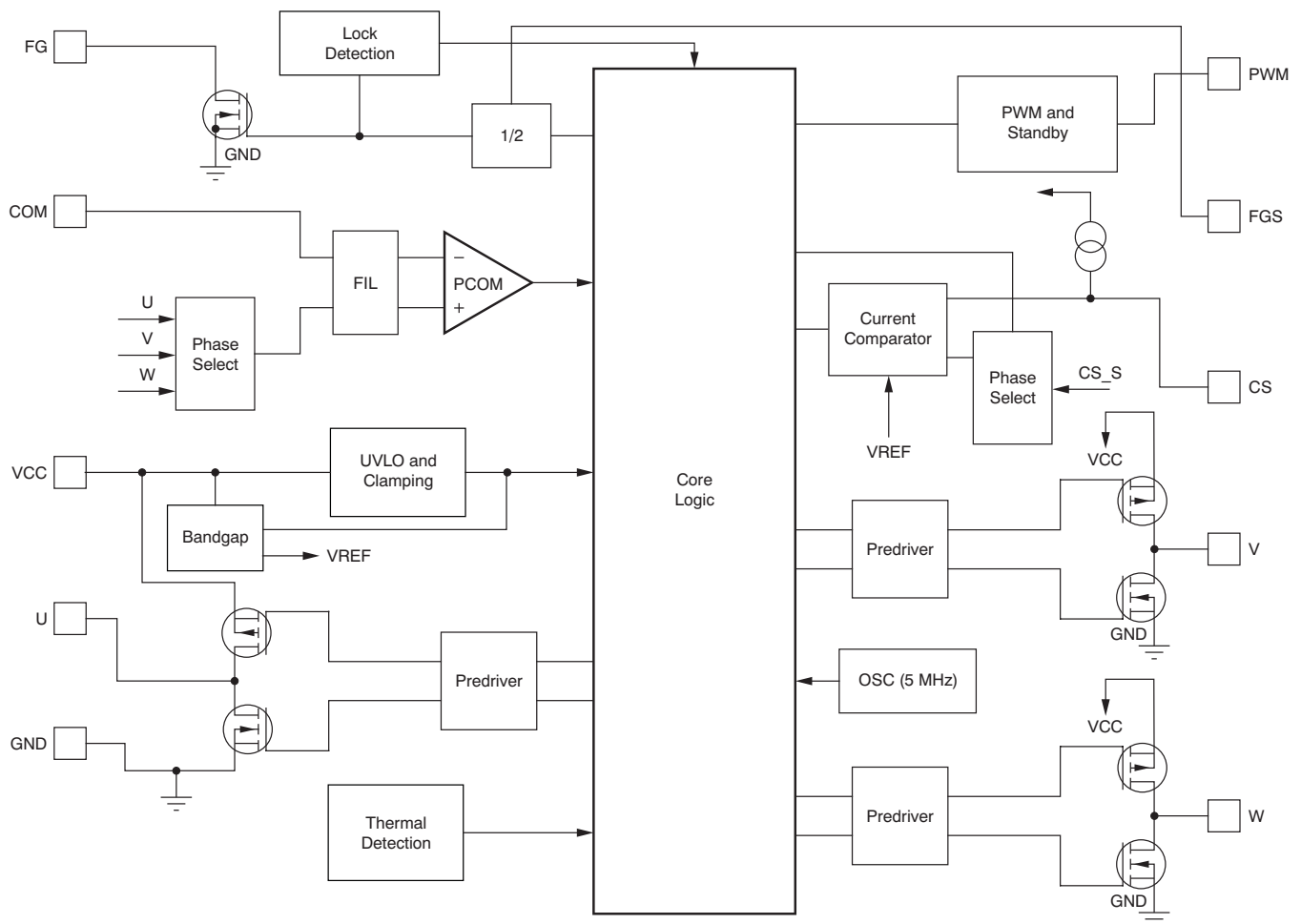
Figure 3. RPM vs Duty Cycle

7 Detailed Description

7.1 Overview

DRV10866 is a 3-phase, sensorless motor driver with integrated power MOSFETs with drive current capability up to 680-mA peak. DRV10866 is specifically designed for low noise, low external component count fan motor drive applications. DRV10866 has built-in overcurrent protection with no external current sense resistor needed. The synchronous rectification mode of operation achieves increased efficiency for motor driver applications. DRV10866 can output either FG or $\frac{1}{2}$ FG to indicate motor speed with open-drain output through FGS pin selection. A 150° sensorless BEMF control scheme is implemented for a 3-phase motor. Voltage surge protection scheme prevents input V_{CC} capacitor from over charge during motor acceleration and deceleration modes. DRV10866 has multiple built-in protection blocks including UVLO, overcurrent protection, lock protection and thermal shutdown protection.

7.2 Functional Block Diagram



7.3 Feature Description

7.3.1 Speed Control

DRV10866 can control motor speed through either the PWM_{IN} or V_{CC} pin. Motor speed will increase with higher PWM_{IN} duty cycle or V_{CC} input voltage. The curve of motor speed (RPM) vs PWM_{IN} duty cycle or V_{CC} input voltage is close to linear in most cases. However, motor characteristics will affect the linearity of this speed curve. DRV10866 can operate at very low V_{CC} input voltage down to 1.65 V. The PWM_{IN} pin is pulled up to V_{CC} internally and frequency range can vary from 15 kHz to 50 kHz. The motor driver MOSFETs will operate at constant switching frequency 156 kHz. With this high switching frequency, DRV10866 can eliminate audible noise and reduce the ripple of V_{CC} input voltage and current, and thus minimize EMI noise.

7.3.2 Frequency Generator

The FG pin outputs a 50% duty cycle of PWM waveform in the normal operation condition. The frequency of the FG signal represents the motor speed and phase information. The FG pin is an open-drain output, so an external pullup resistor is needed when connected to an external system. During the start-up, FG output will stay at high impedance until the motor speed reaches a certain level and BEMF is detected. During lock protection condition, FG output will remain high until the motor restarts and start-up process is completed. DRV10866 can output either FG or ½ FG to indicate motor status with open-drain output through FGS pin selection. When FGS is pulled to V_{CC}, the frequency of FG output is half of that when FGS is pulled to GND. Motor speed can be calculated based on the FG frequency when FGS is pulled to GND, which equals to:

$$\text{RPM} = \frac{(\text{FG} \times 60)}{\text{pole pairs}}$$

where

- FG is in hertz (Hz).

(1)

7.3.3 Lock Protection

If the motor is blocked or stopped by an external force, the lock protection is triggered after lock detection time. During lock detection time, the circuit monitors the PWM and FG signals. If PWM has an input signal while the FG output is in high impedance during this period, the lock protection will be enabled and DRV10866 will stop driving the motor. After lock release time, DRV10866 will resume driving the motor again. If the lock condition still exists, DRV10866 will proceed with the next lock protection cycle until the lock condition is removed. With this lock protection, the motor and device will not get over heated or be damaged.

7.3.4 Voltage Surge Protection

The DRV10866 has a unique feature to clamp the V_{CC} voltage during lock protection and standby mode. If the lock mode condition is caused by an external force that suddenly stops the motor at a high speed, or the device goes into standby mode from a high duty cycle, either situation releases the energy in the motor winding into the input capacitor. When a small input capacitor and anti-reverse diode are used in the system design, the input voltage of the IC could rise above the absolute voltage rate of the chip. This condition either destroys the device or reduces the reliability of the device. For this reason, the DRV10866 has a voltage clamp circuit that clamps the input voltage at 5.95 V, and has a hysteresis of 150 mV. This clamp circuit is only active during the lock protection cycle or when the device enters standby mode. It is disabled during normal operation.

7.3.5 Overcurrent Protection

The DRV10866 can adjust the overcurrent point through an external resistor connected to the CS pin (pin 9) and ground. Without this external current sense resistor, the DRV10866 senses the current through the power MOSFET. Therefore, there is no power loss during the current sensing. The current sense architecture improves the overall system efficiency. Shorting the CS pin to ground disables the overcurrent protection feature. During overcurrent protection, the DRV10866 only limits the current to the motor; it does not shut down the device. The overcurrent limit can be set by the value of current sensing resistor through [Equation 2](#).

$$I \text{ (A)} = \frac{3120}{R_{CS} \text{ (}\Omega\text{)}}$$

(2)

Feature Description (continued)

7.3.6 Undervoltage Lockout (UVLO)

The DRV10866 has a built-in UVLO function block. The hysteresis of UVLO threshold is 150 mV. The device will be locked out when V_{CC} reaches 1.65 V and woke up at 1.8 V.

7.3.7 Thermal Shutdown

The DRV10866 has a built-in thermal shunt down function, which will shut down the device when the junction temperature is over 160°C and will resume operating when the junction temperature drops back to 150°C.

7.4 Device Functional Modes

7.4.1 Start-up

At start-up with motor at standstill, commutation logic starts to drive the motor in open-loop with U-phase high, V-phase low, and the W-phase shut off. During open-loop start-up phase, commutation logic advance to next state automatically as per [Table 1](#) with duty cycle of 100% regardless of PWM input. At each state, commutation logic detects zero-crossing of back-emf at shut-off phase. Once motor reaches to sufficient speed to allow four consecutive successful back-emf zero-crossing, commutation logic switches to closed-loop operation mode as explained in next section.

In certain cases, the motor may have initial speed in forward direction when the device attempts to start-up the motor again. When this occurs, device commutation logic jumps over the open-loop start-up process and goes to closed loop directly. By re-synchronizing to the spinning motor, the user achieves the fastest possible start-up time for this initial condition.

7.4.2 Motor Running at Steady-State Speed

Once open-loop acceleration phase is over, motor steady state speed is determined by applied duty-cycle at PWM input. In this mode, communication logic steps through the six states mentioned in [Table 1](#) and next commutation state is determined by actual back-emf zero-crossing event at shut-off phase. Each state remains for 150°. This is an advanced trapezoidal method that allows the device to drive the phases gradually to the maximum current and gradually to 0. Commutation logic also provides the required 15° angle-advance from zero-crossing events to efficiently commute the motor.

For a given duty-cycle input, motor speed can be different depending upon the motor loading conditions. Device provides motor speed information at FG pin which can be used to achieve closed-loop speed control to get constant speed at varying load condition.

7.4.3 Motor Stopping

Motor can be decelerated gradually by slowly reducing the PWM duty command to avoid overvoltage at DC input. When the device is commanded to decelerate very fast or stop the motor suddenly from high speed, in order to protect the IC and the system, the DRV10866 goes into AVS protection, as explained in [Voltage Surge Protection](#).

Table 1. Commutation Table

COMMUTATION STATE	PHASE_U	PHASE_V	PHASE_W
State 1	High	Low	Off
State 2	High	Off	Low
State 3	Off	High	Low
State 4	Low	High	Off
State 5	Low	Off	High
State 6	Off	Low	High

8 Application and Implementation

NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

8.1 Application Information

DRV10866 only requires three external components. The device needs a 2.2- μ F or higher ceramic capacitor connected to VCC and ground for decoupling. During layout, the strategy of ground copper pour is very important to enhance the thermal performance. For two or more layers, use eight thermal vias. Refer to Layout Example for an example of the PCB layout. If there is no COM pin on the motor, one can be simulated. Use three resistors connected in a wye formation, one connected to U, one to V, and one to W. Connect the resistor ends opposite of the phases together. This center point is COM. To find the proper resistor value, start with a value of 10 k Ω and continue to decrease by 1 k Ω until the motor runs properly.

8.2 Typical Application

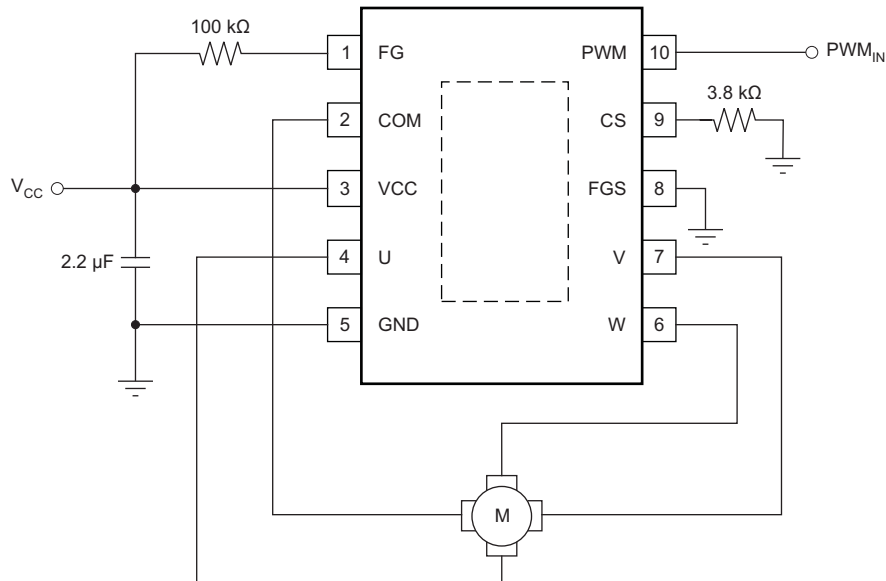


Figure 4. Typical Application Schematic

8.2.1 Design Requirements

For this design example, use the parameters listed in [Table 2](#) as the input parameters.

Table 2. Recommended Application Range

		MIN	TYP	MAX	UNIT
Motor voltage		1.6		5.5	V
VCC capacitor	Place as close to the pin as possible		2.2		μ F
Operating current	Running with normal load at rated speed			500	mA
Absolute max current	During start-up and locked motor condition			650	mA

8.2.2 Detailed Design Procedure

- Refer to the [Design Requirements](#) and ensure the system meets the recommended application range.
 - Ensure the VCC level is in between 1.6 and 5.5 V
 - Verify the motor needs no more than 500 mA during runtime.
- Follow the application and [Power Supply Recommendations](#) when constructing the schematic.
 - Make sure there is adequate capacitance on VCC.
 - Size the resistor on CS according to the details given in [Feature Description](#).
 - Use a pullup on FG.
 - If the motor doesn't have a common pin, create one using the method listed in [Application Information](#).
- Build the hardware according to the [Layout Guidelines](#).
- Test the system with the application's motor to verify proper operation.

8.2.3 Application Curves

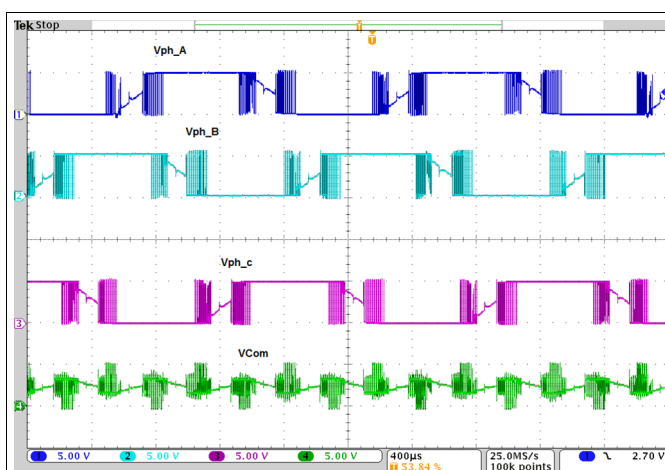


Figure 5. Normal Operation With Vcom at 5 V

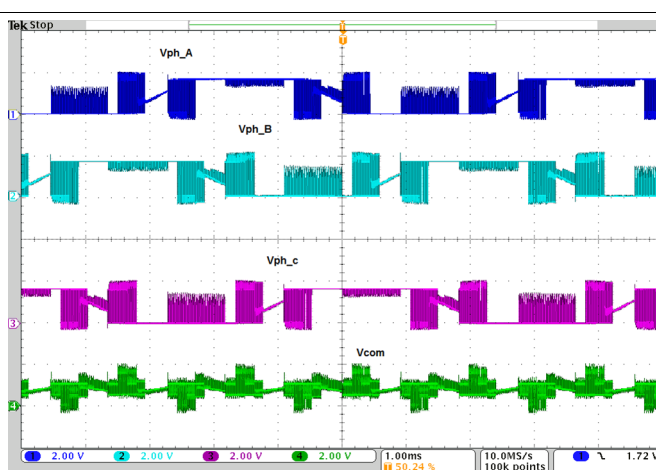


Figure 6. Normal Operation With Vcom at 1.65 V

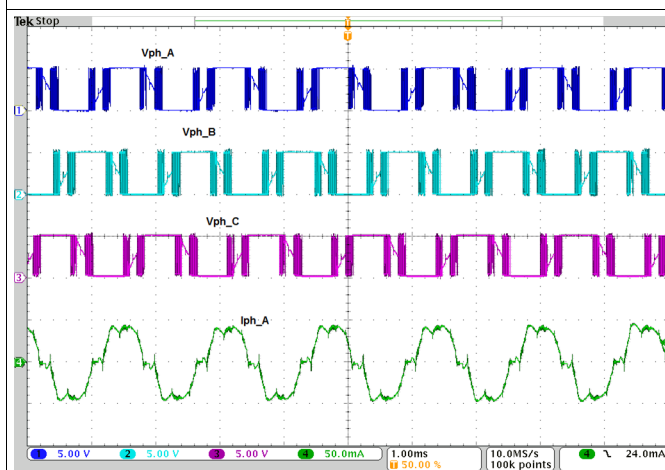


Figure 7. Normal Operation With 3-Phase Voltage and ph-A Current at 5 V

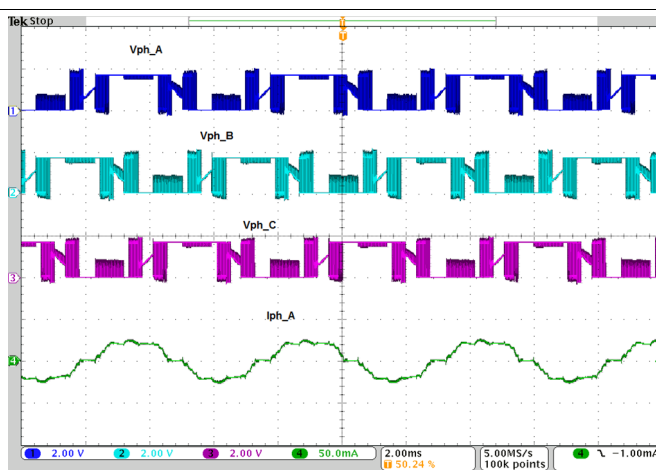


Figure 8. Normal Operation With 3-Phase Voltage and ph-A Current at 1.65 V

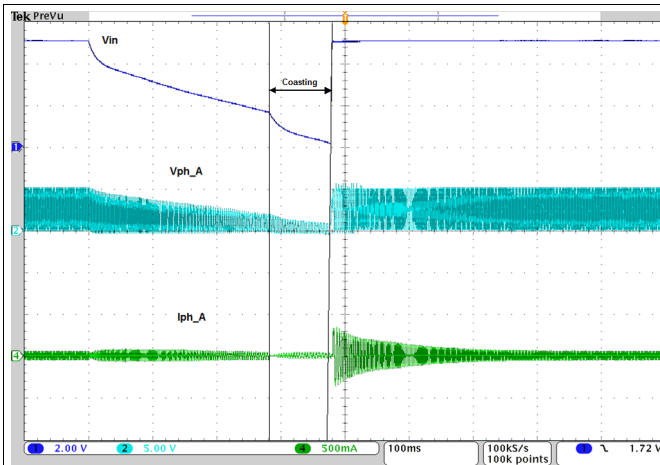


Figure 9. Re-Synchronizing to Spinning Motor During Power On-Off Cycle at 5 V

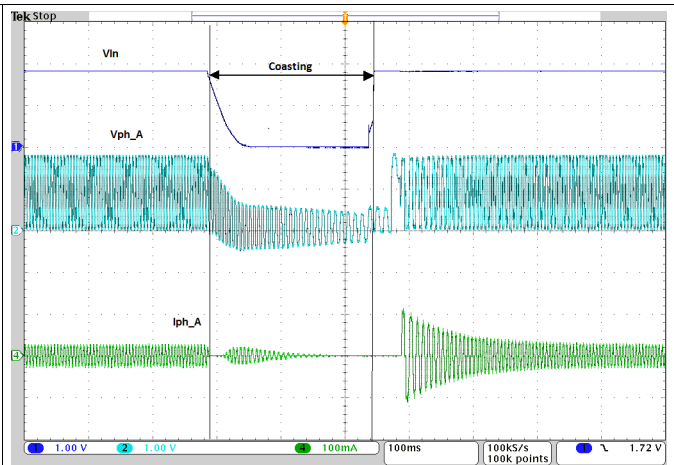


Figure 10. Re-Synchronizing to Spinning Motor During Power On-Off Cycle at 1.8 V

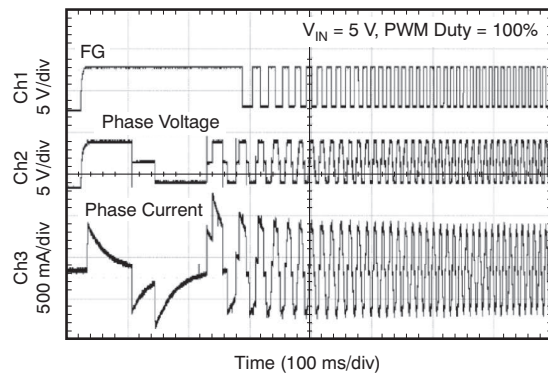


Figure 11. Start-Up at 100% Duty Cycle

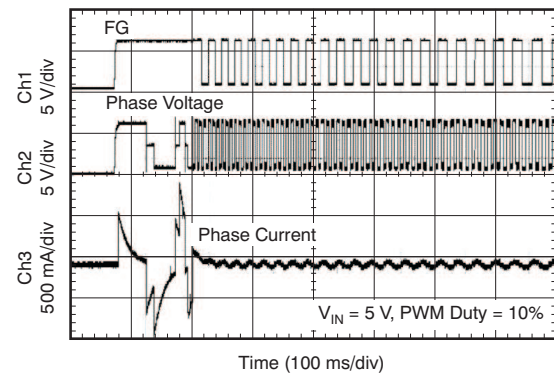


Figure 12. Start-Up at 10% Duty Cycle

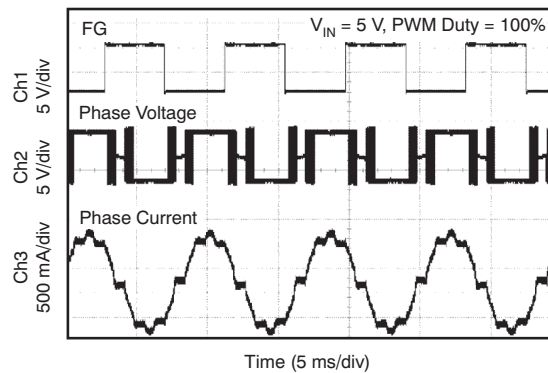


Figure 13. Normal Operation at 100% Duty Cycle

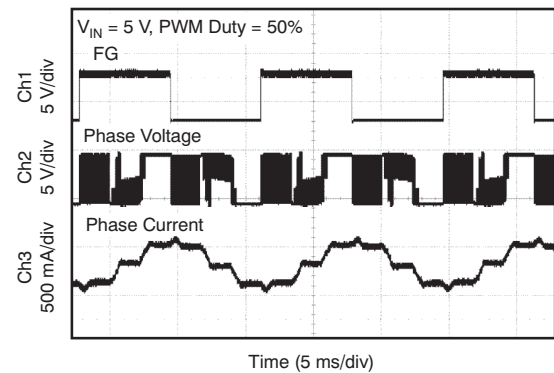


Figure 14. Normal Operation at 50% Duty Cycle

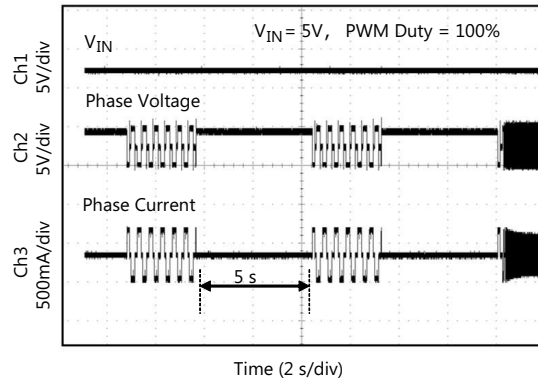


Figure 15. Lock Protection

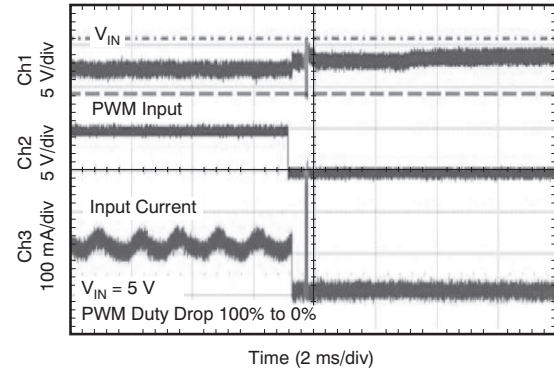


Figure 16. Clamp Voltage at Standby Mode

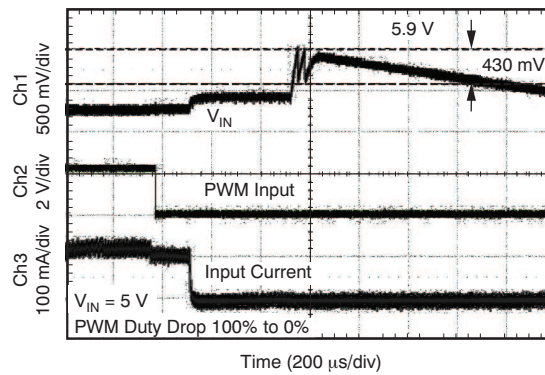


Figure 17. Clamp Voltage at Standby Mode Enlarged View

11 器件和文档支持

11.1 商标

All trademarks are the property of their respective owners.

11.2 静电放电警告



这些装置包含有限的内置 ESD 保护。存储或装卸时，应将导线一起截短或将装置放置于导电泡棉中，以防止 MOS 门极遭受静电损伤。

11.3 术语表

[SLYZ022](#) — *TI 术语表*。

这份术语表列出并解释术语、首字母缩略词和定义。

12 机械封装和可订购信息

以下页中包括机械封装和可订购信息。 这些信息是针对指定器件可提供的最新数据。 这些数据会在无通知且不对本文档进行修订的情况下发生改变。 欲获得该数据表的浏览器版本，请查阅左侧的导航栏。

重要声明

德州仪器(TI) 及其下属子公司有权根据 JESD46 最新标准, 对所提供的产品和服务进行更正、修改、增强、改进或其它更改, 并有权根据 JESD48 最新标准中止提供任何产品和服务。客户在下订单前应获取最新的相关信息, 并验证这些信息是否完整且是最新的。所有产品的销售都遵循在订单确认时所提供的TI 销售条款与条件。

TI 保证其所销售的组件的性能符合产品销售时 TI 半导体产品销售条件与条款的适用规范。仅在 TI 保证的范围内, 且 TI 认为 有必要时才会使用测试或其它质量控制技术。除非适用法律做出了硬性规定, 否则没有必要对每种组件的所有参数进行测试。

TI 对应用帮助或客户产品设计不承担任何义务。客户应对其使用 TI 组件的产品和应用自行负责。为尽量减小与客户产品和应用相关的风险, 客户应提供充分的设计与操作安全措施。

TI 不对任何 TI 专利权、版权、屏蔽作品权或其它与使用了 TI 组件或服务的组合设备、机器或流程相关的 TI 知识产权中授予 的直接或隐含权限作出任何保证或解释。TI 所发布的与第三方产品或服务有关的信息, 不能构成从 TI 获得使用这些产品或服务 的许可、授权、或认可。使用此类信息可能需要获得第三方的专利权或其它知识产权方面的许可, 或是 TI 的专利权或其它 知识产权方面的许可。

对于 TI 的产品手册或数据表中 TI 信息的重要部分, 仅在没有对内容进行任何篡改且带有相关授权、条件、限制和声明的情况 下才允许进行复制。TI 对此类篡改过的文件不承担任何责任或义务。复制第三方的信息可能需要服从额外的限制条件。

在转售 TI 组件或服务时, 如果对该组件或服务参数的陈述与 TI 标明的参数相比存在差异或虚假成分, 则会失去相关 TI 组件 或服务的所有明示或暗示授权, 且这是不正当的、欺诈性商业行为。TI 对任何此类虚假陈述均不承担任何责任或义务。

客户认可并同意, 尽管任何应用相关信息或支持仍可能由 TI 提供, 但他们将独力负责满足与其产品及其应用中使用的 TI 产品 相关的所有法律、法规和安全相关要求。客户声明并同意, 他们具备制定与实施安全措施所需的全部专业技术和知识, 可预见 故障的危险后果、监测故障及其后果、降低有可能造成人身伤害的故障的发生机率并采取适当的补救措施。客户将全额赔偿因 在此类安全关键应用中使用任何 TI 组件而对 TI 及其代理造成的任何损失。

在某些场合中, 为了推进安全相关应用有可能对 TI 组件进行特别的促销。TI 的目标是利用此类组件帮助客户设计和创立其特 有的可满足适用的功能安全性标准和要求的终端产品解决方案。尽管如此, 此类组件仍然服从这些条款。

TI 组件未获得用于 FDA Class III (或类似的生命攸关医疗设备) 的授权许可, 除非各方授权官员已经达成了专门管控此类使 用的特别协议。

只有那些 TI 特别注明属于军用等级或“增强型塑料”的 TI 组件才是设计或专门用于军事/航空应用或环境的。购买者认可并同 意, 对并非指定面向军事或航空航天用途的 TI 组件进行军事或航空航天方面的应用, 其风险由客户单独承担, 并且由客户独 力负责满足与此类使用相关的所有法律和法规要求。

TI 已明确指定符合 ISO/TS16949 要求的产品, 这些产品主要用于汽车。在任何情况下, 因使用非指定产品而无法达到 ISO/TS16949 要求, TI 不承担任何责任。

	产品		应用
数字音频	www.ti.com.cn/audio	通信与电信	www.ti.com.cn/telecom
放大器和线性器件	www.ti.com.cn/amplifiers	计算机及周边	www.ti.com.cn/computer
数据转换器	www.ti.com.cn/dataconverters	消费电子	www.ti.com.cn/consumer-apps
DLP® 产品	www.dlp.com	能源	www.ti.com.cn/energy
DSP - 数字信号处理器	www.ti.com.cn/dsp	工业应用	www.ti.com.cn/industrial
时钟和计时器	www.ti.com.cn/clockandtimers	医疗电子	www.ti.com.cn/medical
接口	www.ti.com.cn/interface	安防应用	www.ti.com.cn/security
逻辑	www.ti.com.cn/logic	汽车电子	www.ti.com.cn/automotive
电源管理	www.ti.com.cn/power	视频和影像	www.ti.com.cn/video
微控制器 (MCU)	www.ti.com.cn/microcontrollers		
RFID 系统	www.ti.com.cn/rfidsys		
OMAP应用处理器	www.ti.com.cn/omap		
无线连通性	www.ti.com.cn/wirelessconnectivity	德州仪器在线技术支持社区	www.deyisupport.com

邮寄地址: 上海市浦东新区世纪大道1568 号, 中建大厦32 楼邮政编码: 200122
Copyright © 2015, 德州仪器半导体技术(上海)有限公司

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
DRV10866DSCR	ACTIVE	WSO	DSC	10	3000	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	10866	Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

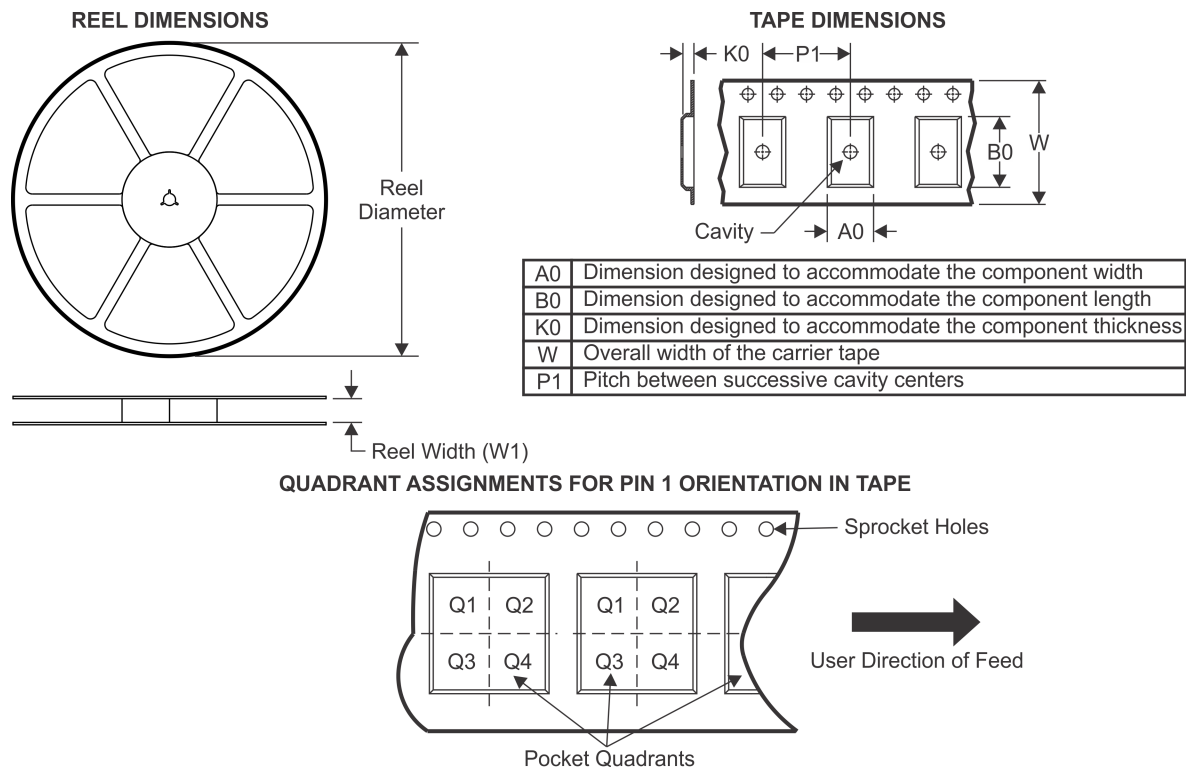
(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

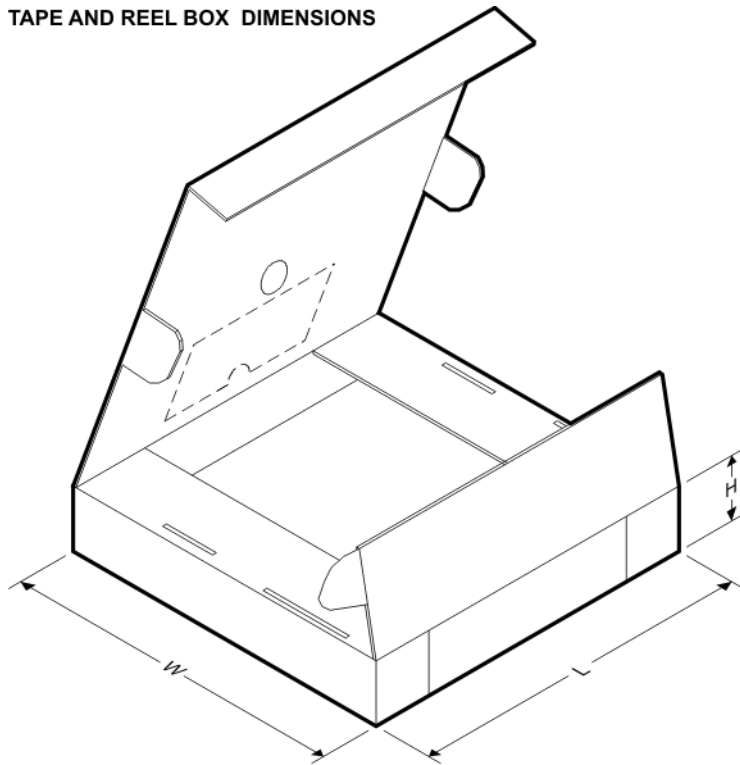
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION


*All dimensions are nominal

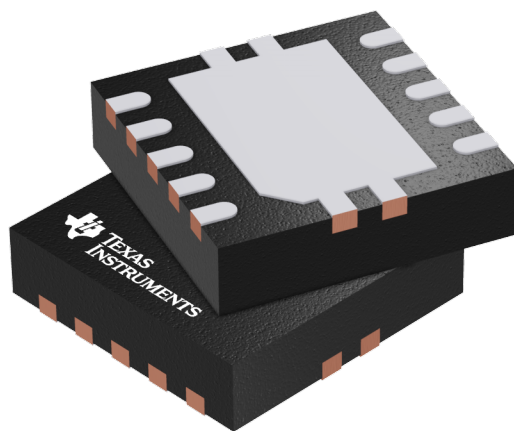
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
DRV10866DSCR	WSON	DSC	10	3000	330.0	12.4	3.3	3.3	1.1	8.0	12.0	Q2

TAPE AND REEL BOX DIMENSIONS

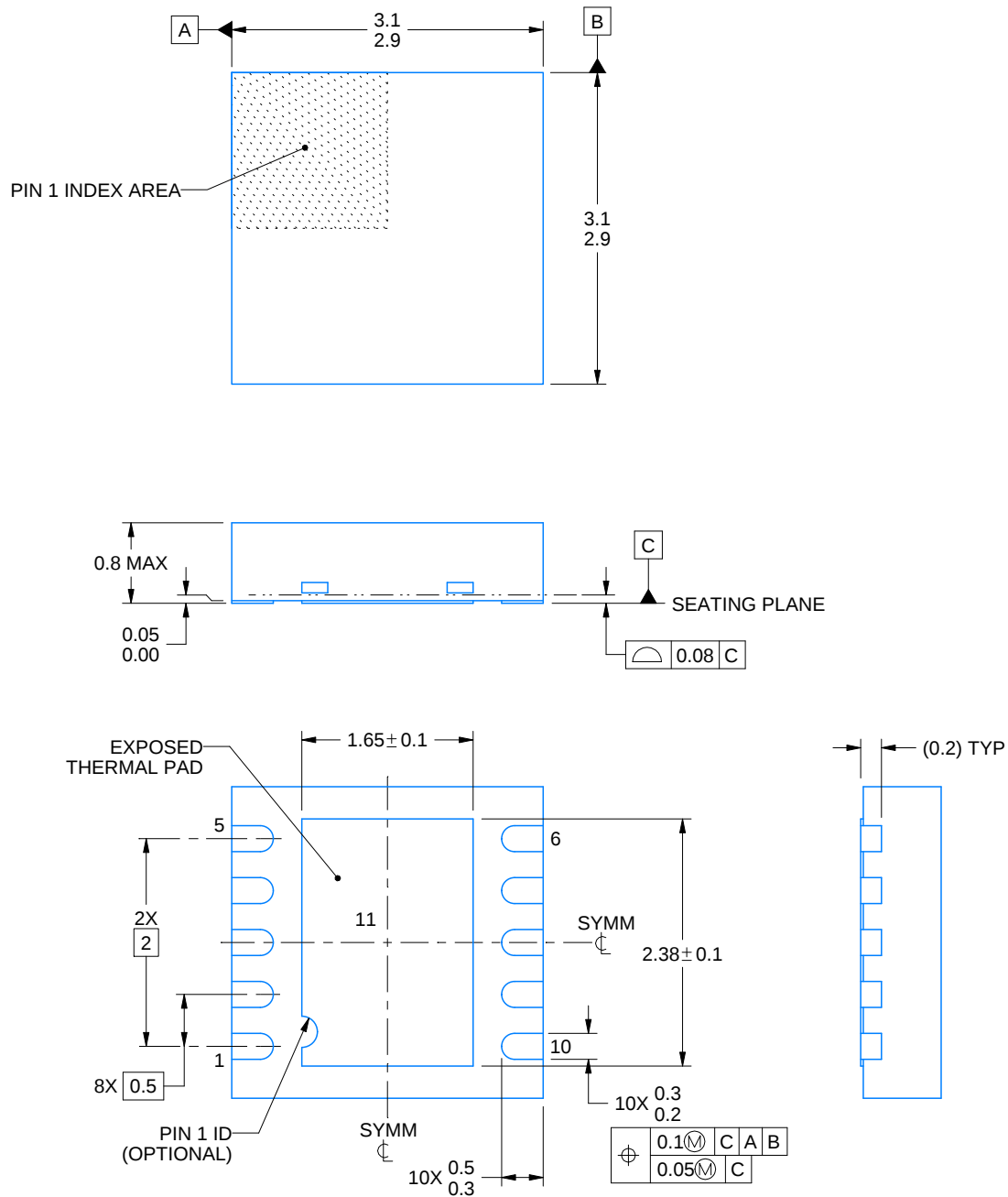
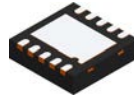


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
DRV10866DSCR	WSON	DSC	10	3000	367.0	367.0	35.0



Images above are just a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



4223802/B 01/2018

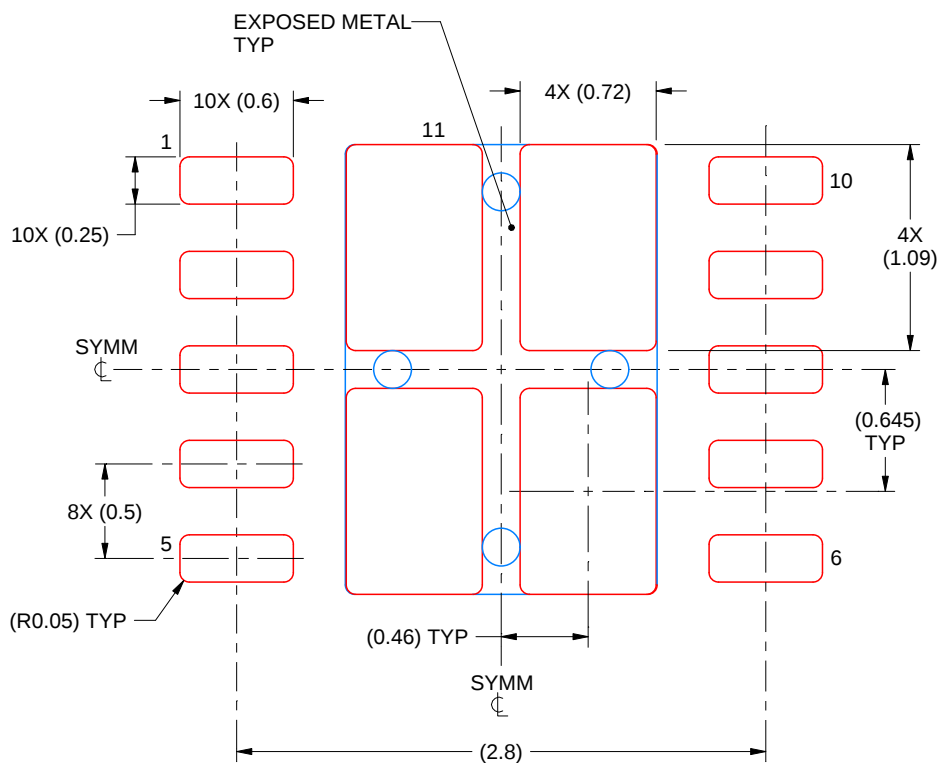
NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. The package thermal pad must be soldered to the printed circuit board for optimal thermal and mechanical performance.

DSC0010K

WSN - 0.8 mm max height

PLASTIC SMALL OUTLINE - NO LEAD



SOLDER PASTE EXAMPLE BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD 11:
80% PRINTED SOLDER COVERAGE BY AREA
SCALE:25X

4223802/B 01/2018

NOTES: (continued)

6. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

重要声明和免责声明

TI 均以“原样”提供技术性 & 可靠性数据（包括数据表）、设计资源（包括参考设计）、应用或其他设计建议、网络工具、安全信息和其他资源，不保证其中不含任何瑕疵，且不做任何明示或暗示的担保，包括但不限于对适销性、适合某特定用途或不侵犯任何第三方知识产权的暗示担保。

所述资源可供专业开发人员应用 TI 产品进行设计使用。您将对以下行为独自承担全部责任：(1) 针对您的应用选择合适的 TI 产品；(2) 设计、验证并测试您的应用；(3) 确保您的应用满足相应标准以及任何其他安全、安保或其他要求。所述资源如有变更，恕不另行通知。TI 对您使用所述资源的授权仅限于开发资源所涉及 TI 产品的相关应用。除此之外不得复制或展示所述资源，也不提供其它 TI 或任何第三方的知识产权授权许可。如因使用所述资源而产生任何索赔、赔偿、成本、损失及债务等，TI 对此概不负责，并且您须赔偿由此对 TI 及其代表造成的损害。

TI 所提供产品均受 TI 的销售条款 (<http://www.ti.com.cn/zh-cn/legal/termsofsale.html>) 以及 [ti.com.cn](http://www.ti.com.cn) 上或随附 TI 产品提供的其他可适用条款的约束。TI 提供所述资源并不扩展或以其他方式更改 TI 针对 TI 产品所发布的可适用的担保范围或担保免责声明。

邮寄地址：上海市浦东新区世纪大道 1568 号中建大厦 32 楼，邮政编码：200122
Copyright © 2020 德州仪器半导体技术（上海）有限公司