TPS62A03x 3A、高効率同期整流降圧コンバータ、SOT563 パッケージ

1 特長

- 入力電圧範囲:2.5V～5.5V
- 調整可能な出力電圧範囲:0.6V～V_{IN}
- 42mΩ および 27.5mΩ 低 R_{DSON} スイッチ
- 28.5µA 未満の静止電流
- 1.2V I/O 論理電圧対応
- タイミング精度:1% (0℃～125℃)
- 100% モード動作
- 2.2MHz のスイッチング周波数
- パワー セーブ モードまたは PWM オプションが利用可能
- パワー グッド出力ピン
- 短絡保護 (HICCUP)
- ソフト スタートアップを内蔵
- アクティブ出力放電
- サーマル シャットダウン保護機能
- TLV62585 (DRL) とピン互換

2 アプリケーション

- セットトップ ボックス、TV アプリケーション
- IP ネットワーク カメラ、多機能プリンタ
- ワイヤレス ルータ、ソリッドステート ドライブ
- バッテリ駆動アプリケーション
- 汎用 POL (ポイント オブ ロード) 電源

3 概要

TPS62A03 および TPS62A03A は同期整流降圧型 DC/DC コンバータで、高効率と小型の設計サイズ向けに最適化されています。このデバイスには、最大 3A の出力電流を供給できるスイッチが内蔵されています。中負荷から高負荷では、デバイスはパルス幅変調 (PWM) モードで、2.2MHz のスイッチング周波数で動作します。軽負荷時には、TPS62A03 は自動的にパワー セーブ モード (PSM) へ移行し、負荷電流範囲の全体にわたって高い効率を維持します。このデバイスの TPS62A03A バリアントは、固定スイッチング周波数で、負荷電流範囲全体にわたって PWM モードで動作します。シャットダウン時には、両デバイスの消費電流は最小限に抑えられます。

TPS62A03 および TPS62A03A は、外付けの分圧抵抗によって出力電圧を変更できます。内部のソフト スタート回路により、スタートアップ時の突入電流が制限されます。過電流保護とサーマル シャットダウンにより、障害状況でデバイスとアプリケーションを保護します。パワー グッド信号は、出力電圧が適切にレギュレーションされていることを示します。これらのデバイスは、SOT563 パッケージで供給されます。

パッケージ情報

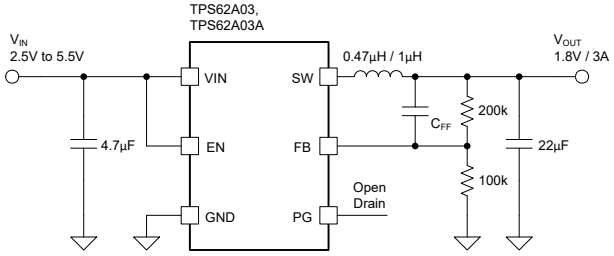
部品番号	パッケージ(1)	パッケージ サイズ(2)
TPS62A03	DRL (SOT-563、6)	1.60mm × 1.60mm
TPS62A03A		

(1) 詳細については、セクション 11 を参照してください。
(2) パッケージ サイズ (長さ × 幅) は公称値であり、該当する場合はピンも含まれます。

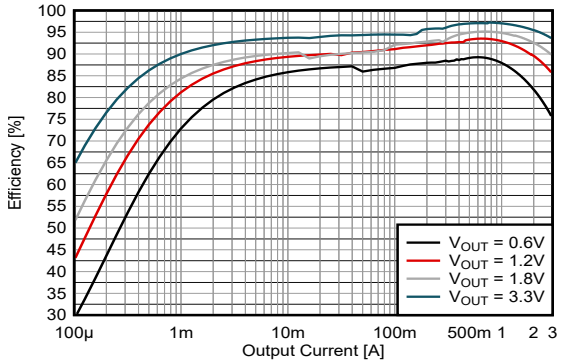
製品情報

部品番号(1)	動作モード	出力電流
TPS62A03	PSM、PWM	3A
TPS62A03A	FPWM	3A

(1) *デバイス比較表*を参照してください。セクション 4



代表的なアプリケーション



5V_{IN} での出力電流と効率の関係

ADVANCE INFORMATION

Table of Contents

ADVANCE INFORMATION

4 Device Comparison Table

Device Number	Output Current	Package	Operation Mode
TPS62A03DRLR	3A	SOT-563	PSM, PWM
TPS62A03ADRLR	3A	SOT-563	FPWM

5 Pin Configuration and Functions

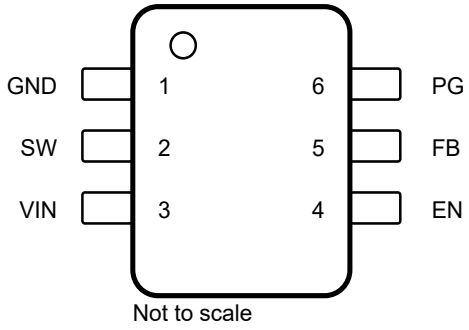


図 5-1. 6-Pin DRL SOT-563 Package (Top View)

表 5-1. Pin Functions

SOT563-6		TYPE(1)	DESCRIPTION
NAME	NO.		
EN	4	I	Device enable logic input. Logic high enables the device. Logic low disables the device and turns the device into shutdown. Do not leave the pin floating.
FB	5	I	Feedback pin for the internal control loop. Connect this pin to an external feedback divider.
GND	1	G	Ground pin
PG	6	O	Power-good open-drain output pin. The pullup resistor cannot be connected to any voltage higher than 5.5V. If unused, leave the pin open or connect to GND.
SW	2	O	Switch pin connected to the internal FET switches and inductor terminal. Connect the inductor of the output filter to this pin.
VIN	3	I	Power supply voltage pin

(1) I = Input, O = Output, G = Ground

ADVANCE INFORMATION

ADVANCE INFORMATION

6 Specifications

6.1 Absolute Maximum Ratings

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

		MIN	MAX	UNIT
Pin voltage(2)	VIN, EN, PG	–0.3	6	V
	SW, DC	–0.3	V_{IN} + 0.3	V
	SW, transient < 10ns	–3.0	10	V
	FB	–0.3	3	V
T_J	Operating junction temperature	–40	150	°C
T_{stg}	Storage temperature	–55	150	°C

(1) Operation outside the Absolute Maximum Ratings may cause permanent device damage. Absolute Maximum Ratings do not imply functional operation of the device at these or any other conditions beyond those listed under Recommended Operating Conditions. If used outside the Recommended Operating Conditions but within the Absolute Maximum Ratings, the device may not be fully functional, and this may affect device reliability, functionality, performance, and shorten the device lifetime.
(2) All voltage values are with respect to the network ground terminal.

6.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 (1)	±2000	V
		Charged-device model (CDM), per ANSI/ESDA/JEDEC JS-002 (2)	±500	

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

6.3 Recommended Operating Conditions

Over operating junction temperature range (unless otherwise noted)

			MIN	NOM	MAX	UNIT
V_{IN}	Input supply voltage range		2.5		5.5	V
V_{OUT}	Output voltage range		0.6		V_{IN}	V
I_{OUT}	Output current range	TPS62A03			3	A
L	Effective inductance			1.0		µH
C_{OUT}	Output capacitance	V_{OUT} < 1.2V		44		µF
C_{OUT}	Output capacitance	1.2V ≤ V_{OUT} < 1.8V		22		µF
C_{OUT}	Output capacitance	V_{OUT} ≥ 1.8V		22		µF
I_{PG}	Power-Good input current capability		0		1	mA
T_J	Operating junction temperature	Operating junction temperature	-40		125	°C

6.4 Thermal Information

THERMAL METRIC(1)		TPS62A03x DRL (SOT-563) 6 PINS	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance	157.3	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	92.2	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	45.6	°C/W
ψ_{JT}	Junction-to-top characterization parameter	4.0	°C/W
ψ_{JB}	Junction-to-board characterization parameter	45.0	°C/W

(1) For more information about traditional and new thermal metrics, see the Semiconductor and IC Package Thermal Metrics application note.

6.5 Electrical Characteristics

T_J = –40°C to +125°C, V_{IN} = 2.5V to 5.5V. Typical values are at T_J = 25°C and V_{IN} = 5V (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
SUPPLY						
$I_{Q(VIN)}$	VIN quiescent current	Non-switching, V_{EN} = High, V_{FB} = 610mV		28.5		µA
$I_{SD(VIN)}$	VIN shutdown supply current	V_{EN} = Low; T_J = 85°C		0.15	2	µA
UVLO						
$V_{UVLO(R)}$	VIN UVLO rising threshold	V_{IN} rising	2.3	2.4	2.5	V
$V_{UVLO(F)}$	VIN UVLO falling threshold	V_{IN} falling	2.2	2.3	2.4	V
ENABLE						
$V_{EN(R)}$	EN high-level input voltage	EN rising, enable switching			0.8	V
$V_{EN(F)}$	EN low-level input voltage	EN falling, disable switching	0.4			V
$V_{EN(LKG)}$	EN Input leakage current	V_{EN} = 5V			100	nA
REFERENCE VOLTAGE						
V_{FB}	FB voltage	T_J = 0°C to 125°C, PWM mode	594	600	606	mV
V_{FB}	FB voltage	PWM mode	591	600	609	mV
$I_{FB(LKG)}$	FB input leakage current	V_{FB} = 0.6V			100	nA
SWITCHING FREQUENCY						
$f_{SW(FCCM)}$	Switching frequency, FPWM operation	V_{IN} = 5V, V_{OUT} = 1.8V		2200		kHz
STARTUP						
	Internal fixed soft-start time	From EN = High to V_{FB} = 0.56V; V_{OUT} = 0.6V; T_J = 0°C to 85°C			1	ms
POWER STAGE						
$R_{DSON(HS)}$	High-side MOSFET on-resistance	V_{IN} = 5V		42		mΩ
$R_{DSON(LS)}$	Low-side MOSFET on-resistance	V_{IN} = 5V		28		mΩ
OVERCURRENT PROTECTION						
$I_{HS(OC)}$	High-side peak current limit	TPS62A03	3.9	5		A
$I_{LS(OC)}$	Low-side valley current limit	TPS62A03		4.2		A
$IL_{PEAK(min)}$	Valley inductor current in PSM			0.47		A
POWER GOOD						
V_{PGTH}	Power Good threshold	PG low, FB falling		93.5		%
V_{PGTH}	Power Good threshold	PG high, FB rising		96		%
	PG delay falling			35		µs
	PG delay rising			10		µs
$I_{PG(LKG)}$	PG pin Leakage current when open drain output is high	V_{PG} = 5V			100	nA
	PG pin output low-level voltage	I_{PG} = 1mA			400	mV
OUTPUT DISCHARGE						
	Output discharge current on SW pin	V_{IN} = 3V, V_{OUT} = 2.0V		120		mA
THERMAL SHUTDOWN						
$T_{J(SD)}$	Thermal shutdown threshold	Temperature rising		165		°C
$T_{J(HYS)}$	Thermal shutdown hysteresis			20		°C

ADVANCE INFORMATION

6.6 Typical Characteristics

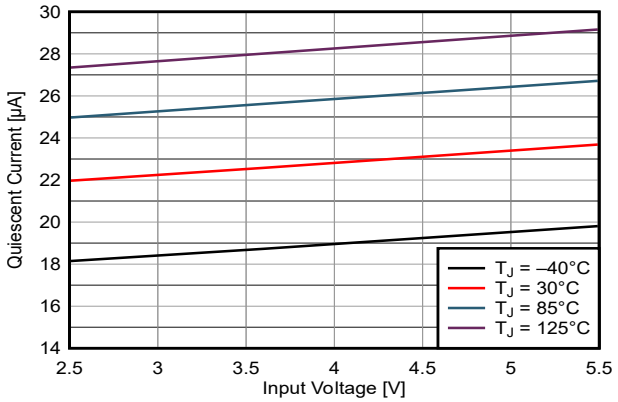


図 6-1. Quiescent Current vs Input Voltage

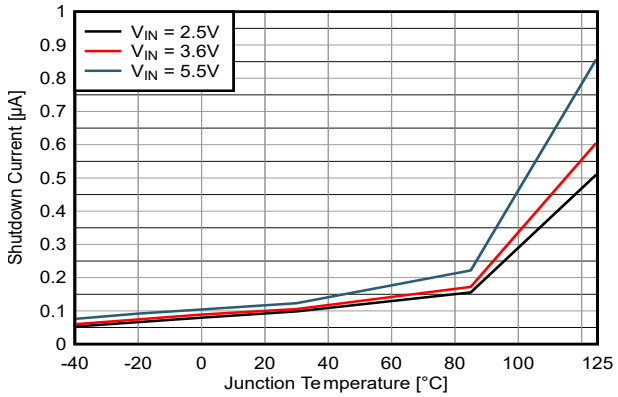


図 6-2. Shutdown Current vs Junction Temperature

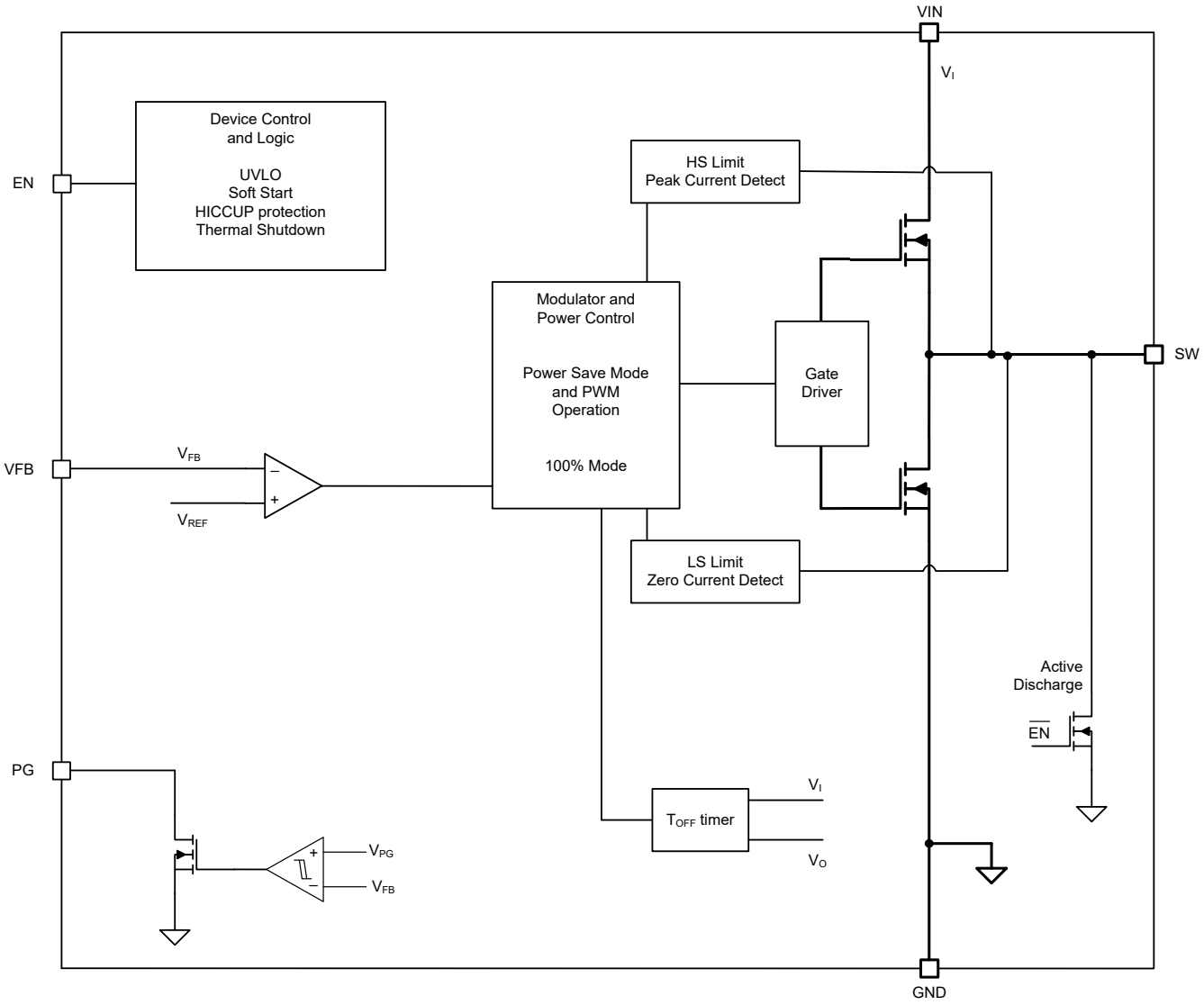
ADVANCE INFORMATION

7 Detailed Description

7.1 Overview

The TPS62A03x is a high-efficiency, synchronous, step-down converter. The device operates with an adaptive off time with a peak current control scheme. The device operates typically at 2.2MHz frequency pulse width modulation (PWM) at moderate to heavy load currents. Based on the V_{IN}/V_{OUT} ratio, a simple circuit sets the required off time for the low-side MOSFET, making the switching frequency relatively constant regardless of the variation of the input voltage, output voltage, and load current.

7.2 Functional Block Diagram



7.3 Feature Description

7.3.1 Power Save Mode

The TPS62A03 version of the device automatically enters power save mode to improve efficiency at light load when the inductor current becomes discontinuous. In power save mode, the converter reduces the switching frequency and minimizes current consumption. In power save mode, the output voltage rises slightly above the nominal output voltage. This effect is minimized by increasing the output capacitor or adding a feedforward capacitor.

ADVANCE INFORMATION

The TPS62A03A version of the device does not have the power saving functionality and preserves the switching frequency at all load conditions.

7.3.2 100% Duty Cycle Low Dropout Operation

The device offers low input-to-output voltage difference by entering 100% duty cycle mode. In this mode, the high-side MOSFET switch is constantly turned on and the low-side MOSFET is switched off. The minimum input voltage to maintain output regulation, depending on the load current and output voltage, is calculated as:

$$V_{IN(MIN)} = V_{OUT} + I_{OUT} \times (R_{DS(ON)} + R_L) \quad (1)$$

where

- $R_{DS(ON)}$ = High-side FET on-resistance
- R_L = Inductor ohmic resistance (DCR)

7.3.3 Soft Start

After enabling the device, internal soft-start circuitry ramps up the output voltage, which reaches the nominal output voltage during start-up time, avoiding excessive inrush current and creating a smooth voltage rise slope. Internal soft-start circuitry also prevents excessive voltage drops of primary cells and rechargeable batteries with high internal impedance.

The TPS62A03 is able to start into a prebiased output capacitor. The converter starts with the applied bias voltage and ramps the output voltage to the nominal value.

7.3.4 Switch Current Limit and Short-Circuit Protection (HICCUP)

The switch current limit prevents the device from high inductor current and drawing excessive current from the battery or input rail. Due to internal propagation delay, the AC peak current can exceed the static current limit during that time. Excessive current can occur with a shorted or saturated inductor, an overload, or shorted output circuit condition. If the inductor current reaches the threshold I_{LIM}, the high-side MOSFET is turned off and the low-side MOSFET is turned on to ramp down the inductor current with an adaptive off time.

When this switch current limit is triggered 32 times, the device stops switching to protect the output. The device then automatically starts a new start-up after a typical delay time of 100µs has passed. This action is named HICCUP short-circuit protection. The device repeats this mode until the high load condition disappears. HICCUP protection is also enabled during the start-up.

7.3.5 Undervoltage Lockout

To avoid misoperation of the device at low input voltages, an undervoltage lockout (UVLO) is implemented, which shuts down the device at voltages lower than V_{UVLO}.

7.3.6 Thermal Shutdown

The device goes into thermal shutdown and stops switching when the junction temperature exceeds T_{JSD}. When the device temperature falls below the threshold by 20°C, the device returns to normal operation automatically.

7.4 Device Functional Modes

7.4.1 Enable and Disable

The device is enabled by setting the EN input to a logic High. Accordingly, a logic Low disables the device. If the device is enabled, the internal power stage starts switching and regulates the output voltage to the set point voltage. The EN input must be terminated and not be left floating.

7.4.2 Power Good

The TPS62A03 has a built-in power-good (PG) feature to indicate whether the output voltage has reached the target and the device is ready. The PG signal can be used for start-up sequencing of multiple rails. The PG pin is an open-drain output that requires a pullup resistor to any voltage up to the recommended input voltage level.

ADVANCE INFORMATION

PG is low when the device is turned off due to EN, UVLO (undervoltage lockout), or thermal shutdown. VIN must remain present for the PG pin to stay low. If not used, the power-good can be tie to GND or left open. The PG indicator has a de-glitch to avoid the signal indicating glitches or transient responses from the loop.

表 7-1. Power-Good indicator Functional Table

Logic Signals				PG Status
V_I	EN Pin	Thermal Shutdown	V_O	
V_I > UVLO	HIGH	NO	V_O on target	High Impedance
			V_O < target	LOW
			YES	LOW
		YES	x	LOW
	LOW	x	x	LOW
V_I < 1.8V	x	x	x	Undefined

ADVANCE INFORMATION

8 Application and Implementation

注

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, as well as validating and testing their design implementation to confirm system functionality.

8.1 Application Information

The following section discusses the design of the external components to complete the power supply design for several input and output voltage options by using typical applications as a reference.

8.2 Typical Application

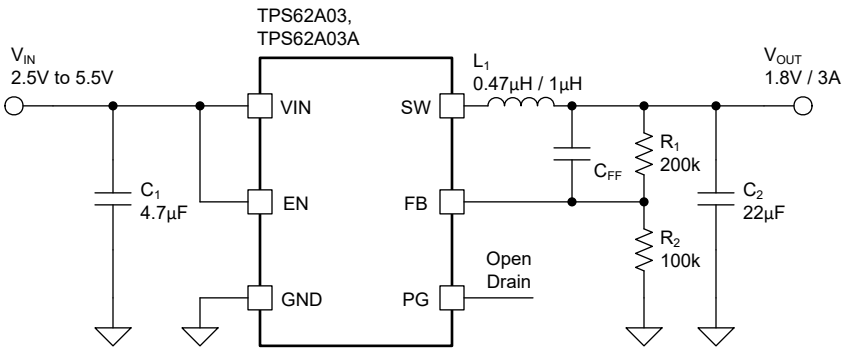


図 8-1. TPS62A03 Typical Application Circuit

*C_{FF} is optional

8.2.1 Design Requirements

For this design example, use the parameters listed in 表 8-1 as the input parameters

表 8-1. Design Parameters

Design Parameter	Example Value
Input voltage	2.5V to 5.5V
Output voltage	1.8V
Maximum output current	3.0A

表 8-2 lists the components used for the example.

表 8-2. List of Components

Reference	Description	Manufacturer (1)
C1	4.7µF, Ceramic Capacitor, 10V, X7R, size 0805, GRM21BR71A475KA73L	Murata
C2	22µF, Ceramic Capacitor, 10V, X7R, size 0805, GRM21BZ71A226KE15L	Murata
L1	1µH, Power Inductor, XGL3520-102MEC	Coilcraft
R1, R2	Chip resistor, 1%, size 0603	Std.
C_{FF}	Optional. If needed, then use up to 120pF, 10pF for 3.3V, 15pF for 1.8V, and 22pF for 1.2V VOUT. Make sure of a phase margin of > 45 degrees.	Std.

(1) See the *Third-Party Products Disclaimer*.

ADVANCE INFORMATION

8.2.2 Detailed Design Procedure

8.2.2.1 Setting the Output Voltage

The output voltage is set by an external resistor divider according to 式 2.

$$R1 = R2 \times \left(\frac{V_{OUT}}{V_{FB}} - 1\right) = R2 \times \left(\frac{V_{OUT}}{0.6V} - 1\right) \quad (2)$$

R2 must not be higher than 100kΩ to provide acceptable noise sensitivity.

8.2.2.2 Output Filter Design

The inductor and output capacitor together provide a low-pass filter. To simplify this process, 表 8-3 outlines possible inductor and capacitor value combinations. Checked cells represent combinations that are proven for stability by simulation and lab test. Check further combinations for each individual application.

表 8-3. Matrix of Output Capacitor and Inductor Combinations for TPS62A03

V_{OUT} [V]	L [µH](1)	C_{OUT} [µF](2)	
		22	2 × 22
0.6 ≤ V_{OUT} < 1.2	1	+	++(3)
1.2 ≤ V_{OUT} < 1.8	1	++(3)	+
1.8 ≤ V_{OUT}	1	++(3)	+

(1) Inductor tolerance and current derating is anticipated. The effective inductance can vary by +20% and –30%. A 0.47uH inductor can also be used with the same recommended output capacitors for the TPS62A03.
(2) Capacitance tolerance and bias voltage derating is anticipated. The effective capacitance can vary by +20% and –50%. In case a lower output ripple is desired, higher output capacitance can help reduce the ripple.
(3) This LC combination is the standard value and recommended for most applications.

8.2.2.3 Input and Output Capacitor Selection

The architecture of the TPS62A03 allows use of tiny ceramic-type output capacitors with low equivalent series resistance (ESR). These capacitors provide low output voltage ripple and are thus recommended. To keep resistance up to high frequencies and to achieve narrow capacitance variation with temperature, TI recommends to use X7R or X5R dielectric.

The input capacitor is the low impedance energy source for the converter that helps provide stable operation. TI recommends a low-ESR multilayer ceramic capacitor for best filtering. For most applications, a 4.7µF input capacitor is sufficient; a larger value reduces input voltage ripple.

The TPS62A03 is designed to operate with an output capacitor of 22µF to 47µF, depending on the selected output voltage, as outlined in セクション 8.2.2.2.

A feedforward capacitor reduces the output ripple in PSM. The capacitance has to be selected such that enough phase margin is available for stability. Smaller capacitance of the forward capacitor results in larger phase margin but also in larger ripple. Good starting points for capacitor values at a VIN of 5V are 10pF for VOUT = 3.3V, 15pF for VOUT = 1.8V, and 22pF for VOUT = 1.2V.

ADVANCE INFORMATION

8.2.3 Application Curves

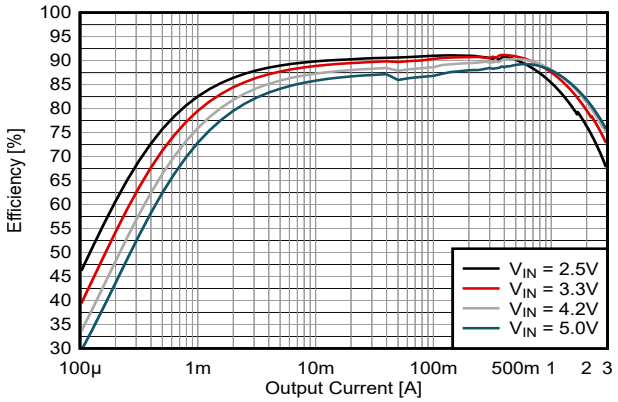


図 8-2. 0.6V Output Efficiency (TPS62A03)

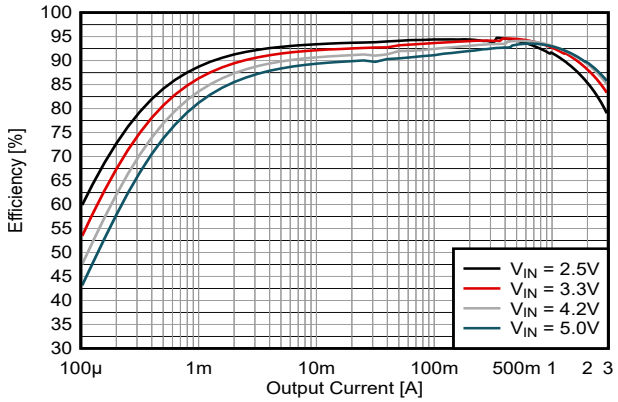


図 8-3. 1.2V Output Efficiency (TPS62A03)

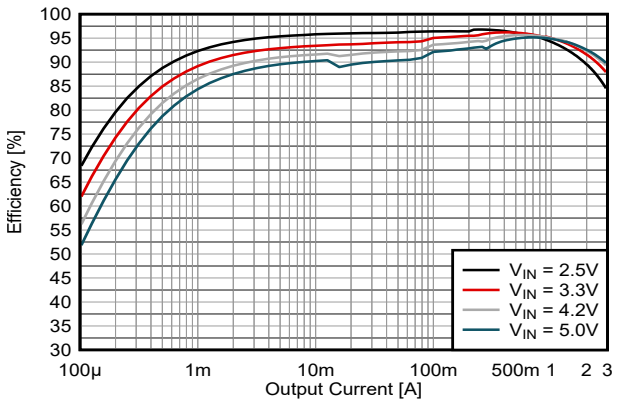


図 8-4. 1.8V Output Efficiency (TPS62A03)

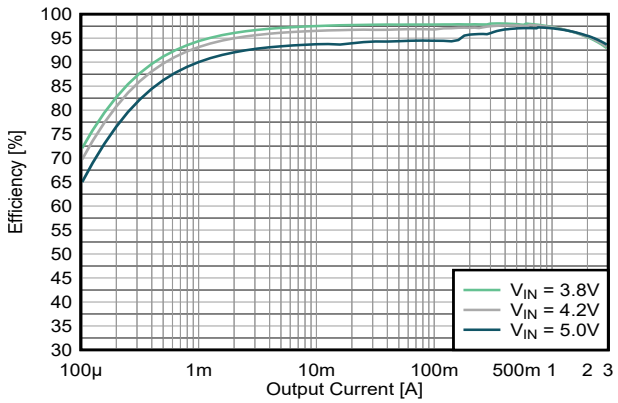


図 8-5. 3.3V Output Efficiency (TPS62A03)

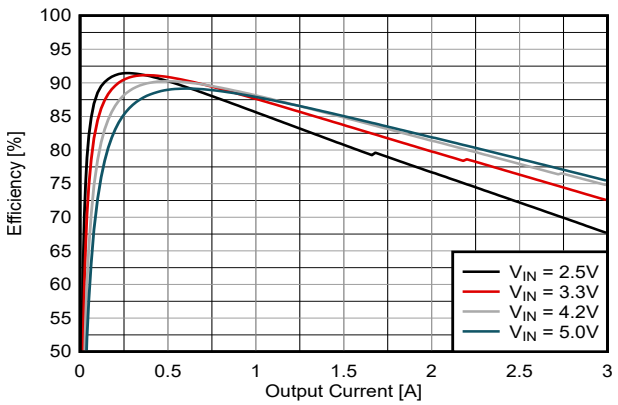


図 8-6. 0.6V Output Efficiency (TPS62A03A)

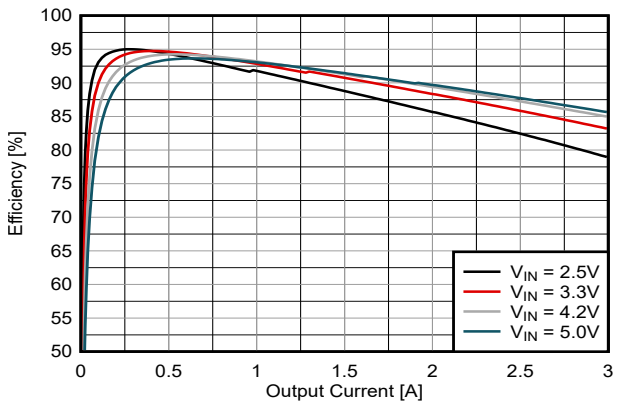


図 8-7. 1.2V Output Efficiency (TPS62A03A)

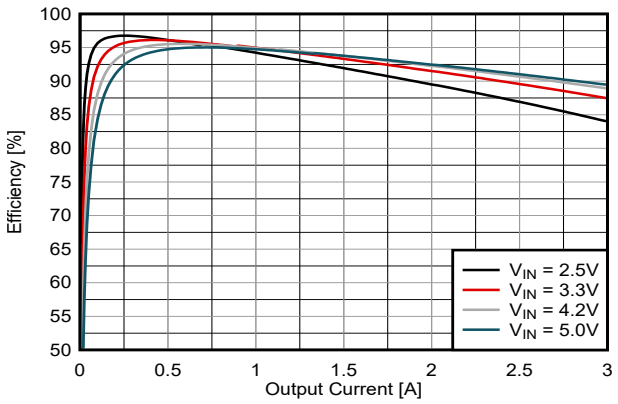


図 8-8. 1.8V Output Efficiency (TPS62A03A)

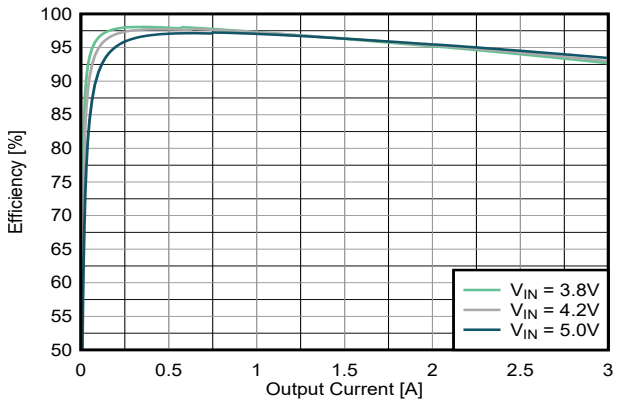


図 8-9. 3.3V Output Efficiency (TPS62A03A)

8.3 Power Supply Recommendations

The device is designed to operate from an input voltage supply range from 2.5V to 5.5V. Make sure that the input power supply has a sufficient current rating for the application.

8.4 Layout

8.4.1 Layout Guidelines

The printed-circuit-board (PCB) layout is an important step to maintain the high performance of the TPS62A0x device.

- Place the input and output capacitors and the inductor as close as possible to the IC. This action keeps the power traces short. Routing these power traces direct and wide results in low trace resistance and low parasitic inductance.
- Connect the low side of the input and output capacitors properly to the GND pin to avoid a ground potential shift.
- The sense traces connected to FB is a signal trace. Take special care to avoid noise being induced. Keep these traces away from SW nodes.
- Use a common ground. Use GND layers for shielding.

See 図 8-10 for the recommended PCB layout.

8.4.2 Layout Example

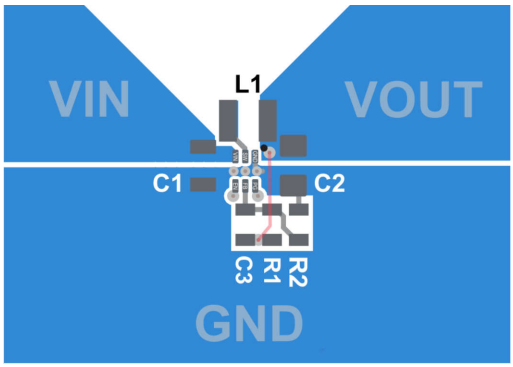


図 8-10. TPS62A0x PCB Layout Recommendation

ADVANCE INFORMATION

9 Device and Documentation Support

9.1 Device Support

9.1.1 サード・パーティ製品に関する免責事項

サード・パーティ製品またはサービスに関するテキサス・インスツルメンツの出版物は、単独またはテキサス・インスツルメンツの製品、サービスと一緒に提供される場合に関係なく、サード・パーティ製品またはサービスの適合性に関する是認、サード・パーティ製品またはサービスの是認の表明を意味するものではありません。

9.2 ドキュメントの更新通知を受け取る方法

ドキュメントの更新についての通知を受け取るには、www.tij.co.jp のデバイス製品フォルダを開いてください。[通知] をクリックして登録すると、変更されたすべての製品情報に関するダイジェストを毎週受け取ることができます。 変更の詳細については、改訂されたドキュメントに含まれている改訂履歴をご覧ください。

9.3 サポート・リソース

テキサス・インスツルメンツ E2E™ サポート・フォーラムは、エンジニアが検証済みの回答と設計に関するヒントをエキスパートから迅速かつ直接得ることができる場所です。既存の回答を検索したり、独自の質問をしたりすることで、設計で必要な支援を迅速に得ることができます。

リンクされているコンテンツは、各寄稿者により「現状のまま」提供されるものです。これらはテキサス・インスツルメンツの仕様を構成するものではなく、必ずしもテキサス・インスツルメンツの見解を反映したものではありません。テキサス・インスツルメンツの使用条件を参照してください。

9.4 Trademarks

テキサス・インスツルメンツ E2E™ is a trademark of Texas Instruments.
すべての商標は、それぞれの所有者に帰属します。

9.5 静電気放電に関する注意事項

この IC は、ESD によって破損する可能性があります。テキサス・インスツルメンツは、IC を取り扱う際には常に適切な注意を払うことを推奨します。正しい取り扱いおよび設置手順に従わない場合、デバイスを破損するおそれがあります。

ESD による破損は、わずかな性能低下からデバイスの完全な故障まで多岐にわたります。精密な IC の場合、パラメータがわずかに変化するだけで公表されている仕様から外れる可能性があるため、破損が発生しやすくなっています。

9.6 用語集

テキサス・インスツルメンツ用語集　　この用語集には、用語や略語の一覧および定義が記載されています。

10 Revision History

資料番号末尾の英字は改訂を表しています。その改訂履歴は英語版に準じています。

DATE	REVISION	NOTES
August 2024	*	Initial Release

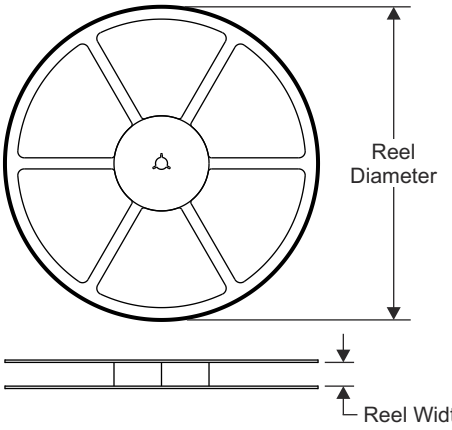
11 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

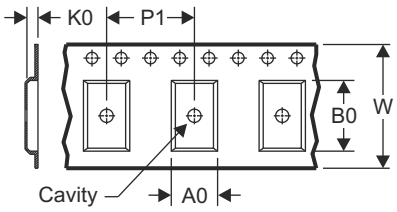
ADVANCE INFORMATION

11.1 Tape and Reel Information

REEL DIMENSIONS

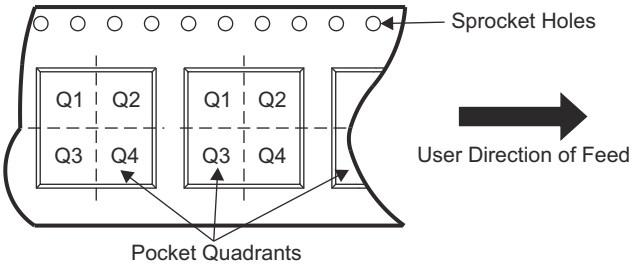


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

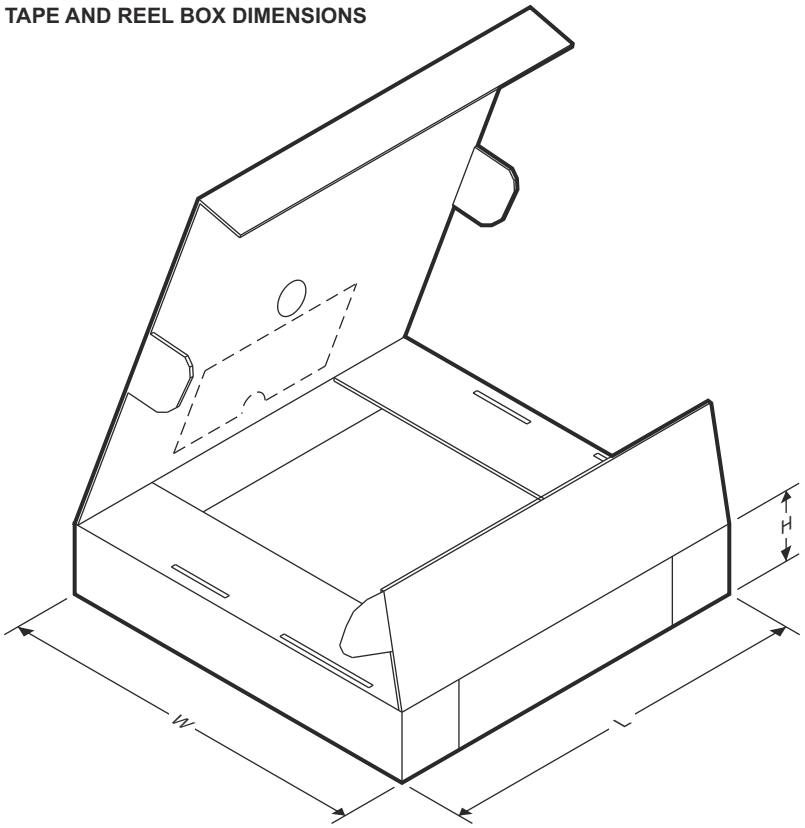


Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TPS62A03DRLR	SOT-5X3	DRL	6	4000	180	8.4	2.0	1.8	0.75	4.0	8.0	Q3
TPS62A03ADRLR	SOT-5X3	DRL	6	4000	180	8.4	2.0	1.8	0.75	4.0	8.0	Q3

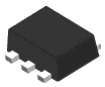
ADVANCE INFORMATION

ADVANCE INFORMATION

TAPE AND REEL BOX DIMENSIONS



Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS62A03DRLR	SOT-5X3	DRL	6	4000	210.0	185.0	35.0
TPS62A03ADRLR	SOT-5X3	DRL	6	4000	210.0	185.0	35.0

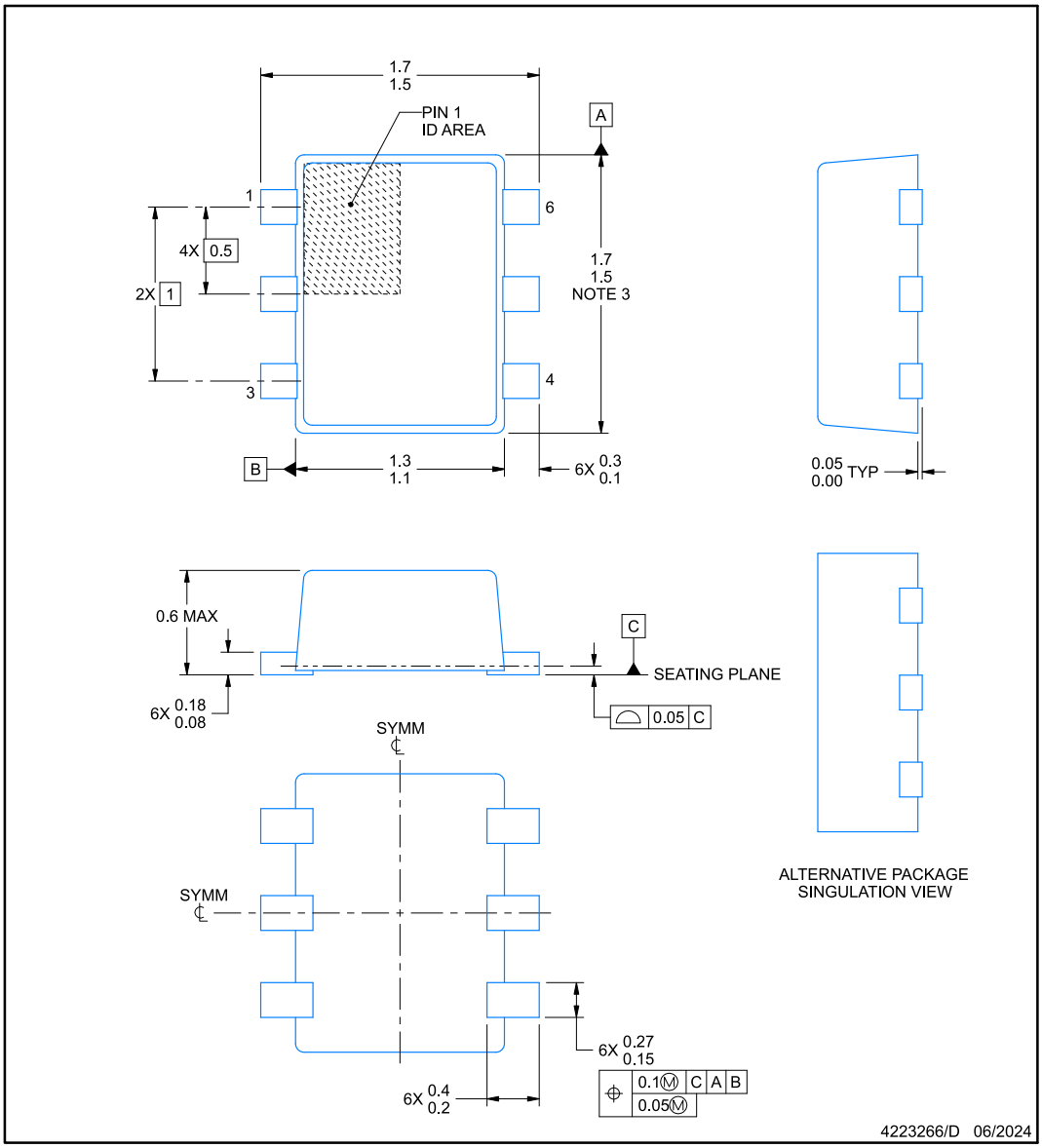


PACKAGE OUTLINE

DRL0006A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



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. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MO-293 Variation UAAD

www.ti.com

ADVANCE INFORMATION

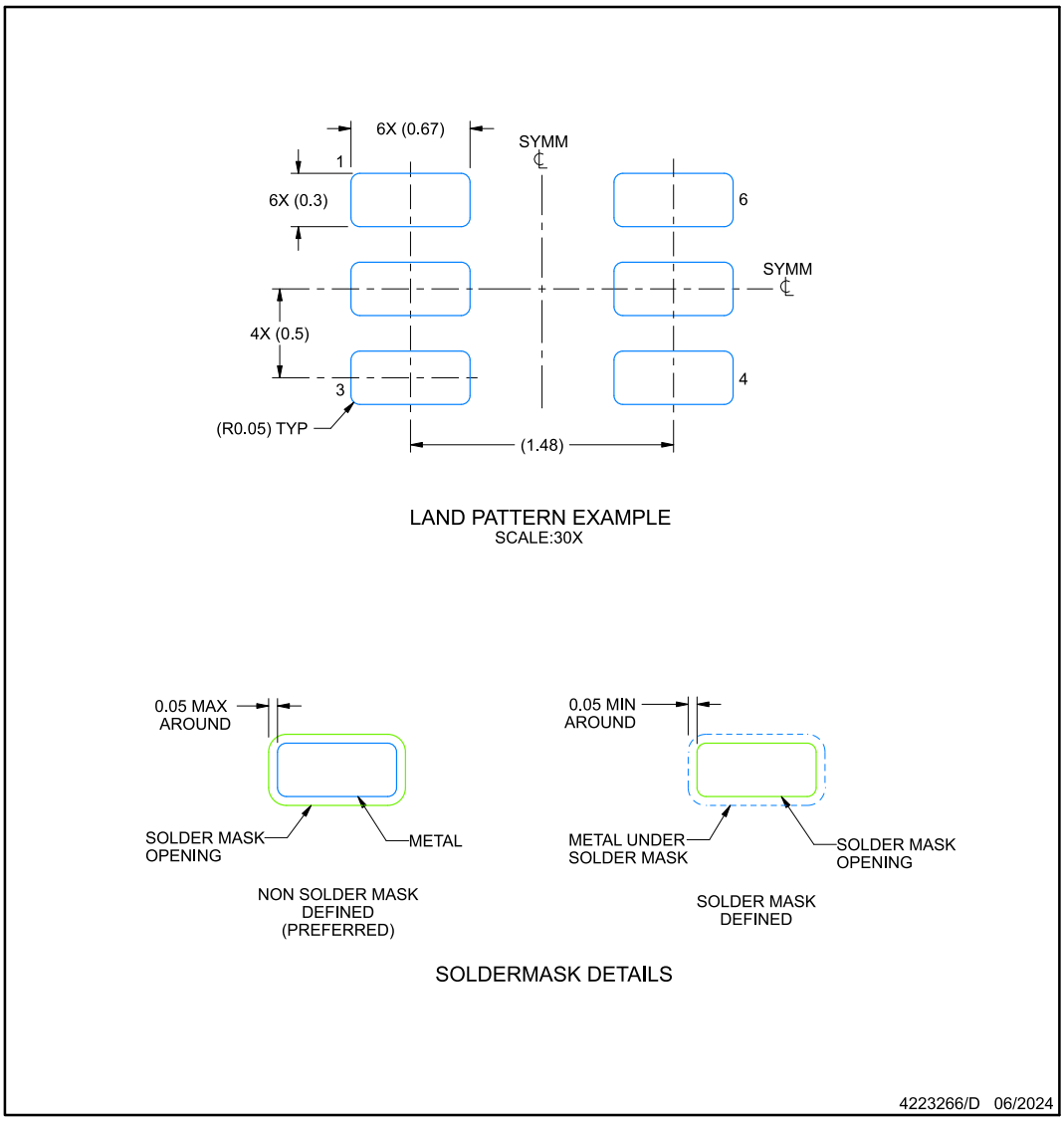
ADVANCE INFORMATION

EXAMPLE BOARD LAYOUT

DRL0006A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



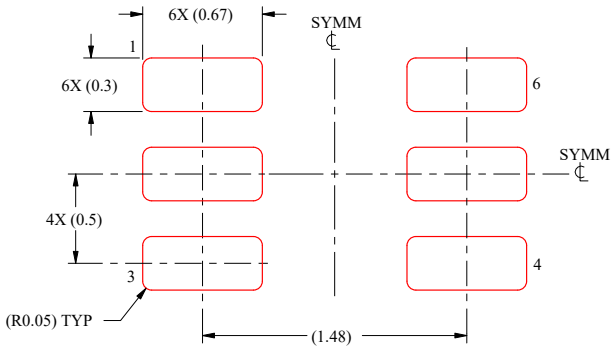
NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
7. Land pattern design aligns to IPC-610, Bottom Termination Component (BTC) solder joint inspection criteria.

EXAMPLE STENCIL DESIGN

DRL0006A — **SOT - 0.6 mm max height**

PLASTIC SMALL OUTLINE



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE:30X

4223266/D 06/2024

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

重要なお知らせと免責事項

テキサス・インスツルメンツは、技術データと信頼性データ (データシートを含みます)、設計リソース (リファレンス デザインを含みます)、アプリケーションや設計に関する各種アドバイス、Web ツール、安全性情報、その他のリソースを、欠陥が存在する可能性のある「現状のまま」提供しており、商品性および特定目的に対する適合性の黙示保証、第三者の知的財産権の非侵害保証を含むいかなる保証も、明示的または黙示的にかかわらず拒否します。

これらのリソースは、テキサス・インスツルメンツ製品を使用する設計の経験を積んだ開発者への提供を意図したものです。(1) お客様のアプリケーションに適した テキサス・インスツルメンツ製品の選定、(2) お客様のアプリケーションの設計、検証、試験、(3) お客様のアプリケーションに該当する各種規格や、その他のあらゆる安全性、セキュリティ、規制、または他の要件への確実な適合に関する責任を、お客様のみが単独で負うものとします。

上記の各種リソースは、予告なく変更される可能性があります。これらのリソースは、リソースで説明されている テキサス・インスツルメンツ製品を使用するアプリケーションの開発の目的でのみ、テキサス・インスツルメンツはその使用をお客様に許諾します。これらのリソースに関して、他の目的で複製することや掲載することは禁止されています。テキサス・インスツルメンツや第三者の知的財産権のライセンスが付与されている訳ではありません。お客様は、これらのリソースを自身で使用した結果発生するあらゆる申し立て、損害、費用、損失、責任について、テキサス・インスツルメンツおよびその代理人を完全に補償するものとし、テキサス・インスツルメンツは一切の責任を拒否します。

テキサス・インスツルメンツの製品は、テキサス・インスツルメンツの販売条件、または ti.com やかかる テキサス・インスツルメンツ製品の関連資料などのいずれかを通じて提供する適用可能な条項の下で提供されています。テキサス・インスツルメンツがこれらのリソースを提供することは、適用されるテキサス・インスツルメンツの保証または他の保証の放棄の拡大や変更を意味するものではありません。

お客様がいかなる追加条項または代替条項を提案した場合でも、テキサス・インスツルメンツはそれらに異議を唱え、拒否します。

郵送先住所:Texas Instruments, Post Office Box 655303, Dallas, Texas 75265

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
XPS62A03ADRLR	ACTIVE	SOT-5X3	DRL	6	4000	TBD	Call TI	Call TI	-40 to 125		Samples
XPS62A03DRLR	ACTIVE	SOT-5X3	DRL	6	4000	TBD	Call TI	Call TI	-40 to 125		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.

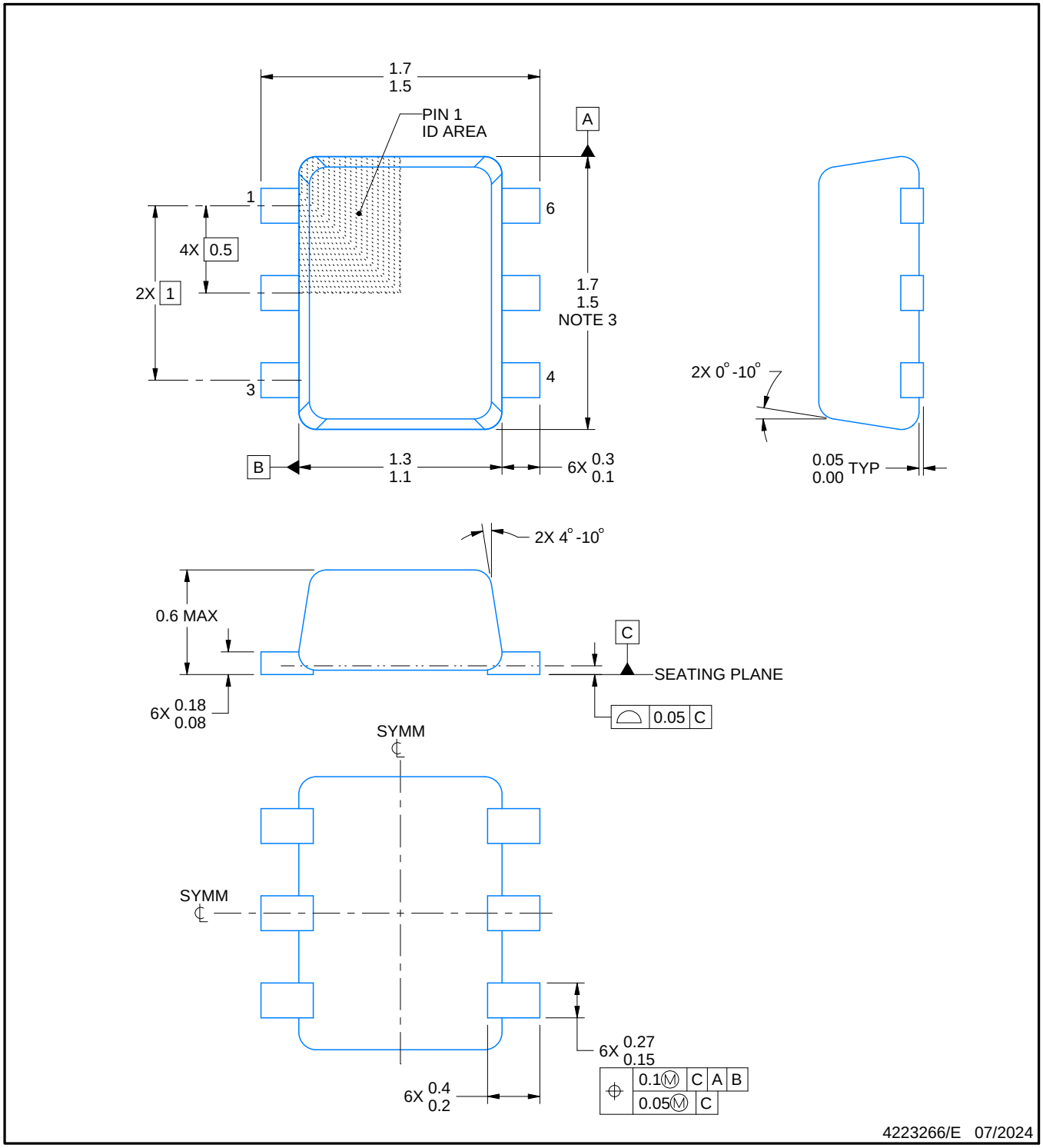
(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

PACKAGE OUTLINE

DRL0006A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



NOTES:

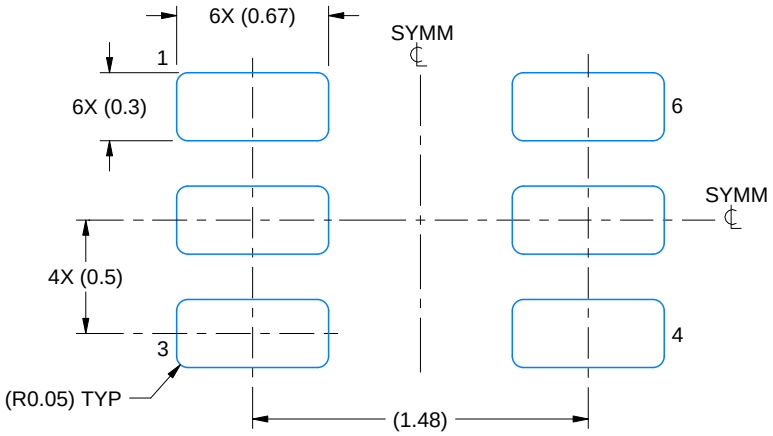
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MO-293 Variation UAAD

EXAMPLE BOARD LAYOUT

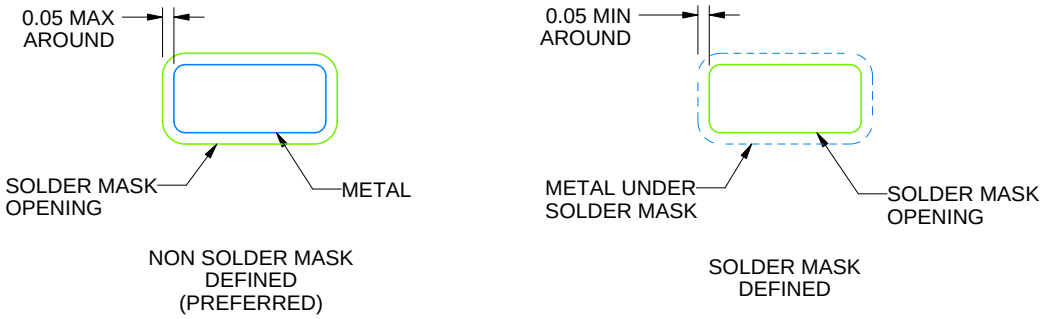
DRL0006A

SOT - 0.6 mm max height

PLASTIC SMALL OUTLINE



LAND PATTERN EXAMPLE
SCALE:30X

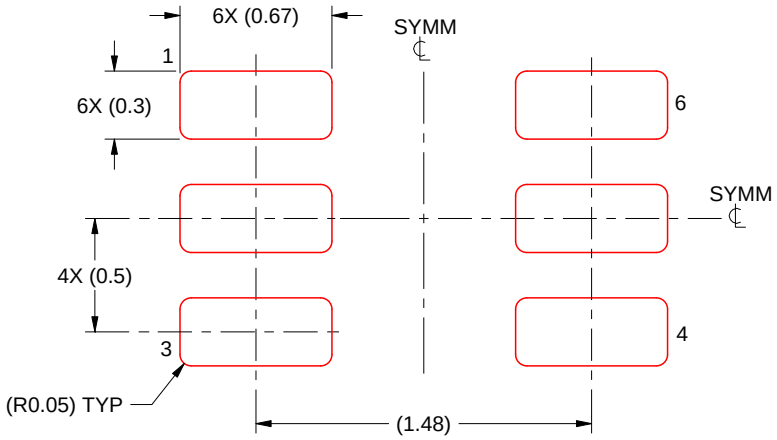


SOLDERMASK DETAILS

4223266/E 07/2024

NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
7. Land pattern design aligns to IPC-610, Bottom Termination Component (BTC) solder joint inspection criteria.



SOLDER PASTE EXAMPLE
BASED ON 0.1 mm THICK STENCIL
SCALE:30X

4223266/E 07/2024

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

重要なお知らせと免責事項

TI は、技術データと信頼性データ (データシートを含みます)、設計リソース (リファレンス· デザインを含みます)、アプリケーションや設計に関する各種アドバイス、Web ツール、安全性情報、その他のリソースを、欠陥が存在する可能性のある「現状のまま」提供しており、商品性および特定目的に対する適合性の黙示保証、第三者の知的財産権の非侵害保証を含むいかなる保証も、明示的または黙示的にかかわらず拒否します。

これらのリソースは、TI 製品を使用する設計の経験を積んだ開発者への提供を意図したものです。(1) お客様のアプリケーションに適した TI 製品の選定、(2) お客様のアプリケーションの設計、検証、試験、(3) お客様のアプリケーションに該当する各種規格や、その他のあらゆる安全性、セキュリティ、規制、または他の要件への確実な適合に関する責任を、お客様のみが単独で負うものとします。

上記の各種リソースは、予告なく変更される可能性があります。これらのリソースは、リソースで説明されている TI 製品を使用するアプリケーションの開発の目的でのみ、TI はその使用をお客様に許諾します。これらのリソースに関して、他の目的で複製することや掲載することは禁止されています。TI や第三者の知的財産権のライセンスが付与されている訳ではありません。お客様は、これらのリソースを自身で使用した結果発生するあらゆる申し立て、損害、費用、損失、責任について、TI およびその代理人を完全に補償するものとし、TI は一切の責任を拒否します。

TI の製品は、TI の販売条件、または ti.com やかかる TI 製品の関連資料などのいずれかを通じて提供する適用可能な条項の下で提供されています。TI がこれらのリソースを提供することは、適用される TI の保証または他の保証の放棄の拡大や変更を意味するものではありません。

お客様がいかなる追加条項または代替条項を提案した場合でも、TI はそれらに異議を唱え、拒否します。

郵送先住所：Texas Instruments, Post Office Box 655303, Dallas, Texas 75265