TPS22919 5.5V、1.5A、90mΩ、立ち上がり時間制御、自己保護機能付きの負荷スイッチ

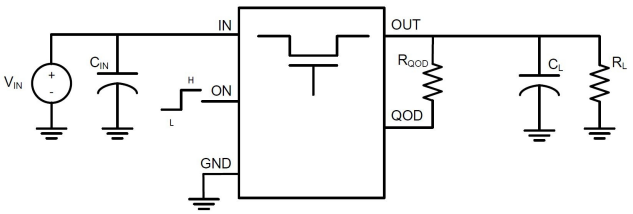
1 特長

- 入力動作電圧範囲 (V_{IN}): 1.6V～5.5V
- 最大連続電流 (I_{MAX}): 1.5A
- オン抵抗 (R_{ON})
  - $5V_{IN}$: 89mΩ (標準値)
  - $3.6V_{IN}$: 90mΩ (標準値)
  - $1.8V_{IN}$: 105mΩ (標準値)
- 出力短絡保護 (I_{SC}): 3A (標準値)
- 低消費電力
  - オン状態 (I_Q): 8µA (標準値)
  - オフ状態 (I_{SD}): 2nA (標準値)
- ON ピンのスマート・プルダウン (R_{PD})
  - ON ≥ V_{IH} (I_{ON}): 100nA (最大値)
  - ON ≤ V_{IL} (R_{PD}): 530kΩ (標準値)
- 低速のターンオン・タイミングによる突入電流制限 (t_{ON})
  - 5.0V のターンオン時間 (t_{ON}): 3.2mV/µs で 1.95ms
  - 3.6V のターンオン時間 (t_{ON}): 2.7mV/µs で 1.75ms
  - 1.8V のターンオン時間 (t_{ON}): 1.8mV/µs で 1.5ms
- 出力放電および立ち下がり時間を変更可能
  - 内部 QOD 抵抗 = 24Ω (標準値)

2 アプリケーション

- パーソナル・エレクトロニクス
- セットトップ・ボックス
- HDTV
- 多機能プリンタ

概略回路図



3 概要

TPS22919デバイスは、スルー・レート制御機能付きの小型シングル・チャネル負荷スイッチです。このデバイスは、1.6V～5.5Vの入力電圧範囲で動作でき、最大1.5Aの連続電流をサポートできるNチャネルMOSFETを内蔵しています。

スイッチのオン状態はデジタル入力により制御され、この入力は低電圧の制御信号と直接接続できます。電源が最初に印加されたときには、スマート・プルダウンを使用して、システムのシーケンシングが完了するまで、ONピンがフローティング状態になることが防止されます。ピンが意図的にHIGH (> V_{IH})に駆動されると、不必要な電力損失を避けるため、スマート・プルダウンは切断されます。

また、TPS22919負荷スイッチには自己保護機能があり、デバイスの出力が短絡した場合も自身を保護できます。サーマル・シャットダウン機能もあり、過熱による損傷を防止します。

TPS22919は標準のSC-70パッケージで供給され、–40 °C～125°Cの接合部温度範囲で動作が規定されています。

製品情報(1)

型番	パッケージ	本体サイズ(公称)
TPS22919DCK	SC-70 (6)	2.1mm×2.0mm

(1) 提供されているすべてのパッケージについては、巻末の注文情報を参照してください。

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4 改訂履歴

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2018年10月発行のものから更新 **Page**

- 事前情報から量産データに 変更 1

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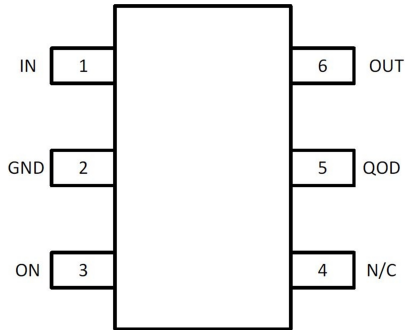
5 Pin Configuration and Functions

DCK Package
6-Pin SC-70
Top View



Pin Functions

PIN		I/O	DESCRIPTION
NO.	NAME		
1	IN	I	Switch input.
2	GND	—	Device ground.
3	ON	I	Active high switch control input. Do not leave floating.
4	NC	—	No connect pin, leave floating.
5	QOD	O	Quick Output Discharge pin. This functionality can be enabled in one of three ways. • Placing an external resistor between VOUT and QOD • Tying QOD directly to VOUT and using the internal resistor value (R_{PD}) • Disabling QOD by leaving pin floating See the *Fall Time (t_{FALL}) and Quick Output Discharge (QOD)* section for more information.
6	VOUT	O	Switch output.

6 Specifications

6.1 Absolute Maximum Ratings

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

		MIN	MAX	UNIT
V_{IN}	Maximum Input Voltage Range	–0.3	6	V
V_{OUT}	Maximum Output Voltage Range	–0.3	6	V
V_{ON}	Maximum ON Pin Voltage Range	–0.3	6	V
V_{QOD}	Maximum QOD Pin Voltage Range	–0.3	6	V
I_{MAX}	Maximum Continuous Current		1.5	A
I_{PLS}	Maximum Pulsed Current (2 ms, 2% Duty Cycle)		2.5	A
T_J	Junction temperature	Internally Limited		°C
T_{STG}	Storage temperature	–65	150	°C
T_{LEAD}	Maximum Lead Temperature (10 s soldering time)		300	°C

(1) Stresses beyond those listed under *Absolute Maximum Rating* 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 Condition*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

6.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, allpins[1]	±2000	V
		Charged device model (CDM), per JEDEC specificationJESD22-C101, all pins[2]	±1000	

(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. Manufacturing with less is possible with the necessary precautions. Pins listed may actually have higher performance.

6.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)

		MIN	TYP	MAX	UNIT
V_{IN}	Input Voltage Range	1.6		5.5	V
V_{OUT}	Output Voltage Range	0		5.5	V
V_{IH}	ON Pin High Voltage Range	1		5.5	V
V_{IL}	ON Pin Low Voltage Range	0		0.35	V
T_A	Ambient Temperature	–40		105	°C

6.4 Thermal Information

THERMAL METRIC[1]		TPS22919 DCK (SC-70) PINS	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance	210.7	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	142.0	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	69.0	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	52.7	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	68.8	°C/W

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

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6.5 Electrical Characteristics

Typical values at VIN = 3.6V unless otherwise specified

PARAMETER		TEST CONDITIONS		T_J	MIN	TYP	MAX	UNIT
Input Supply (VIN)								
$I_{Q, VIN}$	VIN Quiescent Current	$V_{ON} \geq V_{IH}$, VOUT = Open		25°C		8	15	µA
				-40°C to 125°C			20	µA
$I_{SD, VIN}$	VIN Shutdown Current	$V_{ON} \leq V_{IL}$, VOUT = GND		25°C		2	20	nA
				-40°C to 125°C			800	nA
ON-Resistance (RON)								
R_{ON}	ON-State Resistance	I_{OUT} = -200 mA	V_{IN} = 5 V	25°C		89	125	mΩ
				-40°C to 85°C			150	mΩ
				-40°C to 105°C			175	mΩ
				-40°C to 125°C			200	mΩ
			V_{IN} = 3.6 V	25°C		90	150	mΩ
				-40°C to 85°C			200	mΩ
				-40°C to 105°C			225	mΩ
				-40°C to 125°C			250	mΩ
			V_{IN} = 1.8 V	25°C		105	300	mΩ
				-40°C to 85°C			400	mΩ
				-40°C to 105°C			450	mΩ
				-40°C to 125°C			500	mΩ
Output Short Protection (ISC)								
I_{SC}	Short Circuit Current Limit	$V_{OUT} \leq V_{IN}$ - 1.5 V		-40°C to 125°C		3		A
		$V_{OUT} \leq V_{SC}$		-40°C to 125°C	30	500	900	mA
V_{SC}	Output Short Detection Threshold	V_{IN} - V_{OUT}		-40°C to 125°C	0.3	0.36	0.46	V
t_{SC}	Output Short Reponse Time	V_{IN} = 1.6V to 5.5V, 10mΩ short applied		-40°C to 125°C		2		µs
T_{SD}	Thermal Shutdown			Rising		180		℃
				Falling		145		℃
Enable Pin (ON)								
I_{ON}	ON Pin Leakage	$V_{ON} \geq V_{IH}$		-40°C to 125°C			100	nA
$R_{PD, ON}$	Smart Pull Down Resistance	$V_{ON} \leq V_{IL}$		-40°C to 125°C		530		kΩ
Quick-output Discharge (QOD)								
$R_{PD, QOD}$	QOD Pin Internal Discharge Resistance	$V_{ON} \leq V_{IL}$		-40°C to 125°C		24		Ω

6.6 Switching Characteristics

Unless otherwise noted, the typical characteristics in the following table apply to an input voltage of 3.6V, an ambient temperature of 25°C, and a load of CL = 0.1 µF, RL = 100 Ω

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{ON}	Turn ON Time	VIN = 5.0 V			1950		µs
		VIN = 3.6 V			1750		µs
		VIN = 1.8 V			1500		µs
t_R	Output Rise Time	VIN = 5.0 V			1280		µs
		VIN = 3.6 V			1100		µs
		VIN = 1.8 V			750		µs
SR_{ON}	Turn ON Slew Rate	VIN = 5.0 V			3.2		mV/µs
		VIN = 3.6 V			2.7		mV/µs
		VIN = 1.8 V			1.8		mV/µs
t_{OFF}	Turn OFF Time	VIN = 1.8 V to 5.0V	R_L = 100Ω, C_L = 0.1uF		6		µs

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Switching Characteristics (continued)

Unless otherwise noted, the typical characteristics in the following table apply to an input voltage of 3.6V, an ambient temperature of 25°C, and a load of CL = 0.1 µF, RL = 100 Ω

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{FALL}	Output Fall Time (1)	R_L = 100Ω	C_L = 0.1uF, R_{QOD} = Short		10		µs
		R_L = Open (2)	C_L = 10uF, R_{QOD} = Short		0.4		ms
			C_L = 10uF, R_{QOD} = 100 Ω		3.5		ms
			C_L = 100uF, R_{QOD} = Short		4		ms

(1) Output may not discharge completely if QOD is not connected to VOUT
(2) See the *Timing Application* section for information on how R_L and C_L affect Fall Time.

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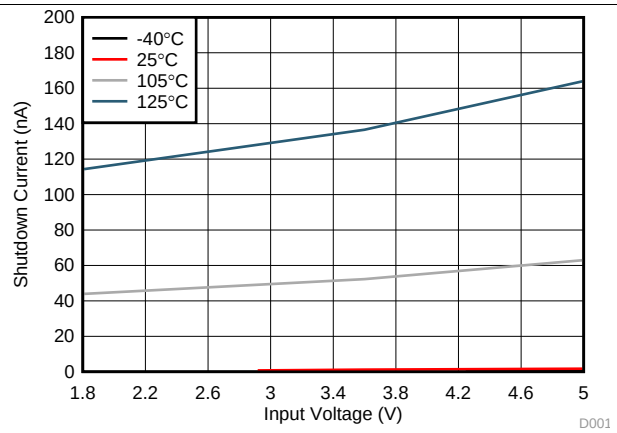
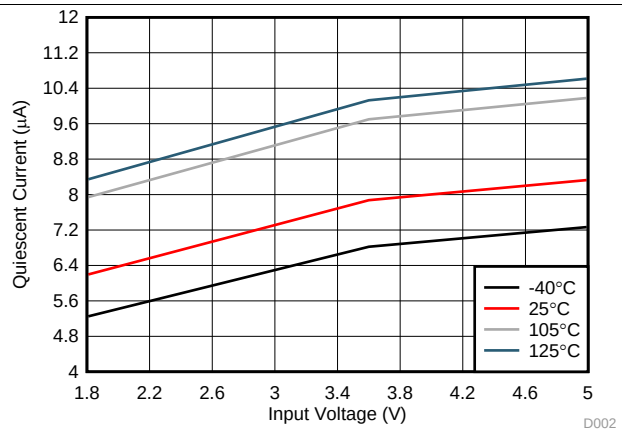
6.7 Typical Characteristics



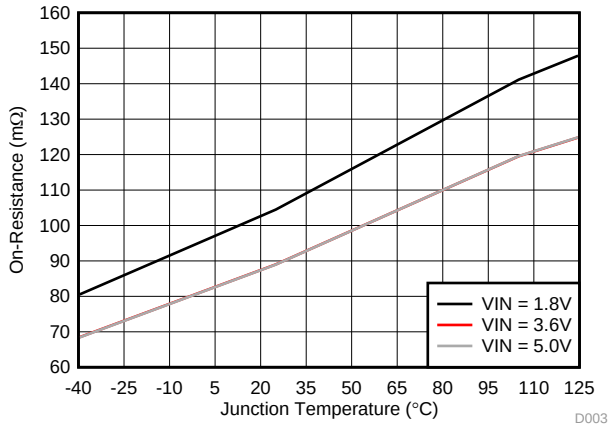
$V_{ON} \leq V_{IL}$

図 1. Shutdown Current vs Input Voltage



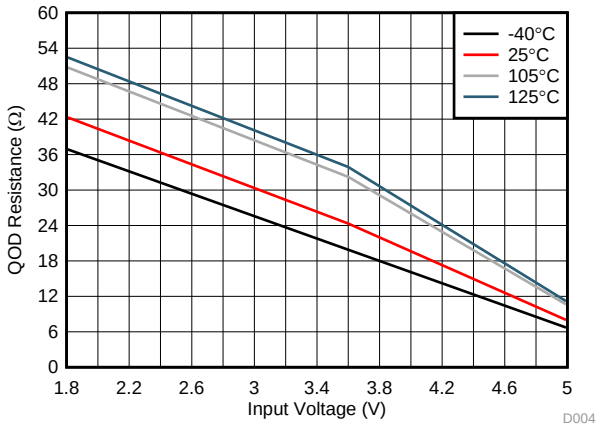
$V_{ON} \geq V_{IH}$

図 2. Quiescent Current vs Input Voltage



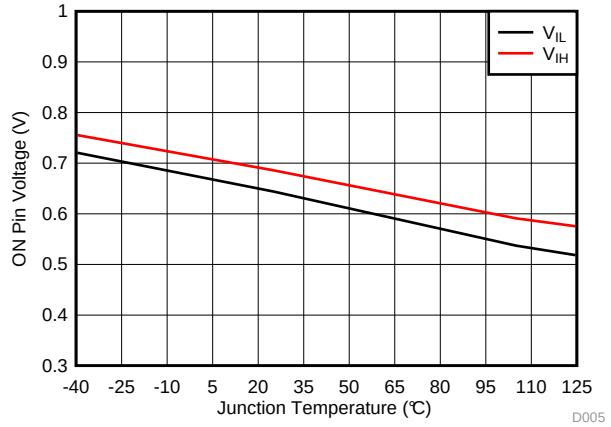
I_{LOAD} = –200 mA

図 3. On-Resistance vs Junction Temperature



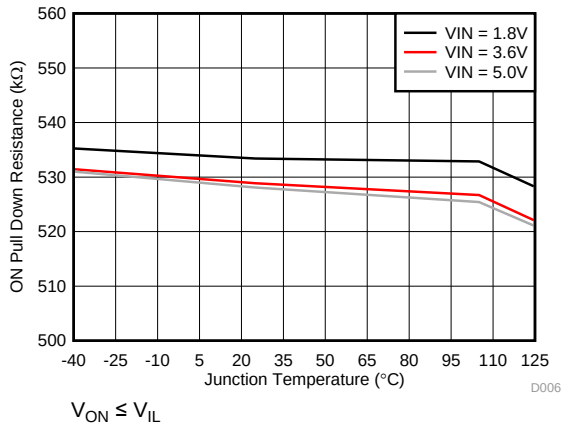
$V_{ON} \leq V_{IL}$

図 4. QOD Resistance vs Input Voltage



$V_{ON} \leq V_{IL}$

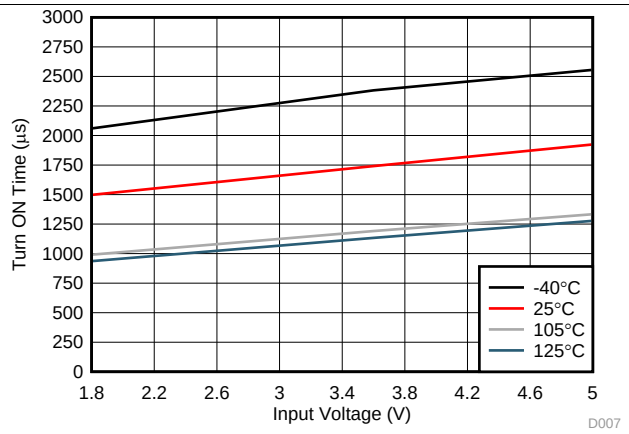
図 5. V_{IH}/V_{IL} vs Junction Temperature



$V_{ON} \leq V_{IL}$

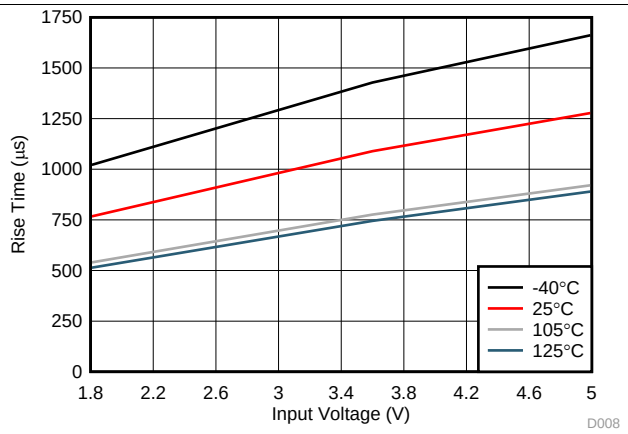
図 6. ON Pull Down Resistance vs Junction Temperature

Typical Characteristics (continued)



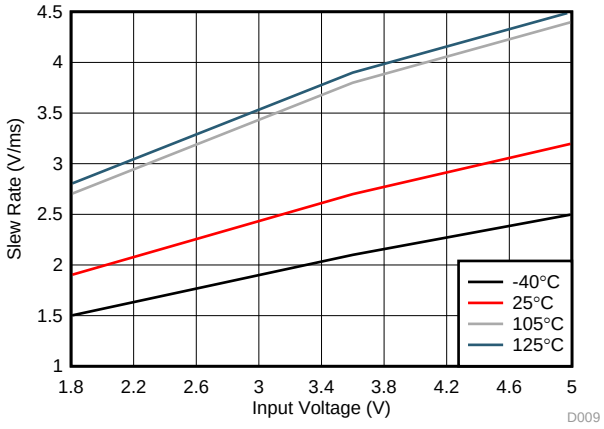
C_L = 0.1 µF R_L = 100 Ω

図 7. Turn ON Time vs Input Voltage



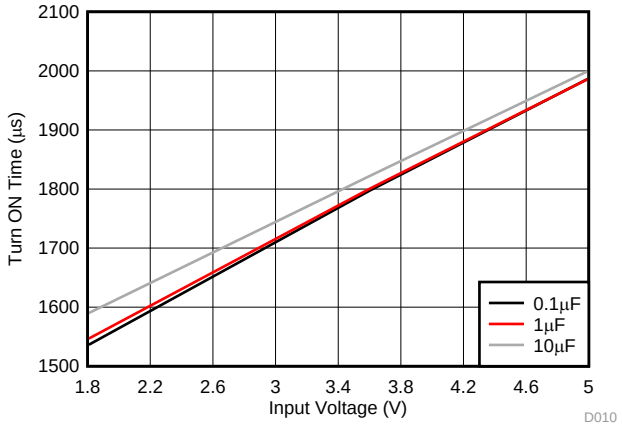
C_L = 0.1 µF R_L = 100 Ω

図 8. Rise Time vs Input Voltage



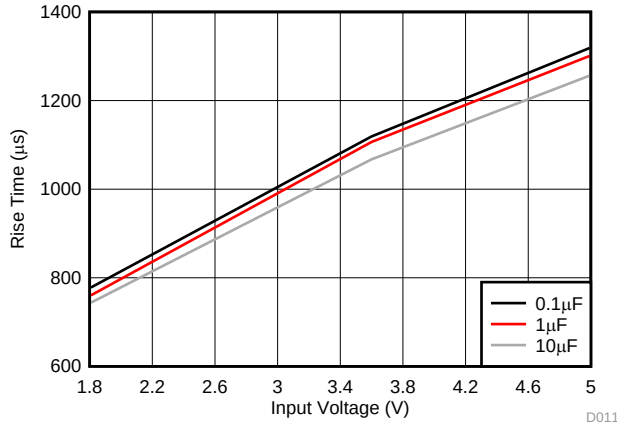
C_L = 0.1 µF R_L = 100 Ω

図 9. Output Slew Rate vs Input Voltage



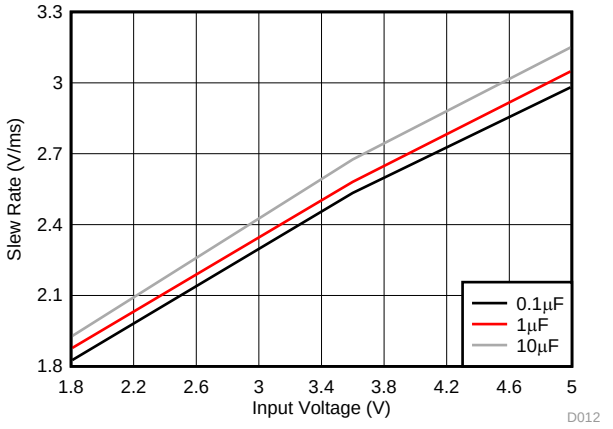
R_L = 100 Ω T_J = 25°C

図 10. Turn ON Time vs Input Voltage Across Load Capacitance



R_L = 100 Ω T_J = 25°C

図 11. Rise Time vs Input Voltage Across Load Capacitance



R_L = 100 Ω T_J = 25°C

図 12. Slew Rate vs Input Voltage Across Load Capacitance

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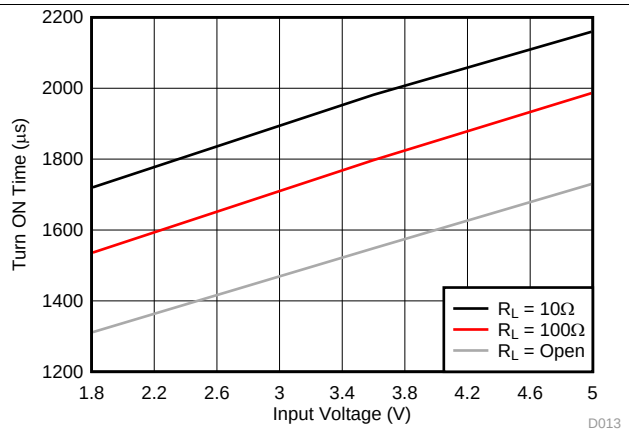
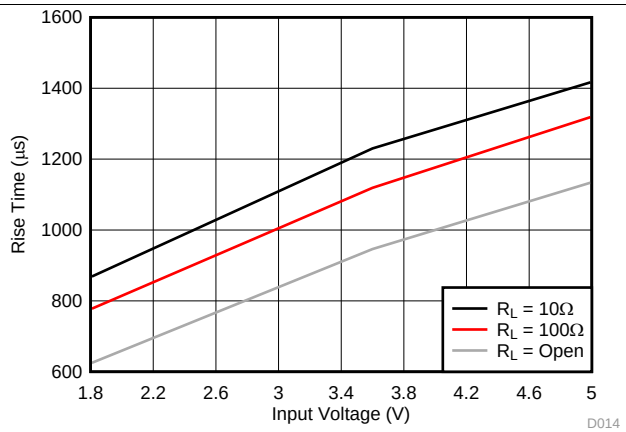
Typical Characteristics (continued)



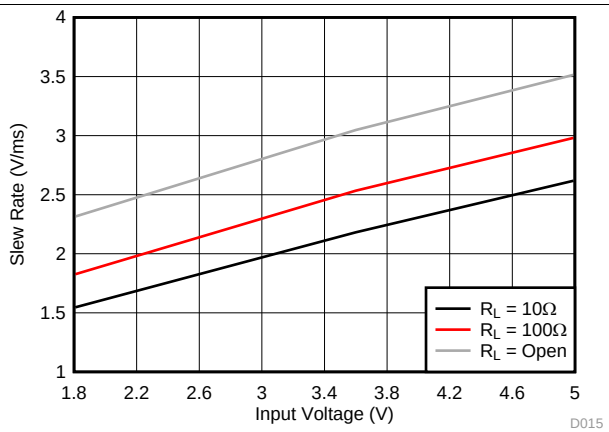
C_L = 0.1 µF T_J = 25°C

図 13. Turn ON Time vs Input Voltage Across Load Resistance



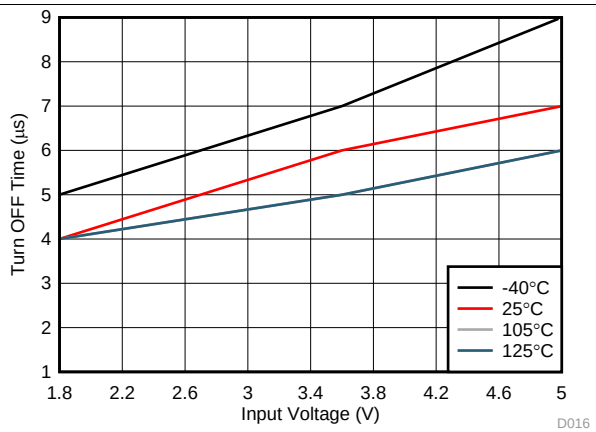
C_L = 0.1 µF T_J = 25°C

図 14. Rise Time vs Input Voltage Across Load Resistance



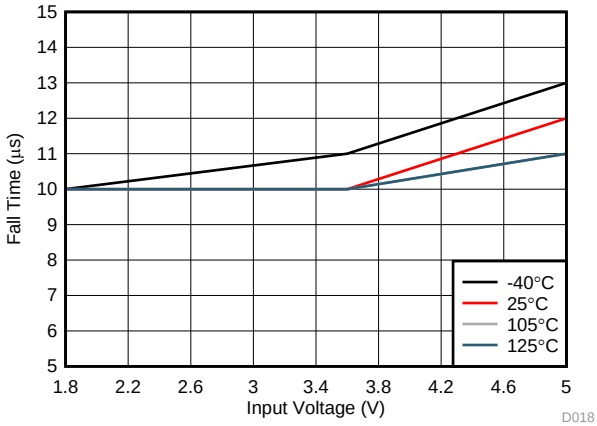
C_L = 0.1 µF T_J = 25°C

図 15. Output Slew Rate vs Input Voltage Across Load Resistance



C_L = 0.1 µF R_L = 100 Ω

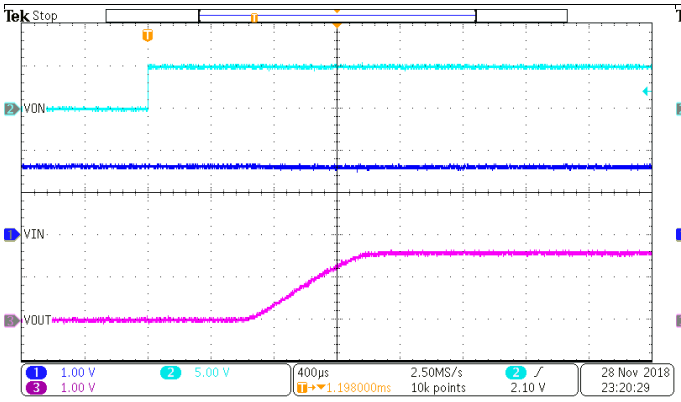
図 16. Turn OFF Time vs Input Voltage



C_L = 0.1 µF R_L = 100 Ω $R_{PD,QOD}$ = Short

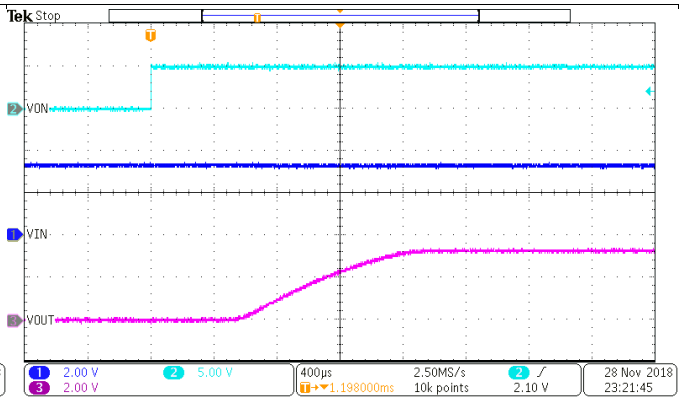
図 17. Fall Time vs Input Voltage

Typical Characteristics (continued)



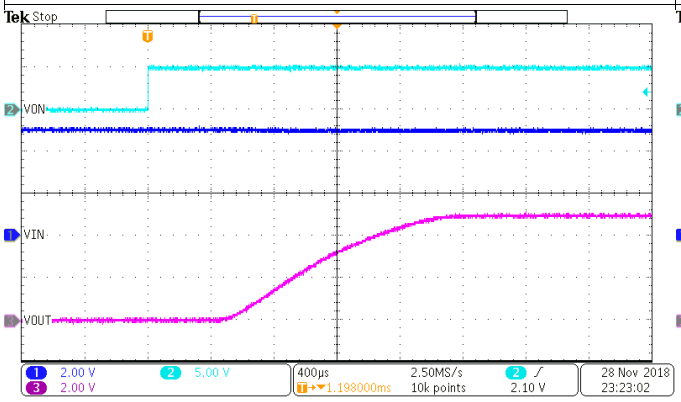
C_L = 0.1 µF R_L = 100 Ω

図 18. Rise Time with VIN = 1.8 V



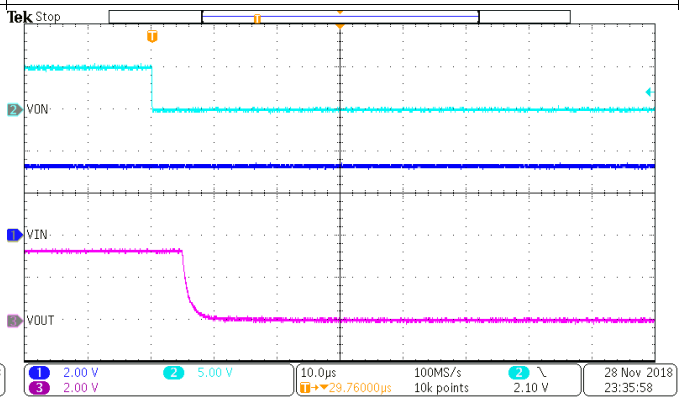
C_L = 0.1 µF R_L = 100 Ω

図 19. Rise Time with VIN = 3.3 V



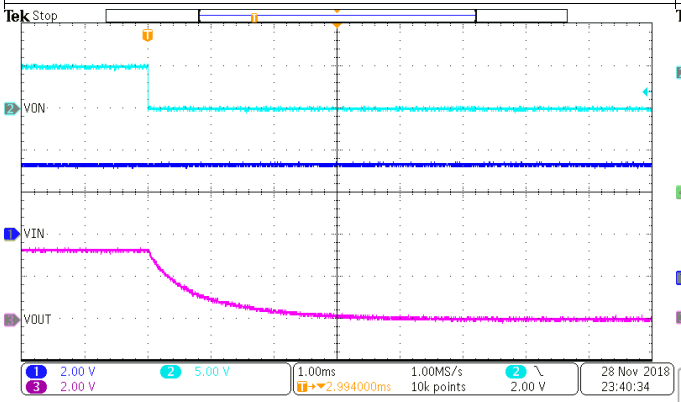
C_L = 0.1 µF R_L = 100 Ω

図 20. Rise Time with VIN = 5 V



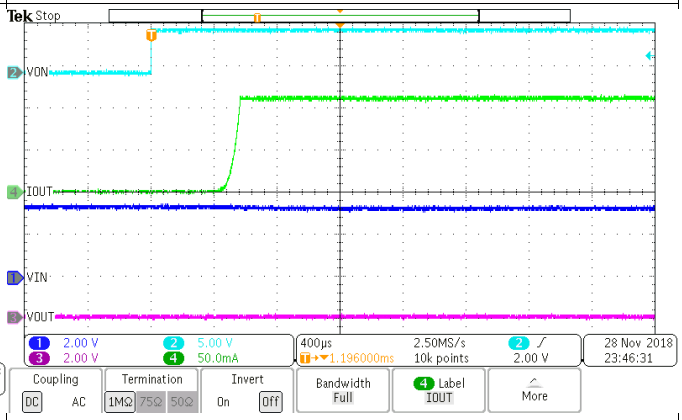
C_L = Open R_L = 100 Ω

図 21. Turn off with a small load capacitance



C_L = 10 µF R_L = 100 Ω

図 22. Turn off with a large load capacitance



V_{IN} = 3.3 V

図 23. Turn on into an output short

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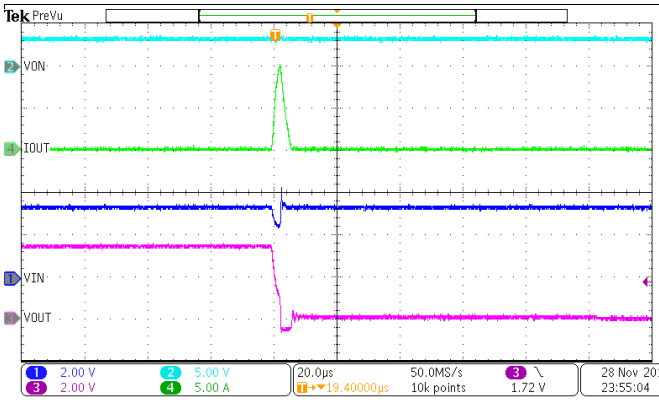
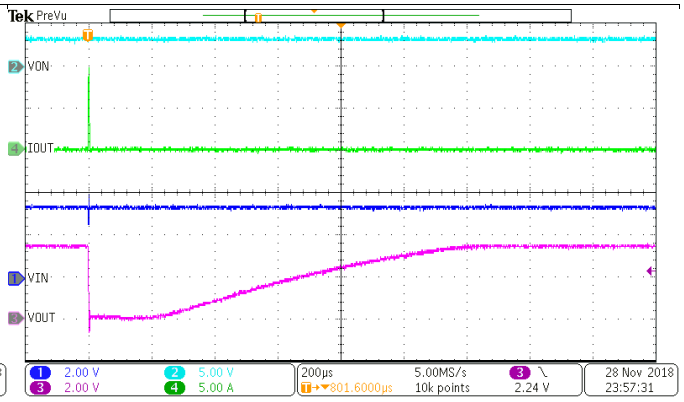
Typical Characteristics (continued)



V_{IN} = 3.3 V

図 24. Hot short event when ON

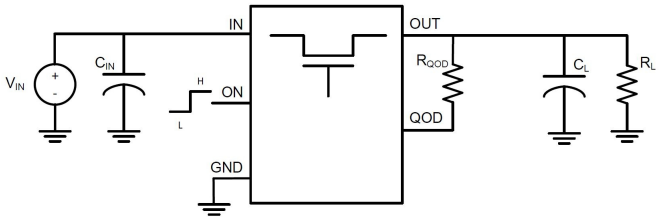


V_{IN} = 3.3 V

図 25. Hot short event when ON and recovery

7 Parameter Measurement Information

7.1 Test Circuit and Timing Waveforms Diagrams



(1) Rise and fall times of the control signal are 100 ns

(2) Turn-off times and fall times are dependent on the time constant at the load. For the TPS22919 devices, the internal pull-down resistance QOD is enabled when the switch is disabled. The time constant is $(R_{QOD} + R_{PD,QOD} \parallel R_L) \times C_L$.

図 26. Test Circuit

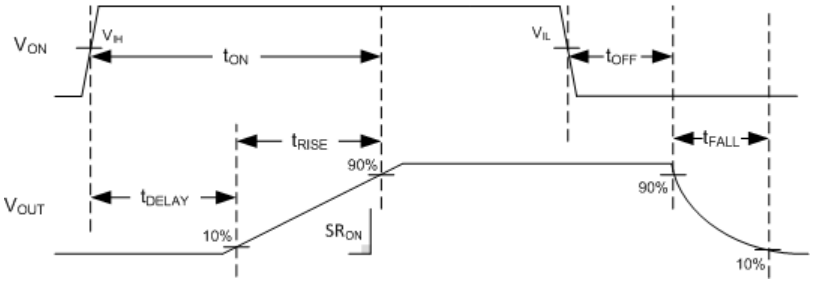


図 27. Timing Waveforms

8 Detailed Description

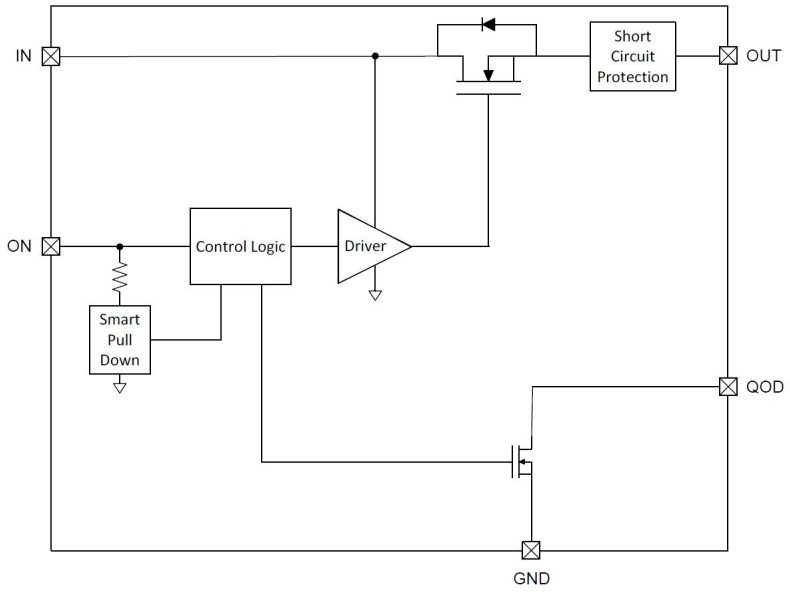
8.1 Overview

The TPS22919 device is a 5.5-V, 1.5-A load switch in a 6-pin SOT-23 package. To reduce voltage drop for low voltage and high current rails, the device implements a low resistance N-channel MOSFET which reduces the drop out voltage across the device.

The TPS22919 device has a slow slew rate which helps reduce or eliminate power supply droop because of large inrush currents. Furthermore, the device features a QOD pin, which allows the configuration of the discharge rate of VOUT once the switch is disabled. During shutdown, the device has very low leakage currents, thereby reducing unnecessary leakages for downstream modules during standby. Integrated control logic, driver, charge pump, and output discharge FET eliminates the need for any external components which reduces solution size and bill of materials (BOM) count.

The TPS22919 load switch is also self-protected, meaning that it will protect itself from short circuit events on the output of the device. It also has thermal shutdown to prevent any damage from overheating.

8.2 Functional Block Diagram



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8.3 Feature Description

8.3.1 On and Off Control

The ON pin controls the state of the switch. The ON pin is compatible with standard GPIO logic threshold so it can be used in a wide variety of applications. When power is first applied to VIN, a Smart Pull Down is used to keep the ON pin from floating until the system sequencing is complete. Once the ON pin is deliberately driven high (≥V_{IH}), the Smart Pull Down is disconnected to prevent unnecessary power loss. See 表 1 when the ON Pin Smart Pull Down is active.

表 1. Smart-ON Pull Down

VON	Pull Down
≤ V_{IL}	Connected
≥ V_{IH}	Disconnected

8.3.2 Output Short Circuit Protection (I_{SC})

The device will limit current to the output in case of output shorts. When a short occurs, the large VIN to VOUT voltage drop causes the switch to limit the output current (I_{SC}) within (t_{SC}). When the output is below the hard short threshold (V_{SC}), a lower limit is used to minimize the power dissipation while the fault is present. The device will continue to limit the current until it reaches its thermal shutdown temperature. At this time, the device will turn off until its temperature has lowered by the thermal hysteresis (35°C typical) before turning on again.

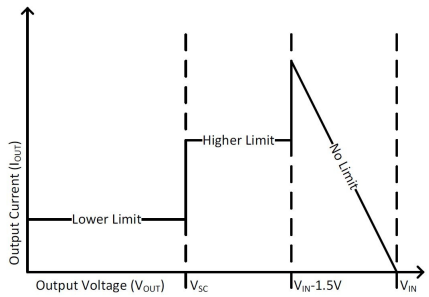

図 28. Output Short Circuit Current Limit

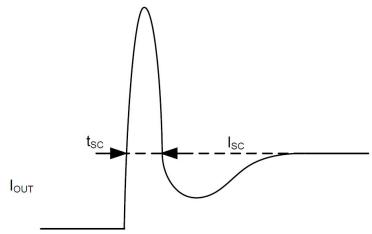

図 29. Output Short Circuit Response

8.3.3 Fall Time (t_{FALL}) and Quick Output Discharge (QOD)

The TPS22919 device includes a QOD pin that can be configured in one of three ways:

- QOD pin shorted to VOUT pin. Using this method, the discharge rate after the switch becomes disabled is controlled with the value of the internal resistance QOD ($R_{PD,QOD}$).
- QOD pin connected to VOUT pin using an external resistor R_{QOD}. After the switch becomes disabled, the discharge rate is controlled by the value of the total discharge resistance. To adjust the total discharge resistance, 式 1 can be used:

  $R_{DIS} = R_{PD,QOD} + R_{QOD}$

  Where:

  - R_{DIS} = Total output discharge resistance (Ω)

- $R_{PD,QOD}$ = Internal pulldown resistance (Ω)
- R_{QOD} = External resistance placed between the VOUT and QOD pins (Ω) (1)

- QOD pin is unused and left floating. Using this method, there will be no quick output discharge functionality, and the output will remain floating after the switch is disabled.

The fall times of the device depend on many factors including the total discharge resistance (R_{DIS}) and the output capacitance (C_L). To calculate the approximate fall time of V_{OUT} use 式 2.

$$t_{FALL} = 2.2 \times (R_{DIS} \parallel R_L) \times C_L$$

Where:

- t_{FALL} = Output Fall Time from 90% to 10% (µs)
- R_{DIS} = Total QOD + R_{QOD} Resistance (Ω)
- R_L = Output Load Resistance (Ω)
- C_L = Output Load Capacitance (µF) (2)

8.3.3.1 QOD When System Power is Removed

The adjustable QOD can be used to control the power down sequencing of a system even when the system power supply is removed. When the power is removed, the input capacitor discharges at V_{IN}. Past a certain V_{IN} level, the strength of the R_{PD} will be reduced. If there is still remaining charge on the output capacitor, this will result in longer fall times. For further information regarding this condition, see the *Setting Fall Time for Shutdown Power Sequencing* section.

8.4 Device Functional Modes

表 2 describes the connection of the VOUT pin depending on the state of the ON pin as well as the various QOD pin configurations.

表 2. VOUT Connection

ON	QOD CONFIGURATION	TPS22919 VOUT
L	QOD pin connected to VOUT with R_{QOD}	GND ($R_{PD, QOD}$ + R_{QOD})
L	QOD pin tied to VOUT directly	GND ($R_{PD, QOD}$)
L	QOD pin left open	Floating
H	N/A	VIN

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9 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. Customers should validate and test their design implementation to confirm system functionality.

9.1 Application Information

This section highlights some of the design considerations when implementing this device in various applications.

9.2 Typical Application

This typical application demonstrates how the TPS22919 devices can be used to power downstream modules.

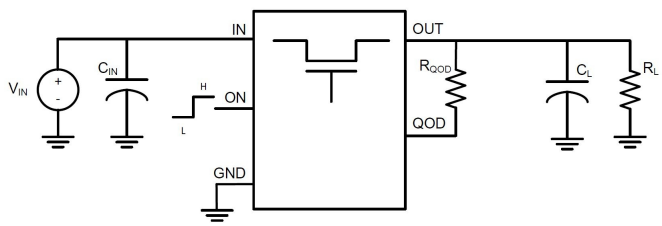

図 30. Typical Application Schematic

9.2.1 Design Requirements

For this design example, use the values listed in 表 3 as the design parameters:

表 3. Design Parameters

DESIGN PARAMETER	EXAMPLE VALUE
Input Voltage (V_{IN})	3.6 V
Load Current / Resistance (R_L)	1 kΩ
Load Capacitance (C_L)	47 µF
Minimum Fall Time (t_F)	40 ms
Maximum Inrush Current (I_{RUSH})	150 mA

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9.2.2 Detailed Design Procedure

9.2.2.1 Limiting Inrush Current

Use 式 3 to find the maximum slew rate value to limit inrush current for a given capacitance:

$$(\text{Slew Rate}) = I_{RUSH} \div C_L$$

where

- I_{INRUSH} = maximum acceptable inrush current (mA)
- C_L = capacitance on VOUT (µF)
- Slew Rate = Output Slew Rate during turn on (mV/µs) (3)

Based on 式 3, the required slew rate to limit the inrush current to 150 mA is 3.2 mV/µs. The TPS22919 has a slew rate of 2.3 mV/µs, so the inrush current will be below 150 mA.

9.2.2.2 Setting Fall Time for Shutdown Power Sequencing

Microcontrollers and processors often have a specific shutdown sequence in which power must be removed. Using the adjustable Quick Output Discharge function of the TPS22919 device, adding a load switch to each power rail can be used to manage the power down sequencing. To determine the QOD values for each load switch, first confirm the power down order of the device you wish to power sequence. Be sure to check if there are voltage or timing margins that must be maintained during power down.

Once the required fall time is determined, the maximum external discharge resistance (R_{DIS}) value can be found using 式 2:

$$t_{FALL} = 2.2 \times (R_{DIS} \parallel R_L) \times C_L \quad (4)$$

$$R_{DIS} = 630\ \Omega \quad (5)$$

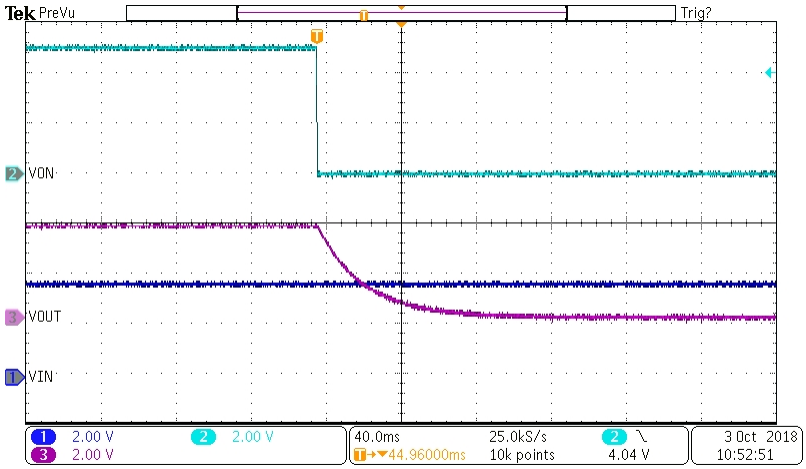
式 1 can then be used to calculate the R_{QOD} resistance needed to achieve a particular discharge value:

$$R_{DIS} = QOD + R_{QOD} \quad (6)$$

$$R_{QOD} = 600\ \Omega \quad (7)$$

To ensure a fall time greater than, choose an R_{QOD} value greater than 600 Ω.

9.2.2.3 Application Curves



A.

C_L = 47µF

図 31. Fall Time (R_{QOD} = 1 kΩ)

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10 Power Supply Recommendations

The device is designed to operate with a VIN range of 1.6 V to 5.5 V. The VIN power supply must be well regulated and placed as close to the device terminal as possible. The power supply must be able to withstand all transient load current steps. In most situations, using an input capacitance (C_{IN}) of 1 μF is sufficient to prevent the supply voltage from dipping when the switch is turned on. In cases where the power supply is slow to respond to a large transient current or large load current step, additional bulk capacitance may be required on the input.

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11 Layout

11.1 Layout Guidelines

For best performance, all traces must be as short as possible. To be most effective, the input and output capacitors must be placed close to the device to minimize the effects that parasitic trace inductances may have on normal operation. Using wide traces for VIN, VOUT, and GND helps minimize the parasitic electrical effects.

11.2 Layout Example

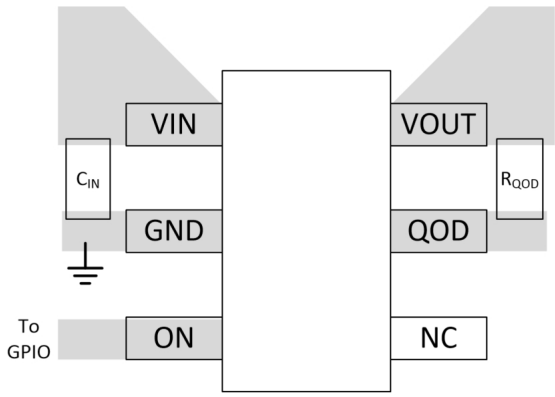

図 32. Recommended Board Layout

11.3 Thermal Considerations

The maximum IC junction temperature should be restricted to 125°C under normal operating conditions. To calculate the maximum allowable dissipation, $P_{D(max)}$ for a given output current and ambient temperature, use 式 8:

$$P_{D(MAX)} = \frac{T_{J(MAX)} - T_A}{\theta_{JA}}$$

where

- $P_{D(MAX)}$ = maximum allowable power dissipation
- $T_{J(MAX)}$ = maximum allowable junction temperature (125°C for the TPS22919 devices)
- T_A = ambient temperature of the device
- θ_{JA} = junction to air thermal impedance. Refer to the Thermal Parameters table. This parameter is highly dependent upon board layout. (8)

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12 デバイスおよびドキュメントのサポート

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12.2 コミュニティ・リソース

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Design Support ***TI's Design Support*** Quickly find helpful E2E forums along with design support tools and contact information for technical support.

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静電気放電はわずかな性能の低下から完全なデバイスの故障に至るまで、様々な損傷を与えます。高精度の集積回路は、損傷に対して敏感であり、極めてわずかなパラメータの変化により、デバイスに規定された仕様に適合しなくなる場合があります。

12.5 Glossary

SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

13 メカニカル、パッケージ、および注文情報

以降のページには、メカニカル、パッケージ、および注文に関する情報が記載されています。この情報は、そのデバイスについて利用可能な最新のデータです。このデータは予告なく変更されることがあり、ドキュメントが改訂される場合もあります。本データシートのブラウザ版を使用されている場合は、画面左側の説明をご覧ください。

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
PTPS22919DCKR	Obsolete	Preproduction	SC70 (DCK) | 6	-	-	Call TI	Call TI	-40 to 125	
TPS22919DCKR	Active	Production	SC70 (DCK) | 6	3000 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 105	1CS
TPS22919DCKR.A	Active	Production	SC70 (DCK) | 6	3000 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	1CS
TPS22919DCKT	Active	Production	SC70 (DCK) | 6	250 | SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 105	1CS
TPS22919DCKT.A	Active	Production	SC70 (DCK) | 6	250 | SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	1CS

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

(4) **Lead finish/Ball material:** Parts 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.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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OTHER QUALIFIED VERSIONS OF TPS22919 :

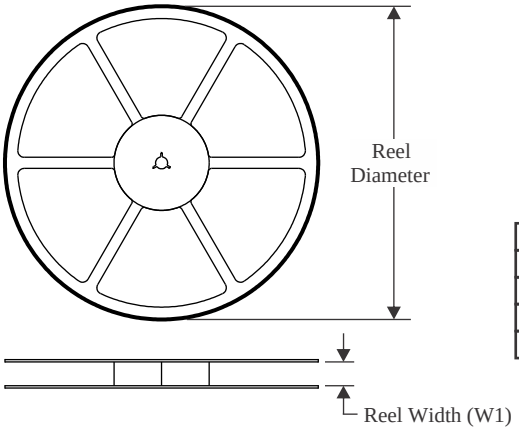
- Automotive : TPS22919-Q1

NOTE: Qualified Version Definitions:

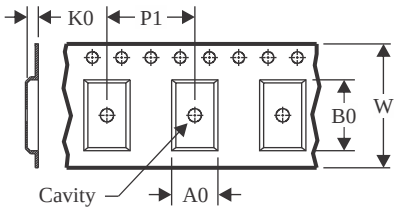
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

TAPE AND REEL INFORMATION

REEL DIMENSIONS

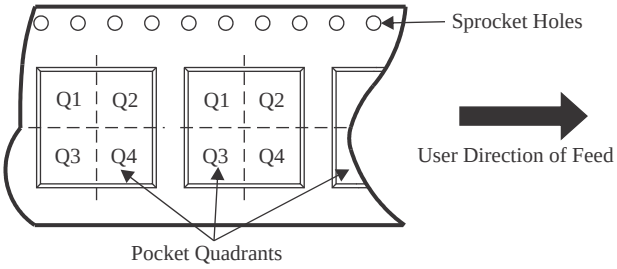


TAPE DIMENSIONS



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

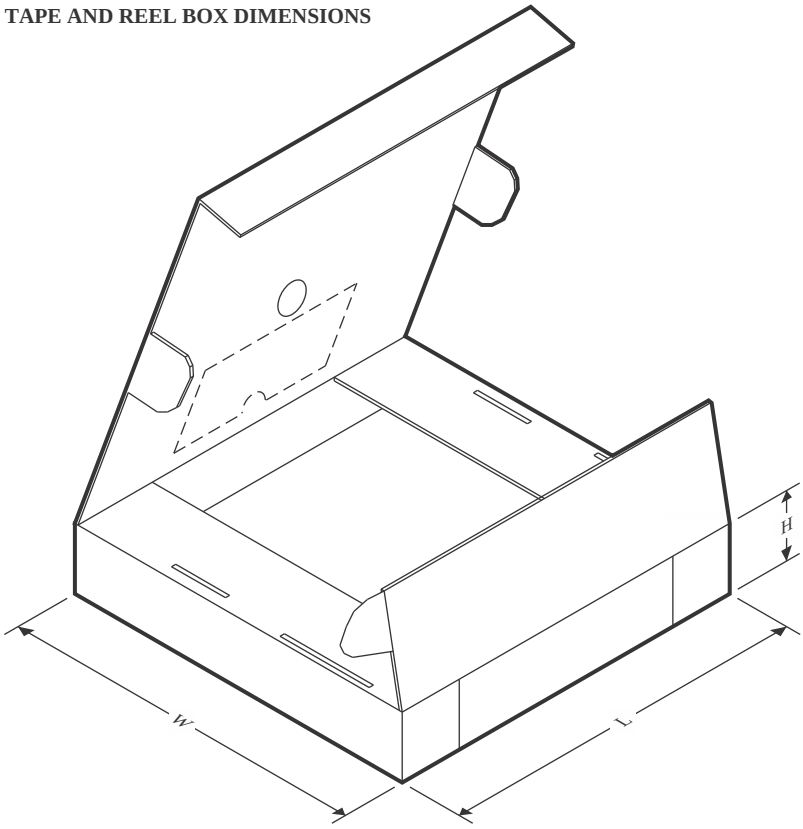
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

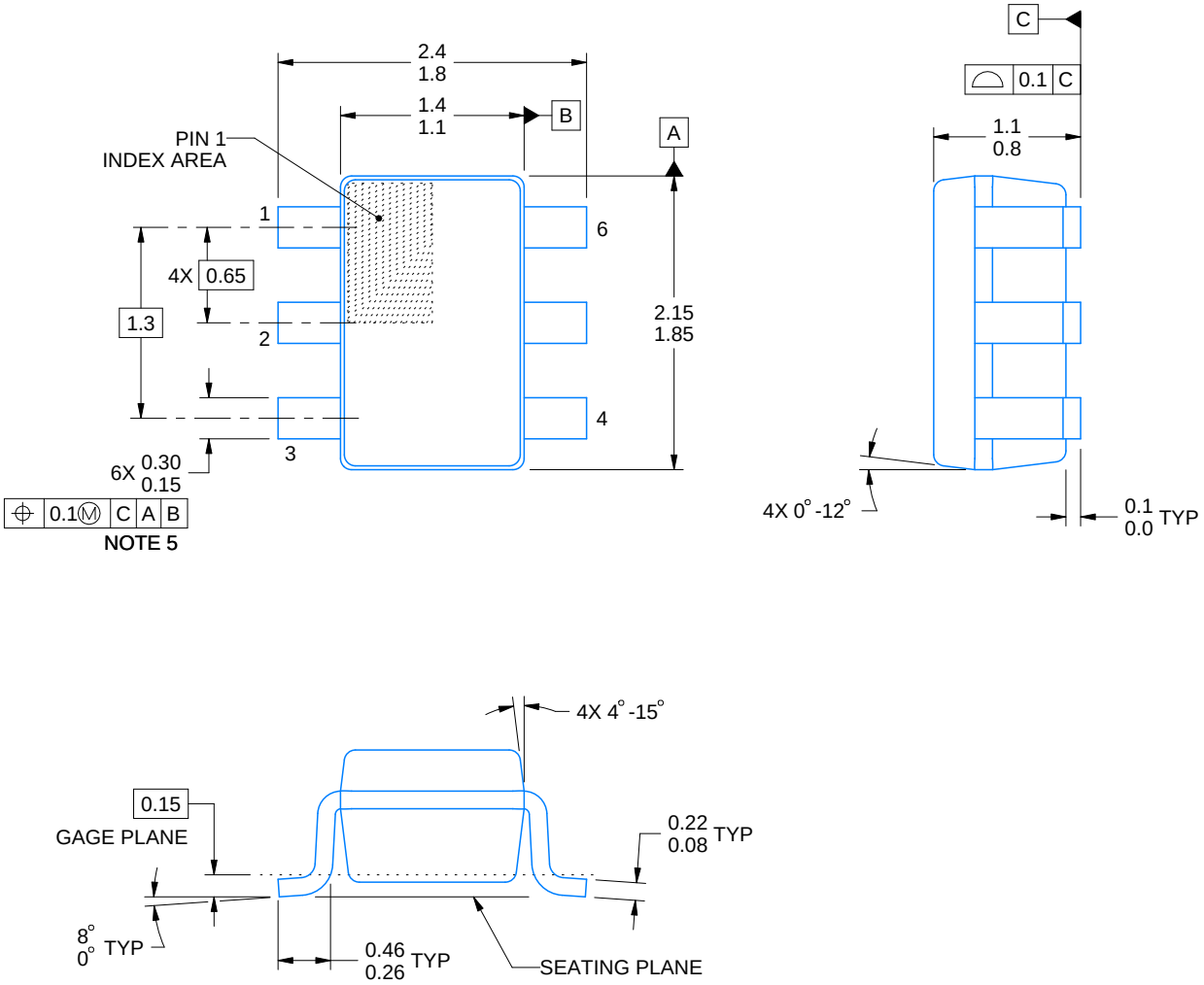
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TPS22919DCKR	SC70	DCK	6	3000	178.0	9.0	2.4	2.5	1.2	4.0	8.0	Q3
TPS22919DCKR	SC70	DCK	6	3000	180.0	8.4	2.3	2.5	1.2	4.0	8.0	Q3
TPS22919DCKT	SC70	DCK	6	250	180.0	8.4	2.3	2.5	1.2	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS22919DCKR	SC70	DCK	6	3000	180.0	180.0	18.0
TPS22919DCKR	SC70	DCK	6	3000	210.0	185.0	35.0
TPS22919DCKT	SC70	DCK	6	250	210.0	185.0	35.0



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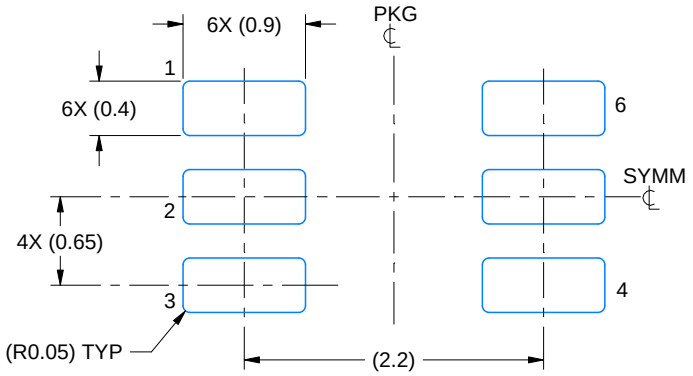
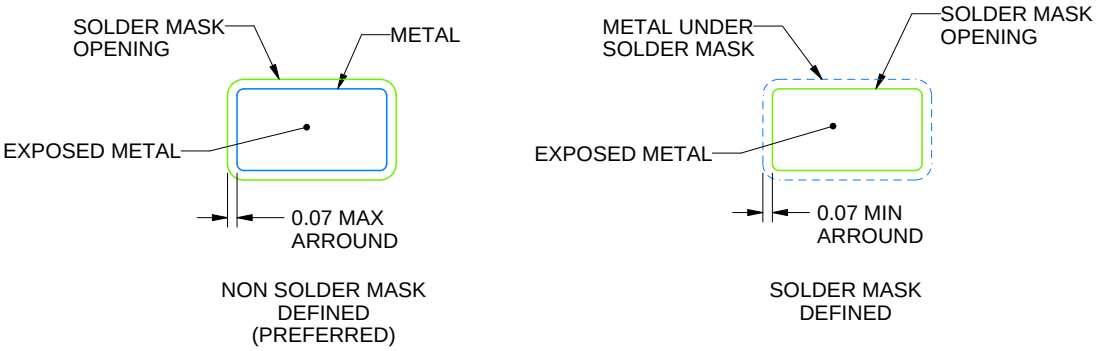
NOTES:

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. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
4. Falls within JEDEC MO-203 variation AB.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:18X



SOLDER MASK DETAILS

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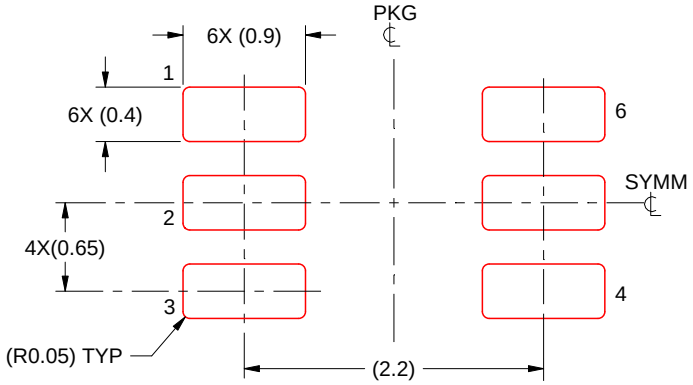
NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOLDER PASTE EXAMPLE
BASED ON 0.125 THICK STENCIL
SCALE:18X

4214835/D 11/2024

NOTES: (continued)

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

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