

# ULTRA SMALL, LOW-INPUT VOLTAGE, LOW $r_{ON}$ LOAD SWITCH

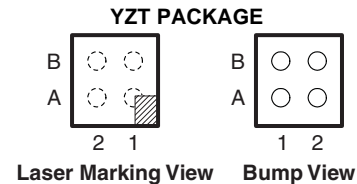
Check for Samples: [TPS22907](#)

## FEATURES

- Low Input Voltage: 1.1 V to 3.6 V
- Ultra-Low ON-State Resistance
  - $r_{ON} = 44 \text{ m}\Omega$  at  $V_{IN} = 3.6 \text{ V}$
  - $r_{ON} = 50 \text{ m}\Omega$  at  $V_{IN} = 2.5 \text{ V}$
  - $r_{ON} = 58 \text{ m}\Omega$  at  $V_{IN} = 1.8 \text{ V}$
  - $r_{ON} = 83 \text{ m}\Omega$  at  $V_{IN} = 1.2 \text{ V}$
- 1-A Maximum Continuous Switch Current
- Quiescent Current  $< 1 \mu\text{A}$
- Shutdown Current  $< 1 \mu\text{A}$
- Low Control Input Thresholds Enable Use of Low-Voltage Logic
- Controlled Slew Rate to Avoid Inrush Currents
- ESD Performance Tested Per JESD 22
  - 3000-V Human-Body Model (A114-B, Class II)
  - 1000-V Charged-Device Model (C101)
- Ultra Small Four-Terminal Wafer Chip Scale Package (WCSP)
  - 0.9 mm  $\times$  0.9 mm, 0.5-mm Pitch, 0.5-mm Height

## APPLICATIONS

- Battery Powered Equipment
- Portable Industrial Equipment
- Portable Medical Equipment
- Portable Media Players
- Point Of Sales Terminal
- GPS Devices
- Digital Cameras
- Portable Instrumentation
- Smartphones


**Table 1. TERMINAL ASSIGNMENTS**

<b>B</b>	ON	GND
<b>A</b>	$V_{IN}$	$V_{OUT}$
	<b>2</b>	<b>1</b>

## DESCRIPTION

The TPS22907 is an ultra small, low  $R_{ON}$  load switch with controlled turn on. The device contains a P-channel MOSFET that operates over an input voltage range of 1.1 V to 3.6 V. The switch is controlled by an on/off input (ON), which is capable of interfacing directly with low-voltage control signals.

The TPS22907 is available in a space-saving 4-terminal WCSP with 0.5-mm pitch (YZT). The device is characterized for operation over the free-air temperature range of  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

DEVICE	$r_{ON}$ (TYP at 1.8 V)	SLEW RATE (TYP at 1.8 V)	MAXIMUM OUTPUT CURRENT	ENABLE
TPS22907	58 m $\Omega$	36 $\mu\text{s}$	1000 mA	Active high

## ORDERING INFORMATION

$T_A$	PACKAGE <sup>(1)</sup> <sup>(2)</sup>	ORDERABLE PART NUMBER	TOP-SIDE MARKING
$-40^{\circ}\text{C}$ to $85^{\circ}\text{C}$	WCSP – YZT (0.5-mm pitch)      Tape and reel	TPS22907YZTR	___5K <sup>(3)</sup>

(1) Package drawings, thermal data, and symbolization are available at [www.ti.com/packaging](http://www.ti.com/packaging).

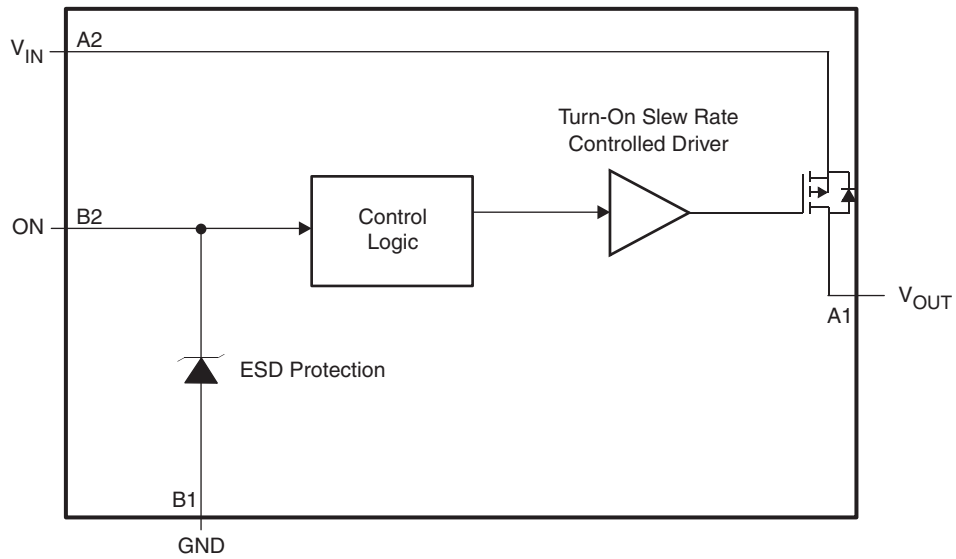
(2) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at [www.ti.com](http://www.ti.com).

(3) The actual top-side marking has three preceding characters to denote year, month, and sequence code, and one following character to designate the wafer fab/assembly site. Pin 1 identifier indicates solder-bump composition (1 = SnPb, • = Pb-free).



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

**FUNCTIONAL BLOCK DIAGRAM**



**FUNCTION TABLE**

ON (Control Input)	V <sub>IN</sub> to V <sub>OUT</sub>
L	OFF
H	ON

**TERMINAL FUNCTIONS**

TERMINAL		DESCRIPTION
BALL NO.	NAME	
A1	V <sub>OUT</sub>	Switch output
A2	V <sub>IN</sub>	Switch input. Bypass this input with a ceramic capacitor to ground.
B1	GND	Ground
B2	ON	Switch control input. Active high, do not leave floating

**ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>**

		MIN	MAX	UNIT
V <sub>IN</sub>	Input voltage range	-0.3	4	V
V <sub>OUT</sub>	Output voltage range		V <sub>IN</sub> + 0.3	V
V <sub>ON</sub>	Input voltage range	-0.3	4	V
I <sub>MAX</sub>	Maximum continuous switch current, T <sub>A</sub> = -40°C to 85°C		1	A
I <sub>PLS</sub>	Maximum pulsed current (100-μs pulse, 2% duty cycle), T <sub>A</sub> = -40°C to 85°C		2.7	A
T <sub>A</sub>	Operating free-air temperature range	-40	85	°C
T <sub>stg</sub>	Storage temperature range	-65	150	°C
ESD	Electrostatic discharge protection	Human-Body Model (HBM)		V
		Charged-Device Model (CDM)		
			3000	
			1000	

- (1) Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

**DISSIPATION RATINGS**

BOARD	PACKAGE	R <sub>θJC</sub>	R <sub>θJA</sub>	DERATING FACTOR ABOVE T <sub>A</sub> = 25°C	T <sub>A</sub> < 25°C	T <sub>A</sub> = 70°C	T <sub>A</sub> = 85°C
High-K <sup>(1)</sup>	YZT	28.6°C/W	116.32°C/W	-8.5969 mW/°C	859.69 mW	472.83 mW	343.87 mW

- (1) The JEDEC high-K (2s2p) board used to derive this data was a 3- x 3-inch, multilayer board with 1-ounce internal power and ground planes and 2-ounce copper traces on top and bottom of the board.

**RECOMMENDED OPERATING CONDITIONS**

		MIN	MAX	UNIT
V <sub>IN</sub>	Input voltage range	1.1	3.6	V
V <sub>OUT</sub>	Output voltage range		V <sub>IN</sub>	V
V <sub>IH</sub>	High-level input voltage, ON	0.85	3.6	V
V <sub>IL</sub>	Low-level input voltage, ON		0.4	V
C <sub>IN</sub>	Input capacitor	1 <sup>(1)</sup>		μF

- (1) See [Application Information](#).

**ELECTRICAL CHARACTERISTICS**

V<sub>IN</sub> = 1.1 V to 3.6 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS		T <sub>A</sub> <sup>(1)</sup>	MIN	TYP <sup>(2)</sup>	MAX	UNIT			
I <sub>IN</sub>	Quiescent current	I <sub>OUT</sub> = 0, V <sub>IN</sub> = V <sub>ON</sub>				0.07	1	μA			
I <sub>IN(OFF)</sub>	Off supply current	V <sub>ON</sub> = GND, OUT = Open				0.05	1	μA			
I <sub>IN(LEAKAGE)</sub>	Leakage current	V <sub>ON</sub> = GND, V <sub>OUT</sub> = 0				0.05	1	μA			
r <sub>ON</sub>	ON-state resistance	V <sub>IN</sub> = 3.6 V, I <sub>OUT</sub> = -200 mA		25°C		44	60	mΩ			
				Full range			67				
		V <sub>IN</sub> = 2.5 V, I <sub>OUT</sub> = -200 mA		25°C		50	63				
				Full range			70				
		V <sub>IN</sub> = 1.8 V, I <sub>OUT</sub> = -200 mA		25°C		58	72				
				Full range			80				
		V <sub>IN</sub> = 1.2 V, I <sub>OUT</sub> = -200 mA		25°C		83	106				
				Full range			117				
		V <sub>IN</sub> = 1.1 V, I <sub>OUT</sub> = -200 mA		25°C		97	125				
				Full range			140				
		I <sub>ON</sub>	ON input leakage current	V <sub>ON</sub> = 1.1 V to 3.6 V or GND		Full range			0.005	1	μA

(1) Full range T<sub>A</sub> = -40°C to 85°C

(2) Typical values are at the specified V<sub>IN</sub> and T<sub>A</sub> = 25°C.

**SWITCHING CHARACTERISTICS**

V<sub>IN</sub> = 3.6 V, T<sub>A</sub> = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
t <sub>ON</sub>	Turn-ON time	R <sub>L</sub> = 500 Ω	C <sub>L</sub> = 0.1 μF		28		μs
t <sub>OFF</sub>	Turn-OFF time	R <sub>L</sub> = 500 Ω	C <sub>L</sub> = 0.1 μF		40		μs
t <sub>r</sub>	V <sub>OUT</sub> rise time	R <sub>L</sub> = 500 Ω	C <sub>L</sub> = 0.1 μF		25		μs
t <sub>f</sub>	V <sub>OUT</sub> fall time	R <sub>L</sub> = 500 Ω	C <sub>L</sub> = 0.1 μF		116		μs

**SWITCHING CHARACTERISTICS**

V<sub>IN</sub> = 1.8 V, T<sub>A</sub> = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
t <sub>ON</sub>	Turn-ON time	R <sub>L</sub> = 500 Ω	C <sub>L</sub> = 0.1 μF		48		μs
t <sub>OFF</sub>	Turn-OFF time	R <sub>L</sub> = 500 Ω	C <sub>L</sub> = 0.1 μF		40		μs
t <sub>r</sub>	V <sub>OUT</sub> rise time	R <sub>L</sub> = 500 Ω	C <sub>L</sub> = 0.1 μF		36		μs
t <sub>f</sub>	V <sub>OUT</sub> fall time	R <sub>L</sub> = 500 Ω	C <sub>L</sub> = 0.1 μF		113		μs

**SWITCHING CHARACTERISTICS**

V<sub>IN</sub> = 1.1 V, T<sub>A</sub> = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
t <sub>ON</sub>	Turn-ON time	R <sub>L</sub> = 500 Ω	C <sub>L</sub> = 0.1 μF		81		μs
t <sub>OFF</sub>	Turn-OFF time	R <sub>L</sub> = 500 Ω	C <sub>L</sub> = 0.1 μF		42		μs
t <sub>r</sub>	V <sub>OUT</sub> rise time	R <sub>L</sub> = 500 Ω	C <sub>L</sub> = 0.1 μF		57		μs
t <sub>f</sub>	V <sub>OUT</sub> fall time	R <sub>L</sub> = 500 Ω	C <sub>L</sub> = 0.1 μF		113		μs

TYPICAL CHARACTERISTICS

ON-STATE RESISTANCE  
vs  
INPUT VOLTAGE

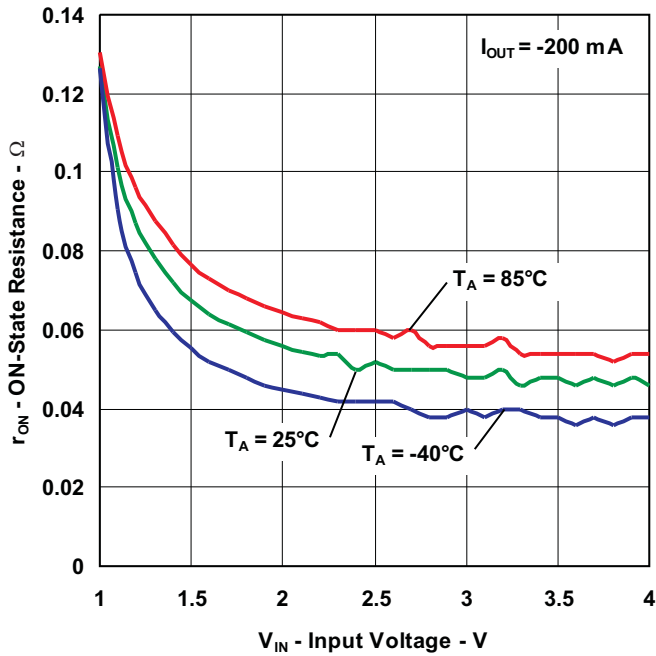


Figure 1.

ON-STATE RESISTANCE  
vs  
TEMPERATURE

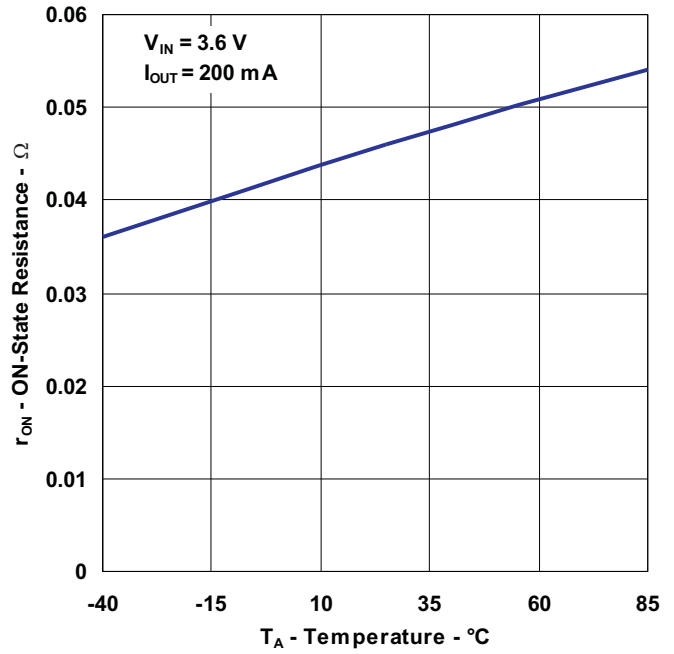


Figure 2.

QUIESCENT CURRENT  
vs  
INPUT VOLTAGE

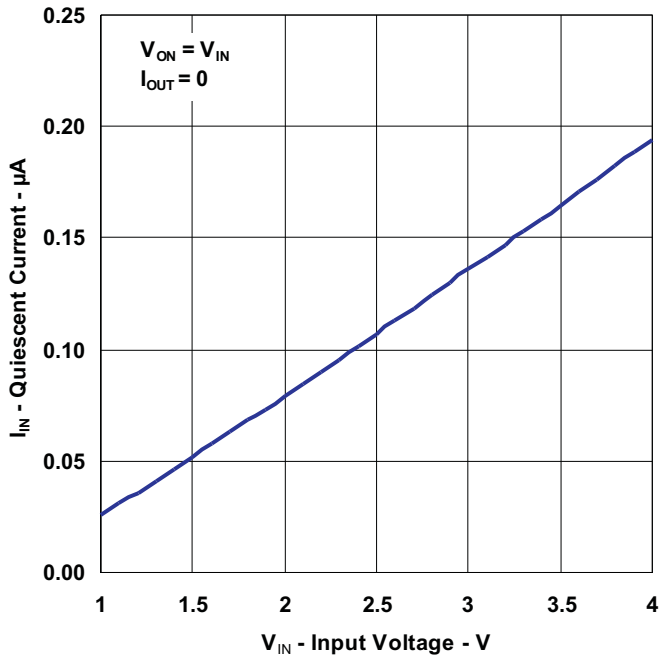


Figure 3.

QUIESCENT CURRENT  
vs  
TEMPERATURE

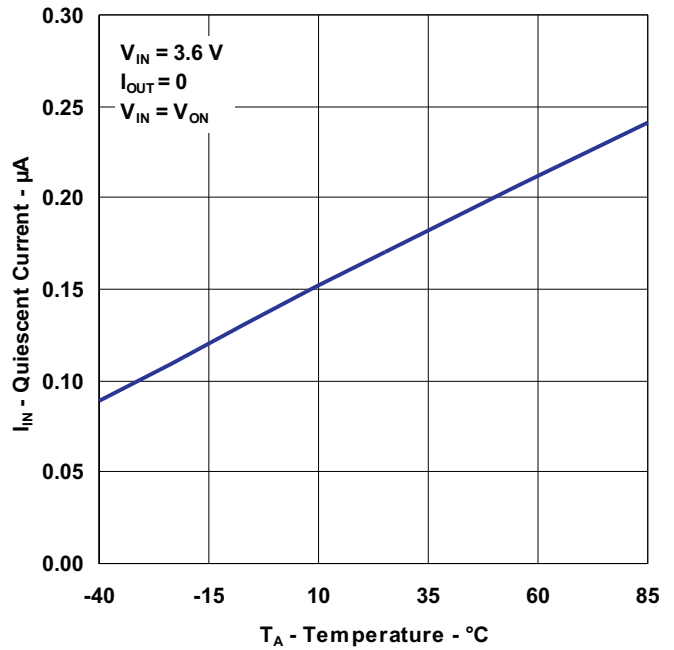


Figure 4.

TYPICAL CHARACTERISTICS (continued)

OFF SUPPLY CURRENT  
VS  
INPUT VOLTAGE

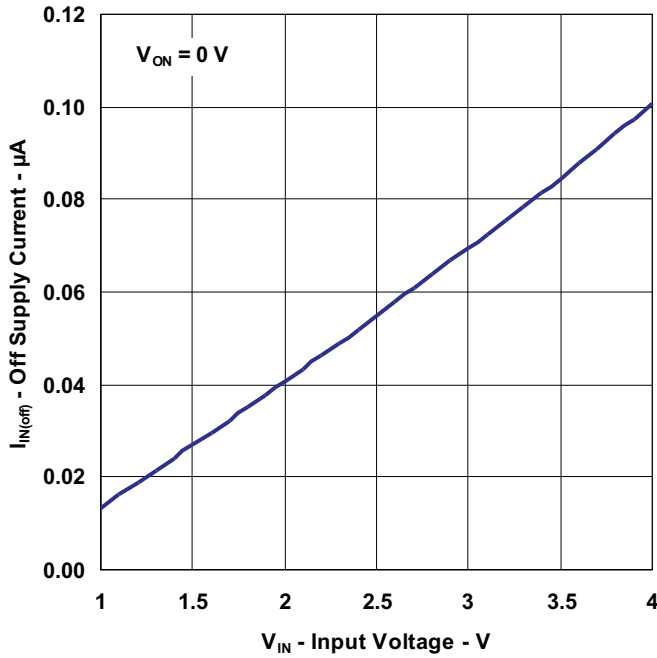


Figure 5.

OFF SUPPLY CURRENT  
VS  
TEMPERATURE

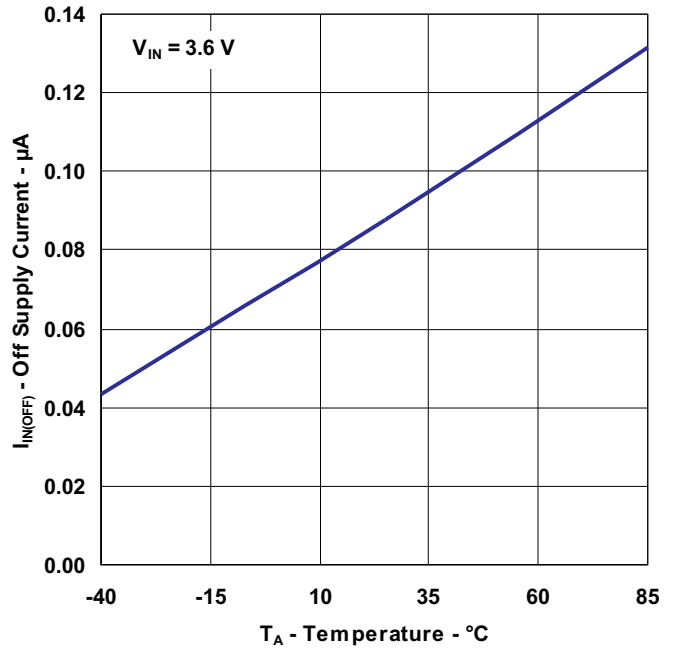


Figure 6.

LEAKAGE CURRENT  
VS  
INPUT VOLTAGE

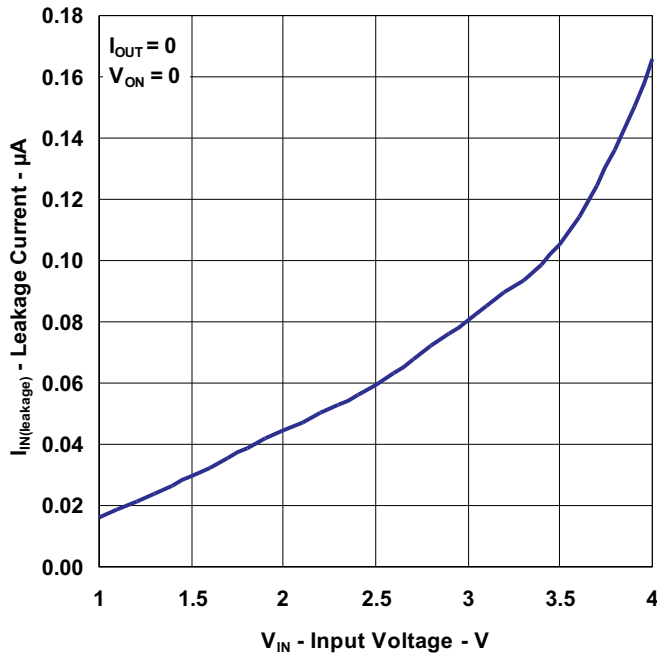


Figure 7.

LEAKAGE CURRENT  
VS  
TEMPERATURE

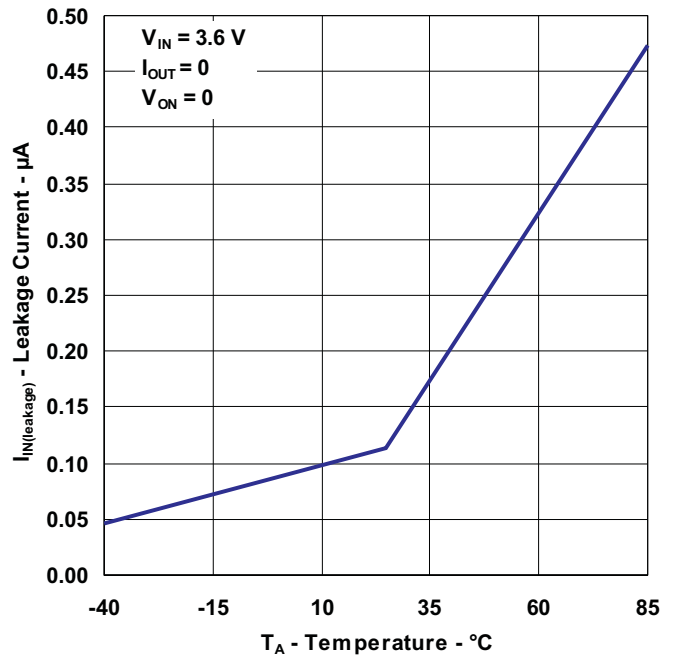
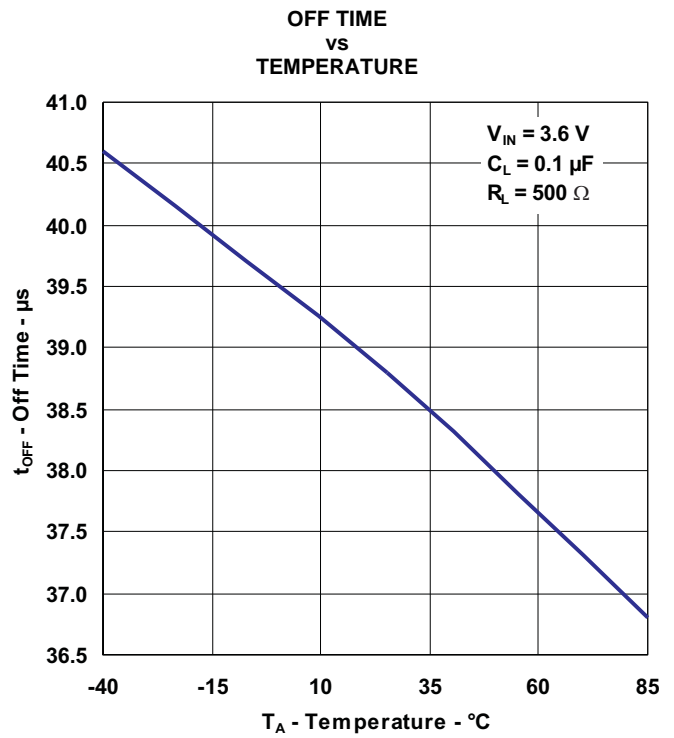
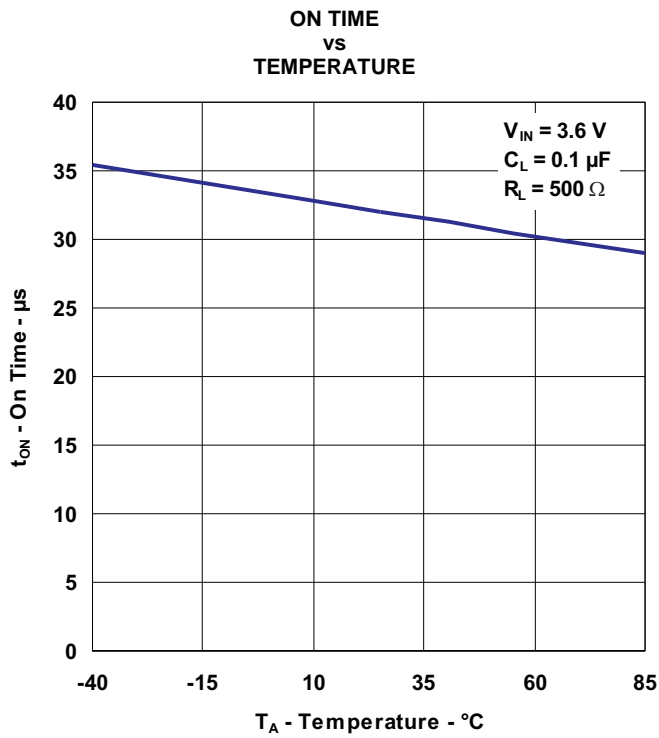
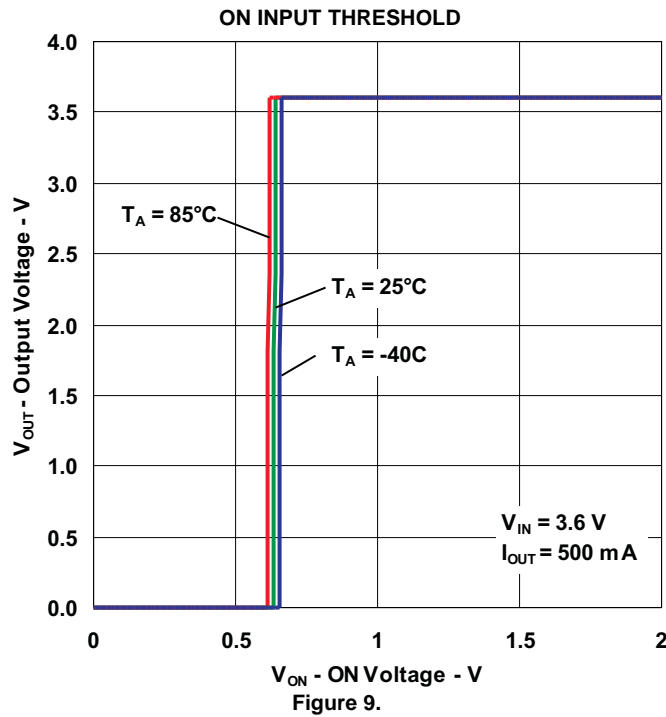


Figure 8.

TYPICAL CHARACTERISTICS (continued)



TYPICAL CHARACTERISTICS (continued)

RISE TIME  
VS  
TEMPERATURE

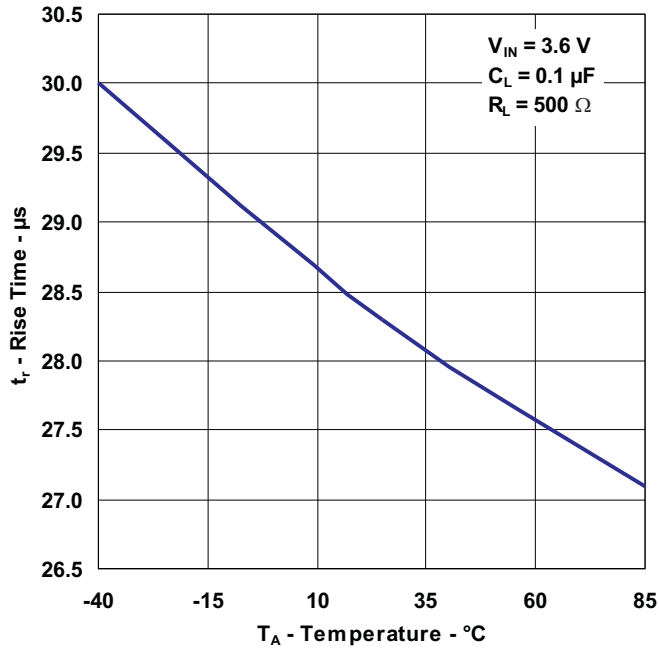


Figure 12.

FALL TIME  
VS  
TEMPERATURE

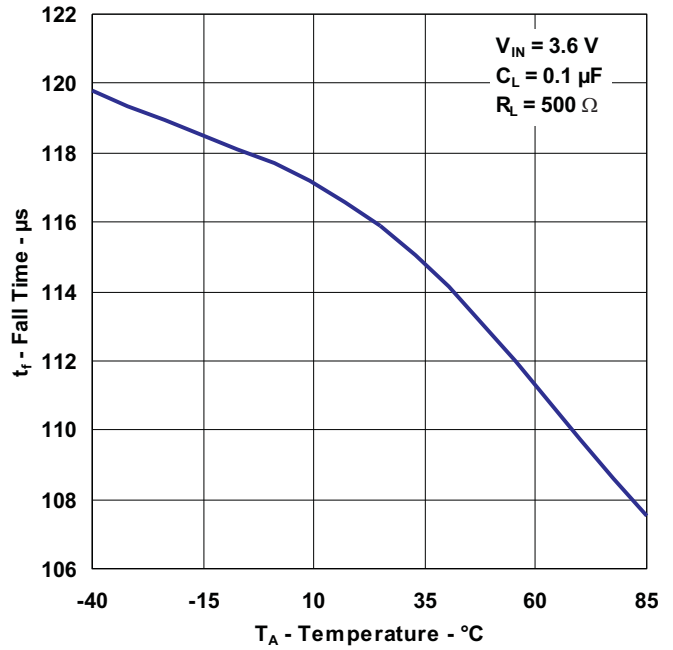


Figure 13.

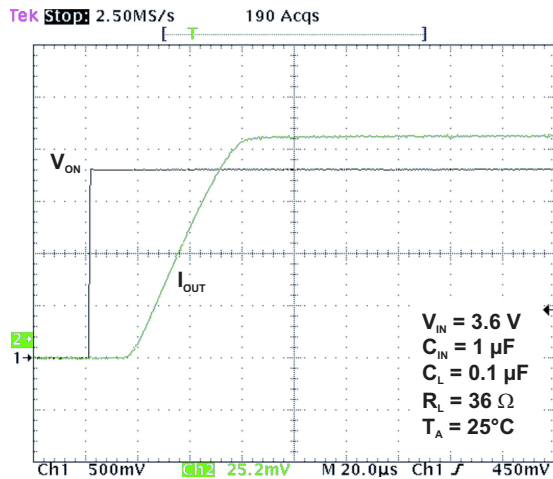


Figure 14. t<sub>ON</sub> RESPONSE

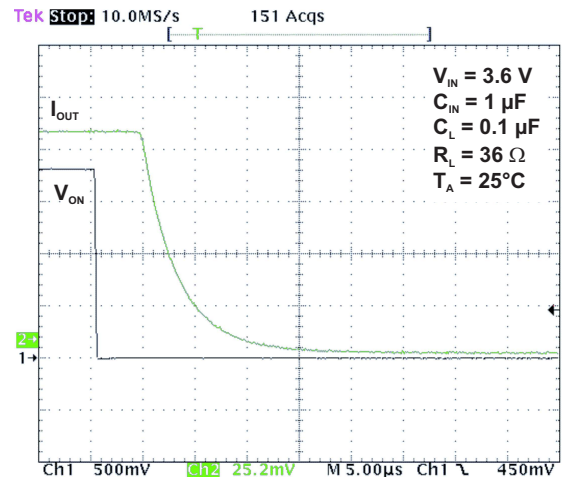


Figure 15. t<sub>OFF</sub> RESPONSE



TYPICAL CHARACTERISTICS (continued)

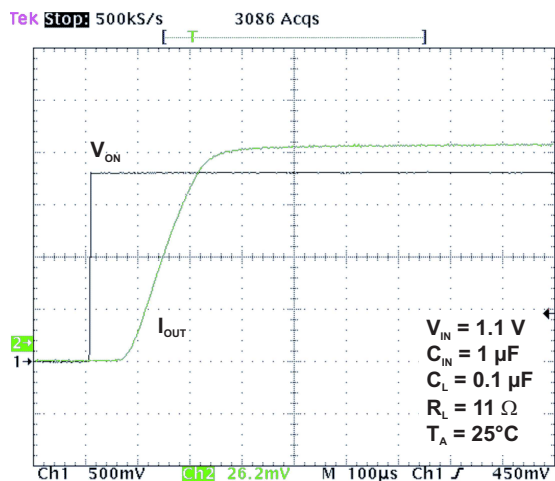


Figure 16.  $t_{ON}$  RESPONSE

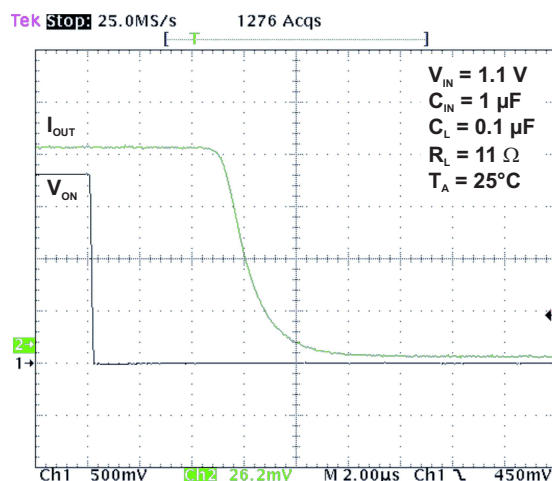


Figure 17.  $t_{OFF}$  RESPONSE

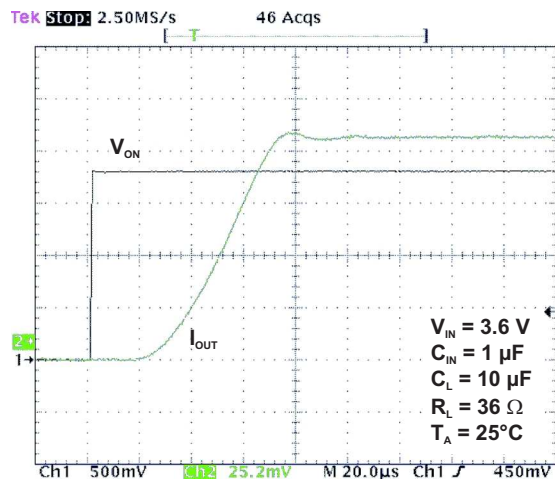


Figure 18.  $t_{ON}$  RESPONSE

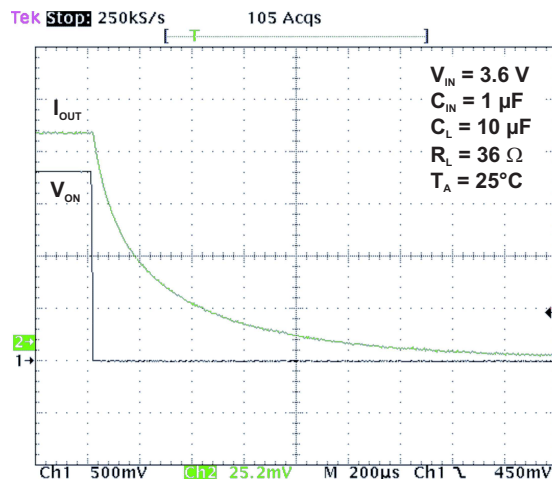


Figure 19.  $t_{OFF}$  RESPONSE

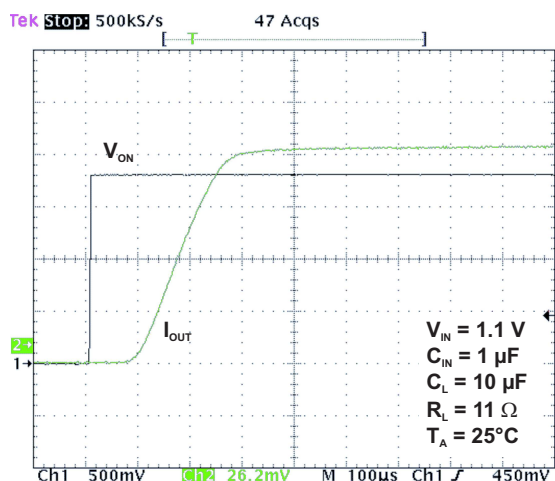


Figure 20.  $t_{ON}$  RESPONSE

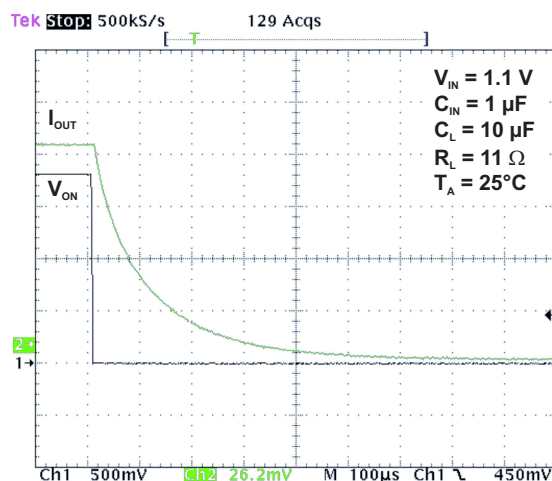
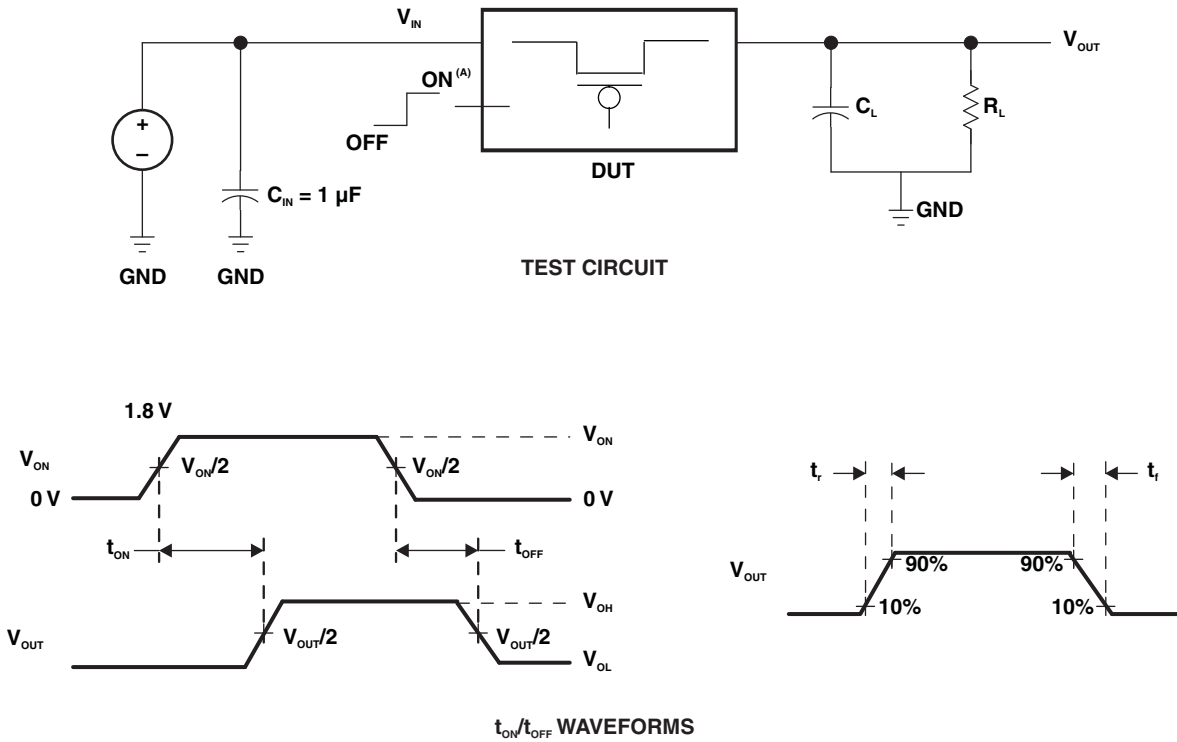


Figure 21.  $t_{OFF}$  RESPONSE

PARAMETER MEASUREMENT INFORMATION



A.  $t_{rise}$  and  $t_{fall}$  of the control signal is 100 ns.

Figure 22. Test Circuit and  $t_{ON}/t_{OFF}$  Waveforms

## APPLICATION INFORMATION

### On/Off Control

The ON pin controls the state of the switch. Activating ON continuously holds the switch in the on state so long as there is no fault. ON is active high and has a low threshold, making it capable of interfacing with low-voltage signals. The ON pin is compatible with standard GPIO logic threshold. It can be used with any microcontroller with 1.2-V, 1.8-V, 2.5-V, or 3.3-V GPIOs.

### Input Capacitor

To limit the voltage drop on the input supply caused by transient in-rush currents when the switch turns on into a discharged load capacitor or short-circuit, a capacitor needs to be placed between  $V_{IN}$  and GND. A 1- $\mu$ F ceramic capacitor,  $C_{IN}$ , placed close to the pins is usually sufficient. Higher values of  $C_{IN}$  can be used to further reduce the voltage drop during high-current application. When switching heavy loads, it is recommended to have an input capacitor approximately ten times higher than the output capacitor to avoid excessive voltage drop.

### Output Capacitor

Due to the integral body diode in the PMOS switch, a  $C_{IN}$  greater than  $C_L$  is highly recommended. A  $C_L$  greater than  $C_{IN}$  can cause  $V_{OUT}$  to exceed  $V_{IN}$  when the system supply is removed. This could result in current flow through the body diode from  $V_{OUT}$  to  $V_{IN}$ .

### Board Layout

For best performance, all traces should be as short as possible. To be most effective, the input and output capacitors should be placed close to the device to minimize the effects that parasitic trace inductances may have on normal and short-circuit operation. Using wide traces for  $V_{IN}$ ,  $V_{OUT}$ , and GND helps minimize the parasitic electrical effects along with minimizing the case to ambient thermal impedance.

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
TPS22907YZTR	ACTIVE	DSBGA	YZT	4	3000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM
TPS22907YZTT	ACTIVE	DSBGA	YZT	4	250	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM

<sup>(1)</sup> 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.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

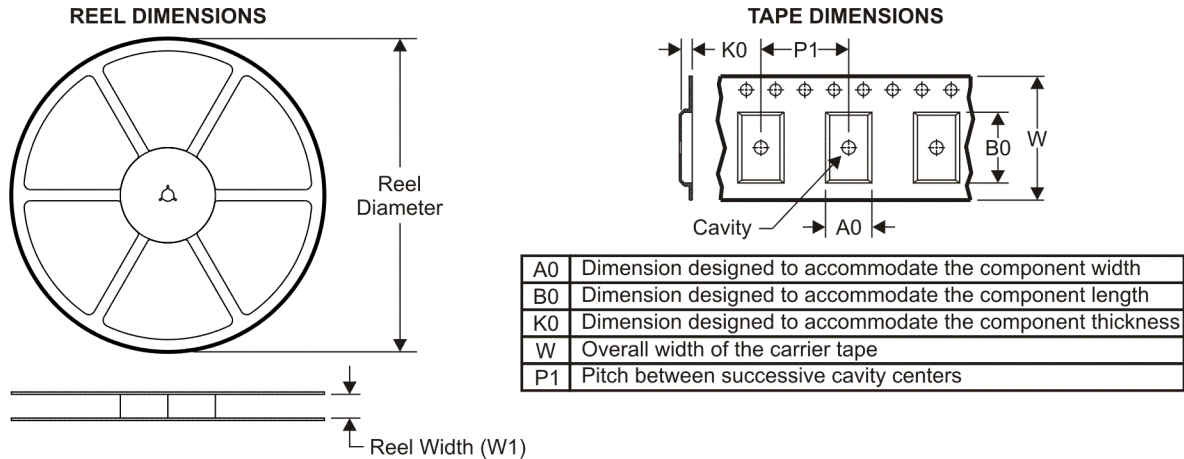
**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

**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



### 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
TPS22907YZTR	DSBGA	YZT	4	3000	178.0	9.2	1.0	1.0	0.73	4.0	8.0	Q1
TPS22907YZTT	DSBGA	YZT	4	250	178.0	9.2	1.0	1.0	0.73	4.0	8.0	Q1

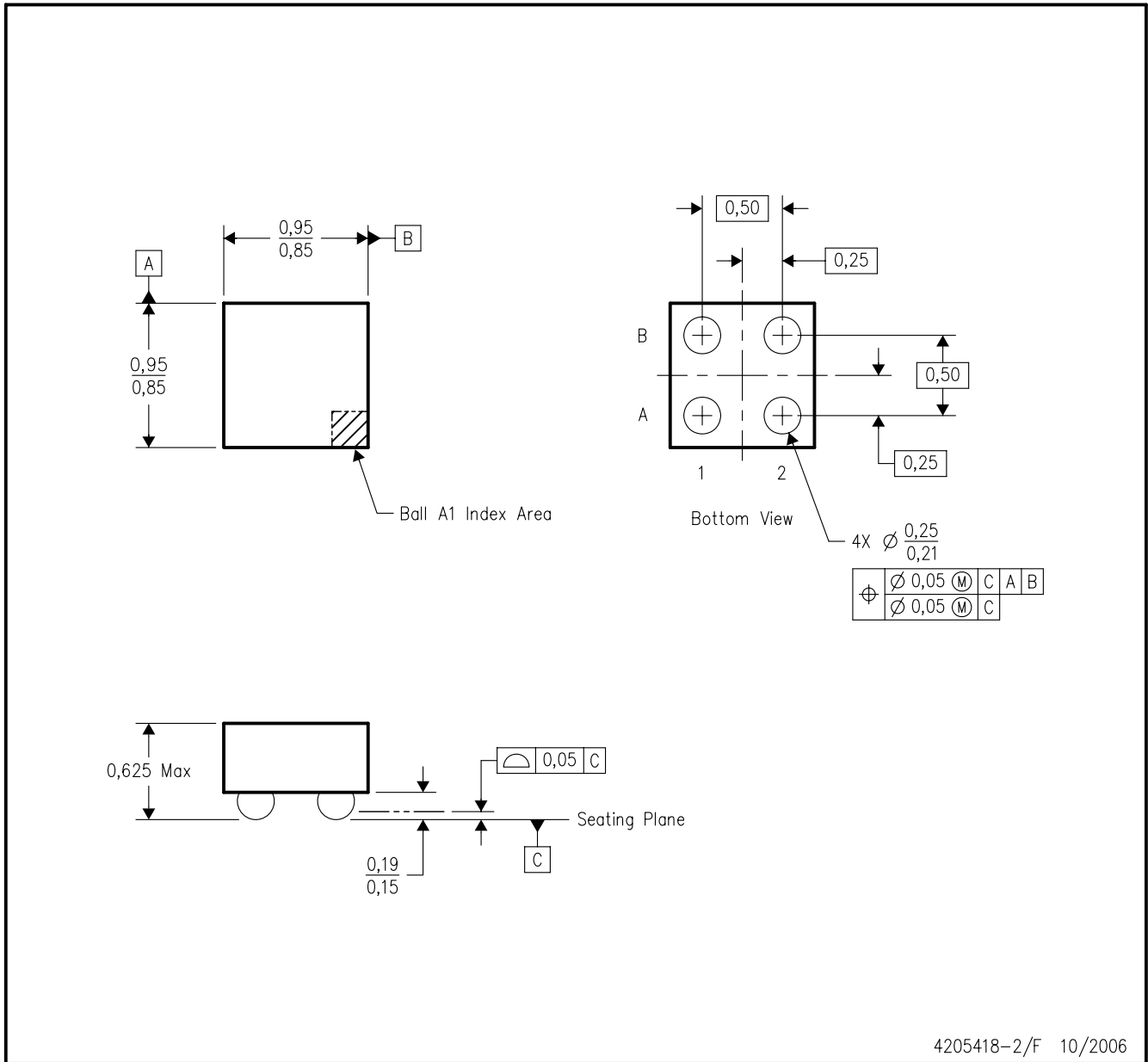
**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS22907YZTR	DSBGA	YZT	4	3000	220.0	220.0	35.0
TPS22907YZTT	DSBGA	YZT	4	250	220.0	220.0	35.0

YZT (S-XBGA-N4)

DIE-SIZE BALL GRID ARRAY



4205418-2/F 10/2006

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. NanoFree™ package configuration.
  - D. This package is Lead-free. Refer to the 4 YET package (drawing 4205421) for tin-lead (SnPb).

NanoFree is a trademark of Texas Instruments.

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

<b>Products</b>		<b>Applications</b>	
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>	Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>	Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>	Communications and Telecom	<a href="http://www.ti.com/communications">www.ti.com/communications</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>	Computers and Peripherals	<a href="http://www.ti.com/computers">www.ti.com/computers</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>	Consumer Electronics	<a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>	Energy	<a href="http://www.ti.com/energy">www.ti.com/energy</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>	Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>	Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>	Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>	Space, Avionics & Defense	<a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a>
RF/IF and ZigBee® Solutions	<a href="http://www.ti.com/lprf">www.ti.com/lprf</a>	Video and Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>
		Wireless	<a href="http://www.ti.com/wireless-apps">www.ti.com/wireless-apps</a>

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2010, Texas Instruments Incorporated