

# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

- Low-Cost Single-Channel High-Speed MOSFET Driver
- $I_{CC}$  . . . 15- $\mu$ A Max (TPS2828, TPS2829)
- 25-ns Max Rise/Fall Times and 40-ns Max Propagation Delay . . . 1-nF Load
- 2-A Peak Output Current
- 4-V to 14-V Driver Supply Voltage Range; Internal Regulator Extends Range to 40 V (TPS2816, TPS2817, TPS2818, TPS2819)
- 5-pin SOT-23 Package
- $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$  Ambient-Temperature Operating Range
- Highly Resistant to Latch-ups

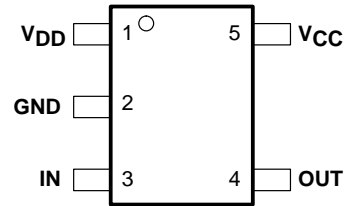
## description

The TPS28xx single-channel high-speed MOSFET drivers are capable of delivering peak currents of up to 2 A into highly capacitive loads. High switching speeds ( $t_r$  and  $t_f = 14$  ns typ) are obtained with the use of BiCMOS outputs. Typical threshold switching voltages are  $2/3$  and  $1/3$  of  $V_{CC}$ . The design inherently minimizes shoot-through current.

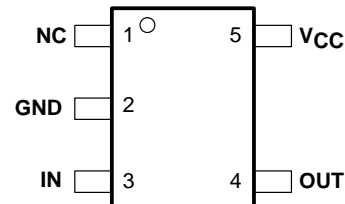
A regulator is provided on TPS2816 through TPS2819 devices to allow operation with supply inputs between 14 V and 40 V. The regulator output can be used to power other circuits, provided power dissipation does not exceed package limitations. If the regulator is not required,  $V_{DD}$  (the regulator input) should be connected to  $V_{CC}$ . The TPS2816 and TPS2817 input circuits include an active pullup circuit to eliminate the need for an external resistor when using open-collector PWM controllers. The TPS2818 and TPS2819 are identical to the TPS2816 and TPS2817, except that the active pullup circuit is omitted. The TPS2828 and TPS2829 are identical to the TPS2818 and TPS2819, except that the internal voltage regulator is omitted, allowing quiescent current to drop to less than 15  $\mu$ A when the inputs are high or low.

The TPS28xx series devices are available in 5-pin SOT-23 (DBV) packages and operate over an ambient temperature range of  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ .

TPS2816, TPS2817  
TPS2818, TPS2819  
DBV PACKAGE  
(TOP VIEW)



TPS2828, TPS2829  
DBV PACKAGE  
(TOP VIEW)



NC – No internal connection

## AVAILABLE OPTIONS

T <sub>A</sub>	FUNCTION	PACKAGED DEVICES	CHIP FORM (Y)
		SOT-23-5 (DBV)	
$-40^{\circ}\text{C}$ to $125^{\circ}\text{C}$	Inverting driver with active pullup input	TPS2816DBV	TPS2816Y
	Noninverting driver with active pullup input	TPS2817DBV	TPS2817Y
	Inverting driver	TPS2818DBV	TPS2818Y
	Noninverting driver	TPS2819DBV	TPS2819Y
	Inverting driver, no regulator	TPS2828DBV	TPS2828Y
	Noninverting driver, no regulator	TPS2829DBV	TPS2829Y

The DBV package is available taped and reeled only.



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.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

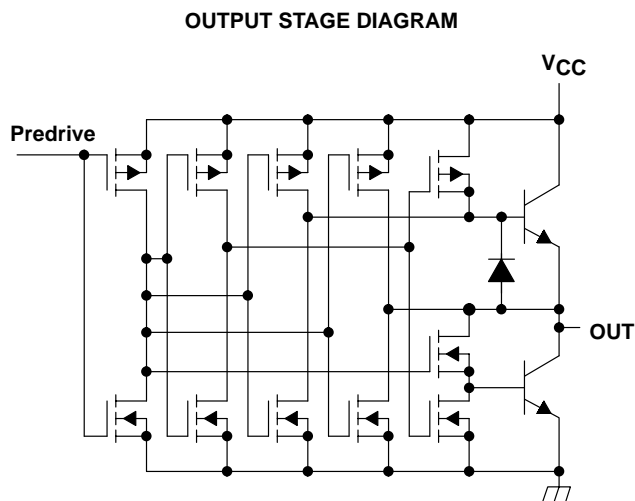
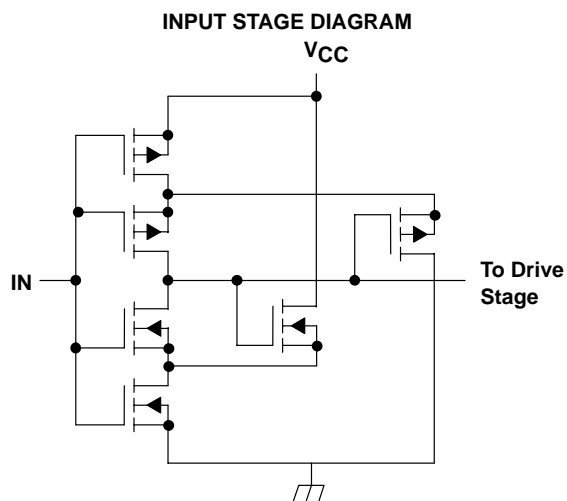
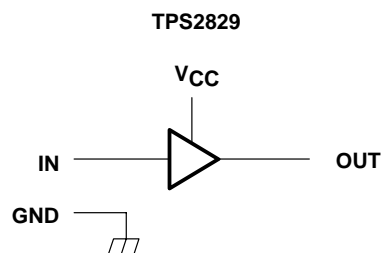
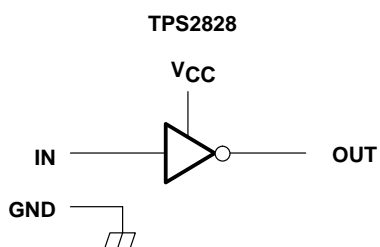
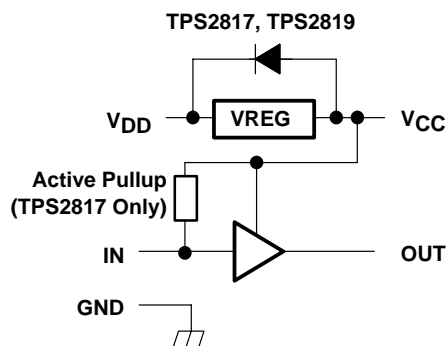
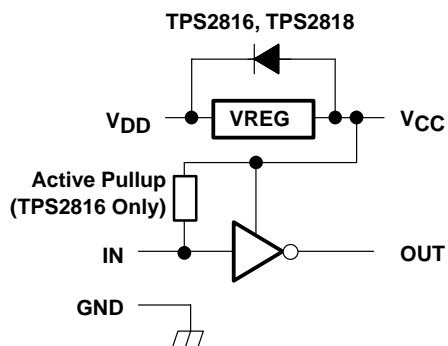
**TEXAS  
INSTRUMENTS**  
www.ti.com

Copyright © 2002, Texas Instruments Incorporated

# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

## functional block diagram



## SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

This chip, when properly assembled, displays characteristics similar to those of the TPS28xx. Thermal compression or ultrasonic bonding may be used on the doped aluminum bonding pads. The chip may be mounted with conductive epoxy or a gold-silicon preform.



TERMINAL		DESCRIPTION
NAME	NO.	
V <sub>DD</sub>	1	Regulator supply voltage input. (Not connected on TPS2828)
GND	2	Ground
IN	3	Driver input.
OUT	4	Driver output, OUT = $\overline{\text{IN}}$
V <sub>CC</sub>	5	Driver supply voltage/regulator output voltage

TERMINAL		DESCRIPTION
NAME	NO.	
V <sub>DD</sub>	1	Regulator supply voltage input. (Not connected on TPS2829)
GND	2	Ground
IN	3	Driver input.
OUT	4	Driver output, OUT= IN
V <sub>CC</sub>	5	Driver supply voltage/regulator output voltage

# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING	$T_A = 80^\circ\text{C}$ POWER RATING
DBV	437 mW	3.5 mW/°C	280 mW	227 mW

These dissipation ratings are based upon EIA specification JESD51-3, "Low Effective Thermal Conductivity Test Board for Leaded Surface Mount Packages," in tests conducted in a zero-airflow, wind tunnel environment.

## absolute maximum ratings over operating temperature range (unless otherwise noted)<sup>†</sup>

Supply voltage range, $V_{CC}$	–0.3 V to 15 V
Regulator supply voltage range, $V_{DD}$	$V_{CC}$ –0.3 V to 42 V
Input voltage range, $I_N$	–0.3 V to $V_{CC} + 0.5$ V
Output voltage range, (pin 4)	–0.5 V to $V_{CC} + 0.5$ V
Continuous regulator output current, $V_{CC}$	25 mA
Continuous output current, $OUT$	$\pm 100$ mA
Continuous total power dissipation	See Dissipation Rating Table
Operating ambient temperature range, $T_A$	–40°C to 125°C
Storage temperature range, $T_{stg}$	–65°C to 150°C
Lead temperature 1,6 mm (1/16inch) from case for 10 seconds	260°C

<sup>†</sup> 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.

NOTE 1: All voltages are with respect to device GND terminal.

## recommended operating conditions

	MIN	MAX	UNIT
Regulator input voltage range, $V_{DD}$ , TPS2816 through TPS2819	8	40	V
Supply voltage, $V_{CC}$	4	14	V
Input voltage, $I_N$	–0.3	$V_{CC}$	V
Continuous regulator output current, $I_{CC}$	0	20	mA
Operating ambient temperature range, $T_A$	–40	125	°C

# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

**TPS28xx electrical characteristics over recommended operating ambient temperature range,  $V_{CC} = 10\text{ V}$ ,  $V_{DD}$  tied to  $V_{CC}$ ,  $C_L = 1\text{ nF}$  (unless otherwise specified)**

## Inputs

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
Positive-going input threshold voltage	$V_{CC} = 5\text{ V}$		3.3	4	V
	$V_{CC} = 10\text{ V}$		6.6	7	
	$V_{CC} = 14\text{ V}$		9.3	10	
Negative-going input threshold voltage	$V_{CC} = 5\text{ V}$	1	1.7		V
	$V_{CC} = 10\text{ V}$	2	3.3		
	$V_{CC} = 14\text{ V}$	2.5	4.6		
Input voltage hysteresis			1.3		V
Input current, TPS2818/19/28/29	Input = 0 V or $V_{CC}$		0.2		$\mu\text{A}$
Input current, TPS2816/17	Input = 0 V		650		$\mu\text{A}$
	Input = $V_{CC}$		15		
Input capacitance			5	10	pF

† Typicals are for  $T_A = 25^\circ\text{C}$  unless otherwise noted.

## outputs

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
High-level output voltage	$I_O = -1\text{ mA}$	9.75	9.9		V
	$I_O = -100\text{ mA}$	8	9.1		
Low-level output voltage	$I_O = 1\text{ mA}$		0.18	0.25	V
	$I_O = 100\text{ mA}$		1	2	

† Typicals are for  $T_A = 25^\circ\text{C}$  unless otherwise noted.

## regulator, TPS2816 through TPS2819

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
Output voltage	$14 \leq V_{DD} \leq 40\text{ V}$ , $0 \leq I_O \leq 20\text{ mA}$	10	11.5	13	V
Output voltage in dropout	$I_O = 10\text{ mA}$ , $V_{DD} = 10\text{ V}$	8		10	V

† Typicals are for  $T_A = 25^\circ\text{C}$  unless otherwise noted.

## supply current

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
Supply current into $V_{CC}$	TPS2816, TPS2817	IN = high = 10 V		150	250	$\mu\text{A}$
		IN = low = 0 V		650	1000	
	TPS2818, TPS2819 TPS2828, TPS2829	IN = high or low, High = 10 V, Low = 0 V		25	50	
				0.1	15	
Supply current into $V_{DD}$	TPS2816, TPS2817	$V_{DD} = 20\text{ V}$ , IN = high = 10 V or low = 0 V		650	1000	$\mu\text{A}$
	TPS2818, TPS2819	$V_{DD} = 20\text{ V}$ , IN = high = 10 V or low = 0 V		50	150	

† Typicals are for  $T_A = 25^\circ\text{C}$  unless otherwise noted.

# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

**TPS28xxY electrical characteristics at  $T_A = 25^\circ\text{C}$ ,  $V_{CC} = 10\text{ V}$ ,  $V_{DD}$  tied to  $V_{CC}$ ,  $C_L = 1\text{ nF}$  (unless otherwise specified)**

## Inputs

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Positive-going input threshold voltage	$V_{CC} = 5\text{ V}$		3.3		V
	$V_{CC} = 10\text{ V}$		6.6		
	$V_{CC} = 14\text{ V}$		9.3		
Negative-going input threshold voltage	$V_{CC} = 5\text{ V}$		1.7		V
	$V_{CC} = 10\text{ V}$		3.3		
	$V_{CC} = 14\text{ V}$		4.6		
Input voltage hysteresis			1.3		V
Input current, TPS2818/19/28/29	Input = 0 V or $V_{CC}$		0.2		$\mu\text{A}$
Input current, TPS2816/17	Input = 0 V		650		$\mu\text{A}$
	Input = $V_{CC}$		15		
Input resistance			1000		$\text{M}\Omega$
Input capacitance			5		pF

## outputs

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-level output voltage	$I_O = -1\text{ mA}$		9.9		V
	$I_O = -100\text{ mA}$		9.1		
Low-level output voltage	$I_O = 1\text{ mA}$		0.18		V
	$I_O = 100\text{ mA}$		1		

## regulator, TPS2816 through TPS2819

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output voltage	$14 \leq V_{DD} \leq 40\text{ V}$ , $0 \leq I_O \leq 20\text{ mA}$		11.5		V
Output voltage in dropout	$I_O = 10\text{ mA}$ , $V_{DD} = 10\text{ V}$		9		V

## supply current

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply current into $V_{CC}$	TPS2816, TPS2817	IN = high = 10 V		150		$\mu\text{A}$
		IN = low = 0 V		650		
	TPS2818, TPS2819	IN = high or low, High = 10 V, Low = 0 V		25		
				0.1		
Supply current into $V_{DD}$	TPS2816, TPS2817	$V_{DD} = 20\text{ V}$ , IN = high = 10 V or low = 0 V		650		$\mu\text{A}$
	TPS2818, TPS2819	$V_{DD} = 20\text{ V}$ , IN = high = 10 V or low = 0 V		50		

# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

switching characteristics for all devices over recommended operating ambient temperature range,  
 $V_{CC} = 10\text{ V}$ ,  $V_{DD}$  tied to  $V_{CC}$ ,  $C_L = 1\text{ nF}$  (unless otherwise specified)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_r$	Rise time	$V_{CC} = 14\text{ V}$			25	ns
		$V_{CC} = 10\text{ V}$		14	30	
		$V_{CC} = 5\text{ V}$			35	
$t_f$	Fall time	$V_{CC} = 14\text{ V}$			25	ns
		$V_{CC} = 10\text{ V}$		14	30	
		$V_{CC} = 5\text{ V}$			35	
$t_{PHL}$	Propagation delay time, high-to-low-level output	$V_{CC} = 14\text{ V}$			40	ns
		$V_{CC} = 10\text{ V}$		24	45	
		$V_{CC} = 5\text{ V}$			50	
$t_{PLH}$	Propagation delay time, low-to-high-level output	$V_{CC} = 14\text{ V}$			40	ns
		$V_{CC} = 10\text{ V}$		24	45	
		$V_{CC} = 5\text{ V}$			50	

## PARAMETER MEASUREMENT INFORMATION

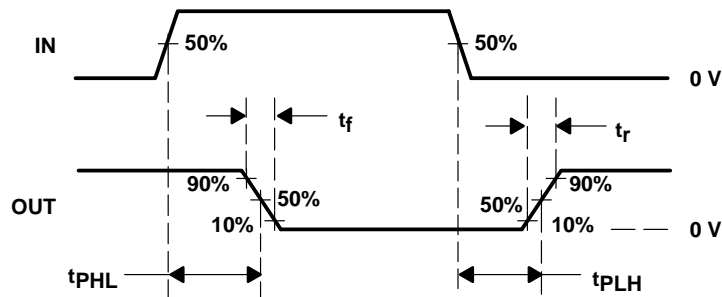


Figure 1. Typical Timing Diagram (TPS2816)

# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

## PARAMETER MEASUREMENT INFORMATION

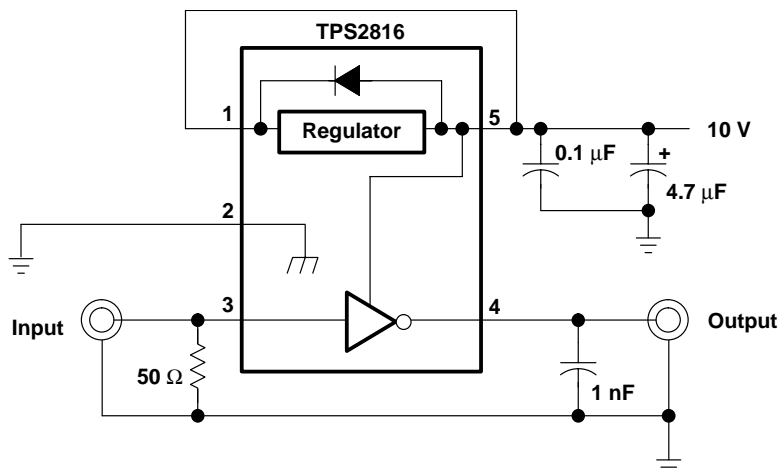


Figure 2. Switching Time Test Setup

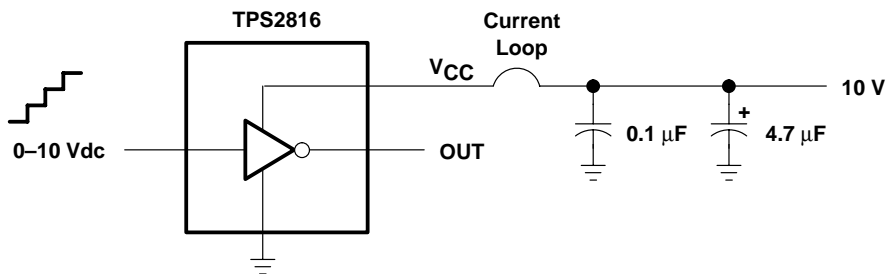


Figure 3. Shoot-Through Current Test Setup



# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

## TYPICAL CHARACTERISTICS

Table of Graphs

		FIGURE
Rise time	vs Supply voltage	4
Fall time	vs Supply voltage	5
Propagation time (L>H)	vs Supply voltage	6
Propagation Time (H>L)	vs Supply voltage	7
Rise time	vs Ambient temperature	8
Fall time	vs Ambient temperature	9
Propagation time (L>H)	vs Supply voltage	10
Propagation time (H>L)	vs Ambient temperature	11
Supply current ( $V_{CC}$ )	vs Supply voltage	12
Supply current ( $V_{CC}$ )	vs Load capacitance	13
Supply current ( $V_{CC}$ )	vs Ambient temperature	14
Input threshold voltage	vs Supply voltage	15
Regulator output voltage	vs Regulator supply voltage	16
Regulator quiescent current	vs Regulator supply voltage	17
Shoot-through current	vs Input voltage (L>H)	18
Shoot-through current	vs Input voltage (H>L)	19

# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

## TYPICAL CHARACTERISTICS

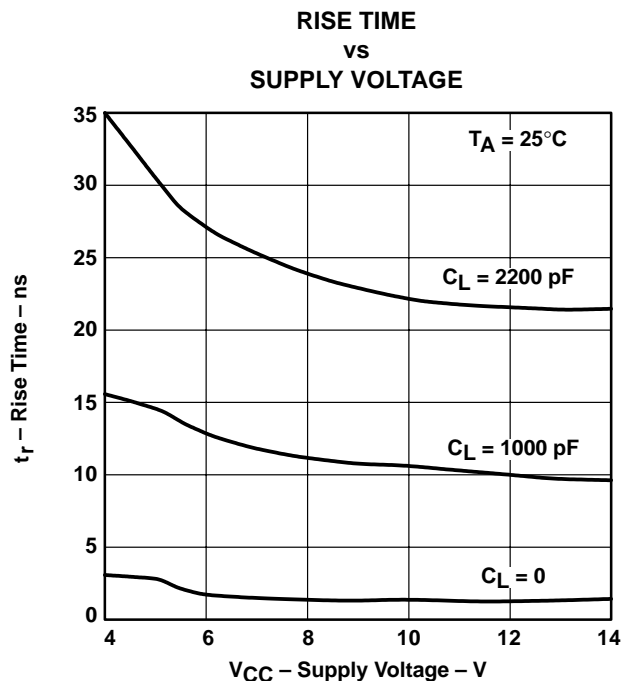


Figure 4

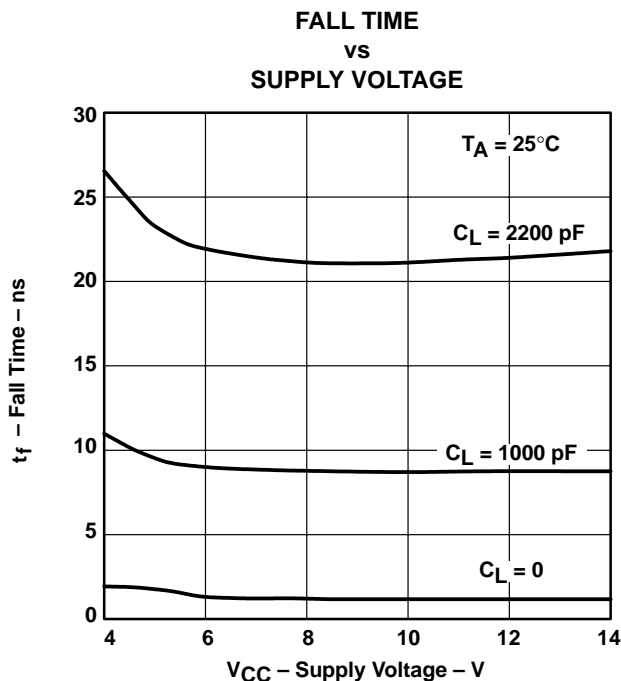


Figure 5

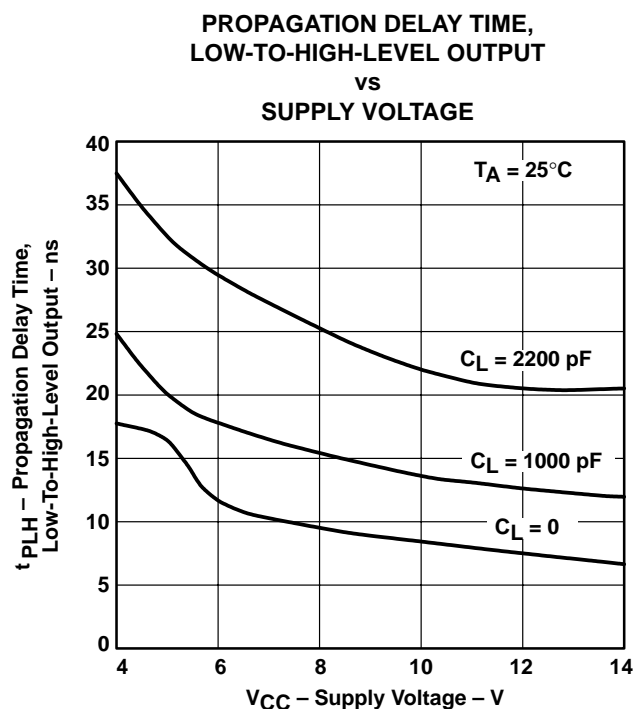


Figure 6

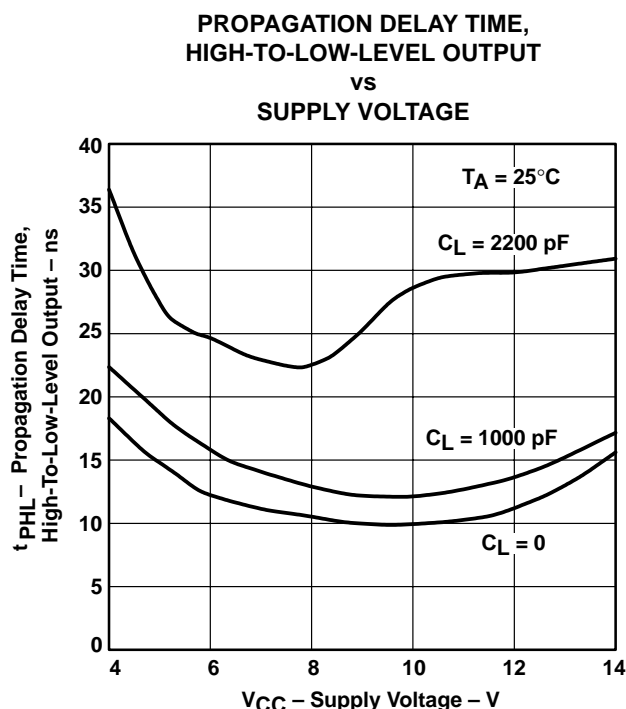


Figure 7

TYPICAL CHARACTERISTICS

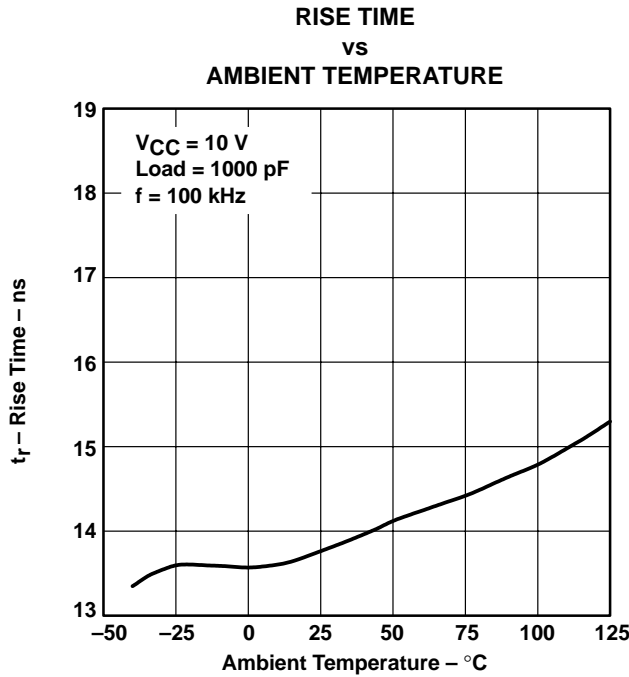


Figure 8

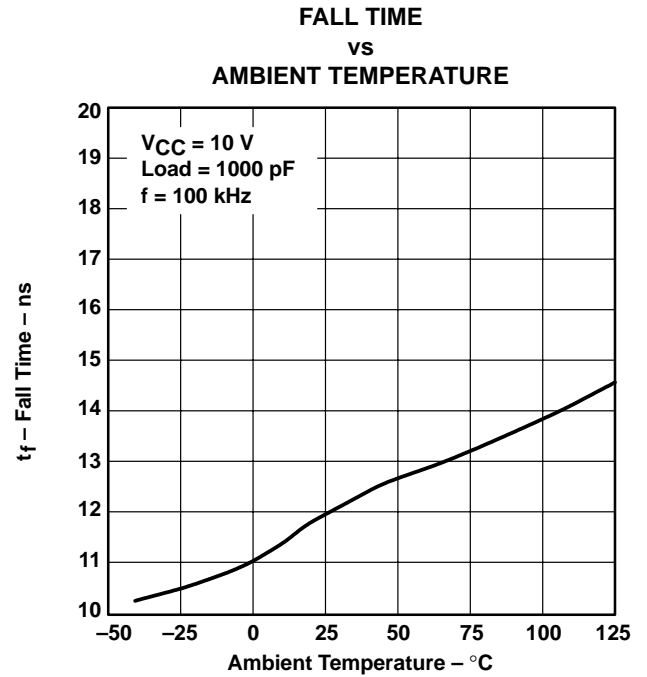


Figure 9

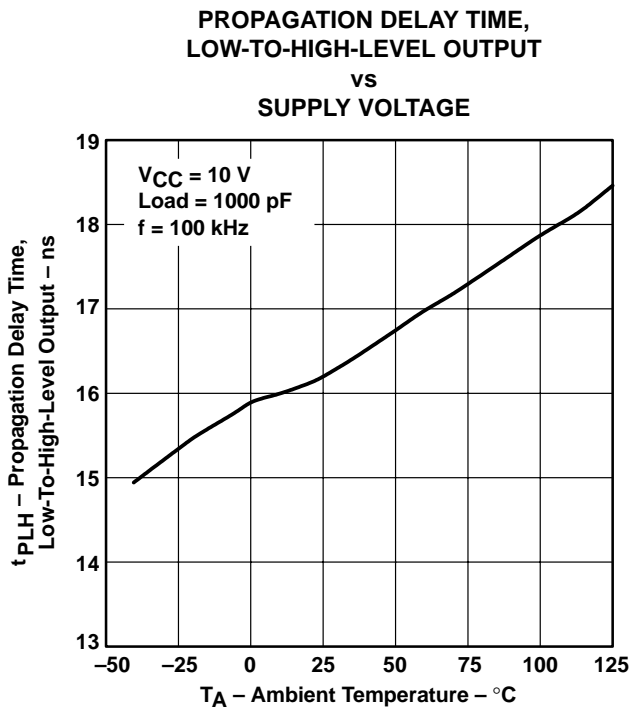


Figure 10

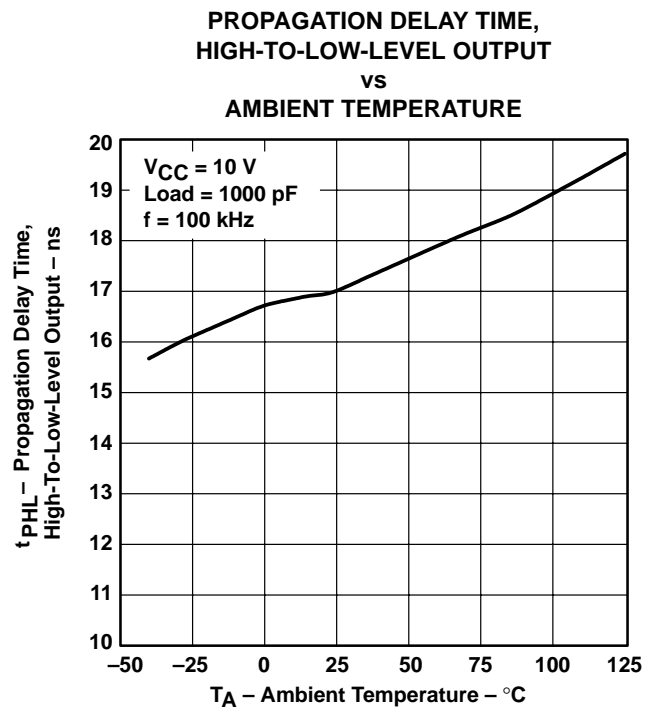
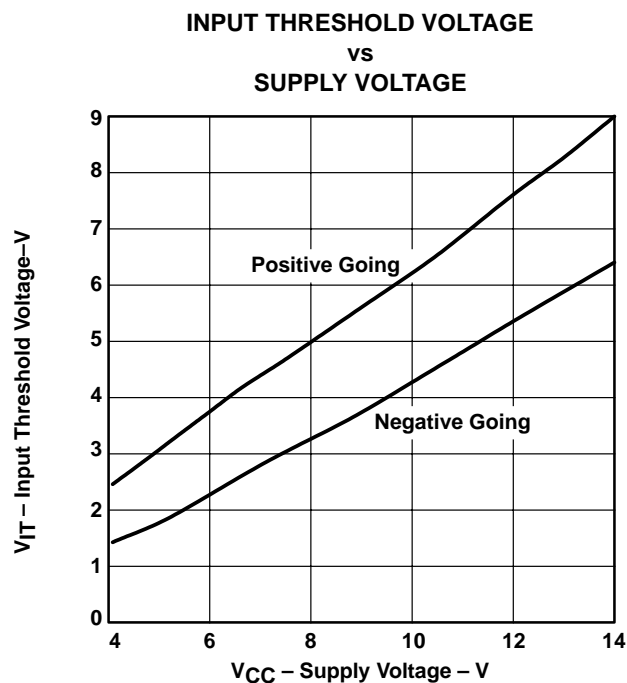
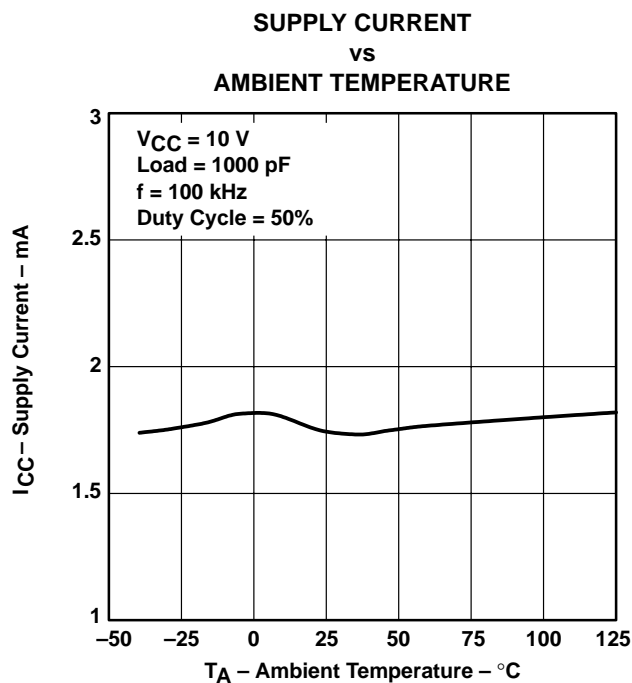
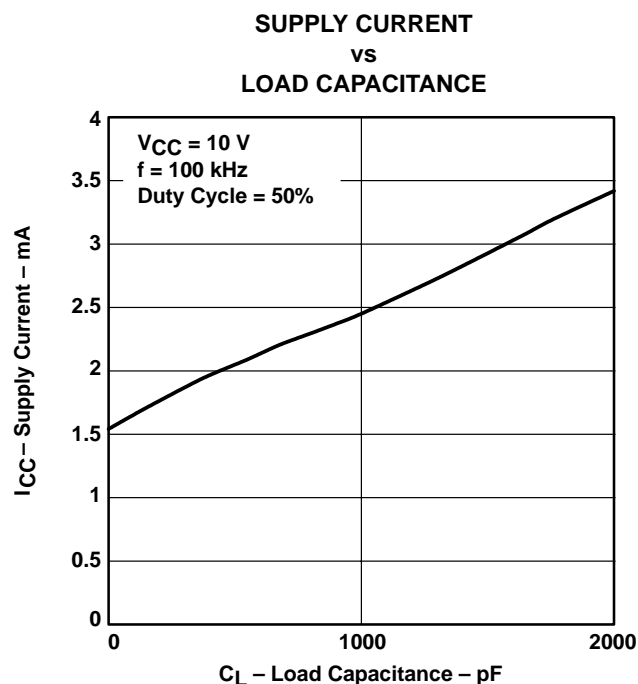
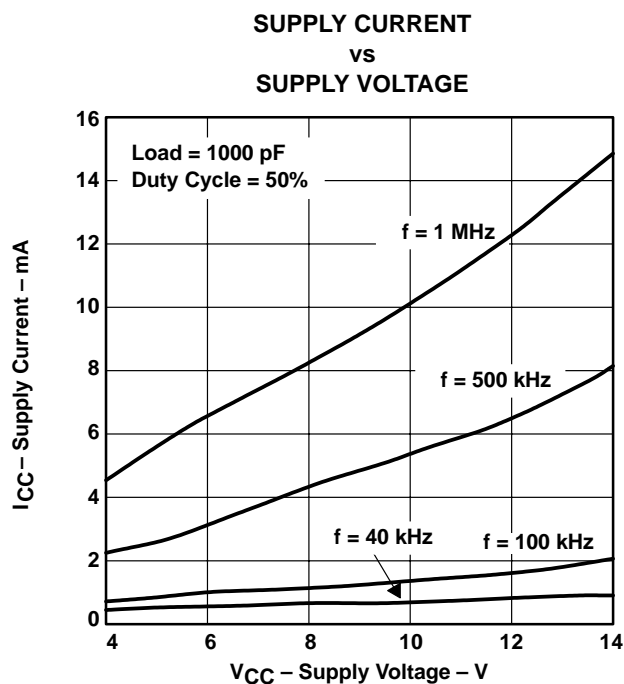


Figure 11

# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

## TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS

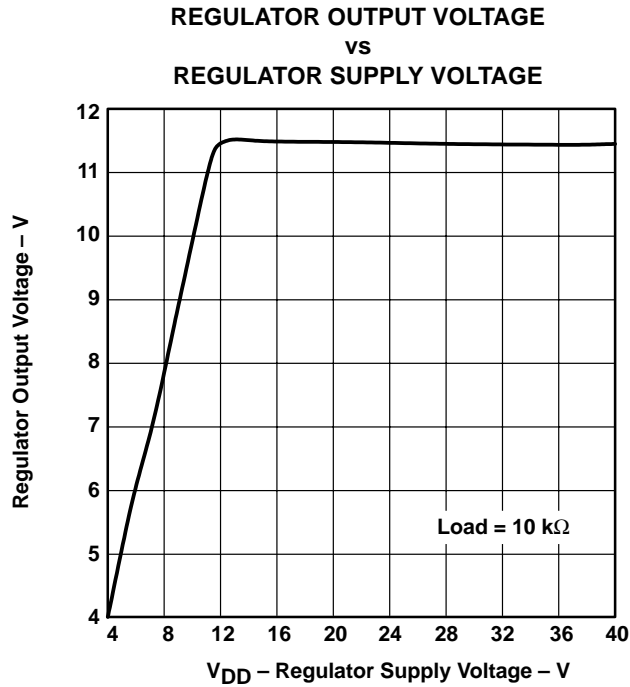


Figure 16

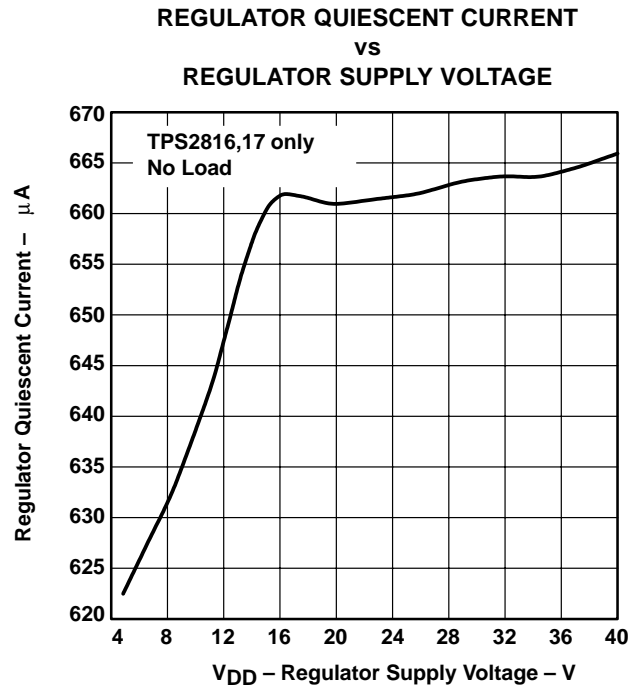


Figure 17

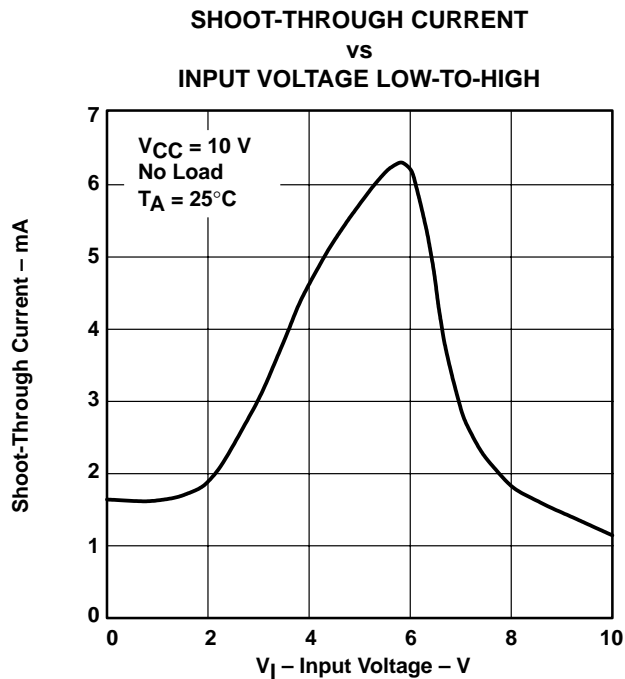


Figure 18

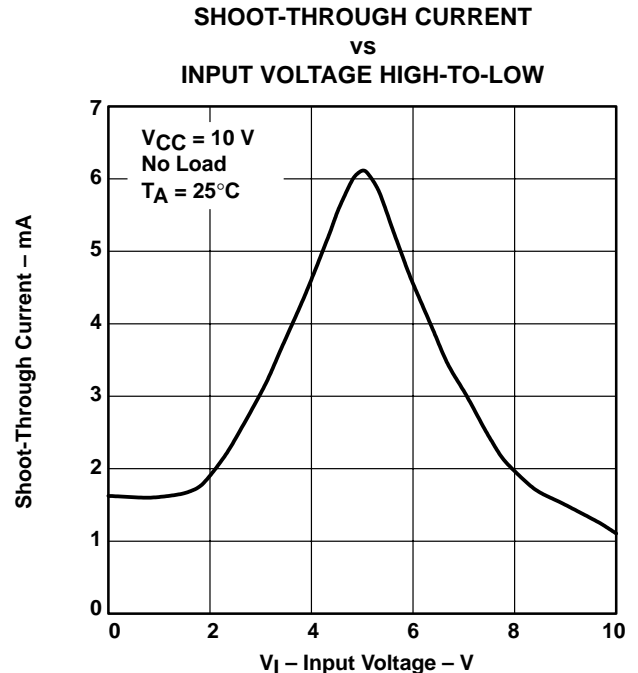


Figure 19

# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

## APPLICATION INFORMATION

MOSFETs are voltage-driven devices that require very little steady-state drive current. However, the large input capacitance (200 pF to 3000 pF or greater) of these devices requires large current surges to reduce the turn-on and turn-off times. The TPS2816 series of high-speed drivers can supply up to 2 A to a MOSFET, greatly reducing the switching times. The fast rise times and fall times and short propagation delays allow for operation in today's high-frequency switching converters.

In addition, MOSFETs have a limited gate-bias voltage range, usually less than 20 V. The TPS2816 series of drivers extends this operating range by incorporating an on-board series regulator with an input range up to 40 V. This regulator can be used to power the drivers, the PWM chip, and other circuitry, providing the power dissipation rating is not exceeded.

When using these devices, care should be exercised in the proper placement of the driver, the switching MOSFET, and the bypass capacitor. Because of the large input capacitance of the MOSFET, the driver should be placed close to the gate to eliminate the possibility of oscillations caused by trace inductance ringing with the gate capacitance of the MOSFET. When the driver output path is longer than approximately 2 inches, a resistor in the range of 10  $\Omega$  should be placed in series with the gate drive as close as possible to the MOSFET. A ceramic bypass capacitor is also recommended to provide a source for the high-speed current transients that the MOSFET requires. This capacitor should be placed between  $V_{CC}$  and GND of the driver (see Figures 20 and 21).

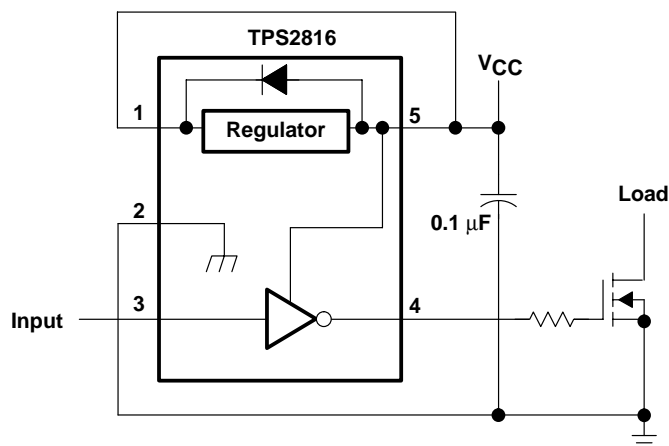


Figure 20.  $V_{CC} < 14$  V

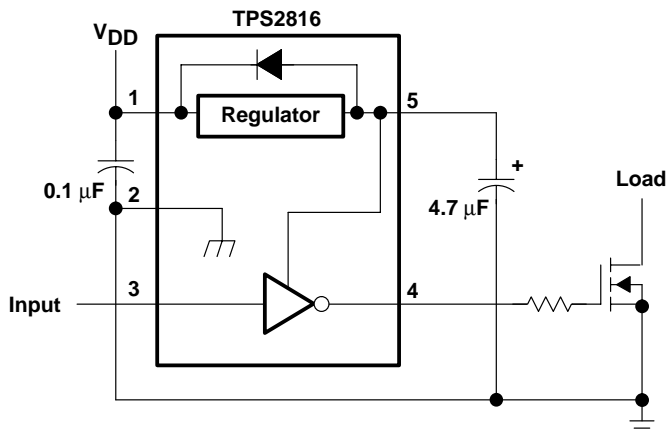
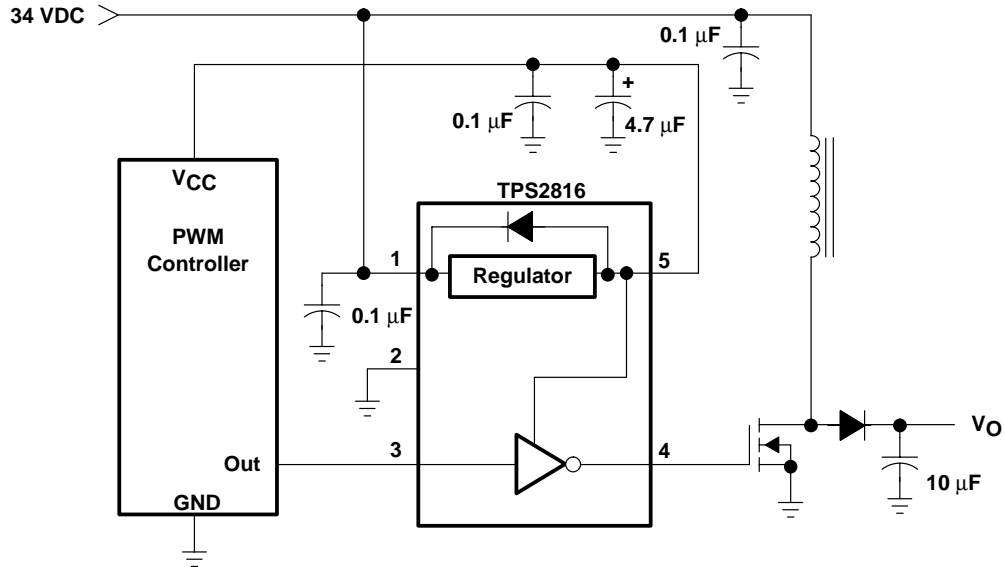


Figure 21.  $V_{CC} > 14$  V

## APPLICATION INFORMATION

The on-board series regulator supplies approximately 20 mA of current at 11.5 V, some of which can be used for external circuitry, providing the power dissipation rating for the driver is not exceeded. When using the on-board series regulator, an electrolytic output capacitor of 4.7  $\mu\text{F}$  or larger is recommended. Although not required, a 0.1- $\mu\text{F}$  ceramic capacitor on the input of the regulator can help suppress transient currents (see Figure 22). When not used, the regulator should be connected to  $V_{CC}$ . Grounding  $V_{DD}$  will result in destruction of the regulator.



**Figure 22. Boost Application**

The TPS2816 and TPS2818 drivers include active pullup circuits on the inputs to eliminate the need for external pullup resistors when using controllers with open-collector outputs (such as the TL5001). The TPS2817 and TPS2819 drivers have standard CMOS inputs providing a total device operating current of less than 50  $\mu\text{A}$ . All devices switch at standard CMOS logic levels of approximately  $2/3 V_{CC}$  with positive-going input levels, and approximately  $1/3 V_{CC}$  with negative-going input levels. Being CMOS drivers, these devices will draw relatively large amounts of current (Approximately 5 mA) when the inputs are in the range of one-half of the supply voltage. In normal operation, the driver input is in this range for a very short time. Care should be taken to avoid use of very low slew-rate inputs, used under normal operating conditions. Although not destructive to the device, slew rates slower than 0.1 V/ $\mu\text{s}$  are not recommended.

The BiCMOS output stage provides high instantaneous drive current to rapidly toggle the power switch, and very low drop to each rail to ensure proper operation at voltage extremes.

Low-voltage circuits (less than 14 V) that require very low quiescent currents can use the TPS2828 and TPS2829 drivers. These drivers use typically 0.2  $\mu\text{A}$  of quiescent current (with inputs high or low). They do not have the internal regulator or the active pullup circuit, but all other specifications are the same as for the rest of the family.

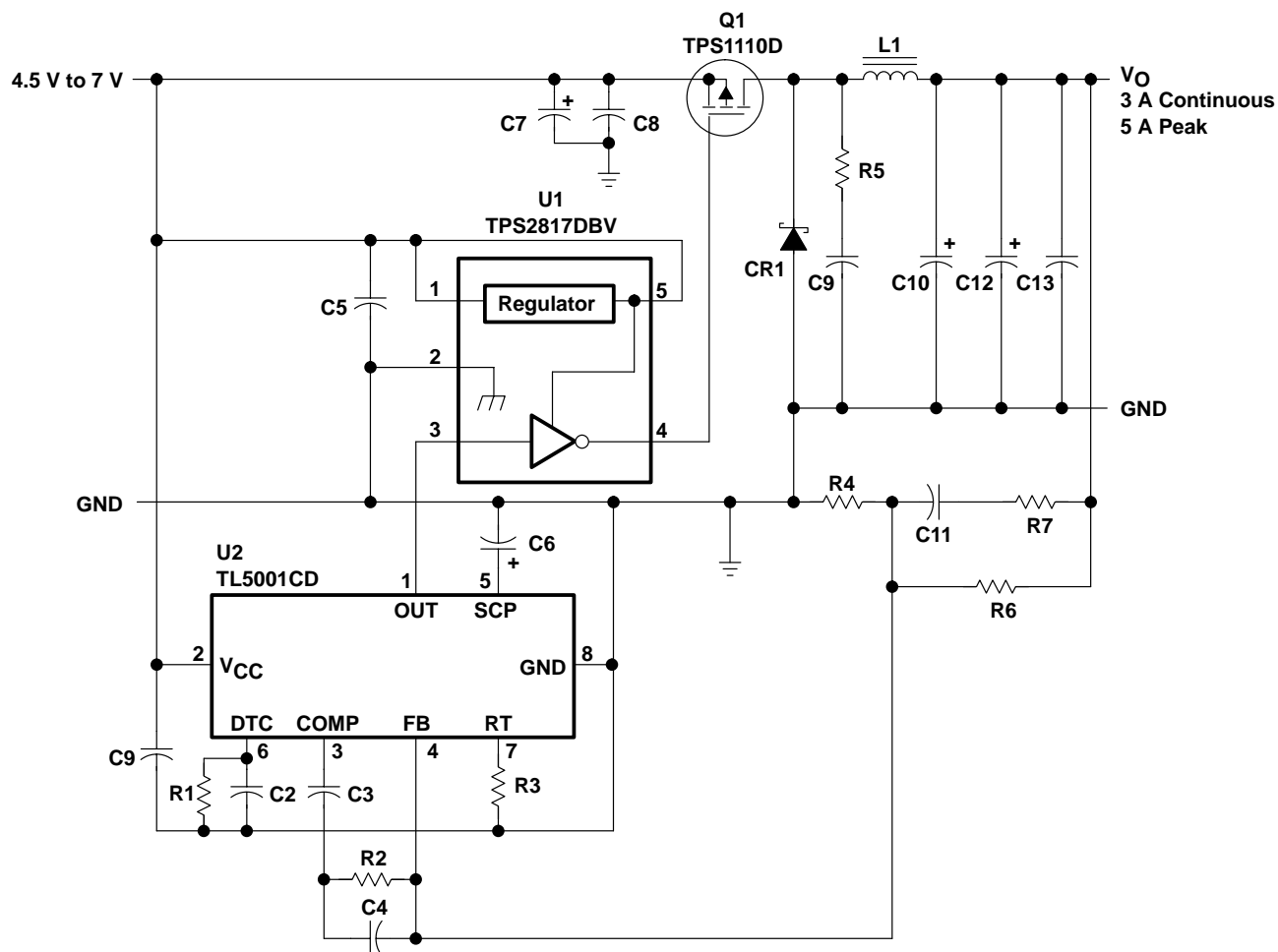
### 2.5-V/3.3-V, 3-A application

Figure 23 illustrates the use of the TPS2817 with a TL5001 PWM controller and a TPS1110 in a simple step-down converter application. The converter operates at 275 kHz and delivers either 2.5 V or 3.3 V (determined by the value of R6) at 3 A (5 A peak) from a 5-V supply. The bill of materials is provided in Table 1.

# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

## APPLICATION INFORMATION



**Figure 23. Step-Down Application**

**NOTE:** If the parasitics of the external circuit cause the voltage to violate the Absolute Maximum Rating for the Output pins, Schottky diodes should be added from ground to output and from output to Vcc.



# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

## APPLICATION INFORMATION

Table 1. Bill of Materials

REF DES	PART NO.	DESCRIPTION	MFR
U1	TPS2817DBV	IC, MOSFET driver, single noninverting	TI
U2	TL5001CD	IC, PWM controller	TI
Q1	TPS1110D	MOSFET, p-channel, 6 A, 7 V, 75 m $\Omega$	TI
C1, C2, C5, C8		Capacitor, ceramic, 0.1 $\mu$ F, 50 V, X7R, 1206	
C3		Capacitor, ceramic, 0.033 $\mu$ F, 50 V, X7R, 1206	
C4		Capacitor, ceramic, 2200 pF, 50 V, X7R, 0805	
C6	ECS-T1CY105R	Capacitor, tantalum, 1.0 $\mu$ F, 16 V, A case	Panasonic
C7	10SC47M	Capacitor, OS-Con, 47 $\mu$ F, 10 V	Sanyo
C9		Capacitor, ceramic, 1000 pF, 50 V, X7R, 0805	
C10, C12	10SA220M	Capacitor, OS-Con, 220 $\mu$ F, 10 V	Sanyo
C11		Capacitor, ceramic, 0.022 $\mu$ F, 50 V, X7R, 0805	
C13		Capacitor, ceramic, 47 $\mu$ F, 50 V, X7R	
CR1	50WQ03F	Diode, Schottky, D-pak, 5 A 30 V	IR
L1	SML3723	Inductor, 27 $\mu$ H, $\pm$ 20%, 3 A	Nova Magnetics
R1		Resistor, CF, 47 k $\Omega$ , 1/10 W, 5%, 0805	
R2		Resistor, CF, 1.5 k $\Omega$ , 1/10 W, 5%, 0805	
R3		Resistor, MF, 30.1 k $\Omega$ , 1/10 W, 1%, 0805	
R4		Resistor, MF, 1.00 k $\Omega$ , 1/10 W, 1%, 0805	
R5		Resistor, CF, 47 $\Omega$ , 1/10 W, 5%, 0805	
R6 (3.3-V)		Resistor, MF, 2.32 k $\Omega$ , 1/10 W, 1%, 0805	
R6 (2.5-V)		Resistor, MF, 1.50 k $\Omega$ , 1/10 W, 1%, 0805	
R7		Resistor, CF, 100 $\Omega$ , 1/10 W, 5%, 0805	

As shown in Figures 24 and 25, the TPS2817 turns on the TPS1110 power switch in less than 20 ns and off in 25 ns.

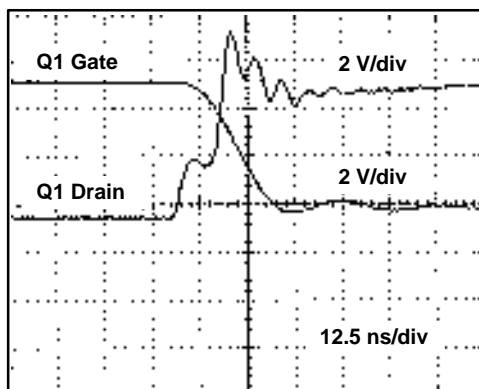


Figure 24. Q1 Turn-On Waveform

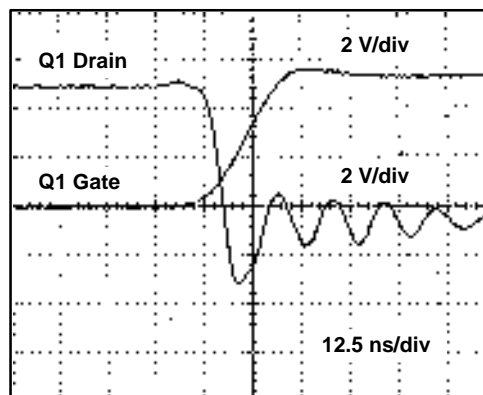


Figure 25. Q1 Turn-Off Waveform

# TPS2816, TPS2817, TPS2818, TPS2819, TPS2828, TPS2829, SINGLE-CHANNEL HIGH-SPEED MOSFET DRIVER

SLVS160C – FEBRUARY 1997 – REVISED OCTOBER 2002

## APPLICATION INFORMATION

The efficiency for various output currents, with a 5.25-V input, is shown in Figure 26. For a 3.3-V output, the efficiency is greater than 90% for loads up to 2 A – exceptional for a simple, inexpensive design.

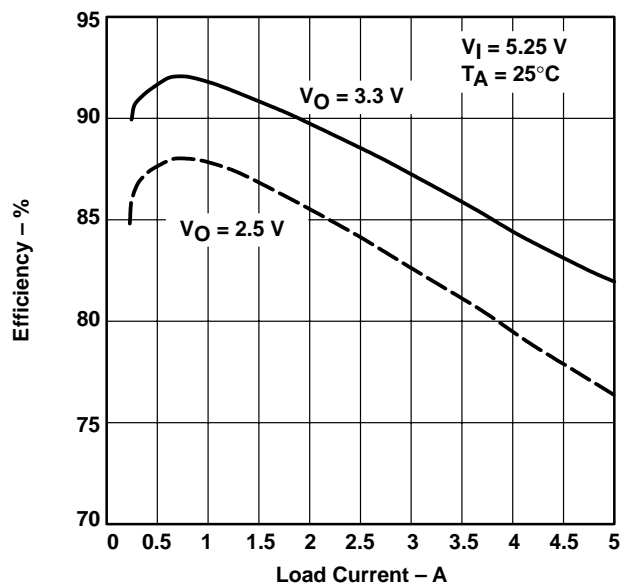


Figure 26. Converter Efficiency

## 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)
<a href="#">TPS2816DBVR</a>	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PAAI
TPS2816DBVR.A	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PAAI
<a href="#">TPS2816DBVT</a>	Active	Production	SOT-23 (DBV)   5	250   SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PAAI
TPS2816DBVT.A	Active	Production	SOT-23 (DBV)   5	250   SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PAAI
<a href="#">TPS2817DBVR</a>	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PABI
TPS2817DBVR.A	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PABI
<a href="#">TPS2817DBVT</a>	Active	Production	SOT-23 (DBV)   5	250   SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PABI
TPS2817DBVT.A	Active	Production	SOT-23 (DBV)   5	250   SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PABI
<a href="#">TPS2818DBVR</a>	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PACI
TPS2818DBVR.A	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PACI
<a href="#">TPS2819DBVR</a>	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PADI
TPS2819DBVR.A	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PADI
<a href="#">TPS2819DBVT</a>	Active	Production	SOT-23 (DBV)   5	250   SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PADI
TPS2819DBVT.A	Active	Production	SOT-23 (DBV)   5	250   SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PADI
<a href="#">TPS2828DBVR</a>	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PAXI
TPS2828DBVR.A	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PAXI
TPS2828DBVRG4	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PAXI
<a href="#">TPS2828DBVT</a>	Active	Production	SOT-23 (DBV)   5	250   SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PAXI
TPS2828DBVT.A	Active	Production	SOT-23 (DBV)   5	250   SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PAXI
<a href="#">TPS2829DBVR</a>	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PAYI
TPS2829DBVR.A	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PAYI
TPS2829DBVRG4	Active	Production	SOT-23 (DBV)   5	3000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	PAYI
<a href="#">TPS2829DBVT</a>	Obsolete	Production	SOT-23 (DBV)   5	-	-	Call TI	Call TI	-40 to 125	PAYI

(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.

**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.

**OTHER QUALIFIED VERSIONS OF TPS2818, TPS2819, TPS2829 :**

● Automotive : [TPS2819-Q1](#), [TPS2829-Q1](#)

● Enhanced Product : [TPS2818-EP](#), [TPS2819-EP](#)

**NOTE: Qualified Version Definitions:**

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product - Supports Defense, Aerospace and Medical Applications

## TAPE AND REEL INFORMATION



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TPS2816DBVR	SOT-23	DBV	5	3000	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
TPS2816DBVT	SOT-23	DBV	5	250	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
TPS2817DBVR	SOT-23	DBV	5	3000	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
TPS2817DBVT	SOT-23	DBV	5	250	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
TPS2818DBVR	SOT-23	DBV	5	3000	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
TPS2819DBVR	SOT-23	DBV	5	3000	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
TPS2819DBVT	SOT-23	DBV	5	250	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
TPS2828DBVR	SOT-23	DBV	5	3000	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
TPS2828DBVT	SOT-23	DBV	5	250	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
TPS2829DBVR	SOT-23	DBV	5	3000	178.0	9.0	3.23	3.17	1.37	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)
TPS2816DBVR	SOT-23	DBV	5	3000	180.0	180.0	18.0
TPS2816DBVT	SOT-23	DBV	5	250	180.0	180.0	18.0
TPS2817DBVR	SOT-23	DBV	5	3000	180.0	180.0	18.0
TPS2817DBVT	SOT-23	DBV	5	250	180.0	180.0	18.0
TPS2818DBVR	SOT-23	DBV	5	3000	180.0	180.0	18.0
TPS2819DBVR	SOT-23	DBV	5	3000	180.0	180.0	18.0
TPS2819DBVT	SOT-23	DBV	5	250	180.0	180.0	18.0
TPS2828DBVR	SOT-23	DBV	5	3000	180.0	180.0	18.0
TPS2828DBVT	SOT-23	DBV	5	250	180.0	180.0	18.0
TPS2829DBVR	SOT-23	DBV	5	3000	180.0	180.0	18.0

## IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#) or other applicable terms available either on [ti.com](https://www.ti.com) or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2025, Texas Instruments Incorporated