

AUTOSWITCHING POWER MUX

Check for Samples: TPS2114A, TPS2115A

FEATURES

- Two-Input, One-Output Power Multiplexer with Low r_{DS(on)} Switches:
 - 120 mΩ Typ (TPS2114A)
 - 84 mΩ Typ (TPS2115A)
- **Reverse and Cross-Conduction Blocking**
- Wide Operating Voltage Range: 2.8 V to 5.5 V
- Low Standby Current: 0.5-µA Typ Low Operating Current: 55-µA Typ
- **Adjustable Current Limit**
- **Controlled Output Voltage Transition Times Limit Inrush Current and Minimize Output** Voltage Hold-Up Capacitance
- **CMOS- and TTL-Compatible Control Inputs**
- **Manual and Auto-Switching Operating Modes**
- **Thermal Shutdown**
- Available in TSSOP-8 and 3-mm × 3-mm SON-8 **Packages**

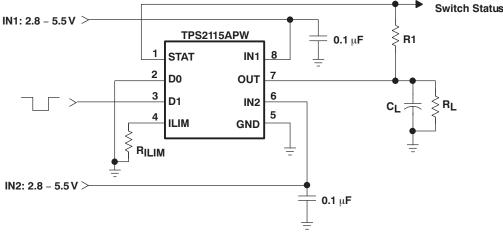
APPLICATIONS

- **PCs**
- **PDAs**
- **Digital Cameras**
- **Modems**
- **Cell Phones**
- **Digital Radios**
- **MP3 Players**

DESCRIPTION

The TPS211xA family of power multiplexers enables seamless transition between two power supplies (such as a battery and a wall adapter), each operating at 2.8 V to 5.5 V and delivering up to 2 A, depending on package. The TPS211xA family includes extensive protection circuitry, including userprogrammable current limiting, thermal protection, inrush current control, seamless supply transition, cross-conduction blocking, and reverse-conduction blocking. These features greatly simplify designing power multiplexer applications.

TYPICAL APPLICATION



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This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

DEVICE INFORMATION⁽¹⁾

T _A	PACKAGE	I _{OUT}	ORDERING NUMBER	MARKING
-40°C to 85°C	TCCOD 9 (DW)	0.75	TPS2114APW	2114A
	TSSOP-8 (PW)	1.25	TPS2115APW	2115A
	SON-8 (DRB)	2	TPS2115ADRB	CGF

⁽¹⁾ For the most current package and ordering information see the Package Option Addendum at the end of this document, or visit the device product folder at www.ti.com.

ABSOLUTE MAXIMUM RATINGS(1)

Over recommended junction temperature range (unless otherwise noted).

		VALUE		
		MIN	MAX	UNIT
Voltage	IN1, IN2, D0, D1, ILIM ⁽²⁾	-0.3	6	V
Voltage	V _{O(OUT)} , V _{O(STAT)} ⁽²⁾	-0.3	6	V
	Output sink, I _{O(STAT)}		5	mA
	Continuous output, I _O (TPS2114APW)		0.9	А
Current	Continuous output, I _O (TPS2115APW)		1.5	А
	Continuous output, I_0 (TPS2115ADRB), $T_J \le 105$ °C		2.5	А
Power dissipation	Continuous total	See Power Dis	sipation Rating	gs table
Temperature	Operating virtual junction, T _J	-40	125	°C
ECD notices	Human body model, HBM		2	kV
ESD ratings	Charge device model, CDM		500	V

⁽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 is not implied. Exposure to absolute-maximum rated conditions for extended periods may affect device reliability.

AVAILABLE OPTIONS

FEATURE		TPS2114A	TPS2115A
Current limit adjustment range		0.31 A to 0.75 A	0.63 A to 2 A
Constant in a second of	Manual	Yes	Yes
Switching modes	Automatic	Yes	Yes
Switch status output		Yes	Yes
Package		TOCOD o	TSSOP-8
		TSSOP-8	SON-8

⁽²⁾ All voltages are with respect to GND.





PACKAGE DISSIPATION RATINGS

PACKAGE	DERATING FACTOR ABOVE T _A = 25°C	T _A ≤ 25°C POWER RATING	T _A = 70°C POWER RATING	T _A = 85°C POWER RATING
TSSOP-8 (PW)	3.9 mW/°C	387 mW	213 mW	155 mW
SON-8 (DRB)	25.0 mW/°C	2.50 W	1.38 W	1.0 W

RECOMMENDED OPERATING CONDITIONS

		MIN	NOM MAX	UNIT
Input voltage at IN11 V	V _{I(IN2)} ≥ 2.8 V	1.5	5.5	V
Input voltage at IN1, V _{I(IN1)}	V _{I(IN2)} < 2.8 V	2.8	5.5	V
Input voltage at IN2 V	V _{I(IN1)} ≥ 2.8 V	1.5	5.5	V
Input voltage at IN2, V _{I(IN2)}	V _{I(IN1)} < 2.8 V	2.8	5.5	V
Input voltage, V _{I(DO)} , V _{I(D1)}		0	5.5	V
	TPS2114APW	0.31	0.75	Α
Nominal current limit adjustment range, $I_{O(OUT)}^{(1)}$	TPS2115APW	0.63	1.25	Α
-0(001)	TPS2115ADRB, T _J ≤ 105°C	0.63	2	Α
Operating virtual junction temperature, T _J		-40	125	°C

⁽¹⁾ Minimum recommended current is based on accuracy considerations.

ELECTRICAL CHARACTERISTICS: POWER SWITCH

Over recommended operating junction temperature range, $V_{I(IN1)} = V_{I(IN2)} = 5.5 \text{ V}$, and $R_{ILIM} = 400 \Omega$, unless otherwise noted.

			TPS2114A			TPS2115A			
	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	UNIT
		$T_J = 25^{\circ}C$, $I_L = 500$ mA, $V_{I(IN1)} = V_{I(IN2)} = 5.0$ V		120	140		84	110	mΩ
		$T_J = 25^{\circ}C$, $I_L = 500$ mA, $V_{I(IN1)} = V_{I(IN2)} = 3.3$ V		120	140		84	110	mΩ
- (1)	Drain-source on-state	$T_J = 25^{\circ}C$, $I_L = 500$ mA, $V_{I(IN1)} = V_{I(IN2)} = 2.8$ V		120	140		84	110	mΩ
r _{DS(on)} ⁽¹⁾	resistance (INx-OUT)	$T_J = 125$ °C, $I_L = 500$ mA, $V_{I(IN1)} = V_{I(IN2)} = 5.0$ V			220			150	mΩ
		$T_J = 125$ °C, $I_L = 500$ mA, $V_{I(IN1)} = V_{I(IN2)} = 3.3$ V			220			150	mΩ
		$T_J = 125$ °C, $I_L = 500$ mA, $V_{I(IN1)} = V_{I(IN2)} = 2.8$ V			220			150	mΩ

⁽¹⁾ The TPS211xA can switch a voltage as low as 1.5 V as long as there is a minimum of 2.8 V at one of the input power pins. In this specific case, the lower supply voltage has no effect on the IN1 and IN2 switch on-resistances.



ELECTRICAL CHARACTERISTICS: GENERAL

Over recommended operating junction temperature range, $V_{I(IN1)} = V_{I(IN2)} = 5.5 \text{ V}$, and $R_{ILIM} = 400 \Omega$, unless otherwise noted.

			TF	PS2114A		
	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
LOGIC IN	IPUTS (D0 AND D1)					
V _{IH}	High-level input voltage		2			V
V _{IL}	Low-level input voltage				0.7	V
	Innut current at DO or D1	D0 or D1 = high, sink current			1	μΑ
	Input current at D0 or D1	D0 or D1 = low, source current	0.5	1.4	5	μΑ
SUPPLY	AND LEAKAGE CURRENTS					
		D1 = high, D0 = low (IN1 active), $V_{I(IN1)}$ = 5.5 V, $V_{I(IN2)}$ = 3.3 V, $I_{O(OUT)}$ = 0 A		55	90	μΑ
	Supply current from IN1	D1 = high, D0 = low (IN1 active), $V_{I(IN1)}$ = 3.3 V, $V_{I(IN2)}$ = 5.5 V, $I_{O(OUT)}$ = 0 A		1	12	μΑ
	(operating)	D0 = D1 = low (IN2 active), $V_{I(IN1)}$ = 5.5 V, $V_{I(IN2)}$ = 3.3 V, $I_{O(OUT)}$ = 0 A			75	μΑ
		D0 = D1 = low (IN2 active), $V_{I(IN1)} = 3.3 \text{ V},$ $V_{I(IN2)} = 5.5 \text{ V}, I_{O(OUT)} = 0 \text{ A}$			1	μΑ
		D1 = high, D0 = low (IN1 active), $V_{I(IN1)}$ = 5.5 V, $V_{I(IN2)}$ = 3.3 V, $I_{O(OUT)}$ = 0 A			1	μΑ
	Supply current from IN2	D1 = high, D0 = low (IN1 active), $V_{I(IN1)}$ = 3.3 V, $V_{I(IN2)}$ = 5.5 V, $I_{O(OUT)}$ = 0 A			75	μΑ
	(operating)	D0 = D1 = low (IN2 active), $V_{I(IN1)}$ = 5.5 V, $V_{I(IN2)}$ = 3.3 V, $I_{O(OUT)}$ = 0 A		1	12	μΑ
		D0 = D1 = low (IN2 active), $V_{I(IN1)} = 3.3 \text{ V},$ $V_{I(IN2)} = 5.5 \text{ V}, I_{O(OUT)} = 0 \text{ A}$		55	90	μΑ
	Quiescent current from IN1	D0 = D1 = high (inactive), $V_{I(IN1)}$ = 5.5 V, $V_{I(IN2)}$ = 3.3 V, $I_{O(OUT)}$ = 0 A		0.5	2	μΑ
	(STANDBY)	D0 = D1 = high (inactive), $V_{I(IN1)}$ = 3.3 V, $V_{I(IN2)}$ = 5.5 V, $I_{O(OUT)}$ = 0 A			1	μΑ
	Quiescent current from IN2	D0 = D1 = high (inactive), $V_{I(IN1)}$ = 5.5 V, $V_{I(IN2)}$ = 3.3 V, $I_{O(OUT)}$ = 0 A			1	μΑ
	(STANDBY)	D0 = D1 = high (inactive), $V_{I(IN1)}$ = 3.3 V, $V_{I(IN2)}$ = 5.5 V, $I_{O(OUT)}$ = 0 A		0.5	2	μΑ
	Forward leakage current from IN1 (measured from OUT to GND)	$\begin{array}{l} \text{D0} = \text{D1} = \text{high (inactive), V}_{\text{I(IN1)}} = 5.5 \text{ V, IN2 open,} \\ \text{V}_{\text{O(OUT)}} = 0 \text{ V (shorted), T}_{\text{J}} = 25^{\circ}\text{C} \end{array}$		0.1	5	μΑ
	Forward leakage current from IN2 (measured from OUT to GND)	D0 = D1= high (inactive), $V_{I(IN2)}$ = 5.5 V, IN1 open, $V_{O(OUT)}$ = 0 V (shorted), T_J = 25°C		0.1	5	μΑ
	Reverse leakage current to INx (measured from INx to GND)	D0 = D1 = high (inactive), $V_{I(INx)}$ = 0 V, $V_{O(OUT)}$ = 5.5 V, T_J = 25°C		0.3	5	μΑ
URREN	T LIMIT CIRCUIT					
	Current limit accuracy, TPS2114A	$R_{ILIM} = 400 \Omega$	0.51	0.63	0.80	Α
	Current minit accuracy, 1F32114A	$R_{ILIM} = 700 \Omega$	0.30	0.36	0.50	Α
	Current limit accuracy, TPS2115A	$R_{ILIM} = 400 \Omega$	0.95	1.25	1.56	Α
	Current limit accuracy, 11 32113A	$R_{ILIM} = 700 \Omega$	0.47	0.71	0.99	Α
i	Current limit settling time	Time for short-circuit output current to settle within 10% of its steady state value.		1		ms
	Input current at ILIM	$V_{I(ILIM)} = 0 \text{ V}, I_{O(OUT)} = 0 \text{ A}$	-15		0	μΑ
IVLO						
	IN1 and IN2 UVLO	Falling edge	1.15	1.25		V
	HAT GIRG HAZ OVEO	Rising edge		1.30	1.35	V
	IN1 and IN2 UVLO hysteresis		30	57	65	mV
	Internal V _{DD} UVLO (the higher of	Falling edge	2.4	2.53		V
	IN1 and IN2)	Rising edge		2.58	2.8	V
	Internal V _{DD} UVLO hysteresis		30	50	75	mV
	UVLO deglitch for IN1, IN2	Falling edge	-	110		μs



ELECTRICAL CHARACTERISTICS: GENERAL (continued)

Over recommended operating junction temperature range, $V_{I(IN2)} = V_{I(IN2)} = 5.5 \text{ V}$, and $R_{II IM} = 400 \Omega$, unless otherwise noted.

			TPS2114A			
	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
REVERSE (CONDUCTION BLOCKING					
$\Delta V_{O(I_block)}$	Minimum input-to-output voltage difference to block switching	$\begin{array}{l} D0 = D1 = high, V_{I(INx)} = 3.3 V \\ Connect OUT to a 5\text{-V} supply through a series 1\text{-k}\Omega \\ resistor. Let D0 = low. Slowly decrease the supply voltage until OUT connects to IN1. \end{array}$	80	100	120	mV
THERMAL	SHUTDOWN					
	Thermal shutdown threshold	TPS211xA is in current limit	135			°C
	Recovery from thermal shutdown	TPS211xA is in current limit	125			°C
	Hysteresis			10		°C
N2-IN1 CO	MPARATORS				·	
	Hysteresis of IN2-IN1 comparator		0.1		0.2	V
	Deglitch of IN2−IN1 comparator (both ↑↓)		10	20	50	μs
STAT OUT	PUT					
	Leakage current	V _{O(STAT)} = 5.5 V		0.01	1	μΑ
	Saturation voltage	I _{I(STAT)} = 2 mA, IN1 switch is on		0.13	0.4	V
	Deglitch time (falling edge only)			150		μs

SWITCHING CHARACTERISTICS

Over recommended operating junction temperature range, $V_{I(IN1)} = V_{I(IN2)} = 5.5 \text{ V}$, and $R_{ILIM} = 400 \Omega$, unless otherwise noted.

			TI	TPS2114A		TF	PS2115A		
	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	UNIT
POWE	R SWITCH		-						
t _r	Output rise time from an enable	$V_{I(IN1)}=V_{I(IN2)}=5$ V, $T_J=25^{\circ}C,~C_L=1~\mu F,~I_L=500~mA$ (see Figure 1a)	0.5	1.0	1.5	1	1.8	3	ms
t _f	Output fall time from a disable	$V_{I(IN1)}=V_{I(IN2)}=5$ V, $T_J=25^{\circ}C,~C_L=1~\mu F,~I_L=500~mA$ (see Figure 1a)	0.35	0.5	0.7	0.5	1	2	ms
t _t Transition time	IN1 to IN2 transition, $V_{I(IN1)}=3.3$ V, $V_{I(IN2)}=5$ V, $T_J=125^{\circ}$ C, $C_L=10$ μ F, $I_L=500$ mA Measure transition time as 10–90% rise time or from 3.4 V to 4.8 V on $V_{O(OUT)}$ (see Figure 1b).		40	60		40	60	μs	
	Transition time	IN2 to IN1 transition, $V_{I(IN1)}=5$ V, $V_{I(IN2)}=3.3$ V, $T_J=125^{\circ}$ C, $C_L=10$ μ F, $I_L=500$ mA Measure transition time as 10–90% rise time or from 3.4 V to 4.8 V on $V_{O(OUT)}$ (see Figure 1b).		40	60		40	60	μs
t _{PLH1}	Turn-on propagation delay from enable	$V_{I(IN1)}=V_{I(IN2)}=5$ V, measured from enable to 10% of $V_{O(OUT)},$ $T_J=25^{\circ}C,$ $C_L=10~\mu\text{F},$ $I_L=500~\text{mA}$ (see Figure 1a)		0.5			1		ms
t _{PHL1}	Turn-off propagation delay from a disable	$V_{I(IN1)}=V_{I(IN2)}=5$ V, measured from disable to 90% of $V_{O(OUT)},T_J=25^{\circ}C,C_L=10~\mu\text{F},I_L=500~\text{mA}$ (see Figure 1a)		3			5		ms
t _{PLH2}	Switch-over rising propagation delay	Logic 1 to Logic 0 transition on D1, $V_{I(IN1)}$ = 1.5 V, $V_{I(IN2)}$ = 5 V, $V_{I(D0)}$ = 0 V, measured from D1 to 10% of $V_{O(OUT)}$, T_J = 25°C, C_L = 10 μ F, I_L = 500 mA (see Figure 1c)		40	100		40	100	μs
t _{PHL2}	Switch-over falling propagation delay	Logic 0 to Logic 1 transition on D1, $V_{1(IN1)}$ = 1.5V, $V_{1(IN2)}$ = 5V, $V_{1(D0)}$ = 0 V, measured from D1 to 90% of $V_{O(OUT)}$, T_J = 25°C, C_L = 10 μ F, I_L = 500 mA (see Figure 1c)	2	3	10	2	5	10	ms

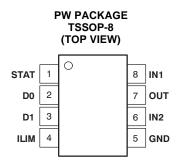


Table 1. Truth Table

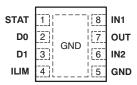
D1	D0	$V_{I(IN2)} > V_{I(IN1)}$	STAT	OUT ⁽¹⁾
0	0	X ⁽²⁾	Hi-Z	IN2
0	1	No	0	IN1
0	1	Yes	Hi-Z	IN2
1	0	X	0	IN1
1	1	X	0	Hi-Z

- (1) The under-voltage lockout circuit causes the output OUT to go Hi-Z if the selected power supply does not exceed the IN1/IN2 UVLO, or if neither of the supplies exceeds the internal V_{DD} UVLO.
- (2) X = Don't care.

PIN CONFIGURATIONS



DRB PACKAGE 3mm × 3mm SON-8 (TOP VIEW)

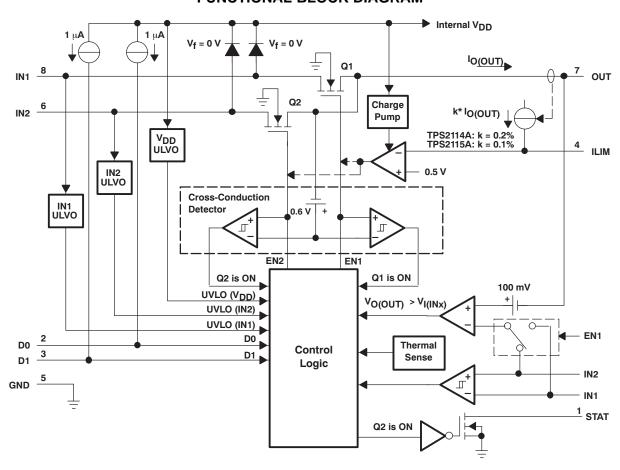


TERMINAL FUNCTIONS

TERMINAL			
NAME	ME NO. I/O		DESCRIPTION
D0	2	I	TTL- and CMOS-compatible input pins. Each pin has a 1-µA pull-up. Table 1 illustrates the functionality of D0 and D1.
D1	3	I	TTL- and CMOS-compatible input pins. Each pin has a 1-µA pull-up. Table 1 illustrates the functionality of D0 and D1.
GND	5	I	Ground
IN1	8	I	Primary power switch input. The IN1 switch can be enabled only if the IN1 supply is above the UVLO threshold and at least one supply exceeds the internal V _{DD} UVLO.
IN2	6	I	Secondary power switch input. The IN2 switch can be enabled only if the IN2 supply is above the UVLO threshold and at least one supply exceeds the internal V_{DD} UVLO.
ILIM	4	I	A resistor $R_{\rm ILIM}$ from ILIM to GND sets the current limit I_L to $250/R_{\rm ILIM}$ and $500/R_{\rm ILIM}$ for the TPS2114A and TPS2115A, respectively.
OUT	7	0	Power switch output
STAT	1	0	STAT is an open-drain output that is Hi-Z if the IN2 switch is ON. STAT pulls low if the IN1 switch is ON or if OUT is Hi-Z (i.e., EN is equal to logic 0).
PAD	_	I	Tie to GND. Connect to internal planes for improved heatsinking with multiple vias.

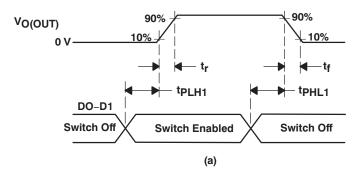


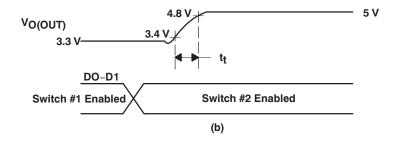
FUNCTIONAL BLOCK DIAGRAM





PARAMETER MEASUREMENT INFORMATION





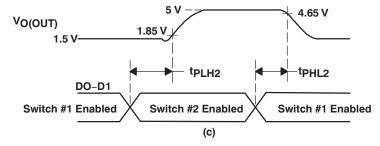


Figure 1. Propagation Delays and Transition Timing Waveforms



TYPICAL CHARACTERISTICS

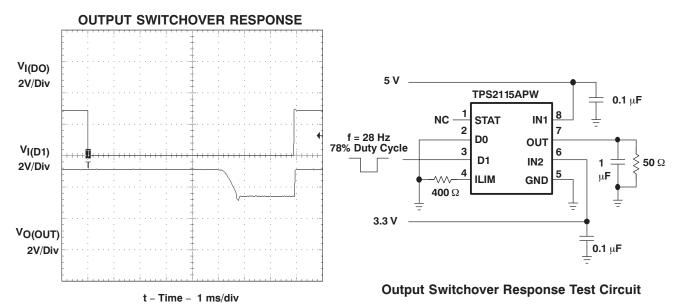


Figure 2.

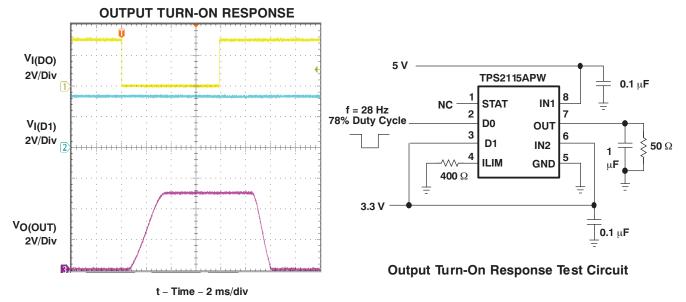


Figure 3.



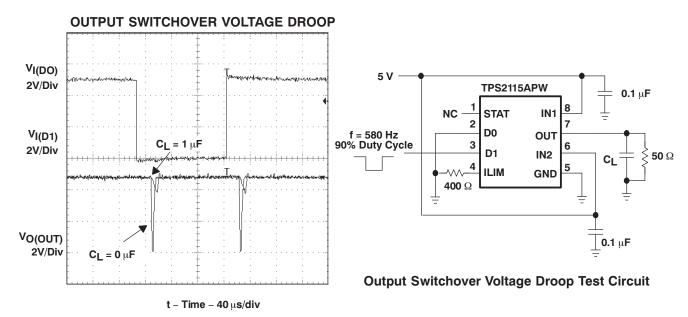
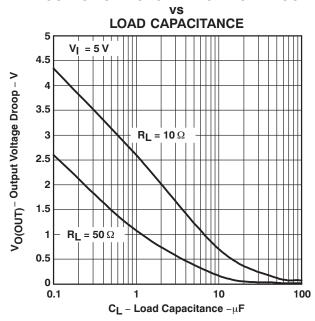
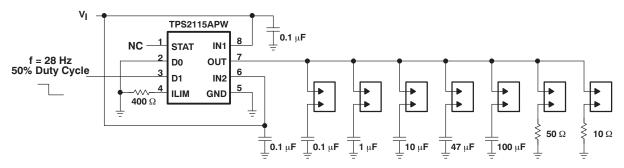


Figure 4.



OUTPUT SWITCHOVER VOLTAGE DROOP





Output Switchover Voltage Droop Test Circuit Figure 5.



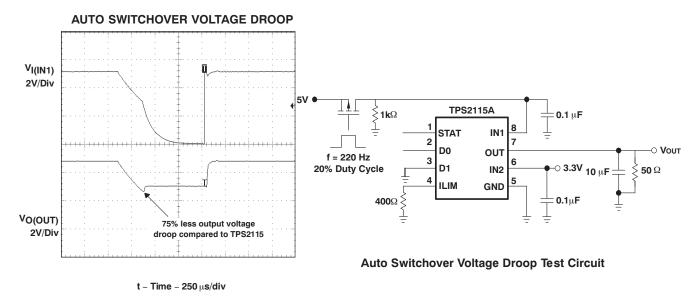
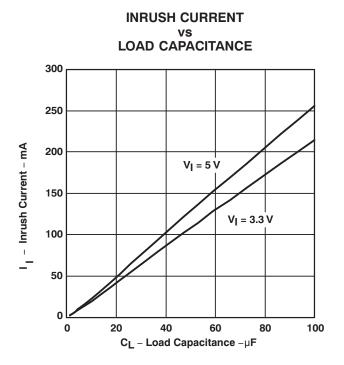
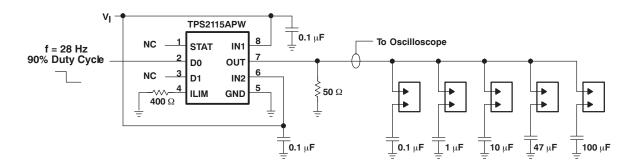


Figure 6.

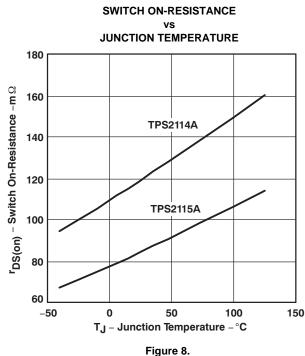




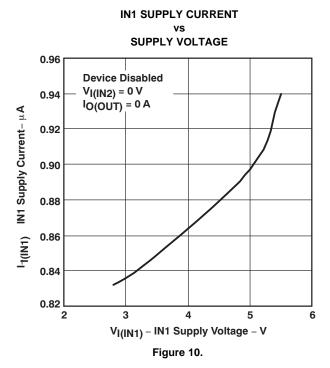


Output Capacitor Inrush Current Test Circuit Figure 7.

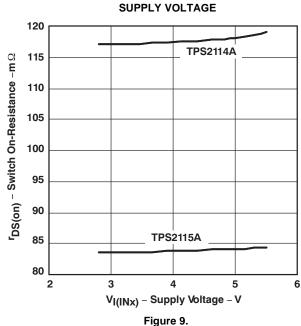








SWITCH ON-RESISTANCE



IN1 SUPPLY CURRENT SUPPLY VOLTAGE

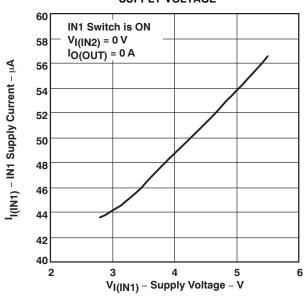
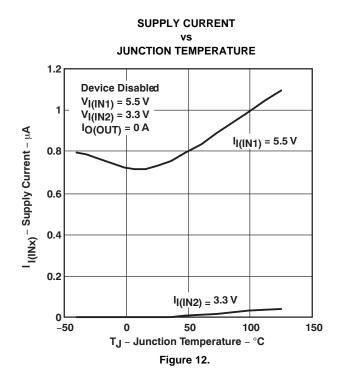
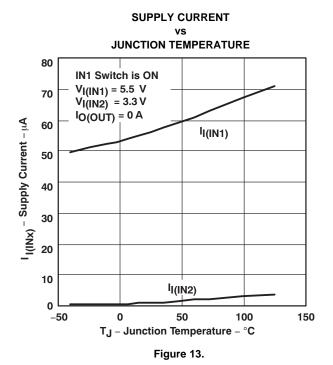


Figure 11.









APPLICATION INFORMATION

Some applications have two energy sources, one of which should be used in preference to another. Figure 14 shows a circuit that will connect IN1 to OUT until the voltage at IN1 falls below a user-specified value. Once the voltage on IN1 falls below this value, the TPS2114A/5A will select the higher of the two supplies. This usually means that the TPS2114A/5A will swap to IN2.

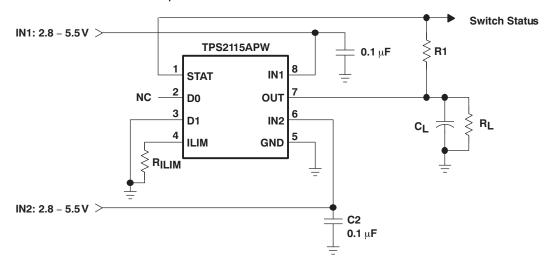


Figure 14. Auto-Selecting for a Dual Power Supply Application

In Figure 15, the multiplexer selects between two power supplies based upon the D1 logic signal. OUT connects to IN1 if D1 is logic 1; otherwise, OUT connects to IN2. The logic thresholds for the D1 terminal are compatible with both TTL and CMOS logic.

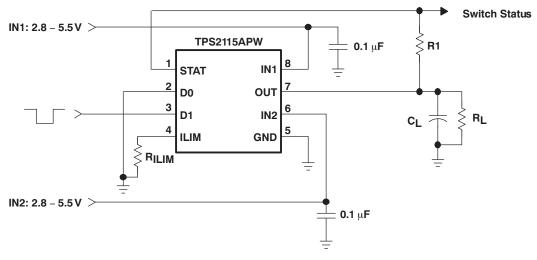


Figure 15. Manually Switching Power Sources



DETAILED DESCRIPTION

AUTO-SWITCHING MODE

D0 equal to logic 1 and D1 equal to logic 0 selects the auto-switching mode. In this mode, OUT connects to the higher of IN1 and IN2.

MANUAL SWITCHING MODE

D0 equal to logic 0 selects the manual-switching mode. In this mode, OUT connects to IN1 if D1 is equal to logic 1, otherwise OUT connects to IN2.

N-CHANNEL MOSFETs

Two internal high-side power MOSFETs implement a single-pole double-throw (SPDT) switch. Digital logic selects the IN1 switch, IN2 switch, or no switch (Hi-Z state). The MOSFETs have no parallel diodes so output-to-input current cannot flow when the FET is off. An integrated comparator prevents turn-on of a FET switch if the output voltage is greater than the input voltage.

CROSS-CONDUCTION BLOCKING

The switching circuitry ensures that both power switches will never conduct at the same time. A comparator monitors the gate-to-source voltage of each power FET and allows a FET to turn on only if the gate-to-source voltage of the other FET is below the turn-on threshold voltage.

REVERSE-CONDUCTION BLOCKING

When the TPS211xA switches from a higher-voltage supply to a lower-voltage supply, current can potentially flow back from the load capacitor into the lower-voltage supply. To minimize such reverse conduction, the TPS211xA will not connect a supply to the output until the output voltage has fallen to within 100 mV of the supply voltage. Once a supply has been connected to the output, it will remain connected regardless of output voltage.

CHARGE PUMP

The higher of supplies IN1 and IN2 powers the internal charge pump. The charge pump provides power to the current limit amplifier and allows the output FET gate voltage to be higher than the IN1 and IN2 supply voltages. A gate voltage that is higher than the source voltage is necessary to turn on the N-channel FET.

CURRENT LIMITING

A resistor R_{ILIM} from ILIM to GND sets the current limit to 250/R_{ILIM} and 500/R_{ILIM} for the TPS2114A and TPS2115A, respectively. Setting resistor R_{ILIM} equal to zero is not recommended as that disables current limiting.

OUTPUT VOLTAGE SLEW-RATE CONTROL

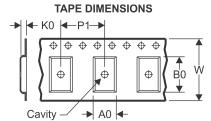
The TPS2114A/5A slews the output voltage at a slow rate when OUT switches to IN1 or IN2 from the Hi-Z state (see Table 1). A slow slew rate limits the inrush current into the load capacitor. High inrush currents can glitch the voltage bus and cause a system to hang up or reset. It can also cause reliability issues—like pit the connector power contacts, when hot-plugging a load such as a PCI card. The TPS2114A/5A slews the output voltage at a much faster rate when OUT switches between IN1 and IN2. The fast rate minimizes the output voltage droop and reduces the output voltage hold-up capacitance requirement.

PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION





	Dimension designed to accommodate the component width
	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

All difficusions are nominal												
Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TPS2114APWR	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
TPS2115ADRBR	SON	DRB	8	3000	330.0	12.4	3.3	3.3	1.1	8.0	12.0	Q2
TPS2115ADRBT	SON	DRB	8	250	180.0	12.4	3.3	3.3	1.1	8.0	12.0	Q2
TPS2115APWR	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1

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*All dimensions are nominal

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Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS2114APWR	TSSOP	PW	8	2000	367.0	367.0	35.0
TPS2115ADRBR	SON	DRB	8	3000	367.0	367.0	35.0
TPS2115ADRBT	SON	DRB	8	250	210.0	185.0	35.0
TPS2115APWR	TSSOP	PW	8	2000	367.0	367.0	35.0



REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

C	hanges from Revision E (April 2011) to Revision F	Page
•	Changed description of power supplies in <i>Description</i> section	1
•	Added I _{OUT} column to Device Information table	2
•	Changed conditions of Absolute Maximum Ratings table	<u>2</u>
•	Added PW to end of device name in first two continuous output rows in <i>Current</i> parameter of Absolute Maximum Ratings table	2
•	Added last continuous output row to Current parameter in Absolute Maximum Ratings table	2
•	Deleted storage temperature row from Absolute Maximum Ratings table	2
•	Changed Current limit adjustment range parameter, TPS2115A specification in Available Options table	
•	Changed Nominal current limit adjustment range parameter in Recommended Operating Conditions table	
•	Added footnote 1 to Recommended Operating Conditions table	3
C	hanges from Revision D (July 2006) to Revision E	Page
•	Updated document to current format	1
•	Changed title, footnote, and CGF marking in Device Information table	<u>2</u>
•	Deleted footnote 1 (not tested in production) from Electrical Characteristics: General table	4
•	Deleted footnote 1 (not tested in production) from Switching Characteristics table	5
•	Added PAD row to Terminal Functions table	6

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PACKAGING INFORMATION

Orderable part number	Status	Material type	Package Pins	Package qty Carrier	RoHS	Lead finish/ Ball material	MSL rating/ Peak reflow	Op temp (°C)	Part marking (6)
						(4)	(5)		
TPS2114APW	Active	Production	TSSOP (PW) 8	150 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2114A
TPS2114APW.A	Active	Production	TSSOP (PW) 8	150 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2114A
TPS2114APWR	Active	Production	TSSOP (PW) 8	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2114A
TPS2114APWR.A	Active	Production	TSSOP (PW) 8	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2114A
TPS2115ADRBR	Active	Production	SON (DRB) 8	3000 LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CGF
TPS2115ADRBR.A	Active	Production	SON (DRB) 8	3000 LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CGF
TPS2115ADRBR.B	Active	Production	SON (DRB) 8	3000 LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CGF
TPS2115ADRBRG4	Active	Production	SON (DRB) 8	3000 LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CGF
TPS2115ADRBRG4.A	Active	Production	SON (DRB) 8	3000 LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CGF
TPS2115ADRBRG4.B	Active	Production	SON (DRB) 8	3000 LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CGF
TPS2115ADRBT	Active	Production	SON (DRB) 8	250 SMALL T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CGF
TPS2115ADRBT.B	Active	Production	SON (DRB) 8	250 SMALL T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CGF
TPS2115ADRBTG4	Active	Production	SON (DRB) 8	250 SMALL T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 85	CGF
TPS2115APW	Active	Production	TSSOP (PW) 8	150 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2115A
TPS2115APW.B	Active	Production	TSSOP (PW) 8	150 TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2115A
TPS2115APWR	Active	Production	TSSOP (PW) 8	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2115A
TPS2115APWR.B	Active	Production	TSSOP (PW) 8	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2115A
TPS2115APWRG4	Active	Production	TSSOP (PW) 8	2000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2115A

⁽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.

PACKAGE OPTION ADDENDUM

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(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 TPS2115A:

Automotive: TPS2115A-Q1

NOTE: Qualified Version Definitions:

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

PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION





A0	Dimension designed to accommodate the component width
В0	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		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TPS2114APWR	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
TPS2115ADRBR	SON	DRB	8	3000	330.0	12.4	3.3	3.3	1.1	8.0	12.0	Q2
TPS2115ADRBRG4	SON	DRB	8	3000	330.0	12.4	3.3	3.3	1.1	8.0	12.0	Q2
TPS2115ADRBT	SON	DRB	8	250	180.0	12.4	3.3	3.3	1.1	8.0	12.0	Q2
TPS2115APWR	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1



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*All dimensions are nominal

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Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS2114APWR	TSSOP	PW	8	2000	353.0	353.0	32.0
TPS2115ADRBR	SON	DRB	8	3000	367.0	367.0	35.0
TPS2115ADRBRG4	SON	DRB	8	3000	367.0	367.0	35.0
TPS2115ADRBT	SON	DRB	8	250	210.0	185.0	35.0
TPS2115APWR	TSSOP	PW	8	2000	353.0	353.0	32.0

PACKAGE MATERIALS INFORMATION

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TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
TPS2114APW	PW	TSSOP	8	150	530	10.2	3600	3.5
TPS2114APW.A	PW	TSSOP	8	150	530	10.2	3600	3.5
TPS2115APW	PW	TSSOP	8	150	530	10.2	3600	3.5
TPS2115APW.B	PW	TSSOP	8	150	530	10.2	3600	3.5



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

4203482/L





PLASTIC SMALL OUTLINE - NO LEAD



NOTES:

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



PLASTIC SMALL OUTLINE - NO LEAD



NOTES: (continued)

- 4. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature number SLUA271 (www.ti.com/lit/slua271).
- Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.



PLASTIC SMALL OUTLINE - NO LEAD



NOTES: (continued)

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





SMALL OUTLINE PACKAGE



NOTES:

- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

 2. This drawing is subject to change without notice.

 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not
- exceed 0.15 mm per side.
- 4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
- 5. Reference JEDEC registration MO-153, variation AA.



SMALL OUTLINE PACKAGE



NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SMALL OUTLINE PACKAGE



NOTES: (continued)

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



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