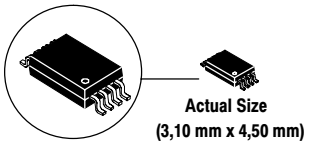


AUTOSWITCHING POWER MUX

FEATURES

- Two-Input, One-Output Power Multiplexer With Low $r_{DS(on)}$ Switches:
  - 84 mΩ Typ (TPS2111)
  - 120 mΩ Typ (TPS2110)
- 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, Limits Inrush Current and Minimizes Output Voltage Hold-Up Capacitance
- CMOS and TTL Compatible Control Inputs
- Manual and Auto-Switching Operating Modes
- Thermal Shutdown
- Available in a TSSOP-8 Package

APPLICATIONS

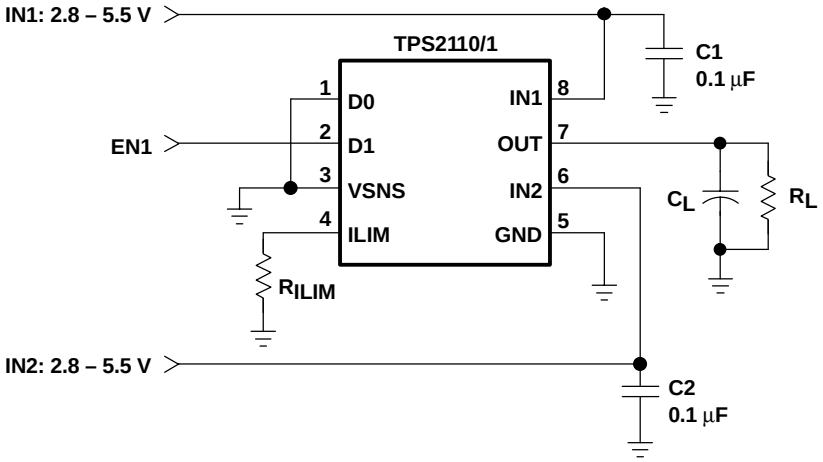
- PCs
- PDAs
- Digital Cameras
- Modems
- Cell phones
- Digital Radios
- MP3 Players

PW PACKAGE
(TOP VIEW)

DESCRIPTION

The TPS211x family of power multiplexers enables seamless transition between two power supplies, such as a battery and a wall adapter, each operating at 2.8–5.5 V and delivering up to 1 A. The TPS211x family includes extensive protection circuitry, including user-programmable 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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These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

AVAILABLE OPTIONS

FEATURE		TPS2110	TPS2111	TPS2112	TPS2113	TPS2114	TPS2115
Current Limit Adjustment Range		0.31–0.75A	0.63–1.25A	0.31–0.75A	0.63–1.25A	0.31–0.75A	0.63–1.25A
Switching modes	Manual	Yes	Yes	No	No	Yes	Yes
	Automatic	Yes	Yes	Yes	Yes	Yes	Yes
Switch Status Output		No	No	Yes	Yes	Yes	Yes
Package		TSSOP-8	TSSOP-8	TSSOP-8	TSSOP-8	TSSOP-8	TSSOP-8

ORDERING INFORMATION

T_A	PACKAGE	ORDERING NUMBER(1)	MARKINGS
–40°C to 85°C	TSSOP-8 (PW)	TPS2110PW	2110
		TPS2111PW	2111

(1) The PW package is available taped and reeled. Add an R suffix to the device type (e.g., TPS2110PWR) to indicate tape and reel.

PACKAGE DISSIPATION RATINGS

PACKAGE	DERATING FACTOR ABOVE T_A = 25°C	$T_A \le 25°C$ POWER RATING	T_A = 70°C POWER RATING	T_A = 85°C POWER RATING
TSSOP-8 (PW)	3.87 mW/°C	386.84 mW	212.76 mW	154.73 mW

ABSOLUTE MAXIMUM RATINGS

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

		TPS2110, TPS2111
Input voltage range at pins IN1, IN2, D0, D1, VSNS, ILIM(2)		–0.3 V to 6 V
Output voltage range, $V_{O(OUT)}$(2)		–0.3 V to 6 V
Continuous output current, I_O	TPS2110	0.9 A
	TPS2111	1.5 A
Continuous total power dissipation		See Dissipation Rating Table
Operating virtual junction temperature range, T_J		–40°C to 125°C
Storage temperature range, T_{stg}		–65°C to 150°C
Lead temperature soldering 1,6 mm (1/16 inch) from case for 10 seconds		260°C

(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.

(2) All voltages are with respect to GND.

RECOMMENDED OPERATING CONDITIONS

		MIN	MAX	UNIT
Input voltage at IN1, $V_{I(IN1)}$	$V_{I(IN2)} \ge 2.8$ V	1.5	5.5	V
	$V_{I(IN2)} < 2.8$ V	2.8	5.5	
Input voltage at IN2, $V_{I(IN2)}$	$V_{I(IN1)} \ge 2.8$ V	1.5	5.5	V
	$V_{I(IN1)} < 2.8$ V	2.8	5.5	
Input voltage, $V_{I(DO)}$, $V_{I(D1)}$, $V_{I(VSNS)}$		0	5.5	V
Current limit adjustment range, $I_{O(OUT)}$	TPS2110	0.31	0.75	A
	TPS2111	0.63	1.25	
Operating virtual junction temperature, T_J		–40	125	°C

ELECTROSTATIC DISCHARGE (ESD) PROTECTION

	MIN	MAX	UNIT
Human body model		2	kV
CDM		500	V

ELECTRICAL CHARACTERISTICS

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

PARAMETER	TEST CONDITIONS		TPS2110			TPS2111			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
POWER SWITCH									
$r_{DS(on)}$(1) Drain-source on-state resistance (INx–OUT)	T_J = 25°C, I_L = 500 mA	$V_{I(IN1)} = V_{I(IN2)} = 5.0$ V		120	140		84	110	mΩ
		$V_{I(IN1)} = V_{I(IN2)} = 3.3$ V		120	140		84	110	
		$V_{I(IN1)} = V_{I(IN2)} = 2.8$ V		120	140		84	110	
	T_J = 125°C, I_L = 500 mA	$V_{I(IN1)} = V_{I(IN2)} = 5.0$ V			220			150	mΩ
		$V_{I(IN1)} = V_{I(IN2)} = 3.3$ V			220			150	
		$V_{I(IN1)} = V_{I(IN2)} = 2.8$ V			220			150	

(1) The TPS211x 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.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
LOGIC INPUTS (D0 AND D1)					
V_{IH} High-level input voltage		2			V
V_{IL} Low-level input voltage				0.7	V
Input current at D0 or D1	D0 or D1 = High, sink current			1	µA
	D0 or D1 = Low, source current	0.5	1.4	5	
SUPPLY AND LEAKAGE CURRENTS					
Supply current from IN1 (operating)	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	µA
	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	
	D0 = D1 = Low (IN2 active), $V_{I(IN1)} = 5.5$ V, $V_{I(IN2)} = 3.3$ V, $I_{O(OUT)} = 0$ A			75	
	D0 = D1 = Low (IN2 active), $V_{I(IN1)} = 3.3$ V, $V_{I(IN2)} = 5.5$ V, $I_{O(OUT)} = 0$ A			1	
Supply current from IN2 (operating)	D1 = High, D0 = Low (IN1 active), $V_{I(IN1)} = 5.5$ V, $V_{I(IN2)} = 3.3$ V, $I_{O(OUT)} = 0$ A			1	µA
	D1 = High, D0 = Low (IN1 active), $V_{I(IN1)} = 3.3$ V, $V_{I(IN2)} = 5.5$ V, $I_{O(OUT)} = 0$ A			75	
	D0 = D1 = Low (IN2 active), $V_{I(IN1)} = 5.5$ V, $V_{I(IN2)} = 3.3$ V, $I_{O(OUT)} = 0$ A		1	12	
	D0 = D1 = Low (IN2 active), $V_{I(IN1)} = 3.3$ V, $V_{I(IN2)} = 5.5$ V, $I_{O(OUT)} = 0$ A		55	90	
Quiescent current from IN1 (STANDBY)	D0 = D1 = High (inactive), $V_{I(IN1)} = 5.5$ V, $V_{I(IN2)} = 3.3$ V, $I_{O(OUT)} = 0$ A		0.5	2	µA
	D0 = D1 = High (inactive), $V_{I(IN1)} = 3.3$ V, $V_{I(IN2)} = 5.5$ V, $I_{O(OUT)} = 0$ A			1	
Quiescent current from IN2 (STANDBY)	D0 = D1 = High (inactive), $V_{I(IN1)} = 5.5$ V, $V_{I(IN2)} = 3.3$ V, $I_{O(OUT)} = 0$ A			1	µA
	D0 = D1 = High (inactive), $V_{I(IN1)} = 3.3$ V, $V_{I(IN2)} = 5.5$ V, $I_{O(OUT)} = 0$ A		0.5	2	
Forward leakage current from IN1 (measured from OUT to GND)	D0 = D1 = High (inactive), $V_{I(IN1)} = 5.5$ V, IN2 open, $V_{O(OUT)} = 0$ V (shorted), T_J = 25°C		0.1	5	µA
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	µA
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	µA

ELECTRICAL CHARACTERISTICS Continued

over recommended operating junction temperature range, $V_{I(IN1)}$ = $V_{I(IN2)}$ = 5.5 V, R_{ILIM} = 400 Ω (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
CURRENT LIMIT CIRCUIT						
Current limit accuracy	TPS2110	R_{ILIM} = 400 Ω	0.51	0.63	0.80	A
		R_{ILIM} = 700 Ω	0.30	0.36	0.50	
	TPS2111	R_{ILIM} = 400 Ω	0.95	1.25	1.56	
		R_{ILIM} = 700 Ω	0.47	0.71	0.99	
t_d Current limit settling time(1)		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 V, $I_{O(OUT)}$ = 0 A	–15		0	µA

(1) Not tested in production.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
VSNS COMPARATOR					
VSNS threshold voltage	$V_{I(VSNS)}$ ↑	0.78	0.8	0.82	V
	$V_{I(VSNS)}$ ↓	0.735	0.755	0.775	
VSNS comparator hysteresis(1)		30		60	mV
Deglitch of VSNS comparator (both ↑↓)(1)		90	150	220	µs
Input current	0 V ≤ $V_{I(VSNS)}$ ≤ 5.5 V	–1		1	µA
UVLO					
IN1 and IN2 UVLO	Falling edge	1.15	1.25		V
	Rising edge		1.30	1.35	
IN1 and IN2 UVLO hysteresis(1)		30	57	65	mV
Internal V_{DD} UVLO (the higher of IN1 and IN2)	Falling edge	2.4	2.53		V
	Rising edge		2.58	2.8	
Internal V_{DD} UVLO hysteresis(1)		30	50	75	mV
UVLO deglitch for IN1, IN2(1)	Falling edge		110		µs

(1) Not tested in production.

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
REVERSE CONDUCTION BLOCKING						
$\Delta V_{O(I\_block)}$	Minimum output-to-input voltage difference to block switching	D0 = D1 = high, $V_{I(INx)}$ = 3.3 V. Connect OUT to a 5 V supply through a series 1-kΩ resistor. Let D0 = low. Slowly decrease the supply voltage until OUT connects to IN1.	80	100	120	mV

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
THERMAL SHUTDOWN					
Thermal shutdown threshold(1)	TPS211x is in current limit.	135			°C
Recovery from thermal shutdown(1)	TPS211x is in current limit.	125			
Hysteresis(1)			10		
IN2–IN1 COMPARATORS					
Hysteresis of IN2–IN1 comparator		0.1		0.2	V
Deglitch of IN2–IN1 comparator, (both ↑↓)(1)		90	150	220	µs

(1) Not tested in production.

SWITCHING CHARACTERISTICS

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

PARAMETER		TEST CONDITIONS		TPS2110			TPS2111			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
POWER SWITCH										
t_r	Output rise time from an enable(1)	$V_{I(IN1)} = V_{I(IN2)} =$ 5 V	T_J = 25°C, C_L = 1 µF, I_L = 500 mA, See Figure 1(a)	0.5	1.0	1.5	1	1.8	3	ms
t_f	Output fall time from a disable(1)	$V_{I(IN1)} = V_{I(IN2)}$ = 5 V	T_J = 25°C, C_L = 1 µF, I_L = 500 mA, See Figure 1(a)	0.35	0.5	0.7	0.5	1	2	ms
t_t	Transition time(1)	IN1 to IN2 transition, $V_{I(IN1)}$ = 3.3 V, $V_{I(IN2)}$ = 5 V	T_J = 125°C, C_L = 10 µF, 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 1(b)		40	60		40	60	µs
		IN2 to IN1 transition, $V_{I(IN1)}$ = 5 V, $V_{I(IN2)}$ = 3.3 V			40	60		40	60	
t_{PLH1}	Turn-on propagation delay from enable(1)	$V_{I(IN1)} = V_{I(IN2)}$ = 5 V Measured from enable to 10% of $V_{O(OUT)}$	T_J = 25°C, C_L = 10 µF, I_L = 500 mA, See Figure 1(a)		0.5			1		ms
t_{PHL1}	Turn-off propagation delay from a disable(1)	$V_{I(IN1)} = V_{I(IN2)}$ = 5 V, Measured from disable to 90% of $V_{O(OUT)}$	T_J = 25°C, C_L = 10 µF, I_L = 500 mA, See Figure 1(a)		3			5		ms
t_{PLH2}	Switch-over rising propagation delay(1)	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 µF, I_L = 500 mA, See Figure 1(c)		0.17	1		0.17	1	ms
t_{PHL2}	Switch-over falling propagation delay(1)	Logic 0 to Logic 1 transition on D1, $V_{I(IN1)}$ = 1.5V, $V_{I(IN2)}$ = 5V, $V_{I(D0)}$ = 0 V, Measured from D1 to 90% of $V_{O(OUT)}$	T_J = 25°C, C_L = 10 µF, I_L = 500 mA, See Figure 1(c)	2	3	10	2	5	10	ms

(1) Not tested in production.

TRUTH TABLE

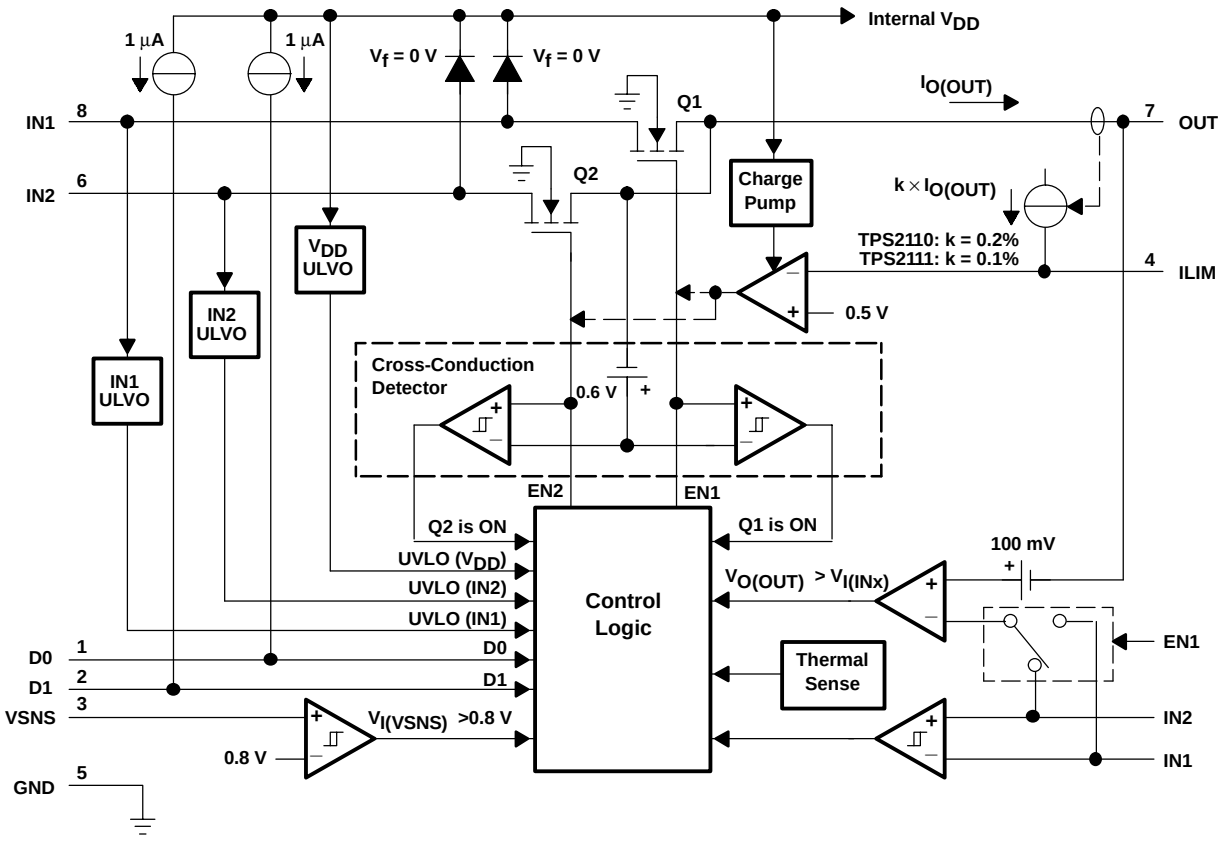
D1	D0	$V_{I(VSNS)} > 0.8V$	$V_{I(IN2)} > V_{I(IN1)}$	OUT(1)
0	0	X	X	IN2
0	1	YES	X	IN1
0	1	NO	NO	IN1
0	1	NO	YES	IN2
1	0	X	X	IN1
1	1	X	X	Hi-Z

(1) The under-voltage lockout circuit causes the output 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.

Terminal Functions

TERMINAL NAME	TERMINAL NO.	I/O	DESCRIPTION
D0	1	I	TTL and CMOS compatible input pins. Each pin has a 1-μA pull-up. The truth table shown above illustrates the functionality of D0 and D1.
D1	2	I	
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_{ILIM} from ILIM to GND sets the current limit I_L to $250/R_{ILIM}$ and $500/R_{ILIM}$ for the TPS2110 and TPS2111, respectively.
OUT	7	O	Power switch output
VSNS	3	I	In the auto-switching mode (D0 = 1, D1 = 0), an internal power FET connects OUT to IN1 if the VSNS voltage is greater than 0.8 V. Otherwise, the FET connects OUT to the higher of IN1 and IN2. The truth table shown above illustrates the functionality of VSNS.

FUNCTIONAL BLOCK DIAGRAM



PARAMETER MEASUREMENT INFORMATION

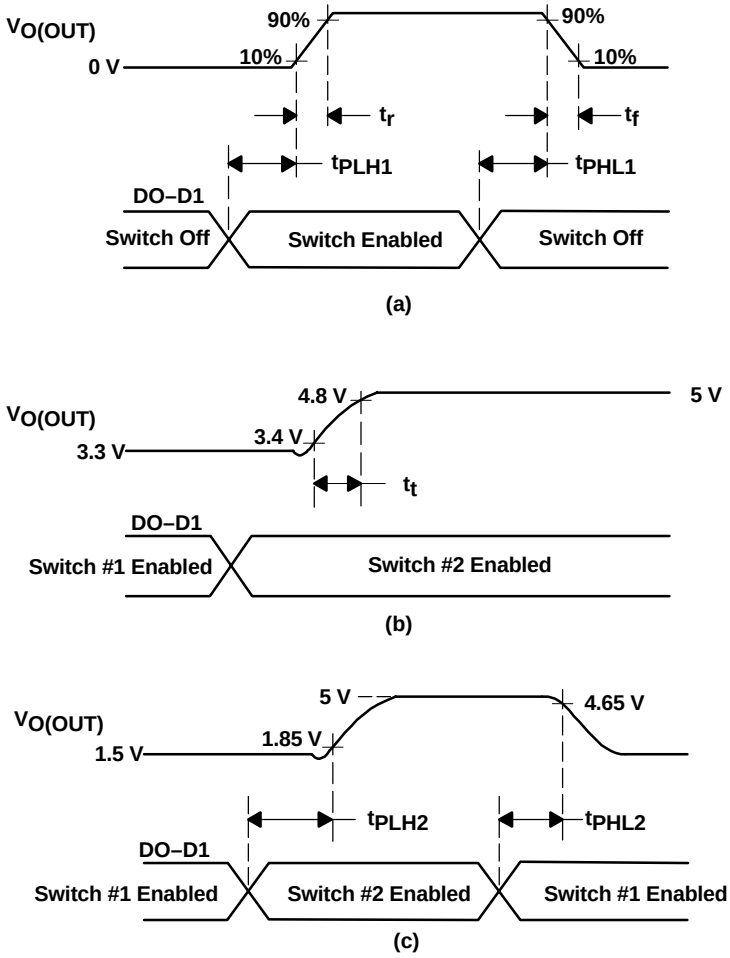
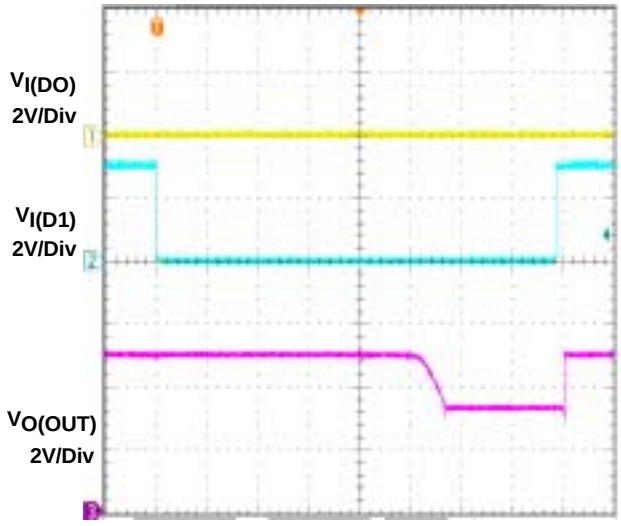
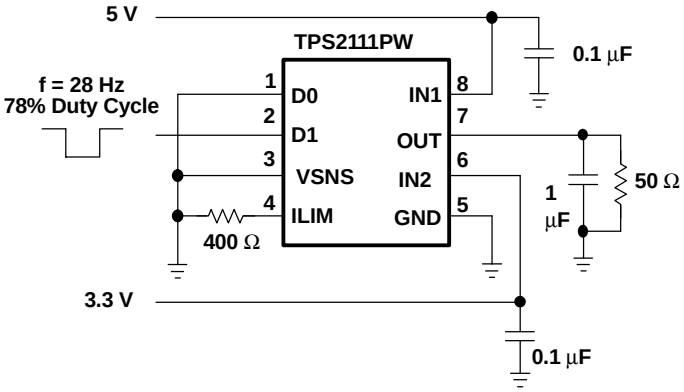


Figure 1. Propagation Delays and Transition Timing Waveforms

TYPICAL CHARACTERISTICS

OUTPUT SWITCHOVER RESPONSE

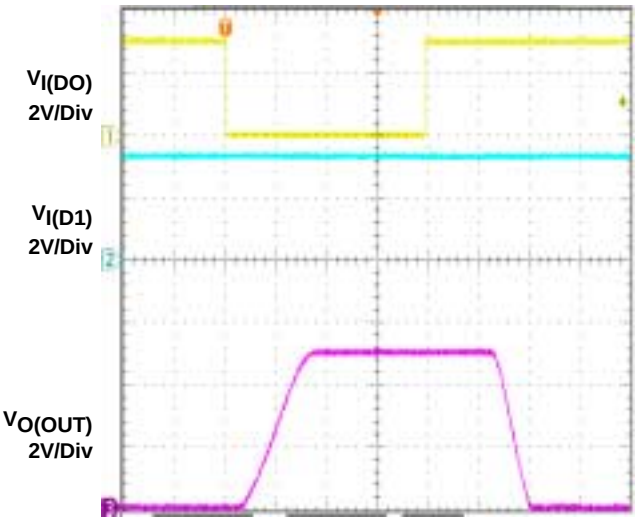


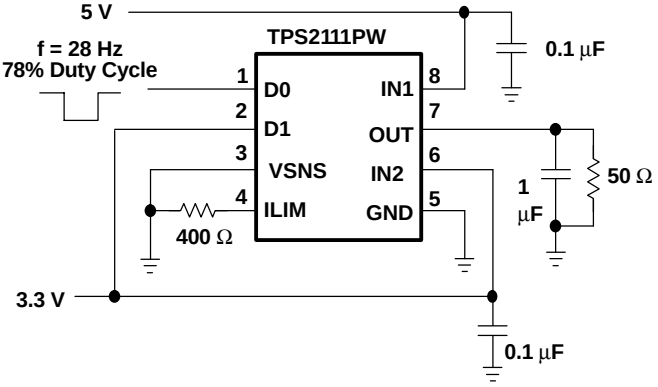


Output Switchover Response Test Circuit

Figure 2

OUTPUT TURN-ON RESPONSE



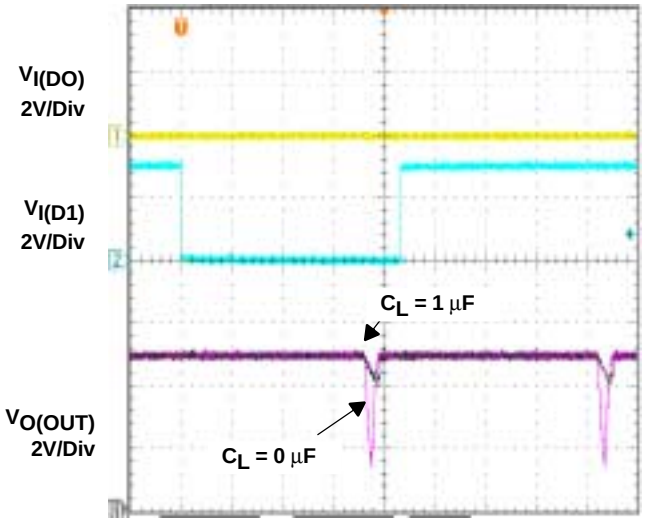


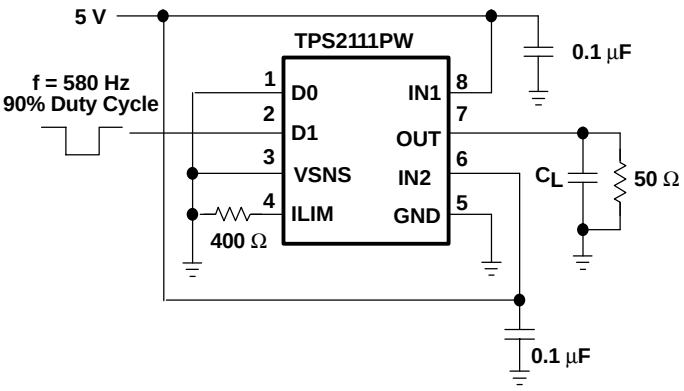
Output Turn-On Response Test Circuit

Figure 3

TYPICAL CHARACTERISTICS

OUTPUT SWITCHOVER VOLTAGE DROOP

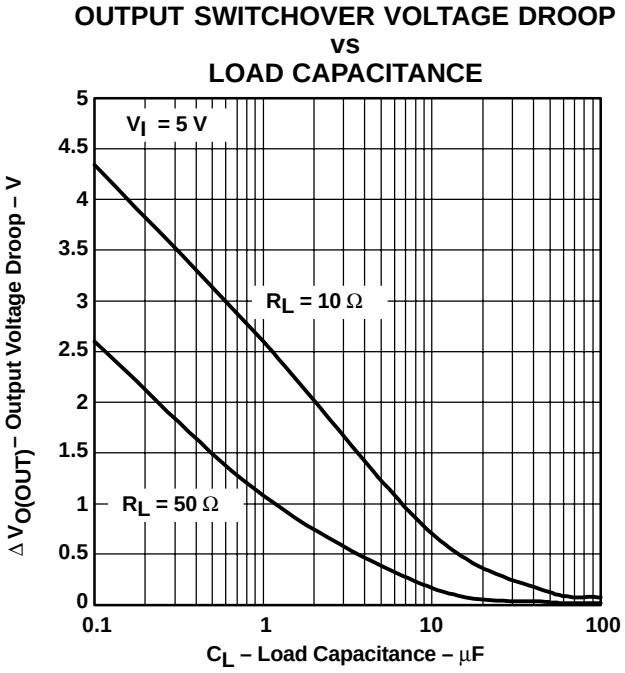


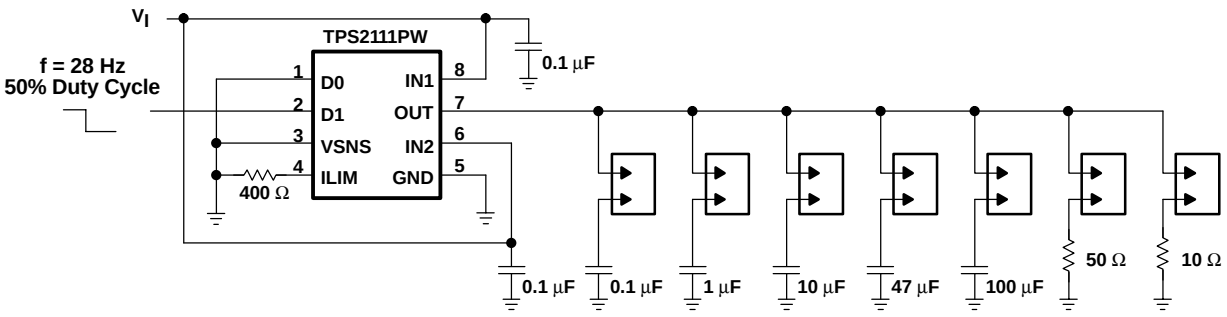


Output Switchover Voltage Droop Test Circuit

Figure 4

TYPICAL CHARACTERISTICS



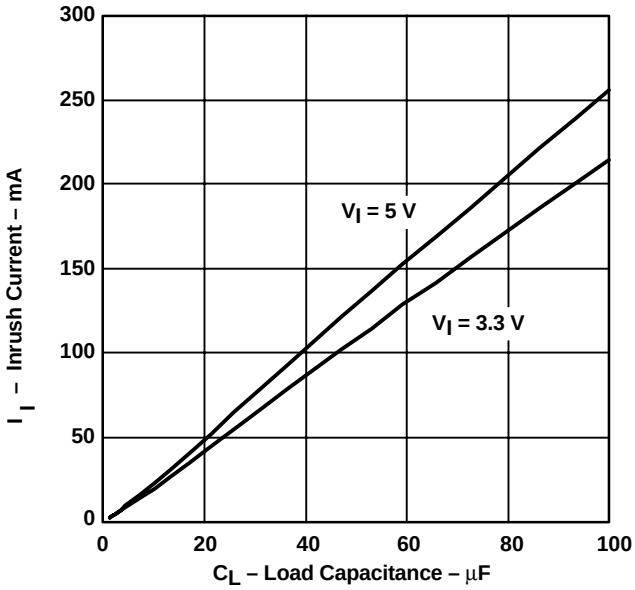


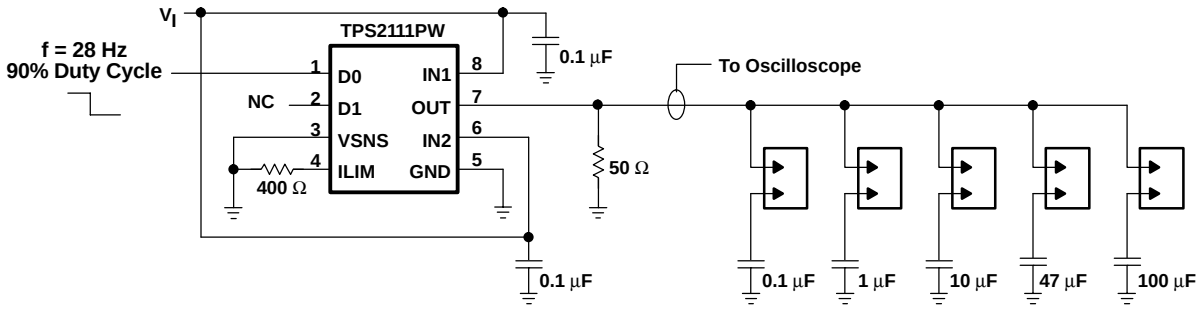
Output Switchover Voltage Droop Test Circuit

Figure 5

TYPICAL CHARACTERISTICS

INRUSH CURRENT vs LOAD CAPACITANCE





Output Capacitor Inrush Current Test Circuit

Figure 6

TYPICAL CHARACTERISTICS

SWITCH ON-RESISTANCE vs JUNCTION TEMPERATURE

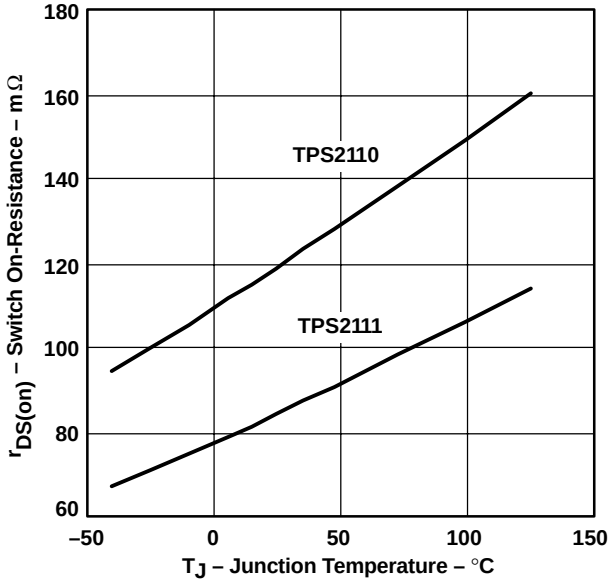


Figure 7

SWITCH ON-RESISTANCE vs SUPPLY VOLTAGE

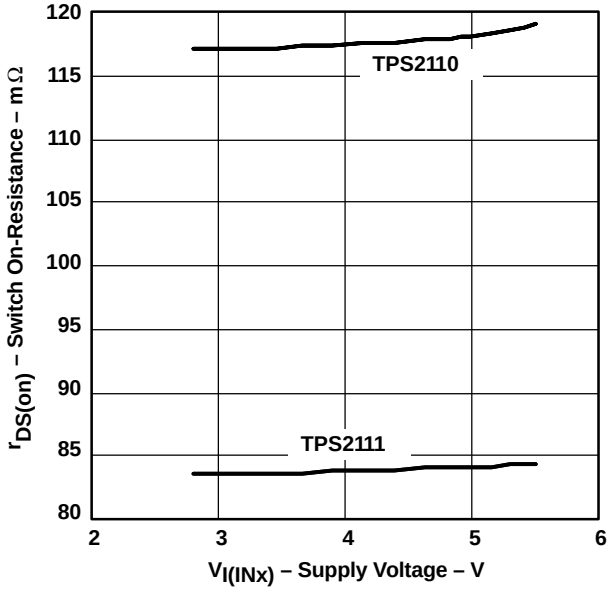


Figure 8

IN1 SUPPLY CURRENT vs SUPPLY VOLTAGE

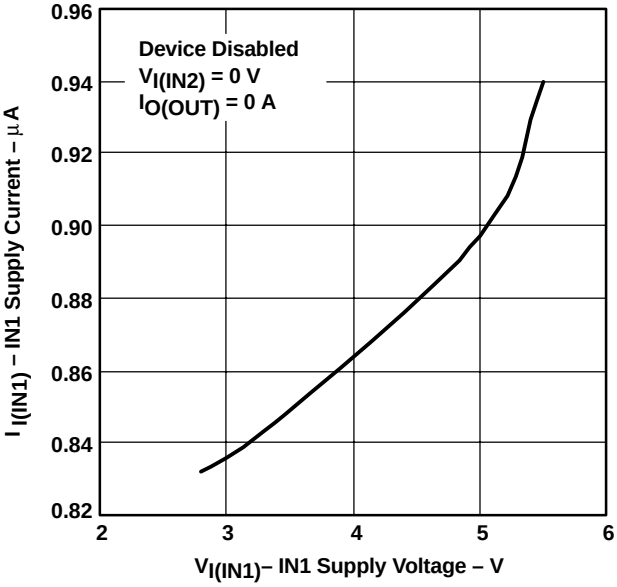


Figure 9

IN1 SUPPLY CURRENT vs SUPPLY VOLTAGE

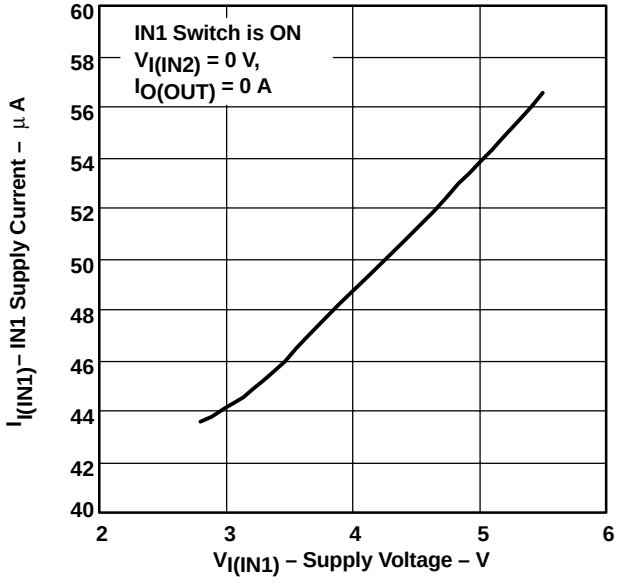


Figure 10

TYPICAL CHARACTERISTICS

SUPPLY CURRENT
vs
JUNCTION TEMPERATURE

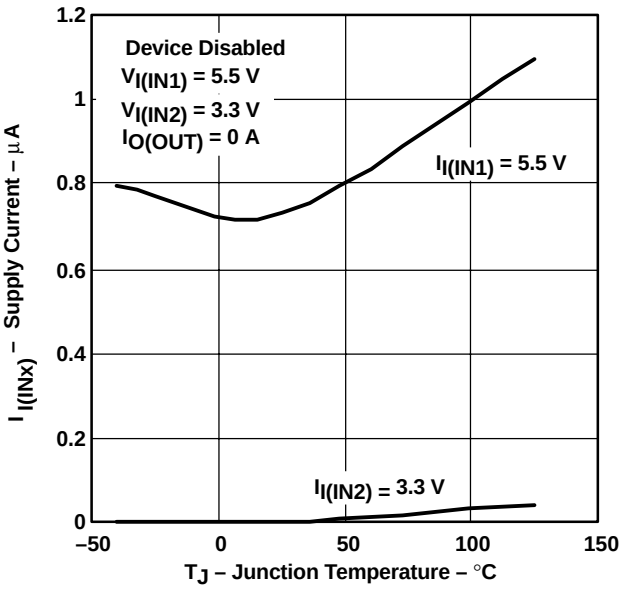


Figure 11

SUPPLY CURRENT
vs
JUNCTION TEMPERATURE

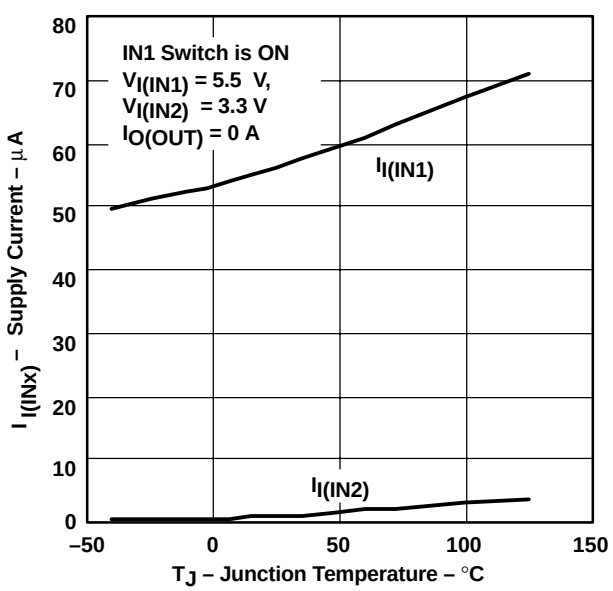


Figure 12

APPLICATION INFORMATION

Some applications have two energy sources, one of which should be used in preference to another. Figure 13 shows a circuit that will connect IN1 to OUT until the voltage at IN1 falls below a user-specified threshold. Once the voltage on IN1 falls below this threshold, the TPS2110/1 will select the higher of the two supplies. This usually means that the TPS2110/1 will swap to IN2.

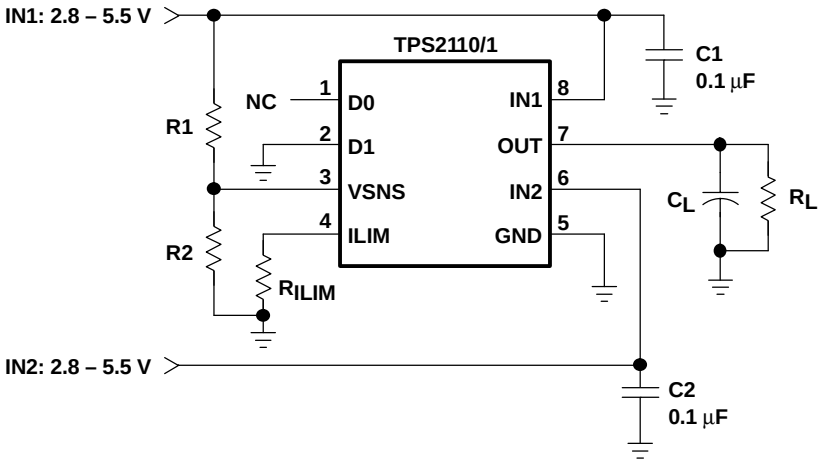


Figure 13. Auto-Selecting for a Dual Power Supply Application

In Figure 14, the multiplexer selects between two power supplies based upon the EN1 logic signal. OUT connects to IN1 if EN1 is logic 1, otherwise OUT connects to IN2. The logic thresholds for the D1 terminal are compatible with both TTL and CMOS logic.

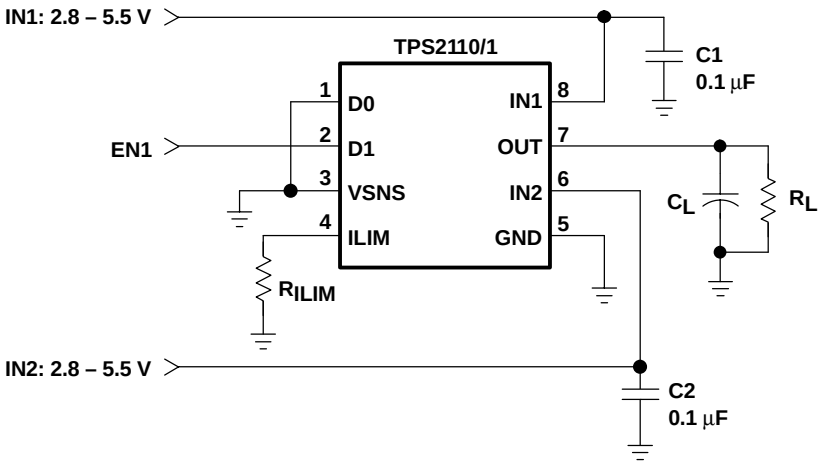


Figure 14. Manually Switching Power Sources

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 IN1 if $V_{I(VSNS)}$ is greater than 0.8 V, otherwise OUT connects to the higher of IN1 and IN2.

The VSNS terminal includes hysteresis equal to 3.75–7.5% of the threshold selected for transition from the primary supply to the higher of the two supplies. This hysteresis helps avoid repeated switching from one supply to the other due to resistive drops.

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 TPS211x 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 TPS211x 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 TPS2110 and TPS2111, respectively. Setting resistor R_{ILIM} equal to zero is not recommended as that disables current limiting.

OUTPUT VOLTAGE SLEW-RATE CONTROL

The TPS2110/1 slews the output voltage at a slow rate when OUT switches to IN1 or IN2 from the Hi-Z state (see *Truth Table*).). 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 like a PCI card. The TPS2110/1 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.

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)
TPS2110PW	Active	Production	TSSOP (PW) | 8	150 | TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2110
TPS2110PW.A	Active	Production	TSSOP (PW) | 8	150 | TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2110
TPS2110PWR	Active	Production	TSSOP (PW) | 8	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2110
TPS2110PWR.A	Active	Production	TSSOP (PW) | 8	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2110
TPS2110PWRG4	Active	Production	TSSOP (PW) | 8	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2110
TPS2111PW	Active	Production	TSSOP (PW) | 8	150 | TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2111
TPS2111PW.A	Active	Production	TSSOP (PW) | 8	150 | TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2111
TPS2111PWR	Active	Production	TSSOP (PW) | 8	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2111
TPS2111PWR.A	Active	Production	TSSOP (PW) | 8	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2111

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

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

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

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

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

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

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

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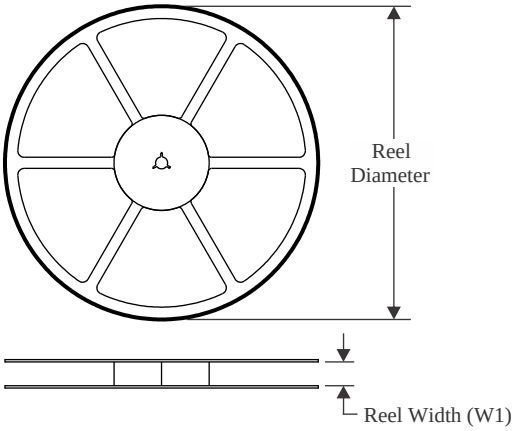
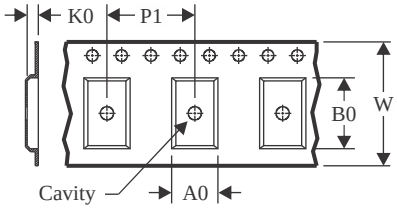
TAPE AND REEL INFORMATION

REEL DIMENSIONS

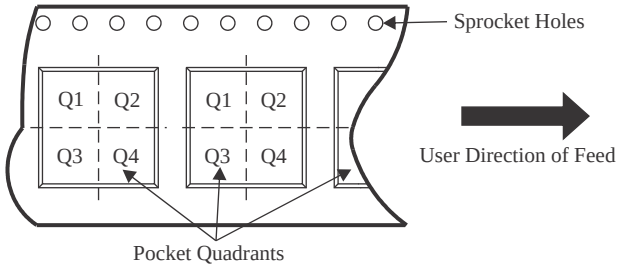


TAPE DIMENSIONS



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

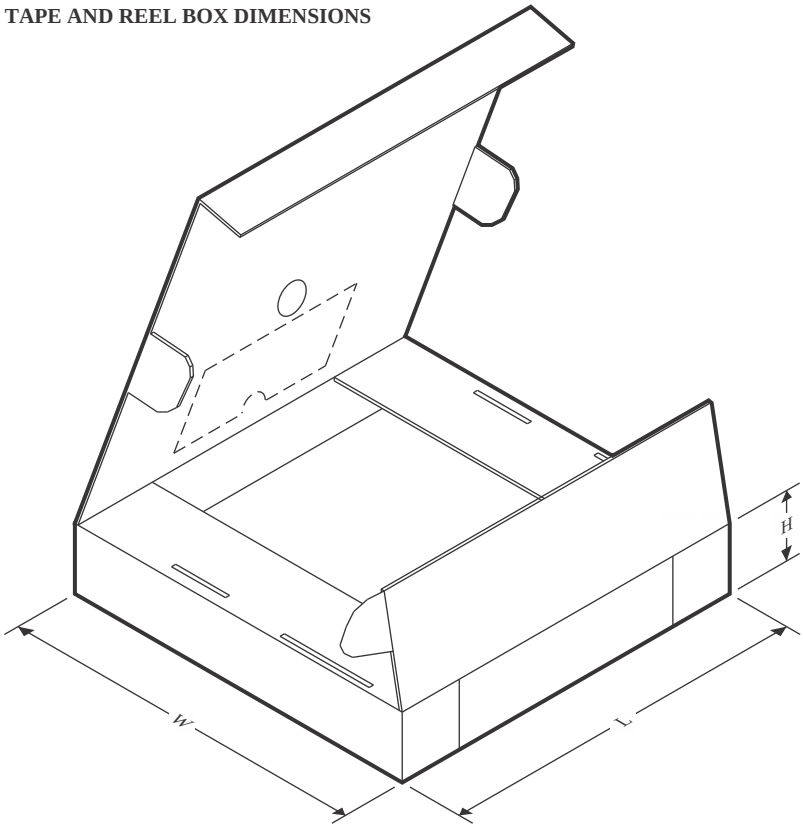
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TPS2110PWR	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
TPS2111PWR	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1

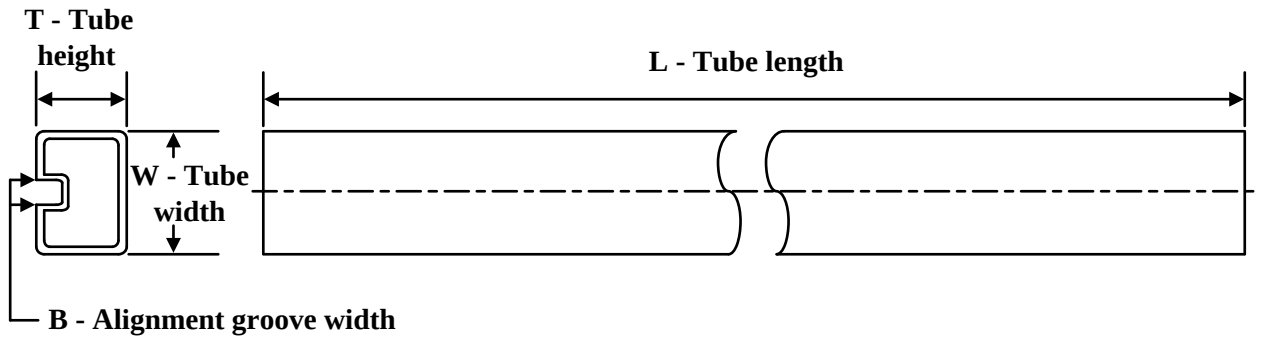
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TPS2110PWR	TSSOP	PW	8	2000	353.0	353.0	32.0
TPS2111PWR	TSSOP	PW	8	2000	353.0	353.0	32.0

TUBE



*All dimensions are nominal

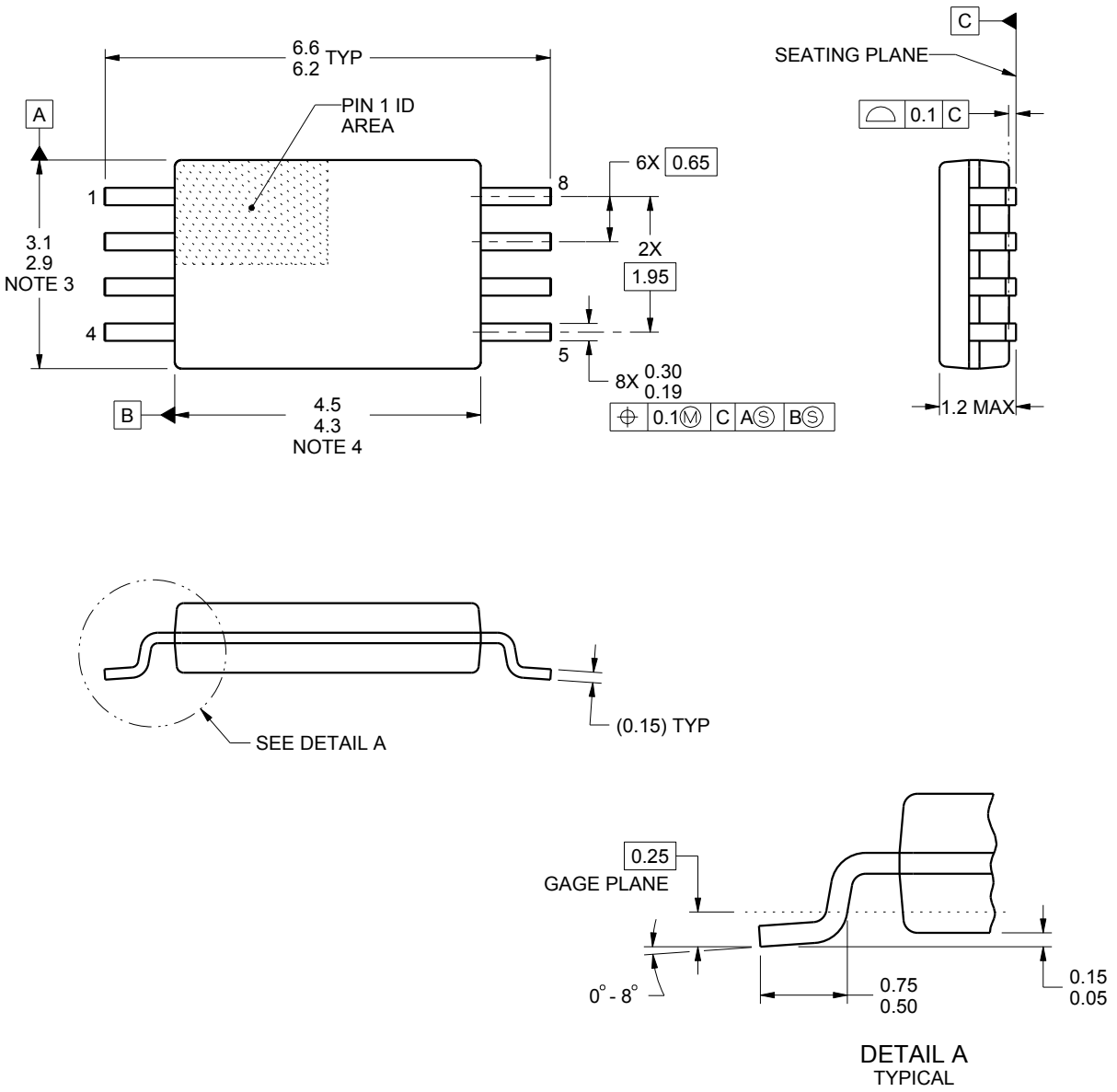
Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
TPS2110PW	PW	TSSOP	8	150	530	10.2	3600	3.5
TPS2110PW.A	PW	TSSOP	8	150	530	10.2	3600	3.5
TPS2111PW	PW	TSSOP	8	150	530	10.2	3600	3.5
TPS2111PW.A	PW	TSSOP	8	150	530	10.2	3600	3.5

PACKAGE OUTLINE

PW0008A

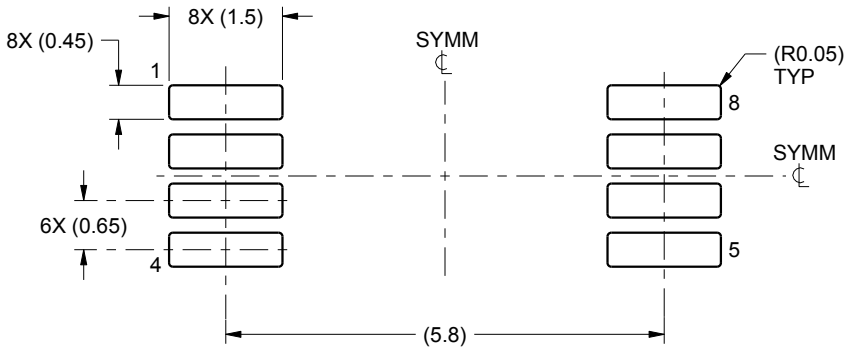
TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE

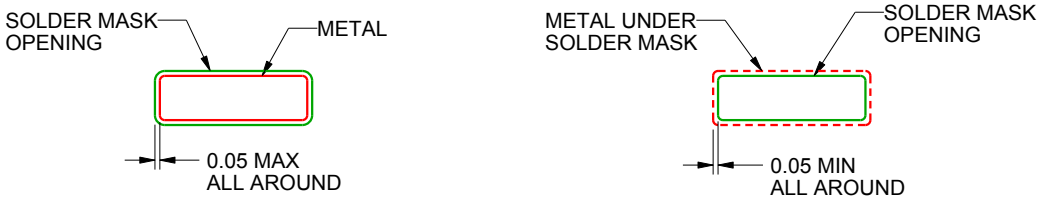


NOTES:

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.



LAND PATTERN EXAMPLE
SCALE:10X



SOLDER MASK DETAILS
NOT TO SCALE

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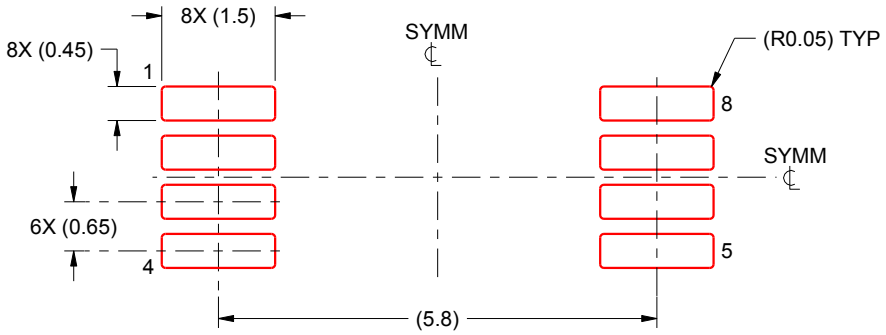
NOTES: (continued)

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



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:10X

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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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