Over-Voltage Protection Load Switch

FPF2290



WLCSP12
CASE 567QX

MARKING DIAGRAM



HR = Specific Device Code
KK = 2−Digits Lot Run Traceability Code
XY = 2−Digit Date Code
Z = Assembly Plant Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

General Description

The FPF2290 features a low−R_{ON} internal FET and an operating voltage range of 2.5 V to 23 V. An internal clamping circuit is capable of shunting surge voltages of ±100 V, protecting downstream components and enhancing system robustness. The FPF2290 features over−voltage protection that powers down the internal FET if the input voltage exceeds the OVP threshold. The OVP threshold is selectable via Logic select pins (OV1 and OV2). Over−temperature protection also powers down the device at 130°C (typical).

The FPF2290 is available in a fully “green“ compliant 1.3 × 1.8 mm Wafer−Level Chip−Scale Package (WLCSP) with backside laminate.

Features

- Surge Protection
  - IEC 61000−4−5: ±100 V
- Selectable Over−Voltage Protection (OVP) with OV1 and OV2 Logic Inputs
  - 5.9 V ±100 mV
  - 10 V ±100 mV
  - 14 V ±280 mV
  - 23 V ±460 mV
- Over−Temperature Protection (OTP)
- Ultra−Low On−Resistance: Typ. 33 mΩ
- ESD Protection
  - Human Body Model (HBM): > 2 kV
  - Charged Device Model (CDM): > 1 kV
  - IEC 61000−4−2 Air Discharge: > 15 kV
- This is a Pb−Free and Halide Free Device

Applications

- Mobile Handsets and Tablets
- Portable Media Players
- MP3 Players

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BLOCK DIAGRAM

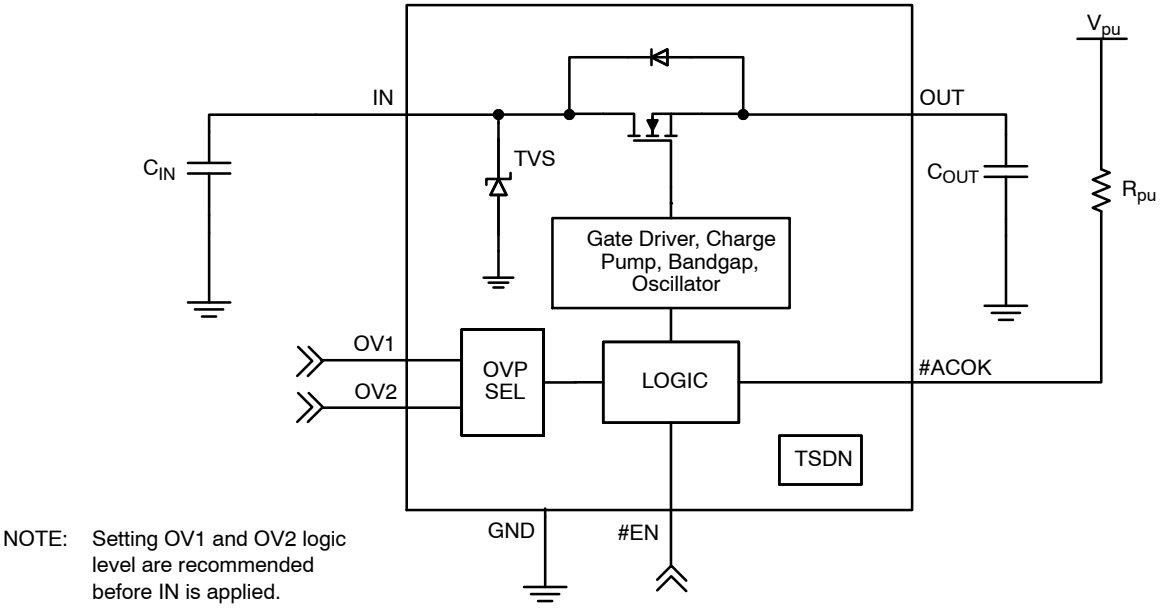


Figure 1. Functional Block Diagram

PIN CONFIGURATION

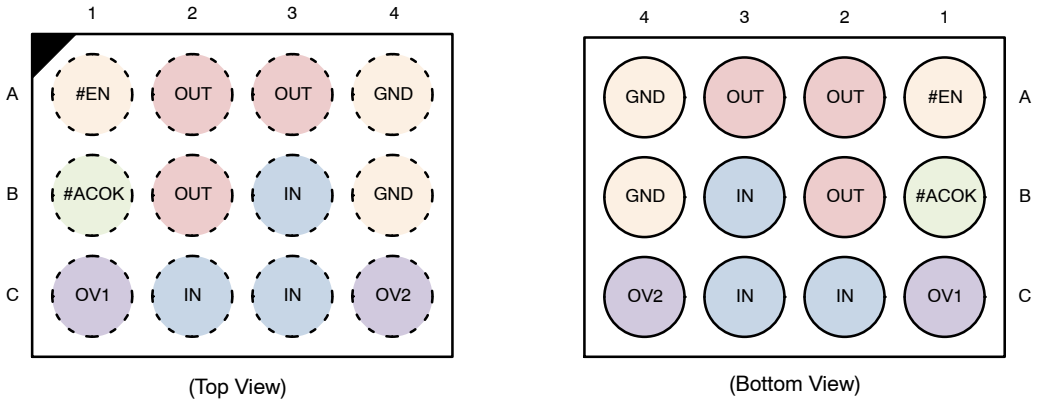


Figure 2. Pin Configuration

PIN DESCRIPTION

Name	Bump	Type	Description		
IN	B3, C2, C3	Input/Supply	Switch Input and Device Supply		
OUT	A2, A3, B2	Output	Switch Output to Load		
#ACOK	B1	Output	Power Good (Open−Drain Output)	1	Hi−Z: $V_{IN} < V_{IN_MIN}$ OR $V_{IN} > V_{OVLO}$
				0	LOW: Voltage Stable
#EN	A1	Input	Device Enable (Active LOW)		
OV1/2	C1, C4	Input	OVLO Selection Input (see Table 1) Note: Apply OV1 and OV2 Logic levels before VIN is applied.		
GND	A4, B4	Supply	Device Ground		

Table 1. OVLO SELECTION

OV1	OV2	OVP Trip Level
LOW	LOW	5.9 V ±100 mV
HIGH	LOW	10 V ±100 mV
LOW	HIGH	14 V ±280 mV
HIGH	HIGH	23 V ±460 mV

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter		Min	Max	Unit
V_{IN}	V_IN to GND & V_IN to V_OUT = GND or Float		−0.3	29.0	V
V_{OUT}	V_OUT to GND		−0.3	V_{IN} + 0.3	V
V_{OVn}	OV1 and OV2 to GND		−0.3	6.0	V
V_{EN_ACOK}	Maximum DC Voltage Allow ed on #EN or #ACOK Pin		–	6	V
I_{IN}	Sw itch I/O Current (Continuous)		–	4.5	A
t_{PD}	Total Pow er Dissipation at T_A = 25°C		–	1.48	W
T_{STG}	Storage Temperature Range		−65	+150	°C
T_J	Maximum Junction Temperature		–	+150	°C
T_L	Lead Temperature (Soldering, 10 Seconds)		–	+260	°C
Θ_{JA}	Thermal Resistance, Junction−to−Ambient (1−in.^{2} Pad of 2−oz. Copper) (Note 1)		–	84.1	°C/W
ESD	IEC 61000−4−2 System Level ESD	Air Discharge	15	–	kV
		Contact Discharge	8	–	
	Human Body Model, ANSI/ESDA/JEDEC JS−001−2012	All Pins	2	–	
	Charged Device Model, JESD22−C101	All Pins	1	–	
Surge	IEC 61000−4−5, Surge Protection	V_{IN}	±100	–	V

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Measured using 2S2P JEDEC std. PCB.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{IN}	Supply Voltage	2.5	23.0	V
T_A	Operating Temperature	−40	+85	°C

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

ELECTRICAL CHARACTERISTICS

(T_A = −40°C to 85°C, V_{IN} = 2.5 to 23 V, unless otherwise indicated. Typical values are V_{IN} = 5.0 V, $I_{IN} \le$ 3 A, C_{IN} = 0.1 μF and T_A = 25°C.)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
BASIC OPERATION							
V_{IN_CLAMP}	Input Clamping Voltage	I_{IN} = 10 mA		–	35	–	V
I_Q	Input Quiescent Current	V_{IN} = 5 V, #EN = 0 V		–	80	115	μA
I_{IN_Q}	OVLO Supply Current	OV1 = LOW, OV2 = LOW V_{IN} = 6.5 V, V_{OUT} = 0 V		–	63	90	μA
V_{IN_OVLO}	Over−Voltage Trip Level	V_{IN} Rising	OV1 = LOW, OV2 = LOW	5.80	5.90	6.00	V
		V_{IN} Falling		5.75			
		V_{IN} Rising	OV1 = HIGH, OV2 = LOW	9.90	10.00	10.10	
		V_{IN} Falling		9.85			
		V_{IN} Rising	OV1 = LOW, OV2 = HIGH	13.72	14.0	14.28	
		V_{IN} Falling		13.52			
		V_{IN} Rising	OV1 = HIGH, OV2 = HIGH	22.54	23.0	23.46	
		V_{IN} Falling		22.34	–	–	
R_{ON}	Resistance from V_{IN} to V_{OUT}	V_{IN} = 5 V, I_{OUT} = 1 A, T_A = 25°C		–	33	40	mΩ
C_{OUT}	OUT Load Capacitance (Note 2)	V_{IN} = 5 V		0.1	–	1000.0	μF
T_{SDN}	Thermal Shutdown (Note 2)			–	130	–	°C
T_{SDN_HYS}	Thermal Shutdown Hysteresis (Note 2)			–	20	–	°C
DIGITAL SIGNALS							
V_{OL}	#ACOK Output Low Voltage	I_{SINK} = 1 mA		–	–	0.4	V
I_{ACOK}	#ACOK Leakage Current	$V_{I/O}$ = 3.0 V, #ACOK Deasserted		–	–	0.5	μA
V_{IH}	Input HIGH Voltage (#EN, OVx)	V_{IN} = 2.5 V to V_{OVLO}		1.2	–	–	V
V_{IL}	Input LOW Voltage (#EN, OVx)	V_{IN} = 2.5 V to V_{OVLO}		–	–	0.5	V
I_{IN}	Input Leakage Current (#EN, OVx)	V_{IN} = 5.0 V, V_{OUT} = Float		–	–	1.0	μA
TIMING CHARACTERISTICS							
t_{DEB}	Debounce Time	Time from 2.5 V < V_{IN} < V_{IN_OVLO} to V_{OUT} = 0.1 × V_{IN}		10	15	20	ms
t_{START}	Soft−Start Time	Time from V_{IN} = V_{IN_min} to 0.2 × #ACOK, V_{IO} = 1.8 V with 10 kΩ Pull−up Resistor		20	30	40	ms
t_{ON}	Switch Turn−On Time	R_L = 100 Ω, C_L = 22 μF, V_{OUT} from 0.1 × V_{IN} to 0.9 × V_{IN}		1	3	5	ms
t_{OFF}	Switch Turn−Off Tim (Note 2)	R_L = 100 Ω, C_L = 0 μF, V_{IN} > V_{OVLO} to V_{OUT} = 0.8 × V_{IN}		–	–	150	ns

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Guaranteed by characterization and design.

TIMING DIAGRAMS

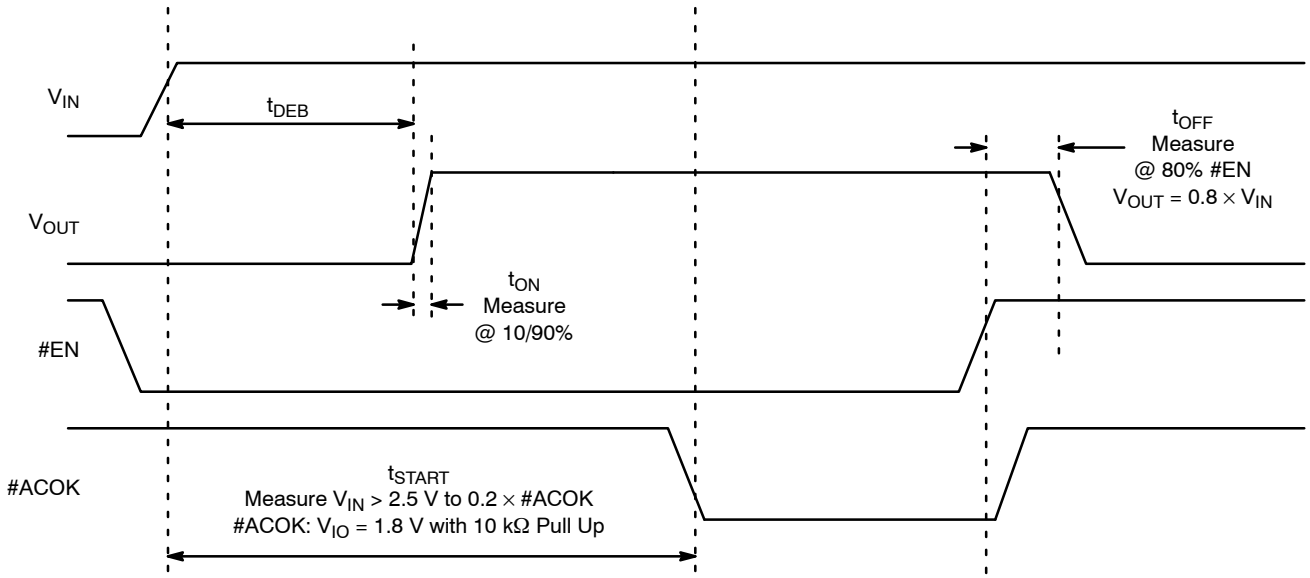


Figure 3. Timing for Power Up and Normal Operation

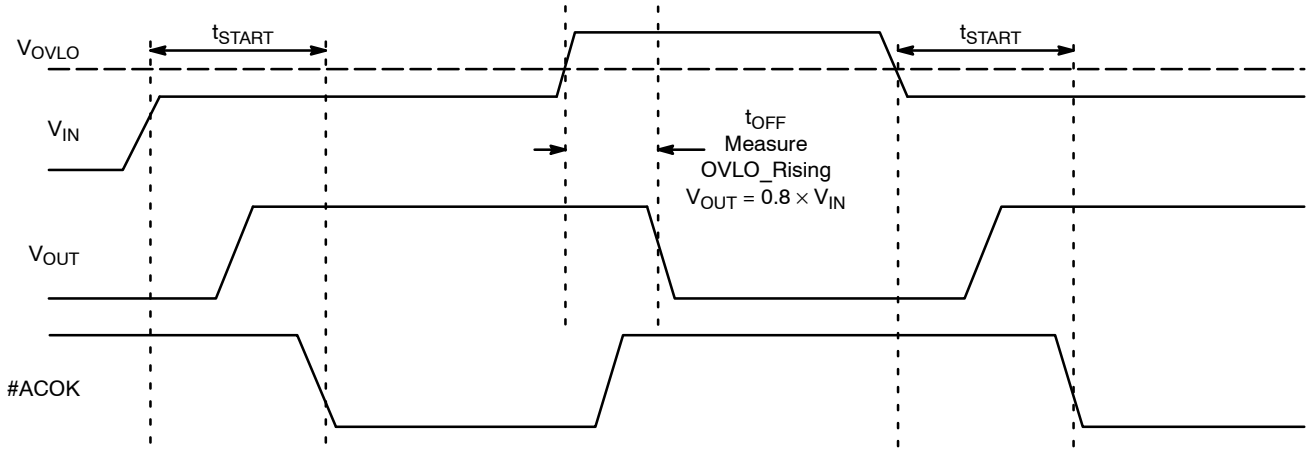


Figure 4. Timing for OVLO Trip

ORDERING INFORMATION

Part Number	Operating Temperature Range	Top Mark	Package	Shipping†
FPF2290BUCX−F130	−40°C to +85°C	HR	WLCSP12 (Pb−Free/Halide Free)	3000 / Tape & Reel

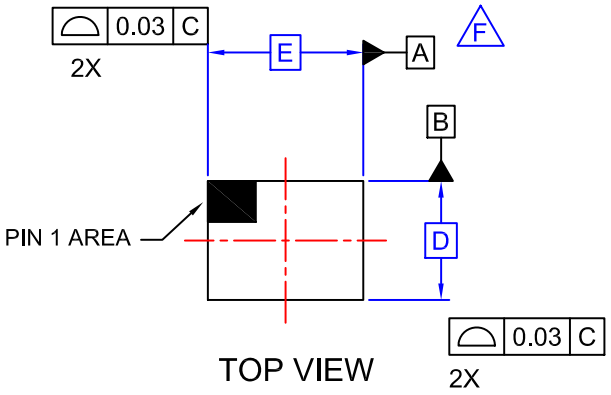
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PRODUCT−SPECIFIC DIMENSIONS

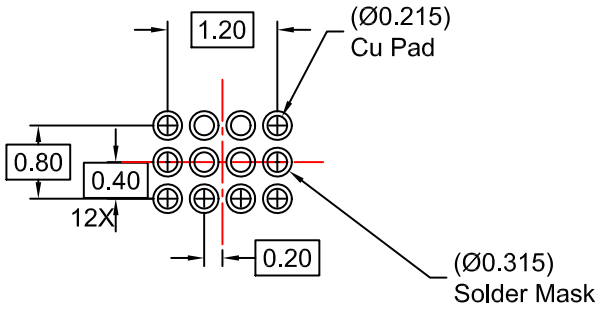
D	E	X	Y
1288 μm ±30 μm	1828 μm ±30 μm	314 μm ±18 μm	244 μm ±18 μm

WLCSP12 1.288x1.828x0.586
CASE 567QX
ISSUE O

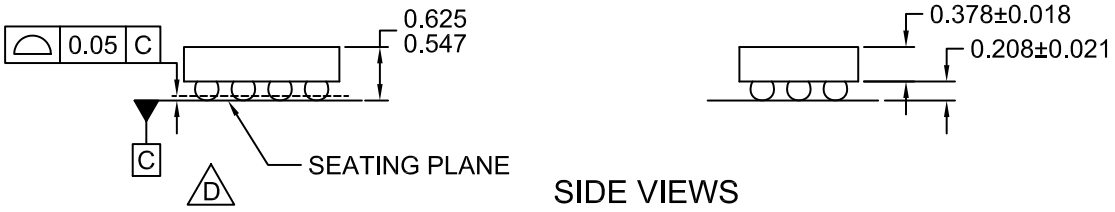
DATE 31 OCT 2016



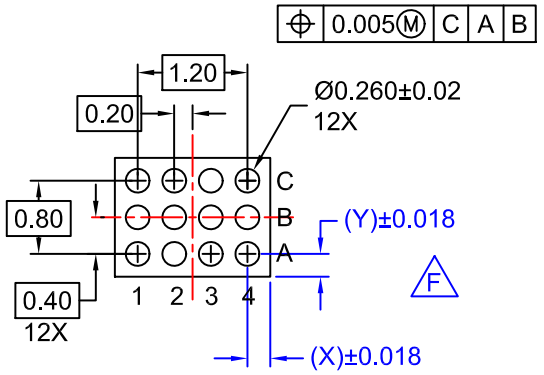
TOP VIEW



RECOMMENDED LAND PATTERN
(NSMD PAD TYPE)



SIDE VIEWS



BOTTOM VIEW

NOTES:

A. NO JEDEC REGISTRATION APPLIES.

B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.

D. DATUM C IS DEFINED BY THE SPHERICAL CROWNS OF THE BALLS.

E. PACKAGE NOMINAL HEIGHT IS 586 MICRONS ±39 MICRONS (547-625 MICRONS).

F. FOR DIMENSIONS D, E, X, AND Y SEE PRODUCT DATASHEET.

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DESCRIPTION:	**WLCSP12 1.288x1.828x0.586**		**PAGE 1 OF 1**

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