

Integrated Switch Dual Channel Charge Pump

1.Description

The FDT0310 is an integrated power supply solution optimized for small to medium size thin-film transistor(TFT)liquid crystal displays (LCD 's).

Primarily intended for smart phone and tablet LCD panel' s driver IC.

The positive charge pump has an internal switch,typically can support output current up to 75mA at $V_{CI}=2.8V$,85mA at $V_{CI}=3V$,170mA at $V_{CI}=3.3V$.

Negative charge pump has an internal switch to generate-1 ratio of VSN and typically can support output current up to 45mA at $V_{CI}=2.8V$,45mA at $V_{CI}=3V$,85mA at $V_{CI}=3.3V$.

The pump clock can be synchronized with external signal from driver IC or can be generated by internal circuit fixed to 630kHz.

The FDT0310 is available in a thin 12 pin 2.4x1.5mm UTDFN green package.

2.Features

- 2.5V to 4.8V Input Supply
- Generate two output voltage,positive Voltage (VSP) and-1 ratio of negative voltage(VSN)
- Only 5 external capacitors
- UTDFN-12(2.4mmx1.5mm) Exposed Pad Package

3.Applications

- Space-Sensitive Applications
- Battery-Powered Equipment
- Cordless and Mobile Phones
- Industrial and Medical Equipment
- Portable Equipment
- TFT LCD for smart phone and tablet LCD panel's driver IC

4.Order Information

Mode	Package	Specified Temperature range	Ordering Number	Packing Option
FDT0310	UTDFN2.4X1.5-12L	-40°C-85°C	FDT0310YDFN12G/TR	Tape and Reel,5000

5.Typical Application

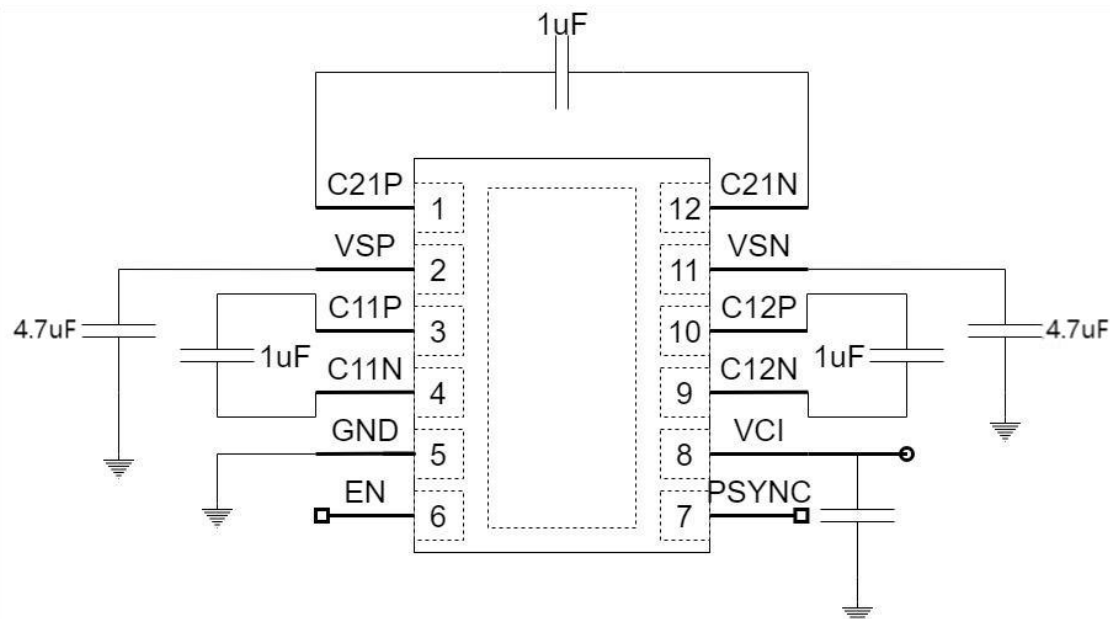


Figure 1. Typical Application for FDT0310

6.Pin Configuration

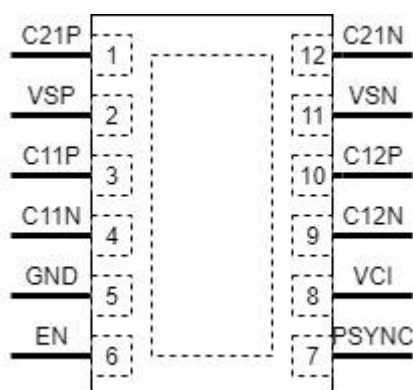


Figure 2. Pin Assignment of FDT0310 Package (UTDFN-12)(2.4mm x 1.5mm)

7.Pin Description

Pin No.	Pin Name	I/O	Pin Function
1	C21P	I	Capacitor connection pin for the VSN.
2	VSP	O	Positive voltage output pin (VSP).
3	C11P	I	Capacitor connection pin for the VSP.
4	C11N	I	Capacitor connection pin for the VSP.
5	GND	P	Ground pin.
6	EN	I	Enable pin.
7	PSYNC	I	PSYNC pin connect with GND or use external clock from driver IC for FDT0310
8	VCI	P	Power supply input pin.
9	C12N	I	Capacitor connection pin for the VSP.
10	C12P	I	Capacitor connection pin for the VSP.
11	VSN	O	Negative voltage output pin (VSN).
12	C21N	I	Capacitor connection pin for the VSN.

8.Absolute Maximum Ratings

Parameter	Min.	Max.	Unit
VCI	0.3	6	V
Control signal voltage	0.3	6	V
VSP	0	6	V
VSN	0	-6	V
Operating Junction Temperature Range (TJ)	-40	+125	°C
Operating Temperature Range (TOP)	-40	+85	°C
Storage Temperature Range	-55	150	°C
Lead soldering Temperature Range (10 seconds)	-	300	°C

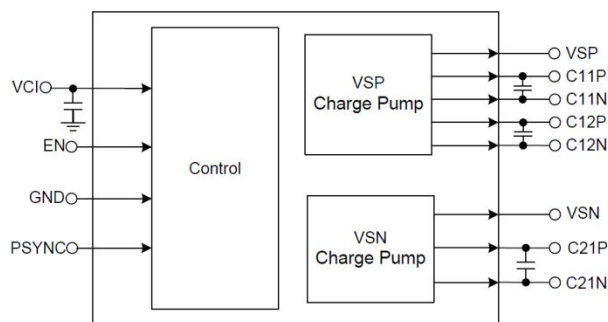
Note1:

Stresses beyond those listed under ‘Absolute Maximum Ratings’ may cause permanent damage to the device.

9.ESD Rating

Parameter	Numerical Value	Unit
ESD(HBM)	±2000	V
ESD(CDM)	±1000	V

10.FUNCTIONAL Block Diagram



11.ELECTRICAL CHARACTERISTICS

(VIN=3V, TA=-40°C to 85°C, unless otherwise specified.)

Paramter	Symbol	Conditions	Min	Typ	Max	Unit
Power Supply						
Input Voltage	V _{CI}		2.5		4.8	V
VCI Under Voltage Lockout(UVLO)	V _{UVLO}	VCI Rising	2.1		2.3	V
		Hysteresis		150		mV
Standby Current	I _{STANDBY}				1.8	uA
Output Voltage VSP						
Output Voltage Range	V _{SP}	VCI=3V. Io=0mA	5.6		6	V
Output Current Capability		VCI=2.8V		75		mA
		VCI=3V		85		mA
		VCI=3.3V		170		mA
Output Voltage VSN						
Output Voltage Range	V _{SN}	VCI=3V. Io=0mA	-5.6		-6	V
Output Current Capability		VCI=2.8V		45		mA
		VCI=3V		45		mA
		VCI=3.3V		85		mA
LOGIC EN/PSYNC						
Threshold Voltage	V _{IH}		1.5			V
	V _{IL}				0.5	V
PSYNC Frequency			50			kHz
Internal Pump Clock Frequency				630		kHz
Enable Pull down Resistor				220		kΩ

Note:

Typical values are tested at 25°C ambient temperature

12.Power On/Off Sequence

(VIN=3.3V, TA=-40°C to 85°C, unless otherwise specified. Typical values are tested at 25°C ambient temperature. Note: Yellow = VCI、Green = EN、Pink = VSP、Blue = VSN)。



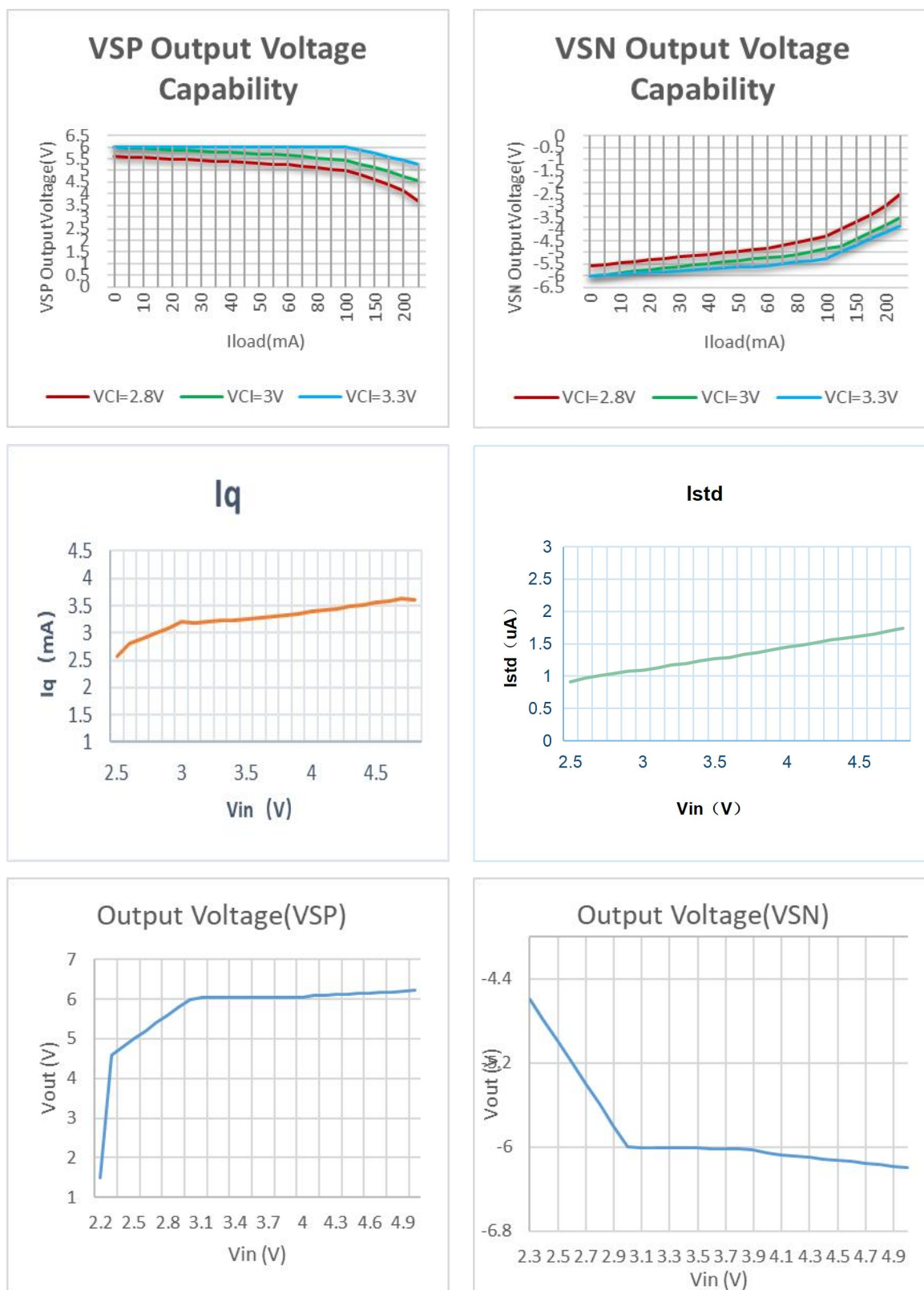
Figure 3.Wave of Power On for FDT0310



Figure 4.Wave of Power Off for FDT0310

13. Typical Performance Characteristics

(VIN=3V, TA=-40°C to 85°C, unless otherwise specified. Typical values are tested at 25°C ambient temperature)



14. Layout Considerations

PCB layout is very important to design charge pump circuits. The following layout guide lines should be strictly followed for best performance of the FDT0310.

- ◆ **Pin1 & P12** is Negative Charge pump, **C4** Provide energy for VSN, Place the **C4** components to **Pin1 & P12** as close as possible.
- ◆ **Pin3 & Pin4** is Positive Charge pump, **C6** Provide energy for VSP, Place the **C6** components to **Pin3 & P4** as close as possible.
- ◆ **Pin9 & Pin10** is Positive Charge pump, **C2** Provide energy for VSN, Place the **C2** components to **Pin9 & P10** as close as possible.
- ◆ **Pin 8** requires a stable and clean Input voltage. Place the capacitor **C1** stable input voltage. Place the **C1** components to pin8 as close as possible.

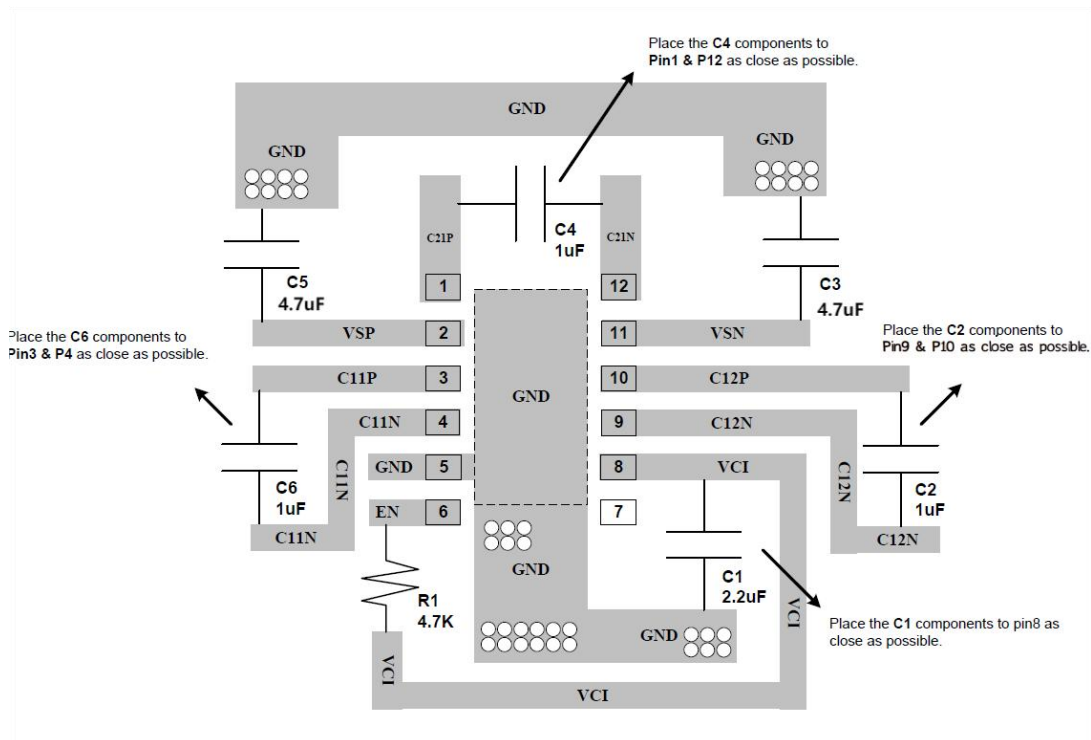
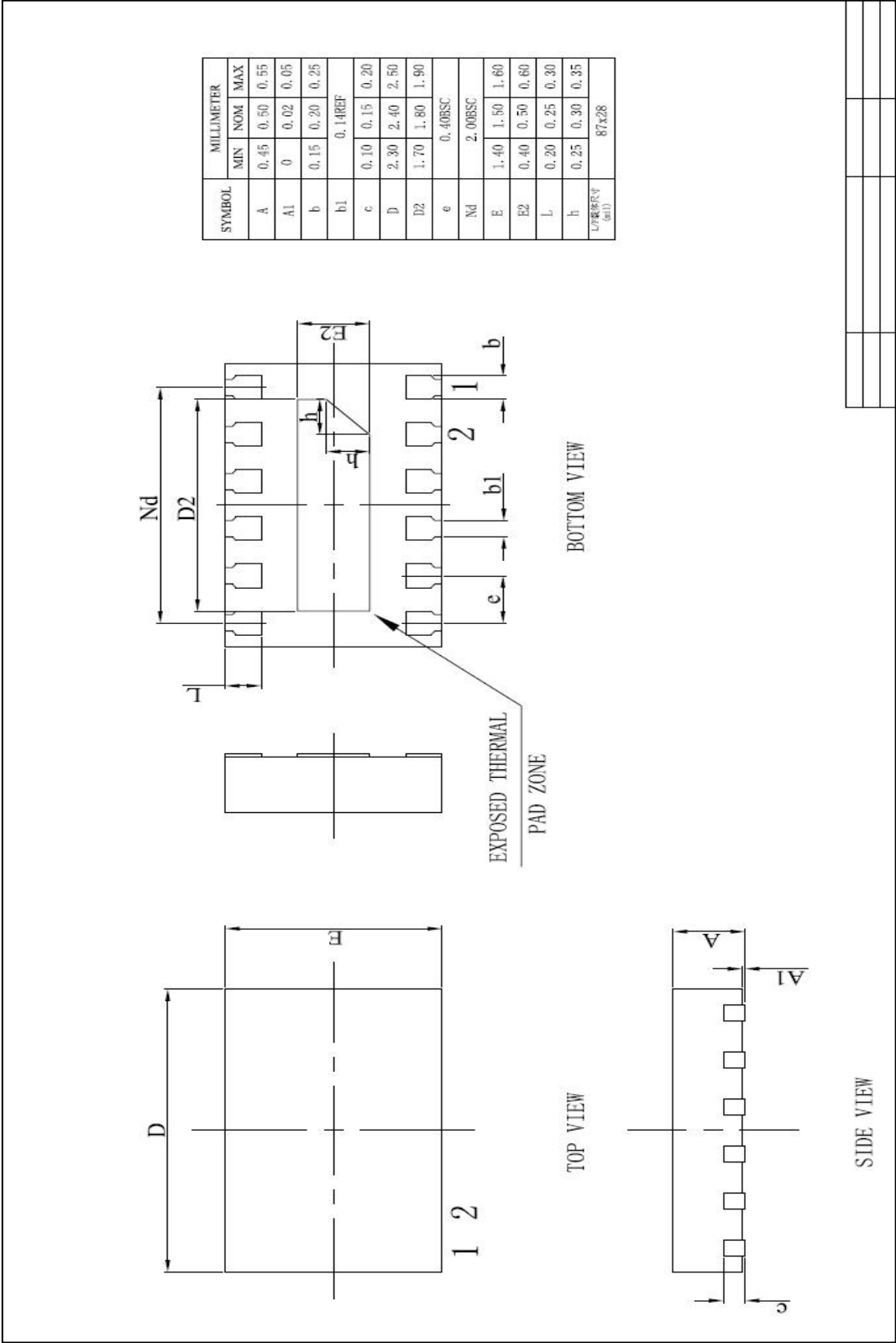


Figure 5. Layout trace guideline

15.Package Outline

Package: UTDFN-12



16.Important Notice And Disclaimer

- We reserves the right to change the instruction manual without prior notice.
- Any semiconductor product has a certain possibility of failure or malfunction under specific conditions. The buyer is responsible for complying with safety standards and taking safety measures when using our products for system design and overall manufacturing to avoid potential failure risks that may cause personal injury or property damage.
- The improvement of product quality is endless, our company will be dedicated to provide customers with better products.

17.Version Modification Record

Version Number	Revision
first edition	
V1.0	1. Increase order information 2. Update the output current capacity to 120 mA 3. Update the power on / off sequence graph 4. Updated typical performance Characteristics
V2.0	1. Update the Important Notice And Disclaimer on page 8.
V3.0	1. Update the Internal Pump Clock Frequency 2. Update the capacitance values of the application diagram and layout reference diagram
V3.1	1. Update the Layout Considerations on page 7. 2. Update the Output Current Capability on page 1&4.