FP7723

Integrated Switch Dual Channel Charge Pump

Description

The FP7723 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.

When VCI= 3.3V, Positive charge pump (VSP) and Negative charge pump (VSN) can typically support output current up to 70mA.

The pump clock can be synchronized with external signal from driver IC.

The FP7723 is available in a thin 12-pin 3x1.5 mm UTDFN green package.

Features

- 2.6V to 4.8V Input Supply
- VSP output range 4.5V to 6.0V
- VSN output range 4.5V to 6.0V
- Only 5 external capacitors
- UTDFN-12 (3mmx1.5mm) Exposed Pad Package

Applications

- TFT LCD for smart phone and tablet LCD panel's driver IC

Pin Assignments

X3 Package (UTDFN-12)(3mm x 1.5mm)

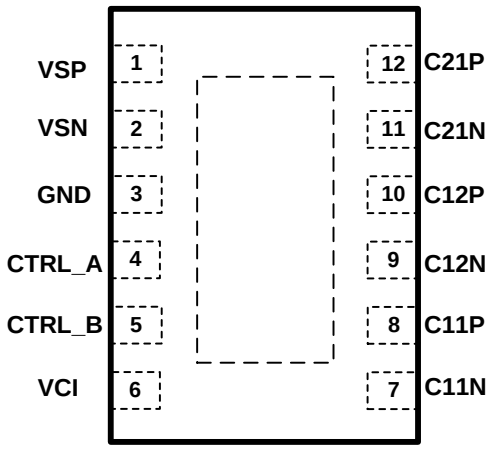


Figure 1. Pin Assignment of FP7723

Ordering Information

FP7723□

□ Package Type
X3: UTDFN-12 (3mmx1.5mm)

Marking Code

Part Number	Product Code
FP7723X3	FR8

Typical Application Circuit

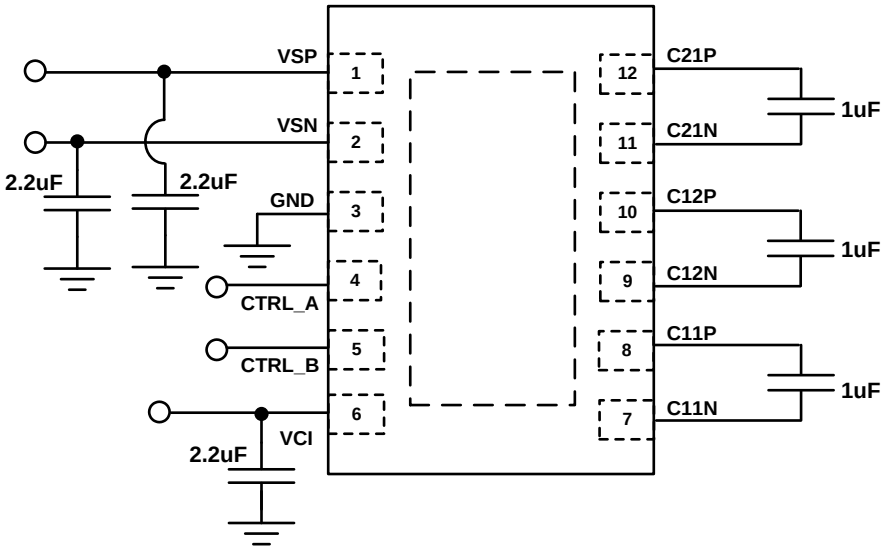


Figure 2. Typical Application Circuit of FP7723

Functional Pin Description

Pin No.	Pin Name	I/O	Pin Function
1	VSP	O	Positive voltage output pin (VSP).
2	VSN	O	Negative voltage output pin (VSN).
3	GND	P	Ground pin.
4	CTRL_A	I	Clock control from driver IC. If not used synchronized with external signal from driver IC, please connected to GND.
5	CTRL_B	I	Clock control from driver IC. If not used synchronized with external signal from driver IC, please connected to GND.
6	VCI	P	Power supply input pin.
7	C11N	I	Capacitor connection pin for the VSP.
8	C11P	I	Capacitor connection pin for the VSP.
9	C12N	I	Capacitor connection pin for the VSP.
10	C12P	I	Capacitor connection pin for the VSP.
11	C21N	I	Capacitor connection pin for the VSN.
12	C21P	I	Capacitor connection pin for the VSN.

Block Diagram

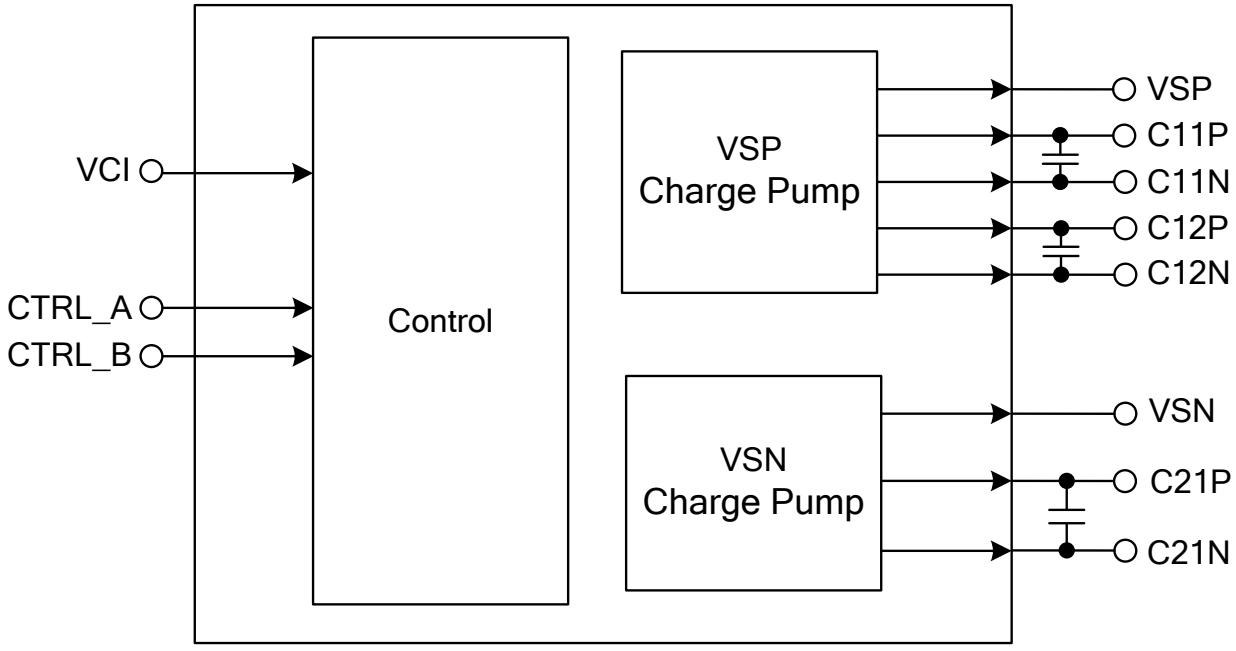


Figure 3. Block Diagram of FP7723

Absolute Maximum Ratings

- VCI ---------- -0.3V to 6V
- Control signal voltage ---------- -0.3V to 6V
- VSP ---------- 0V to 6V
- VSN ---------- 0V to -6V
- Operating Junction Temperature Range (T_J) ---------- -40°C to +125°C
- Operating Temperature Range (T_{OP}) ---------- -40°C to +85°C
- Storage Temperature Range ---------- -55°C to +150°C
- Lead soldering Temperature Range (10 seconds) ---------- -40°C to +125°C

Note1：Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device.

Electrical Characteristics

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Power Supply						
Input Voltage	V_{CI}		2.6		4.8	V
VCI Under Voltage Lockout (UVLO)	V_{UVLO}	VCI Rising	2	2.3	2.5	V
		VCI Falling			1.7	V
Standby Current	$I_{STANDBY}$				5	uA
Output Voltage VSP						
Output Voltage Range	V_{SP}	VCI=3V			6	V
Output Current Capability		VCI=3V	50			mA
R_{out}		Without VSN loading		6		Ω
Output Voltage VSN						
Output Voltage Range	V_{SN}	VCI=3V			-6	V
Output Current Capability		VCI=3V	50			mA
R_{out}		Without VSP loading		11		Ω
LOGIC CTRL_A¸CTRL_B						
Threshold Voltage	VIH		1.5			V
	VIL				0.5	V
External Signal Frequency			100			kHz

Control Signals of FP7723

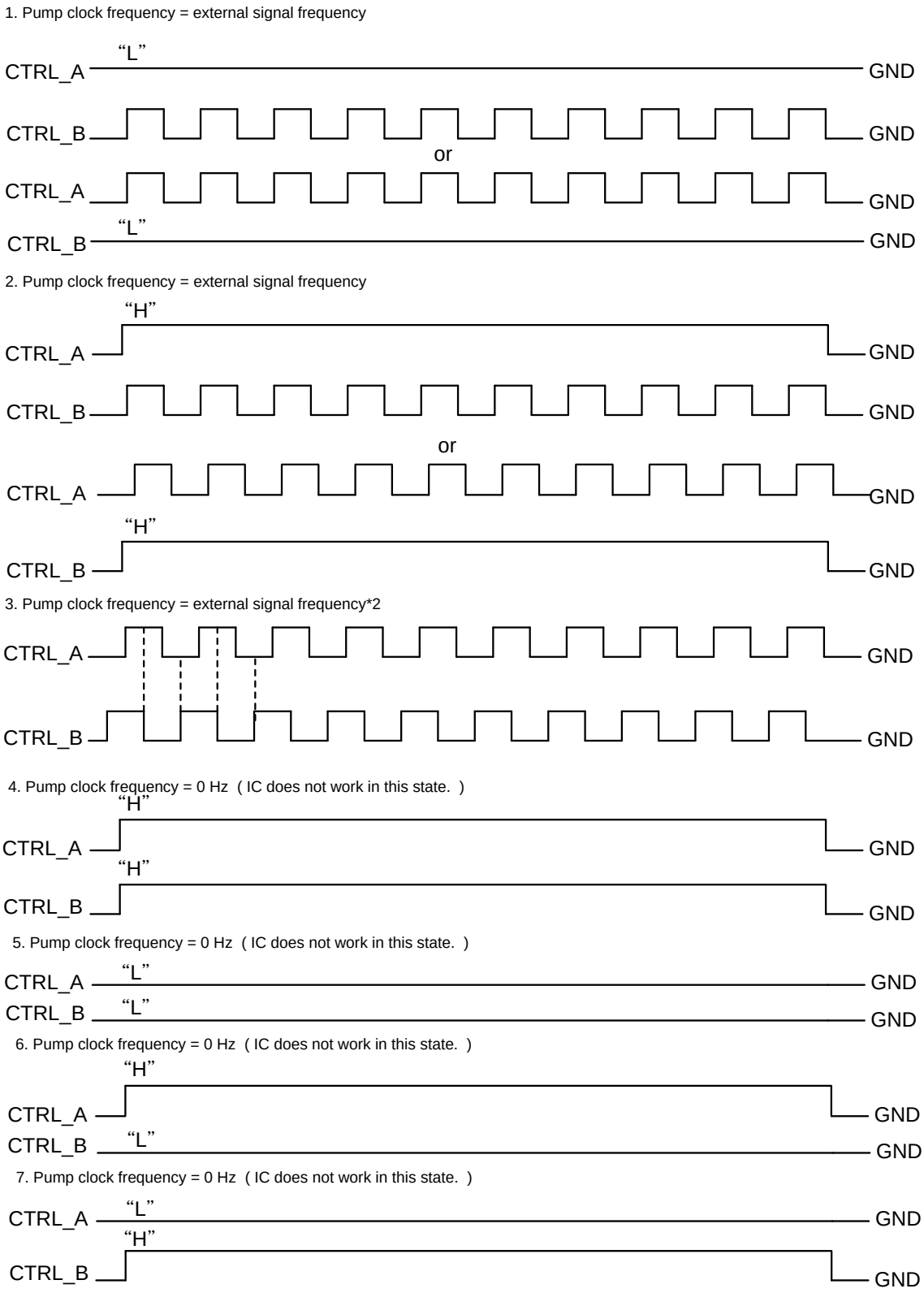
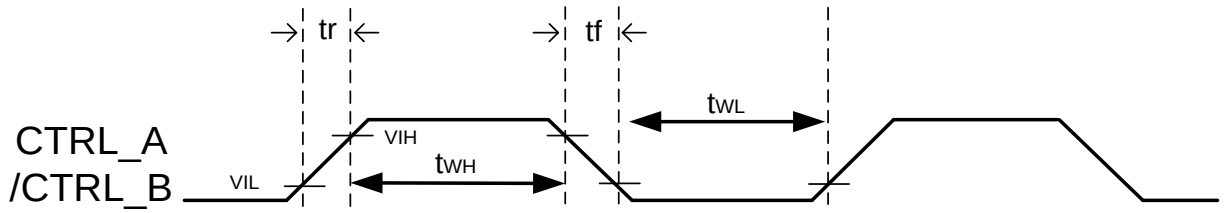


Figure 4. Control signal of FP7723.

Control Signals of FP7723



Parameter	Symbol	Min.	Typ.	Max.	Units
Rising time	tr	1	-	100	ns
Falling time	tf	1	-	100	ns
High pulse width	t_{WH}	0.4	-	4	us
Low pulse width	t_{WL}	0.4	-	4	us

Power On/Off Sequence

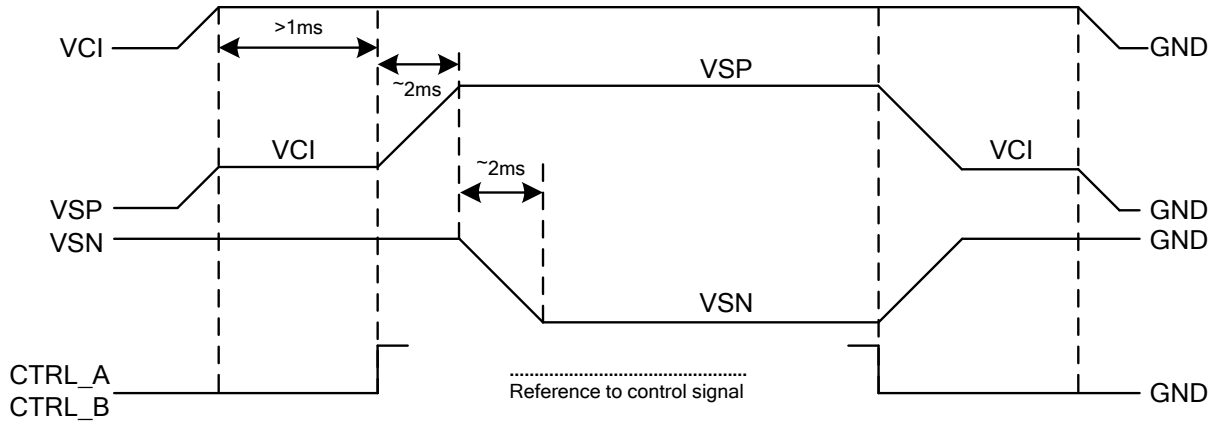


Figure 5. Power on/off sequence of FP7723.

Typical Performance Curves

V_{IN}=2.8V, T_A=+25°C, External Pump Clock Frequency(300kHz).

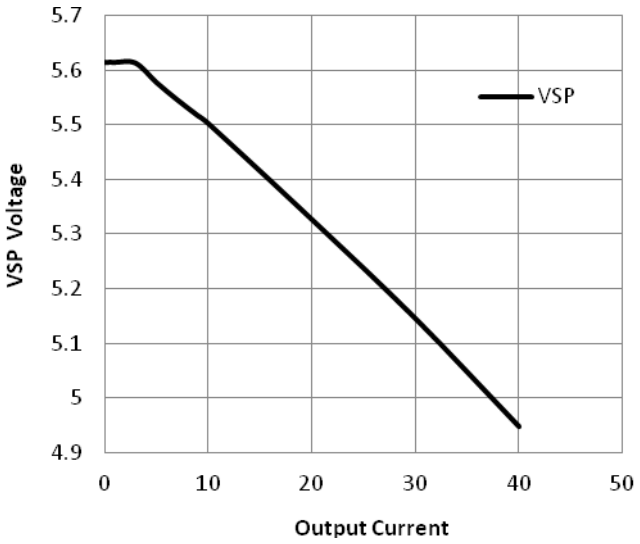


Figure 6. VSP's Output Voltage VS. Output Current

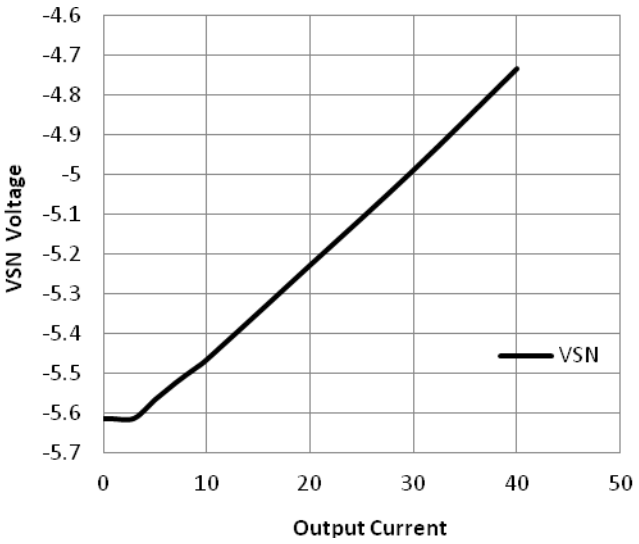


Figure 7. VSN's Output Voltage VS. Output Current

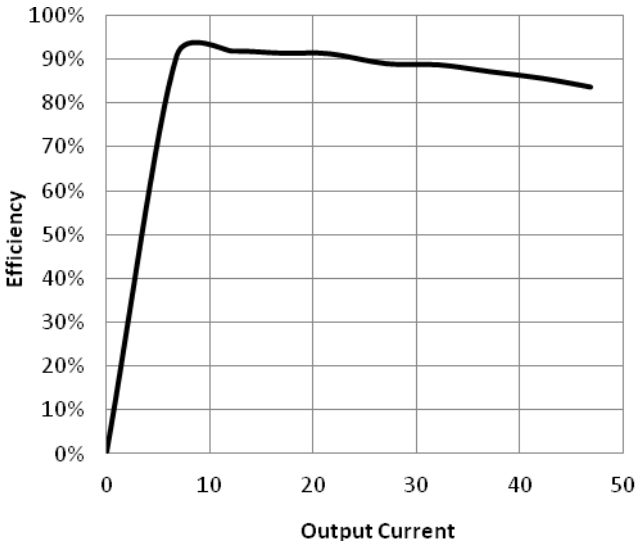


Figure 8. Efficiency VS. Load Current

V_{IN}=3.0V, T_A=+25°C, External Pump Clock Frequency(300kHz).

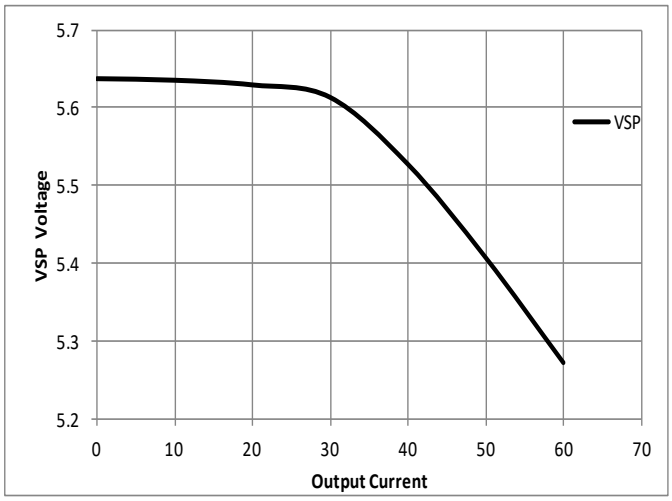


Figure 9. VSP's Output Voltage VS. Output Current

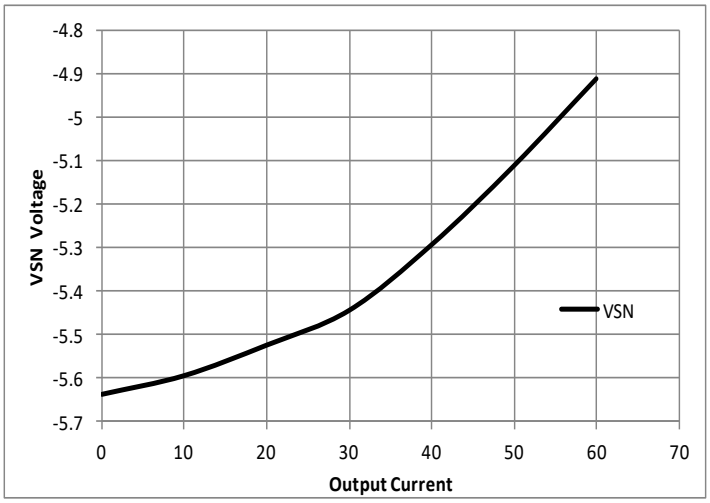


Figure 10. VSN's Output Voltage VS. Output Current

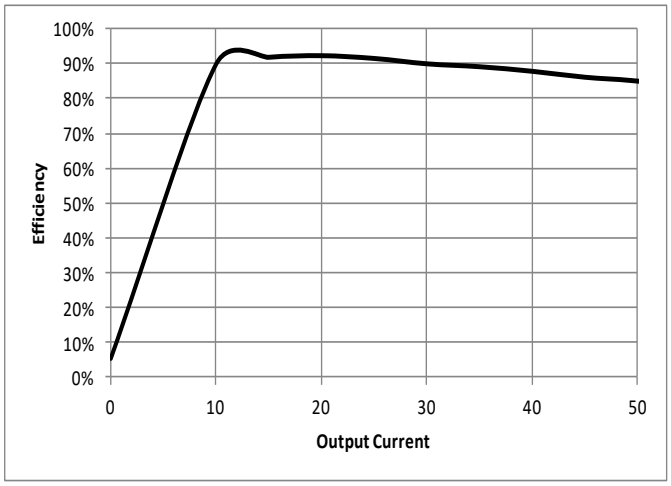


Figure 11. Efficiency VS. Load Current

V_{IN}=3.3V, T_A=+25°C, External Pump Clock Frequency(300kHz).

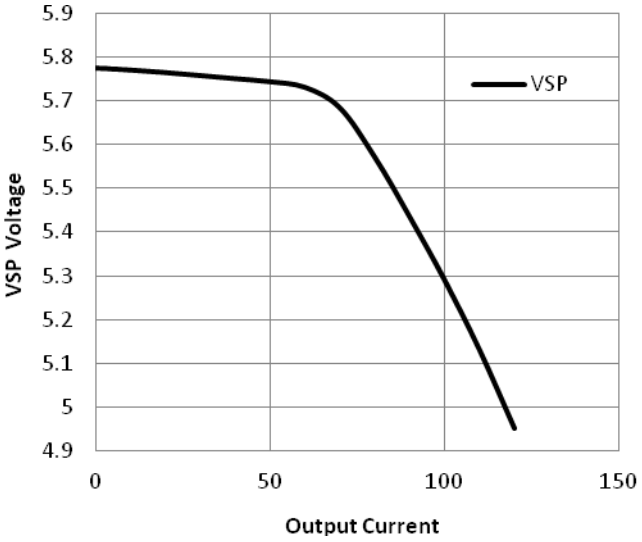


Figure 12. VSP's Output Voltage VS. Output Current

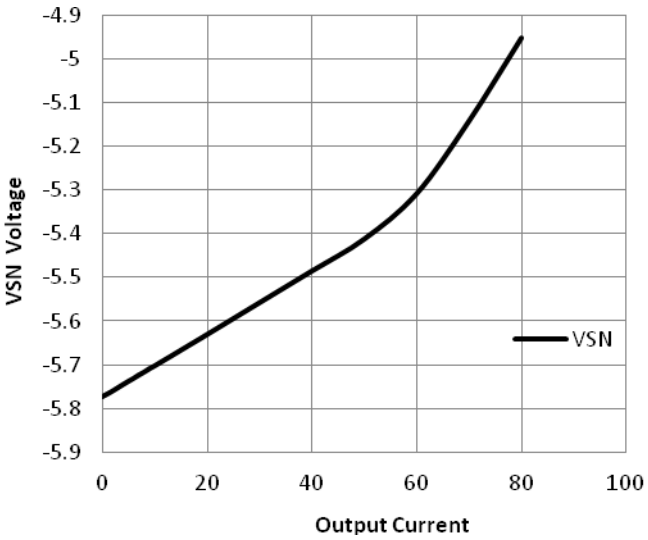


Figure 13. VSN's Output Voltage VS. Output Current

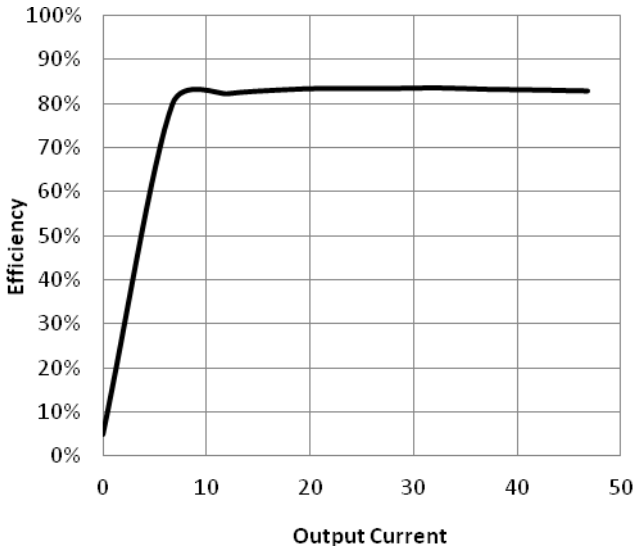
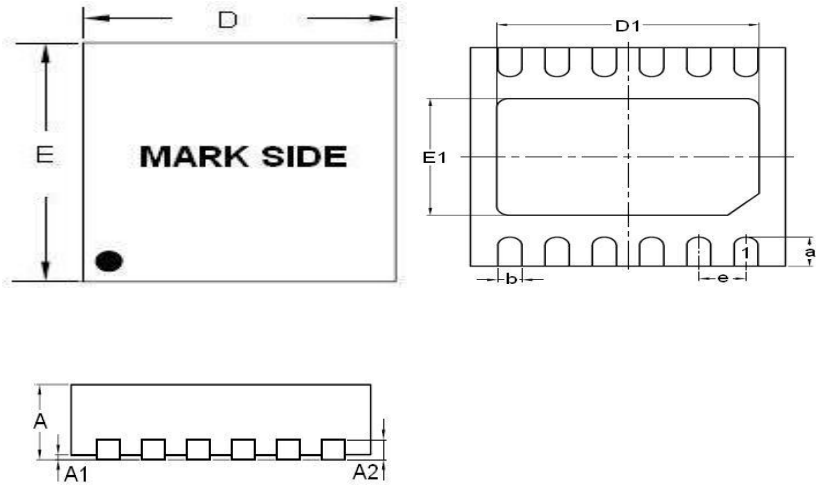


Figure 14. Efficiency VS. Load Current

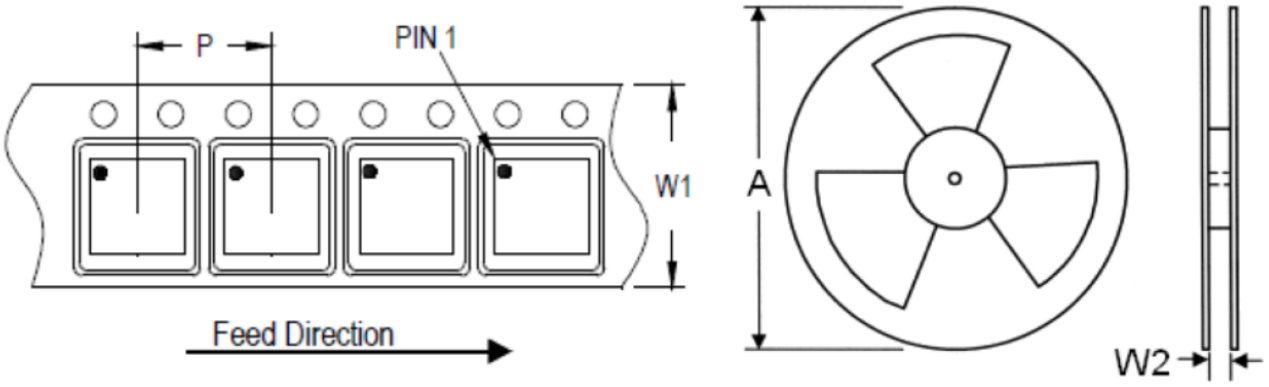
Outline Information

UTDFN- 12 (3mm x 1.5mm) (pitch 0.45 mm) Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	0.40	0.55
A1	0.00	0.05
A2	0.15	0.25
D	2.95	3.05
E	1.45	1.55
a	0.15	0.25
b	0.15	0.25
e	0.40	0.50
D1	2.70	2.90
E1	0.60	0.80

Carrier Dimensions



Tape Size (W1) mm	Pocket Pitch (P) mm	Reel Size (A)		Reel Width (W2) mm	Empty Cavity Length mm	Units per Reel
		in	mm			
8	4	7	180	8.4	300~1000	3,000