YP6188 1A Iout DC-DC Step-up Converter

General Description

The YP6188 is a high efficiency boost DC-DC converter which com bines a current mode, fixed frequency (1.22MHz or 640KHz programmable with FSEL pin) PWM architecture for TFT LCD displays and other portable applications.

YP6188 operates over a wide range of input supply voltage(2.5V<VIN<5.5V) and provides a regulated boost voltage (from VIN up to as high as 15V). The YP6188 also features a skip cycle mode operation for power saving at light loads.

The built-in soft-start circuitry (externally programm able through the CSS pin) provides the freedom for the control of input current ramp rate.Overall current consum ption during the power down mode (by pull MPD~pin to logic low) is typically less than 0.1uA.Under-voltage lockout(UVLO),Thermal Shutdown (TSD), Over Current detection/protection (OVL) and other protection featuers are also incorporated onto the YP6188 to ensure the reliable operation under different operating circumstances.

Features

90% efficiency

Built-in 2.4A,0.18Ω, 20V power NMOS switch

640KHz/1.22MHz FSEL pin selectable fixed frequency PWM operation

Built-in slope compensation circuitry to ensure system stability

Adfustable output voltage from VIN up to as high as 15V

Programmable Soft-Start for optimizing control of input current
ramp rate.

Built-in Skip Cycle mode to maintain high power efficiency at light loads.

Built-in Thermal Shutdown (TSD) and Over-current detection/protection(OVI)

Built-in maximum duty cycle detection/protection.

Small 8-pin MSOP Package

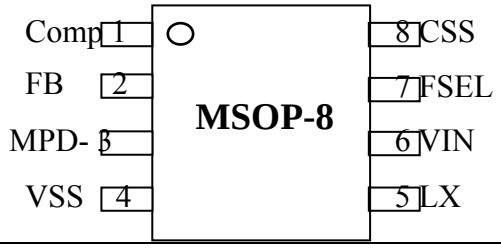
Applications

TFT LCD displays

Portable Applications

Handheld Devices

Pin Assignment:

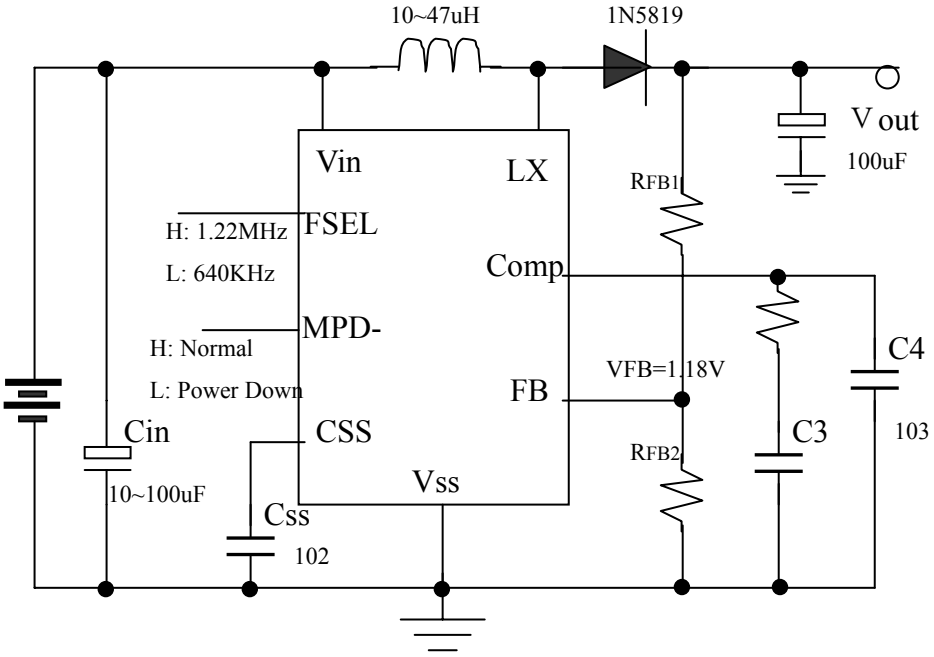


Pin Description

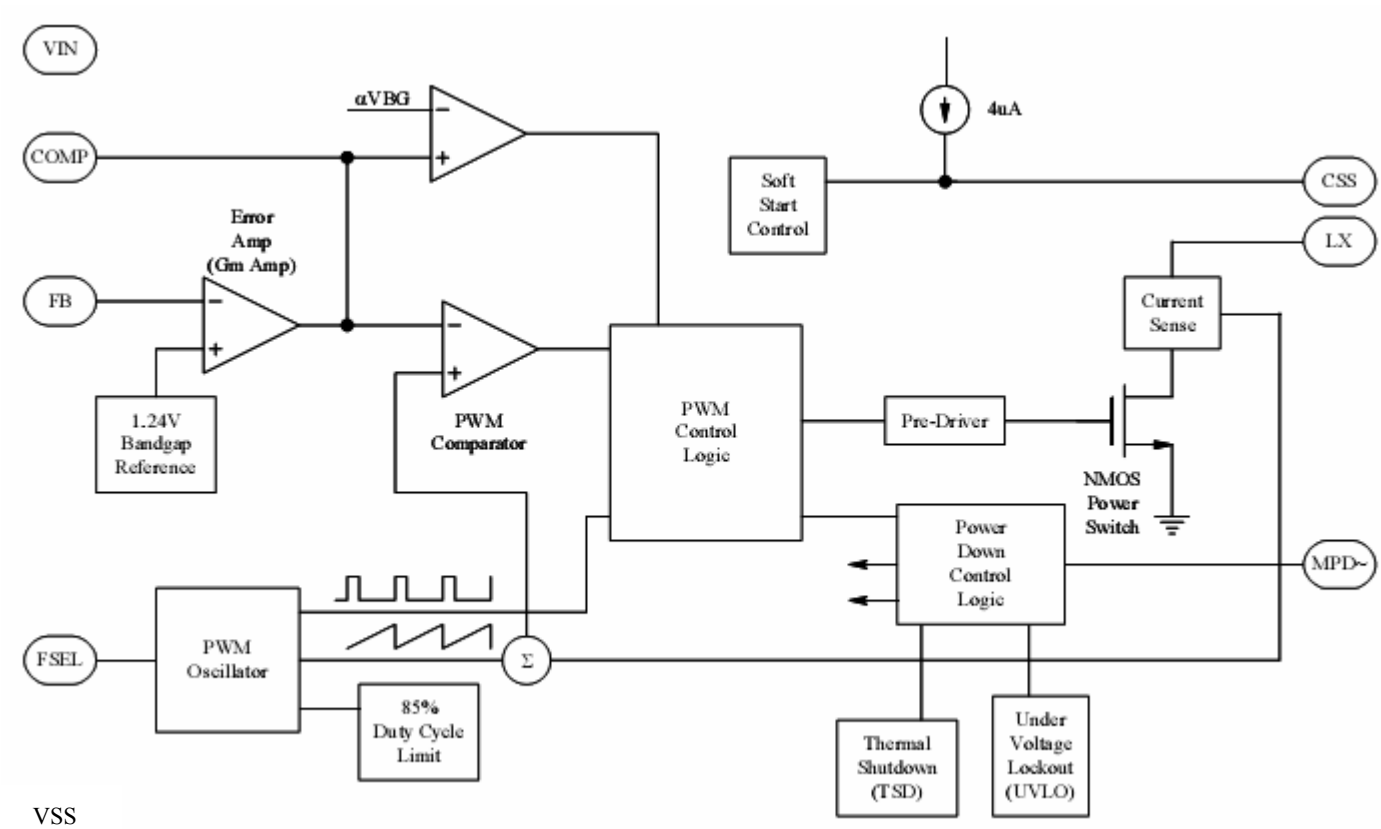
PinNumber	PinName	Pin description
1	COMP	Compensation pin for Error Amplifier Connect RC1 and CC1 in series in-between COMP pin and ground (GND) Optional CC2 between COMP and GND pins will introduce the extra pole to cancel the un wanted zero due to the non-ideal ESR of the output capacitor.
2	FB	Output Voltage Feedback Loop pin.Connect an external preeision resistor divider (RFB1 and RFB2) tap to FB pin (reference voltage is 1.18V nominal) Will determine the nomiinal output voltage.i.e,VOUT=1.18*(1+RFB1/RFB2).
3	MPD~	Master power down pin (active low).When MPD~pin goes low,the YP6188 Will enter the power down mode.
4	GND	Ground pin
5	LX	Boost converter power switch pin.Connect the inductor (L1) and catch (Schottky)diode (D1) to LX pin with minimum trace area.
6	VIN	Supply voltage input pin (2.5V to 5.5V recommen ded).
7	FSEL	Frequency selection pin When this pin is low,640KHz PWM frequency is

		Selected. When this pin is high,the PWM frequency is 1.22MHz.This pin is Default low (640KHz) with internal 5uA pull down device.
8	CSS	Soft-Start current ramp rate control pin. Connect a soft start capscitor (Css) In-between this pin and ground (GND) to set the proper input current ramp rate.

Typical Application Circuit:



Functional Block Diagram.



Recommended Operating Conditions

VIN Supply Voltage Range	2.5V to 5.5V

Operating Ambient Temperature (T A)	-40℃ to 85℃
Output Voltage (VOUT)	VIN to 15V maximum

Absolute Maximum Ratings:

VIN	-0.3V to 5.5V
Lx to GND pin	-0.3V to +20V
MPD~, FSEL, FB to GND pin	-0.3V to (VIN+0.3V)
CSS, COMP to GND pin	-0.3V to(VIN +0.3V)
PMS LX Susceptibility	1.2A
ESD Susceptibility	2KV (Human Body Model) 200V (Machine Model)
Continuous Power Dissipation	Limited by intemal Thermal Shutdown (TSD)
Operating Tem perature Range	-40℃ to 85℃
Junction Temperature	+150℃
Storage Temperature Range	-65℃ to 15085℃
Lead Temperature (Soldering, 10s)	+300℃

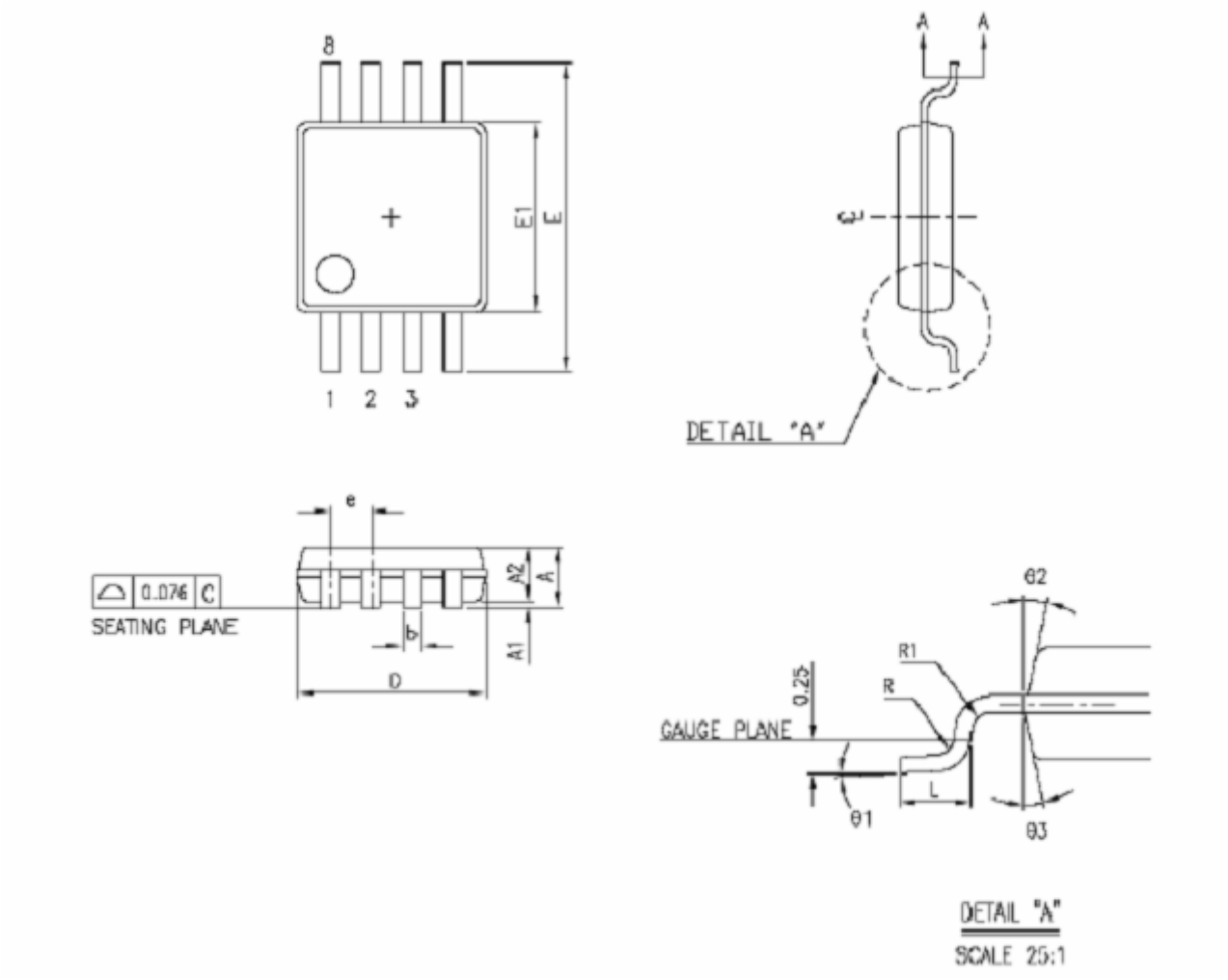
Electrical Characteristics:

Unless otherwise specified, VIN = MPD~ =3.0V, FSEL = GND, T_A= 0℃ to 85℃. Typical values are atT_A= 25℃.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
VIN	Input Supply Voltage		2.5		5.5	V
UVLO_H	Under Voltage Lockout_ High	VIN rising edge threshold	2.15	2.28	2.42	V
UVLO_L	Under Voltage Lockout_ Low	VIN falling edge threshold	2.11	2.24	2.32	V
I_{Q1}_VIN	Quies eent Current_ PWM off	V_{FB}=1.3V (i.e. with PWM switching)		180	350	μA
I_{Q2}_VIN	Quies eent Current_ OWM on	V_{FB}=1.0V (i.e. with PWM switching)		2	5	mA
I_{PD}_VIN	Power Down Current	MPD~pin = GND		0.1	10	μA
V_{FB}	Feedback Voltage	V_{FB} Level in order to Priduce V_{COMP}=1.18V	1.162	1.18	1.198	V
I_B_FB	FB pin Bias current	V_{FB}=1.18V		0	40	nA
Gm	Error Amp (E/A) Trans conductance	△I=5μA	70	140	240	μmhos
A_V	E/A Voltage Gain			700		V/V
△V_{FB}/△V_{IN}	Feedback Voltage Line Regulation	Level to produce V_{COMP}=1.18V (2.5V<VIN<5.5V)		0.05	0.15	%
F_{OSC}_L	Oscillator Frequency_Low	FSEL=GND	540	640	740	KHz
F_{OSC_H}	Oscillator Frequency_High	FSEL=VIN	1.0	1.22	1.5	MHz
D_1_Max	Maximum Duty Cycle	FSEL=GND	79	85	92	%
D_2_Max	Maximum Duty Cycle	FSEL=VIN		84		%

I_{SW-Max}	Switch Current Limit²	V_{FB}=1V Duty Cycle=65%	1.8	2.4	3.4	A
R_{DS_On}	ON Resistance	I_{LX}=1.2A		0.18	0.35	Ω
I_{LX_Off}	Leakage Current	V_{LX}=12V		0.01	20	μA
R_{CS}	Current Sense Tran sres istance		0.20	0.30	0.43	Ω
$R_{SS-Reset}$	Soft Start reset device maximum on resis tance				300	Ω
I_{CH_SS}	Soft Start Ramp Up Charge Current	V_{CSS}=1.2V	1.5	4	7	μA
V_{IL}	Digital input low voltage	MPD~ and FSEL 2.5<VIN<5.5V			0.3* VIN	V
V_{IH}	Digital input low voltage	MPD~ and FSEL 2.5<VIN<5.5V	0.7* VIN			V
V_{HYS}	Hysteresis	MPD~ and FSEL		0.1* VIN		V
I_{FSEL}	FSEL pull down current		1.8	5	9	μA
I_{MPD-}	MPD~ input current			0.001	1	μA

Package Information:



SYMBOL	DIMENSIGN IN HM			DIMENSON IN INCH		
	MIN	NOM	MAN	MIN	NOM	MAX
A	-		1.10	-		0.043
A1	0.05		0.15	0.002		0.0006
A2	0.81	0.86	0.91	0.032	0.034	0.036
b	0.25		0.40	0.00B		0.012
b1	0.25	0.30	0.35	0.010	0.012	0.014
c	0.13		0.23	0.005		0.009
c1	0.13	0.15	0.18	0.005	0.006	0.007
D	2.90	3.00	3.10	0.114	0.118	0.122
E1	2.90	3.00	3.10	0.114	0.118	0.122
e	0.85 BSC			0.026 BSC		
E	4.90 BSC			0.193 BSC		
L	0.445	0.55	0.648	0.0175	0.0217	0.0255
θ1	0*		B*	0*		B*
θ2	12 REF			12 REF		
θ3	12 REF			12 REF		
R	0.09			0.004		
R1	0.09			0.004		
JEDEC	MO-187AA					