



XTP8010

5V/1.3A Synchronous Buck Converter

XTX Technology Inc.

Tel: (+86 755) 28229862

Fax: (+86 755) 28229847

Web Site: <http://www.xtxtech.com/>

Technical Contact: fae@xtxtech.com

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5V/1.3A Synchronous Buck Converter

General Description

The XTP8010 is a compact 5V Buck Converter which can deliver 1.3A output current.

XTP8010 employs a proprietary control loop to achieve a fast transient load response. It keeps high conversion efficiency in both light load and heavy load. XTP8010 is equipped with all kinds of protection, such as input overvoltage protection, output short circuit protection, over current protection and over temperature protection.

XTP8010 consists of internal power tree generator, bandgap voltage reference module, under-voltage-lockout (UVLO) module, error amplifier, protection circuitry, driver block, current sensing block and two power MOSFETs.

XTP8010 is housed in a SOT23-5L package.

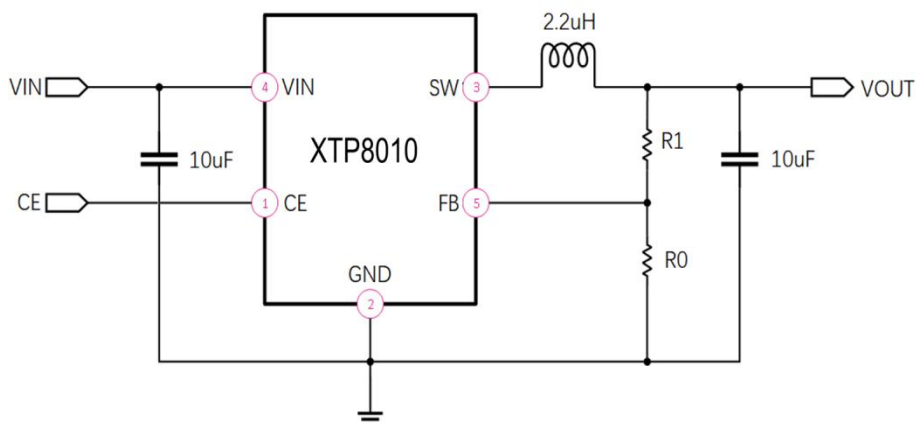
Features

- Input operating voltage range: 2.7 – 5.5V
- Input overvoltage protection at 6.3V
- 55 μ A quiescent current in operation
- Output current up to 1.3A
- Efficiency up to 95%
- OCP, SCP and OTP protection
- SOT23-5L package

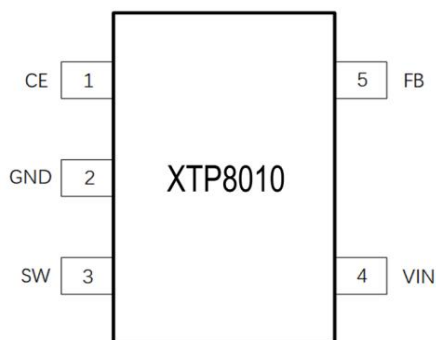
Application

- Set-top Boxes
- Solid State Drives (SSD)
- Wi-Fi and Network Devices
- Security Surveillance Systems
- Toys
- Televisions (TV)
- Other general electronic devices

Typical Application Circuit



Function Order Information



Pin No	Name	Description
1	CE	Chip enable pin, pulled high to turn on the chip
2	GND	Ground
3	SW	The switching node, connecting a 2.2μH inductor to this node
4	VIN	The input power node, connecting a 10μF capacitor to ground.
5	FB	Feedback , with V_{FB} at 0.6V

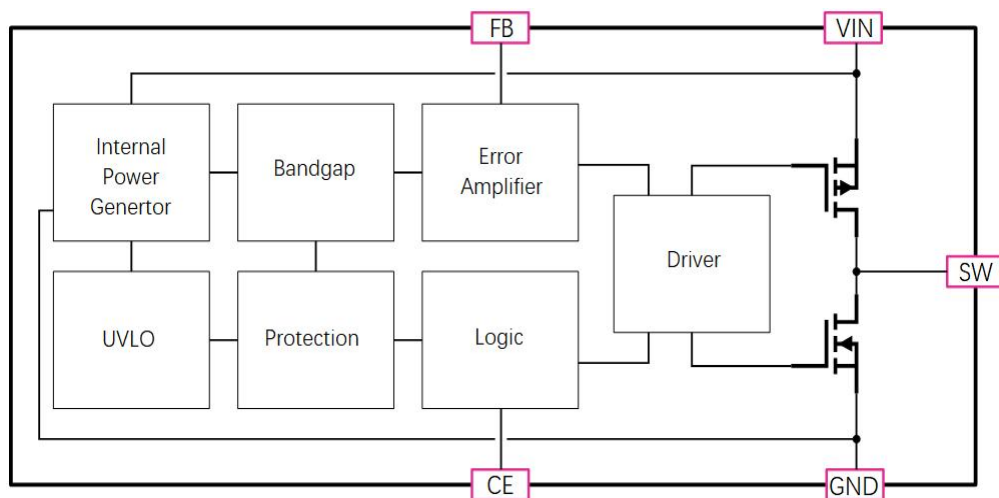
Order Information

Part No	Package	Top Marking	Tape & Reel
XTP8010AS2CT	SOT23-5L	P8010 YWZZX	3000/Reel

MARKING INFORMATION

NOTE: P8010: Device Code. YW : Date Code. ZZX: Inside Code.

Function Block Diagram



Absolute Maximum Ratings

PARAMETER		Min	Typ	Max	Unit
V_{IN} to $GND_{(1)}$		-0.3		6.5	V
$V_{OUT(1)}$		-0.3		5.5	
CE Voltage ₍₁₎		-0.3		6.5	V
SW Voltage		-0.3		6.5	V
Continuous Power Dissipation ($T_A = 25^{\circ}C$) ₍₂₎	SOT23-5L		0.4		W
Junction Temperature		-40		125	$^{\circ}C$
Lead Temperature			260		$^{\circ}C$
Storage Temperature		-65		150	$^{\circ}C$
Thermal Resistance ₍₃₎	θ_{JA}	SOT23-5L	170		$^{\circ}C/W$
	θ_{JC}		75		

Notes:

(1) Exceeding these ratings may damage the device.

(2) The maximum allowable power dissipation is a function of the maximum junction temperature $T_{J(MAX)}$, the junction-to-ambient thermal resistance θ_{JA} , and the ambient temperature T_A . The maximum allowable continuous power dissipation at any ambient temperature is calculated by $P_{D(MAX)} = (T_{J(MAX)} - T_A) / \theta_{JA}$. Exceeding the maximum allowable power dissipation will cause excessive die temperature, and the regulator will go into thermal shutdown. Internal thermal shutdown circuitry protects the device from permanent damage.

(3) Measured on JESD51-7, 4-layer PCB.

Electrical Characteristics

All typical values are at T_J=25°C (unless otherwise noted)

Parameter	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range		2.7	-	5.5	V
V _{OVP}		6.1	6.3	6.5	V
Input Voltage UVLO	Rising	-	2.55	2.65	V
	Falling	2.25	2.37	-	V
FB Voltage	V _{IN} =5V, No load	588	600	612	mV
Switching Frequency	V _{IN} =5V	1.5	2	2.5	MHz
Quiescent Current, I _Q	V _{IN} =5V	35	55	75	μA
Shutdown Current, I _{OFF}	V _{IN} =5V, V _{CE} =0	-	0.1	2	μA
Line regulation	V _{IN} =3V to 5V, V _{OUT} =1.2V	-	0.15	-	%/V
Load regulation	I _{OUT} = 0.1 –1A, V _{IN} =5V, V _{OUT} =3.3V	-	0.1	2	%/A
NMOS Switch On Resistance	V _{IN} =5V	-	230	-	mΩ
PMOS Switch On Resistance	V _{IN} =5V	-	330	-	mΩ
Peak inductor current	V _{IN} =5V	2	2.4	2.8	A
CE Input Threshold ON	V _{IN} =5V	-	0.9	1.1	V
CE Input Threshold OFF	V _{IN} =5V	0.4	0.7	-	V
CE Input Pull Down Resistor		-	900	-	kΩ
Output Discharge Resistor	V _{IN} =5V	-	420	-	Ω
OTP		-	160	-	°C
OTP hysteresis		-	30	-	°C

Application Information

Output Voltage Setting

XTP8010's feedback voltage is set at 0.6V. Assuming the resistor between output node and FB node is R₁, and resistor between FB node and ground is R₀, and the output voltage of DC-DC converting system is given by

$$V_{out} = \frac{0.6V}{R_0} \times (R_1 + R_0)$$

It is recommended that R₀ is less than 100kΩ.

Capacitor Selection

The XTP8010 requires a minimum of one 10 μ F MLCC capacitor at the VIN pin and one 10 μ F MLCC capacitor at the VOUT pin. For better noise suppression and surge current tolerance, it is recommended to use two 10 μ F MLCC capacitors in parallel at both the VIN and VOUT terminals. Place the input and output capacitors as close as possible to the corresponding pins of the XTP8010.

Inductor Selection

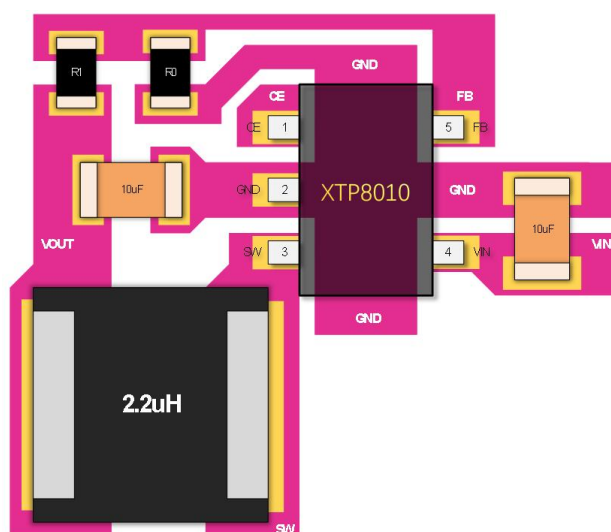
XTP8010 works at a 2MHz switching frequency which helps to have a small voltage ripple at output. And 2.2 μ H inductor is found the most suitable value while meeting requirements on small output voltage ripple as well as a high-power conversion efficiency.

Thermal Considerations

Although the XTP8010 is a high-efficiency DC/DC converter, power loss inevitably occurs during operation and is dissipated as heat, which increases the junction temperature. Proper PCB layout is critical for effective heat dissipation. For the SOT23-5L package, heat is mainly dissipated through Pin 2 (GND). It is required to design a sufficiently large copper ground plane on the PCB to conduct heat away from the device.

PCB Layout

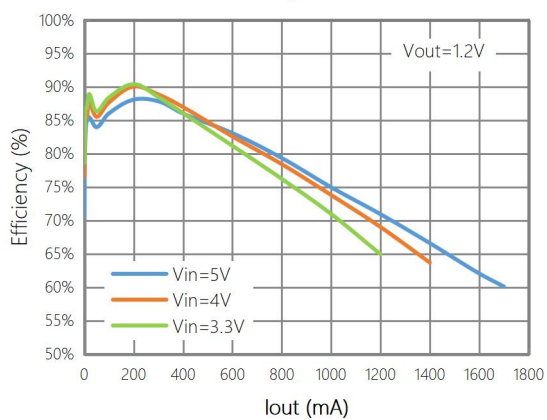
The recommended PCB layout with key components is shown below. Please follow the layout guidelines to place peripheral components including input capacitors, output capacitors and the inductor. Star grounding is required. Minimizing the area of the power loop can effectively improve EMI performance.



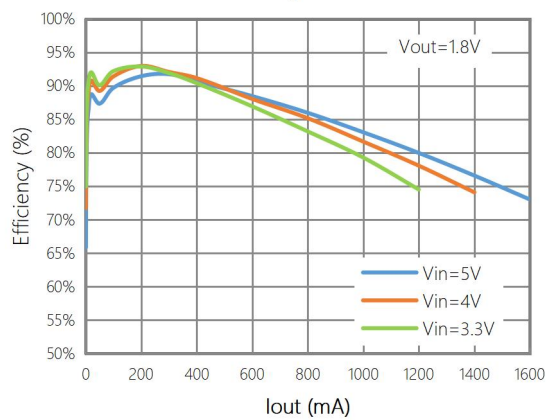
Typical Characteristics

($C_{IN}=C_{OUT}=10\mu F$, $T_A = 25^\circ C$, unless otherwise specified)

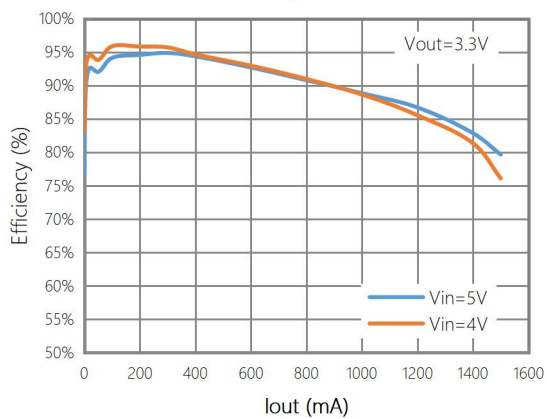
Efficiency Vs Iout



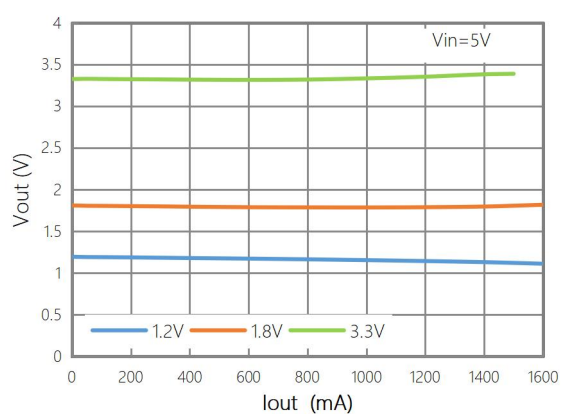
Efficiency Vs Iout



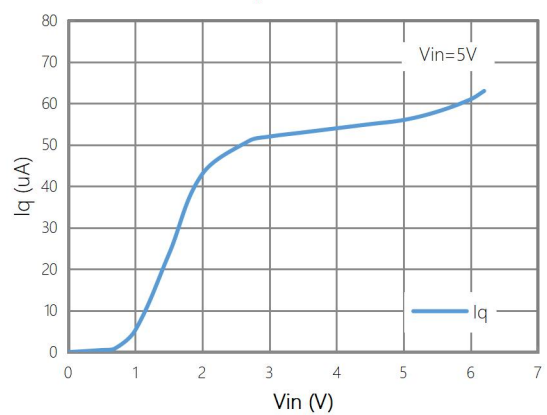
Efficiency Vs Iout



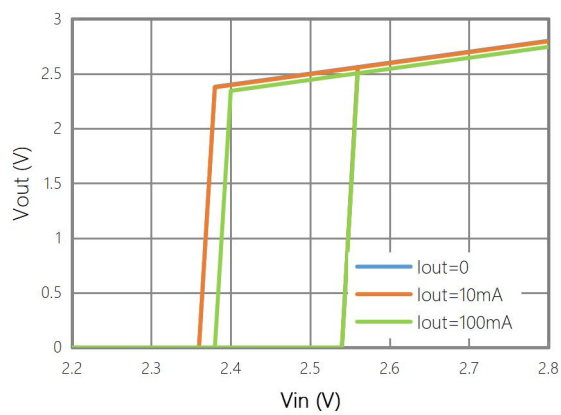
Vout Vs. Iout



Iq Vs. Vin

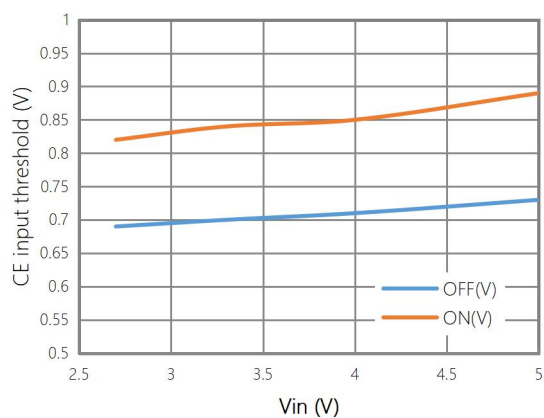


UVLO Vs Vin

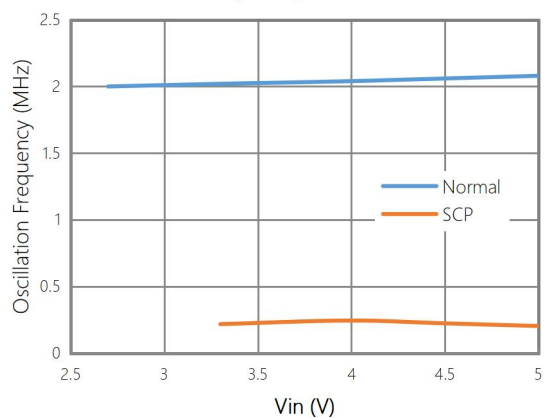


($C_{IN}=C_{OUT}=10\mu F$, $T_A = 25^\circ C$, unless otherwise specified)

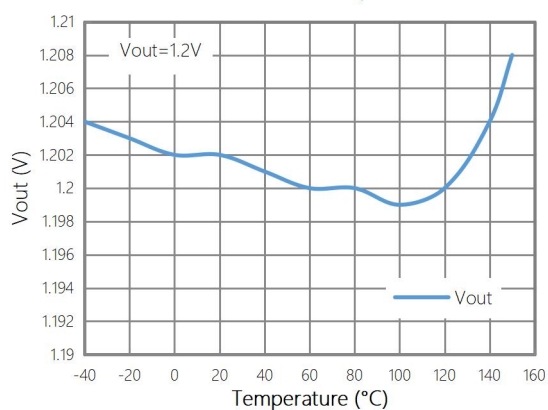
Threshold Vs. Vin



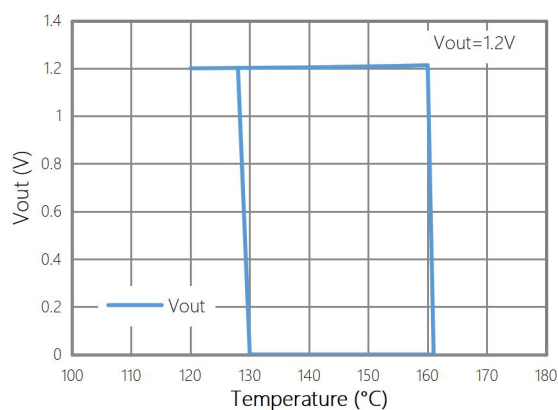
Frequency Vs. Vin



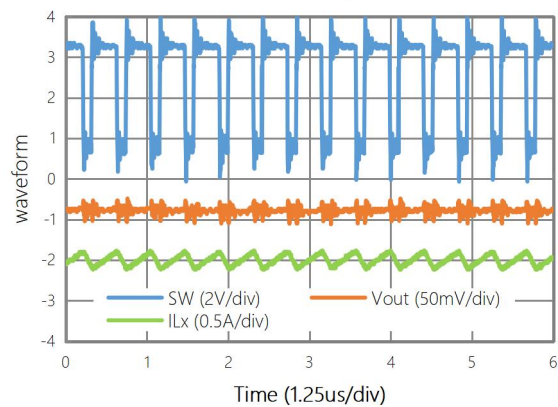
Vout Vs. Temp



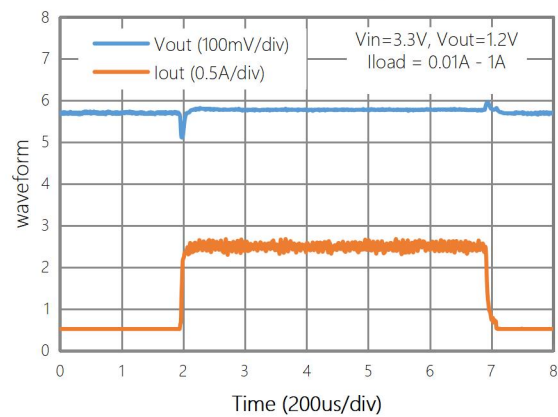
OTP Hysteresis



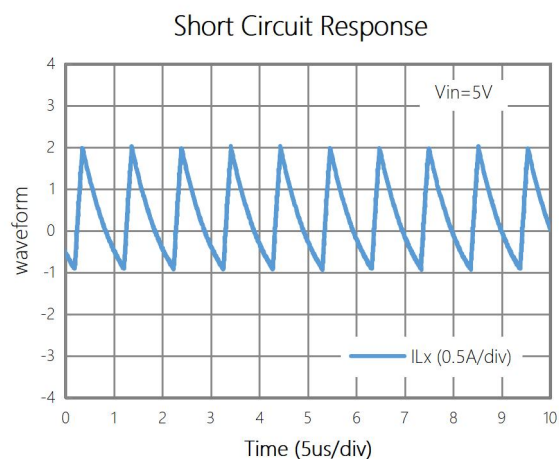
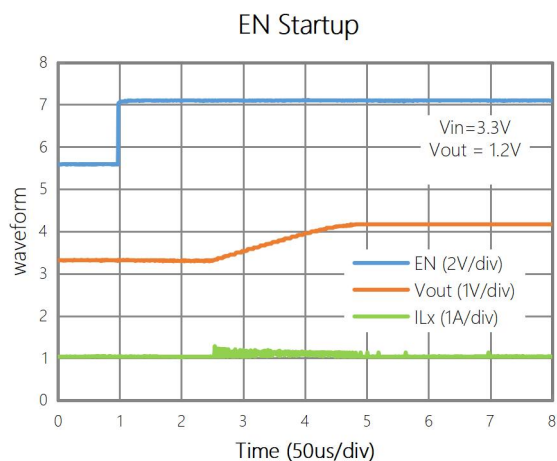
Switching



Load Transient Response

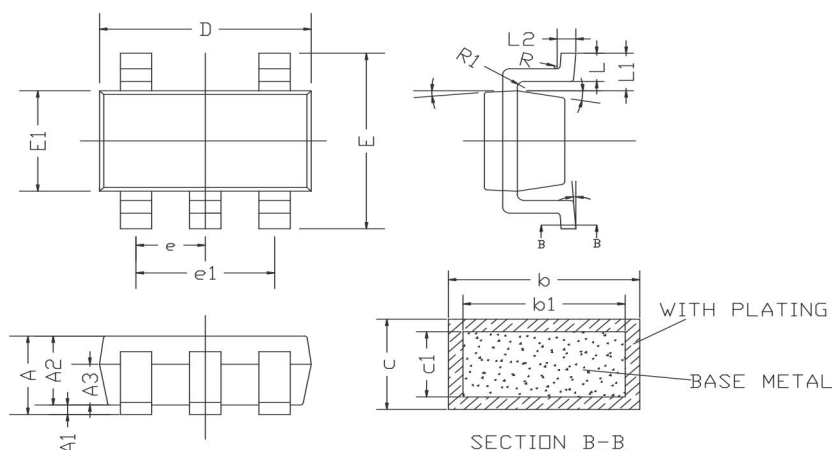


($C_{IN}=C_{OUT}=10\mu F$, $T_A = 25^\circ C$, unless otherwise specified)



Package Information

Package Dimensions (Unit: mm) — SOT23-5L



Symbol	MIN	NOR	MAX	Symbol	MIN	NOR	MAX
A	-	-	1.25	e	0.90	0.95	1.00
A1	0	-	0.15	e1	1.80	1.90	2.00
A2	1.00	1.10	1.20	L	0.35	0.45	0.60
A3	0.60	0.65	0.70	L1	0.59REF		
b	0.36	-	0.50	L2	0.25BSC		
b1	0.36	0.38	0.45	R	0.05	-	-
c	0.14	-	0.20	R1	0.05	-	0.20
c1	0.14	0.15	0.16	θ	0°		8°
D	2.826	2.926	3.026				
E	2.60	2.80	3.00				
E1	1.526	1.626	1.726				

REVISION HISTORY

Number	Description
Rev 1.0	XTP8010 datasheet release