PWM/PFM Automatic Switching Controlled Synchronous DC-DC Converters

■ General Description

The XT3406 is a CMOS step-down DC/DC regulator consisting of a reference voltage source, oscillation circuit, comparator, PWM/PFM control circuit, etc. Using PWM/PFM automatic switching control circuit to achieve adjustable duty ratio, it has the characteristics of low ripple, high efficiency and large output current in full input voltage range (2.5-5.5V). XT3406 built-in power MOSFET, using overpressure, over current, over heat, short circuit and other protective circuit, automatically disconnects when the control value is exceeded, to protect the chip. This product combines the characteristics of microencapsulation and low consumption current, which is suitable for the internal use of mobile devices.

■ Features

- High Efficiency: 95%
- Output Current: 800mA
- Minimum quiescent current: 40μA(typ)
- Small ripple: <±0.4%
- low-voltage operation: up to 100% duty cycle
- PWM / PFM automatic switching

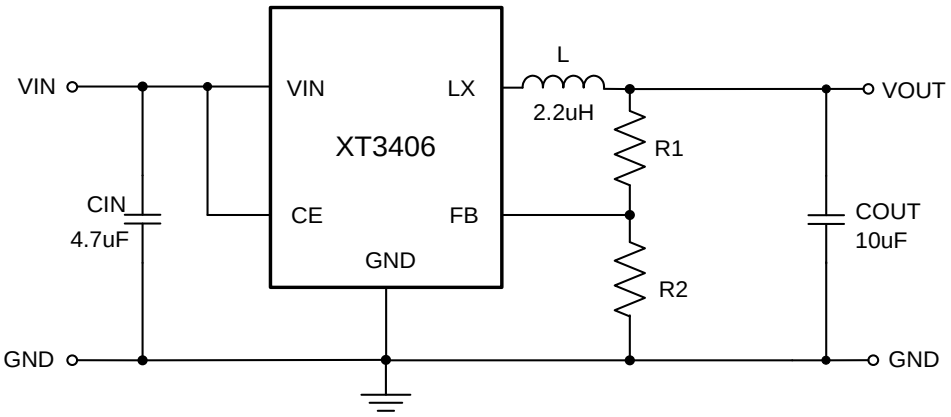
■ Applications

- Cellular and Smart Phones
- PDAs
- MP3/MP4 Player
- Digital Still and Video Cameras
- Microprocessors and DSP Core Supplies
- Portable Instruments

■ Package

- SOT23-5L
- DFN2020-6L

■ Typical Application Circuit

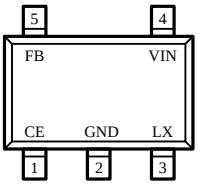


■ Ordering Information

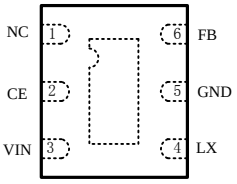
XT3406 A①②③-④

Designator	Symbol	Description
①	F	Built-in PWM/PFM automatic switching function
②	M	Package Types: SOT23-5L
	D	Package Types: DFN2020-6L
③	R	Embossed Tape :Standard Feed
	L	Embossed Tape :Reverse Feed
④	G	Green epoxy molding compound

■ Functional Pin Description



SOT23-5L
(TOP VIEW)



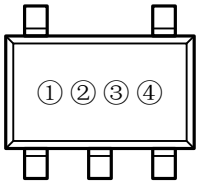
DFN2020-6L
(TOP VIEW)

■ Pin Assignment

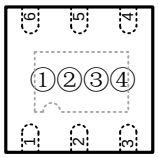
Pin Number		Pin Name	Function
SOT-23-5L	DFN2020-6L		
1	2	CE	Chip Enable Pin
2	5	GND	Common Ground
3	4	LX	Switching Output
4	3	VIN	Power Input
5	6	FB	Feedback
-	1	NC	NC

■ Marking Rule

- **SOT23-5L**



SOT23-5L
(TOP VIEW)



DFN2020-6L
(TOP VIEW)

① Represents the product name

Symbol	Product Name
H	XT3406A◆◆◆◆◆

② Represents the product model

Symbol	Description
F	PWM/PFM automatic switching

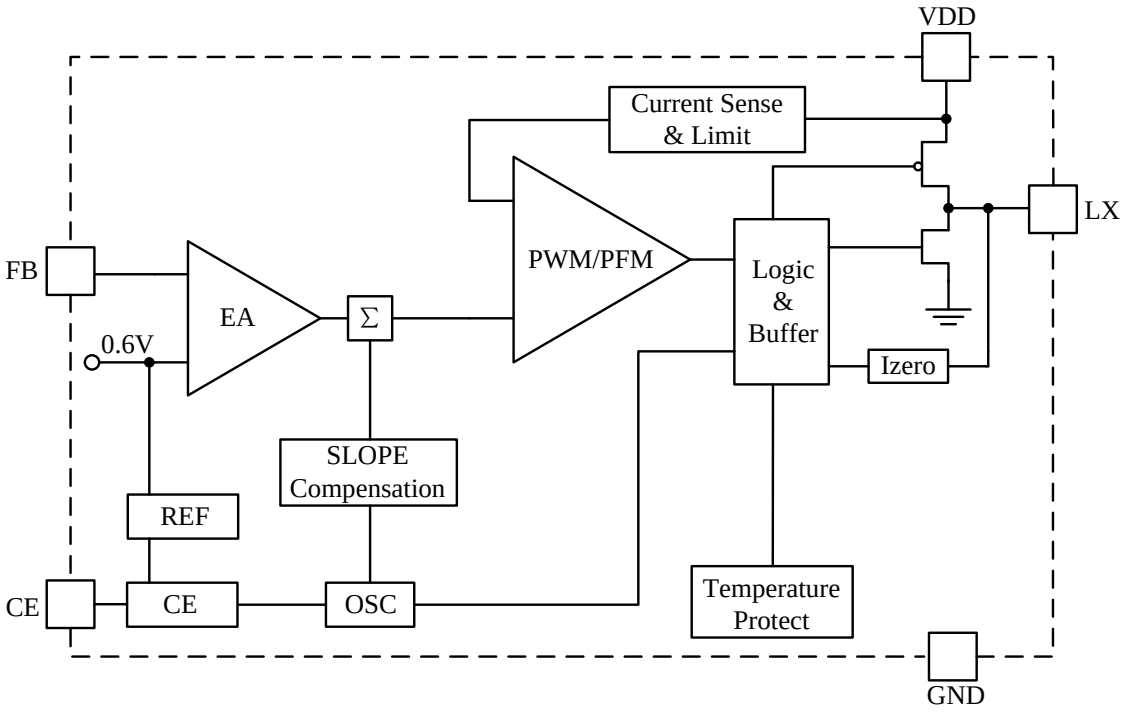
③ Represents the package types

Symbol	Package Types
5	SOT23-5L
D	DFN2020-6L

④ Represents the technological processes change

Character A-Z(Except G, I, J, O, Q, W）

■ Function Block Diagram



■ Absolute Maximum Ratings

Parameter		Symbol	Ratings	Units
Input Supply Voltage		VIN	-0.3～6.5	V
Output Voltage		VFB	-0.3～6.5	
		VLX	-0.3～VIN + 0.3	
CE Voltage		VCE	-0.3～VIN + 0.3	V
Peak LX Current		ILX	±1500	mA
Power Dissipation	SOT23-5L	P_D	250	mW
	DFN2020-6L		300	
Operating Temperature Range		Topr	-40～＋85	℃
Storage Temperature Range		Tstg	-55～＋125	

Note: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

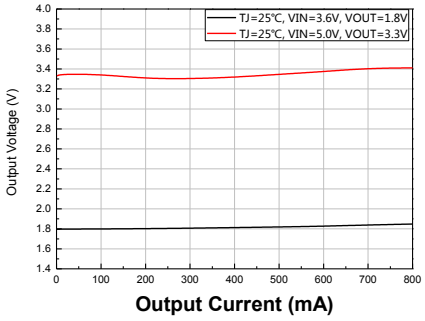
■ Electrical Characteristics

VIN=3.6V, CIN=4.7uF, CL=10uF ,L=2.2uH (Ta=25℃, unless otherwise noted)

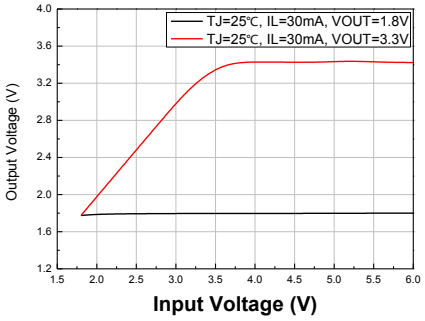
Parameter	Symbol	Cinditons	MIN	TYP	MAX	Units
Input Voltage Range	VIN	-	2.5	-	5.5	V
Regulated Feedback Voltage	VFB	-	0.59	0.6	0.61	V
VIN Under Voltage Lockout	UVLO			2.35		V
VIN Under Voltage Lockout Hysteresis	UVLO_HYS			0.35		V
OVP	OVP			6.2		V
OVP Hysteresis	OVP_HYS			0.2		V
Load regulation	ΔVOUT	ILOAD=10mA to 1.0A	-	0.5	-	%
Line regulation	$\frac{\Delta VOUT}{\Delta VIN \times VOUT}$	VIN=2.5V to 5.5V	-	0.45	-	%
Efficiency	EFFI	VIN=2.7V, IL=100mA	-	92	-	%
CE ” High” voltage	VCEH	VIN=5V	1.2	-	-	V
CE ” Low” voltage	VCEL	VIN=5V	-	-	0.9	V
Stand-by Current	ISTB	VCE=0V, VIN=5.0V	0	-	1	uA
Quiescent Current	IQ	VFB=0.5V or VOUT=90%	-	40	-	uA
FB Input Current	I_FB	VFB=0.65V	-	-	±50	nA
Output Current Limit	ILIM	-	1.2	-	-	A
PFM switching point	ILOAD	VIN=3.6V, VOUT=1.8V	-	50	-	mA
Oscillation Frequency	FOSC	VOUT=100%	-	1.5	-	MHz
Maximum Duty Circle	DMAX	-	100	-	-	%
Power tube internal resistance _P	RDSON_P	ILX=300mA	-	0.35	0.5	Ω
Power tube internal resistance _N	RDSON_N	ILX=-300mA	-	0.3	0.45	Ω
LX leakage current	ILEAK_LX	CE=0V，VIN=5V	-	±0.01	±1	uA
Thermal Shutdown	OTP			160		℃
Thermal Shutdown Hysteresis	OTP_HYS			30		℃

■ Typical Performance Characteristics

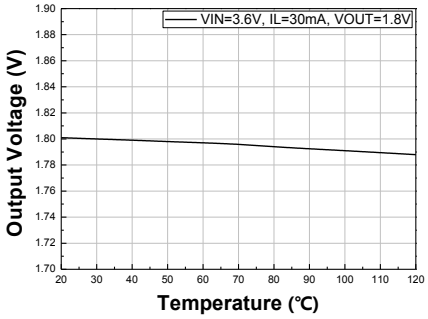
1. Output Voltage VS. Output Current



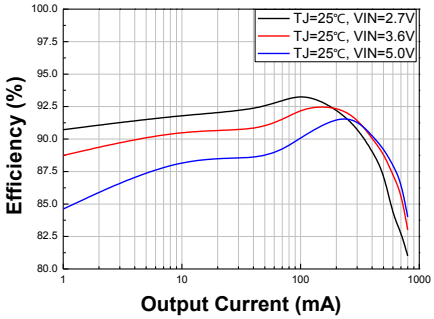
2. Input Voltage VS Output Voltage



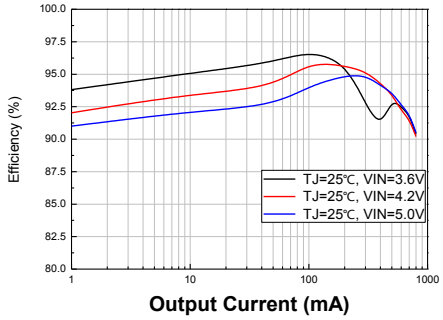
3. Output Voltage VS Temperature



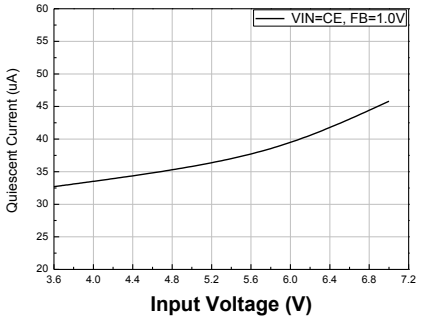
4. 1.8V Efficiency VS Output Current



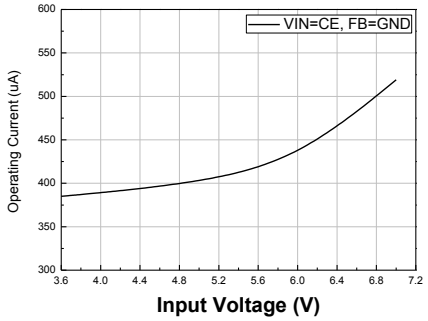
5. 3.3V Efficiency VS Output Current



6. Quiescent Current VS Input Voltage

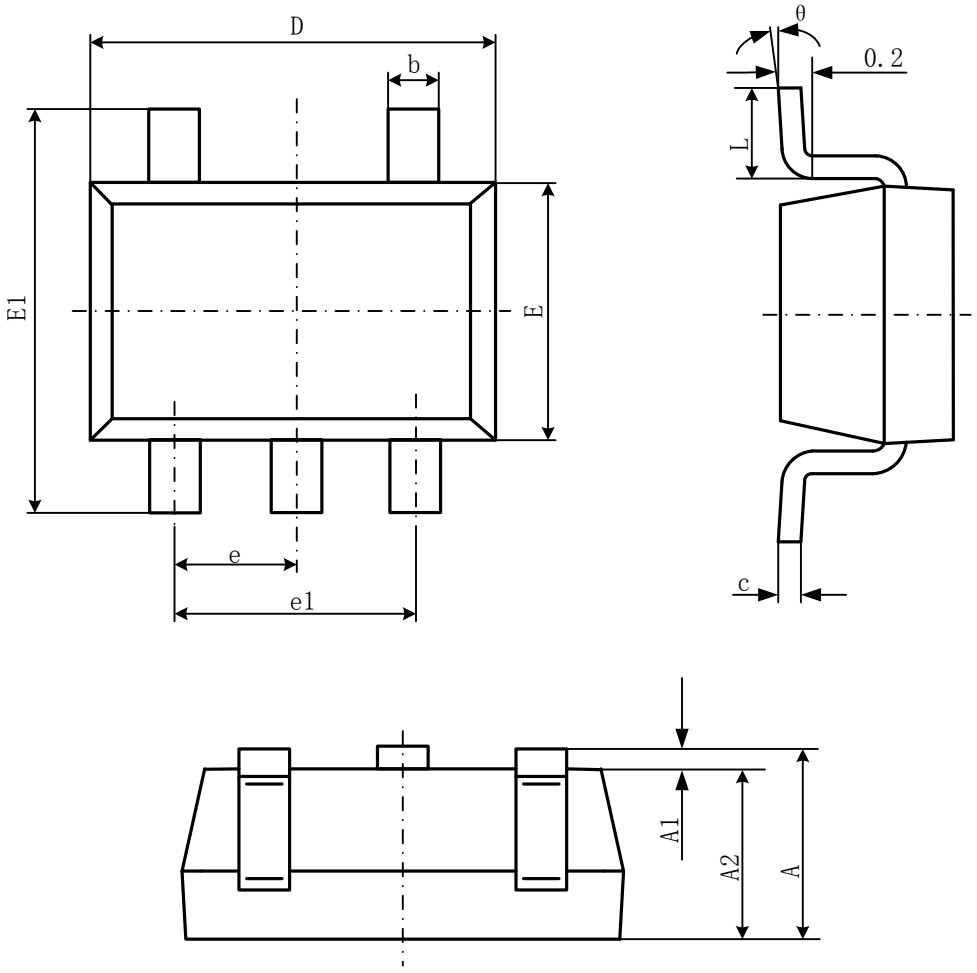


7. Operating Current VS Input Voltage



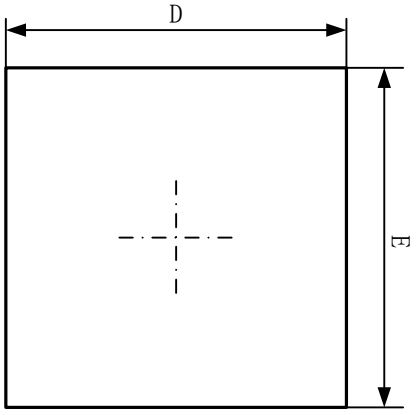
■ Package Information

- **SOT23-5L**

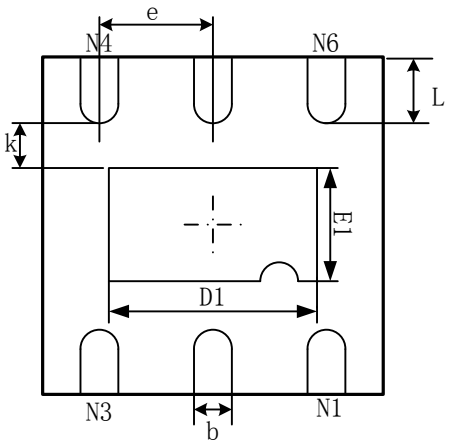


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

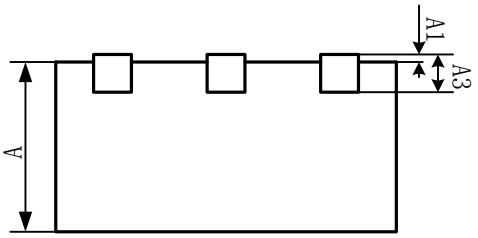
- **DFN2020-6L**



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF		0.008REF	
D	1.900	2.100	0.075	0.083
E	1.900	2.100	0.075	0.083
D1	1.100	1.300	0.043	0.051
E1	0.600	0.800	0.024	0.031
k	0.200MIN		0.008MIN	
b	0.180	0.300	0.007	0.012
e	0.650TYP		0.026TYP	
L	0.250	0.450	0.010	0.018