PFM Step-up DC/DC Converter, MEXX1C Series

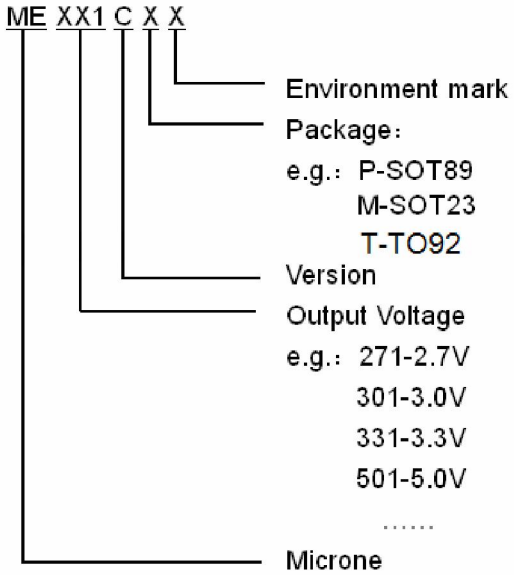
General Description

MEXX1C Series is a PFM Step-up DC/DC converter IC with low supply current by CMOS process. High frequency noise that occurs during switching is reduced by using advanced circuit designed, output voltage is programmable in 0.1V steps between 2.0~7.0V and maximum frequency is 100KHz (TYP.). A low ripple, high efficiency step-up DC/DC converter can be constructed of MEXX1C with only three external components. Also available is a CE(chip enable) function that reduce power dissipation During shut-down mode. MEXX1C is suitable for use with battery-powered instruments with low noise and low supply current.

Features

- Low input current:6μA(TYP.)
- Low ripple and low noise
- Operating voltage range:0.9V~6.5V
- Output voltage range:2.0V~7.0V(step 0.1V)
- Output voltage accuracy:±2.5%；
- Output Current: if V_{IN}=3.0V and V_{OUT}=3.3V,then I_{OUT}=250mA
- Low start voltage:<0.9V(at IOUT=1mA)
- Maximum oscillator frequency:100KHz(TYP.)
- High Efficiency:85%(Type)
- Package:SOT23、SOT89、TO92

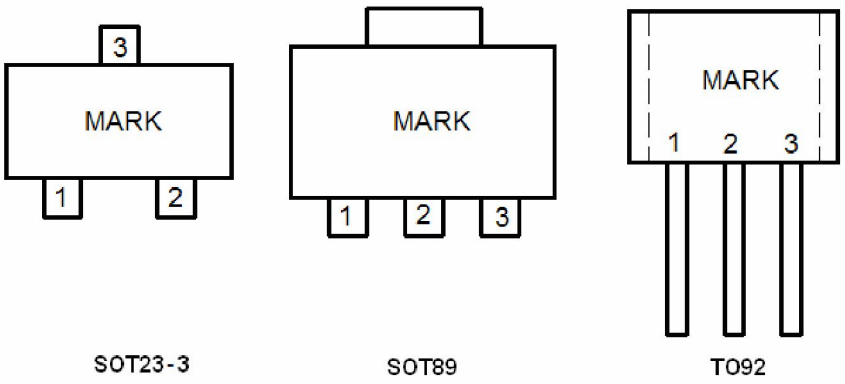
Selection Guide



Typical Application

- Power source for battery-powered equipment
- Power source for wireless mouse, wireless keyboard, toys, cameras, camcorders, VCRs, PDAs, and hand-held communication equipment
- Power source for appliances which require higher cell voltage than that of batteries used in the appliances

Pin Configuration



SOT23-3 SOT89 TO92

Pin Assignment

MEXX1C

PIN Number			Pin Name	Function
SOT23-3	SOT89-3	TO-92		
1	1	1	Vss	Ground
3	2	2	Vout	Output voltage monitor, IC internal power supply
2	3	3	Lx	Switch

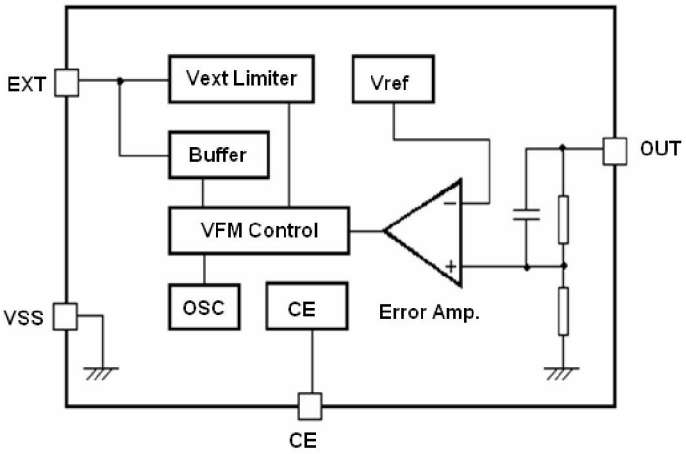
MEXX1C1

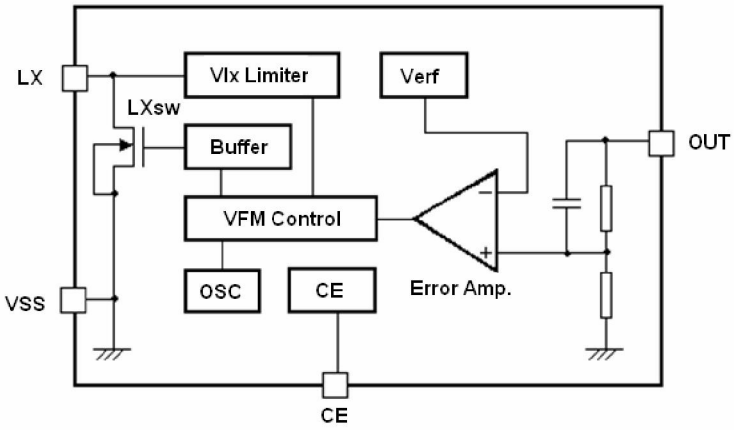
PIN Number		Pin Name	Function
SOT23-3	SOT89-3		
1	1	Vss	Ground
3	2	Vout	Output voltage monitor, IC internal power supply
2	3	Ext	External switch transistor drive

Absolute Maximum Ratings

Parameter		Symbol	Ratings	Units
V_{IN} Input Voltage		V_{IN}	6.5	V
Lx Pin voltage		V_{LX}	6.5	V
EXT Pin voltage		V_{EXT}	-0.3~Vout+0.3	V
CE Pin voltage		V_{CE}	-0.3~Vout+0.3	V
Lx Pin current		I_{LX}	600	mA
EXT Pin current		I_{EXT}	±30	mA
Vdd input voltage		V_{dd}	6.5	V
Continuous Total Power Dissipation	SOT23	Pd	300	mW
	SOT89/TO-92	Pd	500	mW
Operating Ambient Temperature		T_{Opr}	-25~+85	℃
Storage Temperature		T_{stg}	-40~+125	℃
Soldering temperature and time		T_{solder}	260℃, 10s	

Block Diagram





Electrical Characteristics

(Measuring conditions：Unless otherwise specified , V_{IN}=V_{OUT}*0.6，V_{SS}=0V，I_{OUT}=10mA，T_{OPT}=25℃)

Symbol	Parameter	Conditions	Min	Typ.	Max	Units
V_{OUT}	Output Voltage		V_{OUT}*0.975	V_{OUT}	V_{OUT}*1.025	V
V_{IN}	Maximum Input Voltage				6.5	V
Iin	No-load Input Current	Iout=0mA		4.6	9.3	uA
V_{start}	Oscillation Start-up Voltage	I_{OUT}=1mA，V_{IN}：0→2V		0.8	0.9	V
V_{hold}	Oscillation Hold Voltage	I_{OUT}=1mA，V_{IN}：2→0V	0.7			V
I_{DD1}	Supply Current 1	No external component Vout=Vout*0.95,		8	12	μA
I_{DD2}	Supply Current 2	Vout=Vout+0.5V		6		μA
I_{LX}	Lx Switching Current	V_{LX}=0.4V, Vout=Vout*0.95		100	160	mA
I_{Lxleak}	Lx Leakage Current	Vout=V_{LX}=6V			0.5	μA
R_{EXTH}	EXT"High"On Resistance	Same asI_{DD1}.V_{EXT}=Vout-0.4V		140	210	Ω
R_{EXTL}	EXT"Low"On Resistance	Same as I_{DD1}.V_{EXT}=0.4V,		140	210	Ω
V_{CEH}	CE"High" Voltage	Vout=Vce=set Vout*0.95	0.9			V
V_{CEL}	CE"Low" Voltage	Vout=Vce=set Vout*0.95			0.3	V
I_{CEH}	CE"High" Current	Vout=6.0V, Vce=6.0V	-0.5	0	0.5	uA
I_{CEL}	CE"low" Current	Vout=6.0V, Vce=0.0V	-0.5	0	0.5	uA
F_{osc}	Oscillation Frequency			100	150	kHz
Maxdty	Duty Ratio	on(V_{LX}"L")side		75		%
EFFI	Efficiency			85		%

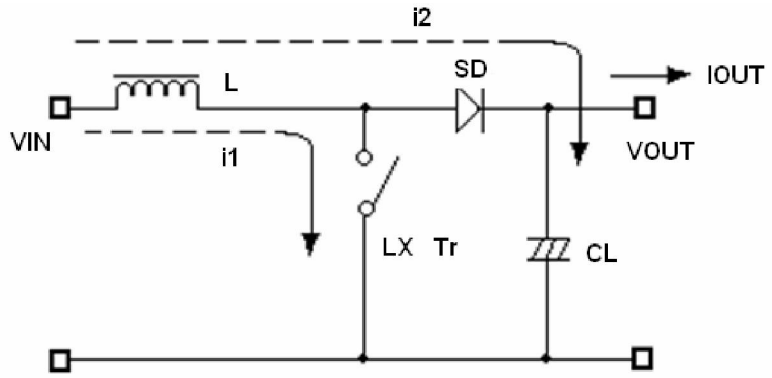
Note：1、Diode use Schottky diode such as IN5817 or IN5819 (forward voltage drop:0.2V)

2、Inductor：47μH（r<0.5Ω）

3、Capacitor：Tantalum type 47μF

Operation Description

MEXX1C step-up DC/DC converter charges energy in the inductor when Lx Transistor is on, and discharges the energy with the addition of the energy from input power source thereto, so that a higher output voltage than the input voltage is obtained. Following is the operation diagram.

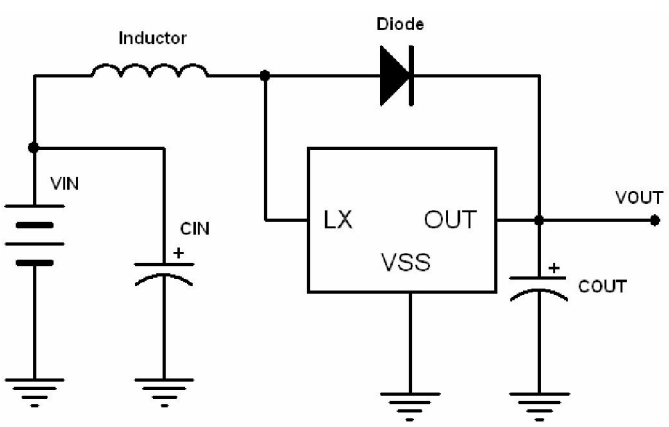


Switching DC/DC Step up Converter operating process

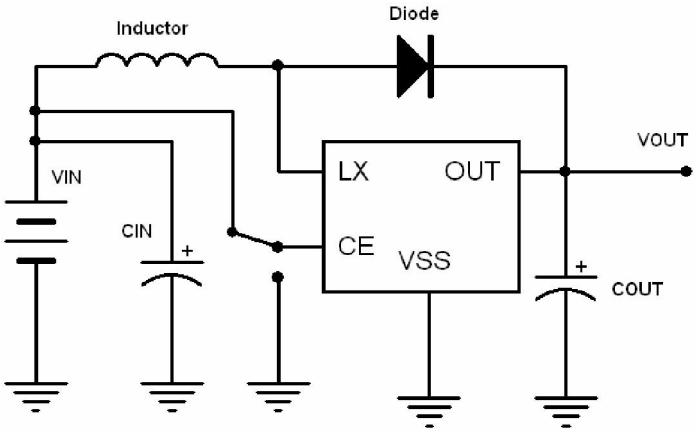
Selection of Peripheral Components and Application Notes

- Power source for battery-powered equipment
- Power source for wireless mouse, wireless keyboard, toys, cameras, camcorders, VCRs, PDAs, and hand-held communication equipment
- Power source for appliances which require higher cell voltage than that of batteries used in the appliances
- Peripheral components should be selected carefully because they are greatly affect the performances of MEXX1C：
  - Use capacitor with a capacity of 10μF or more (too small capacity will lead to high output ripple), and with good frequency characteristics (it is better to use Tantalum type). Besides, it is recommended the use of a capacitor with an allowable voltage which is at least three times the output set voltage. This is because there may be the case where a spike-shaped high voltage is generated by the inductor when Lx transistor is turned OFF.
  - Choose such an inductor that has sufficiently small d.c. resistance and large allowable current, and hardly reaches magnetic saturation. When the inductance value of the inductor is small, there may be the case where ILX exceeds the absolute maximum ratings at the maximum load.
  - Use a diode of a Schottky type with high switching speed.
- PCB Layout：
  - Set external components as close as possible to the IC and minimize the connection between the components and the IC. In particular, when an external component is connected to VOUT Pin, make minimum connection with the capacitor.
  - Make Vss pin sufficient grounding, otherwise, the zero level within IC will varied with the switching current. This may result in unstable operation of IC.

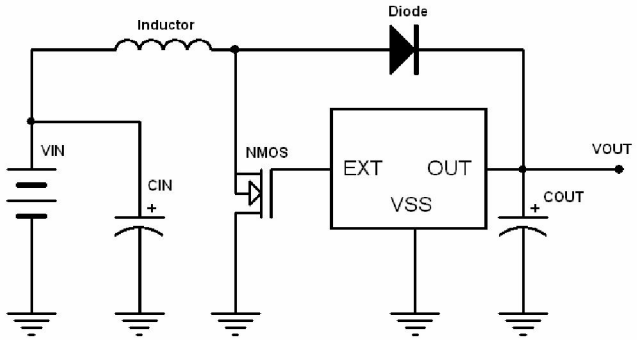
Typical Applications



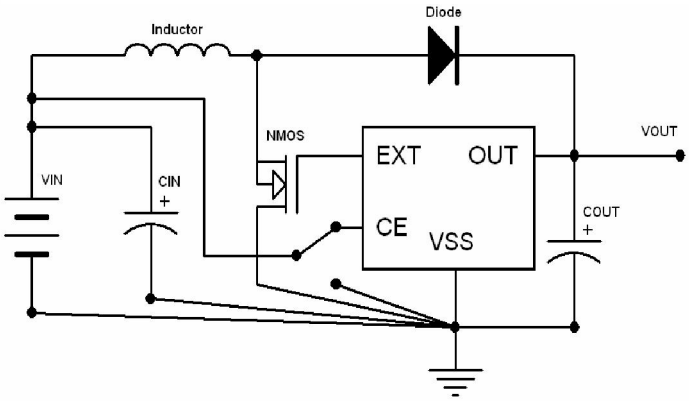
For use build in transistor



For use chip enable



For use external transistor



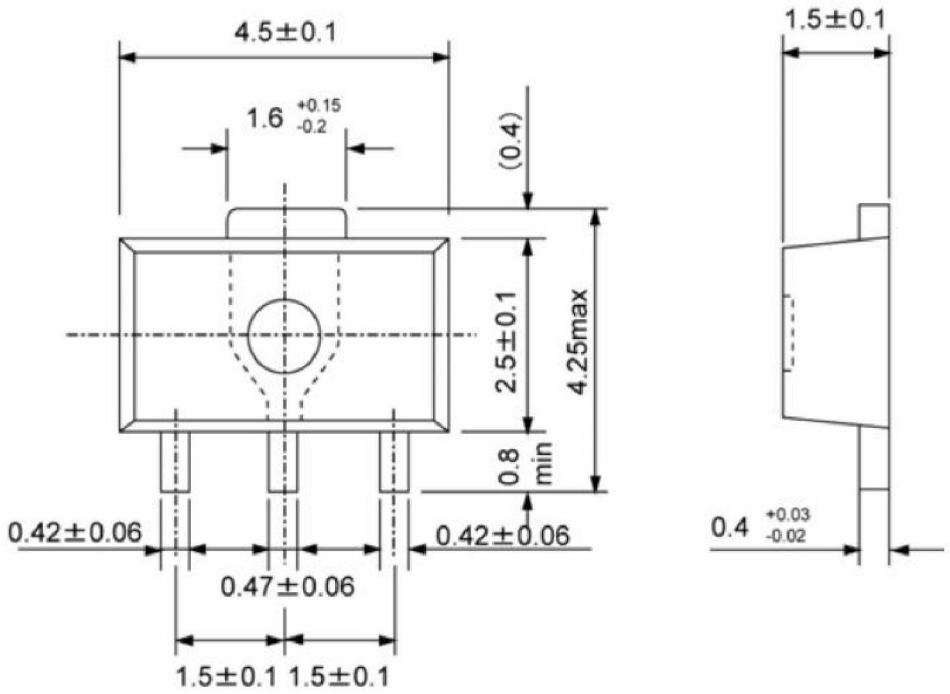
For use external transistor&chip enable

Components：

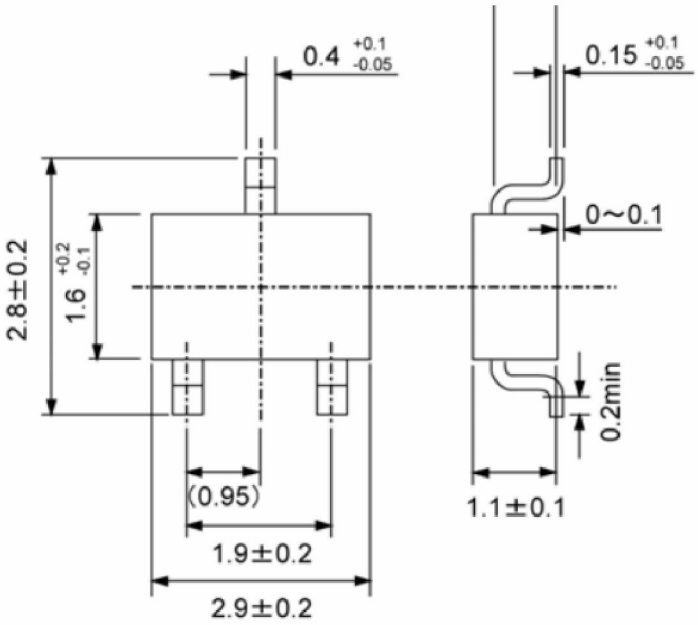
- Inductor：47uH(Sumida)
- Diode：IN5817、IN5819
- Capacitor：47uF/16V(Tantalum Capacitor)
- Transistor：2SD1628G、2SD3279
- NMOS：MEM2302、AAT9460、XP151、XP161

Packaging Information:

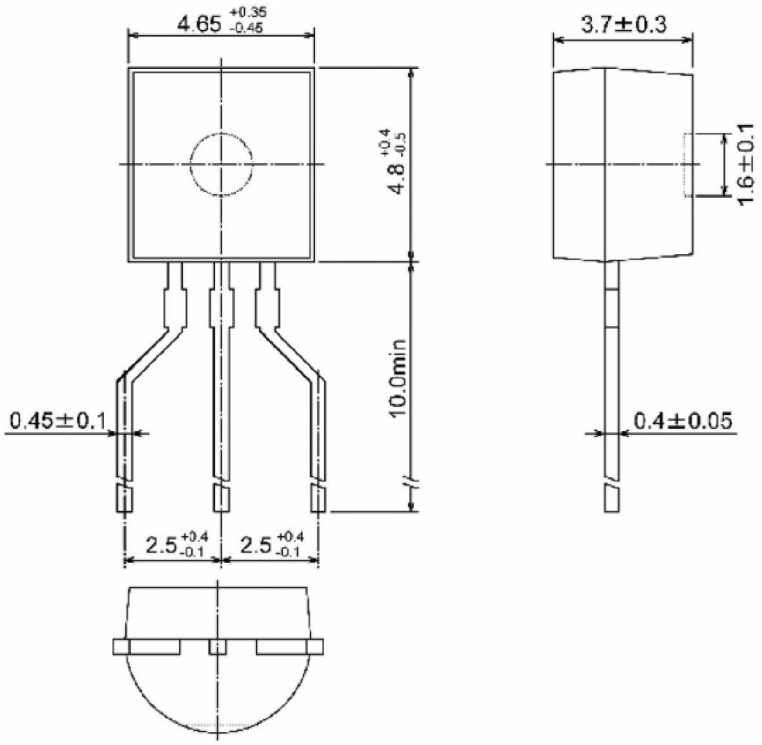
● SOT89-3



● SOT23-3



● TO-92


4.65 +0.35 -0.45
3.7±0.3
4.8 +0.4 -0.5
1.6±0.1
10.0min
0.45±0.1
0.4±0.05
2.5 +0.4 -0.1
2.5 +0.4 -0.1

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