

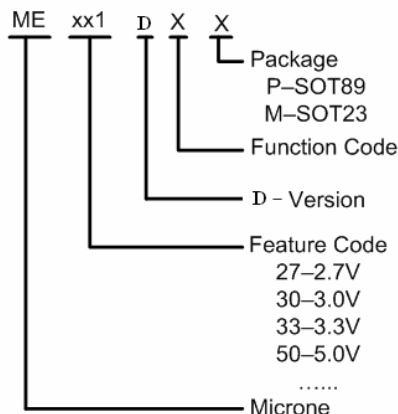
MEXX1D Series DC-DC Converter

MEXX1D Series is a VFM Step-up DC/DC converter IC with ultra-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. A low ripple, high efficiency step-up DC/DC converter for MEXX1D can be constructed of with only three external components. MEXX1D is suitable for use with battery-powered instruments with low noise and ultra low supply current; Ext function can use for large output circuit.

Features

- Ultra low ripple and noise;
- Operating voltage range: 0.9V~6.5V;
- Output voltage range: 2.0V~7.0V(step 0.1V);
- Output voltage accuracy: $\pm 2.5\%$;
- Output Current: if $V_{in}=3.0V$ and $V_{out}=5.0V$, then $I_{out}=250mA$;
- Low start voltage: $\leq 0.9V$ (at $I_{out}=1mA$);
- Maximum oscillator frequency: 180KHz(Typ.);
- High Efficiency: 85%(Type);
- PACKAGE: SOT23, SOT89.

Selection Guide

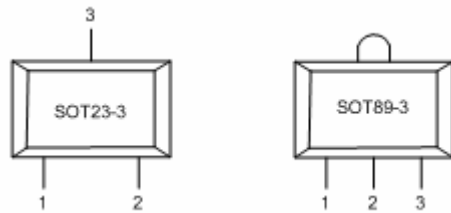


Applications

- 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.

TYPE	POSTFIX	PACKAGE	SWITCHING TRANSISTOR	FEATURES
ME501D	M3	SOT23-3	Build-in Transistor	Lx
	P	SOT89-3		
ME501D1	M3	SOT23-3	External Transistor	Ext
	P	SOT89-3		

Pin Configuration



Pin Assignment

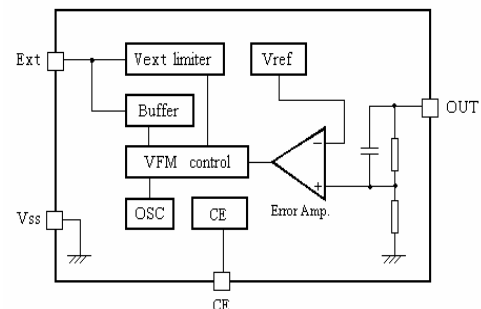
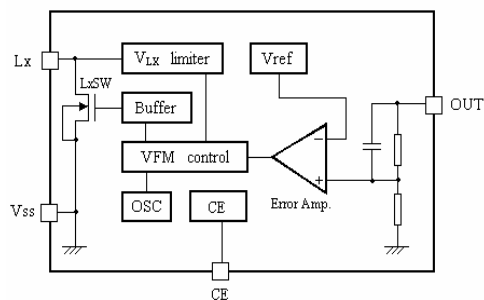
ME501D

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	Lx	Switch

ME501D 1

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

Block Diagram



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~ V_{out} +0.3	V
CE Pin voltage		V_{CE}	-0.3~ V_{out} +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	P_d	300	mW
	SOT89	P_d	500	mW
Operating Ambient Temperature		T_{opr}	-25~+85	°C
Storage Temperature		T_{stg}	-40~+125	°C
Soldering temperature and time		T_{solder}	260°C, 10s	

Electrical Characteristics

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{OUT}	Output Voltage		$V_{out} \times 0.975$	V_{out}	$V_{out} \times 1.025$	V
V_{start}	Oscillation Start-up Voltage	$I_{OUT}=1mA$, $V_{IN}: 0 \rightarrow 2V$		0.8	0.9	V
V_{hold}	Oscillation Hold Voltage	$I_{OUT}=1mA$, $V_{IN}: 2 \rightarrow 0V$	0.7			V
I_{DD1}	Supply Current 1	No external component $V_{out}=V_{out} \times 0.95$,		50		μA
I_{DD2}	Supply Current 2	$V_{out}=V_{out}+0.5V$		10		μA
I_{Lxleak}	Lx Leakage Current	$V_{out}=V_{LX}=6V$			0.5	μA
R_{EXTH}	EXT"High" On Resistance	Same as I_{DD1} . $V_{EXT}=V_{out}-0.4V$,		140	210	Ω
R_{EXTL}	EXT"Low" On Resistance	Same as I_{DD1} . $V_{EXT}=0.4V$,		140	210	Ω
F_{osc}	Oscillation Frequency			180		kHz
Maxdty	Duty Ratio	on(V_{LX} "L")side		84		%
EFFI	Efficiency			85		%

Measuring conditions: Unless otherwise specified , $V_{IN}=V_{out} \times 0.6$, $V_{SS}=0V$, $I_{OUT}=10mA$, $T_{opt}=25^{\circ}C$.

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

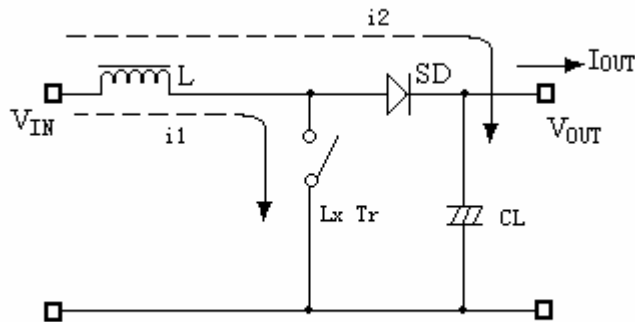
2、Inductor: 47 μH ($r < 0.5 \Omega$)

3、Capacitor: Tantalum type 47 μF

Operation

MEXX1D 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

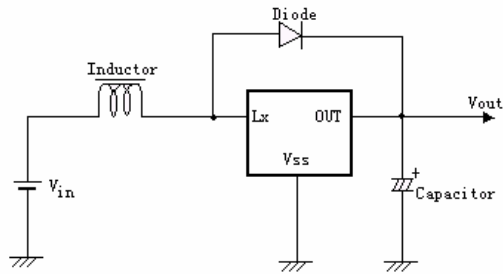
Peripheral components should be selected carefully because they are greatly affect the performances of MEXX1D:

- Use capacitor with a capacity of 10 μ F 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.

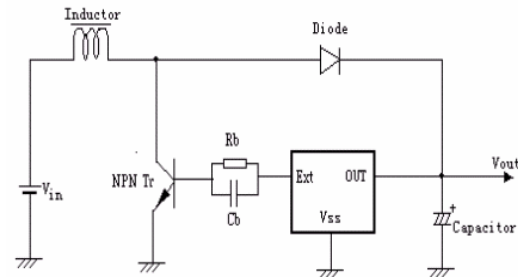
Notes:

- 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 V_{OUT} Pin, make minimum connection with the capacitor. A 0.1 μ F ceramic capacitor is suggested to be parallely connected to V_{OUT} Pin and V_{SS} Pin.
- Make V_{SS} pin sufficient grounding, otherwise, the zero level within IC will varied with the switching current. This may result in unstable operation of IC.

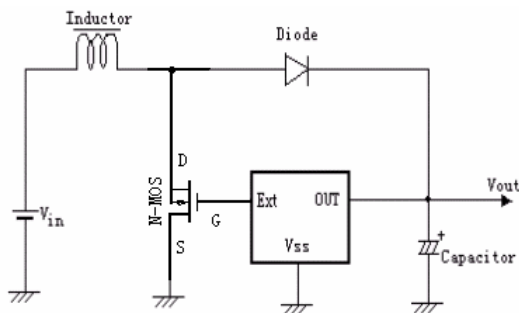
Typical Applications



For use Build_in Transistor



For use External Transistor

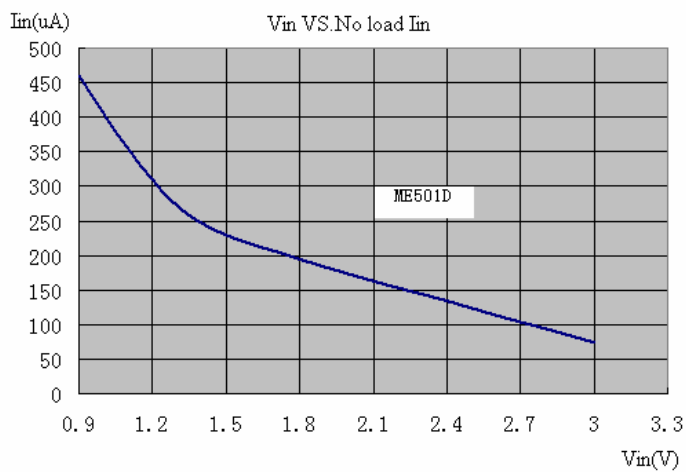
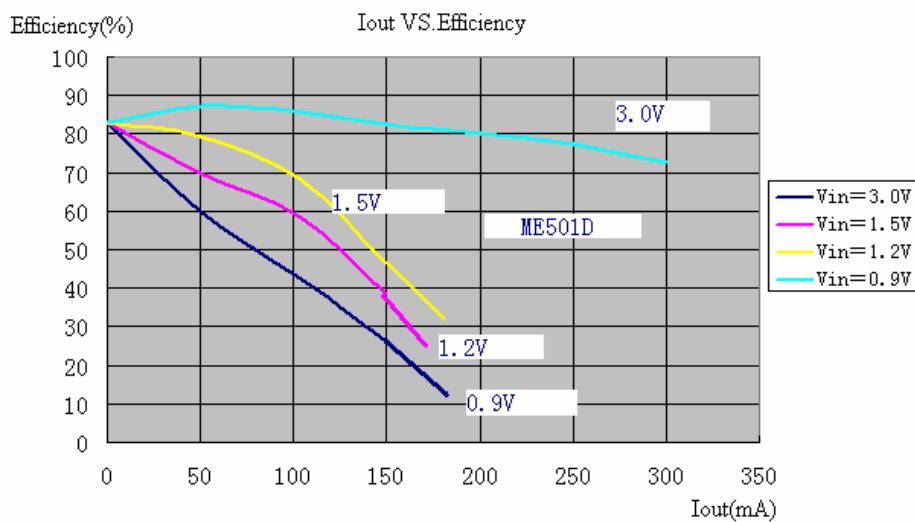
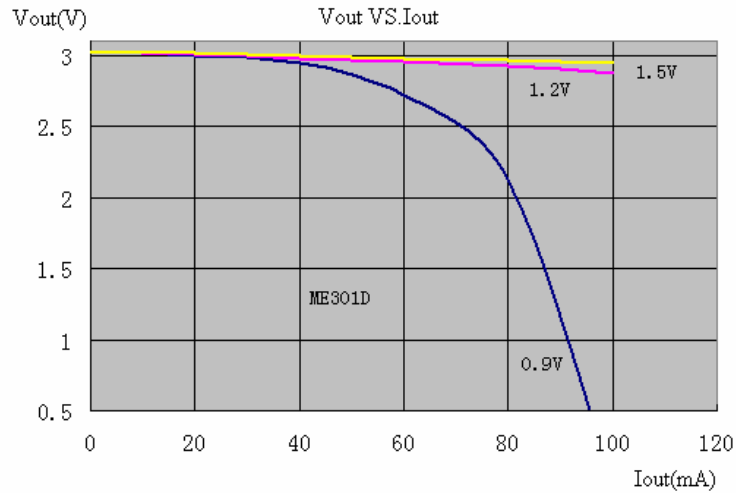


For use external transistor(N_MOS)

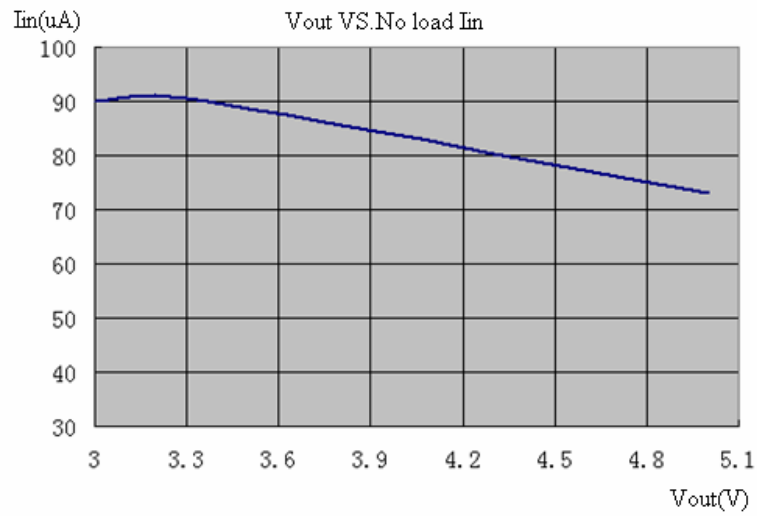
Components: Inductor: 47uH(Sumida)
Capacitor: 47uF/16V(Tantalume type)
NMOS: AAT9460、XP151、XP161
Base Capacitor(Cb): 2200pF

Diode: IN5817、IN5819
Transistor: 2SD1628G、2SD3279
Base Resistor(Rb): 1K Ω

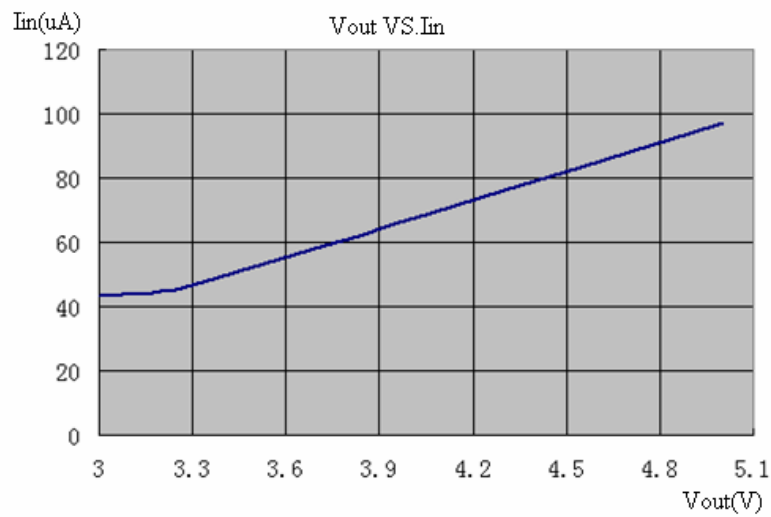
Type Characteristics:



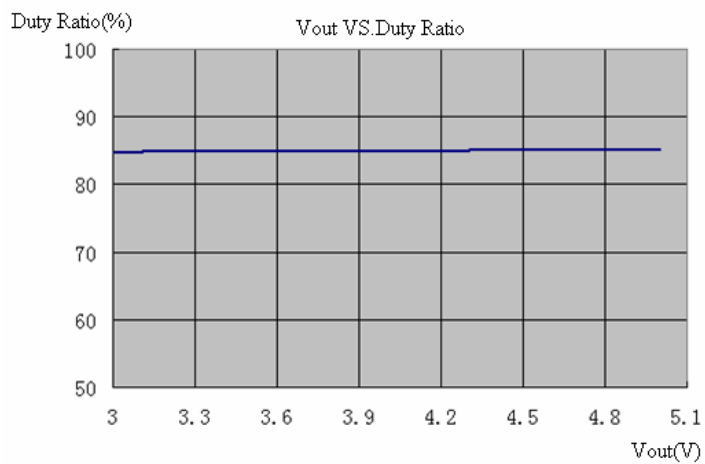
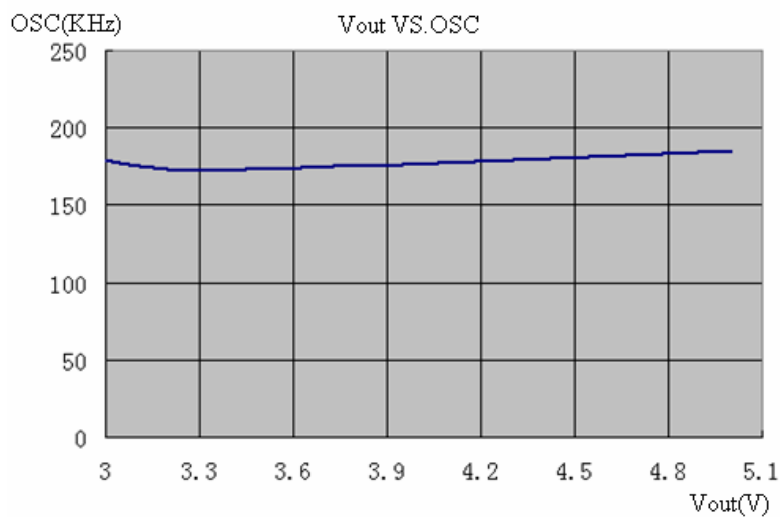
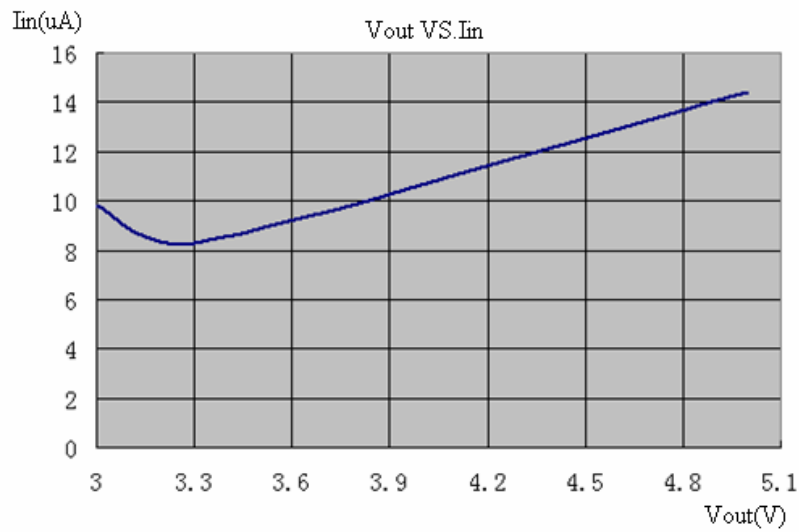
$L=47\mu\text{H}$, $C_{\text{out}}=47\mu\text{F}$, SD: 1N5717/5819, $V_{\text{IN}}=V_{\text{OUT}}*0.6$



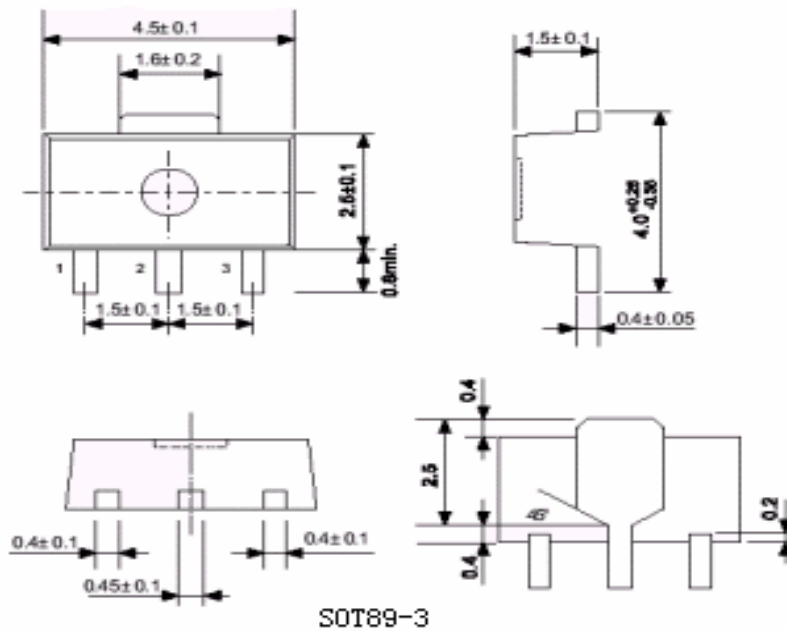
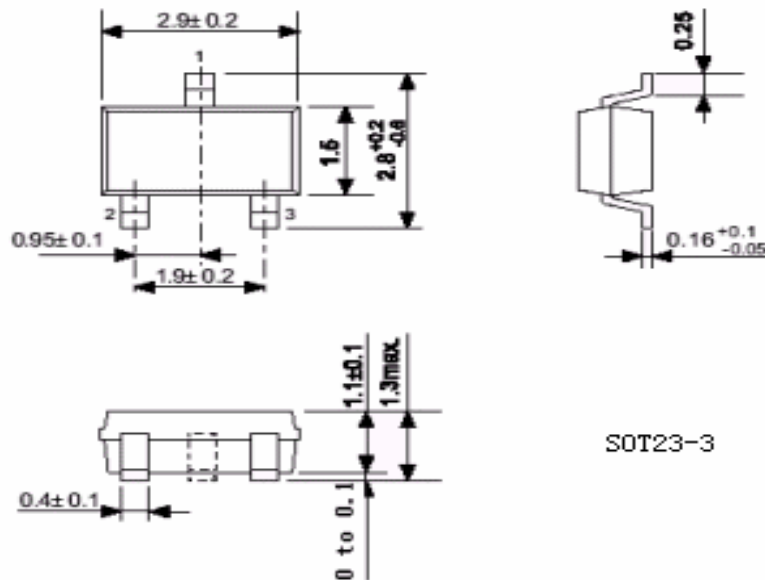
$V_{\text{DD}}=V_{\text{OUT}}*0.95$



$$V_{DD}=V_{OUT}+0.5$$



Package Dimensions



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