



# Step-up DC/DC converter

## General Description

The ML9266 is a small, high efficiency, and low voltage step-up DC/DC converter with an Adaptive Current Mode PWM control loop, includes an error amplifier, ramp generator, comparator, switch pass element and driver in which providing a stable and high efficient operation over a wide range of load currents. It operates in stable waveforms without external compensation.

The low start-up input voltage below 1V makes ML9266 suitable for 1 to 4 battery cells applications of providing up to 300mA output current. The 450KHz high switching rate minimized the size of external components. Besides, the 17µA low quiescent current together with high efficiency maintains long battery lifetime.

The ML9266 is available in small package SOT-26 and SOT89-5

## Features

- ◆ 90% Efficiency
- ◆ High Supply Capability to Deliver 3.3V 100mA with 1 Alkaline cell
- ◆ 17µA Quiescent (switch-off) Supply Current
- ◆ 450KHz Fixed Switching Frequency
- ◆ Zero Shutdown Mode Supply Current
- ◆ Providing Flexibility for Using Internal and External Power Switches
- ◆ 1.0V Low Start-up Input Voltage
- ◆ Small SOT-26 & SOT89-5 Package

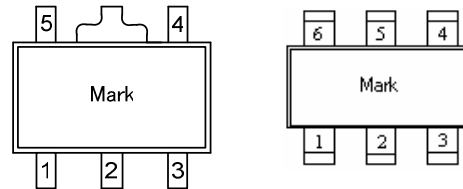
## Ordering Information

Item	Package	Shipping
ML9266MRG	SOT-26	3000pcs/Reel&Tape
ML9266PRG	SOT-89-5	1000pcs/Reel&Tape

## Applications

- ◆ LCD Panel
- ◆ DSC
- ◆ MP3
- ◆ Wireless Equipment
- ◆ Portable Instrument
- ◆ PDA

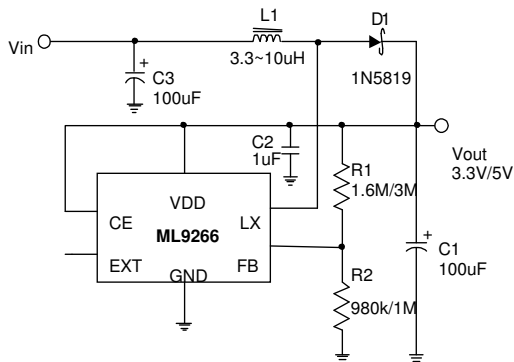
## Package Information



SOT89-5

SOT-23-6

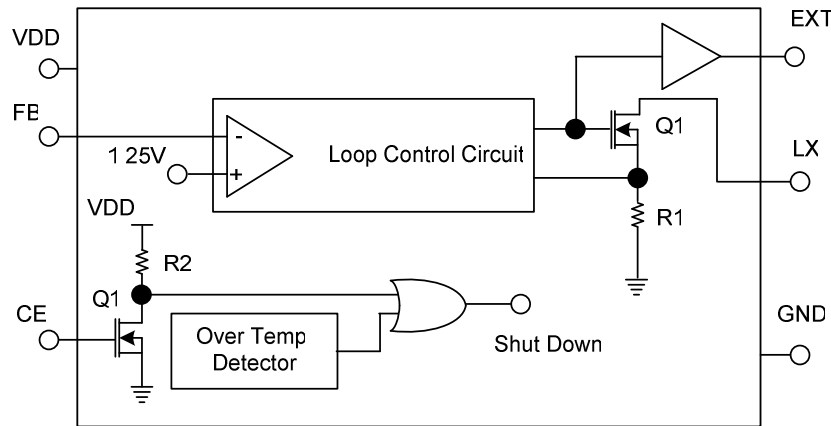
## Typical Application Circuit



## Pin Configurations

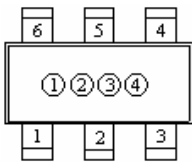
SOT-26	SOT-89-5	Pin Name	Pin Function
1	1	CE	Chip enable
2		EXT	Output
3	5	GND	Ground
4	4	LX	Switching
5	2	VDD	Input
6	3	FB	Feedback input 1.25V

### ■ Function Block Diagram

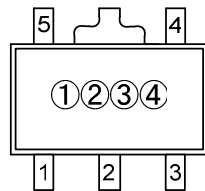


### ■ Marking Information

	Symbol	Description
① ②	E1	Product Code
③ ④	XX	XX = (00-ZZ) is the code to indicate wafer lot and production date

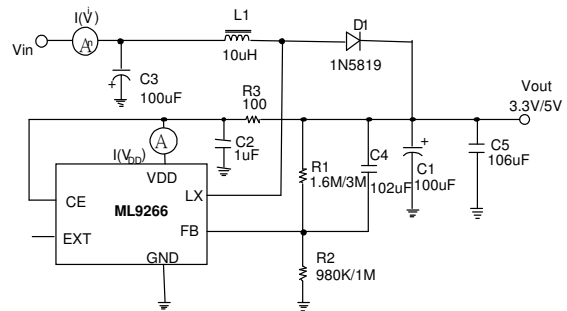


SOT-26



SOT-89-5

### ■ Test Circuit





■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Ratings	Unit	
Supply Voltage	V <sub>in</sub>	- 0.3V ~ 7V	V	
LX Pin Switch Voltage	V <sub>LX</sub>	- 0.3 ~ (VDD + 0.8V)	V	
Other I/O Pin Voltages	V <sub>ss</sub>	- 0.3V ~ (VDD + 0.3V)	V	
Lx Pin Switch Current	I <sub>LX</sub>	2.5	A	
EXT Pin Driver Current	I <sub>EXT</sub>	200	mA	
Package Thermal Resistance	SOT-26	Pd	145	°C/W
	SOT-89-5		45	°C/W
Operating Junction Temperature	T <sub>j</sub>	125	°C	
Storage Temperature Range	T <sub>stg</sub>	- 65 ~ +150	°C	

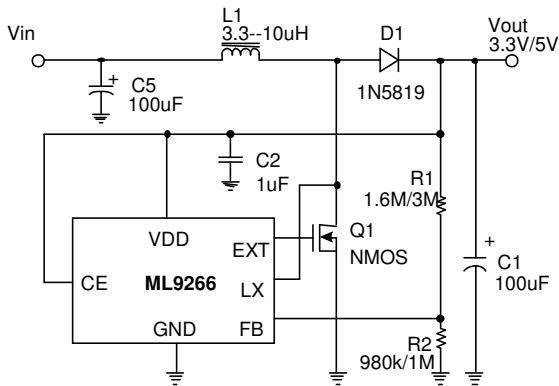
■ Electrical Characteristics (V<sub>in</sub> =1.5V, VDD=3.3V, I=0, Ta = 25°C, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Start-UP Voltage	V <sub>ST</sub>	I <sub>L</sub> = 1mA	--	0.98	1.05	V
Operating VDD Range	V <sub>DD</sub>	VDD pin voltage	2	--	6.5	V
No Load Current I (V <sub>IN</sub> )	I <sub>NO LOAD</sub>	V <sub>IN</sub> = 1.5V, V <sub>OUT</sub> = 3.3V	--	75	--	μA
Switch-off Current I (VDD)	I <sub>SWITCH OFF</sub>	V <sub>IN</sub> = 6V	--	17	--	μA
Shutdown Current I (V <sub>IN</sub> )	I <sub>OFF</sub>	CE Pin = 0V, V <sub>IN</sub> = 4.5V	--	0.01	1	μA
Feedback Reference Voltage	V <sub>REF</sub>	Close Loop, VDD = 3.3V	1.225	1.25	1.275	V
Switching Frequency	F <sub>S</sub>	VDD = 3.3V	--	450	--	KHz
Maximum Duty	D <sub>MAX</sub>	VDD = 3.3V	--	95	--	%
LX ON Resistance		VDD = 3.3V	--	0.3	--	Ω
Current Limit Setting	I <sub>LIMIT</sub>	VDD = 3.3V	--	2	--	A
EXT ON Resistance to VDD		VDD = 3.3V	--	5	--	Ω
EXT ON Resistance to GND		VDD = 3.3V	--	5	--	Ω
Line Regulation	ΔV <sub>LINE</sub>	V <sub>IN</sub> = 1.5 ~ 2.5V, I <sub>L</sub> = 1mA	--	10	--	mV/V
Load Regulation	ΔV <sub>LOAD</sub>	V <sub>IN</sub> = 2.5V, I <sub>L</sub> = 1 ~ 100mA	--	0.25	--	mV/mA
CE Pin Trip Level		VDD = 3.3V	0.4	0.8	1.2	V
Temperature Stability for Vout	T <sub>S</sub>		--	50	--	ppm/°C
Thermal Shutdown	T <sub>SD</sub>		--	165	--	°C
Thermal Shutdown Hysterises	ΔT <sub>SD</sub>		--	10	--	°C

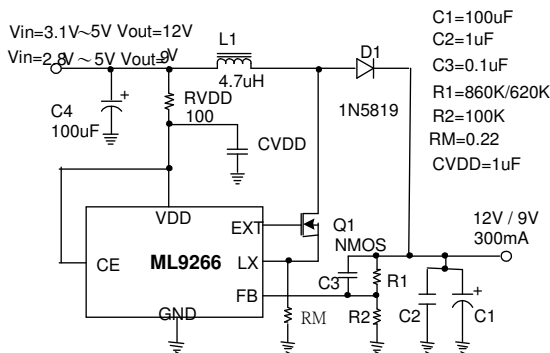
\* Note: The CE pin shall be tied to VDD pin and inhibit to act the ON/OFF state whenever the VDD pin voltage may reach to 5.5V or above.

■ **Applications**

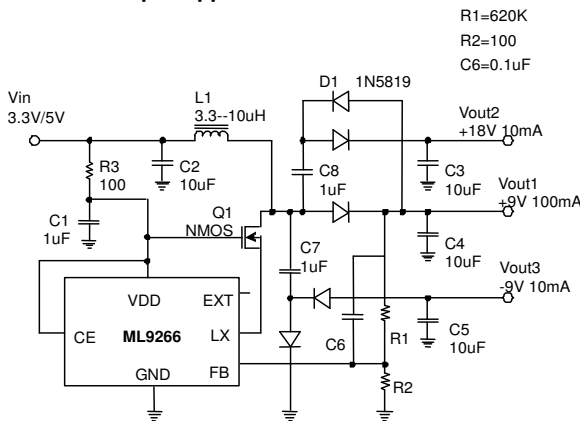
● **High Current Application**



● **High Voltage Application**



● **Multi-Output Applications**



■ **Application Note**

● **Output Voltage Setting**

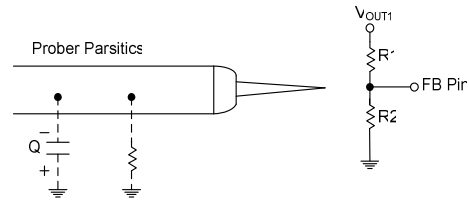
Referring to application circuits, the output voltage of the switching regulator ( $V_{OUT}$ ) can be set

$$V_{OUT1} = \left(1 + \frac{R1}{R2}\right) \times 1.25V \quad \dots A$$

● **Feedback Loop Design**

Referring to application circuits, The selection of R1 and R2 based on the trade-off between quiescent current consumption and interference immunity is stated below:

- ◆ Follow Equation A
- ◆ Higher R reduces the quiescent current (Path current =  $1.25V/R2$ ), however resistors beyond  $5M\Omega$  are not recommended.
- ◆ Lower R gives better noise immunity, and is less sensitive to interference, layout parasitics, FB node leakage, and improper probing to FB pins.



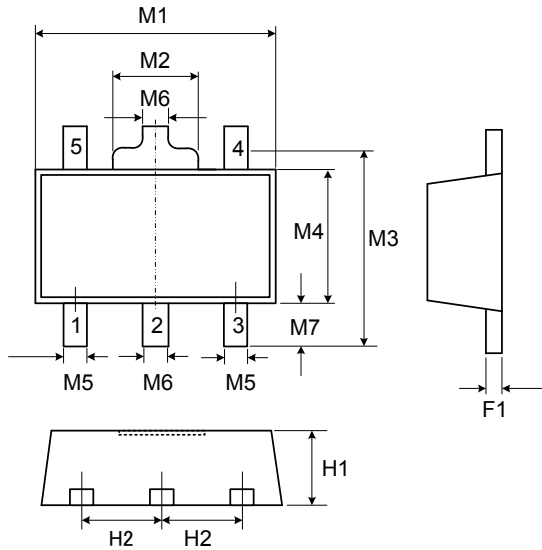
- ◆ A proper value of feed forward capacitor parallel with R1 can improve the noise immunity of the feedback loops, especially in an improper layout. An empirical suggestion is around  $0\sim 33pF$  for feedback resistors of  $M\Omega$ , and  $10nF\sim 0.1\mu F$  for feedback resistors of tens to hundreds  $K\Omega$ .

For applications without standby or suspend modes, lower values of R1 and R2 are preferred. For applications concerning the current consumption in standby or suspend modes, the higher values of R1 and R2 are feedback needed. Such "high impedance loops" are sensitive to any interference, which require careful layout and avoid any interference, e.g. probing to FB pin.



■ Package Dimensions

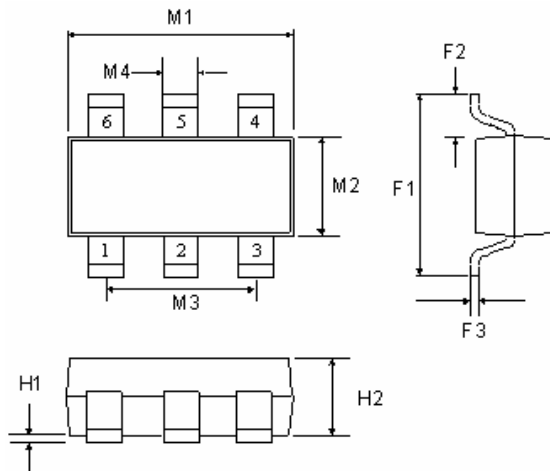
● SOT-89-5



Units: mm

Symbol	Min	Max
A	1.400	1.600
b	0.360	0.520
B	2.400	2.600
b1	0.406	0.533
C	--	4.250
C1	0.800	--
D	4.400	4.600
D1	--	1.700
e	1.400	1.600
H	0.380	0.430

● SOT-26



Units: mm

Symbol	Min	Max
A	0.889	1.295
A1	--	0.152
B	1.397	1.803
b	0.356	0.559
C	2.591	2.997
D	2.692	3.099
e	0.838	1.041
H	0.102	0.254
L	0.356	0.610

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