

Adjustable High Output Voltage High Efficiency Step-Up DC/DC Converter

■ **INTRODUCTION**

The HG1208 is a CMOS step-up switching DC/DC converter, which allows the duty ratio to be automatically switched according to the load (light load: 50%, high output current: 75%), enabling products with a low ripple over a wide range, high efficiency, and high output current. With the HG1208, a step-up switching DC/DC converter can be configured by using an external coil, capacitor, diode and NMOS. This feature, along with the mini package and low current consumption, makes the HG1208 ideal for applications such as the power supply unit of portable equipment.

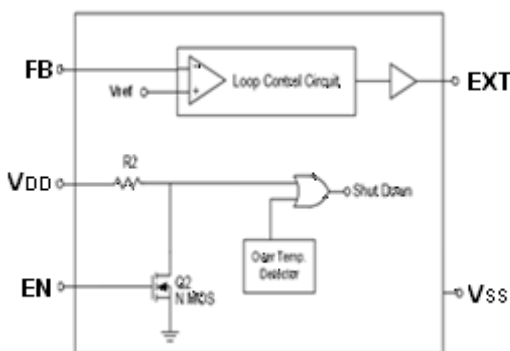
■ **FEATURES**

- Low voltage operation: Oscillation start voltage at 0.8V
- Duty ratio: 50/75%, built-in auto switching
- External parts: Coil, capacitor, diode, NMOS
- High efficiency: 85% (typ.)
- Output voltage Adjustable
- Providing Flexibility for Using External Power Switches
- Zero Shutdown Mode Supply Current
- 6 μ A Quiescent (Switch-off) Supply Current
- Small SOT-23-5, SOT-89-5 Package

■ **APPLICATIONS**

- PDA
- LCD Panel
- Portable Instrument
- DSC
- RF-Tags
- Wireless Equipment

■ **BLOCK DIAGRAM**

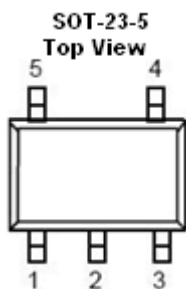


■ **ODERING INFORMATION**

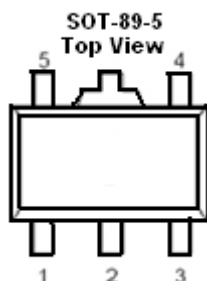
HG1208①②③④⑤

DESIGNATOR	SYMBOL	DESCRIPTION
①	A	Output Voltage Adj, EXT
	B	Output Voltage Adj, EXT, EN
②③④	Integer	FB, Voltage
		EXP: $V_{FB}=1.25V$, Number125
		EXP: $V_{FB}=3.3V$, Number nothing
⑤	M	Package: SOT-23-5
	P	Package: SOT-89-5

PIN CONFIGURATION



PIN NUMBER (SOT-23-5)		PIN NAME	FUNCTION
HG1208A	HG1208B		
1	1	FB	Feedback Input Pin
2	2	V _{DD}	IC power supply pin
-	3	EN	Chip Enable (Active High)
3	-	NC	No Connection
4	4	V _{SS}	Ground
5	5	EXT	External transistor connection pin



PIN NUMBER (SOT-89-5)		PIN NAME	FUNCTION
HG1208A	HG1208B		
-	1	EN	Chip Enable (Active High)
1	-	NC	No Connection
2	2	V _{DD}	IC power supply pin
3	3	FB	Feedback Input Pin
4	4	EXT	External transistor connection pin
5	5	V _{SS}	Ground

ABSOLUTE MAXIMUM RATINGS

(Unless otherwise specified, Ta=25°C)

PARAMETER		SYMBOL	RATINGS	UNITS
V _{DD} pin voltage		V _{DD}	V _{SS} -0.3 ~ V _{SS} +8	V
EN pin voltage		EN	V _{SS} -0.3 ~ V _{SS} +8	V
Power dissipation	SOT-23-5	PD	250	mW
	SOT-89-5		500	mW
Operating temperature		T _{opr}	-40 ~+85	°C
Storage temperature		T _{stg}	-40 ~+125	°C
Soldering Temperature & Time		T _{solder}	260°C, 10s	

■ ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, $T_a = 25^\circ\text{C}$)

PARAMETER	SYMBOL	CONDITONS	MIN	TYP	MAX	UNITS
Feedback Voltage	V_{FB}	—	$V_{FB(s)} \times 0.98$	V_{FB}	$V_{FB(s)} \times 1.02$	V
Input voltage	V_{IN}	—	—	—	6	V
Oscillation start voltage	V_{ST}	No external parts, voltage applied to V_{OUT} LX pulled up to V_{OUT} via 300Ω resistor			0.8	V
Current consumption 1	I_{SS1}	$V_{DD}=5V$, $FB=V_{SS}$, Continuously Switching	—	30	60	μA
Current consumption 2	I_{SS2}	$V_{DD}=5V$, $FB=V_{DD}$, No Switching	—	6	10	μA
Shutdown Current	I_{SSS}	$V_{DD}=5V$, $V_{EN}=0V$	—	—	1.0	μA
Line regulation	ΔV_{OUT1}	$V_{IN}=0.4 \times V_{OUT} \sim 0.6 \times V_{OUT}$ ($V_{OUT}=5V$)	—	20	50	mV
Load regulation	ΔV_{OUT2}	$I_{OUT}=10\mu A \sim 50mA$ ($V_{OUT}=5V$)	—	20	50	mV
Oscillation frequency	f_{OSC}			100		KHz
Duty ratio 1	Duty1	$V_{OUT}=0.95 \times V_{OUT}$, measure waveform at LX pin	70	75	85	%
Duty ratio 2	Duty2	Measure waveform at LX pin with light load	—	50	—	%
Efficiency	EFF1			85		%
Shutdown pin input voltage	V_{SH}	$V_{OUT}=0.95 \times V_{OUT}$, judge oscillation at EXT pin	0.75	—	—	V
	V_{SL1}	$V_{OUT}=0.95 \times V_{OUT}$, judge stop at EXT pin	—	—	0.3	V
Shutdown pin input current	I_{SH}	$V_{EN}=8V$	—	—	0.1	μA
	I_{SL}	$V_{EN}=0V$	—	—	0.1	μA

Remark: 1、 $V_{IN}=V_{OUT(s)} \times 0.6$ applied, $I_{OUT}=V_{OUT(s)} / 250\Omega$

2、Shutdown function built-in type: EN pin is connected to V_{OUT}

3、 $V_{OUT(s)}$ specified above is the set output voltage value, and V_{OUT} is the typical value of the actual output voltage.

■ STANDARD CIRCUITS

Component: Inductor: 22uH(Sumida)

Diode: IN5817、IN5819

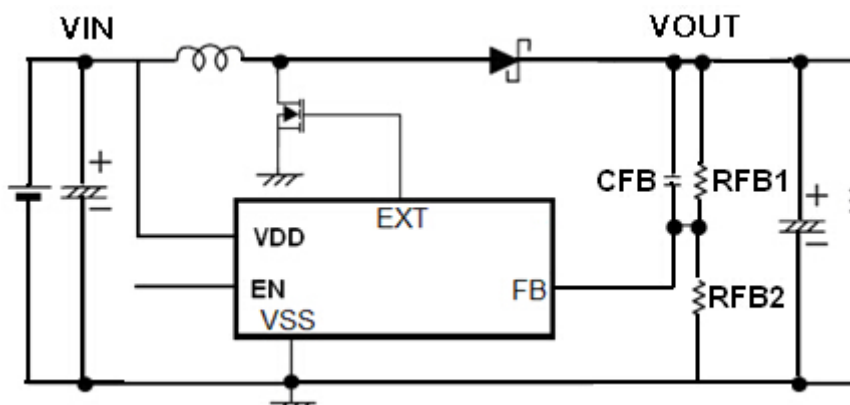
Capacitor: 47uF (Tantalum type)

MOS: CE2312、XP151、XP161

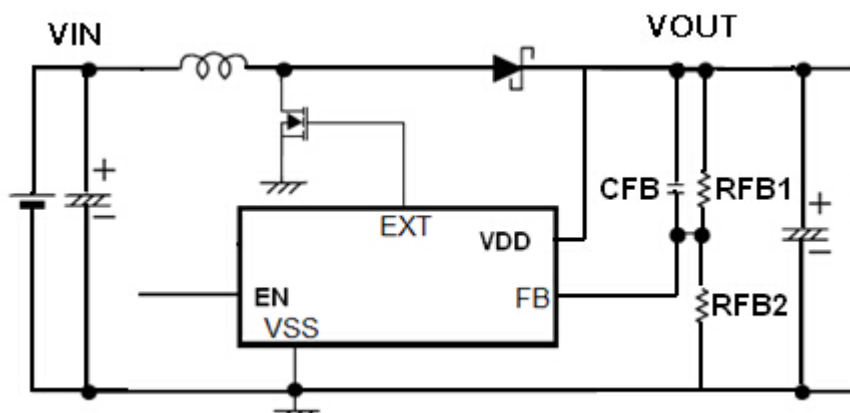
R_{FB} : Set up so that $R_{FB1}/R_{FB2} = (V_{OUT} - V_{FB}) / V_{FB}$ (V_{OUT} =set-up output voltage) ,
Please use with $R_{FB1} + R_{FB2} \leq 2M \Omega$

C_{FB} : Set up that $F_{zfb} = 1/(2 \times \pi \times C_{FB} \times R_{FB1})$ is within the Adjustments necessary
in respect of L, C_L .

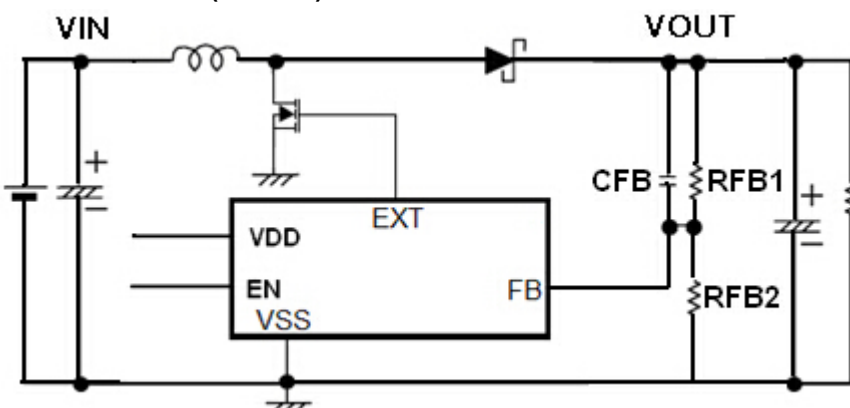
1、HG1208 Circuits 1: ($3V \leq V_{IN} \leq 8V$)



2、HG1208 Circuits 2: ($V_{IN} \leq 3V$)



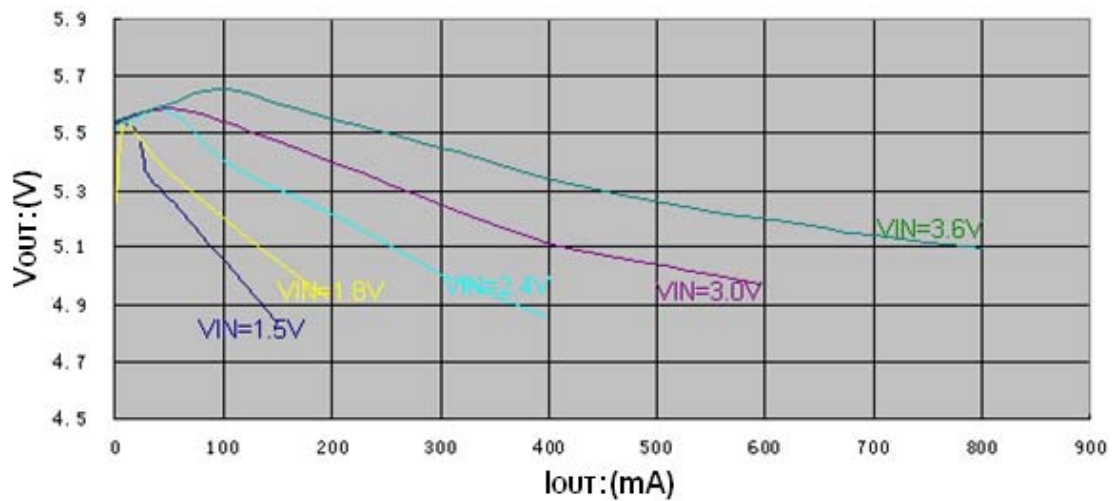
3、HG1208 Circuits 3: ($V_{IN} \geq 8V$)



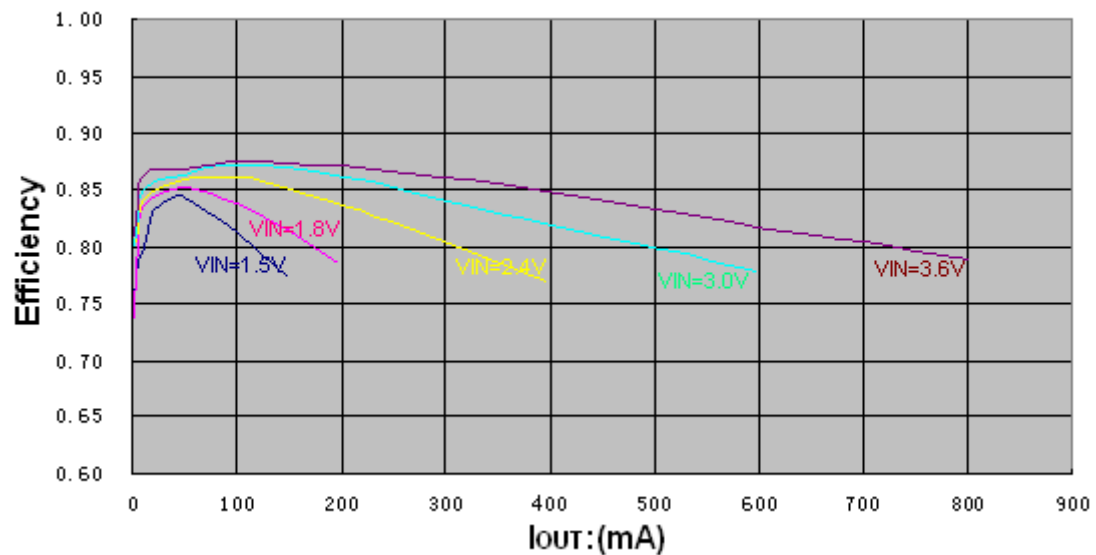
NOTE: Pin VDD can be connected to some other power supply (3V~8V)

■ TYPICAL PERFORMANCE CHARACTERISTICS

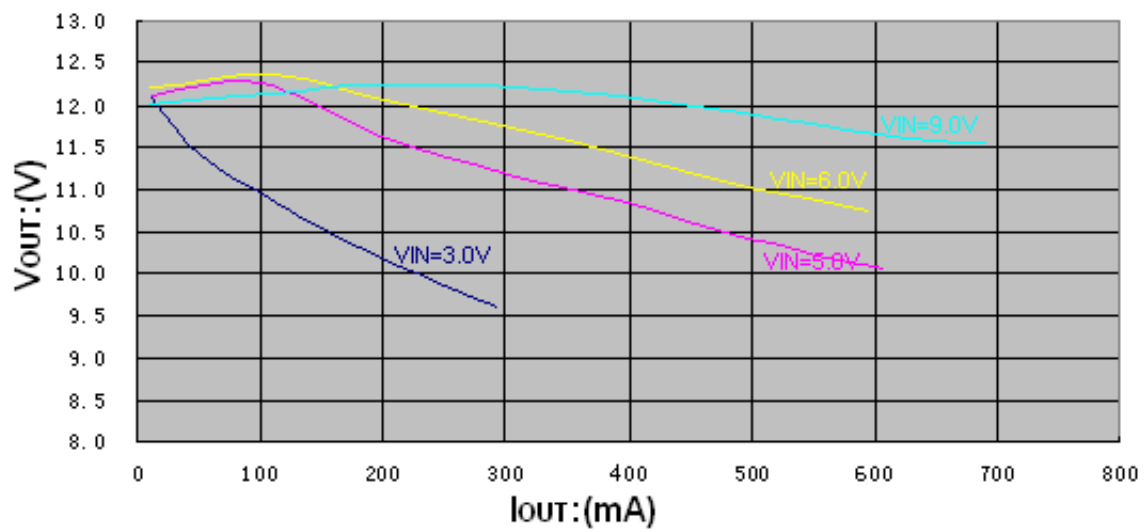
1. V_{OUT} vs. I_{OUT} : ($V_{OUT}=5.5V$)



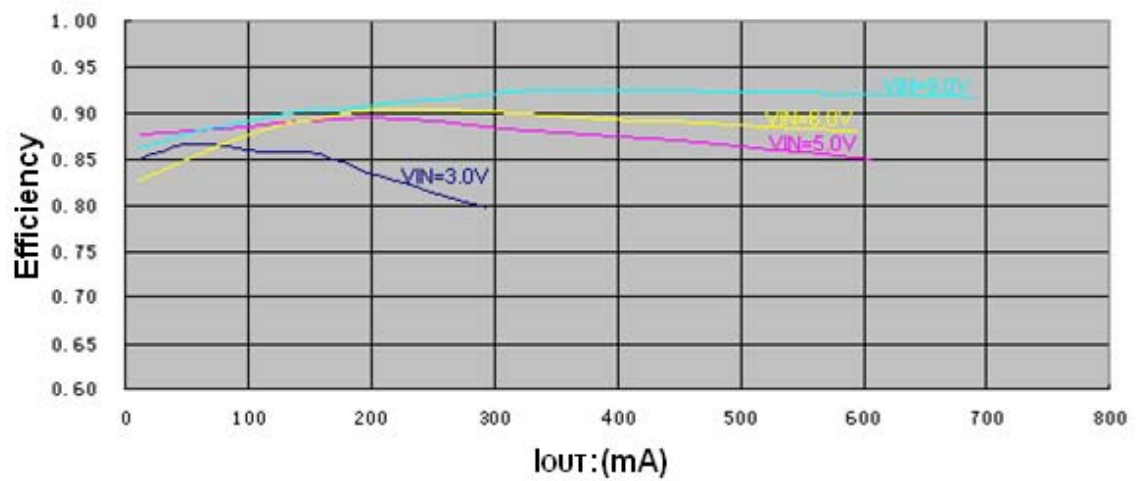
2. Efficiency vs. I_{OUT} : ($V_{OUT}=5.5V$)



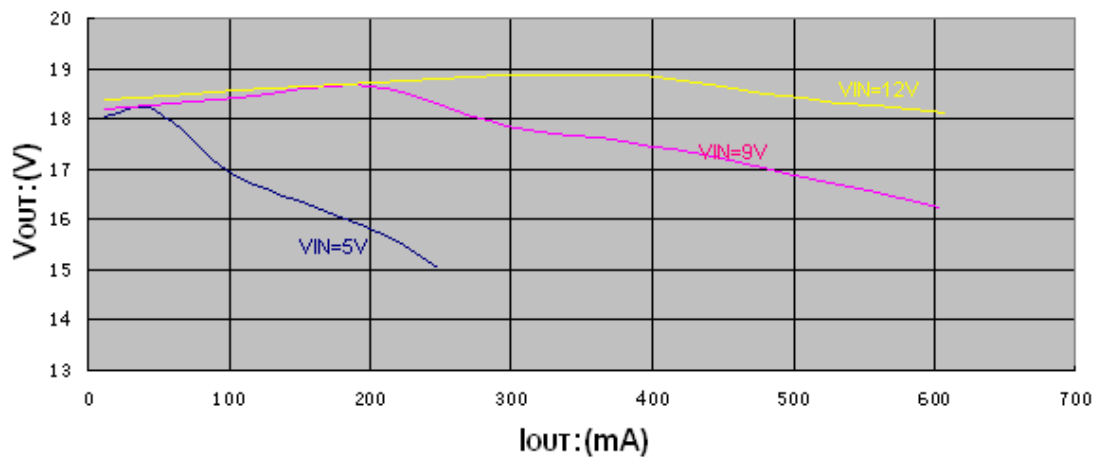
3. V_{OUT} vs. I_{OUT} : ($V_{OUT}=12V$)



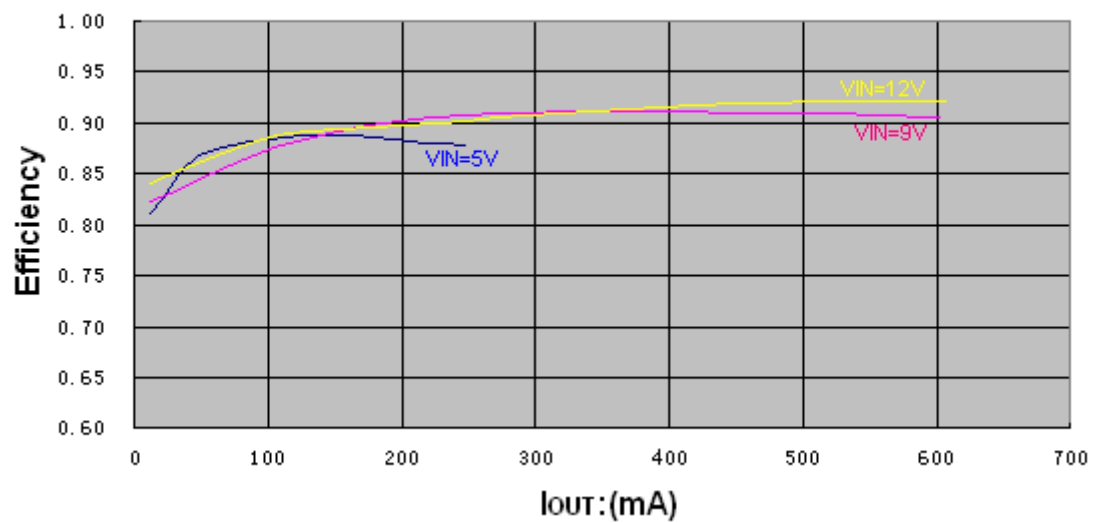
4. Efficiency vs. I_{OUT} : ($V_{OUT}=12V$)



5. V_{OUT} vs. I_{OUT} : ($V_{OUT}=18V$)

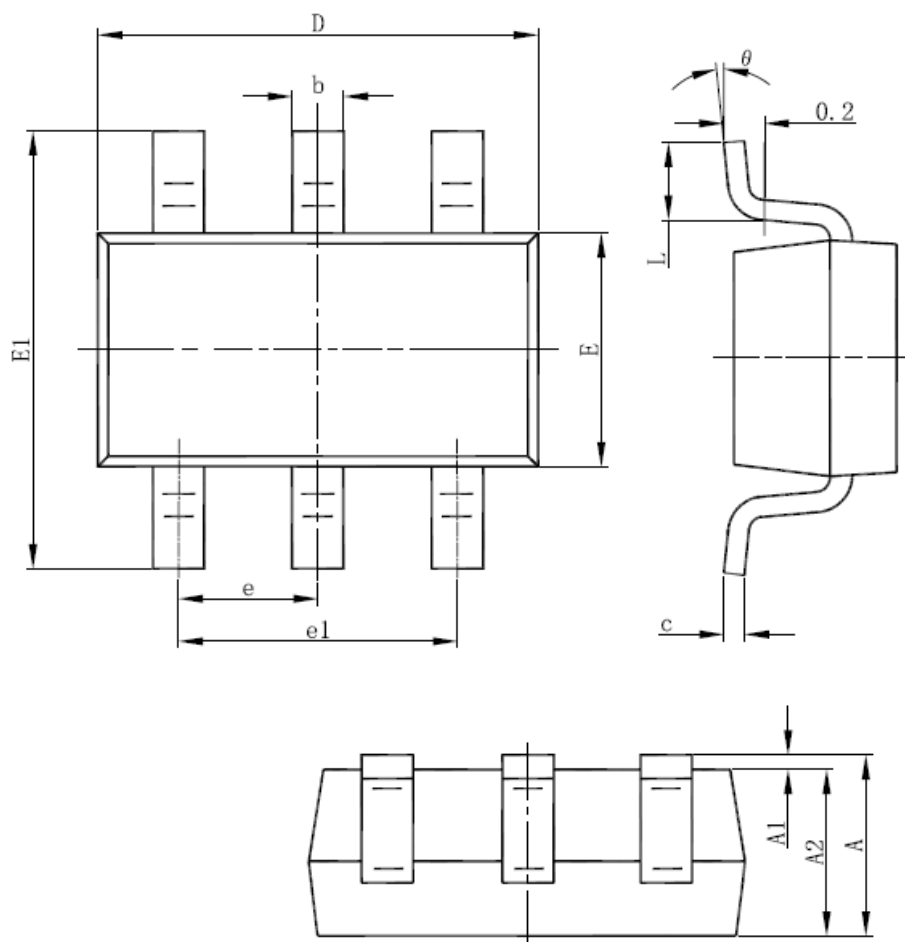


6. Efficiency vs. I_{OUT} : ($V_{OUT}=18V$)



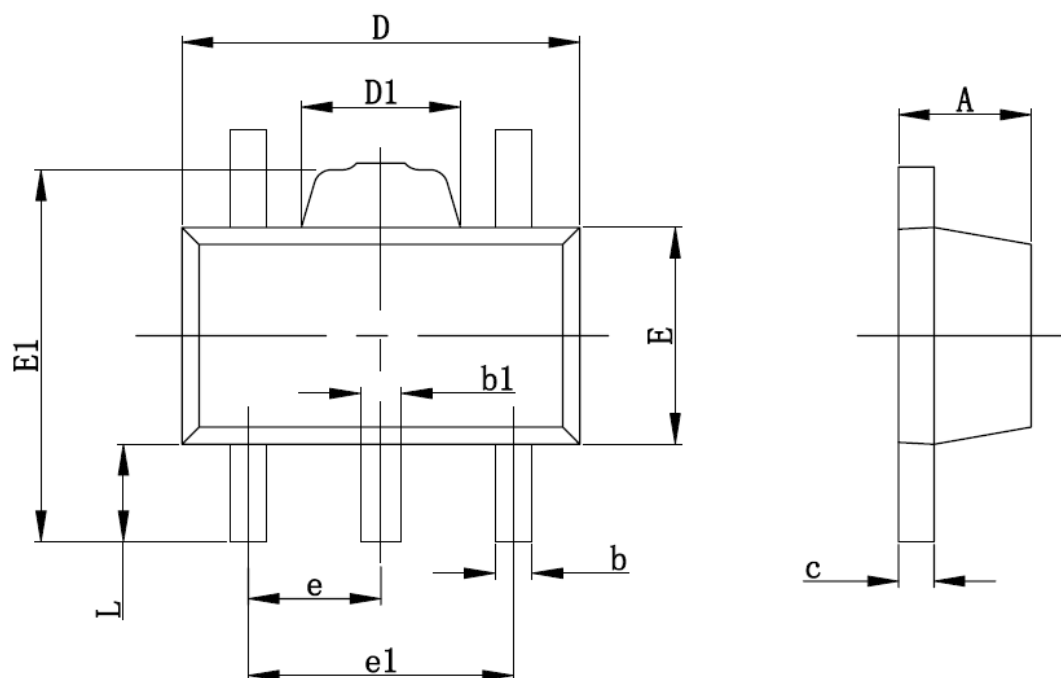
■ Package information

• SOT-23-5



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°

• SOT-89-5



Symbol	Dimensions in Millimeters		
	Min	TYP	Max
A	1.40	1.50	1.60
b	0.36	0.42	0.48
b1	0.41	0.47	0.53
b2	1.40	1.60	1.75
C	0.38	0.40	0.43
D	4.40	4.50	4.60
E	—	—	4.25
E1	2.40	2.50	2.60
e	1.40	1.50	1.60
L	0.80	—	—