

FEATURES

- 8V to 30V operating input range
- 1200mA output current
- Up to 92% efficiency
- High efficiency (>80%) at light load
- Internal Soft-Start
- 400kHz switching frequency
- CC/CV control mode
- Input under voltage lockout
- Input over voltage lockout
- Start-up current run-away protection
- Short circuit protection
- Thermal protection
- 4000V ESD

DESCRIPTION

The HM1593 is a CC/CV control mode monolithic buck switching regulator. Operating with an input range of 8-30V, the HM1593 delivers 1200mA of continuous output current. It adopts NMOS for the main switch and PMOS for the synchronous switch. The internal synchronous power switches provide high efficiency without the use of an external Schottky diode. At light loads, regulators operate in low frequency to maintain high efficiency and low output ripple. Current mode control provides tight load transient response and cycle-by-cycle current limit.

The HM1593 guarantees robustness with short-circuit protection, thermal protection, start-up current run-away protection, and input under/over voltage lockout.

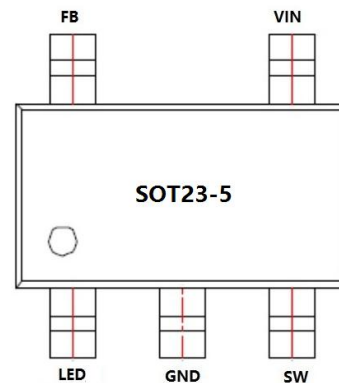
The HM1593 is available in 5-pin SOT23-5, 8-pin SOP8, 8-pin HDIP8, 8-pin DIP8 package, which provides a compact solution with minimal external components.

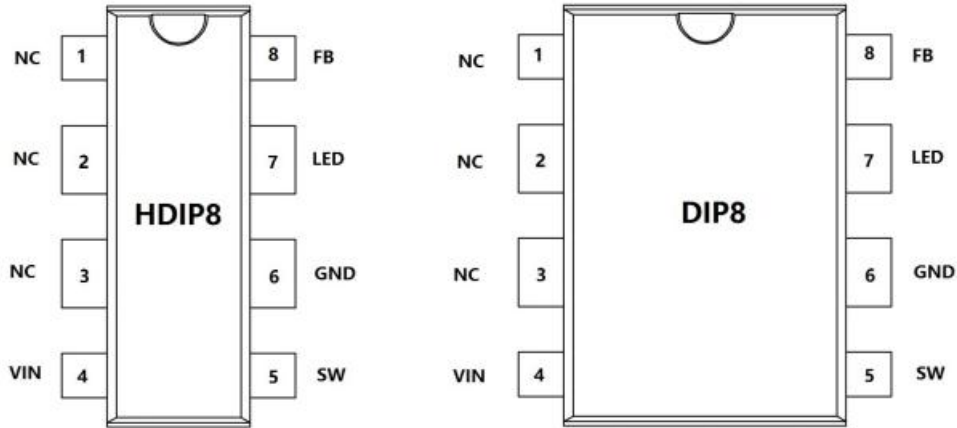
APPLICATIONS

- Distributed Power Systems
- Automotive Systems
- High Voltage Power Conversion
- Industrial Power Systems
- Battery Powered Systems

PIN CONFIGURATION

TOP VIEW

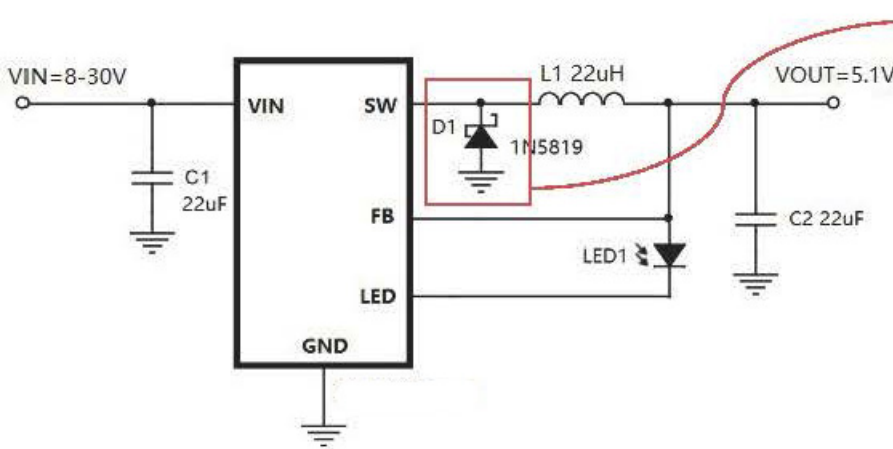




ORDER INFORMATION

PART MARKING	OUTPUT VOLTAGE	PACKAGE DESCRIPTION	TEMPERATURE RANGE
HM1593MR	5.1V	SOT23-5	-40°C to +85°C
HM1593S	5.1V	SOP8	-40°C to +85°C
HM1593H	5.1V	HDIP8	-40°C to +85°C
HM1593D	5.1V	DIP8	-40°C to +85°C
HM1593MR-56	5.6V	SOT23-5	-40°C to +85°C
HM1593S-56	5.6V	SOP8	-40°C to +85°C
HM1593H-56	5.6V	HDIP8	-40°C to +85°C
HM1593D-56	5.6V	DIP8	-40°C to +85°C
HM1593MR-A	ADJ	SOT23-5	-40°C to +85°C
HM1593S-A	ADJ	SOP8	-40°C to +85°C
HM1593H-A	ADJ	HDIP8	-40°C to +85°C
HM1593D-A	ADJ	DIP8	-40°C to +85°C

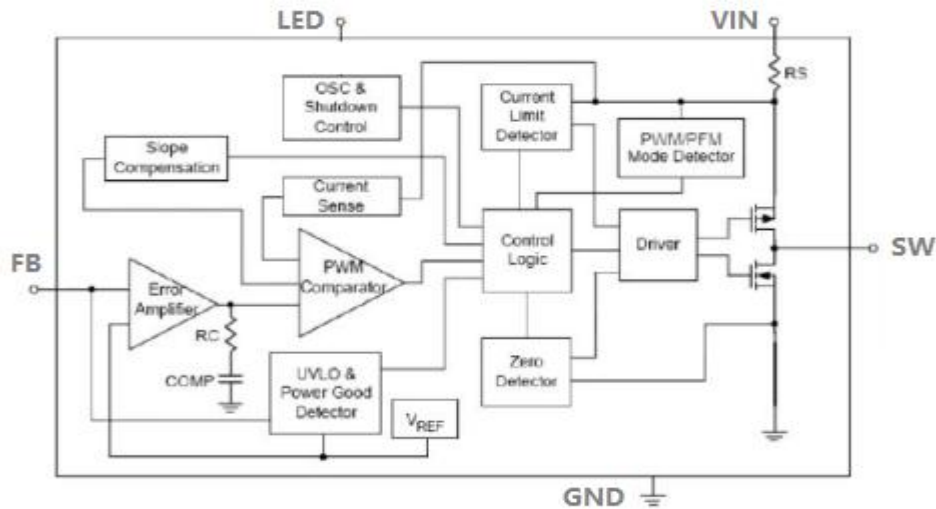
TYPICAL APPLICATION



Optional Schottky Diode

During the transition between high-side switch and low-side switch, the body diode of the low side power MOSFET conducts the inductor current. The forward voltage of this body diode is high. An optional Schottky diode may be paralleled between the SW pin and GND pin to improve overall efficiency.

BLOCK DIAGRAM



PIN DESCRIPTION

Pin	Name	Description
1	GND	Ground.
2	FB	Adjustable Version Feedback input.
3	LED	Output indicator led.
4	VIN	Input voltage pin. VIN supplies power to the IC. Connect a 8V to 30V supply to VIN and bypass VIN to GND with a suitably large capacitor to eliminate noise on the input to the IC.
5	SW	SW is the switching node that supplies power to the output. Connect the output LC filter from SW to the output load.

ABSOLUTE MAXIMUM RATING

Item	Extreme value
VIN,SW	-0.3V to +30V
FB,LED	-0.3V to +18V
Junction Temperature	125 °C
Lead Temperature	260 °C
Storage Temperature	-65 °C to +150 °C

RECOMMENDED OPERATING CONDITIONS

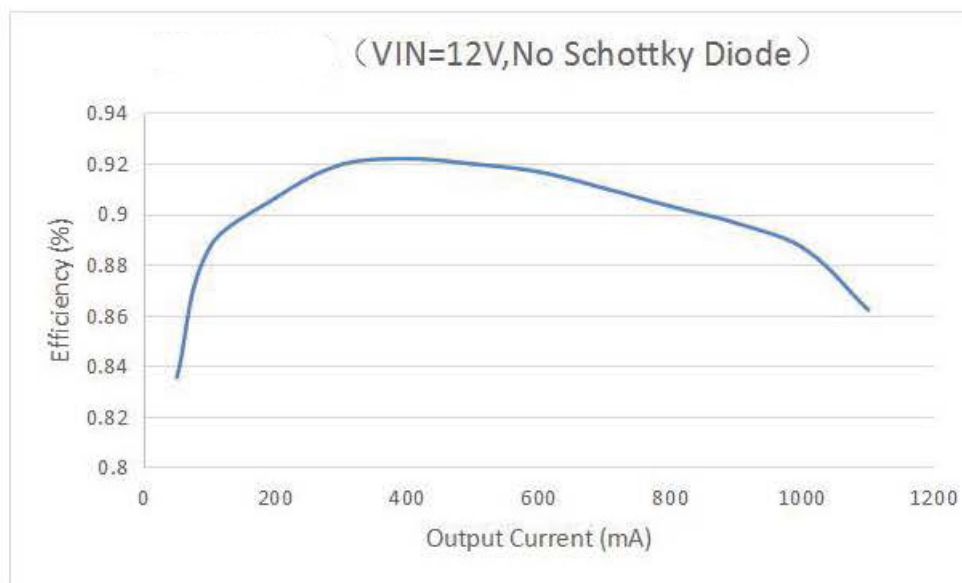
Item	Extreme value
Input Voltage VIN	8V to 28V
Output voltage Vout	1.2V to 15V
Operating Junction Temperature (T _J)	-40 °C to +85 °C

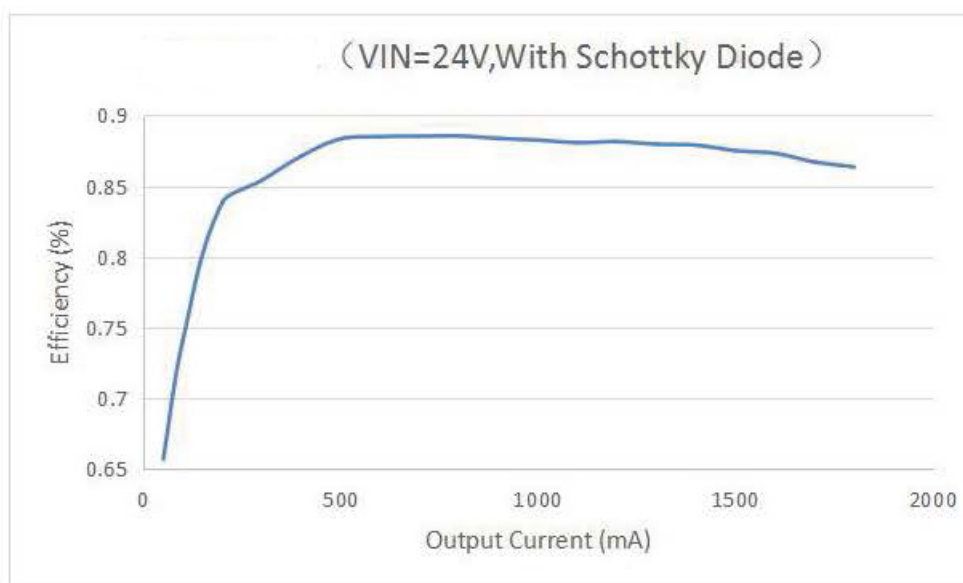
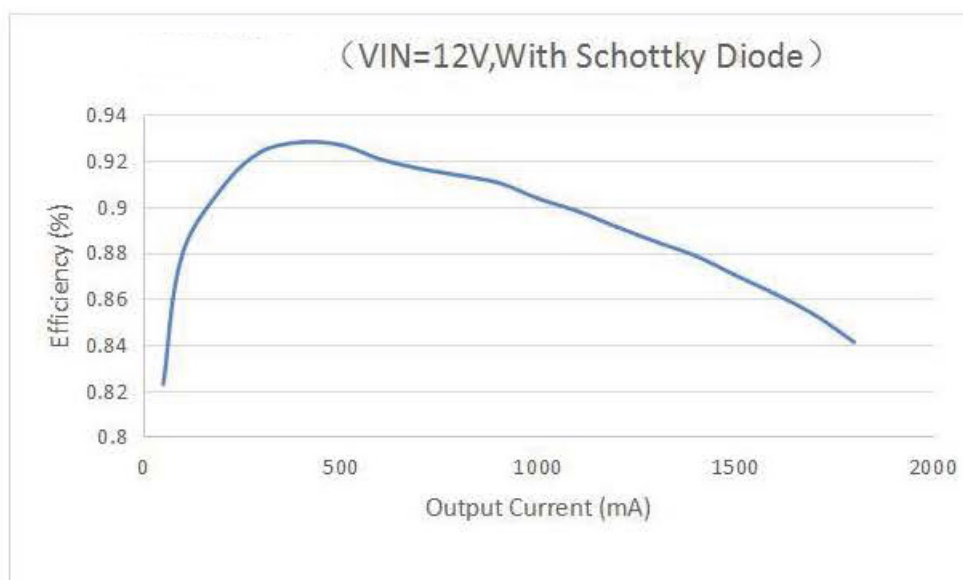
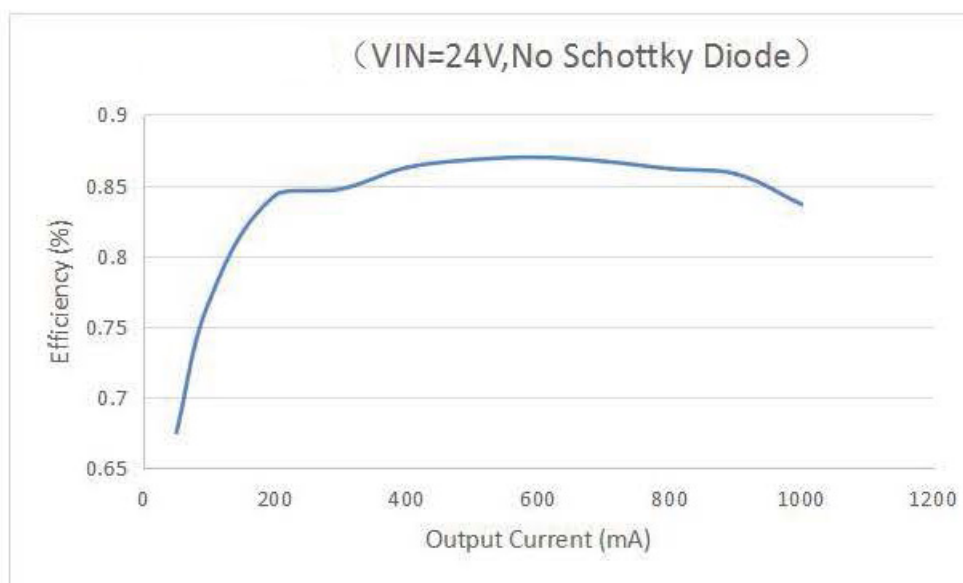
ELECTRICAL CHARATERISTICS

$V_{IN} = 24V$, $T_A = 25^{\circ}C$, unless otherwise stated. (HM1593-51)						
Item	Symbol	Condition	Min.	Typ.	Max.	Units
V_{IN} Undervoltage Lockout Thershold	V_{IN_MIN}	V_{IN} falling	7	7.5	8	V
V_{IN} Undervoltage Lockout Hysteresis	$V_{IN_MIN_HYST}$	V_{IN} rising		100		mV
V_{IN} Overvoltage Lockout Thershold	V_{IN_MAX}	V_{IN} falling	30	31	32	V
V_{IN} Overvoltage Lockout Hysteresis	$V_{IN_MAX_HYST}$	V_{IN} rising		100		mV
Supply Current	I_Q	$V_{EN}=24V$, $V_{FB}=5.1V$			2.5	mA
Feedback Voltage	V_{FB}	$8V < V_{IN} < 28V$	5.0	5.1	5.2	V
Top Switch Resistance	$R_{DS(ON)T}$			400		m Ω
Bottom Switch Resistance	$R_{DS(ON)B}$			200		m Ω
Top Switch Leakage Current	I_{LEAK_TOP}	$V_{IN}=24V$, $V_{SW}=0V$		1		μA
Bottom Switch Leakage Current	I_{LEAK_BOT}	$V_{IN}=V_{SW}=24V$		1		μA
Top Switch Current Limit	I_{LIM_TOP}	Minimum Duty Cycle		1		A
Switch Frequency	F_{SW}			400K		kHz
Minimum On Time	T_{ON_MIN}			200		ns
Minimum Off Time	T_{OFF_MIN}	$V_{FB}=0V$		200		ns
Thermal Shutdown	T_{TSD}			150		$^{\circ}C$

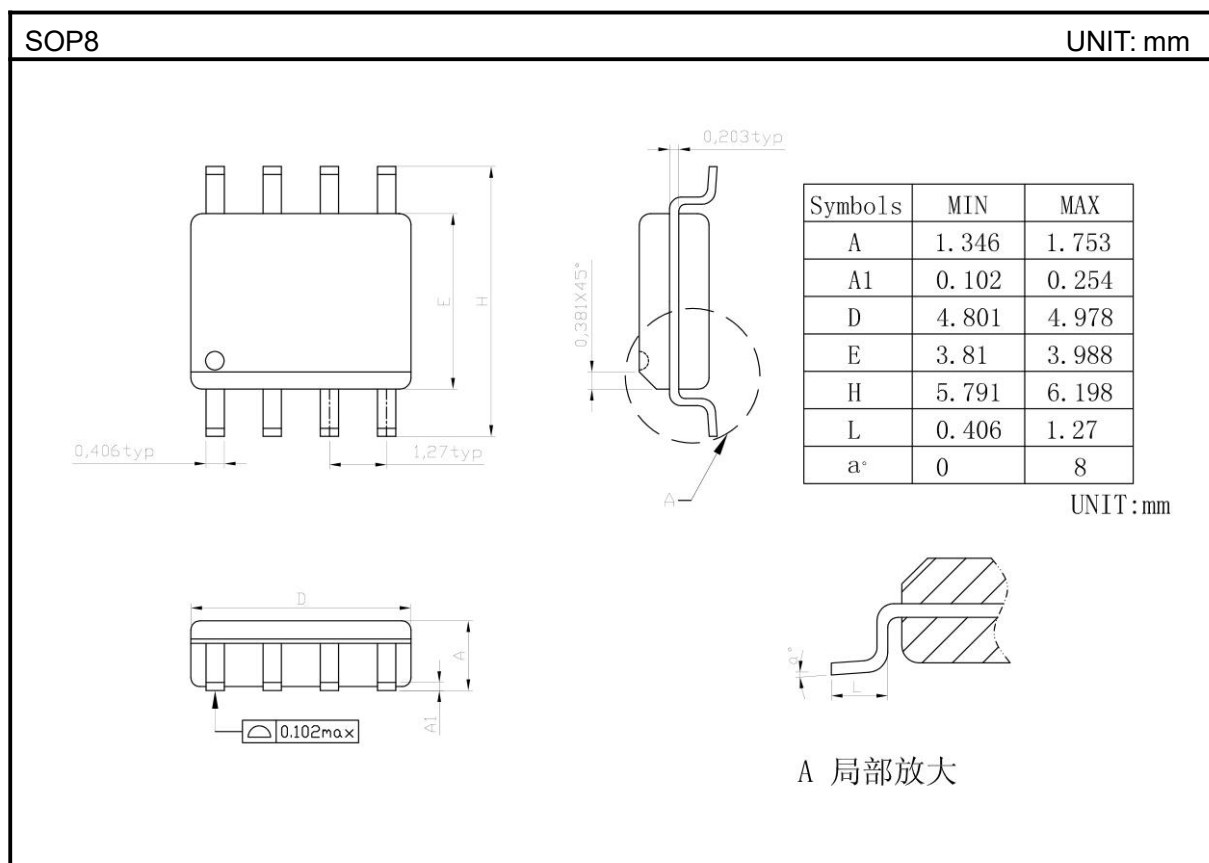
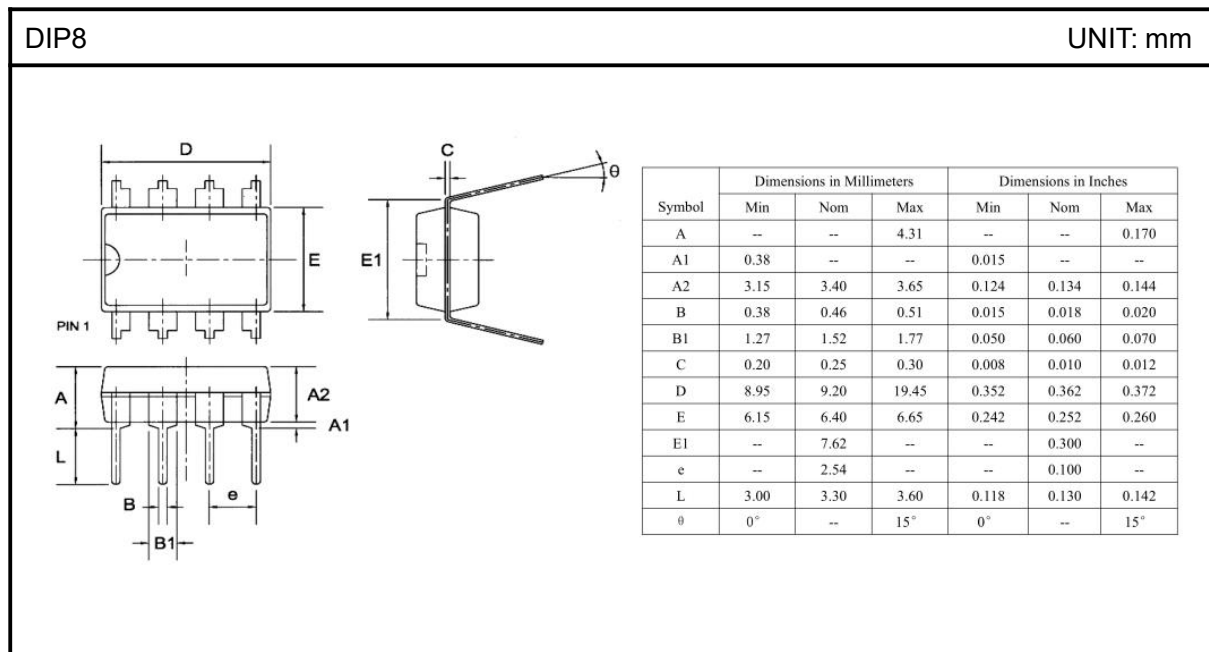
TYPICAL PERFORMANCE CHARACTERISTICS

($L = 22\mu H$, $T_A = 25^{\circ}C$, unless otherwise noted.)



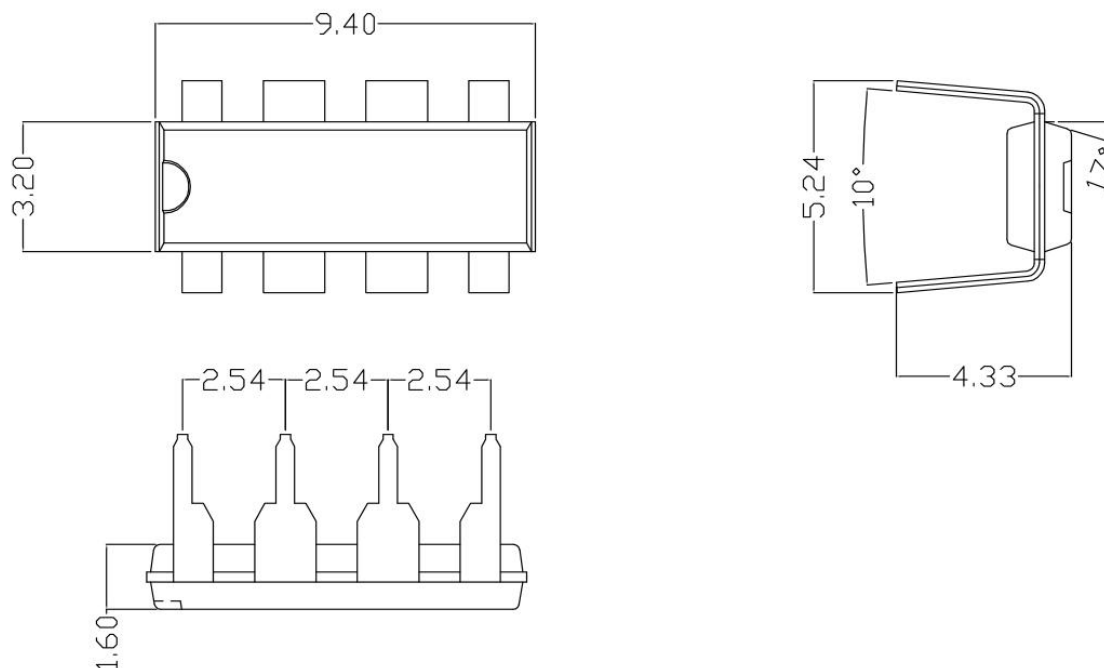


PACKAGE OUTLINE



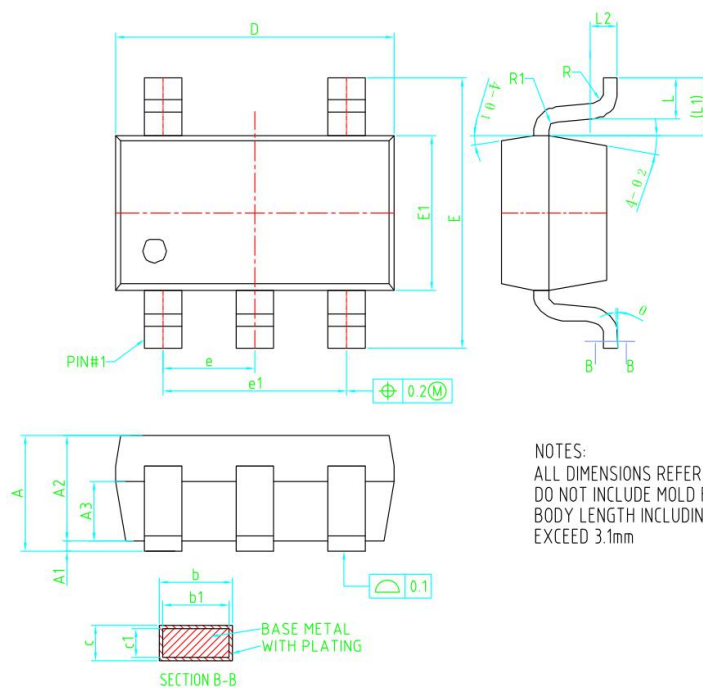
HDIP8

UNIT: mm



SOT23-5

UNIT: mm



COMMON DIMENSIONS (UNITS OF MEASURE: MILLIMETER)			
SYMBOL	MIN	NOM	MAX
A	-	-	1.25
A1	0	-	0.15
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.36	-	0.50
b1	0.36	0.38	0.45
c	0.14	-	0.20
c1	0.14	0.15	0.16
D	2.826	2.926	3.026
E	2.6	2.8	3.00
E1	1.526	1.626	1.726
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
L	0.35	0.45	0.60
L1	0.59REF		
L2	0.25BSC		
R	0.10	-	-
R1	0.10	-	0.20
θ	0°	-	8°
θ1	3°	5°	7°
θ2	6°	-	14°

NOTES:
ALL DIMENSIONS REFER TO JEDEC STANDARD MO-178 AB
DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS
BODY LENGTH INCLUDING MOLD PRUTRUSIONS SHALL NOT EXCEED 3.1mm