Integrated Single LDO And Single Step Down DC-DC

■ General Description

The LN5061 is a complex power management, which can provide low-noise high-speed LDO and high efficiency reached 95% of the DC-DC buck. As the use of CMOS process realization of the work of the chip consumes very little current, the internal use of low-resistance, makes the LDO's output current of up to 300mA, DC-DC load current of up to 800mA.

A built-in low on-resistance transistor provides a low dropout voltage and large output current, a built-in overcurrent protector prevents the load current from exceeding the current capacitance of the output transistor, and a built-in thermal shutdown circuit prevents damage caused by the heat.Small MSOP-10 package realize high-density mounting.

■ Applications

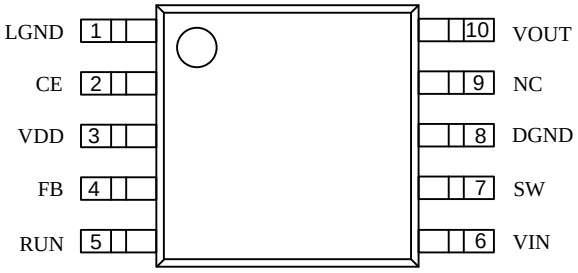
- Mobile phones and other handheld electronic products
- DVD
- Battery powered equipment

■ Features

- Highly Accurate LDO : ± 2%
  DC-DC :± 2.5%
- Output current Range LDO:300mA
  DC-DC:800mA
- Dropout Voltage: 300mV @ 100mA (3.0V type)
- High Ripple Rejection: 70dB@(1KHz,50mA)
- Low Power Consumption :150μA (TYP.)
- Shutdown Current : less than 0.1μA
- Internal protector: current limiter 、short protector and thermal shutdown protector
- Small package: MSOP-10

■ Package

- MSOP-10



MSOP-10
(Top View)

■ Ordering Information

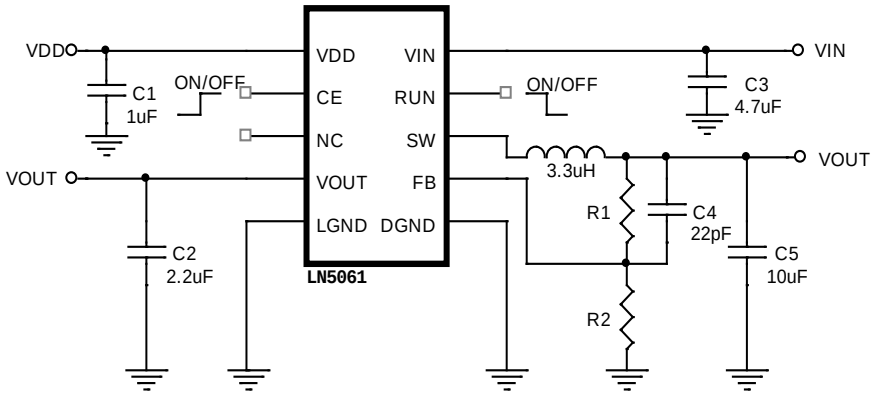
LN5061B①②③④⑤

Designator	Symbol	Description
①②	18-33	Output voltage of LDO
③	A	Adjustable Output
	others	Fixed Voltage Output
④	M	Package type: MSOP-10
⑤	R	Embossed Tape: Standard Feed
	L	Embossed Tape: Reverse Feed

■ Pin Assignment

Pin Number	Pin Name	Function Description
1	LGND	Ground of LDO
2	CE	Enable of LDO，high active
3	VDD	Supply Power of LDO
4	FB	Feedback of DC-DC
5	RUN	Enable of DC-DC, high active
6	VIN	Input of DC-DC
7	SW	Output of DC-DC
8	DGND	Ground of DC-DC
9	NC	No connect
10	VOUT	Output of LDO

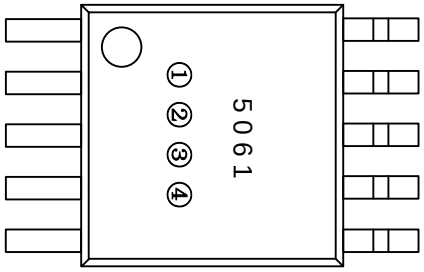
■ Typical Application Circuit



Caution: The above connection diagram and constant will not guarantee successful operation. Perform thorough evaluation using the actual application to set the constant.

■ Marking Rule

- **MSOP-10**



MSOP-10
(Top View)

① Represents the product lot

Symbol a-z,A-Z(except G，I，J，O，Q，W)

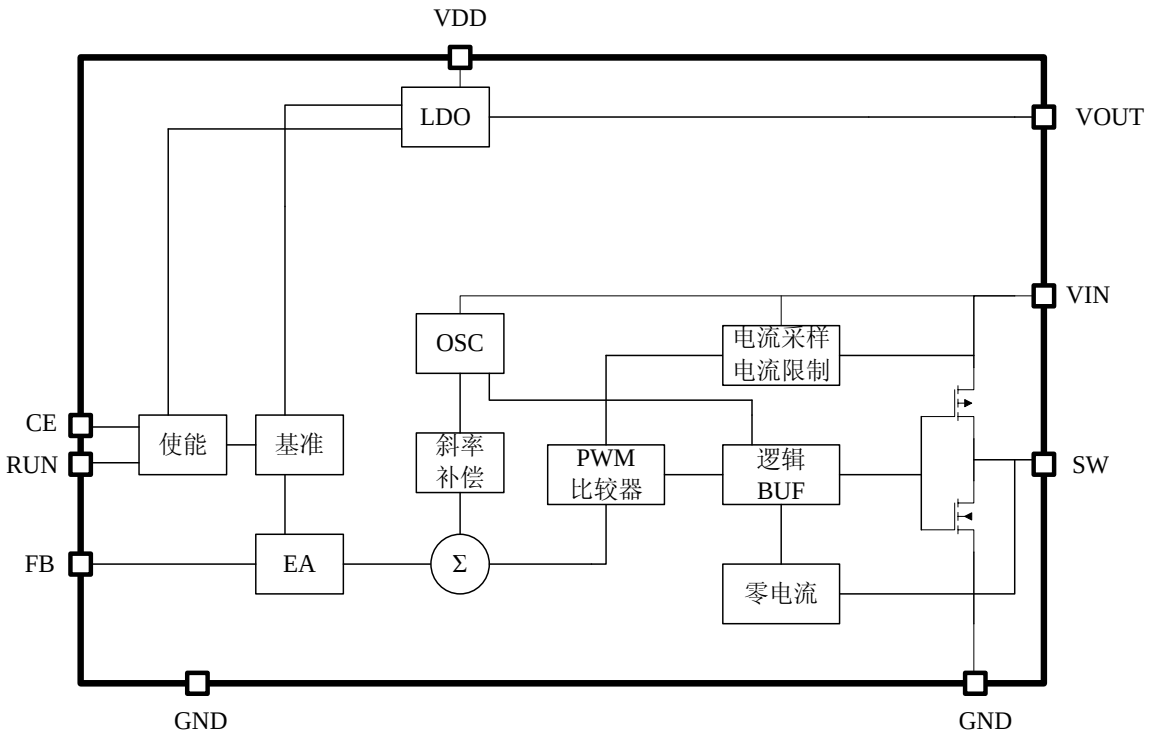
②③ Represents the output voltage of LDO

33 represents 3.3V，18 represents 1.8V

④ Represents the output voltage of DC-DC

Symbol	Output Voltage(V)	Symbol	Output Voltage(V)	Symbol	Output Voltage(V)	Symbol	Output Voltage(V)
A	Adjustable	N	1.8	a	2.8	n	3.8
B	0.9	P	1.9	b	2.9	p	3.9
C	1.0	R	2.0	c	3.0	r	4.0
D	1.1	S	2.1	d	3.1	s	4.1
E	1.2	T	2.2	e	3.2	t	4.2
F	1.3	U	2.3	f	3.3	u	4.3
H	1.4	V	2.4	h	3.4	v	4.4
K	1.5	X	2.5	k	3.5	x	4.5
L	1.6	Y	2.6	l	3.6	y	4.6
M	1.7	Z	2.7	m	3.7	z	4.7

■ Function Block Diagram



■ Absolute Maximum Ratings

Parameter	Symbol	Maximum Rating		Unit
Input Voltage	V_{IN}	V_{SS}-0.3～V_{SS}+6		V
	$V_{ON/OFF}$	V_{SS}-0.3～V_{IN}+0.3		
output voltage	V_{OUT}	V_{SS}-0.3～V_{IN}+0.3		
Power Dissipation	P_D	MSOP-10/PP	1.5	W
Operating Ambient Temperature	Topr	-40～+85		°C
Storage Temperature	Tstg	-40～+125		

Caution: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

■ Electrical Characteristics

- **LDO electrical characteristics**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output Voltage	$V_{OUT(E)}$	V_{IN} =$V_{OUT(S)}$+1.0 V, I_{OUT}=30 mA	$V_{OUT(S)}$ ×0.98	$V_{OUT(S)}$	$V_{OUT(S)}$ ×1.02	V
Output Current	I_{OUT}	V_{IN}≥$V_{OUT(S)}$+1.0 V	300	—	—	mA
Dropout Voltage	V_{drop}	I_{OUT}=50 mA	—	0.06	0.10	V
		I_{OUT}=100 mA	—	0.15	0.20	
Line Regulations	$\frac{\Delta V_{OUT1}}{\Delta V_{IN} \bullet V_{OUT}}$	$V_{OUT(S)}$+0.5 V ≤V_{IN}≤8 V I_{OUT}=10 mA	—	0.01	0.2	%/V
Load Regulation	ΔV_{OUT2}	V_{IN}=$V_{OUT(S)}$+1.0 V 1.0 mA ≤I_{OUT} ≤100 mA	—	15	50	mV
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta Ta \bullet V_{OUT}}$	V_{IN}=$V_{OUT(S)}$+1.0 V, I_{OUT}=10 mA -40°C ≤Ta ≤85°C	—	±100	—	ppm/℃
Supply Current	I_{SS1}	V_{IN}=$V_{OUT(S)}$+1.0 V	—	70	110	μA
Shutdown current	I_{STB}	V_{IN}=V_{EN}=$V_{OUT(T)}$+1V ， V_{EN}=VSS	—	0.01	1	μA
Input Voltage	V_{IN}	——	2.0	—	10	V
Ripple-Rejection	|PSRR|	V_{IN}=$V_{OUT(S)}$+1.0 V， f=1kHz Vrip=0.5 Vrms, I_{OUT}=30 mA	—	70	—	dB
Short-circuit Current	Ishort	V_{IN}=$V_{OUT(S)}$+1.0 V,V_{CE} on V_{OUT}=gnd	—	30	—	mA
Current limit	Ilim	V_{IN}=V_{EN}=$V_{OUT(T)}$+1V	-	400	-	mA
CE “High” Voltage	V_{CEH}		1.3		VIN	V
CE “Low” Voltage	V_{CEL}				0.25	V
CE “High” Current	I_{CEH}	V_{IN}=V_{CE}=$V_{OUT(T)}$+1.0V	-0.1		0.1	μA
CE “Low” Current	I_{CEH}	V_{IN}= $V_{OUT(T)}$+1.0V, V_{CE}=V_{SS}	-0.1		0.1	μA

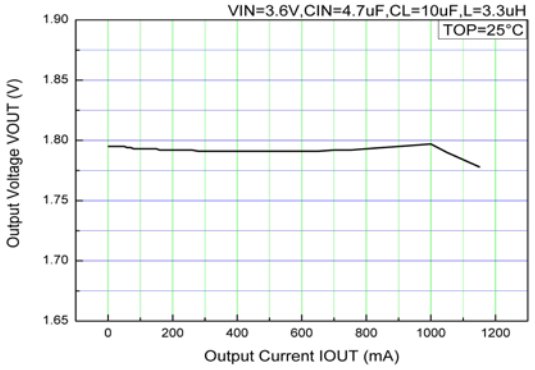
- **DC-DC electrical characteristics**

Parameter	Symbol	Cinditons	Min	Typ	Max	Units
Feedback Voltage	V_{FB}	-	0.59	0.6	0.61	V
Input Voltage Range	V_{IN}		2	-	6	
Output Voltage ripple	$\triangle V_{OUT}$	IL_{MAX}=600mA		5		mV
Efficiency	EFFI	VIN=2.7V;IL=60mA	—	92	—	%
Minimum CE Voltage	V_{CEH}	-	0.8	1	-	V
Shutdown Curren	I_{STB}	VCE=0V、VIN=3.6V	0	-	1	μA
Supply Current	I_{DD1}	VFB=0.6V*0.9	-	150	-	μA
Quiescent Current	I_{DD2}	VFB=0.6V*1.1	—	40	-	
Output Current Limit	I_{LIM}	-	-	1200	-	mA
PFM switching point	I_L			40		mA
Oscillation Frequency	F_{OSC}		-	1.2	-	MHz
Maximum Duty Circle	M_{AXDTY}	-	100	-	-	%

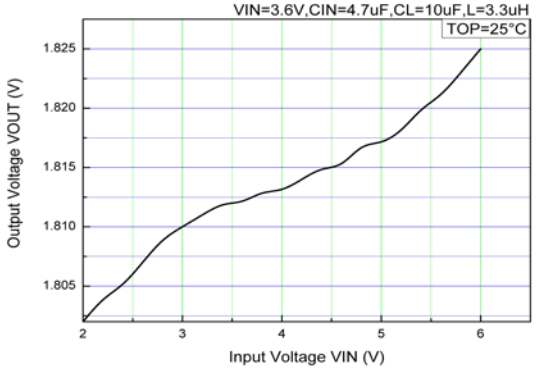
■ Typical Performance Characteristics

- **DC-DC electrical characteristics**

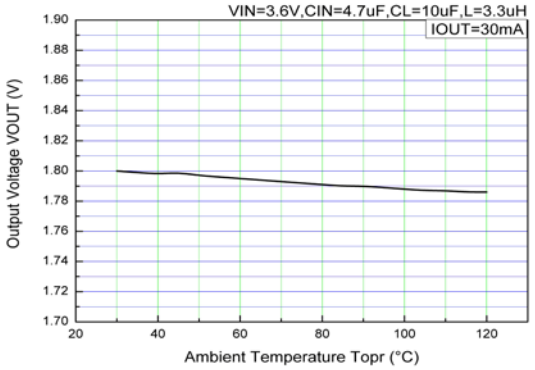
Output voltage-output current



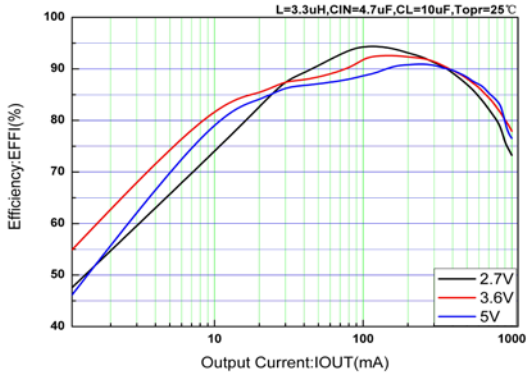
Input voltage-output voltage



Temperature characteristics

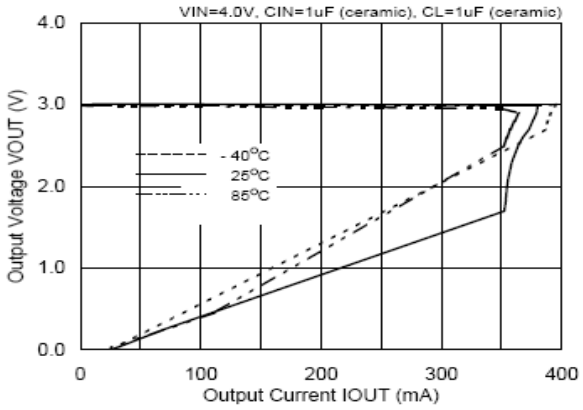


Efficiency

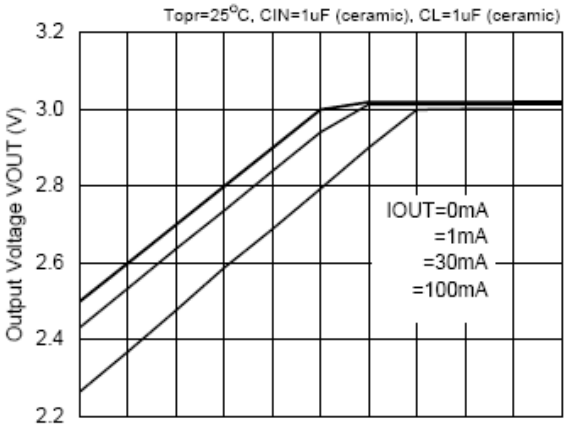


- **LDO electrical characteristics**

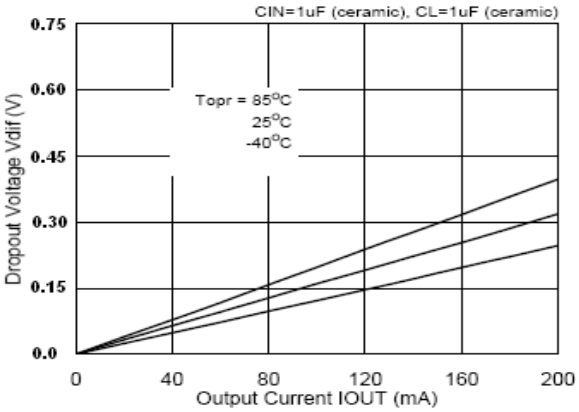
Output voltage-output current



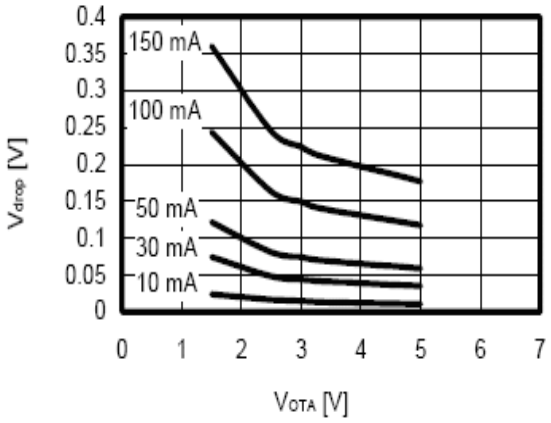
Input voltage-output voltage



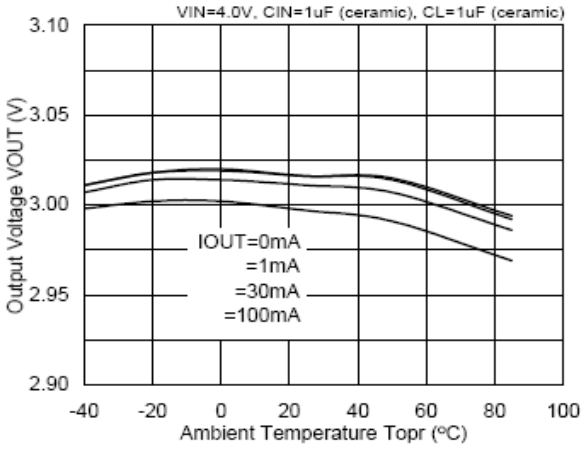
Dropout voltage and output current



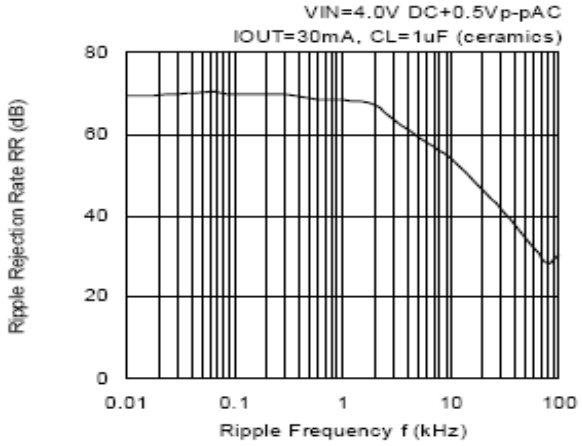
Dropout voltage and output voltage



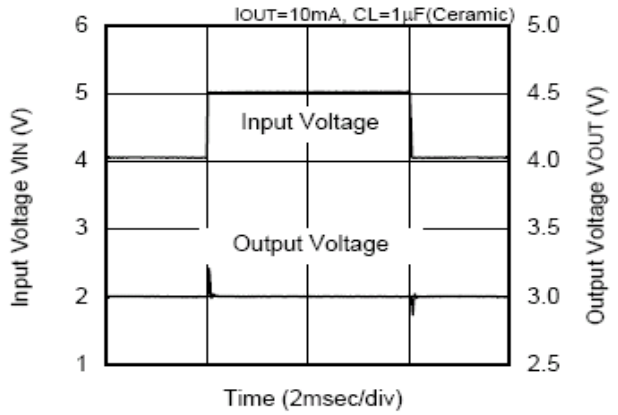
Output voltage and temperature



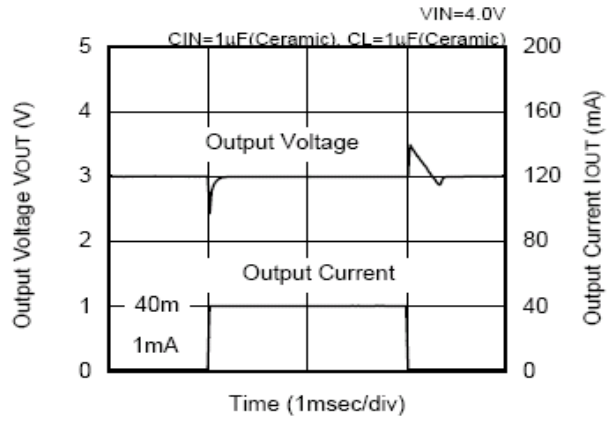
PSRR



Input transient response characteristics

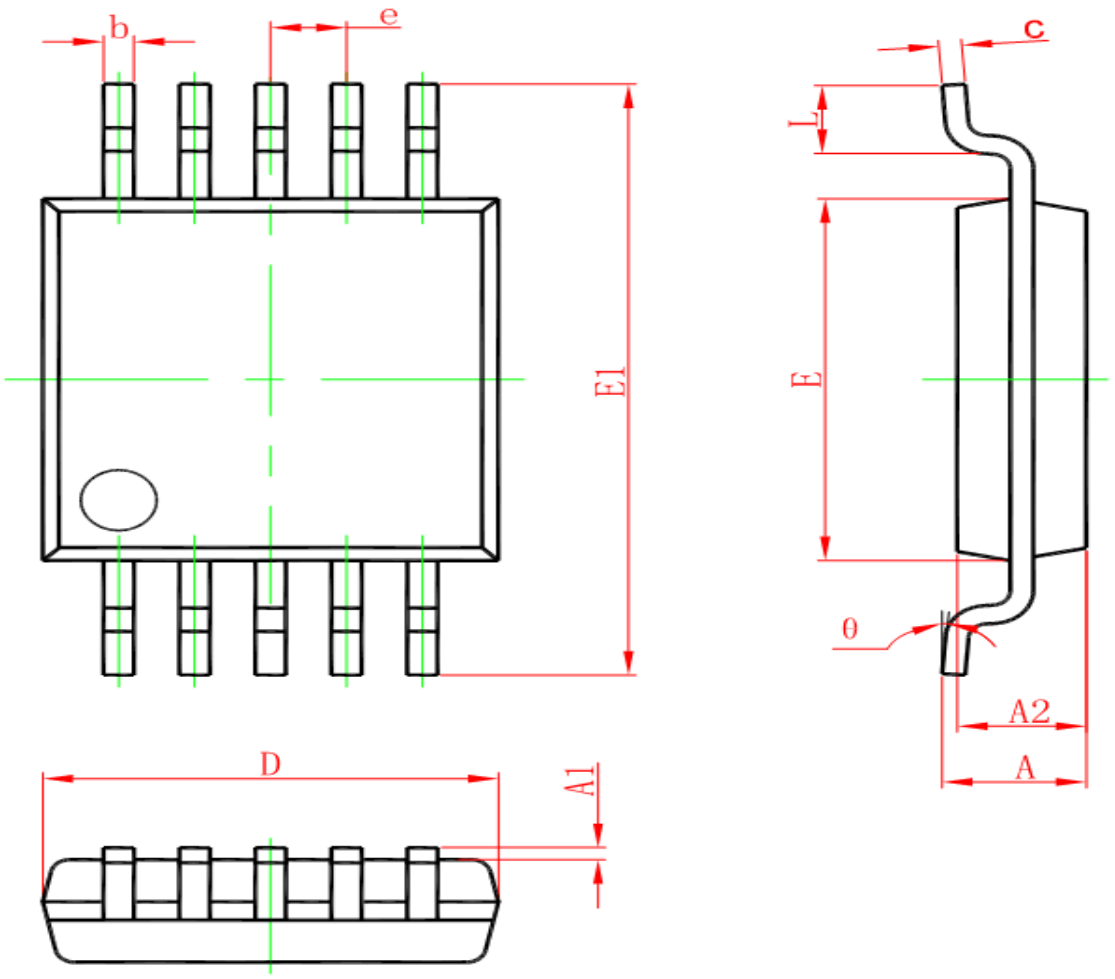


Load-response characteristics of the transitional type



■ Package Information

- **MSOP-10**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.180	0.280	0.007	0.011
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
e	0.50(BSC)		0.020(BSC)	
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°