

SK6012 500mA, High PSRR, High Speed, Low Dropout CMOS LDO

GENERAL DESCRIPTION

The SK6012 is a high accuracy, high speed, low dropout CMOS Linear regulator with high power supply ripple rejection and fast discharge function. The device offers a new level of cost-effective performance in cellular phones, surveillance system, Bluetooth, wireless and other portable electronic devices.

For the fixed voltage version, SK6012 can provide product selections of output value in the range of 0.8V to 3.6V by every 0.1V step. For the adjustable voltage version, the output voltage range is 0.6V to 5.0V.

Other features include enable function, shutdown mode output discharge, current limit and thermal shutdown protection.

The SK6012 are available in standard SOT23-5L and DFN1x1-4L packages. Standard products are Pb-free and Halogen-free.

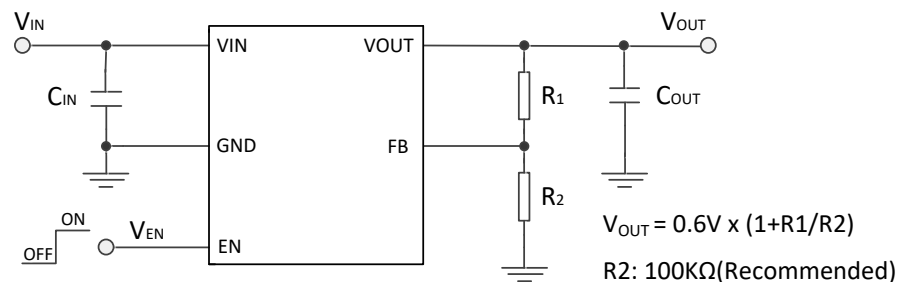
FEATURES

- Input voltage: 1.6V~6.5V
- Adjustable Output Voltage from 0.6V to 5.0V
- Feedback Voltage: 0.6V
- Fixed Output Voltage from 0.8V to 3.6V (Customized by every 0.1V step)
- Maximum output current: 500mA @ $V_{IN}-V_{OUT}=0.5V$
- PSRR: 70dB @ 1KHz, $V_{OUT}=1.8V$
- Dropout voltage: 145mV @ $V_{OUT}=3.3V$, $I_{OUT}=300mA$
- Quiescent current : 50μA Typ.
- Shut-down current: < 1μA
- Recommend input and output capacitor: 1μF

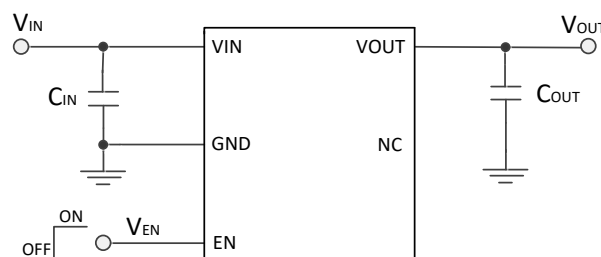
APPLICATIONS

- Digital cameras
- Cellphones
- Bluetooth and wireless handsets
- Other portable electronic devices

TYPICAL APPLICATION CIRCUIT

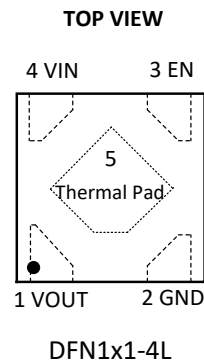
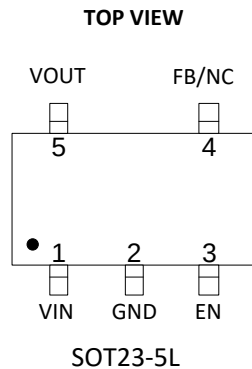


Typical Application Circuit of Adjustable version



Typical Application Circuit of Fixed Version

PIN CONFIGURATION



PIN DESCRIPTION

PIN NO.	PIN NO.	SYMBOL	I/O	DESCRIPTION
SOT23-5L	DFN1x1-4L			
1	4	VIN	P	Input
2	2	GND	G	Ground
3	3	EN	I	Enable (active high, do not float)
4	—	FB/NC	I / —	Feedback voltage (adjustable voltage version only): $V_{OUT}=V_{FB}*(1+R1/R2)$; or no connection (fixed voltage version only)
5	1	VOUT	O	Output
—	5	Thermal Pad	-	Thermal pad is not connected to GND pin internally. This pad should be soldered to a large PCB and connected to GND for maximum thermal dissipation.

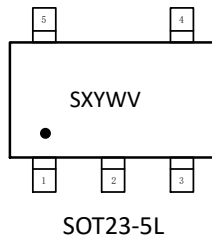
ORDERING INFORMATION

PART NO	PACKAGE	VOUT DISCHARGE	TEMPERATURE	TAPE & REEL
SK6012AS5-XX	SOT23-5L	Yes	-40 ~ +85℃	3000/REEL
SK6012AS5-ADJ	SOT23-5L	Yes	-40 ~ +85℃	3000/REEL
SK6012AD4-XX	DFN1x1-4L	Yes	-40 ~ +85℃	10000/REEL

Note: XX indicates 0.8V~3.6V by 0.1V step. For example, 28 means product outputs 2.8V.

ADJ indicates adjustable output voltage.

MARKING DESCRIPTION



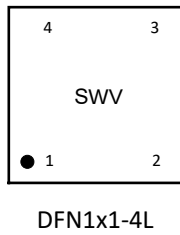
"S": Product code

"XY": Internal Control Code

"W": The week of manufacturing. "A" stands for week

1, "Z" stands for week 26, "a" stands for week 27, "z" stands for week 52.

"V": Output voltage code.



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"V": Output voltage code.

TYPICAL OUTPUT VOLTAGE CODE TABLE

VOUT	CODE	VOUT	CODE
0.8V	R	1.2V	B
1.3V	3	1.5V	C
1.8V	D	2.2V	V
2.5V	E	2.6V	F
2.7V	L	2.8V	M
2.9V	N	3.0V	G
3.3V	H	3.6V	I
ADJ	X		

ABSOLUTE MAXIMUM RATINGS (Note1)

SYMBOL	ITEMS		VALUE	UNIT
V _{IN}	Input Voltage		-0.3~8	V
V _{EN}	EN voltage range		-0.3~V _{IN}	V
V _{OUT}	Output Voltage		-0.3~V _{IN}	V
I _{OUT}	Output Current		750	mA
P _{DMAX}	Power Dissipation	SOT23-5L	0.5	W
		DFN1x1-4L	0.5	
R _{θJA}	Thermal Resistance	SOT23-5L	270	°C/W
		DFN1x1-4L	220	
T _J	Junction Temperature		-40~150	°C
T _A	Ambient Temperature		-40~85	°C
T _{STG}	Storage Temperature		-55~150	°C
T _{SOLDER}	Package Lead Soldering Temperature		260°C, 10s	°C
ESD	HBM		±6.5	KV
LU	Latch up		±500	mA

Note(1): Exceed these limits could damage the device. Exposure to absolute maximum rating conditions may affect device reliability.

$$P_{DMAX} = (V_{IN} - V_{OUT}) * I_{OUT_MAX}$$

RECOMMENDED OPERATING RANGE

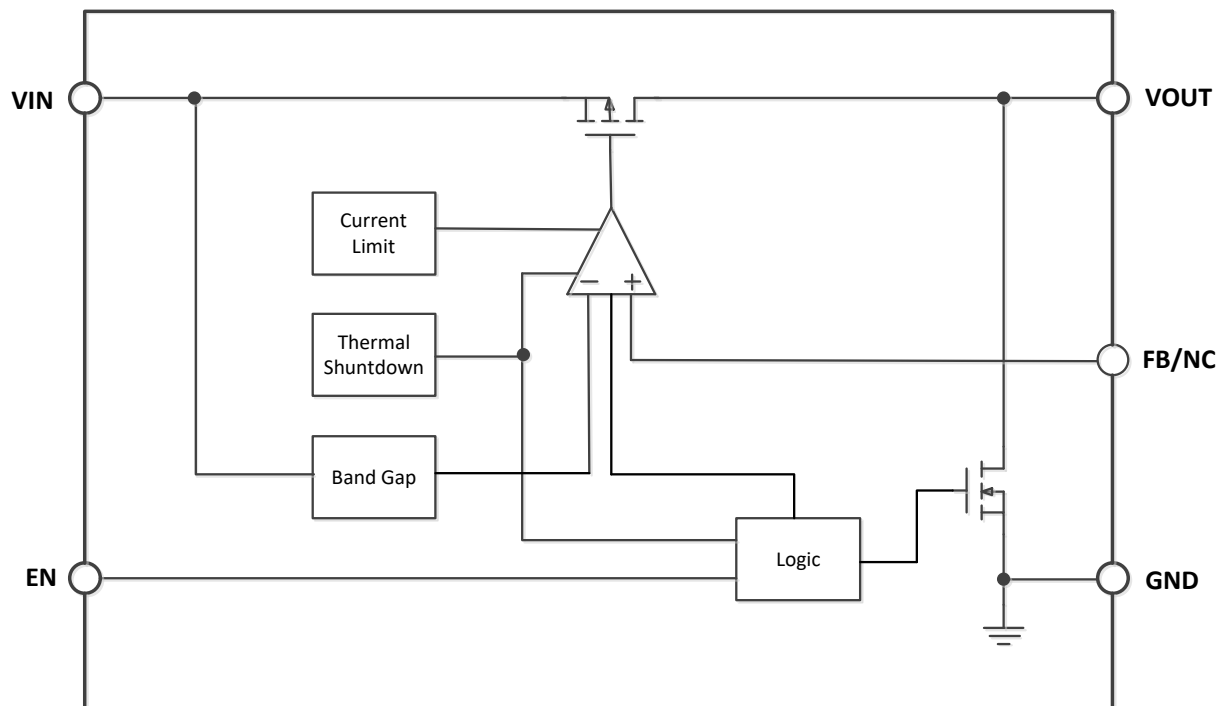
SYMBOL	ITEMS	VALUE	UNIT
V _{IN}	Supply Voltage	1.6~6.5	V
I _{OUT}	Output Current	≤500	mA
C _{IN}	Input Capacitor	1μF to 10μF, 1μF is recommended when output voltage ≥ 0.8V, 4.7μF is recommended when output voltage < 0.8V	μF
C _{OUT}	Output Capacitor		μF

ELECTRICAL CHARACTERISTICS

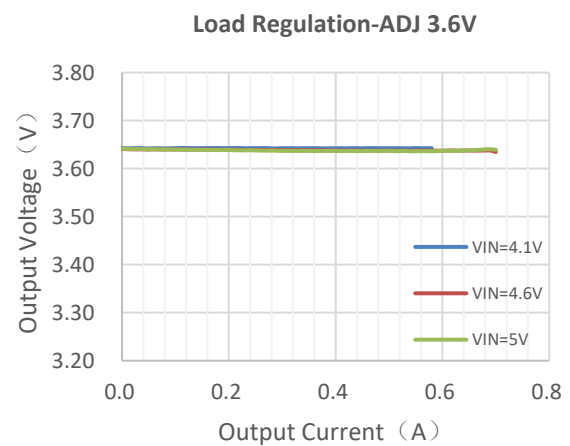
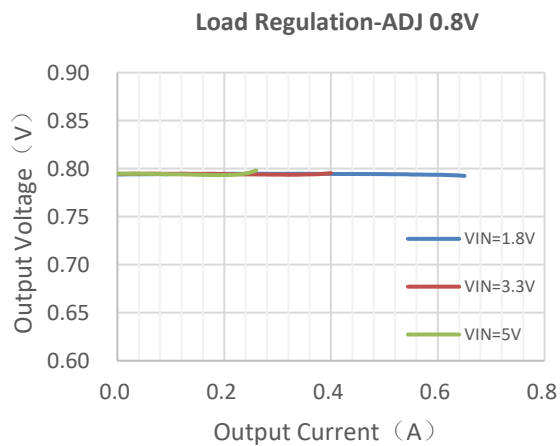
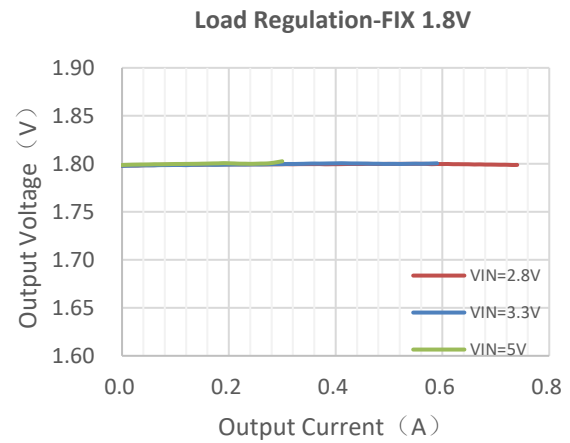
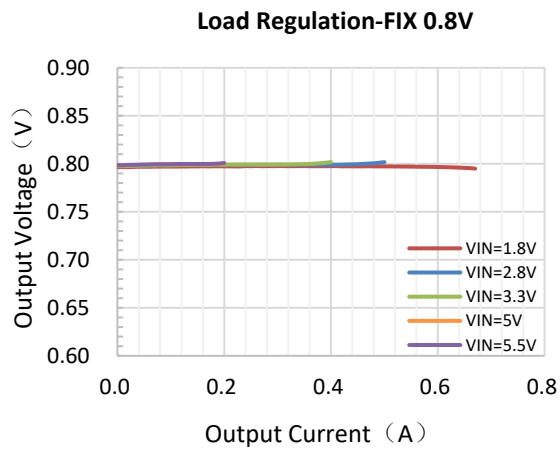
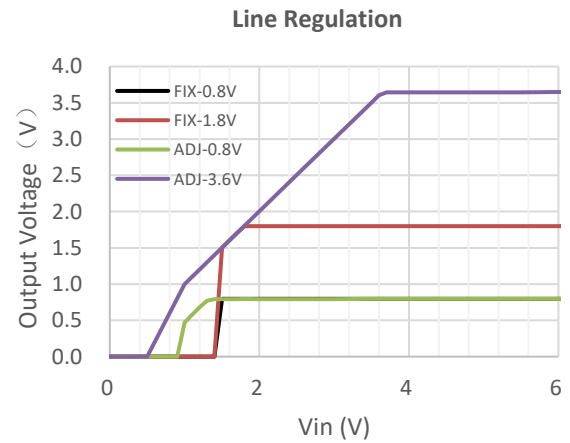
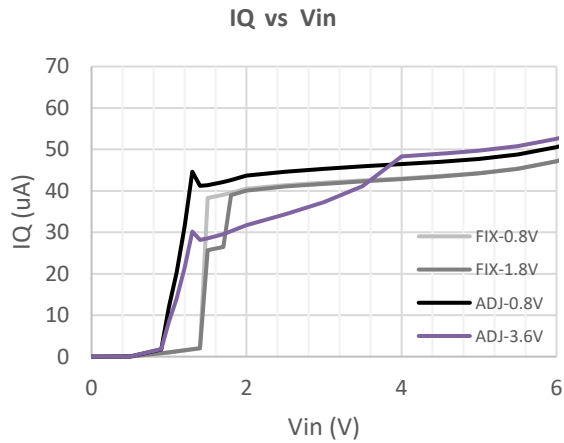
The following specifications apply for $V_{IN} = V_{OUT} + 1V$, $T_A = 25^\circ C$, unless specified otherwise.

SYMBOL	ITEMS	CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN}	Input Voltage		1.6		6.5	V
V_{OUT}	Output Range Accuracy	$V_{OUT} < 2.0V$, $I_{OUT} = 1mA$	-20		20	mV
		$V_{OUT} \geq 2.0V$, $I_{OUT} = 1mA$	-2		2	%
V_{FB}	Feedback voltage	$V_{IN} = 5.0V$	0.588	0.6	0.612	V
I_Q	Quiescent Current	$V_{IN} = 5.0V$, $I_{OUT} = 0$		50		μA
I_{LIMIT}	Current Limit	$0.75V \leq V_{OUT} < 1.5V$, $V_{IN} = 1.6V$	600			mA
		$1.5V \leq V_{OUT} \leq 3.6V$, $V_{IN} = V_{OUT} + 1V$	700			mA
V_{DROP}	Dropout Voltage	$V_{OUT} = 1.8V$, $I_{OUT} = 300mA$		250		mV
		$V_{OUT} = 2.8V$, $I_{OUT} = 300mA$		170		
		$V_{OUT} = 3.3V$, $I_{OUT} = 300mA$		145		
		$V_{OUT} = 3.6V$, $I_{OUT} = 300mA$		140		
ΔV_{LINE}	Line Regulation $ \Delta V_{OUT} $	$V_{IN} = V_{OUT} + 1V \sim 6.5V$, $I_{OUT} = 1mA$		0.5	5	mV
ΔV_{LOAD}	Load Regulation $ \Delta V_{OUT} $	$I_{OUT} = 1mA$ to $300mA$		3	10	mV
I_{SHDN}	Shut-down Current	$V_{EN} = 0V$			1	μA
PSRR	Power Supply Rejection Ratio (Note1)	$V_{IN} = 5.0V + 0.5V_{P-P}$, $V_{OUT} = 1.8V$ $f = 1KHz$, $I_{OUT} = 30mA$		70		dB
V_{ENH}	EN logic high voltage	$V_{IN} = 6.5V$	1.5			V
V_{ENL}	EN logic low voltage	$V_{IN} = 6.5V$			0.4	V
I_{EN}	EN Input Current	$V_{EN} = 0$ to $6.5V$		0.6	1.0	μA
e_{NO}	Output Noise Voltage (Note1)	$V_{IN} = 2.5V$, $V_{OUT} = 1.8V$, $I_{OUT} = 50mA$ $f = 10Hz$ to $100kHz$		100		μV_{RMS}
R_{DIS}	Output Discharge Resistance	$V_{IN} = 5.0V$, $V_{EN} = 0V$ (A version only)		100		Ω

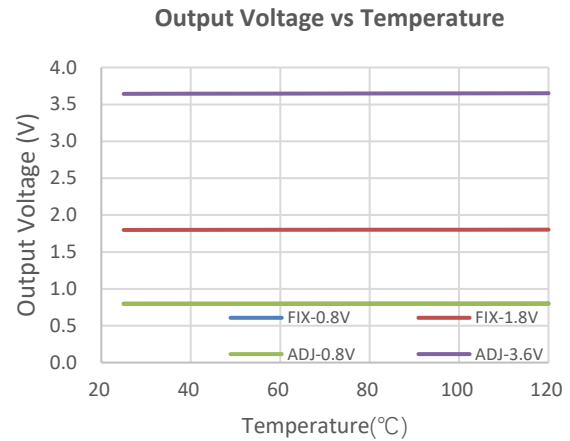
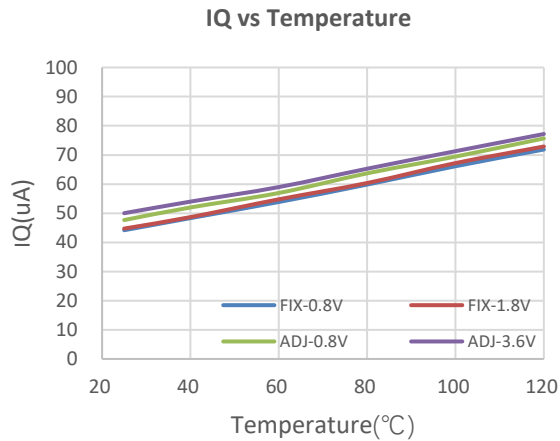
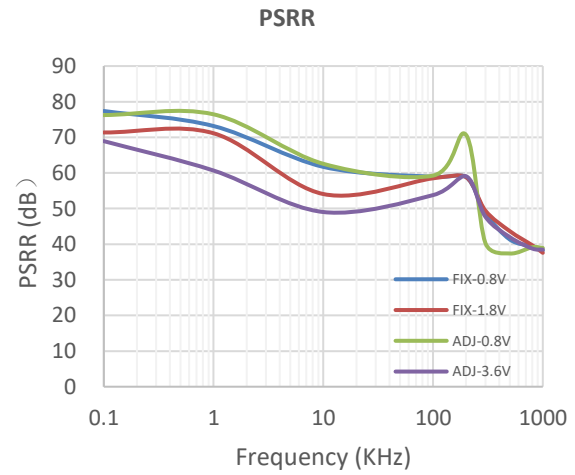
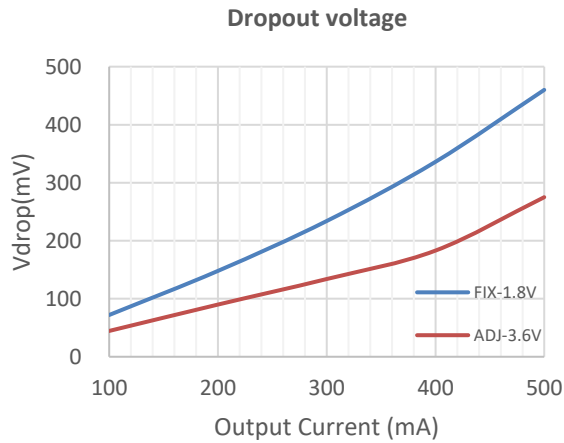
Note1: Granted by design.

BLOCK DIAGRAM

TYPICAL PERFORMANCE CHARACTERISTICS



TYPICAL PERFORMANCE CHARACTERISTICS (cont.)



Typical performance waveform

CH1:V_{IN}CH2:V_{OUT}CH4:I_{OUT}

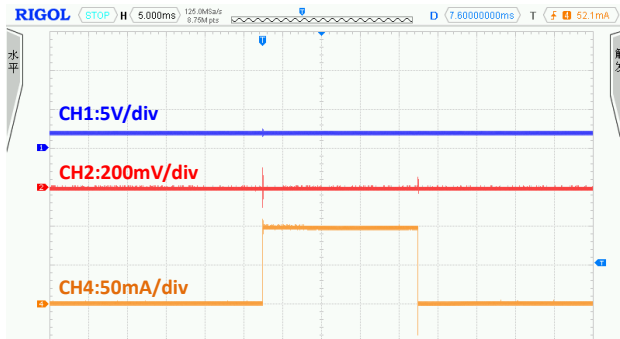
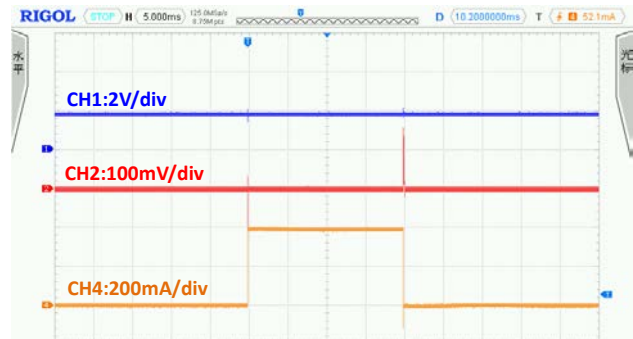
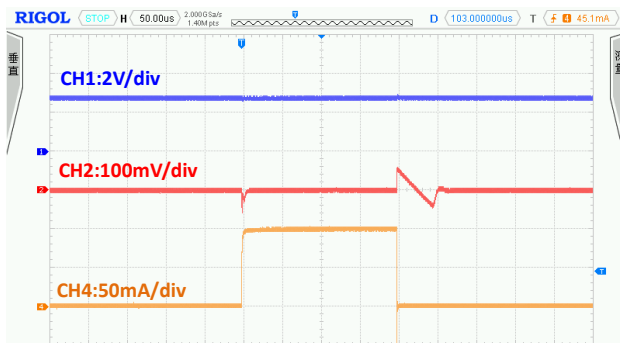
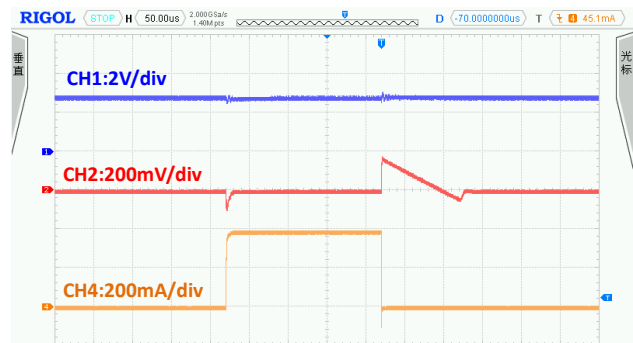
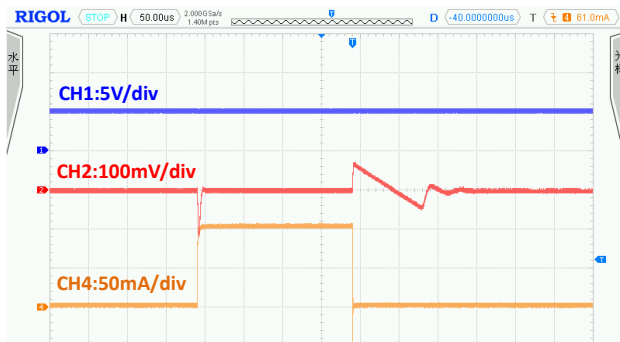
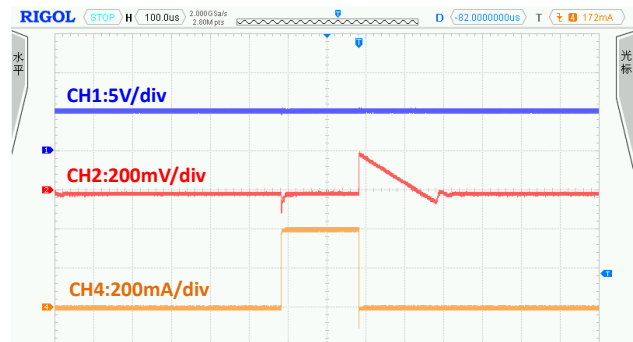
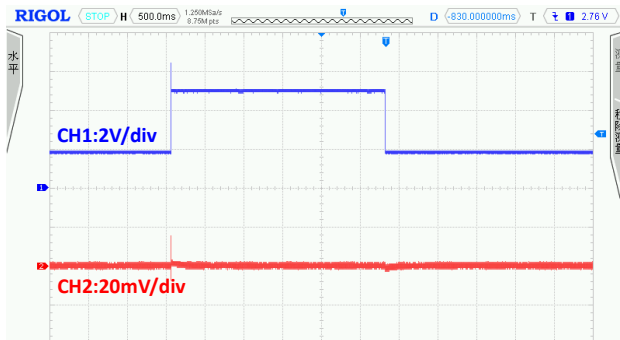
Power ON/OFF

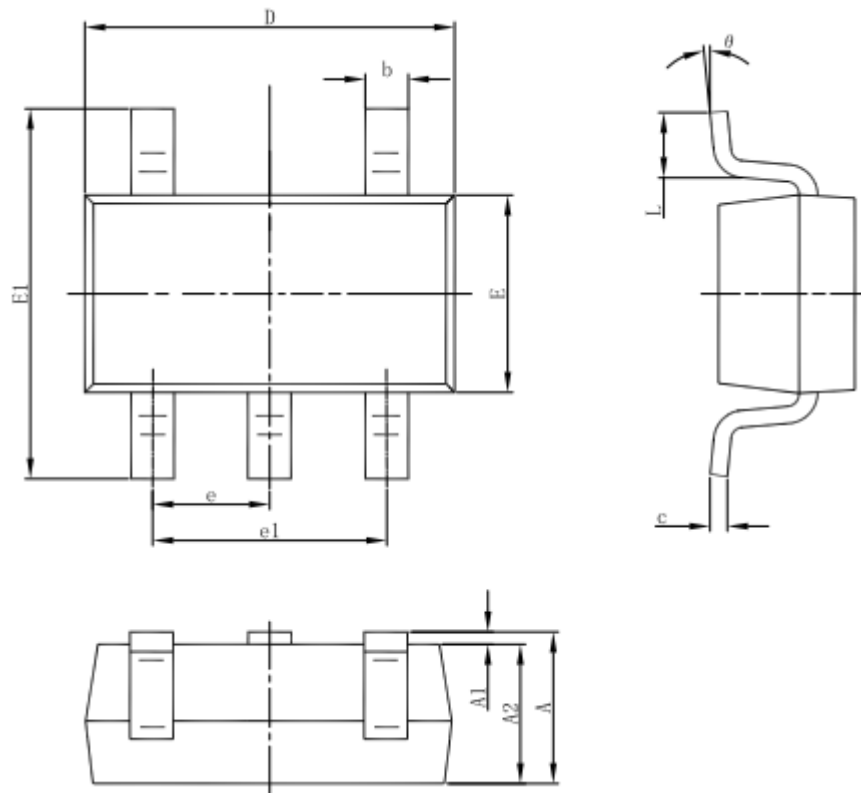
Power ON (VIN: 0V to 5V)



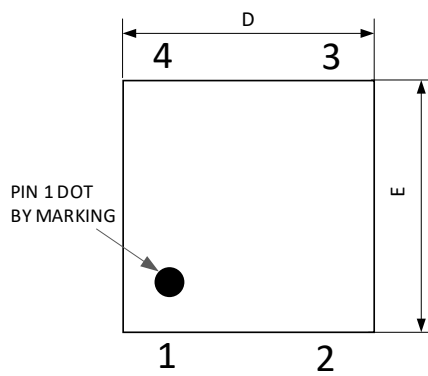
Power OFF (VIN: 5V to 0V)



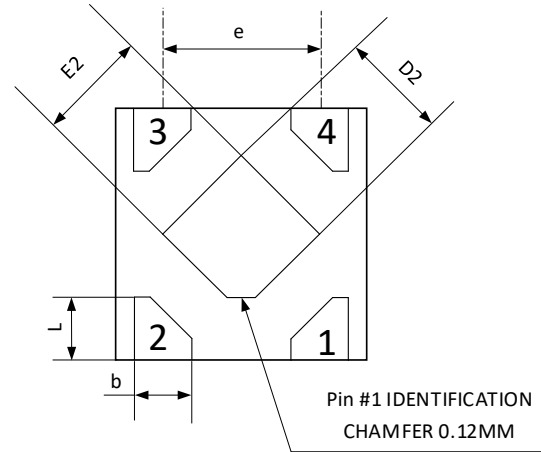
CH1:V_{IN}CH2:V_{OUT}CH4:I_{OUT}Load transient (V_{OUT}=0.8V, I_{OUT}:1mA to 100mA)Load transient (V_{OUT}=0.8V, I_{OUT}:1mA to 400mA)Load transient (V_{OUT}=1.8V, I_{OUT}:1mA to 100mA)Load transient (V_{OUT}=1.8V, I_{OUT}:1mA to 400mA)Load transient (V_{OUT}=3.6V, I_{OUT}:1mA to 100mA)Load transient (V_{OUT}=3.6V, I_{OUT}:1mA to 400mA)Line transient (I_{OUT}=1mA)

PACKAGE DIMENSION: SOT23-5


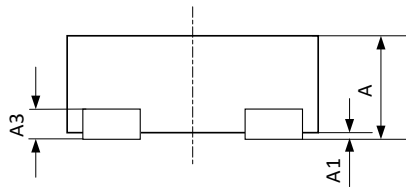
DIMENSIONS IN MILLIMETERS			
SYMBOL	MINIMUM	NOMINAL	MAXIMUM
A	1.05	-	1.35
A1	0.00	-	0.15
A2	1.00	1.10	1.20
b	0.3	-	0.5
D	2.82	2.92	3.02
E	1.50	1.60	1.70
E1	2.60	2.80	3.00
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
L	0.30	0.45	0.60
θ	0°	4°	8°

PACKAGE DIMENSION: DFN1x1-4L


TOP VIEW



BOTTOM VIEW



SIDE VIEW

REMARK:
LEAD FINISH: NIPDAU

DIMENSIONS IN MILLIMETERS			
Symbol	Min.	Nom.	Max.
A	0.40	-	0.50
A1	0.00	-	0.05
A3	0.125REF.		
D	0.95	1.00	1.05
E	0.95	1.00	1.05
b	0.15	0.20	0.25
L	0.15	0.25	0.35
D2	0.38	0.48	0.58
E2	0.38	0.48	0.58
e	0.65 BSC		