

SK6052 1A Ultra-low Dropout, High PSRR CMOS LDO

GENERAL DESCRIPTION

The SK6052 series are ultra-low dropout, fast transient response, high current delivery, high PSRR CMOS LDO. The quiescent current consumed by the SK6052 is typically 75μA over the entire input voltage range, making it ideal for consumer, networking applications that demand high output current and low quiescent consumption.

The SK6052 series are available in wide output voltage range from 0.8V to 3.6V (fixed voltage version) or adjustable voltage from 0.6V to 5.0V. The SK6052 series offer over temperature protection (OTP) and over current protection (OCP), to maintain the stability operation at abnormal conditions.

The SK6052 is available in DFN2x2-6L, SOT23-5L and SOT89-5L packages. Standard products are Pb-free and Halogen-free.

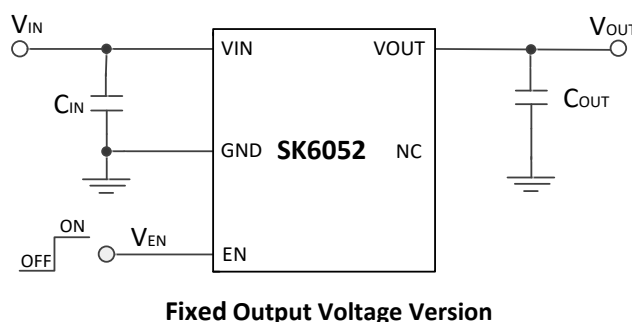
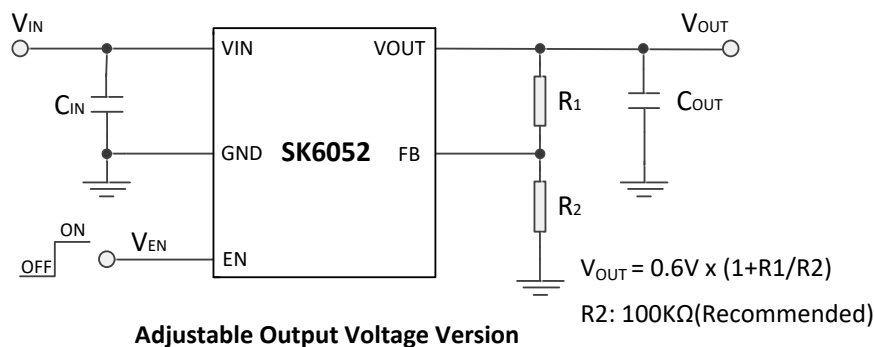
FEATURES

- Input Voltage: 1.5V~6.5V
- Fixed Output Range: 0.8~3.6V
(Customized by every 0.1V step)
- Adjustable Output Range: 0.6~5.0V
- Output Current: up to 1A
- Ultra-low Dropout Voltage:
160mV@ $V_{OUT}=1.8V$, $I_{OUT}=500mA$
- Quiescent Current: 75μA Typ.
- PSRR: 65dB@ $V_{OUT}=1.8V$, 1KHz, $I_{OUT}=30mA$

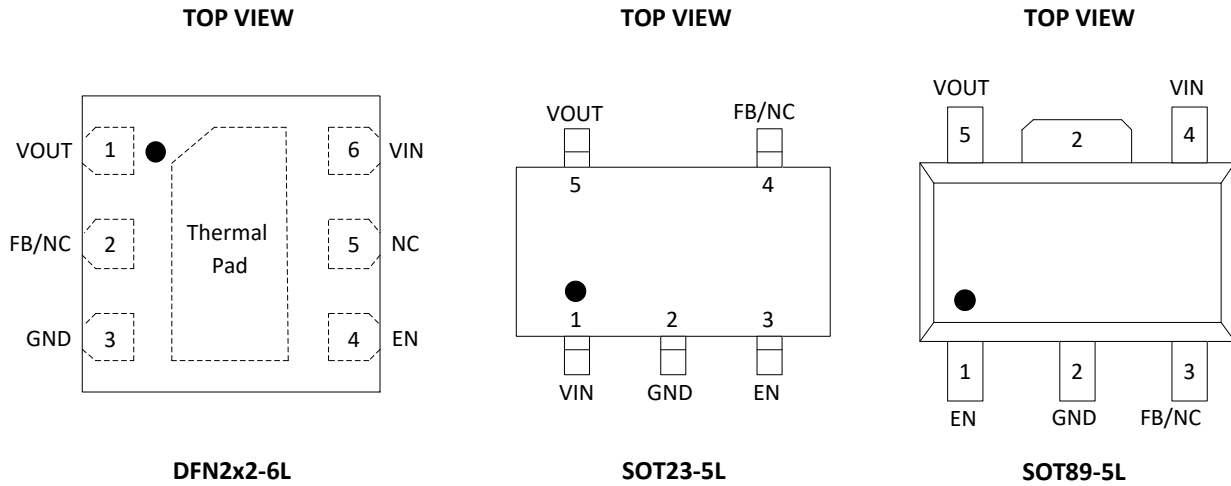
APPLICATIONS

- Portables, battery powered equipment
- Computer, Graphic card
- Network communication equipment

TYPICAL APPLICATION CIRCUITS



PIN CONFIGURATION



Note: Thermal pad must be soldered to a large PCB and connected to GND for maximum thermal dissipation.

PIN DESCRIPTION

PIN NO			SYMBOL	I/O	DESCRIPTION
DFN2x2-6L	SOT23-5L	SOT89-5L			
1	5	5	VOUT	O	Regulated output voltage
2	4	3	FB/NC	I/—	Feedback voltage (adjustable voltage version only) or no connection (fixed voltage version only)
3	2	2	GND	Ground	Ground
4	3	1	EN	I	Enable function, Active high. Floating is internally pulled low
5	—	—	NC	—	No connection
6	1	4	VIN	Power	Input supply voltage

ORDERING INFORMATION

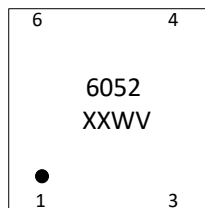
PART NO	PACKAGE	TEMPERATURE	TAPE & REEL
SK6052D6-XX	DFN2x2-6L	-40 ~ +85°C	4000/REEL
SK6052S5-XX	SOT23-5L	-40 ~ +85°C	3000/REEL
SK6052T5-XX	SOT89-5L	-40 ~ +85°C	2500/REEL
SK6052D6-ADJ	DFN2x2-6L	-40 ~ +85°C	4000/REEL
SK6052S5-ADJ	SOT23-5L	-40 ~ +85°C	3000/REEL
SK6052T5-ADJ	SOT89-5L	-40 ~ +85°C	2500/REEL

“XX”: fixed voltage version, output voltage ranging from 0.8V to 3.6V, customized by every 0.1V step.

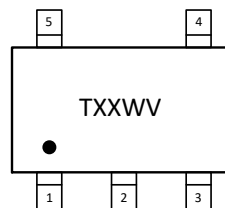
“ADJ”: adjustable voltage version, output voltage ranging from 0.6V to 5.0V.

SK6052 devices are Pb-free and RoHS compliant.

MARKING DESCRIPTION



(DFN2x2-6L)



(SOT23-5L)

“XX”: 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

“T”: Product code, stand for SK6052

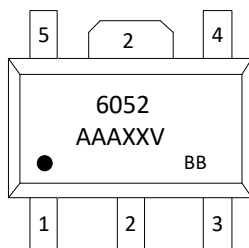
“XX”: Internal Control Code

“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.



(SOT89-5L)

“AAA”: Internal Control Code 1.

“XX”: Production serial number

“V”: Output voltage code.

“BB”: Internal Control Code 2.

TYPICAL OUTPUT VOLTAGE CODE TABLE

VOUT	CODE	VOUT	CODE
0.8V	R	2.8V	M
1.2V	B	3.0V	G
1.5V	C	3.3V	H
1.8V	D	3.6V	I
2.5V	E	ADJ	X

ABSOLUTE MAXIMUM RATINGS (Note)

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
P_{DMAX}	Power Dissipation	DFN2x2-6L	1	W
		SOT23-5L	0.5	
		SOT89-5L	0.8	
$R_{\theta JA}$	Thermal resistance	DFN2x2-6L	100	°C/W
		SOT23-5L	270	
		SOT89-5L	140	
T_J	Junction Temperature		-40~150	°C
T_A	Ambient Temperature		-40~85	°C
T_{STG}	Storage Temperature		-55~150	°C
ESD Ratings	HBM		±5	KV
	Latch up		±500	mA

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

RECOMMENDED OPERATING RANGE

SYMBOL	ITEMS	VALUE	UNIT
V_{IN}	Supply Voltage	1.5~6.5	V
C_{IN}	Input capacitor	4.7	μF
C_{OUT}	Output capacitor	4.7	μF
R2	FB pin bottom resistor, connect FB to GND	100	KΩ

ELECTRICAL CHARACTERISTICS

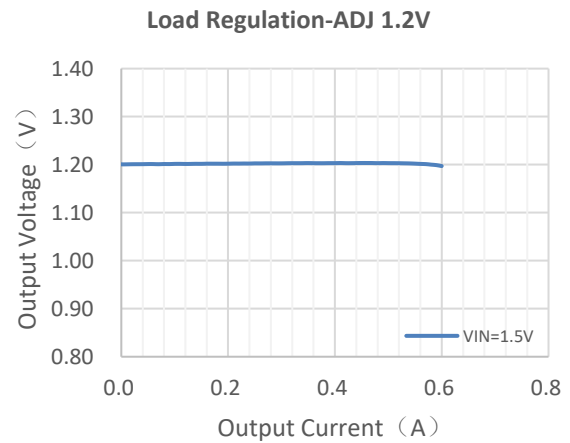
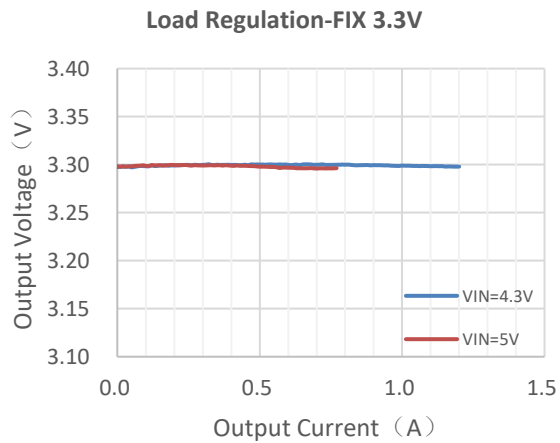
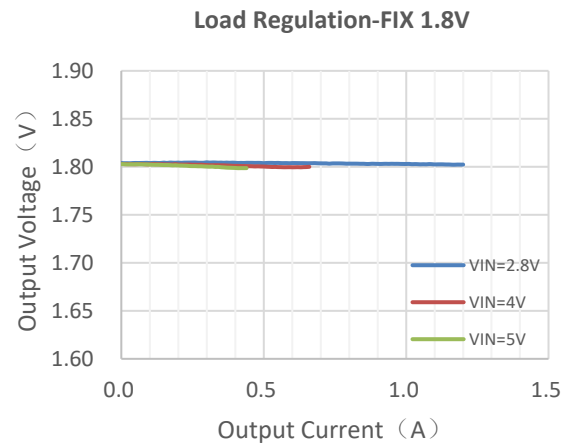
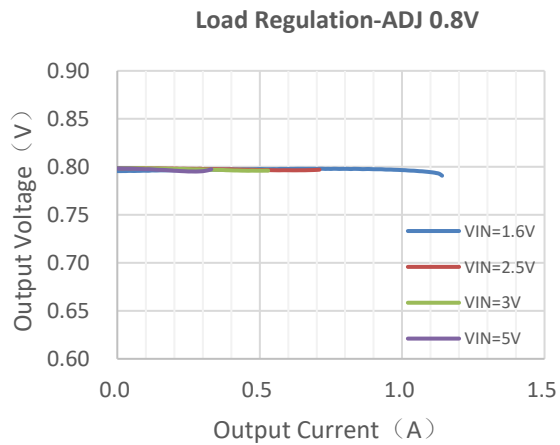
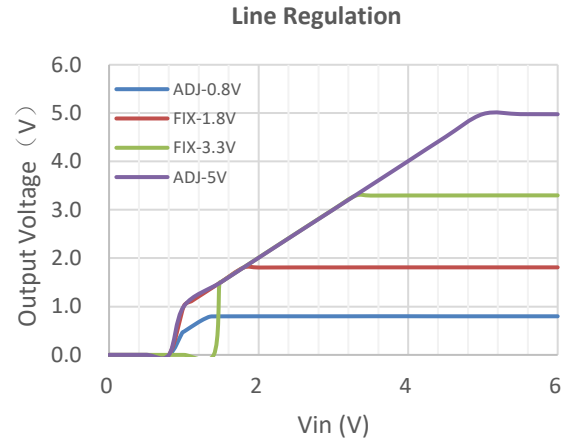
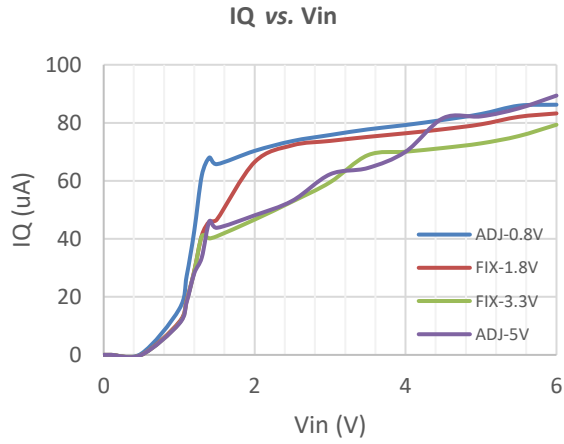
The following specifications apply for $T_A=25^{\circ}\text{C}$, $V_{IN}=V_{OUT}+1\text{V}$, $C_{IN}=4.7\mu\text{F}$, $C_{OUT}=4.7\mu\text{F}$, $I_{OUT}=1\text{mA}$, $V_{EN}=V_{IN}$, unless specified otherwise.

SYMBOL	ITEMS	CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN}	Input Voltage		1.5		6.5	V
V_{OUT}	Output Voltage Accuracy	$V_{IN} = V_{OUT} + 1\text{V}$, $I_{OUT} = 1\text{mA}$ $V_{OUT} \geq 1.5\text{V}$	-2		+2	%
		$V_{IN} = V_{OUT} + 1\text{V}$, $I_{OUT} = 1\text{mA}$ $0.8\text{V} \leq V_{OUT} < 1.5\text{V}$	-30		30	mV
V_{FB}	Feedback Voltage		0.588	0.6	0.612	V
I_{GND}	Ground Current	$I_{OUT} = 0\text{mA}$	50	75	100	μA
I_{SHDN}	Shut-down Current	$V_{EN} = 0\text{V}$			1	μA
I_{OUT}	Output Current	$V_{IN} = \text{Max}(V_{OUT} + 0.5\text{V}, 1.5\text{V})$	1			A
I_{LIM}	Output Current Limit	$V_{IN} = 5.0\text{V}$	1.3	1.6		A
ΔV_{LOAD}	Load Regulation	$V_{IN} = \text{Max}(V_{OUT} + 1\text{V}, 1.5\text{V})$, $1\text{mA} \leq I_{OUT} \leq 0.5\text{A}$		5	20	mV
ΔV_{LINE}	Line Regulation	$I_{OUT} = 1\text{mA}$ $\text{Max}(V_{OUT}+1\text{V}, 1.5) \leq V_{IN} \leq 6.5\text{V}$		2	15	mV
V_{DROP}	Dropout Voltage	$V_{OUT} = V_{OUT(NOM)} * 0.95$	$V_{OUT} = 1.8\text{V}$, $I_O = 0.5\text{A}$	160		mV
			$V_{OUT} = 3.3\text{V}$, $I_O = 0.5\text{A}$	100		
			$V_{OUT} = 5.0\text{V}$, $I_O = 0.5\text{A}$	90		
I_{SC}	Short Current Limit	$V_{OUT} = 0.5\text{V}$		600		mA
V_{ENH}	EN Logic High Voltage		1.5			V
V_{ENL}	EN Logic Low Voltage				0.3	V
I_{EN}	EN Pull-down Current	$V_{IN}=5\text{V}$, $V_{EN}=5\text{V}$,		4.5		μA
R_{VOUT_DIS}	V_{OUT} Discharge Resistance	$V_{IN}=5\text{V}$, $V_{EN}=0\text{V}$, $V_{OUT}=1\text{V}$		100		Ω
PSRR	Power Supply Ripple Rejection	$V_{IN}=5\text{V}+0.5V_{p-p}$, $f=1\text{KHz}$, $I_{OUT}=30\text{mA}$		65		dB
		$V_{IN}=5\text{V}+0.5V_{p-p}$, $f=100\text{KHz}$, $I_{OUT}=30\text{mA}$		38		dB
e_{NO}	Output Noise Voltage*1	$\text{BW}=10\text{Hz to } 100\text{KHz}$, $I_{OUT}=30\text{mA}$ $V_{OUT} = 1.8\text{V}$		200		μV_{RMS}
T_{SD}	Thermal Shutdown Threshold			150		$^{\circ}\text{C}$
ΔT_{SD}	Thermal Shutdown Hysteresis			20		$^{\circ}\text{C}$

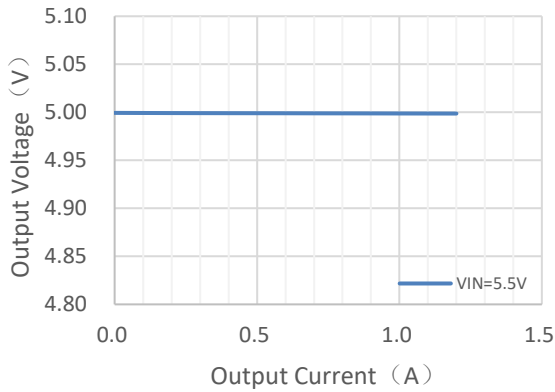
Note1: Guaranteed by design

TYPICAL PERFORMANEN CHARACTERISTICS

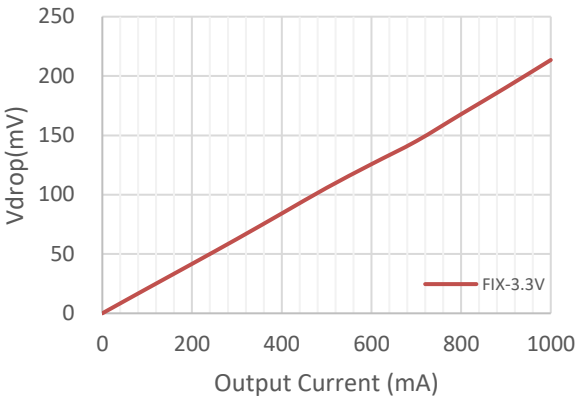
The following specifications apply for $T_A=25^{\circ}\text{C}$, $V_{IN}=V_{OUT}+1\text{V}$, $C_{IN}=C_{OUT}=4.7\mu\text{F}$, $I_{OUT}=1\text{mA}$, unless specified otherwise.



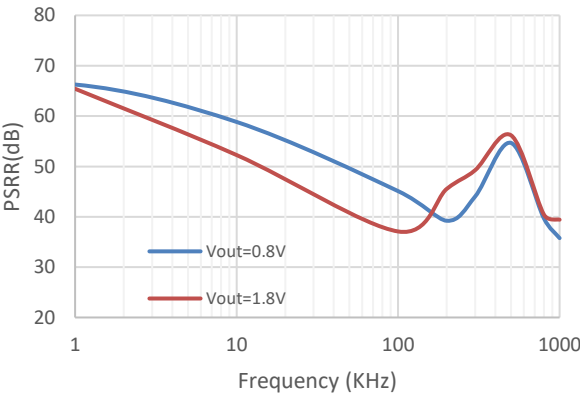
Load Regulation-ADJ 5V



Dropout voltage



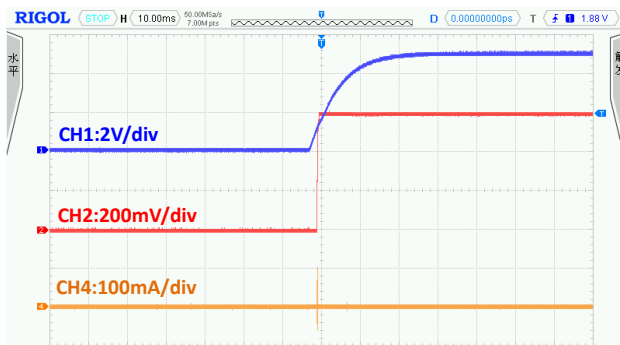
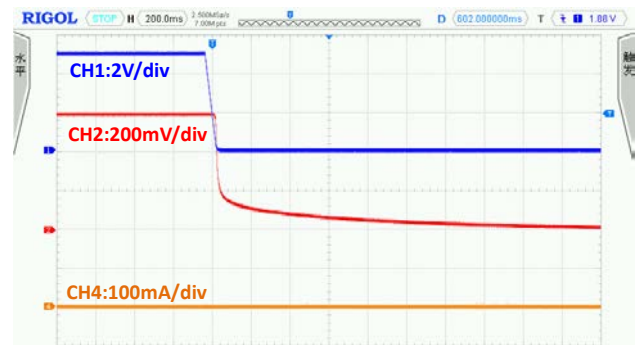
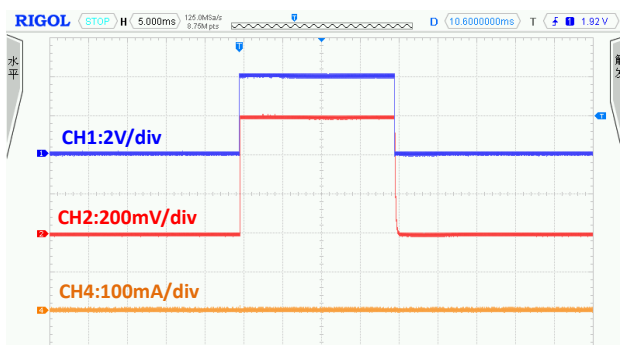
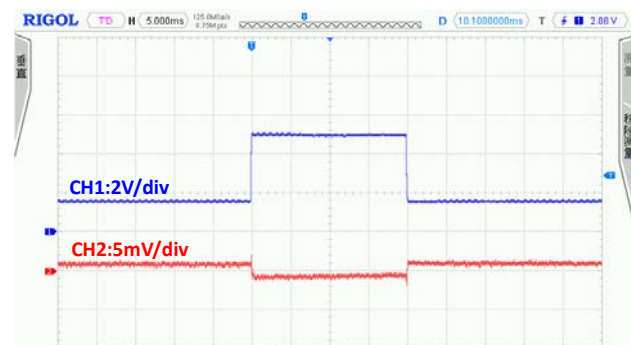
PSRR

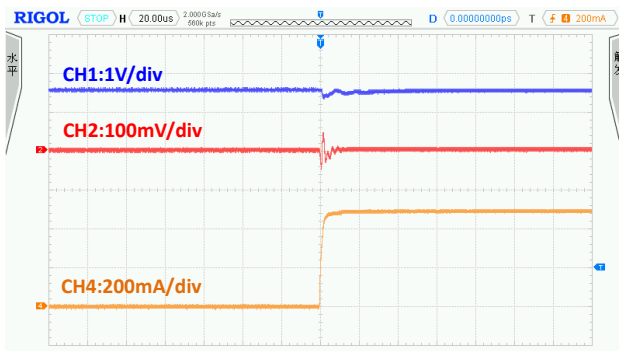
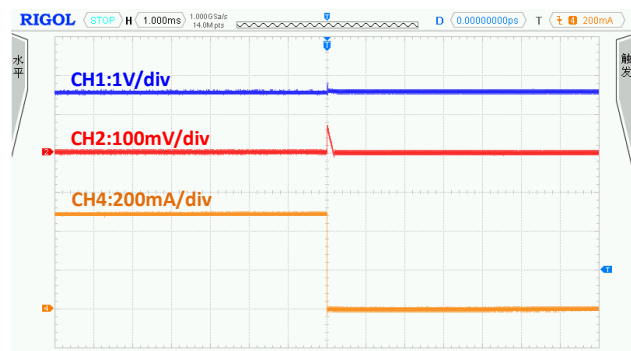
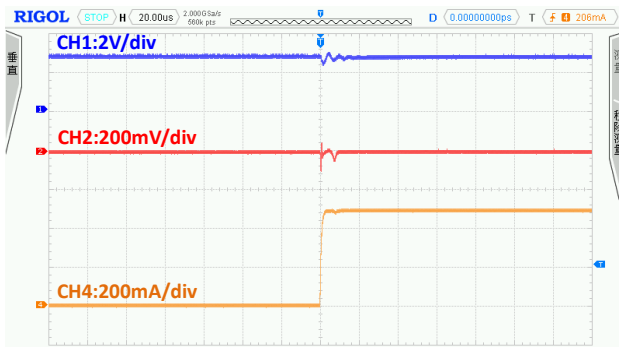
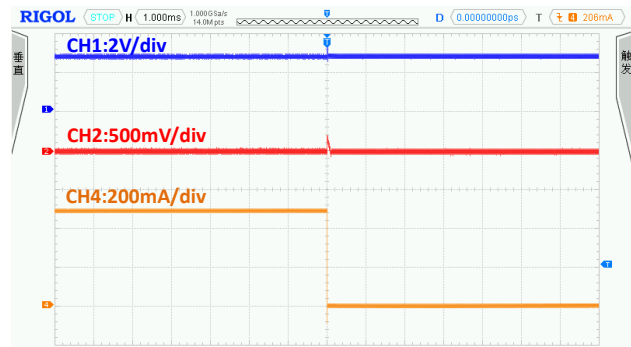
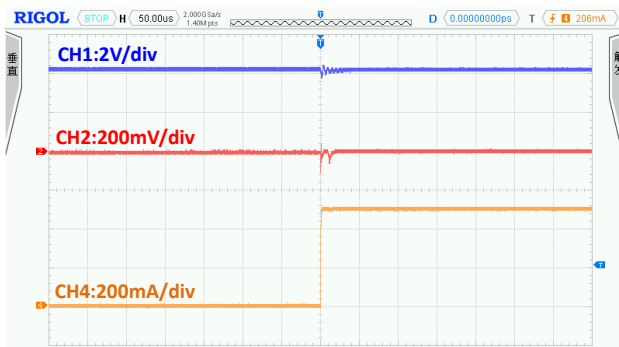
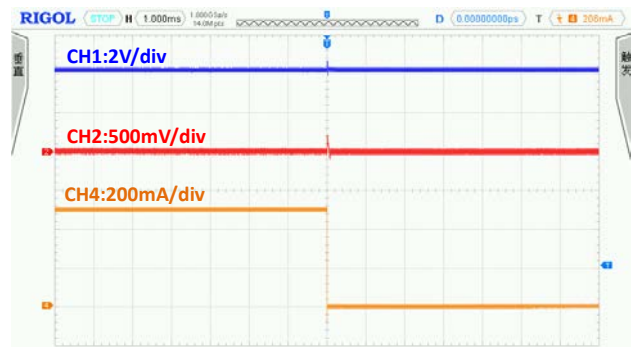
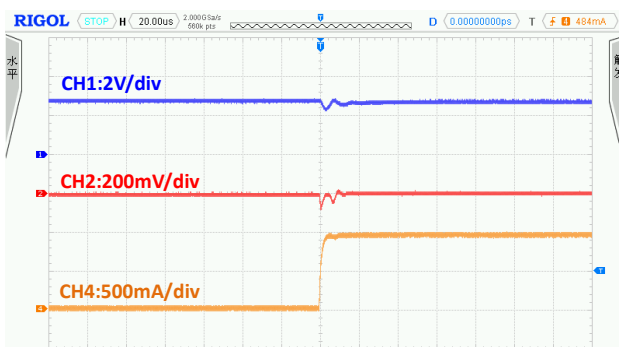
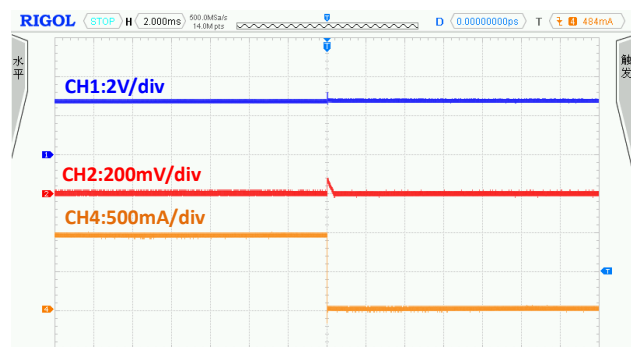


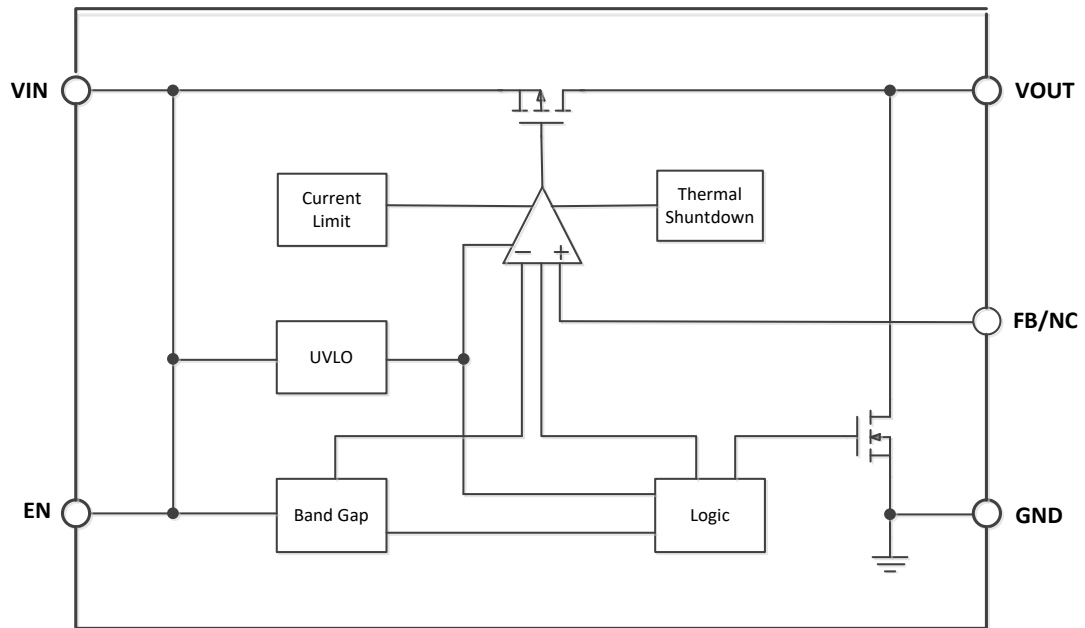
TYPICAL PERFORMANCE WAVEFORM

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

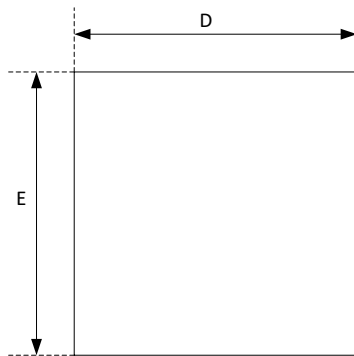
Power ON/OFF

Power ON (V_{IN}: 0V to 5V)Power OFF (V_{IN}: 5V to 0V)CH1:V_{EN}CH2:V_{OUT}CH4:I_{OUT}EN ON/OFF (V_{EN}: 0V to 4V)CH1:V_{IN}CH2:V_{OUT}Line transient (I_{OUT}=1mA)

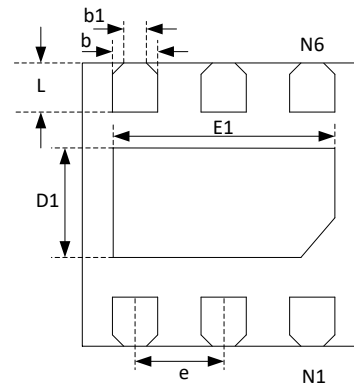
Load transient (I_{OUT} :1mA to 500mA) $V_{IN}=1.6V$, $V_{OUT}=0.8V$ Load transient (I_{OUT} :500mA to 1mA) $V_{IN}=1.6V$, $V_{OUT}=0.8V$ Load transient (I_{OUT} :1mA to 500mA) $V_{IN}=2.8V$, $V_{OUT}=1.8V$ Load transient (I_{OUT} :500mA to 1mA) $V_{IN}=2.8V$, $V_{OUT}=1.8V$ Load transient (I_{OUT} :1mA to 500mA) $V_{IN}=4.3V$, $V_{OUT}=3.3V$ Load transient (I_{OUT} :500mA to 1mA) $V_{IN}=4.3V$, $V_{OUT}=3.3V$ Load transient (I_{OUT} :1mA to 1A) $V_{IN}=2.8V$, $V_{OUT}=1.8V$ Load transient (I_{OUT} :1A to 1mA) $V_{IN}=2.8V$, $V_{OUT}=1.8V$ 

BLOCK DIAGRAM

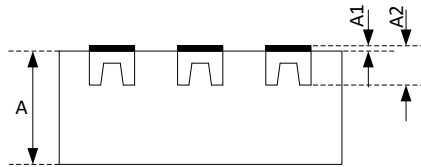
PACKAGE DIMENSIONS: DFN2x2-6L



Top View



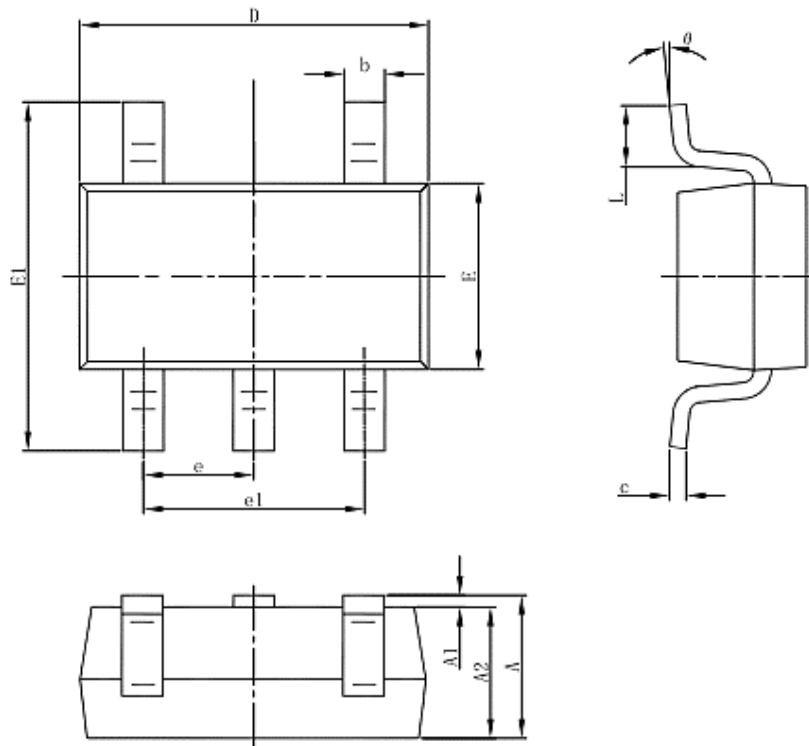
Bottom View



Side View

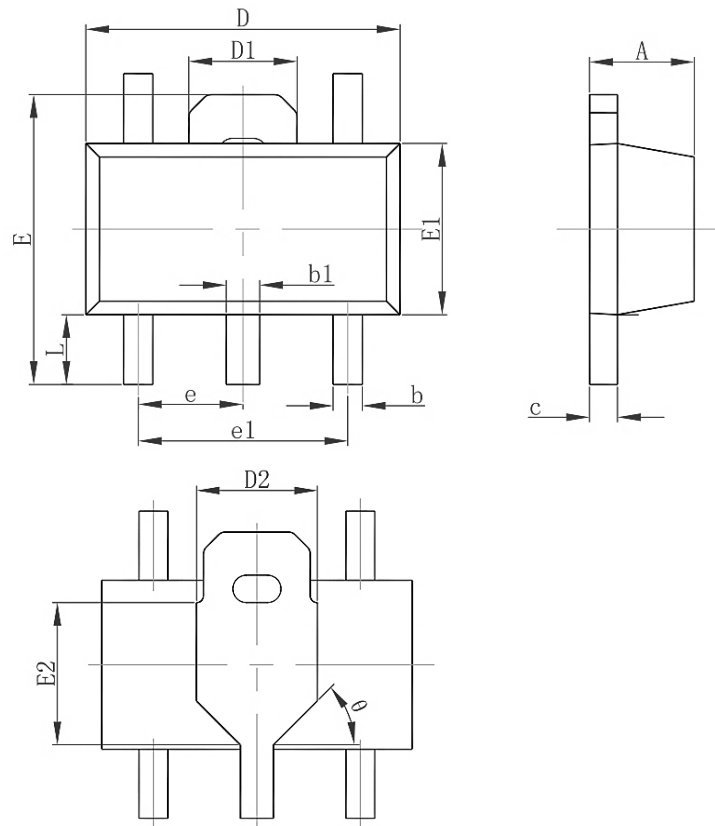
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 TYP.		0.008 TYP.	
D	1.900	2.100	0.075	0.083
E	1.900	2.100	0.075	0.083
D1	0.900	1.100	0.035	0.043
E1	1.500	1.700	0.059	0.067
b	0.250	0.350	0.010	0.014
b1	0.220 TYP.		0.009 TYP.	
e	0.650 TYP.		0.026 TYP.	
L	0.174	0.326	0.007	0.013

PACKAGE DIMENSIONS: SOT23-5L



Symbol	Dimensions In Millimeters		
	Min	Nom	Max
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 DIMENSIONS: SOT89-5L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
B1	0.380	0.580	0.015	0.023
C	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550REF.		0.061REF.	
D2	1.750REF.		0.069REF.	
E	3.940	4.250	0.155	0.167
E1	2.300	2.600	0.091	0.102
E2	1.900REF.		0.075REF.	
e	1.500TYP.		0.060TYP.	
e1	3.000TYP.		0.118TYP.	
L	0.900	1.200	0.035	0.047
θ	45°		45°	