SK6013C 300mA High PSRR, Fast Response CMOS LDO

GENERAL DESCRIPTION

SK6013C series is a group of positive voltage output, low power consumption, low dropout voltage regulator.

SK6013C can provide output value in the range of 0.9V~3.6V every 0.1V step. It also can be customized on command.

SK6013C includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module with discharge capability.

SK6013C has excellent load and line transient response and good temperature characteristics, which can assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within ±2%.

SK6013C is available in SOT23-5L and DFN1x1-4 packages which are lead free.

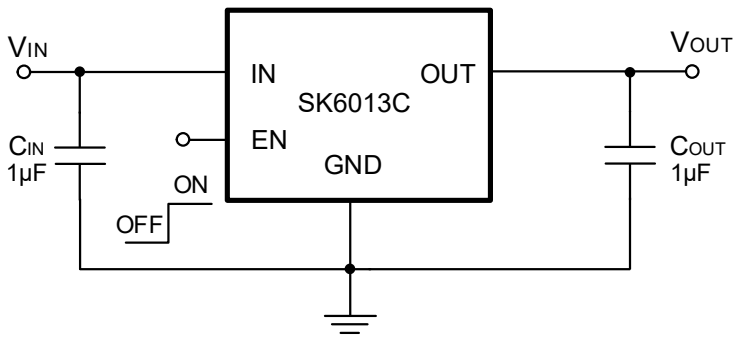
FEATURES

- Input voltage: 1.5V~6V
- Fixed output voltage: 1.2V/1.8V/2.8V/3.3V
- Low power consumption: 58uA (Typ.)
- Standby mode: 0.1uA
- Low dropout voltage: 195mV @I_{OUT}=300mA, V_{OUT}=3.3V (Typ.)
- High PSRR: 70dB@1KHz (Typ.)
- Low temperature coefficient: ±100ppm/°C
- Excellent line regulation: 0.05%/V
- Highly accurate: ±2%
- Build-in chip enable and discharge circuit
- Thermal shutdown
- Overcurrent protection

APPLICATIONS

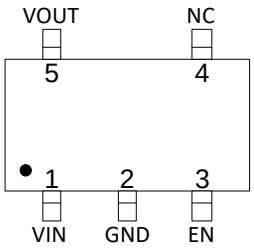
- Cellular phones and various kind of PCSs
- Battery powered equipment
- Digital cameras
- Bluetooth and wireless handsets
- Other portable electronic devices

TYPICAL APPLICATION CIRCUIT



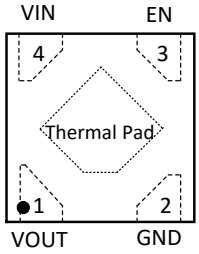
PIN CONFIGURATION

TOP VIEW



SOT23-5L

TOP VIEW



DFN1x1-4L

PIN DESCRIPTION

PIN NO		SYMBOL	I/O	DESCRIPTTION
SOT23-5L	DFN1x1-4L			
1	4	VIN	Power	Input
2	2	GND	Ground	Ground
3	3	EN	I	Enable (active high, do not float)
4	-	NC	/	Not connected
5	1	VOUT	O	Output
-	Thermal Pad	-	/	Thermal pad, connect to GND

ORDERING INFORMATION

PART NO	PACKAGE	V_{OUT} DISCHARGE	TEMPERATURE	TAPE & REEL
SK6013CS5-XX Note	SOT23-5L	Yes	-40 ~ +85℃	3000/REEL
SK6013CD4-XX Note	DFN1x1-4L	Yes	-40 ~ +85℃	10000/REEL

Note:XX indicates output voltage range 0.9V~3.6V . For example, 28 means product outputs 2.8V.

The SK6013C devices are Pb-free and RoHS compliant.

PART NUMBER RULES

SK6013C [1] - [2]

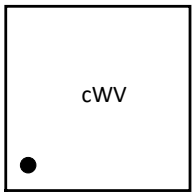
Output Voltage

XX: 0.9V~3.6V, Example: 28 - 2.8V

Package

S5: SOT23-5L; D4: DFN1x1-4L

MARKING DESCRIPTION:

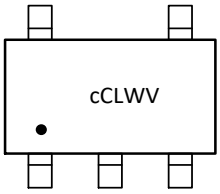


DFN1x1-4L

"**c**": Internal Product code

"**W**": The week of manufacturing. "A" stands for week1, "Z" stands for week 26, "a" stands for week 27, "z" stands for week 52 to 54.

"**V**": Output voltage code.



SOT23-5L

"**c**": Internal Product code

"**CL**": Internal code

"**W**": The week of manufacturing. "A" stands for week1, "Z" stands for week 26, "a" stands for week 27, "z" stands for week 52 to 54.

"V": Output voltage code.

TYPICAL OUTPUT VOLTAGE CODE TABLE

Vout	CODE	Vout	CODE
1.2V	B	1.8V	D
2.8V	M	3.3V	H

ABSOLUTE MAXIMUM RATING

Parameter		Value
Max input voltage		8V
Operating junction temperature(T_J)		125°C
Output current		300mA
Power dissipation	SOT23-5	600mW
	DFN1x1-4	500mW
Package thermal resistance (θ_{JA})	SOT23-5	200°C / W
	DFN1x1-4	250°C / W
Storage temperature(T_S)		-40°C -150°C
Lead temperature & time		260°C,10S
ESD (HBM)		>2000V

Note:

1) Package Thermal Resistance value can be affected by PCB design, outside radiator, ambient airflow, operating power, it just shows for reference.
2) Exceed these limits to damage to the device.
3) Exposure to absolute maximum rating conditions may affect device reliability.

RECOMMENDED WORK CONDITIONS

Item	Min	Max.	Unit
Input voltage range	1.5 [1]	6	V
Ambient temperature	-40	85	°C

Note:

1) The output current capability depends on the input voltage and the minimum dropout voltage.

ELECTRICAL CHARACTERISTICS

(Test Conditions: C_{IN}=1uF,C_{OUT}=1uF,T_A=25°C, unless otherwise specified.)

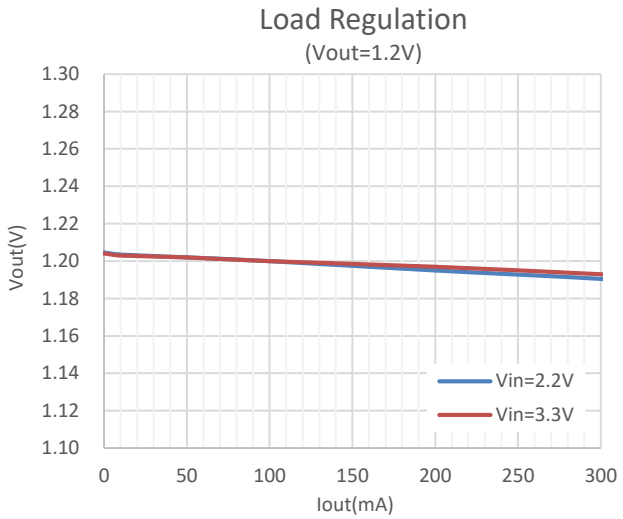
Symbol	Parameter		Conditions	Min	Typ	Max	Units
V_{IN}	Input voltage			1.5 [1]		6	V
V_{OUT}	Output voltage	V_{OUT}>1.5V	V_{IN}=Set V_{OUT}+1V, 1mA≤I_{OUT}≤30mA	V_{OUT} x0.98	V_{OUT}	V_{OUT} X1.02	V
		V_{OUT}≤1.5V		V_{OUT} -0.03		V_{OUT} +0.03	
$I_{OUT\ (Max.)}$	Maximum output current		V_{IN}-V_{OUT}=1V	300			mA
V_{DROP} [2]	Dropout voltage		V_{OUT}=1.2V, I_{OUT}=300mA		640	960	mV
			V_{OUT}=1.8V, I_{OUT}=300mA		395	600	mV
			V_{OUT}=3.3V, I_{OUT}=300mA		195	300	mV
$\frac{\Delta Vout}{\Delta Vin \cdot Vout}$	Line regulation		I_{OUT}=10mA, Set V_{OUT}+1V≤V_{IN}≤6V		0.05	0.2	%/V
ΔVout	Load regulation		V_{IN}=Set V_{OUT}+1V, 1mA≤I_{OUT}≤300mA		50	80	mV
I_Q	Supply current		V_{IN}=Set V_{OUT}+1V		58		uA
$I_{STANDBY}$	Supply current (Standby)		V_{IN}=Set V_{OUT}+1V, V_{CE}=GND		0.1	1.0	uA
$\frac{\Delta Vout}{\Delta T \cdot Vout}$	Output voltage temperature coefficient		I_{OUT}=10mA		±100		ppm/°C
PSRR	Ripple rejection		F=1KHz, Ripple=0.5Vp-p V_{IN}=Set V_{OUT}+1V		70		dB
I_{SHORT}	Short current limit		V_{IN}=5V, V_{OUT}=0V		100		mA
R_{PD}	CE pull down resistance				500K		Ω
$R_{DISCHARGE}$	Discharge resistor		V_{CE}=GND, V_{OUT}=3.0V		1.5K		Ω
T_{SD}	Thermal shutdown temp		V_{IN}=Set V_{OUT}+1V, I_{OUT}=10mA		160		°C
T_{SH}	Thermal shutdown hysteresis		V_{IN}=Set V_{OUT}+1V, I_{OUT}=10mA		30		°C
V_{CEH}	CE input voltage “H”			1		V_{IN}	V
V_{CEL}	CE input voltage “L”			0		0.5	V

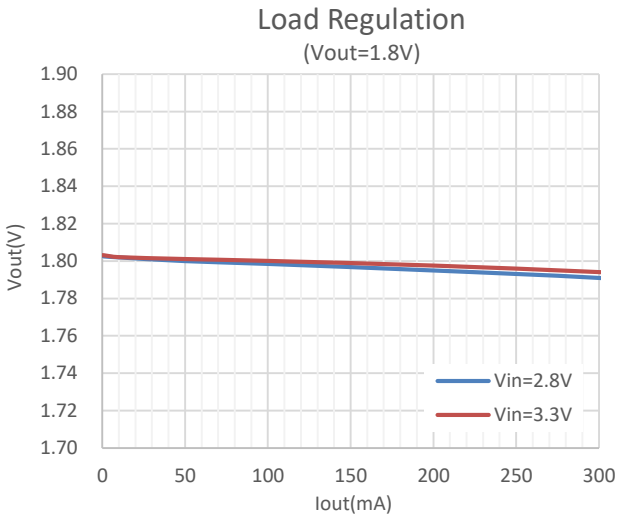
Note:

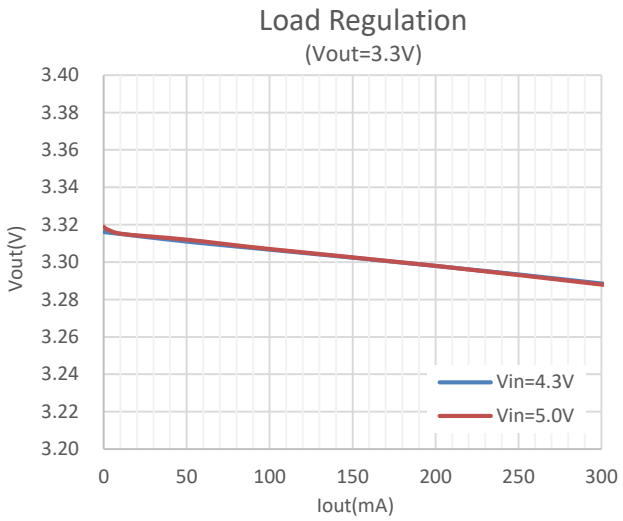
1) The output current capability depends on the input voltage and the minimum dropout voltage.

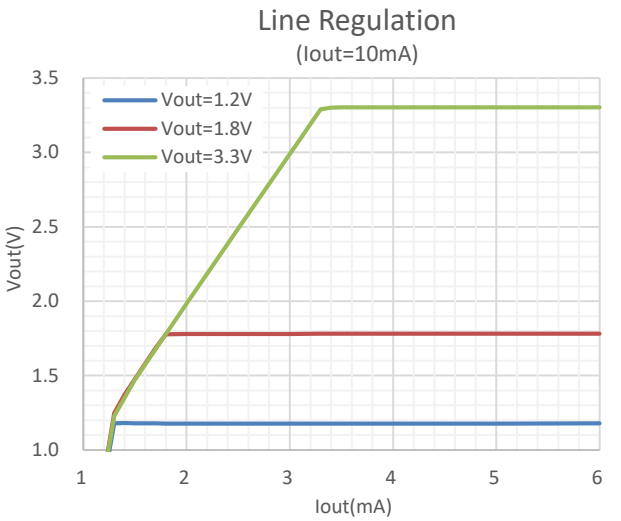
2) V_{DROP}=V_{IN}-V_{OUT} when V_{OUT} drops below 98% of the normal V_{OUT}.

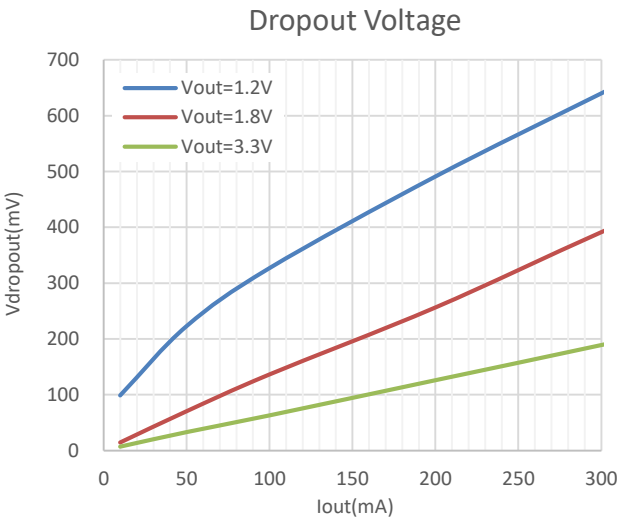
TYPICAL PERFORMANCE CHARACTERISTICS

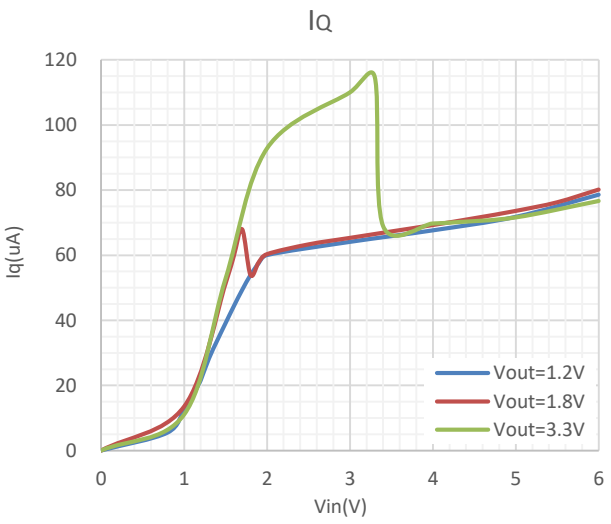






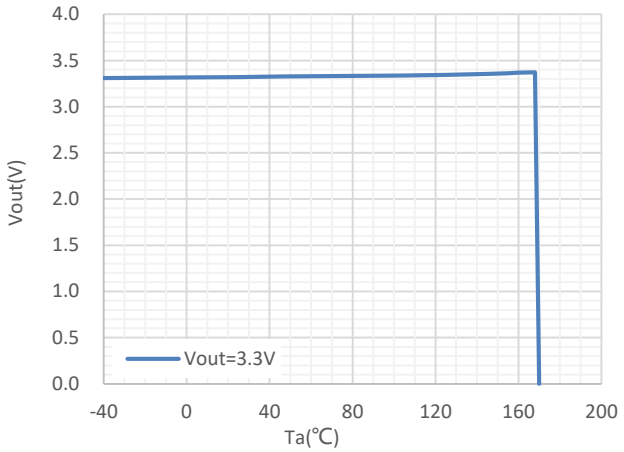




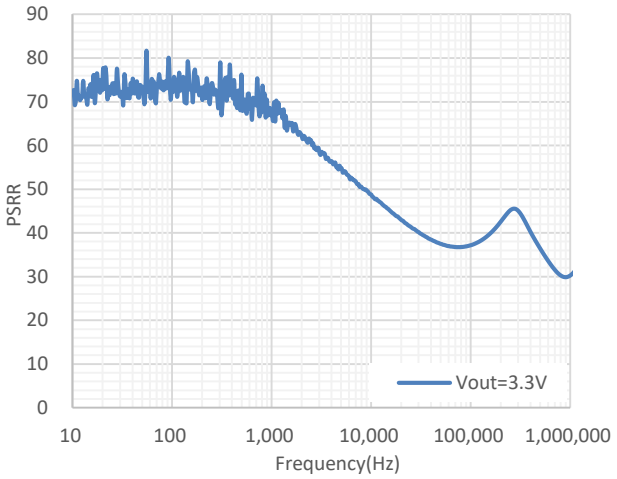


Vout vs. Temp

(Vin=5V, Iout=10mA)

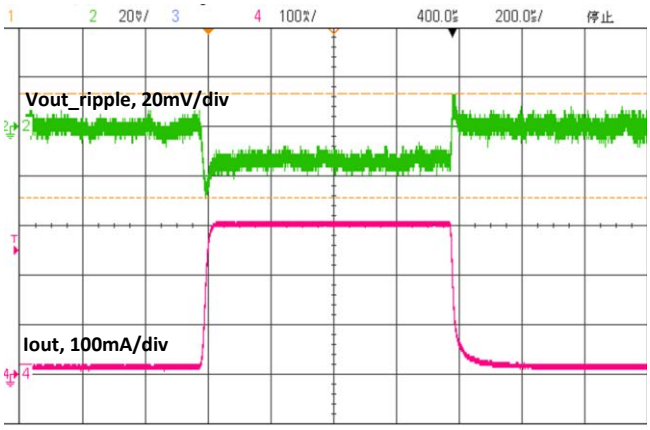


PSRR



Load Transient Response

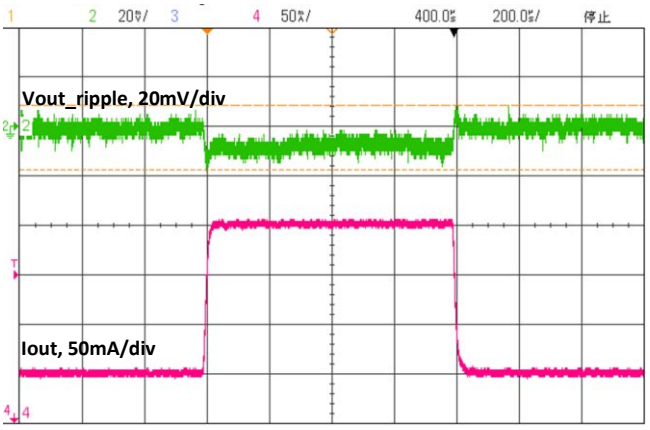
(Vin=5V, Vout=3.3V, Iout=10-300mA)



CH2: Vout_ripple, CH4: Iout

Load Transient Response

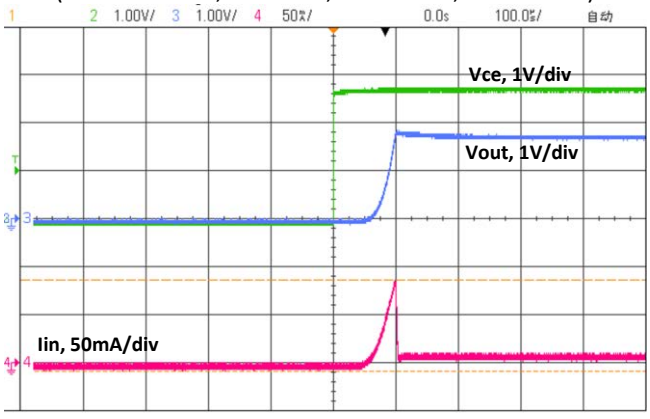
(Vin=5V, Vout=3.3V, Iout=150-300mA)



CH2: Vout_ripple, CH4: Iout

CE Chip Enable Response

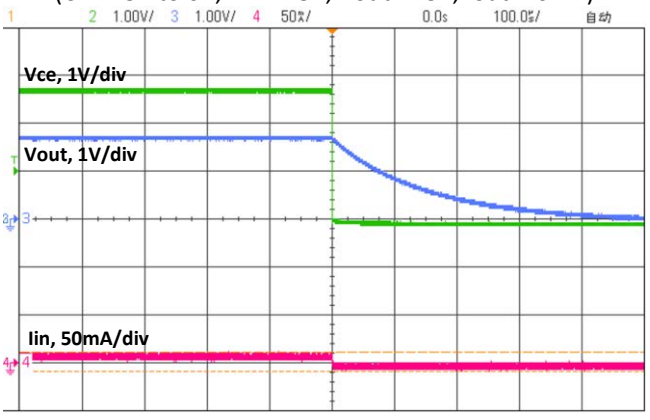
(CE=0V to 2.8V, Vin=2.8V, Vout=1.8V, Iout=10mA)



CH2: CE; CH3: Vout; CH4: Iin

CE Chip Enable Response

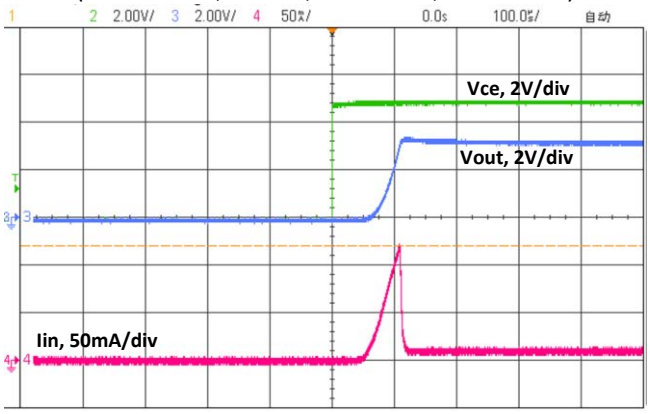
(CE=2.8V to 0V, Vin=2.8V, Vout=1.8V, Iout=10mA)



CH2: CE; CH3: Vout; CH4: Iin

CE Chip Enable Response

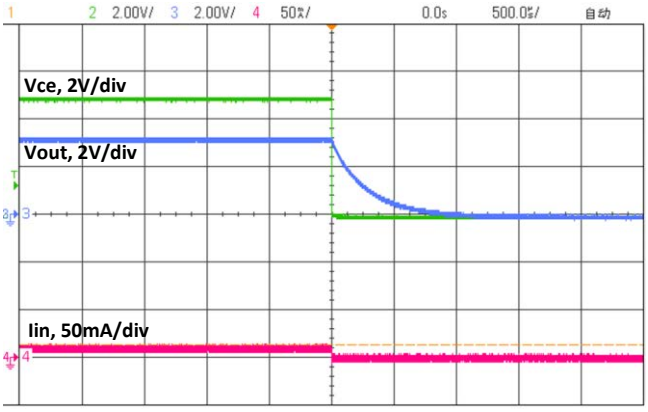
(CE=0V to 5V, Vin=5V, Vout=3.3V, Iout=10mA)



CH2: CE; CH3: Vout; CH4: Iin

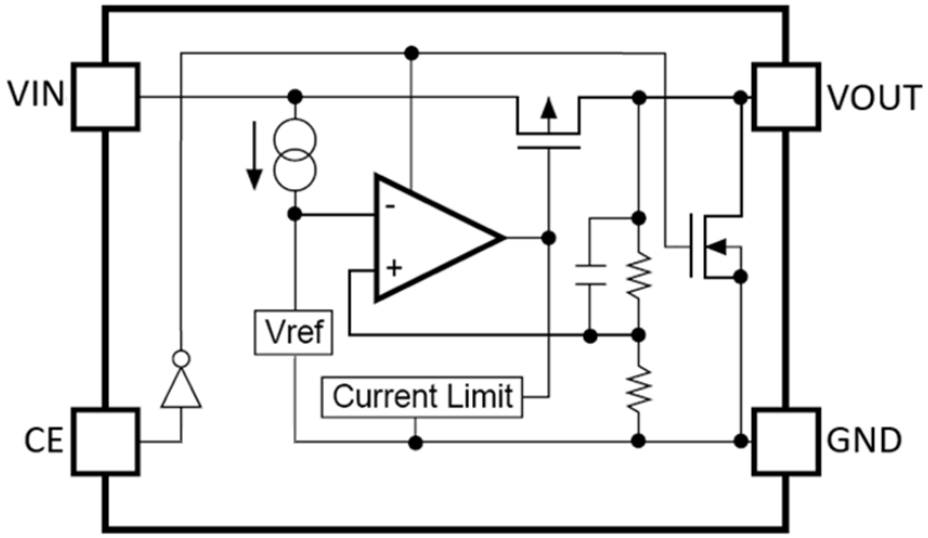
CE Chip Enable Response

(CE=5V to 0V, Vin=5V, Vout=3.3V, Iout=10mA)

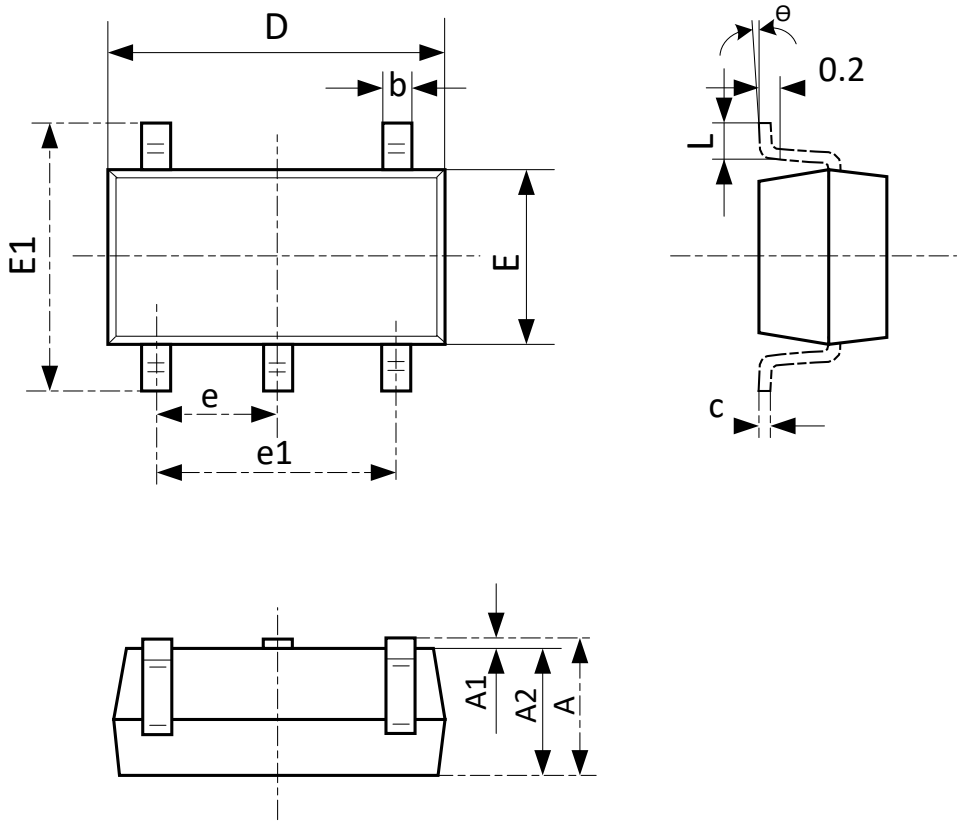


CH2: CE; CH3: Vout; CH4: Iin

BLOCK DIAGRAM

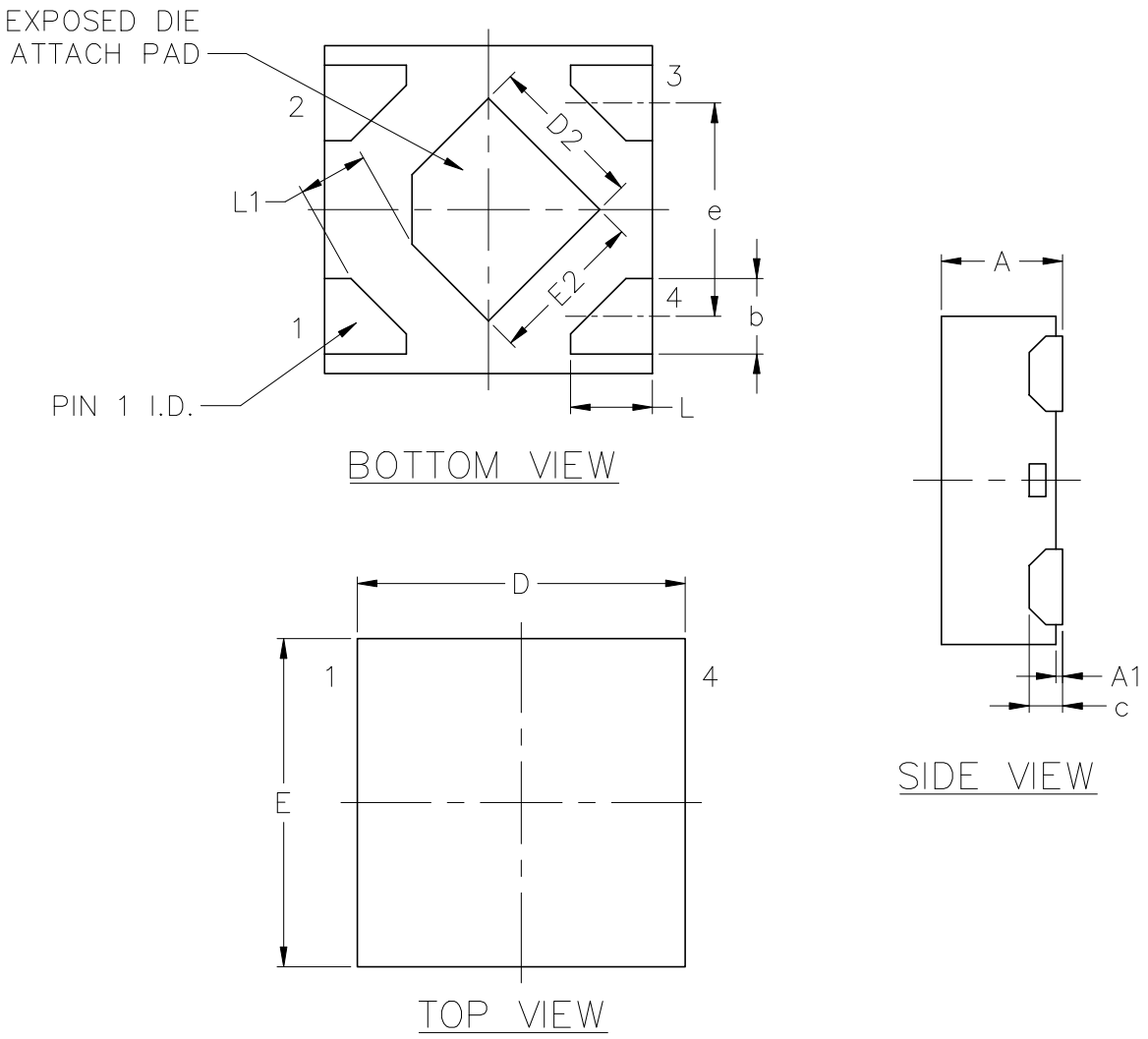


PACKAGE DIMENSIONS: SOT23-5



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℃

PACKAGE DIMENTSIONS: DFN1x1-4L



Symbol	MIN. (mm)	NOM. (mm)	MAX. (mm)	Symbol	MIN. (mm)	NOM. (mm)	MAX. (mm)
A	0.32	0.37	0.41	C	0.65 BSC		
A1	0.00	0.02	0.05	E	0.95	1.00	1.05
b	0.18	0.23	0.28	E2	0.43	0.48	0.53
C	0.102 REF			L	0.20	0.25	0.30
D	0.95	1.00	1.05	L1	0.205 REF		
D2	0.43	0.48	0.53				