

SK6013

Low Noise, High PSRR, High Speed, CMOS LDO

GENERAL DESCRIPTION

The SK6013 is a high accuracy, low noise, high speed, low dropout CMOS Linear regulator with high 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.

SK6013 can provide product selections of output value in the range of 1.2V~3.6V by every 0.1V step.

The current limiter's fold-back circuit also operates as a short circuit protection and an output current limiter at the output pin.

The SK6013 regulators are available in standard SOT23-5L and DFN1x1-4L packages. Standard products are Pb-free and Halogen-free.

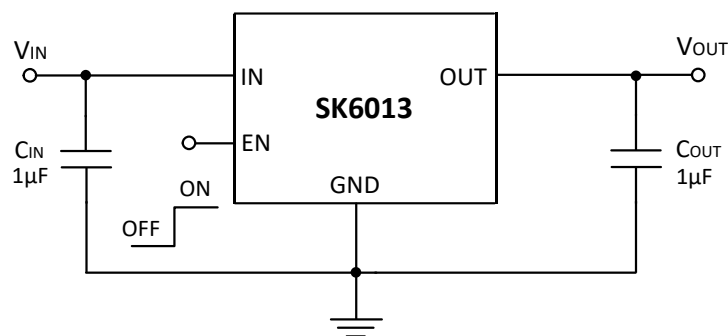
FEATURES

- Input voltage : 2.5V~6.5V
- Output range: 1.2V~3.6V
- Maximum output current: 300mA
- PSRR: 75dB @1KHz
- Dropout voltage: 220mV @ $I_{OUT}=200mA$
- Quiescent current : 50 μA Typ.
- Shut-down current: <1 μA
- Recommend capacitor:1 μF
- Low output noise: 100 μV_{RMS}

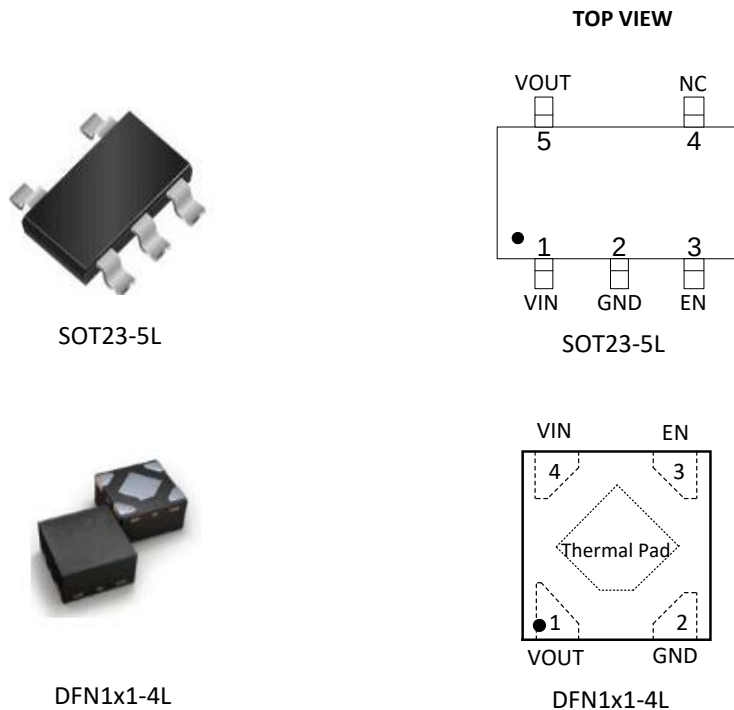
APPLICATIONS

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

TYPICAL APPLICATION CIRCUIT



PIN CONFIGURATION



PIN DESCRIPTION

PIN NO		SYMBOL	I/O	DESCRIPTION
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

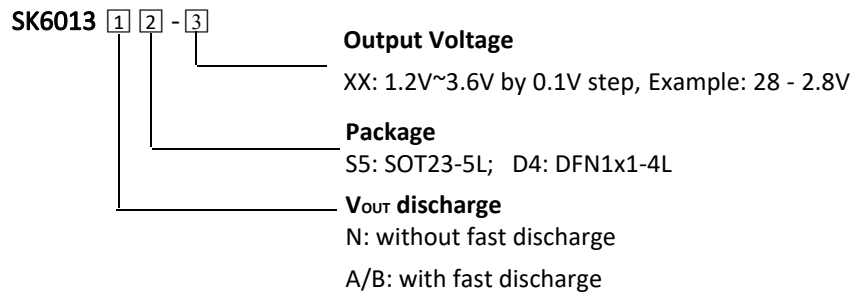
ORDERING INFORMATION

PART NO	PACKAGE	V _{OUT} DISCHARGE	TEMPERATURE	TAPE & REEL
SK6013AD4-XX ^{Note}	DFN1x1-4L	Yes	-40 ~ +85℃	10000/REEL
SK6013BS5-XX ^{Note}	SOT23-5L	Yes	-40 ~ +85℃	3000/REEL
SK6013ND4-XX ^{Note}	DFN1x1-4L	No	-40 ~ +85℃	10000/REEL
SK6013NS5-XX ^{Note}	SOT23-5L	No	-40 ~ +85℃	3000/REEL

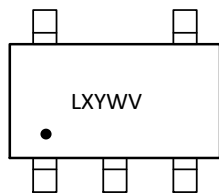
Note: XX indicates 1.2V~3.6V by 0.1V step. For example, 28 means product outputs 2.8V.

The SK6013 devices are Pb-free and RoHS compliant.

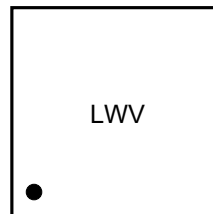
PART NUMBER RULES



MARKING DESCRIPTION



SOT23-5L



DFN1x1-4L

“L”: Product code

“XY”: Internal control 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.

“V”: Output voltage code

TYPICAL OUTPUT VOLTAGE CODE TABLE

V _{OUT}	CODE	V _{OUT}	CODE
1.2V	B	1.5V	C
1.8V	D	2.5V	E
2.6V	F	2.7V	L
2.8V	M	2.9V	N
3.0V	G	3.3V	H
3.6V	I	2.2V	V
1.3V	3		

ABSOLUTE MAXIMUM RATINGS^(Note)

SYMBOL	ITEMS		VALUE	UNIT
V _{IN}	Input Voltage		-0.3~8	V
I _{OUT}	Output Current		550	mA
P _{DMAX}	Power Dissipation	SOT23-5L	0.45	W
		DFN1x1-4L	0.55	
R _{θJA}	Thermal Resistance	SOT23-5L	270	°C/W
		DFN1x1_4L	220	
T _J	Junction Temperature		-40~+125	°C
T _A	Ambient Temperature		-40~+85	°C
T _{STG}	Storage Temperature		-55 to +150	°C
T _{SOLDER}	Package Lead Soldering Temperature		260°C, 10s	

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

RECOMMENDED OPERATING RANGE

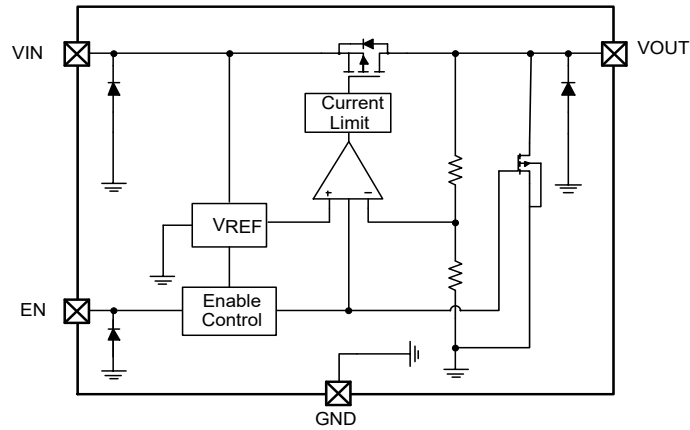
SYMBOL	ITEMS	VALUE	UNIT
V _{IN}	Supply Voltage	2.5 to 6.5	V
I _{OUT}	Output Current	<300	mA
T _{OPT}	Operating Temperature	-40 to +85	°C
C _{IN}	Input Capacitor	1μF ~10μF, 1μF is recommended	μF
C _{OUT}	Output Capacitor		μF

ELECTRICAL CHARACTERISTICS

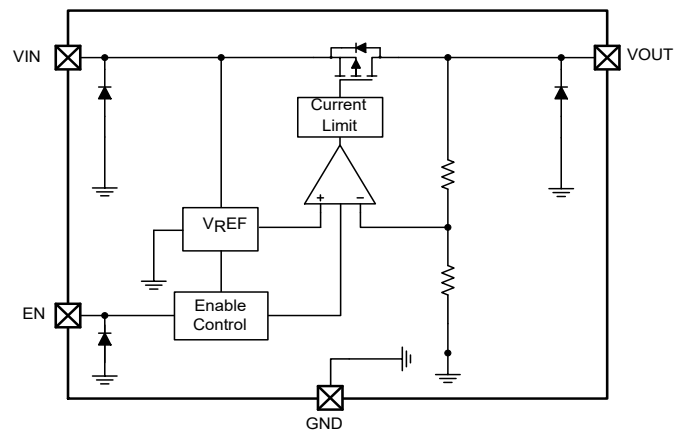
The following specifications apply for $V_{OUT}=2.8V$, $T_A=25^{\circ}C$, unless otherwise specified.

SYMBOL	ITEMS	CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN}	Input Voltage		2.5		6.5	V
V_{OUT}	Output Range	$V_{OUT} < 1.8V$, $V_{IN}=2.7V$, $I_{OUT}=1mA$	-3	V_{OUT}	3	%
		$V_{OUT} \geq 1.8V$, $I_{OUT}=1mA$	-2	V_{OUT}	2	
I_Q	Quiescent Current	$V_{OUT}=2.8V$, $I_{OUT}=0$		50		μA
I_{LIMIT}	Current Limit	$V_{IN}=V_{EN}=4.5V$		500		mA
V_{DROP}	Dropout Voltage	$V_{OUT}=3.3V$, $I_{OUT}=200mA$		220	250	mV
		$V_{OUT}=3.3V$, $I_{OUT}=300mA$		320	350	
ΔV_{LINE}	Line Regulation	$V_{IN}=2.7\sim 5.5V$, $I_{OUT}=1mA$		0.01	0.15	%/V
ΔV_{LOAD}	Load Regulation	$V_{OUT}=2.8V$, $I_{OUT}=1\sim 300mA$		40	70	mV
I_{SHORT}	Short Current	$V_{EN}=V_{IN}$, V_{OUT} Short to GND with 1Ω		100		mA
I_{SHDN}	Shut-down Current	$V_{EN}=0V$			1	μA
PSRR	Power Supply Rejection Rate	$V_{IN}=5V_{DC}+0.5V_{P-P}$ $F=1KHz$, $I_{OUT}=10mA$		75		dB
		$V_{IN}=5V_{DC}+0.5V_{P-P}$ $F=100KHz$, $I_{OUT}=10mA$		55		
V_{ENH}	EN logic high voltage	$V_{IN}=5.5V$, $I_{OUT}=1mA$	1.5		V_{IN}	V
V_{ENL}	EN logic low voltage	$V_{IN}=5.5V$, $V_{OUT}=0V$			0.4	V
I_{EN}	EN Input Current	$V_{EN}=0$ to $5.5V$			1.0	μA
e_{NO}	Output Noise Voltage	10Hz to 100KHz, $C_{OUT}=1\mu F$		100		μV_{RMS}

SIMPLIFIED BLOCK DIAGRAM



With auto-discharge

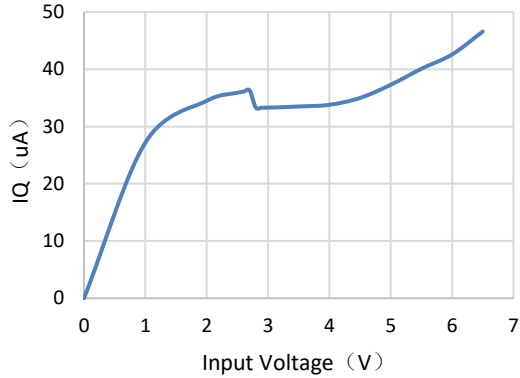


Without auto-discharge

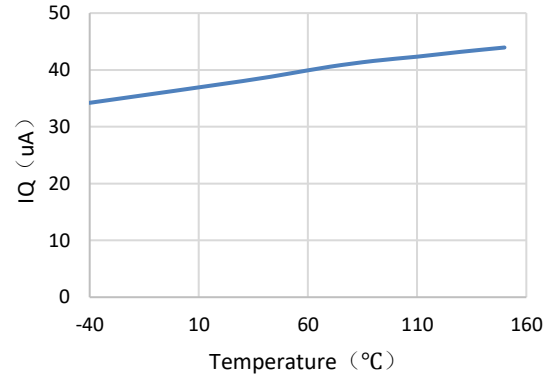
TYPICAL PERFORMANCE CHARACTERISTICS

$C_{IN}=C_{OUT}=1\mu F$, $V_{IN}=4.5V$, $V_{OUT}=2.8V$, $T_A=25^\circ C$, unless otherwise specified. Package : SOT23-5L

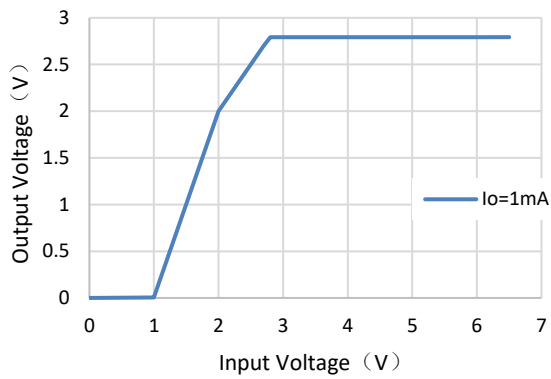
IQ vs. Input Voltage



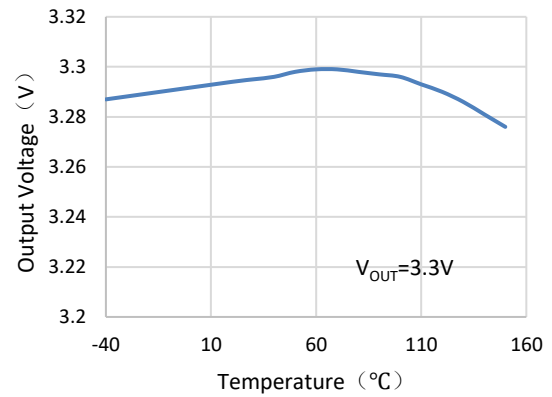
IQ vs. Temperature



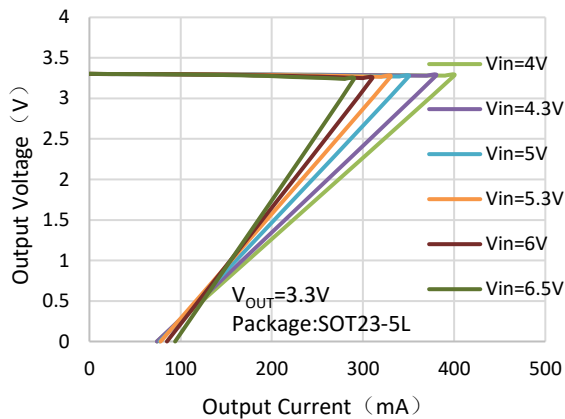
Output Voltage vs. Input Voltage



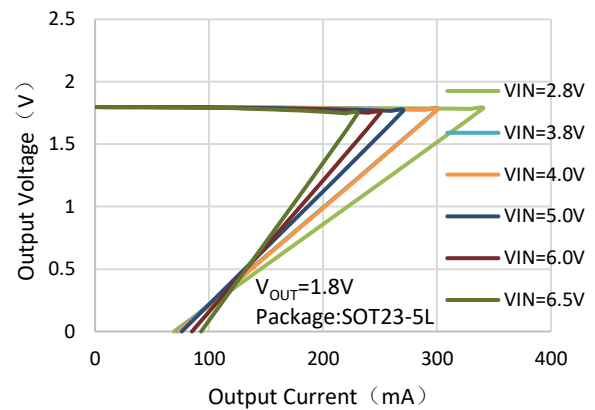
Output Voltage vs. Temperature



Output Voltage vs. Output Current

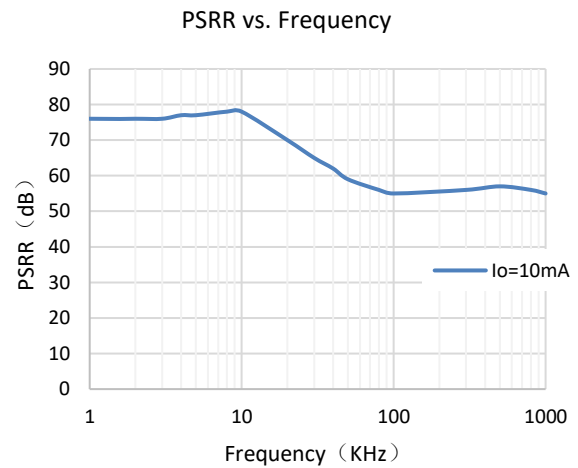
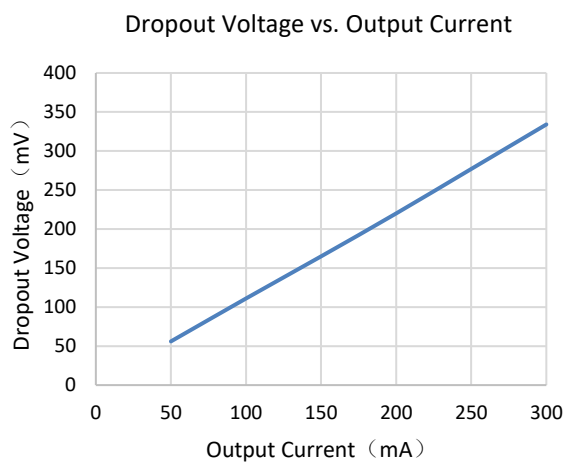
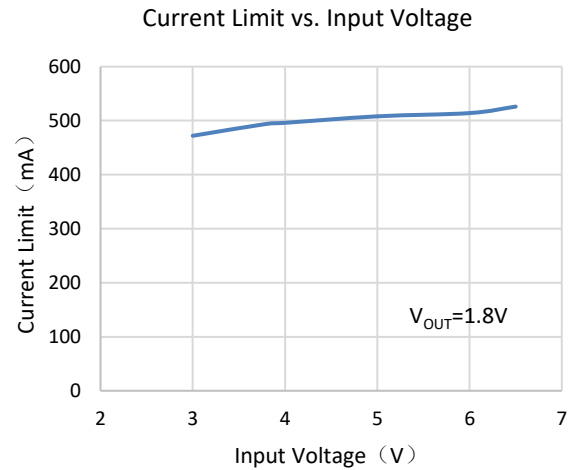
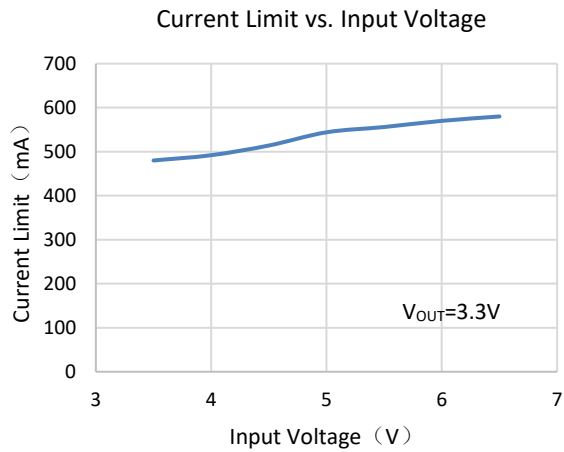
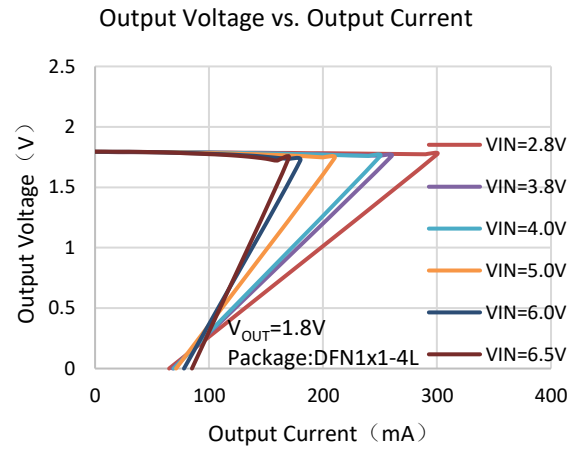
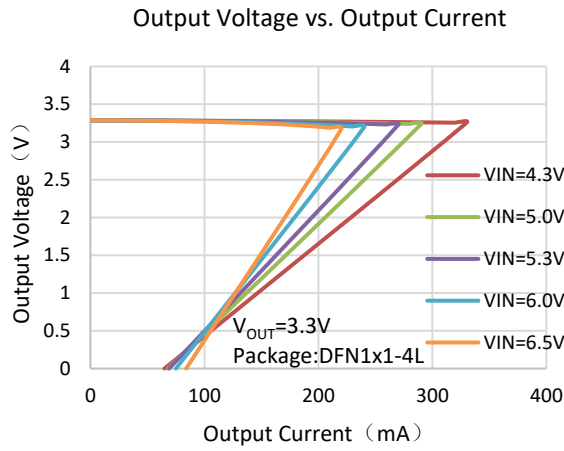


Output Voltage vs. Output Current



TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

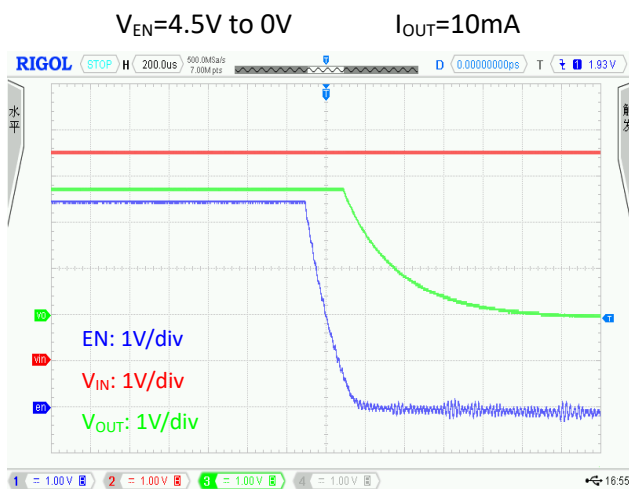
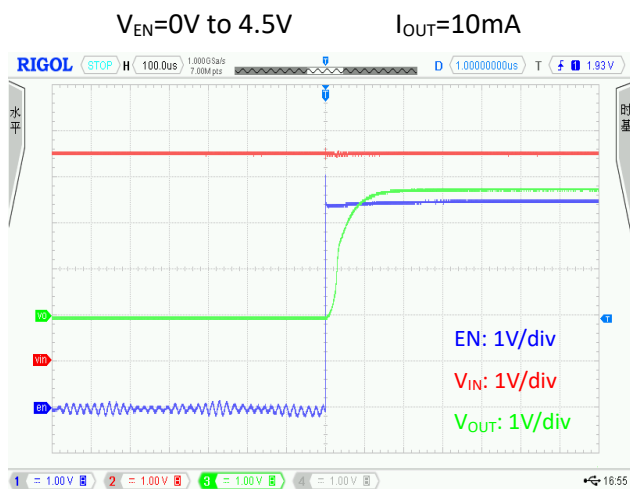
$C_{IN}=C_{OUT}=1\mu F$, $V_{IN}=4.5V$, $V_{OUT}=2.8V$, $T_A=25^\circ C$, unless otherwise specified. Package: SOT23-5L



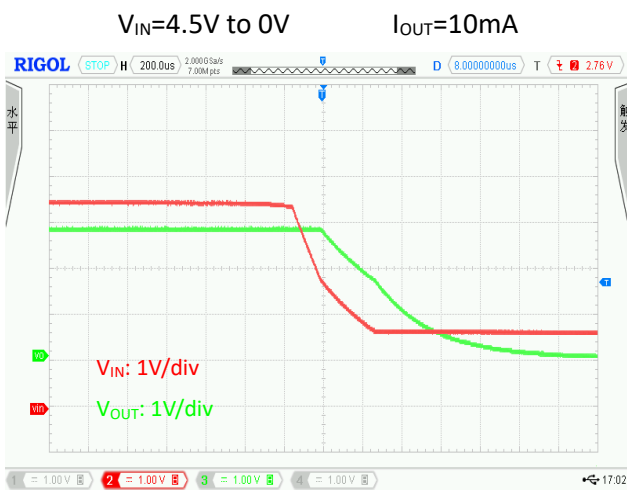
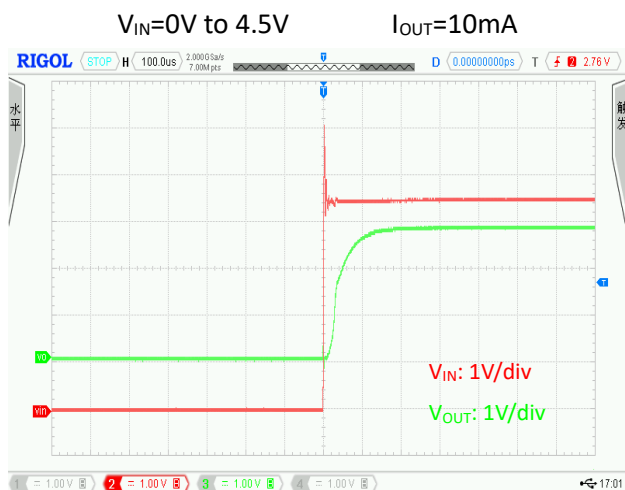
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

$C_{IN}=C_{OUT}=1\mu F$, $V_{IN}=4.5V$, $V_{OUT}=2.8V$, $T_A=25^\circ C$, unless otherwise specified. Package: SOT23-5L

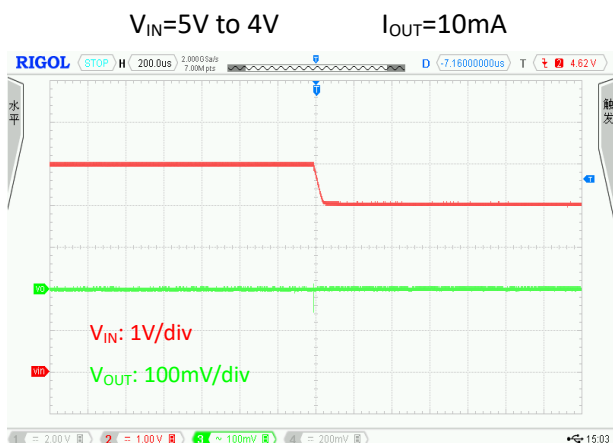
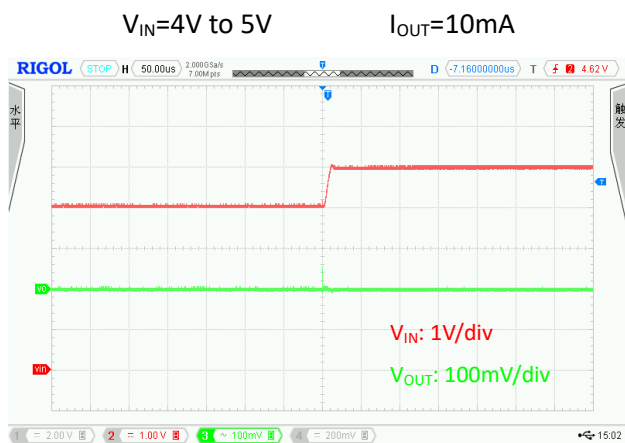
EN ON / OFF



Power ON / OFF



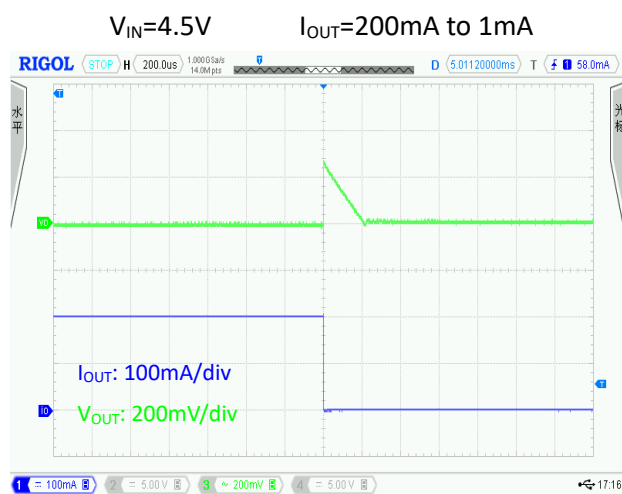
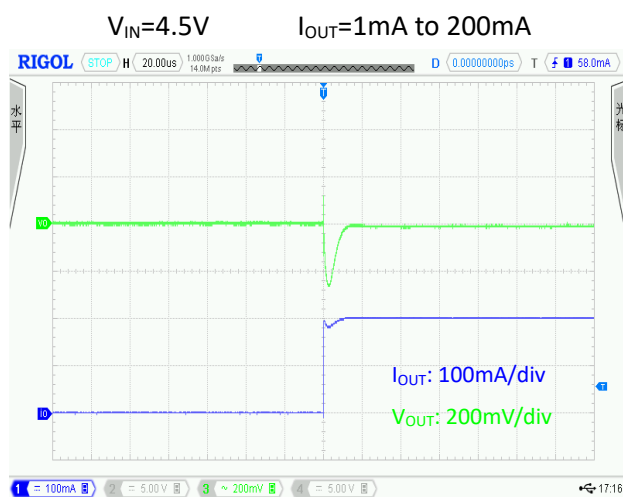
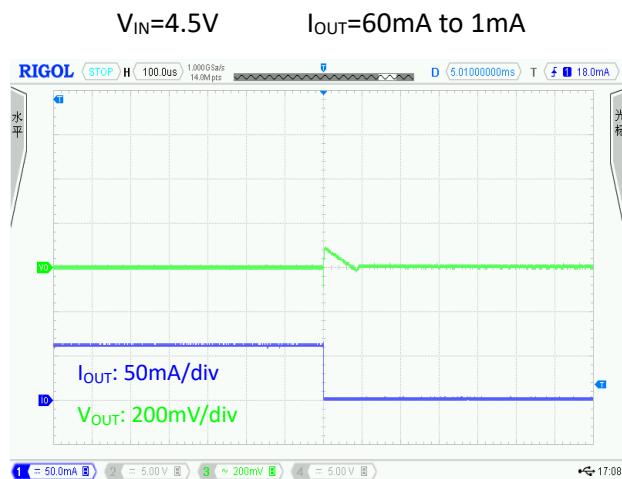
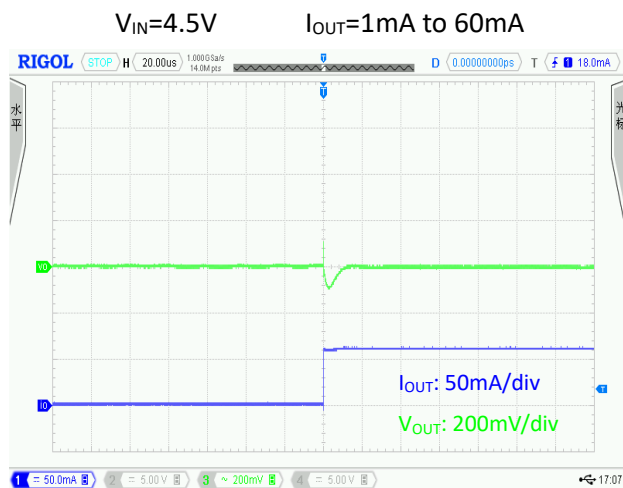
Line Transient



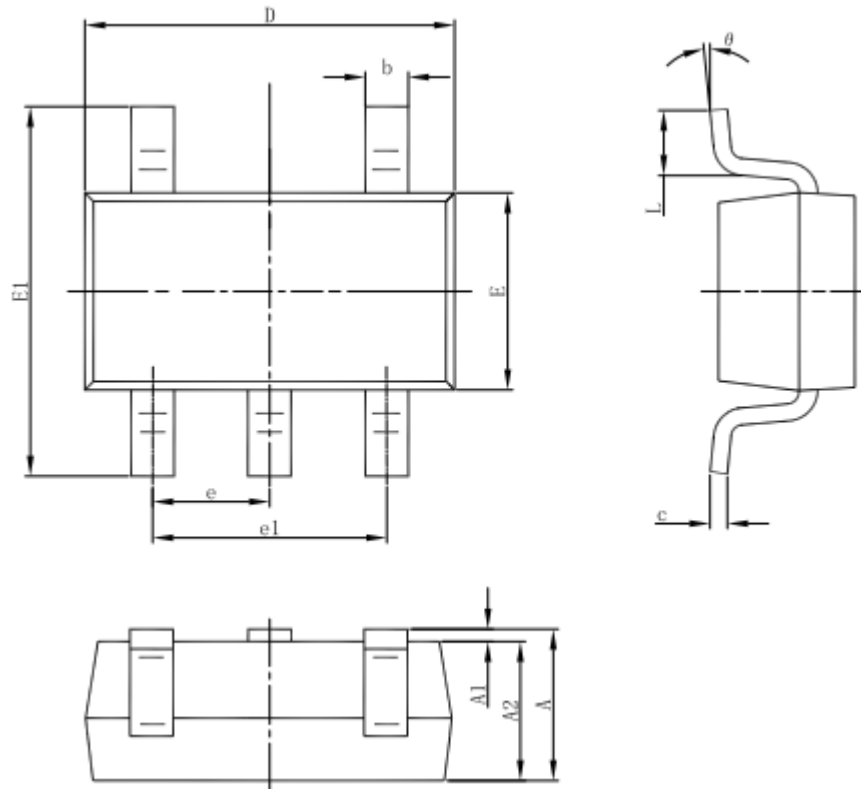
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

$C_{IN}=C_{OUT}=1\mu F$, $V_{IN}=4.5V$, $V_{OUT}=2.8V$, $T_A=25^\circ C$, unless otherwise specified. Package: SOT23-5L

Load Transient

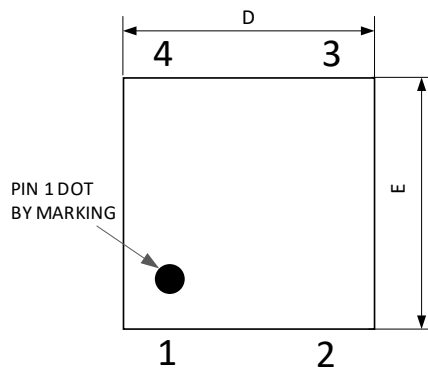


PACKAGE DIMENSIONS: SOT23-5L

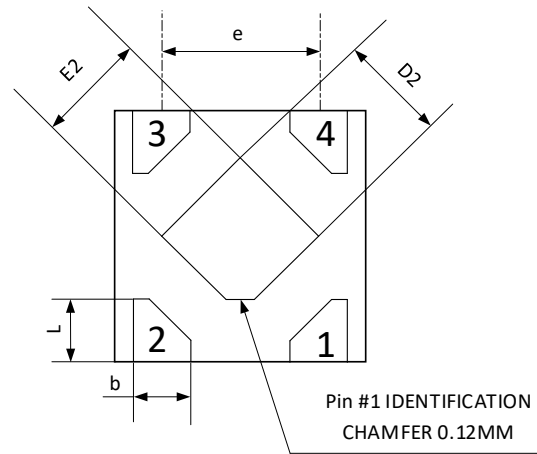


DIMENSIONS IN MILLIMETERS			
SYMBOL	MINIMUM	NOMINAL	MAXIMUM
A	1.05	-	1.35
A1	0.00	-	0.15
A2	1.00	1.10	1.20
b	0.3	-	0.5
D	2.82	2.92	3.02
E	1.50	1.60	1.70
E1	2.60	2.80	3.00
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
L	0.30	0.45	0.60
θ	0°	-	8°

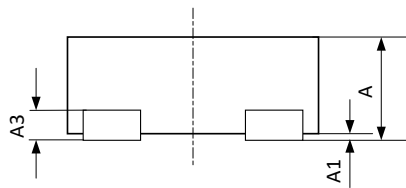
PACKAGE DIMENSIONS: DFN1X1-4L #1



TOP VIEW



BOTTOM VIEW

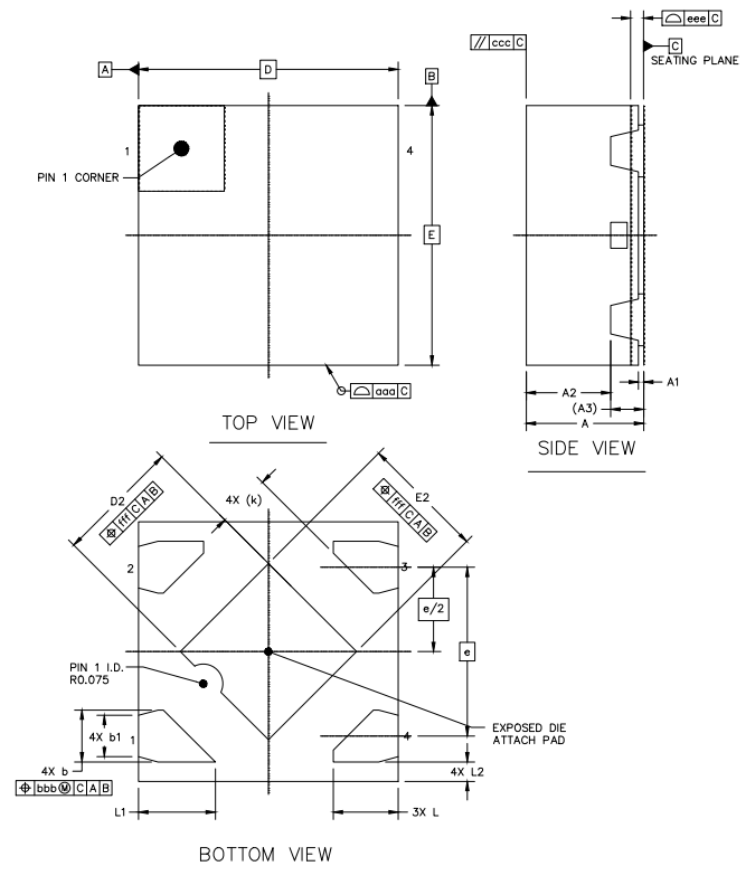


SIDE VIEW

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		

PACKAGE DIMENSIONS: DFN1X1-4L #2



DIMENSIONS IN MILLIMETERS			
Symbol	Min.	Nom.	Max.
A	0.40	0.45	0.50
A1	0.00	0.02	0.05
A2	-	0.325	-
A2	0.127 REF		
b	0.15	0.2	0.25
b1	0.16 REF		
D	1 BSC		
E	1 BSC		
e	0.65 BSC		
D2	0.38	0.48	0.58
E2	0.38	0.48	0.58
L	0.2	0.25	0.3
L1	0.286	0.296	0.306
L2	0.025	0.075	0.125
K	0.205 REF		