



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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Description

The NK-AP2126 series are positive voltage regulator ICs fabricated by CMOS process.

The NK-AP2126 series have features of low dropout voltage, low noise, high output voltage accuracy, and low current consumption which make them ideal for use in various battery-powered devices.

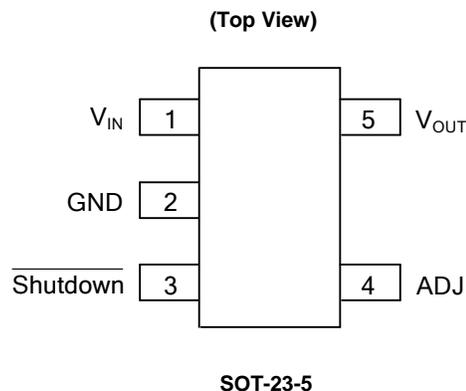
The NK-AP2126 is available in 1.25V to 5.5V adjustable voltage versions.

The NK-AP2126 series are available in SOT-23-5 Package.

Features

- Wide Operating Voltage: 3.0V to 6V
- High Output Voltage Accuracy: $\pm 2\%$
- High Ripple Rejection: 68dB@ $f = 1\text{kHz}$, 54dB@ $f = 10\text{kHz}$
- Low Standby Current: 0.1 μA
- Low Dropout Voltage: 170mV@300mA for $V_{\text{OUT}} = 3.3\text{V}$, 140mV@ 300mA for $V_{\text{OUT}} = 5.2\text{V}$
- Low Quiescent Current: 60 μA Typical
- Low Output Noise: 80 μVrms @ $V_{\text{OUT}} = 1.25\text{V}$
- Short Current Limit: 50mA
- Over Temperature Protection
- Compatible with Low ESR Ceramic Capacitor: 1 μF for C_{IN} and C_{OUT}
- Excellent Line/Load Regulation
- Soft Start Time: 50 μs
- Auto Discharge Resistance: $R_{\text{DS(ON)}} = 60\Omega$

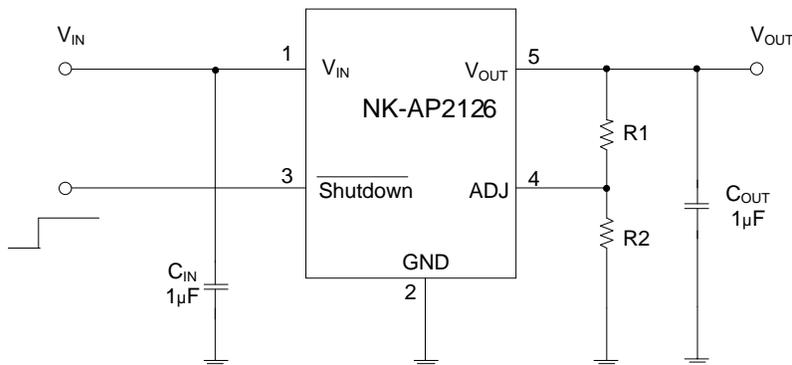
Pin Assignments



Applications

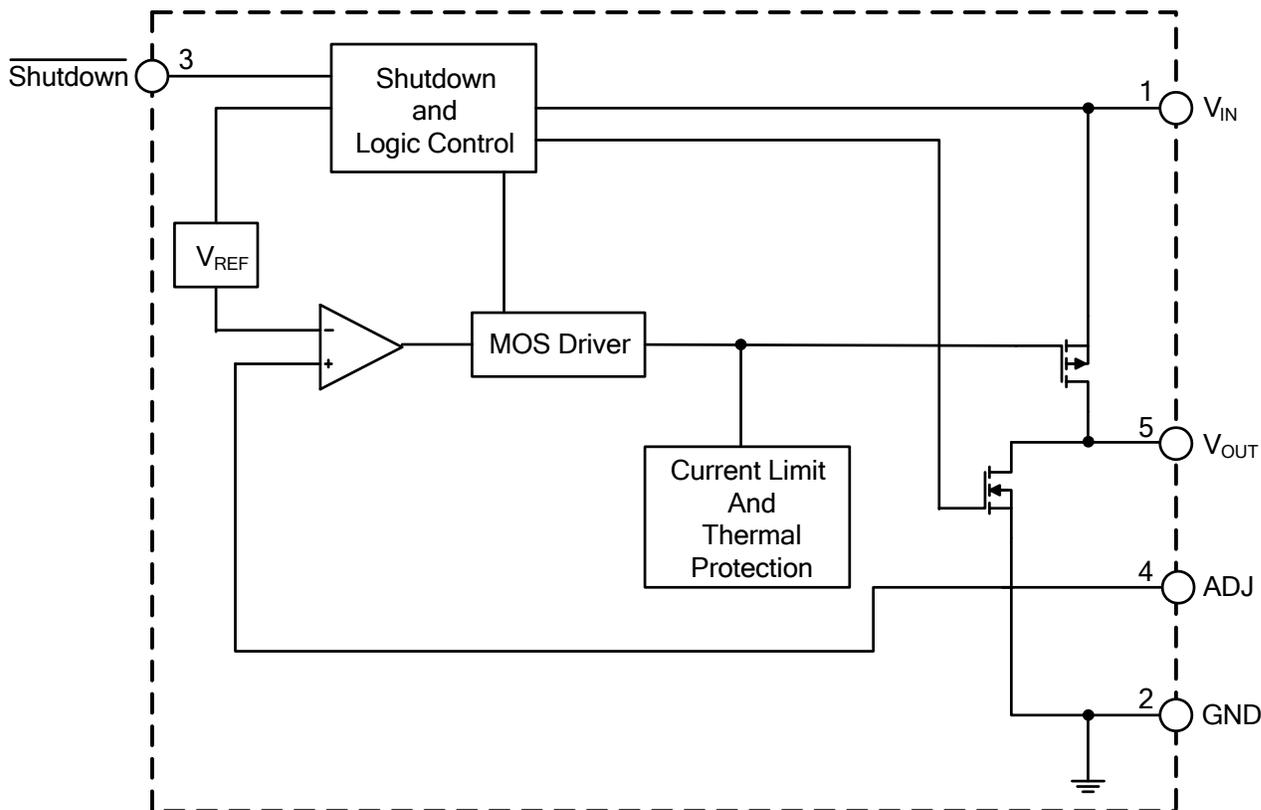
- Datacom
- Notebook Computers
- Mother Board

Typical Applications Circuit



$$V_{\text{OUT}} = 1.25 \cdot (1 + R1/R2) \text{ V}$$

Functional Block Diagram



Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Rating	Unit
V_{IN}	Input Voltage	6.5	V
V_{CE}	Shutdown Input Voltage	-0.3 to $V_{IN} + 0.3$	V
I_{OUT}	Output Current	450	mA
T_J	Junction Temperature	+150	°C
T_{STG}	Storage Temperature Range	-65 to +150	°C
T_{LEAD}	Lead Temperature (Soldering, 10sec)	+260	°C
θ_{JA}	Thermal Resistance (Junction to Ambient)	250	°C/W
ESD	ESD (Human Body Model)	6000	V
ESD	ESD (Machine Model)	250	V

Note 4: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operating Conditions

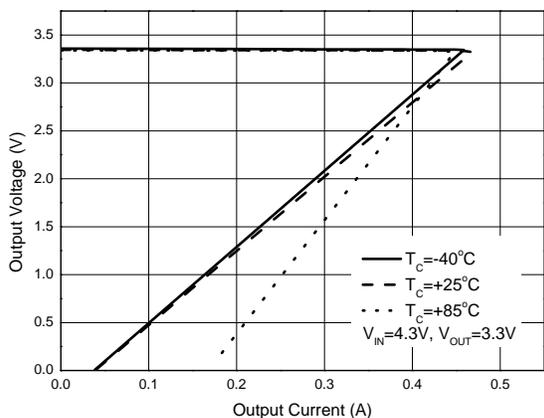
Symbol	Parameter	Min	Max	Unit
V_{IN}	Input Voltage	3.0	6	V
T_A	Operating Ambient Temperature Range	-40	+85	°C

Electrical Characteristics (NK-AP2126-ADJ, V_{IN} min = 3.0V, C_{IN} = 1 μ F, C_{OUT} = 1 μ F, unless otherwise specified.)

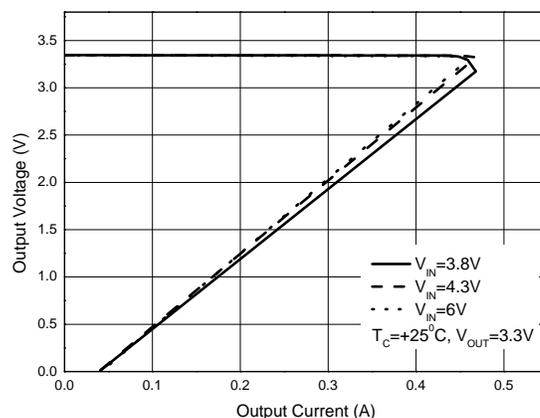
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
V_{REF}	Reference Voltage	$V_{IN} = 3.0V, 1mA \leq I_{OUT} \leq 300mA$	1.225	1.25	1.275	V	
V_{IN}	Input Voltage	—	3.0	—	6	V	
$I_{OUT(MAX)}$	Maximum Output Current	$V_{IN} = 3.0V, V_{OUT} = 98\% \times V_{OUT}$	300	400	—	mA	
$\frac{\Delta V_{OUT}}{(\Delta I_{OUT} \times V_{OUT})}$	Load Regulation	$V_{IN} = 3.0V, 1mA \leq I_{OUT} \leq 300mA$	—	—	0.6	%/A	
$\frac{\Delta V_{OUT}}{(\Delta V_{IN} \times V_{OUT})}$	Line Regulation	$V_{IN} = 3.0V$ to 6V, $I_{OUT} = 30mA$	—	—	0.06	%/V	
I_Q	Quiescent Current	$V_{IN} = 3.0V, I_{OUT} = 0mA$	—	60	90	μ A	
I_{STD}	Standby Current	$V_{IN} = 3.0V, V_{Shutdown}$ in Off Mode	—	0.1	1.0	μ A	
PSRR	Power Supply Rejection Ratio	Ripple 1Vp-p $V_{IN} = 3.5V$	f = 100Hz	—	68	—	dB
			f = 1kHz	—	68	—	dB
			f = 10kHz	—	54	—	dB
$\frac{(\Delta V_{OUT}/V_{OUT})}{\Delta T}$	Output Voltage Temperature Coefficient	$I_{OUT} = 30mA, -40^\circ C \leq T_A \leq +85^\circ C$	—	± 100	—	ppm/°C	
I_{SHORT}	Short Current Limit	$V_{OUT} = 0V$	—	50	—	mA	
t_{UP}	Soft Start Time	—	—	50	—	μ s	
V_{NOISE}	RMS Output Noise	$T_A = +25^\circ C, 10Hz \leq f \leq 100kHz, V_{OUT} = 1.25V$	—	80	—	μ Vrms	
—	Shutdown "High" Voltage	Shutdown Input Voltage "High"	1.5	—	6	V	
—	Shutdown "Low" Voltage	Shutdown Input Voltage "Low"	0	—	0.4	V	
—	V_{OUT} Discharge MOSFET $R_{DS(ON)}$	Shutdown Input Voltage "Low"	—	60	—	Ω	
—	Shutdown Pull Down Resistance	—	—	3	—	M Ω	
—	Thermal Shutdown	—	—	+165	—	°C	
—	Thermal Shutdown Hysteresis	—	—	+30	—	°C	
θ_{JC}	Thermal Resistance	SOT-23-5	—	150	—	°C/W	

Performance Characteristics

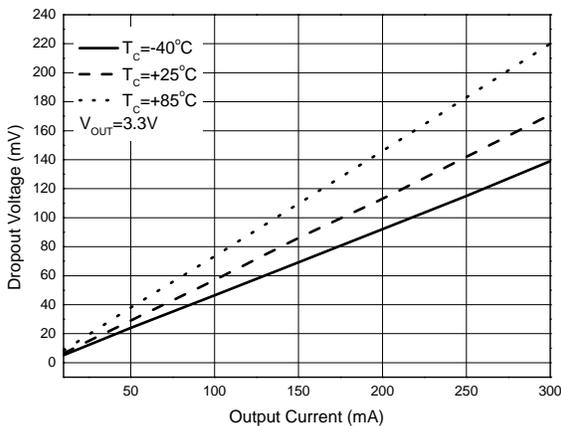
Output Voltage vs. Output Current



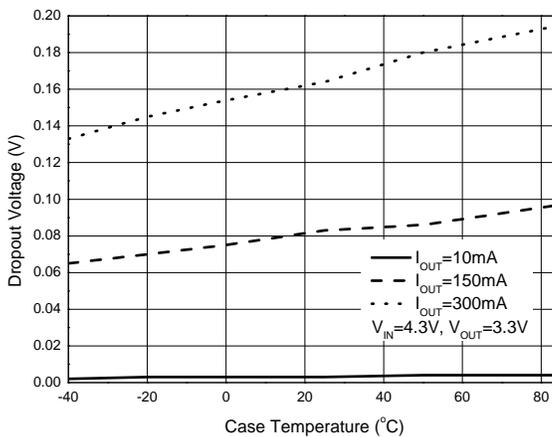
Output Voltage vs. Output Current



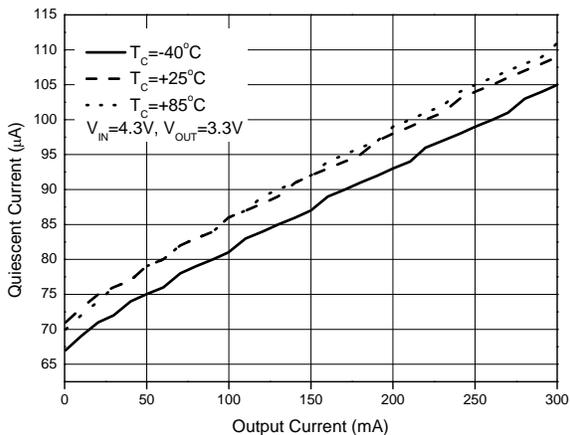
Dropout Voltage vs. Output Current



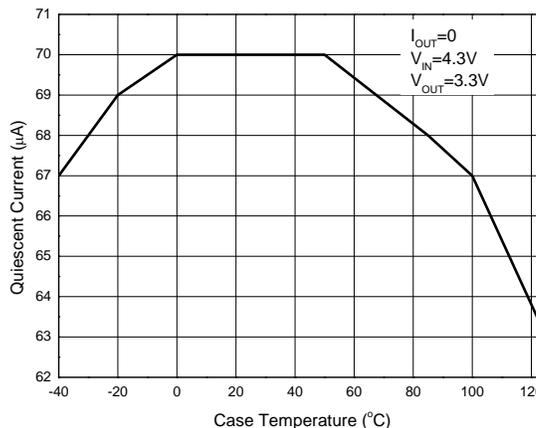
Dropout Voltage vs. Case Temperature



Quiescent Current vs. Output Current

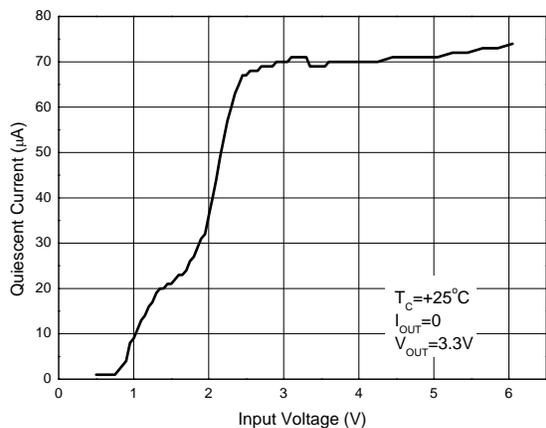


Quiescent Current vs. Case Temperature

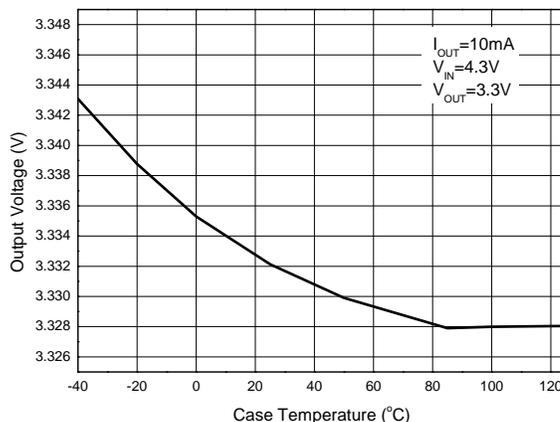


Performance Characteristics (Cont.)

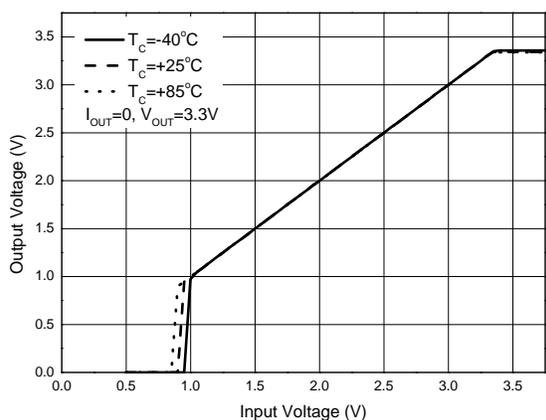
Quiescent Current vs. Input Voltage



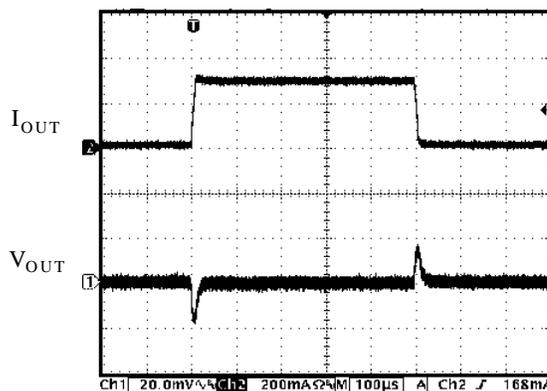
Output Voltage vs. Case Temperature



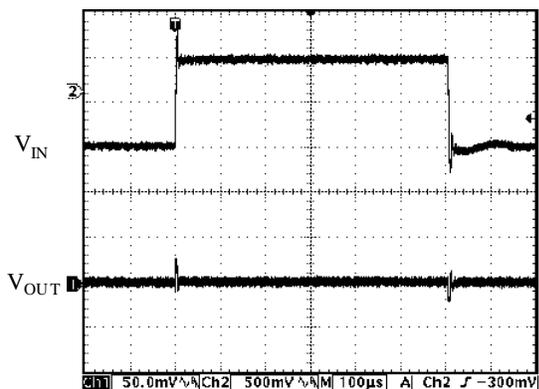
Output Voltage vs. Input Voltage



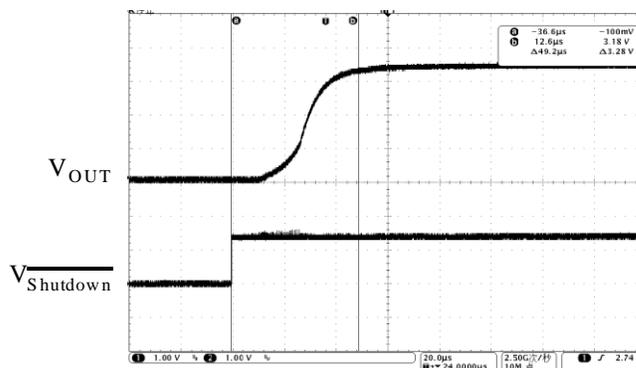
Load Transient
(Conditions: $C_{IN}=C_{OUT}=1\mu F$, $V_{IN}=4.4V$, $V_{OUT}=3.3V$, $I_{OUT}=10mA$ to $300mA$)



Line Transient
(Conditions: $I_{OUT}=30mA$, $C_{IN}=C_{OUT}=1\mu F$, $V_{IN}=4V$ to $5V$, $V_{OUT}=3.3V$)

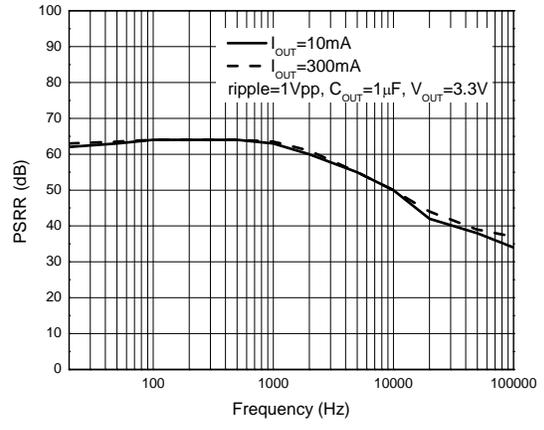


Soft Start Time
(Conditions: $I_{OUT}=0mA$, $C_{IN}=C_{OUT}=1\mu F$, $V_{Shutdown}=0$ to $2V$, $V_{OUT}=3.3V$)



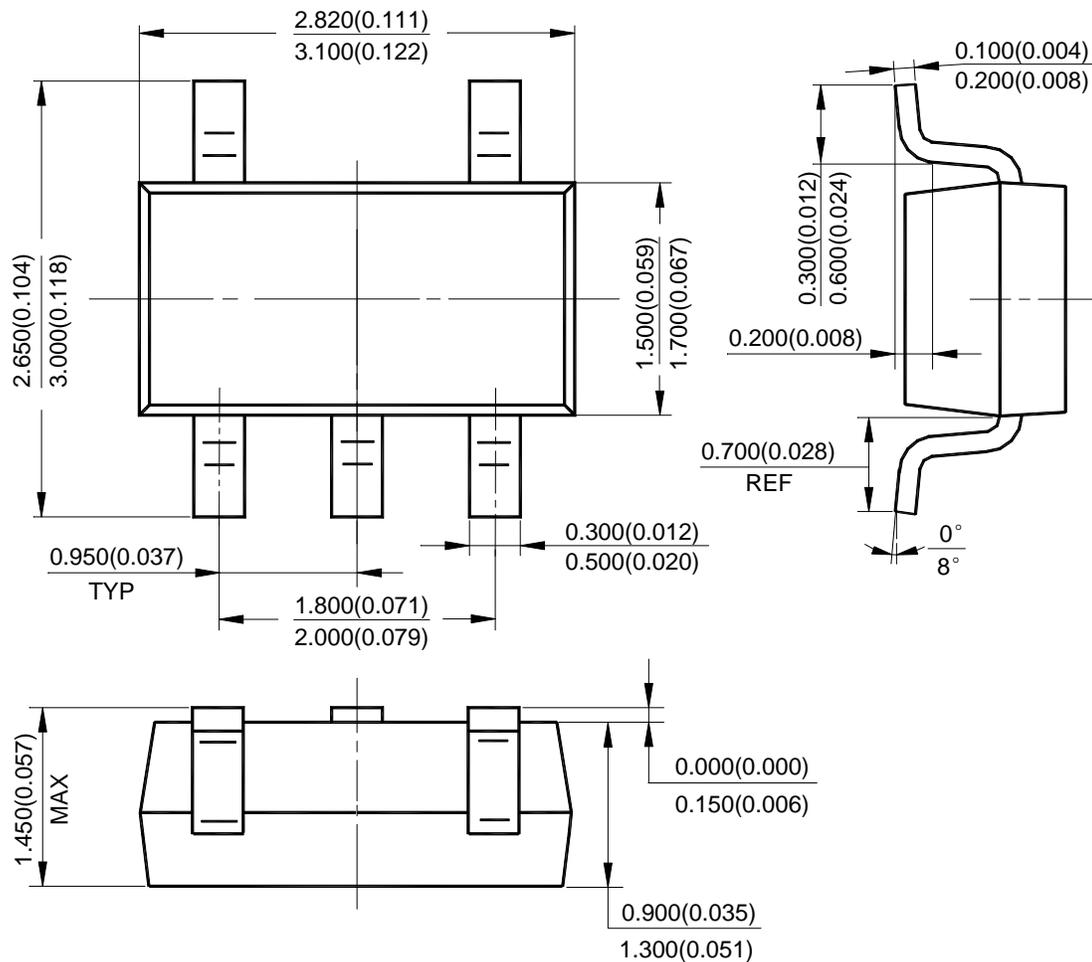
Performance Characteristics (Cont.)

PSRR vs. Frequency



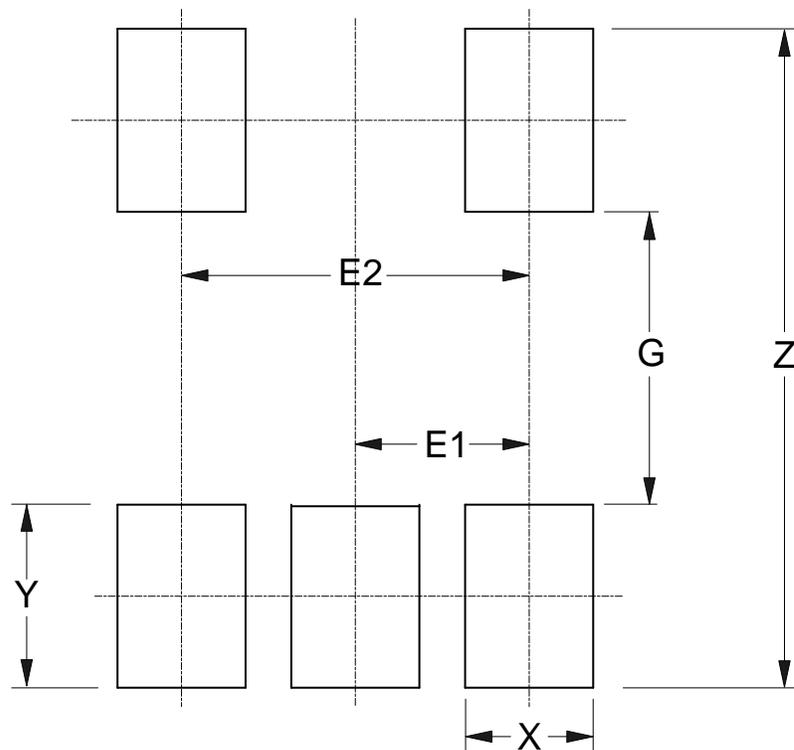
Package Outline Dimensions (All dimensions in mm(inch).)

(1) Package Type: SOT-23-5



Suggested Pad Layout

(1) Package Type: SOT-23-5



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E1 (mm)/(inch)	E2 (mm)/(inch)
Value	3.600/0.142	1.600/0.063	0.700/0.028	1.000/0.039	0.950/0.037	1.900/0.075