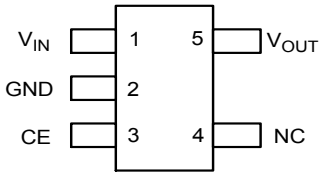
SP6260

High Speed, Extremely Low Noise 150mA LDO Regulator

Features

- Low Dropout Voltage at I_{OUT}=100mA: 150mV Typical (Except 1.5V Version)
- Low Standby Current: 0.1µA Typical
- Low Quiescent Current: 25µA Typical
- High Ripple Rejection: 70dB Typical（f=10kHz）
- Maximum Output Current: More Than 150mA (300mA Limit)
- Extremely Low Noise: 30µVrms (10Hz to 100kHz)
- Excellent Line Regulation: 4mV Typical
- Excellent Load Regulation: 12mV Typical
- High Output Voltage Accuracy: ±2%
- Excellent Line Transient Response and Load Transient Response
- Compatible with Low ESR Ceramic Capacitor (as Low as 1µF)
- Available in Lead Free, RoHS Compliant Package: SOT-23-5

SOT-23-5 Package



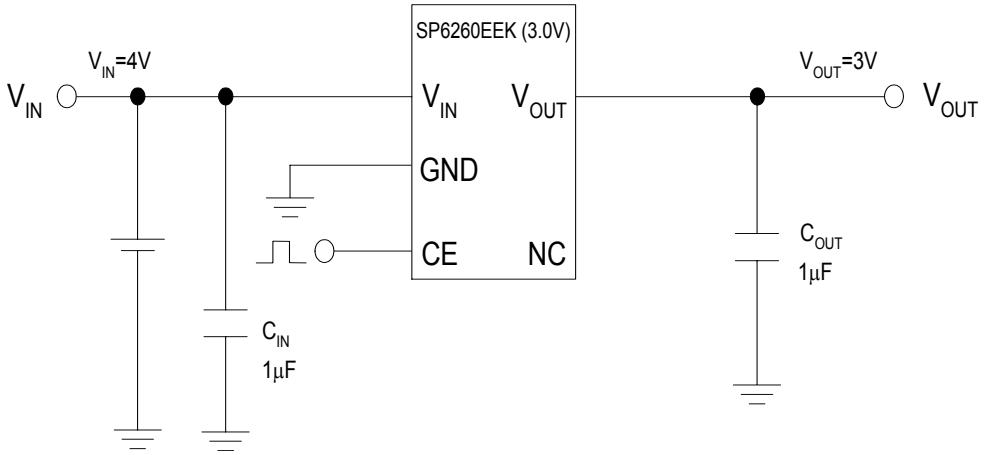
Applications

- Mobile Phones, Cordless Phones
- Wireless Communication Equipment
- Portable Games
- Cameras, Video Recorders
- Sub-board Power Supplies for Telecom Equipment
- Battery Powered Equipment

DESCRIPTION

The SP6260 series are positive voltage regulator ICs fabricated by CMOS process. Each of these ICs consists of a voltage reference an error amplifier, a resistor network for setting output voltage, a current limit circuit for current protection and a chip enable circuit The SP6260 series feature high ripple rejection, low dropout voltage, low noise, high output voltage accuracy, and low curren consumption which make them ideal for use in various battery-powered devices. The SP6260 devices have 1.5V, 1.8V, 2.5V, 2.8V 3.0V, 3.2V and 3.3V versions. The SP6260 is available in standard Lead Free, RoHS Compliant SOT-23-5 packaging.

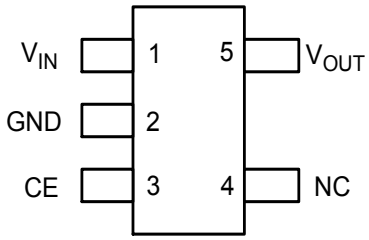
TYPICAL APPLICATION CIRCUIT



Pin Configuration

Package Pinout
(SOT-23-5)

SOT-23-5



Package Perspective of SOT23-5

Pin Configuration of SP6260 (Top View)

Pin Description

Pin Number	Pin Name	Function
1	V_{IN}	Input voltage
2	GND	Ground
3	CE	Active high enable input pin. Logic high=enable, logic low=shutdown
4	NC	No connection
5	V_{OUT}	Regulated output voltage

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Input Voltage	V_{IN}	6.5	V
Enable Input Voltage	V_{CE}	-0.3 to V_{IN}+0.3	V
Output Current	I_{OUT}	300	mA
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-65 to 150	°C
Lead Temperature (Soldering, 10sec)	T_{LEAD}	260	°C
Thermal Resistance (Note 2) SOT-23-5	θ_{JA}	250	°C/W
ESD (Human Body Model)	ESD	2000	V
ESD (Machine Model)	ESD	200	V

Note 1: 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.

Note 2: Absolute maximum ratings indicate limits beyond which damage to the component may occur. Electrical specifications do not apply when operating the device outside of its operating ratings. The maximum allowable power dissipation is a function of the maximum junction temperature, $T_{J(max)}$, the junction-to-ambient thermal resistance, θ_{JA}, and the ambient temperature, T_A. The maximum allowable power dissipation at any ambient temperature is calculated using: $P_{D(max)}=(T_{J(max)} - T_A)/\theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Input Voltage	V_{IN}	2	6	V
Operating Junction Temperature Range	T_J	-40	85	°C

Electrical Characteristics

SP6260AEK (1.5V)

(V_{IN}=2.5V, T_J=25°C, C_{IN}=1µF, C_{OUT}=1µF, **Bold** typeface applies over -40°C≤T_J≤85°C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	V_{IN}=2.5V 1mA≤I_{OUT}≤30mA	1.47	1.5	1.53	V
Input Voltage	V_{IN}				6	V
Output Current	I_{OUT}	V_{IN}-V_{OUT}=1V	150			mA
Load Regulation	V_{RLOAD}	V_{IN}=2.5V 1mA≤I_{OUT}≤80mA		12	40	mV
Line Regulation	V_{RLINE}	2.3V≤V_{IN}≤6V I_{OUT}=30mA		4	16	mV
Dropout Voltage	V_{DROP}	I_{OUT}=10mA		400	600	mV
		I_{OUT}=100mA		400	600	
		I_{OUT}=150mA		400	600	
Quiescent Current	I_Q	V_{IN}=2.5V, I_{OUT}=0mA		25	50	µA
Standby Current	I_{STD}	V_{IN}=2.5V V_{CE} in OFF mode		0.1	1	µA
Power Supply Rejection Ratio	PSRR	Ripple 0.5Vp-p, f=10kHz V_{IN}=2.5V		70		dB
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	I_{OUT}=30mA		**±150**		µV/°C
	$(\Delta V_{OUT}/V_{OUT})/\Delta T$			**±100**		ppm/°C
Short Current Limit	I_{LIMIT}	V_{OUT}=0V		50		mA
RMS Output Noise	V_{NOISE}	T_A=25°C 10Hz ≤f≤100kHz		30		µVrms
CE "High" Voltage		CE input voltage "High"	1.5			V
CE "Low" Voltage		CE input voltage "Low"			0.25	V
CE Pull-down Resistance	R_{PD}		2.5	5	10	MΩ

Electrical Characteristics (Continued)

SP6260BEK (1.8V)

(V_{IN}=2.8V, T_J=25°C, C_{IN}=1µF, C_{OUT}=1µF, **Bold** typeface applies over -40°C≤T_J≤85°C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	V_{IN}=2.8V 1mA≤I_{OUT}≤30mA	1.764	1.8	1.836	V
Input Voltage	V_{IN}				6	V
Output Current	I_{OUT}	V_{IN}-V_{OUT}=1V	150			mA
Load Regulation	V_{RLOAD}	V_{IN}=2.8V 1mA≤I_{OUT}≤80mA		12	40	mV
Line Regulation	V_{RLINE}	2.3V≤V_{IN}≤6V I_{OUT}=30mA		4	16	mV
Dropout Voltage	V_{DROP}	I_{OUT}=10mA		20	40	mV
		I_{OUT}=100mA		150	300	
		I_{OUT}=150mA		200	400	
Quiescent Current	I_Q	V_{IN}=2.8V, I_{OUT}=0mA		25	50	µA
Standby Current	I_{STD}	V_{IN}=2.8V V_{CE} in OFF mode		0.1	1	µA
Power Supply Rejection Ratio	PSRR	Ripple 0.5Vp-p, f=10kHz V_{IN}=2.8V		70		dB
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	I_{OUT}=30mA		**±180**		µV/°C
	$(\Delta V_{OUT}/V_{OUT})/\Delta T$			**±100**		ppm/°C
Short Current Limit	I_{LIMIT}	V_{OUT}=0V		50		mA
RMS Output Noise	V_{NOISE}	T_A=25°C 10Hz ≤f≤100kHz		30		µVrms
CE "High" Voltage		CE input voltage "High"	1.5			V
CE "Low" Voltage		CE input voltage "Low"			0.25	V
CE Pull-down Resistance	R_{PD}		2.5	5	10	MΩ

SP6260CEK (2.5V)

(V_{IN}=3.5V, T_J=25°C, C_{IN}=1µF, C_{OUT}=1µF, **Bold** typeface applies over -40°C≤T_J≤85°C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	V_{IN}=3.5V 1mA≤I_{OUT}≤30mA	2.45	2.5	2.55	V
Input Voltage	V_{IN}				6	V
Output Current	I_{OUT}	V_{IN}-V_{OUT}=1V	150			mA
Load Regulation	V_{RLOAD}	V_{IN}=3.5V 1mA≤I_{OUT}≤80mA		12	40	mV
Line Regulation	V_{RLINE}	3V≤V_{IN}≤6V I_{OUT}=30mA		4	16	mV
Dropout Voltage	V_{DROP}	I_{OUT}=10mA		20	40	mV
		I_{OUT}=100mA		150	300	
		I_{OUT}=150mA		200	400	
Quiescent Current	I_Q	V_{IN}=3.5V, I_{OUT}=0mA		25	50	µA
Standby Current	I_{STD}	V_{IN}=3.5V V_{CE} in OFF mode		0.1	1	µA
Power Supply Rejection Ratio	PSRR	Ripple 0.5Vp-p, f=10kHz V_{IN}=3.5V		70		dB
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	I_{OUT}=30mA		**±250**		µV/°C
	$(\Delta V_{OUT}/V_{OUT})/\Delta T$			**±100**		ppm/°C
Short Current Limit	I_{LIMIT}	V_{OUT}=0V		50		mA
RMS Output Noise	V_{NOISE}	T_A=25°C 10Hz ≤f≤100kHz		30		µVrms
CE "High" Voltage		CE input voltage "High"	1.5			V
CE "Low" Voltage		CE input voltage "Low"			0.25	V
CE Pull-down Resistance	R_{PD}		2.5	5	10	MΩ

Electrical Characteristics (Continued)

SP6260DEK (2.8V)

(V_{IN}=3.8V, T_J=25°C, C_{IN}=1µF, C_{OUT}=1µF, **Bold** typeface applies over -40°C≤T_J≤85°C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	V_{IN}=3.8V 1mA≤I_{OUT}≤30mA	2.744	2.8	2.856	V
Input Voltage	V_{IN}				6	V
Output Current	I_{OUT}	V_{IN}-V_{OUT}=1V	150			mA
Load Regulation	V_{RLOAD}	V_{IN}=3.8V 1mA≤I_{OUT}≤80mA		12	40	mV
Line Regulation	V_{RLINE}	3.3V≤V_{IN}≤6V I_{OUT}=30mA		4	16	mV
Dropout Voltage	V_{DROP}	I_{OUT}=10mA		20	40	mV
		I_{OUT}=100mA		150	300	
		I_{OUT}=150mA		200	400	
Quiescent Current	I_Q	V_{IN}=3.8V, I_{OUT}=0mA		25	50	µA
Standby Current	I_{STD}	V_{IN}=3.8V V_{CE} in OFF mode		0.1	1	µA
Power Supply Rejection Ratio	PSRR	Ripple 0.5Vp-p, f=10kHz V_{IN}=3.8V		70		dB
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	I_{OUT}=30mA		**±280**		µV/°C
	$(\Delta V_{OUT}/V_{OUT})/\Delta T$			**±100**		ppm/°C
Short Current Limit	I_{LIMIT}	V_{OUT}=0V		50		mA
RMS Output Noise	V_{NOISE}	T_A=25°C 10Hz ≤f≤100kHz		30		µVrms
CE "High" Voltage		CE input voltage "High"	1.5			V
CE "Low" Voltage		CE input voltage "Low"			0.25	V
CE Pull-down Resistance	R_{PD}		2.5	5	10	MΩ

SP6260EEK (3.0V)

(V_{IN}=4V, T_J=25°C, C_{IN}=1µF, C_{OUT}=1µF, **Bold** typeface applies over -40°C≤T_J≤85°C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	V_{IN}=4V 1mA≤I_{OUT}≤30mA	2.94	3.0	3.06	V
Input Voltage	V_{IN}				6	V
Output Current	I_{OUT}	V_{IN}-V_{OUT}=1V	150			mA
Load Regulation	V_{RLOAD}	V_{IN}=4V 1mA≤I_{OUT}≤80mA		12	40	mV
Line Regulation	V_{RLINE}	3.5V≤V_{IN}≤6V I_{OUT}=30mA		4	16	mV
Dropout Voltage	V_{DROP}	I_{OUT}=10mA		20	40	mV
		I_{OUT}=100mA		150	300	
		I_{OUT}=150mA		200	400	
Quiescent Current	I_Q	V_{IN}=4V, I_{OUT}=0mA		25	50	µA
Standby Current	I_{STD}	V_{IN}=4V V_{CE} in OFF mode		0.1	1	µA
Power Supply Rejection Ratio	PSRR	Ripple 0.5Vp-p, f=10kHz V_{IN}=4V		70		dB
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	I_{OUT}=30mA		**±300**		µV/°C
	$(\Delta V_{OUT}/V_{OUT})/\Delta T$			**±100**		ppm/°C
Short Current Limit	I_{LIMIT}	V_{OUT}=0V		50		mA
RMS Output Noise	V_{NOISE}	T_A=25°C 10Hz ≤f≤100kHz		30		µVrms
CE "High" Voltage		CE input voltage "High"	1.5			V
CE "Low" Voltage		CE input voltage "Low"			0.25	V
CE Pull-down Resistance	R_{PD}		2.5	5	10	MΩ

SP6260FEK (3.2V)

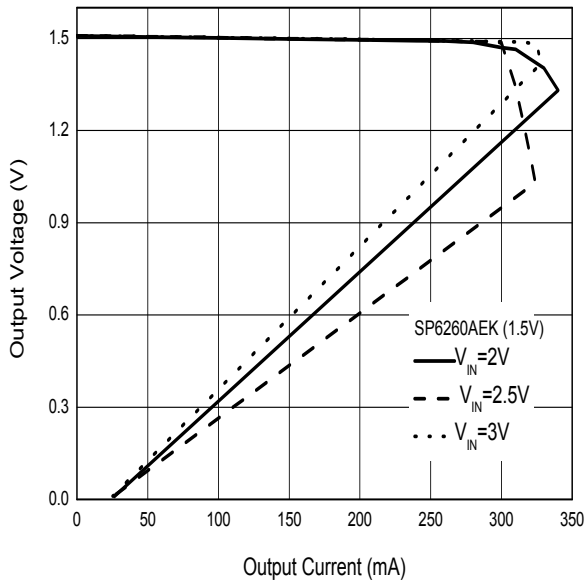
(V_{IN}=4.2V, T_J=25°C, C_{IN}=1µF, C_{OUT}=1µF, **Bold** typeface applies over -40°C≤T_J≤85°C, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	V_{IN}=4.2V 1mA≤I_{OUT}≤30mA	3.136	3.2	3.264	V
Input Voltage	V_{IN}				6	V
Output Current	I_{OUT}	V_{IN}-V_{OUT}=1V	150			mA
Load Regulation	V_{RLOAD}	V_{IN}=4.2V 1mA≤ I_{OUT}≤ 80mA		12	40	mV
Line Regulation	V_{RLINE}	3.7V≤V_{IN}≤6V I_{OUT}=30mA		4	16	mV
Dropout Voltage	V_{DROP}	I_{OUT}=10mA		20	40	mV
		I_{OUT}=100mA		150	300	
		I_{OUT}=150mA		200	400	
Quiescent Current	I_Q	V_{IN}=4.2V, I_{OUT}=0mA		25	50	µA
Standby Current	I_{STD}	V_{IN}=4.2V V_{CE} in OFF mode		0.1	1	µA
Power Supply Rejection Ratio	PSRR	Ripple 0.5Vp-p, f=10kHz V_{IN}=4.2V		70		dB
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	I_{OUT}=30mA		**±320**		µV/°C
	$(\Delta V_{OUT}/V_{OUT})/\Delta T$			**±100**		ppm/°C
Short Current Limit	I_{LIMIT}	V_{OUT}=0V		50		mA
RMS Output Noise	V_{NOISE}	T_A=25°C 10Hz ≤f≤100kHz		30		µVrms
CE "High" Voltage		CE input voltage "High"	1.5			V
CE "Low" Voltage		CE input voltage "Low"			0.25	V
CE Pull-down Resistance	R_{PD}		2.5	5	10	MΩ

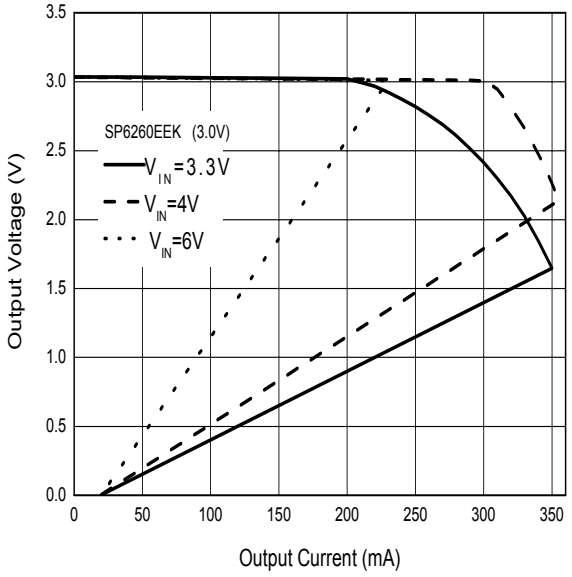
SP6260GEK (3.3V)

(V_{IN}=4.3V, T_J=25°C, C_{IN}=1µF, C_{OUT}=1µF, **Bold** typeface applies over -40°C≤T_J≤85°C, unless otherwise specified.)

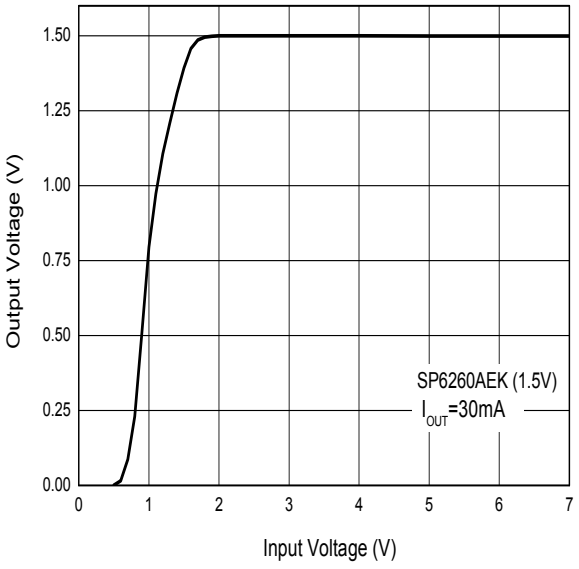
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage	V_{OUT}	V_{IN}=4.3V 1mA≤I_{OUT}≤30mA	3.234	3.3	3.366	V
Input Voltage	V_{IN}				6	V
Output Current	I_{OUT}	V_{IN}-V_{OUT}=1V	150			mA
Load Regulation	V_{RLOAD}	V_{IN}=4.3V 1mA≤ I_{OUT}≤ 80mA		12	40	mV
Line Regulation	V_{RLINE}	3.8V≤V_{IN}≤6V I_{OUT}=30mA		4	16	mV
Dropout Voltage	V_{DROP}	I_{OUT}=10mA		20	40	mV
		I_{OUT}=100mA		150	300	
		I_{OUT}=150mA		200	400	
Quiescent Current	I_Q	V_{IN}=4.3V, I_{OUT}=0mA		25	50	µA
Standby Current	I_{STD}	V_{IN}=4.3V V_{CE} in OFF mode		0.1	1	µA
Power Supply Rejection Ratio	PSRR	Ripple 0.5Vp-p, f=10kHz V_{IN}=4.3V		70		dB
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	I_{OUT}=30mA		**±330**		µV/°C
	$(\Delta V_{OUT}/V_{OUT})/\Delta T$			**±100**		ppm/°C
Short Current Limit	I_{LIMIT}	V_{OUT}=0V		50		mA
RMS Output Noise	V_{NOISE}	T_A=25°C 10Hz ≤f≤100kHz		30		µVrms
CE "High" Voltage		CE input voltage "High"	1.5			V
CE "Low" Voltage		CE input voltage "Low"			0.25	V
CE Pull-down Resistance	R_{PD}		2.5	5	10	MΩ



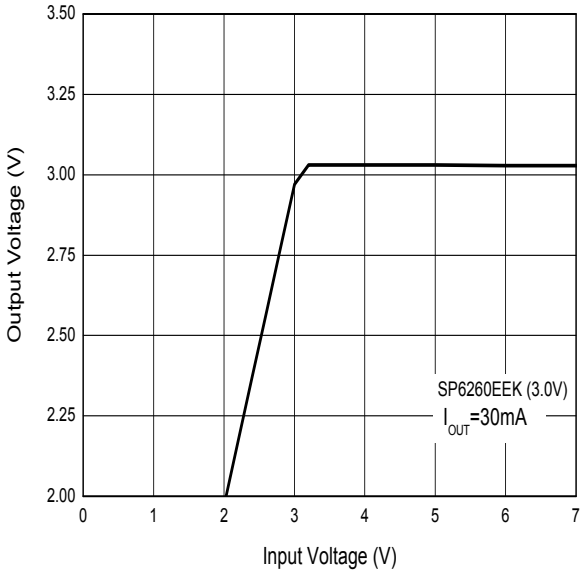
Output Voltage vs. Output Current
SP6260AEK (1.5V)



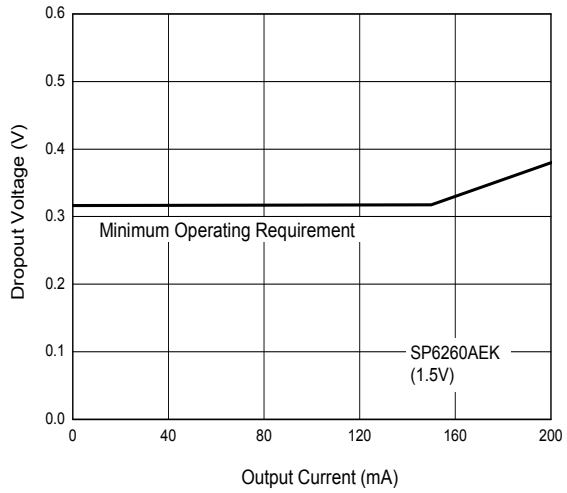
Output Voltage vs. Output Current
SP6260EEK (3.0V)



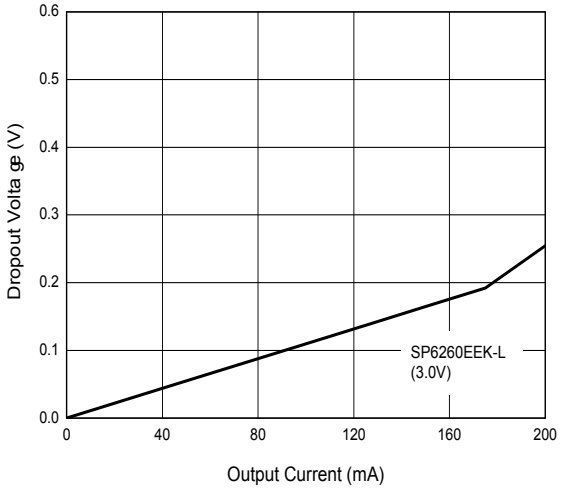
Output Voltage vs. Input Voltage
SP6260AEK (1.5V)



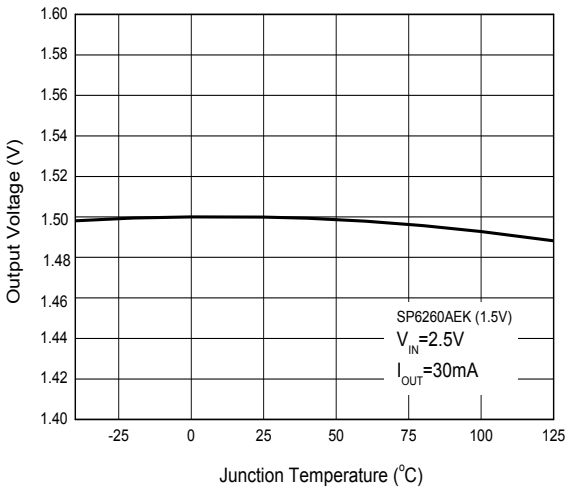
Output Voltage vs. Input Voltage
SP6260EEK (3.0V)



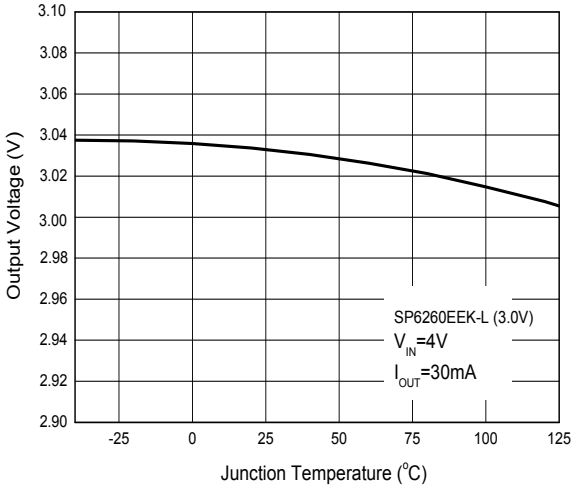
SP6260AEK-L (1.5V) Dropout Voltage vs. Output Current



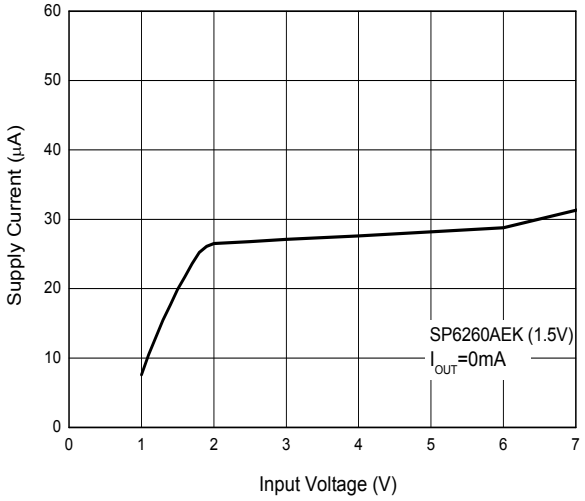
SP6260EEK-L (3.0V) Dropout Voltage vs. Output Current



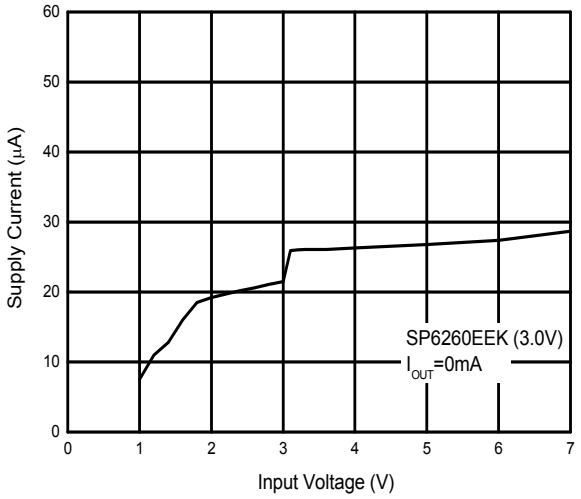
SP6260AEK-L (1.5V) Output Voltage vs. Junction Temperature



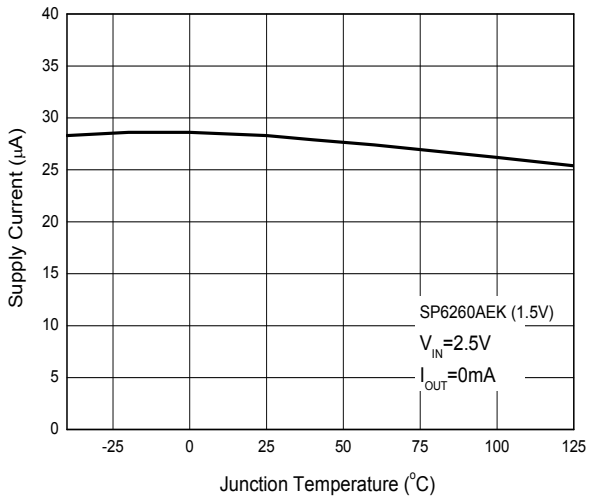
SP6260EEK-L (3.0V) Output Voltage vs. Junction Temperature



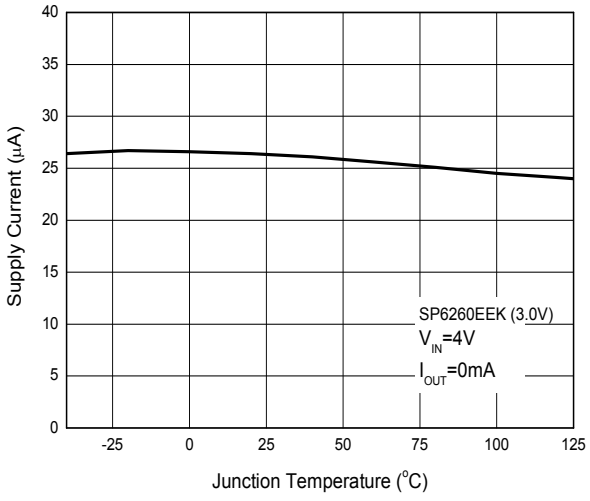
Supply Current vs. Input Voltage
SP6260AEK (1.5V)



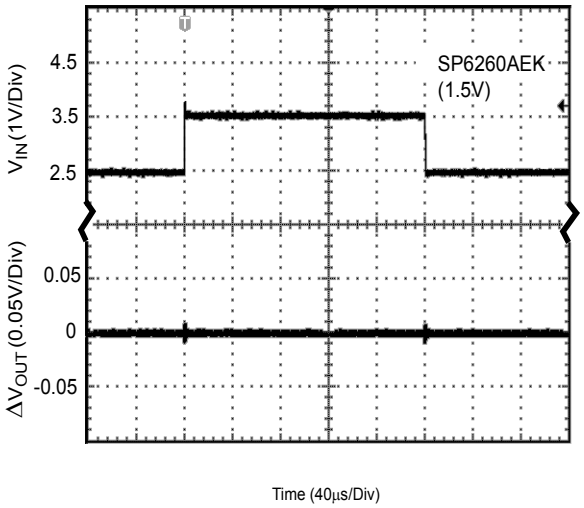
Supply Current vs. Input Voltage
SP6260EEK (3.0V)



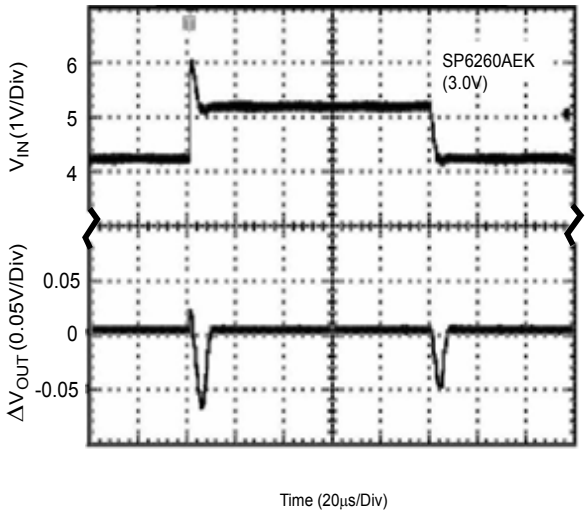
Supply Current vs. Junction Temperature
SP6260AEK (1.5V)



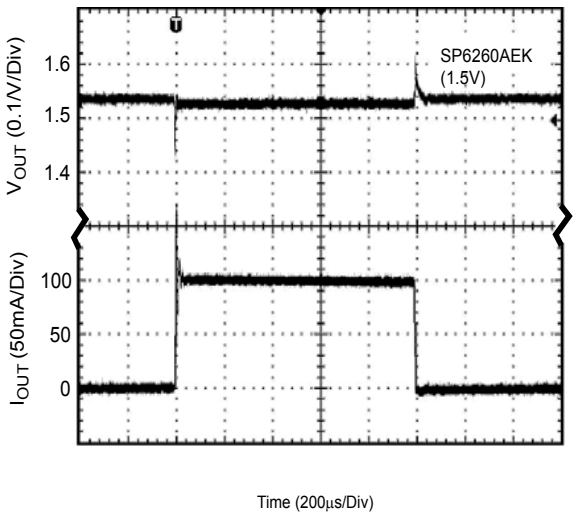
Supply Current vs. Junction Temperature
SP6260EEK (3.0V)



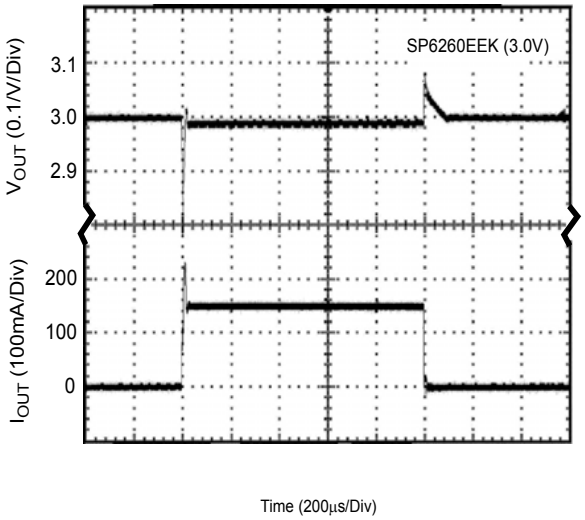
SP6260AEK (1.5V) Line Transient
(Conditions: I_{OUT}=30mA, C_{IN}=1µF, C_{OUT}=1µF)



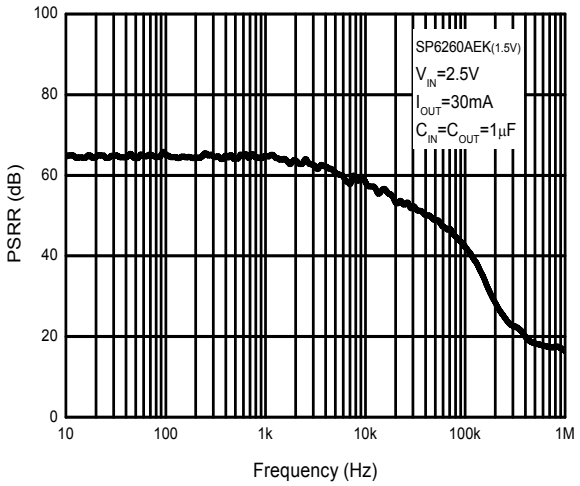
SP6260EEK (3.0V) Line Transient
(Conditions: I_{OUT}=30mA, C_{IN}=1µF, C_{OUT}=1µF)



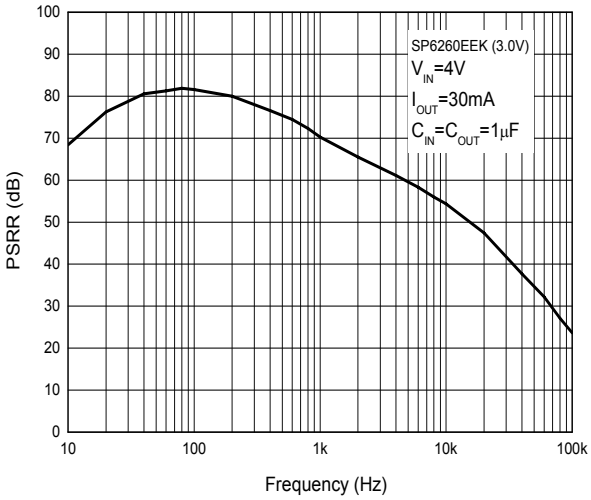
SP6260AEK (1.5V) Load Transient
(Conditions: V_{IN}=2.5V, C_{IN}=1µF, C_{OUT}=1µF)



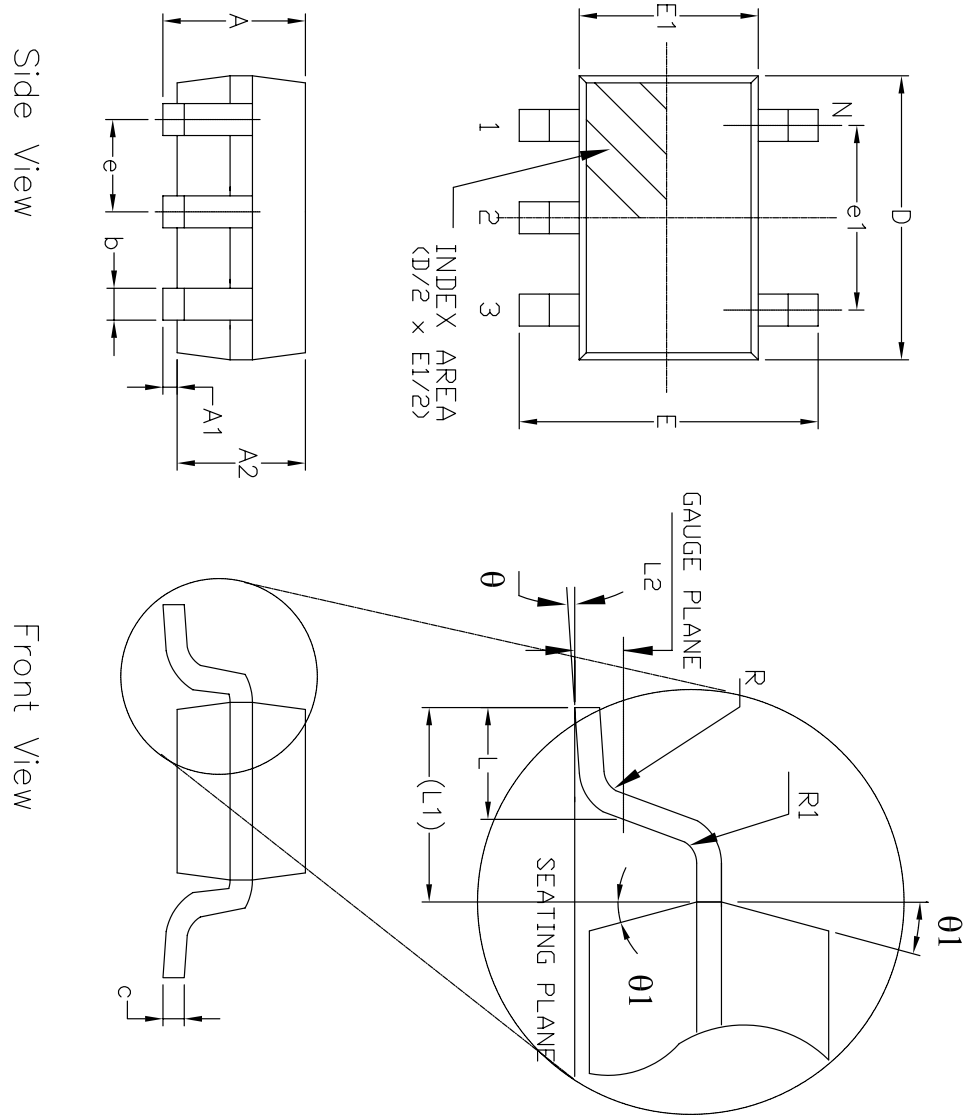
SP6260EEK (3.0V) Load Transient
(Conditions: V_{IN}=4V, C_{IN}=1µF, C_{OUT}=1µF)



PSRR vs. Frequency
SP6260AEK (1.5V)



PSRR vs. Frequency
SP6260EEK (3.0V)



5 Pin SOT-23 JEDEC MO-178 Variation AA

SYMBOLS	DIMENSIONS IN MM (Control Unit)			DIMENSIONS IN INCH (Reference Unit)		
	MIN	NOM	MAX	MIN	NOM	MAX
A	—	—	1.45	—	—	0.057
A1	0.00	—	0.15	0.000	—	0.006
A2	0.90	1.15	1.30	0.036	0.045	0.051
b	0.30	—	0.50	0.012	—	0.020
c	0.08	—	0.22	0.003	—	0.009
D	2.90 BSC			0.115 BSC		
E	2.80 BSC			0.111 BSC		
E1	1.60 BSC			0.063 BSC		
e	0.95 BSC			0.038 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.30	0.45	0.60	0.012	0.018	0.024
L1	0.60 REF			0.024 REF		
L2	0.25 BSC			0.010 BSC		
R	0.10	—	—	0.004	—	—
R1	0.10	—	0.25	0.004	—	0.010
θ	0°	4°	8°	0°	4°	8°
θ1	5°	10°	15°	5°	10°	15°
N	5			5		

REVISION HISTORY

REV.	DISCRIPTION	DATE	APP'D
A	DRAWING ORIGINATION	10/3/05	JL
B	DRAWING FORMAT MODIFICATION	07/25/06	JL

SIPEX CORPORATION

5 PIN SOT-23 PACKAGE OUTLINE

Drawing No: 5-PIN SOT-23

Revision: B Sheet: 1 OF 1

Packaging Approval:

By: JL Date: 07/25/06

Part Number	Voltage	Voltage Accuracy	Operating Temperature Range	Package	Marking	Pack Qty
SP6260AEK-L/TR	1.5V	± 2%	-40ºC to +85ºC	Lead Free 5 Pin SOT-23	DBWW	3,000 Tape & Reel
SP6260BEK-L/TR	1.8V	± 2%	-40ºC to +85ºC	Lead Free 5 Pin SOT-23	EBWW	3,000 Tape & Reel
SP6260CEK-L/TR	2.5V	± 2%	-40ºC to +85ºC	Lead Free 5 Pin SOT-23	FBWW	3,000 Tape & Reel
SP6260DEK-L/TR	2.8V	± 2%	-40ºC to +85ºC	Lead Free 5 Pin SOT-23	GBWW	3,000 Tape & Reel
SP6260EEK-L/TR	3.0V	± 2%	-40ºC to +85ºC	Lead Free 5 Pin SOT-23	HBWW	3,000 Tape & Reel
SP6260FEK-L/TR	3.2V	± 2%	-40ºC to +85ºC	Lead Free 5 Pin SOT-23	JBWW	3,000 Tape & Reel
SP6260GEK-L/TR	3.3V	± 2%	-40ºC to +85ºC	Lead Free 5 Pin SOT-23	KBWW	3,000 Tape & Reel

For further assistance:

Email: Sipexsupport@sipex.com
WWW Support page: http://www.sipex.com/content.aspx?p=support
Sipex Application Notes: http://www.sipex.com/applicationNotes.aspx

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