General Description

SLD509S is a LDO with ultra-low noise, high PSRR with low quiescent current.It has 400mA output current capability. The device is designed to work with 1μF input and output ceramic capacitor. It is very suitable for noise- sensitive, low power consumption requirement and space limited applications.

SLD509S has OCP function thermal shutdown mode to protect itself during system abnormal situation.

SLD509S is available in SOT23-5 package, and operates over an ambient temperature range of -40°C to +85°C.

Features

- Input voltage range: 1.6V ~ 6.5V
- Fixed VOUT:0.9V/1.2V/1.5V/1.8V/2.0V/2.2V/2.5V/2.7V/2.8V/2.85V/3V/3.1V/3.2V/3.3V/ 3.5V/4.5V/ 5V in different version
- Output accuracy: 2% for all version and temperature range
- High PSRR: 93 dB (TYP) @ 1Khz
- Low noise: 8μVRMS (TYP) @ 10Hz~100Khz
- Low Quiescent current: 15μA (TYP)
- Shutdown Supply Current: 0.03μA (TYP)
- Over Current protection
- Output Discharge
- Thermal Shutdown
- -40°C to +85°C Operating Temperature Range
- Excellent Load and Line Transient Responses
- Robust ESD immunity capability
- HBM > ±2KV
- CDM > ±1KV
- Available in Green SOT23-5 Packages

Applications

- Camera Power
- Wireless device Power
- Smartphone, Wearable device
- Noise sensitive device Power

Typical Application

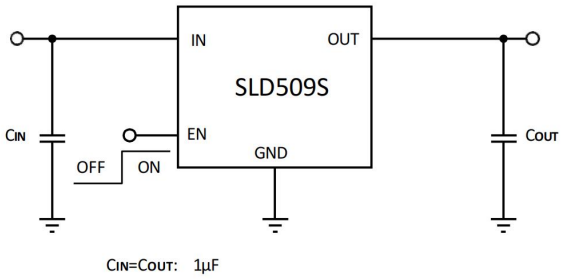


Figure 1. Application Diagram

Block Diagram

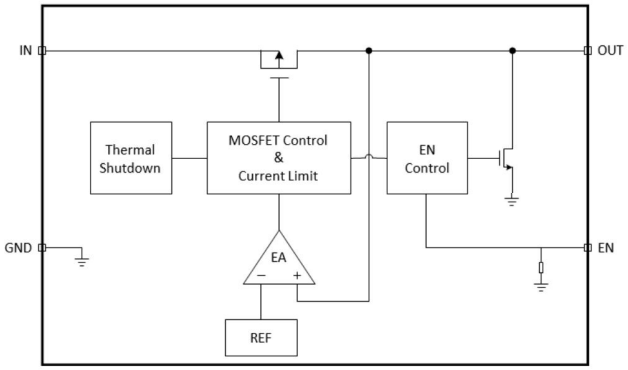


Figure 2. Block Diagram

Pin Configurations

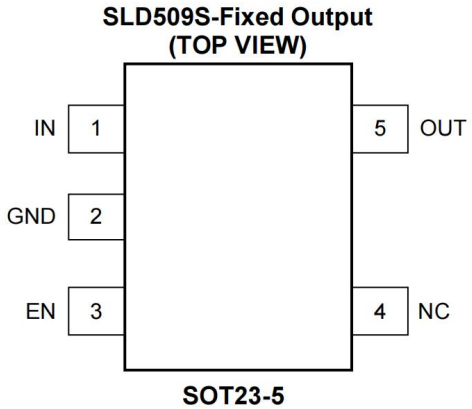


Figure 3. SLD509S SOT23-5 Pin Assignment(Top View)

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended.In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter		Min.	Max.	Unit
V_{IN}	IN to GND		-0.3	7	V
V_{OUT}	OUT to GND		-0.3	7	V
V_{EN}	EN to GND		-0.3	7	V
I_{IN}	Input Current (Continuous)			1	A
I_{OUT}	Output Current			1	A
T_{STG}	Storage Temperature Range		-65	+150	°C
T_J	Maximum Junction Temperature			+150	°C
ESD	Human Body Model, ANSI/ESDA/JEDEC JS-001-2012	All Pins	2		KV
	Charged Device Model, JESD22-C101	All Pins	1		

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance.

Parameters	Min.	Max.	Unit
Input Voltage: V_{IN}	1.7	6.5	V
Operating Junction Temperature Range	-40	125	°C

Electrical Characteristics

Condition: V_{IN}=V_{SET}+1V, I_{OUT}=1mA or I_{LOUT}=1mA,T_A =-40°C~85°C,unless otherwise noted. Typical value at T_A=+25°C and V_{SET}=3.3V, C_{IN}=C_{OUT}=1μF

Parameter	Symbol	Test Conditions		Min.	TYP.	Max.	Unit
Input Voltage Range(Note 1)	V_{IN}			1.6		6.5	V
EN Logic Voltage(Note 2)	V_{ENH}			1.1		5	V
	V_{ENL}					0.3	
EN Pull Down Resistor	R_{ENPD}	V_{EN} = 5V			10		MΩ
Output Discharge Resistor	R_{DIS}				150		Ω
Thermal Shutdown Threshold	T_{SD}				150		°C
Thermal Hysteresis	T_{HYS}				20		°C
Output Current	I_{OUT}			400			mA
UVLO Threshold	V_{UVLO}	V_{IN} rising			1.5		V
UVLO Hysteresis	V_{UVLO_HYS}				100		mV
Input Quiescent Current	I_Q	I_{OUT} = 0,			15	20	μA
Shut Down Current	I_{SHUT}	EN = 0. T_A = 25°C			0.21	1	μA
Output Voltage Accuracy	A_{OUT}	I_{OUT} = 0~400mA,All V_{SET}		-2		2	%
Dropout Voltage(Note 3)	V_{DO}	V_{SET} = 1.8V, I_{OUT} = 400mA				300	mV
Line Regulation	LineRe	V_{IN} = V_{SET} + 1V~5V, ΔV_{IN} = 1V. I_{OUT} = 200mA.			0.02		%/V
Load Regulation	LoadRe	I_{OUT} = 1mA to 400mA			0.001		%/mA
Output Current Limit	I_{Lim}	V_{OUT} = 0.9*V_{SET}		550	625		mA
Short circuit current(Note 3)	I_{SC}	V_{OUT} = 0			70		mA
Power Supply Rejection Ration	PSRR	I_{OUT}=20mA, V_{SET} =3.3V	f = 1KHz		93		dB
			f = 10KHz		84		
			f = 100KHz		65		
			f = 2MHz		51		
Output Voltage Noise	V_{NOISE}	BW = 10Hz to 100KHz, I_{OUT}= 20mA			8		μV_{RMS}

Note 1: Output current capability is 270mA when 1.6V ≤ V_{IN} < 1.7V, is 360mA when 1.7V ≤ V_{IN} < 1.75V. And the device has full function when V_{IN} ≥ 1.75V

Note 2: If the voltage that applied on EN pin higher than 5V, need add one 2Mohm in series.

Note 3: Guarantee by design. Not test on ATE.

Typical Characteristics

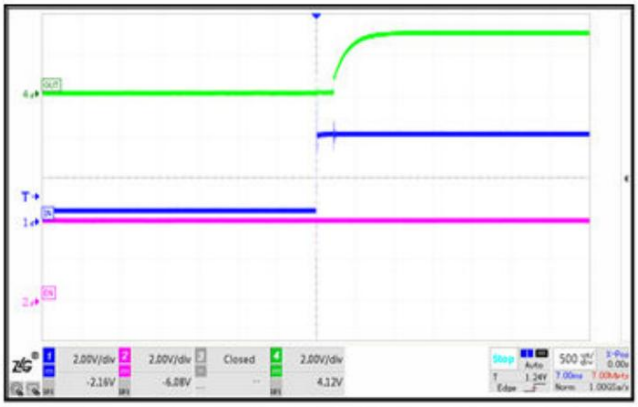


Figure 6. Start-Up with EN before IN (I_{OUT}=0mA)

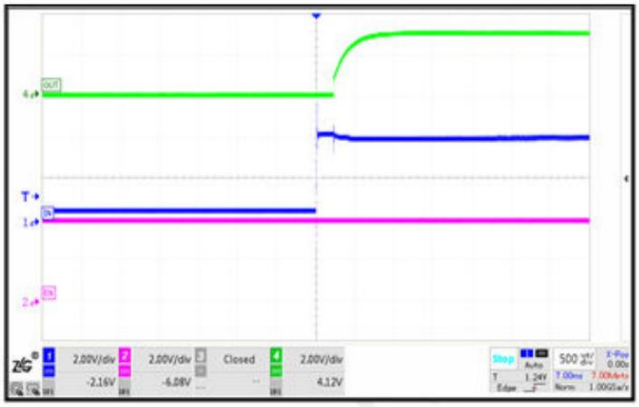


Figure 7. Start-Up with EN before IN (I_{OUT}=400mA)

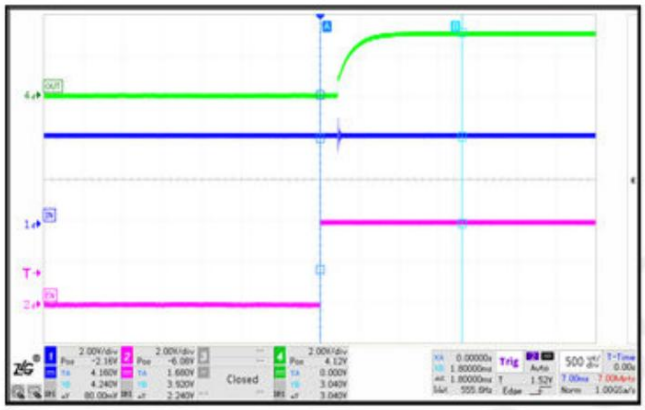


Figure 8. Start-Up with IN before EN (I_{OUT}=0mA)

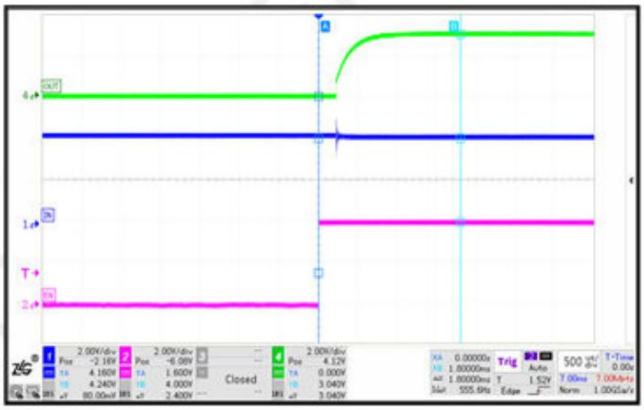


Figure 9. Start-Up with IN before EN (I_{OUT}=400mA)

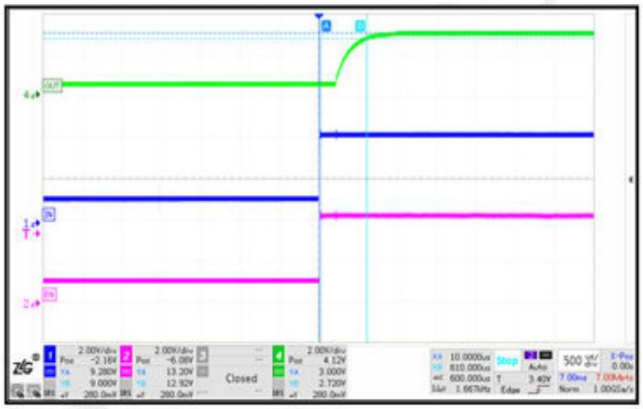


Figure 10. Start-Up with EN tied to IN(I_{OUT}=0mA)

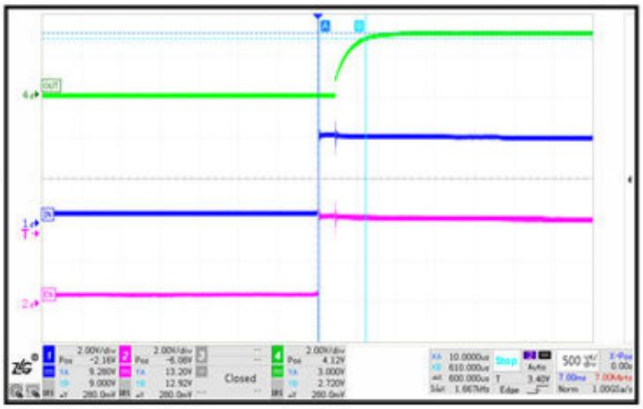


Figure 11. Start-Up with EN tied to IN (I_{OUT}=400mA)

Typical Characteristics(continued)

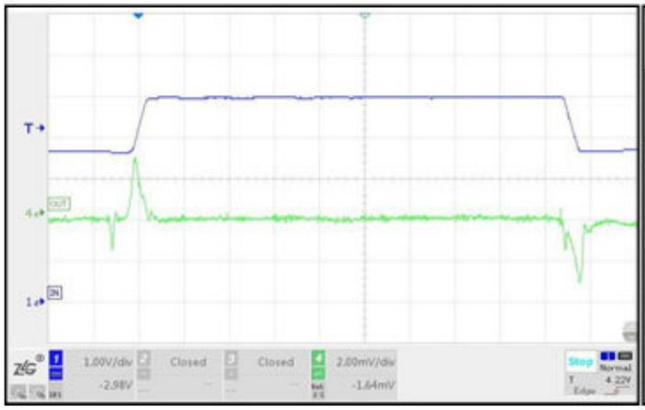


Figure 12. Line Transient (I_{OUT}=200mA)

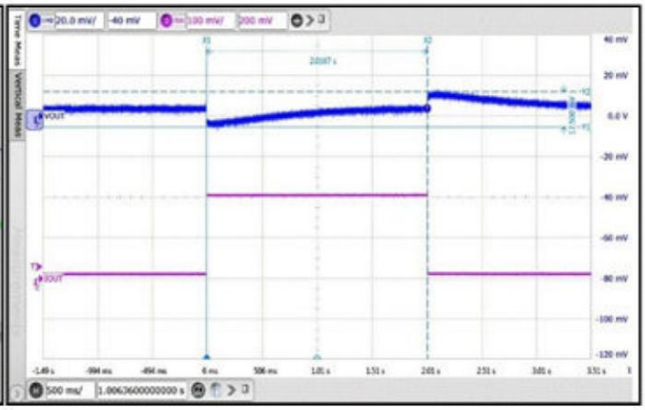


Figure 13. Load Transient(1μs rising/falling time)

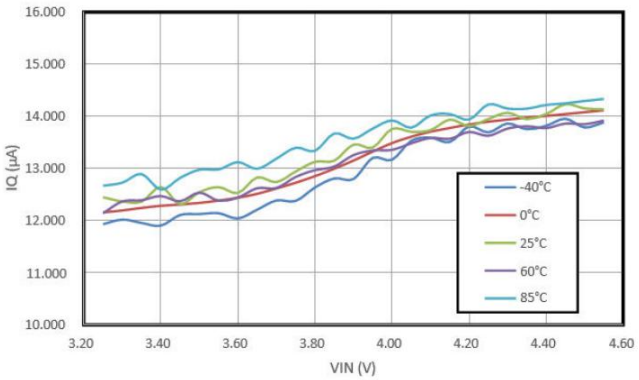


Figure 14. IQ vs VIN (V_{SET} = 3.3V)

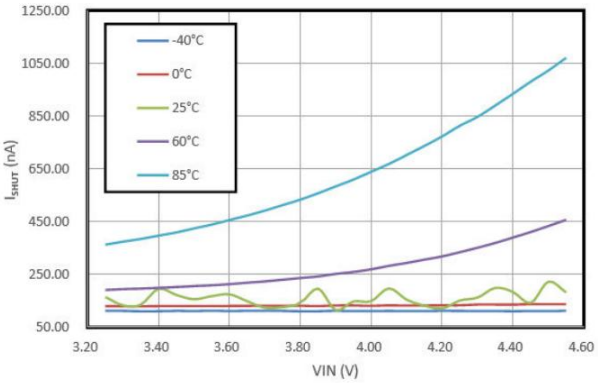


Figure 15. I_{SHUT} vs VIN (V_{SET} = 3.3V)

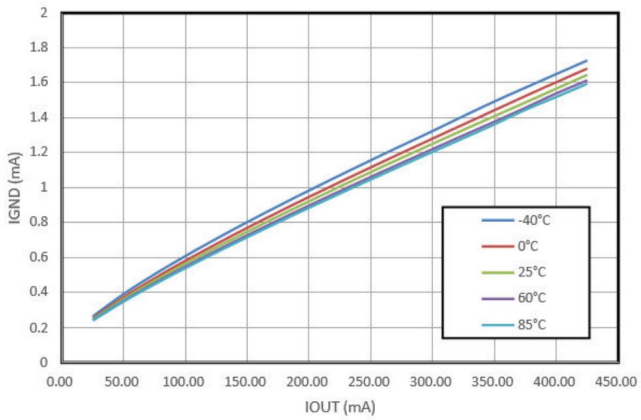


Figure 16. IGND vs IOUT

Typical Characteristics(continued)

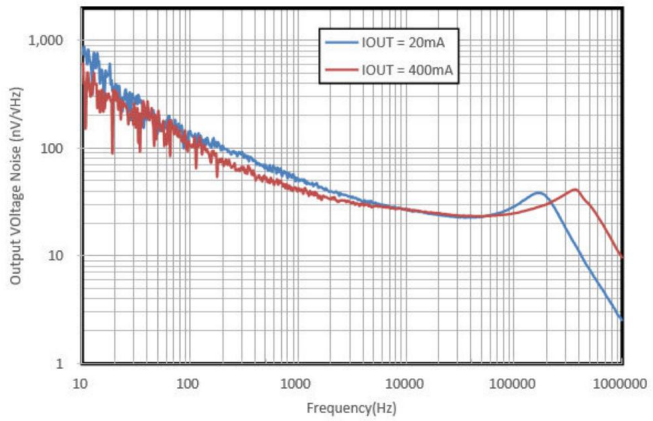


Figure 17. Noise vs Frequency and IOUT (COUT = 1μF)

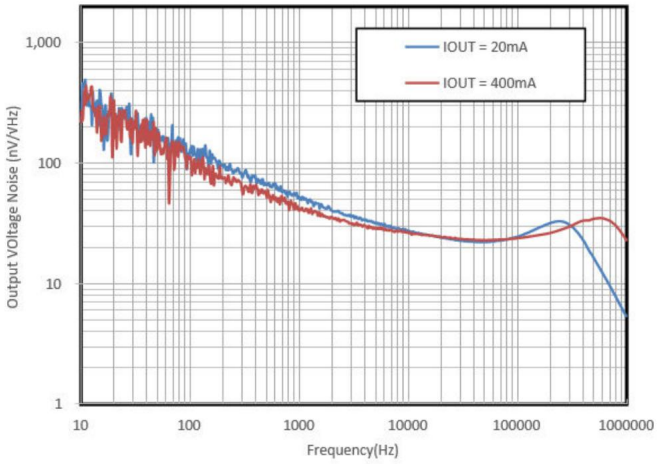


Figure 18. Noise vs Frequency and IOUT (COUT = 2.2μF)

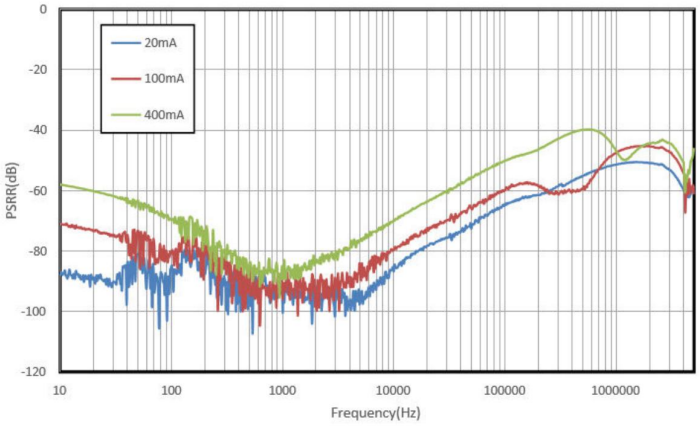


Figure 19. PSRR vs Frequency

Detailed Description

General Introduction

SLD509S is a low noise, high PSRR LDO which can provide 400mA output current. With very low quiescent current, SLD509S is suitable for high performance analog circuits and battery powered portable devices.

UVLO (Under-Voltage Lockout)

The device has a built-in under-voltage lockout (UVLO) circuit in LDO mode. When VIN is rising, the output remains disconnected from the input until IN voltage is above 1.5V (TYP). This circuit has a 100mV hysteresis to provide noise immunity to transient conditions.

OCP (Over Current Protection)

The device enters foldback mode when the output load hit the over current threshold or in shorting event. The current is clamped. The output voltage drops. When the voltage drops below foldback voltage threshold, foldback current limit is activated and scales back to short circuit current.

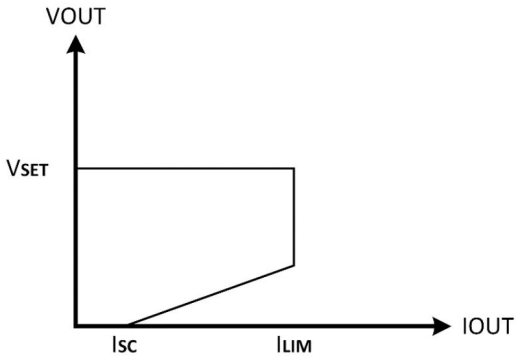


Figure 20. OCP behavior

The OCP threshold is 625mA (typical).

Thermal Shutdown

SLD509S has thermal shutdown function. When the junction temperature exceeds TSD, the device turns off internal MOSFET to protect itself. The device exits thermal shutdown after junction temperature cools down below TSD-THYS. And then the device full works after a soft start period.

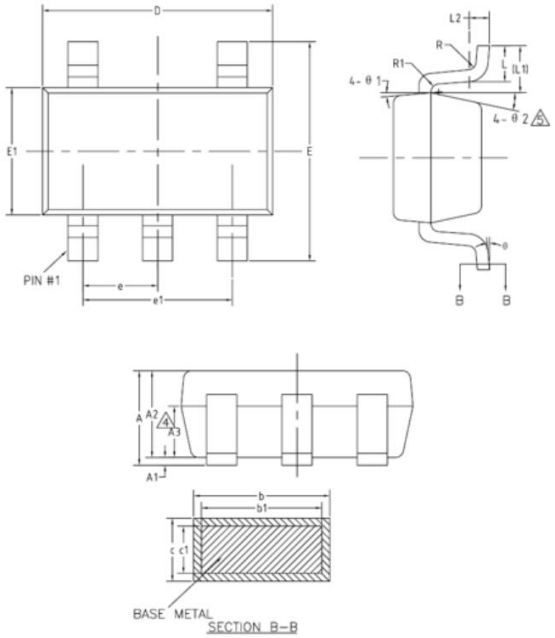
SS function

To avoid high inrush current, SLD509S integrated soft-start function. When EN status changes from logic 0 to logic 1 or from thermal shutdown mode, SLD509S will regulate output current for about 1ms and then enter full function status.

Output discharge

SLD509S has output discharge function. The VOUT connects to GND with 150ohm resistor when EN=0 or thermal shutdown mode for 2ms and then disconnects this resistor.

PACKAGE SOT23-5



COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

	SYMOB	MIN	NOW	MAX
3	A	-	-	1.25
	A1	0	-	0.15
	A2	1.00	1.10	1.20
	A3	0.60	0.65	0.70
	b	0.36	-	0.50
	b1	0.36	0.38	0.45
	c	0.14	-	0.20
	c1	0.14	0.15	0.16
	D	2.826	2.926	3.026
	E	2.60	2.80	3.00
	E1	1.526	1.625	1.726
	e	0.90	0.95	1.00
5	e1	1.80	1.90	2.00
5	L	0.35	0.45	0.60
	L1	0.59REF		
	L2	0.25BSC		
	R	0.10	-	-
	R1	0.10	-	0.25
	θ	0	-	8
	Θ1	3	5	7
5	Θ2	6	-	14

NOTES:
ALL DIMENSIONS REFER TO JEDEC STANDARD MO-178 AA
DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS

SOT23-5 Package Outline Dimensio

PACKAGE/ORDERING INFORMATION

Product Name	①②③④⑤	Set Voltage	Package	Units Reel
SLD509S091A	2029A	0.9V	SOT23-5	3000
SLD509S121A	2029B	1.2V	SOT23-5	3000
SLD509S151A	2029D	1.5V	SOT23-5	3000
SLD509S181A	2029E	1.8V	SOT23-5	3000
SLD509S201A	2029M	2.0V	SOT23-5	3000
SLD509S221A	2029F	2.2V	SOT23-5	3000
SLD509S251A	2029G	2.5V	SOT23-5	3000
SLD509S271A	2029H	2.7V	SOT23-5	3000
SLD509S281A	2029J	2.8V	SOT23-5	3000
SLD509S2850A	2029K	2.85V	SOT23-5	3000
SLD509S301A	2029N	3.0V	SOT23-5	3000
SLD509S321A	2029Q	3.2V	SOT23-5	3000
SLD509S331A	2029L	3.3V	SOT23-5	3000
SLD509S351A	2029R	3.5V	SOT23-5	3000
SLD509S451A	2029S	4.5V	SOT23-5	3000
SLD509S501A	LD509	5.0V	SOT23-5	3000

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