

High Voltage, Low Power LDO

DESCRIPTION

SUM3581 series are 35 μ A 300mA LDO. It uses an advanced CMOS process and a PMOSFET pass device to achieve low noise, fast start-up and excellent output accuracy. The dynamic transient boost feature improves device transient response for wireless communication applications.

SUM3581 series are offered SOT23-5 and DFN1.0 $\times$ 1.0-4 packages.

FEATURES

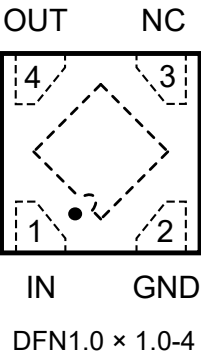
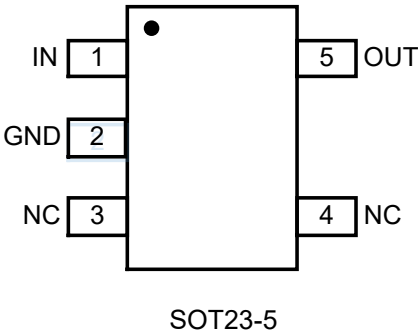
- Wide Input Voltage Range: 2.5 V ~ 20 V
- Standard Fixed Output Voltage Options: 1.2 V, 1.8 V
- Up to 300 mA Load Current
- I_Q is 35 μ A Typical
- Dropout is 1300 mV at 200 mA Load @ V_{OUT} = 1.2 V
- Dropout is 700 mV at 200 mA Load @ V_{OUT} = 1.8 V
- Short current protection is 100 mA
- Excellent load/line transient response
- Line regulation is 0.01%/V typical
- Packages: SOT23-5, DFN1.0 $\times$ 1.0-4

ORDER INFORMATION

Model	Package	Ordering Number	Packing Option
SUM3581	SOT23-5	SUM3581-XXKA5	Tape and Reel, 3000
	DFN1.0 $\times$ 1.0-4	SUM3581-XXYB	Tape and Reel, 10000

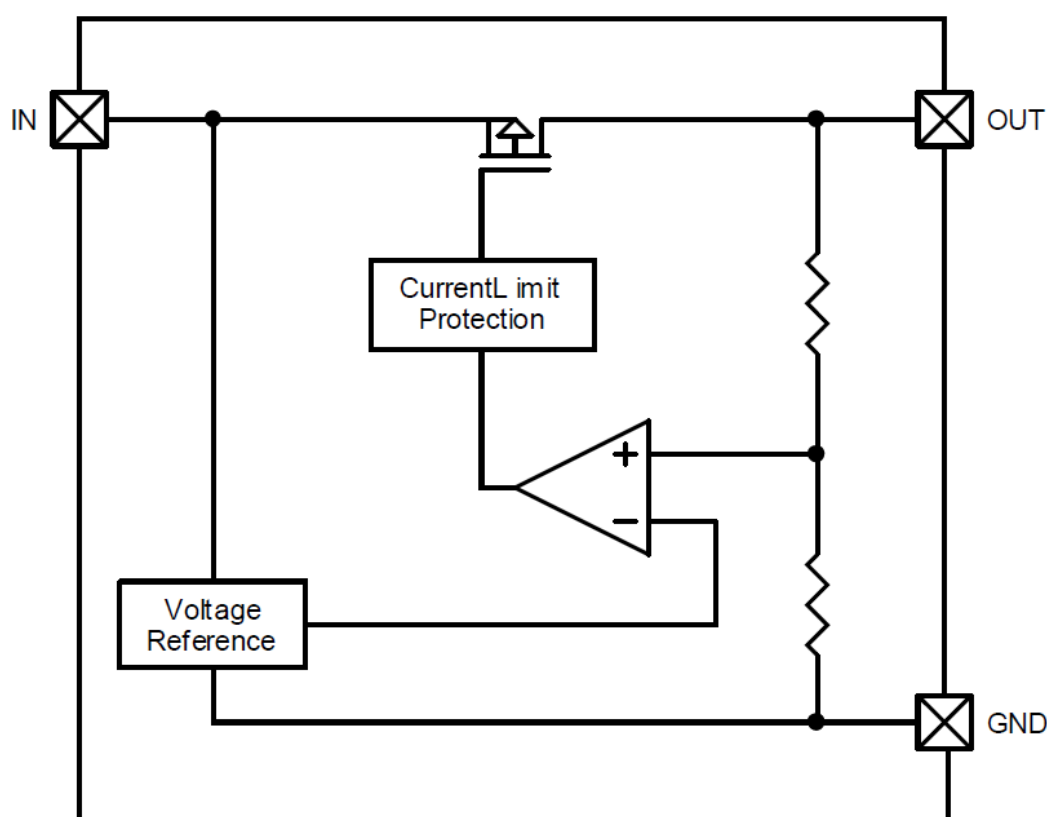
*XX: When expressed as 12, the output voltage is 1.2 V; when expressed as 18 the output voltage is 1.8 V.

PIN CONFIGURATION (Top View)



Pin		Symbol	Description
SOT23-5	DFN1.0 × 1.0-4		
1	1	IN	Supply input pin. Need a 1 μ F or greater capacitor closely decoupled to GND.
2	2	GND	Ground.
3, 4	3	NC	No connection.
5	4	OUT	Output pin. Bypass a 1 μ F or greater capacitor from this pin to ground.

BLOCK DIAGRAM



FUNCTIONAL DESCRIPTION

Input Capacitor

A 1 μF ~ 10 μF ceramic capacitor is recommended to connect between V_{IN} and GND pins to decouple input power supply glitch and noise. The amount of the capacitance may be increased without limit. This input capacitor must be located as close as possible to the device to assure input stability and less noise. For PCB layout, a wide copper trace is required for both V_{IN} and GND.

Output Capacitor

An output capacitor is required for the stability of the LDO. The recommended output capacitance is from 1 μF to 10 μF , Equivalent Series Resistance (ESR) is from 5 m Ω to 100 m Ω , and temperature characteristics are X7R or X5R. Higher capacitance values help to improve load/line transient response.

The output capacitance may be increased to keep low undershoot/overshoot. Place output capacitor as close as possible to V_{OUT} and GND pins.

Low Quiescent Current

The SUM3581 consuming only around 35 μA for all input range and output loading, provides great power saving in portable and low power applications.

Current Limit Current

When output current at the OUT pin is higher than current limit threshold or the OUT pin, the current limit protection will be triggered and clamp the output current to approximately 500 mA to prevent over-current and to protect the regulator from damage due to overheating.

CAUTION

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SUMSEMI recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

SUMSEMI reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SUMSEMI sales office to get the latest datasheet.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Parameter		Rating		Unit
Input Voltage		-0.3 to 24		V
Output Voltage		-0.3 to 6		V
Junction to Ambient Thermal Resistance (θ_{JA}) ⁽²⁾		SOT23-5	250	°C/W
		DFN1.0 × 1.0-4	250	
Power Dissipation@25°C PCB board dimension: 50mm x 50mm (2layer) Copper :1oz		SOT23-5	400	mW
		DFN1.0 × 1.0-4	400	
Storage Temperature		-65 to 150		°C
Operating Junction Temperature		-40 to 125		°C
Lead Temperature (Soldering, 10 sec)		300		°C
ESD ⁽³⁾	HBM Capability	±2000		V

NOTE:

(1) Stresses beyond 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 in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

(2) This particular frame decreases the total thermal resistance of the package and increases its ability to dissipate power when an appropriate area of copper on the printed circuit board is available for heat-sinking.

(3) This device series incorporates ESD protection and is tested by the following methods:

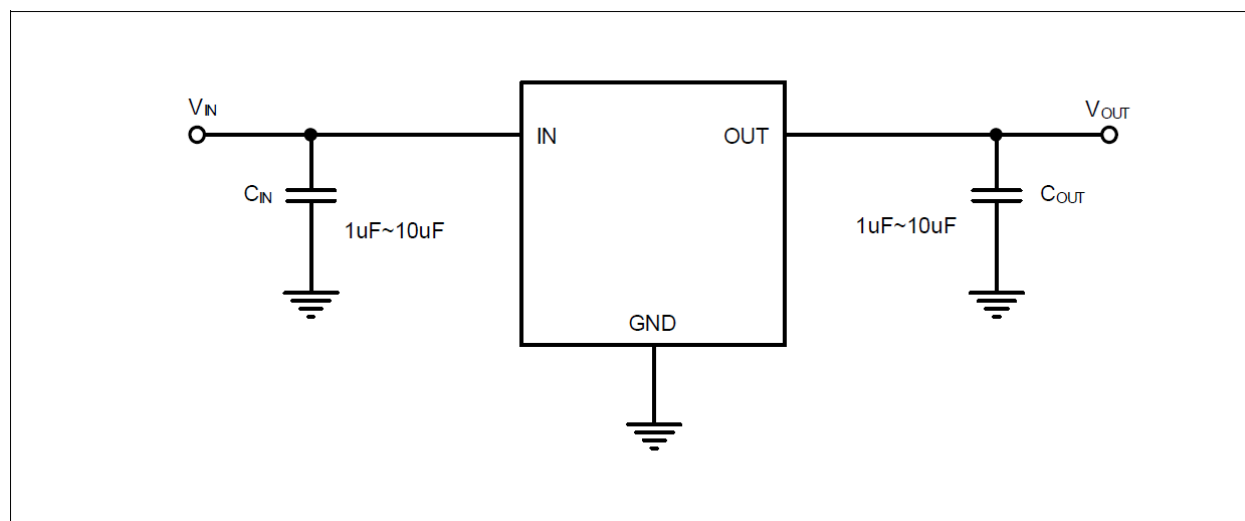
ESDA/JEDEC JS-001-2017.

ELECTRICAL CHARACTERISTICS

($V_{IN} = V_{OUT} + 2\text{ V}$; $C_{IN} = C_{OUT} = 10\text{ }\mu\text{F}$, unless otherwise noted. Typical values are at $T_A = +25^\circ\text{C}$.)

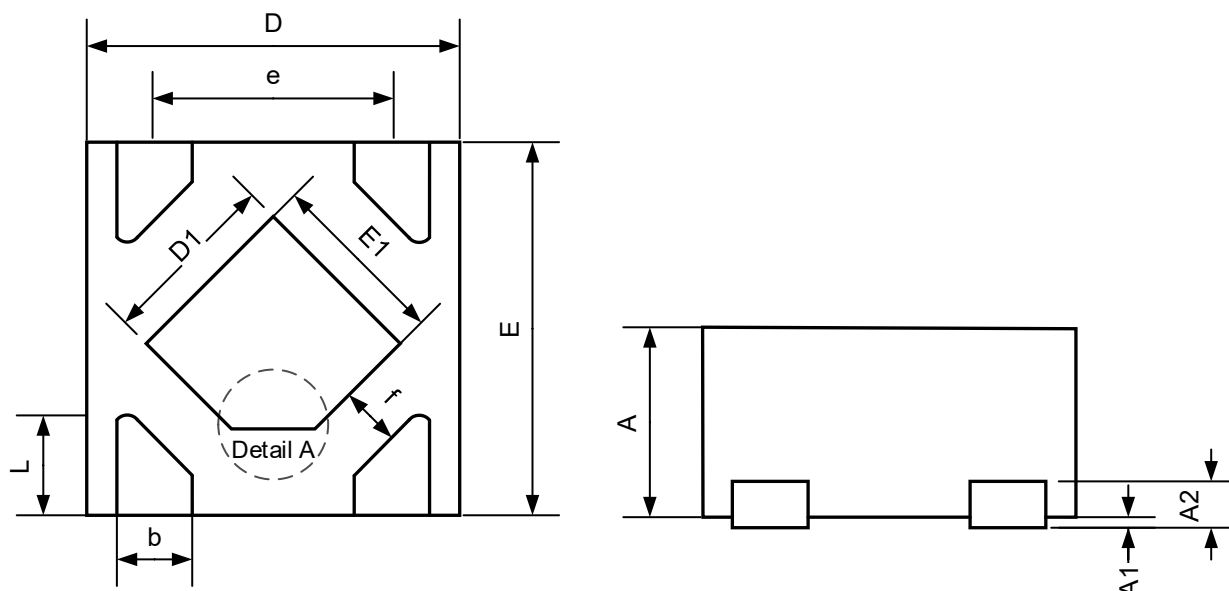
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{IN}^{(1)}$	Operating Input Voltage		2.5		20	V
V_{OUT}	Output Voltage	$I_{OUT} = 1\text{ mA}$	-2%		+2%	V
$V_{DROP}^{(2)}$	Dropout Voltage	$V_{OUT} = 1.2\text{ V}$, $I_{OUT} = 200\text{ mA}$			1300	mV
		$V_{OUT} = 1.8\text{ V}$, $I_{OUT} = 200\text{ mA}$		700	1000	
I_Q	Quiescent Current			35	60	μA
Reg_{Line}	Line Regulation	$V_{IN} = V_{OUT} + 1\text{ V to } 16\text{ V}$, $I_{OUT} = 10\text{ mA}$ ($\Delta V_{OUT}/\Delta V_{IN}/V_{OUT}$)		0.01	0.1	%/V
Reg_{LOAD}	Load Regulation	$1\text{ mA} \leq I_{OUT} \leq 300\text{ mA}$, $V_{IN} = V_{OUT} + 2\text{ V}$		10	60	mV
I_{LIMIT}	Over Current Protection	$R_{OUT} = 1\Omega$		500		mA
PSRR	Power Supply Rejection Ratio	$f = 1\text{ kHz}$, $C_{OUT} = 1\text{ }\mu\text{F}$, $I_{OUT} = 20\text{ mA}$		50		dB
e_N	Output Noise	$I_{OUT} = 20\text{ mA}$, $V_{OUT} = 1.2\text{ V}$ $f = 10\text{ Hz to } 100\text{ KHz}$		100		μV_{rms}

APPLICATION CIRCUITS



PACKAGE DIMENSION

DFN1.0 × 1.0-4

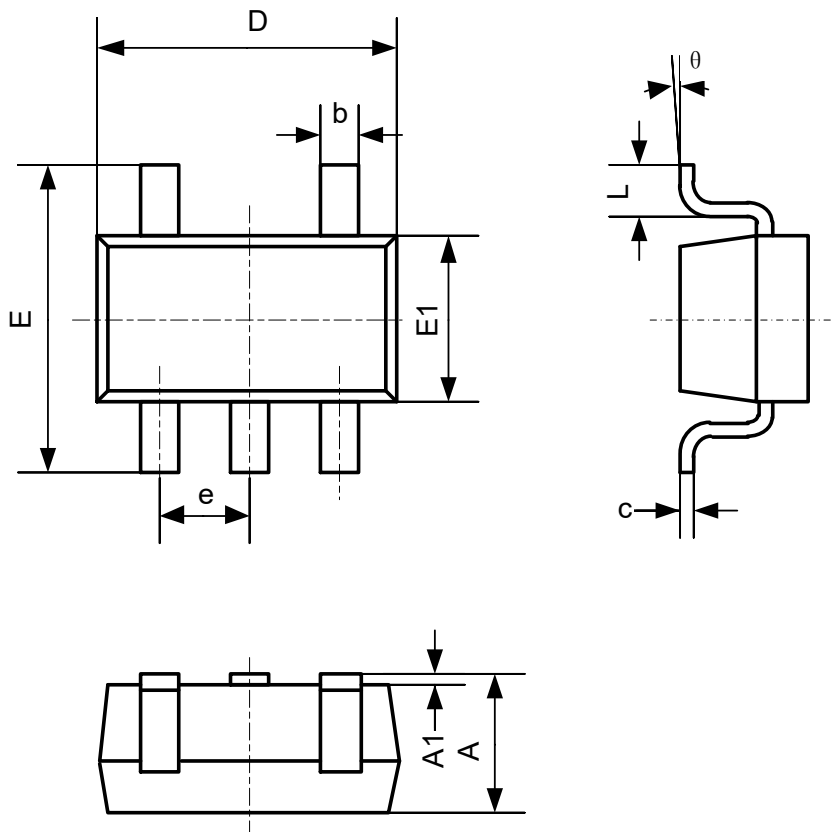


Detail A:



Note: Detail A has two kinds of shapes

Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.400	0.500	0.550
A1	0.000	0.025	0.050
A2	0.125REF		
D	0.950	1.000	1.050
D1	0.380	0.480	0.580
E	0.950	1.000	1.050
E1	0.380	0.480	0.580
b	0.150	0.200	0.250
e	0.650BSC		
f	0.190	0.195	0.200
L	0.150	0.250	0.350

PACKAGE DIMENSION
SOT23-5


Symbol	Dimensions In Millimeters	
	Min	Max
A	1.05	1.25
A1	0.00	0.10
b	0.35	0.50
c	0.08	0.20
D	2.82	3.02
E	2.60	3.00
E1	1.50	1.70
e	0.95BSC	
L	0.30	0.60
θ	0°	8°