MAS9161

80 mA LDO Voltage Regulator IC

- **Only 10.5 µA Ground Pin Current at 1 mA Load Current**
- **Good Transient Performance**
- **Low Dropout Voltage: 200 mV**
- **Low Noise**
- **Enable/Disable Control**
- **Stable with Low-ESR Output Capacitors**

DESCRIPTION

MAS9161 LDO voltage regulator is optimized for operation at low ground pin current of just 10.5 µA. This combined with the good overall performance makes MAS9161 very suitable for providing continuous supply in low power circuits. The performance of MAS9161 benefits applications where standby periods are long and where long battery life is essential.

In addition to the low ground pin current, MAS9161 excels in dropout voltage (200 mV typical at 80 mA). Even though MAS9161 does not use an external bypass capacitor, the noise level (100 Hz… 100 kHz) is only 70 µVrms with 1 µF output capacitor.

The Equivalent Series Resistance (ESR) range of output capacitors that can be used with MAS9161 is very wide. This ESR range from zero up to a couple of Ohms combined with no minimum output current requirement makes the usage of MAS9161 easier and low in cost.

Enable/disable pin allows MAS9161 to be turned off and on. In order to save power the device enters the sleep mode when the regulator is disabled. MAS9161A also includes an auto-discharge function, wherein a shutdown transistor turns on and discharges the output capacitor. MAS9161B does not feature the auto-discharge function.

An internal thermal protection circuit prevents the device from overheating. Also the maximum output current is internally limited.

FEATURES

- Extremely Low Current Consumption
- Good Transient Performance
- Output Accuracy < ± 3.3%
- Internal Thermal Shutdown
- Short Circuit Protection
- Thin SOT (TSOT-5) Package
- Several Output Voltage Options Available, see Ordering Information p. 13

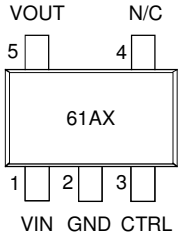
APPLICATIONS

- Continuously Working Low Power Circuits
- Bluetooth Modules
- Digital Circuits
- Real-Time Clocks (RTC)
- SRAMs
- CMOS Backup Power
- Cellular Phones
- Portable Systems
- Smoke Detectors

PIN CONFIGURATION

TSOT-5

Top view



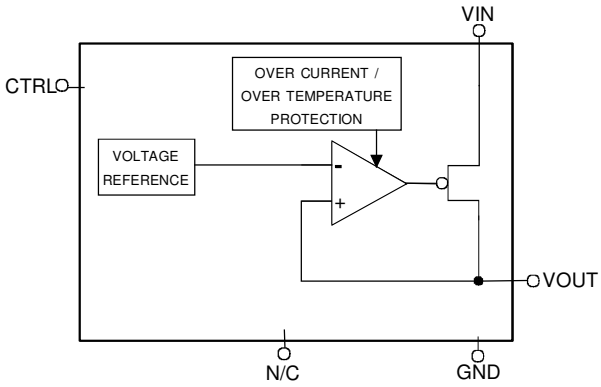
For top marking information see
ordering information p. 13

PIN DESCRIPTION

Pin Name	Pin Number	Type	Function
VIN	1	P	Power Supply Voltage
GND	2	G	Ground
CTRL	3	I	Enable/Disable Pin for Regulator
N/C	4	-	Not Connected
VOUT	5	O	Output

G = Ground, I = Input, O = Output, P = Power

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

All voltages with respect to ground.

Parameter	Symbol	Conditions	Min	Max	Unit
Supply Voltage	V_{IN}		-0.3	6	V
Voltage Range for All Pins			-0.3	V_{IN} + 0.3	V
ESD Rating		HBM		2	kV
Junction Temperature	T_{Jmax}			+175 (limited)	℃
Storage Temperature	T_S		-55	+150	℃

Stresses beyond those listed may cause permanent damage to the device. The device may not operate under these conditions, but it will not be destroyed.

RECOMMENDED OPERATING CONDITIONS

All voltages with respect to ground.

Parameter	Symbol	Conditions	Min	Max	Unit
Operating Junction Temperature	T_J		-40	+125	℃
Operating Ambient Temperature	T_A		-40	+85	℃
Operating Supply Voltage	V_{IN}		$V_{OUT(NOM)}$ + 0.3 V	5.3	V
		For 1.5 V & 1.8 V Output Options	2.5		

ELECTRICAL CHARACTERISTICS

◆ Thermal Protection

T_A = -40℃ to +85℃, typical values at T_A = +27℃, V_{IN} = $V_{OUT(NOM)}$ + 1 V, I_{OUT} = 1 mA, C_{IN} = 1.0 µF, C_L = 1.0 µF, V_{CTRL} = 2 V, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold	T		130	150	175	℃

◆ Control Terminal Specifications

T_A = -40℃ to +85℃, typical values at T_A = +27℃, V_{IN} = $V_{OUT(NOM)}$ + 1 V, I_{OUT} = 1 mA, C_{IN} = 1.0 µF, C_L = 1.0 µF, V_{CTRL} = 2 V, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Control Voltage OFF State ON State	V_{CTRL}		 -0.3 1.2		 0.5 V_{IN} + 0.3	V
Control Current	I_{CTRL}	V_{CTRL} = 1.2 V V_{CTRL} = 2.0 V V_{CTRL} = 3.8 V		0.35 0.70 1.50	1.5	µA

If CTRL-pin is not connected, MAS9161 is in OFF state (4 MΩ pull-down resistor to ground).

◆ Voltage Parameters

T_A = -40°C to +85°C, typical values at T_A = +27°C, V_{IN} = $V_{OUT(NOM)}$ + 1 V, I_{OUT} = 1 mA, C_{IN} = 1.0 µF, C_L = 1.0 µF, V_{CTRL} = 2 V, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Voltage Tolerance	V_{OUT}	I_{OUT} = 0 mA I_{OUT} = 50 mA	$V_{OUT(NOM)}$ – 0.06 $V_{OUT(NOM)}$ – 0.08		$V_{OUT(NOM)}$ + 0.06 $V_{OUT(NOM)}$ + 0.06	V
Dropout Voltage	V_{DROP}	I_{OUT} = 1 mA I_{OUT} = 10 mA I_{OUT} = 50 mA I_{OUT} = 80 mA		5 50 150 200		mV

◆ Current Parameters

T_A = -40°C to +85°C, typical values at T_A = +27°C, V_{IN} = $V_{OUT(NOM)}$ + 1 V, I_{OUT} = 1 mA, C_{IN} = 1.0 µF, C_L = 1.0 µF, V_{CTRL} = 2 V, unless otherwise specified.

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Continuous Output Current	I_{OUT}			0		80	mA
Short Circuit Current	I_{MAX}	R_L = 0 Ω				300	mA
Peak Output Current	I_{PK}	V_{OUT} > 95% * $V_{OUT(NOM)}$			120		mA
Ground Pin Current	I_{GND}	V_{CTRL} = 2.0 V I_{OUT} = 0 mA I_{OUT} = 1 mA I_{OUT} = 10 mA I_{OUT} = 80 mA			 10 10.5 16 61		µA
Ground Pin Current, Sleep Mode	I_{GND}	MAS9161A, V_{CTRL} = 0 V, V_{OUT} = 0 V	T_A = + 27°C		0.01	0.5	µA
			T_A = + 85°C		0.2	4	
		MAS9161B, V_{CTRL} = 0 V	T_A = + 27°C, V_{OUT} = 0 V		0.3		
			T_A = + 27°C V_{OUT} = 2.7 V		4.3		
			T_A = + 85°C, V_{OUT} = 0 V		0.4		
			T_A = + 85°C V_{OUT} = 2.7 V		4.4		

◆ Power Dissipation

T_A = -40°C to +85°C, typical values at T_A = +27°C, V_{IN} = $V_{OUT(NOM)}$ + 1 V, I_{OUT} = 1 mA, C_{IN} = 1.0 µF, C_L = 1.0 µF, V_{CTRL} = 2 V, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Thermal Resistance (Junction-to-Air)	R_{JA}	thermal test board according to JESD51-7 (4 layers), TSOT-5 package		207		°C/W
Maximum Power Dissipation	P_d	any ambient temperature	$P_{dMAX} = \frac{T_{J(MAX)} - T_A}{R_{JA}}$ Note 1			W

Note 1: $T_{J(MAX)}$ denotes maximum operating junction temperature (+125°C), T_A ambient temperature, and R_{JA} junction-to-air thermal resistance specified above.

◆ Line and Load Regulation

T_A = -40°C to +85°C, typical values at T_A = +27°C, V_{IN} = $V_{OUT(NOM)}$ + 1 V, I_{OUT} = 1 mA, C_{IN} = 1.0 µF, C_L = 1.0 µF, V_{CTRL} = 2 V, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Line Regulation		$V_{OUT(NOM)}$ + 1 V < V_{IN} < 5.3 V, I_{OUT} = 10 mA		1.0	3	mV
Load Regulation		I_{OUT} = 1 mA to 80 mA		12	24	mV

◆ Noise and Ripple Rejection

T_A = -40°C to +85°C, typical values at T_A = +27°C, V_{IN} = $V_{OUT(NOM)}$ + 1 V, I_{OUT} = 1 mA, C_{IN} = 1.0 µF, C_L = 1.0 µF, V_{CTRL} = 2 V, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output Noise Voltage	V_{RMS}	100 Hz < f < 100 kHz, I_{OUT} = 10 mA		70		µVrms
Noise Density	V_N	I_{OUT} = 10 mA, f = 10 kHz		300		$nV/\sqrt{Hz}$
PSRR		I_{OUT} = 1 mA				dB
		f = 1 kHz		50		
		f = 10 kHz		30		
		f = 100 kHz		30		
		I_{OUT} = 10 mA				dB
		f = 1 kHz		50		
		f = 10 kHz		30		
		f = 100 kHz		30		

◆ Dynamic Parameters

T_A = -40°C to +85°C, typical values at T_A = +27°C, V_{IN} = $V_{OUT(NOM)}$ + 1 V, I_{OUT} = 1 mA, C_{IN} = 1.0 µF, C_L = 1.0 µF, V_{CTRL} = 2 V, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Start-up Delay		V_{CTRL} = 0 to 2.4 V, I_{OUT} = 10 mA (see figure 1 below)		0.5		ms
Overshoot		V_{CTRL} = 0 to 2.4 V		1.0	8.0	%

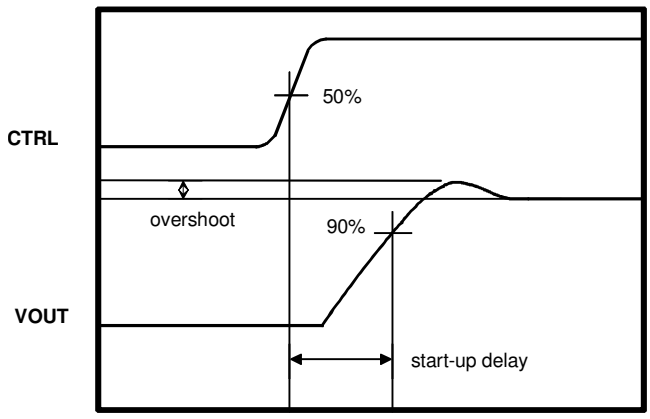


Figure 1. Definitions of overshoot and start-up delay.

TYPICAL PERFORMANCE CHARACTERISTICS

V_{IN} = 3.8 V, T_A = +27°C, I_{OUT} = 50 mA, C_{IN} = 1.0 µF, C_L = 1.0 µF, V_{CTRL} = 2 V, unless otherwise specified.

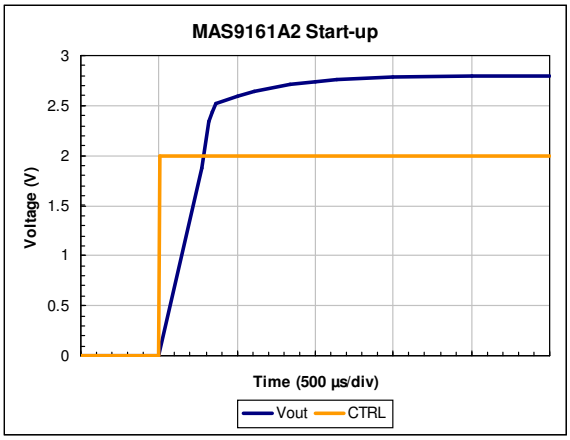


Figure 2. MAS9161A2 typical start-up.

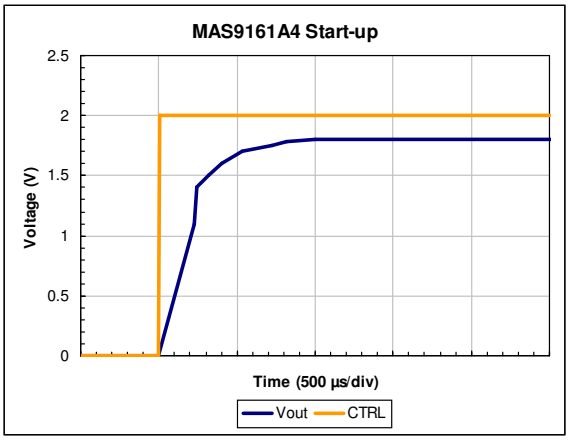


Figure 3. MAS9161A4 typical start-up. V_{IN} = 2.8 V.

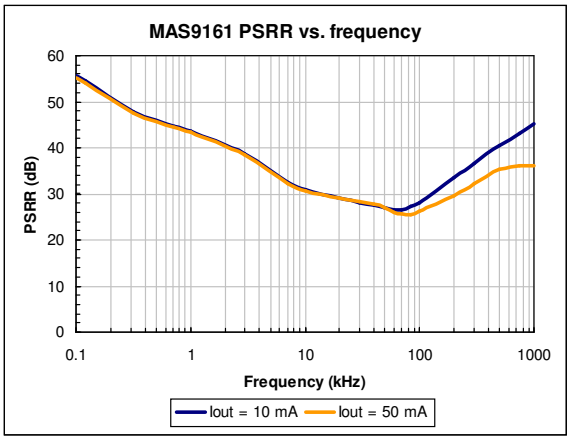


Figure 4. PSRR vs. frequency. T_A = +25°C.

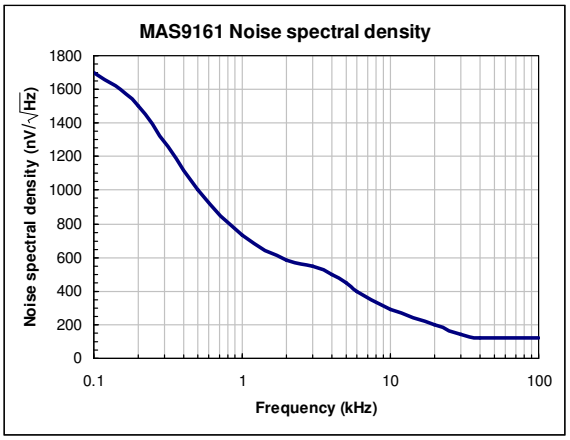


Figure 5. Output noise spectral density.

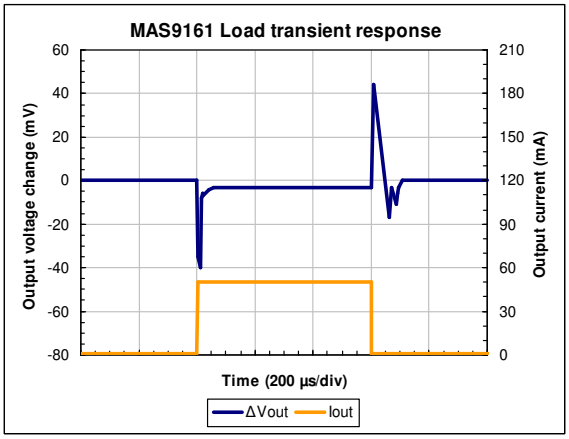


Figure 6. Load transient response. I_{OUT} = 1…50 mA in 10 µs.

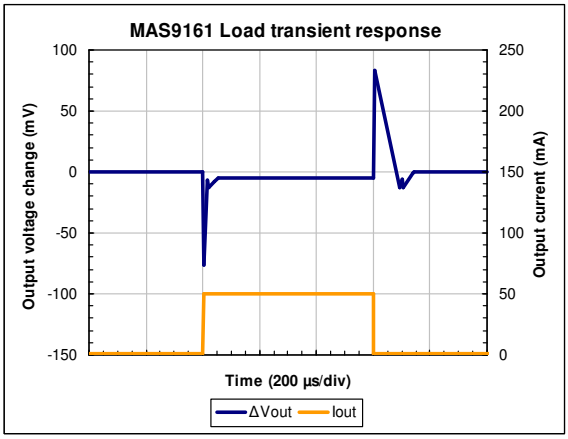


Figure 7. Load transient response. I_{OUT} = 1…50 mA in 2 µs.

TYPICAL PERFORMANCE CHARACTERISTICS

V_{IN} = 3.8 V, T_A = +27°C, I_{OUT} = 50 mA, C_{IN} = 1.0 µF, C_L = 1.0 µF, V_{CTRL} = 2 V, unless otherwise specified.

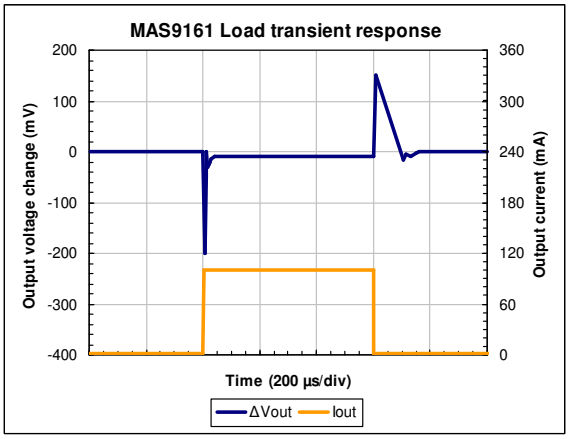


Figure 8. Load transient response. I_{OUT} = 1…100 mA in 2 µs.

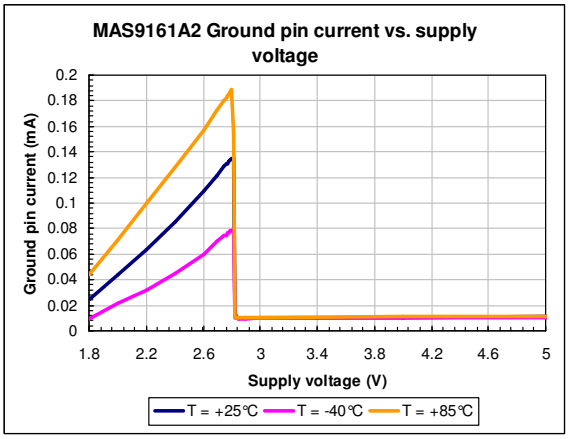


Figure 9. MAS9161A2 ground pin current against the supply voltage. I_{OUT} = 0 mA.

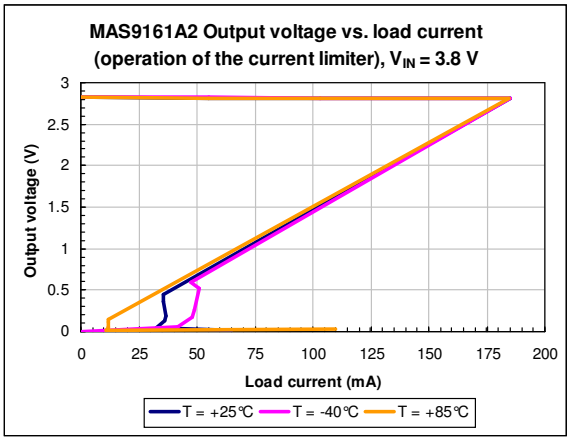


Figure 10. MAS9161A2 output voltage vs. load current (operation of the current limiter).

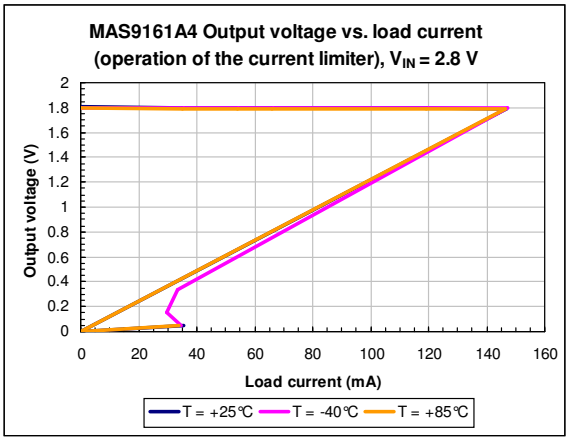


Figure 11. MAS9161A4 output voltage vs. load current (operation of the current limiter). V_{IN} = 2.8 V.

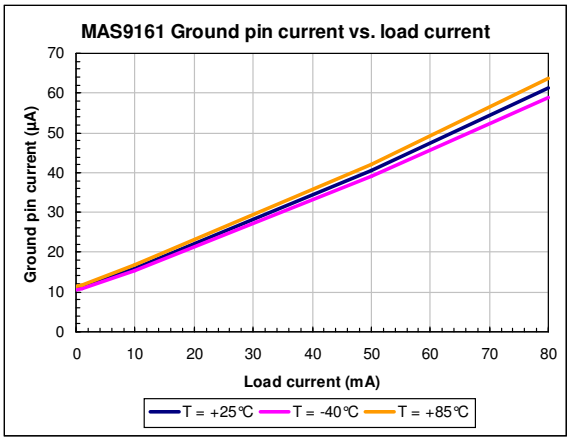


Figure 12. Ground pin current vs. load current.

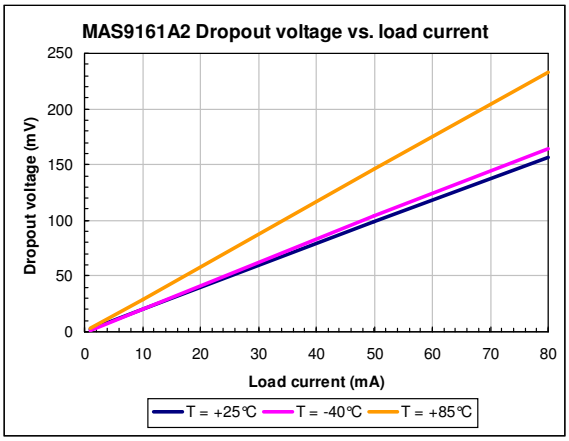


Figure 13. MAS9161A2 dropout voltage vs. load current.

TYPICAL PERFORMANCE CHARACTERISTICS

V_{IN} = 3.8 V, T_A = +27°C, I_{OUT} = 50 mA, C_{IN} = 1.0 µF, C_L = 1.0 µF, V_{CTRL} = 2 V, unless otherwise specified.

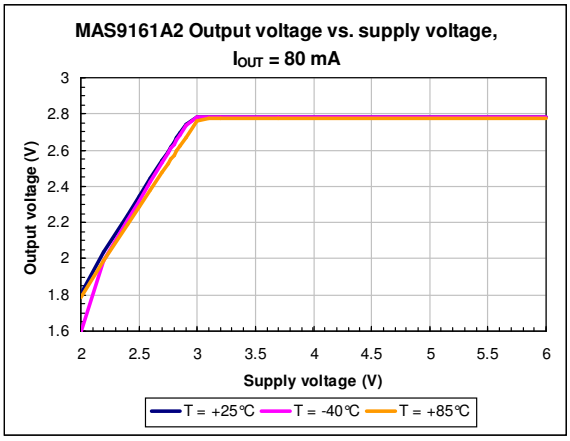


Figure 14. MAS9161A2 output voltage vs. supply voltage. I_{OUT} = 80 mA

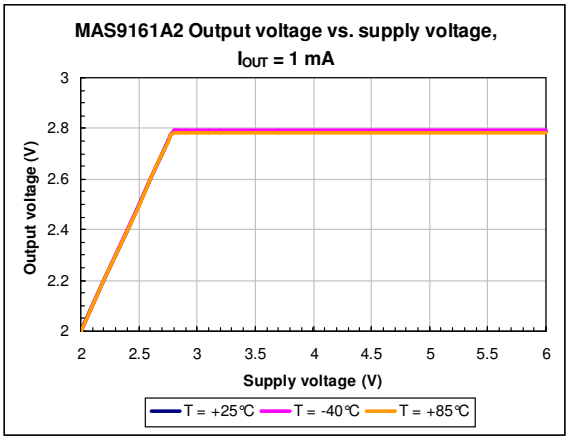


Figure 15. MAS9161A2 output voltage vs. supply voltage. I_{OUT} = 1 mA.

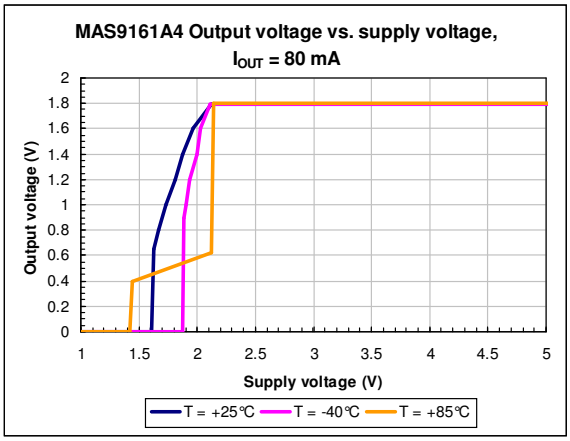


Figure 16. MAS9161A4 output voltage vs. supply voltage. I_{OUT} = 80 mA.

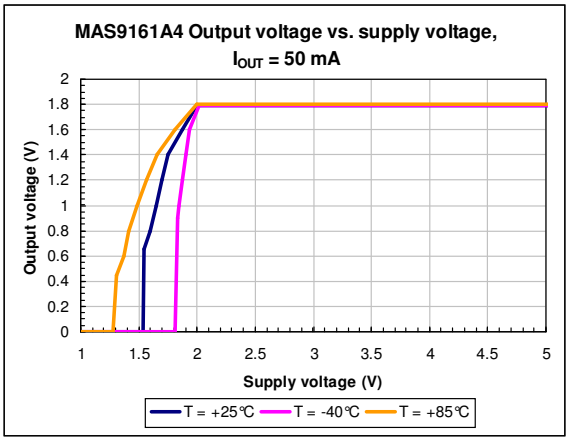


Figure 17. MAS9161A4 output voltage vs. supply voltage. I_{OUT} = 50 mA.

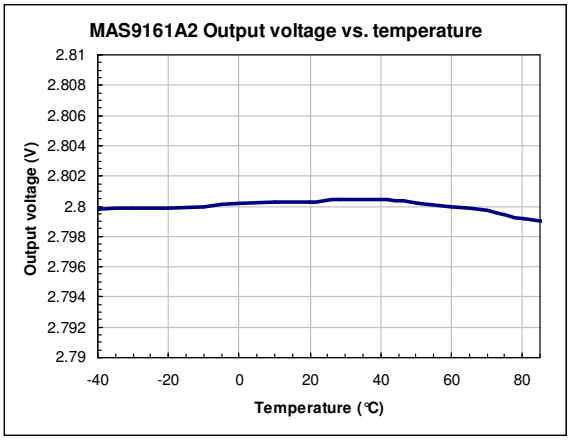


Figure 18. MAS9161A2 output voltage vs. temperature.

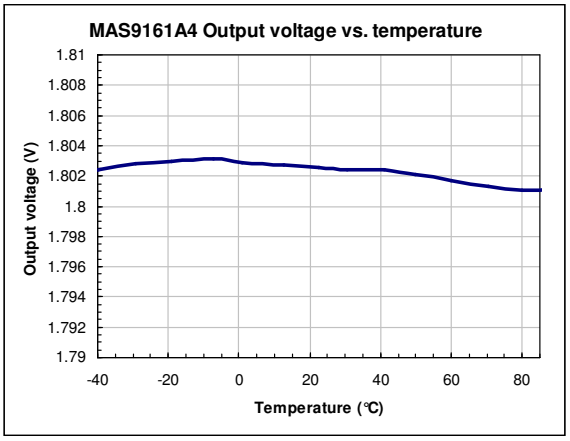
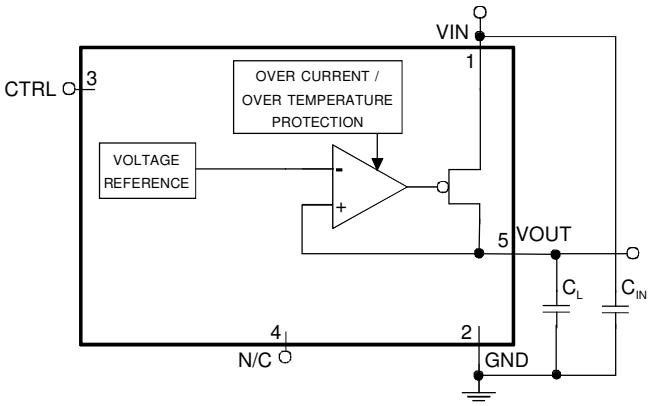


Figure 19. MAS9161A4 output voltage vs. temperature. V_{IN} = 2.8 V.

APPLICATION INFORMATION

MAS9161 is available in two different versions:

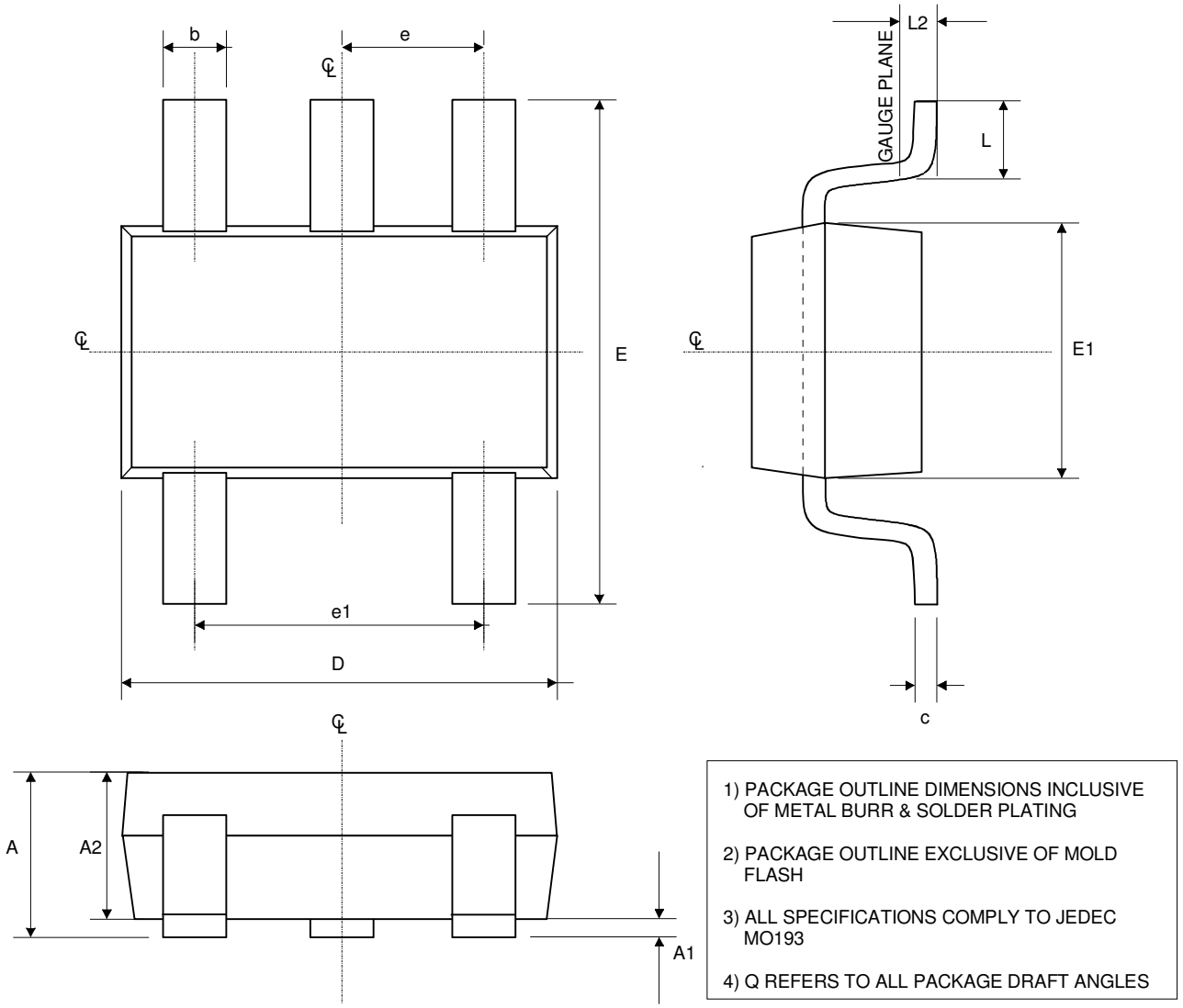
- Version A includes an auto-discharge function, wherein a shutdown transistor turns on and discharges the output capacitor, when MAS9161 is turned off. Thus VOUT pin reaches the value 0 V fast after shut-down.
- Version B does not feature the auto-discharge function. The voltage in VOUT pin, when MAS9161 is turned off, depends on the load circuits leakage: if the load has big leakage current, VOUT rapidly drops to the value 0 V, but if the leakage current is non-existing, VOUT pin stays in $V_{OUT(NOM)}$ value.



Parameter	Symbol	Min	Typ	Max	Unit	Note
Output Capacitance	C_L	0.6	1.0		µF	1. The selected capacitor has to meet the minimum capacitance requirement in all operating conditions. 2. Ceramic and film capacitors can be used.
Effective Series Resistance	ESR	0		3	Ω	1. When within this range stable with all I_{OUT} = 0 mA…80 mA values.
Input Capacitance	C_{IN}	0.23			µF	1. A big enough input capacitance is needed to prevent possible impedance interactions between the supply and MAS9161. 2. Ceramic, tantalum, and film capacitors can be used. If using a tantalum capacitor, it should be checked that surge current rating is sufficient for the application. In the case that the inductance between a battery and MAS9161 is very small (< 0.1 µH) 0.22 µF input capacitor is sufficient.

Values given on the table are minimum requirements unless otherwise specified. When selecting capacitors, tolerance and temperature coefficient must be considered to **make sure that the requirement is met in all potential operating conditions**.

PACKAGE (TSOT-5) OUTLINE



1) PACKAGE OUTLINE DIMENSIONS INCLUSIVE OF METAL BURR & SOLDER PLATING

2) PACKAGE OUTLINE EXCLUSIVE OF MOLD FLASH

3) ALL SPECIFICATIONS COMPLY TO JEDEC MO193

4) Q REFERS TO ALL PACKAGE DRAFT ANGLES

Symbol	Min	Nom	Max	Unit
A	--	--	1.00	mm
A1	0.01	0.05	0.10	mm
A2	0.84	0.87	0.90	mm
b	0.30	--	0.45	mm
c	0.12	0.127	0.20	mm
D		2.90BSC		mm
E		2.80BSC		mm
E1		1.60BSC		mm
e		0.95BSC		mm
e1		1.90BSC		mm
L	0.30	0.40	0.50	mm
L2		0.25BSC		mm
Q	4°	10°	12°	

SOLDERING INFORMATION

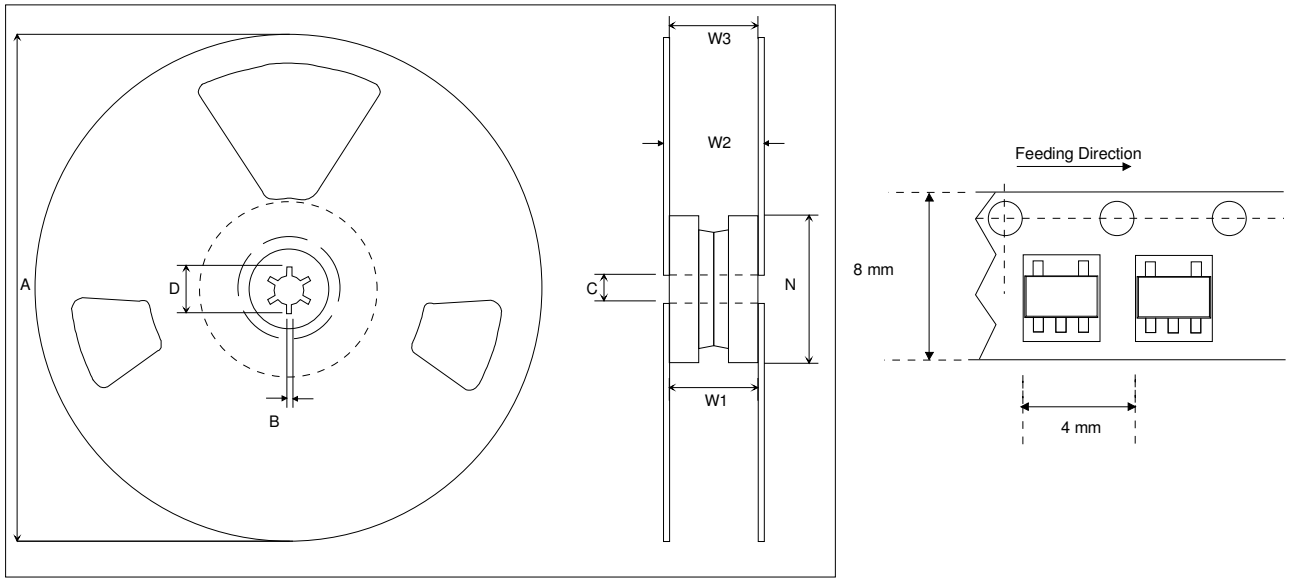
◆ **For Eutectic Sn/Pb TSOT-5**

Resistance to Soldering Heat	According to RSH test IEC 68-2-58/20 2*220°C
Maximum Temperature	240°C
Maximum Number of Reflow Cycles	3
Reflow profile	Thermal profile parameters stated in JESD22-A113 should not be exceeded. http://www.jedec.org
Seating Plane Co-planarity	max 0.08 mm
Lead Finish	Solder plate 7.62 - 25.4 µm, material Sn 85% Pb 15%
MSL (Moisture Sensitivity Level)	1

◆ **For Pb-Free TSOT-5 and Pb-Free, RoHS Compliant TSOT-5**

Resistance to Soldering Heat	According to RSH test IEC 68-2-58/20
Maximum Temperature	260°C
Maximum Number of Reflow Cycles	3
Reflow profile	Thermal profile parameters stated in IPC/JEDEC J-STD-020 should not be exceeded. http://www.jedec.org
Seating Plane Co-planarity	max 0.08 mm
Lead Finish	Solder plate 7.62 – 25.4 µm, material Matte Tin
MSL (Moisture Sensitivity Level)	1

TAPE & REEL SPECIFICATIONS (TSOT-5)



Other Dimensions according to EIA-481 Standard

3000 Components on Each Reel

Dimension	Min	Max	Unit
A		178	mm
B	1.5		mm
C	12.80	13.50	mm
D	20.2		mm
N	50		mm
W_1 (measured at hub)	8.4	9.9	mm
W_2 (measured at hub)		14.4	mm
W_3 (includes flange distortion at outer edge)	7.9	10.9	mm
Trailer	160		mm
Leader	390, of which minimum 160 mm of empty carrier tape sealed with cover tape		mm

ORDERING INFORMATION

- Version A: MAS9161 with auto-discharge function
- Version B: MAS9161 without auto-discharge function
  (see p. 9 for definition of auto-discharge function)

Product Code	Output Voltage	Version	Top Marking	Package	Comments
MAS9161B5GA06	1.5 V	B	61B5	TSOT-5	Tape and Reel
MAS9161B5GB06	1.5 V	B	61B5 (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161B5GC06	1.5 V	B	61B5 (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161AGA4-T	1.8 V	A	61A4	TSOT-5	Tape and Reel
MAS9161B4GA06	1.8 V	B	61B4	TSOT-5	Tape and Reel
MAS9161AGB4-T	1.8 V	A	61A4 (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161B4GB06	1.8 V	B	61B4 (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161A4GC06	1.8 V	A	61A4 (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161B4GC06	1.8 V	B	61B4 (G in the bottom marking to indicate Pb free, RoHS compliant)	TSOT-5 Pb free, RoHS compliant	Tape and Reel
MAS9161AGA3-T	2.5 V	A	61A3	TSOT-5	Tape and Reel
MAS9161B3GA06	2.5 V	B	61B3	TSOT-5	Tape and Reel
MAS9161AGB3-T	2.5 V	A	61A3 (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161B3GB06	2.5 V	B	61B3 (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161A3GC06	2.5 V	A	61A3 (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161B3GC06	2.5 V	B	61B3 (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161AGAE-T	2.65 V	A	61AE	TSOT-5	Tape and Reel
MAS9161BEGA06	2.65 V	B	61BE	TSOT-5	Tape and Reel

Product Code	Output Voltage	Version	Top Marking	Package	Comments
MAS9161AGBE-T	2.65 V	A	61AE (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161BEGB06	2.65 V	B	61BE (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161AEGC06	2.65 V	A	61AE (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161BEGC06	2.65 V	B	61BE (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161AGA2-T	2.8 V	A	61A2	TSOT-5	Tape and Reel
MAS9161B2GA06	2.8 V	B	61B2	TSOT-5	Tape and Reel
MAS9161AGB2-T	2.8 V	A	61A2 (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161B2GB06	2.8 V	B	61B2 (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161A2GC06	2.8 V	A	61A2 (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161B2GC06	2.8 V	B	61B2 (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161AGA7-T	2.9 V	A	61A7	TSOT-5	Tape and Reel
MAS9161B7GA06	2.9 V	B	61B7	TSOT-5	Tape and Reel
MAS9161AGB7-T	2.9 V	A	61A7 (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161B7GB06	2.9 V	B	61B7 (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161A7GC06	2.9 V	A	61A7 (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161B7GC06	2.9 V	B	61B7 (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161AGA6-T	3.0 V	A	61A6	TSOT-5	Tape and Reel
MAS9161B6GA06	3.0 V	B	61B6	TSOT-5	Tape and Reel
MAS9161AGB6-T	3.0 V	A	61A6 (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel

Product Code	Output Voltage	Version	Top Marking	Package	Comments
MAS9161B6GB06	3.0 V	B	61B6 (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161A6GC06	3.0 V	A	61A6 (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161B6GC06	3.0 V	B	61B6 (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161AGAD-T	3.1 V	A	61AD	TSOT-5	Tape and Reel
MAS9161BDGA06	3.1 V	B	61BD	TSOT-5	Tape and Reel
MAS9161AGBD-T	3.1 V	A	61AD (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161BDGB06	3.1 V	B	61BD (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161ADGC06	3.1 V	A	61AD (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161BDGC06	3.1 V	B	61BD (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161AGA1-T	3.3 V	A	61A1	TSOT-5	Tape and Reel
MAS9161B1GA06	3.3 V	B	61B1	TSOT-5	Tape and Reel
MAS9161AGB1-T	3.3 V	A	61A1 (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161B1GB06	3.3 V	B	61B1 (B in the bottom marking to indicate Pb-free)	TSOT-5 Pb-free	Tape and Reel
MAS9161A1GC06	3.3 V	A	61A1 (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel
MAS9161B1GC06	3.3 V	B	61B1 (G in the bottom marking to indicate Pb-free, RoHS compliant)	TSOT-5 Pb-free, RoHS compliant	Tape and Reel

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