

1A Load Switch with Slew Rate Control

Description

The AM6U1601 is a 30mΩ, 1.0A, load switch that switches a power rail ranging from 1.5V to 5.5V.

The product is packaged in a small 1.0 x 1.0 mm package.

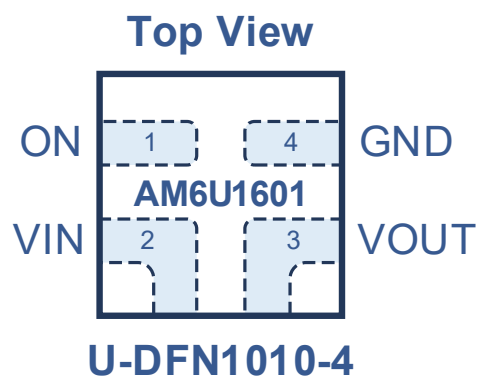
Features

- 1.0 x 1.0 x 0.55mm DFN package
- $R_{DS(on)}$:
 - 30mΩ at $V_{IN} = 5.5V$
 - 38mΩ at $V_{IN} = 3.3V$
 - 47mΩ at $V_{IN} = 2.5V$
 - 65mΩ at $V_{IN} = 1.8V$
 - 86mΩ at $V_{IN} = 1.5V$
- RoHS Compliant / Halogen-Free / Pb-Free
- Operating Voltage: 1.5V to 5.5V
- Operating Temperature: -40°C to 85°C

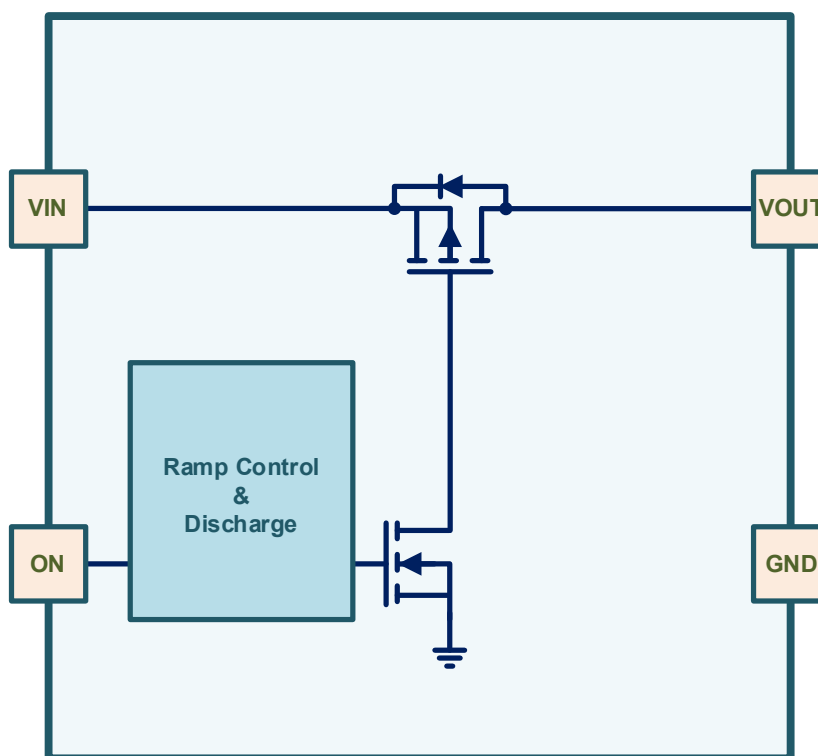
Applications

- Smartphones
- Tablets
- Notebooks

PIN Configuration



Functional Block Diagram

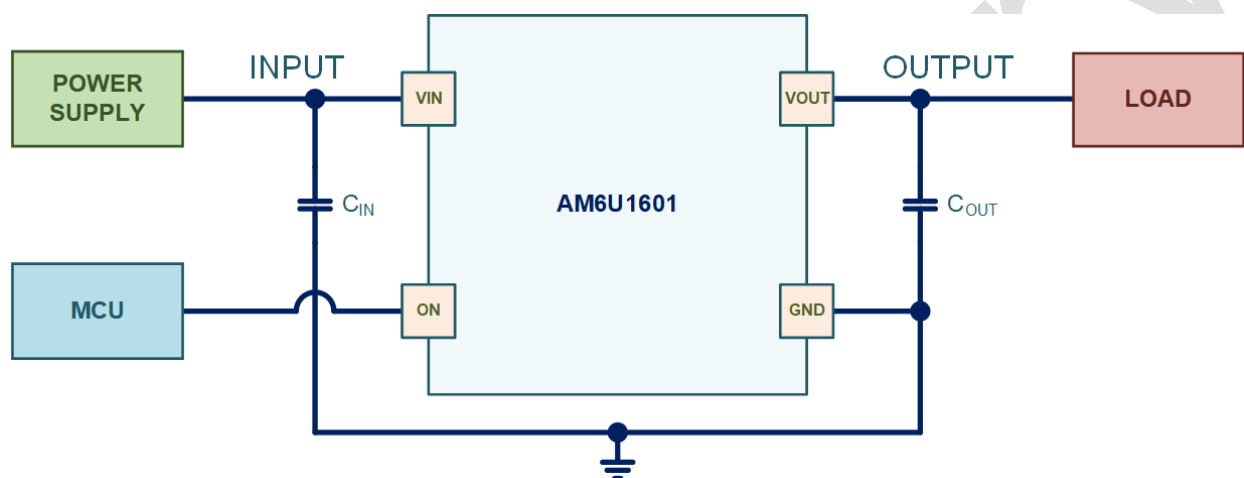




Pin Description

Pin #	Pin Name	Type	Pin Description
1	ON	Input	Turns on load switch, active HI.
2	VIN	MOSFET	Input terminal connection for the load switch.
3	VOUT	MOSFET	Output terminal connection for the load switch.
4	GND	GND	Ground

Typical Application Circuit





1A Load Switch with Slew Rate Control

Absolute Maximum Ratings

Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
V_{IN}	Switch Input Voltage		—	—	6	V
T_S	Storage Temperature		-65	—	140	°C
ESD _{HBM}	ESD Protection	Human Body Model	2000	—	—	V
MSL	Moisture Sensitivity Level		1			
W_{DIS}	Package Power Dissipation		—	—	0.4	W
MOSFET $I_{OUT(PK)}$	Peak Current from VIN to VOUT	For no more than 1ms with 1% duty cycle	—	—	1.5	A

Electrical Characteristics

$T_A = -40^{\circ}\text{C}$ to 85°C unless otherwise stated. Typical values at $T_A = 25^{\circ}\text{C}$ (unless otherwise stated).

Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
V_{IN}	Switch Input Voltage	-40°C to 85°C	1.5	—	5.5	V
I_{SHDN}	Input Shutdown Current	Disabled, no Load	—	2.8	26	nA
I_Q	Input Quiescent Current	Enabled, no Load	—	0.76	600	nA
I_{FET_OFF}	MOSFET OFF Leakage Current		—	0.035	2.4	μA
I_{OUT}	Output Current	Continuous	0	—	1.0	A
R_{DS_ON}	Switch ON Resistance	$V_{IN} = 5.5\text{V}, T_A = 25^{\circ}\text{C}; I_{OUT} = 100\text{mA}$	—	30.0	33.0	m Ω
		$V_{IN} = 3.3\text{V}, T_A = 25^{\circ}\text{C}; I_{OUT} = 100\text{mA}$	—	38.5	42.0	
		$V_{IN} = 2.5\text{V}, T_A = 25^{\circ}\text{C}; I_{OUT} = 100\text{mA}$	—	47.0	51.5	
		$V_{IN} = 1.8\text{V}, T_A = 25^{\circ}\text{C}; I_{OUT} = 100\text{mA}$	—	65.5	73.5	
		$V_{IN} = 1.5\text{V}, T_A = 25^{\circ}\text{C}; I_{OUT} = 100\text{mA}$	—	86.0	100.0	
		$V_{IN} = 5.5\text{V}, T_A = 85^{\circ}\text{C}; I_{OUT} = 100\text{mA}$	—	35.0	38.0	
		$V_{IN} = 3.3\text{V}, T_A = 85^{\circ}\text{C}; I_{OUT} = 100\text{mA}$	—	45.0	49.0	
		$V_{IN} = 2.5\text{V}, T_A = 85^{\circ}\text{C}; I_{OUT} = 100\text{mA}$	—	54.5	60.0	
		$V_{IN} = 1.8\text{V}, T_A = 85^{\circ}\text{C}; I_{OUT} = 100\text{mA}$	—	75.0	84.0	
		$V_{IN} = 1.5\text{V}, T_A = 85^{\circ}\text{C}; I_{OUT} = 100\text{mA}$	—	96.0	110.0	
t_{ON_Delay}	ON Delay Time	50% ON to V_{OUT} Ramp Start $V_{IN} = 5.0\text{V}, R_{LOAD} = 10\Omega, C_{OUT} = 100\text{nF}$	3	5.2	10	μs
		50% ON to V_{OUT} Ramp Start $V_{IN} = 3.3\text{V}, R_{LOAD} = 10\Omega, C_{OUT} = 100\text{nF}$	12	19	45	
		50% ON to V_{OUT} Ramp Start $V_{IN} = 1.5\text{V}, R_{LOAD} = 10\Omega, C_{OUT} = 100\text{nF}$	45	66	160	
t_{ON}	Total Turn On Time	50% ON to 90% V_{OUT} $V_{IN} = 5.0\text{V}, R_{LOAD} = 10\Omega$	90	146	333	μs
		50% ON to 90% V_{OUT} $V_{IN} = 3.3\text{V}, R_{LOAD} = 10\Omega$	85	138	328	
		50% ON to 90% V_{OUT} $V_{IN} = 1.5\text{V}, R_{LOAD} = 10\Omega$	100	142	340	

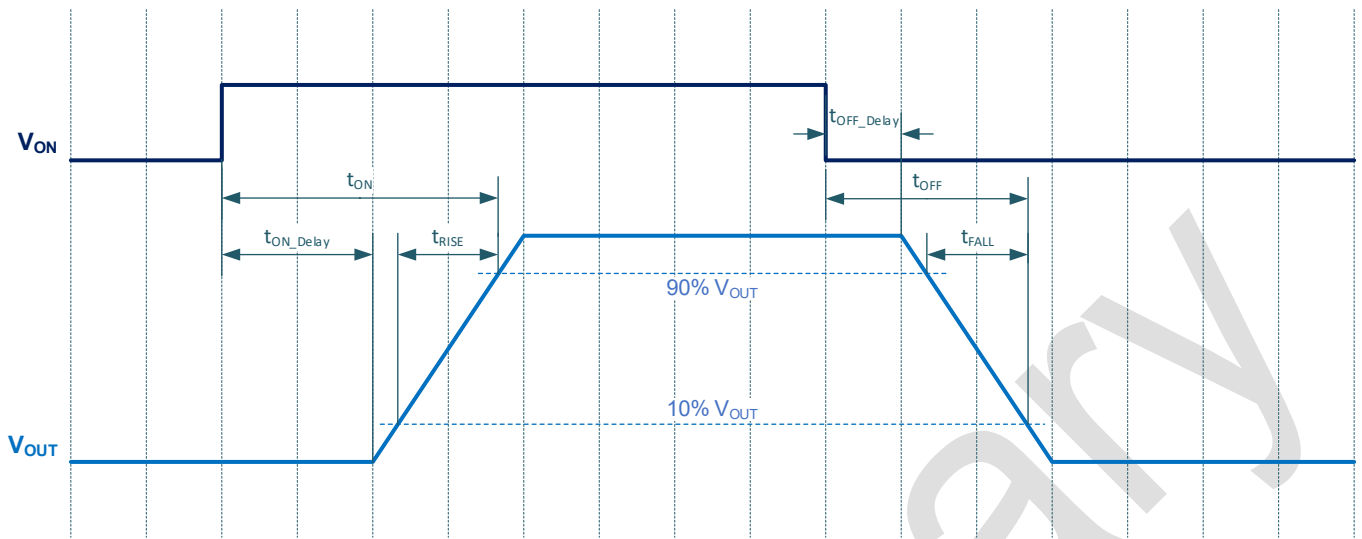


1A Load Switch with Slew Rate Control

Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
t_{RISE}	Rise Time	10% V_{OUT} to 90% V_{OUT} $V_{IN} = 5.0V$, $R_{LOAD} = 10\Omega$	80	132	305	μs
		10% V_{OUT} to 90% V_{OUT} $V_{IN} = 3.3V$, $R_{LOAD} = 10\Omega$	65	109	260	
		10% V_{OUT} to 90% V_{OUT} $V_{IN} = 1.5V$, $R_{LOAD} = 10\Omega$	40	72	175	
t_{OFF_Delay}	OFF Delay Time	50% ON to V_{OUT} Fall Start, $V_{IN} = 5.0V$, $R_{LOAD} = 10\Omega$, no C_{OUT}	4.2	4.9	5.5	μs
C_{OUT}	Output Load Capacitance	C_{OUT} connected from V_{OUT} to GND	—	0.1	—	μF
V_{IH}	ON Pin High Input Voltage		0.85	—	V_{IN}	V
V_{IL}	ON Pin Low Input Voltage		-0.3	0	0.3	V



Basic Timing Parameters





1A Load Switch with Slew Rate Control

Application Information

For correct operability per AM6U1601 EC table a proper power-up sequence must be applied. Apply V_{IN} first, followed by the ON signal to power-up the device. To power-down the device apply the sequence in reverse order. It is also recommended to connect at least $0.1\mu\text{F}$ capacitor from VOUT pin to GND.

Some typical operation waveforms are illustrated below.

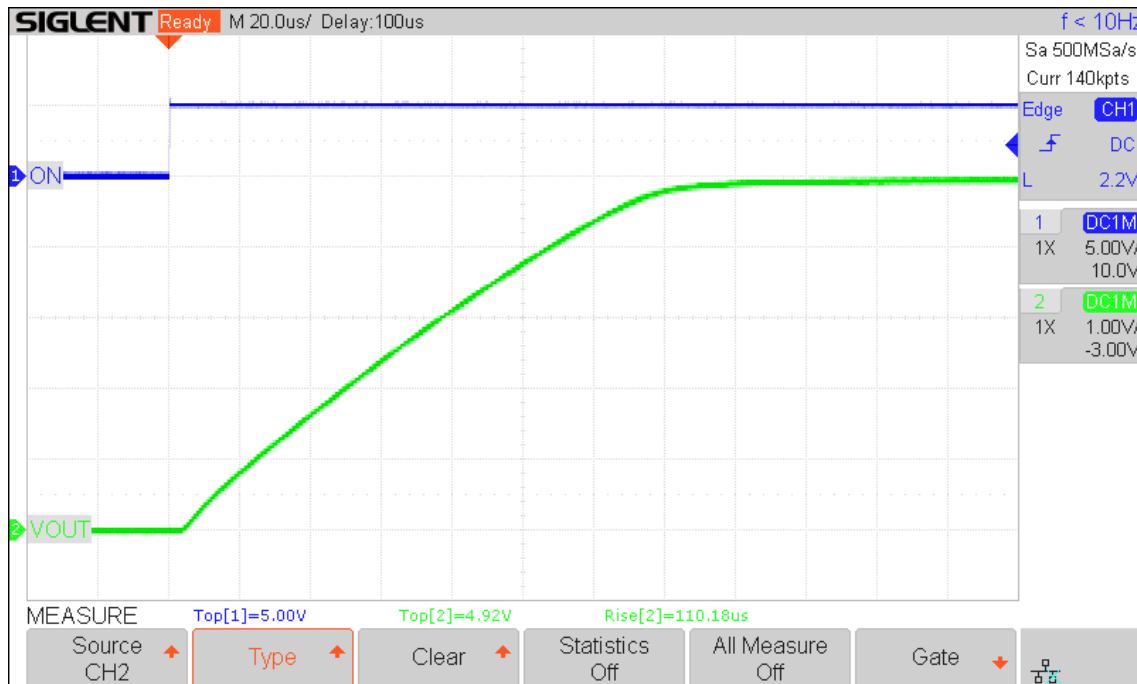


Figure 1. AM6U1601 typical power-up operation waveform. $V_{IN} = 5\text{V}$, $C_{OUT} = 0.1\mu\text{F}$, $R_{LOAD} = 10\Omega$

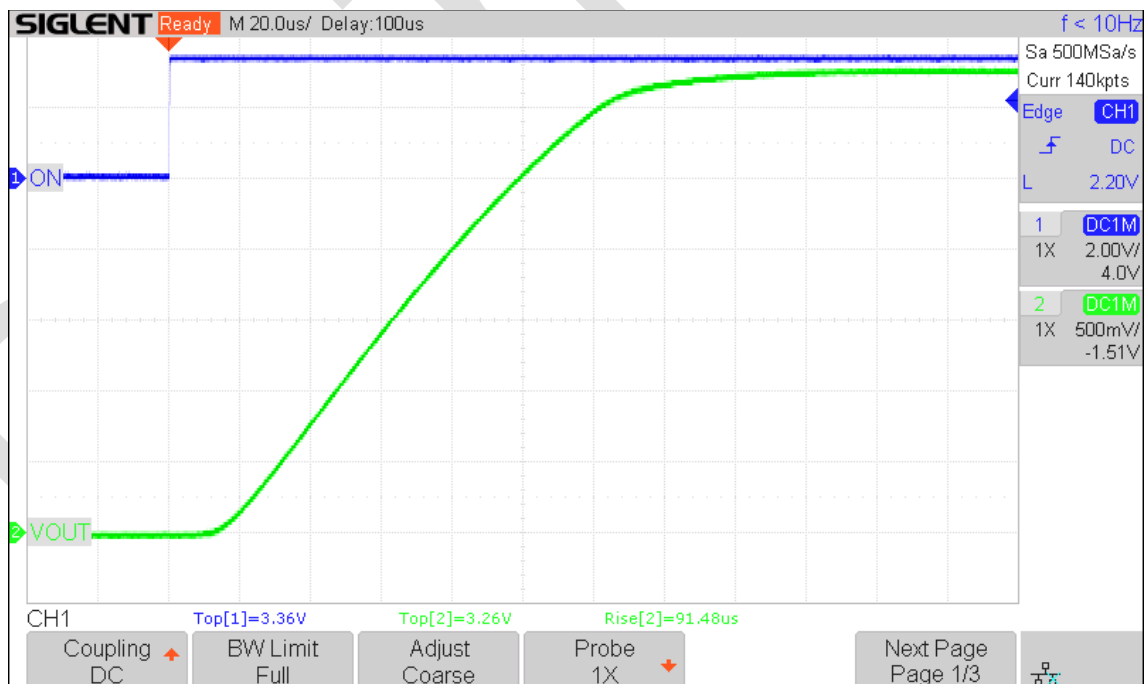
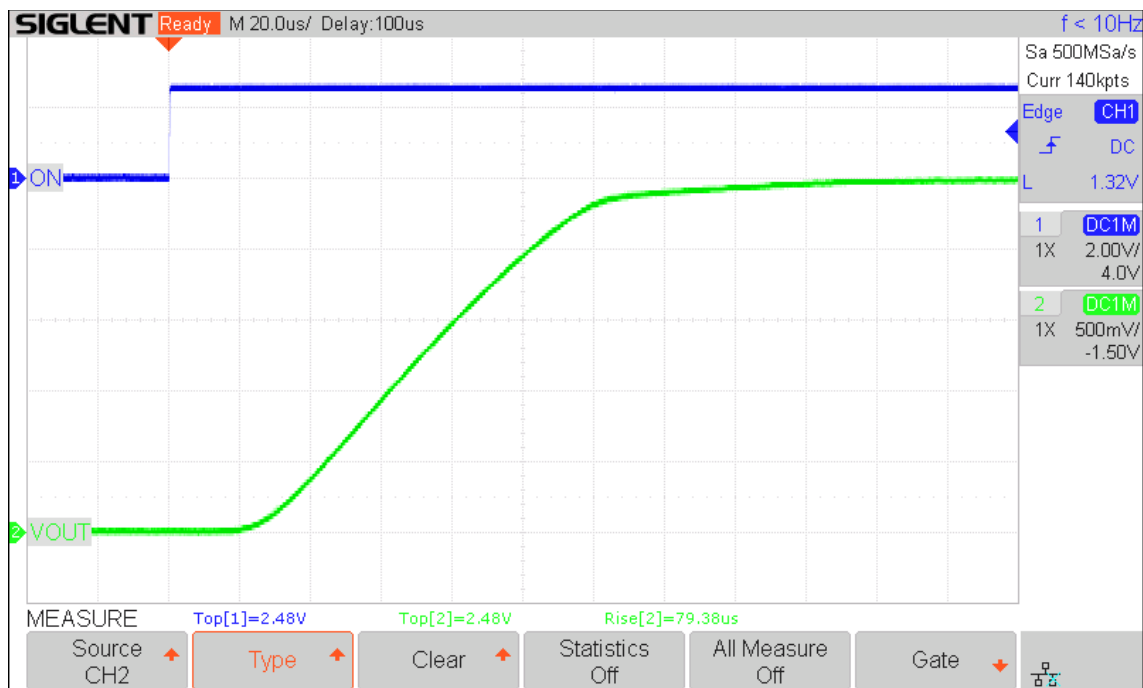
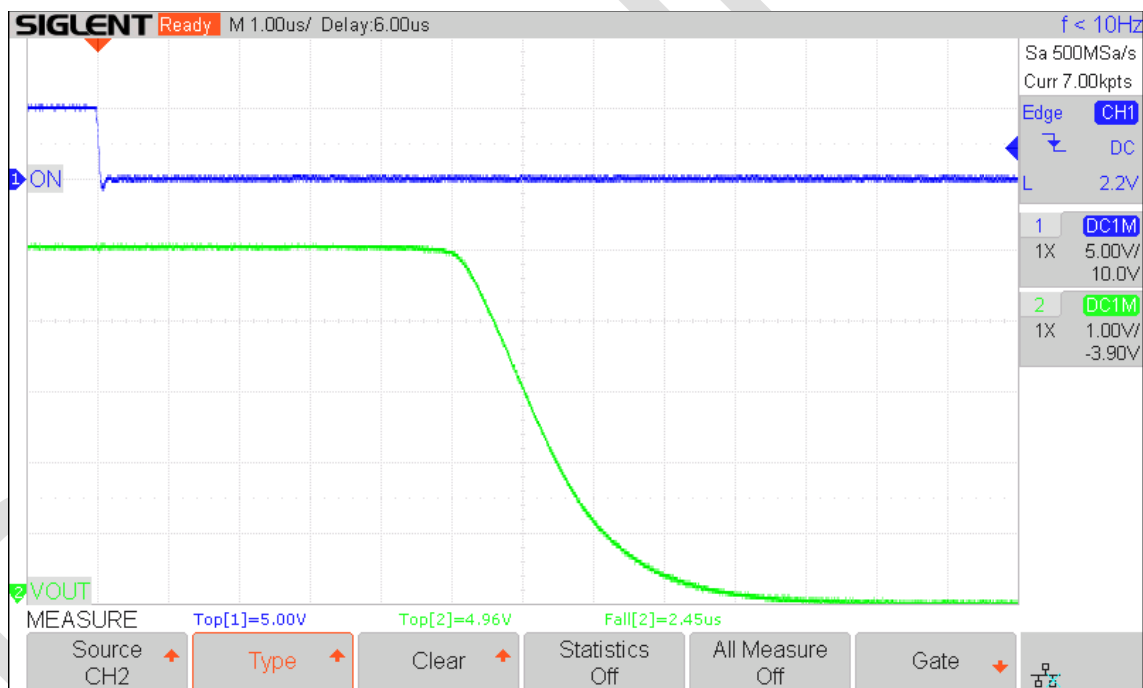


Figure 2. AM6U1601 typical power-up operation waveform. $V_{IN} = 3.3\text{V}$, $C_{OUT} = 0.1\mu\text{F}$, $R_{LOAD} = 10\Omega$



1A Load Switch with Slew Rate Control

Figure 3. AM6U1601 typical power-up operation waveform. $V_{IN} = 2.5V$, $C_{OUT} = 0.1\mu F$, $R_{LOAD} = 10\Omega$ Figure 4. AM6U1601 typical power-down operation waveform. $V_{IN} = 5V$, $C_{OUT} = 0.1\mu F$, $R_{LOAD} = 10\Omega$

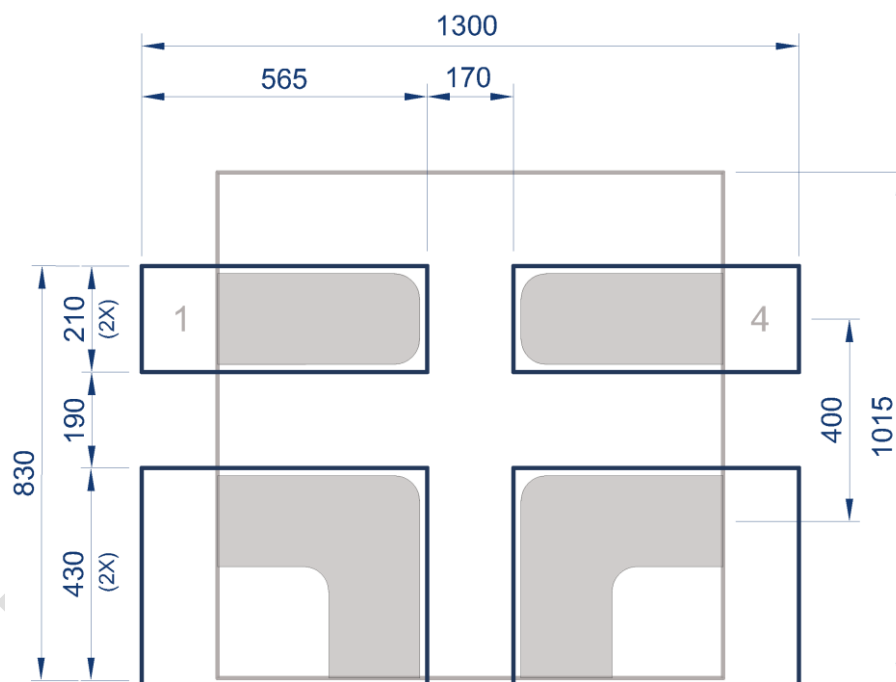


Package Top Marking



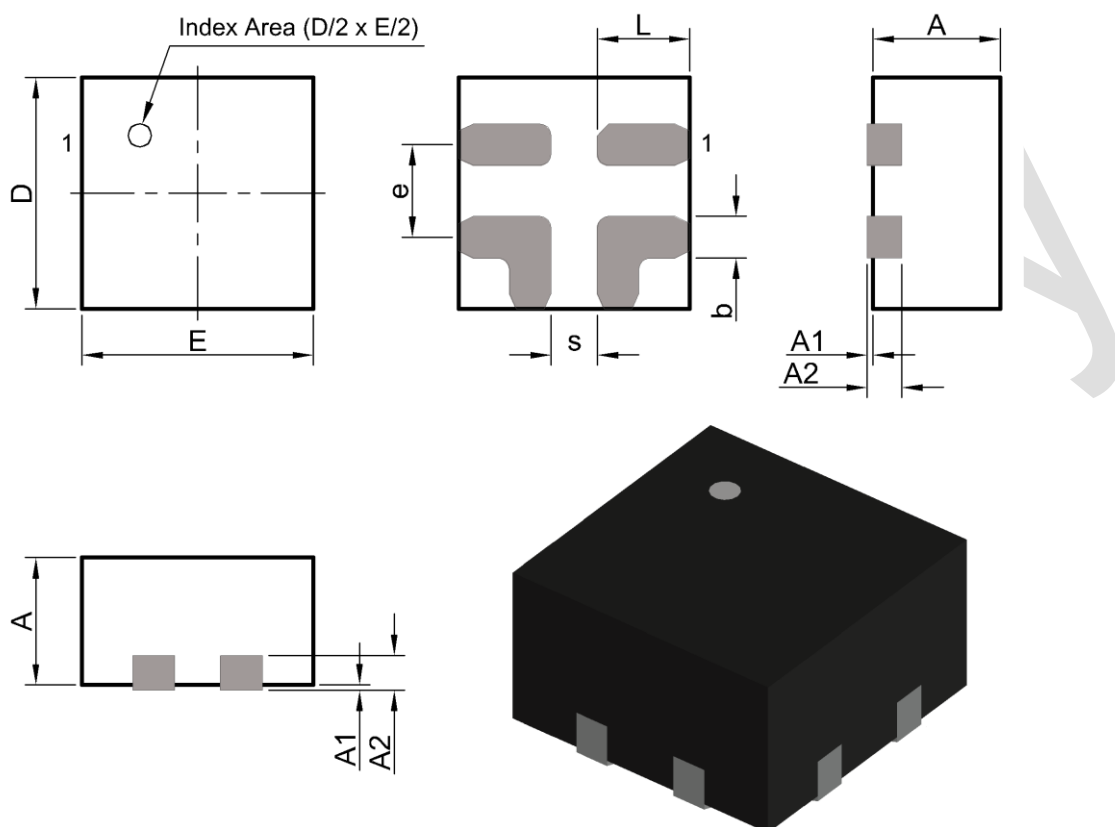
NNN – Identification Code. Includes product ID, lot number and date

Suggested Pad Layout





Package Outline Dimensions



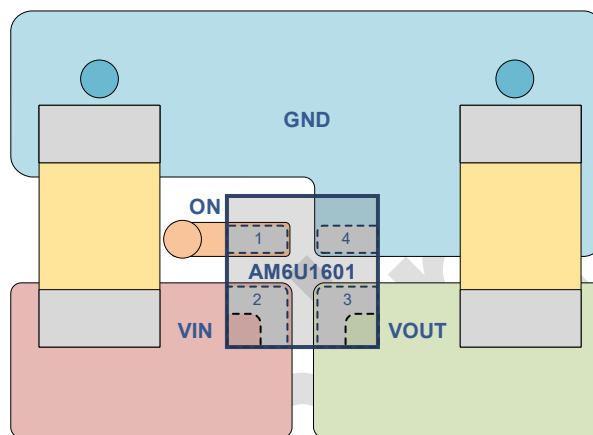
Symbol	Min.	Typ.	Max.	Symbol	Min.	Typ.	Max.
A	0.50	0.55	0.60	e	—	0.400	—
A1	-0.010	—	0.00	L	0.375	0.40	0.425
A2	0.125	0.15	0.175	L1	0.125	0.15	0.175
b	0.155	0.18	0.205	s	—	—	0.20
D	0.95	1.00	1.05	aaa	—	0.050	—
E	0.95	1.00	1.05	ccc	—	0.050	—
All Dimensions in mm							



Recommended Layout

It is important to have a proper PCB layout for high-performance device operation. The list below provides some basic rules for PCB layout.

- Place high-quality low-ESR input C_{IN} (10 μ F min) and output C_{OUT} capacitors close to the device VIN and VOUT pins to minimize the effects of parasitic inductance.
- Make sure to have a solid Ground connection.
- All traces should be as short, wide and direct as possible.
- VIN and VOUT pins have the most heat dissipation during max current operations. Use polygon planes and/or 2 oz. copper for VIN and VOUT connections.

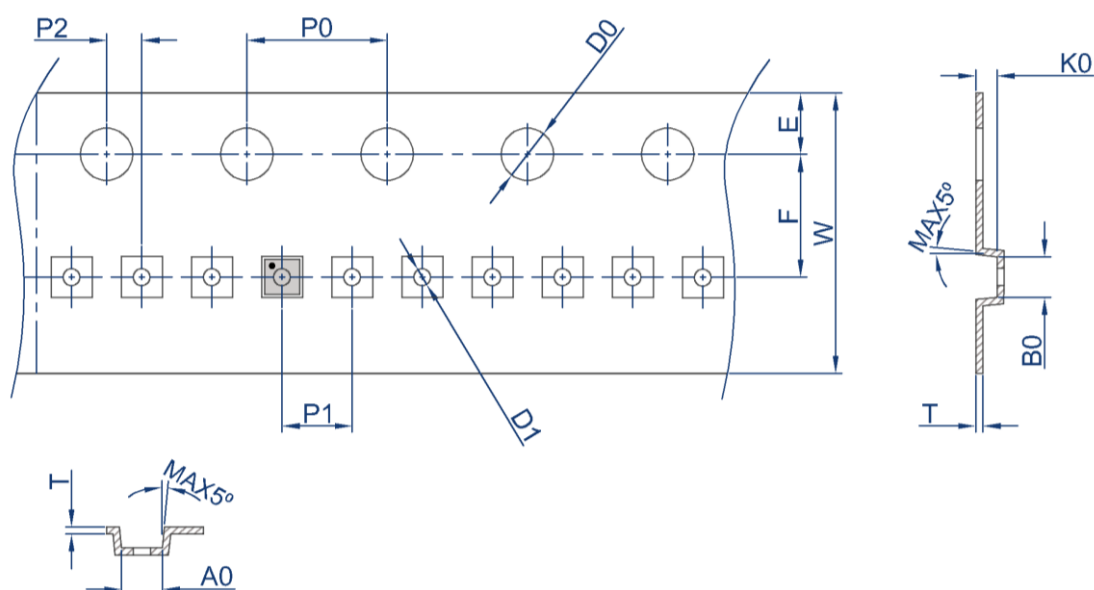




Tape and Reel Specifications

Package Type	# of Pins	Nominal Package Size [mm]	Max Units		Reel & Hub Size [mm]	Leader (min)		Trailer (min)		Tape Width [mm]	Part Pitch [mm]
			per Reel	per Box		Pockets	Length [mm]	Pockets	Length [mm]		
U-DFN1010-4	4	1.0 x1.0 x 0.55	8000	8000	178/60	200	400	200	400	8	2

Package Type	A0	B0	K0	P0	P1	P2	T	D0	D1	E	F	W
U-DFN1010-4	1.16	1.16	0.63	4.00	2.00	1.00	0.20	1.50	0.50	1.75	3.50	8.00



**Revision History**

Date	Version	Change
November 2, 2023	Rev.001	Initial release
February 5, 2024	Rev.002	Updated pinout and POD
October 17, 2024	Rev.003	Updated EC Table. Added Package Top Marking section
June 11, 2025	Rev.004	Updated Recommended Layout



Legal Statement

1. ATLAS MAGNETICS (AM) AND ITS SUBSIDIARIES MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of AM's products described herein and application examples. AM does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with AM's products. AM's products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate AM products for their applications, (b) evaluating the suitability of AM's products for their intended applications, (c) ensuring their applications, which incorporate AM's products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.

3. AM assumes no liability for any application-related information, support, assistance or feedback that may be provided by AM from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold AM and all companies whose products are represented herein or on AM's websites, harmless against all damages and liabilities.

4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. AM does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on AM's website) under this document.

5. AM does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

6. AM's products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use AM's products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold AM and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.

7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. AM does not warrant that information contained in this document is error-free and AM is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, AM reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by AM.

8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. AM assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.

9. This Notice may be periodically updated.

The Atlas Magneticon logo is a trademark of Atlas Magneticon Co in the United States and other countries. All other trademarks are the property of their respective owners.

© 2025 Atlas Magneticon Co. All Rights Reserved.

www.atlasmagneticon.com