DIO7301/1B

5.5 V rated 2 A capable slew rate controlled load switch

Features

- 1.8 V to 5.5 V operation voltage range
- Low quiescent current < 1 μA when disabled
- Reverse current blocking when switch is off
- DIO7301B: built-in 100 Ω (typ) output discharge resistor
- 48 mΩ (typ) N−MOSFET resistor:
- DC current up to 2 A (max.)
- Peak current up to 5 A (max.)
- Built−in soft−start 3 ms
- Active high with integrated bridge
- Pb−free device SOT23-5

Applications

- Cell phone and digital camera
- PDA and notebook
- LCD monitor
- TV and set-top box

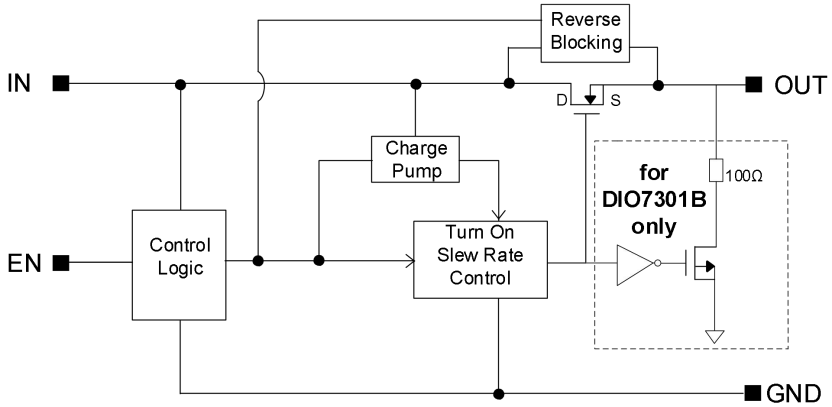
Descriptions

The DIO7301/1B is a low on-resistance N−channel MOSFET controlled by a soft−start sequence of 3ms for mobile applications.

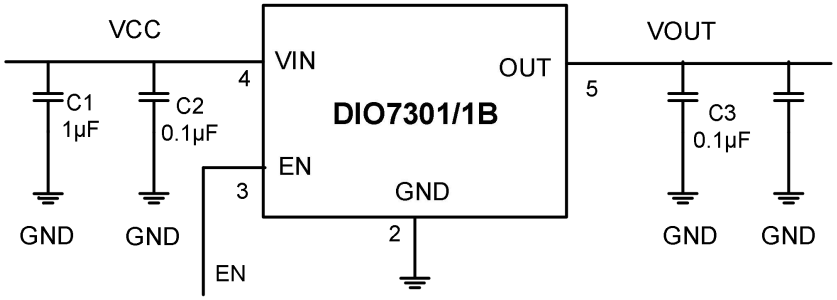
The low R_{DS}(on) allows system supplying or battery charging up to DC 2 A.The device is enable automatically if a power supply is connected on V_{IN} pin (active High) and maintained off if no power input (internal pull-down).

Due to the current consumption optimization, the leakage current is drastically decreased from the battery connected to the device, which allows extending the battery life.

Block Diagram



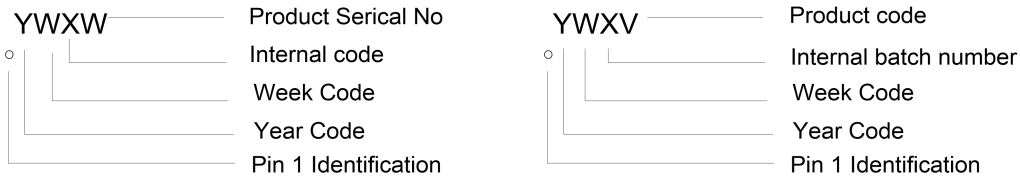
Typical Application



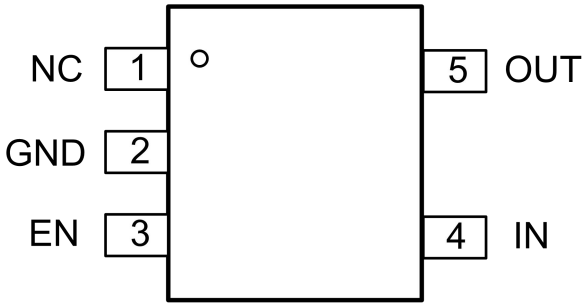
Ordering Information

Ordering Part No.	Top Marking	MSL	Output Discharge Resistance	RoHS	T_A	Package	
DIO7301ST5	YWXW	3	No	Green	-40 to 85°C	SOT23-5	Tape & Reel, 3000
DIO7301BST5	YWXV	3	Yes	Green	-40 to 85°C	SOT23-5	Tape & Reel, 3000

Marking Definition



Pin Assignments



Pin Description

Pin No.	Name	Type	Description
1	NC	NC	Not connect. Connect to GND recommended.
2	GND	Power	GND
3	EN	Input	Enable input, logic high active.
4	IN	Power	Switch input voltage; connect a 1 μF or greater ceramic capacitor from IN to GND as close as possible to the IC.
5	OUT	Output	Switch output; connect a 1 μF capacitor from OUT to GND as close as possible to the IC.

Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Rating” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other condition beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maxim rating conditions for extended periods may affect device reliability.

Symbol	Parameter	Rating	Unit
V_{IN}		-0.3 to 6	V
	OUT, EN	-0.3 to 6	V
T_{STG}	Storage temperature	-65 to 150	°C
T_J	Junction temperature range	-40 to 145	°C
θ_{JA}	Thermal resistance	190	°C/W
P_D	Power dissipation (T_A = 25°C)	526	mW
ESD	Latch up protection	200	mA
	HBM, JEDEC: JESD22-A114	±6	kV
	CDM, JEDEC: JESD22-C101	±2	

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation to ensure optimal performance to the datasheet specifications. DIOO does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{IN}	Operational power supply		1.8		5.5	V
V_{EN}	Enable voltage		0		5.5	V
C_{IN}	Decoupling input capacitor		1			μF
C_{OUT}	Decoupling output capacitor	USB port per Hub	1			μF
I_{OUT}	Maximum DC current	T_A = 25°C			2	A
I_{PEAK}	Maximum peak current	1 ms pulse width at 217 Hz ,T_A= 25°C			5	A
T_A	Ambient temperature range		-40	25	85	°C
T_J	Junction temperature range		-40	25	125	°C

Electrical Characteristics

T_A = 25°C, V_{IN} = 5 V, unless otherwise noted.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Power switch							
$R_{DS(ON)}$	Static drain-source on-state resistance	V_{IN} = 5 V, T_A = 25°C		40	48	60	mΩ
		I_{OUT} = 200 mA, -40°C < T_A < 85°C				85 (1)	mΩ
t_R	Switch turn-on edge rising time	V_{IN} = 4.5 V	C_{LOAD} = 100 µF, R_{LOAD} = 150 Ω	2 (1)	2.5	5 (1)	ms
t_F	Switch turn-off edge falling time	V_{IN} = 4.5 V	C_{LOAD} = 100 µF, R_{LOAD} = 150 Ω (DIO7301)	17 (1)	35	52 (1)	ms
			C_{LOAD} = 100 µF, R_{LOAD} = 150 Ω (DIO7301B)	9 (1)	13	17 (1)	ms
t_{DON}	Switch turn-on delay	V_{IN} = 4.5 V; C_{LOAD} = 100 µF	50% of EN pin to V_{OUT} = 10% of fully on	0.7 (1)	1.5	2.3 (1)	ms
t_{DOFF}	switch turn-off delay	V_{IN} = 4.5 V; C_{LOAD} = 100 µF	50% of EN pin to V_{OUT} = 90% of fully on	7.5 (1)	15	22.5(1)	µs
Enable input EN							
V_{IH}	High-level input voltage	V_{IN} = 5 V, T_A = 25°C		1.45			V
V_{IL}	Low-level input voltage	V_{IN} = 5 V, T_A = 25°C				0.85	V
R_{PD}	Pull-down resistance at EN pin	T_A = -45°C to 85°C			1		MΩ
Reverse-leakage protection							
I_{REV}	Reverse-current protection	V_{IN} = 0 V, V_{OUT} = 4.2 V, -40°C < T_A < 85°C, EN = "0"			1	2	µA
Quiescent current							
I_Q	Current consumption	V_{IN} = 5 V, V_{OUT} floating, EN = 5 V			100	140	µA
I_{SDN}	shutdown current	V_{IN} = 5 V, EN = "0", V_{OUT} = GND, -40°C < T_A < 85°C				1	µA

Note:

(1) This parameter is guaranteed by design and characterization.

(2) Specifications subject to change without notice.

Application information

Enable

Enable pin voltage in the active high means on. This part is automatically turned on when the input voltage enables the device. In the other side, this part is turned off when the input voltage is not available, which limits current consumption from battery to OUT pin.

Input capacitor

To limit the voltage drop on the input supply caused by transient inrush currents, an input capacitor is placed to the V_{IN} and GND as close as possible. The value of the input capacitor is recommended 1 μF at least. Higher values capacitor can help to further reduce the voltage drop.

Output capacitor

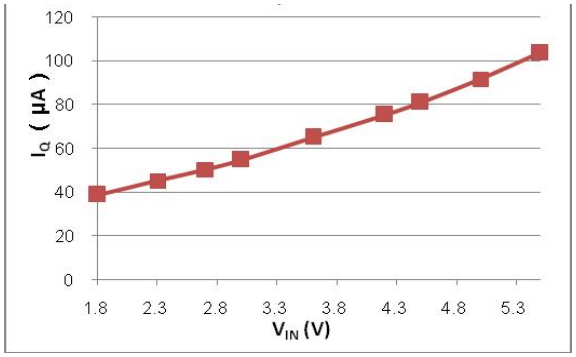
While the device works, a capacitor from 100 nF to 1 μFacross V_{OUT} and GND is recommended to accommodate load transient condition. It also helps to prevent parasitic inductance forces V_{OUT} below GND when switching off. Output capacitor has the minimal effect on device's turn on slew rate time.

Blocking control

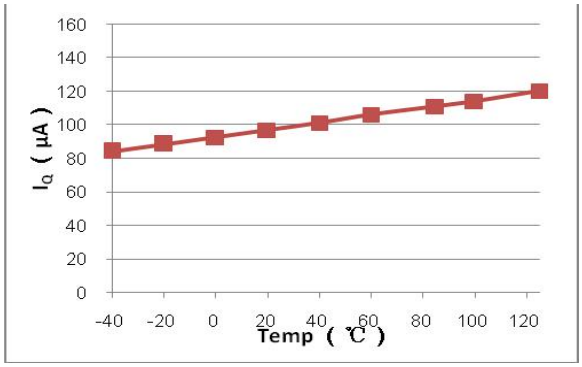
The blocking control circuitry switches the bulk of the power NMOS. When the part is off (No V_{IN} or EN tied to GND externally), the body diode limits the leakage current I_{REV} from OUT to IN. In this condition, the anode of the body diode is connected to IN pin and the cathode is connected to OUT pin. During the operation, the anode of the body diode is connected to OUT pin and the cathode is connected to IN pin to prevent the discharge of the power supply.

Typical Performance Characteristics

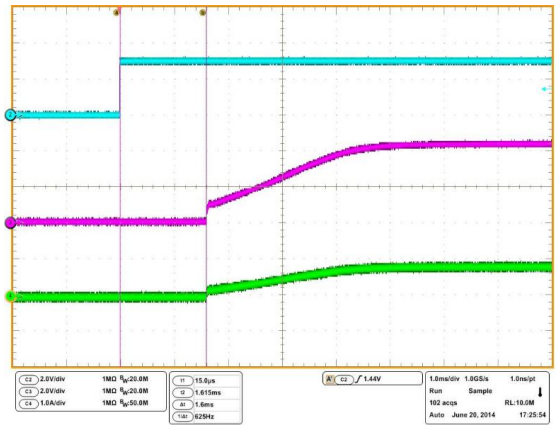
T_A = 25°C, V_{IN} = 5 V, unless otherwise noted.



I_Q vs. V_{IN}

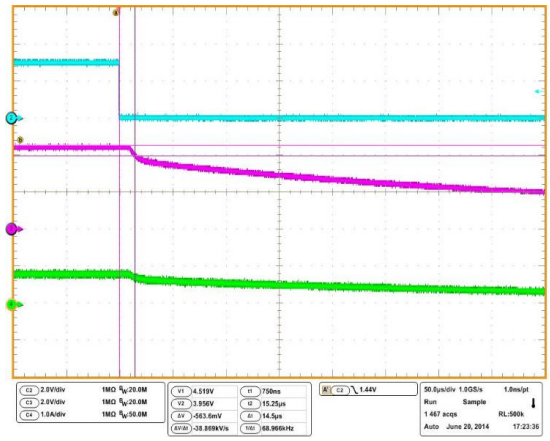


I_Q vs. Temperature



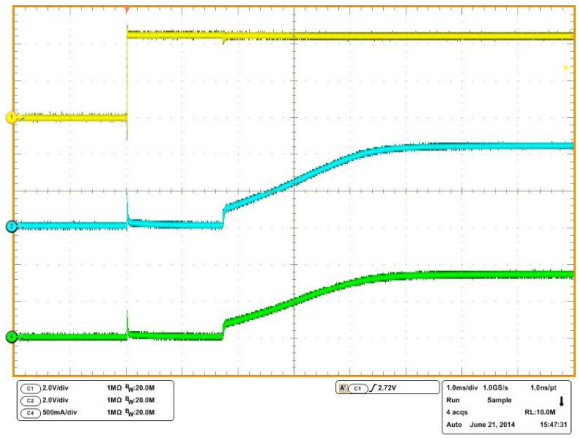
V_{IN} = 5 V, R_{OUT} = 5 Ω, C_{OUT} = 100 µF

Turn on delay time



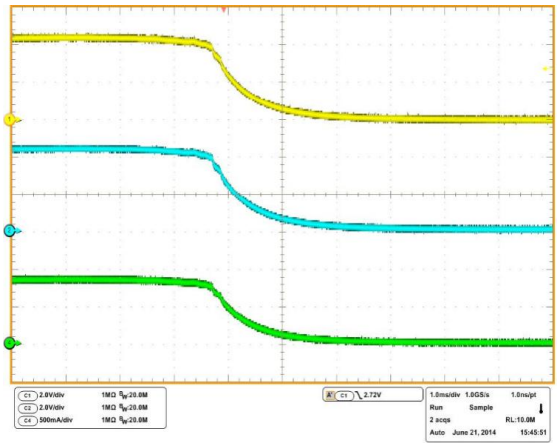
V_{IN} = 5 V, R_{OUT} = 5 Ω, C_{OUT} = 100 µF

Turn off delay time



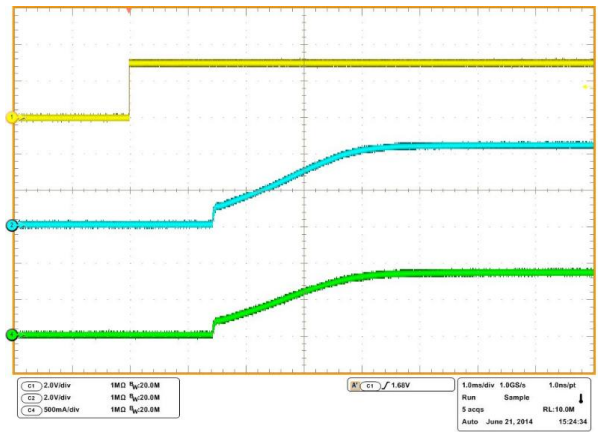
V_{IN} = 5 V, R_{OUT} = 5.1 Ω

V_{IN} startup



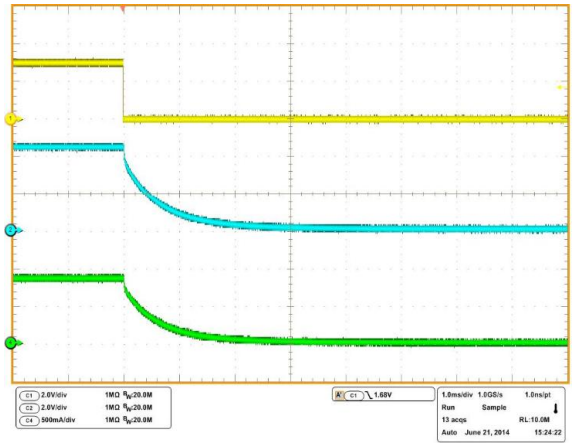
V_{IN} = 5 V, R_{OUT} = 5.1 Ω

V_{IN} shutdown



V_{IN} = 5 V, R_{OUT} = 5.1 Ω

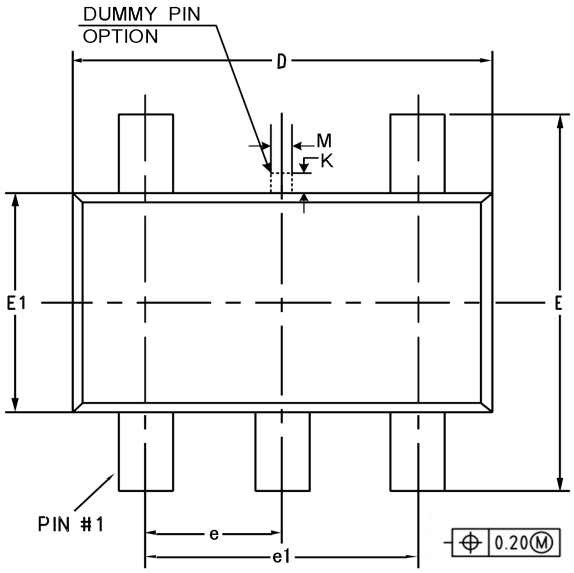
EN startup

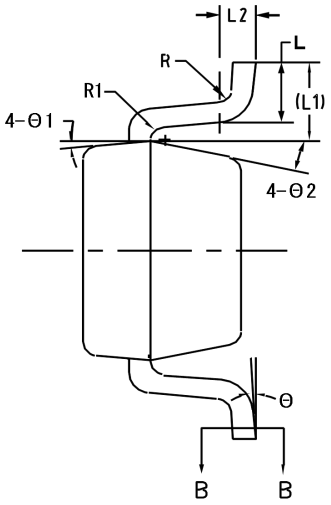


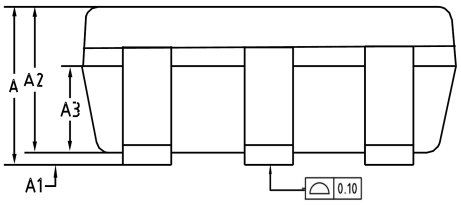
V_{IN} = 5 V, R_{OUT} = 5.1 Ω

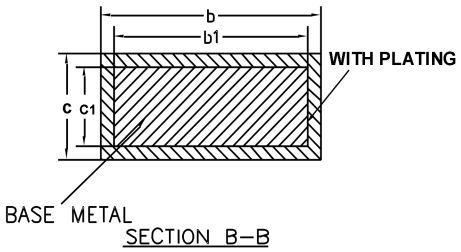
EN shutdown

Physical Dimensions: SOT23-5









Common Dimensions (Units of measure = Millimeter)			
Symbol	**Min**	**Nom**	**Max**
A	-	-	1.25
A1	0	-	0.15
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.36	-	0.45
b1	0.35	0.38	0.41
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	1.626	1.726
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
K	0	-	0.25
L	0.30	0.40	0.60
L1	0.59 REF		
L2	0.25 BSC		
M	0.10	0.15	0.25
R	0.05	-	0.20
R1	0.05	-	0.20
θ	0°	-	8°
θ1	8°	10°	12°
θ2	10°	12°	14°

CONTACT US

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