DIO7911
600 mA, Ultra-Low-Noise, Low-I_Q LDO

Features

- Operating input voltage range: 1.6 V to 5.5 V
- Output voltage range:
  0.75 V to 5 V (fixed voltage version)
  0.8 V to 5 V (adjustable voltage version)
- Output current: 600 mA
- Ultra-Low quiescent current: Typ. 34 μA
- Dropout voltage: 145 mV at I_{OUT} = 600 mA
- PSRR: 75 dB at 1 kHz, I_{OUT} = 20 mA
- Output voltage tolerance: ±1%
- Stable with ceramic capacitors of 1 μF
- Thermal-overload protection
- Short-circuit protection
- Quick output discharge:
  DIO7911A: available
  DIO7911B: not available
- Available in small DFN1*1-4, SOT23-5, and SC70-5 packages
- These devices are Pb−free, halogen-free/BFR free and are RoHS compliant

Applications

- MP3/MP4 players
- Cellphones, radiophone, digital cameras
- Bluetooth, wireless handsets
- Others portable electronics devices

Descriptions

The DIO7911 series is a high-accuracy, low-noise, high-speed, high-PSRR, and low-dropout CMOS linear regulator with high ripple rejection. The devices offer a new level of cost-effective performance in cellular phones, laptop and notebook computers, and other portable devices.

The DIO7911 has the fold-back maximum output current which depends on the output voltage. So the current limit functions both as a short circuit protection and as an output current limiter.

The device is available in small DFN1*1-4, SOT23-5, and SC70-5 packages.

Typical Applications

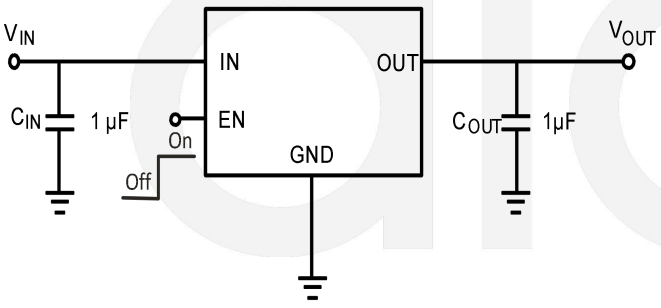


Figure 1. Fixed version

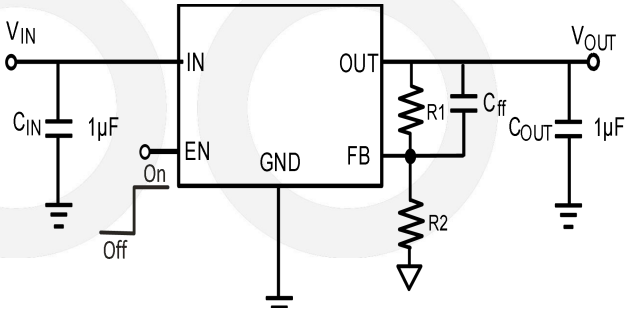


Figure 2. Adjustable version

Ordering Information

Part Number	Top Marking	RoHS	T_A	Package	
DIO7911AaaST5	LAXYW	Green	-40 to 125°C	SOT23-5	Tape & Reel, 3000
DIO7911AADJST5	YWAAD	Green	-40 to 125°C	SOT23-5	Tape & Reel, 3000
DIO7911AaaEN4	YWLX	Green	-40 to 125°C	DFN1*1-4	Tape & Reel,10000
DIO7911AaaSC5	YWLX	Green	-40 to 125°C	SC70-5	Tape & Reel, 3000
DIO7911AADJSC5	AADW	Green	-40 to 125°C	SC70-5	Tape & Reel, 3000
DIO7911BaaST5	LBXYW	Green	-40 to 125°C	SOT23-5	Tape & Reel, 3000
DIO7911BADJST5	YWBAD	Green	-40 to 125°C	SOT23-5	Tape & Reel, 3000
DIO7911BaaEN4	YWTX	Green	-40 to 125°C	DFN1*1-4	Tape & Reel,10000
DIO7911BaaSC5	YWTX	Green	-40 to 125°C	SC70-5	Tape & Reel, 3000
DIO7911BADJSC5	BADW	Green	-40 to 125°C	SC70-5	Tape & Reel, 3000

Output Voltage Options

Option Code "**aa**"	07	10	11	12	15	18	25	28	30	33	36	50
Voltage	0.75 V	1.0 V	1.1 V	1.2 V	1.5 V	1.8 V	2.5 V	2.8 V	3.0 V	3.3 V	3.6 V	5.0 V

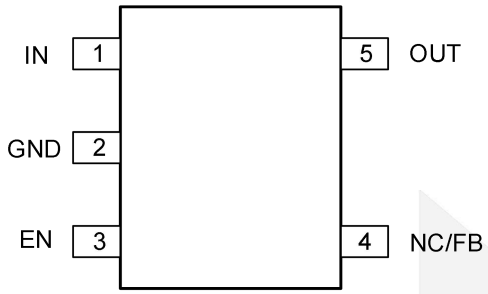
Marking Definition: LAXYW / YWAAD / YWLX / AADW / LBXYW / YWBAD / YWTX / BADW

LAXYW	LA: product code; Y: year code; W: week code
YWAAD	Y: year code; W: week code
YWLX	Y: year code; W: week code; L: product code
AADW	AAD: product code; W: week code
LBXYW	LB: product code; Y: year code; W: week code
YWBAD	Y: year code; W: week code; BAD: product code
YWTX	Y: year code; W: week code; T: product code
BADW	BAD: Product code; W: week code

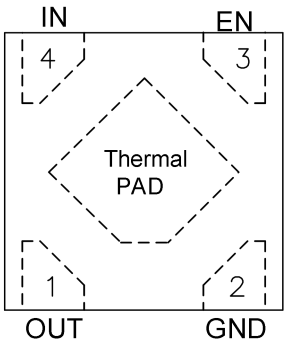
Voltage code

Option Code "X"	C	D	E	F	G	H	J	K	M	N	P	Q
Voltage	0.75 V	1.0 V	1.1 V	1.2 V	1.5 V	1.8 V	2.5 V	2.8 V	3.0 V	3.3 V	3.6 V	5.0 V

Pin Assignments



SOT23-5/SC70-5



DFN1*1-4

Figure 3. Pin assignment (Top view)

Pin Definitions

Pin Name	Description
OUT	Output voltage pin
EN	Enable pin. This pin has an internal pull-down current source. A logic low reduces the supply current to less than 1 μA. Connect to logic “High” for normal operation.
GND	Power supply ground
IN	Input voltage pin
NC/FB	No connection for fixed version / feedback pin for adjustable version.

Absolute Maximum Ratings

Stresses beyond those listed under the Absolute Maximum Rating table 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 maximum rating conditions for extended periods may affect device reliability.

Symbol	Parameter		Rating	Unit
V_{IN}	Input voltage V_{IN}		-0.3 to 6.5	V
V_{OUT}	Output voltage V_{OUT}		-0.3 to V_{IN}	V
V_{EN}	Chip enable input V_{EN}		-0.3 to V_{IN}	V
I_{OUT}	Output current I_{OUT}		600	mA
C_{FF}	Feed-forward capacitor		1	nF
T_J	Lead temperature range		260	°C
$T_{J(MAX)}$	Operating junction temperature $T_{J(MAX)}$		150	°C
T_{STG}	Storage temperature T_{STG}		-55 to 150	°C
MSL	Moisture sensitivity level	SOT23-5	Level-3	
		SC70-5	Level-3	
		DFN1*1-4	Level-1	
ESD	Electro staticdischarge	HBM	4000	V
		CDM	400	

Recommend Operating Ratings

Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. DIOO does not recommend exceeding them or designing to absolute maximum ratings.

Symbol	Parameter		Rating	Unit
V_{IN}	Operating supply voltage		1.6 to 5.5	V
T_A	Operating temperature range		-40 to 125	°C
$R_{\theta JA}$	Thermal resistance, $R_{\theta JA}$	SOT23-5	235	°C/W
		DFN1*1-4	250	
		SC70-5	307.6	

Electrical Characteristics

V_{IN} = V_{OUT} + 1 V, I_{OUT} = 1 mA, C_{IN} = C_{OUT} = 1.0 μF, Full = -40℃ to 125℃, typical values are at T_A = 25°C, unless otherwise specified.

Symbol	Parameter	Condition		Min	Typ	Max	Unit
V_{IN}	Input voltage			1.6		5.5	V
V_{OUT} (1)	Output voltage			0.75		5	V
	Output accuracy	V_{OUT} < 2 V, T_A = 25°C		-20	V_{OUT}	+20	mV
		V_{OUT} ≥ 2 V, T_A = 25°C		-1%	V_{OUT}	1%	V
V_{FB}	Reference voltage (adjustable version)	T_A = 25°C			0.8		V
I_{LIM}	Output current limit	V_{OUT} = 90% $V_{OUT(NOM)}$		600			mA
V_{DROP}	Dropout voltage	V_{IN} = 0.95 x $V_{OUT(SET)}$, I_{OUT} = 600 mA	$V_{OUT(SET)}$ = 1.8 V		220		mV
			$V_{OUT(SET)}$ = 2.8 V		145		
			$V_{OUT(SET)}$ = 3.3 V		135		
			$V_{OUT(SET)}$ = 5 V		115		
$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	Line regulation	$V_{OUT(NOM)}$ + 1.0 V ≤ V_{IN} ≤ 5.5 V			0.02		%/V
$\triangle V_{OUT}$	Load regulation	I_{OUT} = 0 mA to 600 mA, T_A= 25°C				6	mV
I_Q	Quiescent current	No load			34		μA
I_{SC}	Short circuit current	V_{OUT} = 0 V			430		mA
I_{SHDN}	Shutdown current	V_{EN} = 0 V, V_{IN} = 5.5 V			0.1		μA
PSRR	Power supply rejection rate	I_{OUT} = 20 mA	f = 100 Hz		80		dB
			f = 1 kHz		75		dB
			f = 10 kHz		70		dB
			f = 100 kHz		50		dB
			f = 1 MHz		45		dB
V_{IH}	EN pin threshold voltage	EN logic high voltage, T_A = 25°C		0.8			V
V_{IL}		EN logic low voltage, T_A = 25°C				0.3	V
I_{EN}	EN pull-down current	V_{EN} = 5.5 V			0.1		μA
e_n	Output voltage noise (fixed voltage version)	f = 10 Hz to 100 kHz, V_{OUT} = 0.75 V, I_{OUT} = 1 mA			55		μV_{RMS}
T_{SD}	Thermal shutdown threshold	Shutdown, temperature increasing	I_{OUT} = 1 mA		170		°C
		Reset, temperature decreasing			145		
R_{DISCH}	Output discharge resistance	V_{EN} = 0 V, V_{IN} = 5 V (only DIO7911A)			100		Ω
t_{ON}	Turn-on time	From assertion of V_{EN} to V_{OUT} = 90% $V_{OUT(NOM)}$			260		μs

Note:

(1) It is not recommended to use at 125°C without load.

(2) Specifications subject to change without notice.

Typical Characteristics

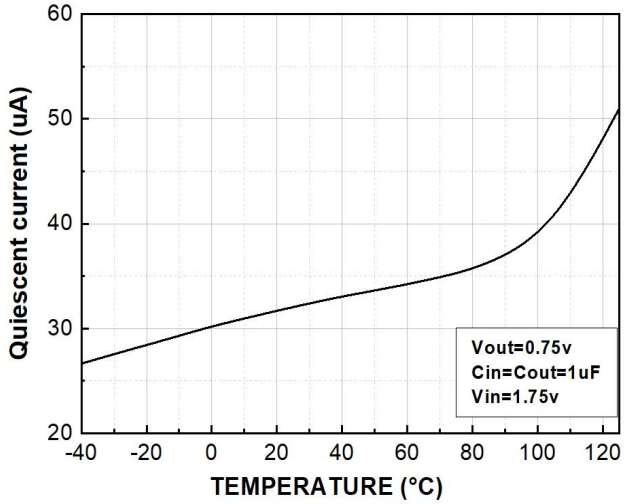


Figure 4. IQ vs. Temperature

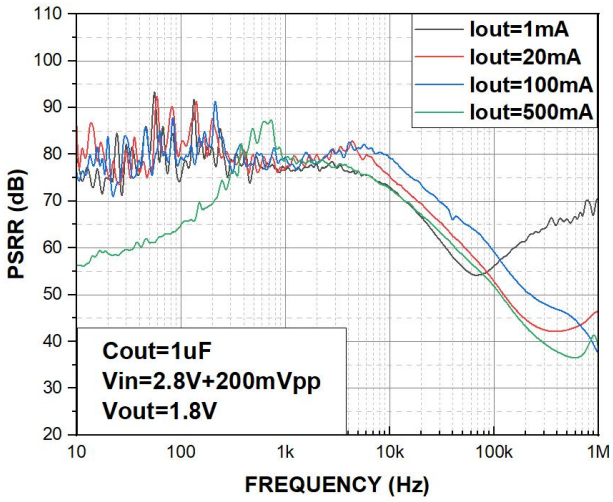


Figure 5. PSRR vs. Frequency

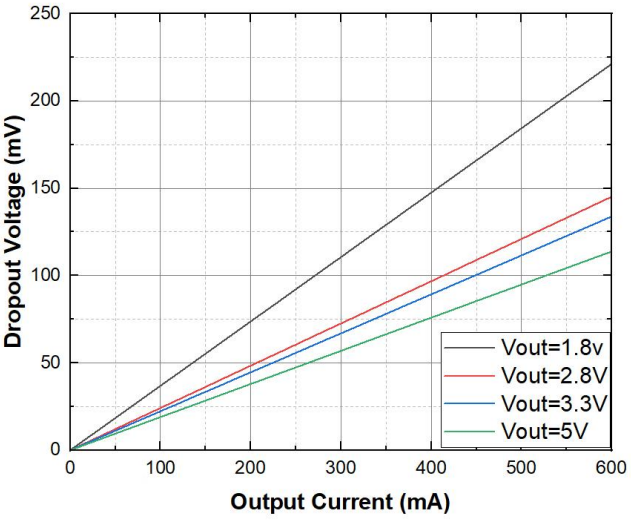


Figure 6. Dropout vs. Output current

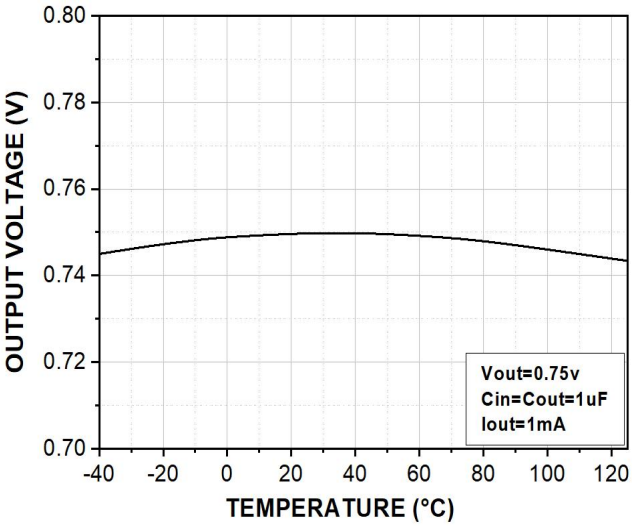
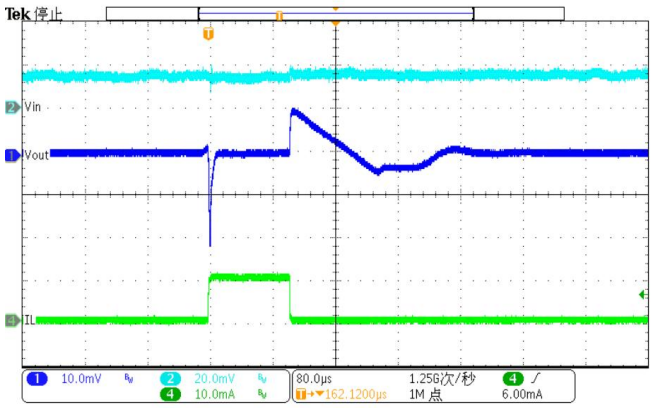


Figure 7. Output voltage vs. Temperature



V_{IN} = 5.5 V,V_{OUT} = 0.75 V,C_{OUT} =1 µF,
I_{OUT} = 0.1 mA ~ 10 mA,1µs Edge

Figure 8. Load transient

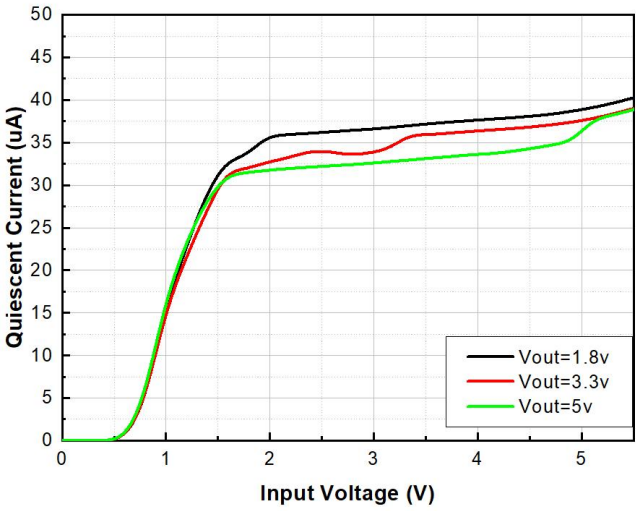


Figure 9. Quiescent current vs. Input voltage

Block Diagram

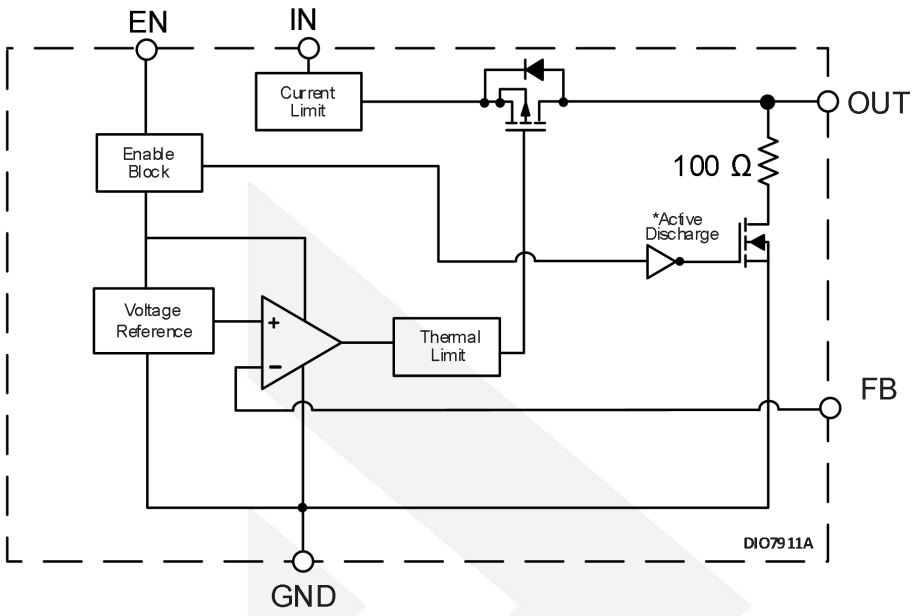


Figure 10. Adjustable version

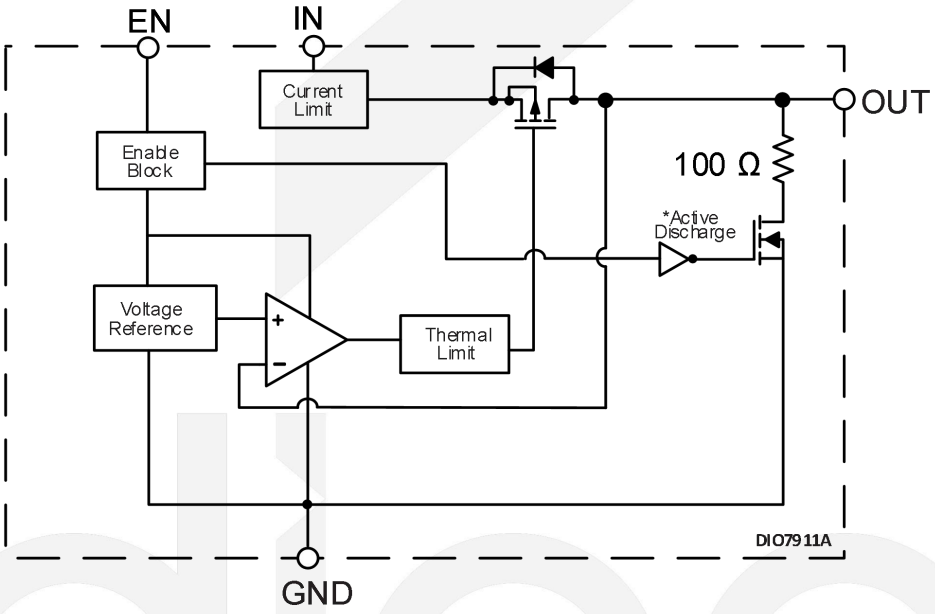


Figure 11. Fixed version

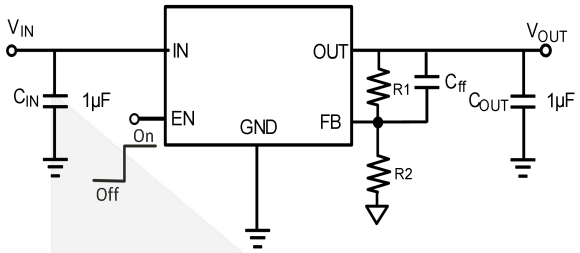
Detailed Description

Overview

The DIO7911 series of LDO linear regulators are low quiescent current devices with excellent line and load transient performance. These LDOs are designed for power-sensitive applications. A precision bandgap and error amplifier provides overall 1% accuracy. Low output noise, very high PSRR, and low dropout voltage make this series of devices ideal for most battery-operated handheld equipment. All device versions have integrated thermal shutdown and current limit.

Adjustable output voltage

The required output voltage of adjustable devices can be adjusted from V_{FB} to 5 V by using two external resistors. Typical application schematics are shown in Figure 12.



$$V_{OUT} = V_{FB} \times (1 + R1/R2)$$

Figure 12. Typical application

It is recommended to keep the total serial resistance of resistors (R1 + R2) no greater than 50 kΩ. A good analog design practice is to connect a 1 nF connector from OUT to FB for better stability performance.

Internal current limit

The DIO7911 internal current limit helps to protect the regulator during fault conditions. During the current limit, the output sources a fixed amount of current that is largely independent of the output voltage. In such a case, the output voltage is not regulated and $V_{OUT} = I_{CL} \times R_{LOAD}$. The PMOS pass transistor dissipates $(V_{IN} – V_{OUT}) \times I_{CL}$ until the thermal shutdown is triggered and the device turns off. As the device cools down, it is turned on by the internal thermal shutdown circuit. If the fault condition continues, the device cycles between the current limit and thermal shutdown.

The PMOS pass element in the DIO7911 has a built-in body diode that conducts current when the voltage at OUT exceeds the voltage at IN. This current is not limited, so if extended reverse voltage operation is anticipated, external limiting to 5% of the rated output current is recommended.

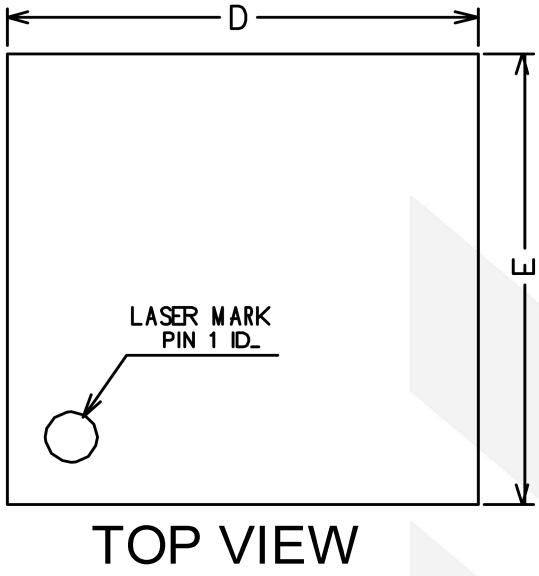
Shut-down

The enable pin (EN) is active high. The device is enabled when the voltage at the EN pin goes above 0.8 V. The device is turned off when the EN pin is held at less than 0.3 V. When shutdown capability is not required, EN can be connected to the IN pin.

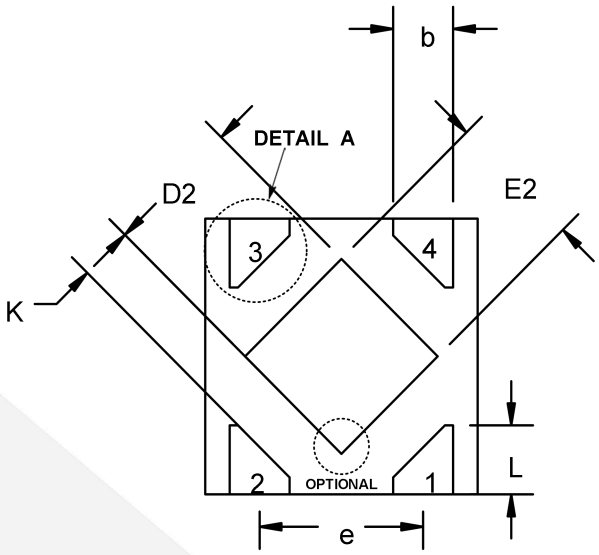
Dropout voltage

The DIO7911 uses a PMOS pass transistor to achieve low dropout. When $(V_{IN} – V_{OUT})$ is less than the dropout voltage (V_{DO}), the PMOS pass device is in the linear region of operation and the input-to-output resistance is the $R_{DS(on)}$ of the PMOS pass element. V_{DO} scales approximately with output current because the PMOS device behaves as a resistor in dropout.

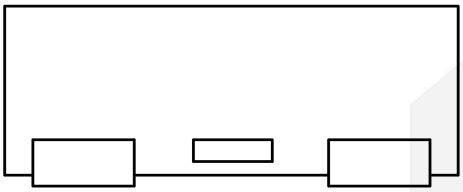
Physical Dimensions: DFN 1*1-4



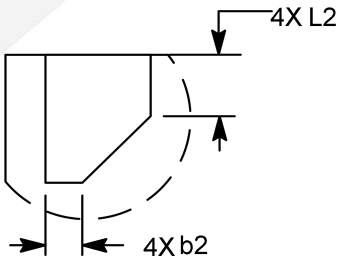
TOP VIEW



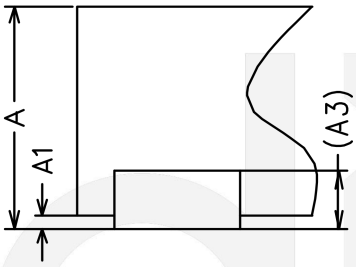
BOTTOM VIEW



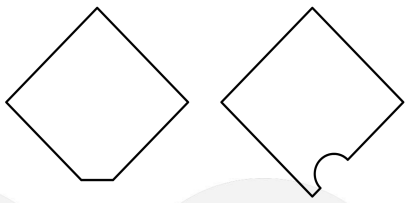
SIDE VIEW

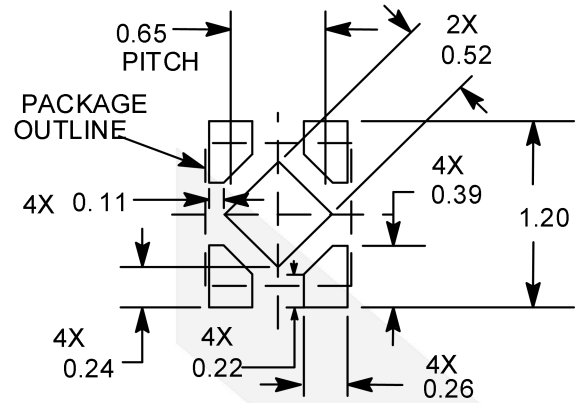


DETAIL A



Two options:

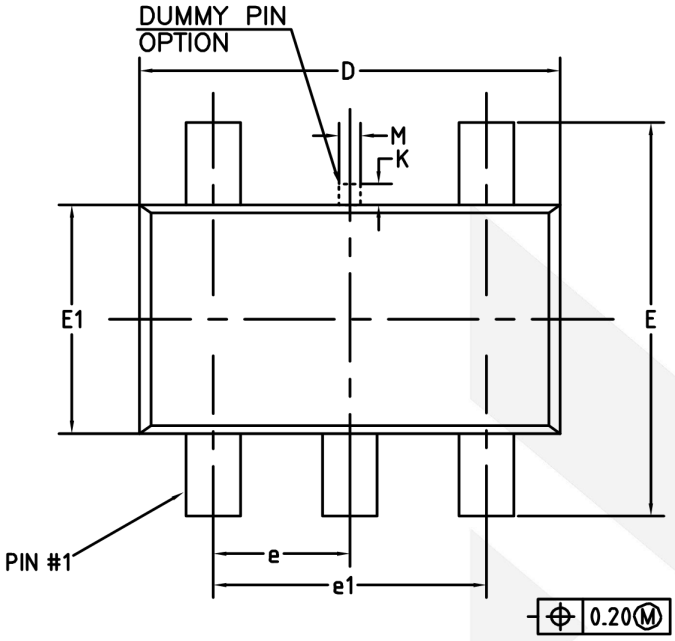


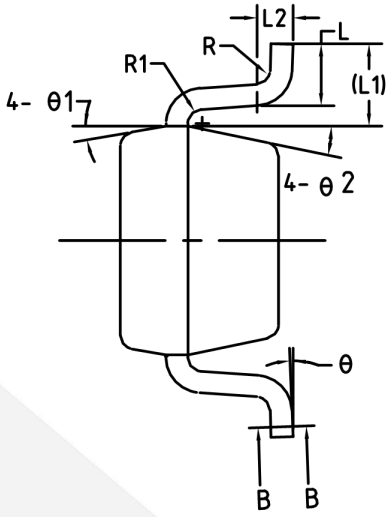


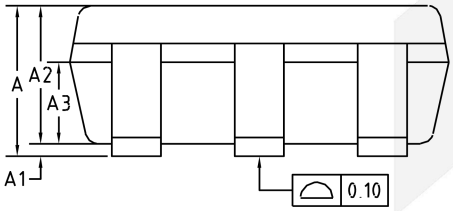
RECOMMENDED LAND PATTERN (Unit: mm)

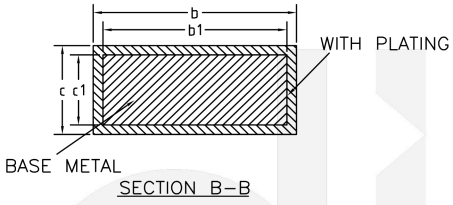
Common Dimensions (Units of measure = Millimeter)			
Symbol	**Min**	**Nom**	**Max**
A	0.34	0.37	0.40
A1	0	0.02	0.05
A3		0.10 REF	
b	0.17	0.22	0.27
D	0.95	1.00	1.05
E	0.95	1.00	1.05
D2	0.43	0.48	0.53
E2	0.43	0.48	0.53
L	0.20	0.25	0.30
e	0.60	0.65	0.70
K	0.15	-	-
L2	0.07	0.12	0.17
b2	0.02	-	0.12

Physical Dimensions: SOT23-5



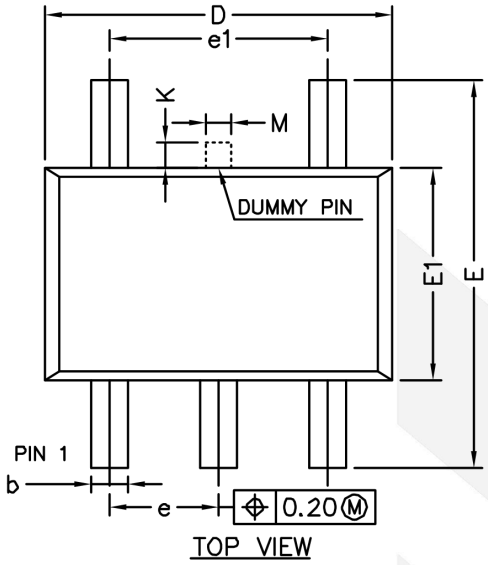


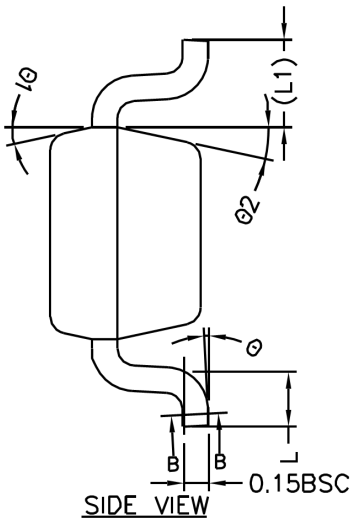


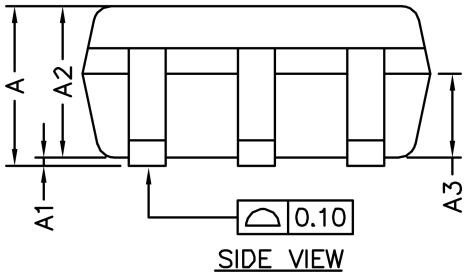


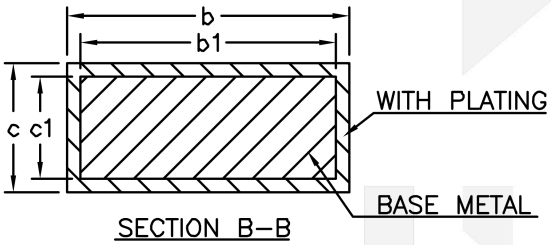
Common Dimensions (Units of measure = Millimeter)			
Symbol	**Min**	**Nom**	**Max**
A	-	-	1.25
A1	0	-	0.15
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.36	-	0.45
b1	0.35	0.38	0.41
c	0.14	-	0.20
c1	0.14	0.15	0.16
D	2.826	2.926	3.026
E	2.60	2.80	3.00
E1	1.526	1.626	1.726
e	0.90	0.95	1.00
e 1	1.80	1.90	2.00
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°

Physical Dimensions: SC70-5









Common Dimensions (Units of measure = Millimeter)			
Symbol	**Min**	**Nom**	**Max**
A	0.80	-	1.10
A1	0	-	0.10
A2	0.80	0.90	1.00
A3	0.40	0.50	0.60
b	0.17	-	0.30
b1	0.17	0.22	0.25
c	0.12	-	0.20
c1	0.12	0.15	0.16
D	2.02	2.07	2.12
E	2.20	2.30	2.40
E1	1.21	1.26	1.31
e	0.60	0.65	0.70
e1	1.20	1.30	1.40
L	0.26	0.33	0.46
L1	0.52 REF		
M	0.10	0.15	0.20
K	0	-	0.20
θ	0°	-	8°
θ1	10°	12°	14°
θ2	10°	12°	14°

CONTACT US

Dioo is a professional design and sales corporation for high-quality and performance analog semiconductors. The company focuses on industry markets, such as cell phones, handheld products, laptops, medical equipment, and so on. Dioo's product families include analog signal processing and amplifying, LED drivers, and charger ICs. Go to http://www.dioo.com for a complete list of Dioo product families.

For additional product information or full datasheet, please contact our sales department or representatives.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

DIOO:

DIO7911A33ST5 DIO7911AADJST5 DIO7911A07ST5