

DIO7982

Ultra-Low Quiescent Current, 150 mA CMOS LDO Regulator

Features

- Operating input voltage range: 1.8 V to 5.5 V
- Output voltage range: 1.2 V to 3.6 V
- Ultra-low quiescent current : 0.5 μ A (typ.)
- Low dropout:
170 mV (typ.) at $V_{OUT} = 3.3$ V, $I_{OUT} = 150$ mA
- High output voltage accuracy $\pm 1\%$
- Stable with ceramic capacitors 1 μ F
- Over-current protection
- Thermal shutdown protection
- Quick output discharge
- DIO7982A: available
DIO7982B: not available
- Available in small DFN1*1-4, DFN0.8*0.8-4 and SOT23-5 packages
- These devices are Pb-free, halogen-free/BFR free and are RoHS compliant

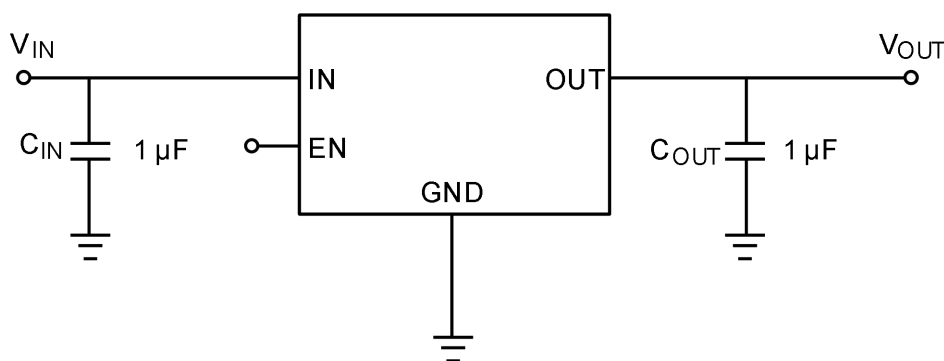
Descriptions

The DIO7982 series of CMOS low dropout regulators is designed specifically for portable battery-powered applications which require ultra-low quiescent current. The ultra-low consumption of a typical 500 nA ensures long battery life and dynamic transient boost feature improves device transient response for wireless communication applications. The device is available in DFN1*1-4, DFN0.8*0.8-4 and SOT23-5 packages.

Applications

- Battery powered equipment
- Portable communication equipment
- Cameras, image sensors and camcorders

Typical Applications





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Ordering Information

Ordering Part No.	Top Marking	MSL	Description	RoHS	T _A	Package	
DIO7982AaaST5	DAXYW	3	Active discharge	Green	-40 to 85°C	SOT23-5	Tape & Reel, 3000
DIO7982AaaEN4	WX	1		Green	-40 to 85°C	DFN1*1-4	Tape & Reel, 10000
DIO7982AaaCN4	C	1		Green	-40 to 85°C	DFN0.8*0.8-4	Tape & Reel, 5000
DIO7982BaaST5	DBXYW	3	Non-active discharge	Green	-40 to 85°C	SOT23-5	Tape & Reel, 3000
DIO7982BaaEN4	YW2X	1		Green	-40 to 85°C	DFN1*1-4	Tape & Reel, 10000
DIO7982BaaCN4	C	1		Green	-40 to 85°C	DFN0.8*0.8-4	Tape & Reel, 5000

Output Voltage Options

Option Code "aa"	12	15	18	25	28	30	33	36
Voltage	1.2 V	1.5 V	1.8 V	2.5 V	2.8 V	3 V	3.3 V	3.6 V

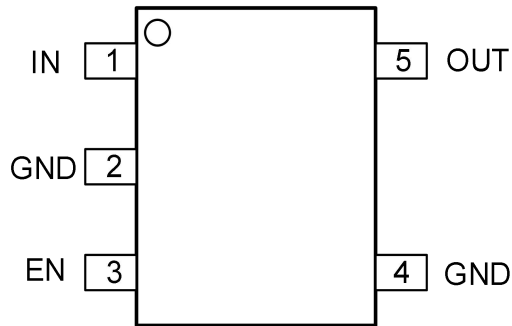
Marking Definition: DAXYW / WX / DBXYW / YW2X / C

DAXYW	DA: product code; X: voltage code; Y: year code; W: week code
WX	W: week code; X: voltage code
C	C: product code
DBXYW	DB: product code; X: voltage code; Y: year code; W: week code
YW2X	Y: year code; W: week code; 2: product code; X: voltage code

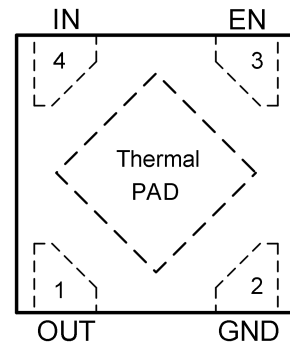
Voltage Code

Option Code "X"	F	G	H	J	K	M	N	P
Voltage	1.2 V	1.5 V	1.8 V	2.5 V	2.8 V	3 V	3.3 V	3.6 V

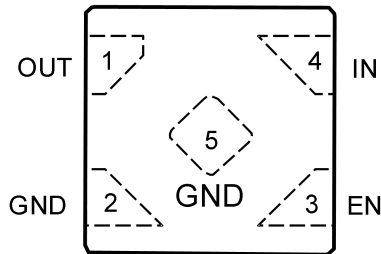
Pin Assignments



SOT23-5



DFN1*1-4



DFN0.8*0.8-4

Figure 1. 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. Connect to logic "High" for normal operation.
GND	Power supply ground.
IN	Input voltage pin.



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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 (Maximum)		6.0	V
V_{OUT}	Output voltage		-0.3 to $V_{IN} + 0.3$	V
V_{EN}	Chip enable input		-0.3 to 6.0	V
$T_{J(MAX)}$	Maximum junction temperature		150	°C
T_{STG}	Storage temperature		-55 to 150	°C
$R_{\theta JA}$	Junction-to-ambient thermal resistance	DFN0.8*0.8-4	400	°C/W
		DFN1*1-4	250	
		SOT23-5	235	
ESD	Electrostatic discharge	HBM	± 8000	V

Recommend Operating Conditions

The 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	Min	Max	Unit
V_{IN}	Operating input voltage	1.8	5.5	V
V_{EN}	Enable input voltage	0	5.5	V
T_A	Ambient temperature	-40	85	°C

Electrical Characteristics – Voltage Version 1.2 V

$V_{IN} = 2.5 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $C_{IN} = C_{OUT} = 1.0 \text{ } \mu\text{F}$, $-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$, typical values are at $T_A = 25^{\circ}\text{C}$, unless otherwise specified.

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_{IN}	Operating input voltage			1.8		5.5	V
V_{OUT}	Output voltage	$T_A = 25^{\circ}\text{C}$		1.188	1.2	1.212	V
Line_{Reg}	Line regulation	$2.5 \text{ V} < V_{IN} \leq 5.5 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $T_A = 25^{\circ}\text{C}$				6	mV
Load_{Reg}	Load regulation	$0 \text{ mA} < I_{OUT} \leq 150 \text{ mA}$, $V_{IN} = 2.5 \text{ V}$, $T_A = 25^{\circ}\text{C}$		-20	8	20	mV
Line_{Res}	Line transient response	V_{IN} step from 2.5 V to 5.5 V, $I_L = 10 \text{ mA}$			50		mV
Load_{Res}	Load transient response	$V_{IN} = 2.5 \text{ V}$, I_{OUT} step from 1 mA to 50 mA			120		mV
I_{OUT}	Output current			150			mA
I_{SC}	Short circuit current limit	$V_{OUT} = 0 \text{ V}$			130		mA
I_Q	Quiescent current	$I_{OUT} = 0 \text{ mA}$, $T_A = 25^{\circ}\text{C}$			0.5	0.9	μA
I_{STB}	Standby current	$V_{EN} = 0 \text{ V}$, $T_A = 25^{\circ}\text{C}$			0.1	0.5	μA
V_{ENH}	EN pin threshold voltage	EN input voltage "H"		1.0			V
V_{ENL}	EN pin threshold voltage	EN input voltage "L"				0.4	V
I_{EN}	EN pin current	$V_{EN} \leq V_{IN} \leq 5.5 \text{ V}$			10		nA
PSRR	Power supply rejection ratio	$f = 1 \text{ kHz}$, $V_{IN} = 2.5 \text{ V} + 200 \text{ mV}_{PP}$ modulation	$I_{OUT} = 150 \text{ mA}$		57		dB
			$I_{OUT} = 10 \text{ mA}$		63		dB
V_{NOISE}	Output noise voltage	$V_{IN} = 5.5 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $f = 100 \text{ Hz to } 1 \text{ MHz}$, $C_{OUT} = 1 \text{ } \mu\text{F}$			85		μV_{rms}
R_{LOW}	Active output discharge resistance	$V_{IN} = 5.5 \text{ V}$, $V_{EN} = 0 \text{ V}$ (DIO7982A only)			100		Ω
T_{SD}	Thermal shutdown temperature	Temperature increasing from $T_A = 25^{\circ}\text{C}$			160		$^{\circ}\text{C}$
T_{SDH}	Thermal shutdown hysteresis	Temperature falling from T_{SD}			25		$^{\circ}\text{C}$
T_C	Output voltage temperature coefficient	$I_{OUT} = 1 \text{ mA}$			45		ppm/ $^{\circ}\text{C}$
t_{ON}	Turn ON time	$V_{IN} = 2.5 \text{ V}$, $C_{OUT} = 1 \text{ } \mu\text{F}$			480		μs
t_{OFF}	Turn OFF time	$V_{IN} = 2.5 \text{ V}$, $C_{OUT} = 1 \text{ } \mu\text{F}$			300		μs
$t_{D(ON)}$	Turn ON delay time	$V_{IN} = 2.5 \text{ V}$, $C_{OUT} = 1 \text{ } \mu\text{F}$			300		μs

Note:

(1) Specifications subject to change without notice.

Electrical Characteristics – Voltage Version 1.5 V

$V_{IN} = 2.5\text{ V}$, $I_{OUT} = 1\text{ mA}$, $C_{IN} = C_{OUT} = 1.0\text{ }\mu\text{F}$, $-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$, typical values are at $T_A = 25^{\circ}\text{C}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Operating input voltage		1.8		5.5	V
V_{OUT}	Output voltage	$T_A = 25^{\circ}\text{C}$	1.485	1.5	1.515	V
Line_{Reg}	Line regulation	$2.5\text{ V} < V_{IN} \leq 5.5\text{ V}$, $I_{OUT} = 1\text{ mA}$, $T_A = 25^{\circ}\text{C}$			6	mV
Load_{Reg}	Load regulation	$0\text{ mA} < I_{OUT} \leq 150\text{ mA}$, $V_{IN} = 2.5\text{ V}$, $T_A = 25^{\circ}\text{C}$	-20	8	20	mV
Line_{Res}	Line transient response	V_{IN} step from 2.5 V to 5.5 V, $I_L = 10\text{ mA}$		50		mV
Load_{Res}	Load transient response	$V_{IN} = 2.5\text{ V}$, I_{OUT} step from 1 mA to 50 mA		120		mV
V_{DO}	Dropout voltage	$I_{OUT} = 150\text{ mA}$, $T_A = 25^{\circ}\text{C}$		370		mV
I_{OUT}	Output current		150			mA
I_{SC}	Short circuit current limit	$V_{OUT} = 0\text{ V}$		130		mA
I_Q	Quiescent current	$I_{OUT} = 0\text{ mA}$, $T_A = 25^{\circ}\text{C}$		0.5	0.9	μA
I_{STB}	Standby current	$V_{EN} = 0\text{ V}$, $T_A = 25^{\circ}\text{C}$		0.1	0.5	μA
V_{ENH}	EN pin threshold voltage	EN input voltage "H"	1.0			V
V_{ENL}	EN pin threshold voltage	EN input voltage "L"			0.4	V
I_{EN}	EN pin current	$V_{EN} \leq V_{IN} \leq 5.5\text{ V}$		10		nA
PSRR	Power supply rejection ratio	$f = 1\text{ kHz}$, $V_{IN} = 2.5\text{ V} +$ 200 mVpp modulation	$I_{OUT} = 150\text{ mA}$	57		dB
			$I_{OUT} = 10\text{ mA}$	63		dB
V_{NOISE}	Output noise voltage	$V_{IN} = 5.5\text{ V}$, $I_{OUT} = 1\text{ mA}$, $f = 100\text{ Hz to } 1\text{ MHz}$, $C_{OUT} = 1\text{ }\mu\text{F}$		85		μVrms
R_{LOW}	Active output discharge resistance	$V_{IN} = 5.5\text{ V}$, $V_{EN} = 0\text{ V}$ (DIO7982A only)		100		Ω
T_{SD}	Thermal shutdown temperature	Temperature increasing from $T_A = 25^{\circ}\text{C}$		160		$^{\circ}\text{C}$
T_{SDH}	Thermal shutdown hysteresis	Temperature falling from T_{SD}		25		$^{\circ}\text{C}$
T_C	Output voltage temperature coefficient	$I_{OUT} = 1\text{ mA}$		45		ppm/ $^{\circ}\text{C}$
t_{ON}	Turn ON time	$V_{IN} = 2.5\text{ V}$, $C_{OUT} = 1\text{ }\mu\text{F}$		670		μs
t_{OFF}	Turn OFF time	$V_{IN} = 2.5\text{ V}$, $C_{OUT} = 1\text{ }\mu\text{F}$		300		μs
$t_{D(ON)}$	Turn ON delay time	$V_{IN} = 2.5\text{ V}$, $C_{OUT} = 1\text{ }\mu\text{F}$		300		μs

Note:

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Electrical Characteristics – Voltage Version 1.8 V

$V_{IN} = 2.8 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $C_{IN} = C_{OUT} = 1.0 \text{ }\mu\text{F}$, $-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$, typical values are at $T_A = 25^{\circ}\text{C}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Operating input voltage		1.8		5.5	V
V_{OUT}	Output voltage	$T_A = 25^{\circ}\text{C}$	1.782	1.8	1.818	V
Line_{Reg}	Line regulation	$2.8 \text{ V} < V_{IN} \leq 5.5 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $T_A = 25^{\circ}\text{C}$			6	mV
Load_{Reg}	Load regulation	$0 \text{ mA} < I_{OUT} \leq 150 \text{ mA}$, $V_{IN} = 2.8 \text{ V}$, $T_A = 25^{\circ}\text{C}$	-20	8	20	mV
Line_{Res}	Line transient response	V_{IN} step from 2.8 V to 5.5 V, $I_L = 10 \text{ mA}$		50		mV
Load_{Res}	Load transient response	$V_{IN} = 2.8 \text{ V}$, I_{OUT} step from 1 mA to 50 mA		100		mV
V_{DO}	Dropout voltage	$I_{OUT} = 150 \text{ mA}$, $T_A = 25^{\circ}\text{C}$		280	360	mV
I_{OUT}	Output current		150			mA
I_{SC}	Short circuit current limit	$V_{OUT} = 0 \text{ V}$		130		mA
I_Q	Quiescent current	$I_{OUT} = 0 \text{ mA}$, $T_A = 25^{\circ}\text{C}$		0.5	0.9	μA
I_{STB}	Standby current	$V_{EN} = 0 \text{ V}$, $T_A = 25^{\circ}\text{C}$		0.1	0.5	μA
V_{ENH}	EN pin threshold voltage	EN input voltage "H"	1.0			V
V_{ENL}	EN pin threshold voltage	EN input voltage "L"			0.4	V
I_{EN}	EN pin current	$V_{EN} \leq V_{IN} \leq 5.5 \text{ V}$		10		nA
PSRR	Power supply rejection ratio	$f = 1 \text{ kHz}$, $V_{IN} = 2.8 \text{ V} +$ 200 mVpp modulation	$I_{OUT} = 150 \text{ mA}$	57		dB
			$I_{OUT} = 10 \text{ mA}$	63		dB
V_{NOISE}	Output noise voltage	$V_{IN} = 5.5 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $f = 100 \text{ Hz to } 1 \text{ MHz}$, $C_{OUT} = 1 \text{ }\mu\text{F}$		95		μVrms
R_{LOW}	Active output discharge resistance	$V_{IN} = 5.5 \text{ V}$, $V_{EN} = 0 \text{ V}$ (DIO7982A only)		100		Ω
T_{SD}	Thermal shutdown temperature	Temperature increasing from $T_A = 25^{\circ}\text{C}$		160		$^{\circ}\text{C}$
T_{SDH}	Thermal shutdown hysteresis	Temperature falling from T_{SD}		25		$^{\circ}\text{C}$
T_C	Output voltage temperature coefficient	$I_{OUT} = 1 \text{ mA}$		50		ppm/ $^{\circ}\text{C}$
t_{ON}	Turn ON time	$V_{IN} = 2.8 \text{ V}$, $C_{OUT} = 1 \text{ }\mu\text{F}$		770		μs
t_{OFF}	Turn OFF time	$V_{IN} = 2.8 \text{ V}$, $C_{OUT} = 1 \text{ }\mu\text{F}$		300		μs
$t_{\text{D(ON)}}$	Turn ON delay time	$V_{IN} = 2.8 \text{ V}$, $C_{OUT} = 1 \text{ }\mu\text{F}$		300		μs

Note:

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Electrical Characteristics – Voltage Version 2.8 V

$V_{IN} = 3.8 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $C_{IN} = C_{OUT} = 1.0 \mu\text{F}$, $-40^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$, typical values are at $T_A = 25^\circ\text{C}$, unless otherwise specified.

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_{IN}	Operating input voltage			1.8		5.5	V
V_{OUT}	Output voltage	$T_A = 25^\circ\text{C}$		2.772	2.8	2.828	V
Line_{Reg}	Line regulation	$4 \text{ V} < V_{IN} \leq 5.5 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $T_A = 25^\circ\text{C}$				6	mV
Load_{Reg}	Load regulation	$0 \text{ mA} < I_{OUT} \leq 150 \text{ mA}$, $V_{IN} = 4 \text{ V}$, $T_A = 25^\circ\text{C}$		-20	8	20	mV
Line_{Res}	Line transient response	V_{IN} step from 4 V to 5.5 V, $I_L = 10 \text{ mA}$			50		mV
Load_{Res}	Load transient response	$V_{IN} = 4 \text{ V}$, I_{OUT} step from 1 mA to 50 mA			120		mV
V_{DO}	Dropout voltage	$I_{OUT} = 150 \text{ mA}$, $T_A = 25^\circ\text{C}$			195	230	mV
I_{OUT}	Output current			150			mA
I_{SC}	Short circuit current limit	$V_{OUT} = 0 \text{ V}$			130		mA
I_Q	Quiescent current	$I_{OUT} = 0 \text{ mA}$, $T_A = 25^\circ\text{C}$			0.5	0.9	μA
I_{STB}	Standby current	$V_{EN} = 0 \text{ V}$, $T_A = 25^\circ\text{C}$			0.1	0.5	μA
V_{ENH}	EN pin threshold voltage	EN input voltage "H"		1.0			V
V_{ENL}	EN pin threshold voltage	EN input voltage "L"				0.4	V
I_{EN}	EN pin current	$V_{EN} \leq V_{IN} \leq 5.5 \text{ V}$			10		nA
PSRR	Power supply rejection ratio	$f = 1 \text{ kHz}$, $V_{IN} = 4 \text{ V} + 200 \text{ mV}_{PP}$ modulation	$I_{OUT} = 150 \text{ mA}$		54		dB
			$I_{OUT} = 10 \text{ mA}$		60		dB
V_{NOISE}	Output noise voltage	$V_{IN} = 5.5 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $f = 100 \text{ Hz to } 1 \text{ MHz}$, $C_{OUT} = 1 \mu\text{F}$			97		μV_{rms}
R_{LOW}	Active output discharge resistance	$V_{IN} = 5.5 \text{ V}$, $V_{EN} = 0 \text{ V}$ (DIO7982A)			100		Ω
T_{SD}	Thermal shutdown temperature	Temperature increasing from $T_A = 25^\circ\text{C}$			160		$^\circ\text{C}$
T_{SDH}	Thermal shutdown hysteresis	Temperature falling from T_{SD}			25		$^\circ\text{C}$
T_C	Output voltage temperature coefficient	$I_{OUT} = 1 \text{ mA}$			40		ppm/ $^\circ\text{C}$
t_{ON}	Turn ON time	$V_{IN} = 4 \text{ V}$, $C_{OUT} = 1 \mu\text{F}$			1300		μs
t_{OFF}	Turn OFF time	$V_{IN} = 4 \text{ V}$, $C_{OUT} = 1 \mu\text{F}$			300		μs
$t_{D(ON)}$	Turn ON delay time	$V_{IN} = 4 \text{ V}$, $C_{OUT} = 1 \mu\text{F}$			300		μs

Note:

(1) Specifications subject to change without notice.

Electrical Characteristics – Voltage Version 3.0 V

$V_{IN} = 4\text{ V}$, $I_{OUT} = 1\text{ mA}$, $C_{IN} = C_{OUT} = 1.0\text{ }\mu\text{F}$, $-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$, typical values are at $T_A = 25^{\circ}\text{C}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Operating input voltage		1.8		5.5	V
V_{OUT}	Output voltage	$T_A = 25^{\circ}\text{C}$	2.97	3.0	3.03	V
Line_{Reg}	Line regulation	$4\text{ V} < V_{IN} \leq 5.5\text{ V}$, $I_{OUT} = 1\text{ mA}$, $T_A = 25^{\circ}\text{C}$			6	mV
Load_{Reg}	Load regulation	$0\text{ mA} < I_{OUT} \leq 150\text{ mA}$, $V_{IN} = 4\text{ V}$, $T_A = 25^{\circ}\text{C}$	-20	8	20	mV
Line_{Res}	Line transient response	V_{IN} step from 4 V to 5.5 V, $I_L = 10\text{ mA}$		50		mV
Load_{Res}	Load transient response	$V_{IN} = 4\text{ V}$, I_{OUT} step from 1 mA to 50 mA		120		mV
V_{DO}	Dropout voltage	$I_{OUT} = 150\text{ mA}$, $T_A = 25^{\circ}\text{C}$		175	215	mV
I_{OUT}	Output current		150			mA
I_{SC}	Short circuit current limit	$V_{OUT} = 0\text{ V}$		130		mA
I_Q	Quiescent current	$I_{OUT} = 0\text{ mA}$, $T_A = 25^{\circ}\text{C}$		0.5	0.9	μA
I_{STB}	Standby current	$V_{EN} = 0\text{ V}$, $T_A = 25^{\circ}\text{C}$		0.1	0.5	μA
V_{ENH}	EN pin threshold voltage	EN input voltage "H"	1.0			V
V_{ENL}	EN pin threshold voltage	EN input voltage "L"			0.4	V
I_{EN}	EN pin current	$V_{\text{EN}} \leq V_{\text{IN}} \leq 5.5\text{ V}$		10		nA
PSRR	Power supply rejection ratio	$f = 1\text{ kHz}$, $V_{\text{IN}} = 4\text{ V} +$ 200 mV _{PP} modulation	$I_{OUT} = 150\text{ mA}$	54		dB
			$I_{OUT} = 10\text{ mA}$	60		dB
V_{NOISE}	Output noise voltage	$V_{\text{IN}} = 5.5\text{ V}$, $I_{OUT} = 1\text{ mA}$, $f = 100\text{ Hz to }1\text{ MHz}$, $C_{OUT} = 1\text{ }\mu\text{F}$		100		μV_{rms}
R_{LOW}	Active output discharge resistance	$V_{\text{IN}} = 5.5\text{ V}$, $V_{\text{EN}} = 0\text{ V}$ (DIO7982A)		100		Ω
T_{SD}	Thermal shutdown temperature	Temperature increasing from $T_A = 25^{\circ}\text{C}$		160		$^{\circ}\text{C}$
T_{SDH}	Thermal shutdown hysteresis	Temperature falling from T_{SD}		25		$^{\circ}\text{C}$
T_C	Output voltage temperature coefficient	$I_{OUT} = 1\text{ mA}$		40		ppm/ $^{\circ}\text{C}$
t_{ON}	Turn ON time	$V_{\text{IN}} = 4\text{ V}$, $C_{OUT} = 1\text{ }\mu\text{F}$		1400		μs
t_{OFF}	Turn OFF time	$V_{\text{IN}} = 4\text{ V}$, $C_{OUT} = 1\text{ }\mu\text{F}$		300		μs
$t_{\text{D(ON)}}$	Turn ON delay time	$V_{\text{IN}} = 4\text{ V}$, $C_{OUT} = 1\text{ }\mu\text{F}$		300		μs

Note:

(1) Specifications subject to change without notice.

Electrical Characteristics – Voltage Version 3.3 V

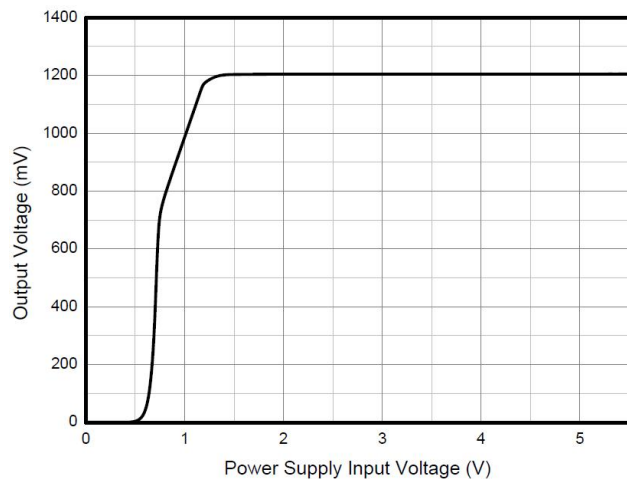
$V_{IN} = 4.3 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $C_{IN} = C_{OUT} = 1.0 \text{ } \mu\text{F}$, $-40^{\circ}\text{C} \leq T_A \leq 85^{\circ}\text{C}$, typical values are at $T_A = 25^{\circ}\text{C}$, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Operating input voltage		1.8		5.5	V
V_{OUT}	Output voltage	$T_A = 25^{\circ}\text{C}$	3.267	3.3	3.333	V
Line_{Reg}	Line regulation	$4.3 \text{ V} < V_{IN} \leq 5.5 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $T_A = 25^{\circ}\text{C}$			6	mV
Load_{Reg}	Load regulation	$0 \text{ mA} < I_{OUT} \leq 150 \text{ mA}$, $V_{IN} = 4.3 \text{ V}$, $T_A = 25^{\circ}\text{C}$	-20	8	20	mV
Line_{Res}	Line transient response	V_{IN} step from 4.3 V to 5.5 V, $I_L = 10 \text{ mA}$		50		mV
Load_{Res}	Load transient response	$V_{IN} = 4.3 \text{ V}$, I_{OUT} step from 1 mA to 50 mA		150		mV
V_{DO}	Dropout voltage	$I_{OUT} = 150 \text{ mA}$, $T_A = 25^{\circ}\text{C}$		170	205	mV
I_{OUT}	Output current		150			mA
I_{SC}	Short circuit current limit	$V_{OUT} = 0 \text{ V}$		130		mA
I_Q	Quiescent current	$I_{OUT} = 0 \text{ mA}$, $T_A = 25^{\circ}\text{C}$		0.5	0.9	μA
I_{STB}	Standby current	$V_{EN} = 0 \text{ V}$, $T_A = 25^{\circ}\text{C}$		0.1	0.5	μA
V_{ENH}	EN pin threshold voltage	EN input voltage "H"	1.0			V
V_{ENL}	EN pin threshold voltage	EN input voltage "L"			0.4	V
I_{EN}	EN pin current	$V_{EN} \leq V_{IN} \leq 5.5 \text{ V}$		10		nA
PSRR	Power supply rejection ratio	$f = 1 \text{ kHz}$, $V_{IN} = 4.3 \text{ V} +$ 200 mV _{PP} modulation	$I_{OUT} = 150 \text{ mA}$	54		dB
			$I_{OUT} = 10 \text{ mA}$	60		dB
V_{NOISE}	Output noise voltage	$V_{IN} = 5.5 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $f = 100 \text{ Hz to } 1 \text{ MHz}$, $C_{OUT} = 1 \text{ } \mu\text{F}$		125		μVrms
R_{LOW}	Active output discharge resistance	$V_{IN} = 5.5 \text{ V}$, $V_{EN} = 0 \text{ V}$ (DIO7982A)		100		Ω
T_{SD}	Thermal shutdown temperature	Temperature increasing from $T_A = 25^{\circ}\text{C}$		160		$^{\circ}\text{C}$
T_{SDH}	Thermal shutdown hysteresis	Temperature falling from T_{SD}		25		$^{\circ}\text{C}$
T_C	Output voltage temperature coefficient	$I_{OUT} = 1 \text{ mA}$		35		ppm/ $^{\circ}\text{C}$
t_{ON}	Turn ON time	$V_{IN} = 4.3 \text{ V}$, $C_{OUT} = 1 \text{ } \mu\text{F}$		1600		μs
t_{OFF}	Turn OFF time	$V_{IN} = 4.3 \text{ V}$, $C_{OUT} = 1 \text{ } \mu\text{F}$		300		μs
$t_{\text{D(ON)}}$	Turn ON delay time	$V_{IN} = 4.3 \text{ V}$, $C_{OUT} = 1 \text{ } \mu\text{F}$		300		μs

Note:

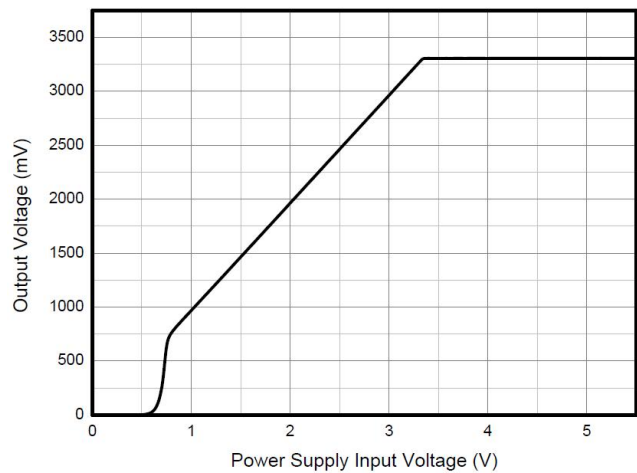
(1) Specifications subject to change without notice.

Typical Performance Characteristics



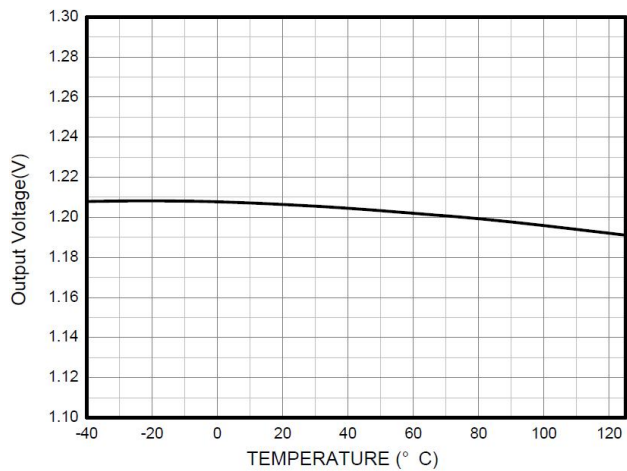
$C_{IN} = C_{OUT} = 1 \mu F$, $I_{OUT} = 1 \text{ mA}$, $V_{OUT} = 1.2 \text{ V}$

Figure 2. Output voltage vs. Input voltage



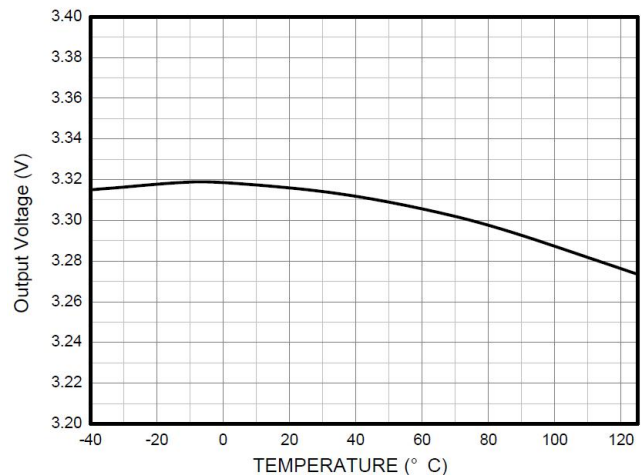
$C_{IN} = C_{OUT} = 1 \mu F$, $I_{OUT} = 1 \text{ mA}$, $V_{OUT} = 3.3 \text{ V}$

Figure 3. Output voltage vs. Input voltage



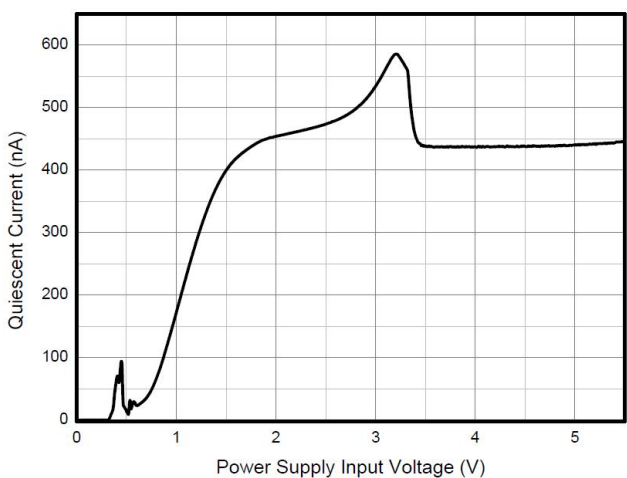
$C_{IN} = C_{OUT} = 1 \mu F$, $I_{OUT} = 1 \text{ mA}$, $V_{OUT} = 1.2 \text{ V}$

Figure 4. Output voltage vs. Temperature



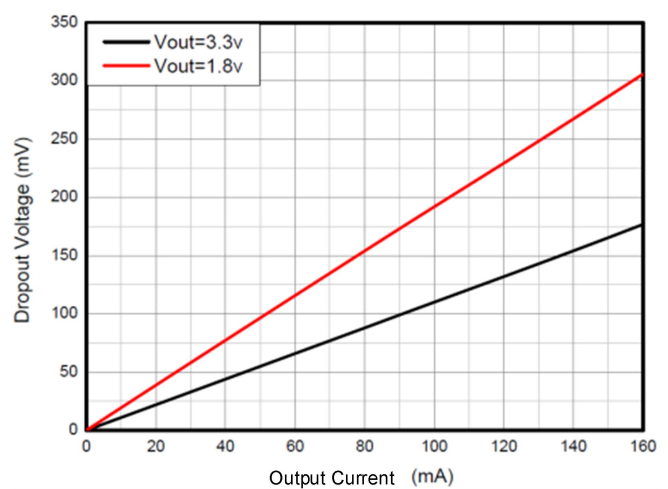
$C_{IN} = C_{OUT} = 1 \mu F$, $I_{OUT} = 1 \text{ mA}$, $V_{OUT} = 3.3 \text{ V}$

Figure 5. Output voltage vs. Temperature



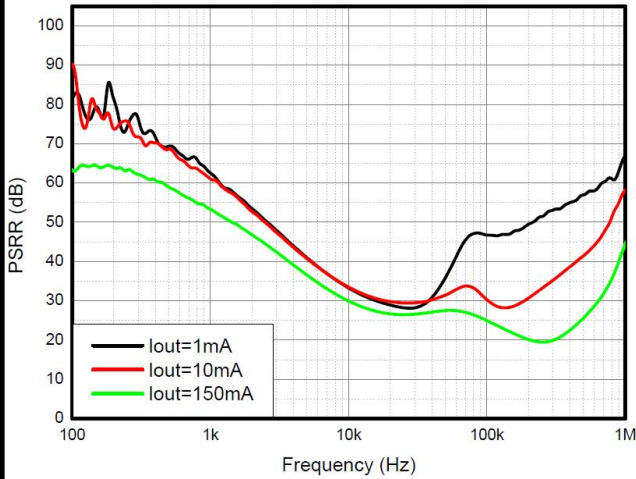
$C_{IN} = C_{OUT} = 1 \mu F$, $I_{OUT} = 0$, $V_{OUT} = 3.3 \text{ V}$

Figure 6. Quiescent current vs. Input voltage



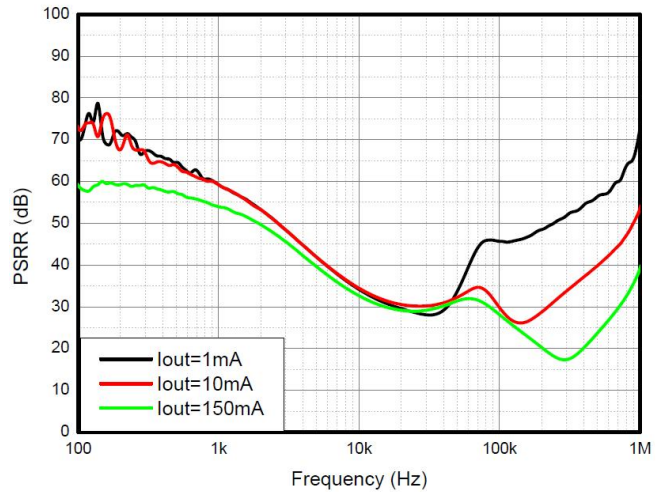
$C_{IN} = C_{OUT} = 1 \mu F$

Figure 7. Dropout voltage vs. Output current



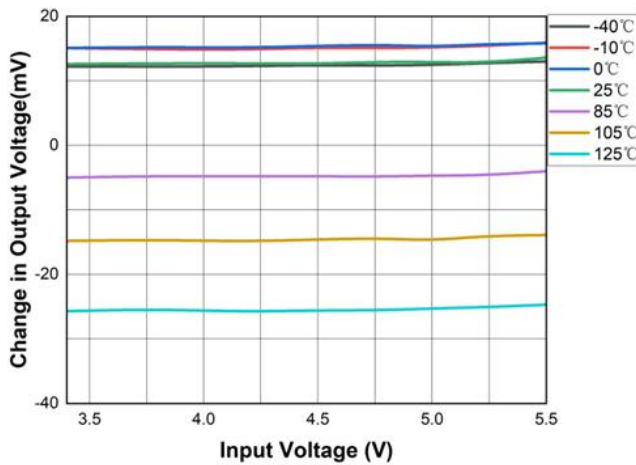
$C_{OUT} = 1 \mu F$, $V_{IN} = 2.5 V + 200 mV_{pp}$, $V_{OUT} = 1.2 V$

Figure 8. PSRR vs. Frequency



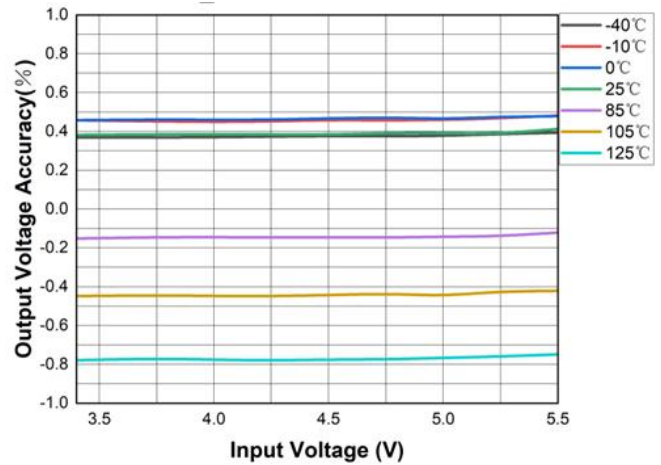
$C_{OUT} = 1 \mu F$, $V_{IN} = 4.3 V + 200 mV_{pp}$, $V_{OUT} = 3.3 V$

Figure 9. PSRR vs. Frequency



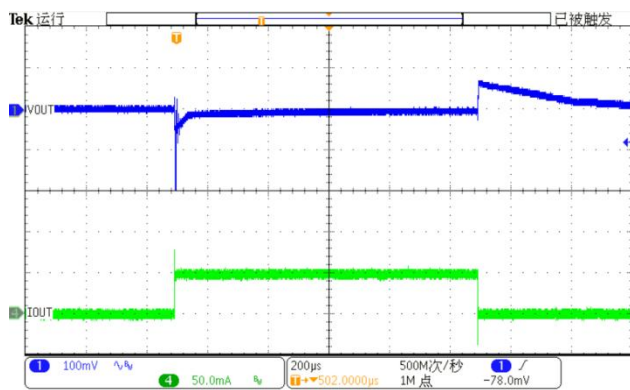
$V_{OUT} = 3.3 V$, $I_{OUT} = 1 mA$

Figure 10. Line regulation vs. V_{IN} and Temperature



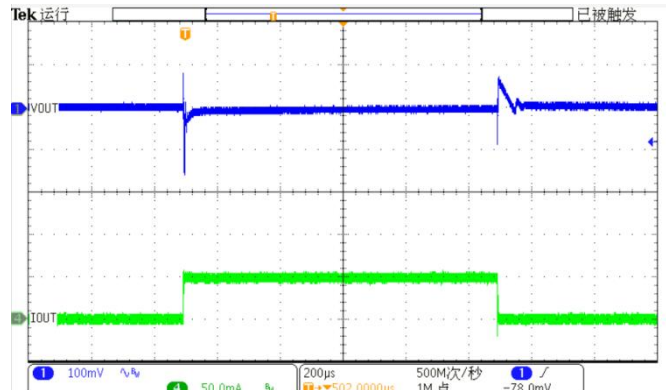
$V_{OUT} = 3.3 V$, $I_{OUT} = 1 mA$

Figure 11. Output accuracy vs. V_{IN} and Temperature



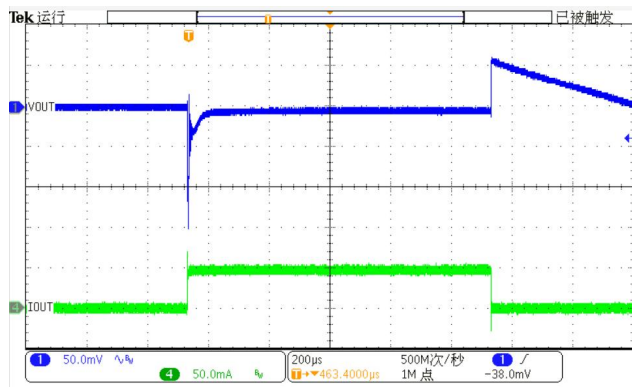
$V_{IN} = 5.5 V$, $V_{OUT} = 3.3 V$, $C_{IN} = C_{OUT} = 1 \mu F$

Figure 12. Load transient response at load step from 0.1 mA to 50 mA, $V_{OUT} = 3.3 V$



$V_{IN} = 5.5 V$, $V_{OUT} = 3.3 V$, $C_{IN} = C_{OUT} = 1 \mu F$

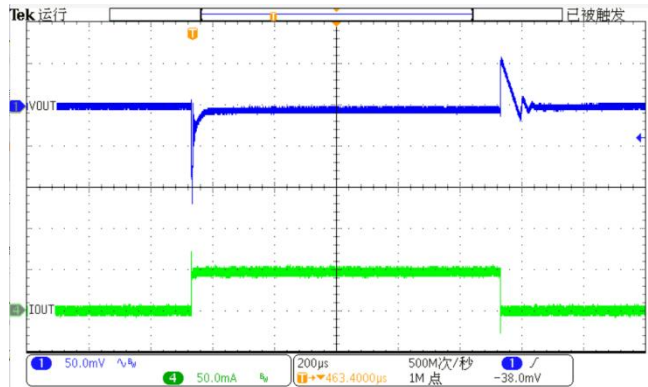
Figure 13. Load transient response at load step from 1 mA to 50 mA, $V_{OUT} = 3.3 V$



$V_{IN} = 5.5 \text{ V}$, $V_{OUT} = 1.2 \text{ V}$, $C_{IN} = C_{OUT} = 1 \mu\text{F}$

Figure 14. Load transient response at load

Step from 0.1 mA to 50 mA, $V_{OUT} = 1.2 \text{ V}$

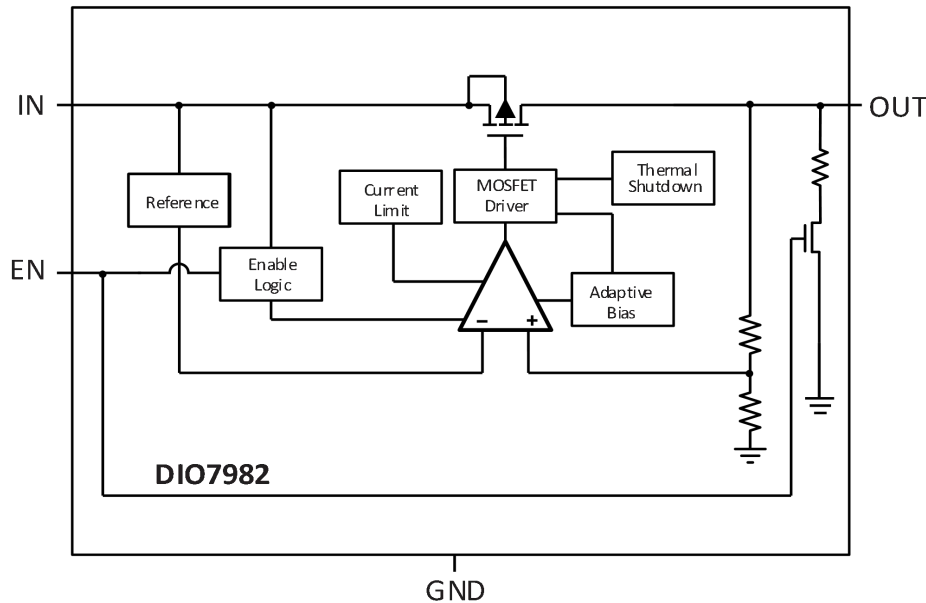


$V_{IN} = 5.5 \text{ V}$, $V_{OUT} = 1.2 \text{ V}$, $C_{IN} = C_{OUT} = 1 \mu\text{F}$

Figure 15. Load transient response at load

Step from 1 mA to 50 mA, $V_{OUT} = 1.2 \text{ V}$

Block Diagram



Applications Information

The DIO7982 is a high-performance 150 mA linear regulator with an ultra-low quiescent current. This device delivers low noise and high power supply rejection ratio with excellent dynamic performance due to employing the dynamic quiescent current adjustment, which assures ultra-low quiescent current consumption at a no-load state. These parameters make this device very suitable for various battery-powered applications.

Input Decoupling (C_{IN})

It is recommended to connect at least a 1 μ F ceramic X5R or X7R capacitor between IN and GND pins of the device. This capacitor will provide a low impedance path for any unwanted AC signals or noise superimposed onto constant input voltage. A good input capacitor will limit the influence of input trace inductance and source resistance during sudden load current changes.

Higher capacitance and lower ESR capacitors will improve the overall line transient response.

Output Decoupling (C_{OUT})

The DIO7982 does not require a minimum Equivalent Series Resistance (ESR) for the output capacitor. The device is designed to be stable with standard ceramics capacitors with values of 1.0 μ F to 10 μ F. The X5R and X7R types have the lowest capacitance variations over temperature thus they are recommended. Connect the output capacitor as close as possible to the output pin of the regulator.

Enable Operation

The DIO7982A uses the EN pin to enable/disable its device and to activate/deactivate the active discharge function at devices with this feature. If the EN pin voltage is pulled below 0.4 V the device is guaranteed to be disabled. The active discharge transistor at the devices with an active discharge feature is activated and the output voltage V_{OUT} is pulled to GND through an internal circuitry with an effective resistance of about 100 Ω .

If the EN pin voltage is higher than 1.0 V, the device is guaranteed to be enabled. The internal active discharge circuitry is switched off and the desired output voltage is available at the output pin. When the enable function is not required, the EN pin should be connected directly to the input pin.

Thermal Shutdown

When the die temperature exceeds the thermal shutdown point ($T_{SD} = 160^{\circ}\text{C}$ typical), the device goes to the disabled state and the output voltage is not delivered until the die temperature decrease to 135°C . The thermal shutdown feature protects from a catastrophic device failure at accidental overheating. This protection is not intended to be used as a substitute for proper heat sinking.

Power Dissipation and Heat Sinking

The maximum power dissipation supported by the device is dependent upon board design and layout. Mounting pad configuration on the PCB, the board material, and the ambient temperature affect the rate of junction temperature rise for the part. The maximum power dissipation the DIO7982 device can handle is given by Equation (1).

$$P_{D(MAX)} = \frac{[T_{J(MAX)} - T_A]}{R_{\theta JA}} \quad (1)$$

The power dissipated by the DIO7982 device for given application conditions can be calculated from the Equation (2) and Equation (3).

$$P_D \approx V_{IN} \times I_{GND} + I_{OUT} \times (V_{IN} - V_{OUT}) \quad (2)$$

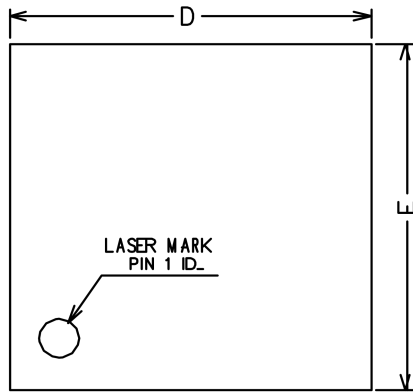
Or

$$V_{IN(MAX)} \approx \frac{P_{D(MAX)} + (V_{OUT} \times I_{OUT})}{I_{OUT} + I_{GND}} \quad (3)$$

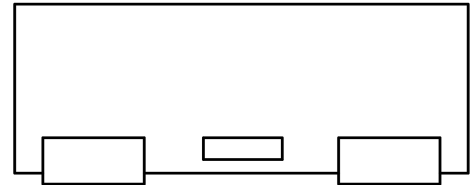
Hints

IN and GND printed circuit board traces should be as wide as possible. When the impedance of these traces is high, there is a chance to pick up noise or cause the regulator to malfunction. Place external components, especially the output capacitor, as close as possible to the DIO7982, and make traces as short as possible.

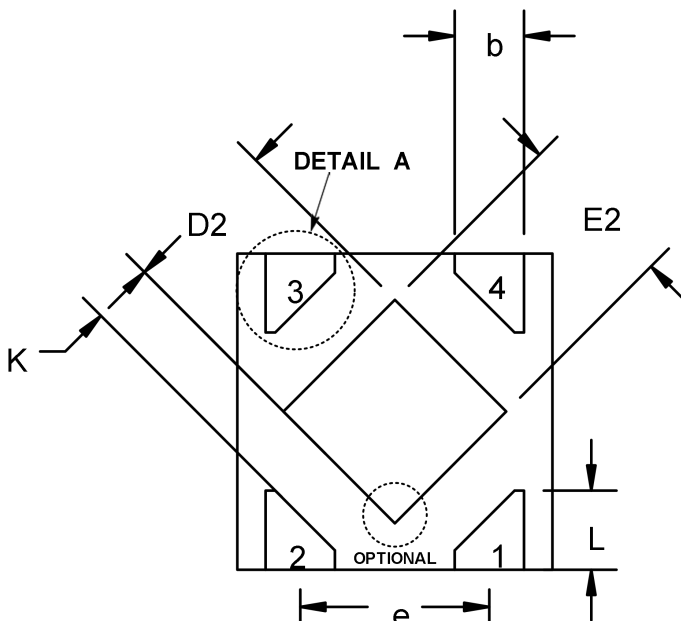
Physical Dimensions: DFN1*1-4



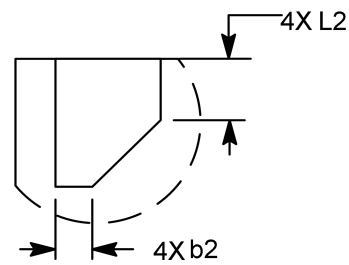
TOP VIEW



SIDE VIEW

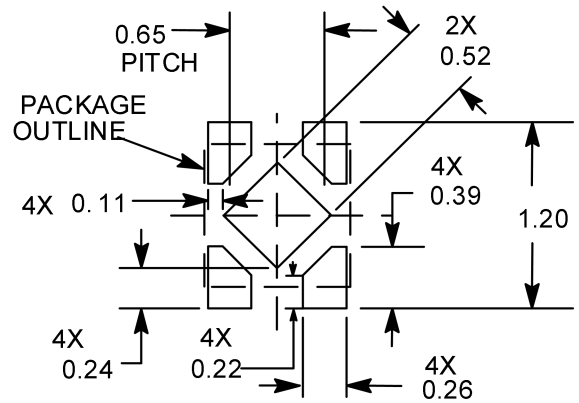
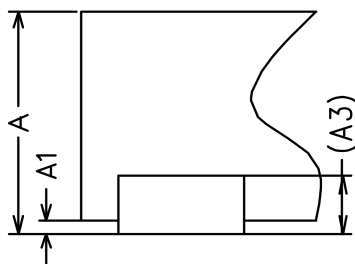
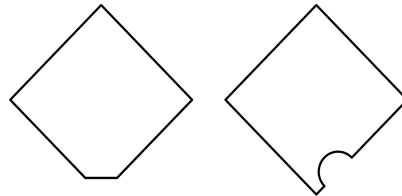


BOTTOM VIEW



DETAIL A

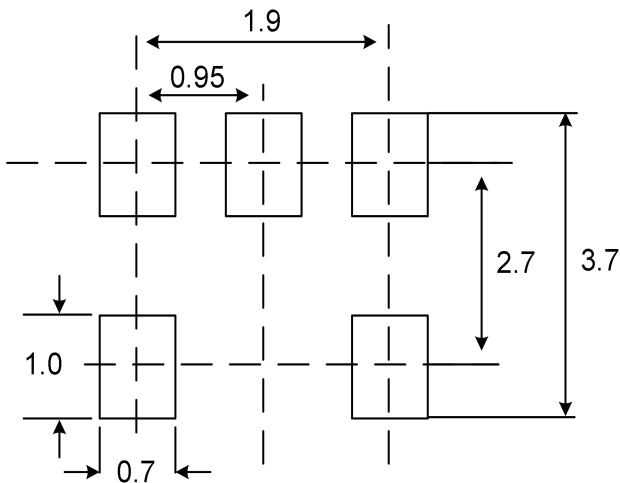
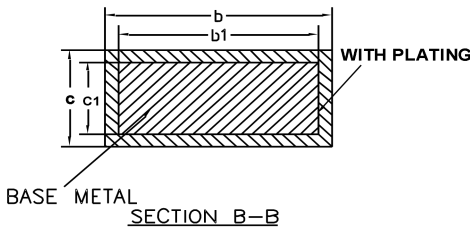
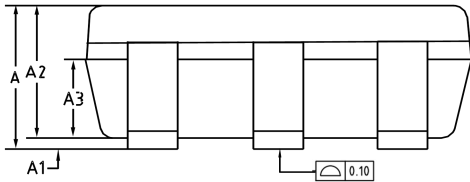
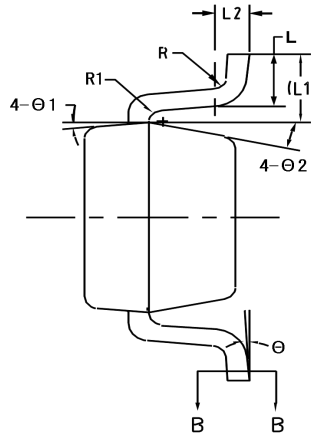
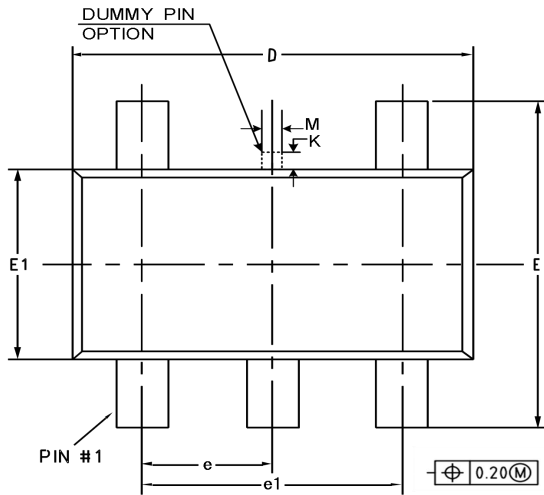
Two options:



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

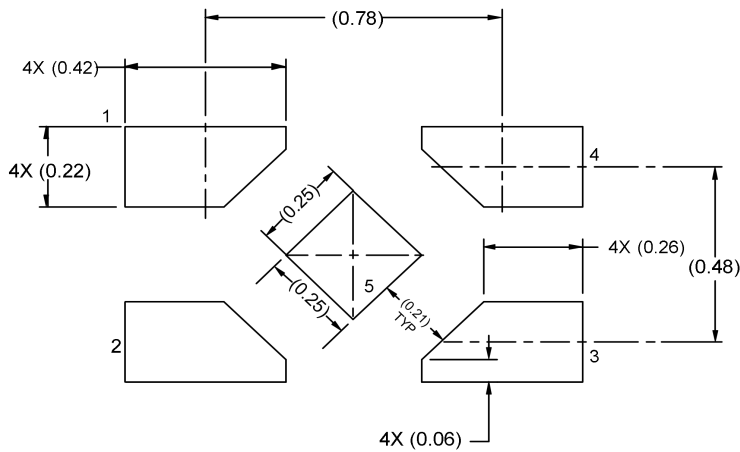
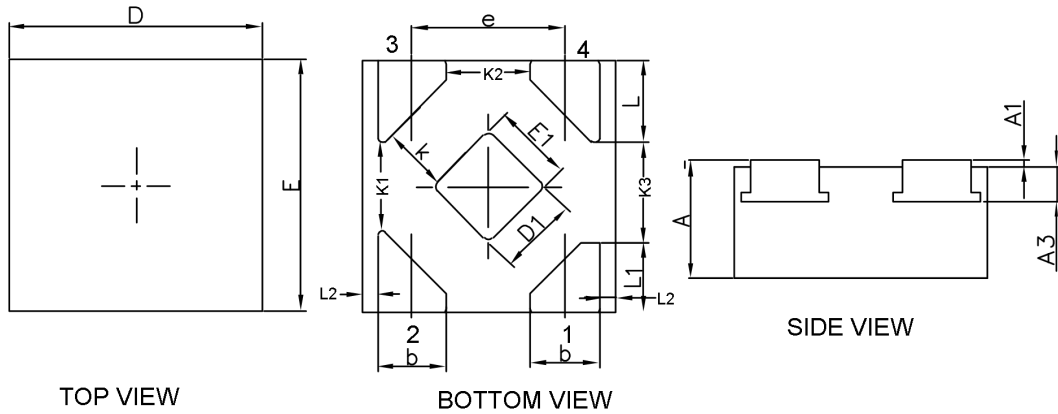
Physical Dimensions: SOT23-5



RECOMMENDED LAND PATTERN

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°

Physical Dimensions: DFN0.8*0.8-4



RECOMMENDED LAND PATTERN (Unit: mm)

Common Dimensions (Units of measure = Millimeter)			
Symbol	Min	Nom	Max
A	0.320	0.375	0.400
A1	0.000	0.020	0.050
A3	0.110 REF		
D	0.750	0.800	0.850
E	0.750	0.800	0.850
D1	0.200	0.250	0.300
E1	0.200	0.250	0.300
K	0.210 TYP		
K1	0.270 TYP		
K2	0.260 TYP		
K3	0.315 TYP		
b	0.170	0.220	0.270
e	0.480 TYP		
L	0.210	0.265	0.320
L1	0.170	0.220	0.270
L2	0.050 TYP		



DIO7982

Ultra-Low Quiescent Current, 150 mA CMOS LDO Regulator

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.